



Israel Electric Corporation
Marketing Division
Central Metering Unit

17 Ha-Lehi Street, Bnei Brak 51200, Israel
Tel. 972 3 6174859 Fax 972 3 6174908



Test Certificate

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Date: 10/07/2007

Test Certificate No.: 167-2007

According to procedure No. n/a

And/or according to requirement: 29-2007

Date of acceptance: 25/06/2007

Description of tested item: Power Meter

Manufacturer: SATEC

Type: PM130 PLUS

Serial No: 72446, 72447

Status: new

Customer: SATEC

Address: Har Ha-tzofim, Science Based Industrial Park,
POBox 45022, Jerusalem 91450, Israel.

Environmental conditions: Ambient temperature: $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$; relative humidity: $50\% \pm 20\%$

Method: Comparison with reference standard

Suggested next test date: n/a

List of main equipment used for the calibration

Description/Type	Manufacturer	Serial number	Test date
RMM 3000	Zera	7/5302	3/2006
MTS 320	Zera	7/5130	6/2007
9500	F.W.Bell	7/4342	11/2004
UNITEST	BEHA	K2251/19	2/2007
UH 28 M	RB	7/4009	2/2004
GP3050	SCHLUMBERGER	7/5098	6/2007
VCL 4034 MH	VOTSCH	7/5282	9/2006
51-548-1	ZERA	7/3671	11/2004

The reported expanded measurement uncertainties correspond to the coverage probability of approximately 95% and based on coverage factor $K=2$, or as stated in enclosed document.

The results of calibration characterize the calibrated item at the time of calibration only, and not include any changes after this time.

Reference should be made the full document. The document or part of it should not be copied without confirmation with the laboratory manager.

This Calibration meets the requirements of ISO/IEC 17025 and reference quantities of the laboratory are traceable to national and international reference quantities.

The use of ISRAC symbol relates to tests/calibrations which are included in the laboratory scope of accreditation, as detailed in the accreditation certificate.

ISRAC is one of the signatories of the International Accreditation Cooperation (ILAC) Agreement for the mutual recognition of test and calibration reports/certificates.



Signature:

Date: 10/07/07

Tested by: G. Mitelman

Signature:

Date: 12/7/07

Verified by:

בן ציון רכנטי
מהנדס מומחה
מנהל טכני במעבדת תקנים
מחלקת מבדקה למונים

Central Metering Unit – Standard Laboratory 17, Ha-Lechi Str. Benei-Braq 51200 Tel. +972 3 6174859 Fax +972 3 6174908	Test Report No. 167-2007	DATE: 2007-07-12
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Test report of samples "Power Meter PM130 PLUS"

List of samples

Manufacturer	Type	Serial number	Reference voltage, V	Rated (maximum) current, A	Reference frequency, Hz
SATEC	PM130 PLUS	724446	230/400	3 x 5(10)	50
		724447			

List of performed tests

# item in IEC62053-22- class 0.5 s	# item in IEC6205 2-11	Test	Pass/No pass	# test
8.1	-	Error due to variation of the current	Pass	1.
8.2	-	Error due to ambient temperature variation	Pass	2.
8.2	-	Error due to voltage variation	Pass	3.
8.2	-	Error due to frequency variation	Pass	4.
8.2	-	Error due to reversed phase sequence	Pass	5.
8.2	-	Error due to voltage unbalance	Pass	6.
8.2.1	-	Error due to harmonic components in the current and voltage circuit	Pass	7.
8.2.2	-	Error due to sub-harmonics in the a.c. current circuit	Pass	8.
8.2.3	-	Error due to magnetic indication of external origin 0.5 mT	Pass	9.
8.3.1	-	Test of initial start-up of the meter	Pass	10.
7.4	7.3.3	AC voltage Insulation test	Pass	11.
7	7.3.2	Impulse voltage tests for circuits and between the circuits	Pass	12.

Expanded uncertainty of energy error: 200ppm at PF = 1 and 250ppm at PF = 0.5

TEST RESULTS

1. Error due to variation of the current

1.1. Balanced loads

Error limits IEC 62053-22 (± %)	Meter No. 72446	Meter No.72447	Power Factor	Value of Rated Current (% In)
Class 0.5S				
1.0	-0.91	-0.25	1	1
1.0	-0.76	-0.20	0.5 lag.	2
	-0.51	-0.39	0.8 lead.	
0.5	-0.23	-0.10	1	5
0.6	-0.10	0.05	0.5 lag.	10
	-0.04	0.02	0.8 lead.	
1.0	-0.25	0.09	0.25 lag.,	
	-0.13	0.03	0.5 lead.	
0.5	0.00	0.02	1	100
0.6	-0.10	0.03	0.5 lag.	
	0.02	0.06	0.8 lead.	
1.0	-0.15	-0.06	0.25 lag.	
0.5	-0.01	0.08	1	120
0.6	0.27	0.31	0.5 lag.	
	-0.01	0.12	0.8 lead.	
1.0	-0.17	-0.04	0.25 lag.	
	0.33	0.35	0.5 lead.	

