NMI M6-1

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Electricity Meters Part 1: Metrological and Technical Requirements

Test Report

Reference No. ..... : **R4790913970_NMI_ Gen™5 Riva_R1**

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Contents ..... : 53 pages

Laboratory details

Name ..... : **UL International-Singapore Pte Ltd**

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Test specification

Standard ..... : NMI M6-1 3rd Edition July 2020 Pathway 2 Electricity Meters: Part 1 : Metrological and Technical Requirements

Client details

Applicant ..... : PT. MECOINDO - Itron

Address ..... : Plot 6B-2, EJIP, Bekasi, Jawa barat, 17550, Indonesia

Product details (see additional details on page 3)

Type of test object ..... : Energy meter

Model/type reference ..... : Gen™5 Riva

Rating ..... : 230Vac, 5(100)A, Single Phase, 50Hz, Active CL 1,

Accreditation details

This report shall not be reproduced, except in full, without the written approval to the Laboratory. The results in this report apply only to the test sample(s) specified and at the time of testing period only. The results are not to be used to indicate applicability to other similar products.

The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.

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Possible results

Test case does not apply to the test object ..... : N(.A.)

Test sample does meet the requirement ..... : P(ass)

Test sample does not meet the requirement ..... : F(ail)

General remarks

"(see remark #)" refers to a remark appended to the report.

"(see appended table)" refers to a table appended to the report.

"(see appended results)" refers to results appended to the report.

The test results presented in this report relate only to the sample(s) tested.

The test sample(s) were provided by the client and were tested as submitted.

This report does not contain corrections or erasures.

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UL Singapore Lab uses the “Simple Acceptance” decision rule based on IEC Guide 115:2023, Clause 4.3.3 and measurement uncertainty is not applied when providing statements of conformity in accordance with IEC Guide 115:2023, 4.3.3.

Specific remarks

1) In this report, revision up from R4790778107_ NMI_ Gen™5 Riva to R4790913970_NMI_ Gen™5 Riva_R1 due to added clock tests in the report.
2) In this report, All the tests were covered based on NMI M6-1 standard with 230Vac.
3) Refer individual tests column for subcontracted tests to UL RTP Lab & Power Lab

Statement of results

The test samples were assessed to the NMI M6-1 clause of the test specification.

The test samples COMPLY with NMI M6-1 clauses of the test specification.

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Product details

Enclosure type ..... :	Thermoplastic
Connection type ..... :	Direct
Meter type ..... :	Active
Energy type..... :	Import and Export
Accuracy class ..... :	1
Protective class..... :	II
Number of phases ..... :	1
Number of elements ..... :	1
Voltage rating..... :	230Vac
Operating Temperature..... :	-25 °C to 70 °C
Limit range of operation..... :	-25 °C to 70 °C
Storage and transportation..... :	-25 °C to 70 °C
Standard current rating..... :	5A
Maximum current rating..... :	100A
Indoor or outdoor..... :	Indoor
Frequency..... :	50 Hz
Clock..... :	Crystal
Product mass ..... :	0.85kg
Product dimensions ..... :	201mm (H) x 125mm (W) x 91.6mm (D)

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Marking details

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3	**Units of measurement**		
	Valid units of measurement used	KWh	P

4.1	**Minimum measured quantity**		
	Has the form 1×10^n authorised units of energy, where n is an integer		P

4.2	**Maximum permissible variation between indicators**		
	No indicated difference between indications of same quantity on different indicators	Meter has one indicator for active energy in kWh for import/export and both are showing same values	P

4.3	**Calculated quantities**		
	Indicated quantity equals value obtained using indicated values with applicable rounding	kWh Method: kWh Method: Dose with 15+15Wh, notice no change in registration, Dose with 1+3.5Wh, notice register has changed to 0.034kWh only and increased another 0.5Wh became 0.035Wh, no rounding taken place.	P
	If rounding applied it is ±0.5 minimum measured quantity	No rounding applied	N

4.6	**Meter constant**		
	No error in relationship between test output and indication on display		P

4.7	**Class indices (accuracy class)**		
	Meter classified as one of 0.2, 0.5, 1 or 1.5	Meter is Class 1	P

4.8	**Maximum permissible error**		
	Percentage errors do not exceed the relevant values specified in tables 1, 2 and 3 due to variations in current	(see results below)	P

5.2	**Temperature range** (ranges shall comply with the minimum acceptable ranges in Table 5)		
	Specified operating range	-25 °C to 70 °C	P
	Limit range of operation	-25 °C to 70 °C	P
	Storage and transportation	-25 °C to 70 °C	P

5.7.2	**Initial start up of the meter**		
	Time to start – shall be functional within 5 s	1.13 s	P

5.7.3	**Running with no load**		
	Test voltage@230Vac	264.5V	
	Test current	0A	
	Test period	27 mins	
	Test output pulses – shall be no more than one	0	P
	Rotor revolutions – may start but shall not complete a revolution		N

5.7.4	**Starting**		
	Test current@230V	40mA	
	Meter starts and continues to register		P

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	Rotor revolutions – shall start and complete at least one revolution		N

7.2	**Acting upon significant faults** (static meters only)		
	Has capability to detect, log and communicate significant faults	Recording and detecting each log	P
	Logged data kept in permanent record with date and time stamp	Recording each log date and time	P

7.3	**Display**		
	Meter has a display which is legible whilst operating		P
	Visible to consumer in normal installation position		P
	There is a procedure to show all relevant elements of indicator display, with sufficient time to check them		P
	Able to display quantity of energy corresponding to I_{max} for at least 4 000 h without returning to same index		P
	Calculated value (energy at I_{max} for 4 000 h)	92,000kWh based on 230V	
	Number of display digits	6 total digits with allowance of up to 3 decimal places for kWh display	

7.4	**Auxiliary devices interface**		
	Interface shall be sealed if parameters can be altered by instructions or data introduced through interface	No Auxiliary devices	N

8.1	**Information to be displayed on meter exterior**		
	Manufacturer's name or mark		P
	Model designation		P
	Serial number		P
	NMI certificate of approval number (space for)		P
	Number of phases, number of wires		P
	Reference frequency		P
	Specified operating temperature limits (if more restrictive than –10°C to +60°C)	The meter has an operating temperature of -25ºC to +70ºC	N
	Meter constant		P
	Rated voltage		P
	Rated currents		P
	Class index		P

8.2	**Notices**		
	Any special notices or limitations of use shall be clearly marked or provided in manual		N

9.1	**Verification mark**		
	Easily affixed without affecting metrological properties of the meter		P
	Visible without moving or dismantling the meter when in use	Marks are permanent and visible	P
	Part where mark is located shall not be removable with damage to mark		P
	Sufficient space (≥ 200 mm^2)		P

9.2	**Sealing**		
	Customer omitted this test		N

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Maximum Permissible Errors

Refer to NMI M 6-1, clause 4.8 (Tables 1 to 3).
Mandatory test currents are shown. Extra test points should be included where appropriate for the particular meter.

Meter serial number: 967
Test Voltage: 230V

Direct-connected Meters with Balanced Loads (Positive Energy)				P
Current (A)	Power factor	Percentage error	Limit (±%) for class	
			1	1.5
0.05 I_b	1	0.06	1.5	1.5
0.1 I_b		0.07	1.0	1.5
0.2 I_b		0.02		
I_b		0.09		
I_{max}		0.06		
0.1 I_b	0.5 inductive	0.23	1.5	1.5
0.2 I_b		0.22	1.0	1.5
I_b		0.13		
I_{max}		-0.10		
0.1 I_b	0.8 capacitive	0.00	1.5	
0.2 I_b		0.01	1.0	
I_b		0.09		
I_{max}		0.11		

Direct-connected Meters with Balanced Loads (Negative Energy)				P
Current (A)	Power factor	Percentage error	Limit (±%) for class	
			1	1.5
0.05 I_b	1	0.14	1.5	1.5
0.1 I_b		0.13	1.0	1.5
0.2 I_b		0.06		
I_b		0.11		
I_{max}		0.15		
0.1 I_b	0.5 inductive	0.32	1.5	1.5
0.2 I_b		0.26	1.0	1.5
I_b		0.15		
I_{max}		0.06		
0.1 I_b	0.8 capacitive	0.06	1.5	
0.2 I_b		0.05	1.0	
I_b		0.10		
I_{max}		0.21		

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Influence Factors and Disturbances

Voltage Variation

Refer to NMI M 6-1, Table 4 and A.2.12.

Meter serial number: 967
Test Voltage:230V

Direct-connected Meters, Classes 1 and 1.5					P
Current (A)	Voltage variation (% from U_{nom})	Power factor	Variation in error (%)	Limit of variation (%) by class	
				1	1.5
0.05 I_b	REF	1	-	-	-
	+10		0.06	0.7	1.0
	-10		0.01		
	+15		0.03	2.1	3.0
	-20		0.00		
	-50		0.10	–100 to +10	
I_b	REF	1	-	-	-
	+10		0.00	0.7	1.0
	-10		0.00		
	+15		0.01	2.1	3.0
	-20		0.01		
	-50		0.02	–100 to +10	
I_{max}	REF	1	-	-	-
	+10		0.02	0.7	1.0
	-10		0.03		
	+15		0.05	2.1	3.0
	-20		0.04		
	-50		0.01	–100 to +10	
0.1 I_b	REF	0.5 inductive	-	-	-
	+10		0.02	1.0	1.0
	-10		0.03		
	+15		0.00	3.0	3.0
	-20		0.03		
	-50		0.11	–100 to +10	
I_b	REF	0.5 inductive	-	-	-
	+10		0.01	1.0	1.0
	-10		0.01		
	+15		0.00	3.0	3.0
	-20		0.02		
	-50		0.02	–100 to +10	
I_{max}	REF	0.5 inductive	-	-	-
	+10		0.03	1.0	1.0
	-10		0.03		
	+15		0.06	3.0	3.0
	-20		0.04		
	-50		0.02	–100 to +10	

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Frequency Variation

Refer to NMI M 6-1, Table 4 and A.2.13.

