Laboratory	**Yadav Measurements Private Limited, Plot No. 373-375, RIICO, Bhamashah Industrial Area, Kaladwas, Udaipur, Rajasthan**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Discipline	**Electro – Technical Calibration**	**Issue Date**	**24.07.2014**
Certificate Number	**C-0035**	**Valid Until**	**23.07.2016**
Last Amended on	**11.09.2015**	**Page**	**1 of 14**

Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
I. SOURCE			
1. DC VOLTAGE $	1mV to 100 mV 100 mV to 1000 V	0.37 % to 0.013 % 0.013 % to 0.008 %	Direct Method Using Fluke5500A
2. DC CURRENT $	1 mA to 100 mA 100 mA to 1 A 1 A to 11 A	0.02 % to 0.03 % 0.03 % to 0.05% 0.05 % to 0.58 %	Direct Method/ Using Fluke5500A
3. RESISTANCE $	1 mΩ to 100 mΩ 0.1Ω to 1 Ω 1 Ω to 10 Ω 10 Ω to 10 MΩ 10 MΩ to 100 MΩ 100 MΩ to 330 MΩ 330 MΩ to 1 GΩ	0.6 % to 0.2 % 0.18 % to 0.06 % 0.06 % to 0.004 % 0.004 % to 0.015 % 0.015 % to 0.12 % 0.12 % to 1.14 % 1.5 %	Comparison Method Using μΩ meter Using 8½ DMM HP3458 Using 8½ DMM Decade resistance box
4. AC VOLTAGE $	**50 Hz** 10 V to 480 V	0.011 %	Direct Method/ Using TS/VCS/COM3003
	40 Hz to 1 kHz 1 V to 700 V	0.25 % to 0.20 %	Using Fluke5500A
	1kHz 10 mV to 1 V	0.64 % to 0.25 %	
	50Hz 700 V to 90 kV	0.50 %	Using Capacitive Divider + DMM
5. AC CURRENT $	**40 Hz to 70 Hz** 1 mA to 120 A	0.021 % to 0.012 %	Direct Method/ Using MTS/VCS/COM3003
	40 Hz to 1 kHz 1 mA to 1 A	0.35 %	Using Fluke5500A

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	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
6.	**FREQUENCY** $	10 Hz to 225 MHz	0.015 %	Direct Method/ Using Fluke + Signal generator by Direct Method
7.	**POWER FACTOR** #	**40 Hz to 70 Hz** +1 to -1	0.005 PF	Direct Method/ Using MTS/VCS/COM3003
8.	**AC POWER / ENERGY** # **1 PHASE & 3 PHASE ACTIVE COS Ø ± 0.1 TO 1 REACTIVE SIN Ø ± 0.10 TO 1 APPARENT**	**45 Hz to 65 Hz** 40 V to 240 V 1 mA to 10 mA 11 mA to 20 mA 21 mA to 100 mA 101 mA to 120 A		Direct Method/ Using COM3003 Make:- ZERA
		Active / Reactive		
		0.004 to 7.2 W/VAr	0.036 %	
		0.044 to 14.4 W/VAr	0.016 %	
		0.084 to 72 W /VAr	0.009 %	
		0.404 W/VAr to 86.4 kW/kVAr	0.007 %	
		Apparent	Apparent	Using Com 3003 Zear By Direct Method
		0.004 to 7.2 VA	0.052 %	
		0.044 to 14.4 VA	0.023 %	
		0.084 to 72 VA	0.013 %	
		0.404 VA to 86.4 kVA	0.008 %	
		45 Hz to 65 Hz 241 V to 320 V 1 mA to 10 mA 11 mA to 20 mA 21 mA to 100 mA 101 mA to 120 A		

