CENTER FOR TESTING AND EUROPEAN CERTIFICATION LTD

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LABORATORY FOR TESTING OF MACHINERY, EQUIPMENT AND DEVICES
Certificate of accreditation № 101 ЛИ / 07.10.2021, valid until: 26.05.2023
Issued by EA BAS, in accordance with the requirements of BDS EN ISO/IEC 17025:2018

ИА "БСА" Рег.№ 101 ЛИ
ЛАБОРАТОРИЯ ЗА ИЗПИТВАНЕ

TEST REPORT

№ 2emc-22-689 / 19.12.2022

OBJECT TO BE TESTED: Household and similar electrical appliances.
Donut machime , Model: MP3/230
Model representative of models: MP2-1/230; MP2-2/230; MP3/400; MP2-1/400; MP2-2/400
MP3 /110; MP2-1/110; MP2-2/110
(name of obejct to be tested , type, model, quantity, type – portable, fixed, for walling in and other)
*Note: The test object is provided by the applicant

APPLICANT FOR TEST: STOK ENGINEERING Ltd ; Plovdiv, 69 Polk. Sava Mutkurov Str,
e-mail: office@stok-engineering.com , tel.: +359889356229 ;
Application № 689 / 25.10.2021
(name of the firm – applicant, address, telephone, number and date of the test application)

METHOD OF TEST :
BDS EN IEC 55014-1:2021 Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
BDS EN IEC 61000-3-2:2019+A1:2021 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
BDS EN 61000-3-3:2013+A1:2019+A2:2022 Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection
BDS EN IEC 55014-2:2021 Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard- cl.5.1; 5.7
BDS EN 61000-4-2:2009 Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
BDS EN IEC 61000-4-11:2020 Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests
(number and name of the standards)

DATE OF ACCEPTANCE IN THE TEST LABORATORY: 25.10.2021

CODE OF THE OBJECT: 2021/16; 30.09.2021 ;
(identification number , year of production)

MANIFACTURER: STOK ENGINEERING Ltd ; Plovdiv, 69 Polk. Sava Mutkurov Str,
e-mail: office@stok-engineering.com , tel.: +359889356229 ;
(firm, trade mark, address)

DECLARED TECHNICAL DATA: Rated voltage: 230 V
Rated frequency: 50 Hz
Rated maximum power: 4 kW
Class I
*Note: Test subject data provided by applicant. The laboratory does not carry liability if the same may affect the validity of the results.

DATE OF TEST PERFORMANCE: 23.11.2021 – 01.12.2022

THE HEAD OF LABORATORY : .....
/ T. Hristov /

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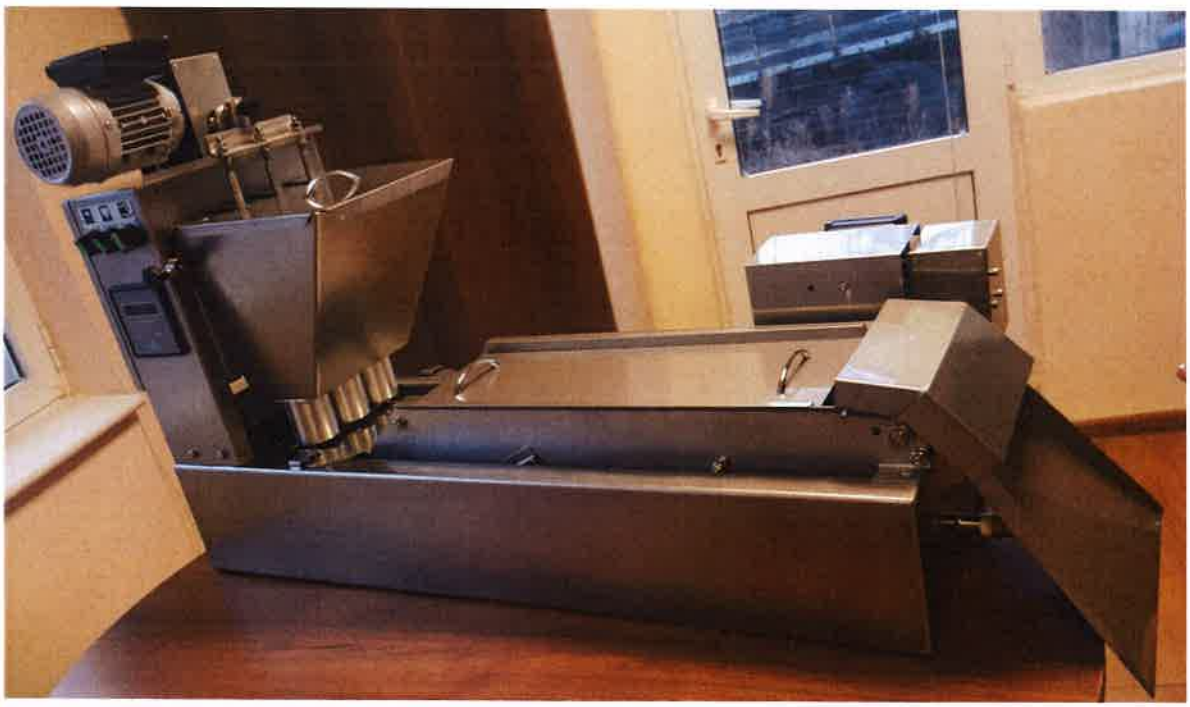
Copy of identification table and/or photo of tested object



