

ที่ สทช ๒๔๐๗/ ๘๓๘๗

สำนักงาน กสทช.
๘๗ พหลโยธิน ซอย ๘
แขวงสามเสนใน เขตพญาไท
กรุงเทพฯ ๑๐๔๐๐

๑๒ มีนาคม ๒๕๖๔

เรื่อง การตรวจสอบและรับรองเครื่องโทรคมนาคมและอุปกรณ์ ตราอักษร PM (PRIMUS) รุ่น KM-24-L

เรียน กรรมการผู้จัดการ บริษัท ไพรมัส จำกัด

อ้างถึง ๑. แบบคำขอรับบริการจดทะเบียนเครื่องโทรคมนาคมและอุปกรณ์ ลงวันที่ ๑๐ มีนาคม ๒๕๖๔
๒. ประกาศคณะกรรมการกิจการกระจายเสียง กิจการโทรทัศน์ และกิจการโทรคมนาคมแห่งชาติ เรื่อง การตรวจสอบและรับรองมาตรฐานของเครื่องโทรคมนาคมและอุปกรณ์ ประกาศ ณ วันที่ ๒ กรกฎาคม ๒๕๕๙

สิ่งที่ส่งมาด้วย ใบจดทะเบียนเครื่องโทรคมนาคมและอุปกรณ์ จำนวน ๑ ชุด

ตามหนังสือที่อ้างถึง ๑ ท่านได้ยื่นขอรับบริการจดทะเบียนเครื่องโทรคมนาคมและอุปกรณ์ (วท.๐๒) ตราอักษร PM (PRIMUS) รุ่น KM-24-L ต่อสำนักงานคณะกรรมการกิจการกระจายเสียง กิจการโทรทัศน์ และกิจการโทรคมนาคมแห่งชาติ (สำนักงาน กสทช.) ความละเอียดแจ้งแล้ว นั้น

สำนักงาน กสทช. ขอเรียนว่าเครื่องวิทยุคมนาคม ตราอักษร แบบรุ่นดังกล่าว ผ่านการรับรองมาตรฐานจากสำนักงาน กสทช. รายละเอียดปรากฏตามใบจดทะเบียนเครื่องโทรคมนาคมและอุปกรณ์ตามสิ่งที่ส่งมาด้วย ทั้งนี้ การผลิตหรือนำเครื่องวิทยุคมนาคมเข้ามาจำหน่ายภายในประเทศ ผู้ประกอบการมีหน้าที่และความรับผิดชอบ ตามหมวด ๖ ของประกาศที่อ้างถึง ๒

จึงเรียนมาเพื่อโปรดทราบและถือปฏิบัติต่อไป

ขอแสดงความนับถือ

(นายชุติเดช บุญโกสุมภ์)
ผู้อำนวยการสำนักเทคโนโลยีและมาตรฐานโทรคมนาคม
ปฏิบัติการแทน เลขาธิการ กสทช.

สำนักเทคโนโลยีและมาตรฐานโทรคมนาคม
โทร. ๐-๒๖๗๐-๘๘๘๘ ต่อ ๗๖๒๑
โทรสาร ๐-๒๒๗๙-๒๒๗๓
ไปรษณีย์อิเล็กทรอนิกส์ standard@nbtc.go.th



สำนักงานคณะกรรมการกิจการกระจายเสียง กิจการโทรทัศน์และกิจการโทรคมนาคมแห่งชาติ

The Office of National Broadcasting and Telecommunications Commission

หมายเลขการจดทะเบียน (Registration Number): **A59004-21**

เครื่องโทรคมนาคมและอุปกรณ์ดังมีรายละเอียดต่อไปนี้ ได้รับการจดทะเบียนเครื่องโทรคมนาคมและอุปกรณ์ จากสำนักงานคณะกรรมการกิจการกระจายเสียง กิจการโทรทัศน์และกิจการโทรคมนาคมแห่งชาติ แล้ว

ตราอักษร (Brand Name) : PM (PRIMUS)

รุ่น/แบบ (Model) : KM-24-L

ผู้ยื่นขอจดทะเบียน : บริษัท ไพรมัส จำกัด

วันที่ 12 มีนาคม 2564 ลงชื่อ (Signature) .....

(Date of Registration)

(นายชุติเดช บุญโกสุมภ์)

ผู้อำนวยการสำนักเทคโนโลยีและมาตรฐานโทรคมนาคม

พนักงานเจ้าหน้าที่

หมายเหตุ : ให้ถือปฏิบัติตามประกาศ กสทช. เรื่อง หลักเกณฑ์การอนุญาตให้ใช้คลื่นความถี่ย่าน 920-925 เมกะเฮิรตซ์ ลงวันที่ 17 พฤศจิกายน 2560

87 ซอยถนนพหลโยธิน 8 (สายลม) แขวงสามเสนใน เขตพญาไท กรุงเทพมหานคร 10400 โทร 0 2271 0151-60 ต่อ 321 โทรสาร 0 2279 2273

รายการ	การจดทะเบียนเครื่องโทรคมนาคมและอุปกรณ์
เลขที่รับ	832
วันที่	10 มีนาคม 2564
ผู้ยื่นคำขอ	บริษัท ไพรมัส จำกัด
ประเภท	เครื่องโทรคมนาคมและอุปกรณ์
	☐ เครื่องโทรคมนาคม
	☑ เครื่องวิทยุคมนาคม ที่ไม่ใช่ประเภท Radio Frequency Identification : RFID ซึ่งใช้คลื่นความถี่ย่าน 920-925 เมกะเฮิรตซ์ (LORA Meter)
	☐ อุปกรณ์
ตราอักษร	PM (PRIMUS)
รุ่น	KM-24-L
เอกสารประกอบการพิจารณา	
1	☑ ใบอนุญาตให้ ทำ ซึ่งเครื่องวิทยุคมนาคม ตราอักษร PM รุ่น KM-24-L ของ กสทช. (/) : ฉบับที่ 050463000256 ลงวันที่ 8 กรกฎาคม 2563 ☑ สำเนารายงานผลการทดสอบของ PTEC. (/) RF/EMF Test : หมายเลข 270/64-061 ลงวันที่ 4 ธันวาคม 2563 มาตรฐานที่ใช้ทดสอบ EN 300 220-1 (/) Safety Test : หมายเลข 103/64-027 ลงวันที่ 17 กุมภาพันธ์ 2564 อ้างถึงรายงานผลการทดสอบหมายเลข 103/64-023 มาตรฐานที่ใช้ทดสอบ IEC 60950-1
2	☑ แค็ตตาล็อก(Catalogue) ☑ ข้อกำหนดทางวิชาการ(Techniccal Specifications)
กฎ ระเบียบ ที่เกี่ยวข้อง	
ผลการพิจารณา	สอดคล้องตามมาตรฐานทางเทคนิคและประกาศที่เกี่ยวข้อง
พ.ร.บ.	☑ มาตรา 95 แห่ง พ.ร.บ.องค์กรจัดสรรคลื่นความถี่และกำกับการประกอบกิจการวิทยุกระจายเสียง วิทยุโทรทัศน์ และกิจการโทรคมนาคม พ.ศ. 2553
มาตรฐาน	☑ กสทช. มท. 1033-2560 ลงวันที่ 17 พฤศจิกายน พ.ศ. 2560
ประกาศ	☑ ประกาศ กสทช. เรื่อง หลักเกณฑ์การอนุญาตให้ใช้คลื่นความถี่ย่าน 920-925 เมกะเฮิรตซ์
สรุปผล	
ประเภท	เครื่องวิทยุคมนาคม ที่ไม่ใช่ประเภท Radio Frequency Identification : RFID ซึ่งใช้คลื่นความถี่ย่าน 920-925 เมกะเฮิรตซ์ (LORA Meter)

ตราอักษร	PM (PRIMUS)
รุ่น	KM-24-L
ลักษณะ	LORA Meter
ชนิด	ประจำที่
เงื่อนไข	ได้รับยกเว้นไม่ต้องได้รับใบอนุญาตให้มี ใช้ และนำออกซึ่งเครื่องวิทยุคมนาคม และตั้งสถานีวิทยุคมนาคม แต่ไม่ได้รับยกเว้นใบอนุญาตทำ นำเข้า และค้าซึ่งเครื่องวิทยุคมนาคม
ย่านความถี่วิทยุ	Tx/Rx. 920-925 MHz
กำลังส่งที่วัดได้ (e.i.r.p.)	10.67 dBm (11.66 mW) (Specification 20 dBm)
Antenna	External (non-detachable)

(นายภาณุ สิงห์หล้า)
พนักงานผู้ตรวจสอบ
๑๒ มี.ค. ๖๔

(นายสมศักดิ์ หล่ำศรี)
ผอ. ส่วนรับรองมาตรฐาน
12 มี.ค ๖๔

Test Report issued under the responsibility of:

TCT 通测检测 TESTING CENTRE TECHNOLOGY

TEST REPORT
IEC 62053-21
Electricity metering equipment - Particular requirements -

Part 21: Static meters for AC active energy (classes 0,5, 1 and 2)

Report Number..... :	TCT251113S005
Date of issue..... :	2025-12-02
Total number of pages ..... :	52 pages
Name of Testing Laboratory preparing the Report ..... :	Shenzhen TCT Testing Technology Co., Ltd.
Applicant's name ..... :	Primus Co., Ltd.
Address..... :	118/60 Moo18 Khlong Nueng, Khlong Luang, Pathum Thani 12120
Test specification:	
Standard ..... :	IEC 62053-21:2020
Test procedure ..... :	Type test
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC62053_21B
Test Report Form(s) Originator .... :	-
Master TRF ..... :	Dated 2025-11-14

General disclaimer:

Note: This report shall not be reproduced except in full, without the written approval of Shenzhen TCT Testing Technology Co., Ltd. This document may be altered or revised by Shenzhen TCT Testing Technology Co., Ltd. personnel only, and shall be noted in the revision section of the document. The test results in the report only apply to the tested sample. Decision rule applied procedure 2 "Accuracy Method" as stated in the IEC Guide 115:2007.

Test item description ..... :	Single Phase kWh-meter
Trade Mark ..... :	PRIMUS
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	KM-24-L, KM-24-Series
Ratings ..... :	AC110-240AC,50/60Hz, 0.25-5(60)A

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	Shenzhen TCT Testing Technology Co., Ltd.	
Testing location/ address.....:		2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China	
Tested by (name, function, signature).....:		Owen Hu (Project Engineer)	
Approved by (name, function, signature)...:		Tomsin (Reviewer)	
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment): Attachment 1: Photo documentation (10 pages).	
Summary of testing:	
Tests performed (name of test and test clause): All applicable test	**Testing location:** **Shenzhen TCT Testing Technology Co., Ltd.** 2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Summary of compliance with National Differences (List of countries addressed): ☐ **The product fulfils the requirements of standards:**	

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Single Phase kWh-meter
KM-24-L
IEC62053-21
serial number: 68100013
Year of manufacture:XXXX



AC110-240AC,50/60Hz, 0.25-5(60)A
class 1
500 imp / kWh
Specified operating range: -10 °C to 60 °C
Limit range of operation: -25 °C to 65°C
Limit range for storage and transport: -25 °C to 70 °C

Test item particulars.....:
Possible test case verdicts: **- test case does not apply to the test object.....:** N/A **- test object does meet the requirement.....:** P (Pass) **- test object does not meet the requirement.....:** F (Fail)
Testing.....: **Date of receipt of test item .....:** 2025-11-13 **Date (s) of performance of tests.....:** 2025-11-13 to 2025-12-02
General remarks:
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.** Clause numbers between brackets refer to clauses in IEC 62052-11
When differences exist; they shall be identified in the General product information section.
Name and address of factory (ies).....: Same as manufacturer
General product information: - The KM-24-L is a single-phase electricity meter. Can measure voltage (V), current (A), and electrical energy (kWh). and display the water usage in cubic meters (m^3). - According to the test results, this product conforms to classes 1.

