



**National Institute of Metrology (Thailand)**

3/4-5 Moo 3, Klong 5, Klong Luang, Pathumthani, 12120, Thailand

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**Price List**

Electrical Metrology Department						
Item No.	Description	Range	Accuracy / Uncertainty	Calibration Fee (THB)	Remark	Code
1	DC Voltage Standard	1.018 V	0.9 $\mu$ V/V	12,500/piece		09010-10110
		10 V	0.4 $\mu$ V/V	+ 6,750/next point		
	Standard Cell	1 V / 1.018 V	0.9 $\mu$ V/V	12,500/piece		09010-10111
2	DC Voltage Standard	1 V / 1.018 V	0.09 $\mu$ V/V	36,000/piece	Compared against JJVS maintained by NIMT.	09010-10112
		10 V	0.03 $\mu$ V/V			
3	Picoampmeter	2 pA to 200 mA	0.1 mA/A to 0.01 mA/A	6,750 to 11,250/piece	Used volt-ampere method.	09010-10320
4	Electrometer	2 nC to 200 $\mu$ C	0.1 mC/C	6,750 to 11,250/ piece		09010-10321
5	AC/DC Transfer Standard	AC-DC Transfer Difference 2 mV to 20 V Frequency: 10 Hz to 1 MHz	8 $\mu$ V/V to 0.22 mV/V	90,000/item		09020-10510
		AC-DC Transfer Difference > 20 V to 1000 V Frequency: 10 Hz to 100 kHz				
6	Thermal Transfer Standard	AC-DC Transfer Difference 0.5 V to 20 V Frequency: 10 Hz to 1 MHz	8 $\mu$ V/V to 0.22 mV/V	67,500/item		09020-10511
		AC-DC Transfer Difference > 20 V to 1000 V Frequency: 10 Hz to 100 kHz				
7	Thermal Voltage Converter Standard	AC-DC Transfer Difference 0.5 V to 20 V Frequency: 10 Hz to 1 MHz	8 $\mu$ V/V to 0.22 mV/V	9,000/item		09020-10512
		AC-DC Transfer Difference > 20 V to 1000 V Frequency: 10 Hz to 100 kHz				
8	AC Measurement Standard	AC-DC Transfer Difference 10 mV to 20 V Frequency: 10 Hz to 1 MHz	8 $\mu$ V/V to 0.12 mV/V	67,500 to 78,750 /item	Excluded WB option.	09020-10520
		AC-DC Transfer Difference > 20 V to 1000 V Frequency: 10 Hz to 100 kHz				
		AC Voltage 10 mV to 20 V Frequency: 10 Hz to 1 MHz	11 $\mu$ V/V to 0.18 mV/V	78,750 to 85,500 /item	Included WB option.	09020-10521
		AC Voltage > 20 V to 1000 V Frequency: 10 Hz to 100 kHz				
9	Alternating Voltage Measurement Standard	AC Voltage 100 mV to 20 V Frequency: 10 Hz to 1 MHz	11 $\mu$ V/V to 0.18 mV/V	67500/item		09020-10522
		AC Voltage > 20 V to 1000 V Frequency: 10 Hz to 100 kHz				
10	AC Voltage Current Standard	AC Voltage 100 mV to 1000V Frequency 60 Hz and 400 Hz	18 $\mu$ V/V to 0.58 mV/V	18,130 to 21,700/item		09020-10560
		AC Current 100 mA to 30 A Frequency 60 Hz and 400 Hz	50 $\mu$ A/A to 0.12 mA/A			
11	Multifunction Transfer Standard	AC Voltage 100 mV to 20 V Frequency: 10 Hz to 1 MHz	11 $\mu$ V/V to 0.18 mV/V	78750/item		09020-10561
		AC Voltage > 20 V to 1000 V Frequency: 10 Hz to 100 kHz				
		AC Current 100 $\mu$ V to 10 A Frequency: 10 Hz to 10 kHz	50 $\mu$ A/A to 0.12 mA/A			
12	AC Current Shunt	AC-DC Transfer Difference 5 mA to 100 A Frequency: 10 Hz to 100 kHz	18 $\mu$ A/A to 0.20 mA/A	6,750 to 11,250/item		09020-10610
13	DC Standard Resistor	1 k $\Omega$	0.14 $\mu\Omega/\Omega$	42,500/item	Compared against QHR standard maintain by NIMT using automatic resistance bridge.	09030-10210
14	Standard Resistor 1 $\Omega$	1 $\Omega$ at 50 mA	$\geq$ 0.21 $\mu\Omega/\Omega$	8,625/piece	Used a group of 1 $\Omega$ standard.	09030-10211
15	Standard Resistor 10 k $\Omega$	10 k $\Omega$ at 0.3 mA	$\geq$ 1.4 $\mu\Omega/\Omega$	8,625/piece	Used a group of 10 k $\Omega$ standard.	09030-10212



