المـــركـــــز الـــوطـــنـــي للمـــتـــرولـــوجـيـــا
Jordan National Metrology Institute

Introduction :

Jordan National Metrology Institute (JNMI) was established in 2006 as the successor of the Standards and Calibration Division , which was established in 1981 as one of the divisions of the Royal Scientific Society RSS. JNMI is managed by RSS according to the signed authorization agreement between Jordan Institute for Standards & Metrology (JISM) , which is a governmental institute responsible for the national system of measurement in Jordan, and RSS, which is the largest applied research institution, consultation and technical service provider established in 1970 in Jordan housing more than 38 specialized Metrology Testing and 14 Metrology Calibration laboratories .

History Milestones :

- **1981** ; Establishing a small Unit for Electrical Calibration including DC Voltage , DC Current and Resistance in the Royal Scientific Society
- **1998** ; Accreditation by DKD German accreditation Service for the Electrical calibration Unit Activities complying with International standard ISO/IEC 17025
- **1999** ; Establishing a division for calibration including the electrical calibration unit and a new Unit for Physical Calibration to cope with Industrial demand
- **2003** ; Extension of scope of accreditation to include AC Voltage and AC Current
- **2005**; Acquiring a wide range of high accurate equipment through a Japanese grant to establish 14 specialized calibration laboratories in the fields of Metrology covering Electrical , Physical and Mechanical fundemental measurement
- **2006**; signing an agreement with JISM authorizing RSS to establish and manage the Jordan National Metrology Institute JNMI .

- **2007** RSS which is established in 1970 as not- for- profit organization located on a picturesque 85-acre prime site with floor area 32,000 m² have now more than 38 Metrology Testing Accredited Laboratories and 14 Metrology calibration Accredited laboratories providing R&D , Measurement , Consultations , Testing & Calibration services for all sectors including chemical industries , food industries, textile and paper industries , materials and mechanical engineering industries , environmental assessment services , building and infrastructure , IT , as well as electrical and electronic industries ; moreover to all economic and scientific sectors

JNMI Vision

We are seeking for unified local measurements that are accepted internationally.

JNMI Mission

We maintain the national measurement standards and assure its traceability to international standards. We also provide highly accurate metrological services, which are accepted locally and internationally to all scientific, industrial, economic, health and legal sectors in order to make effective contributions supporting the national economy, maintaining safety, well-being and the environment and protecting citizens' rights – the ultimate goal being the achievement of a better quality of life. These tasks are accomplished through implementing new updated systems complying with international good practices in metrology and by providing, developing and motivating human resources and know-how.

Function & Activities :

1. Realizing , Maintaining and ensuring the traceability of the National Measurement Standards to International Standard

2. Dissemination of national standards by providing metrological and calibration services to reference standards that exist in the national laboratories and to all scientific , industrial and legal sector

3. Following up the scientific development that is related to the international system of units and applying it

4. Representing Jordan locally and internationally in all metrological activities

5. Performing research in Metrology issues

6. Conducting Training courses , Seminars and work shops in Metrology

7. Participating in Interlaboratory comparison programs on the local and International level

8. Providing consultancy to Government in the field of Metrology

JNMI Accreditation :

Our calibration laboratories are among the unique labs in Jordan as well as in the Arab Region which complies with the requirements of the international standard for calibration laboratories ISO/IEC 17025 . Moreover, Our Labs are Accredited by The German Accreditation Calibration Service DKD – GERMANY since 1998 (The Registration Number is : DKD –K –20301). Furthermore, our Labs are accredited by Jordan Institution for Standards and Metrology (JISM) in The certificate registration Number is: JLAS/ 003 . Our labs are also ISO 9001:2000 certified by Lloyd's Register, In 2007 we have extended our DKD accreditation to include physical and mechanical quantities

JNMI Role in Society & Future Plans :

JNMI constitutes the backbone and the cornerstone of quality assurance in Jordan. It effectively contribute to attracting foreign investment, improving local investment, and eliminating technical impediments. This facilitates trade movement as well as improves the quality of Jordanian industrial products, which contributes to boosting national economy , it also aims to maintain safety , health , environment and protecting citizen rights , in order to achieve better quality of life , we aim to establish a new chemical metrology division to assure the control and traceability of all reference materials related to food , drug and health sectors ; moreover to extend legal metrology services to include medical equipment control in hospitals and medical centers and to include control of equipment used in construction testing laboratories ; these will be first steps in controlloing all measuring equipment which is realted to safety , health and protection of citizen rights .

