

Vojenský technický ústav, s.p.
odštěpný závod VTÚPV
Víta Nejedlého 691, 682 01 Vyškov, Czech Republic

CERTIFICATE

No VTÚPV - 031 / 2026 / ZAHR

Applicant: Shanghai Matis Electric Co., Ltd.
上海麦豆电气有限公司
Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China
201306

Product: Three phase Multi-Functional Smart Meter

Tested Model: PEM5553-A
Derived Models: PEM5353-A, PEM5353-D, PEM5553-D, PEM5353-H, PEM5553-H

Manufacturer: Shanghai Matis Electric Co., Ltd.
Room318-320, No.83, West Huanghu Road, Pudong, Shanghai, China
201306

Rating and principal characteristics: Auxiliary Voltage: 85-305 V AC / 100-430 V DC (A Type); 18-36 V DC (D type); 90-528 V AC (H type);
Voltage Input: L-N: 0-720 V AC;
Frequency: 45-65 Hz;
Rated Current Input: 5 A CT, mV CT, Rogowski Coil (mV/kA);
Wiring Connection: 1P+N/3P/3P+N

Test results are described in the Test Reports No.:
STE03092662S, STE03092663S, STE03092661E (tests made STE Testing Laboratory Co., Ltd)

The sample of tested product conforms with the requirements of the following standards harmonized with the LVD Directive No. 2014/35/EU & EMC Directive No. 2014/30/EU

- EN IEC 61326-1: 2021
- EN 55011: 2016 + A1: 2017 + A11: 2020 + A2: 2021
- EN 61010-1: 2010 + A1: 2019
- EN IEC 61010-2-030: 2021 + A11:2021

This certificate is valid until: **13. 04. 2031**

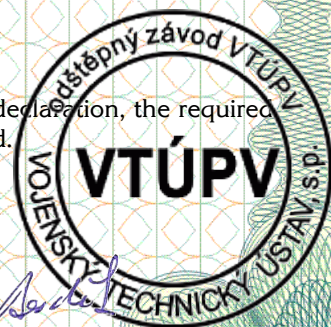
After preparation of the necessary technical documentation as well as the conformity declaration, the required CE marking can be affixed on the product. Other relevant directives have to be observed.
The CE mark shall appear according to this sample:

CE

Vyškov 13. 04. 2026

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Milan Bezdek
Certification Head





EMC TEST REPORT

For

Shanghai Matis Electric Co., Ltd

Three phase Multi-Functional Smart Meter

Test Model: PEM5553-A

Serial models: (others refer to page 8)

Prepared for : Shanghai Matis Electric Co., Ltd

Address : Room 318-320, No. 83, West Huanghu Road, Pudong, Shanghai,
China 201306

Prepared by : Shenzhen STE Testing Laboratory Co., Ltd

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Date of receipt of test sample : March 09, 2026

Date of Test : March 09, 2026 ~ March 24, 2026

Date of Report : March 24, 2026

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**EMC TEST REPORT
EN IEC 61326-1: 2021****Electrical equipment for measurement, control and laboratory use -
EMC requirements - Part 1: General requirements**

Report Reference No.: STE03092661E

Date Of Issue.....: March 24, 2026

Testing Laboratory Name.....: Shenzhen STE Testing Laboratory Co., Ltd

Testing Location/ Address.....: 3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, Niuhu Community, Guanlan Street, Longhua District, Shenzhen, China

Applicant's Name.....: Shanghai Matis Electric Co., Ltd

Address.....: Room 318-320, No. 83, West Huanghu Road, Pudong, Shanghai, China 201306

Manufacturer's Name.....: Shanghai Matis Electric Co., Ltd

Address.....: Room 318-320, No. 83, West Huanghu Road, Pudong, Shanghai, China 201306

Test Specification:Standard.....: EN IEC 61326-1: 2021
EN 55011: 2016+ A1: 2017+ A11: 2020+ A2: 2021;**Copyright © Shenzhen STE Testing Laboratory Co., Ltd All rights reserved.**

Test Item Description.....: Three phase Multi-Functional Smart Meter

Trade Mark.....: Matis, Matismart

Test Model.....: PEM5553-A

Serial Models.....: (others refer to page 8)

Ratings.....: Auxiliary voltage : 85–305VAC / 100–430VDC (A Type);
18 - 36 VDC (D type); 90 - 528VAC(H type)

Voltage Input: L-N: 0-720VAC

Frequency: 45-65Hz

Rated Current input:5A CT , mV CT, Rogowski Coil (mV/kA)

Wiring Connection: 1P+N/3P/3P+N

Result: Pass

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Todd Qian

Todd Qian/ Technique principal

Approved by:



File Manager

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1. SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION TESTS (EN 55011: 2016+ A1: 2017+ A11: 2020+ A2: 2021)			
Description of Test Item	Standard	Limits	Results
Conducted disturbance	EN 55011: 2016+ A1: 2017+ A11: 2020+ A2: 2021	Class B	PASS
Radiated disturbance	EN 55011: 2016+ A1: 2017+ A11: 2020+ A2: 2021	Class B	PASS
Harmonic current emissions	EN 61000-3-12: 2011 + A1: 2024	Class A	N/A
Voltage fluctuations & flicker	EN IEC 61000-3-11: 2019	--	N/A
IMMUNITY TESTS (EN IEC 61326-1: 2021)			
Description of Test Item	Basic Standard	Performance Criteria	Results
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Radio-frequency, Continuous radiated disturbance	EN IEC 61000-4-3: 2020	A	PASS
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	PASS
Surge (Input a.c. power ports)	EN 61000-4-5: 2014+ A1: 2017	C	PASS
Surge (Telecommunication ports)		C	N/A
Radio-frequency, Continuous conducted disturbance	EN 61000-4-6: 2018	A	PASS
Power frequency magnetic field	EN 61000-4-8: 2010	A	PASS
Voltage dips, >95% reduction	EN IEC 61000-4-11: 2020	B	PASS
Voltage dips, 30% reduction		C	PASS
Voltage interruptions		C	PASS

N/A is an abbreviation for Not Applicable.

1.2 Description of Performance Criteria

General Performance Criteria

The general principles (performance criteria) for the evaluation of the immunity test results are the following.

Permissible LOSSES OF PERFORMANCE are allowed only if specified in the test plan before testing, and clearly provided to the user in the product specification.

If the PERFORMANCE LEVEL or the permissible LOSS OF PERFORMANCE is not specified, either of these may be derived from the product specification or user documentation and what the user may reasonably expect from the equipment if used as intended.

1.2.1 Performance criterion A

The equipment shall continue to operate as intended during and after the test. No DEGRADATION OF PERFORMANCE or LOSS OF FUNCTION is allowed below a PERFORMANCE LEVEL specified in the user documentation, when the equipment is used as intended.

In the case of applying immunity tests with continuous electromagnetic phenomena, the PERFORMANCE LEVEL may be replaced by a permissible LOSS OF PERFORMANCE which shall recover, without user intervention.

A permissible LOSS OF PERFORMANCE is allowed within the PERFORMANCE LEVEL only when this information is clearly provided to the end user via documentation, such as the product user manual. No change in the operating state is allowed nor is loss of data.

1.2.2 Performance criterion B

The equipment shall continue to operate as intended after the test. No DEGRADATION OF PERFORMANCE or LOSS OF FUNCTION is allowed below a PERFORMANCE LEVEL specified in the user documentation, when the equipment is used as intended.

During the test, the equipment PERFORMANCE LEVEL may be replaced by a permissible LOSS OF PERFORMANCE if such LOSS OF PERFORMANCE is detailed in the EMC test plan.

A permissible LOSS OF PERFORMANCE is allowed within the PERFORMANCE LEVEL only when this information is clearly provided to the end user via documentation, such as the product user manual.

An unintended change of the operating state is allowed if self-recoverable. No loss of stored data is allowed.

1.2.3 Performance criterion C

LOSS OF FUNCTION is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

Recovery procedure shall be included in the user documentation.

No permanent damage to the equipment is allowed.

2. GENERAL INFORMATION

2.1 Description of Device (EUT)

- EUT : Three phase Multi-Functional Smart Meter
- Trade mark : Matis, Matismart
- Test Model : PEM5553-A
- Serial Model No. : PEM5353-A, PEM5353-D, PEM5553-D,
PEM5353-H, PEM5553-H
- Model Difference : All models are same except the appearance.
The laboratory only tests and evaluates the main model.
Adding models haven't been tested, but only based on the
guarantee letter provided by the Applicant. STE takes no
responsibility for any mistakes and the problems of product
consistency caused by inaccurate and/or invalid information
submitted by the client. The Applicant will take the
responsibility of all discrepancy and risk.
- Power Supply : Auxiliary voltage: 85–305VAC / 100–430VDC (A Type);
18 - 36 VDC (D type); 90 - 528VAC(H type)
Voltage Input: L-N: 0-720VAC
Frequency: 45-65Hz
Rated Current input:5A CT , mV CT, Rogowski Coil (mV/kA)
Wiring Connection: 1P+N/3P/3P+N
- Separation into groups : Group 1 equipment
 Group 2 equipment (intentionally RF energy)
- Division into classes : Class A equipment
 Class B equipment (domestic purposes)

Highest internal frequency (Fx)	Highest measured frequency
Fx ≤ 108 MHz	1 GHz
108 MHz < Fx ≤ 500 MHz	2 GHz
500 MHz < Fx ≤ 1 GHz	5 GHz
Fx > 1 GHz	5 × Fx up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, Fx is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.	

Where Fx is unknown, the radiated emission measurements shall be performed up to 6 GHz.

2.2 Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Normal Operation

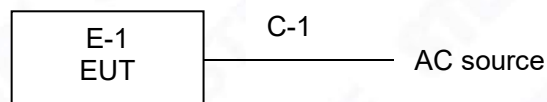
For Conducted Test	
Final Test Mode	Description
Mode 1	Normal Operation

For Radiated Test	
Final Test Mode	Description
Mode 1	Normal Operation

For EMS Test	
Final Test Mode	Description
Mode 1	Normal Operation

2.3 Description of Test Setup

Mode 1:



2.4 Description Test Peripheral and EUT Peripheral

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model / Type No.	Series No.	Note
E-1	Three phase Multi-Functional Smart Meter	Matis, Matismart	PEM5553-A	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	120cm	Power cord

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” means “shielded” “with core”; “NO” means “unshielded” “without core”.

2.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc.

To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the STE quality system according to ISO/ IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.6 Measurement Uncertainty

Test Item	Frequency Range	Expanded uncertainty (Ulab)	Expanded uncertainty (Ucisp)
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 2.63 dB ± 2.35 dB	± 3.8 dB ± 3.4 dB
Power disturbance	Level accuracy (30MHz to 300MHz)	± 2.90 dB	± 4.5 dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	± 3.60 dB	± 3.3 dB
Radiated Emission	Level accuracy (9kHz to 30MHz)	± 3.68 dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	± 3.48 dB	± 5.3 dB
Radiated Emission	Level accuracy (above 1000MHz)	± 3.90 dB	± 5.2 dB
Mains Harmonic	Voltage	$\pm 0.510\%$	N/A
Voltage Fluctuations & Flicker	Voltage	$\pm 0.510\%$	N/A
EMF	--	$\pm 21.59\%$	N/A

(1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

(2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1 Conducted Disturbance

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	EMI Test Software	EZ	EZ-EMC	/	2026-01-08
2	EMI Test Receiver	R&S	ESPI	101840	2026-01-08
3	Artificial Mains	R&S	ENV216	101288	2026-01-08
4	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	/
5	Power Divider	Weinschel	1506A	PM204	2026-01-08
6	L.I.S.N	TESEQ	T800	45130	2026-01-08

3.2 Radiated Disturbance (Electric Field)

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	3m Semi Anechoic Chamber	Maorui	/	/	2026-01-08
2	EMI Test Receiver	ROHDE & SCHWARZ	ESR 3	102312	2026-01-08
3	Log per Antenna	ROHDE & SCHWARZ	VULP9118	873	2026-01-08
4	EMI Test Software	Farad	EMC	N/A	/
5	Positioning Controller	MF	MF-7082	/	2026-01-08

3.3 Harmonic Current, Voltage fluctuation and Flicker

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Power Analyzer Test System	Laplace	AC2000A	20000670053	2026-01-08

3.4 Electrostatic Discharge

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	ESD Simulator	TESEQ	NSG 437	1615	2026-01-08

3.5 RF Field Strength Susceptibility

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	RS Test Software	Tonscend	/	/	2026-01-08
2	ESG Vector Signal Generator	Agilent	E4438C	MY42081396	2026-01-08
3	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2026-01-08
4	RF POWER AMPLIFIER	OPHIR	5225R	1052	2026-01-08
5	RF POWER AMPLIFIER	OPHIR	5273F	1019	2026-01-08
6	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2026-01-08
7	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-484	2026-01-08

3.6 Electrical Fast Transient / Burst Immunity Test

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Electrical fast transient (EFT) generator	HTEC	HEFT51	162201	2026-01-08
2	Coupling Clamp	HTEC	H3C	163701	2026-01-08

3.7 Surge

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Surge test system	3CTEST	SG5006G	EC5581070	2026-01-08
2	Coupling/decoupling network	3CTEST	SGN-5010G	EC5591033	2026-01-08

3.8 Conducted Susceptibility

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Simulator	FRANKONIA	CIT-10/75	A126A1195	2026-01-08
2	CDN	FRANKONIA	CDN-M2+M3	A2210177	2026-01-08
3	6dB Attenuator	FRANKONIA	DAM25W	1172040	2026-01-08

3.9 Voltage Dips and Short Interruptions

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2026-01-08

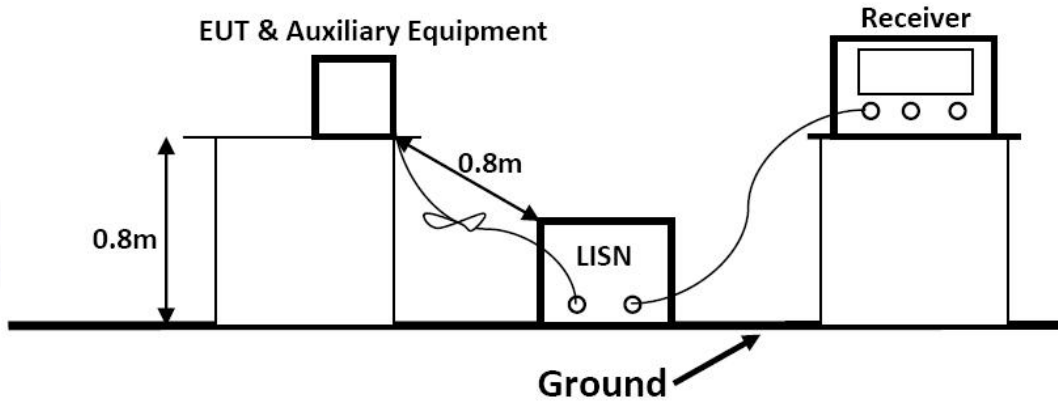
3.10 Power Frequency Magnetic Field

Item	Test equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Power Frequency Mag-Field Generator System	HTEC	HPFMF100	100-2400	2026-01-08

4. EMISSION TESTS

4.1 Conducted Emission Measurement

4.1.1 Block Diagram of Test Setup



4.1.2 Measuring Standard

EN 55011: 2016+ A1: 2017+ A11: 2020+ A2: 2021 class A

4.1.3 Conducted Emission Limits

1, POWER LINE CONDUCTED EMISSION (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	☐ Class A		☒ Class B	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

2, TELECOMMUNICATION PORT CONDUCTED EMISSION(VOLTAGE LIMITS) (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	☐ Class A (at 3m) dBuV/m		☒ Class B (at 3m) dBuV/m	
	Peak	Avg	Peak	Avg
0.15 -0.5	97 - 87 *	84 - 74 *	84 - 74 *	74 - 64 *
0.5 -30.0	87.00	74.00	74.00	64.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
- (3) When the EUT has the telecommunication terminal, this test is performed.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

4.1.4 EUT Configuration on Test

The following equipments are installed on Power Line Conducted Emission Measurement to meet the EN 61000-6-4 requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

4.1.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 4.1.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

4.1.6 Test Procedure

All the scanning waveform is in next page.

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided 50-ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 61000-6-4 regulations during conducted emission measurement.

The bandwidth of the field strength meter is set at 9kHz in 150kHz~30MHz.

