Test Report issued under the responsibility of:

NCB TÜV SÜD Product Service GmbH
Ridlerstr. 65, 80339 Munich
Germany

NCB TÜV SÜD PSB
1 Science Park Drive, 118221 Singapore

Please select the responsible NCB and delete the other one and this field

EST REPORT
IEC 61326-1
Electrical equipment for measurement, control and laboratory use – EMC requirements
Part 1: General requirements

Report Reference No. ..... :	EMC1008714A
Date of issue ..... :	2017-10-26
Total number of pages	48

CB Testing Laboratory ..... :	TUV Italia
Address ..... :	Via Montalenghe, 8 – 10010 Scarmagno (TO) - Italy

Applicant's name ..... :	Energy Team S.p.A
Address ..... :	Via della Repubblica, 9 – 20090 Trezzano s/Naviglio (MI) - Italy

Test specification:

Standard ..... :	IEC 61326-1:2012 (Second Edition)
Test procedure ..... :	CB
Non-standard test method……..…..:	N/A

Test Report Form No. ..... :	IEC61326_1B
Test Report Form(s) Originator..... :	IMQ S.p.A.
Master TRF ..... :	Date 2013-09

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

Test item description ..... :	9 Channel Power Analyzer
Trade Mark ..... :	Energy Team
Manufacturer ..... :	Energy Team
Model/Type reference ..... :	NG-9, NG-9 PLUS
Ratings ..... :	24-120 Vdc, 2 W, 80-265 Vac 50-60 Hz, 2 VA

Report Index:

Item	Description

Note: To update all fields in this TRF, including the Page numbers on the Index page, click Select All on the Edit menu, and then press F9.

Testing procedure and testing location:
☐ **CB Testing Laboratory:** Testing location/ address.....: TUV Italia Via Montalenghe, 8 – 10010 Scarmagno (TO) - Italy Tested by (name + signature)..... Giuseppe Mecchia Approved by (name + signature) ... : Enzo Berardi
☐ **Associated CB Test Laboratory:** Testing location/ address.....: Tested by (name + signature)..... Approved by (name + signature) ... :
☐ **Testing procedure: TMP** Tested by (name + signature)..... : Approved by (name + signature) ... : Testing location/ address.....:
☐ **Testing procedure: WMT** Tested by (name + signature)..... : Witnessed by (name + signature).. : Approved by (name + signature) ... : Testing location/ address.....:
☐ **Testing procedure: SMT** Tested by (name + signature)..... : Approved by (name + signature) ... : Supervised by (name+ signature) . : Testing location/ address.....:
☐ **Testing procedure: RMT** Tested by (name + signature)..... : Approved by (+ signature) ..... : Supervised by (+ signature)..... : Testing location/ address.....:

Test item description ..... :	9 Channel Power Analyzer
Trade Mark ..... :	Energy Team
Manufacturer ..... :	Energy Team
Model/Type reference ..... :	NG-9, NG-9 PLUS
Ratings ..... :	24-120 Vdc, 2 W, 80-265 Vac 50-60 Hz, 2 VA
Possible test case verdicts:	
- test case does not apply to the test object.. :	N/A
- test object does meet the requirement..... :	P (Pass)
- test object does not meet the requirement.. :	F (Fail)
Testing ..... :	
Date of receipt of test item ..... :	2017-10-24
Date (s) of performance of tests ..... :	From 2017-10-24 to 2017-10-26…

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

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 the decimal separator is comma or point. (Select one).

General product information:

NG9 Plus is a new generation network analyzer, user friendly and intuitive to use. Its design is to install the device in electrical boards so it is a DIN guide device. In the following part there is a description of main characteristics of the device:

- Reduced Size: The world' smallest analyzer:
  - 9 channels within only 88x90x60 mm (5 DIN modules);
  - Easy to fit in pre-existing panels;
  - New panels can be up to 67% smaller;
- Installation: NG-9 reduces space, time and costs to increase simplicity:
  - Set sizes and most suitable solutions to get extremely precise measurements;
  - Appropriate extensions allow up to 10 m distance from the device;
  - Reduction of installation errors to allow a simple and correct start up;
  - Each current sensor can be connected to the device with a one-way electrical connector without using additional cables, scissors and screwdrivers. Installation costs reduced by 85% and no need for plants shutdown;
- Flexibility: NG-9 the highest versatility on the market:
  - Only set sizes and most suitable solutions to get extremely precise measurements: 1 to 8000A with 2m long cables and extensions up to 10m;
  - Possibility of using all range of Rogowski Sensors or Split Current Sensors on each instrument on either single, three or mixed phase mode;
- Accuracy: NG-9 0,5 class on the entire measure chain:
  - Device and sensors tested and calibrated to guarantee the stated accuracy;
  - Calibration certificate available for each instrument and related sensor;
- Settings: set manually or by software:
  - «Smart» system 1 key joystick configuration;
  - Set by NG software that permits simple and fast programming;
  - Disaster Recovery Feature: every configuration is saved and shared with Energy Team Assistance Service;
- Efficiency and High Performance: NG-9 the most efficient metering system on the market:
  - Power consumption 12 times less than any other device on the market;
  - Modbus RTU communication speed 3 times faster than other analyzers: 115200 baud rate;
  - Auxiliary power supply 90 to 250 VAC or 24 to 120 VDC;
  - Test voltage:3,7 kV, double than other analyzers (less electrical disturbances and more safety);
- Graphics: NG-9 160 electrical parameters on the display:
  - 160 parameters on LCD display and, on your own device, via RTU-Modbus;
  - Simple and immediate information: possibility to label each channel by software;
  - All measures displayed by using joystick;
  - Graphic display with RGB LED background;
- Versatility: NG-9 anywhere it's needed:
  - Different fields of application: offices, warehouses, retail centers, small and large factories, data centers and many more;
  - Different final users: Energy Managers, Maintenance and Production Managers, Energy Consulting Companies, ESCo, Energy Certifications (Diagnose, Audit).

1.0 Equipment Description

Same as previous paragraph; in addition to be noted than No. 2 different versions are available:
NG-9 and NG-9 PLUS.

The manufacturer guarantees and subscribes the two instruments' characteristics are identical. The only difference is with the firmware since the NG9 Plus's can enable the acquisition of:

- Temperature;
- Status' signals (i.e. NA-NC);
- Digital signals (i.e.: 4-20 mA signal);

Furthermore, NG9 Plus can detect:

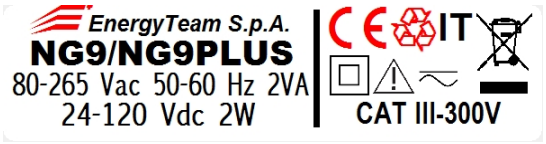
- Up to the 15th harmonic and THD on the 3 voltage channels;
- Up to the 15th harmonic and THD on the 9 current channels

Those stated above are the only differences between the two instruments.

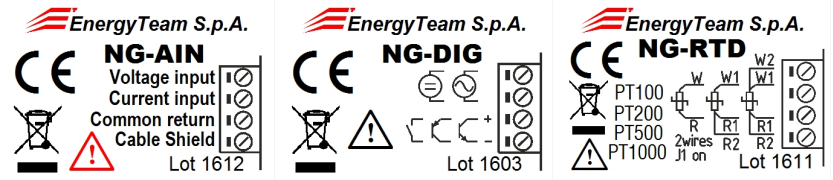
Software version :	**2.0.7**			
Firmware version :	**1.0.3**			
Number of tested samples :	**one**			
Serial number :	**171017NG111145**			
Equipment class :	☒	A	☐	B
Electromagnetic environment :	☐	Residential locations		
	☒	Industrial locations		
	☐	Controlled electromagnetic environment		

1.1 Equipment Marking Plate

Main unit



Marking plate of peripherals



1.2 Supporting Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	9 Channel Power Analyzer	Energy Team	NG-9 PLUS	
AE	6mm split current transformer up to 10A	Energy Team	1210HA	Representative model used for testing
AE	16mm split current transformer up to 100A	Energy Team	1211HA	Representative model used for testing
AE	24mm split current transformer up to 200A	Energy Team	1212HA	Variant
AE	Current probe Diameter 100mm, Length 37cm up to 2000A	Energy Team	8368VV	Representative model used for testing
AE	Extension cable length 4m	Energy Team	1220HA	Representative model used for testing
AE	Peripheral	Energy Team	NG-AIN	Representative model used for testing
SIM	Heater	DPE	Tropical	Load
Delete or add rows as needed except for the header.				
Note: * Use EUT - Equipment Under Test AE - Auxiliary/Associated Equipment SIM - Simulator (Not Subjected to Test) *Note: Use abbreviations:				

1.3 Input/Output Ports:

Port No.	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
0	Enclosure	N/E	—	—	None
1	Mains	AC/DC	---	N	None
2	Voltage input	I/O	Y	N	None
3	Current / peripheral input	I/O	Y	N	None
Delete or add rows as needed except for the header.					
*Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal Input or Output Port TP = Telecommunication Ports					

1.4 EUT Internal Operating Frequencies:

Frequency (MHz)	Description	Frequency (MHz)	Description
0.07 to 0.14	Switching power supply		
8	CPU clock frequency		
Delete or add rows as needed except for the header.			