Description of JNMI Calibration Laboratories :

Through our 14 specialized calibration laboratories we maintain and assure the traceability of the National Measurement Standards which are the most accurate standards in Jordan , and are traceable to International Standards . We disseminate these standards by providing credible and accredited locally and internationally calibration services to all measuring equipment to assure uniformity of all measurements throughout Jordan .

JNMI also provides technical consultancy, training, and advice in all aspects of measurements and metrology to all scientific, economic, industrial and commercial parties in both private and public sectors

JNMI is composed of 14 specialized laboratories that are divided to:

National Primary Laboratories , which comprise national measurement standards that are considered the most accurate measuring standards on the national level in the following fields:

- Electrical measurement such as measurement of voltage, current, resistance, capacitance, Inductance , frequency and time

- Physical and mechanical measurement such as Temperature , Humidity, Dimension, Pressure, Mass, and Force .

The secondary laboratories , which comprise a less accurate measuring standards, providing calibration services in the fields of the electrical, physical and mechanical measurement as well as Power , flow, volume, speed, luminance, and medical measurement equipment .

Scope of Measurement for Jordan National Metrology Institute (JNMI)

Permanent Laboratory

Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability [1)]	Remarks
DC Voltage	100 mV		$3{,}6 \cdot 10^{-6} \cdot U$	
Sources	1 V		$3{,}4 \cdot 10^{-6} \cdot U$	
fixed values	1,018 V		$3{,}8 \cdot 10^{-6} \cdot U$	
	10 V		$3{,}4 \cdot 10^{-6} \cdot U$	
	100 V		$3{,}4 \cdot 10^{-6} \cdot U$	
	1000 V		$3{,}6 \cdot 10^{-6} \cdot U$	
DC Voltage	10 mV to <100 mV		$2 \cdot 10^{-6} \cdot U + 8\ \mu V$	U = measured value
Sources	100 mV to <1 V		$9 \cdot 10^{-6} \cdot U + 7\ \mu V$	
	1 V to <10 V		$12 \cdot 10^{-6} \cdot U + 4\ \mu V$	
	10 V to <100 V		$13 \cdot 10^{-6} \cdot U + 50\ \mu V$	
	100 V to 1000 V		$20 \cdot 10^{-6} \cdot U + 0{,}25$ mV	
DC Voltage	10 mV to 220 mV		$1 \cdot 10^{-6} \cdot U + 6\ \mu V$	
Measuring	>220 mV to 2,2 V		$4 \cdot 10^{-6} \cdot U + 5\ \mu V$	
Instruments	>2,2 V to 11 V		$4 \cdot 10^{-6} \cdot U + 5\ \mu V$	
	>11 V to 22 V		$4 \cdot 10^{-6} \cdot U + 5\ \mu V$	
	>22 V to 220 V		$5 \cdot 10^{-6} \cdot U + 40\ \mu V$	
	>220 V to 1000 V		$7 \cdot 10^{-6} \cdot U + 0{,}4$ mV	
DC Current	10 µA to <100 µA		$100 \cdot 10^{-6} \cdot I + 0{,}006\ \mu A$	I = measured value
Source	100 µA to <1 mA		$45 \cdot 10^{-6} \cdot I + 0{,}009\ \mu A$	
	1 mA to <10 mA		$45 \cdot 10^{-6} \cdot I + 0{,}07\ \mu A$	
	10 mA to <100 mA		$68 \cdot 10^{-6} \cdot I + 0{,}9\ \mu A$	
	100 mA to 1 A		$0{,}16 \cdot 10^{-3} \cdot I + 15\ \mu A$	
	>1A to 11 A		$0{,}64 \cdot 10^{-3} \cdot I + 0{,}26$ mA	

