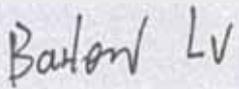
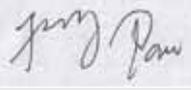




Test report No:  
18C2046E-AEC-CE-P01V01

## TEST REPORT

### Electromagnetic Compatibility (EMC)

Identification of item tested	Tstat8 Bacnet Thermostat
Trademark	N/A
Model and /or type reference	Tstat8
Features	N/A
Derived model(s)	N/A
Applicant's name / address	Temco Controls Ltd 3500 Hongxin Road.Shanghai 201101,China
Test method requested, standard	EN 60730-1: 2016
Verdict Summary	COMPLIANCE
Tested by (name / position & signature)	Barlow Lv/Project Engineer 
Approved by (name / position & signature)	Jerry Pan/Manager 
Date of issue	May.10,2019
Report template No	Template_EN60730-1-EMC-V1.1

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## COMPETENCES AND GUARANTEES

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DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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## GENERAL CONDITIONS

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1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

## UNCERTAINTY

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For all measurements where guidance for the calculation of the instrumentation uncertainty of a measurement is specified in CISPR 16-4-2, IEC 61000-4 series or a product standard, the measurement instrumentation uncertainty has been calculated and applied in accordance with these standards.

Uncertainties have been calculated according to the DEKRA internal document PROD-P-EMC-M22. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%. Refer to the Annex 1 for further information.

## ENVIRONMENTAL CONDITIONS

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The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	25 % - 75 %; 30 % - 60 % (ESD)
Atmospheric pressure	86 kPa – 106 kPa

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

## POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

## DEFINITION OF SYMBOLS USED IN THIS TEST REPORT

<input checked="" type="checkbox"/> Indicates that the listed condition, standard or equipment is applicable for this report/test/EUT.			
<input type="checkbox"/> Indicates that the listed condition, standard or equipment is not applicable for this report/test/EUT.			
Decimal separator used in this report	<input checked="" type="checkbox"/>	Comma (,)	<input type="checkbox"/> Point (.)

## ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	:	Equipment Under Test
QP	:	Quasi-Peak
CAV	:	CISPR Average
AV	:	Average
CDN	:	Coupling Decoupling Network
SAC	:	Semi-Anechoic Chamber
OATS	:	Open Area Test Site
BW	:	Bandwidth
AM	:	Amplitude Modulation
PM	:	Pulse Modulation
HCP	:	Horizontal Coupling Plane
VCP	:	Vertical Coupling Plane
U <sub>N</sub>	:	Nominal voltage
Tx	:	Transmitter
Rx	:	Receiver
N/A	:	Not Applicable
N/M	:	Not Measured
TEM	:	Transverse Electromagnetic Mode

## DOCUMENT HISTORY

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Report nr.	Date	Description
18C2046E-AEC-CEP01V01	May. 10, 2019	First release.

## REMARKS AND COMMENTS

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1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with EN 60730-1: 2016.
3. The test results presented in this report relate only to the object tested.
4. This report will not be used for social proof function in China market.
5. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, it is not necessary to account the uncertainty associated with the measurement result.

# 1 GENERAL INFORMATION

## 1.1 General Description of the Item(s)

Description of the item .....	Tstat8 Bacnet Thermostat
Model / Type number .....	Tstat8
Serial number .....	N/A
Trademark .....	N/A
Manufacturer.....	Temco Controls Ltd
Address .....	3500 Hongxin Road, Shanghai 201101, China

Rated power supply .....	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	<input type="checkbox"/>	AC: 220 – 240 V, 50/60 Hz	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/>	AC: 100 – 240 V, 50/60 Hz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	DC:					
	<input type="checkbox"/>	Battery:					
Rated Power :	100 – 240 VAC, 50/60 Hz						
Clock frequencies :	8MHz						
Other parameters :	N/A						
Software version :	Not provided						
Hardware version :	Not provided						
Dimensions in cm (L x W x H) .....	11.5cm*8cm*2.8cm						
Mounting position.....	<input type="checkbox"/>	Table top equipment					
	<input checked="" type="checkbox"/>	Wall/Ceiling mounted equipment					
	<input type="checkbox"/>	Floor standing equipment					
	<input type="checkbox"/>	Hand-held equipment					
	<input type="checkbox"/>	Other:					

Intended use of the Equipment Under Test (EUT)
Commercial and light-industrial

No	Module/parts of test item	Type	Manufacturer
1	Power Adapter	B06240030	delibaoke

No	Documents as provided by the applicant - Description	File name	Issue date
N/A	N/A	N/A	N/A

Modifications to the test item during testing .....	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>	Supplemental information:
-----------------------------------------------------	-------------------------------------	-----	--------------------------	---------------------------

Copy of marking plate:
N/A

### 1.2 The environment(s) in which the EUT is intended to be used

The equipment under test (EUT) is intended to be used in the following environment(s):

<input type="checkbox"/>	Residential (domestic) environment.
<input checked="" type="checkbox"/>	Commercial and light-industrial environment.
<input type="checkbox"/>	Industrial environment.

### 1.3 Test date

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	Apr. 20, 2019
Date (start test)	Apr. 22, 2019
Date (finish test)	May.10, 2019

### 1.4 Classification according to EN 60730-1

For the Equipment Under Test (EUT) the following classification is applicable:

<input type="checkbox"/>	Type 1 action	Operating controls	Incorporated and integrated controls
<input checked="" type="checkbox"/>			Free standing controls, independently mounted and/or in-line cord controls
<input type="checkbox"/>	Type 2 action	Protective controls	Incorporated and integrated controls
<input type="checkbox"/>			Free standing controls, independently mounted and/or in-line cord controls
<input type="checkbox"/>	Type 2 action	Operating controls	Incorporated and integrated controls
<input type="checkbox"/>			Free standing controls, independently mounted and/or in-line cord controls
<input type="checkbox"/>	Type 2 action	Protective controls declared in Table 1 of EN 60730-1, requirement 90 intended for use in accordance with IEC 60335-1	

### 1.5 Classification according to CISPR 11

<input checked="" type="checkbox"/>	Group 1	group 1 contains all equipment in the scope of this standard which is not classified as group 2 equipment.
<input type="checkbox"/>	Group 2	group 2 contains all ISM RF equipment in which radio-frequency energy in the frequency range 9 kHz to 400 GHz is intentionally generated and used or only used locally, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material, for inspection/analysis purposes, or for transfer of electromagnetic energy.
<input type="checkbox"/>	Class A	Class A equipment is equipment suitable for use in all locations other than those allocated in residential environments and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.
<input checked="" type="checkbox"/>	Class B	Class B equipment is equipment suitable for use in d locations in residential environments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

## 1.6 Classification according to CISPR 22

For the Equipment Under Test (EUT) the following classification is applicable, and this classification only apply for the radiated emission above 1GHz test item.

<input type="checkbox"/>	Class A	Class A ITE is a category of all other ITE which satisfies the class A ITE limits but not the class B ITE limits.
<input checked="" type="checkbox"/>	Class B	Class B ITE is intended primarily for use in the domestic environment and may include: <ul style="list-style-type: none"> <li>- equipment with no fixed place of use; for example, portable equipment powered by built-in batteries;</li> <li>- telecommunication terminal equipment powered by a telecommunication network;</li> <li>- personal computers and auxiliary connected equipment.</li> </ul>

## 2 DESCRIPTION OF TEST SETUP

### 2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

Operating mode	Operating mode description	Used for testing	
		Emission	Immunity
1	Working Mode	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<u>Supplemental information:</u>			

### 2.2 Port(s) of the EUT

Port name and description	Connected to / Termination	Cable		
		Length used during test [m]	Attached during test	Shielded
DC Port	AC/DC adapter	1.5 m	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<u>Supplemental information:</u>				

### 2.3 Support / Auxiliary equipment / unit / software for the EUT

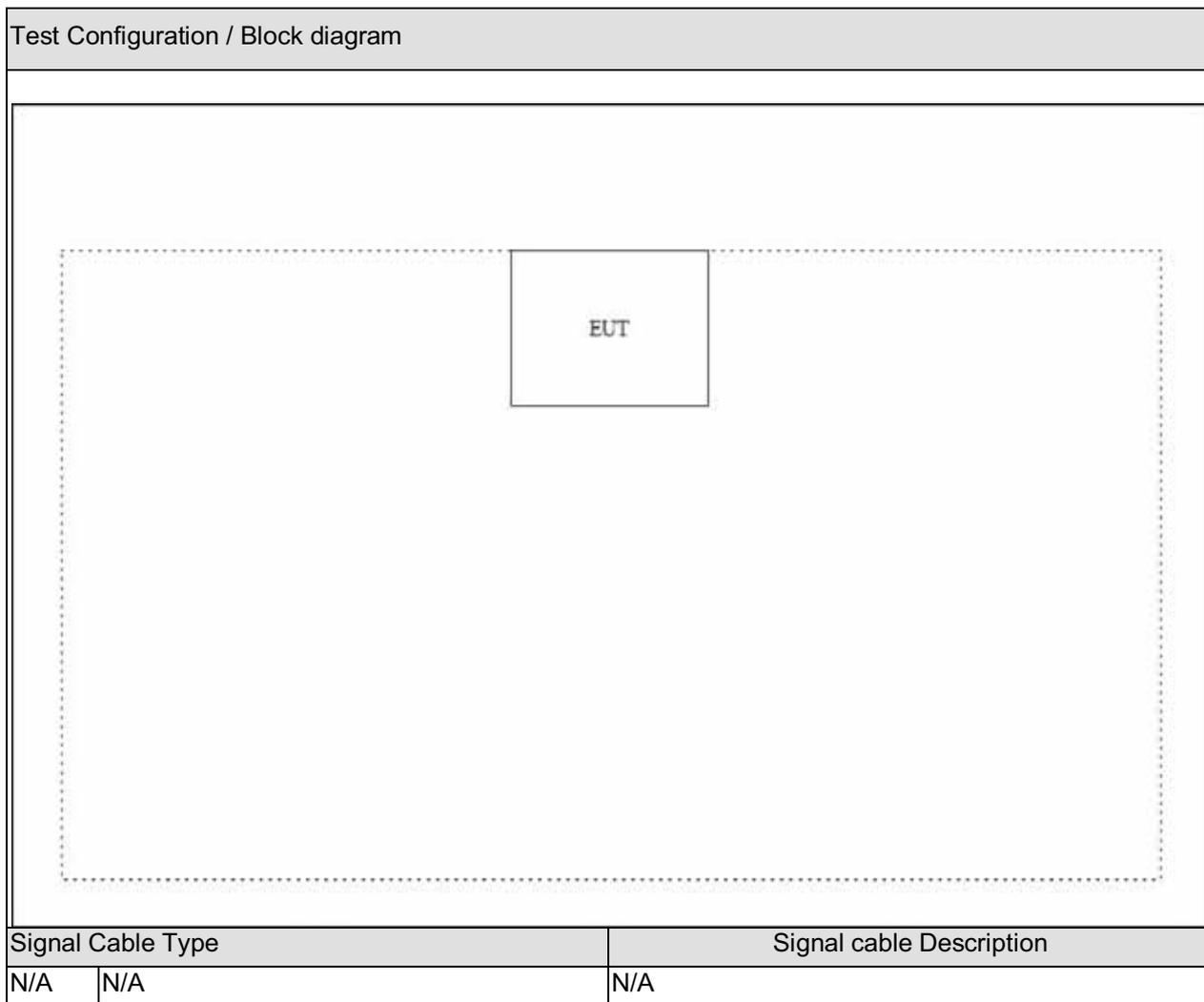
The EUT has been tested with the following auxiliary equipment / unit / software:

Auxiliary equipment / unit / software	Type / Version	Manufacturer	Supplied by
N/A	N/A	N/A	N/A
<u>Supplemental information:</u>			

## 2.4 Test Configuration / Block diagram used for tests

The following test setup / configuration / block diagram has been used during the tests:

Test Item		EMI / EMS			
Product		Manufacturer	Model No.	Serial No.	Power Cord
1	N/A	N/A	N/A	N/A	N/A



### 3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

#### 3.1 Standards

Standard	Year	Description
EN 60730-1	2016	Automatic electrical controls Part 1: General requirements
CISPR 22	2008	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
CISPR 14-1	2016	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
EN 55016-2-1 +A1	2014 2017	Methods of measurement of disturbances and immunity - Conducted disturbance measurements.
EN 55016-2-3	2017	Methods of measurement of disturbances and immunity - Radiated disturbance measurements.
IEC 61000-3-2	2018	Limits for harmonic current emissions (equipment input current $\leq 16$ A per phase)
IEC 61000-3-3 +A1	2013 2017	Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current $\leq 16$ A per phase and not subject to conditional connection
IEC 61000-4-2	2008	Electrostatic discharge immunity test
IEC 61000-4-3 A1 A2	2006 2007 2010	Radiated, radio-frequency, electromagnetic field immunity test
IEC 61000-4-4	2012	Electrical fast transient/burst immunity test
IEC 61000-4-5 +A1	2014 2017	Surge immunity test
IEC 61000-4-6 +AC	2013 2015	Immunity to conducted disturbances, induced by radio-frequency fields
IEC 61000-4-8	2009	Power frequency magnetic field immunity test
IEC 61000-4-11 +A1	2004 2017	Voltage dips, short interruptions and voltage variations immunity tests

#### 3.2 Deviation(s) from the Standard(s) / Test Specification(s)

No deviation.