1.5 Power Interface

Mode No.	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (No.)	Comments
Rated	24-120 Vdc, 80-265 Vac		2	DC, 50-60 Hz	1	Input for both AC or DC supply
Delete or add rows as needed except for the header.						

1.6 EUT Operation Modes:

Mode #	Description
1	Continuous measurements of voltage input, currents and verification and acquisition of digital input
Delete or add rows as needed except for the header.	

1.7 EUT Configuration Modes

Mode #	Description
1	EUT connected to No. 3 representative current probes, 1 voltage input and 1 external peripheral
Delete or add rows as needed except for the header.	

1.8 EUT Technical Documentation

Document	Reference
EMC1008714A_MAN_CB_e.pdf	User's manual
EMC1008714A_DOC_CB_e.pdf	Models differences declaration with photos
EMC1008714A_CDF2_CB_e.pdf	Devices identity
Delete or add rows as needed except for the header.	

1.9 Immunity Performance Criteria

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level defined by its manufacturer or the requestor of the test, or agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:

☒ based on the used product standard
☒ based on the declaration of the manufacturer, requestor or purchaser

Criterion A:
Definition: 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 by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Representative parameter	Acceptable level of performance
Voltage and current	Precision Class 0.5

Criterion B:
Definition: 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 by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Representative parameter	Acceptable level of performance
Voltage and current	Precision Class 0.5 verified after test

Criterion C:
Definition: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

Representative parameter	Acceptable level of performance
Voltage and current	Precision Class 0.5 verified after test

2.0 Result Summary

IEC 61326-1			
Clause	Requirement – Test	Result	Verdict
7.2	Limits of terminal disturbance voltages in the frequency range 150 kHz to 30 MHz .....:		P
7.2	Limits of radiated disturbance in the frequency range 30 MHz to 1000 MHz .....:		P
7.2	Harmonics current emission.....:		N/A
7.2	Voltage Fluctuations and Flicker.....:		N/A
Clause	Requirement – Test	Result	Verdict
6.2	Electrostatic Discharges (ESD).....:		P
6.2	Radiated RF electromagnetic Fields……..:		P
6.2	Electrical Fast Transients and bursts.....:		P
6.2	Surges.....:		P
6.2	Conducted Disturbances, induced by RF fields...:		P
6.2	Voltage Dips, Interruptions, and variations.....:		P
6.2	Power-frequency Magnetic Fields.....:		P

Summary of compliance with National Differences:

EUT is complying with IEC 61326-1:

- Class A emission tests,
- Industrial electromagnetic environment immunity test.

2.1 Test Conditions and Results – Conducted Emissions

TEST: Limits of mains terminal disturbance voltage					**Verdict**
Reference standard: CISPR 11:2009 + A1:2010					P
Laboratory Parameters	Required prior to the test		During the test		
Ambient Temperature	10 to 40 °C		22.3 °C		
Relative Humidity	10 to 90 %		44%		
Fully configured sample scanned over the following frequency range	Frequency range on each side of line		Measurement Point		
	150kHz to 30MHz		Mains		
Limits – Group 1 - Class A equipment with rated input power of ≤ 20 kVA*					
Frequency (MHz)	Limit dB (µV)				
	Quasi-Peak	Result	Average	Result	
0.15 to 0.50	79	P	66	P	
0.50 to 30	73	P	60	P	

Supplementary information:
* - Delete limit sections, which are not applicable to the product under test.

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Receiver	Rohde & Schwarz	ESCI	101279	2017-03-07	2018-03-07
LISN	Rohde & Schwarz	ESH2-Z5	100365	2017-03-09	2018-03-09
Delete or add rows as needed except for the header.					

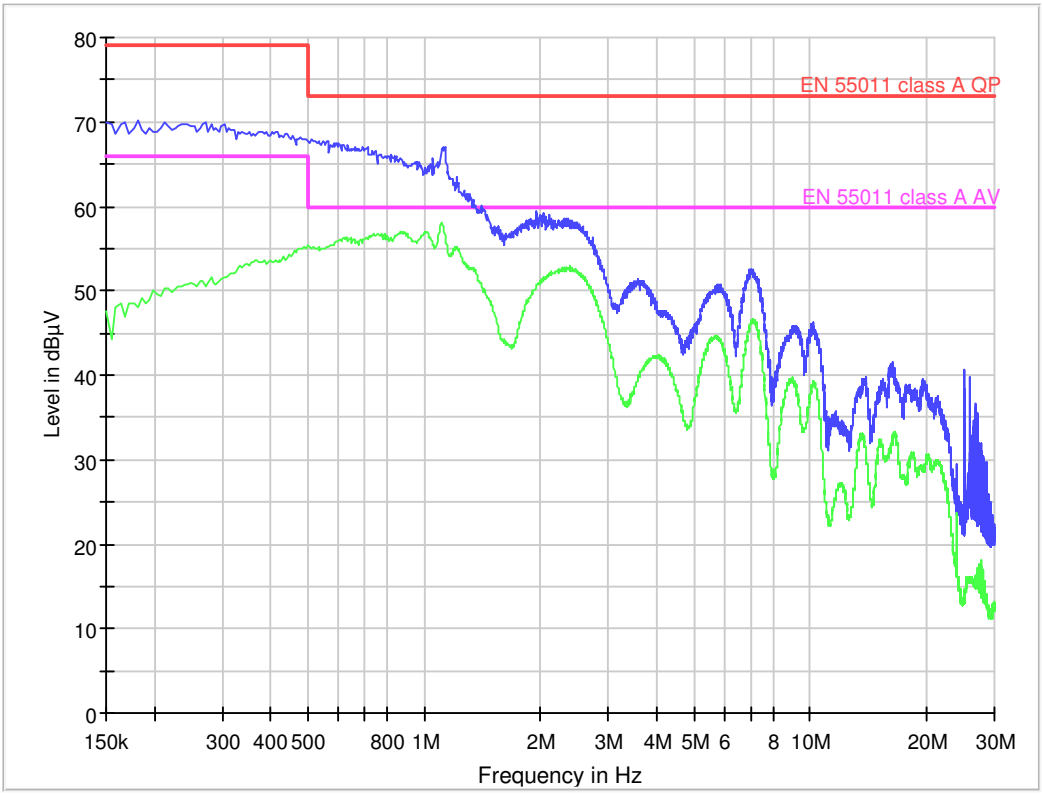
Photo of test setup for Mains Terminal Disturbance Voltage

EUT Operation mode: 1 EUT configuration mode: 1

Tabulated Results for Mains Terminal Disturbance Voltage						
Terminal	Test Frequency (MHz)	Detector (Pk/QP/Av)	Correction Factor (dB)	Level dB (µV)	Limit dB (µV)	Margin (dB)
Mains	0.5	Pk		71.2	73	1.8
Delete or add rows as needed except for the header.						
Note: Use column "Terminal" to identify the Line and /or Neutral that was tested. Other table formats are allowed as long as all information is included.						