DC Current Measuring Instruments	10 µA to <220 µA		$0{,}10 \cdot 10^{-3} \cdot I + 0{,}006$ µA	
	220 µA to 2,2 mA		$35 \cdot 10^{-6} \cdot I + 0{,}007$ µA	
	>2,2 mA to 22 mA		$35 \cdot 10^{-6} \cdot I + 0{,}04$ µA	
	>22 mA to 220 mA		$50 \cdot 10^{-6} \cdot I + 0{,}7$ µA	
	>220 mA to 2,2 A		$80 \cdot 10^{-6} \cdot I + 12$ µA	
	>2,2 A to 11 A		$0{,}74 \cdot 10^{-3} \cdot I + 0{,}50$ mA	
DC Resistance Sources	1 Ω to 10 Ω		$0{,}11 \cdot 10^{-3} \cdot R + 0{,}08$ mΩ	R = measured value
	>10 Ω to 100 Ω		$32 \cdot 10^{-6} \cdot R + 1{,}1$ mΩ	
	>100 Ω to 1 kΩ		$21 \cdot 10^{-6} \cdot R + 1{,}1$ mΩ	
	>1 kΩ to 10 kΩ		$20 \cdot 10^{-6} \cdot R + 11$ mΩ	
	>10 kΩ to 100 kΩ		$21 \cdot 10^{-6} \cdot R + 0{,}10$ Ω	
	>100 kΩ to 1 MΩ		$30 \cdot 10^{-6} \cdot R + 4{,}2$ Ω	
	>1 MΩ to 10 MΩ		$95 \cdot 10^{-6} \cdot R + 0{,}11$ kΩ	
	>10 MΩ to 100 MΩ		$1{,}2 \cdot 10^{-3} \cdot R + 1{,}2$ kΩ	
	>100 MΩ to 1 GΩ		$10 \cdot 10^{-3} \cdot R + 10$ kΩ	
DC Resistance Sources fixed values	1 Ω		$22 \cdot 10^{-6} \cdot R$	
	1,9 Ω		$16 \cdot 10^{-6} \cdot R$	
	10 Ω		$11 \cdot 10^{-6} \cdot R$	
	100 Ω		$8{,}2 \cdot 10^{-6} \cdot R$	
	1 kΩ		$5{,}8 \cdot 10^{-6} \cdot R$	
	10 kΩ		$1{,}3 \cdot 10^{-6} \cdot R$	
	19 kΩ		$5{,}0 \cdot 10^{-6} \cdot R$	
	100 kΩ		$7{,}0 \cdot 10^{-6} \cdot R$	
	1 MΩ		$15 \cdot 10^{-6} \cdot R$	
	10 MΩ		$0{,}10 \cdot 10^{-3} \cdot R$	
	19 MΩ		$0{,}11 \cdot 10^{-3} \cdot R$	
DC Resistance	100 MΩ		$0{,}56 \cdot 10^{-3} \cdot R$	
Sources, fixed values	1 GΩ		$10 \cdot 10^{-3} \cdot R$	
DC Resistance Measuring Instruments	1 Ω		$62 \cdot 10^{-6} \cdot R$	
	1,9 Ω		$36 \cdot 10^{-6} \cdot R$	
	10 Ω		$13 \cdot 10^{-6} \cdot R$	
	100 Ω		$10 \cdot 10^{-6} \cdot R$	
	1 kΩ		$8{,}0 \cdot 10^{-6} \cdot R$	
	10 kΩ		$4{,}0 \cdot 10^{-6} \cdot R$	
	19 kΩ		$7{,}0 \cdot 10^{-6} \cdot R$	