Meter serial number:967
Test Voltage:230V

Direct-connected Meters, Classes 1 and 1.5					P
Current (A)	Frequency variation (% from f_{nom})	Power factor	Variation in error (%)	Limit of variation (%) by class	
				1	1.5
0.05 I_b	+2	1	0.00	0.5	1.0
	-2		0.01		
I_b	+2	1	0.00		
	-2		0.01		
I_{max}	+2	1	0.02		
	-2		0.03		
0.1 I_b	+2	0.5 inductive	0.01	0.7	1.0
	-2		0.01		
I_b	+2	0.5 inductive	0.00		
	-2		0.00		
I_{max}	+2	0.5 inductive	0.02		
	-2		0.04		

Meter serial number: 967
Test Voltage: 230V

Harmonic Components in the Current and Voltage Circuits								P
Refer to NMI M 6-1, Table 4 and A.2.21 The variation in percentage error shall be measured under the most unfavourable phase displacement of the fifth harmonic in the current compared with the fundamental error.								
Current (A)	Power factor	Percentage error		Variation in error (%)	Limit of variation (%) by class			
		f_{nom}	f_{nom} + harmonics		0.2	0.5	1	1.5
0.5 I_{max}	1	0.18	0.27	0.09	0.4	0.5	0.8	1.0

Note*: Tests been repeated three time and results are remain same

Meter serial number: 986
Test Voltage: 230V

DC Component in the AC Circuit						P
Refer to NMI M 6-1, Table 4. This test does not apply to transformer-operated meters.						
Current (A)	Power factor	Percentage error		Variation in error (%)	Limit of variation (%) by class	
		f_{nom}	+ DC component		1	1.5
$I_{max}/\sqrt{2}$	1	-0.14	0.44	0.58	3.0	6.0
This test was subcontracted to UL LLC RTP North Carolina USA on behalf of UL International-Singapore. The report reference number is R4790778107_NMI_RTP						

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Meter serial number: 983
Test Voltage: 230V

Continuous Magnetic Induction of External Origin							P
Refer to NMI M 6-1, Table 4.							
Current (A)	Power factor	Position of magnet	Variation in error (%)	Limit of variation (%) by class			
				0.2	0.5	1	1.5
I_b (I_n)	1	LCD	0.01	2.0	2.0	2.0	3.0
		Push Buttons	0.01				
		Top of meter	0.01				
		Left of Meter	0.01				
		Bottom of Meter	0.01				
		Right of Meter	0.01				

Meter serial number: 983
Test Voltage: 230V

Magnetic Induction of External Origin 0.5 mT						P
Refer to NMI M 6-1, Table 4. A magnetic induction of external origin of 0.5 mT produced by a current of the same frequency as that of the voltage applied to the meter and under the most unfavourable conditions of phase and direction shall not cause a variation in the percentage error of the meter exceeding the values shown. The magnetic induction shall be obtained by placing the meter in the centre of a circular coil, 1 m in mean diameter, of square section and of small radial thickness relative to the diameter, and having 400 At.						
Current (A)	Power factor	Variation in error (%)	Limit of variation (%) by class			
			0.2	0.5	1	1.5
I_b (I_n)	1	0.11	0.5	1.0	2.0	–
I_b (I_n)	1	0.29	0.5	1.0	2.0	–
I_b (I_n)	1	0.41	0.5	1.0	2.0	–

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Meter serial number: 934
Test Voltage: 230V

Electromagnetic RF Fields								P
Refer to NMI M 6-1, Table 4 and A.2.9 (test with current test). Meters constructed with passive elements only, including electromechanical meters, are exempt from this test. Frequency range: 0 to 2400 MHz Modulation: 80% AM, 1kHz sine wave Field strength: 10 V/m								
Current (A)	Power factor	Polarisation	Facing meter	Variation in error (%)	Limit of variation (%) by class			
					0.2	0.5	1	1.5
I_b (I_n)	1	Vertical	Front	0.05	1.0	2.0	2.0	3.0
			Right					
			Left					
			Rear					
		Horizontal	Front					
			Right					
			Left					
			Rear					
Requirement				Remark				Result
During the test, the behaviour of the meter shall not be perturbed				None				P

Meter serial number: 934
Test Voltage: 230V

Radiated Electromagnetic Radiofrequency Fields Test without Current			P
Refer to NMI M 6-1, A.2.9. Frequency range: 80 to 2400 MHz (continuous) Modulation: 80% AM, 1 kHz sine wave Field strength: 30 V/m Meter/EUT: in operating condition, reference voltage, current terminal open-circuit			
Requirement	Remark		Result
The behaviour of the equipment shall not be perturbed	No effect on EUT seen during test, specific results & comments in test sheet.		P
Changes in pulse and Register	No changes in Pulse and Register	Pulse: 23 Register:0.023	P

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Meter serial number: 934
Test Voltage: 230V

Conducted RF Fields	P

Refer to NMI M 6-1, Table 4 and A.2.10.
Meters constructed with passive elements only, including electromechanical meters, are exempt from this test.
RF amplitude (50 Ω): 10 V (e.m.f.)
Modulation: 80% AM, 1 kHz sine wave
Frequency range: 0.15 to 80 MHz

Current (A)	Power factor	Variation in error (%)	Limit of variation (%) by class			
			0.2	0.5	1	1.5
I_b (I_n)	1	0.03	1.0	2.0	2.0	3.0

Requirement	Remark	Result
During the test, the behaviour of the meter shall not be perturbed	None	P

Meter serial number: 934
Test Voltage: 230V

Fast Transient Bursts	P

Refer to NMI M 6-1, Table 4 and A.2.15.
Meters constructed with passive elements only, including electromechanical meters, are exempt from this test. During the test, a temporary degradation or loss of function or performance is acceptable.

Current (A)	Power factor	Circuit	Voltage peak (kV)	Polarity (60 s at each)	Variation in error (%)	Limit of variation (%) by class			
						0.2	0.5	1	1.5
I_b (I_n)	1	Voltage & Current	4	Positive & Negative	0.02	1.0	2.0	4.0	6.0

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Meter serial number: EE98 for Test A and EE97 for Test C
Test Voltage: 230V

Variations due to Short-time Overcurrent — P

Refer to NMI M 6-1, Table 4 and A.2.16.
The test shall be practically non-inductive

Current (A)	Power factor	Test	Over-current value (A)	Duration (ms)	Phase	Variation in error (%)	Limit of variation (%) by class			
							0.2	0.5	1.0	1.5
Ib	1	A	30 I_{max}	10	1	0.01	-	-	1.5	1.5
Ib	1	C	7000	60	1	0.76	Meter shall not cause damage to surrounding equipment			

Requirement	Remark	Result
For tests C, D and E the meter shall not cause damage to surrounding equipment	No damage caused to the surrounding	P*

*This test was subcontracted to PowerLab Limited on behalf of UL International-Singapore except for the accuracy measurements before and after the test. Refer to PowerLab report pl1817-NMI 1 phase for detailed test results.

* This test results referred from report number R4790537805_NMI_STOC

Meter serial number: -
Test Voltage:

Operation of Accessories — N

Refer to NMI M 6-1, Table 4.
Such an accessory, when enclosed in the meter case, is energised intermittently, for example the electromagnet of a multi-rate register. It is preferable that the connection to the auxiliary device(s) is marked to indicate the correct method of connection. If these connections are made by means of plugs and sockets, they should be irreversible. However, in the absence of those markings or irreversible connections, the variations of errors shall not exceed those indicated in this table if the meter is tested with the connections giving the most unfavourable condition.

Current (A)	Power factor	Accessory	Variation in error (%)	Limit of variation (%) by class			
				0.2	0.5	1	1.5
0.05 I_b	1	-	-	–	–	0.5	–

Note*: No accessories in the product and no tools have been provided for accessing the meters externally

Meter serial number: 967
Test Voltage: 230V

Sub-harmonics in the AC Circuit — P

Refer to NMI M 6-1, Table 4 and A.2.17.
Test waveform: sinusoid, 2 cycles on, 2 cycles off
Current amplitude: 2 × reference current

Current (A)	Power factor	Percentage error		Variation in error (%)	Limit of variation (%) by class			
		f_{nom}	Test waveform		0.2	0.5	1	1.5
0.5 I_b	1	-0.03	0.11	0.14	0.5	0.75	1.5	3.0

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Meter serial number:967
Test Voltage: 230V

Odd Harmonics in the AC Circuit								P
Refer to NMI M 6-1, Table 4 and A.2.18. Test waveform: sinusoid, set to zero for first and third quarters of each period Current amplitude: 2 × reference current								
Current (A)	Power factor	Percentage error		Variation in error (%)	Limit of variation (%) by class			
		f_{nom}	Test waveform		0.2	0.5	1	1.5
0.5 I_b	1	0.11	0.13	0.02	0.4	0.5	0.8	1.0

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Ambient Temperature Variation

Refer to NMI M 6-1, Table 6 and A.2.3.
The meter error shall be determined at a minimum of four temperature values across the whole operating range.

Meter serial number: 967
Test Voltage: 230V

Direct-connected Meters							P
Current (A)	Power factor	Percentage error		Variation in error (%)	Mean temperature coefficient (%/K)		
		T_{Low}	T_{High}		Calculated	Limit by class	
						1	1.5
Temperature interval, *-25°C* to *-5°C*							
I_{max}	1	0.00	0.04	0.04	0.002	0.05	0.05
I_{max}	0.5	-0.18	-0.15	0.03	0.002	0.07	0.07
I_b	1	0.01	0.06	0.05	0.003	0.05	0.05
I_b	0.5	0.04	0.09	0.05	0.003	0.07	0.07
$0.1I_b$	1	-0.03	0.03	0.06	0.003	0.05	0.05
$0.2I_b$	0.5	0.09	0.17	0.08	0.004	0.07	0.07
Temperature interval, *-5°C* to *15°C*							
I_{max}	1	0.04	0.06	0.02	0.001	0.05	0.05
I_{max}	0.5	-0.15	-0.14	0.01	0.000	0.07	0.07
I_b	1	0.06	0.10	0.04	0.002	0.05	0.05
I_b	0.5	0.09	0.12	0.03	0.002	0.07	0.07
$0.1I_b$	1	0.03	0.07	0.04	0.002	0.05	0.05
$0.2I_b$	0.5	0.17	0.17	0.00	0.000	0.07	0.07
Temperature interval, *15°C* to *35°C*							
I_{max}	1	0.06	0.09	0.03	0.002	0.05	0.05
I_{max}	0.5	-0.14	-0.12	0.02	0.001	0.07	0.07
I_b	1	0.10	0.13	0.03	0.002	0.05	0.05
I_b	0.5	0.12	0.15	0.03	0.002	0.07	0.07
$0.1I_b$	1	0.07	0.09	0.02	0.001	0.05	0.05
$0.2I_b$	0.5	0.17	0.23	0.06	0.003	0.07	0.07

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Temperature interval, *35°C to 55°C*							
I_{max}	1	0.09	0.12	0.03	0.002	0.05	0.05
I_{max}	0.5	-0.12	-0.08	0.04	0.002	0.07	0.07
I_b	1	0.13	0.18	0.05	0.003	0.05	0.05
I_b	0.5	0.15	0.19	0.04	0.002	0.07	0.07
$0.1I_b$	1	0.09	0.11	0.02	0.001	0.05	0.05
$0.2I_b$	0.5	0.23	0.25	0.02	0.001	0.07	0.07
Temperature interval, *55°C to 70°C*							
I_{max}	1	0.12	0.15	0.03	0.002	0.05	0.05
I_{max}	0.5	-0.08	-0.05	0.03	0.002	0.07	0.07
I_b	1	0.18	0.22	0.04	0.003	0.05	0.05
I_b	0.5	0.19	0.23	0.04	0.003	0.07	0.07
$0.1I_b$	1	0.11	0.15	0.04	0.003	0.05	0.05
$0.2I_b$	0.5	0.25	0.29	0.04	0.003	0.07	0.07

Internal Clocks

Refer to NMI M 6-1, clause 6.
This test applies to any solid state internal clock used for electricity meters and load control devices.