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
4(4)	**Standard electrical values**		P
4.1(4.1)	**Voltages**		P
4.1(4.1.1)	Nominal voltages		N/A
	The nominal voltage(s) of a meter shall be equal to one or more of the nominal voltages listed in Table 1.		N/A
4.1(4.1.2)	Voltage ranges		P
	The voltage ranges of a meter shall be at least equal to the voltage ranges listed in Table 2.	110-240VAC	P
4.2(4.2)	**Currents**		—
4.2.1(4.2.1)	Nominal currents		P
	The preferred nominal current(s) of a meter shall be equal to one or more of the nominal current values listed in Table 3.	5A	P
4.2.2	Starting current		P
	The meter shall start and continue to register electrical energy at current value equal to the starting current (Ist) value specified in the relevant accuracy class standard. Registration of energy at current values lower than the starting current is permitted and see table 1	0.02A	P
4.2.3	Minimum current		P
	The meter shall meet its accuracy requirements at the minimum current (Imin) value as specified for the relevant accuracy class standard and see Table 2	0.25A	P
4.2.4(4.2.4)	Maximum current		P
	The maximum current (Imax) for directly connected meters should be an integral multiple of the nominal current (for example four times the nominal current).	65A	P
4.3(4.3)	**Frequencies**		P
4.3(4.3.1)	Nominal frequencies		P
	The nominal frequencies for AC meters (fn) shall be equal to at least one of the nominal frequencies of 50 Hz or 60 Hz.	50/60Hz	P
4.3(4.3.2)	Frequency ranges		N/A
	The frequency range(s) of AC meters shall be at least equal to the frequency ranges listed in Table 5.		N/A
4.4(4.4)	**Power consumption**		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	The power consumption requirements in 4.4. apply to AC meters.		P
	The power consumption requirements for DC meters are given in the relevant particular accuracy class standards.		N/A
	The power consumption of a meter shall be determined at reference conditions given in 7.1 by any suitable method. The maximum uncertainty of the measurement of the power consumption shall not exceed 5 %.		P
	The active and apparent power consumption for each voltage and current circuit measured at nominal frequency and reference temperature shall not exceed the values shown in Table 6.	2.5VA	P
	In case of meters specified for multiple values of nominal frequency, voltage or current, the measurements shall be conducted using nominal values resulting in the worst case (highest) power consumption of the meter.		P
5 (5)	**Construction requirements**		**P**
5(5.1)	**General**		P
	The meter shall comply with the safety requirements covered in IEC 62052-31:2015	Additional assessment	N/A
	The construction safety requirements for detached indicating displays are covered in IEC 62052-31:2015, 13.1 c).		N/A
	All parts which are subject to corrosion under normal working conditions shall be protected effectively.		P
	The meter case shall be so constructed and arranged that any non-permanent deformation cannot prevent the satisfactory operation of the meter.		P
	The meter cover shall not be removable without the use of a tool.		P
	The mechanical strength of the meter shall be tested with the tests specified in 5.2.		P
	If an electricity meter is designed to be installed in a specified matching socket or a rack, then the mechanical requirements apply to, and the mechanical tests shall be performed on, the meter installed in its specified matching socket or rack, as per the manufacturer's instructions.	Consideration of end Products	P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	If an electricity meter is designed to be installed with a specified detached indicating display, then the mechanical requirements apply to, and the mechanical tests shall be performed on, the meter and its specified detached indicating display.		N/A
	If an electricity meter is designed to be installed with specified LPITs, then the mechanical requirements apply to, and the mechanical tests shall be performed on, the meter with its specified LPITs connected.		N/A
	Electricity meters designed to operate only with data communication interfaces and without any indicating display may be also evaluated using this document.		N/A
5(5.2)	**Mechanical tests**		P
5(5.2.1)	Shock test		P
	The test shall be carried out according to IEC 60068-2-27: 2008, under the following conditions:		P
	a) meter in non-operating condition, without the packing;		P
	b) half-sine pulse;		P
	c) peak acceleration: 30 *g*n (300 m/s2);	30 *g*n	P
	d) duration of the pulse: 18 ms.	18 ms	P
	After the test, the meter shall show no damage or change of the information and shall operate correctly in accordance with the requirements of the relevant standard.	After the test, no damage of the information and operate correctly.	P
5(5.2.2)	Vibration test		P
	The test shall be carried out according to IEC 60068-2-6: 2007, under the following conditions:		P
	a) meter in non-operating condition, without the packing;		P
	b) frequency range: 10 Hz to 150 Hz;	10 Hz to 150 Hz	P
	c) transition frequency: 60 Hz;	60 Hz	P
	d) *f* < 60 Hz, constant amplitude of movement 0,075 mm;	0,075 mm	P
	e) *f* > 60 Hz, constant acceleration 9,8 m/s2 (1 *g*);	9,8 m/s^2	P
	f) single point control;		P
	g) number of sweep cycles per axis: 10.	10	P
	After the test, the meter shall show no damage or change of the information and shall operate correctly in accordance with the requirements of the relevant standard.	After the test, no damage of the information and operate correctly.	P
5(5.3)	**Window**		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	If the cover is not transparent, one or more windows shall be provided for reading the indicating display and observation of the operation indicator.		N/A
	These windows shall be of transparent material which cannot be removed undamaged without breaking the seal(s). This requirement also applies to detached indicating displays.		P
5(5.4)	**Terminals – Terminal block(s) – Protective conductor terminal**		P
	The material of which the terminal block is made shall be capable of passing the tests given in 10.5.2 of IEC 62052-31:2015.		P
	The protective conductor terminal, if present, shall meet the requirements given in 6.5.2.3 of IEC 62052-31:2015.		P
5(5.5)	**Sealing provisions**		P
5(5.5.1)	General		N/A
	The meter shall be designed in a way that allows sealing of the meter case, the meter terminal covers, and the relevant metrological configuration parameters which influence the measurement results.	Consideration of end Products	N/A
	If the meter is installed in a meter cabinet that is sealed, the terminal covers do not need to be sealed (see 5.5.3.1).		N/A
	When the meter has been installed according to the installation instructions, regardless of the solution used to implement sealing, it shall be visually evident if the sealing has been tampered with.		N/A
5(5.5.2)	Meter case		N/A
	The meter case shall have a means for applying a metrology seal in such a way that the internal parts of the meter are accessible only after breaking the sealing mechanism.		N/A
	The meter case may be designed in such a way that it cannot be opened after the meter is manufactured.		—
5(5.5.3)	Meter terminals		N/A
5(5.5.3.1)	General		N/A
	The terminals of a meter shall be protected against tampering using sealable terminal covers, or by installing the meter in a sealable electrical cabinet.		N/A
5(5.5.3.2)	Sealing of installation cabinet		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	Meters specified by the manufacturer for installation in sealable electrical cabinets are considered to meet the requirement for terminal sealing provisions without sealable terminal covers.		N/A
5(5.5.3.3)	Sealing of terminal covers		N/A
	The terminals of meters specified for installation without a sealable electrical cabinet shall have a terminal cover(s) which can be sealed independently of the meter case and the meter cover.		N/A
	Access to the meter terminals shall not be possible without breaking the seal(s) of the terminal cover(s).		N/A
	This requirement applies to the terminal cover(s) for the terminals of current and voltage measuring circuits, and the terminals of auxiliary power supply circuits.		N/A
5(5.5.4)	Sealing of detached indicating displays		N/A
	The enclosure (case) of a detached indicating display shall have means for applying a metrology seal in such a way that the internal parts of the detached indicating display are accessible only after breaking the sealing mechanism.		N/A
	All seals are not required if the enclosure of the detached indicating display cannot be opened without damaging it to such an extent that the attempt is clearly visible, and the enclosure cannot be reused.		N/A
5(5.5.5)	Sealing of LPIT connections		N/A
	The connection terminals of the LPIT cables, both at the meter and at the LPIT end, shall have means for being sealed with a metrology seal.		N/A
5(5.6)	**Display of measured values**		P
5(5.6.1)	General		P
	These requirements are applicable to meters with or without indicating displays.		P
	The update rate of the energy register shall be documented in the user manual.		P
5(5.6.2)	Meters without indicating displays		—
	The measurement results (value of the register) shall be available via a data communication interface(s).		P
5(5.6.3)	Meters with indicating displays		P
5(5.6.3.1)	General		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	The measurement results shall be shown on an indicating display either continuously or on demand.		P
	When the meter is not energized, an electronic indicating display does not need to be readable.		P
	In the case of multiple values presented by a single indicating display it shall be possible to display the content of all relevant registers.		P
	For indicating displays with automatic sequencing, each register content used for billing purposes shall be displayed for a minimum of 5 s.		N/A
	An electronic indicating display shall be provided with a test function for the purpose of determining whether it is functioning correctly. This function shall be accessible during normal use of the meter.		P
	Every numerical element of an electronic indicating display shall be able to show all the numbers from "zero" to "nine".		P
	For testing purposes only, it shall be possible to increase the resolution in order to enable the critical change value to be seen.		N/A
5(5.6.3.2)	Detached indicating display		N/A
	A detached indicating display shall provide information sufficient to identify the meter to which it is connected, in particular, the type and serial number of the meter.		N/A
	The detached indicating display shall be capable of showing the status of its data communication connection with the meter.		N/A
5(5.7)	**Storage of measured values**		P
	Following the disconnection of all external power sources to the meter, the amounts of electrical energy measured shall remain stored in the meter's memory for a period of at least 12 months while the meter is powered down and shall be available for reading once the meter power is restored.		P
	The measured values shall be stored in the meter.		P
	Conformity to 5.7 shall be verified by a design examination.		P
5(5.8)	**Pulse outputs**		P
5(5.8.1)	General		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	Pulse outputs shall be designed in such a way that electromagnetic influence quantities and disturbances do not damage or substantially influence its operation.		P
5(5.8.2)	Optical test output		N/A
5(5.8.2.1)	General characteristics		N/A
	Static meters shall have an optical test output capable of being monitored with suitable testing equipment.		N/A
	The optical test output shall be located on the meter.		N/A
	In case of meters designed to operate with a detached indicating display, a second optical test output may be also located on the detached indicating display.		N/A
	An optical test output shall be accessible when the meter is installed for normal operation.		—
	The test output pulses shall represent the total energy measured by the meter on all phases of the electrical system.		N/A
	The optical test output shall generate a number of pulses proportional to the measured energy.		N/A
	The unmodulated output pulses shall have the shape shown in Figure A.2.		N/A
5(5.8.2.2)	Optical characteristics		N/A
	The wavelength of the radiated signals for emitting systems shall be between 550 nm and 1 000 nm.		N/A
5(5.8.2.3)	Functional tests		N/A
	The optical pulse output shall operate correctly with regards to the number of pulses emitted, and the times *t*ON and *t*OFF shall remain within their specified range.		N/A
	The functional tests of the optical test output shall be carried out under reference conditions given in 7.1.		N/A
	The test arrangement shall be according to Annex A.		N/A
5(5.8.3)	Electrical pulse output		P
5(5.8.3.1)	General characteristics		P
	The meter may be equipped with electrical pulse outputs.		P
	The meter may have a passive, externally powered pulse output(s). Such pulse outputs may be used as meter test outputs, or to transmit pulses representing a finite energy quantity, to a remote receiver (e.g. a tariff device).		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	Three types of pulse outputs are defined: a) pulse outputs class A for long range transmission (See Annex B); b) pulse outputs class B for short range transmission (See Annex B); c) pulse outputs for long distances according to IEC 60381-1:1982 (See Annex C).		P
	The pulse output shall generate a number of pulses proportional to the measured energy.		P
	When the meter is equipped with several pulse outputs that have a common terminal this common terminal shall be negative.		P
5(5.8.3.2)	Electrical characteristics		P
	The main electrical characteristics of class A and class B electrical pulse outputs are summarized in Annex B, Table B.1.		P
	The main electrical characteristics of pulse outputs for long distances according to IEC 60381‑1: 1982 are summarized in Annex C, Table C.1.		P
5(5.8.3.3)	Functional tests		P
5(5.8.4)	Operation indicator		P
	Electromechanical meters do not need to be equipped with an operation indicator.		P
	Solid state meters shall have an operation indicator.		P
	The operation indicator is intended to show that the meter’s power supply circuit is energized.		P
	An operation indicator shall be visible when the meter is installed for normal use.		P
	The operation indicator shall be located on the meter and on the detached indicating display, if present.		P
	The optical output may be configurable to operate as the operation indicator or as the test output if an indication is provided to identify the active function of the optical output.		N/A
	Alternatively, the indicating display may be used to provide (or be considered as) an indication of meter operation.		P
5(5.9)	**Electrical pulse inputs**		N/A
5(5.9.1)	General characteristics		N/A
	The meter may have a passive or active two-wire, pulse input(s).		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	Inputs shall be designed in such a way that electromagnetic influence quantities and disturbances do not damage or substantially influence their operation.		N/A
5(5.9.2)	Functional tests of electrical pulse inputs		N/A
	The functional tests of the electrical pulse inputs shall be carried out under reference conditions given in 7.1.		N/A
5(5.10)	**Auxiliary power supply**		N/A
	In special applications meters may be powered either exclusively from an auxiliary power supply, or from both the voltage circuits (measured mains) and from the auxiliary power supply.		N/A
	Where a three-phase meter powered exclusively from the auxiliary power supply is intended to be used in billing applications, the manufacturer shall specify the auxiliary power supply connection method(s) which ensure the meter operation when any one or two of its voltage circuits (phases of the measured mains) are de-energized.		N/A
	In addition, auxiliary power supply terminals of such meters shall be marked with symbol 14 from IEC 62052-31:2015, Table 3 and shall be accompanied by appropriate information in the installation instructions		N/A
	Meters powered both from their voltage circuits and from the auxiliary power supply shall automatically switch between these power sources in case either one becomes de-energized.		N/A
6(6)	**Meter marking and documentation**		**P**
6(6.1)	**Meter accuracy class marking**		P
	A meter shall not be marked with an accuracy class index unless it meets all applicable accuracy and performance requirements specified in the relevant accuracy class standard(s).		P
6(6.2)	**Meter marking**		P
	A meter shall bear all of the markings required by local regulations and the following information as applicable:		P
	a) manufacturer's name or trademark;		P
	b) designation of type (see e.g. 3.1.2, 3.1.13);		P
	c) space for approval mark;		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	d) the meter serial number and year of manufacture.		P
	e) service type:		P
	f) the nominal voltage or the range of voltage,		P
