

Rototherm Certificates of Calibration *Traceability and Quality System*

Explanation of how Rototherm, or any company operating ISO 9001:2008, ensures that quality calibration work is performed and the provision of the required certificates to confirm this.

Rototherm **calibrates** an instrument (thermometer data logger pressure gauge etc.) by **adhering to Rototherm's ISO 9001:2008 Quality Management System** and by **using test equipment which provides traceability to international standards (INAB/UKAS/DKD etc.)**
Refer to attached copy Certificate of Calibration from Rototherm

Sample certificates attached, refer to the following calibration, the numbers on the explanation below are marked on the relevant parts of the Certificates.

Instrument Serial No	D11223344
Rototherm Certificate No	18025
Certificate of Calibration For Reference Equipment	21-01-12
Rototherm ISO Registration No.	3092

1 The calibration is performed adhering to Rototherm's **ISO 9001:2008** Quality System Standard Operating Procedures which is evidenced by Rototherm's current ISO Certificate which states that Calibration is within the scope of our ISO9001:2008 Quality System (Note This ISO Certificate is issued by EQA whose systems are certified to ISO 17021)
Refer attached copy of Rototherm current ISO9001:2008 Certificate

2 The **Traceability** of the calibration is stated on the Certificate of Calibration and evidenced by a copy of the relevant Certificate of Calibration for the test equipment from an external laboratory which is accredited to ISO 17025 by UKAS·INAB·DKD etc.
Refer attached copy of UKAS Certificate of Calibration for Test Equipment used on above calibration and Copy of Schedule of Calibration showing that this Laboratory is accredited to ISO/IEC 17025:2005

UKAS laboratories are not required to show specific proof of the traceability of their measurements. This is certified by their Laboratory Number which is shown on their Certificates of Calibration. The laboratory's status may be confirmed by accessing <http://www.ukas.org/calibration/labsearch.asp> and inserting the laboratory number in the search field. This brings up the laboratory details which is confirmation that the laboratory is within it's accreditation. By clicking on the laboratory name the Schedule of Accreditation can be accessed , this shows all of the different calibration types/ranges for which this laboratory is accredited.

Glossary

Accuracy : is the accuracy specified by the manufacturer in the specification of the thermometer. The accuracy required for the food industry is +0.5°C.

Certificate of Calibration : This gives a snap shot of the performance of the thermometer and/or probe at a particular point in time.

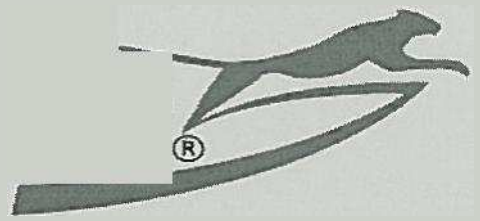
Resolution : Refers to how the thermometer can be read — either as whole numbers only e.g. 5°C or with a decimal point e.g. 5.1°C

ISO9001:2008 : Quality Management System used as a way of managing a business organization to ensure quality and consistency of product and service.

ISO 17021 is a standard used by Accreditation Bodies for accrediting Certification Bodies who certify organizations against Quality Management Systems standards (usually ISO 9001 and ISO 14001)

ISO/IEC 17025:2005 is a quality system standard for calibration laboratories which is the basis for accreditation from Accreditation Bodies such as INAB;UKAS;DKD etc.

Rototherm



the temperature experts

Unit C2 Clonlara Ave, Baldonnell Business Park, Dublin 22. T 01-466 0260 F 01-4660285 E sales@rototherm.ie

CERTIFICATE OF CALIBRATION

The readings obtained by the Test Equipment referred to on this certificate are traceable to National Standards.

P.Heenan

D.Brooks

T.Gilner

Customer John Smith Ltd.
123 Fake Avenue
Smithstown Business Park

Instrument Certificate Number : **18025**
Description : Therma 20 Thermometer & Probe
Manufacturer : ETI Ltd
Serial Number : **D11223344**

Environmental Conditions

Temperature : 22°C ± 3°C

Relative Humidity : 50%RH ± 20%RH

Comments

Instrument placed in the laboratory and allowed to stabilise before calibration.
Calibrated in constant temperature baths by comparison with certified equipment.