### 3.3 Overview of results

EMISSION TESTS – EN 55032, and EN 61000-3-2 and EN 61000-3-3			
Requirement – Test case	Basic standard(s)	Verdict	Remark
Conducted emissions – AC mains power ports	EN 55016-2-1, CISPR 22	PASS	---
Discontinuous disturbance (clicks)– Load terminal	CISPR 14-1	N/A	See 3)
Radiated emissions <sup>1)</sup> (30 MHz to 1000 MHz)	EN 55016-2-3, CISPR 22	PASS	---
Radiated emissions (above 1 GHz)	EN 55016-2-3, CISPR 22	PASS	---
Harmonic current emissions <sup>2)</sup>	IEC 61000-3-2	PASS	---
Voltage changes, voltage fluctuations and flicker <sup>2)</sup>	IEC 61000-3-3	PASS	---
<sup>1)</sup> Applicable only to controls containing processing devices, for example, microprocessors operating at frequencies greater than 9 kHz. <sup>2)</sup> Applicable only to equipment within the scope of IEC 61000-3-2 and IEC 61000-3-3. Limits for controls not currently covered by IEC 61000-3-2 and IEC 61000-3-3 are under consideration. <sup>3)</sup> The calculated click rate N is not more than 5 times per minute and all the clicks are classified as short ( $t \leq 10$ ms). Thus, the EUT is deemed to comply with the limits without any further measurement at an increased limit.			
<u>Supplementary information:</u>			

Immunity TESTS – EN 55024			
Requirement – Test case	Basic standard(s)	Verdict	Remark
Electrostatic discharge	IEC 61000-4-2	PASS	---
Radio-frequency electromagnetic field	IEC 61000-4-3	PASS	---
Electrical fast transients	IEC 61000-4-4	PASS	---
Surges	IEC 61000-4-5	PASS	---
Radio-frequency continuous conducted	IEC 61000-4-6	PASS	---
Power-frequency magnetic field	IEC 61000-4-8	PASS	---
Voltage dips and interruptions	IEC 61000-4-11	PASS	---
<u>Supplementary information:</u>			

### 3.4 Test Matrix

EMISSION TESTS	Model / Type		
	Mode 1		
Conducted emissions – AC mains power ports (150 KHz – 30 MHz)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Discontinuous disturbance (clicks)– Load terminal (150 KHz – 30 MHz)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated emissions (30 MHz to 1000 MHz)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated emissions (above 1 GHz)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Harmonic current emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Voltage changes, voltage fluctuations and flicker	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Supplementary: Information:</u>			

IMMUNITY TESTS	Model / Type		
	Mode 1		
Electrostatic discharge	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radio-frequency electromagnetic fields	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electrical fast transients	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Surges	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radio-frequency continuous conducted	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power-frequency magnetic field	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Voltage dips and interruptions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Supplementary: Information:</u>			

## 4 EMISSION TEST RESULTS

<b>4.1 Conducted emissions – AC mains power ports</b>	<b>VERDICT: PASS</b>
-------------------------------------------------------	----------------------

Standard	EN 60730-1
Basic standard(s)	EN 55016-2-1, CISPR 22, CISPR 11

### Limits

Frequency range [MHz]	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>	IF BW	Detector(s)
0.15 - 0.50	66 – 56 <sup>2)</sup>	56 – 46 <sup>2)</sup>	9 kHz	QP, CAV
0.50 - 5.0	56	46	9 kHz	QP, CAV
5.0 - 30	60	50	9 kHz	QP, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

<sup>2)</sup> The limit decreases linearly with the logarithm of the frequency.

Note: Free-standing, independently mounted and in-line cord electronic controls using telecommunication ports, software, oscillating circuits, or switching power supplies shall comply with the requirements .

### Limits – Group 1 Class A (a.c. mains power port)

Frequency range [MHz]	Rated input power of ≤ 20 kVA		Rated input power of > 20 kVA <sup>a</sup> to ≤ 75 kVA		Rated input power of > 75 kVA <sup>a</sup>		IF BW	Detector (s)
	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>		
0.15 - 0.5	79	66	100	90	130	120	9 kHz	QP, CAV
0.5 - 5	73	60	86	76	125	115	9 kHz	QP, CAV
5 - 30	73	60	90-73	80-60	115	105	9 kHz	QP, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

Note: Controls for ISM equipment and free-standing, independently mounted and in-line cord controls for use with ISM equipment shall comply with the requirements

### Limits – Group 1 Class A (d.c. mains power port)

Frequency range [MHz]	Rated input power of ≤ 20 kVA		Rated input power of > 20 kVA <sup>a</sup> to ≤ 75 kVA				Rated input power of > 75 kVA <sup>a</sup>				IF BW	Detector (s)
	Limit [dB(μV) <sup>1)</sup>		Limit [dB(μV) <sup>1)</sup>		Limit [dB(μA) <sup>1)</sup>		Limit [dB(μV) <sup>1)</sup>		Limit [dB(μA) <sup>1)</sup>			
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV		
0.15 - 5	97-89	106-96	116-106	106-96	72-62	122-112	132-122	122-112	88-78	78-68	9 kHz	QP, CAV
5 - 30	89	96-76	106-89	96-76	62-45	112-92	122-105	112-92	78-61	68-48	9 kHz	QP, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

Note: Controls for ISM equipment and free-standing, independently mounted and in-line cord controls for use with ISM equipment shall comply with the requirements

### Limits – Group 1 Class B (a.c. mains power port)

Frequency range [MHz]	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>	IF BW	Detector(s)
0.15 - 0.50	66-56	56-46	9 kHz	QP, CAV
0.50 - 5	56	46	9 kHz	QP, CAV
5 - 30	60	50	9 kHz	QP, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

Note: Controls for ISM equipment and free-standing, independently mounted and in-line cord controls for use with ISM equipment shall comply with the requirements

### Limits – Group 1 Class B (d.c. mains power port)

Frequency range [MHz]	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>	IF BW	Detector(s)
0.15 - 0.50	84-74	74-64	9 kHz	QP, CAV
0.5 - 30	74	64	9 kHz	QP, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

Note: Controls for ISM equipment and free-standing, independently mounted and in-line cord controls for use with ISM equipment shall comply with the requirements

### Limits – Group 2 Class A (a.c. mains power port)

Frequency range [MHz]	Rated input power of ≤ 75 kVA		Rated input power of > 75 kVA <sup>2)</sup>		IF BW	Detector(s)
	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>		
0.15 - 0.50	100	90	130	120	9 kHz	QP, CAV
0.50 - 5	86	76	125	115	9 kHz	QP, CAV
5 - 30	90-73	80-60	115	105	9 kHz	QP, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

<sup>2)</sup> The manufacturer and/or supplier shall provide information on installation measures that can be used to reduce emissions from the installed equipment.

At the transition frequency, the more stringent limit shall apply.

NOTE 1: Limits only apply to Low Voltage (LV) a.c. mains input ports.

NOTE 2: For class A equipment with a rated power ≤ 75 kVA intended to be connected solely to isolated neutral or high impedance earthed (IT) industrial power distribution networks (see IEC 60364-1), the limits defined for group 2 equipment with a rated input power > 75 kVA can be applied.

NOTE 3: Controls for ISM equipment and free-standing, independently mounted and in-line cord controls for use with ISM equipment shall comply with the requirements

### Limits – Group 2 Class B (a.c. mains power port)

Frequency range [MHz]	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>	IF BW	Detector(s)
0.15 - 0.50	66-56	56-46	9 kHz	QP, CAV
0.50 - 5	56	46	9 kHz	QP, CAV
5 - 30	60	50	9 kHz	QP, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

Note: Controls for ISM equipment and free-standing, independently mounted and in-line cord controls for use with ISM equipment shall comply with the requirements.

### Performed measurements

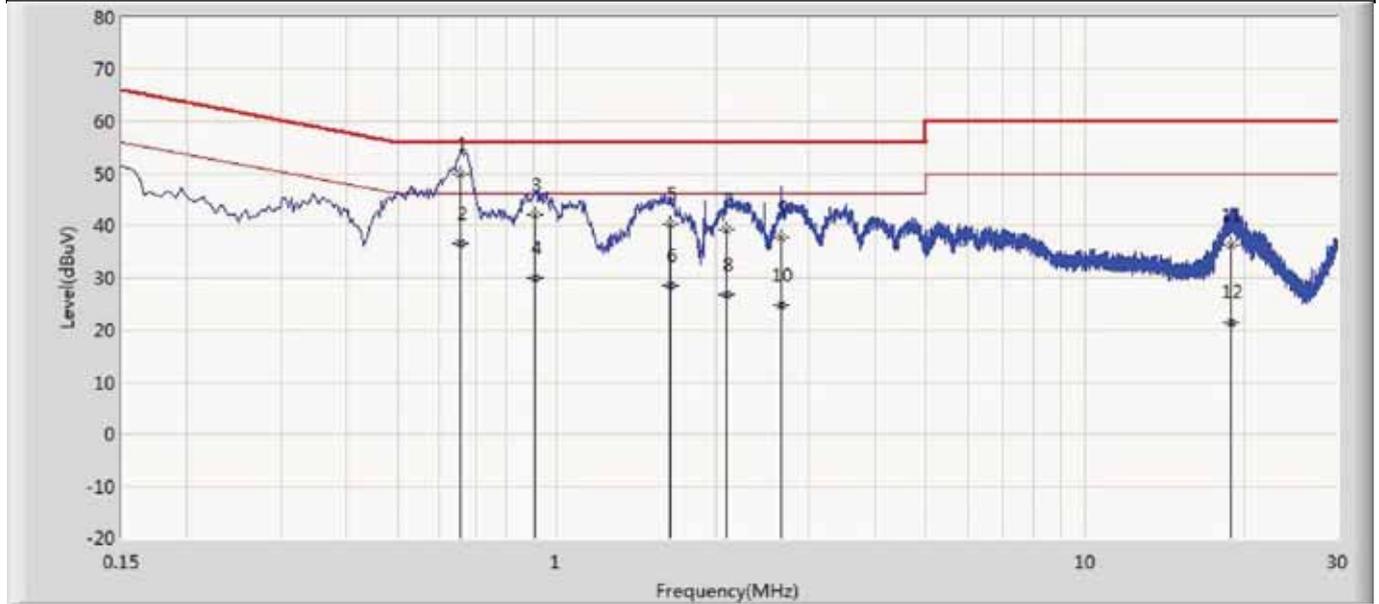
Port under test		Terminal							
<input checked="" type="checkbox"/>	AC mains input power	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	L1	<input type="checkbox"/>	L2	<input type="checkbox"/>	L3
<input type="checkbox"/>	Other:	<input type="checkbox"/>	N	<input type="checkbox"/>	L1	<input type="checkbox"/>	L2	<input type="checkbox"/>	L3
Voltage – Mains [V]		230 Vac							
Frequency – Mains [Hz]		50 Hz							
Test method applied		<input checked="" type="checkbox"/>	Artificial mains network						
		<input type="checkbox"/>	Voltage probe						
Test setup		<input checked="" type="checkbox"/>	Table top	<input type="checkbox"/>	Artificial hand applied				
		<input type="checkbox"/>	Floor standing	<input type="checkbox"/>	Other:				
		Refer to the Annex 2 for test setup photo(s).							
Operating mode(s) used		Mode 1							
Remark		---							

See next page.

<b>Measurement data</b>	Port under test	AC mains input power
-------------------------	-----------------	----------------------

Operating mode / voltage / frequency used during the test	Mode 1 / 230 Vac / 50 Hz
-----------------------------------------------------------	--------------------------

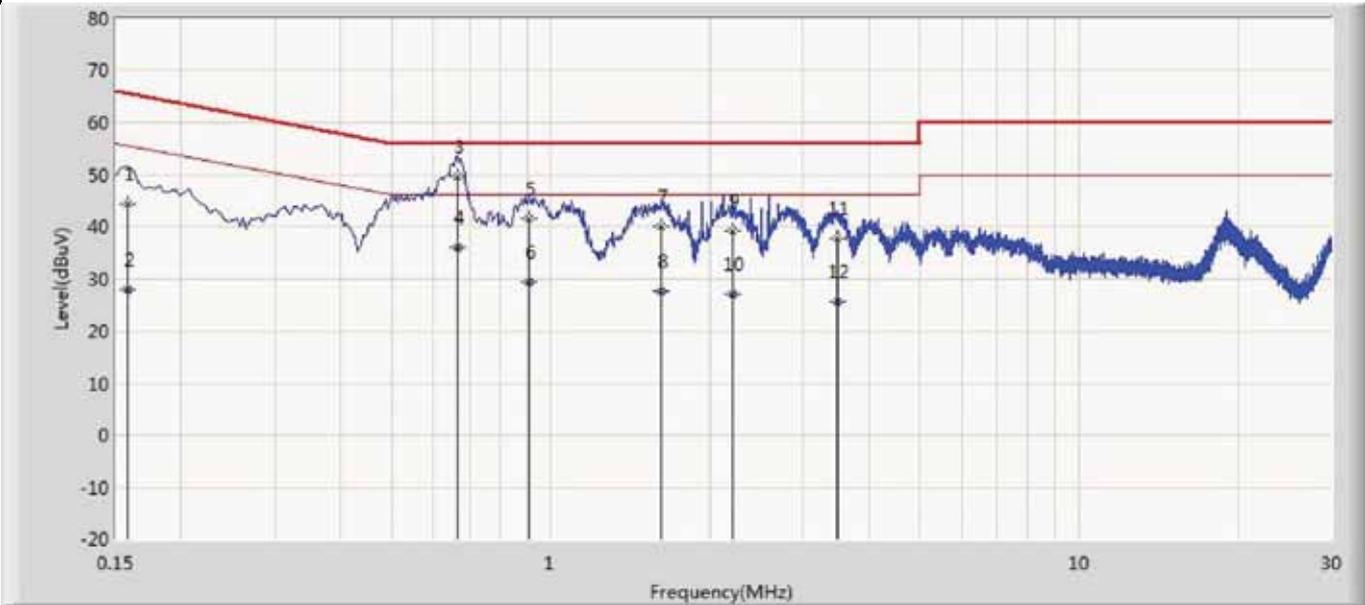
Engineer: Canon	
Site: TR1	Time: 2019/04/23
Limit: CISPR22_CE_Mains_ClassB	Margin: 0
Probe: ENV216_101190(0.009-30MHz)	Polarity: Line
EUT: Tstat8 Bacnet Thermostat	Power: AC 230V/50Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1	*	0.658	49.765	40.117	-6.235	56.000	9.600	0.048	0.000	QP
2		0.658	36.588	26.940	-9.412	46.000	9.600	0.048	0.000	AV
3		0.910	41.950	32.286	-14.050	56.000	9.607	0.057	0.000	QP
4		0.910	29.877	20.213	-16.123	46.000	9.607	0.057	0.000	AV
5		1.638	40.307	30.619	-15.693	56.000	9.610	0.078	0.000	QP
6		1.638	28.277	18.590	-17.723	46.000	9.610	0.078	0.000	AV
7		2.090	39.020	29.320	-16.980	56.000	9.611	0.089	0.000	QP
8		2.090	26.687	16.987	-19.313	46.000	9.611	0.089	0.000	AV
9		2.662	37.631	27.908	-18.369	56.000	9.621	0.102	0.000	QP
10		2.662	24.557	14.834	-21.443	46.000	9.621	0.102	0.000	AV
11		18.918	36.249	25.881	-23.751	60.000	10.088	0.280	0.000	QP
12		18.918	21.312	10.944	-28.688	50.000	10.088	0.280	0.000	AV

Note:  
 1. " \* ", means this data is the worst emission level.  
 2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Remark	
--------	--

