

EMC TEST REPORT

FCC 47 CFR Part 15B, ISED ICES-003 Issue 6

Report Reference No	G0M-2003-8906-EF0115B-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    DAkkS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-3 DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	W.O.M. WORLD OF MEDICINE GmbH
Address	Salzufer 8 10587 Berlin GERMANY
Test Specification Standard(s)	47 CFR Part 15 Subpart B ISED ICES-003 Issue 6 ANSI C63.4:2014+A1:2017
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy
Model(s) / Type	PG145
Additional Model(s)	None
Brand Name(s)	Multi Flow plus / Multi Flow
Hardware Version(s)	02/2020
Software Version(s)	XP2 011 DD 0301
FCC-ID	2AS5K-TSHW42
IC	25004-TSHW42A
Test Result	PASSED

Possible test case verdicts:				
required by standard but not tested	N/T			
not required by standard	N/R			
required by standard but not appl. to test object	N/A			
test object does meet the requirement	P(PASS)			
test object does not meet the requirement	F(FAIL)			
Testing:				
Date of receipt of test item	2020-03-18			
Report:				
Compiled by	Ruslan Colbasiuc			
Tested by (+ signature) (Responsible for Test)	Ruslan Colbasiuc			
Approved by (+ signature) (Deputy Head of Lab)	Jens Marquardt			
Date of Issue	2020-12-14			
Total number of pages	43			
General Remarks:				
<p>The test results presented in this report relate only to the object tested.</p> <p>The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.</p> <p>This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.</p>				
Additional Comments:				
Additional variants have been declared by the manufacturer. The listed models were not tested, evaluated or assessed in no way.				
Description	Model	Hardware version	Software version	Brand Name
Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy	PG 130	02/2020	XP2 011 DD 0301	Multi Flow

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
T _{NOM}	Nominal operating temperature
V _{NOM}	Nominal supply voltage

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2020-12-14	Initial Release	-

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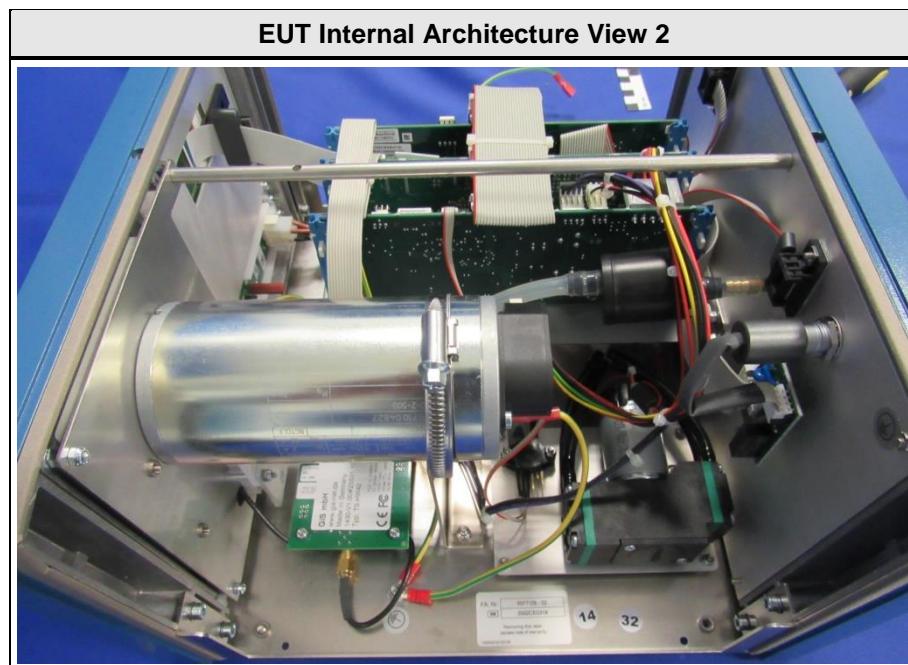
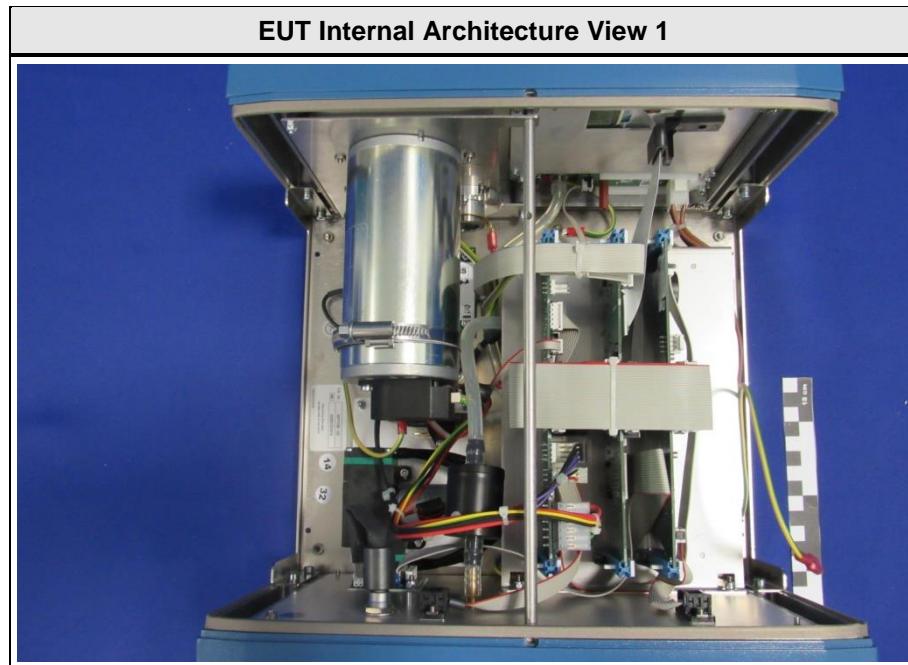
1 Equipment (Test Item) Under Test

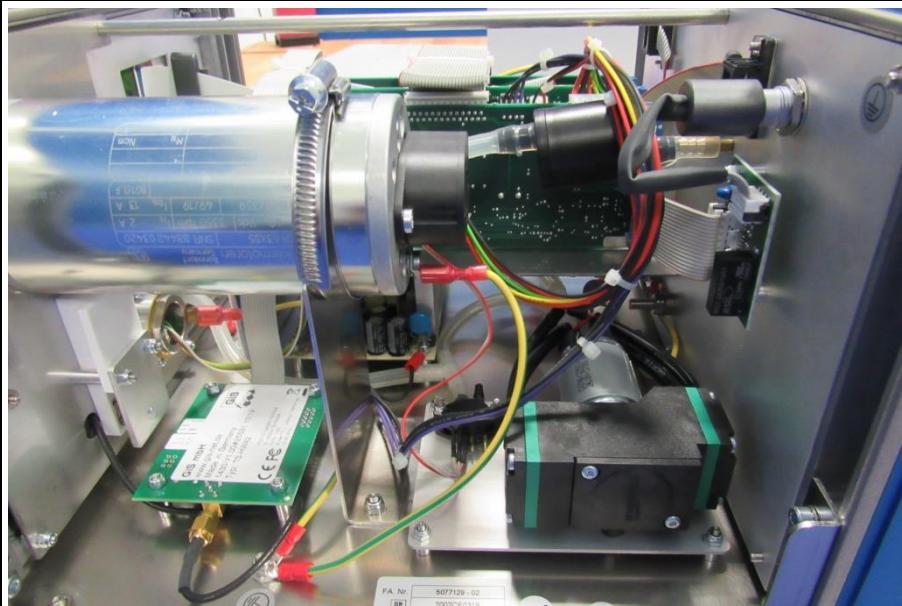
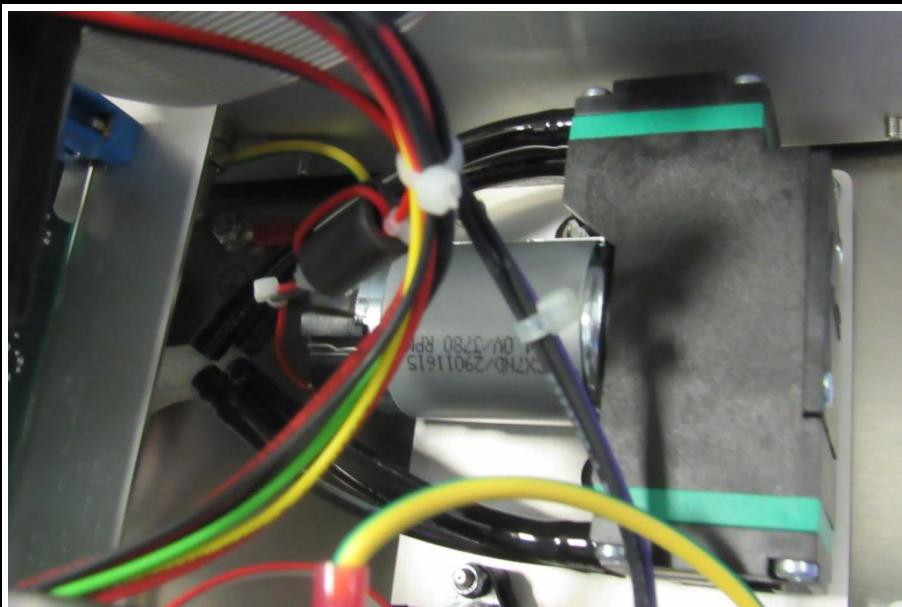
Description	Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy	
Model / Type	PG145	
Additional Model(s)	None	
Brand Name(s)	Multi Flow plus / Multi Flow	
Serial Number(s)	2002CE0319	
Hardware Version(s)	02/2020	
Software Version(s)	XP2 011 DD 0301	
FCC-ID	2AS5K-TSHW42	
IC	25004-TSHW42A	
Class	Class B	
Equipment type	Table top	
Highest internal frequency [MHz]	16	
Dimension	30.5x18.3x30.5	
Radio Module	Type	RFID
	Model	TS-HW42
	Manufacturer	GiS GmbH
	FCC-ID	2AS5K-TSHW42
	IC	25004-TSHW42A
Supply Voltage	V _{NOM}	120 VAC / 60 Hz
Manufacturer	Aesculap AG Am Aesculap-Platz 78532 Tuttlingen Germany	