Internal clock type (synchronous or crystal-controlled) ..... Crystal and Synchronous controlled

Operational reserve (spring or battery/super-capacitor/primary cell battery ..... Lithium

Meter serial number: 005
Test Voltage: 230V
Clock type: crystal controlled

Mains Supply			P
Testing period: 30 days Test temperature: 23.6°C			
Variation (s/day)	Limit variation (s/day)		
Result	Synchronous	Crystal	
Start date & Time: 2023/07/31 & 16:16:14 End date & Time: 2023/08/31 & 16:43:04 Reading 5: -0.06	0.167	0.5	

Meter serial number: 003
Test Voltage: 230V
Clock type: crystal controlled

Operational Reserve	P
Testing period: 36 h Test temperature: 21.9°C	

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Variation (s/day)	Limit variation (s/ day)		
Result	Synchronous		Crystal
	Spring	Battery	
0.63	120	1	1

Meter serial number: 004
Test Voltage: 230V

High Temperature	P
Testing period: 24 h Test temperature: 45°C	
Variation (s/ºC/day)	Limit variation (s/ºC/day)
Result	Crystal
0.04	3.3 seconds/24 hr

Meter serial number: 004
Test Voltage: 230V

Low Temperature	P
Testing period: 24 h Test temperature: –10°C	
Variation (s/ºC/day)	Limit variation (s/ºC/day)
Result	Crystal
-0.06	4.95 seconds/24 hr

Performance Tests

Meter serial number: 967

Optical Port Requirements		P
Refer to NMI M 6-1, A.1.3.		
Requirement	Remark	Result
Environmental lighting condition	16000 Lux	P
Transmission speed	Tested with default baud rate(9600) due to no communication accessories provided	P

Meter serial number: 967
Test Voltage: 230V

Dry Heat Test							P
Refer to NMI M 6-1, A.2.1. Duration: 72 h Meter/EUT: In operating condition except whilst temperature is lowered or raised. High temperature: .....(maximum specified operating temperature)							
Current (A)	Power factor	Percentage error			MPE by class		
		At reference before heat	At high temperature after 72 h	Reference after recovery	0.2	0.5	1	1.5

NMI M6-1

I_b (I_n)	1	0.00	0.14	0.01	0.2	0.5	1	1.5

Requirement	Remark	Result
No damage to meter	No visible damage to the meter	P
No change of information	No change in information	P

Meter serial number: 967
Test Voltage: 230V

Cold Test	P

Refer to NMI M 6-1, A.2.2.
Duration: 72 h
Meter/EUT: in operating condition except whilst temperature is lowered or raised.
Low temperature: .....(minimum specified operating temperature)

Current (A)	Power factor	Percentage error			MPE by class			
		At reference before temp	At low temperature after 72 h	Reference after recovery	0.2	0.5	1	1.5
I_b (I_n)	1	0.14	-0.03	0.09	0.2	0.5	1	1.5

Requirement	Remark	Result
No damage to meter	No damage to meter	P
No change of information	No change in information	P

NMI M6-1

Meter serial number: 967
Test Voltage: 230V

Damp Heat Cyclic Test		P
Refer to NMI M 6-1, A.2.4. Duration (cycles): 6 × 24 h cycles Meter/EUT: non-operating condition Low temperature: 25°C High temperature: .....(maximum specified operating temperature)		
Requirement	Remark	Result
No trace of corrosion likely to affect the functional properties of the EUT shall be present	No trace of corrosion	P

24 h after the end of this test, submit the EUT to the following tests:

- AC voltage test (NMI M 6-1, A.2.20) — refer to clause 8.13.
- impulse voltage test (NMI M 6-1, A.2.19, except 0.8 of impulse voltage, i.e. 9.6 kV +0%, –15%)

Impulse voltage test						P
Current (A)	Power factor	Percentage error		Variation in error (%)	Limit	
		Before	After			
I_b (I_n)	1	(Ref to AC voltage accuracy test)			1.0	
Requirement				Remark		Result
During the test, no flashover, disruptive discharge or puncture shall occur				None		P
After the test, no mechanical damage to the EUT				None		P

AC voltage test						P
Current (A)	Power factor	Percentage error		Variation in error (%)	Limit	
		Before	After			
I_b (I_n)	1	0.04	-0.11	0.15	1.0	
Requirement				Remark		Result
2 kV: during the test, no flashover, disruptive discharge or puncture shall occur				None		N
4 kV: during the test, no flashover, disruptive discharge or puncture shall occur				None		P
40 V: during the test, no flashover, disruptive discharge or puncture shall occur				NA		N
After the test, no mechanical damage to the EUT				No visible damage to the meter		P

NMI M6-1

Meter serial number: 928
Test Voltage: 230V

Dust Test							P
Refer to NMI M 6-1, A.2.6. Enclosure category: 2 Duration: 8 h Meter/EUT: non-operating condition							
Current (A)	Power factor	Percentage error	MPE by class				
			0.2	0.5	1	1.5	
I_b (I_n)	1	0.27	0.2	0.5	1	1.5	

Requirement	Remark	Result
No dust accumulation which could affect meter operation or safety	None	P
No dust deposition that could lead to tracking along creepage distances	None	P
The function of the meter shall not be impaired (see error above)	See above results	P

Meter serial number: 931
Test Voltage: 230V

Vibration (Sinusoidal) Test							P
Refer to NMI M 6-1, A.2.7. Severity level: 2 Frequency range: 10 to 150 Hz Max acceleration level: 10 m/s^2 No sweep cycles per axis: 10 Meter/EUT: non-operating condition							
Current (A)	Power factor	Percentage error	MPE by class				
			0.2	0.5	1	1.5	
I_b (I_n)	1	0.04	0.2	0.5	1	1.5	

Requirement	Remark	Result
No damage to meter	No damage	P
No change of information	Register are same before and after	P
Meter shall operate correctly (see error above)	Verified meter functions	P

This test was subcontracted to UL LLC RTP North Carolina USA on behalf of UL International-Singapore.
The report reference number is R4790778107_NMI_RTP

NMI M6-1

Meter serial number: 931
Test Voltage: 230V

Mechanical Shock Test							P
Refer to NMI M 6-1, A.2.8. Severity level: 1 Pulse shape: half-sine Peak acceleration: 300 m/s^2 Pulse duration: 18 ms Meter/EUT: non-operating condition, without packing							
Current (A)	Power factor	Percentage error	MPE by class				
			0.2	0.5	1	1.5	
I_b (I_n)	1	0.04	0.2	0.5	1	1.5	
Requirement		Remark				Result	
No damage to meter		No damage				P	
No change of information		Register are same before and after				P	
Meter shall operate correctly (see error above)		Verified meter functions				P	
This test was subcontracted to UL LLC RTP North Carolina USA on behalf of UL International-Singapore. The report reference number is R4790778107_NMI_RTP							

Meter serial number: 934
Test Voltage: 230V

Electrostatic Discharge Test							P
Refer to NMI M 6-1, A.2.11. Number of discharges: at least 10 Polarity of discharges: the most sensitive polarity Severity level: 4 Meter/EUT: in operating condition, reference voltage, current terminal open-circuit							
Application (direct/indirect)	Coupling plane	Discharge mode (contact/air)	Test voltage (kV)	Change in		Limit, x (kW·h)	
				Register	Test output		
Direct	-	Air	15	0	0	0.023	
Indirect	Horizontal	Contact	8	0	0	0.023	
Indirect	Vertical	Contact	8	0	0	0.023	
Current (A)	Power factor	Percentage error	MPE by class				
			0.2	0.5	1	1.5	
I_b (I_n)	1	-0.16	0.2	0.5	1	1.5	
Requirement		Remark				Result	
Meter shall operate correctly (see error above)		None				P	
No AUX voltages over 40V		None				N	

NMI M6-1

Meter serial number:985
Test Voltage: 230V

Voltage Dips and Short-term Interruptions Test							P
Refer to NMI M 6-1, A.2.14. Meter/EUT: in operating condition, reference voltage, no current							
Voltage dip or interruption	ΔU	Duration	Dips/interruptions		Change in		Limit, *x* (kW·h)
			Number	Time between	Register	Test output	
Dip	50%	1 min	1	–	0	0	0.023
Interruption	100%	1 s	3	50 ms	0	0	0.023
Interruption	100%	20 ms	1	–	0	0	0.023

Meter serial number: 967
Test Voltage: 230V

Impulse Voltage Test						P
Refer to NMI M 6-1, A.2.19. For circuits and Between circuits Impulse voltage: 12 kV +0%, –15% Source capacitance : 0.125 µF Source impédance : 40 Ω ± 5 Ω Stored energy: 9.0 J ± 1.0 J Impulse waveform at no load: 1.2/50 impulse Meter/EUT: non-operating condition						
Current (A)	Power factor	Percentage error		Variation in error (%)	Limit	
		Before	After			
I_b (I_n)	1	0.04	-0.11	0.15	1.0	