Measurement data		Port under test	AC mains input power							
Operating mode / voltage / frequency used during the test			Mode 1 / 230 Vac / 50 Hz							
Engineer: Canon										
Site: TR1					Time: 2019/04/23					
Limit: CISPR22_CE_Mains_ClassB					Margin: 0					
Probe: ENV216_101190(0.009-30MHz)					Polarity: Neutral					
EUT: Tstat8 Bacnet Thermostat					Power: AC 230V/50Hz					
Note: Mode 1										
										
No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.158	44.477	34.856	-21.091	65.568	9.592	0.029	0.000	QP
2		0.158	27.913	18.292	-27.655	55.568	9.592	0.029	0.000	AV
3	*	0.666	49.653	40.014	-6.347	56.000	9.590	0.049	0.000	QP
4		0.666	36.080	26.441	-9.920	46.000	9.590	0.049	0.000	AV
5		0.906	41.309	31.663	-14.691	56.000	9.590	0.057	0.000	QP
6		0.906	29.150	19.503	-16.850	46.000	9.590	0.057	0.000	AV
7		1.618	39.956	30.277	-16.044	56.000	9.603	0.076	0.000	QP
8		1.618	27.678	17.999	-18.322	46.000	9.603	0.076	0.000	AV
9		2.202	39.218	29.513	-16.782	56.000	9.613	0.092	0.000	QP
10		2.202	27.028	17.323	-18.972	46.000	9.613	0.092	0.000	AV
11		3.494	37.561	27.813	-18.439	56.000	9.630	0.118	0.000	QP
12		3.494	25.561	15.813	-20.439	46.000	9.630	0.118	0.000	AV
Note: 1. " * ", means this data is the worst emission level. 2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).										
Remark										

<b>4.2 Discontinuous disturbance (clicks)– Load terminal</b>	<b>VERDICT: N/A</b>
--------------------------------------------------------------	---------------------

Standard	EN 60730-1		
Basic standard	CISPR 14-1		
Frequency [MHz]	Limit: QP [dB(μV)]	IF BW	Detector
0,15	66	9 KHz	Quasi-Peak (QP)
0,50	56	9 KHz	Quasi-Peak (QP)
1,40	56	9 KHz	Quasi-Peak (QP)
30,0	60	9 KHz	Quasi-Peak (QP)

**Performed measurements**

Voltage – Mains [V]			
Frequency – Mains [Hz]			
Test method applied	<input checked="" type="checkbox"/>	Artificial mains network	
	<input type="checkbox"/>	Voltage probe	
Test setup	<input checked="" type="checkbox"/>	Table top	<input type="checkbox"/> Floor standing
	<input type="checkbox"/>	Other:	
Refer to the Annex 2 for test setup photo(s).			
Operating mode(s) used			
Remark	---		

Reason for not performing the test	<input checked="" type="checkbox"/>	The amplitudes of the observed disturbances were all below the limit for continuous disturbance, these are not considered to be clicks.
------------------------------------	-------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------

Measurement results	<input type="checkbox"/>	Neutral	<input type="checkbox"/>	Line 1	<input type="checkbox"/>	Line 2	<input type="checkbox"/>	Line 3
---------------------	--------------------------	---------	--------------------------	--------	--------------------------	--------	--------------------------	--------

Frequency (MHz)	First Measurement: Determination of the limit $L_q$ – Quasi-peak							
	Limit $L$ (dBμV)	Number of short clicks	Number of long clicks	Number of clicks – $N_1$	Time of meas. (min.)	Click rate $N$	Increased limit (dB)	Increased Limit $L_q$
0,15	66							
0,5	56							
1,4	56							
30	60							

<input type="checkbox"/>	The calculated click rate $N$ is not more than 5 times per minute and all the clicks are classified as short ( $t \leq 10$ ms). Thus, the EUT is deemed to comply with the limits without any further measurement at an increased limit.
--------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Frequency (MHz)	Second measurement with Limit = $L_q$ (Upper quartile method):			
	Limit $L_q$ (dBμV)	Number of clicks – $N_2$	Number of authorized clicks $N_2 \leq N_1/4$	Verdict
0,15				
0,5				
1,4				
30				

Supplementary information: --- The calculated click rate  $N$  is not more than 5 times per minute and all the clicks are classified as short ( $t \leq 10$  ms). Thus, the EUT is deemed to comply with the limits without any further measurement at an increased limit.

<b>4.3 Radiated emissions (30 MHz to 1000 MHz)</b>	<b>VERDICT: PASS</b>
----------------------------------------------------	----------------------

Standard	EN 60730-1
Basic standard(s)	EN 55016-2-3, CISPR 22, CISPR 11
Test method	Antenna method according to EN 55016-2-3 standard.
<u>Supplementary information:</u>	

#### Limits

Frequency [MHz]	Limit: QP [dB(μV/m) <sup>1)</sup>		IF BW	Detector
	@10 m.			
30 - 230	30		120 KHz	QP
230 - 1000	37		120 KHz	QP

<sup>1)</sup> At the transition frequency, the lower limit applies.

Note: Free-standing, independently mounted and in-line cord electronic controls using telecommunication ports, software, oscillating circuits, or switching power supplies shall comply with the requirements .

#### Limits – Group 1 Class A

Frequency [MHz]	Limit: QP [dB(μV/m) <sup>1)</sup>				IF BW	Detector
	@10 m.		@3 m.			
	≤ 20 kVA	> 20 kVA	≤ 20 kVA	> 20 kVA		
30 - 230	40	50	50	60	120 kHz	QP
230 - 1000	47	50	57	60	120 kHz	QP

<sup>1)</sup> At the transition frequency, the lower limit applies.

Note: Controls for ISM equipment and free-standing, independently mounted and in-line cord controls for use with ISM equipment shall comply with the requirements.

#### Limits – Group 1 Class B

Frequency [MHz]	Limit: QP [dB(μV/m) <sup>1)</sup>		IF BW	Detector
	@10 m.	@3 m.		
30 - 230	30	40	120 kHz	QP
230 - 1000	37	47	120 kHz	QP

<sup>1)</sup> At the transition frequency, the lower limit applies.

Note: Controls for ISM equipment and free-standing, independently mounted and in-line cord controls for use with ISM equipment shall comply with the requirements.

#### Limits – Group 2 Class A

Frequency [MHz]	Limit: QP [dB(μV/m) <sup>1)</sup>						IF BW	Detector
	@30 m.		@10 m.		@3 m. <sup>2)</sup>			
	Magnetic Field	Electric field	Magnetic Field	Electric field	Magnetic Field	Electric field		
0.15 - 0.49	33.5	/	57.5		82		120 kHz	QP

Frequency [MHz]	Limit: QP [dB(μV/m) <sup>1)</sup>						IF BW	Detector
	@30 m.		@10 m.		@3 m. <sup>2)</sup>			
	Magnetic Field	Electric field	Magnetic Field	Electric field	Magnetic Field	Electric field		
0.49 - 1.705	23.5	/	47.5		72		120 kHz	QP
1.705 - 2.194	28.5	/	52.5		77		120 kHz	QP
2.194 - 3.95	23.5	/	43.5		68		120 kHz	QP
3.95 - 11	8.5	/	18.5		43.5-28.5		120 kHz	QP
11 - 20	8.5	/	18.5		28.5		120 kHz	QP
20 - 30	-1.5	/	8.5		18.5		120 kHz	QP
30 - 47	/	58	/	68	/	78	120 kHz	QP
47 - 53.91	/	40	/	50	/	60	120 kHz	QP
53.91 - 54.56	/	40	/	50	/	60	120 kHz	QP
54.56 - 68	/	40	/	50	/	60	120 kHz	QP
68 - 80.872	/	53	/	63	/	73	120 kHz	QP
80.872 - 81.848	/	68	/	78	/	88	120 kHz	QP
81.848 - 87	/	53	/	63	/	73	120 kHz	QP
87 - 134.786	/	50	/	60	/	70	120 kHz	QP
134.786 - 136.414	/	60	/	70	/	80	120 kHz	QP
136.414 - 156	/	50	/	60	/	70	120 kHz	QP
156 - 174	/	64	/	74	/	84	120 kHz	QP
174 - 188.7	/	40	/	50	/	60	120 kHz	QP
188.7 - 190.979	/	50	/	60	/	70	120 kHz	QP
190.979 - 230	/	40	/	50	/	60	120 kHz	QP
230 - 400	/	50	/	60	/	70	120 kHz	QP
400 - 470	/	53	/	63	/	73	120 kHz	QP
470 - 1000	/	50	/	60	/	70	120 kHz	QP

<sup>1)</sup> At the transition frequency, the lower limit applies.

<sup>2)</sup> The limits specified for the 3 m separation distance apply only to small equipment meeting the size criterion defined in 3.10.

Note1: On a test site, class A equipment can be measured at a nominal distance of 3 m, 10 m or 30 m. A measuring distance less than 10 m is allowed only for equipment which complies with the definition given in 3.10.

Note2: At the transition frequency, the more stringent limit shall apply.

Note3: Controls for ISM equipment and free-standing, independently mounted and in-line cord controls for use with ISM equipment shall comply with the requirements.

### Limits – Group 2 Class B

Frequency [MHz]	Limit: QP [dB(μV/m) <sup>1)</sup>				Limit: QP [dB(μA/ m) <sup>1)</sup>	IF BW	Detector
	@10 m.		@3 m.				
	Electric field		Electric field		Magnetic field		
	QP	AV	QP	AV	QP		
0.15 - 30	30	25	40	35	39-3	120 kHz	QP

Frequency [MHz]	Limit: QP [dB( $\mu$ V/m) <sup>1</sup> ]				Limit: QP [dB( $\mu$ A/m) <sup>1</sup> ]	IF BW	Detector
	@10 m.		@3 m.				
	Electric field		Electric field		Magnetic field		
	QP	AV	QP	AV	QP		
30 - 80.872	50	45	60	55	/	120 kHz	QP
80.872 - 81.848	30	25	40	35	/	120 kHz	QP
81.848 - 134.786	50	45	60	55	/	120 kHz	QP
134.786 - 136.414	30	25	40	35	/	120 kHz	QP
136.414 - 230	37	32	47	42	/	120 kHz	QP
230 - 1000	30	25	40	35	/	120 kHz	QP

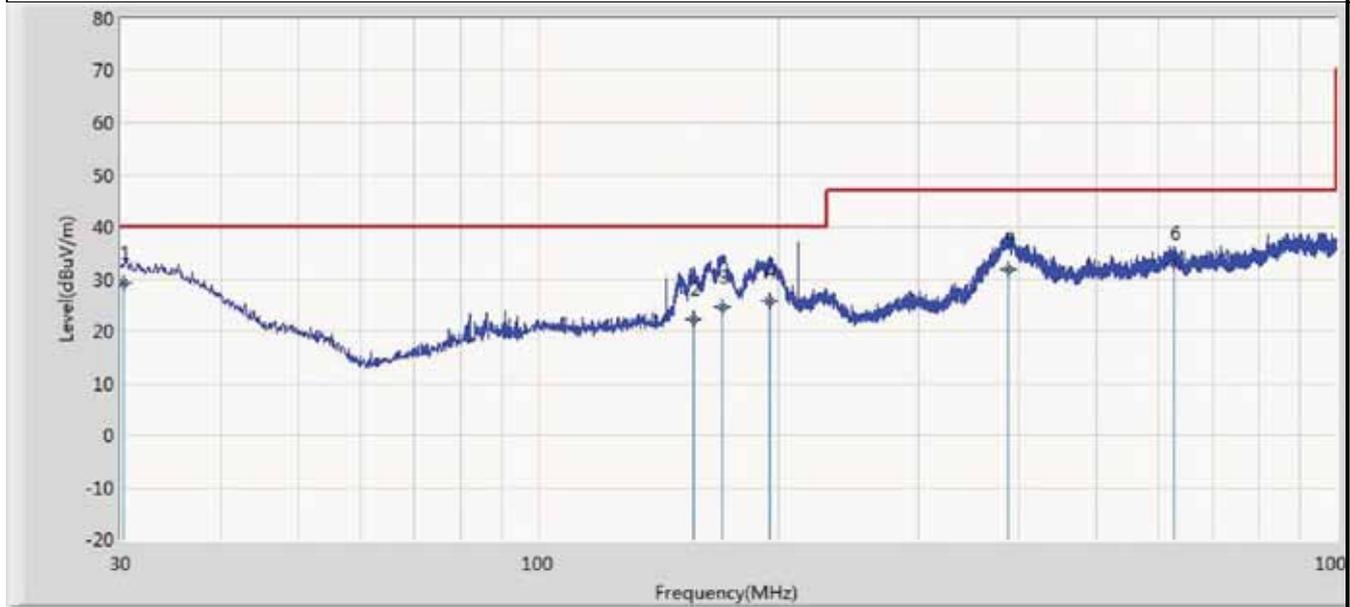
Note3: Controls for ISM equipment and free-standing, independently mounted and in-line cord controls for use with ISM equipment shall comply with the requirements.

### Performed measurements

Port under test	Enclosure	
Voltage – Mains [V]	230 Vac	
Frequency – Mains [Hz]	50 Hz	
Test method applied	<input checked="" type="checkbox"/>	OATS or SAC with measurement distance [m]: 3 m.
	<input type="checkbox"/>	OATS or SAC with measurement distance [m]: 10 m.
Test setup	<input checked="" type="checkbox"/>	Equipment on a table of 80 cm height
	<input type="checkbox"/>	Equipment on the floor (insulated from ground plane)
	<input type="checkbox"/>	Other:
	Refer to the Annex 2 for test setup photo(s).	
Operating mode(s) used	Mode 1	
Remark	---	

See next page.