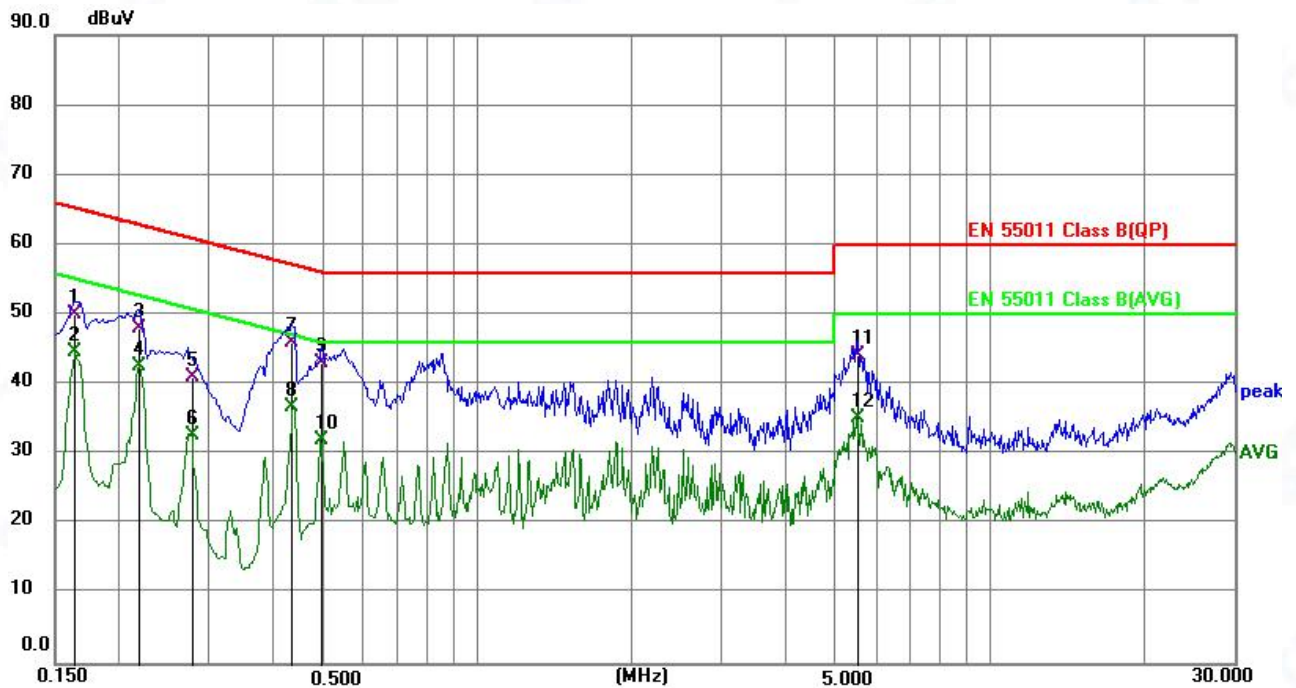
The frequency range from 150kHz to 30MHz is investigated.

4.1.7 Test Results

PASS.

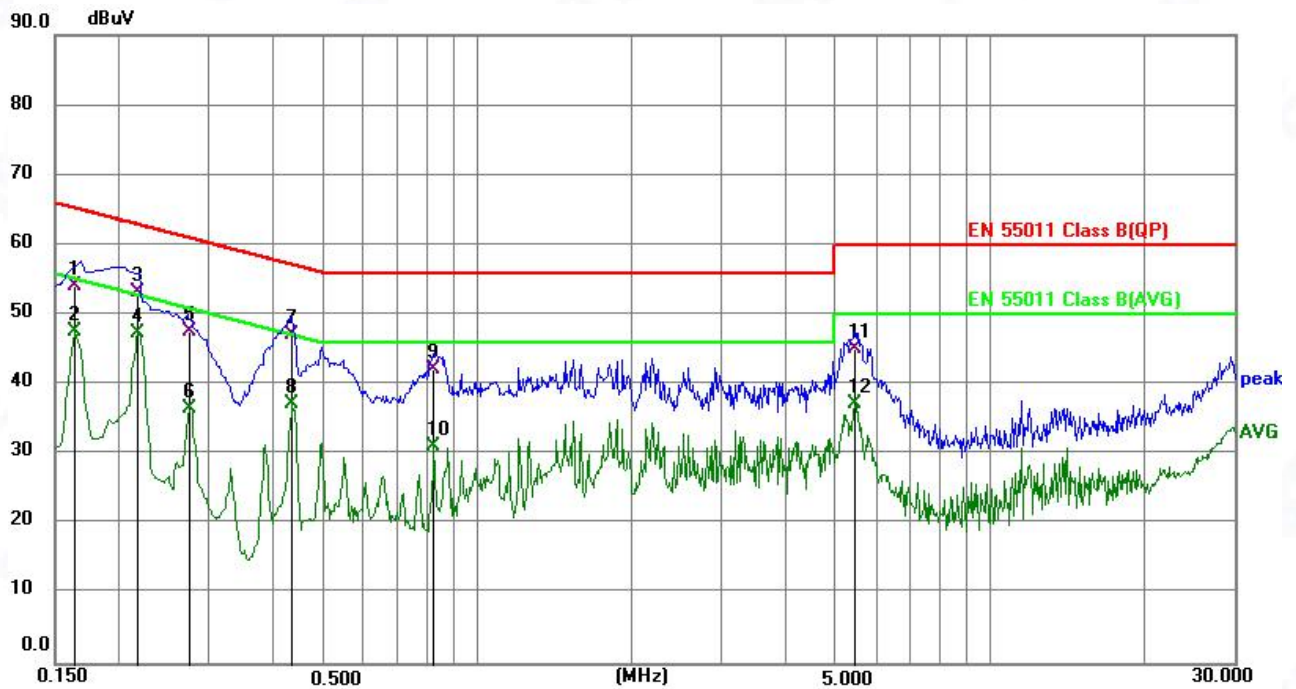
The test result please refer to the next page.

Test Model	PEM5553-A	Test Mode	Mode 1
Environmental Conditions	23.8°C, 52.9% RH	Test Engineer	Xp Rao
Pol.	Line 1	Test Voltage	AC 400V/50Hz



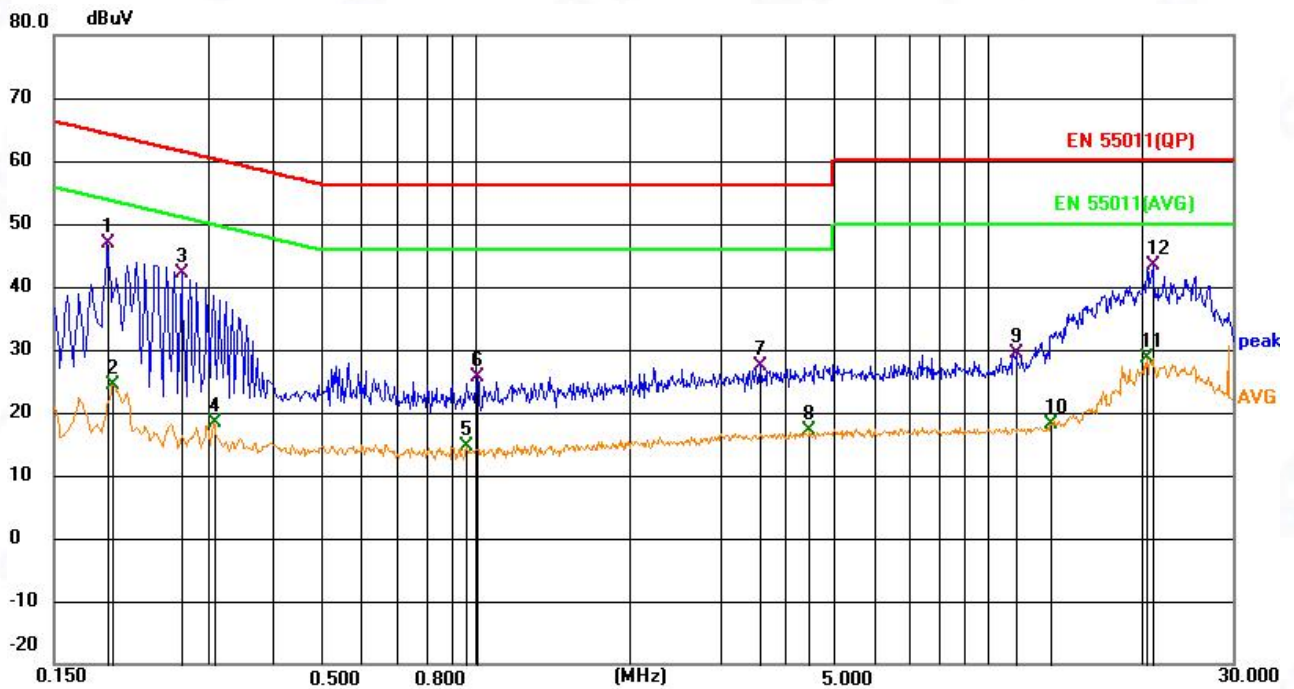
No.	Mk.	Freq. MHz	Reading Level	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1641	39.78	10.23	50.01	65.25	-15.24	QP	
2		0.1641	34.36	10.23	44.59	55.25	-10.66	AVG	
3		0.2185	37.91	10.22	48.13	62.88	-14.75	QP	
4	*	0.2185	32.37	10.22	42.59	52.88	-10.29	AVG	
5		0.2773	30.94	10.21	41.15	60.90	-19.75	QP	
6		0.2773	22.61	10.21	32.82	50.90	-18.08	AVG	
7		0.4351	35.88	10.20	46.08	57.15	-11.07	QP	
8		0.4351	26.64	10.20	36.84	47.15	-10.31	AVG	
9		0.4967	32.92	10.20	43.12	56.06	-12.94	QP	
10		0.4967	21.82	10.20	32.02	46.06	-14.04	AVG	
11		5.5346	34.03	10.20	44.23	60.00	-15.77	QP	
12		5.5346	24.91	10.20	35.11	50.00	-14.89	AVG	

Test Model	PEM5553-A	Test Mode	Mode 1
Environmental Conditions	23.8°C, 52.9% RH	Test Engineer	Xp Rao
Pol.	Line 2	Test Voltage	AC 400V/50Hz



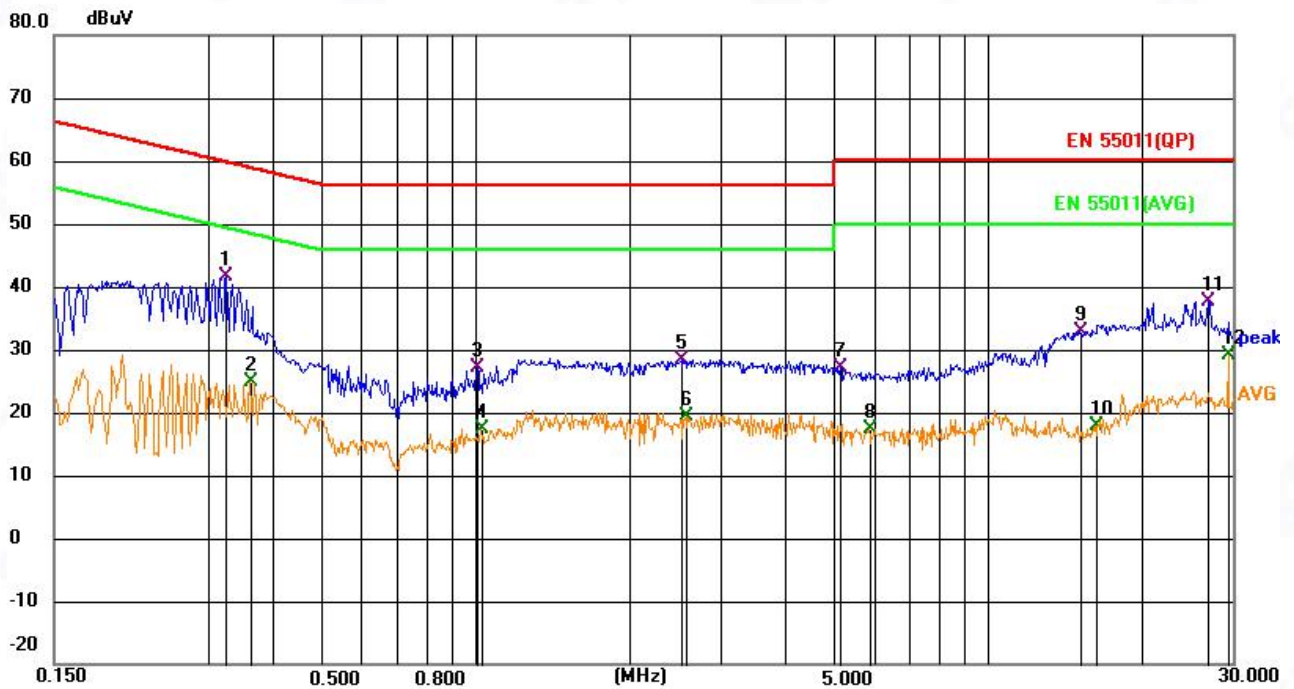
No.	Mk.	Freq. MHz	Reading Level dB	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1632	43.82	10.23	54.05	65.30	-11.25	QP	
2		0.1632	37.39	10.23	47.62	55.30	-7.68	AVG	
3		0.2173	42.94	10.22	53.16	62.92	-9.76	QP	
4	*	0.2173	37.25	10.22	47.47	52.92	-5.45	AVG	
5		0.2744	37.28	10.21	47.49	60.98	-13.49	QP	
6		0.2744	26.43	10.21	36.64	50.98	-14.34	AVG	
7		0.4351	36.85	10.20	47.05	57.15	-10.10	QP	
8		0.4351	26.95	10.20	37.15	47.15	-10.00	AVG	
9		0.8217	31.90	10.20	42.10	56.00	-13.90	QP	
10		0.8217	20.98	10.20	31.18	46.00	-14.82	AVG	
11		5.4474	34.89	10.20	45.09	60.00	-14.91	QP	
12		5.4474	27.15	10.20	37.35	50.00	-12.65	AVG	

Test Model	PEM5553-A	Test Mode	Mode 1
Environmental Conditions	23.8°C, 52.9% RH	Test Engineer	Xp Rao
Pol.	Line 3	Test Voltage	AC 400V/50Hz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1906	27.20	19.63	46.83	64.01	-17.18	QP	
2		0.1951	4.77	19.63	24.40	53.82	-29.42	AVG	
3		0.2671	22.52	19.63	42.15	61.21	-19.06	QP	
4		0.3076	-1.17	19.63	18.46	50.04	-31.58	AVG	
5		0.9600	-4.98	19.65	14.67	46.00	-31.33	AVG	
6		1.0095	5.95	19.65	25.60	56.00	-30.40	QP	
7		3.5926	7.65	19.70	27.35	56.00	-28.65	QP	
8		4.4836	-2.67	19.70	17.03	46.00	-28.97	AVG	
9		11.3596	9.46	19.85	29.31	60.00	-30.69	QP	
10		13.2226	-1.70	19.84	18.14	50.00	-31.86	AVG	
11		20.3776	8.46	20.19	28.65	50.00	-21.35	AVG	
12	*	20.9490	23.30	20.16	43.46	60.00	-16.54	QP	

Test Model	PEM5553-A	Test Mode	Mode 1
Environmental Conditions	23.8°C, 52.9% RH	Test Engineer	Xp Rao
Pol.	Neutral	Test Voltage	AC 400V/50Hz

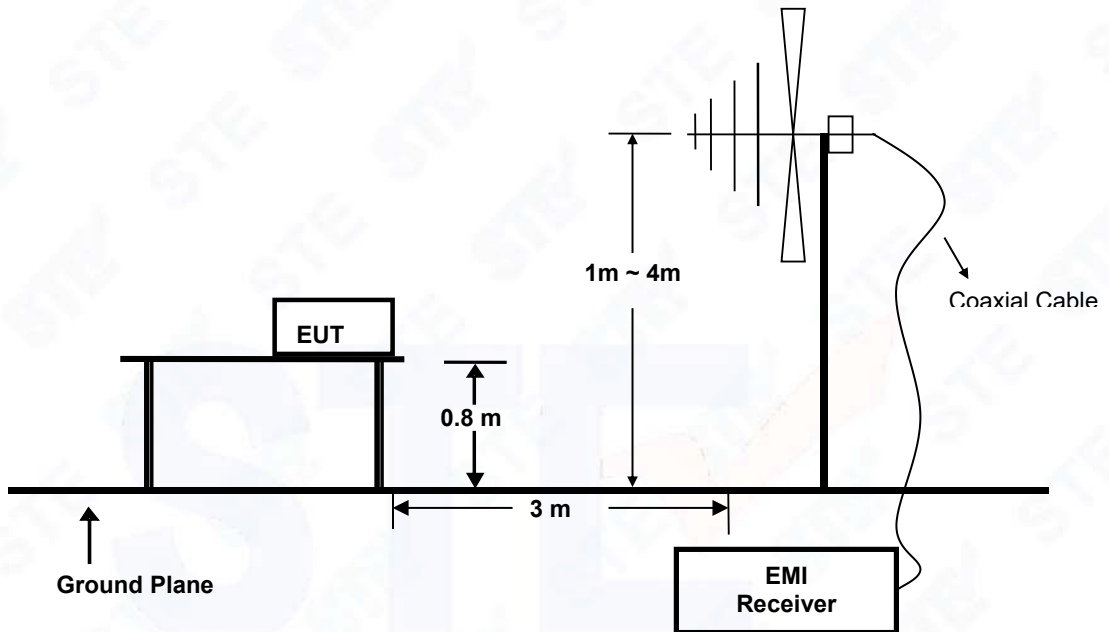


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.3256	21.93	19.63	41.56	59.56	-18.00	QP	
2		0.3616	5.14	19.63	24.77	48.69	-23.92	AVG	
3		1.0095	7.45	19.65	27.10	56.00	-28.90	QP	
4		1.0230	-2.29	19.65	17.36	46.00	-28.64	AVG	
5		2.5216	8.58	19.71	28.29	56.00	-27.71	QP	
6		2.5711	-0.29	19.71	19.42	46.00	-26.58	AVG	
7		5.1406	7.35	19.80	27.15	60.00	-32.85	QP	
8		5.8561	-2.54	19.80	17.26	50.00	-32.74	AVG	
9		15.0811	12.93	19.88	32.81	60.00	-27.19	QP	
10		16.2241	-2.02	19.93	17.91	50.00	-32.09	AVG	
11		26.9476	17.60	20.04	37.64	60.00	-22.36	QP	
12		29.4856	9.08	20.10	29.18	50.00	-20.82	AVG	