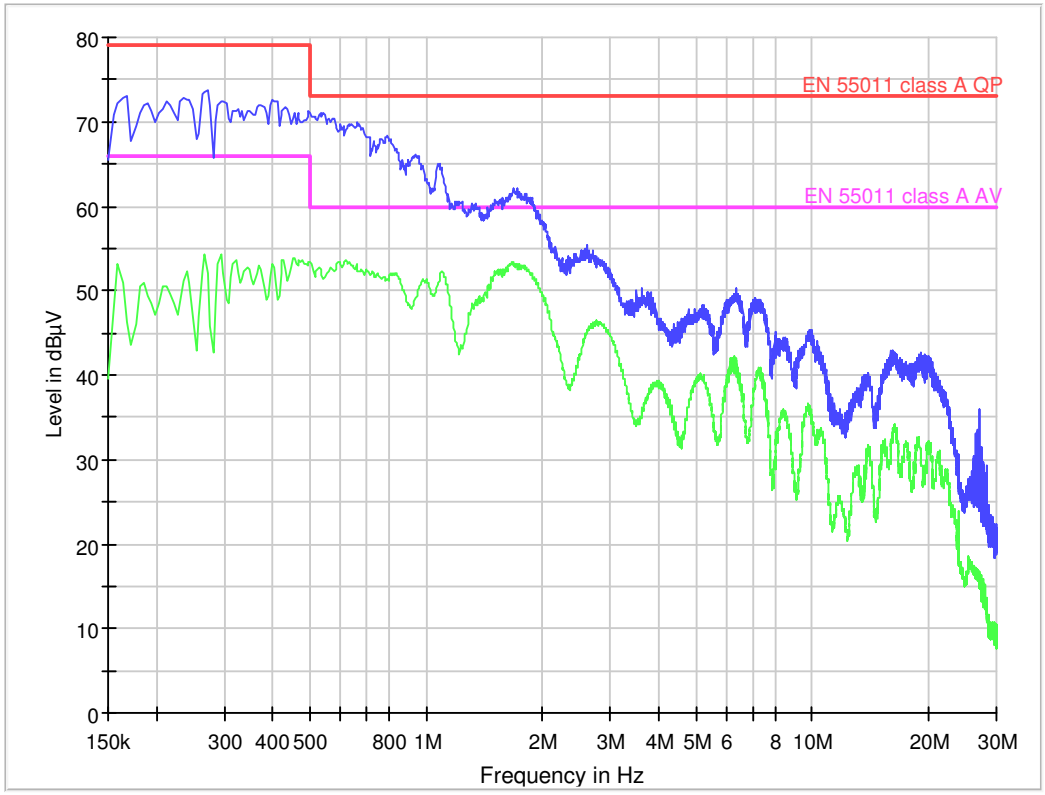
Graphical representation of Mains Terminal Disturbance Voltage Measurement (Optional)

Voltage with 4-Line-LISN



EUT powered 230 Vac

Voltage with 4-Line-LISN



EUT powered 115 Vac

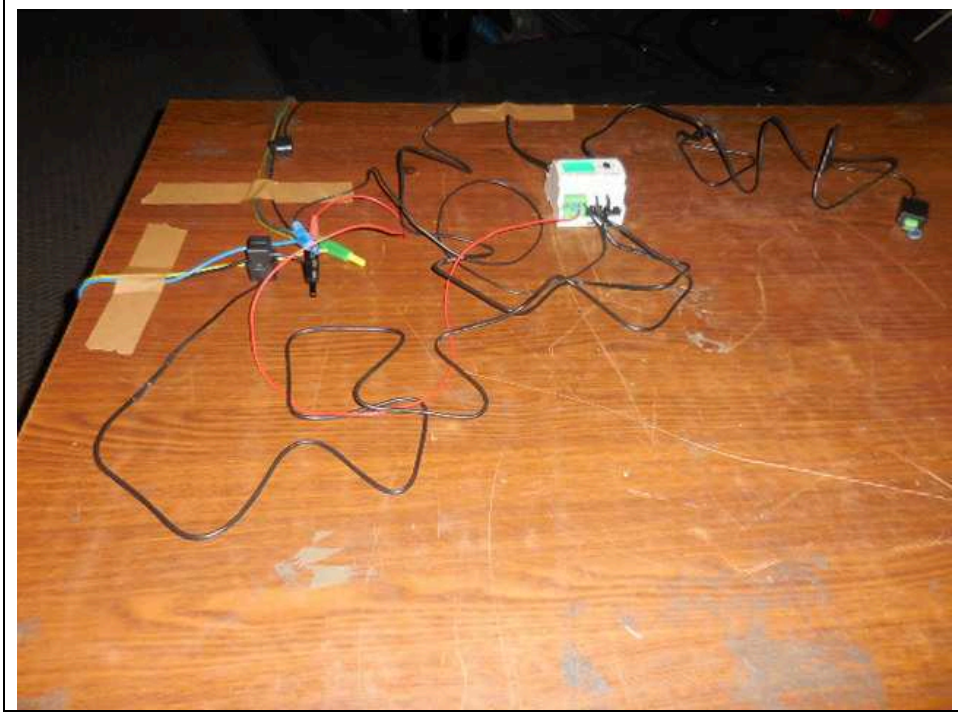
2.2 Test Conditions and Results – Radiated Emissions, from 30 MHz to 1 GHz

TEST: Limits for radiated disturbance 30 MHz – 1 GHz			**Verdict**
Reference standard: CISPR 11:2009 + A1:2010			P
Laboratory Parameters:	Required prior to the test	During the test	
Ambient Temperature	10 to 40 °C	22.3 °C	
Relative Humidity	10 to 90 %	44%	
Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point	
	30MHz – 1GHz	10 m measurement distance	
Limits – Group 1 Class A equipment with rated input power of ≤ 20 kVA*			
Frequency (MHz)	Limit dB (µV/m)		
	Quasi-Peak	Results	
30 to 230	40	P	
230 to 1000	47	P	

Supplementary information:
* - Delete limit sections, which are not applicable to the product under test.
** - The Average Limits Apply To Magnetron Driven Equipment Only.
*** - An inverse proportionality factor of 20 dB per decade shall be used to normalize the measured data to the specified distance for determining compliance (on a test site, Class A equipment can be measured at a distance of 10 m or 30 m; Class B equipment can be measured at a distance of 3 m or 10 m). For *in situ* measurements, refer to limits given in Table 17 and Table 18 of CISPR 11.

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Receiver	Rohde & Schwarz	ESU 26	100188	2017-06-20	2018-06-20
Biconical antenna	EMCO	3110B	9408-1910	2015-07-01	2018-07-01
Log-periodic antenna	Electro-metrics	LPA-25	1117	2016-11-24	2019-11-24
Delete or add rows as needed except for the header.					

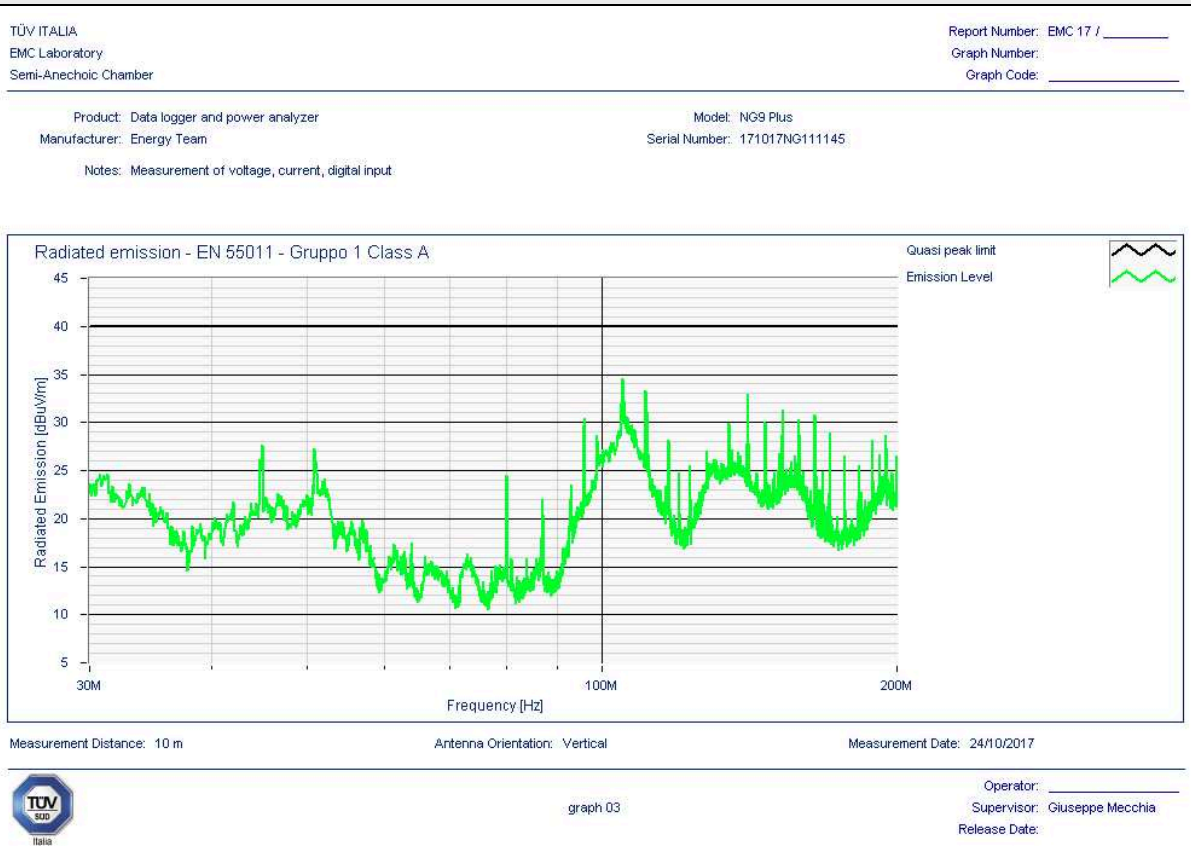
Photo of test setup for Radiated Disturbance, from 30 MHz to 1 GHz