LABORATORY FOR TESTING OF MACHINERY, EQUIPMENT AND DEVICES
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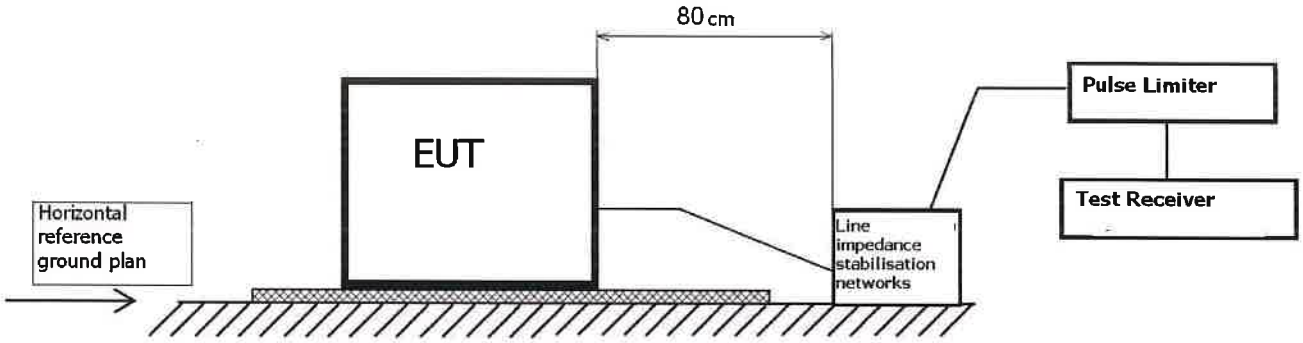
I. **EMISSION**

1. Mains terminal disturbance voltage

BDS EN 55014-1, cl. 5 – Test equipment and methods of measurement
BDS EN 55014-1, cl. 5.2 – Conducted disturbances set-up and measurements
BDS EN 55014-1, cl. 5.2.1 – Arrangement of the EUT
BDS EN 55014-1, cl. 5.2.2 - Arrangement of the leads at the ports of the EUT
BDS EN 55014-1, cl. 4 – Limits
BDS EN 55014-1, cl. 4.3.3 – Frequency range 150 kHz to 30 MHz - Table 5, columns 2 and 3

Conditions during the test - Appliance operated under normal operation
Ambient Temperature - 25 °C; Relative Humidity - 42 %; Air pressure - 1010 mbar