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16	Standard Resistor 0 Ω to 10 TΩ	100 μΩ at 200 A	As Specification	10,000/piece	Used DCC bridge and 400 Amp range extender.	09030-10213
17	Standard Resistor (Calibrate in oil or in air)	1 mΩ to 10 kΩ	As specification	6,750/item	Used DCC bridge and 100 Amp range extender. Using Automatic High Resistance Bridge Using Dual Source High Resistance Ratio Bridge	09030-10214
		>10 kΩ to 1GΩ	≤ 500 μΩ/Ω	7,880/item		09030-10215
		1 GΩ to 1 TΩ	37 μΩ/Ω to 1.25 mΩ/Ω	7,880/item		
		1 TΩ to 100 TΩ	>1.25 mΩ/Ω to 24.4 mΩ/Ω	7,880/item		
		0 Ω to 1 TΩ	As specification	2,250/point test		09030-10216
		10 TΩ at 100 V, 200 V 500 V and 1000 V	3 mΩ/Ω	2,250/point test		09030-10217
18	Decade Resistance Box	1 mΩ to 10 MΩ	As specification	4,500 first decade + 3,380/next step		09030-10218
		10 MΩ to 1 TΩ	As specification	9,900 first decade + 6,750/next step		09030-10219
19	Resistance Calibrator	0 Ω to 100 MΩ	As specification	20,000/piece	Used Volt Amp Method	09031-10210
20	Standard Resistor	Test Voltage: maximum 2500 V Range 100 MΩ to 1 TΩ	As Specification	2,250 / point		09031-10211
21	High Resistance Meter	Upto 1 TΩ	As specification	2,250 / point	Direct	09030-10220
22	Digital Thermometer (indicator)	up to 10 MΩ	≤ 5 μΩ/Ω	(22,500 to 29,250)/item		09030-10221
			≥ 5 μΩ/Ω	(9,000 to 18,000)/item		09030-10222
	Low Resistance meter	Range 1 kΩ maximum Current 0.5 A	As Specification	2,250 / point	Direct measurement	09030-10223
		Range 100 Ω maximum Current 1 A				
		Range 10 Ω maximum Current 5 A				
		Range 1 Ω maximum Current 10 A				
		Range 0.1 Ω maximum Current 20 A				
		Range 0.01 Ω maximum Current 30 A				
		Range 1 mΩ maximum Current 100 A				
24	High Resistance Meter	Test Voltage: maximum 5000 V	As Specification	2,250 / point		09030-10224
		Range 10 MΩ, 20 MΩ and 50 MΩ				
		Range 100 MΩ, 200 MΩ and 500 MΩ				
		Range 1 GΩ, 2 GΩ and 5 GΩ				
		Range 10 GΩ, 20 GΩ and 50 GΩ				
		Range 100 GΩ, 200 GΩ and 500 GΩ				



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25	Low Resistance meter (High Current)	:100 mΩ, 200 mΩ, 400 mΩ, 600 mΩ and 800 mΩ@ Max 120 A : 1 mΩ, 2 mΩ, 4 mΩ, 6 mΩ and 8 mΩ @ Max 100 A : 10 mΩ, 20 mΩ, 40 mΩ, 60 mΩ and 80 mΩ @ Max 60 A : 0.1 Ω, 0.2 Ω, 0.4 Ω, 0.6 Ω and 0.8 Ω @ Max 10 A : 1 Ω, 2 Ω, 4 Ω, 6 Ω, 8 Ω and 16 Ω @ Max 1 A : 40 Ω, 80 Ω @ Max 1 A	As Specification	2,250 / point		09030-10225
	Low Resistance Meter	Range 10 mΩ to 10 MΩ	As Specification	2,250 / point		09030-10226
	High Resistance meter	Range 10 MΩ to 10 TΩ Maximum test Voltage: 5 kV	As Specification	2,250 / point		09030-10227
26	Standard Watt Converter	Volt : 600 V Current : 100 A AC Power : 60 kW Frequency : 50 Hz, 60 Hz Power Factor : ± 0 to 1	> 60 μW/VA	18,000 to 39,500/item		09050-10710
27	AC Wattmeter, Digital Power Meter	Volt : 1000 V Current : 80 A AC Power : 80 kW Frequency : 15 Hz to 450 Hz Power Factor : ± 0 to 1	> 100 μW/VA	6,750 to 13,500/Channel		09050-10711
28	Energy Meter	Energy 1.5 Ws to 3600 kWh Voltage 15 V to 600 V Current 0.1 A to 100 A Power Factor 1 to 0 (Inductive or Capacitive) Frequency 50 Hz to 60 Hz Measurement time 1s to 60 s	≥ 100 μWh/ VAh	6,750 to 13,500/Channel		09050-10712
29	Electrical Power Source	Power 1.5 W to 60 kW Frequency 50 Hz to 60 Hz Power Factor 1 to 0 (Inductive or Capacitive) Voltage 3 V to 1000 V Current 0.05 A to 100 A Frequency 15 Hz to 6 kHz	Power ≥ 70 μW/VA  Voltage ≥ 30 μV/V Current ≥ 30 μA/A Phase ≥ 0.005°	9,000 to 45,000/item		09050-10713
30	DC Power Meter	Power: 1mW to 20 kW Voltage : 100 mV to 1000 V Current : 10 mA to 20 A	≥ 40 μW/ W	6,750 to 13,500/Channel		09050-10714