<b>Measurement data</b>	<input checked="" type="checkbox"/>	<b>Horizontal</b>	<input type="checkbox"/>	<b>Vertical</b>
Operating mode / voltage / frequency used during the test		Mode 1 / 230 Vac / 50 Hz		
Engineer: Nino				
Site: AC2		Time: 2019/04/23		
Limit: CISPR22_RE(3m)_ClassB		Margin: 0		
Probe: AC2_3M(30-1000M)		Polarity: Horizontal		
EUT: Tstat Bacnet Thermostat		Power: AC 230V/50Hz		
Note: Mode 1				



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)
1	*	30.254	29.160	1.500	-10.840	40.000	21.037	6.623	0.000	100	221
2		156.254	22.446	5.300	-17.554	40.000	9.921	7.225	0.000	200	2
3		170.254	24.582	7.200	-15.418	40.000	10.106	7.275	0.000	100	223
4		195.325	25.846	8.200	-14.154	40.000	10.315	7.331	0.000	200	232
5		388.254	31.976	7.200	-15.024	47.000	16.866	7.910	0.000	100	263
6		625.021	32.997	2.300	-14.003	47.000	22.127	8.569	0.000	100	25

**Note:**

1. " \* ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

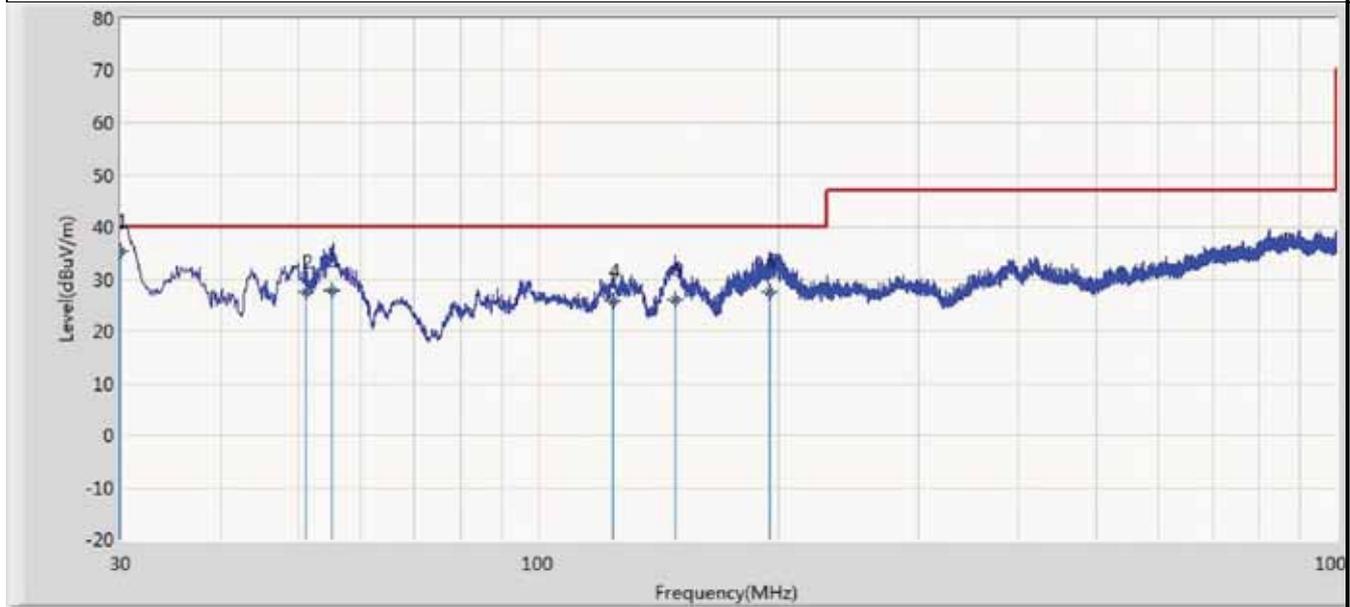
Remark

<b>Measurement data</b>	<input type="checkbox"/>	<b>Horizontal</b>	<input checked="" type="checkbox"/>	<b>Vertical</b>
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Operating mode / voltage / frequency used during the test    Mode 1 / 230 Vac / 50 Hz

Engineer: Nino	
Site: AC2	Time: 2019/04/23
Limit: CISPR22_RE(3m)_ClassB	Margin: 0
Probe: AC2_3M(30-1000M)	Polarity: Vertical
EUT: Tstat Bacnet Thermostat	Power: AC 230V/50Hz

Note: Mode 1



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)
1	*	30.012	35.286	10.900	-4.714	40.000	17.766	6.620	0.000	100	300
2		51.124	27.394	8.200	-12.606	40.000	12.630	6.563	0.000	100	5
3		55.214	27.714	10.200	-12.286	40.000	10.879	6.635	0.000	200	25
4		124.254	25.754	5.200	-14.246	40.000	13.522	7.032	0.000	100	24
5		148.252	26.203	8.200	-13.797	40.000	10.832	7.171	0.000	200	230
6		195.554	27.584	5.200	-12.416	40.000	15.053	7.331	0.000	100	124

Note:

- " \* ", means this data is the worst emission level.
- Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Remark

<b>4.4 Radiated emissions (above 1 GHz)</b>	<b>VERDICT: PASS</b>
---------------------------------------------	----------------------

Standard	EN 60730-1		
Basic standard(s)	EN 55016-2-3, CISPR 22		
Test method	Antenna method according to EN 55016-2-3 standard.		
Required highest frequency for radiated measurement			
Highest internal frequency [ $f_x$ ]		Highest measured frequency	
<input type="checkbox"/>	$f_x \leq 108$ MHz	1 GHz	
<input type="checkbox"/>	$108 \text{ MHz} < f_x \leq 500$ MHz	2 GHz	
<input type="checkbox"/>	$500 \text{ MHz} < f_x \leq 1$ GHz	5 GHz	
<input checked="" type="checkbox"/>	$f_x \geq 1$ GHz	$5x f_x$ or up to 6 GHz	

**Limits – Class A**

Frequency [GHz]	Limit: PK@3m.[dB( $\mu$ V/m) <sup>1)</sup> ]	Limit: AV@3m.[dB( $\mu$ V/m) <sup>1)</sup> ]	IF BW	Detector
1 - 3	76	56	1 MHz	PK, CAV
3 - 6	80	60	1 MHz	PK, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

**Limits – Class B**

Frequency [GHz]	Limit: PK@3m.[dB( $\mu$ V/m) <sup>1)</sup> ]	Limit: AV@3m.[dB( $\mu$ V/m) <sup>1)</sup> ]	IF BW	Detector
1 - 3	70	50	1 MHz	PK, CAV
3 - 6	74	54	1 MHz	PK, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

**Performed measurements**

Port under test	Enclosure		
Voltage – Mains [V]	230/110 Vac		
Frequency – Mains [Hz]	50/60 Hz		
Test method applied	<input checked="" type="checkbox"/>	Absorber-lined OATS or SAC with measurement distance [m]: 3 m.	
Test setup	<input checked="" type="checkbox"/>	Equipment on a table of 80 cm height	
	<input type="checkbox"/>	Equipment on the floor (insulated from ground plane)	
	<input type="checkbox"/>	Other:	
Refer to the Annex 2 for test setup photo(s).			
Operating mode(s) used	Mode 1		
Remark	---		

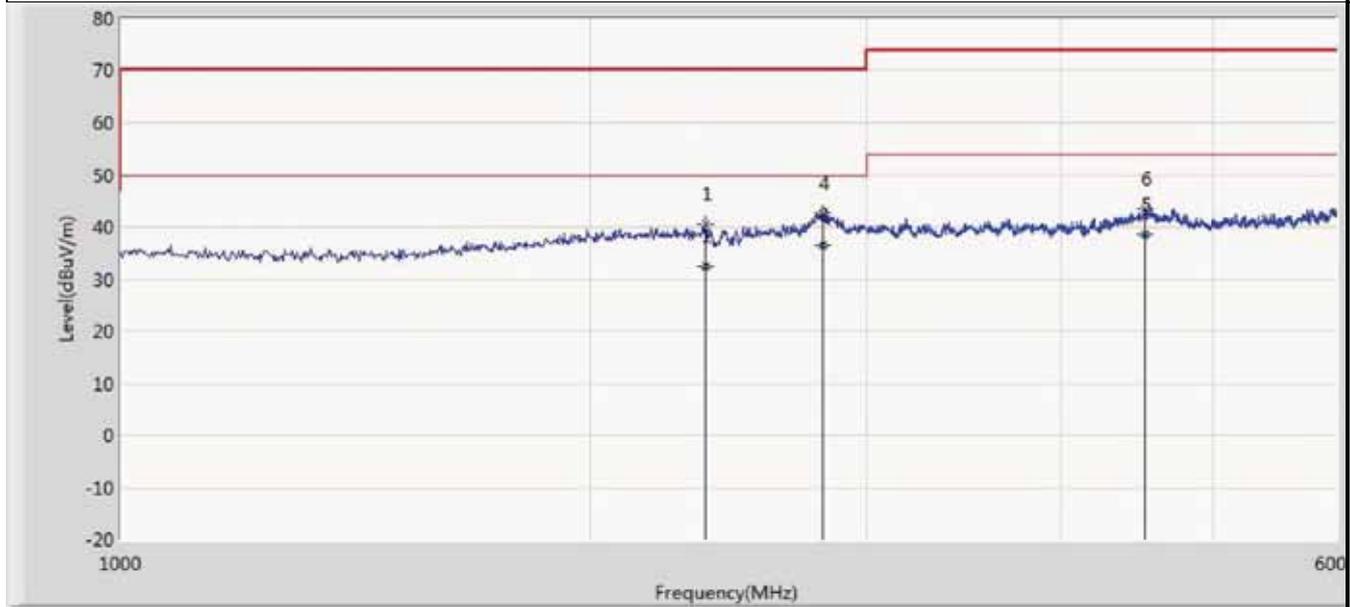
See next page.

<b>Measurement data</b>	<input checked="" type="checkbox"/>	<b>Horizontal</b>	<input type="checkbox"/>	<b>Vertical</b>
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Operating mode / voltage / frequency used during the test    Mode 1 / 230 Vac / 50 Hz

Engineer: Barlow	
Site: AC5	Time: 2019/05/05
Limit: CISPR22_RE(3m)_ClassB	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: Tstat Bacnet Thermostat	Power: AC 230V/50Hz

Note: Mode 1



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)
1		2370.000	40.456	41.111	-29.544	70.000	32.144	4.303	37.102	100	125
2		2370.120	32.366	33.021	-17.634	50.000	32.144	4.303	37.102	100	125
3	*	2811.260	36.478	33.950	-13.522	50.000	32.611	4.497	34.580	100	169
4		2812.500	42.653	40.136	-27.347	70.000	32.612	4.477	34.572	100	169
5		4521.650	38.573	33.950	-15.427	54.000	33.904	8.094	37.376	100	120
6		4522.500	43.402	38.781	-30.598	74.000	33.905	8.095	37.378	100	120

Note:

- " \* ", means this data is the worst emission level.
- Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

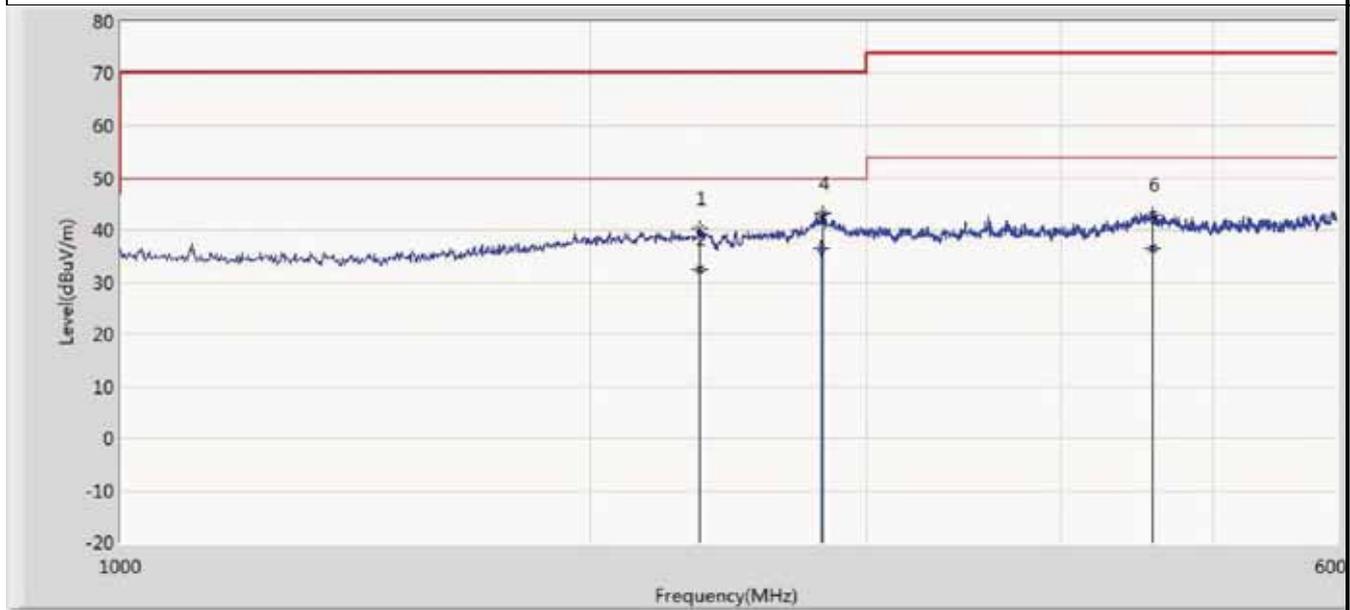
Remark

<b>Measurement data</b>	<input type="checkbox"/>	<b>Horizontal</b>	<input checked="" type="checkbox"/>	<b>Vertical</b>
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Operating mode / voltage / frequency used during the test    Mode 1 / 230 Vac / 50 Hz

Engineer: Barlow	
Site: AC5	Time: 2019/05/05
Limit: CISPR22_RE(3m)_ClassB	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: Tstat Bacnet Thermostat	Power: AC 230V/50Hz

Note: Mode 1



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)
1		2345.000	40.232	41.088	-29.768	70.000	32.114	4.075	37.046	100	126
2		2345.120	32.375	33.230	-17.625	50.000	32.114	4.077	37.046	100	126
3	*	2811.150	36.654	34.125	-13.346	50.000	32.611	4.499	34.581	100	169
4		2812.500	43.069	40.552	-26.931	70.000	32.612	4.477	34.572	100	169
5		4577.124	36.435	32.320	-17.565	54.000	33.915	7.684	37.484	200	32
6		4577.500	42.986	38.867	-31.014	74.000	33.915	7.688	37.484	200	32

Note:

- " \* ", means this data is the worst emission level.
- Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Remark

<b>4.5 Harmonic current emissions</b>	<b>VERDICT: PASS</b>
---------------------------------------	----------------------

Standard	EN 60730-1		
Basic standard	IEC 61000-3-2		
Exclusions (For these categories of equipment, limits are not specified in the EN 61000-3-2 standard)	<input type="checkbox"/>		Arc welding equipment intended for professional use.
	<input type="checkbox"/>		System(s) with nominal voltage(s) less than 220 V <sub>AC</sub> (line-to-neutral).
	<input checked="" type="checkbox"/>		Equipment with rated power of ≤ 75 W (other than lighting equipment).
	<input type="checkbox"/>		Professional equipment with total rated power > 1 kW.
	<input type="checkbox"/>		Symmetrically controlled heating elements with a rated power ≥ 200 W.
	<input type="checkbox"/>		Independent dimmers for incandescent lamps with rated power ≤ 1 kW.
Note: Integrated and incorporated controls are not subjected to the tests of this clause, except if so requested by the manufacturer.			