1.2 Carrying a single-phase load, but with balanced polyphase voltages applied to voltage circuits

Error limits IEC 62053-22 ($\pm$ %)	Meter No. 72446	Meter No.72447	Power Factor	Current in Phase	Value of Rated Current (% In)
Class 0.5S	Measurement Errors ($\pm$ %)				
0.6	-0.15	0.08	1	R	5
	-0.24	-0.09		S	
	-0.27	-0.12		T	
1.0	-0.03	0.22	0.5 lag.	R	10
	-0.24	0.04		S	
	-0.06	0.00		T	
0.6	0.00	0.00	1	R	100
	0.02	0.00		S	
	0.00	0.00		T	
1.0	-0.01	-0.01	0.5 lag.	R	
	-0.07	0.00		S	
	-0.03	0.02		T	
0.6	0.01	-0.01	1	R	120
	0.05	0.05		S	
	0.01	0.02		T	
1.0	-0.05	-0.01	0.5 lag.	R	
	-0.08	-0.01		S	
	-0.08	-0.05		T	

2. Error due to ambient temperature variation

Limits mean temperature coefficient IEC 62053-22 ($\pm$ %/K) Class 0.5S	Meter No.72446 Mean temperature coefficient ($\pm$ %/K)				Power Factor	Value of Rated Current (% In)
	From 3° to -17° C	From 23° to 3° C	From 23° to 43° C	From 40° to 60° C		
0.03	0.012	0.013	0.0027	0.0016	1.0	120
0.05	0.006	0.013	0.0017	0.0048	0.5	
0.03	0.009	0.008	- 0.0004	0.0051	1.0	100
0.05	0.008	0.006	0.0065	- 0.0003	0.5	
0.03	0.008	0.010	0.0028	0.0027	0.5	10
0.05	0.009	0.011	0.0043	0.0054	1.0	5

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Limits mean temperature coefficient IEC 62053-22 (± %/K) Class 0.5S	Meter No.72447				Power Factor	Value of Rated Current (% In)
	Mean temperature coefficient (± %/K)					
	From 3° to -17° C	From 23° to 3° C	From 23° to 43° C	From 40° to 60° C		
0.03	0.012	0.013	-0.010	-0.010	1.0	120
0.05	0.006	0.013	-0.008	-0.012	0.5	
0.03	0.006	0.008	-0.008	-0.011	1.0	100
0.05	0.009	0.006	-0.011	-0.009	0.5	
0.03	0.008	0.010	-0.012	-0.008	0.5	10
0.05	0.009	0.011	-0.014	-0.009	1.0	5

3. Error due to voltage variation

Limits of variation error IEC 62053-22 (± %)	Meter No.724446	Meter No.724447	Power Factor	Value of Rated Current (% In)
	Mean variation Error (± %)			
Class 0.5S				
0.2	-0.02	-0.03	1.0	5
	0.01	-0.01		
0.4	-0.01	0.02	0.5	10
	0.04	0.05		
0.2	-0.03	-0.08	1.0	100
	0.03	0.00		
0.4	0.06	-0.04	0.5	
	0.03	-0.01		
0.2	-0.06	-0.02	1.0	120
	0.00	-0.03		
0.4	-0.04	-0.05	0.5	
	0.00	-0.01		

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4. Error due to frequency variation

Limits of variation error IEC 62053-22 (± %)	Meter No.724446	Meter No.724447	Frequency (Hz)	Power Factor	Value of Rated Current (% In)
	Mean variation Error (± %)				
Class 0.5S					
0.2	0.01	0.03	49	1.0	5
	0.00	-0.03	51		
	-0.01	-0.02	49	0.5	10
	-0.02	0.01	51		
	-0.03	0.00	49	1.0	100
	0.00	-0.02	51		
	0.00	0.00	49	0.5	
	-0.07	-0.02	51		
	0.00	-0.02	49	1.0	120
	0.00	0.00	51		
	0.00	0.05	49	0.5	
	0.00	-0.04	51		