	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
		Active / Reactive		
		0.0241 to 9.6 W/VAr	0.036 %	
		0.265 to 19.2 W /VAr	0.016 %	
		0.506 to 96 W /VAr	0.008 %	
		2.434 W/VAr to 115.2 kW/kVAr	0.009 %	
		Apparent		
		0.0241 to 9.6 VA	0.052 %	
		0.265 to 19.2 VA	0.023 %	
		0.506 to 96 VA	0.011 %	
		2.434 VA to 115.2 kVA	0.011 %	
	AC POWER	**45 Hz to 65 Hz**		
	1 PHASE & 3 PHASE	10 V to 240 V	0.9%	
	ACTIVE	0.1 A to 10 A		
	COS Θ ±0.01 to 0.1	10 mW to 720 W		
9.	**HARMONIC** #	**2 to 40th harmonic**		Direct Method/
	VOLTAGE	1 V to 240 V	0.6 %	Using MTS/
	CURRENT	50 mA to 24 A	0.6 %	MT3000
10.	**FREQUENCY** ♣			Direct Method /
	40 to 240V	40 Hz to 70 Hz	0.03 %	Using 3Φ cal system ZERA TPZ/MTE
11.	**AC VOLTAGE** ♣	**50 Hz**		
		10 V to 550 V	0.011 %	Direct Method / Using MTS /
		40 Hz to 1 kHz		VCS/ COM3003/CALMET
		1 V to 700 V	0.25 % to 0.20 %	
		1 kHz		Using Fluke5500A
		10 mV to 1 V	0.64 % to 0.25 %	
		50Hz		
		700V to 90kV	0.50%	Using Capacitve Divider & DMM

Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
12. AC CURRENT ♣	**45 Hz to 70Hz**		
	1mA to 120A	0.04%	Direct Method/ Using COM3003
	50Hz		
	120A to 2000A	0.09%	Using ELTEL CT set up & MTE PRS 400.3 by Direct Method
II. MEASURE			
1. DC VOLTAGE $	1 mV to 5 mV	0.13 % to 0.03 %	Direct Method/ Using 8½ DMM HP3458
	5 mV to 10 mV	0.03 % to 0.014 %	
	10 mV to 40 mV	0.014 % to 0.005 %	
	40 mV to 1000 V	0.005 % to 0.004 %	
2. DC CURRENT $	1 mA to 100 mA	0.01 %	Direct Method/ Using 8½ DMM HP3458
	100 mA to 1 A	0.01 % to 0.03 %	
	1 A to 11 A	0.03 % to 0.58 %	Using shunt
3. DC RESISTANCE $	1 mΩ to 100 mΩ	0.5 % to 0.2 %	Direct Method/ Using μΩ meter
	0.1 Ω to 1 Ω	0.18 % to 0.06 %	
	1 Ω to 10 Ω	0.06 % to 0.004 %	
	10 Ω to 10 MΩ	0.004 %to0.015 %	Using 8½ DMM HP3458
	10 MΩ to 100 MΩ	0.015 % to 0.12 %	
	100 MΩ to 330 MΩ	0.12 % to 1.14 %	Using 8½ DMM
	330 MΩ to 1 GΩ	1.2 %	
4. AC VOLTAGE $	**50 Hz**		
	10 V to 480 V	0.011 %	Using COM3003
	480 to 33 kV	0.2 %	Using 6 ½ DMM Standard PT (6.6kV), 33 kV Capacitor &EPD& EMVT & MTE/MT3000
	33 kV to 90 kV	0.2 %	Using 6 ½ DMM Standard PT, 132 kV Capacitor &EPD & EMVT & MTE/MT3000

	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
	AC VOLTAGE $	**40Hz to 1 kHz**		
		1 V to 120 V	0.15 % to 0.10 %	Using 8½ DMM HP3458
		120 V to 700 V	0.10 % to 0.13 %	
		At 1 kHz		Using 8½ DMM HP3458
		10 mV to 1 V	0.07 % to 0.15 %	
		1 kHz to 300 kHz		Using 8½ DMM HP3458
		0.5 V to 10 V	0.37 % to 0.6 %	
5.	**AC CURRENT** $	**40 Hz to 70 Hz**		
		1 mA to 120 A	0.021 % to 0.012 %	Using COM3003
		40 Hz to 1 kHz		
		1 mA to 1 A	0.30 %	Using 8½ DMM HP3458
6.	**FREQUENCY** ♯	10 Hz to 225 MHz	0.0020 %	Direct Method Using 53131A Frequency Counter
7.	**POWER FACTOR** ♯	**40 Hz to 70 Hz** +1 to -1	0.005 PF	Direct Method/ Using COM3003
8.	**TIME** $	5 s to 6000 s	0.03 s to 0.60 s	Comparison Method/ Using 53131A Frequency Counter
9.	**AC POWER / ENERGY** ♯	**45 Hz to 65 Hz**		Using COM 3003 Zera By Comparison Method
	1 phase & 3 phase	40 V to 240 V		
	Active	1 mA to 10 mA		
	Cos Ø ± 0.1 to 1	11 mA to 20 mA		
	Reactive	21 mA to 100 mA		
	Sin Ø ± 0.10 to 1	101 mA to 120 A		
	Apparent	**Active / Reactive**		
		0.004 to 7.2 W/VAr	0.036 %	
		0.044 to 14.4 W/VAr	0.016 %	

Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
	0.084 to 72 W /VAr 0.404 W/VAr to 86.4 kW/kVAr	0.009 % 0.007 %	
	Apparent 0.004 to 7.2 VA 0.044 to 14.4 VA 0.084 to 72 VA 0.404 VA to 86.4 kVA	Apparent 0.052 % 0.023 % 0.013 % 0.008 %	
	45 Hz to 65 Hz 241 V to 320 V 1 mA to 10 mA 11 mA to 20 mA 21 mA to 100 mA 101 mA to 120 A		
	Active / Reactive 0.0241 to 9.6 W/VAr 0.265 to 19.2 W /VAr 0.506 to 96 W /VAr 2.434 W/VAr to 115.2 kW/kVAr	Active /Reactive 0.036 % 0.016 % 0.008 % 0.009 %	
	Apparent 0.0241 to 9.6 VA 0.265 to 19.2 VA 0.506 to 96 VA 2.434 VA to 115.2 kVA	Apparent 0.052 % 0.023 % 0.011 % 0.011 %	
10. AC POWER / ENERGY $ **1 phase & 3 phase, Active** **Cos Ø :± 0.01 to ±0.1**	**45 Hz to 65 Hz** 10 V to 240 V 0.1 A to 10 A 10 mW to 720 W	0.9 %	Using COM3003 by Comparison Method

	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
11.	**CURRENT TRANSFORMER ♯ (Primary Injection)**	5 A to 2000 A (Primary) 1 A, 5 A (Secondary)	0.01 % 0.7 Minute	Using Precision current transformer & Automatic Instrument transformer test set (AIITS)
	Ratio error **Phase error**	2000 A to 10000 A (Primary) 1 A, 5 A (Secondary)	0.05 % 2.5 Minute	By Direct Method
12.	**CURRENT TRANSFORMER ♯** **- Ratio error**	10 A to 10000 A (Primary) 1 A, 5 A. (Secondary)	0.09 % 2.8 Minute	Using Portable CT/VT Calibrator
	- Phase error	& 5 A (Primary) 5 A (secondary)		Using Portable CT Calibrator
13.	**VOLTAGE TRANSFORMER / CAPACITOR VOLTAGE TRANSFORMER/ VOLTAGE DIVIDER ♯**	2.2 kV to 33 kV (Primary) 50 V to 144 V (Secondary)	0.04 % 4 Minute	Using Electronic Potential Divider 33kV & Standard Capacitor & EMVT By Direct Method
	Ratio error **Phase Error**	33 kV to 132 kV (Primary) 50 V to 144 V (Secondary)	0.043 % 4 Minute	Using Electronic Potential Divider 132kV + Standard Capacitor + RE & Automatic instrument transformer test set (AIITS) & EMVT By Direct Method
14.	**VOLTAGE TRANSFORMER / CAPACITOR VOLTAGE TRANSFORMER/ VOLTAGE DIVIDER RATIO ERROR PHASE ERROR ♯**	2.2 kV to 33 kV (Primary) 50 V to 144 V (Secondary)	0.15 % 5.6 Minutes	Using Portable CT/VT Calibrator By Direct Method

	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
15.	**CT-VT COMPARATOR / BRIDGE** ♯	Current 1 A , 5 A		Using Precision current transformer & Automatic Instrument transformer test set (AIITS) by Comparison Method
		Ratio error Phase error	RE 0.005 % PE 0.3 min	
		Voltage 63.5 V, 110 V		Using Electronic Potential Divider 33kV + Standard Capacitor & EM by Comparison Method
		Ratio error Phase error	0.005 % 0.3 min	
16.	**HARMONIC** ♯	2 to 40th harmonic		
	VOLTAGE	1 V to 240 V	0. 6 %	Using MTS/ MT3000 by Direct Method
	CURRENT	50 mA to 24 A	0.6 %	
17.	**AC VOLTAGE** ♣	**50 Hz** 10 V to 480 V	0.03 %	Using COM3003 By Direct/ Comparison Method
		50 Hz 480 V to 33 kV	0.20 %	Using 6 ½ DMM Standard PT (6.6kV), 33 kV Capacitor +EPD +EMVT & MTE/MT3000 By Direct/ Comparison Method
		50 Hz 33 kV to 90 kV	0.20 %	Using 6 ½ DMM Standard PT, 132 kV Capacitor +EPD +EMVT & MTE/MT3000 By Direct/ Comparison Method