EUT Operation mode: 1 EUT configuration mode: 1

Tabulated Results for Radiated Disturbance									
Test Frequency (MHz)	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Loss Factor (dB)	Antenna Factor(dB)	Level dB(µV/m)	Limit dB(µV/m)	Margin (dB)
104.8	QP	V	0	1			28	40	12
111	QP	V	45	1.5			26.4	40	13.6
141	QP	V	30	1.3			28.1	40	11.9
392	QP	H	90	3			41.7	47	5.3
Delete or add rows as needed except for the header.									
Note: Other table formats are allowed as long as all information is included.									

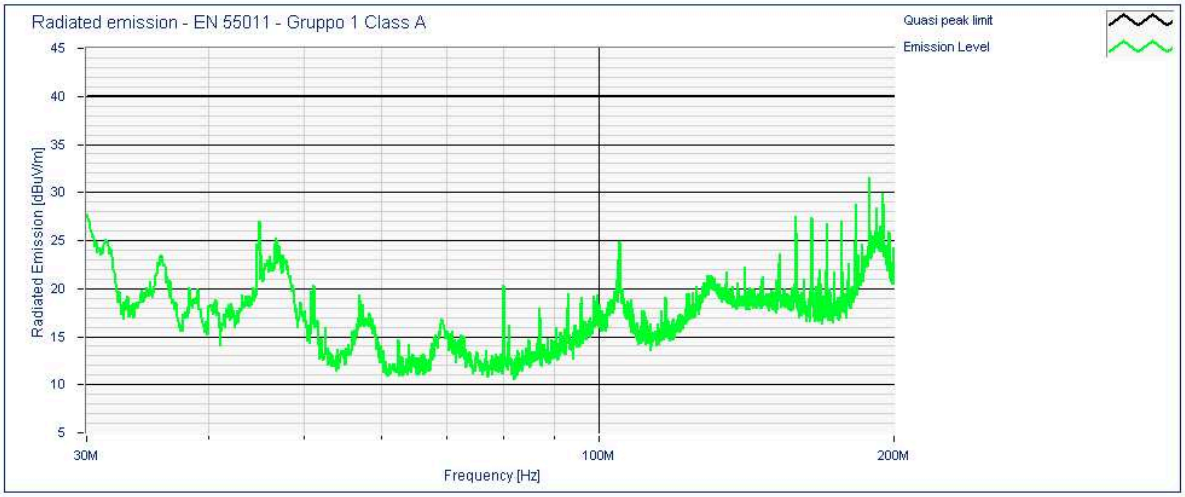
Graphical representation of Radiated Disturbance Measurement (Optional)



TÜV ITALIA
EMC Laboratory
Semi-Anechoic Chamber

Report Number: EMC 17 / _____
Graph Number:
Graph Code: _____

Product: Data logger and power analyzer
Manufacturer: Energy Team
Model: NG9 Plus
Serial Number: 171017NG111145
Notes: Measurement of voltage, current, digital input



Measurement Distance: 10 m
Antenna Orientation: Horizontal
Measurement Date: 24/10/2017

graph 04

Operator: _____
Supervisor: Giuseppe Mecchia
Release Date:

TÜV ITALIA
EMC Laboratory
Semi-Anechoic Chamber

Report Number: EMC 17 / _____
Graph Number:
Graph Code: _____

Product: Data logger and power analyzer
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Model: NG9 Plus
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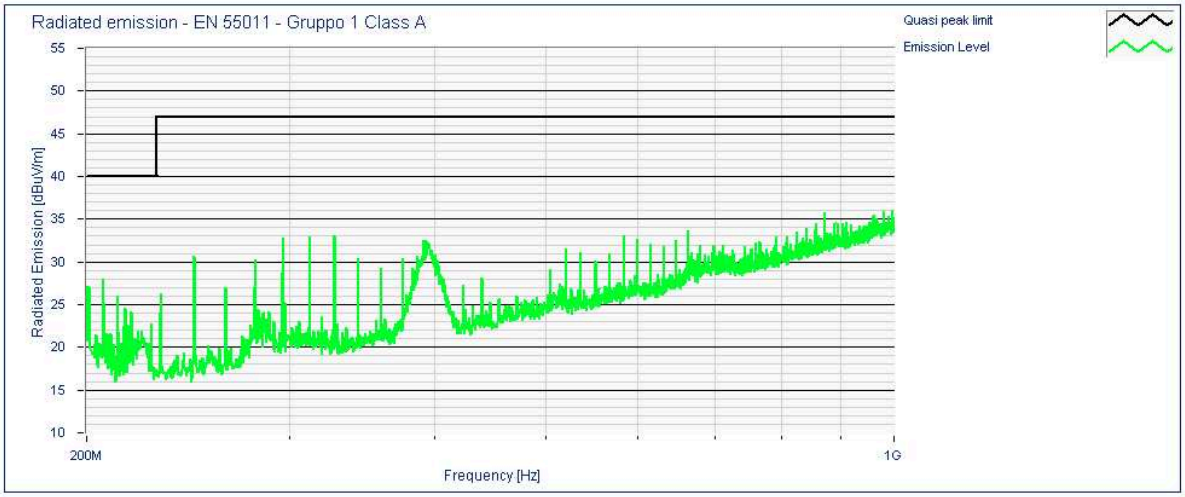
Notes: Measurement of voltage, current, digital input



Measurement Distance: 10 m
Antenna Orientation: Vertical
Measurement Date: 24/10/2017

graph 02

Operator: _____
Supervisor: Giuseppe Mecchia
Release Date:

TÜV ITALIA
EMC Laboratory
Semi-Anechoic Chamber

Report Number: EMC 17 / _____
Graph Number:
Graph Code: _____

Product: Data logger and power analyzer
Manufacturer: Energy Team
Model: NG9 Plus
Serial Number: 171017NG111145

Notes: Measurement of voltage, current, digital input

Measurement Distance: 10 m
Antenna Orientation: Horizontal
Measurement Date: 24/10/2017

graph 01

Operator: _____
Supervisor: Giuseppe Mecchia
Release Date:

2.3 Test Conditions and Results – Radiated Emissions, from 1 GHz to 18 GHz

TEST: Limits for radiated disturbance 1 GHz – 18 GHz		**Verdict**
Reference standard: CISPR 11:2009 + A1:2010		N/A
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	10 to 40 °C	°C
Relative Humidity	10 to 90 %	%
Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point
	1GHz – 18GHz	3 m measurement distance

Limits – Group 2 Class A equipment producing CW type disturbances and operating at frequencies above 400 MHz*		
Frequency (GHz)	Limit dB (µV/m)	
	Quasi-Peak	Results
1 to 18 (within harmonic frequency bands)	82	
1 to 18 (outside harmonic frequency bands)	70	

Limits – Group 2 Class B equipment producing CW type disturbances and operating at frequencies above 400 MHz*		
Frequency (GHz)	Limit dB (µV/m)	
	Peak	Results
1 to 18 (within harmonic frequency bands)	70	
1 to 18 (outside harmonic frequency bands)	70	

Limits – Group 2 Class B equipment producing fluctuating disturbances other than CW and operating at frequencies above 400 MHz*		
Frequency (GHz)	Limit dB (µV/m)	
	Peak	Results
1 to 2.3	92	
2.3 to 2.4	110	
2.5 to 5.725	92	
5.875 to 11.7	92	
11.7 to 12.7	73	
12.7 to 18	92	

Weighted limits – Group 2 Class B equipment producing fluctuating disturbances other than CW and operating at frequencies above 400 MHz*		
Frequency (GHz)	Limit dB (µV/m)	
	Peak	Results
1 to 18	60	

Supplementary information:
* - Delete limit sections, which are not applicable to the product under test.