Requirement	Remark	Result
During the test, no flashover, disruptive discharge or puncture shall occur	None	P
After the test, no mechanical damage to the EUT	None	P

Impulse Voltage Test						P
Refer to NMI M 6-1, A.2.19. For electric circuits relative to earth Impulse voltage: 10 kV +0%, –10% Source capacitance : - Source impédance : 500 Ω ± 50 Ω Stored energy: 0.5 J ± 0.05 J Impulse waveform at no load: 1.2/50 impulse Meter/EUT: non-operating condition						
Current (A)	Power factor	Percentage error		Variation in error (%)	Limit	
		Before	After			
I_b (I_n)	1	0.01	0.00	0.01	1.0	

Requirement	Remark	Result
During the test, no flashover, disruptive discharge or puncture shall occur	None	P
After the test, no mechanical damage to the EUT	None	P

NMI M6-1

Meter serial number: 967
Test Voltage: 230V

AC Voltage Test						P
Refer to NMI M 6-1, A.2.20. This test shall be performed as part of the damp heat cyclic test (refer to NMI M 6-1, A.2.4).						
Current (A)	Power factor	Percentage error		Variation in error (%)	Limit	
		Before	After			
I_b (I_n)	1	0.04	-0.11	0.15	1.0	

Requirement	Remark	Result
2 kV: during the test, no flashover, disruptive discharge or puncture shall occur	None	N
4 kV: during the test, no flashover, disruptive discharge or puncture shall occur	None	P
40 V: during the test, no flashover, disruptive discharge or puncture shall occur	No AUX voltages over 40V	N
After the test, no mechanical damage to the EUT	No visible damage to the meter	P

APPENDIX A

NMI M6-1

NMI M6-1

Electricity Meters Part 1: Metrological and Technical Requirements

Test Report

Reference No.	R4790778107_NMI_ RTP
Tested & approved by (+ signature)	Terrell, JaVon Engineering Associate
Reviewed by (+ signature)	Scott Hunter Operations Leader
Date of issue	2023-06-28
Date of testing	June 2023
Contents	11pages

Laboratory details

Name	UL LLC
Physical Address	12 Laboratory Drive, RTP, NC 27709
Contact Details	Telephone (919) 549-1000

Test specification

Standard	NMI M6-1 3rd Edition July 2020 Pathway 2 Electricity Meters: Part 1 : Metrological and Technical Requirements

Client details

Applicant	PT. MECOINDO - Itron
Address	Plot 6B-2, EJIP, Bekasi, Jawa barat, 17550, Indonesia

Product details (see additional details on page 3)

Type of test object	Energy meter
Model/type reference	Gen™5 Riva
Rating	230Vac, 5(100)A, Single Phase, 50Hz, Active CL 1, Reactive CL 2

APPENDIX A

NMI M6-1

Accreditation details

CERT #0751.06

UL LLC reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL LLC shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL LLC issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or endorsement by NIST, A2LA, or any agency of the US government.

Possible results

Test case does not apply to the test object ..... : N(.A.)

Test sample does meet the requirement ..... : P(ass)

Test sample does not meet the requirement ..... : F(ail)

General remarks

"(see remark #)" refers to a remark appended to the report.

"(see appended table)" refers to a table appended to the report.

"(see appended results)" refers to results appended to the report.

The test results presented in this report relate only to the sample(s) tested.

The test sample(s) were provided by the client and were tested as submitted.

This report does not contain corrections or erasures.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

Decision rule for statement(s) of conformity is based on IEC Guide 115: 2007 Clause 4.4.3 Procedure 2 "Accuracy Method"

Specific remarks

1) In this report, the following tests were performed based on Singapore UL lab request
   - NMI M6-1 Table 4 DC Component in the AC Circuit
   - NMI M6-1 Section A.2.7 Vibration (Sinusoidal) Test
   - NMI M6-1 Section A.2.8 Mechanical Shock Test

APPENDIX A

NMI M6-1

Statement of results

The test samples were assessed with Singapore UL Lab requested tests plan.

The test samples COMPLY with requested clauses by Singapore UL lab.

Product details	
Enclosure type	Thermoplastic
Connection type	Direct
Meter type	Active
Energy type	Import and Export
Accuracy class	1
Protective class	II
Number of phases	1
Number of elements	1
Voltage rating	230Vac
Operating Temperature	-25 °C to 70 °C
Limit range of operation	-25 °C to 70 °C
Storage and transportation	-25 °C to 70 °C
Standard current rating	5A
Maximum current rating	100A
Indoor or outdoor	Indoor
Frequency	50 Hz
Clock	Crystal
Product mass	0.85kg
Product dimensions	198mm (H) x 124mm (W) x 86mm (D)

APPENDIX A

NMI M6-1

Marking details

APPENDIX A

NMI M6-1

Meter serial number: 986
Test Voltage: 230V

DC Component in the AC Circuit						P
Refer to NMI M 6-1, Table 4. This test does not apply to transformer-operated meters.						
Current (A)	Power factor	Percentage error		Variation in error (%)	Limit of variation (%) by class	
		f_{nom}	+ DC component		1	1.5
$I_{max}/\sqrt{2}$	1	-0.14	0.44	0.58	3.0	6.0

Meter serial number: 5931
Test Voltage: 230V

Vibration (Sinusoidal) Test						P
Refer to NMI M 6-1, A.2.7. Severity level: 2 Frequency range: 10 to 150 Hz Max acceleration level: 10 m/s² No sweep cycles per axis: 10 Meter/EUT: non-operating condition						
Current (A)	Power factor	Percentage error	MPE by class			
			0.2	0.5	1	1.5
I_b (I_n)	1	0.04	0.2	0.5	1	1.5

Requirement	Remark	Result
No damage to meter	No damage	P
No change of information	Register are same before and after	P
Meter shall operate correctly (see error above)	Verified meter functions	P

APPENDIX A

NMI M6-1

Meter serial number: 5931
Test Voltage: 230V

Mechanical Shock Test							P
Refer to NMI M 6-1, A.2.8. Severity level: 1 Pulse shape: half-sine Peak acceleration: 300 m/s² Pulse duration: 18 ms Meter/EUT: non-operating condition, without packing							
Current (A)	Power factor	Percentage error	MPE by class				
			0.2	0.5	1	1.5	
I_b (I_n)	1	0.04	0.2	0.5	1	1.5	

Requirement	Remark	Result
No damage to meter	No damage	P
No change of information	Register are same before and after	P
Meter shall operate correctly (see error above)	Verified meter functions	P