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31	Energy Source	<p>Energy 41.67 mWh to 3.333 kWh</p> <p>Power: 0.5 W to 20 kW</p> <p>Voltage: 10 V to 1000 V</p> <p>Current: 0.05 A to 20 A</p> <p>Power Factor: 1</p> <p>Frequency: 50 Hz to 60 Hz</p> <p>Time : 5 minute to 10 minute</p>	> 0.12 %	5,000 to 15,000 / item		09050-10715
32	<p>Three Phase Watt Meter,</p> <p>Three Phase AC Power Meter,</p> <p>Three Phase Comparator</p>	<p>Power : 4.5 W to 240 kW</p> <p>Voltage : 15 V to 1000 V</p> <p>Current : 0.1 A to 80 A</p> <p>Power Factor : 1 to 0 (Inductive, Capacitive)</p> <p>Frequency : 50 Hz to 60 Hz</p>	<p>100 <math>\mu</math>WVA to</p> <p>370 <math>\mu</math>WVA</p>	5,000 to 55,500 /Channel		09050-10716
33	<p>Single phase /</p> <p>Three phase energy meter</p>	<p>Energy : (0.0625 Wh to 5000 kWh) / phase</p> <p>Power : (0.75 W to 50 kW) / phase</p> <p>Voltage : 15 V to 1000 V</p> <p>Current : 0.1 A to 50 A</p> <p>Power Factor : 1 to 0.5 (Inductive ,Capacitive)</p> <p>Frequency : 50 Hz to 60 Hz</p> <p>Time : 300 sec to 100 hours</p>	<p>Single phase @ 300 s</p> <p>515 <math>\mu</math>Wh/Wh</p> <p>to 565 <math>\mu</math>Wh/Wh</p> <p>Three phase @ 300 s</p> <p>570 <math>\mu</math>Wh/Wh</p> <p>to 665 <math>\mu</math>Wh/Wh</p>	5,000 to 30,000 /Channel		09050-10717
34	Single Phase / Three Phase Watt Meter	<p>AC Power : 0 W to 172.8 kW (three phase)</p> <p>: 0 W to 57.6 kW (per phase)</p> <p>Voltage : 10 V to 480 V</p> <p>Current : 0.001 A to 120 A</p> <p>Power Factor : 1 to 0 (Inductive, capacitive)</p> <p>Frequency : 50 Hz to 60 Hz</p>	<p>0.12 % for single phase</p> <p>0.20 % for three phase</p>	5,000 to 25,000 / channel	<p>High burden</p> <p>Direct measurement</p>	09050-10718



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35	AC Power Source (On-site)	AC Power : 0.15 W to 76.8 kW Voltage : 60 V to 480 V Current : 0.005 A to 160 A Power Factor : 1 to 0.5 (Inductive) Frequency : 50 Hz to 60 Hz	100 $\mu$ W/W to 215 $\mu$ W/W	5,000 to 28,000 /Channel	Direct measurement	09050-30710
36	Single phase energy meter,	Energy : (0.01875 Wh to 76.8 kWh)/phase	<u>Single/Three phase (<math>\leq 5</math> A)</u>	2,500 to 10,000 /Channel	Comparison measurement	09050-30711
	Single phase power meter,	Power : (0.0375 W to 76.8 kW)/phase	Power $\geq 400/450$ $\mu$ W/W			
36	Three phase energy meter,	Voltage: 15 V to 480 V	Energy $\geq 400/550$ $\mu$ Wh/Wh		1. $\leq 5$ A : single and three phases 2. $> 5$ A to 160 A : single phase	
	Three phase power meter (On-site)	Current : 0.005 A to 160 A PF : 1 to 0.5 (Inductive) Frequency : 50 Hz to 60 Hz Time : 30 min to 1 hour	<u>Single phase (<math>&gt; 5</math> A to 50 A)</u>  Power $\geq 200$ $\mu$ W/W Energy $\geq 400$ $\mu$ Wh/Wh  <u>Single phase (<math>&gt; 50</math> A to 160 A)</u>  Power $\geq 300$ $\mu$ W/W Energy $\geq 500$ $\mu$ Wh/Wh			
37	Phase Meter	Phase Angle : 0.000° to + 360.000° Frequency : 15 Hz to 100 kHz Amplitude (rms) : 50 mV to 120 V	$> 0.01^\circ$	9,000 to 27,000/item		09050-10920
	Phase Source	Phase Angle : 0.000° to 999.999° Frequency : 10 Hz to 100 kHz Amplitude (rms) : 50 mV to 120 V	$> 0.005^\circ$	18,000 to 45,000/item		09050-10921
39	Phase Meter Current Shunt	Range : 0.1 A to 50 A	$\geq 0.002^\circ$	5,000 (5 pts)		09050-10922
		Phase Angle : 0.000° to $\pm 180^\circ$ Frequency : 16 Hz to 850 Hz		+ 800 / point		