	g) the minimum current, nominal current and the maximum current		P
	h) the rated secondary current of transformer(s) to which a transformer-operated meter should be connected		N/A
	i) the nominal frequency in Hz for AC meters; for DC meters "DC" shall be marked;		P
	j) the meter constants;		P
	k) the ratio(s) of external instrument transformers		N/A
	l) the accuracy class index of the meter		P
	m) the specified operating temperature range (see Table 12);		P
	n) if the meter is of a special type (for example in the case of a multi-rate meter, if the voltage of the tariff control device differs from the nominal voltage), this shall be marked on the meter or on a separate plate;		N/A
	o) the nominal value and the operating range of the auxiliary supply voltage and frequency		N/A
	p) the identification of the embedded software (firmware);		N/A
	The location of the meter marking shall be as specified in Table 7 columns C and D		P
	Other information shall be provided on meter packaging and in documentation as specified in the remaining columns in Table 7.		P
	The external nameplate shall be permanently attached to the meter case.		P
	The marking on an external nameplate shall be indelible, distinct and legible from outside the meter.		P
	Markings shall remain clear and legible under conditions of normal use and resist the effects of cleaning agents specified by the manufacturer.		P
6(6.3)	**Connection diagrams and terminal marking**		P
	Every meter shall preferably be indelibly marked with a diagram of connections.	See Instruction Manual	P
	If the meter terminals are marked, this marking shall appear on the diagram.		P
6(6.4)	**Symbols**		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
6(6.4.1)	General		P
	This subclause applies to letter and graphical symbols intended for marking and identifying the function of electromechanical or static electricity meters and their auxiliary devices.		P
	This section also applies to letter and graphical symbols intended for identifying the information displayed by electromechanical or static electricity meters and their auxiliary devices.		P
	The applicable symbols specified in this subclause shall be marked on the meter case, an external nameplate, dial plate, external labels or accessories, or shown on the indicating display as appropriate.		P
6(6.4.2)	Symbols for the measuring elements		P
	In the symbols, which are given as examples in Annex D, Table D.2, each voltage circuit is represented by a line and each current circuit by a small circle.		P
6(6.4.3)	Symbols for transformer-operated meters		N/A
	For transformer operated meters, the ratios of the external transformers shall be marked as follows.		N/A
	The transformer ratios, which are taken into account in the energy registers values shall be shown on the indicating display (if present) and optionally marked on the name-plate or on the dial of the meter;		N/A
	The transformer ratios which are not taken into account in the energy register values shall be marked on a supplementary plate located on the cover of meters fitted with half-primary or secondary registers;		N/A
	The transformer symbol as shown in Annex D, Table D.5, shall be marked on the meter case, nameplate or on the dial of the meter fitted with half-primary or secondary registers.		N/A
	That factor by which the reading of the register is to be multiplied to obtain the value of the energy on the primary side of the transformers shall be marked on the supplementary plate of meters fitted with half-primary or secondary registers.		N/A
6(6.4.4)	Identification of the displayed information		P
	All information displayed, shall be identified by appropriate symbols or identifiers. These symbols or identifiers shall be placed close to the information that is to be identified.		P
6(6.4.5)	Marking of the measured quantity		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	The symbols of principal units in accordance with 6.4.6, together with the applicable SI unit prefixes (for example, k, M, G) shall be marked conspicuously on the meter case, external nameplate or the dial of the meter.		P
	When the meter is intended only for special conditions and/or for a different power-factor range, the appropriate symbol shall be used.		P
6(6.4.6)	Symbols of principal units used for meters (see Table 8)		P
6(6.4.7)	Symbols for auxiliary devices See examples given in Annex D, Table D.8.		N/A
6(6.4.8)	See examples given in Annex D, Table D.9. Applicable only to electromechanical meters.		N/A
6(6.4.9)	Symbols for communication ports See examples given in Annex D, Table D.10.		N/A
6(6.5)	**Documentation**		P
6(6.5.1)	Installation manuals		P
	For three-phase meters powered exclusively from an auxiliary power supply and intended to be used in billing applications, the manufacturer shall document the auxiliary power supply connection method which ensures meter operation during phase voltage interruptions (see 5.10. and 9.4.5).		N/A
	The manufacturer shall clearly state if the meter is, or is not, suitable for use on impedance grounded networks (see 9.4.13).		P
6(6.5.2)	Instruction for use		P
	The meter's technical documentation shall not reference an accuracy class index unless the meter meets all applicable accuracy and performance requirements specified in the relevant accuracy class standard(s).		P
7(7)	**Accuracy requirements**		P
7.1(7.1)	**General test conditions**		P
	The following test conditions shall be maintained during the testing of accuracy requirements:		P
	a) The meter shall be tested in its case with the cover in place.		P
	b) All parts intended to be earthed (grounded) shall be earthed (grounded).		N/A
	c) Before any test is made, the circuits shall have been energized for a time sufficient to reach thermal stability;		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	d) In addition, for polyphase meters: – the phase sequence shall be as marked on the diagram of connections; – the voltages and currents shall be substantially balanced (see Table 9).		P
	e) The reference conditions are given in Table 10.		P
	f) For requirements regarding test stations, see IEC 62057-1:		P
	g) the tests shall be performed on, the meter installed in its specified matching socket or rack (as per manufacturer's instructions), unless specified otherwise.		N/A
	h) If an electricity meter is designed to be installed with a detached indicating display, then the requirements apply to, and the tests shall be performed on, the meter with its detached indicating display connected.		N/A
	i) If an electricity meter is designed for operation with external LPITs, then the requirements apply to, and the tests shall be performed on, the meter with its LPITs connected.		N/A
	If an electricity meter has more than one current circuit per phase, then the requirements of this document shall apply to all current circuits in the meter case.		P
7.2(7.2)	**Methods of accuracy verification**		P
	The verification of accuracy may be performed using any of the meter test methods specified in IEC 62057-1: –, or alternatively by reading the meter's energy registers.		P
	The manufacturer shall provide to the testing laboratory any software tools which may be required to read the meter's energy register via communication ports.		P
	For testing purposes, the energy registers of the electricity meter shall have a resolution sufficient to observe the critical change value.		P
	The verification of accuracy may be performed using the methods described above or by other suitable means;		P
	it is sufficient to verify the accuracy of the meter at reference conditions.		P
	These methods of accuracy verification apply to the tests specified in 7.4 to 7.11, 8.4, 9.3.2 to 9.3.13, and 9.4.2 to 9.4.13, unless therein specified otherwise.		P
7.3(7.3)	**Measurement uncertainty**		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	An expanded uncertainty (U) shall be estimated according to IEC Guide 98-3 (GUM:1995/JCGM 100:2008) with a level of confidence of approximately 95 %.		P
	An expanded uncertainty U shall not be greater than 1/5th of the error limit for the relevant accuracy class, for all accuracy classes except class 0,1S, unless otherwise specified in the relevant test description.		P
	For the accuracy class 0,1S, an expanded uncertainty U shall not be greater than 1/3rd of the error limit, unless otherwise specified in the relevant test description.		N/A
	However, if the above-mentioned expanded uncertainty requirements cannot be met, the test results (the measured percentage error values) may be evaluated against the percentage error limits reduced by the obtained value of expanded uncertainty U.		P
7.4(7.4)	**Meter constant**		P
	The relationship between the test output and the indication on the indicating display		P
	The difference between the value determined (or calculated) from the test output and the value on the indicating display, or the register content read via data communications port shall not exceed ±1/10th of the intrinsic error limit for the relevant accuracy class, except for meters with accuracy class 0,1S.		P
	For meters with accuracy of class 0,1S this difference may be larger, but shall not exceed ± 0,02 %.		N/A
	The manufacturer documentation and the test report shall state the number of pulses required to verify this requirement.		P
7.5(7.5)	**Initial start-up of the meter**		P
	The meter shall start to register energy after the start-up time $t_{start-up}$ specified by the manufacturer.		P
	In the case of multi-function meters with a real-time operating system and complex embedded firmware, or in the case of meters with SCS that open during power down and close again once the meter is energized, 10 s may not be achievable or economically justifiable.		P
	Conformity is verified by the following test:		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	a) The test conditions shall be as specified in 7.1. Initially, the voltage circuits and the auxiliary power supply circuits, if present, shall not be energized; the current circuits shall be carrying the meter's maximum current *I*max.		P
	b) Subsequently, the voltage circuits and, where applicable, the auxiliary power supply circuits shall be energized with their nominal voltages U_n and cos φ = 1 (for active energy meters) or sin φ = 1 (for reactive energy meters).		P
	c) *t*start-up is the time measured from the moment of energizing the voltage circuits and, where applicable, the auxiliary power supply circuits, until the moment the test output produces the first pulse.		P
7.6(7.6)	**Test of no-load condition**		P
	The purpose of this test is to make sure that the energy accumulation, which may occur in the meter's registers due to effects other than the flow of load current, is sufficiently lower than the energy accumulation at the specified starting current I_{st}.		P
	When the voltage is applied to the voltage circuits and if present, to the auxiliary power supply circuit, with no current flowing in the current circuits, the test output of the meter shall not produce more than one pulse. For an electromechanical meter, the rotor of the meter shall not make a complete revolution.		P
7.7(7.7)	**Starting current test**		P
	For this test, the conditions shall be as stated in 7.1.		P
	The lowest specified nominal voltage of the meter shall be used.		P
	The meter shall start and continue to register at the starting current values specified for the accuracy class in the relevant particular requirements (accuracy class) standards.		P
	If the meter is designed for the measurement of energy in both directions, then the starting current test shall be applied with energy flowing in each direction.		P
7.8(7.8)	**Repeatability test**		P
	The application of the same signal to be measured, under the same conditions of measurement, shall result in the close agreement of successive measurements.		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	At any test point given in Table 11, the repeatability shall be less than, or equal to 1/5th of the absolute intrinsic error limit for the relevant accuracy class, except for meters with accuracy class 0,1S.		P
	For meters with accuracy class 0,1S the repeatability shall not exceed 0,04 %.		N/A
	The methods of accuracy verification described in 7.2 shall apply. The test shall be conducted at reference conditions as specified in 7.1.		P
	At least three measurements shall be done at each of the test points in Table 11, at the same test conditions and in close succession, after the meter under test has achieved thermal stability.		P
	The lowest specified nominal voltage of the meter shall be used.		P
7.9	**Limits of error due to variation of the current**		P
	When the meter is operated under the reference conditions given in IEC 62052-11:2020, 7.1, the percentage errors shall not exceed the limits for the relevant accuracy class given in Table 3	0.8	P
	If the meter is designed for the measurement of energy in both directions, the values in Table 3 shall apply for each direction.		N/A
	If the meter is rated for multiple connection modes, the accuracy testing results are valid only for the connection modes tested and cannot be used to claim accuracy for other, untested connection modes.		N/A
	When testing poly-phase meters for compliance with Table 3 requirements for single phase loads, the test current shall be applied to each measuring element in sequence, while all the phase voltages shall remain balanced.		N/A
7.10	**Limits of error due to influence quantities**		P
	Tests and test conditions given in IEC 62052-11:2020, 7.1 apply.		P
	If the meter is rated for multiple connection modes, the accuracy requirements apply for each of the connection modes. All tests of effects of influence quantities shall be performed in one connection mode selected to exercise the complete metrological capability of the meter		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	When the current and the phase displacement (power factor) are held constant as specified in Table 4, and any single influence quantity is applied one at a time, with the meter otherwise operated at reference conditions as specified in IEC 62052-11:2020, 7.1, the variation in percentage error relative to the intrinsic error shall not exceed the limits for the relevant class indexes given in Table 4	Voltage variation:0.4 Ambient temperature variation:0.04 Interruption of phase voltage:1.8 Frequency variation:0.4 Reversed phase sequence:0.4 Short-time Overcurrents:0.4 Self-heating:0.6 Fast load current Variations:1.7 Dry heat test:0.4 Cold test:0.4 Damp heat cyclic test:0.4	P
	The variation in percentage error induced by the influence quantities may vary depending on the value of the test current. The variation in percentage error in Table 4 is given for the specified values or ranges of the test current, but the testing should be performed at the recommended values of test current given in Table 4		P
7.11(7.11)	**Time-keeping accuracy**		N/A
	Meter clock(s), if fitted, shall meet the relevant timekeeping accuracy requirements specified in IEC 62054-21:2004, 7.5.		N/A
8(8)	**Climatic conditions**		**P**
8(8.1)	**General**		P
	Meters shall be designed to operate and to be stored and transported in the climatic conditions determined by the climatic classes shown in Table 12.		P
8(8.2)	**Environmental conditions**		P
	The rated temperature range of meters shall be as shown in Table 12.		N/A
	The rated humidity conditions shall be as specified in the IEC 60721-1:1990 environmental classes corresponding to the temperature ranges shown in Table 12, but without condensation		N/A
	For special applications, other temperature values can be used according to purchase contract	Specified operating range: -10 °C to 60 °C Limit range of operation: -25 °C to 65°C Limit range for storage and transport: -25 °C to 70 °C	P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	The exposure to the extremes of temperature in each category is 72 h, as specified in the dry heat test and in the cold test.	72 h	P
	The specified operating range and the limit range of operation for the indicating display may be different than that of the meter. The indicating display should function correctly once the temperature returns to its specified operating range.		P
8(8.3)	**Tests of the effects of the climatic environments**		P
8(8.3.1)	General test requirements		P
	If an electricity meter is designed to be installed with a detached indicating display, then the climatic requirements apply to, and the tests shall be performed on, the meter with its detached indicating display connected, unless specified otherwise.		N/A
	If an electricity meter is designed to be installed with specified LPITs, then the climatic requirements apply to, and the tests shall be performed on, the meter with its specified LPITs connected.		N/A
8(8.3.2)	Acceptance criteria		P
	After each of the climatic tests in 8.3.3, 8.3.4, 8.3.5, 8.3.6, and after the specified recovery time in reference temperature and humidity conditions, the acceptance criteria B defined in 9.2, Table 15 shall be applied.		P
