

ENVIRONMENTAL TEST REPORT

ACCORDING TO: EN 50130-5:2011

FOR:

Paradox Security Systems Ltd.

- 1) 7" Touch screen keypad TM70
- 2) EVO192 – Control Panel – CIE
- 3) IP150 – IP module – SPT device
- 4) PCS250 – GSM/GPRS Module
- 5) PCS250G – GSM/GPRS Module
- 6) PGM4 – Programmable Output Module – Ancillary Equipment
- 7) ZX8 – Wired Zones Expander – part of the CIE
- 8) TM50 – Wired Keypad
- 9) RTX3 – Wireless Zones Expander (Transceiver) (433/868 MHz)
- 10) REM1 (433/868 MHz) – Remote Control
- 11) REM3 (433/868 MHz) – Remote Control
- 12) REM15 (433/868 MHz) – Remote Control
- 13) REM101 (433/868 MHz) – Remote Control

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1 Applicant information

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Contact name: Mr. Nimrod Herman

2 Equipment under test attributes

Product name/model	HW version	SW version
TM70	680-6006-991	V1.00
EVO192	668-4004-010	V4.63
IP150	850-2502-020	V4.01
PCS250	710-2250-010	V3.00
PCS250G	710-2250-010	V3.00
PGM4	671-4004-120	V5.00
ZX8	661-8008-130	V6.00
TM50	680-5505-992	V1.36
RTX3	333-5005-000	V5.31
REM1	331-2200-120	V3.10
REM3	331-5909-000	V1.10
REM15	331-5404-991	V3.10
REM101	331-2100-990	V1.10
Receipt date	16-May-17	

3 Manufacturer information

Manufacturer name: Paradox Security Systems Ltd.
Address: 780 INDUSTRIAL BLVD ST-EUSTACHE, QC, CANADA J7R 5V3
Telephone: 450-491-7444
Fax: 450-491-1095
E-Mail: nimrodh@paradox.com
Contact name: Mr. Nimrod Herman

4 Test details

Project ID: 29642
Location: Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started: 16-May-17
Test completed: 11-Jun-17
Test specification: EN 50130-5:2011

5 EUT description

5.1 General information

The EUT are Alarm System components classified as Security Grade 3, Environmental Class II as presented in table below:

	Product name	Environmental Class	Fixed or portable	Remark
1	7" Touch screen keypad TM70	II	fixed	
2	EVO192 - Control Panel – CIE	II	fixed	Contained in the metal BOX
3	IP150 - IP module – SPT device (part of ATS)	II	fixed	Contained in the metal BOX
4	PCS250 - GSM/GPRS Module – SPT device (part of ATS)	II	fixed	
5	PCS250G - GSM/GPRS Module – SPT device (part of ATS)	II	fixed	
6	PGM4 - Programmable Output Module – Ancillary Equipment (covered under EN50131-1)	II	fixed	Contained in the metal BOX
7	ZX8 - Wired Zones Expander – part of the CIE	II	fixed	Contained in the metal BOX
8	TM50 - Wired Keypad – CIE	II	fixed	
9	RTX3 - Wireless Zones Expander (Transceiver) – CIE	II	fixed	
10	REM1 - Remote Control – Portable CIE	II	portable	
11	REM3 - Remote Control – Portable CIE	II	portable	
12	REM15 - Remote Control – Portable CIE	II	portable	
13	REM101 - Remote Control – Portable CIE	II	portable	

The EUTs are presented in Photographs from 5.1.1 to 5.1.9:

Photograph 5.1.1 General view (RTX3 433/868 MHz)



Photograph 5.1.2 General view (EVO192, IP150, ZX8, PGM4 Contained in the Metal BOX)



Photograph 5.1.3 General view (PCS250, PCS250G)



Photograph 5.1.4 General view (TM70, TM50)



Photograph 5.1.5 General view (REM101 433/868 MHz)



Photograph 5.1.6 General view (REM1 433/868 MHz)



Photograph 5.1.7 General view (REM15 433/868 MHz)



Photograph 5.1.8 General view (REM3 433/868 MHz)



Photograph 5.1.9 General view (REM3)



5.2 Acceptance criteria

The EUTs shall not sustain any physical damage or deterioration when subjected to Dry heat (Operational), Cold (Operational), Sinusoidal vibration (Operational), Shock (Operational), Damp heat, steady state (Endurance), Damp heat cyclic (Operational), Temperature change (Operational), Dripping water, Free fall and Impact conditions expected in its application environment.

During/after each operational test the EUT shall function properly.

The CIE (control and indicating equipment) shall pass the reduced functional test before and after operational endurance tests also during operational tests.

The performed reduced functional tests are the tests required by EN 50131-3 for CIE products and EN 50136-1 for included ATS components.

In this Test Report the functional tests referred above are abbreviated as follows:

RFT= Reduced functional test EN50131-3.

5.3 EUT visual inspection and functional check

The reduced functional test as described in EN 50131-3, EN 50136-1 represents the functional checks for CIE performed before/during after ENV tests as per product specification requirements.

Before, after each test, the EUT was visually inspected by the HL engineers.

6 Tests summary

Test	Status
EN 50130-5:2011	
Cold Operational (all units)	Pass
Dry heat Operational (all units)	Pass
Damp heat cyclic Operational (all units)	Pass
Damp heat, steady state Endurance (all units)	Pass
Temperature change Operational (only for portable CIE)	Pass
IP X2: Dripping water (only for portable CIE)	Pass
Sinusoidal vibration Operational (Metal BOX, except portable CIE)	Pass
Sinusoidal vibration Operational (all units, except portable CIE)	Pass
Shock Operational (except portable CIE and Metal BOX)	Pass
Impact Operational (except portable CIE)	Pass
Free fall (only for portable CIE)	Pass

	Name and Title	Date	Signatures
Tested by:	Mr. Sergey Nikolsky Environmental Test Engineer Mr. Liran Kessler, Environmental Test Engineer	29-Jun-17	 
Reviewed by:	Miss. Anna Gorovoy, Environmental Certification Engineer	29-Jun-17	
Approved by:	Mr. Mihaeli Feldmann, Environmental Group Manager	29-Jun-17	



Test specification:		Cold (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 3 ENVIRONMENTAL CLASS II TEST METHOD: IEC 60068-2-1 Test Ad: Cold heat-dissipating specimen with gradual change of temperature	
Test mode:		Compliance	
Test Date:		25-May-17 - 26-May-17	
Atmospheric conditions during the test:		Temperature: 24 °C	Air Pressure: 1014 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 42 %	

6.1 Cold (Operational) test procedure and results

6.1.1 Test purpose

The test was performed to demonstrate the EUT ability to function correctly at low ambient temperatures appropriate to the anticipated service environment.