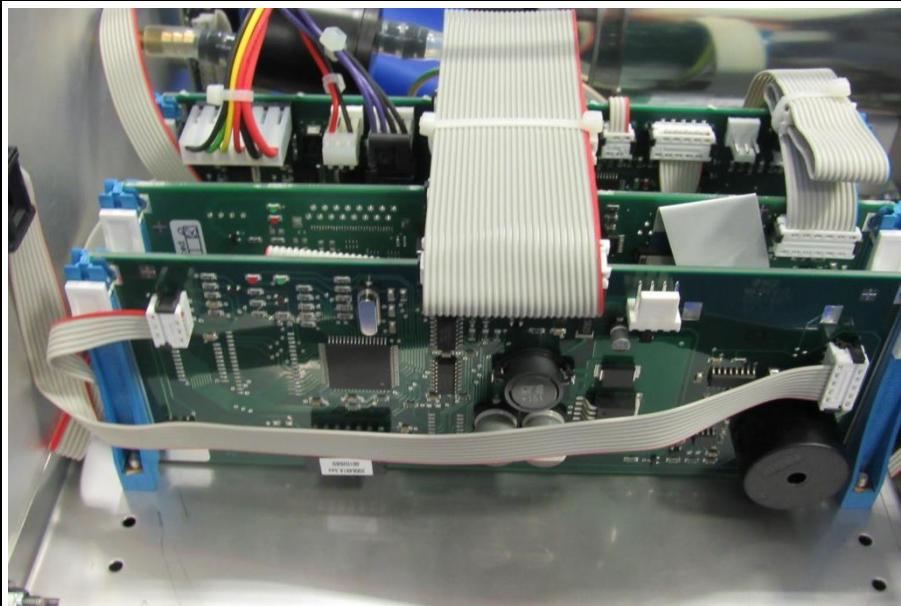
1.1 Equipment Ports

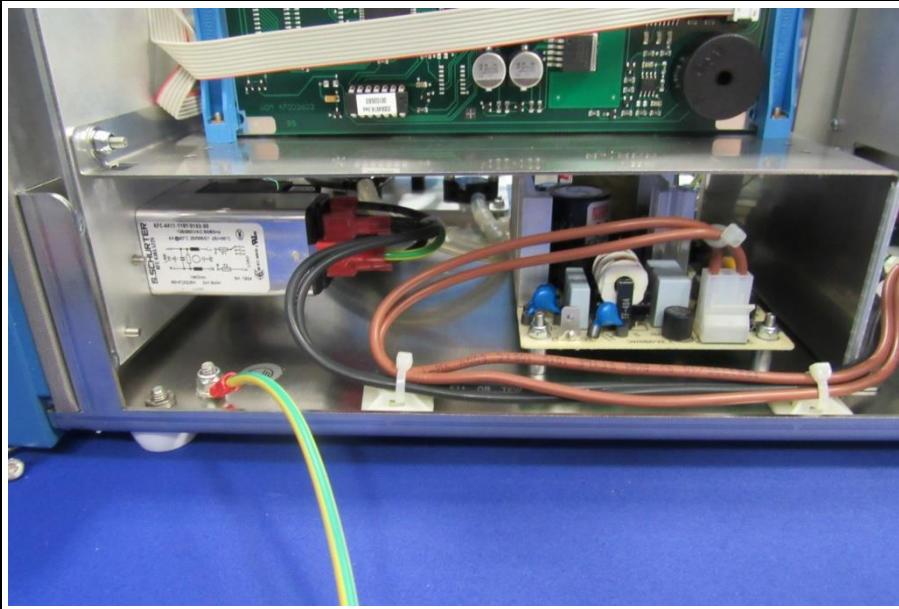
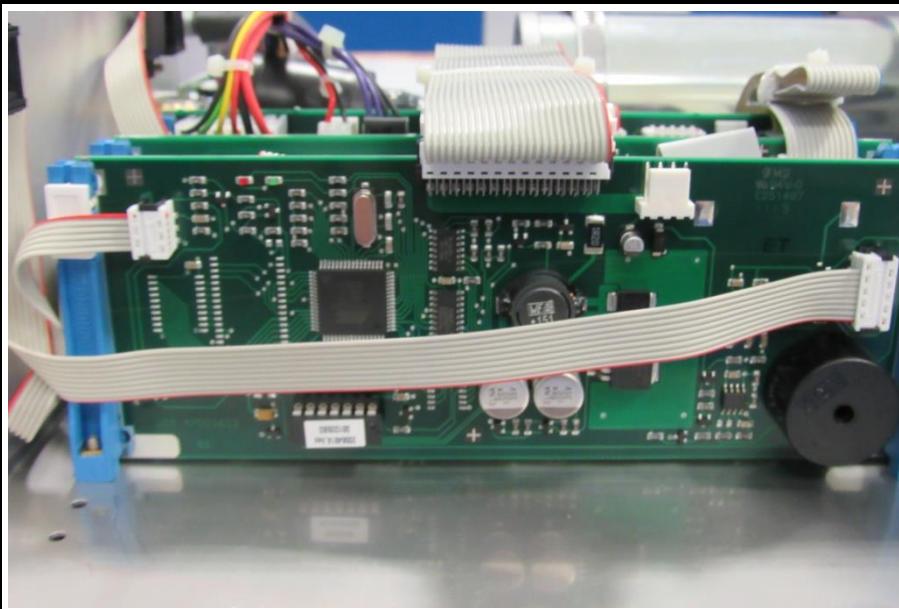
Name	Type	Attributes	Comment
Mains Input	AC	Count: 1 Direction: In Service only: No	-
Earth	PE	Count: 1 Direction: Out Service only: No	-
Service Interface	IO	Count: 1 Direction: IO Service only: Yes	-
Foot Pedal	IO	Count: 1 Direction: IO Service only: No	-
Scale	IO	Count: 1 Direction: IO Service only: No	-
IR remote Control	NE	Count: 1 Direction: In Service only: No	Not part of the tests
Irrigation Tube Set	NE	Count: 1 Direction: IO Service only: No	-
Vacuum Tube Set	NE	Count: 1 Direction: Out Service only: No	-
Description:			
AC	AC mains power input/output port		
DC	DC power input/output port		
BAT	DC power input port connected to external battery		
IO	Input/Output port		
TP	Telecommunication port		
NE	Non-electrical port		
PE	Potential Equalization		