	In addition, after each of the climatic tests the meter shall be visually inspected.		P
	The appearance and, in particular, the legibility of markings shall not be altered.		P
8(8.3.3)	Dry heat test		P
	The test shall be carried out according to IEC 60068-2-2: 2007, under the following conditions:		P
	a) meter in non-operating condition;		P
	b) temperature: +70 °C ± 2 °C;	70°C	P
	c) duration of the test: 72 h;	72 h	P
	d) recovery time: 2 h.	2 h	P
8(8.3.4)	Cold test		P
	The test shall be carried out according to IEC 60068-2-1: 2007, under the following conditions:		P
	a) meter in non-operating condition;		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	b) temperature: –25 °C ± 3 °C for indoor meters; –40 °C ± 3 °C for outdoor meters;	–40 °C	P
	c) duration of the test: 72 h;	72 h	P
	d) recovery time: 2 h.	2 h	P
8(8.3.5)	Damp heat cyclic test		P
	The test shall be carried out according to IEC 60068-2-30: 2005, under the following conditions:		P
	a) voltage and auxiliary power circuits energized with nominal voltage; if a meter is rated for more than one value of nominal voltage, the highest value shall be used;		P
	b) without any current in the current circuits;		P
	c) variant 1;		P
	d) upper temperature: +40 °C ± 2 °C for indoor meters; +55 °C ± 2 °C for outdoor meters;	55 °C	P
	e) no special precautions shall be taken regarding the removal of surface moisture;		P
	f) duration of the test: 6 cycles;		P
	g) recovery time: 24 h.	24 h.	P
	In addition to the acceptance criteria in 8.3.2, the meter shall pass the insulation test according to IEC 62052-31:2015, 6.10.4.3.3 and 6.10.4.3.4		P
	During visual inspection, no traces of corrosion likely to affect the functional properties of the meter shall be apparent.		P
8(8.3.6)	Protection against solar radiation		P
	Meters for outdoor use shall withstand solar radiation.		P
	The test shall be carried out according to IEC 60068-2-5: 2018, under the following conditions:		P
	a) meter in non-operating condition;		P
	b) test procedure A (8 h irradiation and 16 h darkness);	Irradiation: 8 h Darkness: 16 h	P
	c) upper temperature: +55 °C;	+55 °C	N/A
	d) duration of the test: 3 cycles or 3 days.		N/A
8(8.4)	**Durability**		P
	The meter shall be subjected to the metrological stability testing as per IEC 62059-32-1: 2011 and meet the limits of change in percentage error specified therein.		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
9(9)	**The effects of external influences**		P
9(9.1)	**General**		P
	These general test conditions apply to all tests specified in 9.3 and 9.4, unless therein specified otherwise.		P
	For the electromagnetic compatibility tests, the meter – including its detached indicating display and LPITs, if applicable – shall be tested as table top equipment, in its normal working position with the meter cover and terminal covers in place.		N/A
	the meter installed in its specified matching socket or rack, as per the manufacturer's instructions.		P
	If an electricity meter is designed to operate with a detached indicating display, then the effects of external influences apply to, and the tests shall be performed on, the meter with its detached indicating display connected, unless specified otherwise.		N/A
	The meter port(s) intended for connection of a detached indicating display(s) shall be treated as ELV port(s).		N/A
	If an electricity meter is designed to be installed with specified LPITs, then the external influence requirements apply to, and the tests shall be performed on, the meter with its specified LPITs connected.		N/A
	The meter port(s) intended for connection of LPIT(s) shall be treated as ELV port(s).		N/A
	Accessories (e.g. communication modules, I/O modules, etc.) shall be installed to create a test configuration representative of the typical meter configuration in service.		N/A
	All cables shall be connected according to the manufacturer's instructions		P
	The length of the cables, connection of signal ports or termination loads shall be as specified in the referenced basic electromagnetic compatibility standards, unless otherwise specified in a test clause.		N/A
	The temperature and humidity during the electromagnetic compatibility test shall be as per the basic electromagnetic compatibility standards; all other reference conditions shall be as specified in 7.1.		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	If a meter is rated for more than one nominal voltage, a test at one nominal voltage is deemed sufficient		P
	All meter parts intended to be earthed shall be earthed.		N/A
9(9.2)	**Acceptance criteria**		P
	The acceptance criteria in Table 15 shall apply to the tests described in 9.3 and 9.4, unless therein specified otherwise.		P
	Primary functions of electricity meters include:		P
	a) energy registration;		P
	b) indicating display;		P
	c) operation of the supply control and load control switches.		P
	These primary functions shall be observed during testing.		P
9(9.3)	**Electromagnetic compatibility (EMC)**		N/A
9(9.3.1)	General		N/A
9(9.3.1.1)	Electromagnetic phenomena covered by EMC tests		N/A
	Meters (electromechanical with electronic functional devices or fully static meters) shall be designed in a way that prevents external electromagnetic phenomena from damaging the meter, corrupting the meter's energy registers or substantially influencing the result of measurements.		N/A
	The meter under test (EUT) shall be subjected to two types of electromagnetic phenomena:		N/A
	a)acceptance criteria A apply to these tests, see Table 13.		N/A
	a)acceptance criteria B apply to these tests, see Table 14.		N/A
	The meter under test (EUT) shall be subjected to the tests of influence quantities summarized in Table 13 and disturbances summarized in Table 14.		N/A
	The electromagnetic compatibility requirements specified in this document do not cover extreme cases		N/A
9(9.3.1.2)	Dwell time for EMC tests with frequency sweeping		N/A
9(9.3.1.2.1)	General		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	The dwell time is the period during which a disturbance or an influence quantity is applied at a specific frequency.		N/A
9(9.3.1.2.2)	Dwell time for EMC tests with current		N/A
	The dwell time shall be extended as necessary to perform a stable verification of the meter accuracy.		N/A
	The manufacturer shall specify the number of test pulses necessary for the verification of accuracy, or an alternative and equivalent method of verification of accuracy.		N/A
9(9.3.1.2.3)	Dwell time for EMC tests without current		N/A
	During tests without current no pulses should be generated on the test outputs and no change which is more than the critical change value, should occur in the corresponding register.		N/A
9(9.3.2)	Voltage dips and short interruptions		N/A
9(9.3.2.1)	Voltage dips, short interruptions and voltage variations immunity tests		N/A
	The intent of these tests is to ensure that the meter is not susceptible to dips and short interruptions that commonly occur on the mains or auxiliary AC power supply.		N/A
	The test shall be carried out according to IEC 61000-4-11: 2020, under the conditions specified in 7.1, and the following conditions:		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power supply circuits energized with their lowest specified nominal voltages.		N/A
	b) Without any current in the current circuits; the SCS if fitted shall be closed; the external current circuit shall be open-circuit.		N/A
	The voltage shall be interrupted for either the auxiliary power port, or the mains port, or both in sequence, depending on which one is used to power the meter.		N/A
	For meters powered from 3-phase power supplies:		N/A
	c) Voltage interruption tests shall be applied to all three phases simultaneously.		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	d) Voltage dips test for three-phase systems with neutral shall be applied to each individual phase-to-neutral voltage, one at a time, leaving the other phases connected to the supply voltage.		N/A
	e) Voltage dips test for three-phase systems without neutral shall be applied to each individual phase-to-phase voltage, one at a time, leaving the other phases connected to the supply voltage.		N/A
9(9.3.2.2)	Voltage dips, short interruptions and voltage variations on DC input power port immunity tests		N/A
	The intent of these tests is to ensure the meter is not susceptible to common dips and short interruptions on the mains or auxiliary DC power supply.		N/A
	The test shall be carried out according to IEC 61000-4-29: 2000, under the conditions specified in 7.1, and the following conditions:		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power supply circuits energized with their lowest specified nominal voltages.		N/A
	b) Without any current in the current circuits and the current terminals shall be open circuit.		N/A
	c) The voltage shall be interrupted for either the auxiliary power port, or the mains port, or both in sequence, depending on which one is used to power the meter.		N/A
9(9.3.3)	Electrostatic discharge immunity test		N/A
	The test shall be carried out according to IEC 61000-4-2: 2008, under the conditions specified in 7.1, and the following conditions:		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power supply circuits energized with their highest specified nominal voltages;		N/A
	b) Without any current in the current circuits and the current terminals shall be open circuit;		N/A
	The following tests shall be applied to the meter’s enclosure port:		N/A
	c) Indirect discharge: the test voltage of 8 kV shall be applied to both vertical and horizontal coupling planes in contact mode.		N/A
	d) Contact discharge: the test voltage of 8 kV shall be applied to metallic parts accessible in normal operation;		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	e) Air discharge: the test voltage of 15 kV shall be applied to non-metallic parts accessible in normal operation;		N/A
	f) Number of discharges		N/A
9(9.3.4)	Radiated, radio-frequency, electromagnetic field immunity test – test without current		N/A
	This test is intended to verify meter's immunity to electromagnetic radio-frequency fields in various frequency bands.		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power supply circuits energized with their highest specified nominal voltage;		N/A
	b) Without any current in the current circuits and the current terminals shall be open circuit;		N/A
	c) The length of cables exposed to the electromagnetic field shall be 1 m, arranged according to IEC 61000-4-3:2006, 7.3, or according to IEC 61000-4-20: 2010 Annex B;		N/A
	This test shall be applied to the enclosure port:		N/A
	d) Frequency band: 80 MHz to 2,0 GHz;		N/A
	e) Frequency band: 2,0 GHz MHz to 6,0 GHz;		N/A
	f) The frequency step shall be 1 %;		N/A
	g) The dwell time shall be as specified in 9.3.1.2.3.		N/A
9(9.3.5)	Radiated, radio-frequency, electromagnetic field immunity test – test with current		N/A
	This test is intended to verify meter's immunity to electromagnetic radio-frequency fields in various frequency bands.		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power supply circuits energized with their highest specified nominal voltages;		N/A
	b) The current circuits shall be carrying the value of the current given in the relevant particular requirements (accuracy class) standards;		N/A
	c) For AC meters, the power factor (cosφ or sinφ) of the measured test signal shall be according to the values given in the relevant accuracy class standard;		N/A
	d) The length of cables exposed to the electromagnetic field shall be 1 m, arranged according to IEC 61000-4-3:2006, 7.3, or according to IEC 61000-4-20:2010, Annex B;		N/A
	This test shall be applied to the enclosure port:		N/A
	e) Frequency band: 80 MHz-2,0 GHz		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	f) Frequency band: 2,0 GHz – 6,0 GHz		N/A
	g) The frequency step shall be 1 %;		N/A
	h) The dwell time shall be as specified in 9.3.1.2.2.		N/A
9(9.3.6)	Electrical fast transient/burst immunity test		N/A
	The test shall be carried out according to IEC 61000-4-4: 2012, under the conditions specified in 7.1, and the following conditions:		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power supply circuits energized with their highest specified nominal voltages; if a meter is rated for more than one value of nominal voltage, the highest value shall be used;		N/A
	b) The current circuits shall be carrying the value of the current given in the relevant particular requirements (accuracy class) standards;		N/A
	c) For AC meters, the power factor (cosφ or sinφ) of the measured test signal shall be according to the values given in the relevant accuracy class standard;		N/A
	d) The length of cables between the coupling device and the EUT shall be (0,5 − 0/+0,1) m, arranged according to IEC 61000-4-4:2012, 7.3.		N/A
	e) Mains port and the current transformer port: ±4 kV;		N/A
	f) HLV auxiliary power supply port: ±2 kV;		N/A
	g) HLV signal ports: ±2 kV (all terminals tested together as signal groups);		N/A
	h) ELV signal ports and ELV auxiliary power supply ports: ±1 kV		N/A
	i) Duration of the test: 60 s at each polarity;		N/A
	j) Repetition rate: 100 kHz.		N/A
9(9.3.7)	Immunity to conducted disturbances, induced by radio-frequency fields		N/A
	The test shall be carried out according to IEC 61000-4-6: 2013, under the conditions specified in 7.1, and the following conditions:		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power supply circuits energized with their lowest specified nominal voltages;		N/A
	b) The current circuits shall be carrying the value of the current given in the relevant particular requirements (accuracy class) standards;		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	c) For AC meters, the power factor (cosφ or sinφ) of the measured test signal shall be according to the values given in the relevant accuracy class standard;		N/A
	d) A polyphase meter shall be connected to a balanced voltage system with polyphase load.		N/A
	e) Mains port, current transformer port, auxiliary power supply port, HLV signal ports, ELV signal ports;		N/A
	f) Frequency range: 150 kHz to 80 MHz;		N/A
	g) Voltage level: 10 V:		N/A
	h) The dwell time shall be as specified in 9.3.1.2.		N/A
9(9.3.8)	Test for immunity to conducted, differential mode disturbances and signalling in the frequency range 2 kHz to 150 kHz at AC power ports		N/A
	These tests are intended to verify meter's immunity against disturbing differential currents in the 2 kHz-150 kHz originating from power electronics and power line communication systems (see Annex G). This test does not apply to DC meters.		N/A
	The test is performed with disturbances in the current only; the test with voltage disturbances is not required.		N/A
	The test shall be carried out according to the IEC 61000-4-19: 2014, under the conditions specified in 7.1, and the following additional conditions:		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power supply circuits energized with their lowest specified nominal voltages;		N/A
	b) The current circuits shall be carrying the value of the current given in the relevant particular requirements (accuracy class) standards;		N/A
	c) The power factor (cosφ or sinφ) of the measured test signal shall be according to the values given in the relevant accuracy class standard;		N/A
	d) A polyphase meter shall be connected to a balanced voltage system with single-phase load. If the meter metrology design is identical in all three phases, testing of one phase is sufficient; otherwise each phase shall be tested one by one.		N/A
	The differential test current *I*diff shall be applied to:		N/A
	e) Mains port of directly connected meters: 1) 2 kHz to 30 kHz: *I*diff = 3 A, 2) 30 kHz to 150 kHz: *I*diff = 1,5 A.		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	f) Current transformer port of transformer operated meters: 1) 2 kHz to 30 kHz: *I*diff = 0,03 x *I*max; 2) 30 kHz to 150 kHz: *I*diff = 0,015 x *I*max;		N/A
	g) The test waves profiles "CW (Continuous Wave) pulses with pause" and "rectangular modulated pulses" shall be used		N/A
	h) *I*diff shall be generated with a tolerance of ± 5 % of the selected level during the test;		N/A
	i) Frequency step shall be 1 %;		N/A
	j) The dwell time shall be as specified in 9.3.1.2.2.		N/A
9(9.3.9)	Surge immunity test		N/A
	The test shall be carried out according to IEC 61000-4-5: 2017, under the conditions specified in 7.1, and the following conditions:		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power supply circuits energized with their highest specified nominal voltages;		N/A
	b) Without any current in the current circuits and the current terminals shall be open circuit;		N/A
	c) Cable lengths between the surge generator and the EUT shall be 1 m, arranged according to the IEC 61000-4-5: 2017, Clause 7;		N/A
	The surge test signal shall be applied to:		N/A
	d) Mains port: 1) each line to line, and each line to neutral, per Table 18; 2) with generator source impedance of 2 Ω;		N/A