6.1.2 Test procedure

6.1.2.1 After RFT, the operational EUTs were placed in the testing chamber, as presented in Photograph 6.1.1.

6.1.2.2 The chamber temperature was adjusted to +25°C.

6.1.2.3 The temperature in the testing chamber was lowered to -10°C at 1°C/min cooling rate.

6.1.2.4 The operational EUTs were subjected to a temperature of -10°C for 16 hours. RFT was performed in the last half hour.

6.1.2.5 At the end of exposure period, the chamber temperature was raised to +25°C at a 1°C/min heating rate.

6.1.2.6 The air chamber temperature monitoring is presented in Plot 6.1.1.

6.1.2.7 The EUTs were removed from the testing chamber. RFT and a visual inspection were performed.

6.1.3 Test results

Table 6.1.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. All RFT performed at the times specified in product standard passed. No unintentional change in status (system armed), no false alarm recorded. The EUT passed the cold (operational) test.	Pass

Reference numbers of test equipment used:

HL 2906	HL 4755
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Full description is given in Appendix A.



Test specification:	Cold (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 3 ENVIRONMENTAL CLASS II TEST METHOD: IEC 60068-2-1 Test Ad: Cold heat-dissipating specimen with gradual change of temperature		
Test mode:	Compliance	Verdict:	PASS
Test Date:	25-May-17 - 26-May-17		
Atmospheric conditions during the test:	Temperature: 24 °C	Air Pressure: 1014 hPa	Relative Humidity: 42 %
Remarks:			

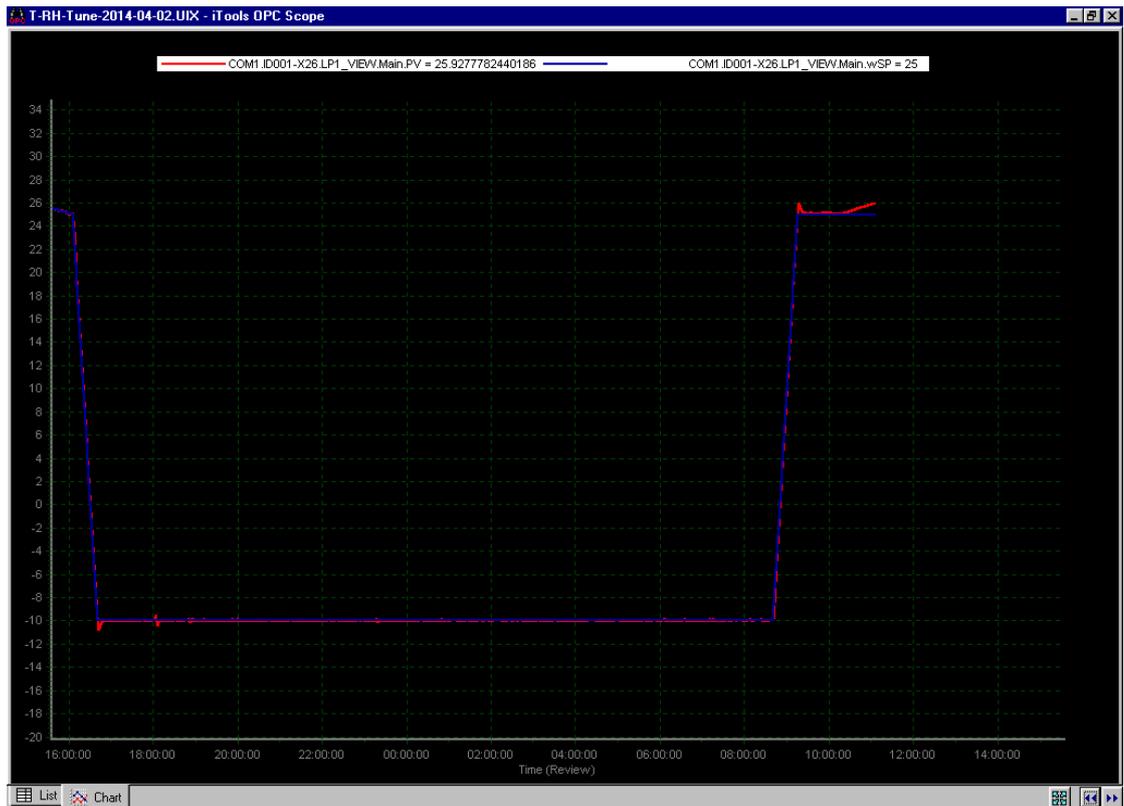
Photograph 6.1.1 The operational EUTs in the low temperature chamber





Test specification:	Cold (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 3 ENVIRONMENTAL CLASS II TEST METHOD: IEC 60068-2-1 Test Ad: Cold heat-dissipating specimen with gradual change of temperature		
Test mode:	Compliance	Verdict:	PASS
Test Date:	25-May-17 - 26-May-17		
Atmospheric conditions during the test:	Temperature: 24 °C	Air Pressure: 1014 hPa	Relative Humidity: 42 %
Remarks:			

Plot 6.1.1 Temperature monitoring during the cold (operational) test





Test specification:		Dry heat (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 1 ENVIRONMENTAL CLASS II TEST METHOD: IEC 60068-2-2 Test Bd: Dry heat for heat-dissipating specimens with gradual change of temperature	
Test mode:		Compliance	
Test Date:		24-May-17 - 25-May-17	
Atmospheric conditions during the test:		Temperature: 23 °C	Air Pressure: 1015 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 45 %	

6.2 Dry heat (Operational) test procedure and results

6.2.1 Test purpose

The test was performed to demonstrate the EUT ability to function correctly at high ambient temperatures, which may occur for short periods in the anticipated service environment.