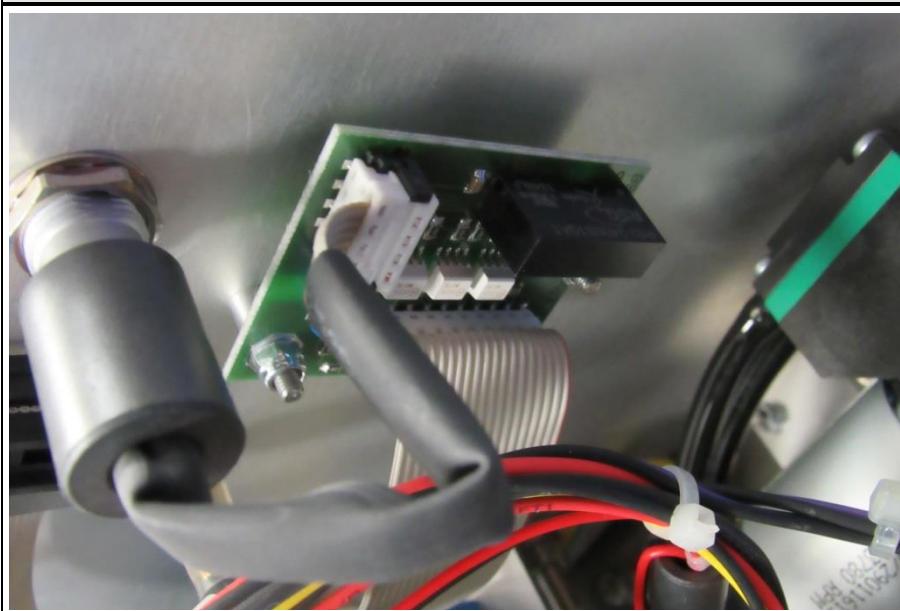
1.2 Equipment Photos - Internal

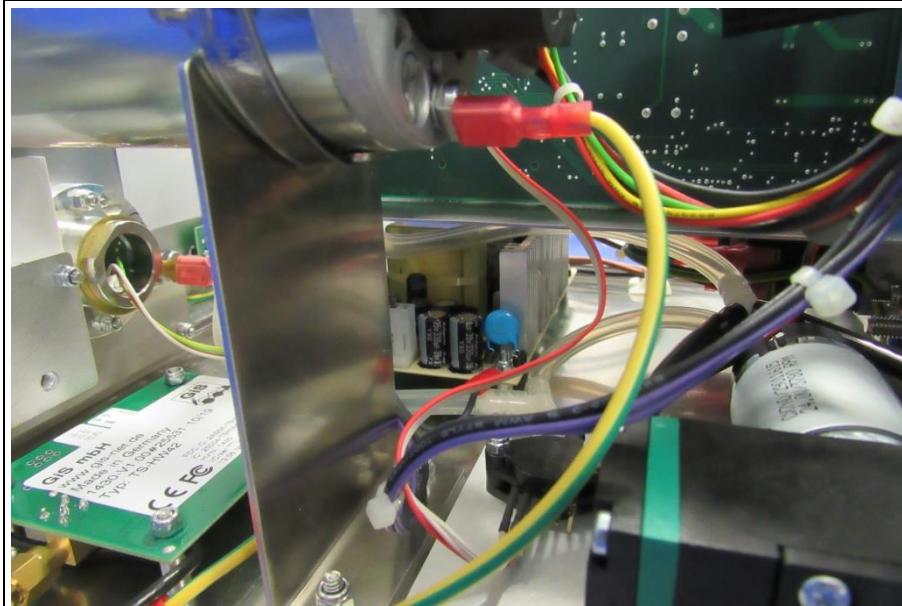
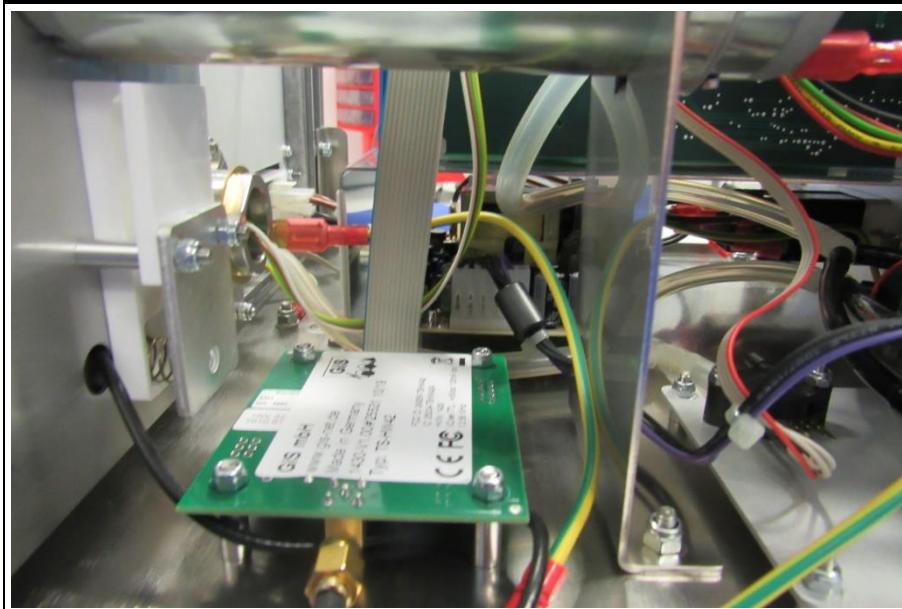


EUT Internal Architecture View 3**EUT Internal Architecture View 4**

EUT Internal Architecture View 5**EUT Internal Architecture View 6**

EUT Internal Architecture View 7**EUT Internal Architecture View 8**

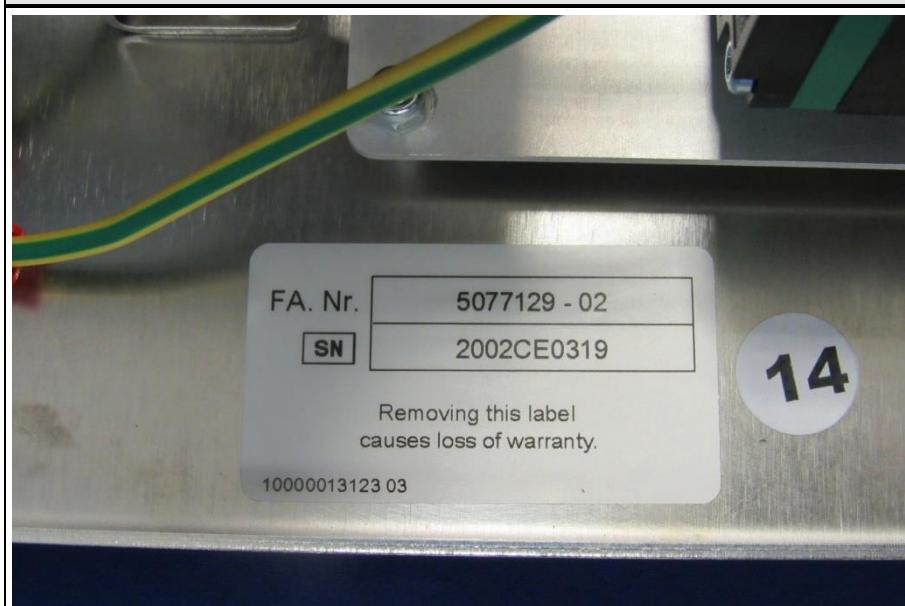
EUT Internal Architecture View 9**EUT Internal Architecture View 10**

EUT Internal Architecture View 11**EUT Internal Architecture View 12**

EUT Internal Label 1

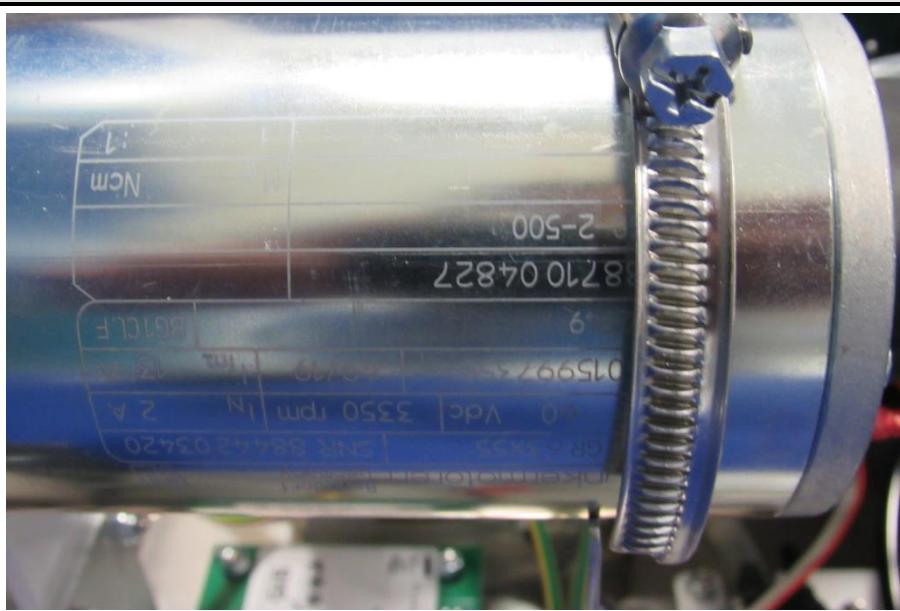


EUT Internal Label 2

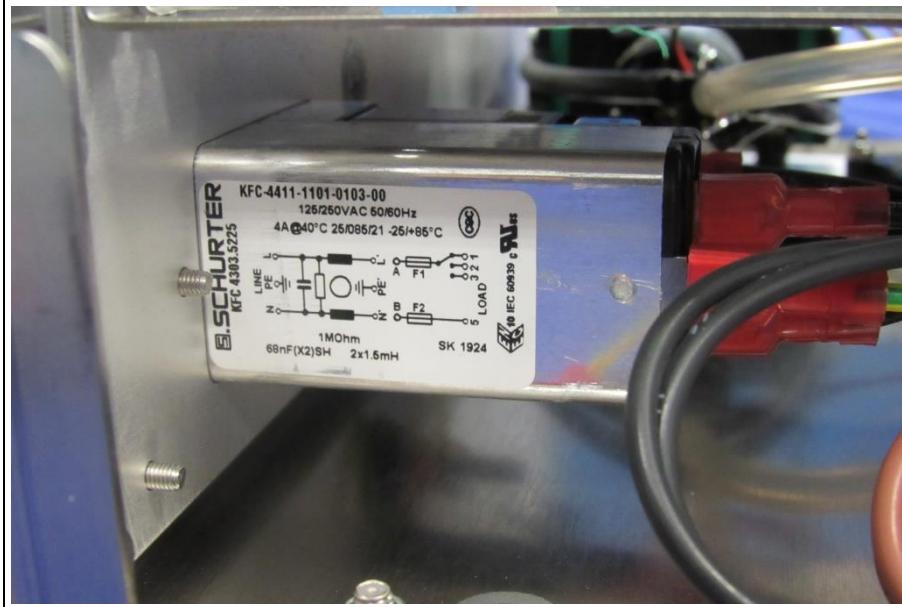


Test Report No.: G0M-2003-8906-EF0115B-V01

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EUT Internal Label 3**EUT Internal Label 4**