	e) Current transformer port 1) the current transformer port shall be tested with one terminal (line) of each current transformer port floating (unconnected, open circuit).		N/A
	2) each current transformer terminal (line) to neutral and between any two current transformer terminals (lines), per Table 18;		N/A
	3) with generator source impedance of 2 Ω;		N/A
	f) HLV auxiliary power supply port and HLV signal ports rated for direct connection to mains:		N/A
	1) each line-to-line: 2 kV with generator source impedance of 2 Ω;		N/A
	2) each line-to-ground: 4 kV with generator source impedance of 12 Ω;		N/A
	g) HLV auxiliary ports rated for connection to circuits other than HLV mains networks:		N/A
	1) each line-to-line: 1 kV;		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	2) each line-to-ground: 2 kV;		N/A
	3) with generator impedance of 42 Ω.		N/A
	h) ELV auxiliary power supply port:		N/A
	1) each line-to-line: 0,5 kV;		N/A
	2) each line-to-ground: 1 kV;		N/A
	3) with generator source impedance: 42 Ω.		N/A
	i) ELV signal ports (if applicable, see l):		N/A
	1) Unshielded or shield connected at one end to ground, unsymmetrical lines: each lineto-ground: 1 kV;		N/A
	2) Unshielded or shield connected at one end to ground, symmetrical lines: in common mode, 1 kV;		N/A
	3) Lines with shield connected at both ends to ground: 1 kV (applied to shield or metallic device case);		N/A
	4) with generator source impedance: 42 Ω.		N/A
	j) The surges on AC ports shall be applied at phase angles of 0°, 90°, 180° and 270° of the fundamental AC voltage waveform; five positive and five negative surges shall be applied at a rate of one surge per minute, at each specified phase angle;		N/A
	k) On DC ports, five positive and five negative surges shall be applied at a rate of one surge per minute;		N/A
	l) Line-to-ground and common mode tests are only applicable to meters with functional or any other connection to ground.		N/A
9(9.3.10)	Ring wave immunity test		N/A
	The test shall be carried out according to IEC 61000-4-12: 2017, under the conditions specified in 7.1, and the following conditions. This test does not apply to DC meters.		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power supply circuits energized with their highest specified nominal voltages;		N/A
	b) Without any current in the current circuits and the current terminals shall be open circuit;		N/A
	c) Cable length between the coupling device and the EUT shall be 1 m, arranged according to the IEC 61000-4-12: 2017 clauses 7.5;		N/A
	The ring wave test waveform shall be applied to:		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	d) Mains port: 1) between each line, including neutral, and ground: 4 kV, 2) in differential mode (each line to line, each line to neutral): 2 kV, 3) with generator source impedance of 12 Ω;		N/A
	e) Current transformer port: 1) the current transformer port shall be tested with one terminal of each current transformer port floating (unconnected, open circuit). 2) between each current transformer port and ground: 4 kV, 3) between any two current transformer ports: 2 kV, 4) with generator source impedance of 12 Ω;		N/A
	f) HLV auxiliary power supply port and HLV signal ports: 1) between each line and ground: 2 kV, 2) in differential mode (each line to line): 1 kV; 3) with generator source impedance of 12 Ω;		N/A
	g) ELV auxiliary power supply port and the ELV signal ports: 1) in common mode: 0,5kV; 2) with generator source impedance of 30 Ω; 3) communication ports and signal ports shall be tested as a signal group.		N/A
	h) The transients on mains port, current transformer port, HLV auxiliary power supply port, and HLV signal port shall be applied at phase angles of 0°, 90°, 180° and 270°of the fundamental AC voltage waveform; five positive and five negative transients shall be applied at a rate of one transient per minute, at each specified phase angle;		N/A
	i) On DC ports (auxiliary power supply port, signal port), five positive and five negative transients shall be applied at a rate of one transient per minute.		N/A
9(9.3.11)	Damped oscillatory wave immunity test		N/A
	This test is applicable only to voltage transformer operated AC meters and does not apply to DC meters.		N/A
	This test shall be carried out according to IEC 61000-4-18: 2019, under the conditions specified in 7.1, and the following conditions.		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power circuits energized with their highest specified nominal voltages;		N/A
	b) The current circuits shall be carrying the value of the current given in the relevant particular requirements (accuracy class) standards;		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	c) The power factor (cosφ or sinφ) of the measured test signal shall be according to the values given in the relevant accuracy class standard;		N/A
	d) Cable length between the coupling device and the EUT shall be 1 m, arranged according to the IEC 61000-4-18: 2019, 7.3;		N/A
	This test voltage shall be applied to each port at a time:		N/A
	e) Mains port, HLV auxiliary power supply port and HLV signal ports: 1) In common mode: 2,5 kV; 2) In differential mode: 1,0 kV;		N/A
	f) Test frequencies shall be: 1) 100 kHz, repetition rate: 40 Hz; 2) 1 MHz, repetition rate: 400 Hz;		N/A
	g) Test duration: 60 s (15 cycles with 2 s on, 2 s off, for each frequency).		N/A
9(9.3.12)	External static magnetic fields		N/A
	This test shall be conducted under the conditions specified in 7.1, and the following conditions:		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power circuits energized with their lowest specified nominal voltages;		N/A
	b) The current circuits shall be carrying the value of the current given in the relevant particular requirements (accuracy class) standards;		N/A
	c) For AC meters, the power factor (cosφ or sinφ) of the measured test signal shall be according to the values given in the relevant accuracy class standard;		N/A
	This test shall be applied to the enclosure port.		N/A
	d) The magnetic field shall act on all accessible surfaces of the meter under normal operating conditions;		N/A
	e) Meter enclosure surfaces in contact with a mounting board or butting up against a supporting structure are regarded as not accessible and do not need to be exposed to the magnetic field.		N/A
	f) The value of the magneto-motive force shall be 1 000 At (ampere-turns); the static magnetic induction may be generated by using the electromagnet according to Clause K.2, energized with a DC current;		N/A
	g) Static meters intended for installation in locations with normally open access (e.g. residential or commercial locations), shall also pass the test of static magnetic induction generated with a permanent magnet according to Clause K.1.		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	h) The application of the field shall be long enough to obtain a stable percentage error measurement.		N/A
9(9.3.13)	Power frequency magnetic field immunity test		N/A
	This test shall be carried out according to IEC 61000-4-8: 2009, under the conditions specified in 7.1, and the following conditions:		N/A
	The meter shall be in operating condition:		N/A
	a) Voltage circuits and auxiliary power circuits energized with their lowest specified nominal voltages;		N/A
	b) The current circuits shall be carrying the value of the current given in the relevant particular requirements (accuracy class) standards;		N/A
	c) For AC meters, the power factor (cosφ or sinφ) of the measured test signal shall be according to the values given in the relevant particular requirements (accuracy class) standards;		N/A
	d) Cable length exposed to the magnetic field shall be 1 m, arranged according to the IEC 61000-4-8: 2009, 7.3.		N/A
	This test shall be applied to the meter's enclosure port:		N/A
	e) A magnetic induction produced by a current of the same frequency as that of the voltage applied to the meter voltage circuits and flowing through the inductive coil shall be applied in the most unfavorable conditions of phase and direction compared to the voltage(s) energizing the meter;		N/A
	f) Frequency equal to nominal meter frequency;		N/A
	g) The inductive coil as per 6.3.3a) of IEC 61000-4-8:2009;		N/A
	h) Immersion test method, continuous magnetic field applied in three perpendicular planes, field strength 0,5 mT (400 A/m);		N/A
	i) After the test position of the EUT has been determined, the test duration shall be 1 min.		N/A
9(9.3.14)	Emission requirements		N/A
	This test shall be carried out according to CISPR 32: 2015, under the conditions specified in 7.1, and the following conditions:		N/A
	The meter shall be tested as table top equipment and shall be in operating condition:		N/A
	a) Voltage and auxiliary power circuits energized with their highest specified nominal voltages;		N/A
	b) The current circuits shall be carrying a current between 0,1 *I*n and 0,2 *I*n drawn by linear load;		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	c) For connection to the voltage circuits, the auxiliary circuits, and the current circuits an unshielded cable length of 1 m to each terminal shall be used;		N/A
	d)the detached indicating display shall also be tested with the meter placed outside of the measurement area or below the reference ground plane; in either case the meter and its specified detached indicating display shall meet the acceptance criteria;		N/A
	e) Indicating display shall be exercised during the test with a test image constructed and provided by the manufacturer according to the CISPR 32: 2015, Clause B.2.		N/A
9(9.4)	**Tests of immunity to other influence quantities**		P
9(9.4.1)	General		P
	The additional percentage error due to the change of influence quantities with respect to reference conditions, shall not exceed the limits specified in the relevant particular requirements (accuracy class) standards.		P
	The meter shall be tested in operating condition:		P
	a) The conditions specified in 7.1 apply, unless specified otherwise;		P
	b) The current circuits shall be carrying the value of the current given in the relevant particular requirements (accuracy class) standards, unless specified otherwise;		P
	c) For AC meters, the power factor (cosφ or sinφ) of the measured test signal shall be according to the values given in the relevant particular requirements (accuracy class) standards, unless specified otherwise.		P
9(9.4.2)	Harmonics in the current and voltage circuits		N/A
	These tests are intended to verify meter's accuracy when measuring various non-sinusoidal current and voltage signals. These tests do not apply to DC meters.		N/A
	These tests shall be applied to the mains port, and the current transformer port, unless specified otherwise.		N/A
	If the meter is specified for operation with a detached indicating display, such device may be connected or not connected.		N/A
	Voltage circuits shall be energized with their highest specified nominal voltages.		N/A
	The distortion factor of the voltage waveform shall be as specified in Table 10.		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
9(9.4.2.2)	Harmonics in the current and voltage circuits – 5th harmonic test		N/A
9(9.4.2.3)	Interharmonics in the current circuit – burst fired waveform test		N/A
	The tests of the influence of interharmonics shall be made with the circuit shown in Figure H.1 or with other equipment able to generate the current waveforms as shown Figure H.2.		N/A
9(9.4.2.4)	Odd harmonics in the current circuit		N/A
	The tests of the influence of odd harmonics shall include test with a 45°, 90° and 135° phase fired waveforms.		N/A
	This test shall be made with the circuit shown in Figure H.1 or with other equipment able to generate the current waveforms as shown Figure H.4, Figure H.6 and Figure H.7.		N/A
9(9.4.2.5)	DC and even harmonics – half-wave rectified waveform test		N/A
	This shall be applied to the mains port of directly connected meters.		N/A
	This test does not apply to the transformer operated meters.		N/A
	The tests of the influence of direct current and even harmonics shall be made with the circuit shown in Figure H.8 or with other equipment able to generate the current waveforms as shown in Figure H.9.		N/A
9(9.4.3)	Voltage variation		P
	This test shall be applied to the mains port.		P
	The primary meter functions shall be evaluated as per Table 19.		P
9(9.4.4)	Ambient temperature variation		P
	The temperature coefficient shall be determined for the specified operating temperature range.		P
	Voltage circuits and auxiliary power circuits shall be energized with their highest specified nominal voltages.		P
	Acceptance criteria: A, except for the indicating display function, which shall be evaluated according to criteria B for temperatures outside the specified range of display operation.		P
9(9.4.5)	Interruption of phase voltage		P
	This test does not apply to DC meters.		P
9(9.4.6)	Frequency variation		P
	This test shall be applied to the mains port of AC meters.		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	This test does not apply to DC meters.		N/A
	Voltage circuits shall be energized with their highest specified nominal voltage.		P
	For this test the measured frequency shall vary within the range specified by the manufacturer, but no less than from -2 % to +2 % of nominal frequency.		P
9(9.4.7)	Reversed phase sequence		P
	This test shall be applied to the mains port of three-phase meters AC meters.		P
	This test does not apply to DC meters.		N/A
	For this test, any two of the three phases shall be interchanged.		P
	Voltage circuits shall be energized with their highest specified nominal voltage.		P
9(9.4.8)	Auxiliary voltage variation		N/A
	This test shall be applied to AC or DC auxiliary power supply port.		N/A
	Voltage circuits shall be energized with the lowest specified nominal voltage.		N/A
9(9.4.9)	Operation of auxiliary devices		N/A
	The installation and operation of any accessories, or combination of accessories, shall not influence the meter accuracy.		N/A
	It is preferable that the connection to the auxiliary device(s) is marked to indicate the correct method of connection.		N/A
	If these connections are made by means of plugs and sockets, they should be irreversible.		N/A
	The meter voltage and auxiliary power circuit shall be energized with their lowest specified nominal voltages.		N/A
	All cables shall be connected according to the manufacturer’s instructions		N/A
9(9.4.10)	Short-time overcurrents		P
	This test is intended to verify the influence of short term overcurrents on meter accuracy.		P
	This test shall be applied to the mains port, or the current transformer port.		P
	Voltage circuits and auxiliary power circuits shall be energized with their highest specified nominal voltages.		P
	Short-time overcurrents shall not damage the meter.		P
	The test circuit shall be practically non-inductive.		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	For polyphase meters this test shall be performed on each phase, one phase at a time.		N/A
	Directly connected AC meters shall be tested with an overcurrent equal to 30 *I*max with a relative tolerance of +0 % to –10 % for one half-cycle at nominal rated frequency. See Annex I.		P
	Transformer operated AC meters shall be tested with an overcurrent equal to 20 *I*max with a relative tolerance of +0 % to –10 % for 0,5 s.		P
	Directly connected DC meters shall be tested with an overcurrent equal to 30 *I*max with a relative tolerance of +0 % to –10 % for 10 ms.		N/A
	The meter shall be allowed at least 1 h of recovery time before the energy measurement percentage error is checked.		P
9(9.4.11)	Self-heating		P
	This test shall be carried out as follows: after the voltage circuits and auxiliary power supply circuits have been energized with the highest specified nominal voltage for at least 1 h, without any current in the current circuits, the maximum current shall be applied to the current circuits.		P
	The cable used for energizing the meter during the test shall be selected according to the IEC 62052-31:2015, 4.3.2.11.		P
	The meter percentage error shall be measured immediately after the current is applied and then at intervals short enough to allow a correct drawing to be made of the curve of percentage error variation as a function of time. The test shall be carried out for at least 1 h.		P
	The current and the power factor (cosφ or sinφ) shall be according to the values given in the relevant particular requirements (accuracy class) standards.		P
9(9.4.12)	Fast load current variations		P
	The intent of this test is to ensure that the accuracy of the meter is not susceptible to fast load current variations occurring over an extended time period (see Annex J).		P
	The test shall be carried out under the conditions specified in 7.1.		P
	Voltage circuits and auxiliary power circuits energized with their highest specified nominal voltages;		P
	The test shall be applied to the mains port of directly connected meters and to the current transformer port of transformer operated meters:		P

