

# Accreditation Certificate

Lotus Automation Ltd

Trading As

**Lotus Technical Services**

Marino House, Finisklin Business Park, Sligo

**Calibration Laboratory**

Registration number: 277C

is accredited by the Irish National Accreditation Board (INAB) to undertake calibration as detailed in the Schedule bearing the Registration Number detailed above, in compliance with the International Standard ISO/IEC 17025:2005 2<sup>nd</sup> Edition

*"General Requirements for the Competence of Testing and Calibration Laboratories"*

*(This Certificate must be read in conjunction with the annexed Schedule of Accreditation)*

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Date of award of accreditation: 07:12:2010

Date of last renewal of accreditation: 07:12:2010

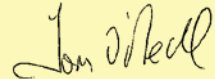
Expiry date of this certificate of accreditation: 07:12:2015

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This Accreditation shall remain in force until further notice subject to continuing compliance with INAB accreditation criteria, ISO/IEC 17025 and any further requirements specified by the Irish National Accreditation Board.

Manager: 

Dr Adrienne Duff

Chairperson: 

Mr Tom O'Neill

Issued on 07 December 2010

Organisations are subject to annual surveillance and are re-assessed every five years. The renewal date on this Certificate confirms the latest date of renewal of accreditation. To confirm the validity of this Certificate, please contact the Irish National Accreditation Board.

INAB is a signatory of the European co-operation for Accreditation (EA) Testing Multilateral Agreement (MLA) and the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement.

# Schedule of Accreditation



(Annex to Accreditation Certificate)

Permanent Laboratory:  
Category A, B

**LOTUS AUTOMATION LTD.**  
**T/A Lotus Technical Services**

**Electrical and Temperature Calibration Laboratory**

*Initial Accreditation Date :* 14-December-2010  
*Postal Address:* Marino House, Finisklin Business Park, Sligo  
*Telephone:* +353 (0)71 9169783  
*Fax:* +353 (0)71 9169865  
*E-mail:* [nmolloy@lotusworks.com](mailto:nmolloy@lotusworks.com)  
*Contact Name:* Noel Molloy  
*Facilities:* Public calibration service

# Schedule of Accreditation



Permanent Laboratory:  
**Category A**

THE IRISH NATIONAL ACCREDITATION BOARD (INAB) is the Irish body for the accreditation of organisations including laboratories.

Laboratory accreditation is available to testing and calibration facilities operated by manufacturing organisations, government departments, educational institutions and commercial testing/calibration services. Indeed, any organisation involved in testing, measurement or calibration in any area of technology can seek accreditation for the work it is undertaking.

Each accredited laboratory has been assessed by skilled specialist assessors and found to meet criteria which are in compliance with ISO/IEC 17025 or ISO/IEC 15189 (medical laboratories). Frequent audits, together with periodic inter-laboratory test programmes, ensure that these standards of operation are maintained.

## Calibration Categories:

- Category A:** Permanent calibration laboratory where the laboratory is erected on a fixed location for a period expected to be greater than three years.
- Category B:** Site calibration that is performed by staff sent out on site by a permanent laboratory that is accredited by the Irish National Accreditation Board.
- Category C:** Site calibration that is performed in a site/mobile laboratory or by staff sent out by such a laboratory, the operation of which is the responsibility of a permanent laboratory accredited by the Irish National Accreditation Board.
- Category D:** Site calibration that is performed on site by individuals and organisations that do not have a permanent calibration laboratory. Calibration may be performed using
- (a) portable test equipment
  - (b) a site laboratory
  - (c) a mobile laboratory or
  - (d) equipment from a mobile or site laboratory

## Standard Specification or Calibration Procedure Used:

The standard specification or calibration procedure that is accredited is the issue that is current on the date of the most recent visit, unless otherwise stated.