Classification		
<input checked="" type="checkbox"/>	Class A	All apparatus not classified as Class B, C or D
<input type="checkbox"/>	Class B	Portable tools
<input type="checkbox"/>	Class C	<input type="checkbox"/> Lighting equipment with active input power > 25 W
		<input type="checkbox"/> Lighting equipment with active input power ≤ 25 W (First requirement, Table 3 column 2)
		<input type="checkbox"/> Lighting equipment with active input power ≤ 25 W (Second requirement)
<input type="checkbox"/>	Class D	Personal computers, television receivers

**Performed measurements**

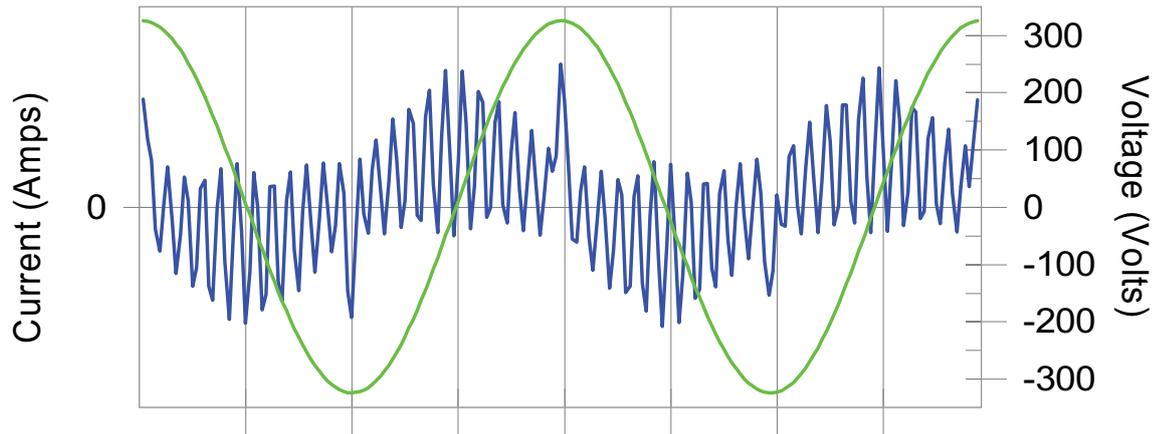
Port under test	AC mains power input		
Voltage – Mains [V]	230 Vac		
Frequency – Mains [Hz]	50 Hz		
Observation period	<input type="checkbox"/> 6.5 min.	<input checked="" type="checkbox"/> 3 min.	<input type="checkbox"/> Other:
Version of measurement instrument standard used EN / IEC61000-4-7 (Cl. 7)	<input checked="" type="checkbox"/>	EN 61000-4-7:2002 + AM1:2009 (IEC 61000-4-7:2002+AM1:2008)	
	<input type="checkbox"/>	EN 61000-4-7:1991	
Control principle used in the EUT	<input checked="" type="checkbox"/>	Comply with the requirements of the Clause 6.1 (EN / IEC 61000-3-2).	
	<input type="checkbox"/>	Not comply with the requirements of the Clause 6.1 (EN / IEC 61000-3-2).	
Operating mode(s) used	Mode 1		
Remark	---		

See next page.

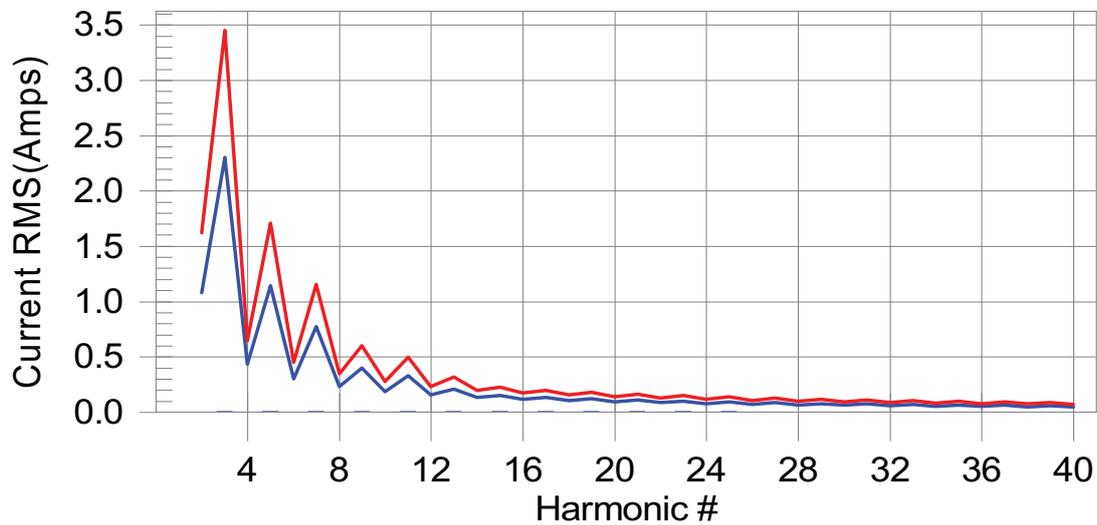
<b>Measurement data</b>	Port under test	AC mains power input
Operating mode / voltage / frequency used during the test		Mode 1 / 230 Vac / 50 Hz

**Test Result: Pass**      **Source qualification: Normal**

**Current & voltage waveforms**



**Harmonics and Class A limit line**      **European Limits**



Measurement data		Port under test		AC mains power input			
<b>Test Result: Pass</b> <b>Source qualification: Normal</b> <b>THC(A): 0.019</b> <b>I-THD(%): 58.9</b> <b>POHC(A): 0.008</b> <b>POHC Limit(A): 0.251</b>							
<b>Highest parameter values during test:</b>							
V_RMS (Volts): 230.04		Frequency(Hz): 50.00		I_RMS (Amps): 0.060		Crest Factor: 2.609	
I_Peak (Amps): 0.155		I_RMS (Amps): 0.060		Crest Factor: 2.609		Power Factor: 0.142	
I_Fund (Amps): 0.033		Power (Watts): 1.9		Power (Watts): 1.9		Power Factor: 0.142	
Power (Watts): 1.9		Power Factor: 0.142		Power Factor: 0.142		Power Factor: 0.142	
Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.001	1.620	N/A	Pass
3	0.007	2.300	0.3	0.008	3.450	0.2	Pass
4	0.001	0.430	N/A	0.001	0.645	N/A	Pass
5	0.007	1.140	0.6	0.007	1.710	0.4	Pass
6	0.001	0.300	N/A	0.001	0.450	N/A	Pass
7	0.006	0.770	0.8	0.007	1.155	0.6	Pass
8	0.000	0.230	N/A	0.001	0.345	N/A	Pass
9	0.006	0.400	1.5	0.006	0.600	1.1	Pass
10	0.000	0.184	N/A	0.001	0.276	N/A	Pass
11	0.006	0.330	1.8	0.006	0.495	1.2	Pass
12	0.000	0.153	N/A	0.001	0.230	N/A	Pass
13	0.006	0.210	2.6	0.006	0.315	1.8	Pass
14	0.000	0.131	N/A	0.001	0.197	N/A	Pass
15	0.005	0.150	3.5	0.005	0.225	2.4	Pass
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass
17	0.005	0.132	N/A	0.005	0.198	N/A	Pass
18	0.000	0.102	N/A	0.001	0.153	N/A	Pass
19	0.004	0.118	N/A	0.005	0.178	N/A	Pass
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass
21	0.004	0.107	N/A	0.004	0.161	N/A	Pass
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass
23	0.004	0.098	N/A	0.004	0.147	N/A	Pass
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass
25	0.003	0.090	N/A	0.003	0.135	N/A	Pass
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.003	0.083	N/A	0.003	0.125	N/A	Pass
28	0.000	0.066	N/A	0.000	0.099	N/A	Pass
29	0.002	0.078	N/A	0.003	0.116	N/A	Pass
30	0.001	0.061	N/A	0.001	0.092	N/A	Pass
31	0.002	0.073	N/A	0.002	0.109	N/A	Pass
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass
33	0.002	0.068	N/A	0.002	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.001	0.064	N/A	0.001	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.001	0.061	N/A	0.001	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.001	0.058	N/A	0.001	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass
Remark							

<b>4.6 Voltage changes, voltage fluctuations and flicker</b>	<b>VERDICT: PASS</b>
--------------------------------------------------------------	----------------------

Standard	EN 60730-1
Basic standard	IEC 61000-3-3
Note: Integrated and incorporated controls are not subjected to the tests of this clause, except if so requested by the manufacturer.	

**Limits**

P <sub>ST</sub> (Short term flicker)	<input checked="" type="checkbox"/>	≤ 1	<input type="checkbox"/>	Not Applicable
P <sub>LT</sub> (Long term flicker)	<input checked="" type="checkbox"/>	≤ 0.65	<input type="checkbox"/>	Not Applicable
d <sub>c</sub> (Relative Voltage change)	<input checked="" type="checkbox"/>	≤ 3,3 %	<input type="checkbox"/>	Not Applicable
T <sub>MAX</sub> (Maximum time duration)	<input checked="" type="checkbox"/>	≤ 500ms	<input type="checkbox"/>	Not Applicable
d <sub>MAX</sub> (Max. voltage change)	<input checked="" type="checkbox"/>	≤ 4 %	<input type="checkbox"/>	6 %
	<input type="checkbox"/>	7 %	<input type="checkbox"/>	Not Applicable
<u>Supplemental information:</u>				

**Performed measurements**

Reason for not performing the measurement(s)	<input type="checkbox"/>	Tests are not necessary because the EUT is unlikely to produce significant voltage fluctuations or flicker (clause 6.1).				
Port under test	AC Mains power input					
Voltage – Mains [V]	230 Vac					
Frequency – Mains [Hz]	50 Hz					
Test method	<input checked="" type="checkbox"/>	Flickermeter according EN / IEC 61000-4-15:2011				
	<input type="checkbox"/>	Simulation (Clause 4.2.3 of EN / IEC 61000-3-3)				
	<input type="checkbox"/>	Analytical method (Clause 4.2.4 of EN / IEC 61000-3-3)				
	<input type="checkbox"/>	Use of P <sub>st</sub> = 1 curve (Clause 4.2.5 of EN / IEC 61000-3-3)				
Observation period	<input checked="" type="checkbox"/>	10 min.	<input type="checkbox"/>	120 min.	<input type="checkbox"/>	Other:
	<input type="checkbox"/>	24 times switching according to Annex B				
Operating mode(s) used	Mode 1					
Remark	---					

See next page.



## 5 IMMUNITY TEST RESULTS

### 5.1 Performance (Compliance) criteria

[Source: EN 60730-1 Table ZD.2 ]

Operating conditions	Compliance criteria		
	A	B	C
Digital inputs/outputs	No deviation on input readings; No deviation on output settings.	No deviation on input Readings; No deviation on output settings	Any error, such as a change of state, destruction of data, and loss of a connection is permitted, provided the initial state is restored automatically after the test -Automatic recovery after the test <sup>b</sup>
Analogue inputs/outputs	Deviation as declared in the final product specification is permitted <sup>a</sup> .	Deviation is permitted during test.	
Display, Monitor	Operation shall be possible at reasonable comfort.	Deviation is permitted (e.g. display fault, such as flickering)	
Local operator override / switching	No deviation	Deviation is permitted for analogue values.; No change of state for digital values	
Communication ports	No deviation detectable by the user ; The reduced data transfer rate shall be reasonable for the control operation.	Deviation is permitted; Loss of communication during the test ; Automatic recovery after the test	

<sup>a</sup>The permissible deviation is with respect to the value without electromagnetic interference. This means that any basic deviation is ignored.  
<sup>b</sup>This compliance criterion is based on the fact that the control operation in the end user application will be unsupervised.

#### 5.1.1 Performance criteria related to immunity tests

Immunity test	Performance criteria
Electrostatic discharge	B
Radio-frequency electromagnetic fields	A
Electrical fast transients	B
Surges	B
Radio-frequency continuous conducted	A
Power-frequency magnetic field	A
Voltage dips and interruptions	B, C

#### 5.1.2 Manufacturer defined performance criteria

Not provided.

**5.2 Monitored – Checked Functions / Parameters**

During the immunity tests the following functions of the EUT has/have been monitored/checked.

<input type="checkbox"/>	Motor speed	<input checked="" type="checkbox"/>	Display data
<input type="checkbox"/>	Switching	<input type="checkbox"/>	Data storage
<input type="checkbox"/>	Standby mode	<input type="checkbox"/>	Sensor functions
<input type="checkbox"/>	Temperature	<input type="checkbox"/>	Audible signals
<input type="checkbox"/>	Power consumption	<input checked="" type="checkbox"/>	Others : LED's
<input type="checkbox"/>	AC mains input current	<input type="checkbox"/>	Others : Transmit/receive packet loss rate
<input type="checkbox"/>	Timing	<input type="checkbox"/>	Others :
<input type="checkbox"/>	Illumination	<input type="checkbox"/>	Others :
<u>Supplementary information :</u>			

Immunity test	Monitored - Checked function(s)/parameter(s) during / after the test	Method
Electrostatic discharge	Pass	Visual
Radio-frequency electromagnetic fields	Pass	Camera
Electrical fast transients	Pass	Visual
Surges	Pass	Visual
Radio-frequency continuous conducted	Pass	Visual
Power-frequency magnetic field	Pass	Visual
Voltage dips and interruptions	Pass	Visual
<u>Supplementary information :</u>		

<b>5.3 Electrostatic discharge immunity</b>	<b>VERDICT: PASS</b>
---------------------------------------------	----------------------

Electrostatic discharges (ESD) are the result of persons or objects that accumulate static electricity due to for instance walking on synthetic carpets. The ESD can influence the operation of equipment or damage its electronics, either by a direct discharge or indirectly by coupling or radiation. Both effects are simulated during the tests.

**Requirements**

Standard	EN 60730-1							
Basic standard	IEC 61000-4-2							
Port	Enclosure							
For Type 1 action(Free standing controls, independently mounted and/or in-line cord controls)								
EUT Environment	Residential & Industrial							
Air discharges <sup>1)2)</sup>	<input checked="" type="checkbox"/>	±2 kV	<input checked="" type="checkbox"/>	±4 kV	<input checked="" type="checkbox"/>	±8 kV	<input type="checkbox"/>	±15kV
Contact discharges <sup>1)2)</sup>	<input type="checkbox"/>	±2 kV	<input checked="" type="checkbox"/>	±4 kV	<input type="checkbox"/>	±6 kV	<input type="checkbox"/>	±8 kV
Number of discharges	Air discharges , ≥ 5 per polarity with ≥ 1 sec interval. Contact discharges , ≥ 5 per polarity with ≥ 1 sec interval.							
Performance criterion	B; Refer to the chapter 5.1 for details.							
<sup>1)</sup> For protective controls, the additional test shall apply:contact discharges at 8 kV to accessible metal parts, or air discharges at 15 kV to accessible parts of insulating material shall apply.								