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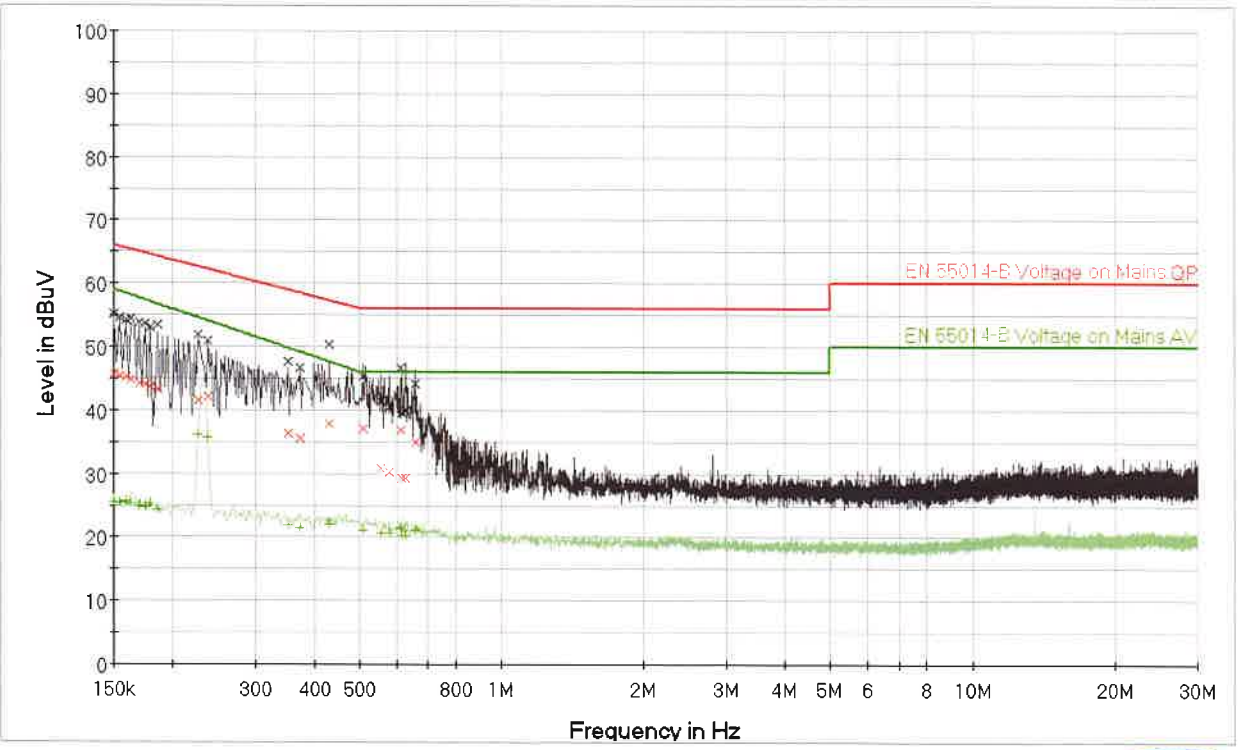
RESULTS OF MEASUREMENT :

Frequency	Terminal disturbance voltages, mains line – L					
	Quasi peak - QP			Average - AV		
	Measuring	Margin	Limit	Measuring	Margin	Limit
MHz	dB(μV)	dB(μV)	dB(μV)	dB(μV)	dB(μV)	dB(μV)
0,1500	45,80	20,20	66,00	25,40	33,60	59,00
0,1545	45,40	20,40	65,80	25,40	33,30	58,70
0,1590	45,10	20,40	65,50	25,70	32,70	58,40
0,1635	44,90	20,40	65,30	25,20	32,90	58,10
0,1703	44,20	20,70	64,90	24,90	32,70	57,60
0,1748	44,00	20,70	64,70	24,80	32,60	57,40
0,1793	43,60	20,90	64,50	25,20	31,90	57,10
0,1860	43,20	21,00	64,20	24,20	32,50	56,70
0,2265	41,50	21,10	62,60	36,20	18,40	54,60
0,2378	42,10	20,10	62,20	35,80	18,20	54,00
0,3525	36,30	22,60	58,90	21,80	28,00	49,80
0,3728	35,60	22,80	58,40	21,50	27,70	49,20
0,4313	37,80	19,40	57,20	21,90	25,70	47,60
0,5078	37,10	18,90	56,00	21,10	24,90	46,00
0,5550	31,00	25,00	56,00	20,60	25,40	46,00
0,5798	30,30	25,70	56,00	20,60	25,40	46,00
0,6113	36,90	19,10	56,00	21,40	24,60	46,00
0,6158	29,40	26,60	56,00	20,30	25,70	46,00
0,6270	29,40	26,60	56,00	20,30	25,70	46,00
0,6585	35,00	21,00	56,00	21,00	25,00	46,00