6.2.2 Test procedure

6.2.2.1 After RFT, the operational EUTs were placed in the testing chamber, as presented in Photograph 6.2.1.

6.2.2.2 The chamber temperature was adjusted to +25°C.

6.2.2.3 The temperature in the testing chamber was raised to +55°C at a 1°C/min heating rate.

6.2.2.4 The operational EUTs were subjected to a temperature of +55°C for 16 hours. RFT was performed in the last half hour.

6.2.2.5 At the end of exposure period, the chamber temperature was lowered to +25°C at a 1°C/min cooling rate.

6.2.2.6 The air chamber temperature monitoring is presented in Plot 6.2.1.

6.2.2.7 The EUTs were removed from the testing chamber. RFT and a visual inspection were performed.

6.2.3 Test results

Table 6.2.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. All RFT performed at the times specified in product standard passed. No unintentional change in status (system armed), no false alarm recorded. The EUT passed the dry heat (operational) test.	Pass

Reference numbers of test equipment used:

HL 2906	HL 4755
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Full description is given in Appendix A.



Test specification:	Dry heat (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 1 ENVIRONMENTAL CLASS II TEST METHOD: IEC 60068-2-2 Test Bd: Dry heat for heat-dissipating specimens with gradual change of temperature		
Test mode:	Compliance	Verdict:	PASS
Test Date:	24-May-17 - 25-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 45 %
Remarks:			

Photograph 6.2.1 The operational EUT in the high temperature chamber





Test specification:	Dry heat (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 1 ENVIRONMENTAL CLASS II TEST METHOD: IEC 60068-2-2 Test Bd: Dry heat for heat-dissipating specimens with gradual change of temperature		
Test mode:	Compliance	Verdict:	PASS
Test Date:	24-May-17 - 25-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1015 hPa	Relative Humidity: 45 %
Remarks:			

Plot 6.2.1 Temperature monitoring during the dry heat (operational) test





Test specification:		Damp heat cyclic (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 7 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-30 Test Db and guidance: Damp heat cyclic (12+12 hour cycle)	
Test mode:		Compliance	
Test Date:		18-May-17 - 20-May-17	
Atmospheric conditions during the test:		Temperature: 23 °C	Air Pressure: 1008 hPa
Remarks:		Relative Humidity: 42 %	Verdict: PASS

6.3 Damp heat, cyclic (Operational) test procedure and results

6.3.1 Test purpose

The test was performed to demonstrate the EUT immunity to an environment with high relative humidity, where condensation occurs on the equipment.

6.3.2 Test procedure

6.3.2.1 After RFT, the operational EUTs were placed into the testing chamber, as presented in Photograph 6.3.1.

6.3.2.2 The chamber temperature was adjusted to +25°C and relative humidity was increased to 95%.

6.3.2.3 The chamber temperature was raised to +40°C within a period of 3 hours. During this period relative humidity was maintained at 95%.

6.3.2.4 These conditions (+40°C and 95% RH) were maintained for 9 hours.

6.3.2.5 The chamber temperature was lowered to +25°C within 3 hours. During this period relative humidity was maintained at 95%.

6.3.2.6 These conditions (+25°C and 95% RH) were maintained for 9 hours.

6.3.2.7 The steps of Paragraphs from 6.3.2.4 to 6.3.2.7 were repeated. RFT was performed in last half hour of second cycle.

6.3.2.8 At the end of exposed period, the relative humidity was reduced to ambient.

6.3.2.9 The EUTs were removed from the testing chamber. RFT and a visual inspection were performed.

6.3.2.10 The humidity and temperature measuring results are presented in Plot 6.3.1.

6.3.3 Test results

Table 6.3.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. All RFT performed at the times specified in product standard passed. No unintentional change in status (system armed), no false alarm recorded. The EUT passed the damp heat cyclic (operational) test.	Pass

Reference numbers of test equipment used:

HL 2906	HL 4755
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Full description is given in Appendix A.



Test specification:	Damp heat cyclic (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 7 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-30 Test Db and guidance: Damp heat cyclic (12+12 hour cycle)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	18-May-17 - 20-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1008 hPa	Relative Humidity: 42 %
Remarks:			

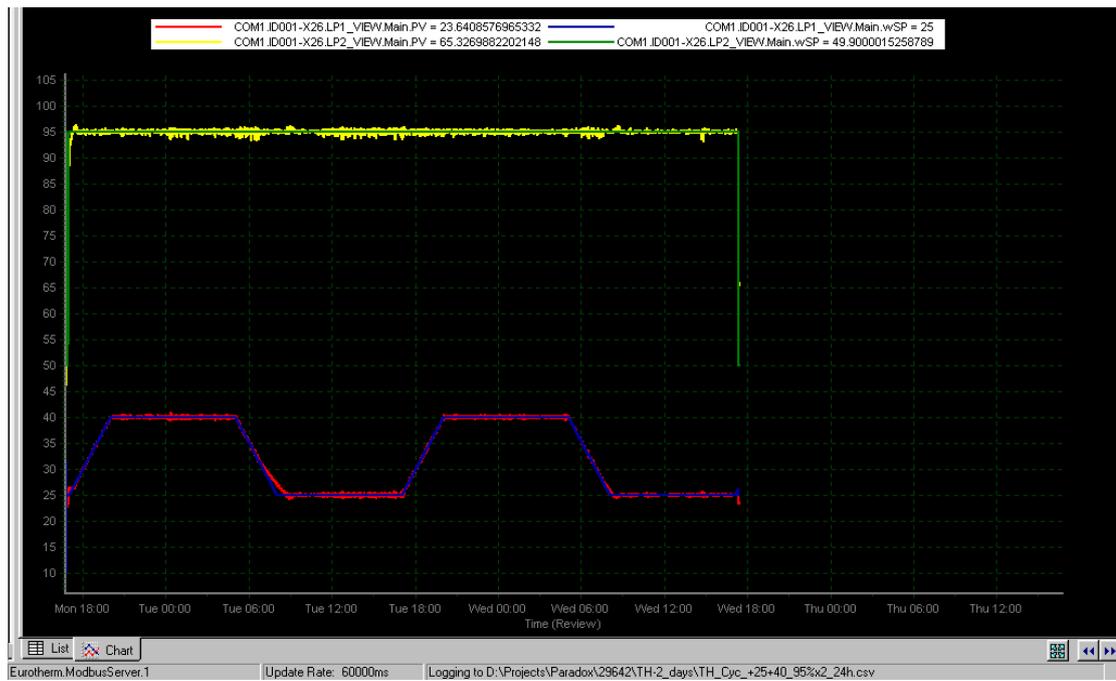
Photograph 6.3.1 The operational EUTs in the testing chamber