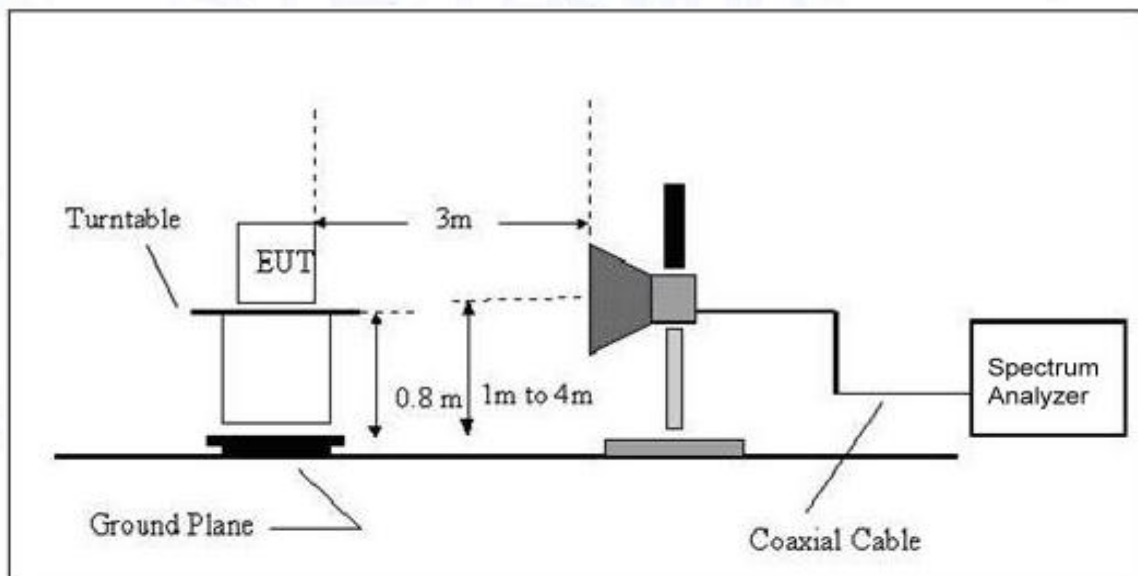
4.2 Radiated emission measurement

4.2.1 Block Diagram of Test Setup

1, Below 1 GHz



2, Above 1 GHz



4.2.2 Measuring Standard

EN IEC 61326-1: 2021 cl. 7.2

EN 55011: 2016+ A1: 2017+ A11: 2020+ A2: 2021 cl. 6.2

4.2.3 Radiated Emission Limits

All emanations from a class device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

1, LIMITS OF RADIATED EMISSION MEASUREMENT (Below 1000MHz)

FREQUENCY (MHz)	<input type="checkbox"/> Class A		<input checked="" type="checkbox"/> Class B	
	<input type="checkbox"/> At 10m	<input type="checkbox"/> At 3m	<input type="checkbox"/> At 10m	<input checked="" type="checkbox"/> At 3m
	dBµV/m	dBµV/m	dBµV/m	dBµV/m
30 – 230	40	50	30	40
230 – 1000	47	57	37	47

2, LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	<input type="checkbox"/> Class A (at 3m) dBµV/m		<input checked="" type="checkbox"/> Class B (at 3m) dBµV/m	
	Peak	Avg	Peak	Avg
1000-3000	76	56	70	50
3000-6000	80	60	74	54

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

4.2.4 EUT Configuration on Test

The EN 55011: 2016+ A1: 2017+ A11: 2020+ A2: 2021 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.2.5 Operating Condition of EUT

1. Turn on the power.
2. Let the EUT work in test mode and measure it.

4.2.6 Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can

rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. By-log antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the Receiver is set at 120kHz.

All the scanning waveform is in next page.

4.2.7 Test Results

PASS.

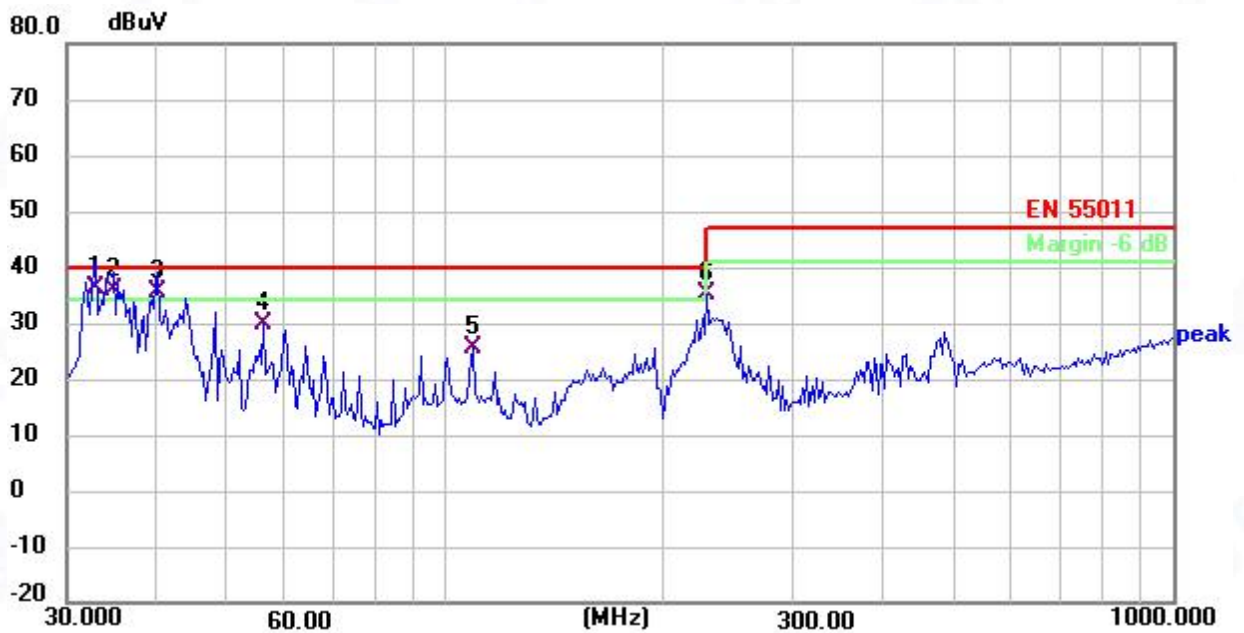
The scanning waveforms are in the next page.



STE Testing

4.2.8 TEST RESULTS (Below 1000MHz)

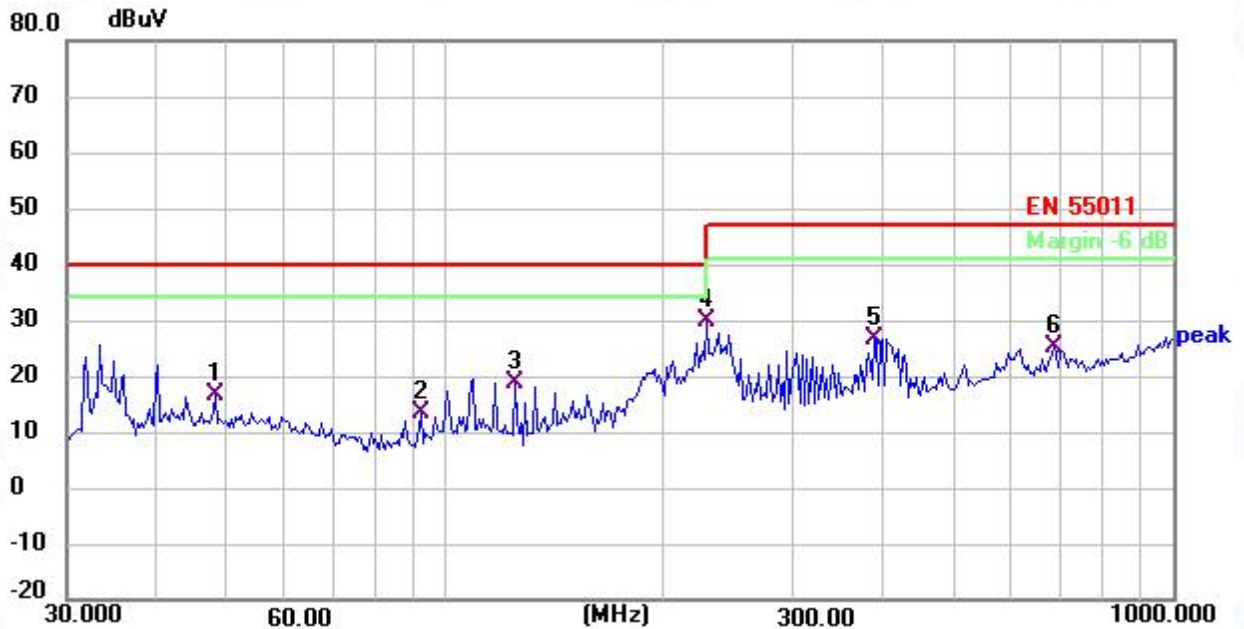
Model No. (M/N):	PEM5553-A	Test Mode:	Mode 1
Environmental Conditions:	23.6°C, 57.5% RH	Detector Function:	Quasi-peak
Distance:	3m	Polarization:	Vertical
Test Engineer:	Feng Liang	Test Voltage:	AC 400V/50Hz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	32.8696	55.28	-19.14	36.14	40.00	-3.86	QP			P	
2 !	34.7704	54.76	-18.98	35.78	40.00	-4.22	QP			P	
3 !	40.0172	52.79	-17.32	35.47	40.00	-4.53	QP			P	
4	56.0708	46.90	-17.16	29.74	40.00	-10.26	QP			P	
5	108.5455	43.99	-18.48	25.51	40.00	-14.49	QP			P	
6 !	228.6173	52.83	-17.66	35.17	40.00	-4.83	QP			P	

*: Maximum data x: Over limit !: over margin

Model No. (M/N):	PEM5553-A	Test Mode:	Mode 1
Environmental Conditions:	23.6°C, 57.5% RH	Detector Function:	Quasi-peak
Distance:	3m	Polarization:	Horizontal
Test Engineer:	Feng Liang	Test Voltage:	AC 400V/50Hz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	48.0392	32.78	-16.13	16.65	40.00	-23.35	QP			P	
2	92.3462	33.32	-19.83	13.49	40.00	-26.51	QP			P	
3	124.0501	39.82	-20.90	18.92	40.00	-21.08	QP			P	
4 *	228.6173	47.54	-17.66	29.88	40.00	-10.12	QP			P	
5	387.2565	41.21	-14.63	26.58	47.00	-20.42	QP			P	
6	684.2258	34.68	-9.48	25.20	47.00	-21.80	QP			P	

*: Maximum data x: Over limit !: over margin

4.2.9 TEST RESULTS (1000~6000MHz)

Model No. (M/N):	PEM5553-A	Test Mode:	Mode 1
Environmental Conditions:	23.6°C, 57.5% RH	Detector Function:	N/A
Distance:	3m	Polarization:	N/A
Test Engineer:	N/A	Test Voltage:	N/A

Remark:

The frequency of the product is lower than 108MHz, it does not apply

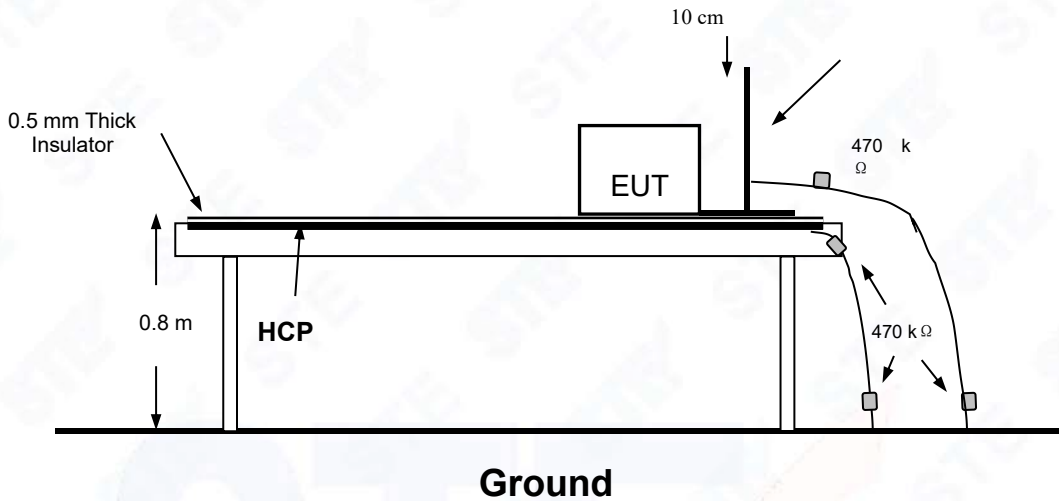
5. IMMUNITY TESTS

Table 1 – Immunity test requirements for equipment intended to be used in a BASIC ELECTROMAGNETIC ENVIRONMENT

PORT	Phenomenon	Basic standard	Test value	Performance criterion
ENCLOSURE	ESD	IEC 61000-4-2	±4 kV contact discharge ±8 kV air discharge	B B
	Electromagnetic field	IEC 61000-4-3	3 V/m (80 MHz to 1 GHz; 1,4 GHz to 6 GHz) ^a	A
	Power frequency magnetic field ^b	IEC 61000-4-8	3 A/m (50 Hz, 60 Hz)	A
AC power (including protective earth)	Burst	IEC 61000-4-4	±1 kV (5 kHz or 100 kHz)	B
	Surge	IEC 61000-4-5	±0,5 kV line-to-line ±1 kV line-to-ground	B B
	Conducted RF	IEC 61000-4-6	3 V (150 kHz to 80 MHz)	A
	Voltage dip	IEC 61000-4-11	0 % during half cycle 0 % during 1 cycle 70 % during 25/30 cycles ^c	B B C
	Short interruptions	IEC 61000-4-11	0 % during 250/300 cycles ^c	C
DC power ^{d, e} (including protective earth)	Burst	IEC 61000-4-4	±1 kV (5 kHz or 100 kHz)	B
	Surge	IEC 61000-4-5	±0,5 kV line-to-line ±1 kV line-to-ground	B B
	Conducted RF	IEC 61000-4-6	3 V (150 kHz to 80 MHz)	A
I/O signal/control ^e (including functional earth)	Burst ^d	IEC 61000-4-4	±0,5 kV (5 kHz or 100 kHz)	B
	Surge ^f	IEC 61000-4-5	±1 kV line-to-ground	B
	Conducted RF ^d	IEC 61000-4-6	3 V (150 kHz to 80 MHz)	A
I/O signal/control ^e connected directly to mains supply	Burst ^d	IEC 61000-4-4	±1 kV (5 kHz or 100 kHz)	B
	Surge ^f	IEC 61000-4-5	±0,5 kV line-to-line ±1 kV line-to-ground	B B
	Conducted RF ^d	IEC 61000-4-6	3 V (150 kHz to 80 MHz)	A

5.1 ELECTROSTATIC DISCHARGE IMMUNITY TEST

5.1.1 Block Diagram of Test Setup



5.1.2 Test Standard

EN IEC 61326-1: 2021 (EN 61000-4-2: 2009)

5.1.3 Severity Levels and Performance Criterion

Electrostatic discharges — Test levels				
Discharge Type	Discharge Level (kV)		Number of discharges (Each point)	Performance Criteria
	+	-		
Air Discharge-Direct	2, 4, 8	2, 4, 8	20	B
Contact Discharge-Direct	2, 4	2, 4	20	
Contact Discharge- Indirect	2, 4	2, 4	20	

5.1.4 EUT Configuration on Test

The configuration of EUT is listed in Section 3.2.

5.1.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 5.1.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

5.1.6 Test Procedure

(1) Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

(2) Contact Discharge

All the procedure shall be same as Section 5.1.6(1). Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

(3) Indirect Discharge For Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

(4) Indirect Discharge For Vertical Coupling Plane

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

5.1.7 Test Results

PASS.