Drawing of terminal disturbance voltages, mains line – L



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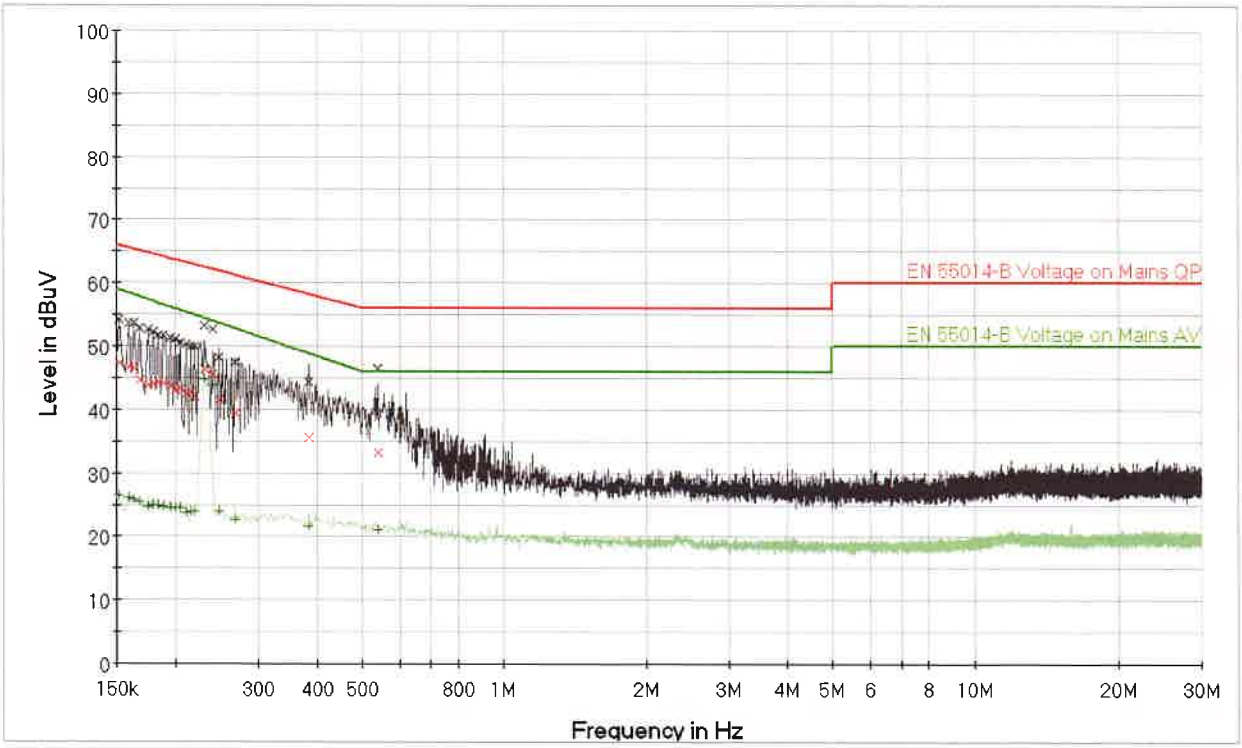
Frequency	Terminal disturbance voltages, mains line – N					
	Quasi peak - QP					
	Measuring	Margin	Limit	Measuring	Margin	Limit
MHz	dB(μV)	MHz	dB(μV)	MHz	dB(μV)	MHz
0,1523	47,30	18,60	65,90	26,50	32,30	58,80
0,1590	46,70	18,80	65,50	26,10	32,30	58,40
0,1635	46,40	18,90	65,30	26,00	32,10	58,10
0,1680	44,50	20,60	65,10	25,40	32,40	57,80
0,1748	43,80	20,90	64,70	24,70	32,70	57,40
0,1793	44,10	20,40	64,50	24,90	32,20	57,10
0,1838	44,20	20,10	64,30	24,90	31,90	56,80
0,1883	44,30	19,80	64,10	24,70	31,80	56,50
0,1950	43,60	20,20	63,80	24,60	31,60	56,20
0,1995	43,10	20,50	63,60	24,40	31,50	55,90
0,2040	43,20	20,20	63,40	24,40	31,30	55,70
0,2108	42,50	20,70	63,20	23,80	31,50	55,30
0,2153	42,60	20,40	63,00	23,90	31,20	55,10
0,2198	42,10	20,70	62,80	23,90	31,00	54,90
0,2310	46,30	16,10	62,40	44,90	9,40	54,30
0,2400	45,50	16,60	62,10	43,80	10,10	53,90
0,2468	41,60	20,30	61,90	23,90	29,70	53,60
0,2670	39,40	21,80	61,20	22,70	30,10	52,80
0,3840	35,50	22,70	58,20	21,60	27,30	48,90
0,5393	33,10	22,90	56,00	21,00	25,00	46,00

Drawing of terminal disturbance voltages, mains line - N



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2. Mains terminal disturbance voltage (Discontinuous disturbances)

BDS EN 55014-1, cl. 5 – Test equipment and methods of measurement
BDS EN 55014-1, cl. 5.2 – Conducted disturbances set-up and measurements
BDS EN 55014-1, cl. 5.2.1 – Arrangement of the EUT
BDS EN 55014-1, cl. 5.2.2 - Arrangement of the leads at the ports of the EUT
BDS EN 55014-1, cl. 4 – Limits – cl.4.4- Discontinuous disturbances – Table 5, columns 2
BDS EN 55014-1, Annex A – Standard operating conditions and normal loads for specific equipment
BDS EN 55014-1, Annex B - Click rate of special equipment – Table B.1
BDS EN 55014-1, Annex C - Guidance for the measurement of discontinuous disturbances/clicks
Conditions during the test - Appliance operated under normal operation
Ambient Temperature - 25 °C; Relative Humidity - 42 %; Air pressure - 1010 mbar

Measurement of a disturbance, the amplitude of which exceeds the quasi-peak limit of continuous disturbance, the duration of which is not longer than 200 ms which is separated from a subsequent disturbance by at least 200 ms.