Test specification:	Damp heat cyclic (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 7 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-30 Test Db and guidance: Damp heat cyclic (12+12 hour cycle)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	18-May-17 - 20-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1008 hPa	Relative Humidity: 42 %
Remarks:			

Plot 6.3.1 Temperature and relative humidity monitoring during the damp heat cyclic (operational) test





Test specification:		Damp heat, steady state (Endurance) test	
Test procedure:		STEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 6 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-78 Test Cab: Damp heat, steady state	
Test mode:		Compliance	
Test Date:		18-May-17 - 08-Jun-17	
Atmospheric conditions during the test:		Temperature: 23 °C	Air Pressure: 1008 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 45 %	

6.4 Damp heat, steady state (Endurance) test procedure and results

6.4.1 Test purpose

The test was performed to demonstrate the EUT ability to withstand the long term effects of humidity in the service environment (changes in electrical proprieties due to absorption, chemical reactions involving moisture, galvanic corrosion etc.)

6.4.2 Test procedure

- 6.4.2.1 After RFT, the non-operational EUTs were placed into the testing chamber, as presented in Photograph 6.4.1, and subjected to high humidity.
- 6.4.2.2 The chamber temperature was raised to +40°C and relative humidity to 93%.
- 6.4.2.3 The conditions of Paragraph 6.4.2.2 were maintained for 504 hours (21 days).
- 6.4.2.4 At the end of exposure period, the chamber temperature and humidity were lowered to ambient.
- 6.4.2.5 The EUTs were removed from the testing chamber. RFT and a visual inspection were performed.
- 6.4.2.6 The damp heat test profile is presented in Figure 6.4.1.

6.4.3 Test results

Table 6.4.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. RFT passed before and after test The EUT passed the damp heat, steady state (endurance) test.	Pass

Reference numbers of test equipment used:

HL 4987	HL 4755
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Full description is given in Appendix A.



Test specification:	Damp heat, steady state (Endurance) test		
Test procedure:	STEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 6 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-78 Test Cab: Damp heat, steady state		
Test mode:	Compliance	Verdict:	PASS
Test Date:	18-May-17 - 08-Jun-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1008 hPa	Relative Humidity: 45 %
Remarks:			

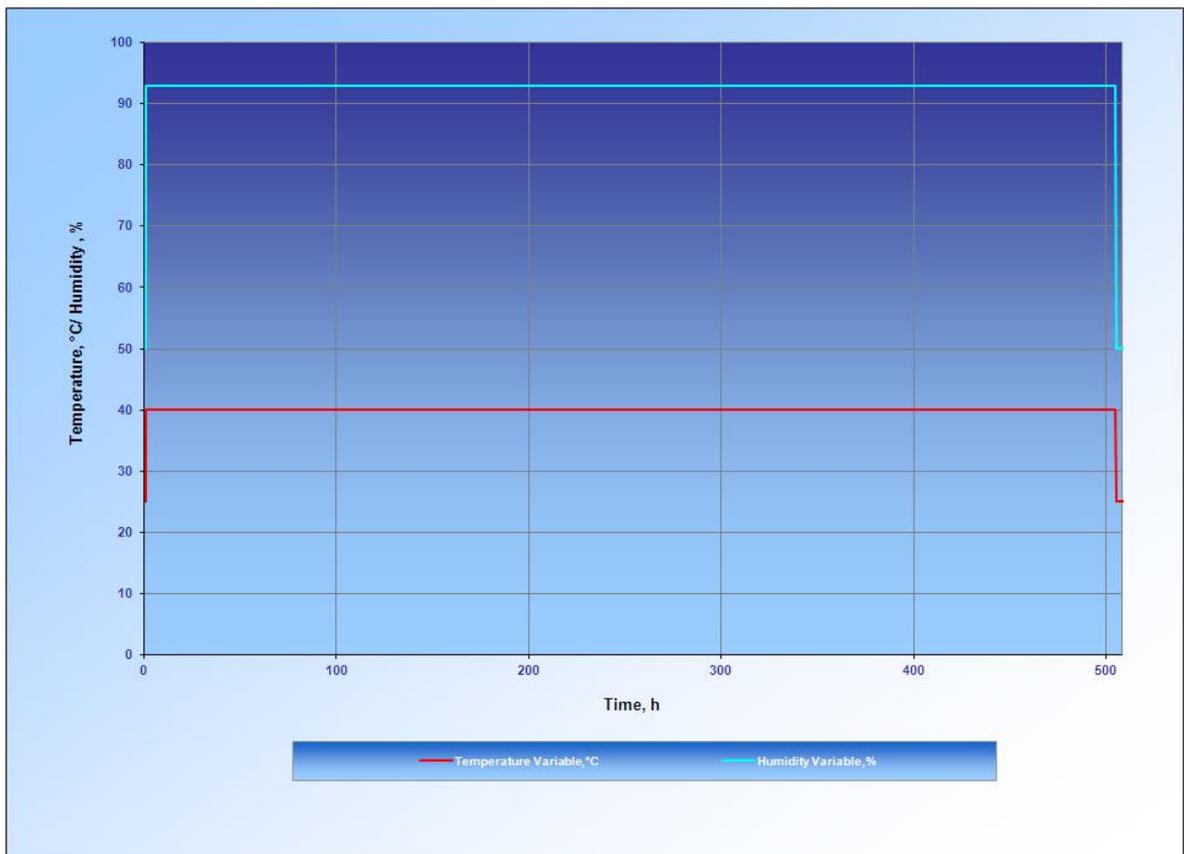
Photograph 6.4.1 The EUTs in the testing chamber





Test specification:	Damp heat, steady state (Endurance) test		
Test procedure:	STEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 6 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-78 Test Cab: Damp heat, steady state		
Test mode:	Compliance	Verdict:	PASS
Test Date:	18-May-17 - 08-Jun-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1008 hPa	Relative Humidity: 45 %
Remarks:			

Figure 6.4.1 Damp heat, steady state test profile





Test specification:		Temperature change (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 4 ENVIRONMENTAL CLASS II TEST METHOD: IEC 60068-2-14 Test Na: Rapid change of temperature with prescribed time of transfer	
Test mode:		Compliance	
Test Date:		01-Jun-17	
Atmospheric conditions during the test:		Temperature: 24.5 °C	Air Pressure: 1015 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 46 %	

6.5 Temperature change (Operational) test procedure and results

6.5.1 Test purpose

The test was performed to demonstrate the EUT ability to function correctly when exposed to temperature shocks when carried back and forth between normal and cold ambient temperature.