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Delete or add rows as needed except for the header.					

Photo of test setup for Radiated Disturbance, from 1 GHz to 18 GHz

EUT Operation mode: EUT configuration mode:

Tabulated Results for Radiated Disturbance									
Test Frequency (MHz)	Detector (Pk/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Loss Factor (dB)	Antenna Factor(dB)	Level dB(µV/m)	Limit dB(µV/m)	Margin (dB)
Delete or add rows as needed except for the header.									
Note: Other table formats are allowed as long as all information is included.									

Graphical representation of Radiated Disturbance Measurement (Optional)

2.4 Test Conditions And Results – Limits for Harmonic Current Emissions

TEST: Limits for Harmonic current emissions		**Verdict**
Reference standard: IEC 61000-3-2:2005		N/A
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	15 to 35 ℃	℃
Relative Humidity	30 to 60 %	%
Classification of Equipment.....:		Class
Limits for Class A equipment*		
Odd harmonics		
Harmonic order (n)	Maximum permissible harmonic current (A)	Results
3	2.30	
5	1.14	
7	0.77	
9	0.40	
11	0.33	
13	0.21	
15 ≤ n ≤ 40	0.15 x 15/n	
Even harmonics		
2	1.08	
4	0.43	
6	0.30	
8 ≤ n ≤ 40	0.23 x 8/n	
Limits for Class C equipment*		
Harmonic order (n)	Maximum permissible harmonic current expressed as a percentage on the input current at the fundamental frequency	Results
2	2	
3	30 λ	
5	10	
7	7	
9	5	
11 ≤ n ≤ 39 (odd harmonic only)	3	
Limits for Class D equipment*		

Harmonic order (n)	Maximum permissible harmonic current per watt (mA/W)	Results
3	3.4	
5	1.9	
7	1.0	
9	0.5	
11	0.35	
11 ≤ n ≤ 39	3.85/n	
Supplementary information: For class B equipment the harmonics of input current shall not exceed the values given for class A multiplied by a factor of 1.5 * - Delete limit sections, which are not applicable to the product under test.		

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Delete or add rows as needed except for the headers.					

Photo of test setup for Harmonic Current Emissions

EUT Operation mode: EUT configuration mode:

Tabulated Results for Harmonic Current Emissions
Note: *Enter compilation of results in any format that fulfils requirements of the standard.*

2.5 Test Conditions and Results – Limitation of Voltage Fluctuations and Flicker

TEST: Limitation of Voltage Fluctuations And Flicker		**Verdict**
Reference standard: IEC 61000-3-3:2008		N/A
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	15 to 35 °C	°C
Relative Humidity	30 to 60 %	%
Control Method of Equipment (see below) ..... :		

1 - without additional conditions
2 - switched manually, or switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.
3 - attended while in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

Supplementary information:

Parameter	Limit	Result
Pst	0.65	
Plt	1.0	
d(t)	3.3 % for > 0.5 s	
dc	3.3 %	
dmax	☐ 4 % ☐ 6 % ☐ 7 %	

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Delete or add rows as needed except for the headers.					

Photo of test setup for Voltage Fluctuations And Flicker

EUT Operation mode: EUT configuration mode:

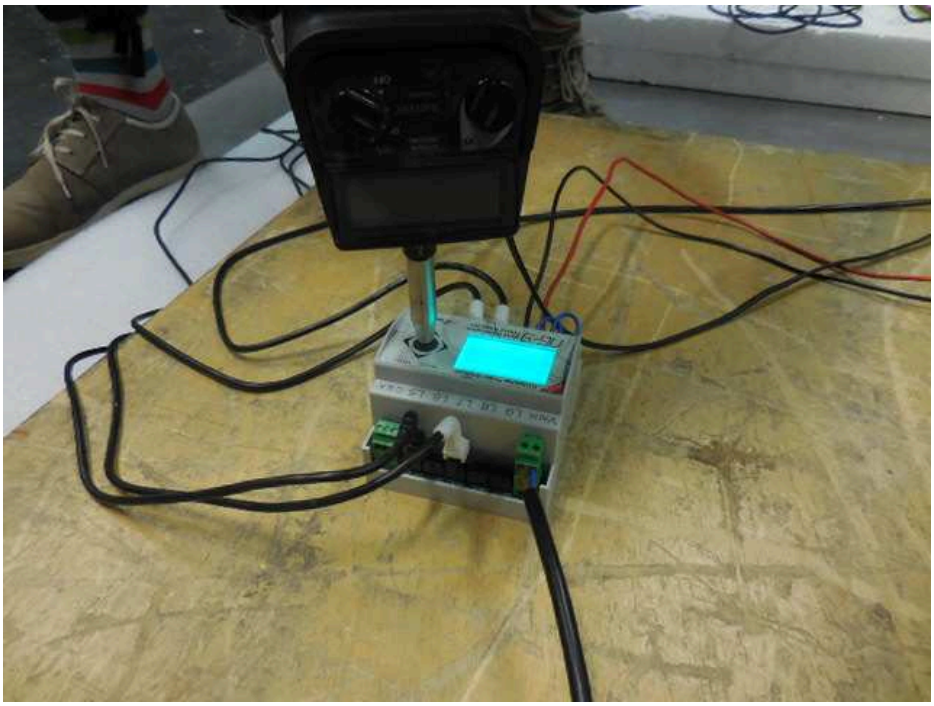
Tabulated Results for Voltage Fluctuations And Flicker
Note: *Enter compilation of results in any format that fulfils requirements of the standard.*

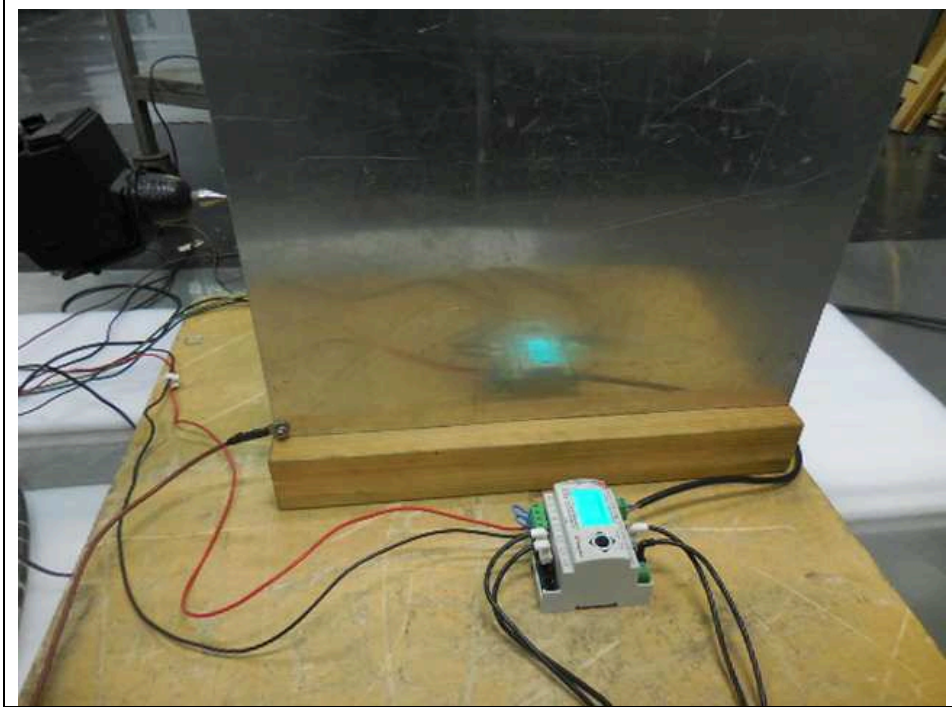
2.6 Test Conditions and Results – Immunity to Electrostatic Discharges

TEST: Immunity to Electrostatic discharges (ESD)				**Verdict**
Reference standard: IEC 61000-4-2:2008				P
Laboratory Parameters:	Required prior to the test		During the test	
Ambient Temperature	15 to 35 °C		22.3 °C	
Relative Humidity	30 to 60 %		44%	
Test Levels for industrial electromagnetic environment*				
Discharge type	Discharge Level (kV)		Number of discharges per location (each polarity)	Result
	Positive	Negative		
Air – Direct	8	8	10	P
Contact – Direct	4	4	10	N/A
Contact – Indirect	4	4	10	P
Discharge location	See photo documentation of the test set-up and tabulated results All external locations accessible by hand, Horizontal plate (HCP) Vertical coupling plate (VCP)			
Supplementary information: EUT powered at one of the Nominal input voltages and frequencies * - Delete level sections, which are not applicable to the product under test.				