APPENDIX A

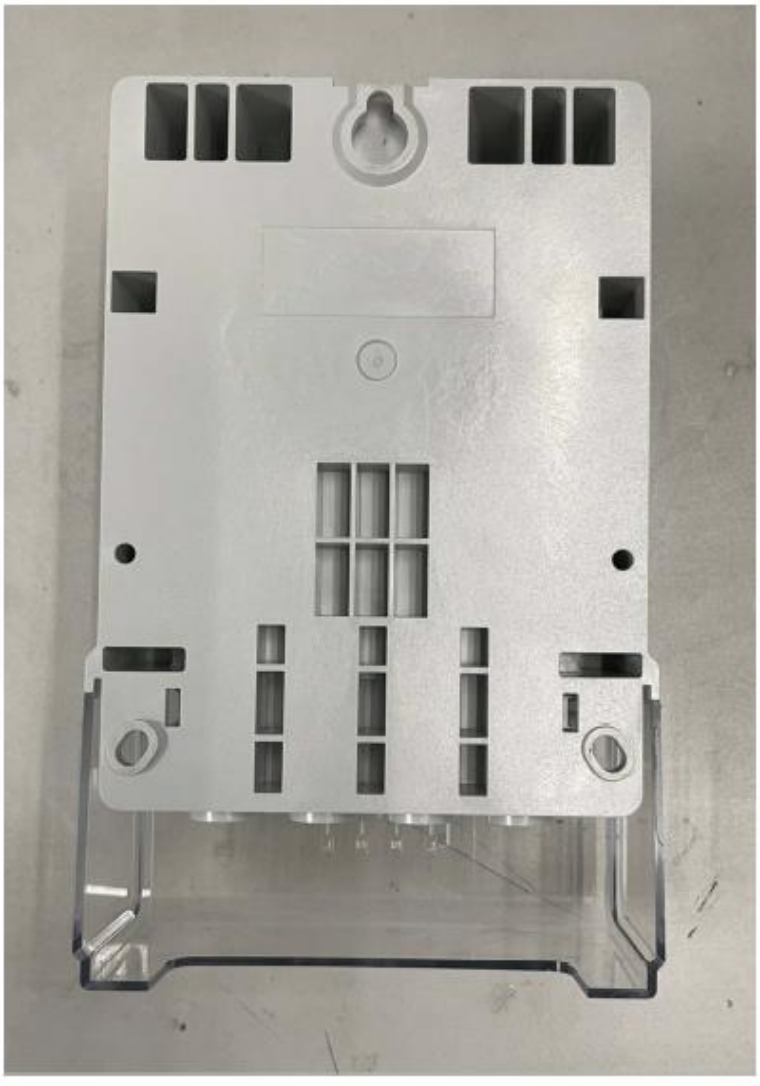
PHOTOGRAPH

Front Meter cover

APPENDIX A

PHOTOGRAPH

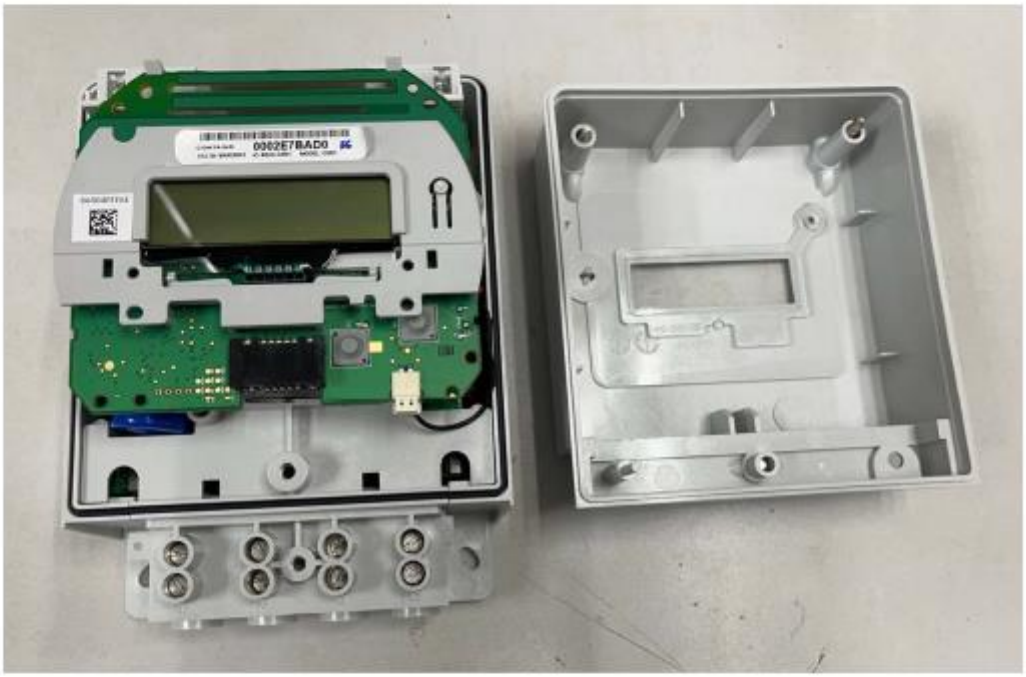
Back Meter cover



APPENDIX A

PHOTOGRAPH

Front layer front PWB



APPENDIX A

PHOTOGRAPH

Front layer rear PWB

APPENDIX A

PHOTOGRAPH

END OF TEST REPORT

APPENDIX B

Report PL1817-Itron from PowerLab

Report Number: PL1817-ITRON

PowerLab

PowerLab Limited

Test Report

DATE ISSUED:	15 September 2022
DEVICE TESTED:	Itron single phase energy meter Type EMS12RA
CLIENT'S NAME:	UL International Singapore Pte Ltd 20 Kian Teck Lane Singapore 627854 Singapore Attention: Vairavan Vairakkannu
CLIENT'S REFERENCE:	PO 1230001369
TEST SPECIFICATION:	NMI M 6 2nd edition, Clause A.2.16 Short-time overcurrents, Tests A and C
DATE OF TEST COMPLETION:	2 September 2022
SUMMARY OF RESULTS:	The sample meters were subjected to 3000 A and 7000 A as specified in A.2.16. No damage to surrounding equipment occurred during the 3000 A Test. No damage to surrounding equipment occurred during the 7 kA Test.

All tests reported herein have been performed in accordance with the Laboratory's scope of accreditation, Accreditation Number: 42

Approved Signatory: K Manson

Checked By: G I Dix

International Accreditation New Zealand (IANZ) has a Mutual Recognition Arrangement (MRA) with ILAC, such that both IANZ and NATA recognize accreditations by IANZ and NATA as being equivalent. Users of inspection reports / certificates are recommended to accept inspection reports / certificates in the name of either accrediting body.

PowerLab Limited, PO Box 31034 Christchurch 8444 New Zealand, 5 Sheffield Crescent Christchurch New Zealand, Info@powerlab.co.nz.

APPENDIX B

Report Number: PL1817-ITRON

PowerLab

1.0 Meter Description

Meter Tested

ITRON single phase energy meter Type EMS12RA

Test A, S/N 66004FEE98

Test C, S/N 66004FEE97

Client rating instruction:

230 V

Meter Manufacturer Markings:

Refer to Photograph(s) included in this report

2.0 TEST PROCEDURE

2.1 Test Witnesses

Laboratory personnel: G I Dix and K Manson

2.2 Procedure

The test current was supplied via a step down transformer from the 11 kV laboratory mains supply. The nominal open circuit supply to the short circuit busbar was 230 V at 50 Hz.

The meter was energized prior to application of the test current.
The meter was tested on a phase by phase basis.

Test A, 3000 A was applied to the sample meter, nominal test duration was 10 ms
Test C, 7000 A was applied to the sample meter, nominal test duration was 60 ms.

Note: All current and voltages quoted in this Report are rms values unless otherwise stated.

Equipment

11 kV/440 V short circuit transformer
20,000/5 CT
2000/5 CT
Tektronix TDS3034 digitising oscilloscope
Laboratory constructed point on wave switch
Inductors and Resistors

Please refer to the Laboratory accreditation details at www.ianz.govt.nz for information on measurement uncertainty.

APPENDIX B

Report Number: PL1817-ITRON

PowerLab

Conditions during the test: 102.5 ± 5 kPa, 14 ± 1 °C (Meters conditioned at 20 °C prior to test)

Test Set-up

For Test A

The test circuit was according to the requirements of Clause A.2.16 and consisted of:

1) A supply with current of 3000 A 'practically non-inductive' open circuit voltage of 240 V
2) A point on wave switch
3) The meter under test
4) Supply voltage, test current and voltage at the phase terminals of the meter were monitored during the test

For Test C

The test circuit was according to the requirements of Clause A.2.16 and consisted of:

5) A supply with current of 7000 A 'practically non-inductive' open circuit voltage of 240 V
6) A point on wave switch
7) The meter under test
8) Supply voltage, test current and voltage at the phase terminals of the meter were monitored during the test

Calibration

Test A

3000 A Test:

Prospective current (obtained with the test object removed from the circuit) 2768 A (allowed minimum of 2700 A)
Circuit power factor 'practically non-inductive'
Duration 10 ms

Test C

7000 A Test:

Prospective current (obtained with the test object removed from the circuit) 6876 A (allowed minimum of 6300 A)
Circuit power factor 'practically non-inductive'
Duration 60 ms

APPENDIX B

Report Number: PL1817-ITRON

PowerLab

3.0 RESULTS

For Test A:

During the tests:

1) Surroundings of the meter and load control equipment were not endangered and protection against indirect contact was assured.
2) The internal meter connections were intact after the test
3) No apparent indication of internal failure during the test was observed by examination of meter terminal voltage record

For Test C:

During the tests:

1) Surroundings of the meter and load control equipment were not endangered and protection against indirect contact was assured.

APPENDIX B

Report Number: PL1817-ITRON

PowerLab

4.0 OSCILLOGRAMS:

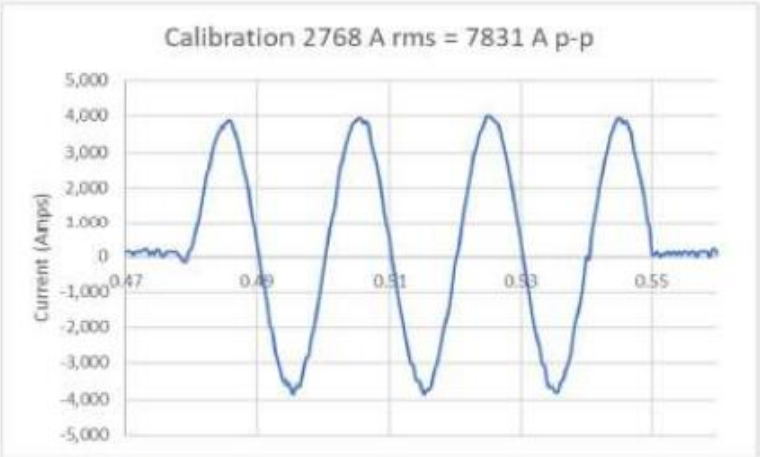


Figure 1, 3000 A Calibration.