The limits for discontinuous disturbance depend mainly on the character of the disturbance and on the click rate N.

First measurement with the limit L and a time of measurement equal to 120 minutes :

The click rate is obtained with :

N = Number of clicks N1 / Time of measurement

For discontinuous disturbance, the click limit Lq is attained by increasing the relevant limit L with :

44 dB за N < 0,2, или
20 lg (30 / N) за 0,2 ≤ N < 30
20lg(30/1)=29,5 dB

Second measurement with the limit Lq during the same time 120 minutes

The number of authorized clicks is equal to :

N2 ≤N1/4

Frequency (MHz)	First measurement - Limit– Quasi-peak					
	Limit L (dB(μV))	Number of clicks – N1	Time of measurement T (min)	Click rate N	Increasing ratio	Limit Lq (dB(μV))
0.15	66	0	120	0	29,5	95,5
0.5	56	0	120	0	29,5	85,5
1.4	56	0	120	0	29,5	85,5
30	60	0	120	0	29,5	89,5

Frequency (MHz)	Second measurement - Limit– Quasi-peak		
	Limit Lq (dB(μV))	Number of clicks – N2	Number of authorized clicks N2 ≤N1/4
0.15	95,5	0	-
0.5	85,5	0	-
1.4	85,5	0	-
30	89,5	0	

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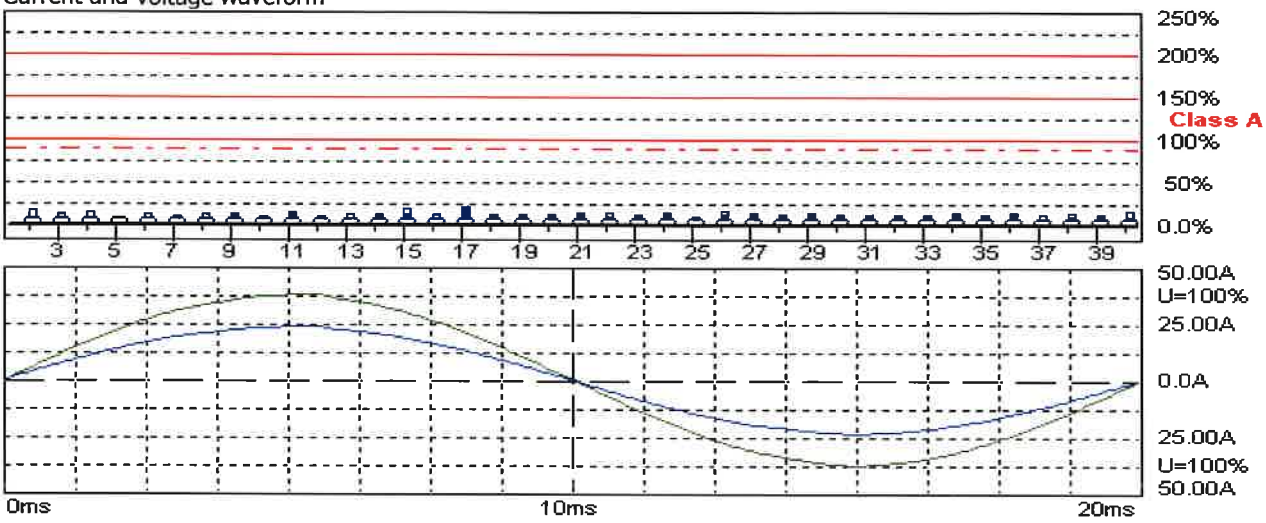
3. HARMONIC CURRENT MEASUREMENT