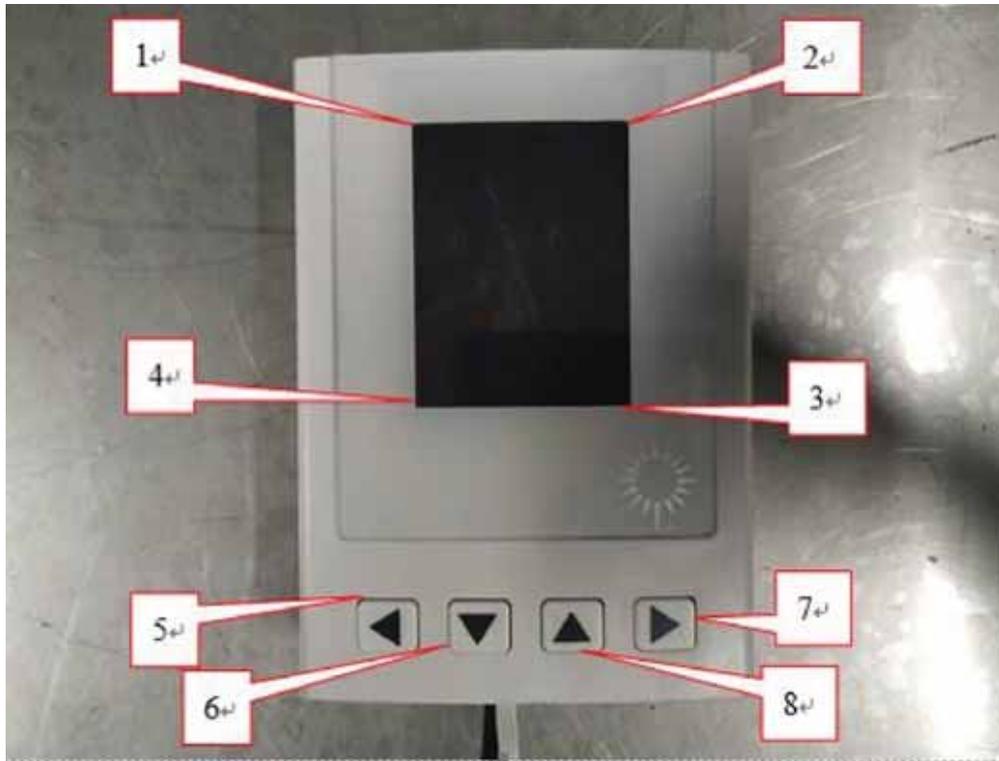
**Performed tests**

Set-up	<input checked="" type="checkbox"/>	Table-top	<input type="checkbox"/>	Floor standing
Ambient temperature [°C]	26		Relative Humidity air [%]	43
Voltage – Mains [V]	230 Vac			
Frequency – Mains [Hz]	50 Hz			
Operating mode(s) used	Mode 1			

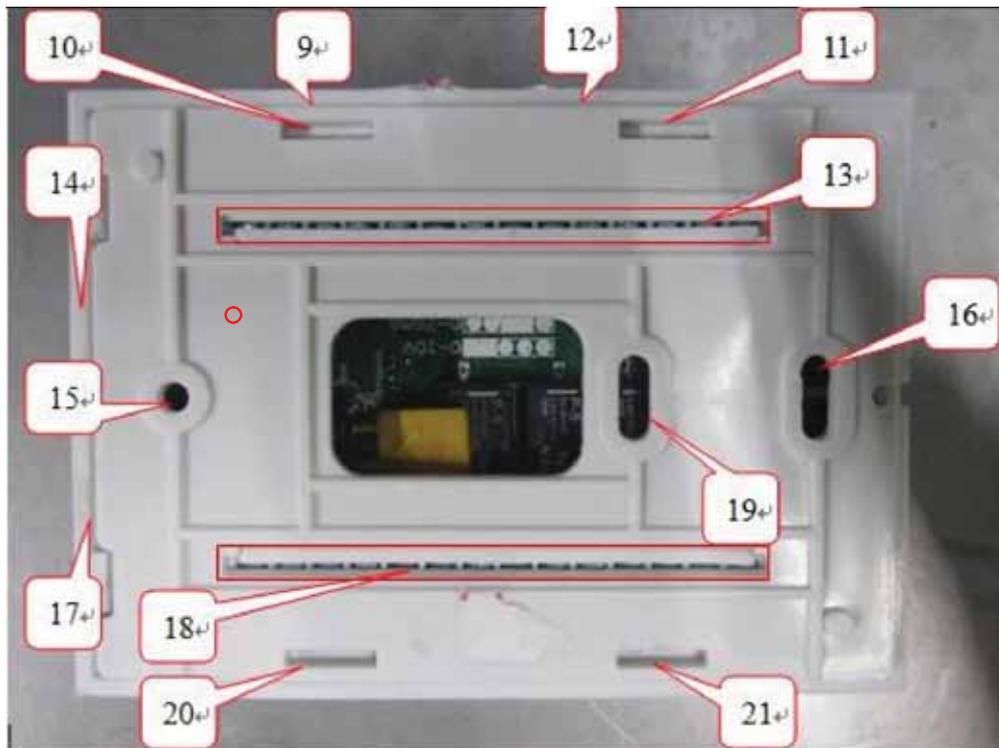
Test Point (Location of discharge, see also photo)		Test Voltage [kV] & Polarity	Coupling type	# of applied discharges / polarity	Discharge interval [s]
<input checked="" type="checkbox"/>	Points on conductive surface as indicated in the picture below.	±4	Contact	5	1
<input checked="" type="checkbox"/>	Points on non-conductive surface as indicated in the picture below.	±2 / ±4 / ±8	Air	5	1
<input checked="" type="checkbox"/>	HCP top side.	±4	Contact	5	1
<input checked="" type="checkbox"/>	HCP bottom side.	±4	Contact	5	1
<input checked="" type="checkbox"/>	VCP right side.	±4	Contact	5	1
<input checked="" type="checkbox"/>	VCP left side.	±4	Contact	5	1
<input checked="" type="checkbox"/>	VCP front side.	±4	Contact	5	1
<input checked="" type="checkbox"/>	VCP rear side.	±4	Contact	5	1
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.				
<u>Supplementary information:</u>					

### Photo of selected test points

Test dot :

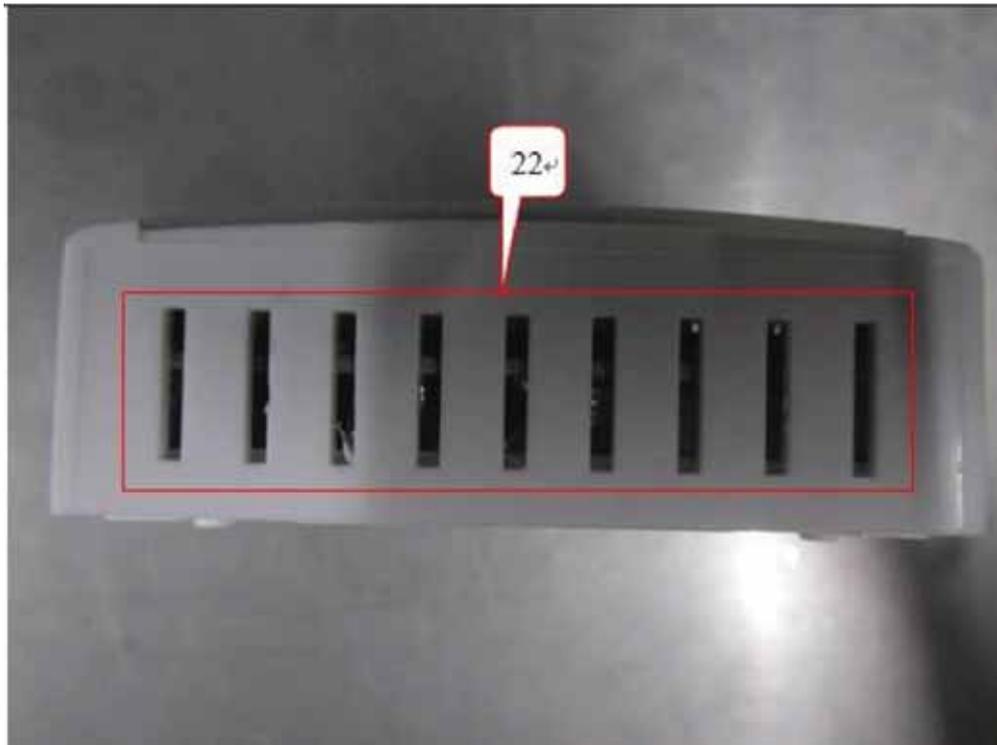


Test dot :

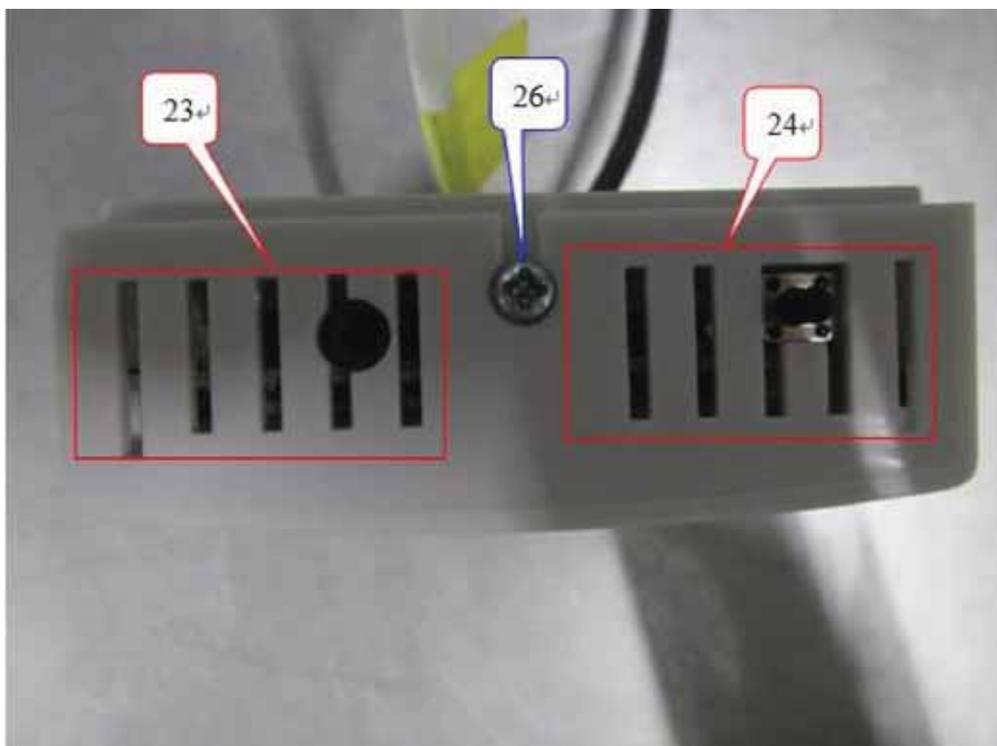


### Photo of selected test points

Test dot :

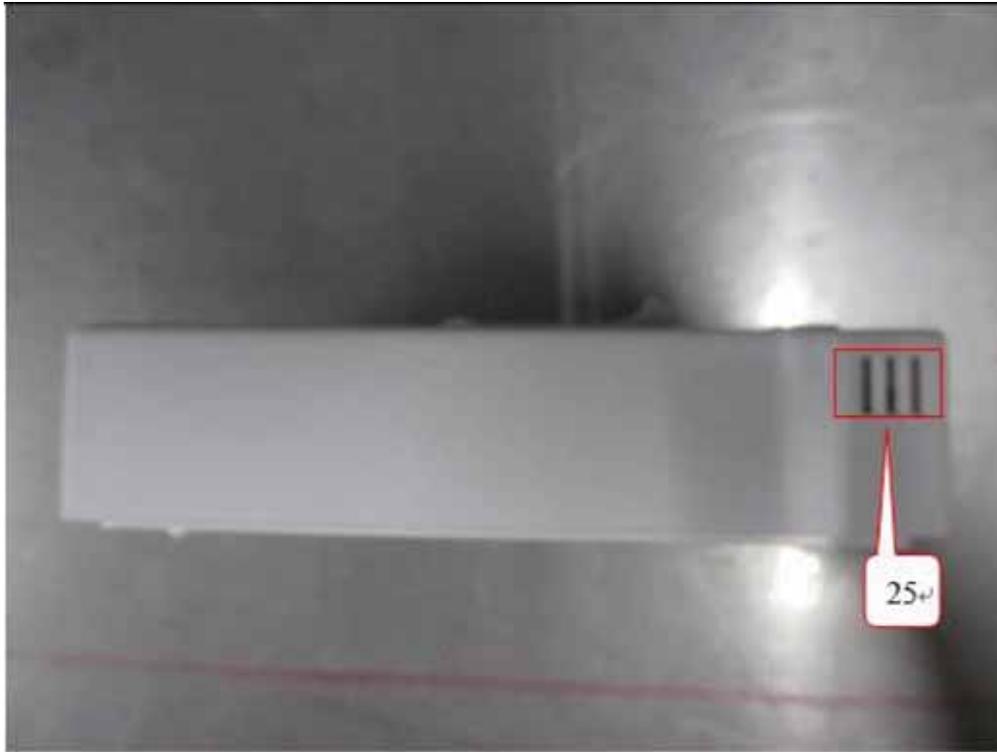


Test dot :



### Photo of selected test points

Test dot :



Supplementary information:

**Red: Air Discharge, Blue: Contact Discharge**

<b>5.4</b>	<b>Radio-frequency electromagnetic fields immunity</b>	<b>VERDICT: PASS</b>
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During the test it is verified if the equipment under test (EUT) has sufficient immunity against radiated electromagnetic fields. Industrial electromagnetic sources, walkie-talkies, radio transmitters, television transmitters and telecommunication equipment including cellular telephones and other emitting devices can generate these fields.

**Requirements**

Standard	EN 60730-1				
Basic standard	IEC 61000-4-3				
Port under test	Enclosure				
For Type 1 action (Free standing controls, independently mounted and/or in-line cord controls)					
Frequency range	Test level		Modulation	Dwell time	Step size
	Residential	Industrial			
80 MHz – 960 MHz	3 V/m	10 V/m	80 % AM (1 kHz)	≥ 0.5 s	≤ 1 %
1400 MHz – 2000 MHz	3 V/m	3 V/m	80 % AM (1 kHz)	≥ 0.5 s	≤ 1 %
2000 MHz – 2700 MHz	1 V/m	1 V/m	80 % AM (1 kHz)	≥ 0.5 s	≤ 1 %
Performance criterion	A; Refer to the chapter 5.1 for details.				
NOTE: The operating control of type 2 action apply for the Level 2&3. The protective control of type 2 action apply for the Level 3.					