	100 kΩ		$8{,}4 \cdot 10^{-6} \cdot R$	
	1 MΩ		$16 \cdot 10^{-6} \cdot R$	
	1,9 MΩ		$22 \cdot 10^{-6} \cdot R$	
	10 MΩ		$41 \cdot 10^{-6} \cdot R$	
	19 MΩ		$52 \cdot 10^{-6} \cdot R$	
	100 MΩ		$0{,}11 \cdot 10^{-3} \cdot R$	
	1 GΩ		$10 \cdot 10^{-3} \cdot R$	
Measuring	10 mV to <100 mV	40 Hz to 1 kHz	$90 \cdot 10^{-6} \cdot U + 18\,\mu V$	U = measured value
Instruments	100 mV to <1 V	40 Hz to 1 kHz	$0{,}11 \cdot 10^{-3} \cdot U + 30\,\mu V$	
AC Voltage	1 V to <10 V	40 Hz to 1 kHz	$0{,}1 \cdot 10^{-3} \cdot U + 0{,}25$ mV	
Sources	10 V to <100 V	40 Hz to 1 kHz	$0{,}24 \cdot 10^{-3} \cdot U + 2{,}4$ mV	
	100 V to 700 V	40 Hz to 1 kHz	$0{,}47 \cdot 10^{-3} \cdot U + 24$ mV	
AC Voltage	2,2 mV to 22 mV	40 Hz to 1 kHz	$40 \cdot 10^{-6} \cdot U + 12\,\mu V$	
Measuring	22 mV to 220 mV	40 Hz to 1 kHz	$80 \cdot 10^{-6} \cdot U + 13\,\mu V$	
Instruments	>220 mV to 2,2 V	40 Hz to 1 kHz	$60 \cdot 10^{-6} \cdot U + 10\,\mu V$	
	>2,2 V to 22 V	40 Hz to 1 kHz	$60 \cdot 10^{-6} \cdot U + 43\,\mu V$	
	>22 V to 220 V	40 Hz to 1 kHz	$65 \cdot 10^{-6} \cdot U + 0{,}53$ mV	
	>220 V to 1000 V	40 Hz to 1 kHz	$80 \cdot 10^{-6} \cdot U + 3{,}5$ mV	
AC Current	1 mA to <10 mA	40 Hz to 100 Hz	$0{,}7 \cdot 10^{-3} \cdot I + 2{,}4\,\mu A$	I = measured value
Sources	1 mA to <10 mA	>100 Hz to 1 kHz	$0{,}37 \cdot 10^{-3} \cdot I + 2{,}4\,\mu A$	
	10 mA to <100 mA	40 Hz to 100 Hz	$0{,}71 \cdot 10^{-3} \cdot I + 24\,\mu A$	
	10 mA to <100 mA	>100 Hz to 1 kHz	$0{,}37 \cdot 10^{-3} \cdot I + 24\,\mu A$	
AC Current	100 mA to 1 A	40 Hz to 100 Hz	$1 \cdot 10^{-3} \cdot I + 0{,}24$ mA	
Sources	100 mA to 1 A	>100 Hz to 1 kHz	$1{,}2 \cdot 10^{-3} \cdot I + 0{,}24$ mA	
	>1 A to 11 A	40 Hz to 60 Hz	$0{,}60 \cdot 10^{-3} \cdot I + 1$ mA	
AC Current	2,2 mA to 22 mA	40 Hz to 1 kHz	$0{,}14 \cdot 10^{-3} \cdot I + 0{,}3\,\mu A$	
Measuring	>22 mA to 220 mA	40 Hz to 1 kHz	$0{,}14 \cdot 10^{-3} \cdot I + 2{,}5\,\mu A$	
Instruments	>220 mA to 2,2 A	40 Hz to 1 kHz	$0{,}28 \cdot 10^{-3} \cdot I + 35\,\mu A$	
	>2,2 A to 11 A	40 Hz to 1 kHz	$0{,}76 \cdot 10^{-3} \cdot I + 1$ mA	

Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability [1)]	Remarks
Conventional Mass	1 mg, 2 mg, 5 mg		0,003 mg	OIML recommendation R 111, class E_2
	10 mg		0,003 mg	
	20 mg		0,003 mg	
	50 mg		0,004 mg	
	100 mg		0,005 mg	
	200 mg		0,006 mg	
	500 mg		0,008 mg	
	1 g		0,010 mg	
	2 g		0,012 mg	
	5 g		0,016 mg	
	10 g		0,020 mg	
	20 g		0,025 mg	
	50 g		0,030 mg	
	100 g		0,05 mg	
	200 g		0,10 mg	
	500 g		0,25 mg	
	1 kg		0,5 mg	
	2 kg		1 mg	
	5 kg		2,5 mg	
	10 kg		5 mg	
	20 kg		30 mg	OIML recommendation R 111, class F_1
Temperature				
Standard platinum resistance thermometers	0,01 °C		8 mK	Calibration at fix point temperatures of ITS-90
	29,7646 °C		10 mK	
	156,5985 °C		10 mK	
	231,928 °C		10 mK	
	419,527 °C		15 mK	
	660,323 °C		20 mK	
	961,78 °C		50 mK	
Resistance thermometers, direct-reading thermometers and data loggers	- 65 °C to -40 °C	Ethanol bath	50 mK	Comparison with standard platinum resistance thermometer
	>-40 °C to 0 °C	Ethanol bath	20 mK	
	> 0 °C to 95 °C	Water bath	20 mK	
	> 95 °C to 250 °C	Oil bath	30 mK	
	200 °C to 500 °C	Salt bath	50 mK	
	0 °C to 70 °C	Climatic chamber	0,5 K	
Liquid in glass thermometers	- 40 °C to 0 °C	Ethanol bath	30 mK	Comparison with standard platinum resistance thermometer
	> 0 °C to 95 °C	Water bath	30 mK	
	> 95 °C to 250 °C	Oil bath	35 mK	
	200 °C to 500 °C	Salt bath	100 mK	
Noble metal thermocouples	231,928 °C		0,6 K	Calibration at fixed point temperatures of ITS-90
	419,527 °C		0,7 K	
	660,323 °C		0,8 K	
	961,78 °C		1,0 K	Calibration at fixed point temperatures
	1084,62 °C		1,2 K	
	- 65 °C to 0 °C	Ethanol bath	0,5 K	Comparison with standard platinum resistance thermometer
	> 0 °C to 95 °C	Water bath	0,2 K	
	> 95 °C to 250 °C	Oil bath	0,7 K	
	200 °C to 500 °C	Salt bath / Furnace	0,8 K	Comparison noble metal thermocouple
	> 500 °C to 1100 °C	Furnace	1,5 K	
Base metal thermocouples	0 °C to 400 °C	Furnace	0,8 K	Comparison method
	> 400°C to 1100 °C	Furnace	2,0 K	

On-site calibration

Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability [1)]	Remarks
Balances	Up to 230 kg	EA 10/18	3·10-6	

Scope of Physical Measurement Table:

Measured quantity / calibration item	*Range*	*Measurement conditions / procedure*	*Best Measurement Capability*	*Remarks*
Length				
1. Gauge Blocks	0.5 mm to 50 mm		0.05 µm	In House Method RSSPGB1
	>50 mm to 100 mm		0.06 µm	ISO 3650 / ver.1999
	>100 mm to 150 mm		0.08 µm	Mechanical Comparison
	>150 mm to 200 mm		0.09 µm	REF: Gauge Block Set, Grade K.
	>200 mm to 250 mm		0.11 µm	
	>250 mm to 500 mm		1 µm	
2. Slide Caliper	0.5 mm to 100 mm		4 µm	In House Method RSSPSC1
	>100 mm to 125 mm		6 µm	ISO 3599 / ver.1976
	>125 mm to 150 mm		8 µm	BS 887 / ver.1982
	>150 mm to 200 mm		10 µm	REF: Gauge Block Set, Grade K.
	>200 mm to 300 mm		13 µm	
	>300 mm to 400 mm		15 µm	
	>400 mm to 500 mm		17 µm	
3. Micrometers	0.5 mm to 250 mm		3 µm	In House Method RSSPM1 ISO 3611 / ver.1978 REF: Gauge Block Set, Grade K
4. Dial Gauges	0.5 mm to 100 mm		1 µm	In House Method RSSPDG1 JIS B 7503 / ver.1997 REF: Gauge Block Set, Grade K.
Pressure (Pressure Gauge, Calibrator, Pressure Balance)				In House Method RSSPPG1 In House Method JNMIPP1 DKD R6-1, EA 10/3
Gauge Pressure	10 kPa to 350 kPa		$\pm(17 \cdot 10^{-6} \cdot P_g + 0.4\ \text{Pa})$	Gas System
Absolute by ATM	108 kPa to 1350 kPa		$\pm(17 \cdot 10^{-6} \cdot P_{abs} + 10\ \text{Pa})$	
Absolute by Vacuum	2 Pa to 100 kPa		$\pm(17 \cdot 10^{-6} \cdot P_{neg} + 0.46\ \text{Pa})$	
Gauge Pressure	2 MPa to 70 MPa		$\pm(32 \cdot 10^{-6} \cdot P_g + 49\ \text{Pa})$	Oil System
Absolute Pressure	2.1 MPa to 70.1 MPa		$\pm(32 \cdot 10^{-6} \cdot P_{abs} + 50\ \text{Pa})$	

Measured quantity / calibration item	*Range*			*Measurement conditions / procedure*	*Best Measurement Capability*	*Remarks*
Humidity	10 %	to	95%		1%	In House Method RSSPT1 Ref: Humidity Generator Model No.: 2500ST-LT

Measured quantity / calibration item	*Range*			*Measurement conditions / procedure*	*Best Measurement Capability*	*Remarks*
Force **1. Shore Hardness**	0	to	50 N		0.30%	In House Method RSSPF2 ISO 868 / ver.2003 REF: Load Cell RSSF-5, VN Digitizer
2. Universal Hardness	0	to	50 N		0.10%	In House Method RSSPF1 ISO 6507-1 / ver.1997 ISO 6507-2 / ver.1997 ISO 156 / ver.1982 REF: Load Cells (RSSF-5, 49067 A, 49137), VN Digitizer, SC-200.
	>50 N	to	1000 N		0.014%	
	>1 kN	to	10 kN		0.035%	
3. Universal Machine Compression Mode	0	to	1 kN		0.016%	Method ISO7500-1 / ver.2004 REF : Class 00 Load cells
	>1 kN	to	10 kN		0.035%	
	>10 kN	to	50 kN		0.024%	
	>50 kN	to	100 kN		0.023%	
	>100 kN	to	500 kN		0.024%	
	>500 kN	to	1000 kN		0.046%	
	>1000 kN	to	2000 kN		0.014%	
Tension Mode	0	to	1 kN		0.014%	
	>1 kN	to	10 kN		0.035%	
	>10 kN	to	50 kN		0.024%	
	>50 kN	to	100 kN		0.035%	
	>100 kN	to	500 kN		0.024%	
	>500 kN	to	1000 kN		0.023%	
	>1000 kN	to	2000 kN		0.135%	
4. Load Cells Compression Mode	0	to	1 kN		0.016%	Method ISO/FDIS 376 / ver 2004 REF : Class 00 Load cells
	>1 kN	to	10 kN		0.035%	
	>10 kN	to	50 kN		0.024%	
	>50 kN	to	100 kN		0.023%	
	>100 kN	to	500 kN		0.024%	
	>500 kN	to	1000 kN		0.046%	
	>1000 kN	to	2000 kN		0.014%	