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40	Power Analyzer, Harmonics and Flicker	Output Voltage : 1020 V Output Current : 80 A  Frequency : 20 Hz and up to 1 kHz  Harmonics : 100 <sup>th</sup> , up to 6 kHz  Flicker : 16 Hz to 9 kHz	Voltage > 100 $\mu$ V/V Current > 150 $\mu$ A/A Power > 200 $\mu$ W/VA Frequency > 50 $\mu$ Hz/Hz	6,750 to 13,500/channel		09050-10930
41	Power Analyzer, Dips/ Swells	Voltage: 10 V to 1000 V Current  Current : 0.05 A to 20A  Dip/Swell amplitude : 10 % to 140 % of nominal amplitude  Time : 1 ms to 1 minute Frequency : 16 Hz to 850 Hz	$\geq 0.07$ %	2,250 to 9,000/ channel		09050-10931
42	Harmonic Current Meter	Current : 1 A to 120 A  Fund. Frequency : 50 Hz and 60 Hz  Harmonic current : 0.1 % to 10 % of fundamental  Harmonics : 1st to 40th, Har. Frequency : 50 Hz to 2.4 kHz	Harmonic < 1 % of Fundamental 0.07 %  Harmonic $\geq 1$ % of Fundamental 5.80 %	5,000 to 27,500/ channel	High burden  Direct measurement	09050-10932
43	Harmonics Power Source	Harmonics Power (0.0025 to 10) % of Fundamental Power Power Factor of Harmonics 1 to 0.5, Inductive or Capacitive Harmonics order : 2nd to 100th Total Power : 20 W to 50 kW Total Voltage : 50 V to 1000 V Total Current : 0.8 A to 50 A  Power Factor of Fundamental 1 to 0.5, Inductive or Capacitive Fundamental Frequency : 50 Hz to 60 Hz	0.32 mW/W to 8.2 mW/W	10,000 THB/channel (10 points)	1) Additional fee: 750 THB/ additional point 2) Digital sampling technique	09050-10933
44	Calibrator	DC Voltage : 0 V to 1 kV	40 $\mu$ V/V to 0.6 $\mu$ V/V	13,500 to 33,750/item	2,000 to 9,000 THB/item for additional adjustment.	09110-11310
		AC Voltage : 10 mV to 1 kV @ 10 Hz to 1 MHz	3.03 mV/V to 20 $\mu$ V/V			
		AC Voltage : 30 V to 1 kV @ 10 Hz to 100 kHz				
		DC Current : 0 A to 20 A	150 $\mu$ A/A to 4.5 $\mu$ A/A			
		AC Current : 100 mA to 20 A @ 10 Hz to 100 kHz	1.1 mA/A to 65 $\mu$ A/A			
		Resistance : 0 $\Omega$ to 1 G $\Omega$	1.3 m $\Omega$ / $\Omega$ to 1.8 $\mu$ $\Omega$ / $\Omega$			



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	Wideband Option	Up to 30 MHz	As specification	11,250/option	3,000 THB/option for additional adjustment.	09110-11311
	Power Option	As specification	As specification	6,750/option	2,500 THB/option for additional adjustment.	09110-11312
	Scope Option	300 MHz	As specification	13,500/option	2,000 to 6,500 THB/option for additional adjustment.	09110-11313
		600 MHz to 1 GHz	As specification	18,000/option		09110-11314
	High Current	DC Current : 30 A	22 $\mu$ A/A	11,250/piece		09110-11315
		AC Current : 30 A @ 10 Hz to 10 kHz	85 $\mu$ A/A to 114 $\mu$ A/A			
	Power Quality	AC Voltage		18,000/option		09110-11316
		-Delta Amplitude Verification, Static Condition 30 V, 300 V @ 50 Hz, 60 Hz	$3.20 \times 10^{-5}$ to $4.10 \times 10^{-5}$			
		-Delta Amplitude Verification, Flicker Condition 230 V @ 50 Hz	$4.13 \times 10^{-5}$			
		Composite Harmonic Verification - Voltage 0.12 V to 450 V @ 50 Hz, 60 Hz Type Wave : I, II, III, IV, Square and NRC 7030 - Current 0.11 A to 9.5 A @ 50 Hz, 60 Hz Type Wave : VI, VII, IECA, IECD and NRC 7030	$1.87 \times 10^{-3}$ to $2.90 \times 10^{-1}$	$1.83 \times 10^{-3}$ to $1.52 \times 10^{-1}$		
45	Oscilloscope Calibrator	Up to 600 MHz	As specification	40,000/item	2,000 to 13,500 THB/item for additional adjustment.	09110-11317
		Up to 2.1 GHz	As specification	45,000/item		09110-11318
46	Amplifier / Precision Power Amplifier	Up to 1kV 10 Hz up to 100 kHz	As specification	9,000/item	2,500 THB/function for additional adjustment.	09110-11319
47	Digital Multimeter	6 1/2 digit	As specification	9,000 to 13,500/item	5,400 THB for additional adjustment.	09110-11320
		7 1/2 digit	As specification	13,500 to 22,500/item	6,750 THB for additional calibrate with AC/DC Shunt using direct measurement method	09110-11321
		8 1/2 digit	As specification	22,500 to 27,000/item		09110-11322
48	Nano Voltmeter	DC Voltage: 1 mV to 100 mV	As specification	11,250 to 13,500/item	2,500 THB for additional adjustment.	09110-10120
49	DC High Voltage Divider	-10 kV to 10 kV	$30 \times 10^{-6}$ (Ratio)	$\leq 10$ kV 4,500 first point + 2,250 next point	Compared against DC high voltage reference system.	09060-10810
		>10 kV to 100 kV	$30 \times 10^{-6}$ (Ratio)	> 10 kV 5,630 first point + 2,250 next point		09060-10811
50	DC High Voltage Divider (On-site), DC High Voltage Measuring System (On-site)	200 kV	$\geq 30 \times 10^{-6}$ (Ratio)	60,000/item (5 voltage levels)	Additional fee: (1) 7,500/additional voltage level (2) Linearity Test: 10,000 /for 5 voltage levels	09060-30810