Please refer to the following pages

ESD Test Results

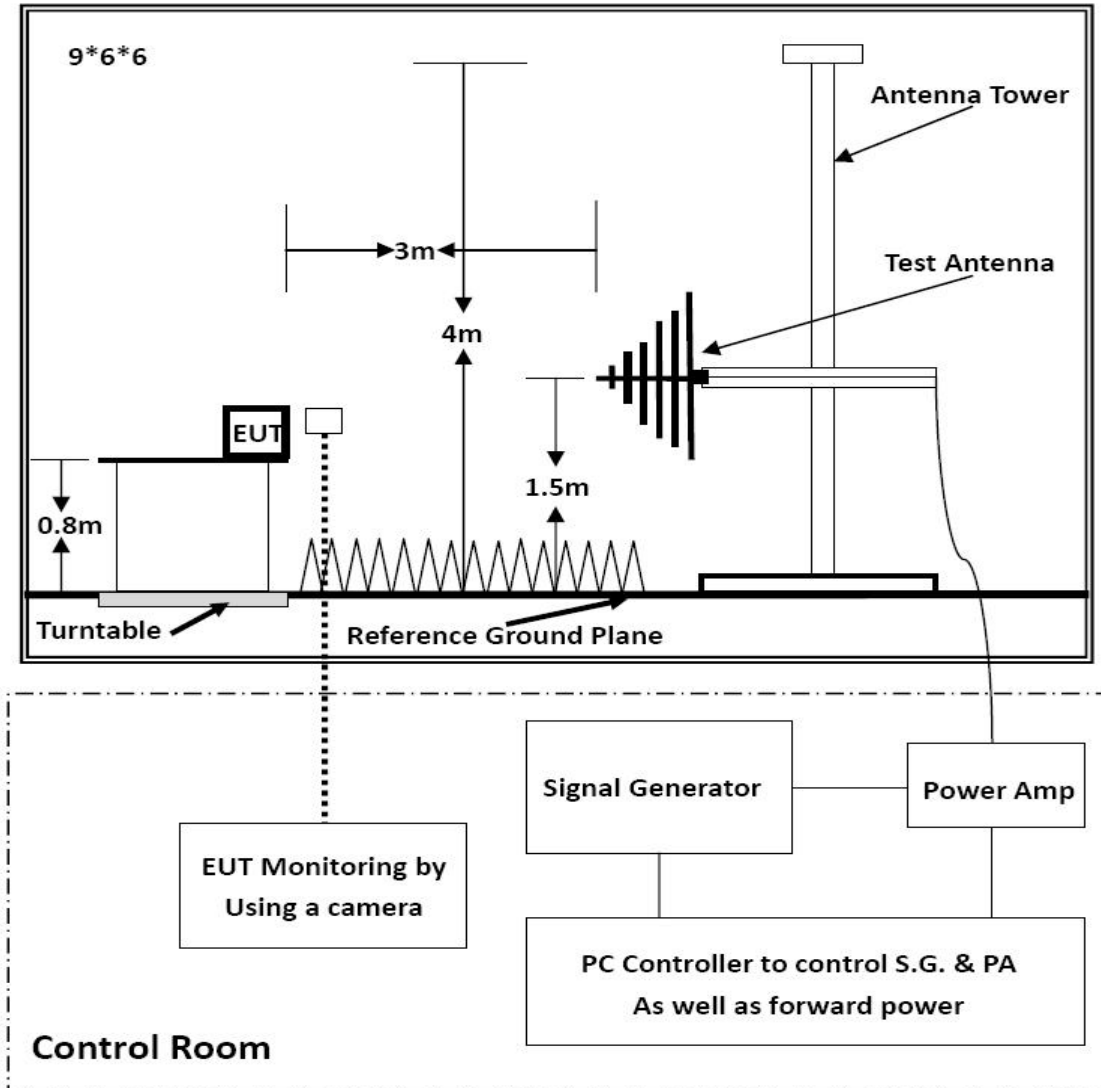
Standard	<input type="checkbox"/> IEC 61000-4-2 <input checked="" type="checkbox"/> EN 61000-4-2		
Applicant	Shanghai Matis Electric Co., Ltd		
EUT	Three phase Multi-Functional Smart Meter	Temperature	23.6°C
M/N	PEM5553-A	Humidity	55.9%
Criterion	B	Pressure	1021mbar
Test Mode	MODE 1	Test Engineer	Feng Liang

Discharge mode	Test points	Results						Performance Criteria
		2kv		4kv		8kv		
		+	-	+	-	+	-	
Direct-Contact Discharge	Front	P	P	P	P	/	/	B
	Back	P	P	P	P	/	/	B
	Left	P	P	P	P	/	/	B
	Right	P	P	P	P	/	/	B
	Top	P	P	P	P	/	/	B
	Bottom	P	P	P	P	/	/	B
Direct-Air Discharge	Front	P	P	P	P	P	P	B
	Back	P	P	P	P	P	P	B
	Left	P	P	P	P	P	P	B
	Right	P	P	P	P	P	P	B
	Top	P	P	P	P	P	P	B
	Bottom	P	P	P	P	P	P	B
Indirect-Contact Discharge(VCP)	/	P	P	P	P	/	/	B
Indirect-Contact Discharge(HCP)	/	P	P	P	P	/	/	B

Note: "P" = Pass.

5.2 RF FIELD STRENGTH SUSCEPTIBILITY TEST

5.2.1 Block Diagram of Test Setup



5.2.2 Test Standard

EN IEC 61326-1: 2021 (EN IEC 61000-4-3)

5.2.3 Severity Levels and Performance Criterion

Radio-frequency electromagnetic fields – Test levels		
Characteristics	Test levels	Performance Criteria
Frequency range	80 MHz to 1 GHz; 1.4G – 6 GHz	A
Test level	3 V/m (unmodulated)	
Modulation	1 kHz, 80 % AM, sine wave	

5.2.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.2.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 5.2.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

5.2.6 Test Procedure

The test was carried out in a half-wave anechoic chamber with absorbent material attached to a reflective ground plate.

Before the test, the test field strength needs to be calibrated. During the calibration, the corresponding relationship between the target field strength and the forward power applied to the transmitting antenna is established. During the test, except for EUT, the indoor layout is consistent with the calibration.

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground.

EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test.

Each of the four sides of EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a CCD camera is used to monitor EUT screen.

5.2.7 Test Results

PASS.

Please refer to the following page.

RF Field Strength Susceptibility Test Results

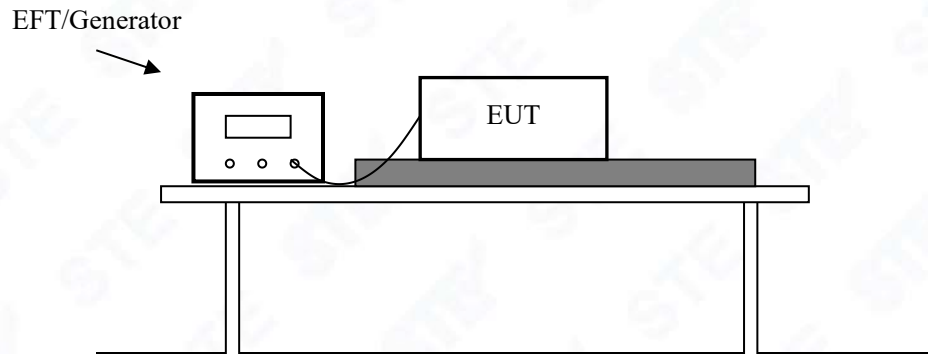
Standard	<input type="checkbox"/> IEC 61000-4-3 <input checked="" type="checkbox"/> EN IEC 61000-4-3		
Applicant	Shanghai Matis Electric Co., Ltd		
EUT	Three phase Multi-Functional Smart Meter	Temperature	23.7°C
M/N	PEM5553-A	Humidity	59.8%
Field Strength	3 V/m	Criterion	A
Test Mode	Mode 1	Test Engineer	Feng Liang
Modulation	80% AM 1KHz	Steps	1%

Angle of EUT	Antenna polarization	Frequency Range (MHz)	Test Level (V/m)	Performance Criteria
0°	Vertical, Horizontal	80 to 1000	3	A
90°	Vertical, Horizontal	80 to 1000	3	A
180°	Vertical, Horizontal	80 to 1000	3	A
270°	Vertical, Horizontal	80 to 1000	3	A
0°	Vertical, Horizontal	1400 to 6000	3	A
90°	Vertical, Horizontal	1400 to 6000	3	A
180°	Vertical, Horizontal	1400 to 6000	3	A
270°	Vertical, Horizontal	1400 to 6000	3	A

Note:

5.3 Electrical Fast Transient/ Burst Immunity Test

5.3.1 Block Diagram of Test Setup



5.3.2 Test Standard

EN IEC 61326-2-3: 2021

(EN 61000-4-4: 2012, Severity Level: Level 3: 1KV)

5.3.3 Severity Levels and Performance Criterion

1. Severity Levels

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
	0.5 KV	0.25 KV
	1 KV	0.5 KV
	2 KV	1 KV
	4 KV	2 KV
X	Special	Special

2. Performance Criterion: B

5.3.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.3.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 5.3.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

5.3.6 Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

1. For input and output DC power ports:

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to DC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

2. For signal lines and control lines ports: No I/O ports. It's unnecessary to test.

5.3.7 Test Results

PASS.

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

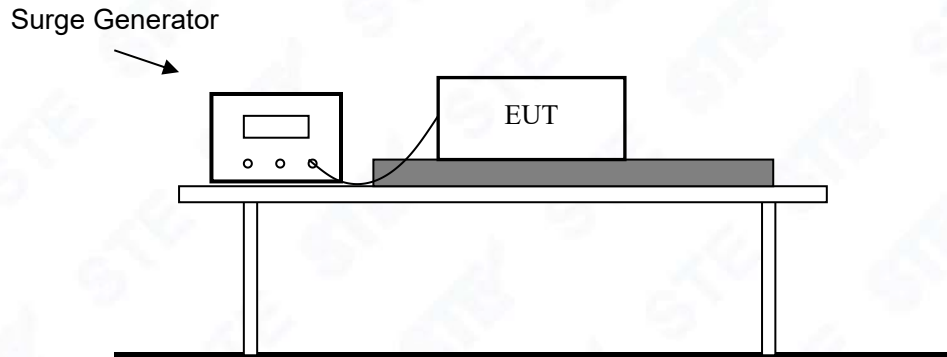
Standard	<input type="checkbox"/> IEC 61000-4-4 <input checked="" type="checkbox"/> EN 61000-4-4		
Applicant	Shanghai Matis Electric Co., Ltd		
EUT	Three phase Multi-Functional Smart Meter	Temperature	24.3°C
M/N	PEM5553-A	Humidity	52.1%
Test Mode	Mode 1	Criterion	B
Test Engineer	Xp Rao	Test Voltage	AC 400V/50Hz

Line	Test Voltage	Result (+)	Result (-)
L	1KV	PASS	PASS
N	1KV	PASS	PASS
PE	1KV	PASS	PASS
L-N	1KV	PASS	PASS
L-PE	1KV	PASS	PASS
N-PE	1KV	PASS	PASS
L-N-PE	1KV	PASS	PASS
Signal Line			
I/O Cable			

Note:

5.4 Surge Immunity Test

5.4.1 Block Diagram of Test Setup



5.4.2 Test Standard

EN IEC 61326-2-3: 2021 (EN 61000-4-5: 2014+A1: 2017, Severity Level: Line to Line: Level 2, 1.0KV, Line to Earth: Level 3, 2.0KV)

5.4.3 Severity Levels and Performance Criterion

1. Severity Levels

Severity Level	Open-Circuit Test Voltage (KV)
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

2. Performance Criterion: B

5.4.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.4.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 5.4.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

5.4.6 Test Procedure

1. Set up the EUT and test generator as shown on Section 4.8.1.
2. For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
3. For line to line coupling mode, provide a 2.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
4. Different phase angles are done individually.
5. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

5.4.7 Test Results

PASS.

Please refer to the following page.

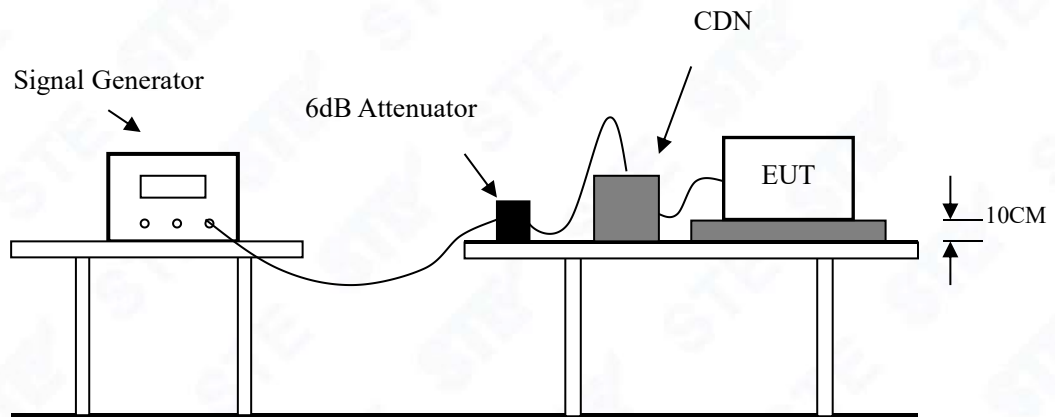
Surge Immunity Test Result			
Standard	<input type="checkbox"/> IEC 61000-4-5 <input checked="" type="checkbox"/> EN 61000-4-5		
Applicant	Shanghai Matis Electric Co., Ltd		
EUT	Three phase Multi-Functional Smart Meter	Temperature	24.2°C
M/N	PEM5553-A	Humidity	52.1%
Test Mode	Mode 1	Criterion	B
Test Engineer	Xp Rao	Test Voltage	AC 400V/50Hz

Location	Polarity	Number of Pulse	Pulse Voltage (KV)	Result
L-N	+	0°, 90°, 180°, 270°	5	1.0
	-	0°, 90°, 180°, 270°	5	1.0
L-PE	+	0°, 90°, 180°, 270°	5	2.0
	-	0°, 90°, 180°, 270°	5	2.0
N-PE	+	0°, 90°, 180°, 270°	5	2.0
	-	0°, 90°, 180°, 270°	5	2.0
Signal Line				

Note	
------	--

5.5 Injected Currents Susceptibility Test

5.5.1 Block Diagram of Test Setup



5.5.2 Test Standard

EN IEC 61326-2-3: 2021 (EN 61000-4-6: 2014, Severity Level: Level 3, (0.15MHz ~ 80MHz))

5.5.3 Severity Levels and Performance Criterion

1. Severity Levels

Level	Field Strength (V)
1	1
2	3
3	10
X	Special

2. Performance Criterion: B

5.5.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.5.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 5.5.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

5.5.6 Test Procedure

1. Set up the EUT, CDN and test generators as shown on Section 5.5.1.
2. Let the EUT work in test mode and measure it.
3. The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
4. The disturbance signal described below is injected to EUT through CDN.
5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.
6. The frequency range is swept from 150kHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
7. The rate of sweep shall not exceed $1.5 \cdot 10^{-3}$ decades/s. where the frequency is swept incrementally; the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

5.5.7 Test Results

PASS.

Please refer to the following page.

Injected Currents Susceptibility Test Results

Standard	<input type="checkbox"/> IEC 61000-4-6 <input checked="" type="checkbox"/> EN 61000-4-6		
Applicant	Shanghai Matis Electric Co., Ltd		
EUT	Three phase Multi-Functional Smart Meter	Temperature	23.8°C
M/N	PEM5553-A	Humidity	52.9%
Test Mode	Mode 1	Criterion	A
Test Engineer	Xp Rao	Test Voltage	AC 400V/50Hz

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 80	AC Mains	10V	A	PASS

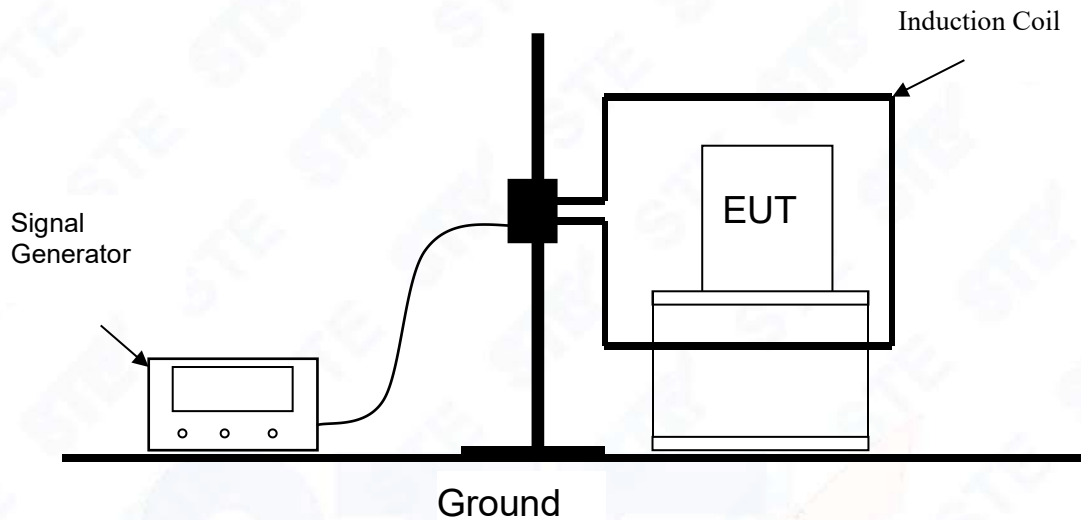
Remark:

1. Modulation Signal: 1kHz 80% AM
2. Measurement Equipment :
 - Simulator: CIT-10 (FRANKONIA)
 - CDN : CDN-M2 (FRANKONIA)
 - CDN-M3 (FRANKONIA)

Note:

5.6 MAGNETIC FIELD SUSCEPTIBILITY TEST

5.6.1 Block Diagram of Test Setup



5.6.2 Test Standard

EN 55035:2019 (EN 61000-4-8: 2010)

5.6.3 Severity Levels and Performance Criterion

Power frequency magnetic fields – Test levels at enclosure port

Characteristics	Test levels
Test frequency	50/60Hz
Magnetic field strength	3 A/m
Performance Criterion	A

5.6.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.6.5 Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. Both horizontal and vertical polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field.