**Performed tests**

Test method	<input checked="" type="checkbox"/>	IEC 61000-4-3				
Test set-up (see annex 2 for photo)	<input checked="" type="checkbox"/>	Equipment on the table (0.8 m height)				
	<input type="checkbox"/>	Equipment standing on floor (0.05 – 0.15 m height)				
Voltage – Mains [V]	230 Vac		Frequency – Mains [Hz]	50 Hz		
Operating mode(s) used	Mode 1					
Frequency range (applied)	Antenna Polarization	Test level (applied)	Modulation (applied)	Dwell time (applied)	Remark	
80 MHz – 960 MHz (step size 1 %)	H	3 V/m	80 % AM (1 kHz)	3 s	---	
	V	3 V/m	80 % AM (1 kHz)	3 s	---	
1400 MHz – 2000 MHz (step size 1 %)	H	3 V/m	80 % AM (1 kHz)	3 s	---	
	V	3 V/m	80 % AM (1 kHz)	3 s	---	
2000 MHz – 2700 MHz (step size 1 %)	H	1 V/m	80 % AM (1 kHz)	3 s	---	
	V	1 V/m	80 % AM (1 kHz)	3 s	---	
Exposed side of the EUT	<input checked="" type="checkbox"/>	Front (0°)	<input checked="" type="checkbox"/>	Right (90°)	<input type="checkbox"/>	Top
	<input checked="" type="checkbox"/>	Rear (180°)	<input checked="" type="checkbox"/>	Left (270°)	<input type="checkbox"/>	Bottom
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.					
Supplementary information:						

<b>5.5 Electrical fast transients immunity</b>	<b>VERDICT: PASS</b>
------------------------------------------------	----------------------

The EFT immunity test simulates disturbances by bursts of very short transients caused for example by switching off loads such as an AC motor or bouncing relay contacts. The transients are likely to disturb electronics but less likely to cause damage.

**Requirements**

Standard	EN 60730-1			
Basic standard	IEC 61000-4-4			
Pulse characteristics	5/50 ns			
For Type 1 action (Free standing controls, independently mounted and/or in-line cord controls)				
Port	Residential	Industrial	Repetition frequency	Duration
Power port	± 1000 V	± 2000 V	5 kHz	1 min. / polarity
I/O (Input/Output) signal, data and control ports	± 500 V	± 1000 V	5 kHz	1 min. / polarity
Note: AC power supply and control output for direct connection to the supply via CDN; DC power supply and control outputs for direct connection to the supply via Capacitive clamp; Data lines for direct connection to the supply via Capacitive clamp. The operating control of type 1 action apply for the Level 2. The operating control of type 2 action apply for the Level 2&3&4. The protective control of type 2 action apply for the Level 3.				
1) If d.c. power is fed on conductors included in a signal cable, then the requirements of signal ports only apply to this cable. 2) Only applicable to ports interfacing with cables whose total length may exceed 3 m. 3) For xDSL equipment, the repetition frequency for EFT testing shall be 100 kHz. 4) Apply for protective controls.				
Performance criterion	B; Refer to the chapter 5.1 for details.			

**Performed tests**

Voltage – Mains [V]	230 Vac			
Frequency – Mains [Hz]	50 Hz			
Operating mode(s) used	Mode 1			
Test Set-up (see annex 2 for photo)	<input type="checkbox"/>	Equipment standing on floor at (0.1 ± 0.01) m above ground plane		
	<input checked="" type="checkbox"/>	Equipment on the table (0.1 ± 0.01) m above ground plane		
	<input type="checkbox"/>	Artificial hand applied. Location refer to chapter 8.		
Coupling	<input checked="" type="checkbox"/>	Common mode	<input type="checkbox"/>	Other:

Port under test	Test Voltage & Polarity	Repetition Frequency	Test duration / polarity	Injection method			
AC mains power input	1 kV <sup>1)</sup>	5 kHz	60 s	<input checked="" type="checkbox"/>	CDN	<input type="checkbox"/>	Clamp
Observation(s)	1) During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed. 2) The packet loss status will be generated during the test. After the test, the EUT automatically restores the normal connection status before the test.						

Port under test	Test Voltage &Polarity	Repetition Frequency	Test duration / polarity	Injection method
<u>Supplementary information:</u>				

<b>5.6</b>	<b>Surges immunity</b>	<b>VERDICT: PASS</b>
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The surge transient immunity test simulates the surges that are caused by over-voltages due to indirect (induced) lightning transients. The pulse is a slow transient with high-energy contents and due to its long duration may cause damage to an unprotected EUT.

### Requirements

Standard	EN 60730-1				
Basic standard	IEC 61000-4-5				
Pulse characteristics	1,2/50 $\mu$ s Voltage; 8/20 $\mu$ s Current 10/700 $\mu$ s Voltage				
Repetition rate	$\geq$ 60 secs. (for each test level and phase angle)				
Number of pulses	5 pulses (at each polarity and phase angle)				
For Type 1 action (Free standing controls, independently mounted and/or in-line cord controls)					
Port	Residential		Industrial		Phase angle [°]
AC power supply and AC I/O directly connected to mains network	$\pm$ 1 kV	$\pm$ 2 kV	$\pm$ 1 kV	$\pm$ 2 kV	0, 90, 180, 270
AC power supply and AC I/O not directly connected to mains network	---	---	$\pm$ 1 kV	$\pm$ 2 kV	0, 90, 180, 270
DC power supply and DC I/O directly Connected thereto	---	---	$\pm$ 0.5 kV	$\pm$ 0.5 kV	---
Unsymmetrical operated circuits/lines	$\pm$ 0.5 kV	$\pm$ 1 kV	$\pm$ 1 kV	$\pm$ 2 kV	---
Symmetrical operated circuits/lines	---	$\pm$ 1 kV	---	$\pm$ 2 kV	---
Shielded I/O and shielded communication lines	---	$\pm$ 0.5 kV	---	$\pm$ 2 kV	---
<sup>1)</sup> Applicable only to ports which according to the manufacturer's specification may connect directly to outdoor cables. <sup>2)</sup> For ports where primary protection is intended, surges are applied at voltages up to 4 kV with the primary protectors fitted. Otherwise the 1 kV test level is applied without primary protection in place. <sup>3)</sup> Test applied to all lines simultaneously to earth (ground). <sup>4)</sup> Where the coupling network for the 10/700 $\mu$ s waveform affects the functioning of high speed data ports, the test shall be carried out using a 1,2/50 (8/20) $\mu$ s waveform and appropriate coupling network.					
Note: The operating control of type 1 action apply for the Level 2.					
The operating control of type 2 action apply for the Level 2&3&4.					
The protective control of type 2 action apply for the Level 3.					
Performance criterion	B; Refer to the chapter 5.1 for details.				

### Performed tests

Voltage – Mains [V]	230 Vac
Frequency – Mains [Hz]	50 Hz
Operating mode(s) used	Mode 1
Repetition rate	60 secs. (for each test level and phase angle)
Number of pulses	5 pulses (at each polarity and phase angle)

Port under test		Coupling	Test level & Polarity	Phase angle [°]	Remark
<input checked="" type="checkbox"/>	Power supply	Line to Neutral	$\pm$ 0.5 / $\pm$ 1 kV	0, 90, 180, 270	---
<input checked="" type="checkbox"/>	Power supply	Line to Earth	$\pm$ 0.5 / $\pm$ 1 / $\pm$ 2 kV	0, 90, 180, 270	---
<input checked="" type="checkbox"/>	Power supply	Neutral to Earth	$\pm$ 0.5 / $\pm$ 1 / $\pm$ 2 kV	0, 90, 180, 270	---

Port under test	Coupling	Test level & Polarity	Phase angle [°]	Remark
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.			
<u>Supplementary information:</u>				

<b>5.7</b>	<b>Radio-frequency continuous conducted immunity</b>	<b>VERDICT: PASS</b>
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During this test the immunity of the equipment for induced or conducted electromagnetic fields is checked. Fields generated by radio and other transmitters cause RF voltages in long cables like the mains network. This test reproduces these induced disturbing voltages by injecting them to the EUT via the cabling.

**Requirements**

Standard	EN 60730-1				
Basic standard	IEC 61000-4-6				
Frequency range	0.15 MHz – 80 MHz				
For Type 1 action (Free standing controls, independently mounted and/or in-line cord controls)					
Port	Test level, $U_0$		Modulation	Step size	Dwell time
	Residential	Industrial			
Power mains	3 V	10V	80 % AM (1 kHz)	≤ 1 %	≥ 0.5 s
DC power lines	3 V	10V	80 % AM (1 kHz)	≤ 1 %	≥ 0.5 s
I/O lines	3 V	10V	80 % AM (1 kHz)	≤ 1 %	≥ 0.5 s
<sup>1)</sup> If d.c. power is fed on conductors included in a signal cable, then the requirements of signal ports only apply to this cable. <sup>2)</sup> Only applicable to ports interfacing with cables whose total length may exceed 1 m.					
Note: The operating control of type 2 action apply for the Level 2&3. The protective control of type 2 action apply for the Level 3.					
Performance criterion	A; Refer to the chapter 5.1 for details.				

**Performed tests**

Test method (applied)	Frequency range (applied)	Modulation (applied)	Step size (applied)	
EN 61000-4-6	0.15 MHz – 80 MHz	80 % AM (1 kHz)	1 %	
Voltage – Mains [V]	230 Vac	Frequency – Mains [Hz]	50 Hz	
Operating mode(s) used	Mode 1			
Test set-up (see annex 2 for photo)	<input type="checkbox"/>	Equipment standing on floor at (0.1 ± 0.01) m above ground plane.		
	<input checked="" type="checkbox"/>	Equipment on the table (0.1 ± 0.01) m above ground plane.		
	<input type="checkbox"/>	Artificial hand applied. Location refer to Annex 2.		
Port under test	Test Level (applied)	Injection method	Dwell time (applied)	Remark
AC main Port	3 V	CDN - AC	3 s	---
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.			
<u>Supplementary information:</u>				

<b>5.8 Power-frequency magnetic field immunity</b>	<b>VERDICT: PASS</b>
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Magnetic fields caused by for example nearby mains frequency transformers may disturb equipment with sensitivity for these type of disturbances such as CRT monitors.

**Requirements**

Standard	EN 60730-1	
Basic standard	IEC 61000-4-8	
Port under test	Enclosure	
For Type 1 action (Free standing controls, independently mounted and/or in-line cord controls)		
Field strength	Residential	Industrial
	3 A/m	30 A/m
Test Frequency	50 Hz or 60 Hz	
Notes: Applicable only to EUT containing devices susceptible to magnetic fields, such as CRT monitors, Hall elements, electrodynamic microphones, magnetic field sensors, etc. The operating control of type 1 action apply for the Level 2. The operating control of type 2 action apply for the Level 2&3. The protective control of type 2 action apply for the Level 3.		
Performance criterion	A; Refer to the chapter 5.1 for details.	

**Performed tests**

Reason for not performing the test	<input type="checkbox"/>	The test is not applicable as the apparatus does not contain any components susceptible to this low-frequency magnetic fields.
Voltage – Mains [V]	230 Vac	
Frequency – Mains [Hz]	50 Hz	
Operating mode(s) used	Mode 1	
Test set-up (see annex 2 for photo)	<input checked="" type="checkbox"/>	Single Coil. Dimensions: 1 m x 1 m
	<input type="checkbox"/>	Single Coil. Dimensions: 2 m x 2 m
	<input type="checkbox"/>	Homogeneous field (Helmholtz coil). Dimensions: 1 m x 1 m
	<input type="checkbox"/>	0.1 m above metal surface

Axis under test	Tested Field strength	Test Frequency	Test Duration	Remark
<input checked="" type="checkbox"/> X-axis	3 A/m	50 Hz	60 s	---
<input checked="" type="checkbox"/> Y-axis	3 A/m	50 Hz	60 s	---
<input checked="" type="checkbox"/> Z-axis	3 A/m	50 Hz	60 s	---

Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.
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Supplementary information:

<b>5.9</b>	<b>Voltage dips and interruptions immunity</b>	<b>VERDICT: PASS</b>
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The purpose of the test is to verify the immunity of the equipment against voltage dips and voltage interruptions. It helps to ensure that the equipment functions properly (as expected and safely) with power supply fluctuations. Voltage dips and interruptions are caused by faults in the LV, MV, HV networks (short-circuit or ground faults).

**Requirements**

Standard	EN 60730-1				
Basic standard	IEC 61000-4-11				
# of dips & interruptions	3 dips / interruptions for each test level and phase angle				
Interval between events	≥ 10 seconds				
For Type 1 action (Free standing controls, independently mounted and/or in-line cord controls)					
Port	Test level		Period (Cycles)		Performance Criterion
	Residential	Industrial	50 Hz	60 Hz	
AC power input port	$U_{NOM} - 30\%$	$U_{NOM} - 30\%$	25	30	C; Refer to the chapter 5.1 for details.
	---	$U_{NOM} - 60\%$	10	12	C; Refer to the chapter 5.1 for details.
	$U_{NOM} - 100\%$	---	0.5	0.5	B; Refer to the chapter 5.1 for details.
	$U_{NOM} - 100\%$	$U_{NOM} - 100\%$	1	1	B; Refer to the chapter 5.1 for details.
	$U_{NOM} - 100\%$	$U_{NOM} - 100\%$	250	300	C; Refer to the chapter 5.1 for details.
<p><b>NOTE:</b> The voltage dips and interruptions, at random phase with respect to the mains frequency, shall be performed at least three times in the relevant operating modes.</p> <p>Between the voltage dips and interruptions a waiting time of at least 10 s shall be observed.</p> <p>Protective controls shall be subjected to voltage dips and interruptions at random phase angles with respect to the mains frequency as well as at the zero crossing of the supply.</p> <p>The operating control of type 1 action apply for the Level 2.</p> <p>The operating control of type 2 action apply for the Level 2&amp;3.</p> <p>The protective control of type 2 action apply for the Level 3.</p>					

**Performed tests**

$U_{NOM}$ [V <sub>AC</sub> ]	Terminal	Test level [% $U_{NOM}$ ]	Duration [cycles]	Repetition rate [s]	Number of dips per test	Phase angle [°]
			50 Hz			
240	L-N	70 <sup>1</sup>	25	10	3	0, 180
240	L-N	0 <sup>1</sup>	0.5	10	3	0, 180
240	L-N	0 <sup>1</sup>	1	10	3	0, 180
240	L-N	0 <sup>2</sup>	250	10	3	0, 180
100	L-N	70 <sup>1</sup>	25	10	3	0, 180
100	L-N	0 <sup>1</sup>	0.5	10	3	0, 180
100	L-N	0 <sup>1</sup>	1	10	3	0, 180
100	L-N	0 <sup>2</sup>	250	10	3	0, 180
Operating mode(s) used		Mode 1				
Observation(s)		<sup>1</sup> ) During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.				