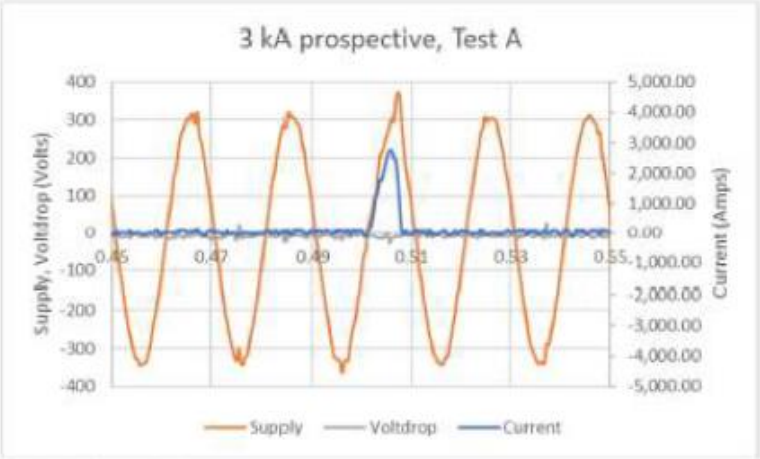


Figure 2, 3000 A test

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Report Number: PL1817-ITRON

PowerLab

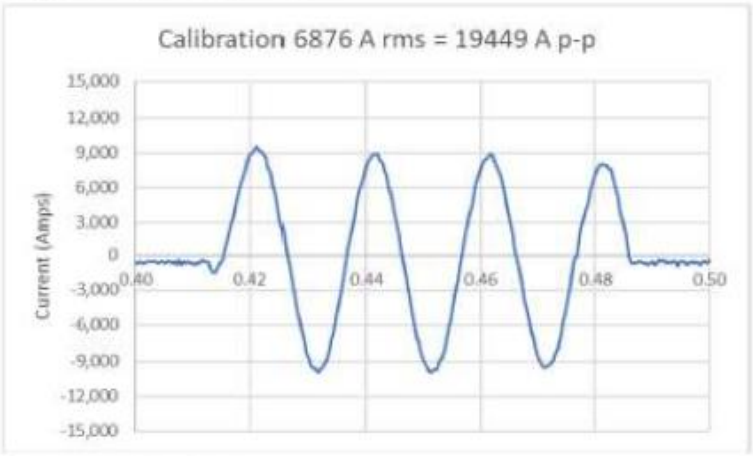

Figure 3, 7 kA Calibration

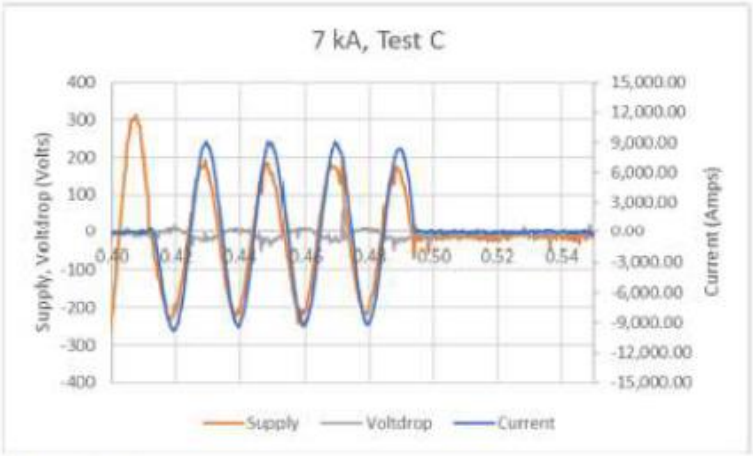

Figure 4, 7 kA Test

APPENDIX B

Report Number: PL1817-ITRON

PowerLab

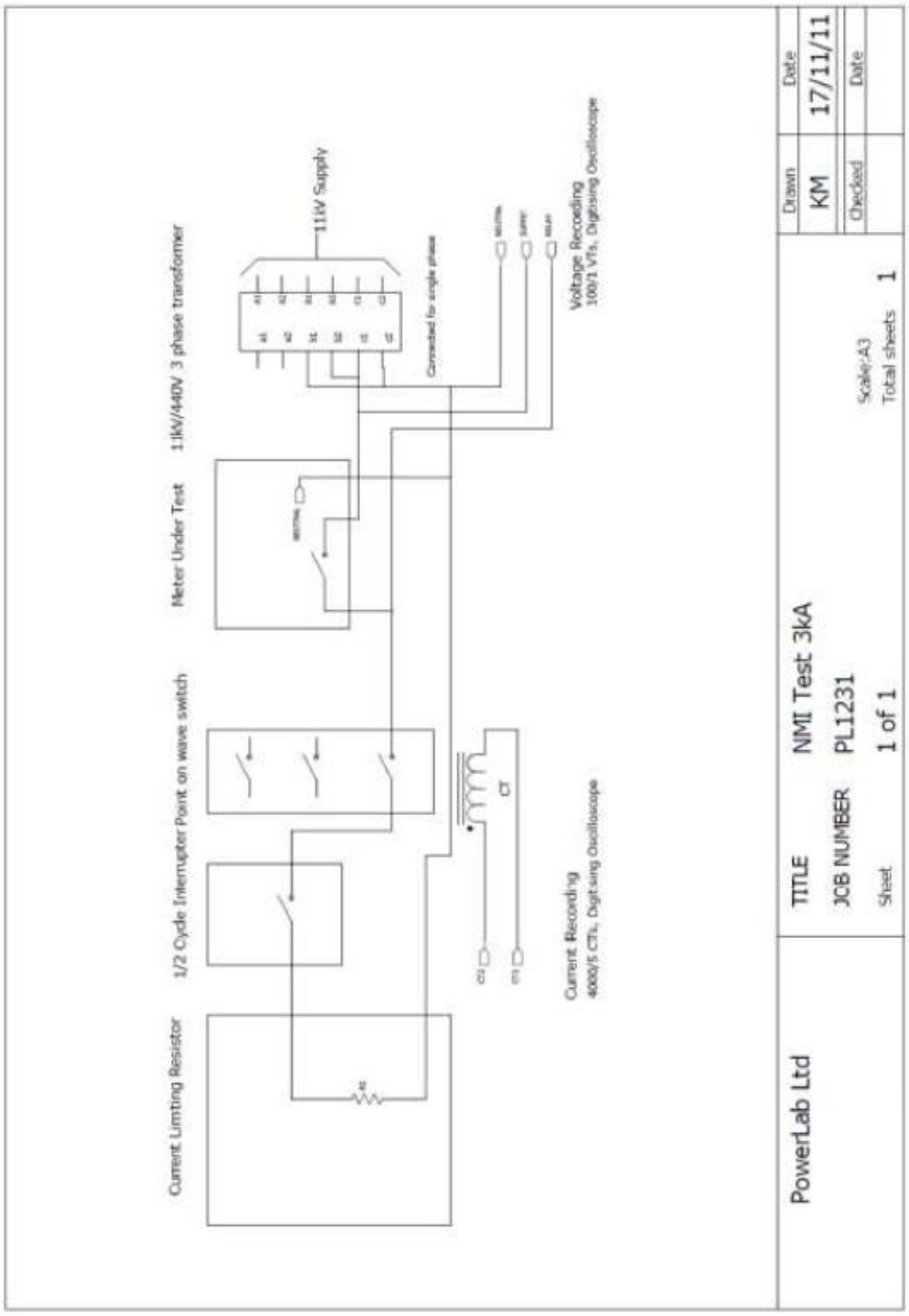

Figure 5Representative Test Schematic

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15 September 2022

APPENDIX B

Report Number: PL1817-ITRON

PowerLab

Photograph(s)