## Glossary of Terms

### Facilities:

- Public calibration service:** Commercial operations which actively seek work from others.
- Conditionally available for public calibration:** Established for another primary purpose but, more commonly than not, is available for outside work.
- Normally not available for public calibration:** Unavailable for public calibration more often than not.

Laboratory users wishing to obtain assurance that calibration results are reliable and carried out to the Irish National Accreditation Board criteria should insist on receiving an accredited calibration certificate. Users should contact the laboratory directly to ensure that this schedule of accreditation is current. INAB will on request verify the status and scope.

# Scope of Accreditation



**LOTUS AUTOMATION LTD.**  
**T/A Lotus Technical Services**  
**Electrical Calibration Laboratory**  
 (Nominal temperature for calibration work: 21±3°C)

Permanent Laboratory:  
 Category A&B

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration and measurement capability expressed as an uncertainty	Method and remarks
<b>DC Voltage</b>  0.000 mV to 300.000 mV 0.30001 V to 3.00000 V 3.00001 V to 30.0000 V 30.0001 V to 300.000 V 300.01 V to 1000.00 V		± 0.0000042 V to 0.000022 V ± 0.000022 V to 0.00022 V ± 0.00022 V to 0.0024 V ± 0.0024 V to 0.024 V ± 0.024 V to 0.08 V	Documented in-house method: QLP 114
<b>Negative DC Voltage</b>  0.000 mV to -300.000 mV 0.30001 mV to -3.00000 V 3.00001 V to -30.0000 V 30.0001 V to -300.000 V 300.01 V to -1000.00 V		± 0.0000042 V to 0.000022 V ± 0.000023 V to 0.00022 V ± 0.00022 V to 0.0024 V ± 0.0024 V to 0.024 V ± 0.024 V to 0.08 V	QLP 114
<b>AC Voltage</b>  30.0000 mV to 3.000V 300.001 mV to 3.000 V 300.001 mV to 3.000 V 300.001 mV to 3.000 V 300.001mV to 3.000 V	10 Hz – 3 kHz 3 kHz – 10 kHz 10 kHz – 30 kHz 30 kHz – 50 kHz 50 kHz – 100 kHz	± 0.00011 V to 0.0015 V ± 0.00015 V to 0.0016 V ± 0.00023 V to 0.0024 V ± 0.00037 V to 0.0037 V ± 0.00086 V to 0.0086 V	QLP 114

**\* Notes:**

- In accordance with INAB policy, uncertainties are calculated for an estimated confidence level of not less than 95%.
- Best measurement capability expressed as an uncertainty (±) to be reported in compliance with EA-4/02, "Expression of the Uncertainty of Measurement in Calibration".

# Scope of Accreditation



**LOTUS AUTOMATION LTD.**  
**T/A Lotus Technical Services**  
**Electrical Calibration Laboratory**

Permanent Laboratory:  
 Category A&B

(Nominal temperature for calibration work: 21±3°C)

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration and measurement capability expressed as an uncertainty *	Method and remarks
<b>AC Voltage</b>			Documented in-house method: QLP 114
3.001 V to 30.000 V	10 Hz – 3 kHz	± 0.0015 V to 0.014 V	
3.001 V to 30.000 V	3 kHz – 10 kHz	± 0.0016 V to 0.021 V	
3.001 V to 30.000 V	10 kHz – 30 kHz	± 0.0024 V to 0.029 V	
3.001 V to 30.000 V	30 kHz – 50 kHz	± 0.0037 V to 0.055 V	
3.001 V to 30.000 V	50 kHz – 100 kHz	± 0.0086 V to 0.14 V	
30.001 V to 100.000 V	10 Hz – 3 kHz	± 0.014 V to 0.046 V	QLP 114
30.001 V to 100.000 V	3 kHz – 10 kHz	± 0.021 V to 0.068 V	
30.001 V to 100.000 V	10 kHz – 30 kHz	± 0.029 V to 0.096 V	
30.001 V to 100.000 V	30 kHz – 50 kHz	± 0.055 V to 0.18 V	
30.001 V to 100.000 V	50 kHz – 100 kHz	± 0.14 V to 0.46 V	
100.001 V to 105.000 V	10 Hz – 3 kHz	± 0.046 V to 0.048 V	QLP 114
100.001 V to 105.000 V	3 kHz – 10 kHz	± 0.068 V to 0.071 V	
100.001 V to 105.000 V	10 kHz – 30 kHz	± 0.096 V to 0.1 V	
100.001 V to 105.000 V	30 kHz – 50 kHz	± 0.18 V to 0.19 V	
100.001 V to 105.000 V	50 kHz – 100 kHz	± 0.46 V to 0.47 V	