Classification of equipment	**A**

Duration of test – 5 min

Current and voltage waveform



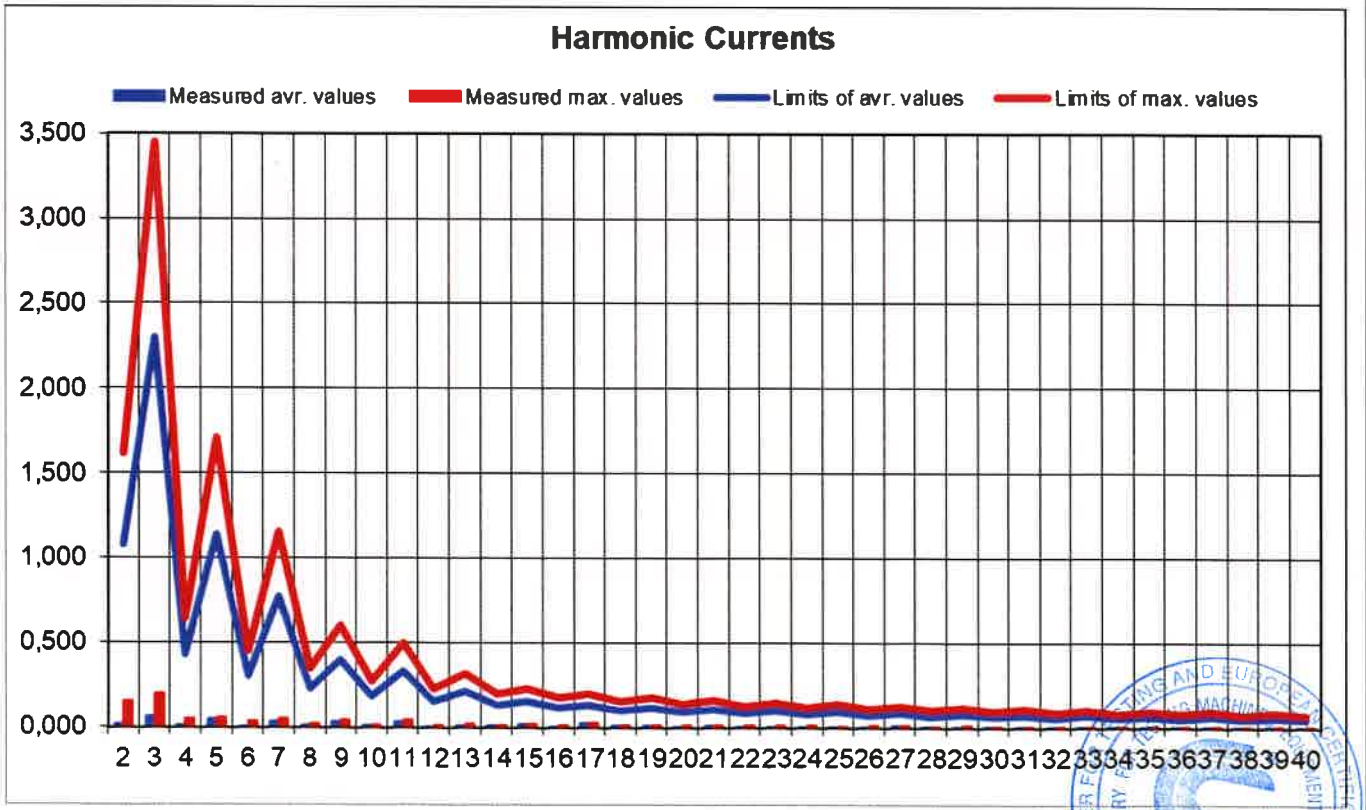
Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2) 01/12/2021 12:38:05

Urms =	230.1	V	P =	3805	W	THC =	0.107	A	Range: 50 A
Irms =	16.53	A	pf =	1.001					V-nom: 229 V
									TestTime: 1 min (100%)

Test completed, Result: PASSED

HAR-1000 EMC-Partner

Graphics harmonics



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Harmonic currents

V_{RMS}= 230,1 V	I_{peak}=23,61 A	Frequency = 50 Hz
I_{RMS}= 16,53 A	Apparent Power S= 3803 VA	Active Power P= 3805 W
Crest Factor= 1,428	Power Factor = 1,00	I-THD= 0,7 %