EUT Internal Label 5



EUT Internal Label 6



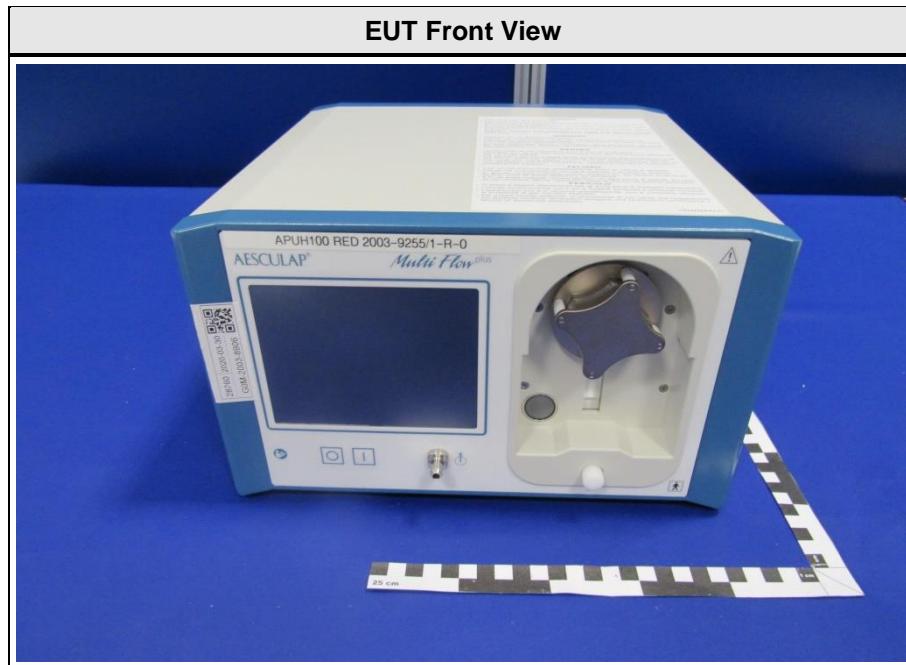
Test Report No.: G0M-2003-8906-EF0115B-V01

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EUT Internal Label 7**EUT Internal Label 8**

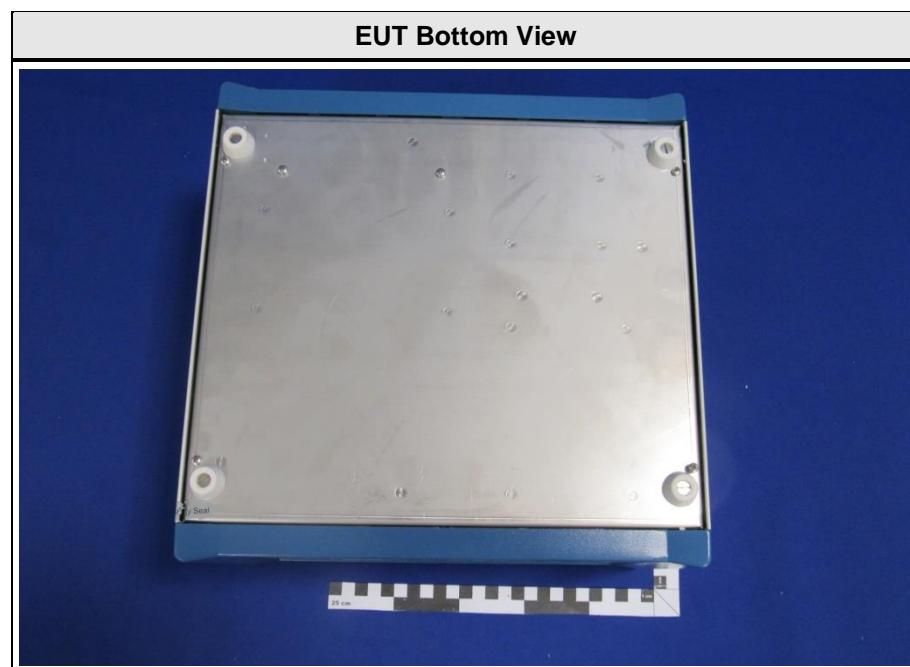
1.3 Equipment Photos - External



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EUT Right Side View**EUT Left Side View**



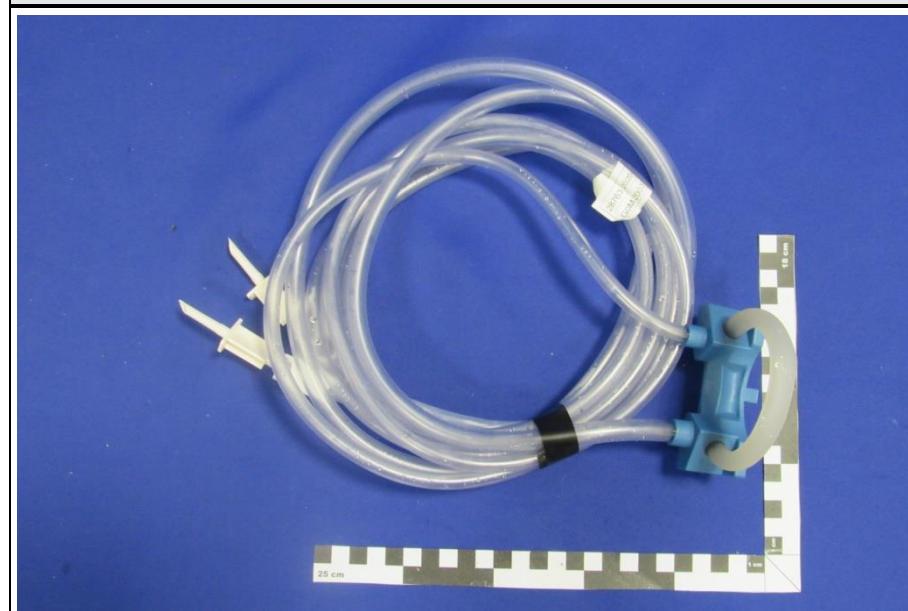
EUT Label**Foot Switch**

Foot Switch Connector**Foot Switch Label 1**

Foot Switch Label 2**Bottle Scale Top View**

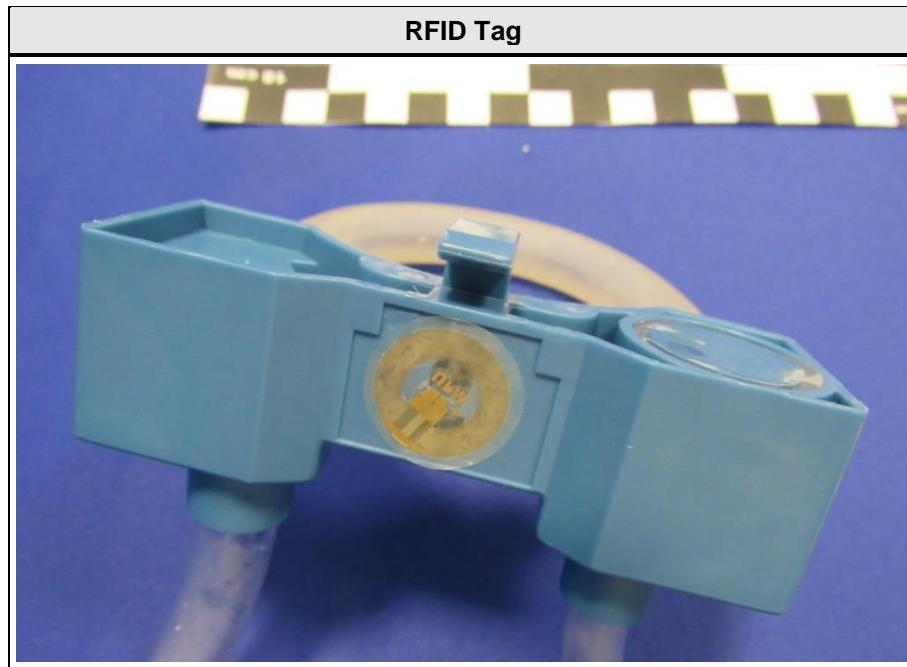
Bottle Scale Bottom View**Bottle Scale Label**

Irrigation Tube Set View 1



Irrigation Tube Set View 2





1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
CBL	Power Cord	Not specified	TE730	EU, 5m
AE	Irrigation Tube Set, multiuse, RFID	WOM	PG132SU	
SIM	Test Dummy	WOM	Not specified	
AE	Foot Switch	Herga Electric Ltd	6224-BCEB-ZZZZ-000	
AE	Bottle Scale	WOM	APUH302 / PM304	SN: 1906CE0150
AE	Vacuum Tube Set	WOM	Not specified	
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	Therapy. Device support 4 type of therapy: LAP / ARTHRO / HYS / URO. During the test it was investigated and found the LAP operating mode with higher emissions. The setting in this mode are: -High Flow, -Vacuum suction level 2 (max).
Comment:	

1.6 EUT Configuration

Configuration #	Description
1	Device is fully connected with auxiliary equipment: Footswitch, Bottle Scale, PE Cable, Tube Set irrigation with RFID Tag and Vacuum Tube Set connected to the Test Dummy, on the Dummy is created a leakage for fluid and vacuum higher flow.
Comment:	

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyser in dB μ V. Any external preamplifiers used are taken into account through internal analyser settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyser. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyser (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dB μ V/m). The FCC limits are given in units of μ V/m. The following formula is used to convert the units of μ V/m to dB μ V/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 * \log (\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dB μ V + 26 dB/m	= 47.5 dB μ V/m	:	47.5 dB μ V/m - 57.0 dB μ V/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15B, ISED ICES-003 Issue 6				
Reference	Requirement	Reference Method	Result	Remarks
Emission				
FCC 15.109 ICES-003, 6.2	Radiated emissions	ANSI C63.4:2014 +A1:2017	PASS	-
FCC 15.107 ICES-003, 6.1	AC power line conducted emissions	ANSI C63.4:2014 +A1:2017	PASS	-
Comment:				