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
ESD generator	Schaffner	NSG 438	248	2016-12-19	2017-12-19
Delete or add rows as needed except for the headers.					

Photo of test setup for Immunity to Electrostatic Discharges





EUT Operation mode: 1 EUT configuration mode: 1

Tabulated Results for Electrostatic Discharges				
		Nominal Rated Voltage (V) .....:	230	
		Nominal Rated Frequency (Hz)..:	50	
Direct discharges				
	Discharge location	**Contact discharge voltage (kV)**	**Polarity**	**Remark**
Contact Discharges				X
	Discharge location	**Air discharge voltage (kV)**	**Polarity**	**Remark**
Air Discharges	Display	8	+/-	1
	Pushbutton	8	+/-	1
Indirect discharges				
	Discharge location	**Contact discharge voltage (kV)**	**Polarity**	**Remark**
HCP	Above EUT	4	+/-	1
	Discharge location	**Contact discharge voltage (kV)**	**Polarity**	**Remark**
VCP	Sides of EUT	4	+/-	1
*** - Remarks should detail the observation during testing* *Delete or add rows as needed except for the header.*				

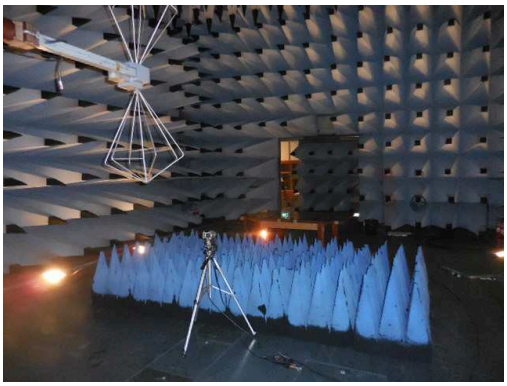
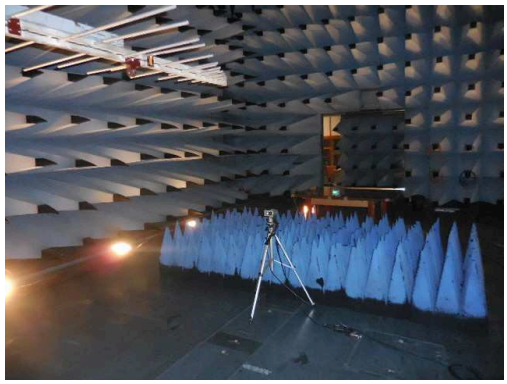
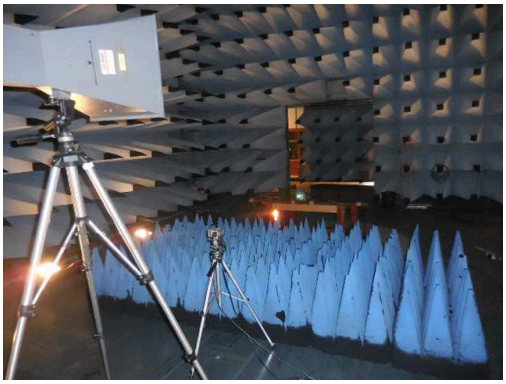
Table of remark	
X	Not performed
1	No observed/perceived response from EUT.
Note: Add more rows if needed. Remark should detail the observation during testing.	

2.7 Test Conditions and Results - Immunity to Radio Frequency Electromagnetic Fields

TEST: Immunity to RF electromagnetic fields					**Verdict**
Reference standard: IEC 61000-4-3:2006					P
Laboratory Parameters:	Required prior to the test		During the test		
Ambient Temperature	15 to 35 ℃		22.3℃		
Relative Humidity	30 to 60 %		44%		
Test specifications					
Frequency bandwidth	80 MHz to 2700 MHz				Result
Level	**Industrial EM environment***	Amplitude modulation (80% - 1KHz - sine wave)	80 – 1000MHz	10 V/m	P
			1400 – 2000MHz	3 V/m	P
			2000 – 2700MHz	1 V/m	P
Frequency step	1% with 3s dwell time				
Supplementary information: EUT powered at one of the Nominal input voltages and frequencies * - Delete level sections, which are not applicable to the product under test.					

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Signal generator	Rohde & Schwarz	SMR20	101684	2016/04/28	2017/10/28
Amplifier	Amplifier Research	500W 1000A	304066	2016/04/01	2018/04/01
Amplifier	Amplifier Research	175S1G4A	340321	2016/04/01	2018/04/01
Power Meter	Rohde & Schwarz	NRVS	841187/022	2016/07/21	2018/01/21
Directional coupler	Amplifier Research	DC6180A	322074	2016/10/05	2018/04/05
Directional coupler	Amplifier Research	DC7144	302459	2016/10/05	2018/04/05
Antenna	EMCO	3145	69598	/	/
Antenna	EMCO	3109	69597	/	/
Antenna	Amplifier Research	AT4002A	307308	/	/
Delete or add rows as needed except for the header.					

Photo of test setup for Radio Frequency Electromagnetic Fields


EUT Operation mode: 1 EUT configuration mode: 1

Tabulated Results for RF Electromagnetic Field 80 MHz to 2700 MHz			
Nominal Rated Voltage (V) ..... :		230	
Nominal Rated Frequency (Hz) . :		50	
Side of the equipment under test	**Frequency (MHz)**	**Antenna polarization (V/H)**	**Remark**
Front	80 – 1000MHz	V/H	1
	1400 – 2000MHz	V/H	1
	2000 – 2700MHz	V/H	1
Back	80 – 1000MHz	V/H	1
	1400 – 2000MHz	V/H	1
	2000 – 2700MHz	V/H	1
Left	80 – 1000MHz	V/H	1
	1400 – 2000MHz	V/H	1
	2000 – 2700MHz	V/H	1
Right	80 – 1000MHz	V/H	1
	1400 – 2000MHz	V/H	1
	2000 – 2700MHz	V/H	1
Delete or add rows as needed except for the header.			

Table of remark	
X	Not performed
1	No observed/perceived response from EUT.
Note: Add more rows if needed. Remark should detail the observation during testing.	

2.8 Test Conditions and Results – Immunity to Electrical Fast Transients

TEST: Immunity to Electrical Fast Transients			**Verdict**
Reference standard: IEC 61000-4-4:2004			P
Laboratory Parameters:	Required prior to the test	During the test	
Ambient Temperature	15 to 35 °C	22.3°C	
Relative Humidity	30 to 60 %	44%	