Traceability Information

Instrument Description

Serial Number

Certificate Number

Fluke Ref.Thermometer & Probe

311430-1 9764110 & 311430-1

21-01-12

2

Calibration Results

Applied Temp

Indicated Temp

100.0°C

100.2°C

70.0°C

70.0°C

0.0°C

0.1°C

-18.0°C

-18.2°C

This Certificate is issued in accordance with our Quality Management System which is certified to ISO 9001:2008

Signature: _____

Date of Calibration: **22 March 2012**

Authorised Signatory

1



Certificate of Registration of Quality System to IS.EN.ISO 9001:2008

EQA (Ireland) Limited certifies that

Rototherm Ltd.

Unit C2, Baldonnell Business Units
Baldonnell Business Park
Naas Road
Dublin 22

has been assessed and is in compliance with the provisions of the above standard in respect of the scope of operations listed below and is hereby included in the EQA directory of certificated organisations.

1

Supply, Calibration and Repair of Thermometer Pressure Gauges and Industrial Instruments. Manufacture of Thermodials. Supply and Installation of Temperature Monitoring Systems, Data Loggers and Temperature Mapping for the Pharmaceutical Healthcare and Food Industries

Signed

DIRECTOR

DATE: 2nd February 2011

on behalf EQA (Ireland) Limited

This Certificate of Registration Number **3092** was first issued on At^{er} February 2005

is valid until **26th January 2014**

and is issued subject to the regulations, and within the accredited scope, of

EQA(Ireland) Limited
15 Greenmount Office
Park, Harolds Cross,
Dublin 6w,
Ireland.



CERTIFICATE OF CALIBRATION

ISSUED BY: Calibration Services.

DATE OF ISSUE: 25th January, 2012.

CERTIFICATE NO: 21-01-12.

Approved Signatory
Name: MAT FENWICKSignature: **CALSERV**

Calibration Services (Calserv) Ltd, Ty Isaf, Frongoch, Bala, Gwynedd, LL23 7NU, United Kingdom.

Telephone. +44 (0) 1678 521567

Internet: <http://www.calserv.co.uk>Email: infori@calserv.co.uk

0794

**CUSTOMER:** Rototherm Ltd, Unit C2, Clonlara Avenue, Baldonnell Business Park, Naas Road, Dublin, Co. Dublin, DUBLIN 22, Ireland.**CUSTOMER 0/NO:** POR002463. **CALSERV JOB NO:** 3033.**DESCRIPTION:** A Fluke 1524 Digital Temperature Indicator and an Isotech 935-14-98 Platinum Resistance Thermometer.**Range:** From -35°C to +150°C at 6 points. **Temperature Scale:** ITS-90.**Serial No:** Indicator: Fluke 1524: 9764110.
Channel T2: Isotech 935-14-98: 311430-1.**Nominal Sensor Length:** 300mm. **Diameter:** 4mm.**Immersion:** 285mm. 4- **Sheath:** Metal.**Lead Material:** Wire/PTFE. **Lead Length:** 2000mm.**Ambient Temp:** 20°C ± 2°C. 11th **Date Received:** 10th January, 2012.**Date Calibration Started:** January, 2012. **Date Calibration Completed:** 23rd January, 2012.**CALIBRATION METHOD:**

The submitted platinum resistance thermometer and indicator were calibrated as a system by comparison with Semi-Standard and Standard Platinum Resistance Thermometers in a range of Stirred Liquid Baths from -35°C to +150°C (except for 0°C). An Izero Ice Bath was used for the 0°C calibration point. Repeat calibration points were made to help determine the stability of the instruments and estimate the uncertainty of the calibration. A 12Vdc power supply was connected throughout the calibration, apart from when indicated otherwise.

All measurements are traceable to recognised National Standards.

CERTIFICATE OF CALIBRATION

Description: A Fluke 1524 Digital Temperature Indicator and an Isotech 935-14-98 PRT.
 Serial No: Indicator: Fluke 1524: 9764110 & Channel T2: Isotech 935-14
 98: 311430-1.