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	a) the test current shall be repeatedly switched between on and off states;		P
	b) during the *t*on period, the value of the test current shall be as given in the relevant particular requirements (accuracy class) standards;		P
	c) during the *t*off period, the value of the test current shall be equal to zero;		P
	d) the duration of the *t*on and *t*off periods shall be according to the following test profiles: 1) *t*on = 10 s *t*off = 10 s, total test duration 4 h; 2) *t*on = 5 s *t*off = 5 s, total test duration 4 h; 3) *t*on = 5 s *t*off = 0,5 s, total test duration 4 h;		P
	e) For AC meters, the turn-off times and the turn-on times do not need to be synchronized with the zero crossings of the mains frequency.		P
	f) For DC meters, the switching between on and off states shall occur within 20 ms. The tolerance for *t*on and *t*off is +/- 20 ms.		N/A
	The recommended method to verify the measured energy is using the energy register of the meter.		P
9(9.4.13)	Earth fault		N/A
	This test applies to three-phase four-wire transformer operated AC meters, connected to distribution networks which are equipped with earth fault neutralizers or in which the star point is isolated.		N/A
	In the case of an earth fault and with 10 % overvoltage, the line-to-earth voltages of the two lines which are not affected by the earth fault will rise to 1,9 times the nominal voltage.		N/A
	The test shall be conducted under the conditions specified in 7.1, and the following conditions:		N/A
	a) The meter shall be in operating condition:		N/A
	b) Voltage circuits and auxiliary power circuits energized with their highest specified nominal voltages;		N/A
	c) The current circuits shall be carrying the value of the current given in the relevant standards;		N/A
	d) For a test under a simulated earth fault condition in one of the three lines, all voltages are increased to 1,1 times the highest specified nominal voltages.		N/A
	e) The simulated earth fault shall be applied to any two phases and neutral with a phase angle of 60° between two phase voltages.		N/A
	f) In every configuration (test) described above, the maximum withstand voltage of 1,9 Un shall be applied for 4 h, with a cooling period of 1 h between the test runs.		N/A