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51	DC High Voltage Source	-10 kV to 100 kV	30 $\mu$ V/V	9,000 to 18,000/item	Compared against DC high voltage reference system.	09060-10812
52	DC High Voltage Source (On-site)	200 kV	$\geq 170 \mu$ V/V	60,000/item (5 voltage levels)	Additional fee: (1) 7,500/additional voltage level (2) Linearity Test: 10,000 /for 5 voltage levels	09060-30811
53	DC High Voltage Meter	-10 kV to 100 kV	As specification	6,750 to 18,000/item	Compared against DC high voltage reference system.	09060-10813
54	DC High Voltage Meter (On-site)	200 kV	$\geq 30 \mu$ V/V	60,000/item (5 voltage levels)	Additional fee: (1) 7,500/additional voltage level (2) Linearity Test: 10,000 /for 5 voltage levels	09060-30812
55	High Voltage Capacitance & Dissipation Factor	Capacitance 10 pF to 1000 pF Voltage:10 kV to 100 kV Frequency : 50 Hz Dissipation Factor: $50 \times 10^{-6}$ to $1 \times 10^{-3}$	$\geq 80 \mu$ F/F for Capacitance $\geq 50 \times 10^{-6}$ for Dissipation Factor	12,500/item	Compared against standard capacitor using AC high voltage capacitance and inductance bridge.	09060-10820
		Capacitance 10 pF to 1000 pF Voltage:10 kV to 200 kV Frequency : 50 Hz Dissipation Factor: $50 \times 10^{-6}$ to $1 \times 10^{-3}$		17,500/item		09060-10821
56	AC High Voltage Divider	1 kV to 200 kV @ 50 Hz	$\geq 0.3 \%$ (Scale Factor)	11,500 to 27,500/item	Compared against AC high voltage reference system.	09060-10830
57	AC High Voltage Meter	1 kV to 200 kV @ 50 Hz	As specification	9,000 to 27,000/item	Compared against AC high voltage reference system.	09060-10831
58	AC High Voltage Meter, AC High Voltage Measuring System (Vrms, Vpeak, Vpeak/2 @ 50 Hz) (On-site)	100 kV	$\geq 0.3 \%$	67,500/item (5 voltage levels)	Additional fee: (1) 7,500/additional voltage level (2) Linearity Test: 10,000 /for 5 voltage levels	09060-30830
		200 kV	$\geq 0.3 \%$	82,500/item (5 voltage levels)		09060-30831
59	AC High Voltage Source	1 kV to 200 kV @ 50 Hz	$\geq 0.3 \%$	11,500 to 23,000/item		09060-10832
60	Voltage Transformer	3.3 kV to 33 kV @ 50Hz/60 Hz	Ratio error $\geq 0.01 \%$ Phase displacement $\geq 0.3 \text{ min}$	7,500 first tap + 1,900 next tap  per frequency, burden and power factor	Compared against voltage transformer reference system.  850 THB for additional point	09060-10833
61	Lightning Impulse Voltage Measuring System 1.2/50 $\mu$ s	100 kV	Scale factor $\geq 1.1 \%$ Time parameter $\geq 1.7 \%$	23,750/ item	Additional fee for time to chopping (2.0 to 6.0) $\mu$ s: 5,000 THB/point for MS rated $\leq 200$ kV, and 10,000 THB/point for MS rated $\leq 500$ kV.	09060-10840
		200 kV		26,250/ item		
		300 kV		31,250/ item		
		400 kV		33,750/ item		
		500 kV		36,250/ item		