Also can reach the same aim by change the position of the EUT.

5.6.6 Test Results

PASS.**Magnetic Field Immunity Test Result**

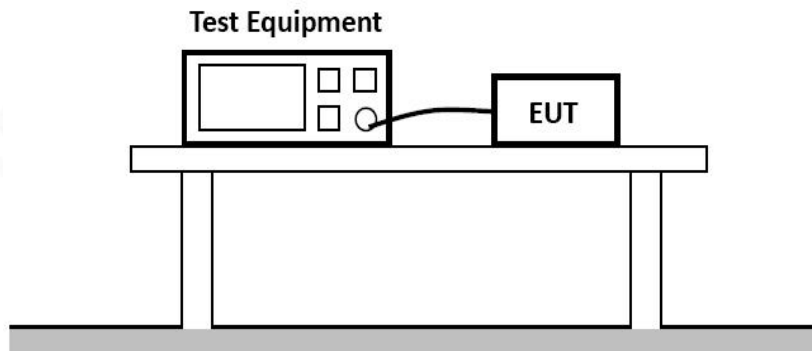
Standard	<input type="checkbox"/> IEC 61000-4-8 <input checked="" type="checkbox"/> EN 61000-4-8		
Applicant	Shanghai Matis Electric Co., Ltd		
EUT	Three phase Multi-Functional Smart Meter	Temperature	24.2°C
M/N	PEM5553-A	Humidity	52.1%
Test Mode	Mode 1	Criterion	A
Test Engineer	Xp Rao	Test Voltage	AC 400V/50Hz

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result
3	5 mins	X	A	PASS
3	5 mins	Y	A	PASS
3	5 mins	Z	A	PASS

Note:

5.7 Voltage Dips And Interruptions Test

5.7.1 Block Diagram of Test Setup



5.7.2 Test Standard

EN IEC 61326-2-3: 2021 (EN 61000-4-11: 2004+A1: 2017)

5.7.3 Severity Levels and Performance Criterion

1. Severity Levels

Test Level		
Voltage Reduction %U _T	Voltage Dips %U _T	Duration (in Period)
100	0	0.5
100	0	1
30	70	5
Voltage Reduction %U _T	Voltage Dips %U _T	Duration (in Period)
100	0	250

2. Performance Criterion: B & C

5.7.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.

5.7.5 Operating Condition of EUT

1. Setup the EUT as shown on Section 5.7.1
2. Turn on the power of all equipments.
3. Let the EUT work in measuring Mode 1 and measure it.

5.7.6 Test Procedure

1. Set up the EUT and test generator as shown on Section 5.7.1.
2. The interruptions are introduced at selected phase angles with specified duration.
3. Record any degradation of performance.

5.7.7 Test Results

PASS.

Please refer to the following page.

Voltage Dips And Interruptions Test Results

Standard	<input type="checkbox"/> IEC 61000-4-11 <input checked="" type="checkbox"/> EN 61000-4-11		
Applicant	Shanghai Matis Electric Co., Ltd		
EUT	Three phase Multi-Functional Smart Meter	Temperature	24.2°C
M/N	PEM5553-A	Humidity	52.1%
Test Mode	Mode 1	Criterion	B&C
Test Engineer	Xp Rao		

Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration (in periods)	Criterion	Result
0	100	0.5P	B	PASS
70	30	25P	C	PASS
0	100	250P	C	PASS

Note:

6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT



Fig. 1



Fig. 2



Fig. 3



Fig. 4

----- THE END OF TEST REPORT -----



LVD TEST REPORT

Report No.: STE03092662S

Product: Three phase Multi-Functional Smart Meter

Model No.: PEM5553-A,(others refer to page 2)

Prepared for: Shanghai Matis Electric Co., Ltd

Address: Room 318-320, No. 83, West Huanghu Road, Pudong, Shanghai, China
201306

Prepared by: Shenzhen STE Testing Laboratory Co., Ltd.


Lab Location: 3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, Niuhu Community,
Guanlan Street, Longhua District, Shenzhen, China

Tel. : +86-755-2373 0717

Fax. : +86-755-2373 0717

Website: <http://www.stecert.com>

This test report may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The test results in the report only apply to the tested sample. Any objections must be raised to STE within 15 days since the date.

<p>TEST REPORT EN 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: General requirements</p>	
<p>Report Number.....: STE03092662S</p> <p>Tested by (name + signature).....: Plum Xiao / Test engineer</p> <p>Approved by (name + signature).....: Allen Huang / Project manager</p> <p>Date of issue.....: March 24, 2026</p> <p>Total number of pages.....: 46</p>	
<p>Testing Laboratory: Shenzhen STE Testing Laboratory Co., Ltd.</p> <p>Address: 3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, Niuhu Community, Guanlan Street, Longhua District, Shenzhen, China</p>	
<p>Applicant's name.....: Shanghai Matis Electric Co., Ltd</p> <p>Address.....: Room 318-320, No. 83, West Huanghu Road, Pudong, Shanghai, China 201306</p>	
<p>Manufacturer's name.....: Shanghai Matis Electric Co., Ltd</p> <p>Address.....: Room 318-320, No. 83, West Huanghu Road, Pudong, Shanghai, China 201306</p>	
<p>Test specification:</p> <p>Standard.....: EN 61010-1: 2010+ A1: 2019</p> <p>Test procedure.....: Type test</p> <p>Non-standard test method.....: N/A</p>	
<p>Test Report Form No.....: IEC61010_1P</p> <p>Test Report Form(s) Originator.....: VDE Prüf- und Zertifizierungsinstitut GmbH</p> <p>Master TRF.....: Dated: 2021-04-12</p>	
<p>Copyright © 2026 Shenzhen STE Testing Laboratory Co., Ltd. All rights reserved.</p>	
<p>Test item description.....: Three phase Multi-Functional Smart Meter</p> <p>Model/Type reference.....: PEM5553-A, PEM5353-A, PEM5353-D, PEM5553-D, PEM5353-H, PEM5553-H</p> <p>Trade Mark.....: Matis, Matismart</p> <p>Ratings.....: Auxiliary voltage: 85–305VAC / 100–430VDC (A Type); 18–36 VDC (D type); 90–528VAC(H type) Voltage Input: L-N: 0-720VAC Frequency: 45-65Hz Rated Current input:5A CT , mV CT, Rogowski Coil (mV/kA) Wiring Connection: 1P+N/3P/3P+N</p>	

Summary of testing:**Tests performed (name of test and test clause):**

The submitted samples were found to comply with the requirements of:

- Electrical safety
 - EN 61010-1: 2010+ A1: 2019

Testing location:

Shenzhen STE Testing Laboratory Co., Ltd.

3/F, Building 9, Hongde Factory, No. 63 Yuchang Road, Niuhu Community, Guanlan Street, Longhua District, Shenzhen, China

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.

Matis

Three phase Multi-Functional Smart Meter

Model: PEM5553-A

Auxiliary voltage: 85–305VAC / 100–430VDC (A Type);
18–36 VDC (D type); 90–528VAC(H type)

Voltage Input: L-N: 0-720VAC

Frequency: 45-65Hz

Rated Current input: 5A CT, mV CT, Rogowski Coil (mV/kA)

Wiring Connection: 1P+N/3P/3P+N



Shanghai Matis Electric Co., Ltd

Room 318-320, No. 83, West Huanghu Road, Pudong,
Shanghai, China 201306

Importer: xxxx

Address: xxxx

Made in China

Remarks:

1. Height of CE mark is 5mm or more, height of WEEE symbol is 7mm or more, height of other marks is 5mm or more, height of letters and numerals is 2mm or more.

TEST ITEM PARTICULARS:

Type of item : Measurement / Control/ Laboratory
 Description of equipment function..... : Voltage, Current, Power meter
 Connection to MAINS supply..... : Permanent
 Overvoltage category..... : II /III / IV
 POLLUTION DEGREE..... : 2
 Means of protection..... : Class II (isolated)
 Environmental conditions..... : Normal / Extended (Specify):
 For use in wet locations..... : Yes / No
 Equipment mobility..... : Portable / Hand-held / Floor-standing- / Fixed / Built-in
 Operating conditions..... : Continuous / Short-time / Intermittent
 Marked degree of protection to IEC 60529..... : IPX0

Possible test case verdicts:

- test case does not apply to the test object..... : N/A (or N) Not Applicable
 - test object does meet the requirement..... : P (Pass)
 - test object does not meet the requirement..... : F (Fail)

Testing.....:

Date of receipt of test item..... : March 09, 2026
 Date(s) of performance of tests..... : March 09, 2026 to March 24, 2026

General remarks:

The test results presented in this report relate only to the object tested.
 This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
 "(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.

Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60384-11:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
--	--

General product information

1, The product is a Three-Phase Energy Meter. Overvoltage category is considered as OVC III.

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

4	Tests		--
4.1	General	Type tests	P
4.2	Sequence of tests	inspected after each test	P
4.3	Reference test conditions	15-20°C, 75-106kPa	P
4.4	Testing in SINGLE FAULT CONDITION	(see Form A.1)	P
4.4.1	General		P
4.4.2	Application of fault conditions		--
4.4.2.1	Fault conditions shall include those specified in 4.4.2.2 to 4.4.2.14	(see Form A.1)	--
	After each application of a fault condition, the equipment or part shall pass the applicable tests of 4.4.4.	See below	P
4.4.2.2	Protective impedance		N
4.4.2.3	Protective conductor	(see Form A.1 & Form A.6)	N
4.4.2.4	Equipment or parts for short-term or intermittent operations	Continuous operation	N
4.4.2.5	Motors	No motor	N
	– stopped while fully energized		N
	– prevented from starting		N
	– one phase interrupted (multi-phase)		N
4.4.2.6	Capacitors		N
4.4.2.7	Mains transformers		P
4.4.2.7.1	Short circuit	(See Form A.1)	P
4.4.2.7.2	Overload	(See Form A.1)	P
4.4.2.8	Outputs	No hazards	P
4.4.2.9	Equipment for more than one supply		N
4.4.2.10	Cooling		N
	a) air-holes with filters shall be closed;		N
	b) forced cooling by motor-driven fans shall be stopped		N
	c) cooling by circulation of water or other coolant shall be stopped		N
	d) loss of cooling liquid shall be simulated		N
4.4.2.11	Heating devices	No such heating devices	N
	a) Overridden timers for limit the heating period		N

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
b)	Overridden temperature controllers		N
4.4.2.12	Insulation between circuits and parts		P
4.4.2.13	Interlocks	No such interlocks	N
4.4.2.14	Voltage selectors		N
4.4.3	Duration of tests		--
4.4.3.1	The equipment shall be operated unit further change as a result of the applied fault is unlikely	Comply with requirement	P
4.4.3.2	A device interrupted or limited the current shall limit the temperature of parts easily touched		N
4.4.3.3	Fuse opened and not operate within approximately 1 s, and the current through the fuse shall be measured		N
4.4.4	Conformity after application of fault conditions		--
4.4.4.1	Protection against electric shock is checked after the application of single fault as follows:		P
	a), no accessible conductive parts become hazardous live	Not become hazardous live parts	P
	b), performing a voltage test on double insulation or reinforced insulation	See clause 6.8	P
	c), measuring the temperature of transformer winding		P
4.4.4.2	Temperature of outer surface of enclosure and of parts that can be touched is checked	See appended table	P
4.4.4.3	Protection against the spread of fire is checked	See appended table	P
4.4.4.4	Protection against other hazard is checked	See clause 7 and 8 and 11 to 16	P

5	MARKING AND DOCUMENTATION		--
5.1	Marking		--
5.1.1	General	See below	P
	Required equipment markings are:		--
	visible:	See page 3	P
	From the exterior; or	See page 3	P
	After removing a cover; or	No removing cover	N
	Opening a door	No opening door	N
	After removal from a rack or panel		N
	Not put on parts which can be removed by an OPERATOR	No such parts	N

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Letter symbols (IEC 60027) used		P
	Graphic symbols (IEC 61010-1: Table 1) used		P
	Graphic symbols shall be explained in the documentation	See user manual or specification	P
5.1.2	Identification		--
	a) Manufacturer's or supplier's name or trademark	See label	P
	b) Model number, name or other means	See label	P
	Manufacturing location identified	Only one manufacturing location.	N
5.1.3	Mains supply		--
	Equipment is marked as follows:	See below	P
	a) Nature of supply:		--
	1) a.c. RATED mains frequency or range of frequencies	45-65Hz	P
	2) d.c. with symbol 1		P
	b) RATED supply voltage(s) or range.....:	85-305V~/400V 3~, 45-65Hz; 100-430VDC;	P
	c) Max. RATED power (W or VA)or input current.....:	600A	P
	The measured value not more than 110 %	(see appended table)	P
	If more than one voltage range:		N
	Separate values marked; or		N
	Values differ by less than 20 %		P
	d) OPERATOR-set for different RATED supply voltages:		N
	Indicates the equipment set voltage		N
	PORTABLE EQUIPMENT indication is visible from the exterior		N
	Changing the setting changes the indication		N
	e) Accessory mains socket-outlets accepting standard mains plugs are marked:	No such accessory	N
	With the voltage if it is different from the mains supply voltage..... :		N
	For use only with specific equipment		N
	If not marked for specific equipment it is marked with:		N
	The maximum rated current or power; or		N
	Symbol 14 with full details in the documentation		N
5.1.4	Fuses		--

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	OPERATOR replaceable fuse marking (see also 5.4.5):		N
5.1.5	Terminals, connections and operating devices	Comply with the standard	N
5.1.5.1	General		--
	Where necessary for safety, indication of purpose of terminals, connectors, controls and indicators marked	Comply with the standard	P
	If insufficient space, symbol 14 used		P
5.1.5.2	Terminals	See below	P
	Mains supply terminals identified		P
	Other terminal marking:	+ -	P
	a) functional earth terminals (symbol 5 used)		N
	b) protective conductor terminals:		--
	Symbol 6 is placed close to or on the terminal; or		N
	Part of appliance inlet		N
	c) Terminals of control circuits which are permitted by 6.6.3 to be connected to accessible conductive parts, with symbol 7 of table 1 unless connection is self-evident;		N
	d) Hazardous live terminals supplied from the interior	Comply with the standard	N
	Symbol 14 used; or		N
	RATINGS marked		N
	Standard mains socket outlet; or		N
5.1.6	Switches and circuit breakers		N
	If disconnecting device, on or off position marked		N
	Symbols 9 and 10 of Table 1		N
	A lamp alone is not considered to be a satisfactory marking		N
	For a push-button switch		N
5.1.7	Equipment protected by double insulation or reinforced insulation		N
	Protected throughout (symbol 11 used)		N
	Only partially protected (symbol 11 not used)		N
5.1.8	Field-wiring terminal boxes		P
	If terminal or enclosure exceeds 60 °C:		N
	Cable temperature rating marked		P
	Marking visible or beside terminal		P

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.2	Warning markings		--
	Visible when ready for normal use		P
	Are near or on applicable parts		P
a)	Symbols shall be at least 2.75 mm high. Text shall be at least 1.5 mm high and contrast in colour with the background		P
b)	Symbols or text moulded, stamped or engraved in a material shall be at least 2.0 mm high. If not contrasting in colour, they shall have a depth or raised height of at least 0.5 mm		P
	If necessary marked with symbol 14		P
	Statement to isolate or disconnect		P
5.3	Durability of markings	See appended table	P
	The required markings remain clear and legible in normal use		P
5.4	Documentation		--
5.4.1	General		P
	Equipment is accompanied by documentation which includes:		P
a)	Intended use	See user manual	P
b)	Technical specification	See user manual	P
c)	name and address of the manufacturer or supplier from whom technical assistance	See user manual	P
d)	Information specified in 5.4.2 to 5.4.5	See user manual	P
e)	information about how to mitigate RISKS	See user manual	P
f)	indicate that only accessories which meet the manufacturer's specifications shall be used	See user manual	P
g)	provide guidance on how to determine that the equipment is functioning correctly	See user manual	P
h)	instructions for lifting and carrying	See user manual	P
	Warning statements and a clear explanation of warning symbols	See user manual	P
	include a statement that it must be consulted in all cases where symbol 14 of Table 1 is marked	See user manual	P
	Documentation may be provided on printed or electronic media		P
5.4.2	Equipment ratings		--
	Documentation includes:		P
a)	Supply voltage or voltage range	See page 3	P