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2. Best measurement capability expressed as an uncertainty (±) to be reported in compliance with EA-4/02, "Expression of the Uncertainty of Measurement in Calibration".

# Scope of Accreditation



LOTUS AUTOMATION LTD.

T/A Lotus Technical Services

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 21±3°C)

Permanent Laboratory:

Category A&B

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration and measurement capability expressed as an uncertainty*	Method and remarks
<b>AC Voltage</b>			Documented in-house method: QLP 114
105.001 V to 300.000 V	40 Hz -100 Hz	± 0.072 V to 0.17 V	
105.001 V to 300.000 V	100 Hz – 3 kHz	± 0.072 V to 0.26 V	
105.001 V to 300.000 V	3 kHz – 10 kHz	± 0.12 V to 0.27 V	
105.001 V to 300.000 V	10 kHz – 30 kHz	± 0.12 V to 0.51 V	
300.001 V to 330.000 V	10 kHz – 30 kHz	± 0.27 V to 0.71 V	QLP 114
330.001 V to 750.000 V	40 Hz -100 Hz	± 0.23 V to 0.44 V	QLP 114
330.001 V to 750.000 V	100 Hz – 3 kHz	± 0.23 V to 0.66 V	
330.001 V to 750.000 V	3 kHz – 10 kHz	± 0.33 V to 0.71 V	
<b>DC Current</b>			QLP 114
000.000 A to 300.000 uA		± 0.000000053 A	
0.30001 mA to 3.0000 mA		± 0.000000053 A to 0.00000051 A	
03.0001 mA to 30.0000 mA		± 0.00000051 A to 0.0000051 A	
030.0001 mA to 300.000 mA		± 0.0000051 A to 0.000058 A	
300.001 mA to 3.0000 A		± 0.000058 A to 0.0019 A	
03.0001 A to 10.000 A		± 0.0019 A to 0.0065 A	

**\* Notes:**

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2. Best measurement capability expressed as an uncertainty (±) to be reported in compliance with EA-4/02, "Expression of the Uncertainty of Measurement".

# Scope of Accreditation



**LOTUS AUTOMATION LTD.**  
**T/A Lotus Technical Services**  
**Electrical Calibration Laboratory**

Permanent Laboratory:  
 Category A&B

(Nominal temperature for calibration work: 21±3°C)