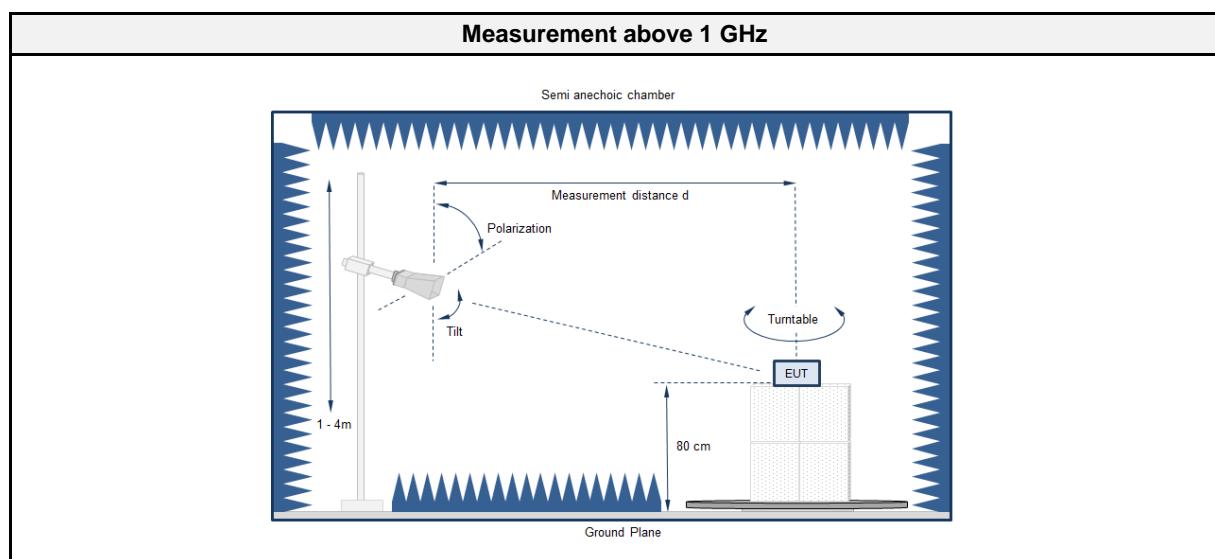
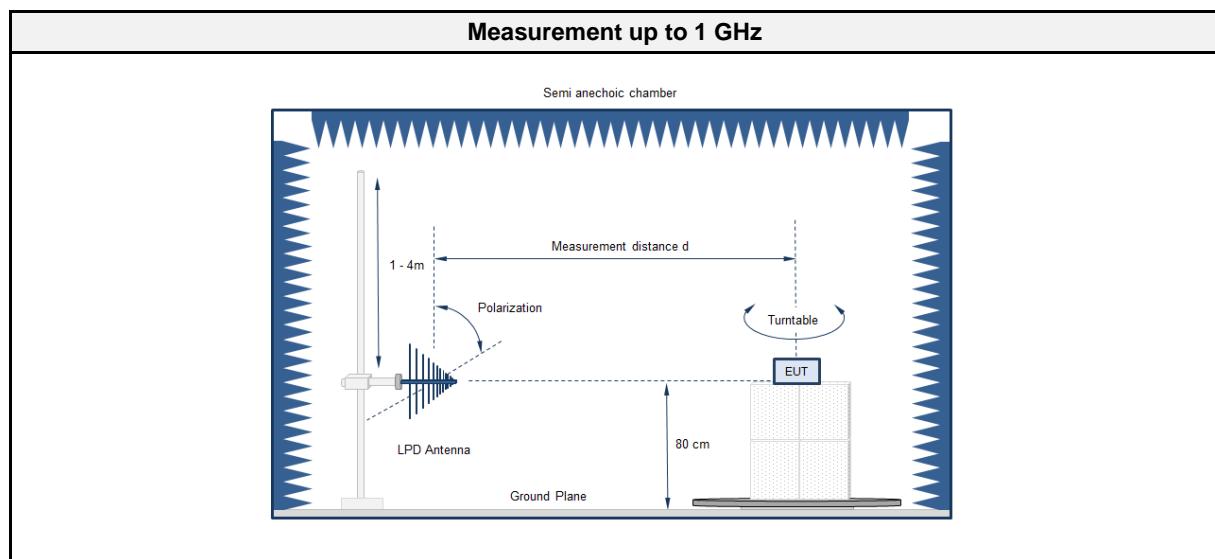
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

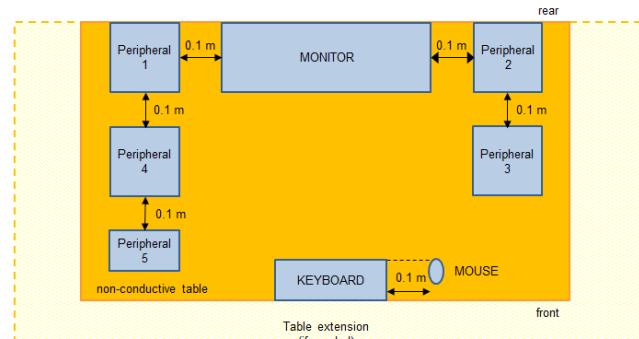
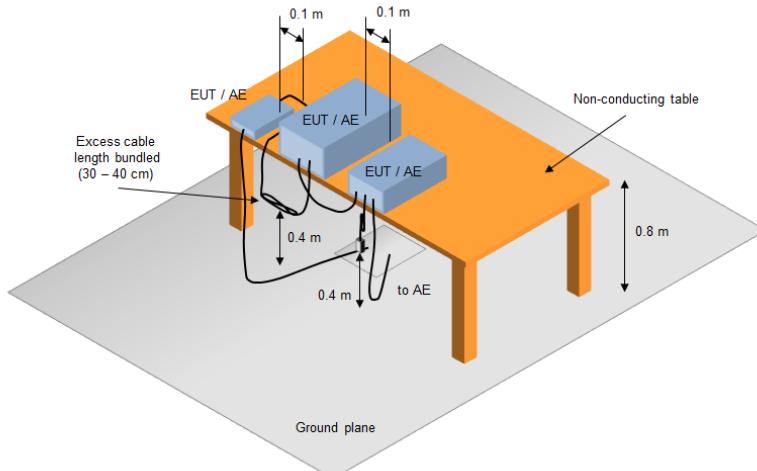
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

Test Information	
Reference	FCC 15.109, ICES-003, 6.2
Reference method	ANSI C63.4:2014+A1:2017 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	16
Measurement range	30 MHz to 1 GHz
Temperature [°C]	23
Humidity [%]	52
Operator	Ruslan Colbasiuc
Date	2020-08-24

2.1.2 Setup



Equipment placement - Table top

Test Setup

2.1.3 Equipment
Test Software

Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2016.1.10

Test Equipment

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC6	EF00910	2020-02	2023-02
EMI Test Receiver	R&S	ESU26	EF00887	2020-07	2021-07
TRILOG Broadband Antenna	Schwarzbeck	VULB 9162	EF00978	2019-10	2022-10
Climatic Sensor	Embedded Data Systems, LLC.	9A00100000254 77E	EF01124	2020-03	2021-03

2.1.4 Procedure

Exploratory measurement
<ol style="list-style-type: none"> 1. The EUT was placed on a non-conductive table at a height of 0.8m. 2. The EUT and support equipment, if needed, were set up to simulate typical usage. 3. Cables, of type and length specified by the manufacturer, were connected to at least one port of each type and were terminated by a device or simulating load of actual usage. 4. The antenna was placed at a distance of 3 or 10 m. 5. The received signal was monitored at the measurement receiver. 6. This procedure has to be performed in both antenna polarizations, horizontal and vertical. 7. The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 1.3

Final measurement
<ol style="list-style-type: none"> 1. The EUT was placed on a 0.8 m non-conductive table at a 3 m distance from the receive antenna. The antenna output was connected to the measurement receiver. 2. A biconical antenna was used for the frequency range 30 – 200 MHz, a logarithmic periodical antenna was used for the frequency range from 200 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast. 3. The EUT and cable arrangement were based on the exploratory measurement results. 4. Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded. 5. The test data of the worst-case conditions were recorded and shown on the next pages.