IEC 62053-21			
Clause	Requirement + Test	Result - Remark	Verdict
	The energy measurement percentage error is checked after a recovery time necessary for the meter to return to the reference conditions and its normal operating temperature after the test.		N/A
10(10)	**Type test**		P
10(10.1)	**Test conditions**		P
	All tests shall be carried out under the reference conditions given in 7.1, unless otherwise stated in the relevant clause.		P
	the tests shall be carried out on a limited number of meters of the same type having identical and representative characteristics of the type, and configuration(s) representative of the worst-case meter configuration(s) in relation to a test.		P
	Testing this representative configuration is deemed to be sufficient to verify compliance of identical sample(s), all possible configurations, and all possible combinations of functions and accessories.		P
	A recommended test sequence is given in Annex P.		P
	Accessories (e.g. communication modules, I/O modules, etc.) shall be installed to create a test configuration representative of the typical meter configuration in service.		N/A
	In case of modifications to parts of the meter made after the type test, only those tests with results possibly influenced by said modifications are deemed to be necessary.		P
10(10.2)	**Type test report**		P
	The type test shall be documented in a test report, which shall include all the information necessary to reproduce the type test.		P
ANNEX A	**COMPARISON OF ACCEPTABLE PERCENTAGE ERROR LIMITS AT REFERENCE CONDITIONS FOR METERS OF CLASSES 0,5, 1, AND 2**		N/A