	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
18.	**AC CURRENT ♣**	**45 Hz to 70 Hz** 1 mA to120 A	0.04 %	Using COM3003 by Direct/ Comparison Method
		50 Hz 120 A to 2000 A	0.09 %	Using ELTEL CT set up + MTE PRS 400.3 by Direct/ Comparison Method
19.	**DC RESISTANCE ♣**	1 Ω to 10 Ω 10 Ω to 100 MΩ 100 MΩ to 1 GΩ	0.5 % 1.1 % 1.5 %	Using Micro ohm meter Using 6½ DMM By Direct Method
20.	**Voltage Transformer / Capacitor Voltage Transformer/Voltage Divider** **-Ratio Error** **-Phase Error $**	6.6 kV to 11 kV (Priamary) 50 V to 144 V (Secondary)	0.017 % to 0.013 % 1.5 min	Using EMVT & Automatic Instrument Transformer Test Set (AIITS) by Direct Method
		11 kV to 33 kV (Priamary) 50 V to 144 V (Secondary)	0.013 % 1.5 min	
		33 kV to 132 kV (Priamary) 50 V to 144 V (Secondary)	0.013 % to 0.017 % 2 min	
21.	**Voltage Transformer / Capacitor Voltage Transformer/Voltage Divider** **-Ratio Error** **-Phase Error #**	2.2 kV to 6.6 kV (Priamary) 50 V to 144 V (Secondary)	0.04 % 4 min	Using EPD 33 kV & Standard Capacitor & EMVT by Direct Method

	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
22.	**Voltage Transformer/Capacitor Voltage Transformer/ Voltage Divide3r -Ratio Error -Phase Error**	6.6 kV to 33 kV (Priamary) 50 V to 144 V (Secondary)	0.04 % 4 min	Using EPD 33kV & Standard Capacitor & EMVT by Director Method
		33 kV to 132 kV (Priamary) 50 V to 144 V (Secondary)	0.043 % 4 min	Using EPD 132 kV & Standard Capacitor & RE & AITTS & EMVT by Director Method
23.	**Total harmonic Distortion**	2nd to 40 th Harmonic		
	Voltage	1 V to 240 V	0. 0.6 %	Using Zero MT 3000 Power/Energy Meter with Source MTS by Direct/Comparison Method
	Current	50 mA to 24 A	0. 0.6 %	
24.	**Distrotion Factor**	2nd to 40 th Harmonic		
	Voltage	1 V to 240 V	0. 0.6 %	Using Zero MT 3000 Power/Energy Meter with Source MTS by Direct/Comparison Method
	Current	50 mA to 24 A	0. 0.6 %	

MOBILE CALIBRATION FACILITY

MEASURE

1.	**FREQUENCY**	10 Hz to 225 MHz	0.002 %	Using Frequency Counter HP 53131A By Comparison Method
2.	**AC VOLTAGE**	**40 to 70 Hz** 10 V to 480 V	0.03 %	Using Ref. Power / Energy Calibrator, COMM 3003 Make:- Zera By Comparison Method

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	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
3.	**AC CURRENT**	**45 Hz to 70 Hz** 1 mA to 120 mA	0.04 %	Using Ref. Power / Energy Calibrator, COMM 3003 Make:- Zera by Comparison Method
4.	**AC POWER / ENERGY** **1 phase & 3 phase** **Active** **Cos Ø ± 0.1 to 1** **Reactive** **Sin Ø ± 0.10 to 1** **Apparent**	**45 Hz to 65 Hz** 40 V to 320 V **Active** 1 mA to 20 mA 0.004 W to 19.2 W 20 mA to 120 A 19.2 W to 115.2 kW	 0.042 % 0.011 %	Using Ref. power / energy calibrator, COMM 3003 Make:- Zera By Direct Method
		Reactive 1 mA to 20 mA 0.004 VAr to 19.2 Var 20 mA to 120 A 19.2 VAr to 115.2 kVAr	 0.043 % 0.011 %	
		Apparent 1 mA to 20 mA 0.004 VA to 19.2 VA 20 mA to 120 A 19.2 VA to 115.2 kVA	 0.056 % 0.015 %	
	AC POWER / ENERGY **1 phase & 3 phase** **Active** **Cos Ø :± 0.01 to ±0.1**	**Active** **45 Hz to 65 Hz** 10 V to 240 V 0.1 A to 10 A 10 mW to 720 W	 0.9 %	