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Frequency or frequency range		P
	Power or current rating	Ditto	P
b)	Description of all input and output connections	See user manual	P
c)	Rating of insulation of external circuits		P
d)	Statement of the range of environmental conditions		P
e)	Degree of protection (IEC 60529)	IP20	N
5.4.3	Equipment installation	See user manual	P
	Documentation includes instructions for:		--
a)	Assembly, location and mounting	See user manual	P
b)	Protective earthing		N
c)	Connections to supply	See user manual	P
d)	Permanently connected equipment:		P
	1) Supply wiring requirements		P
	2) If external switch or circuit-breaker, requirements and location recommendation		P
e)	Ventilation requirements	See user manual	P
f)	Special services (e. g. air, cooling liquid)		N
g)	Maximum sound power level		N
h)	Instructions about sound pressure		N
5.4.4	Equipment operation		--
	Instructions for use include:		P
a)	Identification of operating controls and modes		P
b)	Positioning for disconnection		P
c)	Interconnection		P
d)	Specification of intermittent operation limits		N
e)	Explanation of symbols used		P
f)	Replacement of consumable materials		N
g)	Cleaning and decontamination		P
h)	Listing of any poisonous or injurious gases and quantities		N
i)	Risk-reduction procedures relating to flammable liquids		N
j)	methods of reducing the RISKS of burns from surfaces permitted to exceed the temperature limits of 10.1		P

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	A statement about protection impairment if used in a manner not specified by the manufacturer		P
5.4.5	Equipment maintenance and service		--
	Instructions include:		P
	Sufficient preventive maintenance and inspection information		P
	Replacement of supply cords		N
	Specific battery type		N
	Any manufacturer specified parts		P
	Rating and characteristics of fuses		N
	Provided for service personnel:		--
	a) product-specific risks that may affect the service personnel		P
	b) protective measures for these risks		P
	c) verification of the safe state of the equipment after repair		P
5.4.6	Integration into systems or effects resulting from special conditions		--
	Aspects resulting from integration into systems or effects resulting from special ambient or application conditions shall be described in the documentation		N

6	PROTECTION AGAINST ELECTRIC SHOCK	(see appended table)	--
6.1	General		P
6.1.1	Requirements		P
	Accessible parts not hazardous live in normal condition and single fault condition		P
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11	See below	P
6.1.2	Exceptions		--
	it is not feasible for operating reasons to prevent the following parts being both accessible and hazardous live		N
	a) parts of lamps and lamp sockets after lamp removal		N
	b) parts intended to be replaced by an OPERATOR		N
	hazardous live during the replacement or other operator action, but only if they are accessible only by means of a tool and have a warning marking		N
	Capacitance test	(see appended tables)	N

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Parts not hazardous live 10 s after interruption of supply		N
6.2	Determination of accessible parts		P
6.2.1	General	(see appended table A.6)	P
6.2.2	Examination	10N with test finger	P
6.2.2	Openings above parts that are hazardous live		P
6.2.3	Openings for pre-set controls	No such controls	N
6.3	Limit values for accessible parts		--
6.3.1	Levels in normal condition	(see appended table)	P
6.3.2	Levels in single fault condition	(see appended table)	P
6.4	Primary means of protection		P
6.4.1	General		P
	Accessible parts shall be prevented from becoming hazardous live by following:		P
6.4.2	Enclosures and protective barriers		P
	- meet the rigidity requirements of 8.1		P
	- for provide protection by basic insulation		N
	- provide protection by limiting access, clearances and creepage distances between accessible parts and hazardous live parts shall meet the requirements of 6.7		P
6.4.3	Basic insulation		N
	meet the requirements of 6.7		N
6.4.4	Impedance		N
	impedance used as a primary means of protection		--
	- a) limit the current or voltage to not more than the applicable level of 6.3.2		N
	- b) be rated for the maximum working voltage and for the amount of power that it will dissipate		N
	- c) meet the requirements of 6.7		N
6.5	Additional means of protection in case of single fault conditions		P
6.5.1	General		--
6.5.2	Protective bonding		N
6.5.2.1	General		--
	Accessible conductive parts:		--
	Bonded to the protective conductor terminal; or		N

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Separated by screen or barrier bonded to protective conductor terminal from parts which are hazardous live		N
6.5.2.2	Integrity of protective bonding		N
a)	Protective bonding consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses		N
b)	Soldered connections:		N
	Independently secured		N
	Not used for other purposes		N
c)	Screw connections are secured		N
d)	Protective bonding not interrupted		N
e)	Any moveable connection specifically designed, and meets 6.5.2.4		N
f)	No external metal braid of cables used		N
g)	If mains supply passes through:		--
	Means provided for passing protective conductor;		N
	Impedance meets 6.5.1.3.		N
h)	Protective conductors bare or insulated, if insulated, green/yellow		N
	Exceptions:		--
	1) earthing braids;		N
	2) internal protective conductors etc.;		N
	Green/yellow not used for other purposes		N
	terminal suitable, and meets 6.5.2.3		N
6.5.2.3	Protective conductor terminal		N
a)	Contact surfaces are metal		N
b)	Appliance inlet used		N
c)	For rewirable cords and permanently connected equipment, protective conductor terminal is close to mains supply terminals		N
d)	If no mains supply is required, any protective conductor terminal:		--
	Is near terminals of circuit for which protective earthing is necessary		N
	External if other terminals external		N
e)	Equivalent current-carrying capacity to mains supply terminals	(see appended table)	N

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Clause	Requirement + Test	Result - Remark	Verdict
f)	If plug-in, makes first and breaks last		N
g)	If also used for other bonding purposes, protective conductor:		--
	Applied first;		N
	Secured independently;		N
	Unlikely to be removed by servicing; or		N
	Warning marking requires replacement of protective conductor		N
h)	Protective conductor of measuring circuit:		--
	1) Current rating;		N
	2) protective bonding:		N
	Not interrupted; or		N
	Indirect bonding used (see 6.5.1.5)		N
i)	Functional earth terminals allow independent connection		N
j)	If a binding screw:		--
	Suitable size for bond wire		N
	Not smaller than M 4 (No. 6)		N
	At least 3 turns of screw engaged		N
k)	Contact pressure not capable of reduction by deformation of materials		N
	Passes tightening torque test	(see appended table)	N
6.5.2.4	Impedance of protective bonding of plug-connected equipment	(see appended table)	N
6.5.2.5	Impedance of protective bonding of permanently connected equipment	(see appended table)	N
6.5.2.6	Transformer protective bonding screen	(see appended table)	N
6.5.3	double insulation and reinforced insulation (see 6.7)	See 6.7	P
6.5.4	Protective impedance	(see appended table)	--
a)	single component used, that safety and reliability for protection against electric shock is assured		N
	- rated for twice the maximum working voltage		N
	- if a resistor, rated for twice the power dissipation for the maximum working voltage		N
b)	A combination of components used	No use such component	N
	Components, wires and connections are rated as required sw		N

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Clause	Requirement + Test	Result - Remark	Verdict
6.5.5	Automatic disconnection of the supply		--
	If used, it meets :		N
	a) be rated to disconnect the load within the time specified in figure 2		N
	b) be rated for the maximum rated load conditions of the equipment		N
6.5.6	Current- or voltage-limiting device		--
	If used, it meets :		N
	a) be rated to limit the current or voltage to the levels not exceeding the values of 6.3.2		N
	b) shall be rated for the maximum working voltage and, if applicable, for the maximum operational current		N
	c) clearance and creepage distance between the terminations of the current or voltage limiting device meet requirements of 6.7 for supplementary insulation		N
6.6	Connections to external circuits		--
6.6.1	General		--
	Connections do not cause accessible parts of the following to become hazardous live in normal condition or single fault condition:		N
	Separation of circuits provided; or		N
	Short circuit of separation does not cause a Hazard		N
	Instructions or markings include:		P
	a) rated conditions for terminal		N
	b) Required rating of external circuit insulation		N
6.6.2	terminals for external circuits		--
	terminals which receive a charge from an internal capacitor are not hazardous live	(see appended table)	N
6.6.3	Circuits with terminals which are hazardous live		--
	These circuits are:		--
	Not connected to accessible conductive parts; or		N
	Connected to accessible conductive parts, but are not mains circuits and have one terminal contact at earth potential		N
	No accessible conductive parts are hazardous live		N
6.6.4	Accessible terminals for stranded conductors		N
	No risk of accidental contact because:		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Located or shielded		N
	Self-evident or marked whether connected to accessible conductive parts		N
	Accessible terminals will not work loose		N
6.7	Insulation requirements		P
6.7.1	The nature of insulation		P
6.7.1.1	General		P
	requirements for insulation depend on:		P
	- the required level of insulation		P
	- the maximum TRANSIENT OVERVOLTAGE		N
	- the maximum WORKING VOLTAGE	400V~	P
	- the POLLUTION DEGREE of the micro-environment	POLLUTION DEGREE 2	P
	- the maximum TEMPORARY OVERVOLTAGE		N
6.7.1.2	Clearances		--
	Multiplication factor	1 (rated operating altitude ≤ 2000m)	P
6.7.1.3	Creepage distances		--
	Material group IIIb	$100 \leq CTI < 175$	P
6.7.1.4	Solid insulation		--
6.7.1.5	Requirements for insulation according to type of circuit	see 6.7.2, 6.7.3, K1, K2, K3	--
6.7.2	Insulation for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II with a nominal supply voltage up to 300 V		N
6.7.2.1	CLEARANCES and CREEPAGE DISTANCES	(See appended table)	P
6.7.2.2	Solid insulation	See below	P
6.7.2.2.1	General		--
6.7.2.2.2	Moulded and potted parts	enclosure	P
6.7.2.2.3	Inner insulating layers of printed wiring boards		N
	For REINFORCED INSULATION (RI):		--
	a) the thickness of the insulation is at least 0,4 mm		N
	b) two separate layers, each of which is BASIC INSULATION (BI);		N
	c) two separate, and the combination of layers is REINFORCED INSULATION (RI)		N
6.7.2.2.4	Thin-film insulation		N
	a) the thickness of the insulation is at least 0,4 mm		N

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Clause	Requirement + Test	Result - Remark	Verdict
	b) two separate layers, each of which is BASIC INSULATION (BI);		N
	c) two separate, and the combination of layers is REINFORCED INSULATION (RI)		N
6.7.3	Insulation for secondary circuits derived from MAINS CIRCUITS of OVERVOLTAGE CATEGORY II up to 300 V		--
6.7.3.1	General		--
6.7.3.2	Clearances		P
6.7.3.3	Creepage distances		P
6.7.3.4	Solid insulation		P
6.7.3.4.1	General		P
6.7.3.4.2	Moulded and potted parts		P
6.7.3.4.3	Inner insulating layers of printed wiring boards		P
6.7.3.4.4	Thin-film insulation		N
6.8	Procedure for voltage tests	(See appended table)	P
6.8.1	General		--
6.8.2	Humidity preconditioning	40°C, 94%RH, 48h	--
6.8.3	Test procedures	(See appended table)	--
6.8.3.1	The a.c. voltage test		P
6.8.3.2	The 1 min d.c. voltage test		--
6.8.3.3	The impulse voltage withstand test		--
6.9	Constructional requirements for protection against electric shock		--
6.9.1	General		--
	If a failure could cause a hazard:		N
a)	Security of wiring connections		P
b)	Screws securing removable covers	No such covers	N
c)	Accidental loosening		P
6.9.2	Insulating materials		P
a)	Easily damaged materials not used		P
b)	Non-impregnated hydroscopic materials not used		P
6.9.3	Colour coding		P
	Green-and-yellow insulation shall not be used except for:		--
	a) protective earth conductors;		N
	b) PROTECTIVE BONDING conductors;		N

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Clause	Requirement + Test	Result - Remark	Verdict
	c) potential equalization conductors for safety purposes;		N
	d) functional earth conductors.		N
6.10	Connection to mains supply source and connections between parts of equipment		--
6.10.1	Mains supply cords		--
	rated for maximum equipment current (see 5.1.3c)		N
	Cable complies with IEC 60227 or IEC 60245		N
	Heat-resistant if likely to contact hot parts		N
	Temperature rating (cord and inlet)		N
	Green/yellow used only for connection to protective conductor terminals		N
	Detachable cords with IEC 60320 mains connectors:		--
	Conform to IEC 60799; or		N
	Have the current rating of the mains connector		N
6.10.2	Fitting of non-detachable mains supply cords		N
6.10.2.1	Cord entry		N
	protected against abrasion and sharp bends at the point where the cord enters the equipment		--
	a) an inlet or bushing with a smoothly rounded opening		N
	b) a reliably fixed flexible cord guard made of insulating material protruding		N
	Non-detachable cord protection:		N
6.10.2.2	Cord anchorages:		N
	a) Cord is not clamped by direct pressure from a screw		N
	b) Knots are not used		N
	c) Cannot push the cord into the equipment to cause a hazard		N
	d) No failure of cord insulation in anchorage with metal parts		N
	e) not loosen the cord anchorage without the use of a TOOL		N
	f) be designed so that cord replacement does not cause a HAZARD, and it shall be clear how the relief from strain is provided		N
	compression bushing:		N
	1) Clamps all types and sizes of mains cords; and		N
	2) Is suitable:		N

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Clause	Requirement + Test	Result - Remark	Verdict
	For connection to terminals provided; or		N
	It is designed for screened mains cord		N
6.10.3	Plugs and connectors		--
	Mains supply plugs, connectors etc., conform with relevant specifications		P
	If equipment supplied at voltages below 6.3.2.a) or from a sole source:		P
	Plugs of supply cords do not fit mains sockets above rated supply voltage		N
	Mains-type plugs used only for connection to mains supply		N
	Plug pins which receive a charge from an internal capacitor		N
	Accessory mains socket outlets:		N
	a) Marking if accepts a standard mains plug (see 5.1.3e)		N
	b) Input has a protective earth conductor if outlet has earth terminal contact		N
6.11	Disconnection from supply source		--
6.11.1	General	See below	P
	Disconnects all current carrying conductors		P
6.11.2	Exceptions		--
	a) Equipment supplied by low energy source; or		P
	b) Equipment connected to impedance protected supply; or		N
	c) Equipment constitutes an impedance protected load		N
6.11.3	Requirements according to type of equipment		--
6.11.3.1	Permanently connected equipment and multi-phase equipment		P
	Employs switch or circuit-breaker		N
	If switch or circuit-breaker is not part of the equipment, documentation specifies:		N
	a) Switch or circuit-breaker to be included in building installation		N
	b) Location		N
	c) Marking		N
6.11.3.2	Single-phase cord-connected equipment		N
	Equipment is provided with:		--

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Clause	Requirement + Test	Result - Remark	Verdict
a)	Switch or circuit-breaker; or		N
b)	Appliance coupler (disconnectable without tool); or		N
c)	Separable plug (without locking device)		N
6.11.4	Disconnecting devices		--
6.11.4.1	General		--
	Electrically close to the supply		N
	Power-consuming components shall not be electrically located between the supply source and the disconnecting device		N
6.11.4.2	Switches and circuit-breakers		N
	When used as disconnection device:		--
	Meets IEC 60947-1 and IEC 60947-3		N
	Marked to indicate function		N
	Not incorporated in mains cord		N
	Does not interrupt protective earth conductor		N
6.11.4.3	Appliance couplers and plugs		--
	Where an appliance coupler or separable plug is used as the disconnecting device		N
	Readily identifiable and easily reached by the operator		N
	Single-phase portable equipment cord length ≤ 3 m		N
	Protective earth conductor connected first and disconnected last		N
7	PROTECTION AGAINST MECHANICAL HAZARDS		--
7.1	General	See below	--
	Conformity is checked by 7.2 to 7.7		P
7.2	Sharp edges		--
	All easily-touched parts of the equipment shall be smooth and rounded		P
	easily-touched parts of the equipment shall not cause an injury in SINGLE FAULT CONDITION		P
7.3	Moving parts		N
7.3.1	General		--
7.3.2	Exceptions		--

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Clause	Requirement + Test	Result - Remark	Verdict
a)	For obviously intended to operate on parts or materials external to the equipment, shall be designed to minimize inadvertent touching of these moving parts		N
b)	If operator access permitted:		--
	1) Access requires tool		N
	2) Statement about training		N
	3) Warning markings or symbol 14		N
7.3.3	RISK assessment for mechanical HAZARDS to body parts		--
	RISKS shall be reduced to a tolerable level by at least the applicable minimum protective measure of Table 12		N
7.3.4	Limitation of force and pressure		N
	The maximum tolerable continuous contact pressure is 50 N/cm ² , with a maximum force of 150 N.		N
	The maximum tolerable temporary force for body contact areas of at least 3 cm ² is 250 N for a maximum duration of 0,75 s		N
7.3.5	Gap limitations between moving parts		N
7.3.5.1	Gap limitations between moving parts – Access normally allowed		N
7.3.5.2	Gap limitations between moving parts – Access normally prevented		N
7.4	Stability		N
	For each castor and support foot:		--
	- RATED to support a load of at least 4 times its normal load		N
	- tested according to d) and e)		N
	Conformity tests:		--
a)	10° tilt test		N
b)	multi-directional force test		N
c)	downward force test		N
d)	castor or support foot that supports the greatest load (M) is loaded with 4 times that load (4M)		N
e)	The castor or support foot that supports the greatest load is removed from the equipment and the equipment is placed on a flat surface		N
7.5	Provisions for lifting and carrying		--
7.5.1	General		--

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Clause	Requirement + Test	Result - Remark	Verdict
	Equipment or parts having a mass of 18 kg or more	No Handles or grips	N
7.5.2	Handles and grips		N
	Handles or grips withstand four times weight		N
7.5.3	Lifting devices and supporting parts		--
	four times the maximum load		N
7.6	Wall mounting		N
	Mounting brackets withstand four times weight		N
7.7	Expelled parts		--
	Equipment contains or limits the energy		P
	Protection not removable without the aid of a tool		P