Photo documentation

Photo 1- External view



Photo 2- External view



Photo documentation

Photo 3- External view



Photo 4- External view



Photo documentation

Photo 5- External view



Photo 6- External view



Photo documentation

Photo 7- Internal view



Photo 8- Internal view



Photo documentation

Photo 9- Internal view

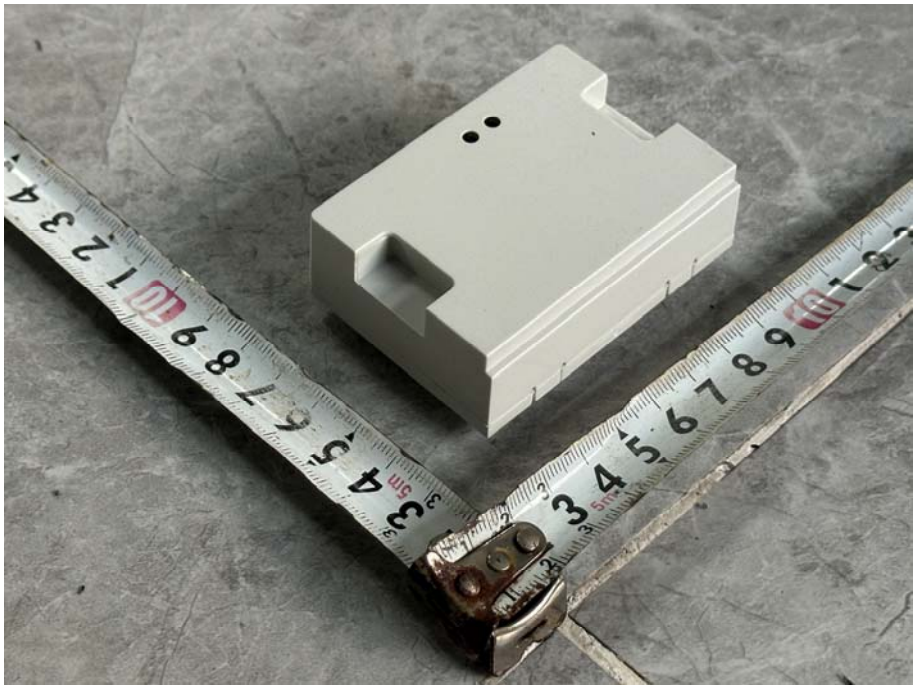


Photo 10- Internal view

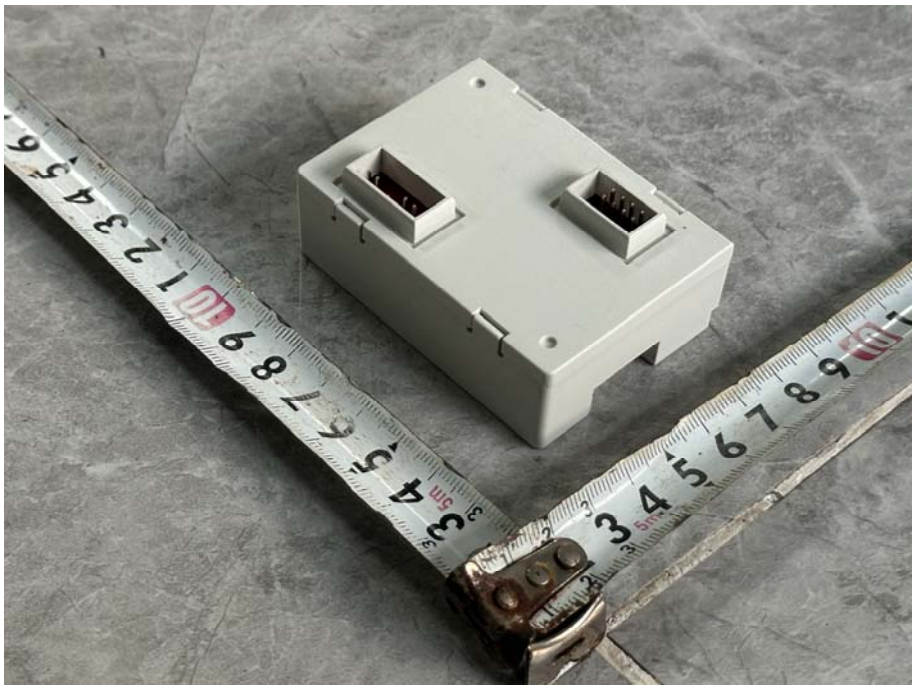


Photo documentation

Photo 11- Internal view

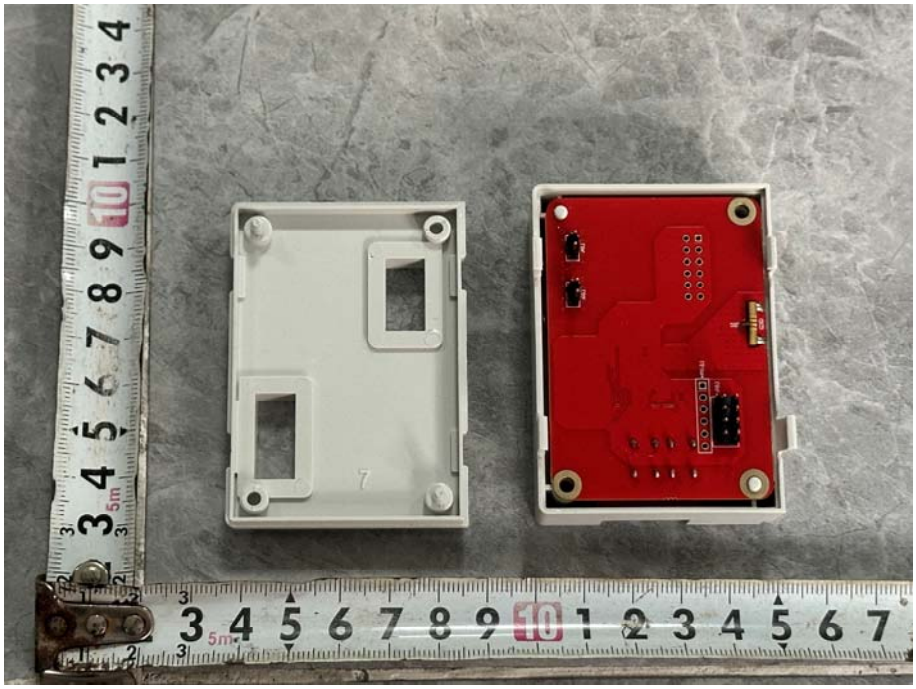


Photo 12- Internal view

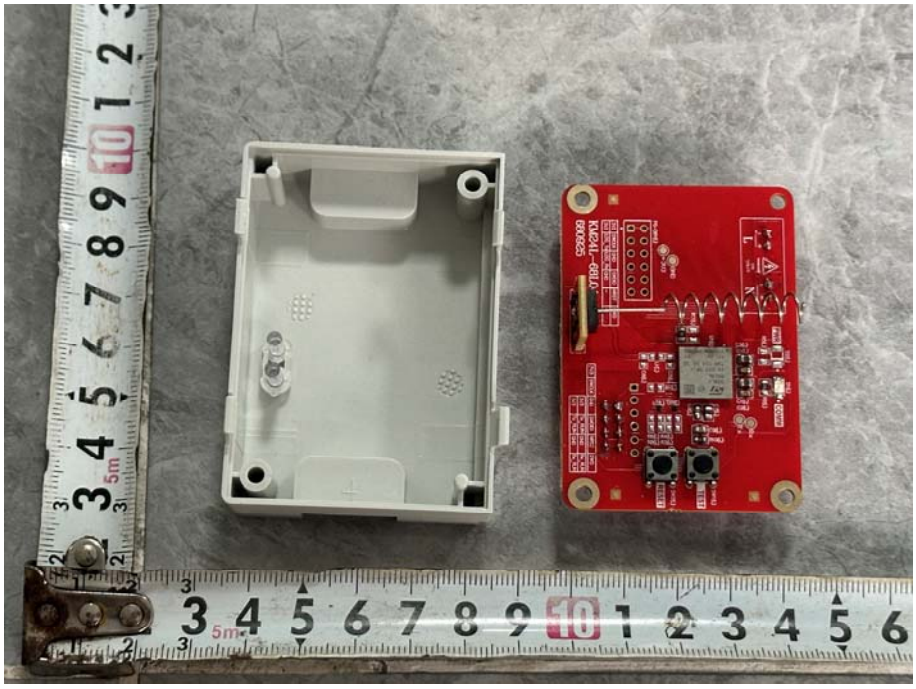


Photo documentation

Photo 13- Internal view

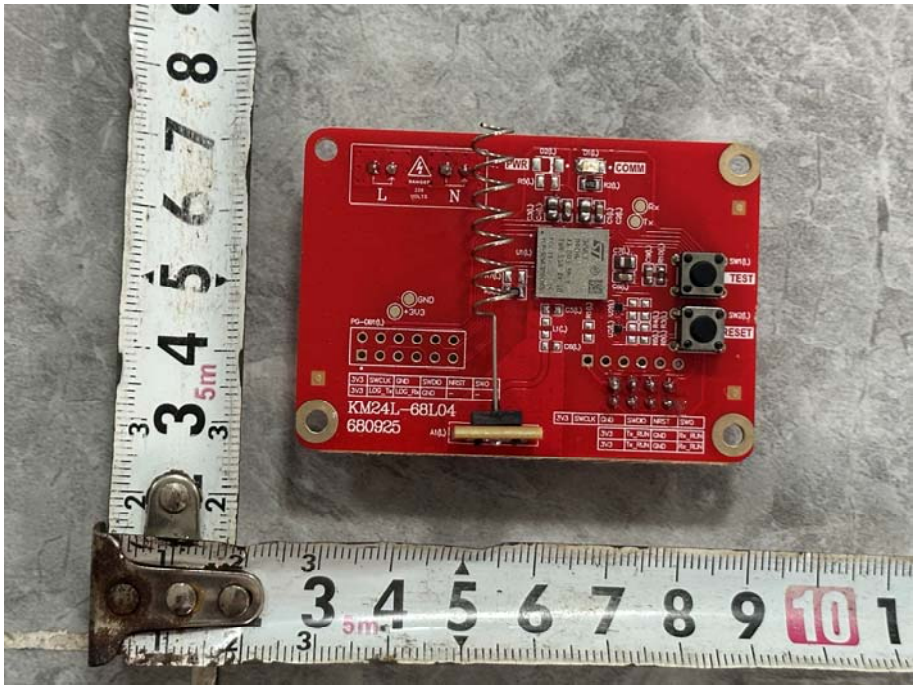


Photo14- Internal view

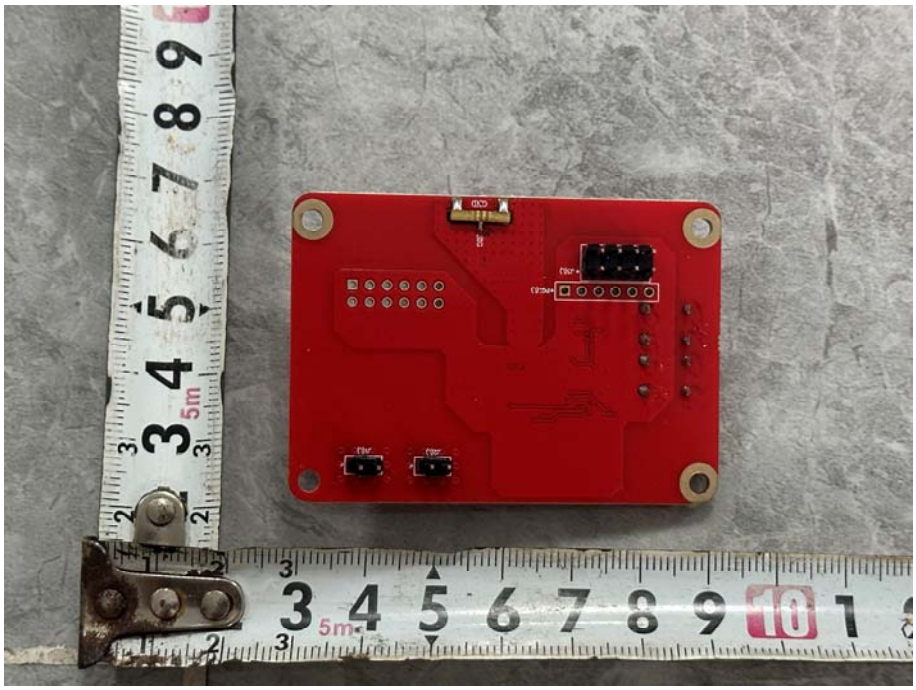


Photo documentation

Photo 15- Internal view

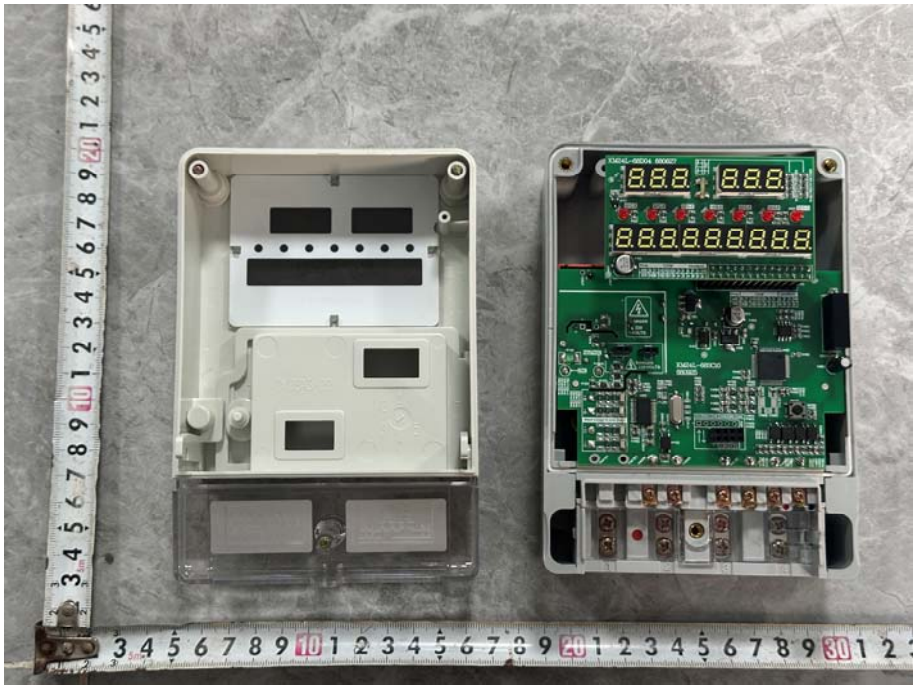


Photo 16- Internal view

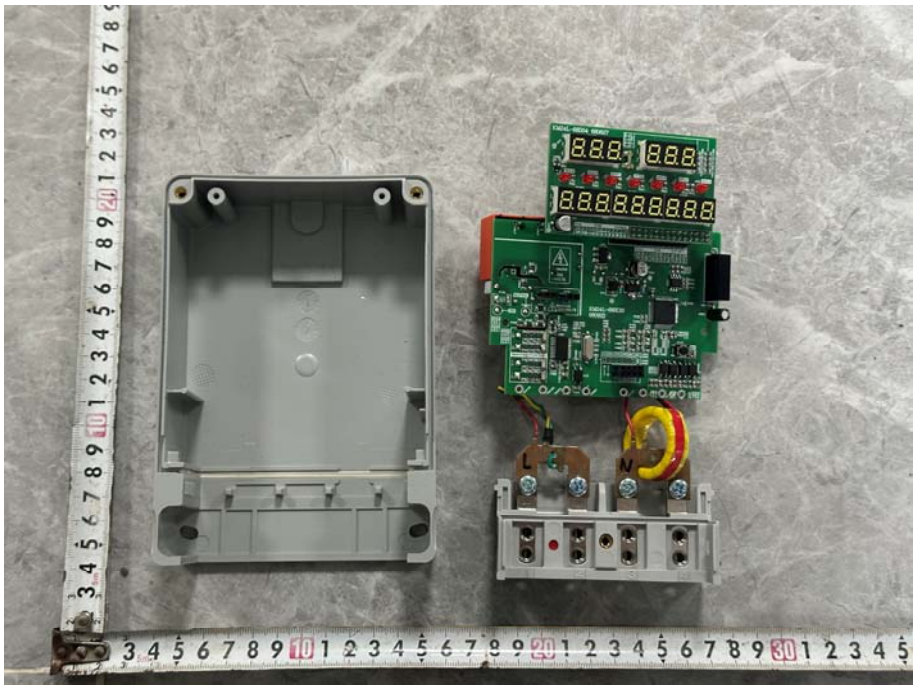


Photo documentation

Photo 17- Internal view

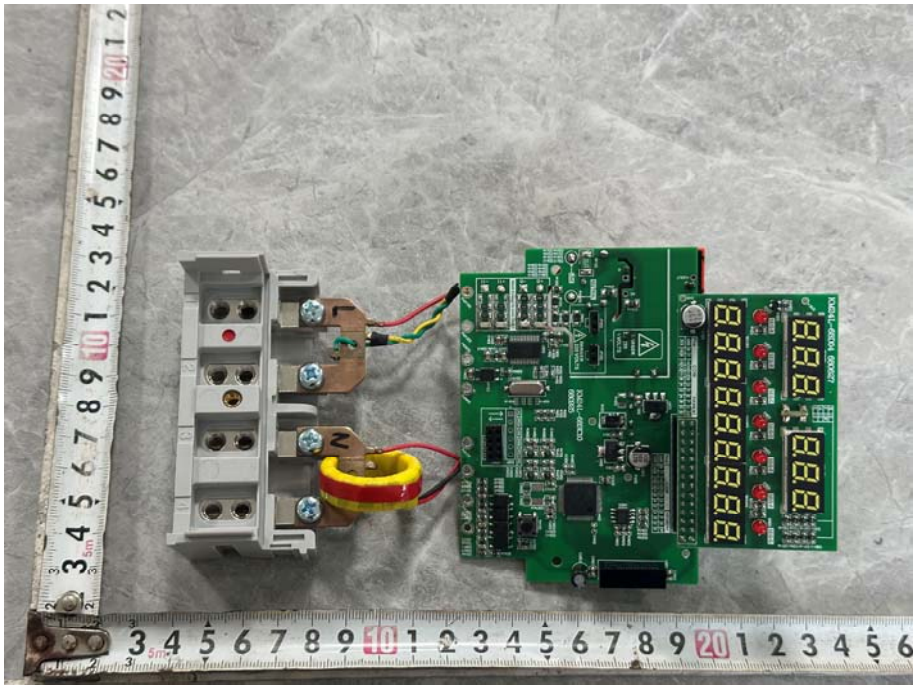


Photo 18- Internal view

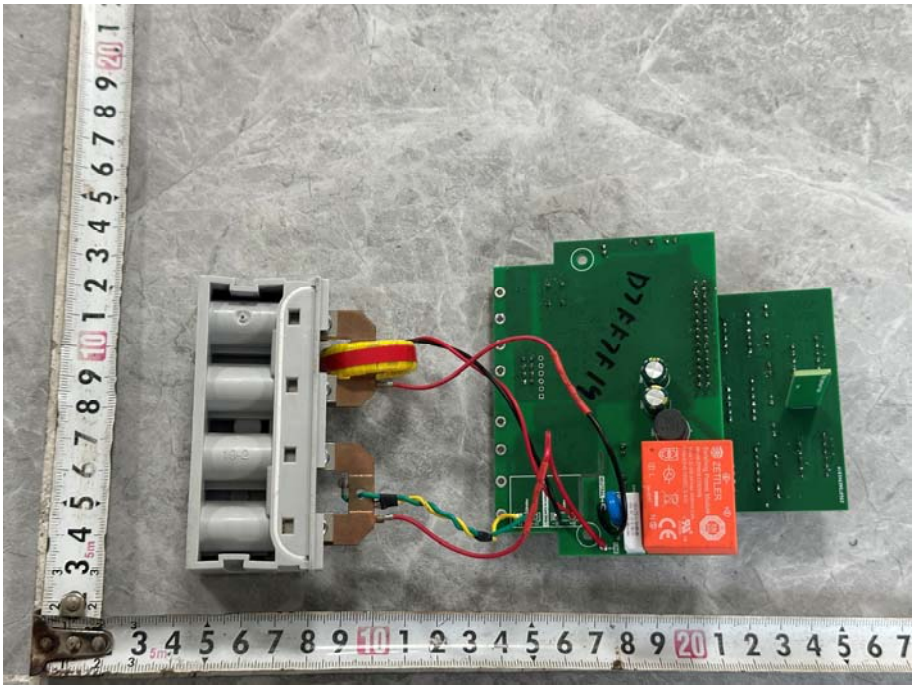


Photo documentation

Photo 19- Internal view

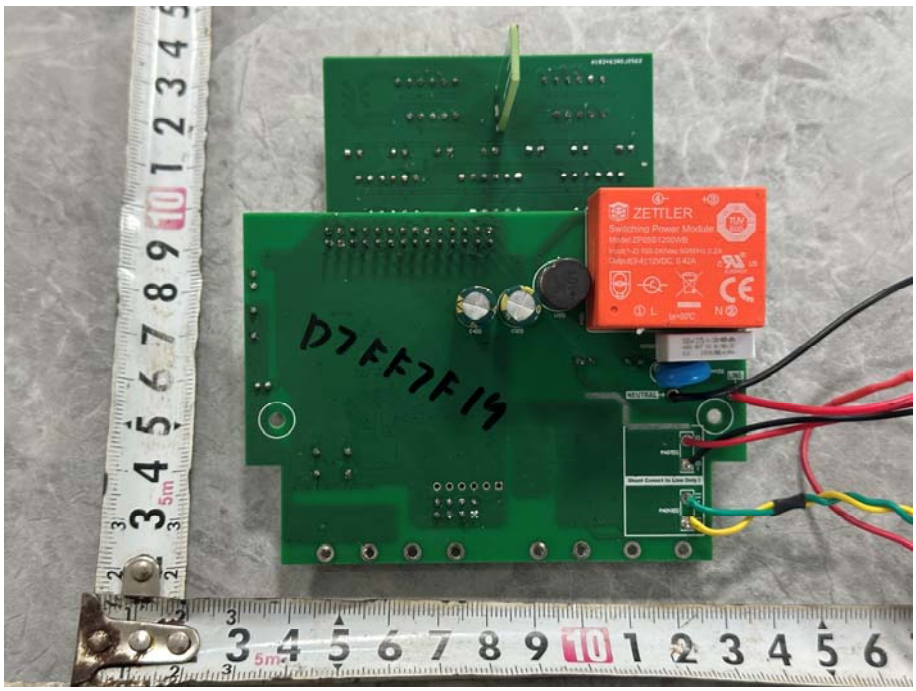
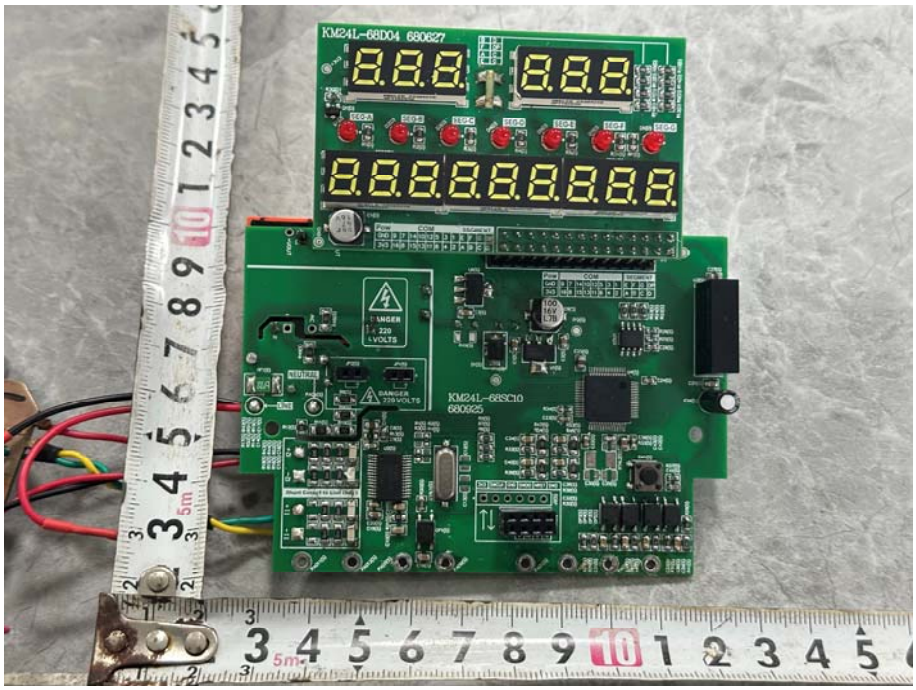


Photo 20- Internal view



-- End of Report --