UKAS Accredited Calibration Laboratory No. 0794

Calibration Services (Calserv) Ltd, Ty Isaf, Frongoch, Bala, Gwynedd, LL23 7NU.

Telephone. +44 (0) 1678 521567 Fax. +44 (0) 8700 510010

CERTIFICATE NO.

21-01-12.

Page 2 of 3


Results.

Table 1 shows the temperature that was established, the mean resistance displayed by the indicator in the 'As Found' condition, and the estimated uncertainty of the calibration. These results were used to derive coefficients for the 'Reprogrammed' calibration.

Table 1 - 'As Found' Values.

Indicator: Fluke 1524: 9764110 & Channel T2: Isotech 935-14-98: 311430-1.

Established Temperature	Mean Resistance	Uncertainty
A °C	n	± OC
-0.001	99.9987	0.010
149.984	157.3542	0.030
-35.001	86.2256	0.015
-17.936	92.9586	0.010
70.012	127.0991	0.020
99.991	138.5270	0.020
-0.002	99.9973	0.010

Table 2 shows the temperature that was established, the temperature displayed by the indicator, with the error, the mean resistance displayed by the indicator in the 'Reprogrammed' condition, and the estimated uncertainty of the calibration.

Table 2 - 'Reprogrammed' Values.

Indicator: Fluke 1524: 9764110 & Channel T2: Isotech 935-14-98: 311430-1.

Established Temperature	Indicated Temperature	Error	Mean Resistance	Uncertainty
A °C	B °C	(B-A) °C	11	± °C
-0.002	-0.003	-0.001	99.9962	0.010
-0.002	* 0.001	+0.003	99.9979	0.010
149.959	149.948	-0.011	157.3408	0.030
149.961	* 149.974	+0.013	157.3502	0.030
-34.992	-34.987	+0.005	86.2310	0.015
-34.991	* -34.987	+0.004	86.2314	0.015
-17.946	-17.943	+0.003	92.9562	0.010
70.021	70.024	+0.003	127.1027	0.020
100.000	100.007	+0.007	138.5329	0.020
-0.002	-0.002	+0.000	99.9966	0.010
-0.002	* 0.003	+0.005	99.9987	0.010

* Indicates readings taken when the Fluke 1524 was running from its internal battery power

CERTIFICATE OF CALIBRATION

Description: A Fluke 1524 Digital Temperature Indicator and an Isotech 935-14-98 PRT.
Serial No: Indicator: Fluke 1524: 9764110 & Channel T2: Isotech 935-14
 98: 311430-1.
 UKAS Accredited Calibration Laboratory No. 0794
 Calibration Services (Calserv) Ltd, Ty Isaf, Frongoch, Bala, Gwynedd, LL23 7NU.
 Telephone. +44 (0) 1678 521567 Fax. +44 (0) 8700 510010

CERTIFICATE NO.

21-01-12.

Page 3 of 3


Notes:

The error values shown apply to the indicated values shown by the Fluke 1524's display. Care should be taken as to how these are applied.

It is the user's responsibility to determine the long term drift and the uncertainty under the conditions of use.

- 3 The results are quoted to a given number of significant figures to facilitate interpolation by the user of the calibration and do not claim a corresponding accuracy.
- 4 The measurement uncertainty stated includes the instrument resolution and the observed performance of the units under test during the calibration.
- 5 The reported uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The Hart 1524 Channel T2 'As Found' and 'Reprogrammed' stored data was as follows:

Probe T2 Settings:

Probe: PRT ITS90
 BaseX: 0.000°C
 Aux Disp: None
 Temp Res: 3
 Serial#: 849650
 Cal Date: 2011/02/01
 RTPW: 1.000470000e+02 -
 A: 9.82547320000e-04 -
 B: 9.99980970000e-05
 C: 0.000000000000e+00
 D A4: 0.000000000000e+00
 B4: -9.3474815000e-04 -
 MINOP: 3.5235426000e-05 -
 MAXOP: 200
 : 420

Reprogrammed:

Serial#: 3114301
 Cal Date: 2012/01/23
 RTPW: 1.000013000e+02
 A: -1.953696424e-02
 B: +2.746659739e-04
 C: 0.000000000000e+00
 D: 0.000000000000e+00
 A4: -1.921980394e-02
 B4: -2.909749039e-04
 MINOP: -75
 MAXOP: 155

Instrument Settings:

Date: 2000/10/21
Time: 06:14:41

Date: 2012/01/04
 Time: 15:40:00

Date: Please note that the date format used is YYYY/MM/DD

The 'As Found' setting was reset to GMT using the Laboratory's reference clock which is controlled from the MSF time signal.