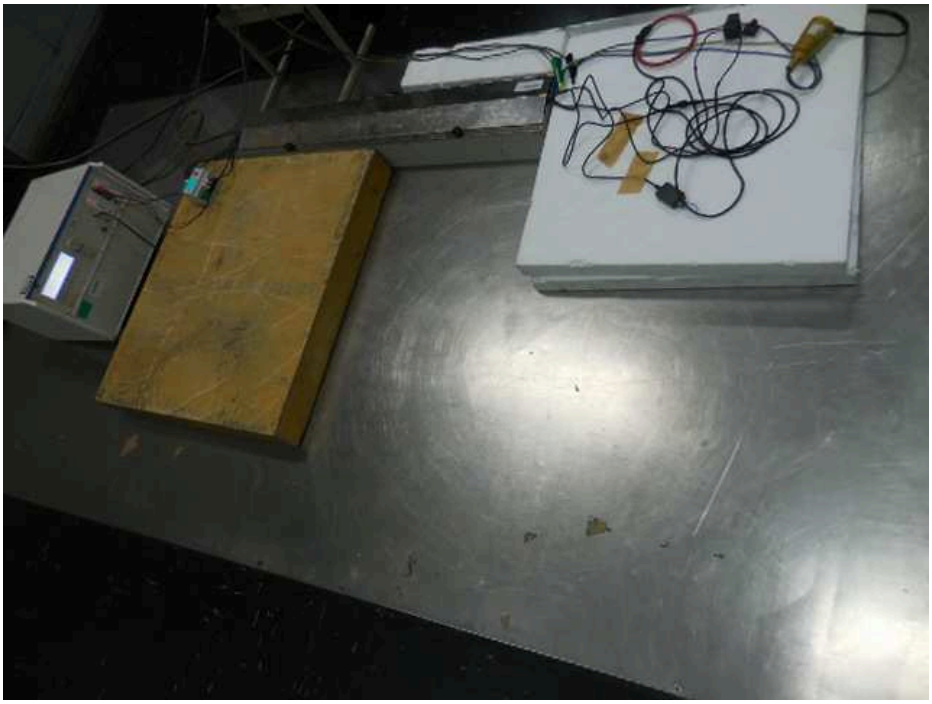
Industrial EM environment*			
Application Point	(kV)	Repetition Frequency (kHz)	Result
Input A.C. Power Ports	±2	5	P
Input D.C. Power Ports	±2	5	P
Signal/control Ports**	±1	5	P
Signal/control Ports connected directly to mains supply	±2	5	P

Supplementary information:

EUT powered at one of the Nominal input voltages and frequencies

* - Delete level sections, which are not applicable to the product under test.
** - Only in case of lines longer than 3 m.

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Burst generator	EM TEST	EFT 500-M	V0723102574	2017/03/22	2018/03/22
Clamp	EM TEST	HFK	II93-08	2017/03/22	2018/03/22
Delete or add rows as needed except for the header.					

Photo of test setup for Electrical Fast Transients


EUT Operation mode: 1 EUT configuration mode: 1

Tabulated Results for Fast Transient	
Nominal Rated Voltage (V) .....:	230
Nominal Rated Frequency (Hz)..:	50

Point of application	Polarity	Remark
Input A.C.	Positive	1
	Negative	1
Input D.C.	Positive	1
	Negative	1
Signal/control port	Positive	1
	Negative	1
Delete or add rows as needed except for the header.		

Table of remark	
X	Not performed
1	No observed/perceived response from EUT.
Note: Add more rows if needed. Remark should detail the observation during testing.	

2.9 Test Conditions and Results – Immunity to Surge

TEST: Immunity to Surge			**Verdict**
Reference standard: IEC 61000-4-5:2005			P
Laboratory Parameters:	Required prior to the test	During the test	
Ambient Temperature	15 to 35 °C	22.3°C	
Relative Humidity	30 to 60 %	44%	

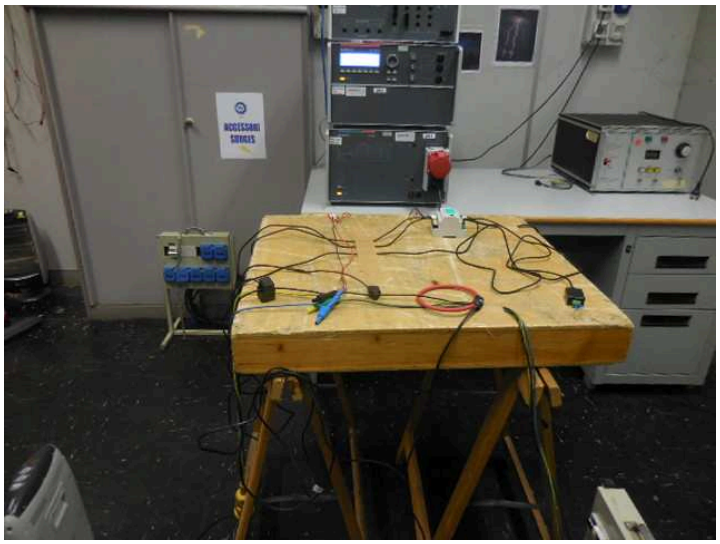
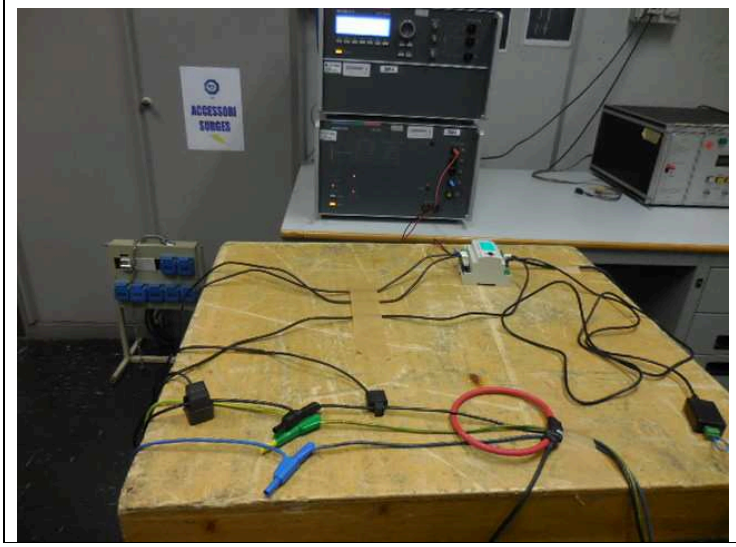
Industrial EM environment*				
Application Point	[kV]	Phase angle	Repetition rate	Result
Input A.C./D.C. Power Ports	±1.0 (Line to Line)	0, 90, 180, 270	60s	P
	±2.0 (Line to Earth)			N/A
Signal/control Ports**	——			
	±1.0 (Line to Earth)			N/A
Signal/control Ports connected directly to mains supply	±1.0 (Line to Line)	0, 90, 180, 270	60s	P
	±2.0 (Line to Earth)			N/A

Supplementary information:

EUT powered at one of the Nominal input voltages and frequencies

* - Delete level sections, which are not applicable to the product under test.
** - Only in case of lines within a building which are longer than 30 m, or which leave the building.

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Voltage Current Simulator	EM TEST	VCS 500N10	P1705192243	28/03/2017	28/03/2018
Coupling Decoupling Network	EM TEST	CNV 503S10	082 316-05	28/03/2017	28/03/2018
Delete or add rows if not needed except for the header.					

Photo of test setup for Surge



EUT Operation mode: 1 EUT configuration mode: 1

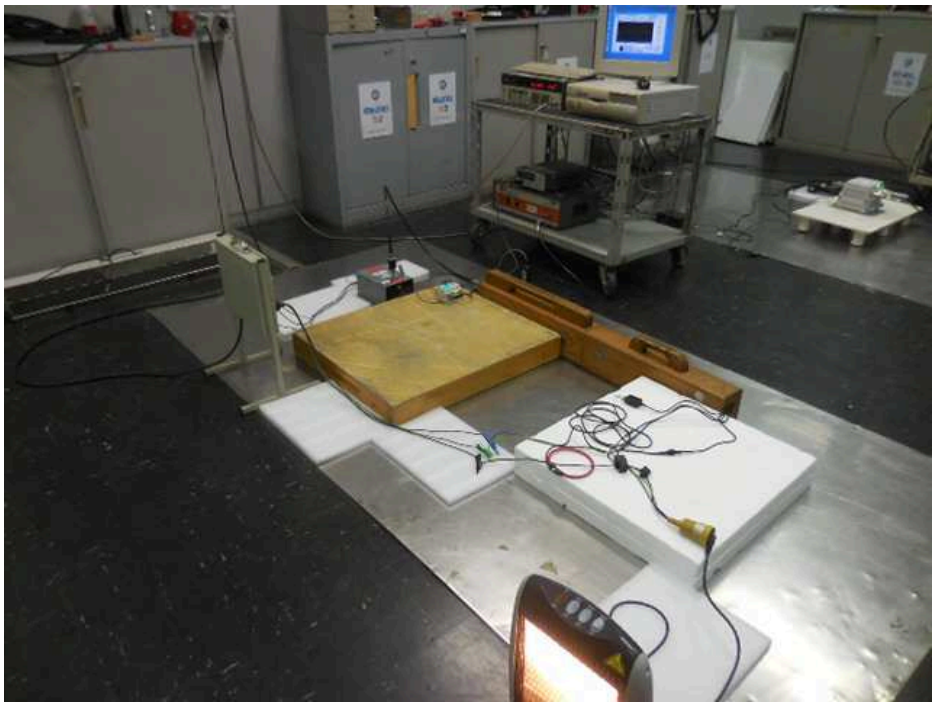
Tabulated Results for Surges			
Nominal Rated Voltage (V).....			230
Nominal Rated Frequency (Hz) .			50
Mode of Application	**Mode of coupling**	**Polarity**	**Remark**
Input A.C./D.C. Power ports	Line to Line	Positive	1
		Negative	1
	Line to Earth	Positive	X
		Negative	X
Signal/Control Ports	Line to Earth	Positive	X
		Negative	X
Signal/Control Ports connected directly to mains supply	Line to Line	Positive	1
		Negative	1
	Line to Earth	Positive	X
		Negative	X
Delete or add rows as needed except for the header.			