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62	Lightning Impulse Voltage	100 kV	Scale factor $\geq 1.1\%$	71,250/ item (5 voltage levels)	Additional fee:  (1) 15,000/additional voltage level  (2) Linearity Test: 20,000/for 5 voltage levels	09060-30840
	Measuring System 1.2/50 $\mu$ s	200 kV	Time parameter $\geq 2.2\%$	78,750/ Item (5 voltage levels)		09060-30841
	(On-site)	300 kV		93,750/ item (5 voltage levels)		09060-30842
		400 kV		101,250/ item (5 voltage levels)		09060-30843
		500 kV		108,750/ item (5 voltage levels)		09060-30844
63	Switching Impulse Voltage	100 kV	Scale factor $\geq 0.8\%$	23,750/ item		09060-10841
	Measuring System 250/2500 $\mu$ s	200 kV	Time parameter $\geq 1.7\%$	26,250/ Item		
		300 kV		31,250/ item		
		400 kV		33,750/ item		
64	Switching Impulse Voltage	100 kV	Scale factor $\geq 1.1\%$	71,250/ item (5 voltage levels)	Additional fee:  (1) 15,000/additional voltage levels  (2) Linearity Test: 20,000/for 5 voltage levels	09060-30845
	Measuring System 250/2500 $\mu$ s	200 kV	Time parameter $\geq 2.2\%$	78,750/ Item (5 voltage levels)		09060-30846
	(On-site)	300 kV		93,750/ item (5 voltage levels)		09060-30847
		400 kV		101,250/ item (5 voltage levels)		09060-30848
65	Partial Discharge Calibrator	1 pC-1000 pC	$\geq 1.7\%$	15,000/ item (7 points x 2 polarities)	Additional fee: 1,500 /item for additional (1 point x 2 polarities)	09060-10850
66	Current Transformer	5 A to 1500 A @ 50 Hz/60 Hz	Ratio error $\geq 0.01\%$ Phase displacement $\geq 0.3$ min	7,500 first tap + 1,900 next tap per frequency, burden and power factor	Compared against current transformer reference system. 850 THB for additional point	09060-10860
67	Rogowski Coil (current transducer), Rogowski Current Transducer	10 A to 1500 A @ 50 Hz/60 Hz	$\geq 0.5\%$	7500/item (5 current levels) frequency 50 Hz or 60 Hz	Compared against current transformer reference system. Additional fee: 7500/additional 5 current levels	09060-10861
68	AC Resistance	1 $\Omega$ , 25 $\Omega$ , 100 $\Omega$ , 400 $\Omega$ at 60 Hz or 75 Hz	As Specification	9,000/piece		09040-10410
69	AC Resistor	1 $\Omega$ to 100 k $\Omega$ @ 1000 Hz	$> 0.20$ m $\Omega/\Omega$	5,000/piece	Measured by RLC digibridge and/or precision LCR meter, direct measurement, at desired frequencies.	09040-10411
	Additional Measurement at another Frequency	1 $\Omega$ to 100 k $\Omega$ @ 100 Hz to 100 kHz	$> 0.20$ m $\Omega/\Omega$	1,250 per frequency		09040-10412
70	Decade AC Resistor	1 $\Omega$ to 100 k $\Omega$ @ 1000 Hz	$> 0.20$ m $\Omega/\Omega$	5,000 first decade + 1,250 next step	Measured by RLC digibridge and/or precision LCR meter, direct measurement, at desired frequencies.	09040-10413
	Additional Measurement at another Frequency	1 $\Omega$ to 100 k $\Omega$ @ 100 Hz to 100 kHz	$> 0.20$ m $\Omega/\Omega$	(4,500 first decade + 1,250 next step) per one frequency		09040-10414
71	Fixed, Fused Silica Dielectric Standard Capacitors	10 pF @ 1000 Hz	0.087 $\mu$ F/F	20,000/piece/frequency	Comparing with a group of 10 pF standards	09040-10420
		1 pF @ 1000 Hz	0.71 $\mu$ F/F	17,500/piece/ frequency	Applied direct substitution method with the reference standard capacitors.	09040-10421
		10 pF @ 1000 Hz	0.70 $\mu$ F/F			
		100 pF @ 1000 Hz	0.70 $\mu$ F/F			