Photo 1 Meter top view

APPENDIX B

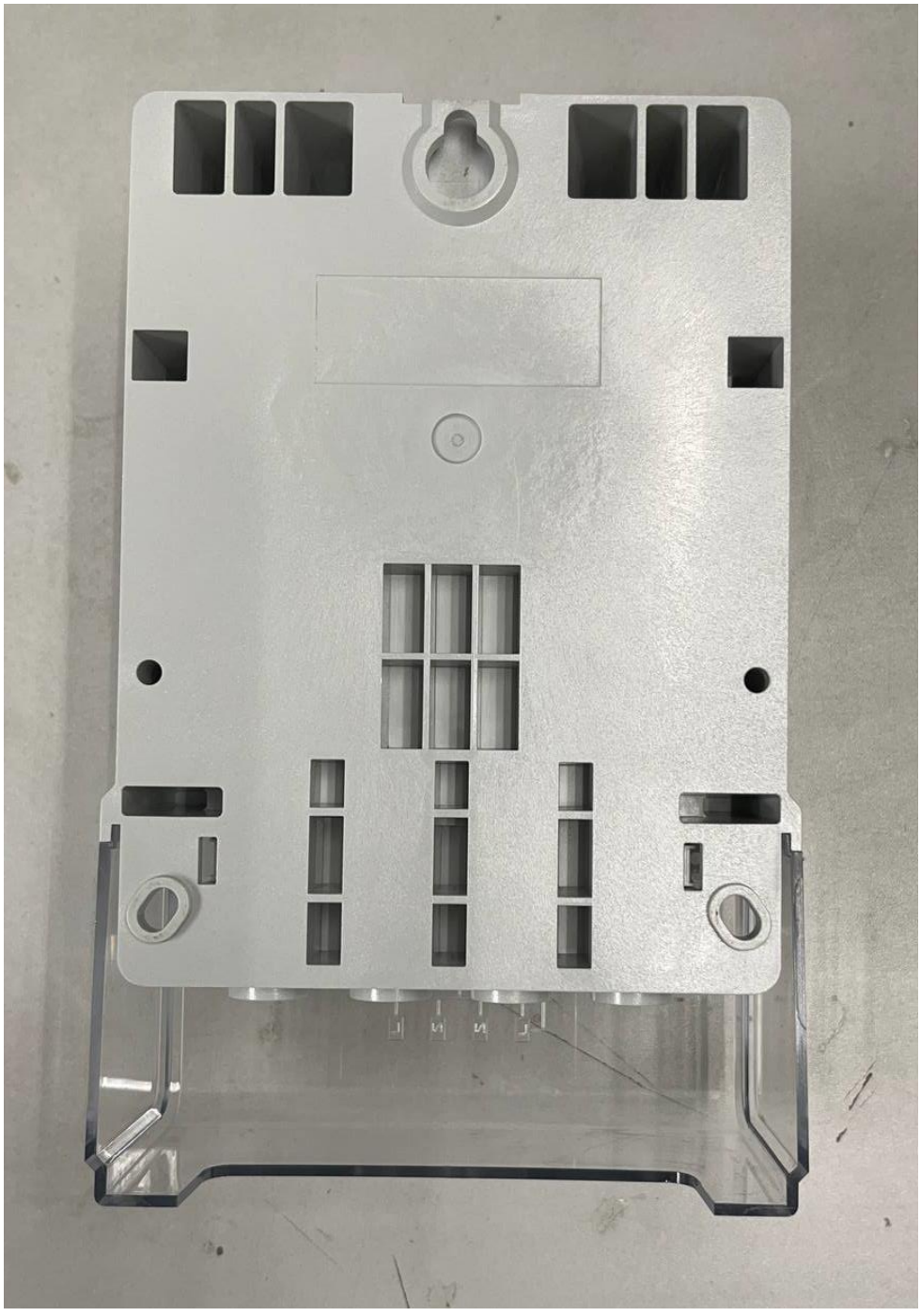
Photo 2 Meter terminals

PHOTOGRAPH

Front Meter cover

PHOTOGRAPH

Back Meter cover

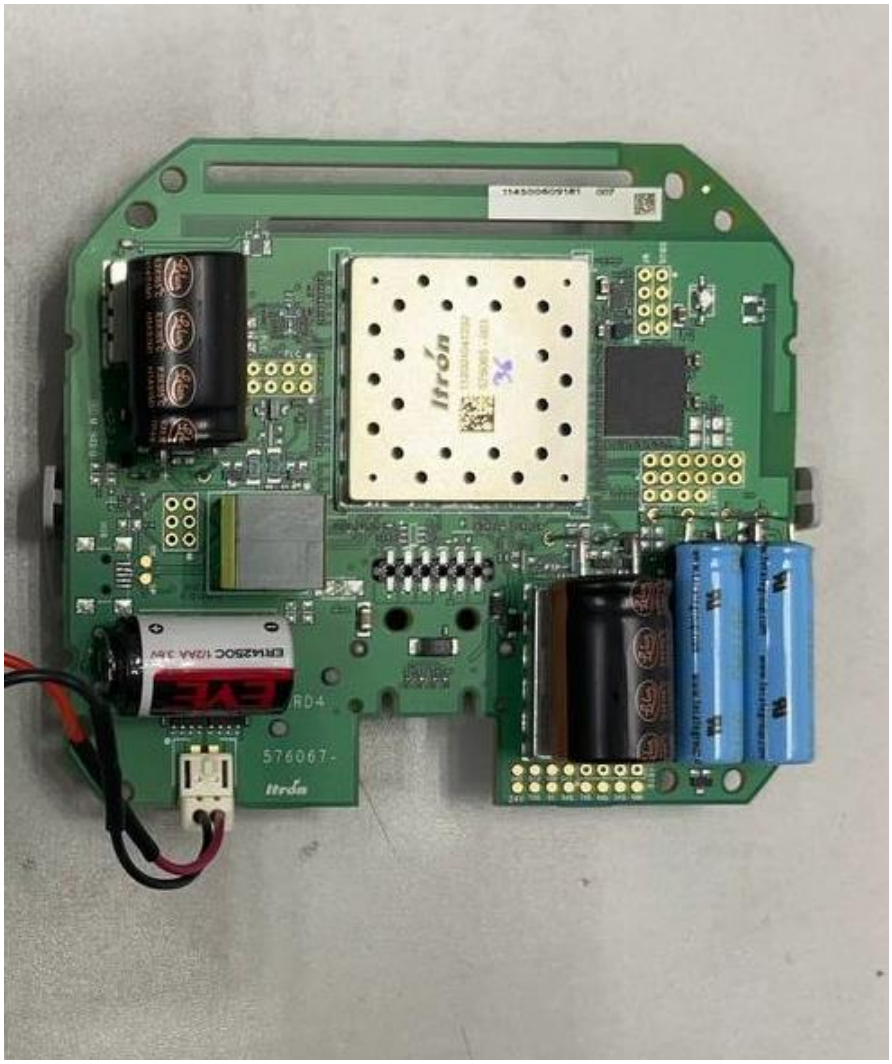


PHOTOGRAPH

Front layer front PWB

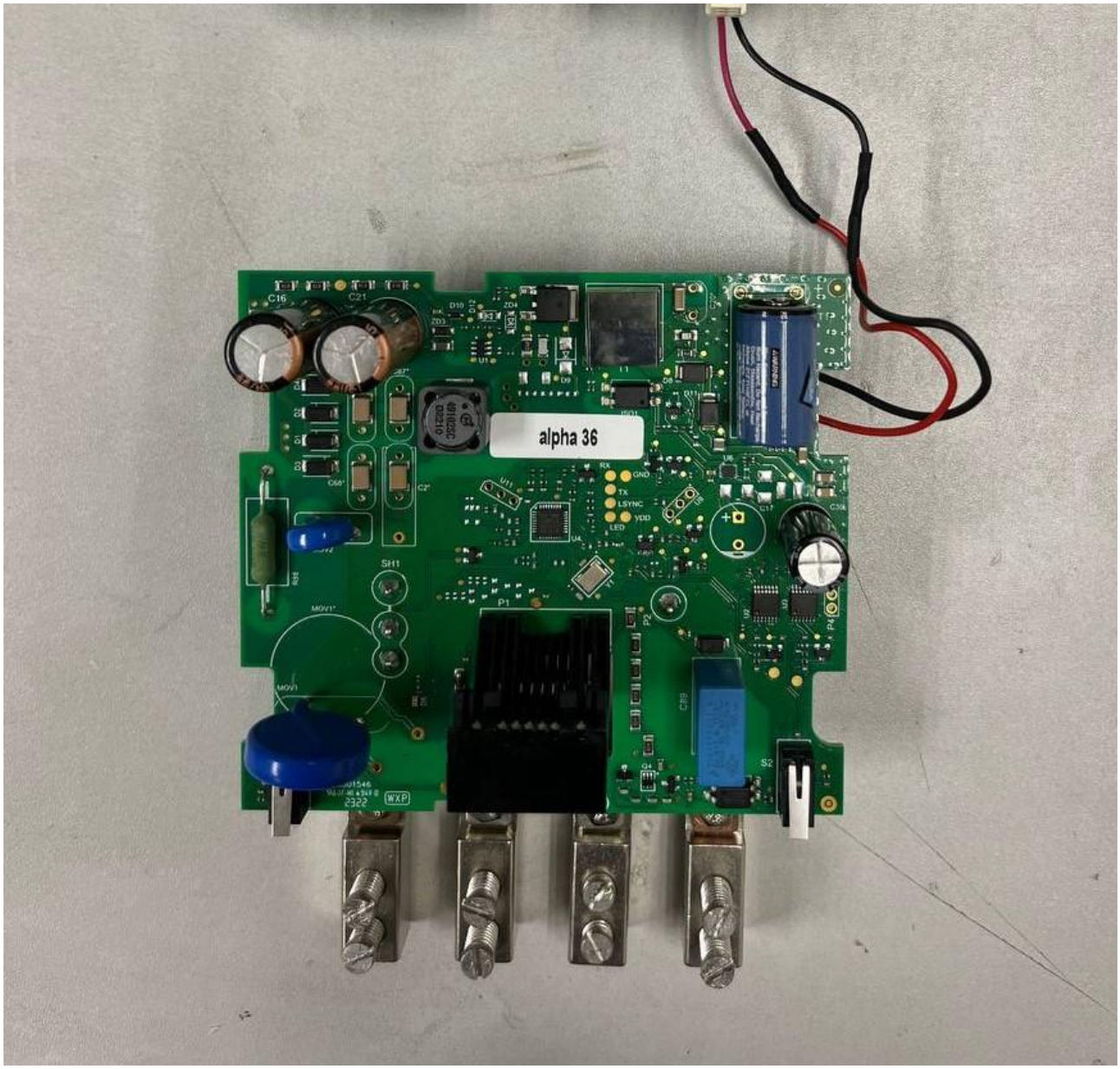
PHOTOGRAPH

Front layer rear PWB



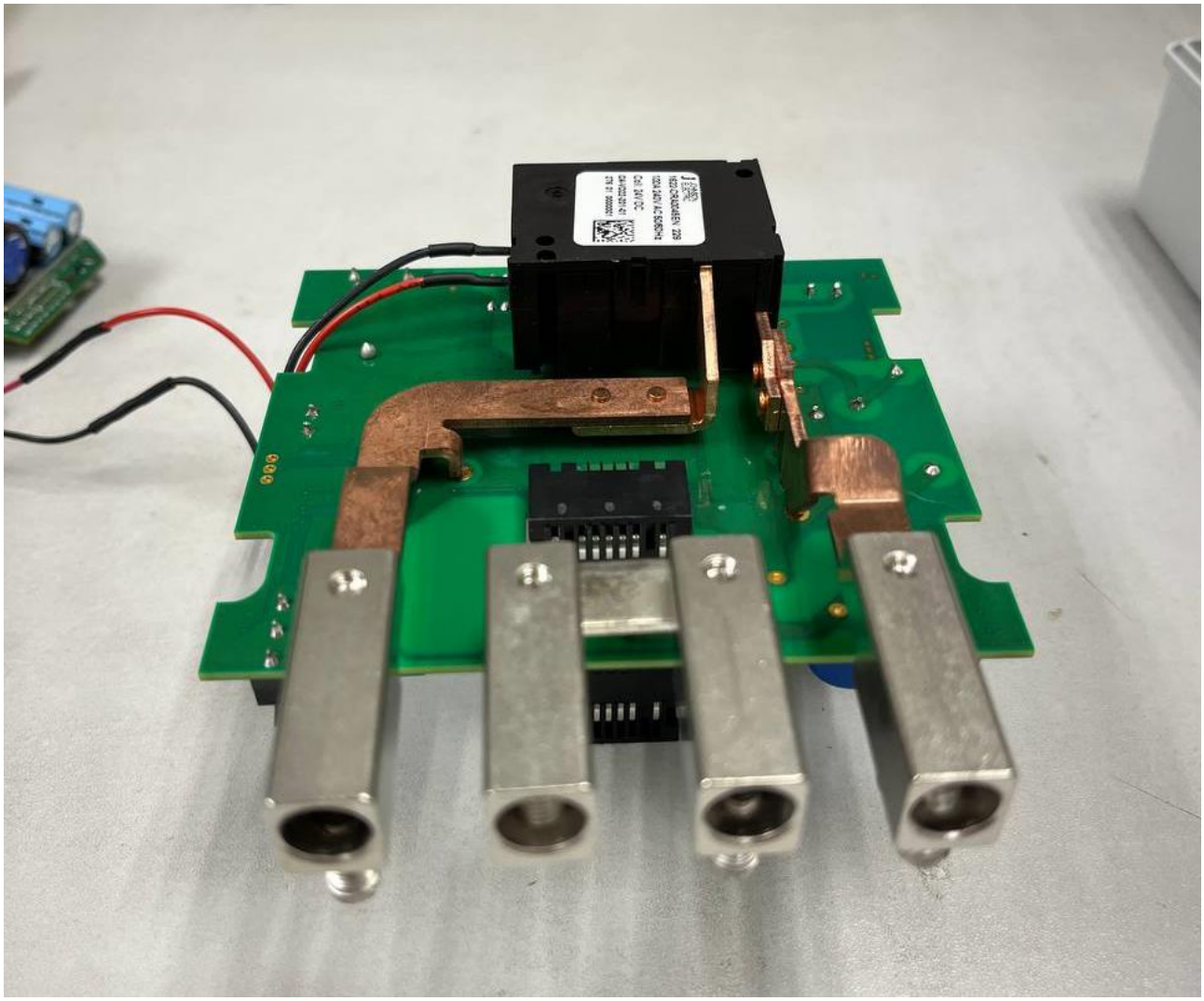