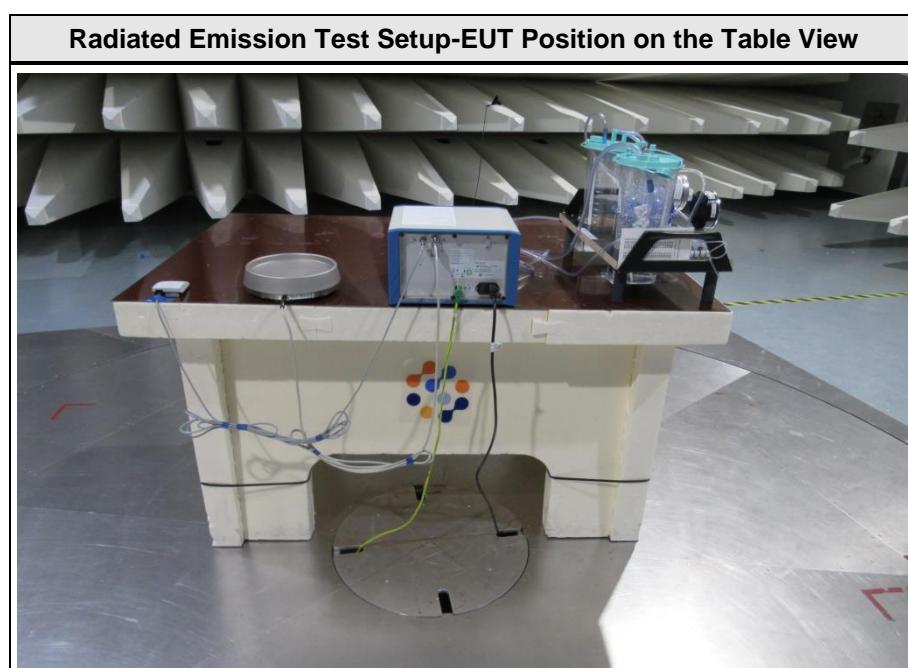
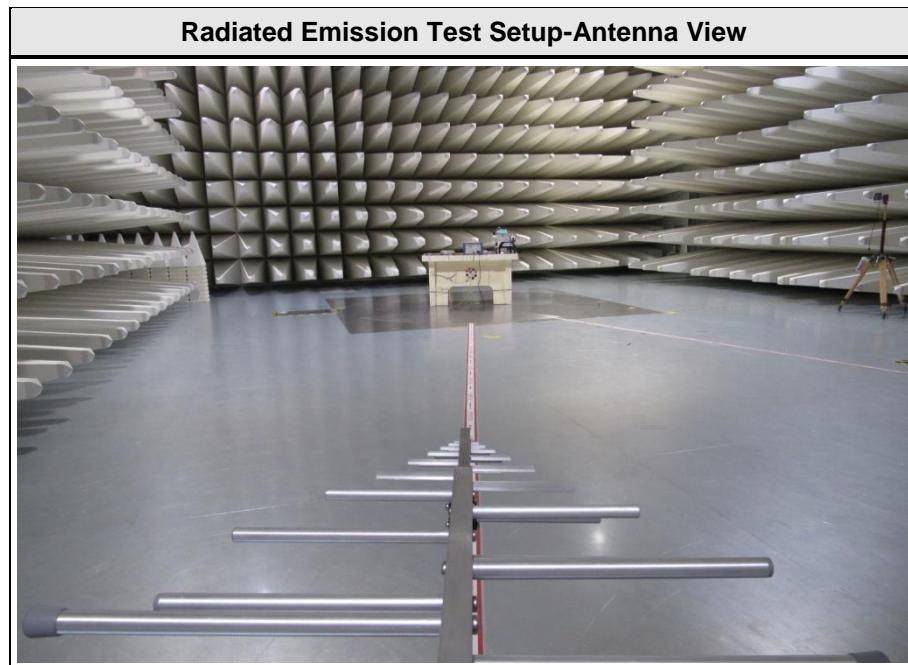
2.1.5 Limits

Class B @ 3 m		
Frequency [MHz]	Detector	Limit [dB μ V/m]
30 - 88	Quasi-peak	40
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46
960 - 1000	Quasi-peak	54
> 1000	Peak Average	74 54

2.1.6 Results

Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	-

2.1.7 Setup Photos

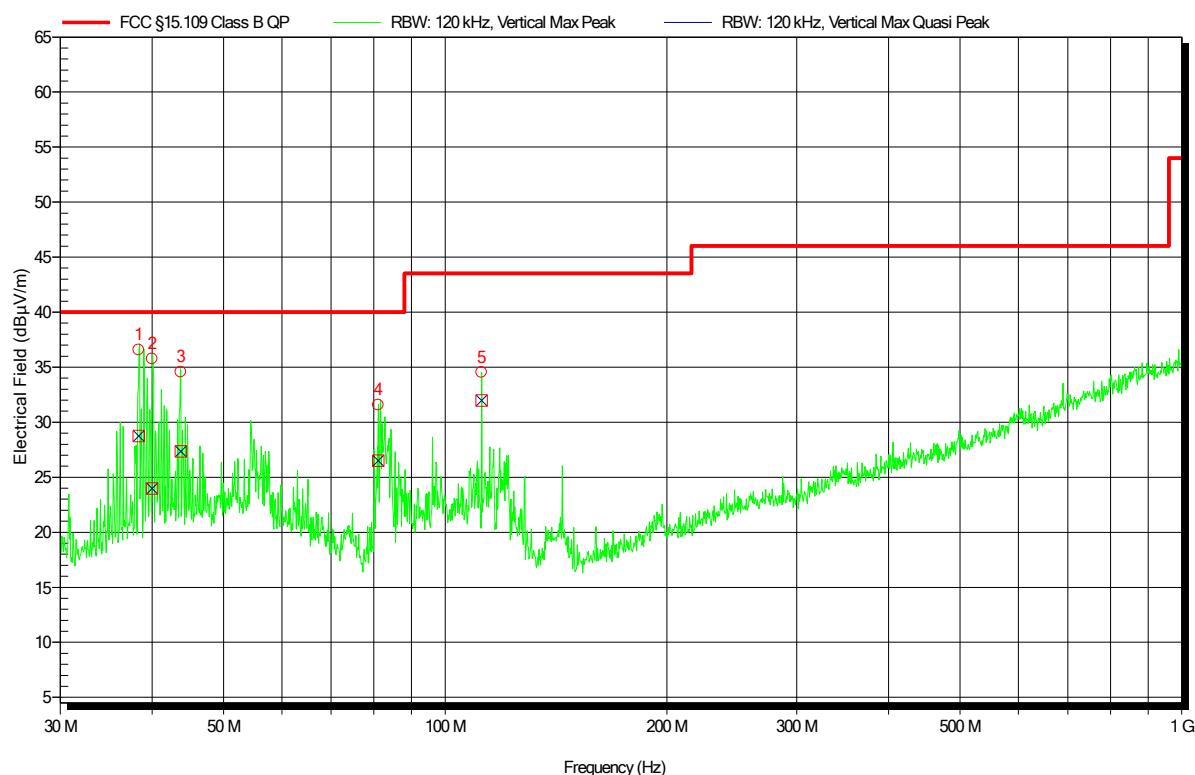


2.1.8 Records

Radiated emissions according to FCC part 15B

Project Number: G0M-2003-8906
 Applicant: W.O.M. WORLD OF MEDICINE GmbH
 Model Description: Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy
 Model: PG145
 Test Sample ID: 28760
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Colbasiuc
 Test Date: 2020-08-24
 Operating Conditions: ambient temperature: 23°C
 power input: 120 V / 60 Hz
 Antenna: Schwarzbeck VULB 9162, Vertical
 Measurement Distance: 10m calculated to 3m
 Mode: 1
 Note 1:

Index 1

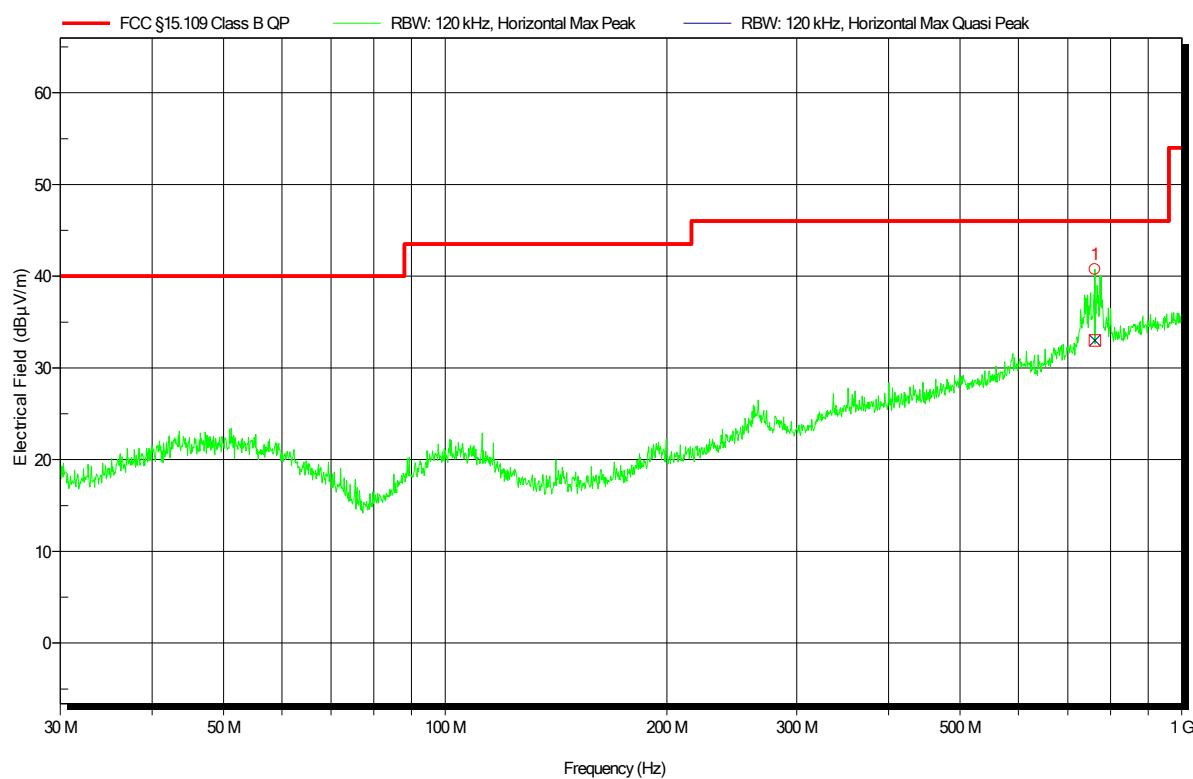


Peak Number	Frequency	Quasi-Peak	Quasi-Peak	Quasi-Peak	Quasi-Peak	Angle	Height
		Limit	Difference	Status			
1	38.376 MHz	28.7 dB μ V/m	40 dB μ V/m	-11.3 dB	Pass	-90 Degree	1 m
2	39.984 MHz	24 dB μ V/m	40 dB μ V/m	-16.0 dB	Pass	-90 Degree	1 m
3	43.74 MHz	27.4 dB μ V/m	40 dB μ V/m	-12.6 dB	Pass	-90 Degree	1 m
4	81.078 MHz	26.5 dB μ V/m	40 dB μ V/m	-13.5 dB	Pass	-90 Degree	1 m
5	112.008 MHz	32 dB μ V/m	43.5 dB μ V/m	-11.5 dB	Pass	-90 Degree	1 m