	2) The packet loss status will be generated during the test. After the test, the EUT automatically restores the normal connection status before the test.
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Supplementary information:

## 6 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

### Conducted Emission / TR1

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100906	2019.03.04	2020.03.04
Two-Line V-Network	R&S	ENV216	101190	2018.06.09	2019.06.09
Two-Line V-Network	R&S	ENV216	101044	2018.06.09	2019.06.09
Impedance Stabilization Network	Teseq GmbH	ISN T800	30306	2019.03.08	2020.03.08
Impedance Stabilization Network	Teseq GmbH	ISN T8-Cat6	29680	2019.03.08	2020.03.08
Current Probe	R&S	EZ-17	100678	2019.03.12	2020.03.12
50ohm Termination	SHX	TF2	07081402	2018.09.08	2019.09.08
50ohm Termination	SHX	TF2	07081403	2018.09.08	2019.09.08
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	N/A	N/A
Coaxial Cable	Suhner	RG 223	TR1-C1	2019.04.26	2020.04.26
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2018.10.24	2019.10.24

### Asymmetric mode conducted emissions / TR1

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100906	2019.03.04	2020.03.04
Two-Line V-Network	R&S	ENV216	101190	2018.06.09	2019.06.09
Two-Line V-Network	R&S	ENV216	101044	2018.06.09	2019.06.09
Impedance Stabilization Network	Teseq GmbH	ISN T800	30306	2019.03.08	2020.03.08
Impedance Stabilization Network	Teseq GmbH	ISN T8-Cat6	29680	2019.03.08	2020.03.08
50ohm Termination	SHX	TF2	07081402	2018.09.08	2019.09.08
50ohm Termination	SHX	TF2	07081403	2018.09.08	2019.09.08
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	N/A	N/A
Coaxial Cable	Suhner	RG 223	TR1-C1	2019.04.26	2020.04.26
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2018.10.24	2019.10.24

### Radiated Emission / AC1

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100175	2018.09.08	2019.09.08
EMI Test Receiver	R&S	ESCI	100726	2019.03.18	2020.03.18
EMI Receiver	Agilent	N9038A	MY51210196	2018.06.09	2019.06.09
Preamplifier	Quietek	AP-025C	CHM-0602008	2019.04.10	2020.04.10
Preamplifier	Quietek	AP-025C	CHM-0503006	2019.04.10	2020.04.10
Bilog Antenna	Schaffner	CBL6112B	2931	2018.05.18	2019.05.18
Bilog Antenna	Schaffner	CBL6112B	2933	2018.05.18	2019.05.18

DRG Horn Antenna	ETS-Lindgren	3117	00167055	2018.06.09	2019.06.09
Coaxial Cable	Huber+Suhner	RG 214_U	AC1-L	2018.10.10	2019.10.10
Coaxial Cable	Huber+Suhner	RG 214_U	AC1-R	2018.10.10	2019.10.10
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2018.10.24	2019.10.24

#### Radiated Emission / AC2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100573	2019.03.03	2020.03.03
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2018.06.09	2019.06.09
Coaxial Cable	Huber+Suhner	RG 214	AC2-C	2019.02.28	2020.02.28
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2018.10.24	2019.10.24

#### Radiated Emission / AC3

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100176	2018.09.08	2019.09.08
Bilog Antenna	Teseq GmbH	CBL6112D	27613	2018.06.09	2019.06.09
Coaxial Cable	Huber+Suhner	RG 214	AC3-C	2019.02.28	2020.02.28
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2018.10.24	2019.10.24

#### Radiated Emission / AC5

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
EMI Receiver	Agilent	N9038A	MY51210196	2018.06.09	2019.06.09
low Noise Amplifier	BXT	NA2651D	LNA17040209	2018.07.16	2019.07.16
DRG Horn Antenna	ETS-Lindgren	3117	00167055	2018.06.09	2019.06.09
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2019.02.28	2020.02.28
Tunable Bandreject filter	Wainwright	WRCG2400/ 2485- 2375/2510- 60/11SS	SUA0500285	2018.06.13	2019.06.13
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2018.10.24	2019.10.24

#### Conducted differential voltage emissions / TR1

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100906	2019.03.04	2020.03.04
Minimum Loss Pad	Agilent	11852B	63771	2019.04.20	2020.04.20
Minimum Loss Pad	Pasternack	PE7070	140204	2019.04.20	2020.04.20
Power Divider	Agilent	11636A	10149	2019.04.20	2020.04.20
50ohm Coaxial Switch	Anritsu	MP59B	620046446 2	N/A	N/A
Coaxial Cable	Suhner	RG 223	TR1-C1	2019.04.26	2020.04.26
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2018.10.24	2019.10.24

#### Harmonic current emissions ( $I \leq 16A$ )/TR1

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Power Analyzer	California	PACS-1	72419	2019.01.02	2020.01.02
AC Power Source	California	5001iX-208	56741	2018.10.20	2019.10.20

Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2018.10.24	2019.10.24
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Voltage fluctuations and flicker( $I \leq 16A$ )/TR1

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Power Analyzer	California	PACS-1	72419	2019.01.02	2020.01.02
AC Power Source	California	5001iX-208	56741	2018.10.20	2019.10.20
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2018.10.24	2019.10.24

Harmonic current emissions( $16A < I \leq 75A$ ) / TR20

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Proflin 2145 Harmonics & Flicker and power line immunity test system	Teseq GmbH	Proflin 2145	1736A02510, 1646A, 01490, 1736A02428, 1736A00944, A41547	2018.09.08	2019.09.08
Temperature/Humidity Meter	RTS	RTS-8S	TR20-TH	2018.10.24	2019.10.24

Voltage fluctuations and flicker ( $16A < I \leq 75A$ ) / TR20

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Proflin 2145 Harmonics & Flicker and power line immunity test system	Teseq GmbH	Proflin 2145	1736A02510, 1646A, 01490, 1736A02428, 1736A00944, A41547	2018.09.08	2019.09.08
Temperature/Humidity Meter	RTS	RTS-8S	TR20-TH	2018.10.24	2019.10.24

Electrostatic discharge / TR3

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
ESD Simulator	EM TEST	Dito	V0616101367	2019.04.18	2020.04.18
ESD Simulator	3C TEST	ESD-30A	EC0261406	2018.08.08	2019.08.08
ESD Simulator	NoiseKen	ESS-B3011	ESS1233485	2019.03.05	2020.03.05
ESD Simulator	EM TEST	NSG 438A	237	2018.08.25	2019.08.25
Barometer	Fengyun	DYM3	0506048	2018.10.23	2019.10.23
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2018.10.24	2019.10.24

Radio-frequency electromagnetic field / AC4

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Signal Generator	R&S	SMB100A	114728	2018.11.16	2019.10.20
Power Meter	R&S	NRP2	106362	2018.11.05	2019.10.20
Power Sensor	R&S	NRP6A	101411	2018.11.13	2019.10.20
Power Sensor	R&S	NRP6B	101412	2018.11.13	2019.10.20
RF Switch	R&S	OPS120	101944	2018.11.14	2019.11.15
Power Amplifier	R&S	BBA150 BC500	102912	2019.01.24	2020.01.24

Power Amplifier	R&S	BBA150 D200	102889	2019.01.24	2020.01.24
Power Amplifier	R&S	BBA150 E200	102890	2019.01.24	2020.01.24
LOG Antenna	R&S	HL046E	100257	N/A	N/A
Filed Probe	AR	FL7006/KIT	350261	2018.09.19	2020.09.19
Temperature/Humidity Meter	RTS	RTS-8S	AC4-TH	2018.10.24	2019.10.24

#### Electrical fast transients / TR2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	4019	2019.03.21	2020.03.21
CDN	Teseq GmbH	CDN 3061	5010	2019.03.21	2020.03.21
Automatic Step transformer	Teseq GmbH	VAR 3005- S16	3010	2019.03.29	2020.03.29
CDN	Teseq GmbH	CDN 3063	1997	2019.03.21	2020.03.21
CDN	Teseq GmbH	CDN 3425	2029	2018.10.20	2019.10.20
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2018.10.24	2019.10.24

#### Surges / TR2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	4019	2019.03.21	2020.03.21
CDN	Teseq GmbH	CDN 3061	5010	2019.03.21	2020.03.21
Automatic Step transformer	Teseq GmbH	VAR 3005-S16	3010	2019.03.29	2020.03.29
CDN	Teseq GmbH	CDN 3063	1997	2019.03.21	2020.03.21
CDN	Teseq GmbH	CDN 118	40652	2018.10.20	2019.10.20
CDN	Teseq GmbH	CDN 118	40644	2018.10.20	2019.10.20
CDN	Teseq GmbH	CDN 117	31806	2019.03.21	2020.03.21
Temperature/Humidity Meter	RTS	RTS-8S	TR2-TH	2018.10.24	2019.10.24

#### Radio-frequency continuous conducted / TR2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
RF-Generator	Teseq GmbH	NSG 4070B-80	43711	2018.06.09	2019.06.09
Attenuation	Woken	/	0080CN1006H	2019.04.20	2020.04.20
Coupling / Decoupling Network	Schaffner	CDN M016	21249	2018.10.14	2019.10.14
Coupling / Decoupling Network	Teseq GmbH	CDN M016	24484	2018.10.20	2019.10.20
Coupling / Decoupling Network	Schaffner	CDN T400	19083	2018.10.20	2019.10.20
Coupling / Decoupling Network	Teseq GmbH	CDN T400	22461	2018.10.20	2019.10.20
Coupling / Decoupling Network	Teseq GmbH	CDN T800	26167	2019.01.07	2020.01.07
Coupling / Decoupling Network	Teseq GmbH	CDN M525	31021	2019.03.04	2020.03.04
EM Clamp	Schaffner	KEMZ 801	21041	2018.11.02	2019.11.02
Temperature/Humidity	Ruitesi	RTS-8S	TR2-TH	2018.10.24	2019.10.24

Meter					
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Power-frequency magnetic field / TR2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	4019	2019.03.21	2020.03.21
CDN	Teseq GmbH	CDN 3061	5010	2019.03.21	2020.03.21
Automatic Step transformer	Teseq GmbH	VAR 3005-S16	3010	2019.03.29	2020.03.29
Magnetic field Coil	Teseq GmbH	INA 702	306	2018.07.20	2019.07.20
Magnetic Field Generator	Teseq GmbH	MFO 6502	201	2018.07.20	2019.07.20
Temperature/Humidity Meter	Ruitesi	RTS-8S	TR2-TH	2018.10.24	2019.10.24

Voltage dips and interruptions / TR2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	4019	2019.03.21	2020.03.21
CDN	Teseq GmbH	CDN 3061	5010	2019.03.21	2020.03.21
Automatic Step transformer	Teseq GmbH	VAR 3005-S16	3010	2019.03.29	2020.03.29
Temperature/Humidity Meter	Ruitesi	RTS-8S	TR2-TH	2018.10.24	2019.10.24

## 7 ANNEX 1 - MEASUREMENT UNCERTAINTIES

The table(s) below show(s) measurement uncertainties of the EMC test set-ups. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

<b>Conducted Emission / TR1</b>
The maximum measurement uncertainty is evaluated as: 9kHz~150kHz: 2.80dB 150kHz~30MHz: 2.40dB
<b>Radiated Emission / AC1</b>
The maximum measurement uncertainty is evaluated as: Horizontal: 30MHz~300MHz: 3.50 dB 300MHz~1GHz: 3.20 dB Vertical: 30MHz~300MHz: 3.60 dB 300MHz~1GHz: 3.10 dB
<b>Radiated Emission / AC5</b>
The maximum measurement uncertainty is evaluated as: Horizontal: 1GHz~18GHz: 5.00 dB Vertical: 1GHz~18GHz: 4.80 dB
<b>Harmonic current emissions / TR1</b>
The maximum measurement uncertainty is evaluated as: 1.8 %.
<b>Voltage fluctuations and flicker / TR1</b>
The maximum measurement uncertainty is evaluated as: 1.5 %.
<b>Electrostatic discharge / TR3</b>
The maximum measurement uncertainty is evaluated as Rise Time: 6.4 %, Peak Current: 6 %, Current at 30 ns: 6 %, Current at 60 ns: 6 %.
<b>Radio-frequency electromagnetic field / AC4</b>
The maximum measurement uncertainty is evaluated as 1.48dB.
<b>Electrical fast transients / TR2</b>
The maximum measurement uncertainty is evaluated as Voltage: 4%, Time: 2%.
<b>Surges / TR2</b>
The maximum measurement uncertainty is evaluated as Voltage: 4%, Time: 2%.
<b>Radio-frequency continuous conducted / TR2</b>
The maximum measurement uncertainty is evaluated as CDN: 1.52dB, EM Clamp: 1.92dB.
<b>Power-frequency magnetic field / TR2</b>
The maximum measurement uncertainty is evaluated as 10%.
<b>Voltage dips and interruptions / TR2</b>
The maximum measurement uncertainty is evaluated as Voltage: 4%, Time: 2%.

## 8 ANNEX 2 - TEST PHOTOS

**Conducted emissions – AC mains power ports: Front View**



**Conducted emissions – AC mains power ports: Side View**



**Radiated emissions (30 MHz to 1000 MHz): Front View**



**Radiated emissions (30 MHz to 1000 MHz): Back View**



**Radiated emissions (above 1 GHz): Front View**



**Radiated emissions (above 1 GHz): Back View**



### Harmonic current emissions & Voltage changes, voltage fluctuations and flicker



### Electrostatic discharge immunity



### Radio-frequency electromagnetic field immunity(Below 1GHz)



### Radio-frequency electromagnetic field immunity(Above 1GHz)



### Electrical fast transients immunity



### Surges immunity



### Radio-frequency continuous conducted immunity



### Power-frequency magnetic field immunity



## Voltage dips and interruptions immunity



## 9 ANNEX 3 - EUT PHOTOS

### EUT PHOTOS (1)



### EUT PHOTOS (2)



### EUT PHOTOS (3)



### EUT PHOTOS (4)



EUT PHOTOS (5)



EUT PHOTOS (6)



## EUT PHOTOS (7)



End of the report