6.5.2 Test procedure

6.5.2.1 After RFT, the operational EUT was placed in the testing chamber, as presented in Photograph 6.5.1.

6.5.2.2 The chamber temperature was adjusted to +25°C.

6.5.2.3 The EUTs were subjected to the test severity presented in Table 6.5.2

6.5.2.4 The temperature in the test chamber was lowered to -10°C within 2 to 3 minutes.

6.5.2.5 The EUTs were subjected to a temperature of -10°C for 1 hour.

6.5.2.6 The temperature in the test chamber was raised to +30°C within 2 to 3 minutes.

6.5.2.7 The EUTs were subjected to a temperature of +30°C for 1 hour.

6.5.2.8 The EUTs were subjected to 4 consecutive cycles as presented in Paragraphs from 6.5.2.4 to 6.5.2.7.

6.5.2.9 The chamber temperature was lowered to +25°C within 2 to 3 minutes.

6.5.2.10 The air temperature monitoring is presented in Plot 6.5.1.

6.5.2.11 The EUTs were removed from the testing chamber. RFT and a visual inspection were performed.

6.5.3 Test results

Table 6.5.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. All RFT performed at the times specified in product standard passed. The EUT passed the temperature change (operational) test.	Pass

Reference numbers of test equipment used:

HL 3990	HL 4019
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Full description is given in Appendix A.



Test specification:	Temperature change (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 4 ENVIRONMENTAL CLASS II TEST METHOD: IEC 60068-2-14 Test Na: Rapid change of temperature with prescribed time of transfer		
Test mode:	Compliance	Verdict: PASS	
Test Date:	01-Jun-17		
Atmospheric conditions during the test:	Temperature: 24.5 °C	Air Pressure: 1015 hPa	Relative Humidity: 46 %
Remarks:			

Table 6.5.2 Temperature change test (operational) specification

Test method	Parameter		Unit	Severity
Temperature cycling	Temperatures		°C	-10 to +30
	Dwell time	at -10°C	hours	1
		at +30°C		1
	Number of cycles		N/A	4
	Change-over time		min	2 to 3

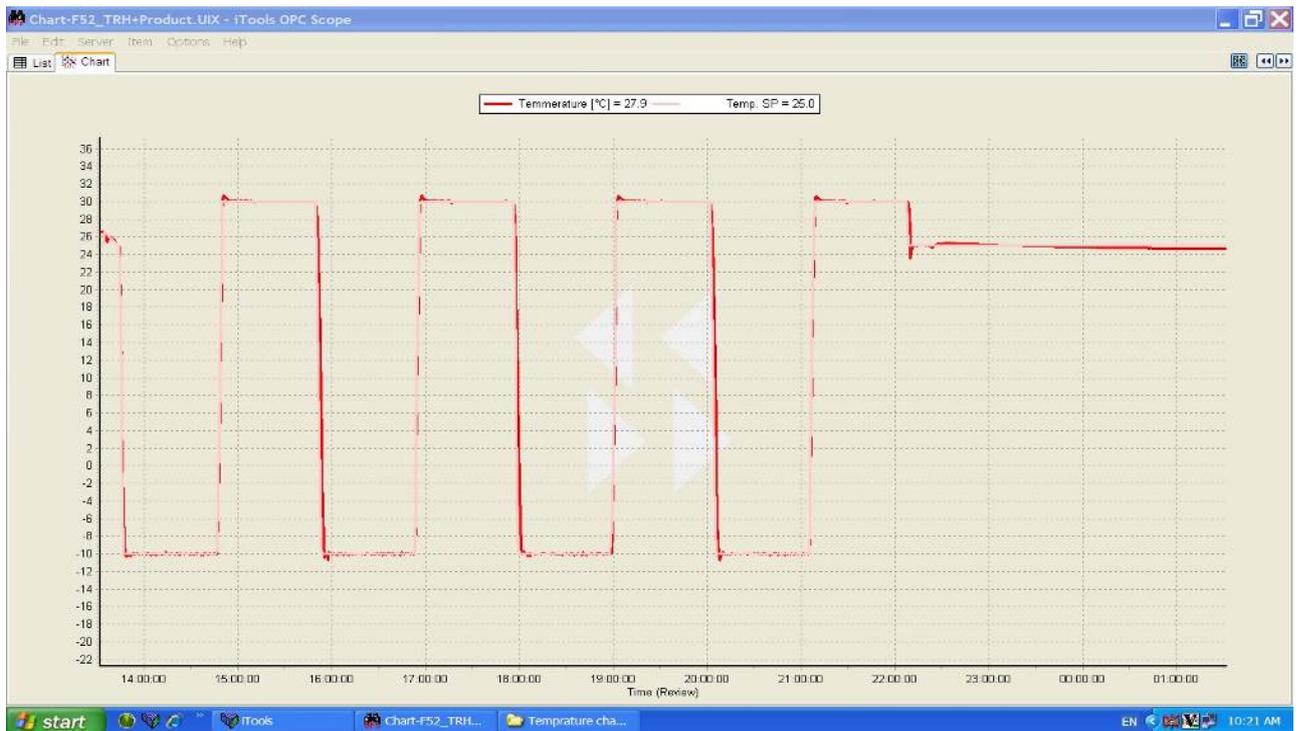
Photograph 6.5.1 The EUT placed inside the temperature chamber





Test specification:	Temperature change (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 4 ENVIRONMENTAL CLASS II TEST METHOD: IEC 60068-2-14 Test Na: Rapid change of temperature with prescribed time of transfer		
Test mode:	Compliance	Verdict:	PASS
Test Date:	01-Jun-17		
Atmospheric conditions during the test:	Temperature: 24.5 °C	Air Pressure: 1015 hPa	Relative Humidity: 46 %
Remarks:			

Plot 6.5.1 Temperature monitoring during the temperature change test (operational)





Test specification:		IPX2 Water dripping test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 10 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60529 PROCEDURE: IPX2, Water dripping Section 14.2.2	
Test mode:		Compliance	
Test Date:		11-Jun-17	
Atmospheric conditions during the test:		Verdict: PASS	
Temperature: 23 °C		Air Pressure: 1010 hPa	
Remarks:		Relative Humidity: 45 %	

6.6 Degrees of protection against ingress of water indicated by the second characteristic numeral (IPX2 test)- test procedure and results

6.6.1 Test purpose

The test was performed to verify that the EUT withstands water penetration under vertically falling water drops.