5. Error due to reversed phase sequence

Limits of variation error IEC 62053-22 (± %)	Meter No.724446	Meter No.724447	Value of Rated Current (% In)
	Mean variation Error (± %)		
Class 0.5S			
0.1	0.03	-0.03	10

6. Error due to voltage unbalance

Limits of variation error IEC 62053-22 (± %)	Meter No.724446	Meter No.724447	Strain in Phase	Value of Rated Current (% In)
Class 0.5S	Mean variation Error (± %)			
1.0	-0.06	0.03	AB	100
	-0.03	0.03	BC	
	0.00	0.06	AC	
	-0.03	0.03	A	
	0.02	0.09	B	
	-0.06	0.06	C	

7. Error due to harmonic components in the current and voltage circuit

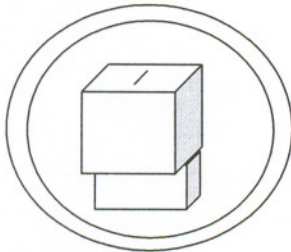
Limits of variation error IEC 62053-22 ($\pm$ %)	Meter No.724446	Meter No.724447	Value of Current
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Class 0.5S	Mean variation Error ($\pm$ %)		
0.5	0.04	0.01	0.5 I _{max}

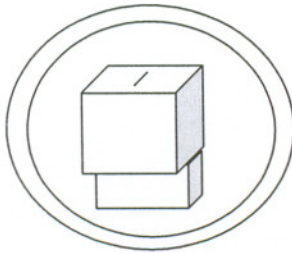
8. Error due to sub-harmonics in the a.c. current circuit

Limits of variation error IEC 62053-22 (± %)	Meter No.724446	Meter No.724447	Value of Current
	Mean variation Error (± %)		
Class 0.5S			
0.5	0.04	0.00	0.5 In

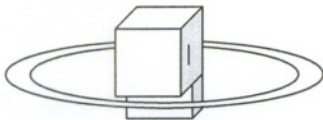
9. Error due to magnetic indication of external origin 0.5 mT



Limits variation error IEC 62053-22 ($\pm$ %)	Meter No. 724447	Corner of turn of a magnetic field in degree
	Mean Error ($\pm$ %)	
Class 0.5S	0.020	Before influence of a magnetic field
	0.015	0
	0.018	30
	0.025	60
	0.044	90
	-0.002	120
	-0.034	150
	-0.008	180
	-0.003	210
	0.025	240
	-0.040	270
	0.054	300
	0.016	330
	0.015	360
	0.020	After influence of a magnetic field
1.0	0.03	Variation Error (+)
	-0.06	Variation Error (-)



Limits variation error IEC 62053-22 (± %)	Meter No. 724447	Corner of turn of a magnetic field in degree
	Mean Error (± %)	
Class 0.5S	-0.055	Before influence of a magnetic field
	-0.053	0
	-0.045	30
	-0.025	60
	-0.074	90
	-0.021	120
	-0.061	150
	-0.054	180
	0.007	210
	-0.095	240
	-0.055	270
	-0.053	300
	-0.019	330
	-0.058	360
	-0.055	After influence of a magnetic field
1.0	0.06	Variation Error (+)
	-0.04	Variation Error (-)



Limits variation error IEC 62053-22 (± %)	Meter No. 724447	Corner of turn of a magnetic field in degree
	Mean Error (± %)	
Class 0.5S	-0.012	Before influence of a magnetic field
	-0.012	0
	-0.008	30
	-0.012	60
	0.019	90
	-0.012	120
	-0.037	150
	-0.031	180
	-0.014	210
	-0.007	240
	-0.038	270
	-0.038	300
	-0.040	330
	-0.012	360
	-0.085	After influence of a magnetic field
1.0	0.07	Variation Error (+)
	-	Variation Error (-)

10. Test of initial start-up of the meter

Limit time of initial start-up IEC 62053-22 (sec)	Meter No. 724446	Meter No. 724447	
5.0	2.7 s	2.8 s	Time of initial start-up (sec)

11. AC voltage Insulation test

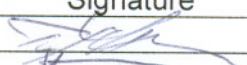
Meter No. 724446	Meter No. 724447
PASS	PASS

Note: This test was done at 2500V AC.

12. Impulse voltage tests for circuits and between the circuits

Meter No. 724447
PASS

Note: This test was done at 6000V.

	Name	Date	Signature
Tested by	G. Mitelman	12.07.07	
Checked by	B. Ricanati	12/2/07	
Approved by	A. Stern	12.07.2007	