Radiated emissions according to FCC part 15B

Project Number: G0M-2003-8906
 Applicant: W.O.M. WORLD OF MEDICINE GmbH
 Model Description: Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy
 Model: PG145
 Test Sample ID: 28760
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Colbasiuc
 Test Date: 2020-08-24
 Operating Conditions: ambient temperature: 23°C
 power input: 120 V / 60 Hz
 Antenna: Schwarzbeck VULB 9162, Horizontal
 Measurement Distance: 10m calculated to 3m
 Mode: 1
 Note 1:

Index 2



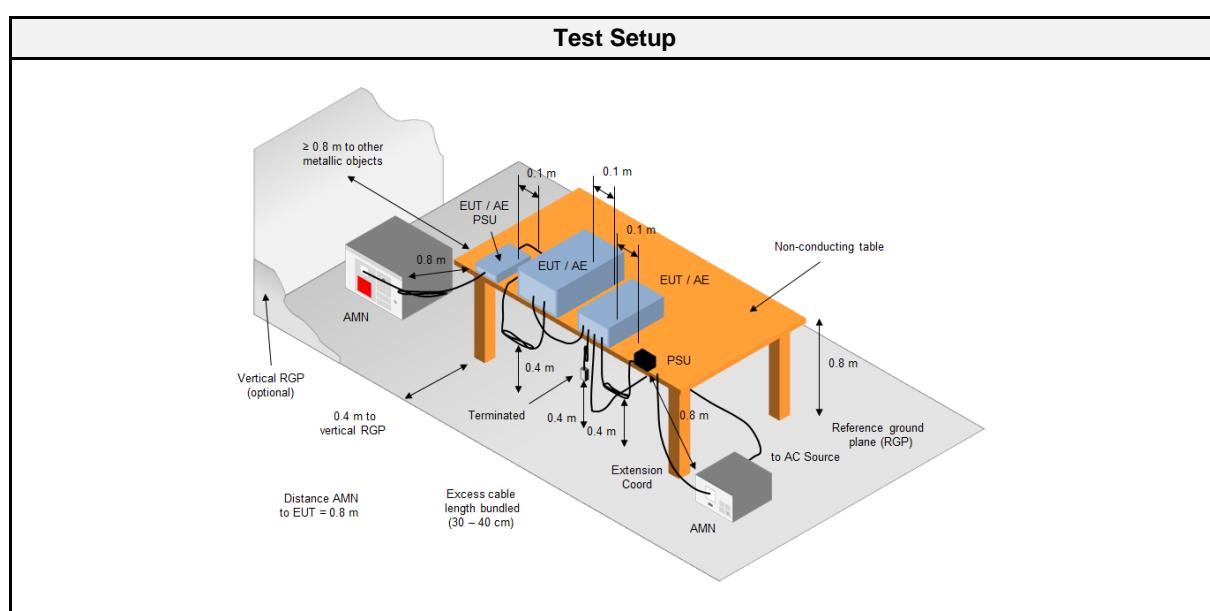
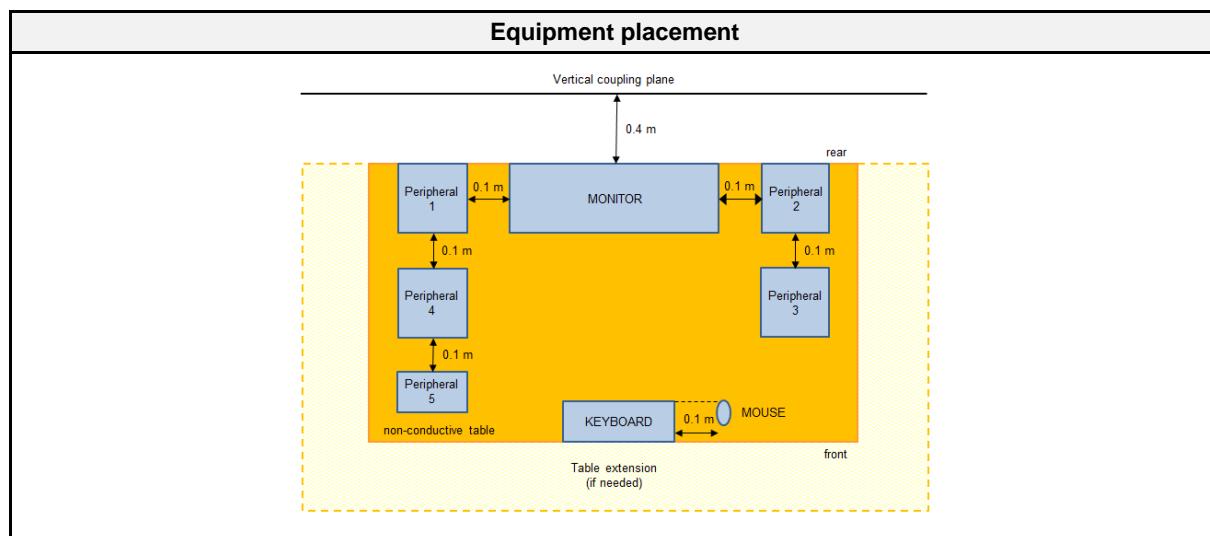
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	761.88 MHz	33 dB μ V/m	46 dB μ V/m	-13.0 dB	Pass	-110 Degree	1.26 m

2.2 Test Conditions and Results - Conducted emissions acc. to ANSI C63.4

2.2.1 Information

Test Information	
Reference	FCC 15.107, ICES-003, 6.1
Reference method	ANSI C63.4:2014+A1:2017 Section 12
Measurement range	150 kHz to 30 MHz
Equipment class	Class B
Equipment type	Table top
Temperature [°C]	23
Humidity [%]	52
Operator	Ruslan Colbasiuc
Date	2020-08-24

2.2.2 Setup



2.2.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2016.1.10

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	Schwarzbeck	NSLK 8128	EF00975	2019-07	2021-07
Pulse Limiter	R&S	ESH3-Z2	EF01063	2020-07	2021-07
EMI Test Receiver	R&S	ESU26	EF00887	2020-07	2021-07
Climatic Sensor	Embedded Data Systems, LLC.	9A00100000254 77E	EF01124	2020-03	2021-03

2.2.4 Procedure

Exploratory measurement					
<ol style="list-style-type: none"> 1. The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1) 2. The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN. 3. The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length). 4. The LISN measurement port was connected to a measurement receiver 5. I/O cables were bundled not longer than 0.4 m 6. Measurement was performed in the frequency range 0.15 – 30MHz on each current-carrying conductor 7. To maximize the emissions the cable positions were manipulated 8. The worst configuration of EUT and cables is shown on a test setup picture at item 1.3 					

Final measurement					
<ol style="list-style-type: none"> 1. The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1) 2. The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN. 3. The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length). 4. The LISN measurement port was connected to a measurement receiver 5. The EUT and cable arrangement were based on the exploratory measurement results 6. The test data of the worst-case conditions were recorded and shown on the next pages 					

2.2.5 Limits

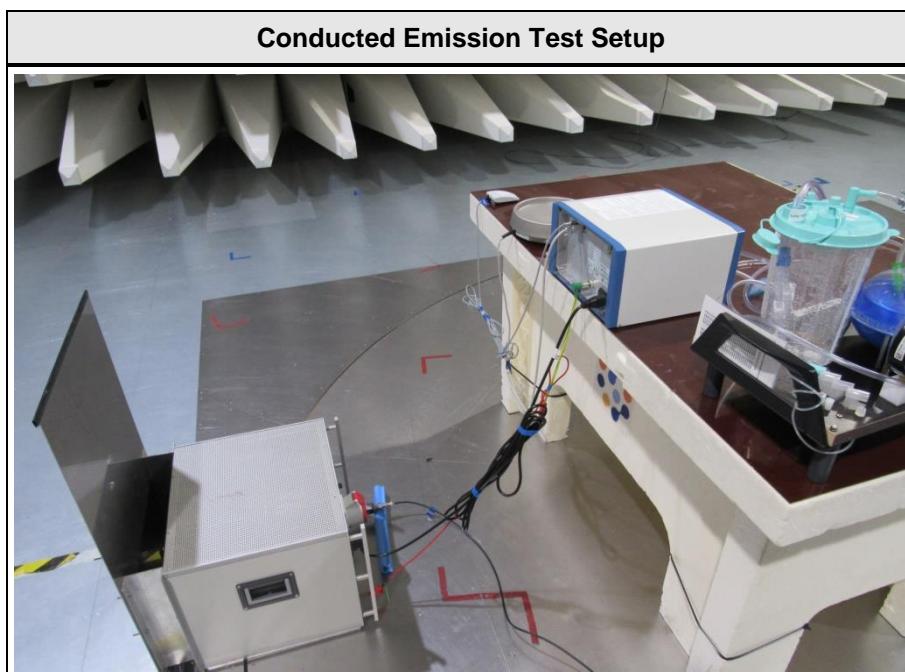
Class B		
Frequency [MHz]	Quasi-peak Limit [dB μ V]	Average Limit [dB μ V]
0.15 - 0.5	66 - 56 *	56 - 46 *
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency

2.2.6 Results

AC power line conducted emissions					
Port	Coupling	Operational mode	EUT Configuration	Verdict	Remark
Mains Input	AMN	1	1	PASS	-

2.2.7 Setup Photos

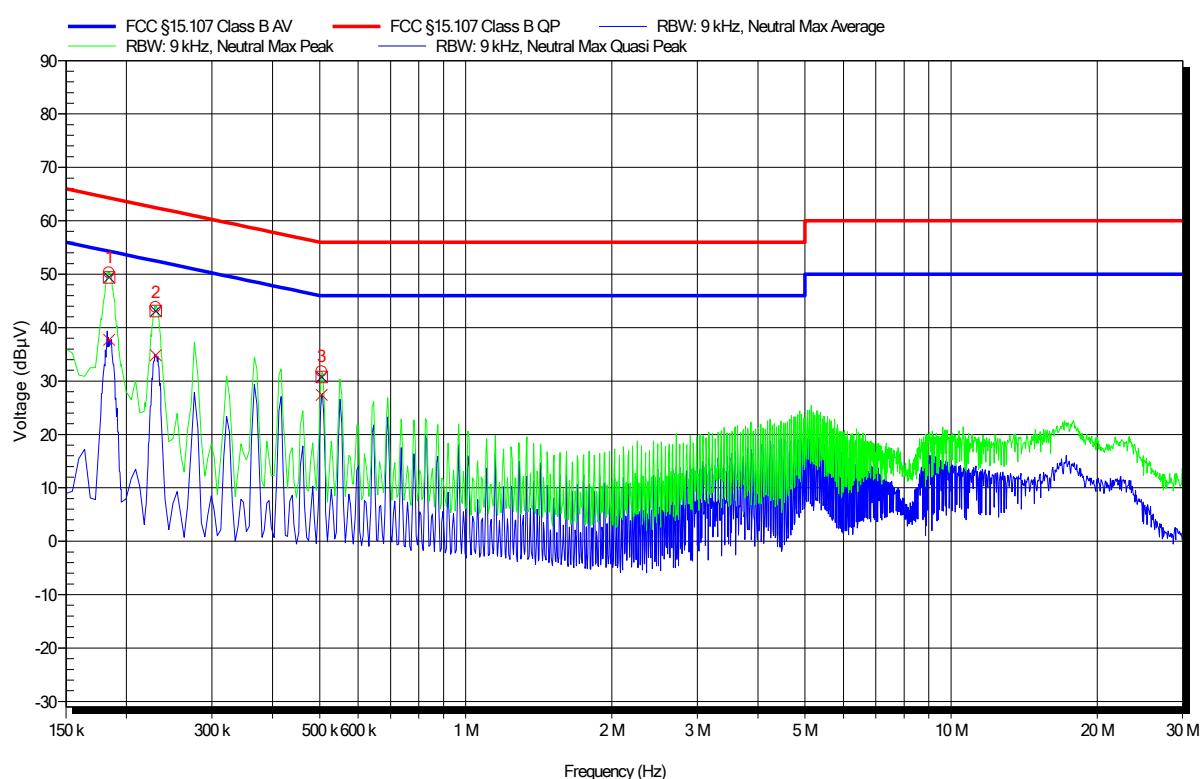


2.2.8 Records

Conducted emissions at the mains power port according to FCC part 15B

Project Number: G0M-2003-8906
 Applicant: W.O.M. WORLD OF MEDICINE GmbH
 Model Description: Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy
 Model: PG145
 Test Sample ID: 28760
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Colbasiuc
 Test Date: 2020-08-24
 Operating Conditions: ambient temperature: 23°C
 power input: 120 V / 60 Hz
 LISN: Schwarzbeck NSLK 8128 (N)
 Mode: 1
 Applied to Port: Mains Input
 Note 1:

Index 3



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	184.2 kHz	49.4 dBµV	64.3 dBµV	-14.9 dB	Pass	Neutral
2	229.65 kHz	43.1 dBµV	62.5 dBµV	-19.3 dB	Pass	Neutral
3	505.05 kHz	30.8 dBµV	56 dBµV	-25.2 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	184.2 kHz	37.7 dBµV	54.3 dBµV	-16.6 dB	Pass	Neutral
2	229.65 kHz	34.9 dBµV	52.5 dBµV	-17.6 dB	Pass	Neutral
3	505.05 kHz	27.4 dBµV	46 dBµV	-18.6 dB	Pass	Neutral

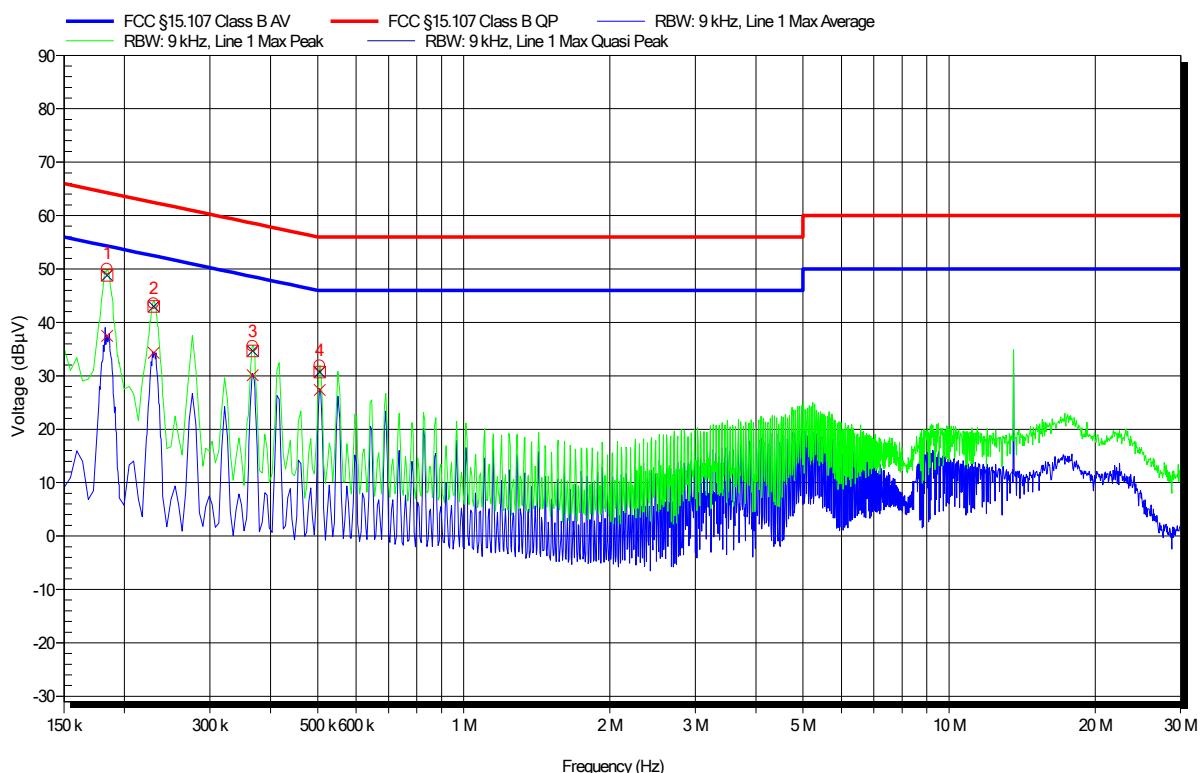
Test Report No.: G0M-2003-8906-EF0115B-V01

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted emissions at the mains power port according to FCC part 15B

Project Number: G0M-2003-8906
 Applicant: W.O.M. WORLD OF MEDICINE GmbH
 Model Description: Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy
 Model: PG145
 Test Sample ID: 28760
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Colbasiuc
 Test Date: 2020-08-24
 Operating Conditions: ambient temperature: 23°C
 power input: 120 V / 60 Hz
 LISN: Schwarzbeck NSLK 8128 (L)
 Mode: 1
 Applied to Port: Mains Input
 Note 1:

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Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	184.2 kHz	48.8 dB μ V	64.3 dB μ V	-15.5 dB	Pass	Line 1
2	229.65 kHz	43 dB μ V	62.5 dB μ V	-19.5 dB	Pass	Line 1
3	367.35 kHz	34.7 dB μ V	58.6 dB μ V	-23.9 dB	Pass	Line 1
4	505.05 kHz	30.7 dB μ V	56 dB μ V	-25.3 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	184.2 kHz	37.5 dB μ V	54.3 dB μ V	-16.8 dB	Pass	Line 1
2	229.65 kHz	34.3 dB μ V	52.5 dB μ V	-18.2 dB	Pass	Line 1
3	367.35 kHz	30.1 dB μ V	48.6 dB μ V	-18.5 dB	Pass	Line 1
4	505.05 kHz	27.3 dB μ V	46 dB μ V	-18.7 dB	Pass	Line 1

Test Report No.: G0M-2003-8906-EF0115B-V01

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End of the Test Report

Test Report No.: G0M-2003-8906-EF0115B-V01

Eurofins Product Service GmbH
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