6.6.2 Test procedure

- 6.6.2.1 The EUTs were installed in their normal operation position on the table under the drip box device, as presented in Photograph 6.6.1
- 6.6.2.2 The dripping device produced a uniform flow of water drops on EUTs area.
- 6.6.2.3 The EUTs were subjected to dripping water.
- 6.6.2.4 The EUTs were tested for 2.5 minutes in each of four fixed positions of tilt. These positions were 15° on either side of the vertical in two mutually perpendicular planes.
- 6.6.2.5 The water at a flow rate of 3 mm/min was dripped for a total duration of 10 min on the EUTs (2.5 min on each of 4 fixed positions of 15° tilt). The test conditions are listed in Table 6.6.2.
- 6.6.2.6 The EUTs were removed from the dripping place.
- 6.6.2.7 RFT and a visual inspection were performed.

6.6.3 Test results

Table 6.6.1 Test results

Observation	Verdict
RFT passed before and after test. No water penetration within the enclosures was noticed during the visual inspection. The EUT passed the test.	Pass

Reference numbers of test equipment used:

HL 2939	HL 4755
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Full description is given in Appendix A.



Test specification:		IPX2 Water dripping test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 10 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60529 PROCEDURE: IPX2, Water dripping Section 14.2.2	
Test mode:		Compliance	
Test Date:		11-Jun-17	
		Verdict: PASS	
Atmospheric conditions during the test:		Temperature: 23 °C	Air Pressure: 1010 hPa
			Relative Humidity: 45 %
Remarks:			

Table 6.6.2 Dripping water test conditions

Test means	Water flow rate	Distance to enclosure	Number of enclosure fixed positions	Test time on each EUT fixed position	Total test duration
	[mm/min]	[mm]	[N/A]	[min]	[min]
Dripping water IPX2	3	200	4	2.5	10

Photograph 6.6.1 The EUTs under dripping water





Test specification:	IPX2 Water dripping test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 10 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60529 PROCEDURE: IPX2, Water dripping Section 14.2.2		
Test mode:	Compliance	Verdict: PASS	
Test Date:	11-Jun-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1010 hPa	Relative Humidity: 45 %
Remarks:			

Photograph 6.6.2 The Enclosures visual after the dripping water test





Test specification:	Sinusoidal vibration (Operational BOX) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

6.7 Sinusoidal vibration (Operational BOX) test procedure and results

6.7.1 Test purpose

The test was performed to demonstrate the EUT ability to withstand the long-term effects of vibration at levels appropriate to the service environment.

6.7.2 Test procedure

- 6.7.2.1** After RFT, the EUT in operational mode and the control accelerometer were installed on the vibration test system, as presented in Figure 6.7.1 and Photograph 6.7.1.
- 6.7.2.2** The required vibration level was applied to the operational EUT along the vertical axis, according to EN 50130-5 standard Class II requirements presented in Table 6.7.2.
- 6.7.2.3** The Paragraphs 6.7.2.1 and 6.7.2.2 were repeated along the transverse and longitudinal axes, as presented in Figure 6.7.1, Photograph 6.7.2 and Photograph 6.7.3.
- 6.7.2.4** The control accelerometer signal is presented in Plots from 6.7.1 to 6.7.3.
- 6.7.2.5** RFT and a visual inspection were performed after the sinusoidal vibration test.

6.7.3 Test results

Table 6.7.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. RFT passed before and after test. No change in system status (armed). No alarm recorded. The EUT passed the sinusoidal vibration test (operational).	Pass

Reference numbers of test equipment used:

HL 2190	HL 3460	HL 4020	HL 4888	HL 3953	HL 2916
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Full description is given in Appendix A.



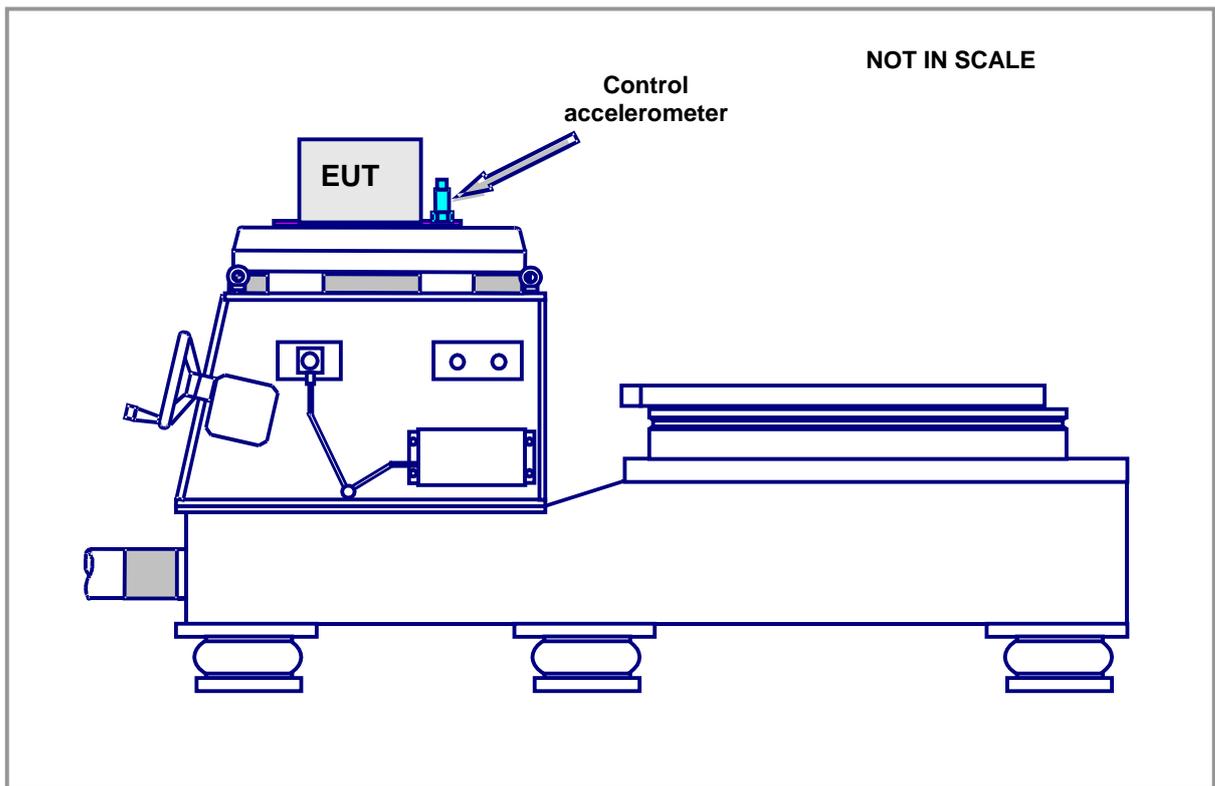
Test specification:	Sinusoidal vibration (Operational BOX) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Table 6.7.2 Sinusoidal vibration test profile (operational)