Measured quantity / calibration item	*Range*	*Measurement conditions / procedure*	*Best Measurement Capability*	*Remarks*
Tension Mode	0 to 1 kN		0.014%	
	>1 kN to 10 kN		0.035%	
	>10 kN to 50 kN		0.024%	
	>50 kN to 100 kN		0.035%	
	>100 kN to 500 kN		0.024%	
	>500 kN to 1000 kN		0.023%	
	>1000 kN to 2000 kN		0.135%	
Speed	100 rpm to <1000 rpm		0.01 rpm	In House Method JNMISMP38 REF: MFC Fluke 5520A. Frequency-Light Converter (FLC) SN: JNMI-01
(Tachometers)	1000 rpm to 20000 rpm		0.1 rpm	
Flow	0.01 m/s to 25 m/s		1.5% of the Reading	ISO 8316 / ver.1987
	1 mL/min to 20 L/min		2.5% of Reading (0.5-10 m/s) 1 cm/s for 0.5 m/s and less	1. Fluid Flow
	up to 300 L/min		1.5% of the Reading	
	0.1 mL/min to 10 mL/min		0.3% of the Reading	2. Air / Gas Flow
	5 L/min to 750 L/min		0.5% of the Reading	
Light	Up to 999000 lx		±2% of the reading ±1 for ≤ 3000 lx ±3% of the reading ±1 for > 3000 lx	Method: Comparison REF: luminance Meter
	0.01 to 199900 µW/cm^2		5% of the reading ± 1 digit	REF: UV Radio Meter
Volume	5 mL to 100 L		0.0015% to 0.014%	Weighting Method
Capacitance Source	1 pF to 1 mF	1 kHz to 100 kHz	0.3 pF to 0.004 mF	Method: Comparison REF: 4274A Multi-Frequency LCR Meter
Capacitance Measuring instruments	1 pF to 1 mF	1 kHz to 100 kHz	0.0002 pF to 0.0016 mF	Method: Comparison REF: Standard Capacitance and High Accuracy Capacitance substituter
Inductance Source				Method: Comparison REF: 4274A Multi-Frequency LCR Meter
Specific values	100 µH	100 Hz to 10 kHz	0.15 µH	
	1 mH	100 Hz to 1 kHz	0.00029 mH	
	10 mH	100 Hz to 1 kHz	0.0029 mH	
	100 mH	100 Hz to 10 kHz	0.029 mH to 0.095 mH	
	1 H	100 Hz to 1 kHz	0.0007 H to 0.001 H	
	10 H	100 Hz to 1 kHz	0.007 H to 0.027 H	
Inductance Measuring instruments				Method: Comparison REF:1482 Primary Standard Inductor
Specific values	100 µH	100 Hz to 10 kHz	0.12 µH	
	1 mH	100 Hz to 1 kHz	0.00027 mH	
	10 mH	100 Hz to 1 kHz	0.0027 mH	
	100 mH	100 Hz to 10 kHz	0.027 mH to 0.060 mH	
	1 H	100 Hz to 1 kHz	0.00027 H to 0.00060 H	
	10 H	100 Hz to 1 kHz	0.0027 H to 0.0230 H	

Measured quantity / calibration item	*Range*	*Measurement conditions / procedure*	*Best Measurement Capability*	*Remarks*
Frequency	100 kHz, 1 MHz, 5 MHz, 10 MHz		$1 \cdot 10^{-10}$	Method: Comparison REF: Primary Cesium Frequency Standard- 5071A, Rubidium GPS controlled standard 910R, counter PM 6681
	0.1 to 300 MHz		$1 \cdot 10^{-10}$	
Time (Stop Watch, Timers)	Up to 1800 s		0.06 sec	In House Method RSSPTM1 REF: SC-200, Primary Cesium Frequency Standard- 5071A. Rubidium GPS controlled standard 910R

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