	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
5.	**POWER FACTOR**	PF: -1 to +1	0.008 PF	Using Ref. power / energy calibrator, COMM 3003 Make:- Zera By Comparison Method
6.	**CURRENT TRANSFORMER (Primary Injection) RATIO ERROR PHASE ERROR**	5 A to 2000 A (Primary) 1 A , 5 A (Secondary)	0.015 % 0.65 min	Using Precision Current Transformer & Automatic Instrument Transformer Test Set (AIITS) By Direct Method
7.	**CURRENT TRANSFORMER RATIO ERROR PHASE ERROR**	10 A to 10000 A (Primary) 1 A, 5 A (Secondary) 5 A (Primary) 5 A (Secondary)	0.09 % 2.8 min	Using Portable Ct/VT Calibrator Using Portable CT Calibrator By Direct Method
8.	**VOLTAGE TRANSFORMER/ CAPACITOR VOLTAGE TRANSFORMER/ VOLTAGE DIVIDER RATIO ERROR PHASE ERROR**	2.2 k V to 33 kV (Primary) 50 V to 144 V (Secondary)	0.04 % 4 min	Using Electronic Potential Divider 33 kV & Standard Capacitor & EMVT By Direct Method
9.	**VOLTAGE TRANSFORMER/ CAPACITOR VOLTAGE TRANSFORMER/ VOLTAGE DIVIDER RATIO ERROR PHASE ERROR**	2.2. kV to 33 kV (Primary) 50 V to 144 V (Secondary)	0.15 5 5.6 min	Using Portable CT/VT Calibrator By Direct Method

Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
10. CT-VT COMPARATOR/ BRIDGE	Current		Using Precision Current
	1 A, 5 A		Transformer &
	Ratio Error	0.005 %	Automatic Instrument
	Phase Error	0.3 min	Transformer Test Set (AIITS)
	Voltage		Using Electronic Potential
	63.5 V, 110 V		Divider 33 kV & Standard
	Ratio Error	0.005 %	Capacitor & EMVT
	Phase Error	0.3 min	By Direct Method
SOURCE			
1. FREQUENCY	40 Hz to 225 Hz	0.002 %	Using Ref. power / energy calibrator, COMM 3003 Make:- Zera By Comparison Method
2. AC VOLTAGE	**40 Hz to 70 Hz**		
	10 V to 480 V	0.03 %	Using Ref. power / energy calibrator, COMM 3003 Make:- Zera By Comparison Method
3. AC CURRENT	**45 Hz to 70 Hz**		
	1 mA to 120 mA	0.04 %	Using Ref. power / energy calibrator, COMM 3003 Make:- Zera By Comparison Method

	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
4.	**AC POWER / ENERGY** **1 phase & 3 phase** **Active** **Cos Ø ± 0.1 to 1** **Reactive** **Sin Ø ± 0.10 to 1** **Apparent**	**45 Hz to 65 Hz** 40 V to 320 V **Active** 1 mA to 20 mA 0.004 W to 19.2 W 20 mA to 120 A 19.2 W to 115.2 kW **Reactive** 1 mA to 20 mA 0.004 VAr to 19.2 Var 20 mA to 120 A 19.2 VAr to 115.2 kVAr **Apparent** 1 mA to 20 mA 0.004 VA to 19.2 VA 20 mA to 120 A 19.2 VA to 115.2 kVA	 0.042 % 0.011 % 0.043 % 0.011 % 0.053 % 0.015 %	Using Ref. power / energy calibrator, COMM 3003 Make:- Zera By Direct Method
	AC POWER / ENERGY **1 phase & 3 phase** **Active** **Cos Ø :± 0.01 to ±0.1**	**45 Hz to 65 Hz** 10 V to 240 V 0.1 A to 10 A 10 mW to 720 W	0.9 %	
5.	**POWER FACTOR**	PF: -1 to +1	0.008 PF	Using Ref. power / energy calibrator, COMM 3003 Make:- Zera By Comparison Method

*** Measurement Capability is expressed as an uncertainty (±) at a confidence probability of 95%**
$Only in Permanent Laboratory
♣Only for Site Calibration
 # The laboratory is also capable for site calibration however, the uncertainty at site depends on the prevailing actual environmental conditions and master equipment used.

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