End of the Certificate.

Schedule of Accreditation

2

issued by

United Kingdom Accreditation Service

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK



0794

Accredited to
ISO/IEC 17025:2005

Calibration Services (Calserv) Limited

Issue No: 029 Issue date: 11 March 2011

Ty Isaf
Frongoch, Bala
Gwynedd
Wales
LL23 7NU

Contact: Miss Alison Ayres
Tel: +44 (0)1678 521567 Fax:
+44 (0)870 051 0010
E-Mail: info@calserv.co.uk
Website: www.calserv.co.uk

Calibration performed by the Organisations at the locations specified below

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details	Activity	Location code
Address Ty Isaf Frongoch, Bala Gwynedd Wales LL23 7NU Local contact Miss Alison Ayres Tel: +44 (0)1678 521567 Fax: +44 (0)870 051 0010 Email: info@calserv.co.uk	Temperature, relative humidity, electrical and time interval calibration	Lab

Site activities performed away from the locations listed above:

Location details	Activity	Location code
The customers' site or premises must be suitable for the nature of the particular calibrations undertaken and will be the subject of contract review arrangements between the laboratory and the customer.	Temperature chamber calibration	Site



0794
Accredited to
ISO/IEC 17025:2005

Schedule of Accreditation
issued by
United Kingdom Accreditation Service
21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

Calibration Services (Calserv) Limited
Issue No: 029 **Issue date:** 11 March 2011

Calibration performed by the Organisation at the locations specified

DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ($k = 2$)	Remarks	Location Code
TEMPERATURE				Lab
Platinum resistance thermometers				
Calibration at fixed points				
TP Mercury	- 38.8344 °C	3.0 mK	Note: TP = Triple Point FP = Freezing Point MP = Melting Point	
TP Water	0.01 °C	1.6 mK		
MP Gallium	29.7646 °C	3.0 mK		
FP Indium	156.5985 °C	5.0 mK		
FP Tin	231.928 °C	6.0 mK		
FP Zinc	419.527 °C	10 mK		
FP Aluminium	660.323 °C	16 mK		
Calibration by comparison	- 196 °C - 90 °C to 0 °C 0 °C 0 °C to 250 °C 250 °C to 300 °C 300 °C to 420 °C 420 °C to 660 °C	0.0070 °C 0.0070 °C 0.0050 0.010 °C 0.015 °C 0.020 °C 0.035 °C		
Thermistors	- 90 °C to 0 °C 0 °C 0 °C to 250 °C	0.0070 °C 0.0050 °C 0.010 °C		
Thermocouples - base metal	- 196 °C - 90 °C to 0 °C 0 °C to 40 °C 40 °C to 80 °C 80 °C to 350 °C 350 °C to 420 °C 420 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1300 °C	0.20 °C 0.15 °C 0.10 °C 0.15 °C 0.20 °C 0.30 °C 0.40 °C 0.70 °C 2.1 °C		
Thermocouples - noble metal	0 °C to 280 °C 280 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1300 °C	0.50 °C 0.45 °C 0.70 °C 2.1 °C		
Electronic thermometers, data loggers and transmitters with sensors	Range as for sensor type	♀ QI 悉U醋F 市 椒.. type	Including instruments with electrical outputs	
Calibration of temperature loggers and probes in an air chamber	5 °C to 10 °C 10 °C to 50 °C	0.35 °C 0.22 °C	Including temperature probes built in to humidity instruments.	