Frequency range [Hz]	Frequency [Hz]	Displacement [mm] Peak-Peak	Velocity [m/s] Peak	Acceleration [m/s ²] Peak	Duration (per each axis) [min]
10-150	10	2.533	0.080	5.000	07:49
	150	0.011	0.005	5.000	

Note: Number of sweep cycles / axis / functional mode =1 cycle (1 Octave / min).

Figure 6.7.1 Sinusoidal vibration test setup





Test specification:	Sinusoidal vibration (Operational BOX) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Photograph 6.7.1 Sinusoidal vibration test setup (vertical axis)





Test specification:	Sinusoidal vibration (Operational BOX) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Photograph 6.7.2 Sinusoidal vibration test setup (transverse axis)





Test specification:	Sinusoidal vibration (Operational BOX) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

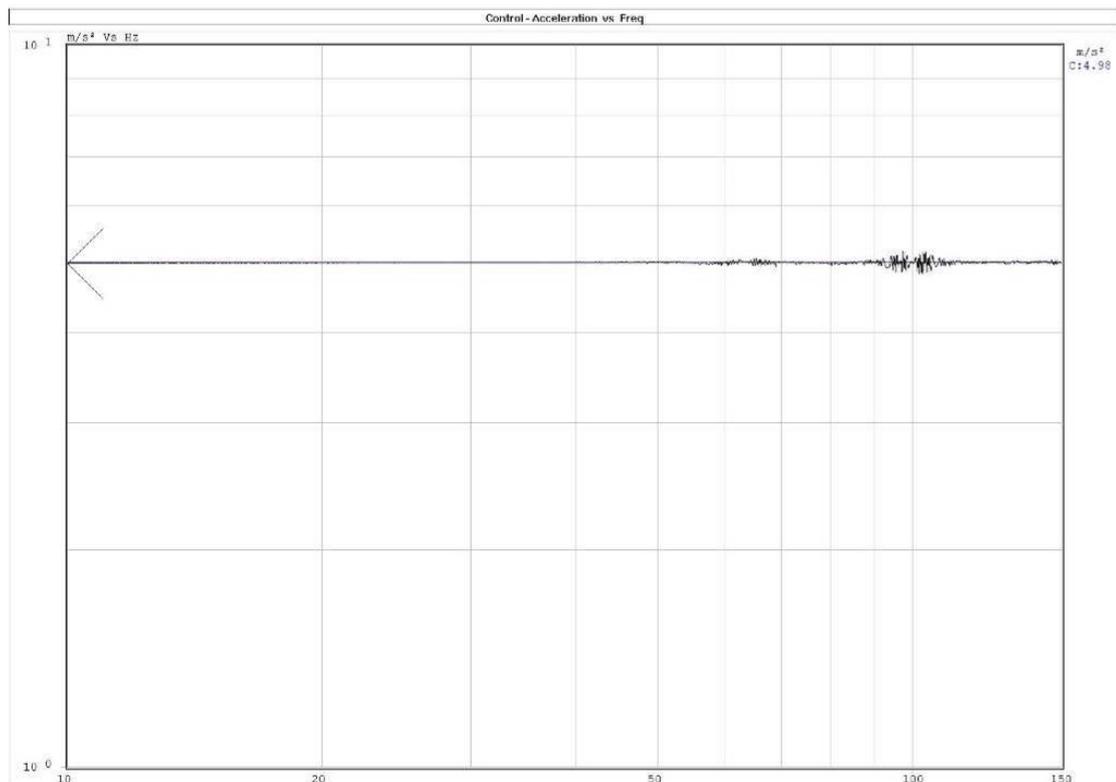
Photograph 6.7.3 Sinusoidal vibration test setup (longitudinal axis)





Test specification:	Sinusoidal vibration (Operational BOX) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