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72	Fixed Three Terminal, Nitrogen Dielectric Standard Capacitors	10 pF 100 pF @ 1000 Hz and 1592 Hz	1.2 $\mu$ F/F	12,500/piece/ frequency	Applied a null method using the basic ratio bridge.	09040-10422
		1000 pF @ 1000 Hz and 1592 Hz	3.5 $\mu$ F/F			
73	Two or Three Terminal Mica Dielectric Standard Capacitors	0.001 $\mu$ F, 0.01 $\mu$ F, 0.1 $\mu$ F and 1 $\mu$ F @ 1000 Hz	> 0.12 mF/F	5,630/piece	Applied a null method using the basic ratio bridge.	09040-10423
	Additional Measurement at another Frequency	0.001 $\mu$ F, 0.01 $\mu$ F, 0.1 $\mu$ F and 1 $\mu$ F @ 100, 120, 200, 400, 500 Hz, 2 kHz, 5 kHz, 10 kHz	> 0.12 mF/F	1,250/frequency	Applied a null method using the basic ratio bridge.	09040-10424
74	Four-Terminal Pair Capacitance Standard	1 pF, 10 pF, 100 pF, 1000 pF, 0.01 $\mu$ F, 0.1 $\mu$ F and 1 $\mu$ F @ 1000 Hz	> 0.12 mF/F	5,630/piece	Measured by precision capacitance bridge, direct measurement, at desired frequency.	09040-10425
75	Additional Measurement at another Frequency	1 pF, 10 pF, 100 pF, 1000 pF, 0.01 $\mu$ F, 0.1 $\mu$ F and 1 $\mu$ F @ 100 Hz to 100 kHz	> 0.20 mF/F	1,250/frequency	Measured by RLC Digibridge and/or Precision LCR Meter, direct measurement, at desired frequency.	09040-10426
76	Fixed Standard Capacitors	1 pF to 1 F @ 1000 Hz	> 0.20 mF/F	4,500/piece	Measured by RLC Digibridge and/or Precision LCR Meter, direct measurement, at desired frequency.	09040-10427
	Additional Measurement at another Frequency	1 pF to 1 F @ 12 Hz to 1 MHz	> 0.20 mF/F	1,250/frequency		09040-10428
77	Decade capacitor	1 pF to 10 mF @ 1000 Hz	> 0.12 mF/F	5,000 first decade + 1,250 next step	Applied a null method using the basic ratio bridge.	09040-10429
		1 pF to 1 F @ 1000 Hz	> 0.20 mF/F	4,500 first decade + 1,250 next step		09041-10420
	Additional Measurement at another Frequency	1 pF to 1 F @ 12 Hz to 1 MHz	> 0.20 mF/F	(4,500 first decade + 1,250 next step) per one frequency		09041-10421
						09041-10422
78	Precision Capacitance Bridge	1 pF, 10 pF, 100 pF and 1000 pF @ 1000 Hz or 1592 Hz	$\geq$ 1 $\mu$ F/F	27,500/item	Calibrated by comparing its reading against the reference standard capacitors. The correction functions are used to correct additional error due to the test fixture and test leads before measurement.	09041-10423
79	Fixed Standard Inductors	100 $\mu$ H, 1 mH, 10 mH, 100 mH, 1 H and 10 H @ 1000 Hz	> 0.16 mH/H	12,500/piece	Measured by the direct substitution method with the reference standard inductors.	09040-10430
	Additional Measurement at another Frequency	100 $\mu$ H, 1 mH, 10 mH, 100 mH, 1 H and 10 H @ 12 Hz to 1 MHz	> 0.20 mH/H	1,250/frequency	Measured by RLC digibridge and/or precision LCR meter, direct measurement, at desired frequencies.	09040-10431
80	Fixed standard Inductor	1 $\mu$ H to 10 H @ 1 kHz	> 0.20 mH/H	5,630/piece	Measured by RLC digibridge and/or precision LCR meter, direct measurement, at desired frequencies.	09040-10432
	Additional Measurement at another Frequency	1 $\mu$ H to 10 H @ 12 Hz to 1 MHz	> 0.20 mH/H	1,250/frequency		09040-10433



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81	Decade Inductors	1 $\mu$ H to 10 H @ 1000 Hz	> 0.20 mH/H	4,500 first decade + 1,250 next step	Measured by RLC digibridge and/or precision LCR meter, direct measurement, at desired frequencies.	09040-10434
	Additional Measurement at another Frequency	1 $\mu$ H to 10 H @ 12Hz to 1 MHz	> 0.20 mH/H	(4,500 first decade + 1,250 next step) per one frequency		09040-10435
82	LCR Meter with 4 terminal pair configuration/without 4 terminal pair configuration	0.001 $\mu$ F, 0.01 $\mu$ F, 0.1 $\mu$ F and 1 $\mu$ F @ 100, 120, 200, 400, 500 Hz, 1 kHz, 2 kHz, 5 kHz, 10 kHz	> 0.12 mF/F	To be determined	Calibrated by comparing its reading against the standard capacitors, standard inductors and standard resistors. The correction functions are used to correct additional error due to the test fixture and test leads before measurement.* For 4 terminal pair configuration	09040-10436
		1 pF, 10 pF, 100 pF, 1000 pF @ 1000 Hz*	> 0.12 mF/F			
		100 $\mu$ H, 1 mH, 10 mH, 100 mH, 1 H and 10 H @ 1000 Hz	> 0.16 mH/H			
		1 $\Omega$ , 10 $\Omega$ , 100 $\Omega$ , 1000 $\Omega$ @ 1 kHz	> 0.20 m $\Omega$ / $\Omega$			
83	Power Sensor	100 kHz to 18 GHz, 1 mW	1.0% to 2.0%	20,000/item	Using DC substitution Method	09090-11110
84	Power meter	As specification	As specification	11,250/item		09090-11111
85	Feedthrough Mount	100 kHz to 18 GHz, 1 mW	0.5% to 1.3%	21,000/item	Using Direct measurement Method	09090-11114
86	RF Attenuator					
	- Fix Attenuator/Step Attenuator	10 MHz to 18 GHz, 10 dB to 80 dB	0.013 dB to 0.22 dB upto frequency range	3,200/Freq. Point	IF substitution Method (1)	09090-11120
	- Attenuation in Coaxial line/Passive device	100 kHz to 18 GHz, 10 dB to 80 dB	0.027 dB to 0.20 dB upto frequency range	3,000/Freq. Point	IF substitution Method (2)	09090-11121
87	Audio Attenuator	31.5 Hz to 100 kHz	As Specification	3,500/Freq.Point		09090-11122
88	Electrical Field Strength	Frequency 100 kHz to 6 GHz	0.7 dB to 1.1 dB	25,000/item	Using Direct measurement by comparing to ther reference standard field	09090-11030
89	Oscilloscope	As specification	As specification	15,000/item		09090-11160
90	Spectrum Analyzer	As specification	As specification	50,000/item		09090-11161
91	Network Analyzer	As specification	As specification	67,500/item		09090-11162
92	Synthesizer Signal Generator	Up to 225 MHz	As specification	8,000 to 10,000/item		09090-11163
93	Function Generator	As specification	As specification	10,000/item		09090-11164
94	RF Signal Generator	As specification	As specification	22,500/item	Excluded AM, FM and phase modulation. Included AM and FM modulation	09090-11170
				33,750/item		
95	Other of RF Microwave Equipment	As specification	As specification	As Cost		09090-11171
96	RF Voltmeter	10 MHz to 1 GHz	0.4%	11,250/item	Comparison with TVC standard	09090-11172
97	RF Voltage Source	As specification	As specification	13,500/item		09090-11173
98	Directional Coupler	100 MHz to 18 GHz	As Specification	3,130/Freq.Point		09090-11174
99	Standard Optical Power Meter	1 mW to 20 mW @ 488 nm,515 nm	$\geq$ 0.5 %	9,380 first point +	Applied direct comparison method with standard calorimeter.	09100-12400
		50 uW to 20 mW @ 633 nm.		3,500 next point		
		10 uW to 3 mW @ 1310 nm Band				
		10 uW to 10 mW @ 1550 nm Band				