Harmonic	AVERAGE VALUE			MAX VALUE		
	Measured	100% Limit	% of Limit	Measured	100% Limit	% of Limit
№	A	A	%	A	A	%
2	0,015	1,080	1,42	0,153	1,620	9,42
3	0,061	2,300	2,65	0,201	3,450	5,84
4	0,009	0,430	2,14	0,049	0,645	7,57
5	0,049	1,140	4,28	0,058	1,710	3,39
6	0,006	0,300	2,03	0,031	0,450	6,78
7	0,037	0,770	4,75	0,049	1,155	4,23
8	0,009	0,230	4,00	0,018	0,345	5,30
9	0,034	0,400	8,40	0,043	0,600	7,12
10	0,009	0,184	5,00	0,012	0,276	4,42
11	0,031	0,330	9,24	0,040	0,495	8,02
12	0,006	0,153	3,99	0,009	0,230	4,01
13	0,012	0,210	5,81	0,021	0,315	6,79
14	0,009	0,131	7,02	0,012	0,197	6,21
15	0,015	0,150	10,20	0,021	0,225	9,51
16	0,006	0,115	5,30	0,009	0,173	5,33
17	0,024	0,132	18,48	0,024	0,198	12,32
18	0,009	0,102	9,02	0,009	0,153	6,01
19	0,009	0,118	7,80	0,009	0,177	5,20
20	0,006	0,092	6,63	0,009	0,138	6,67
21	0,012	0,107	11,40	0,012	0,161	7,60
22	0,006	0,084	7,26	0,009	0,126	7,30
23	0,006	0,098	6,22	0,009	0,147	6,26
24	0,006	0,077	7,92	0,009	0,116	7,97
25	0,006	0,090	6,78	0,006	0,135	4,52
26	0,006	0,071	8,59	0,009	0,107	8,64
27	0,009	0,083	11,08	0,009	0,125	7,39
28	0,006	0,066	9,24	0,006	0,099	6,16
29	0,006	0,078	7,82	0,009	0,117	7,86
30	0,006	0,061	10,00	0,006	0,092	6,67
31	0,006	0,073	8,36	0,006	0,110	5,57
32	0,006	0,058	10,52	0,006	0,087	7,01
33	0,006	0,068	8,97	0,006	0,102	5,98
34	0,006	0,054	11,30	0,006	0,081	7,53
35	0,006	0,064	9,53	0,006	0,096	6,35
36	0,006	0,051	11,96	0,006	0,077	7,97
37	0,003	0,061	5,08	0,006	0,092	6,67
38	0,003	0,048	6,46	0,006	0,072	8,47
39	0,006	0,058	10,52	0,006	0,087	7,01
40	0,003	0,046	6,74	0,006	0,069	8,84

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Harmonics of power supply source

Harmonic	Measured	100% Limit	% of Limit
№	A	A	%
2	0,1963	0,4663	42,1
3	0,2209	2,0861	10,6
4	0,0982	0,4663	21,1
5	0,5399	0,9326	57,9
6	0,0982	0,4663	21,1
7	0,5154	0,6872	75,0
8	0,0982	0,4663	21,1
9	0,3927	0,4663	84,2
10	0,0982	0,4663	21,1
11	0,2172	0,2209	98,3
12	0,0982	0,2209	44,5
13	0,1963	0,2209	88,9
14	0,0982	0,2209	44,5
15	0,2009	0,2209	90,9
16	0,0982	0,2209	44,5
17	0,1945	0,2209	88,0
18	0,0982	0,2209	44,5
19	0,1227	0,2209	55,5
20	0,0982	0,2209	44,5
21	0,1718	0,2209	77,8
22	0,0982	0,2209	44,5
23	0,0982	0,2209	44,5
24	0,0736	0,2209	33,3
25	0,0736	0,2209	33,3
26	0,0982	0,2209	44,5
27	0,1227	0,2209	55,5
28	0,0736	0,2209	33,3
29	0,0736	0,2209	33,3
30	0,0736	0,2209	33,3
31	0,0736	0,2209	33,3
32	0,0736	0,2209	33,3
33	0,0736	0,2209	33,3
34	0,0736	0,2209	33,3
35	0,0982	0,2209	44,5
36	0,0491	0,2209	22,2
37	0,0491	0,2209	22,2
38	0,0491	0,2209	22,2
39	0,0736	0,2209	33,3
40	0,0491	0,2209	22,2

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4. Voltage fluctuations and flicker measurement

BDS EN 61000-3-3, cl. 4 – Assesment of voltage changes, voltage fluctuations and flicker

BDS EN 61000-3-3, cl. 5 – Limits

BDS EN 61000-3-3, cl. 6 – Test conditions

Test supply voltage 230 V ; Frequency 50 Hz,
Ambient temperature: 25°C; Relative Humidity: 42% ; Air pressure: 1010 mbar ;

BDS EN 61000-3-3, cl. 6.5 Observation period - 60 min

	Measured	Limit
Pst (short-term flicker indicator)	0,60	1
Plt (long-term flicker indicator)	0,60 (when the value of Pst is lower of the limit, measurement of Plt is not making, and taking the value of Pst	0,65
dc (relative steady-state voltage change)	2,50 %	3,3 %
dmax (maximum relative voltage change)	3,00 %	4 %
t ➔ d(t) > 3,3 % time for which value of d(t) during a voltage change exceed 3,3%	0 ms	500 ms

LABORATORY FOR TESTING OF MACHINERY, EQUIPMENT AND DEVICES
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II. IMMUNITY OF DISTURBANCE MEASUREMENTS