8	Mechanical resistance to shock and impact		--
8.1	General		--
	After the tests of 8.2 to 8.3		P
	hazardous live parts not accessible		P
	Voltage tests of 6.8	(see appended table)	P
	i) no leaks of corrosive or harmful substances		P
	ii) enclosure shows no cracks (hazard)		P
	iii) clearances not less than their permitted values	(see appended table)	P
	iv) insulation of internal wiring remains undamaged		P
	v) barriers not damaged or loosened		P
	vi) No moving parts exposed, except permitted by 7.3		N
	vii) No damage which could cause spread of fire		P
8.2	Enclosure rigidity tests		--
8.2.1	Static test		--
	a force of 30 N applied by the hemispherical end of a hard rod of 12 mm diameter.	See 8.1	P
8.2.2	Impact test		--
	impact by a smooth steel sphere with a mass 500 g \pm 25 g and with a diameter of approximately 50 mm	See 8.1	P
8.3	Drop test		--
8.3.1	Equipment other than hand-held equipment and direct plug-in equipment		P
8.3.2	Hand-held equipment and direct plug-in equipment		P

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Clause	Requirement + Test	Result - Remark	Verdict
9	Protection against the spread of fire		P
9.1	General		--
	Conformity for each source of hazard or area of the equipment is checked by one of the following:	(See appended table)	--
a)	Fault test of 4.4; or	(See appended table)	P
b)	Application of 9.2 (eliminating or reducing the sources of ignition); or		P
c)	Application of 9.3 (containment of fire within the equipment)		P
9.2	Eliminating or reducing the sources of ignition within the equipment	See below	--
a)	1) Limited-energy circuit (see 9.4); or		P
	2) Insulation meets the requirements for basic insulation; or	(see appended table)	P
	Bridging the insulation does not cause ignition	(see appended table)	P
b)	Any ignition hazard related to flammable liquids (see 9.5)	No flammable liquid	N
c)	No ignition occurs when tested in single fault condition	(see appended table)	N
9.3	Containment of the fire within the equipment, should it occur		--
9.3.1	General		--
a)	Energizing of the equipment is controlled by an operator held switch		P
b)	Enclosure is conform with constructional requirements of 9.3.2; and		P
	Requirements of 9.5 are met		P
9.3.2	Constructional requirements		P
a)	Connectors and insulating material have flammability classification FV2 or better	(see appended table)	P
b)	Insulated wires and cables shall retard flame propagation. Meet: IEC 60332	(see appended table)	P
c)	The enclosure is constructed as follows :	The equipment has bottom openings	--
	1) Bottom and sides constructed with:		P
	i) No openings; or		P
	ii) be made of metal with perforations as specified in Table 16; or		P
	iii) Metal screen with a mesh		N
	iv) openings with baffles according to Figure 12		P

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Clause	Requirement + Test	Result - Remark	Verdict
	2) Material of enclosure and any baffle or flame barrier is made of:		--
	Metal (except magnesium); or		P
	Non metallic materials have flammability classification FV1 or better		N
	3) enclosure and any baffle or flame barrier have adequate rigidity		P
9.4	Limited-energy circuit		--
a)	Potential not more than 30 r.m.s. and 42.4 V peak, or 60 V dc		N
b)	Current limited by one of following means:		N
	1) Inherently or by impedance; or		N
	2) Overcurrent protective device; or		N
	3) A regulating network limits also in single fault condition		N
c)	Is separated by at least basic insulation		N
	If overcurrent protective device used:		N
	Fuse or a non adjustable electromechanical device		N
9.5	Requirements for equipment containing or using flammable liquids	No such liquids.	N
	Flammable liquids contained in or specified for use with equipment do not cause spread of fire		N
	Risk is reduced to a tolerable level :	(see appended table)	N
a)	The temperature of surface or parts in contact with flammable liquids is 25 °C below fire point		N
b)	The quantity of liquid is limited		N
c)	Flames are contained within the equipment		N
	Detailed instructions for risk-reduction provided		N
9.6	Overcurrent protection		--
9.6.1	General		--
	Devices not in the protective conductor		P
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase)		N
9.6.2	permanently connected equipment		P
	Overcurrent device:		P
	Fitted within the equipment; or		P
	Specified in manufacturer's instructions		N

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Clause	Requirement + Test	Result - Remark	Verdict
9.6.3	Other equipment		--
	Protection within the equipment		P

10	Equipment temperature limits and resistance to heat		-
10.1	Surface temperature limits for protection against burns		P
	Easily touched surfaces within the limits	(see appended table)	P
	Heated surfaces necessary for functional reasons exceeding specified values:		N
	Are recognizable as such by appearance or function; or		P
	Are marked with symbol 13	No use this mark	N
	Guards are not removable without tool		P
10.2	Temperatures of windings	(see appended table)	N
	Limits not exceeded in:		N
	normal condition		N
	single fault condition		N
10.3	Other temperature measurements	(see appended table)	P
	Following measurements conducted if applicable:		--
	a) Value of 60 °C of field-wiring terminal box not exceeded		N
	b) Surface of flammable liquids and parts in contact with this liquids		N
	c) Surface of non-metallic enclosures		P
	d) Parts made of insulating material supporting parts connected to mains supply		P
	e) Terminals carrying a current more than 0.5 A		N
10.4	Conduct of temperature test	(see appended table)	P
10.4.1	General		--
10.4.2	Temperature measurement of heating equipment		N
10.4.3	Equipment intended for installation in a cabinet or a wall		N
10.5	Resistance to heat		P
10.5.1	Integrity of clearance and creepage distances	(See appended table)	P
10.5.2	Non-metallic enclosures	(See appended table)	P
	After treatment:		--

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Clause	Requirement + Test	Result - Remark	Verdict
	No hazardous live parts accessible;		P
	Tests of 8.1 and 8.2	(See appended table)	P
	In case of doubt, tests of 6.8 (without humidity preconditioning)	(See appended table)	N
10.5.3	Insulating material		--
a)	Parts supporting parts connected to mains supply		P
b)	Terminals carrying a current more than 0.5 A		P
	Examination of material data; or		P
	in case of doubt:		N
	1) Ball pressure test; or	See appended table	P
	2) Vicat softening test of ISO 306		N

11	Protection against hazards from fluids		P
11.1	General		P
11.2	Cleaning	(See appended table)	P
11.3	Spillage	(See appended table)	N
11.4	Overflow	(See appended table)	N
11.5	Battery electrolyte		P
	Battery electrolyte leakage presents no hazard		P
11.6	Specially protected equipment		N
11.7	Fluid pressure and leakage		--
11.7.1	Maximum pressure		N
	Maximum pressure of any part does not exceed Prated		N
11.7.2	Leakage and rupture at high pressure	(See appended table)	N
	Test to IEC 60335 (refrigeration only)		N
11.7.3	Leakage from low-pressure parts	(See appended table)	N
11.7.4	Overpressure safety device		--
	Does not operate in normal use		N
	Meets ISO 4126-1; and		N
	It is conform with:		N
a)	Connected as close as possible to parts intended to be protected		N
b)	Easy access for inspection, maintenance and repair		N
c)	Adjustment only with tool		N

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Clause	Requirement + Test	Result - Remark	Verdict
d)	No discharge towards person		N
e)	No hazard from deposit of discharged material		N
f)	Adequate discharge capacity		N
	No shut-off valve between overpressure safety device and protected parts		N

12	Protection against radiation, including laser sources, and against sonic and ultrasonic pressure		--
12.1	General		N
	Equipment provides protection		N
12.2	Equipment producing ionizing radiation		N
12.2.1	Ionizing radiation	No ionizing radiation	N
	a) Meet the requirements of 12.2.1.2. or be tested, classified, and marked according to IEC 60405	(See appended table)	N
	b) uses or generates radiation but only emits stray radiation, it shall meet the requirements of 12.2.1.3		N
12.2.1.2	Equipment intended to emit radiation		N
	Equipment which contains radioactive substances or that generates x-rays		N
	If the effective dose rate at any easily reached point 50 mm from the outer surface exceeds 5 µSv/h:		N
	a) with symbol 17 of Table 1;		N
	b) for equipment containing one or more radioactive substances, with the abbreviations of the radionuclides		N
	c) either with the maximum dose rate value at 1 m, or with a dose rate value between 1 µSv/h and 5 µSv/h at the appropriate distance in m		N
	Measuring maximum radiation		N
	Equipment containing X-ray sources is set to produce the maximum possible level of radiation		N
12.2.1.3	Equipment not intended to emit radiation		N
	The effective dose rate of unintended stray radiation at any easily reached point 100 mm shall not exceed 1 µSv/h		N
12.2.2	Accelerated electrons		N
	which electrons are accelerated by voltages exceeding 5 kV cannot be opened without the use of a tool		N

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Clause	Requirement + Test	Result - Remark	Verdict
12.3	Ultra-violet (UV) radiation	(Conformity test under consideration)	N
	No unintentional and hazardous escape of UV radiation		N
12.4	Micro-wave radiation		N
	Power density does not exceed 10 W/m ² :		N
12.5	Sonic and ultrasonic pressure		N
12.5.1	Sound level	(See appended table)	N
12.5.2	Ultrasonic pressure	(See appended table)	N
12.6	Laser sources (IEC 60825-1)		N

13	Protection against liberated gases, explosion and implosion		--
13.1	Poisonous and injurious gases	Not such gases	N
	Attached data/test reports demonstrate conformity		N
13.2	Explosion and implosion		N
13.2.1	Components		N
	Components liable to explode:		N
	Pressure release device provided; or		N
	Apparatus incorporates operator protection (see also 7.6)		N
	Pressure release device:		N
	Discharge without danger		N
	Cannot be obstructed		N
13.2.2	Batteries and battery charging	No batteries used	N
	If explosion or fire hazard could occur:		N
	Protection incorporated in the equipment; or		N
	Instructions specify batteries with built-in protection		N
	In case of wrong type of battery used:		N
	No hazard; or		N
	Warning by marking and within instructions		N
	Equipment with means to charge rechargeable batteries:		N
	Warning against the charging of non-rechargeable batteries; and		N
	Type of rechargeable battery indicated; or		N
	Symbol 14 used		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Battery compartment design	(See appended table)	N
	Single component failure		N
	Polarity reversal test		N
13.2.3	Implosion of cathode ray tubes	No such tubes	N
	If maximum face dimensions > 160 mm:		N
	Intrinsically protected and correctly mounted; or		N
	enclosure provides protection:		N
	If non-intrinsically protected:		N
	Screen not removable without tool		N
	If glass screen, not in contact with surface of tube		N

14	Components and subassemblies		P
14.1	General	See below	P
	Where safety is involved, components meet relevant requirements	(see appended table)	P
14.2	Motors		N
14.2.1	Motor temperatures		--
	Does not present a hazard when stopped or prevented from starting; or		N
	Protected by overtemperature or thermal protection device conform with 14.3		N
14.2.2	Series excitation motors		N
	Connected direct to device, if overspeeding causes a hazard		N
14.3	Overtemperature protection devices		N
	Devices operating in a single fault condition		--
a)	Reliable function is ensured		N
b)	Rated to interrupt maximum current and voltage		N
c)	Does not operate in normal use		N
	For self-resetting overtemperature protection device		--
	1) self-resetting overtemperature protection devices are caused to operate 200 times;		N
	2) non-self-resetting overtemperature protection devices, except thermal fuses, are reset after each operation and thus caused to operate 10 times;		N
	3) non-resetting overtemperature protection devices are caused to operate once.		N

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
14.4	Fuse holders		--
	No access to hazardous live parts		N
14.5	Mains voltage selecting devices		N
	constructed so that a change from one voltage or one type of supply to another cannot occur accidentally		N
	5.1.3 d) for marking requirements		N
14.6	Mains transformers tested outside equipment		N
	short-circuit and overload tests in 4.4.2.7	(see Forms A.1)	P
14.7	Printed circuit boards	See appended table	P
	Data shows conformity with FV-1 of IEC 60707 or better; or	V-0	P
	Test shows conformity with FV-1 of IEC 60707 or better; or	See appended table	N
	Thin film flexible PCB with limited-energy circuit used		N
14.8	Circuits or components used as transient overvoltage limiting devices		P
	After test, no sign of overload or degradation		P

15	Protection by interlocks		N
15.1	General	Not interlocks	N
	Interlocks are designed to remove a hazard before operator exposed		N
15.2	Prevention of reactivation		N
15.3	Reliability		N
	Single fault unlikely to occur; or		N
	Cannot cause a hazard		N

16	Hazards resulting from application		--
16.1	reasonably foreseeable misuse		P
	No HAZARDS shall arise if adjustments, knobs, or other software-based or hardware-based controls are set in a way not intended, and not described in the instructions		P
	Other possible cases of REASONABLY FORESEEABLE MISUSE that are not addressed by specific requirements in this standard shall be addressed by RISK assessment (see Clause 17)		N

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
16.2	Ergonomic aspects		--
	For below which give rise to a HAZARD, a RISK assessment shall be documented:	No rise to hazard	--
	a) limitation of body dimensions;		N
	b) displays and indicators;		N
	c) accessibility and conventions of controls;		N
	d) Arrangements of TERMINALS.		N

17	RISK assessment		--
	equipment shows that HAZARDS not fully addressed in Clauses 6 to 16		N
	a) risk analysis		N
	b) risk evaluation		N
	c) risk reduction		N
	risks remaining after a risk assessment shall be identified in the instructions for the responsible body.		N
	adequate information about how to mitigate these risks shall be given		N
	1) eliminate or reduce RISKS as far as possible		N
	2) take the necessary protective measures in relation to RISKS that cannot be eliminated		N
	3) inform users of the residual RISKS due to any shortcomings of the protective measures adopted		N

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX F	ROUTINE TESTS		--
	Manufacturer's declaration		P

ANNEX H	QUALIFICATION OF CONFORMAL COATINGS FOR PROTECTION AGAINST POLLUTION		--
H.1	General		N
	Conformal coatings meet the requirements of Clause H.2 and H.3.		N
H.2	Technical properties		N
	Technical properties of conformal coatings are suitable for the intended application. In particular:		—
	a) Manufacturer indicate that it is a coating for PWBs;		N
	b) RATED operating temperature include the temperature range of the indicated application;		N
	c) CTI, insulation resistance and dielectric strength are suitable for the intended application;		N
	d) Coating have adequate UV resistance, if it is exposed to sunlight;		N
	e) Flammability RATING of the coating is at least the required flammability RATING of the applied PWB.		N
H.3	Qualification of coatings	(see Form A.42)	N
	Coating complies with the conformity requirements.		N

ANNEX K	INSULATION REQUIREMENTS NOT COVERED BY CLAUSE 6.7	(see Forms A.15 and A.18)	N
----------------	--	---------------------------	---

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
ANNEX AA	General approach to safety for control equipment		--
AA.1	Personnel		--
AA.1.1	General		P
AA.1.2	OPERATOR		P
AA.1.3	SERVICE PERSONNEL		P
AA.2	Operating access areas		P
AA.3	Service access areas		P
AA.4	Equipment types		P
AA.4.1	General		--
AA.4.2	OPEN EQUIPMENT		N
AA.4.3	ENCLOSED EQUIPMENT		P
ANNEX BB	System drawing of isolation boundaries		--
ANNEX CC	Historical techniques for secondary circuits		--
ANNEX DD	Flammability test for magnesium alloy fire ENCLOSUREs or flame barriers (see 9.3.2)		--
ANNEX EE	Information/documentation and correlation to its uses		--
ANNEX FF	Measurement of CLEARANCES and CREEPAGE DISTANCES		P

Appendix tables

4.4	TABLE: Testing in single FAULT CONDITION – Results	Form A.1	P
	Ambient temperature (°C)	23.5°C	--
	Ambient temperature (°C)	23.3°C	--
	Test voltage	400V~, 50Hz	--

Test subclause	Fault No.	Fault	Test time	Comments	Verdict
4.4.2.11	C1	s-c	5mins	Unit shut down, no damage, no hazards. No function	P
	U1 (pin 1-2)	s-c	5mins	Unit shut down, no damage, no hazards. No function	P
	C3	s-c	5mins	Unit shut down, no damage, no hazards. No function	P
	D2	s-c	5mins	Unit shut down, no damage, no hazards. No function	P
4.4.2.14	L2 and L3 replace phase sequence	s-c	5min	Unit shut down, no damage, no hazards. No function	P
4.4.2.10	L1 phase loss	s-c	5mins	Unit shut down, no damage, no hazards. No function	P

NOTE:

- 1, Record dielectric strength test on Form A.14 and temperature tests on Form A.20.
- 2, Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.
- 3, s-c=short circuit, o-c=open circuit, o-l=overload

5.1.3	TABLE: mains supply			P
	Marked rating.....:	85-305V~/400V 3~, 45-65Hz; 100-430VDC;		--
	Phase.....:	Single-phase		--
	Frequency	50Hz,		--
	Current	1.6A		--
Test No.	U (V) / F (Hz)	I (A)	I rated (A)	Condition / status
1	85V~/45Hz	562.5	600	Maximum normal load
2	85V~/65Hz	560.3	600	Maximum normal load
3	305V~/45Hz	191.6	600	Maximum normal load
4	305V~/65Hz	189.5	600	Maximum normal load
5	400V~/45Hz	112.8	600	Maximum normal load
6	400V~/65Hz	110.5	600	Maximum normal load
7	100VDC	422.3	600	Maximum normal load

Appendix tables

8	430VDC	96.1	600	Maximum normal load
Remark: The measured value not exceed the marked value by more than 10%				

5.3	TABLE: Durability of markings				Form A.4	P
Marking method (see NOTE)			Agent			
1)					A Water	
2)					B <input type="checkbox"/> Isopropyl alcohol/ <input checked="" type="checkbox"/> Petroleum spirit	
3)					C (specify agent)	
4)					D (specify agent)	
5)					E (specify agent)	
NOTE – Where applicable include print method, label material, ink or paint type, fixing method, adhesive and surface to which marking is fixed.						
Marking location			Marking method (see above)			
Identification (5.1.2)			1), 2)			
Mains supply (5.1.3)			1), 2)			
Fuses (5.1.4)			1), 2)			
Terminals and operating devices (5.1.5.1)			1), 2)			
Measuring circuit terminals (5.1.5.2)			1), 2)			
Switches and circuit breakers (5.1.6)			1), 2)			
Double/reinforced equipment (5.1.7)			Not such equipment			
Field wiring Terminal boxes (5.1.8)			Not such equipment			
Warning marking (5.2)			1), 2)			
Battery charging (13.2.2)			No battery			
Method	Test agent	Remains legible Verdict	Label loose Verdict	Curled edges Verdict	Comments	
1), 2)	A, B	Remains legible	No loose	No curled	All markings accordance with 5.1.2 to 5.2 test in this method, and pass the test	

Appendix tables

6.2	TABLE: List of accessible parts		Form A.6	P
6.1.2	Exceptions	See below		--
6.2	Determination of accessible parts	See below		--
Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)	
1	Enclosure	Rigid test finger and Test pin 3 mm diameter	No hazard voltage	
NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.1)				
NOTE 2 – Special consideration should be given to inadequate insulation and high voltage parts (see 6.2)				
NOTE 3 – Parts are considered to be ACCESSIBLE if they could be touched in the absence of any covering which is not considered to provide suitable insulation (see note to paragraph 1 of 6.4).				
NOTE 4 – Capacitor test may be required (see Form A.7).				
NOTE 5 – The determination methods are: visual; rigid test finger; jointed test finger; pin 3 mm diameter; pin 4 mm diameter.				
Supplementary information:				
There are no any hazardous parts accessible after installation.				