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100	Optical Power Meter	1 mW to 20 mW @ 488nm,515nm  50 uW-to 20 mW @ 633 nm 10 uW to 3 mW @ 1310 nm Band 10 uW to 10 mW @ 1550 nm Band	≥ 0.7 %	5,500 first point +  1,750 next point	Applied direct comparison method with standard power meter.	09100-12401
	Optical Power Meter	100 mW to 10 W @10600 nm	≥ 4 %	7,500 first point+2,500 next point	Substitutional Method monitor or beam splitter method	09100-12402
	Laser Energy Meter	1mJ to 100 mJ @ 532 nm, 1064 nm	≥ 2.4 %	7,500 first point+2,500 next point	Substitutional Method monitor or beam splitter method	09100-12403
	Average pulse power for laser energy meter	10 mW to 1 W @ 532 nm, 1064 nm	≥ 2.4 %	7,500 first point+2,500 next point	Substitutional Method monitor or beam splitter method	09100-12404
101	DC magnetic flux density / Reference magnet	0.1 mT < B < 5 mT	≥ 0.8 %	9,000/item	Compared with the standard maintained by NIMT Megnetic Laboratory.	09070-11020
		5 mT < B < 20 mT	≥ 0.2 %			
		20 mT < B < 30 mT	≥ 0.1 %			
		30 mT < B < 2.4 T	≥ 0.1 %			
102	DC magnetic flux density / Magnetic field generator	0.1 mT < B < 5 mT	≥ 0.8 %	9,000 first point + next point 630	Compared with the standard maintained by NIMT Megnetic Laboratory.	09070-11021
		5 mT < B < 20 mT	≥ 0.2 %			
		20 mT < B < 30 mT	≥ 0.1%			
103	DC magnetic flux density / Gauss / Tesla meter	0.1 mT < B < 5 mT	≥ 0.8 %	9,000 first point + next point 630	Compared with the standard maintained by NIMT Megnetic Laboratory.	09070-11022
		5 mT < B < 20 mT	≥ 0.2 %			
		20 mT < B < 30 mT	≥ 0.1 %			
		30 mT < B < 2.4 T	≥ 0.08 %			
104	Frequency Source - Rubidium - Quartz, Others	1 MHz, 5 MHz, 10 MHz, 1 PPS	≤ 1 x 10 <sup>-12</sup>	13,500/item		09080-10221
105	Frequency Counter Timer Counter	Up to 1 GHz	1 x 10 <sup>-6</sup> to 1 x 10 <sup>-6</sup>	4,500/item		09080-10231
106	Frequency Meter	10 kHz to 225 MHz	3 x 10 <sup>-13</sup> to 5 x 10 <sup>-10</sup>	6,250/item		09080-10232
107	Tachometer	As specification	As specification	3,380/item		09080-10322
108	Stopwatch	As specification	As specification	2,250/item		09080-10331
<b>On-site Calibration</b>						
109	Standard Frequency Source for Remote Frequency Standard	1 MHz, 5 MHz, 10 MHz	≤ 1 x 10 <sup>-12</sup>	13,500/item		09080-30212