PHOTOGRAPH

Bottom layer PWB front view



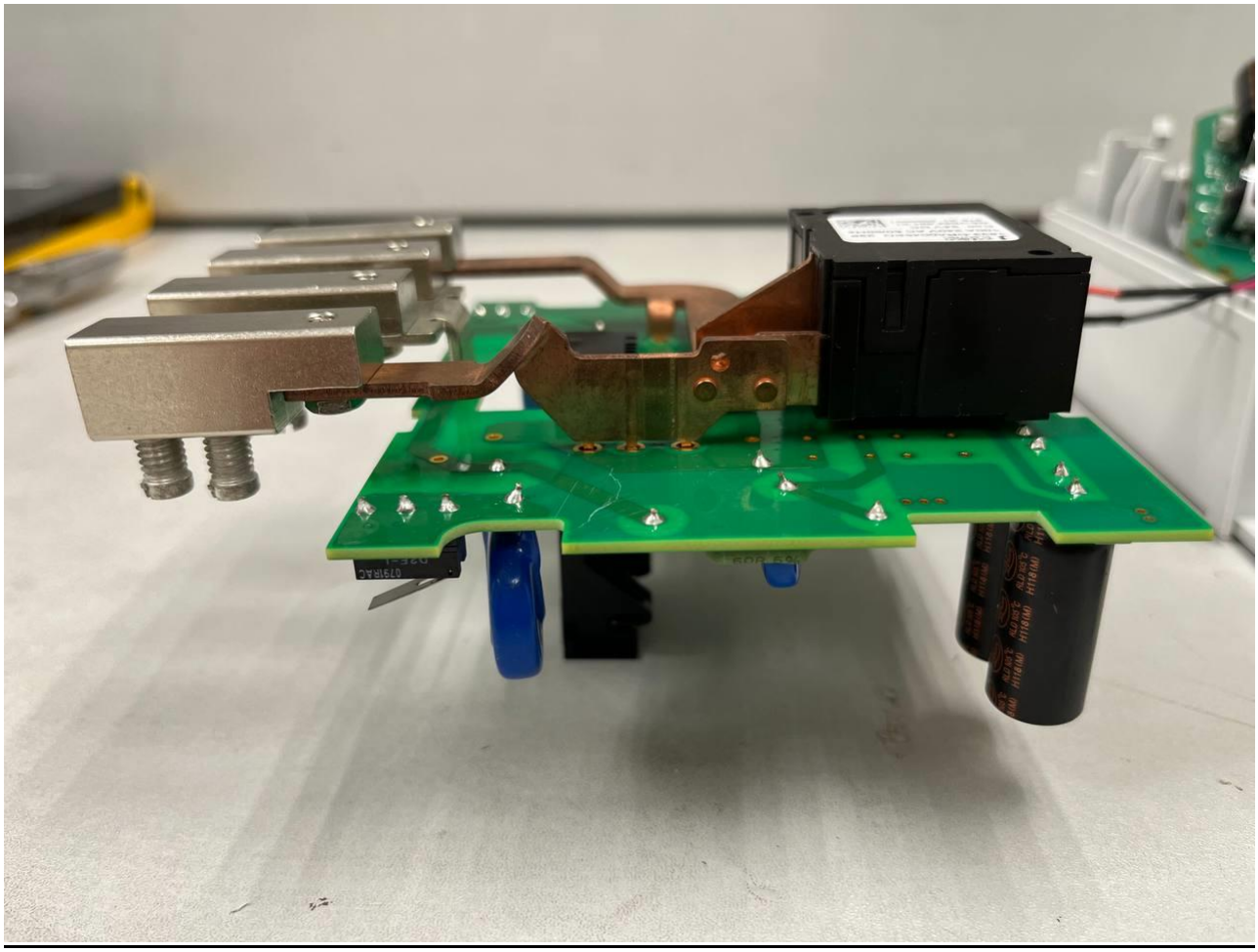
PHOTOGRAPH

Bottom layer PWB rear view



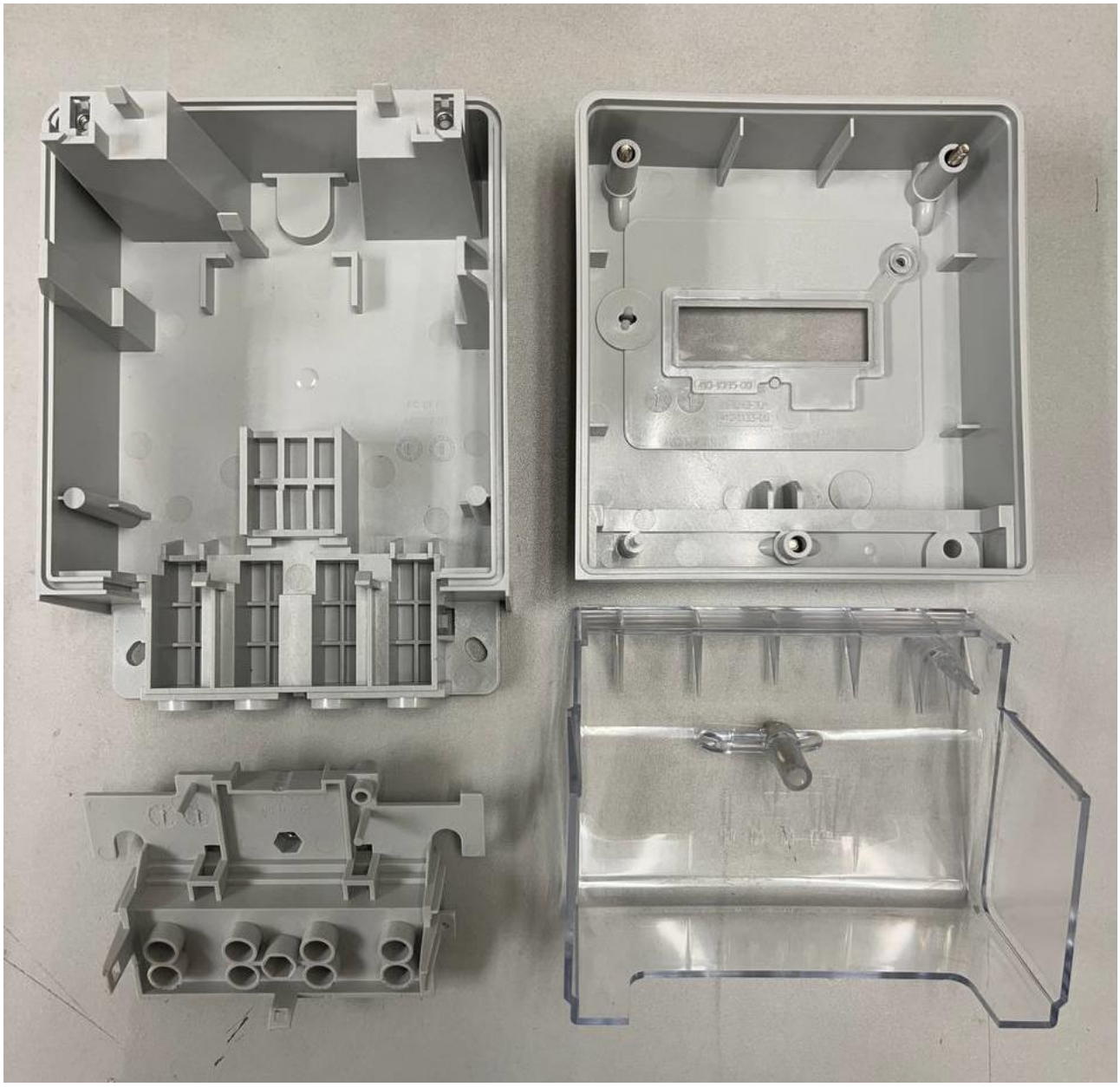
PHOTOGRAPH

Bottom layer PWB side view



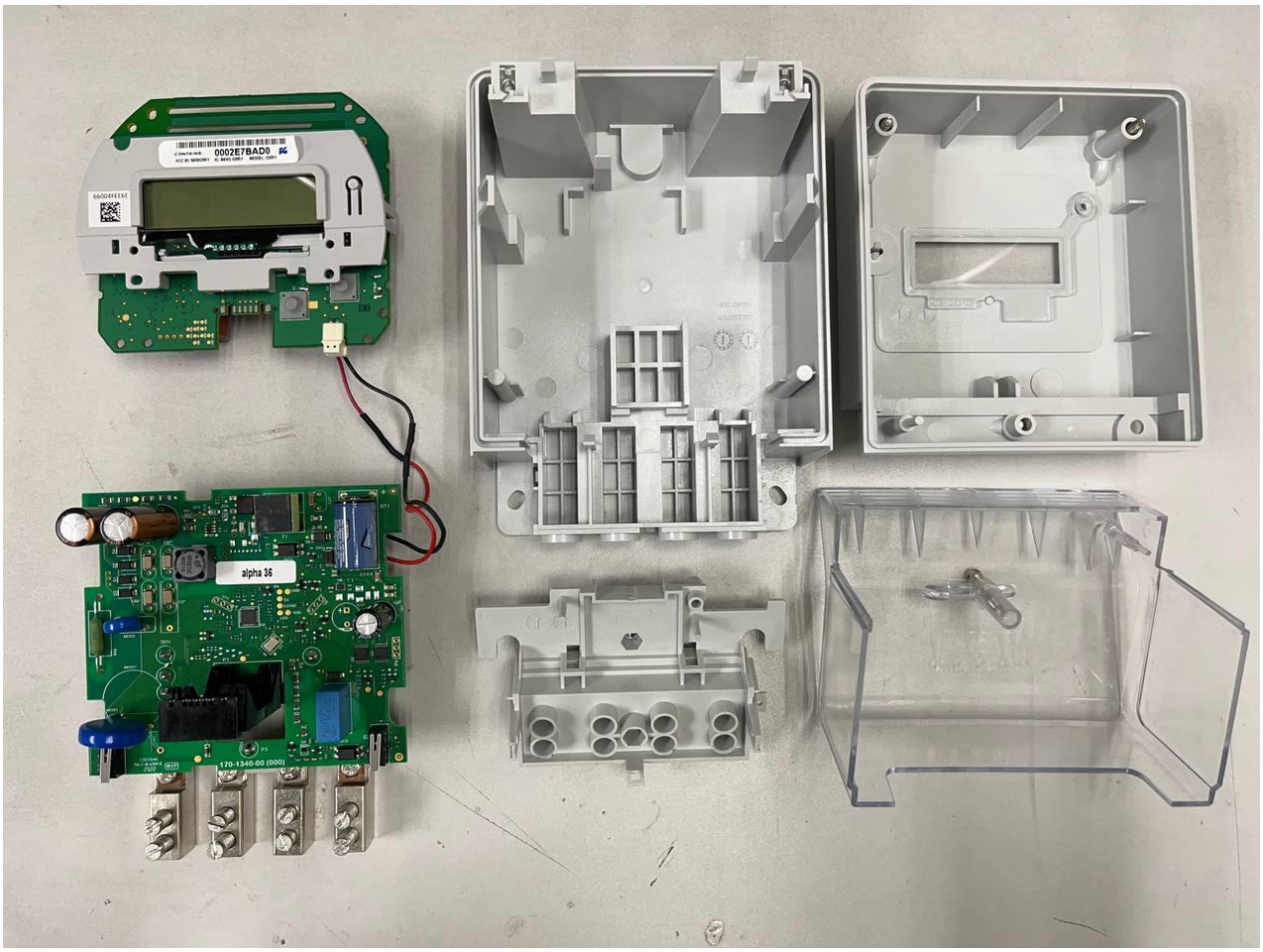
PHOTOGRAPH

Inside Enclosure



PHOTOGRAPH

Inside Enclosure with PWB



****END OF TEST REPORT****