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration and measurement capability expressed as an uncertainty	Method and remarks
<b>AC Current</b> 30.000 uA to 3.0000 mA 03.0001 mA to 30.000 mA 030.001 mA to 300.000 mA 0.3001 A to 3.0000 A 0.3001 A to 3.0000 A 03.001 A to 10.000 A 03.001 A to 10.000 A	10 Hz - 3 kHz 10 Hz - 3 kHz 10 Hz - 3 kHz 10 Hz - 3 kHz 3 kHz - 10 kHz 10 Hz - 3 kHz 3 kHz - 10 kHz	± 0.00000092 A to 0.0000024 A ± 0.0000024 A to 0.000024 A ± 0.000024 A to 0.00027 A ± 0.00027 A to 0.0035 A ± 0.00035 A to 0.01 A ± 0.0035 A to 0.023 A ± 0.01 A to 0.06 A	Documented in-house method: QLP 114
<b>Resistance</b> 00.1000 Ω to 40.0000 Ω 040.001 Ω to 380.000 Ω 0.38001 K Ω to 3.80000 K Ω 03.8001 K Ω to 38.0000 K Ω 038.0001 K Ω to 380.000 K Ω 0.38001 M Ω to 38.000 M Ω 38.001 M Ω to 80.000 M Ω 80.001 M Ω to 100.000 M Ω		± 0.01 Ω to 0.02 Ω ± 0.029 Ω to 0.096 Ω ± 0.077 Ω to 0.65 Ω ± 0.65 Ω to 8.4 Ω ± 8.4 Ω to 76 Ω ± 76 Ω to 21000 Ω ± 21000 Ω to 88000 Ω ± 88000 Ω to 100000 Ω	QLP 114
<b>Frequency</b> 250.000 Hz @ 1V 100.0000 KHz @ 1V		± 0.0063 Hz ± 2.5 Hz	QLP 114

**\* Notes:**

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- Best measurement capability expressed as an uncertainty (±) to be reported in compliance with EA-4/02, "Expression of the Uncertainty of Measurement in Calibration".

# Scope of Accreditation



LOTUS AUTOMATION LTD.

T/A Lotus Technical Services

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 21±3°C)

Permanent Laboratory:

Category A&B

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration and measurement capability expressed as an uncertainty *	Method and remarks
<b>AC Current Turn Coil</b>			Documented in-house method QLP 114
30A	95Hz	± 0.14A	
100A	95Hz	± 0.5A	
30A	440Hz	± 0.33A	
100A	440Hz	± 1.1A	

\* Notes:

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2. Best measurement capability expressed as an uncertainty (±) to be reported in compliance with EA-4/02, "Expression of the Uncertainty of Measurement".

# Scope of Accreditation



LOTUS AUTOMATION LTD.

Permanent Laboratory:

T/A Lotus Technical Services

Category A&B

## Electrical Calibration Laboratory

The following types of instrument can be calibrated in accordance with the scheduled measured quantities and ranges. An uncertainty reported on an INAB certificate will be that for the instrument itself during calibration plus the appropriate measurement capability of the laboratory for the quantities and ranges concerned.

INAB Classification number (P9)		Instrument
302	Resistors and resistance boxes	Resistors, resistance boxes.
303	Insulating materials and insulators	Insulation Resistance tests Direct voltage tests Alternating voltage tests
309	Instrument Calibrators	DC Voltage AC Voltage DC Current AC Current Resistance
310	Indicating and Recording Instruments	DC Voltmeters AC Voltmeters DC Ammeters AC Ammeters Ohmmeters Electricity meters Digital Multimeters
312	Frequency	Frequency Meters
321	Power Supplies	Power Supplies

# Scope of Accreditation



LOTUS AUTOMATION LTD.

Permanent Laboratory:

T/A Lotus Technical Services

Category A&B

## Temperature Calibration Laboratory

(Nominal temperature for calibration work: 21±3°C)

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration and measurement capability expressed as an uncertainty *	Method and remarks
501 Calibration of temperature measuring equipment	- 80°C to + 30°C	± 0.011°C to 0.028°C	Documented in-house method: QLP 103 and QLP 106
.41 DTI Calibration and temperature element calibration	+ 30°C to + 150°C	± 0.014°C to 0.028°C	
	+150°C to + 550°C	± 0.028°C to 0.18°C	
510 Calibration of temperature controlled enclosures	- 80°C to + 30°C	± 0.035°C to 0.036°C	QLP 105
	+ 30°C to + 140°C	± 0.036°C to 0.040°C	
.01 Temperature bath calibration	+145°C to + 550°C	± 0.04°C to 0.20°C	

**\* Notes:**

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2. Best measurement capability expressed as an uncertainty (±) to be reported in compliance with EA-4/02, "Expression of the Uncertainty of Measurement".