Table of remark	
X	Not performed
1	No observed/perceived response from EUT.
Note: Add more rows if needed. Remark should detail the observation during testing.	

2.10 Test Conditions and Results – Immunity to Conducted Disturbances

TEST: Immunity to RF Continuous Conducted disturbances			**Verdict**
Reference standard: IEC61000-4-6:2008			P
Laboratory Parameters:	Required prior to the test	During the test	
Ambient Temperature	15 to 35 °C	22.3°C	
Relative Humidity	30 to 60 %	44%	
Frequency step	1% with 3s dwell time		
Frequency bandwidth	150 KHz to 80 MHz		
Industrial EM environment*			
Application Point	Modulation	Level	Result
Input A.C. Power Ports	Amplitude modulation (80% - 1KHz - sine wave)	3V	P
Input D.C. Power Ports		3V	P
Signal/control Ports**		3V	P
Signal/control Ports connected directly to mains supply		3V	P
Supplementary information: EUT powered at one of the Nominal input voltages and frequencies * - Delete level sections, which are not applicable to the product under test. ** - Only in case of lines longer than 3 m.			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Signal generator	Hewlett-Packard	8656B	2703U03718	2017/03/15	2018/03/15
Power Amplifier	Amplifier Research	75A250	24051	2016/04/01	2018/04/01
Power Meter	Rohde & Schwarz	NRVS	847664//002	2016/07/21	2018/01/21
Directional coupler	Amplifier Research	DC3510	341909	2016/10/05	2018/04/05
CDN	Fischer Custom Communication	FCC 801-M5-16	9706	2017-03-17	2018-0317
Delete or add rows as needed except for the header.					

Photo of test setup for Conducted Disturbances


EUT Operation mode: 1 EUT configuration mode: 1

Tabulated Results for Conducted Disturbances	
Nominal Rated Voltage (V)	230
Nominal Rated Frequency (Hz) .	50

Point of Application	Application mode	Remark
Input A.C.	CDN	1
Input D.C.	CDN	1
Signal/control line	CDN/CLAMP	1
Measurement line	CDN/CLAMP	1
Delete or add rows as needed except for the header.		

Table of remark	
X	Not performed
1	No observed/perceived response from EUT.
Note: Add more rows if needed. Remark should detail the observation during testing.	

2.11 Test Conditions and Results – Immunity to Voltage Dips, Interruptions, and Variations

TEST: Immunity to Voltage Dips, Interruptions and Variations		**Verdict**
Reference method: IEC 61000-4-11:2004		
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	15 to 35 °C	22.3 °C
Relative Humidity	30 to 60 %	44%
Fully configured subjected to the levels indicated below.	Measurement Point	
	Input A.C. Power Ports	

Industrial EM environment*		
Voltage Dips % U_T	Period (Cycles)	Result
30	25/30	P
60	10/12	P
100	1	P
Voltage Interruption % U_T	Period (Cycles)	Result
100	250/300	P

Supplementary information:

Test is performed at the minimum and maximum rated input voltages and at the minimum and maximum rated frequency.

* - Delete level sections, which are not applicable to the product under test.

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Motorized variac	EM Test	MV3P4032DS	P1341125011	2016/04/05	2018/04/05
Power Fail simulator	EM Test	PFS503N32	P1331121500	2016/04/05	2018/04/05
Delete or add rows as needed, except the header.					

Photo of test setup for Voltage Dips, Interruptions, and Variations

Tabulated Results for Voltage Dips and Interruptions

		Minimum Rated Voltage (V)	80
		Maximum Rated Frequency (Hz)	50
Point of application	Voltage reduction	Period (Cycles)	Remark
Mains	30	25/30	1
Mains	60	10/12	1
Mains	100	1	1
Mains	100	250/300	EUT switches off and restarts automatically

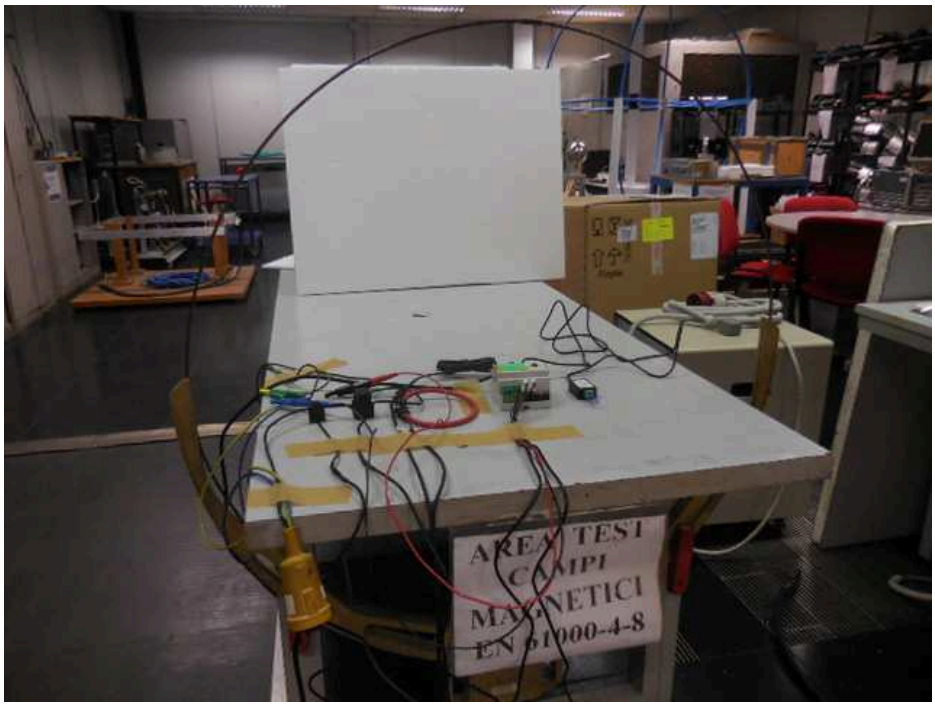
Table of remark

X	Not performed
1	No observed/perceived response from EUT.
Note: Add more rows if needed. Remark should detail the observation during testing.	

2.12 Test Conditions and Results – Immunity to Power- Frequency Magnetic Fields

TEST: Immunity to Power-frequency magnetic field		**Verdict**
Reference method: IEC 61000-4-8:2009		P
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	15 to 35 °C	22.3 °C
Relative Humidity	30 to 60 %	44%
Fully configured sample tested at the power line frequency (See Note 1)	**Frequency**	**Application Point**
	50Hz and 60 Hz [1]	Enclosure
Industrial EM environment*		
Frequency (Hz)	**Test Level (A/m)**	**Result**
50 and 60	30	P
Supplementary information: Note 1: The test is performed at both 50 Hz and 60 Hz, with the exception that equipment rated for use only at one of these frequencies need only to be tested at that frequency.		

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Current generator GE-MA-50	TUV Italia	GE-MA-50	5469	/	/
1 m^2 antenna				/	/
Magnetic Field Meter	COMBINOVA	TESLA 100	10012	2015/02/19	2018/02/19
Delete or add rows as needed except the header.					

Photo of test setup for Power- Frequency Magnetic Fields


Tabulated Results for Power Frequency Magnetic Field		
Nominal Rated Voltage (V)	230	
Point of application	**Remark**	
	50 Hz	**60 Hz**
X-Axis	1	X
Y-Axis	1	X
Z-Axis	1	X

Table of remark	
X	Not performed
1	No observed/perceived response from EUT.
Note: Add more rows if needed. Remark should detail the observation during testing.	