6.3.1	TABLE: Levels in NORMAL CONDITION				P
Open-circuit voltage measurement on secondary output terminal:					
Open-circuit voltage measured between:	Condition	max. Voltage		Comments	
		V peak	V d.c. / V a.c.		
--	--	--	--	--	
--	--	--	--	--	
Touch current measured between:	Condition	Accessible current (mA)	Accessible current limit(mA)	Charged capacitance (µC/mJ)	Charged capacitance (µC/mJ)
Plastics enclosure	Normal working	0.012mA	0.5 mA	--	--
RJ45 port		0.213mA	0.7 mA	--	--
Note: the Accessible current was measured according to 6.3.1 b) with the test circuit of figure A.1 connected between the specified points.					
Input: 110% of rated supply voltage					

Appendix tables

6.3.2	TABLE: Levels in SINGLE FAULT CONDITION				Form A.6	N
Open-circuit voltage measurement on secondary output terminal:						
Open-circuit voltage measured between:	Condition	max. Voltage		Comments		
		V peak	V d.c. / V a.c.			
--	Single fault condition	--	--	Limit: --.		
Touch current measured between:	Condition	Accessible current (mA)	Accessible current limit(mA)	Charged capacitance ($\mu\text{C}/\text{mJ}$)	Charged capacitance ($\mu\text{C}/\text{mJ}$)	
Plastics enclosure	Single fault condition	0.011	3.5	--		
RJ45 port		0.432	15	--		
Note: the Accessible current was measured according to 6.3.1 b) with the test circuit of figure A.1 connected between the specified points.						
Input: 110% of rated supply voltage						

6.5.2.1	TABLE: Cross-sectional area of bonding conductors		N
Conductor location	Cross-sectional area		Verdict
--	--		--

6.5.2.3	TABLE: Tighting torque test			N
Conductor location	Size of Screw	Tighting torque (Nm)		Verdict
--	--	--		--

6.5.2.4	TABLE: Impedance of of plug-connected equipment				N
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min V	Calculated resistance (maximum allowed 0,1 Ω) Ω	Verdict	
--	--	--	--	--	
Supplementary information:					

6.5.2.5	TABLE: Impedance of protective bonding of permanently connected equipment			N
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min (maximum 10 V) V		Verdict
Supplementary information: Not permanently connector equipment				

Appendix tables

6.5.2.6	TABLE: Transformer protective bonding screen			N
ACCESSIBLE part under test		Test current A	Voltage attained after 1 min (maximum 10 V) V	Verdict
Supplementary information: Not permanently connector equipment				

6.5.3	TABLE: protective impedance			N
A high INTEGRITY single component				
Component		Location		Comments
A combination of components				
Component		Location		Comments
A combination of BASIC INSULATION and a current or voltage limiting device				
Component		Location		Comments
Supplementary information:				

6.7.1	TABLE: protection against electric shock					P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Live part to Plastic enclosure	586	416	11.0	14.2	12.0	14.2
Live part to RJ45 port	586	416	11.0	14.2	12.0	14.2

Appendix tables

6.8	TABLE: Procedure for voltage tests (Dielectric strength tests)					P
4.4.4.1 b)	Conformity after application of fault conditions ¹					P
6.5.3	Supplementary insulation and reinforced insulation					P
6.6.1	Connections to external circuits					P
6.7.3.2	CLEARANCE					P
6.7.3.4	Solid insulation					P
6.10.2.2	Fitting of non-detachable MAINS SUPPLY cords ¹					N
8	Mechanical resistance to shock and impact					P
9.1 a) 2)	Eliminating or reducing the sources of ignition within the equipment					N
9.3 c)	Limited-energy circuit					N
11.2	Cleaning ¹					N
11.3	Spillage ¹					N
11.4	Overflow ¹					N
11.6	Specially protected equipment ¹					N
¹ Record the fault, test or treatment applied before the dielectric strength test						
Test site altitude.....:					< 2000m	--
Test voltage correction factor (see Table 10).... :					1.0	--
Location or references from Forms A.2 and A.5	Clause or sub-clause	Humidity Yes/No	Working voltage V	Test voltage r.m.s/peak/d.c V	Comments	Verdict
Live ports to plastic enclosure	K.1	Yes	416	5400Vrms a.c.	No flashover or break down	P
Live ports to RJ45 port	K.1	Yes	416	5400Vrms a.c.	No flashover or break down	P
Supplementary information:						

6.10.2.2	TABLE: Cord anchorage					N
Location	Mass kg	Pull N	Verdict	Torque Nm	Verdict	Comment
Supplementary information:Not fitting of non-detachable mains supply cords						

8	TABLE: mechanical resistance to shock and impact		P
Test part	Test condition	Test result	
Enclosure	Static test: 30N, hard rod of Φ12mm,	No hazard	
Enclosure	Impact test: 500g±25g, 50mm	No hazard	

Appendix tables

9.3	TABLE: flammability of materials (IEC 60695-11-10)		N
	Material tested	Certificated materials	--
	Generic name		--
	Material manufacturer		--
	Type designation		--
	Colour		--
	Conditioning details		--
	Thickness (mm)	1 - 2 - 3 -	--
	Duration of flaming after first application (s)	1 - 2 - 3 -	--
	Duration of flaming plus glowing after second application (s)	1 - 2 - 3 -	--
	Specimen burns to holding clamp (Yes/No)	1 - 2 - 3 -	--
	Cotton ignited (Yes/No)	1 - 2 - 3 -	--
Supplementary information: PCB and plastic enclosure have through UL authentication. And the flammability classification are V-0.			

9.4	TABLE: Limited-energy circuit						N
circuit / location	Open circuit voltage (V)	Maximum current (A)	Maximum available power (VA)	Overload protection (VA)	Limited current (Yes/No)	Comments	
Supplementary information:							

Appendix tables

10	TABLE: temperature tests					P
	Voltage (V)		400V~		--	
	Frequency (Hz)		45Hz		--	
	Duration (h, min)		4 h		--	
	Ambient temperature Ta (°C)		See below		--	
Part / location	Measured temperature Tm (°C)	Corrected maximum temperature(°C)	Maximum allowed temperature (°C)	Result	Comments	
PCB near U1	43.6	61	85	P	--	
T1 coil	44.3	61.7	105	P	--	
T1 core	52.5	69.9	105	P	--	
Surface of E-cap (EC2)	51.4	68.8	105	P	--	
Plastic enclosure (outside, near T1)	34.9	52.3	77	P	--	
Plastic enclosure (outside, near T1)	30.3	47.7	105	P	--	
Inside wire	38.7	56.1	105	P	--	
Ambient	22.6	40	--	--	--	
Supplementary information:						

10.5	TABLE: ball-pressure tests for thermoplastics			P
	Limited impression diameter (mm)		≤2 mm	--
Part	Test temperature (°C)		Impression diameter (mm)	
AC connector	125°C		1.2	
PCB	125°C		1.1	

11	TABLE: protection against hazards from fluids							N
location	cleaning	spillage	overflow	equipment plus liquid	working voltage (V)	test voltage (V)	result	comments

Appendix tables

11.7.2	TABLE: leakage and rupture at high pressure						N
Part	Maximum permissible working pressure (pa)	Factor	Test pressure (pa)	Leakage test	Burst test	Comments	

11.7.3	TABLE: leakage from low-pressure parts				N
Part	Test pressure (Pa)	Result	Comments		

12.2.1	TABLE: ionizing radiation				N
location	radiation (Sv/h)	result	comments		

12.5.1	TABLE: sound level measurements			N
location	value (dBA)	calculated maximum sound pressure level		

12.5.2	TABLE: ultrasonic pressure measurements				N
location	value (dB)	frequency (kHz)	result		

13.2.2	TABLE: batteries tests			N
	Battery load and charging circuit diagram	No battery used		--
	Battery type			--
	Battery manufacturer			--
	Battery model			--
	Battery catalogue No.			--
	Battery ratings			--
	Reverse polarity installment test			--
	Component	Result, open circuit	Result, short circuit	

Appendix tables

14.1		TABLE: components				P
Object/part No.	Manufacturer/ trademark	Type/ model	Technical data	Standard	Mark(s) of conformity ¹⁾	
Enclosure	CGN HUNER NEW MATERIALS CO., LTD	C2F(05)-1	V-0, Max. Operating temperature: 80°C	UL 94	UL	
PCB	Interchangeable	Interchange able	V-1 or better, 130°C	UL746A, UL94	UL	
Internal wire	Interchangeable	1015	26-18AWG, 105°C	UL758 EN61010-1	Tested with appliance & UL	
Chip optocoupler	Everlight electronic Co., Ltd	EL817	110°C	UL 1577	UL	
AC connector	Various	DB9	ABS	EN61010-1	Tested with appliance	
Isolate transformer	Chang Xing Suo Fei Te Electronic Limited By Share Ltd	EE13	Class B	EN 61558-1	TUV GS	

¹⁾ an asterisk indicates a mark which assures the agreed level of surveillance

14.2.1		TABLE: motor temperatures measurements				N
		Voltage (V).....:		--		
		Frequency (Hz)		--		
		Duration (h, min).....:		--		
		Ambient temperature Ta (C)..... :		--		
Motor No. and location	Insulation class	Measured temperature Tm (C)	corrected maximum temperature Tm- Ta+ 40 (C)	maximum allowed temperature (C)	result	

14.3		TABLE: overtemperature protection devices			N
component	type	result	comments		

Note: Type: self-resetting SR, non-self-resetting NSR, non-resetting NR

Appendix tables

14.6	TABLE: Short circuit (for Mains transformer)		Form A.39	N
	Mains transformers tested outside equipment	Approved transformer		--
4.4.2.7.2	Short circuit			--
	Type			--
	Manufacturer			--
	Test in equipment			N
	Test on bench			N
	Temperature protection class of the lowest RATED winding (class or maximum RATED temperature) .:			--
	Winding identification			--
	Type of protector for winding			--
	Elapsed time			--
	Winding temperature, primary (°C)			N
	Winding temperature, secondary (°C)			N
	Tissue paper / cheesecloth OK ?			N
	Voltage test, primary to secondary (V)			N
	Voltage test, primary to core (V)			--

14.6	TABLE: Overload tests (for Mains transformer)		Form A.40	N
	Mains transformers tested outside equipment	Approved transformer		
	Type			--
	Manufacturer			--
	Test in equipment			N
	Test on bench			N
	Temperature protection class of the lowest RATED winding (class or maximum RATED temperature) .:			--
	Winding identification			--
	Type of protector for winding			--
	Elapsed time			--
	Winding temperature, primary (°C)			N
	Winding temperature, secondary (°C)			N
	Tissue paper / cheesecloth OK ?			N
	Voltage test, primary to secondary (V)			N
	Voltage test, primary to core (V)			--

Product Photos



Fig. 1



Fig. 2

Product Photos

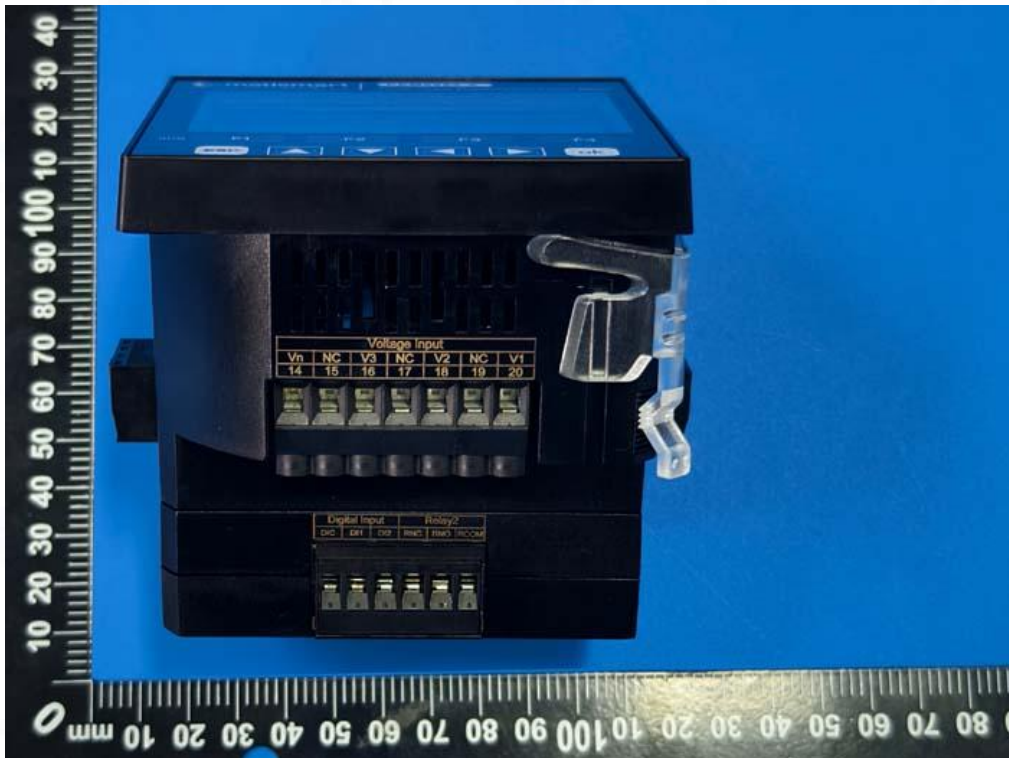


Fig. 3



Fig. 4

----- END OF REPORT -----

EU DECLARATION OF CONFORMITY

This Is Hereby Declared That Following Designated Product Complied With The Essential

Manufacturer Name: Shanghai Matis Electric Co., Ltd Address: Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306
Authorized Representative Established Within The Eu: Company Name:Shanghai Matis Electric Co., Ltd Company Address:Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306
Product Name: Three phase Multi-Functional Smart Meter
Model: PEM5553-A, PEM5353-A, PEM5353-D, PEM5553-D, PEM5353-H, PEM5553-H
Trademark: Matis/Matismart
Meets All Relevant Requirements Of The Following European Directives: 2014/35/EU Low Voltage Directive 2014/30/EU Electromagnetic Compatibility Directive
Applicable Standards: EN IEC 61326-1: 2021 EN 61000-3-12: 2011 + A1: 2024 EN IEC 61000-3-11: 2019 EN61010-1:2010+A1:2019 EN IEC 61010-2-030:2021+A11:2021

THIS DECLARATION APPLIES TO ALL SPECIMENS MANUFACTURED IDENTICAL TO THE MODELSUBMITTED FOR TESTING / EVALUATION. ASSESSMENT OF COMPLIANCE OF THE PRODUCT WITHTHE REOUIREMENTS RELATING TO SAFETY STANDARDS LISTED ABOVE WAS PERFORMED BYMANUFACTURE.

SIGNED ON BEHALF OF Shanghai Matis Electric Co., Ltd



Title and Signature: Timmy Bao

Date and place: 2026.3.24, Shanghai

Seal: _____