BDS EN 55014-2, cl. 6 – Performance Criteria

Performance Criterion A: The apparatus shall contunue to operate as intendet during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss or performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion B: The apparatus shall contunue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however. 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, the either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion C: Temporary loss of functionis allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

Parameters required prior to the test	Laboratory Ambient Temperature	15 to 35 °C
	Relative Humidity	30 to 60 %
	Air pressure	860 to 1060 mbar
Parameters recorded during the test	Laboratory Ambient Temperature	25°C
	Relative Humidity	42%
	Air pressure	1010 mbar

LABORATORY FOR TESTING OF MACHINERY, EQUIPMENT AND DEVICES
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1. IMMUNITY TO ELECTROSTATIC DISCHARGE (ESD)

BDS EN 55014-2, cl.5.1 – Table 1
BDS EN 61000-4-2, cl. 7 – Test setup
BDS EN 61000-4-2, cl. 7.2.3 – Floor-standing equipment , Figure 5
BDS EN 61000-4-2, cl. 8 – Test procedure

Time interval between discharges	1 s
Discharge capacitance	150 pF
Discharge resistor	330 Ω
Performance Criteria according to cl.7.2.2 BDS EN 55014-2	Criteria B
Number of discharges	10 positive and 10 negative at the selected points

Discharge location	Type of discharge	Level	Test voltage	Polarity	Result
Body of EUT - X	Contact - Direct	1;2	2;4 kV	+ / -	Criteria A
Body of EUT - O	Air-Direct	1;2;3;	2;4;8 kV	+ / -	Criteria A
Vertical coupling plane (VCP)	Contact - Indirect	1;2	2;4 kV	+ / -	Criteria A
Horizontal coupling plane (HCP)	Contact - Indirect	1;2	2;4 kV	+ / -	Criteria A

Picture of the object with marked points of discharge locations

2. Voltage dips, short interruptions and voltage variations immunity tests

2.1 Voltage dips immunity tests

BDS EN 55014-2, cl. 5.7 – Table 13

BDS EN IEC 61000-4-11 , cl. 7 – Test setup

BDS EN IEC 61000-4-11 , cl. 8 – Test procedure

BDS EN IEC 61000-4-11 , cl. 8.2.1 – Testing for each selected combination of test level and duration with a sequence of three dips with intervals of 10 s minimum (between each test event)

Performance Criteria according to cl.7.2.2 BDS EN 55014-2	Criteria C

Voltage test levels (% of rated voltage)	Duration (cycles)	Phase angle synchronization	Result
40 %	10 cycles	0°	Criteria B
70 %	25 cycles	0°	Criteria A

2.2 Short interruptions immunity tests

БДС EN 55014-2, cl. 5.7 – Table 13

BDS EN IEC 61000-4-11, cl. 7 – Test setup

BDS EN IEC 61000-4-11 , cl. 8 – Test procedure

BDS EN IEC 61000-4-11 , cl. 8.2.1 – Testing for each selected combination of test level and duration with a sequence of three interruptions with intervals of 10 s minimum (between each test event)

Performance Criteria according to cl.7.2.2 BDS EN 55014-2	Criteria C

Voltage test levels (% of rated voltage)	Duration (cycles)	Phase angle synchronization	Result
0 %	0,5 cycles	0°	Criteria A

LABORATORY FOR TESTING OF MACHINERY, EQUIPMENT AND DEVICES
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USED TECHNICAL EQUIPMENTS:

	Appliance	Type	Manufacturer	Identity №	Last calibration date
1.	Digital multimeter	UNIGOR 390	LEM Austria	PI 3288	20.03.2020
2.	System for measuring of harmonic current emissions and voltage fluctuations and flicker	HAR1000	EMC PARTNER	HAR1000-1P 230V-0253	07.02.2020
3.	Thermometer-higrometer	177-H1	TESTO Germany	01320300/902	29.04.2021
4.	EMI – receiver 9 kHz ÷ 3600 MHz	ESRP3	Rohde & Schwarz	1316.4500K03-102168-uT	15.01.2020
5.	Line impedance stabilisation networks	NNB 52	TESEQ Switzerland	26326	10.09.2020
6.	ESD - Generator	NSG438	TESEQ Switzerland	988	19.05.2021
7.	System for measuring voltage interruptions and dips, fast transients/burst and surge	IMU4000	EMC PARTNER	106754-2150	11.02.2020

TEST PERFORMER: 1. .....
/ D. Chavalinov /

2. .....
/ T. Hristov /

THE HEAD OF LABORATORY :.....
/ T. Hristov /