0794
Accredited to
ISO/IEC 17025:2005

Schedule of Accreditation
issued by
United Kingdom Accreditation Service
21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

Calibration Services (Calserv) Limited
Issue No: 029 **Issue date:** 11 March 2011

Calibration performed by the Organisation at the locations specified

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ($k = 2$)	Remarks	Location Code
TEMPERATURE (cont'd)				
Calibration of temperature loggers and probes in an air chamber suitable for multiple instruments	- 40 °C to 0 °C 0 °C to 60 °C 60 °C to 130 °C	0.70 °C 0.50 °C 1.0 °C	Including temperature probes built in to humidity instruments.	
Metal block calibrators and portable liquid baths	0 °C - 95 °C to - 50 °C - 50 °C to + 250 °C 250 °C to 300 °C 250 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1300 °C	0.015 °C 0.045 °C 0.025 °C 0.045 °C 0.10 °C 1.0 °C 2.4 °C	For zero reference baths	
Averaging thermometers and other instruments with large temperature probes				
Straight probes up to 2 m	5 °C to 50 °C	0.023 °C	Calibration at uniform temperatures in a stirred liquid bath	
Probes which can be coiled	- 20 °C to + 50 °C	0.060 °C		
Temperature controlled baths, fridges, freezers, ovens, furnaces and environmental chambers, inclusive of controllers and displays	- 200 °C to + 250 °C 250 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1300 °C	0.55 °C 1.0 °C 1.4 3.6 °C	Single or multiple point measurements	Site
HUMIDITY				
Relative humidity instruments	5 °C to 10 °C 10 %rh to 90 %rh 10 °C to 15 °C 5 %rh to 50 %rh 10 °C to 15 °C 50 %rh to 95 %rh 15 °C to 30 °C 5 %rh to 95 %rh 30 °C to 40 °C 5 %rh to 95 %rh 40 °C to 50 °C 5 %rh to 90 %rh	0.60 %rh + 2.7 % of reading 0.80 %rh + 1.5 % of reading 3.2 % of reading 0.80 %rh + 1.3 % of reading 0.80 %rh + 1.7 % of reading 0.80 %rh + 1.7 % of reading		Lab



0794
Accredited to
ISO/IEC 17025:2005

Schedule of Accreditation
issued by
United Kingdom Accreditation Service
21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

Calibration Services (Calserv) Limited
Issue No: 029 **Issue date: 11 March 2011**

Calibration performed by the Organisation at the locations specified

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ($k = 2$)	Remarks	Location Code
HUMIDITY (cont'd) Relative humidity instruments (cont'd) Using unsaturated salts	<i>At ambient temperature:</i> 5 %rh 10 %rh 35 %rh 50 %rh 80 %rh 95 %rh	0.70 %rh 0.50 %rh 0.70 %rh 1.1 %rh 1.3 %rh 1.4 %rh		
ELECTRICAL Electrical calibration of temperature simulators for the following sensors:				Lab
Noble metal thermocouples	- 200 °C to + 500 °C 500 °C to 1800 °C	0.50 °C 0.30 °C	including cold junction compensation	
Base metal thermocouples	- 200 °C to + 1380 °C	0.13 °C	including cold junction compensation	
Resistance sensors	- 200 °C to + 800 °C	0.0017 °C		
Electrical calibration of temperature indicators, controllers and recorders for the following sensors:				
Noble metal thermocouples	- 200 °C to + 500 °C 500 °C to 1800 °C	0.50 °C 0.30 °C	including cold junction compensation	
Base metal thermocouples	- 200 °C to + 1380 °C	0.13 °C	including cold junction compensation	
Resistance sensors	- 200 °C to + 800 °C	0.0070 °C		
Calibration of thermistor indicators by resistance simulation.	0 Cto 10 C 10 Cto 100 C 100 Cto 1 kC 1 kCto 10 kC 10 kCto 100 kC 100 kCto 1 MC 1 MCto 10 MC	50 ppm + 6.0 mC 25 ppm + 16 mC 40 ppm + 16 mC 30 ppm + 60 mC 30 ppm + 4.0 C 45 ppm + 18 C 160 ppm + 1.2 kC		
TIME Time interval	 1 minute to 24 hours	 0.50 s		Lab

END