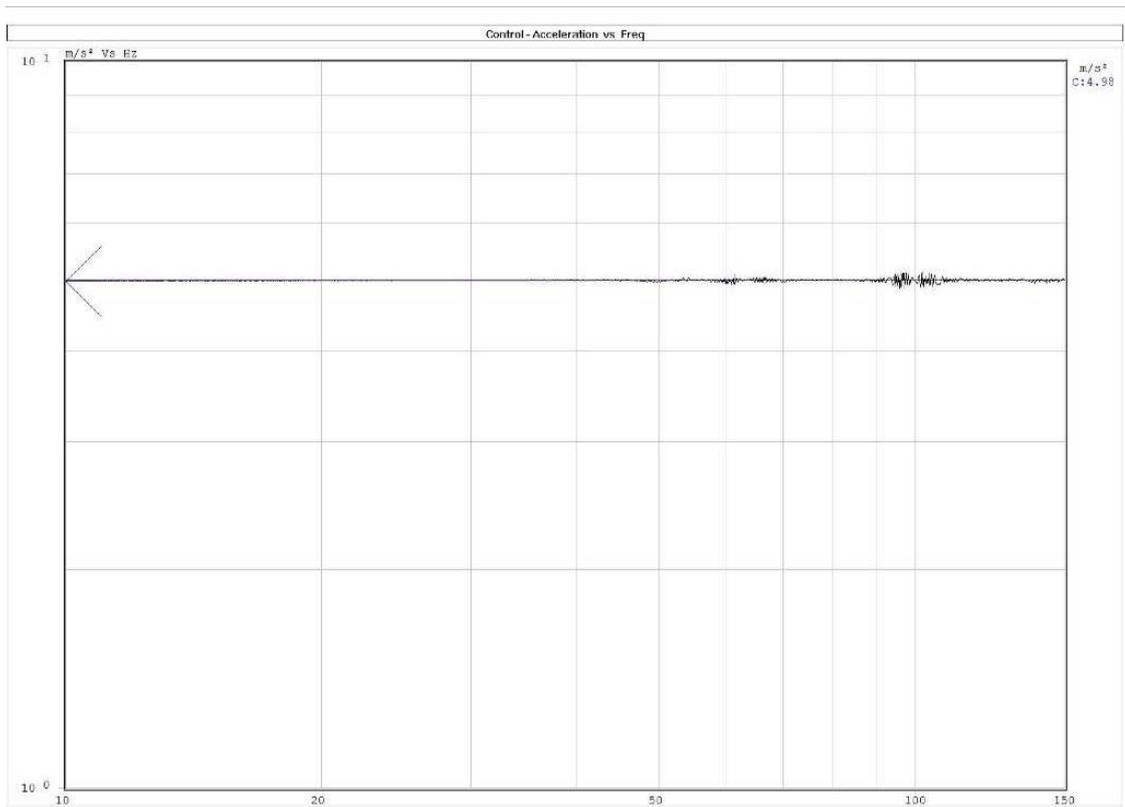
Plot 6.7.1 Sinusoidal vibration along vertical axis (operational)





Test specification:	Sinusoidal vibration (Operational BOX) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

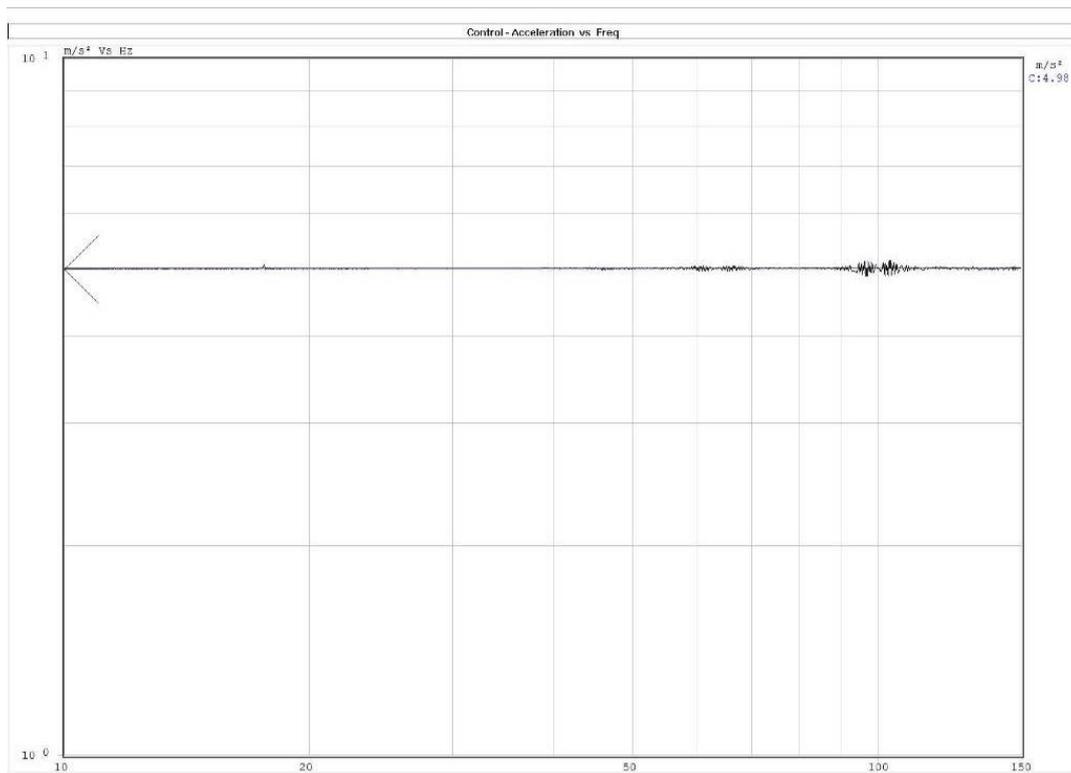
Plot 6.7.2 Sinusoidal vibration along transverse axis (operational)





Test specification:	Sinusoidal vibration (Operational BOX) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Plot 6.7.3 Sinusoidal vibration along longitudinal axis (operational)





Test specification:		Sinusoidal vibration (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)	
Test mode:		Compliance	
Test Date:		16-May-17	
Atmospheric conditions during the test:		Temperature: 23 °C	Air Pressure: 1011 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 44 %	

6.8 Sinusoidal vibration (Operational) test procedure and results

6.8.1 Test purpose

The test was performed to demonstrate the EUT ability to withstand the long-term effects of vibration at levels appropriate to the service environment.

6.8.2 Test procedure

- 6.8.2.1 After RFT, the EUT in operational mode and the control accelerometer were installed on the vibration test system, as presented in Figure 6.8.1 and Photograph 6.8.1.
- 6.8.2.2 The required vibration level was applied to the operational EUT along the vertical axis, according to EN 50130-5 standard Class II requirements presented in Table 6.8.2.
- 6.8.2.3 The Paragraphs 6.8.2.1 and 6.8.2.2 were repeated along the transverse and longitudinal axes, as presented in Figure 6.8.1, Photograph 6.8.2 and Photograph 6.8.3.
- 6.8.2.4 The control accelerometer signal is presented in Plots from 6.8.1 to 6.8.3.
- 6.8.2.5 RFT and a visual inspection were performed after the sinusoidal vibration test.

6.8.3 Test results

Table 6.8.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. RFT passed before and after test. No change in system status (armed). No alarm recorded. The EUT passed the sinusoidal vibration test (operational).	Pass

Reference numbers of test equipment used:

HL 2190	HL 3460	HL 4020	HL 4888	HL 3953	HL 2916
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Full description is given in Appendix A.



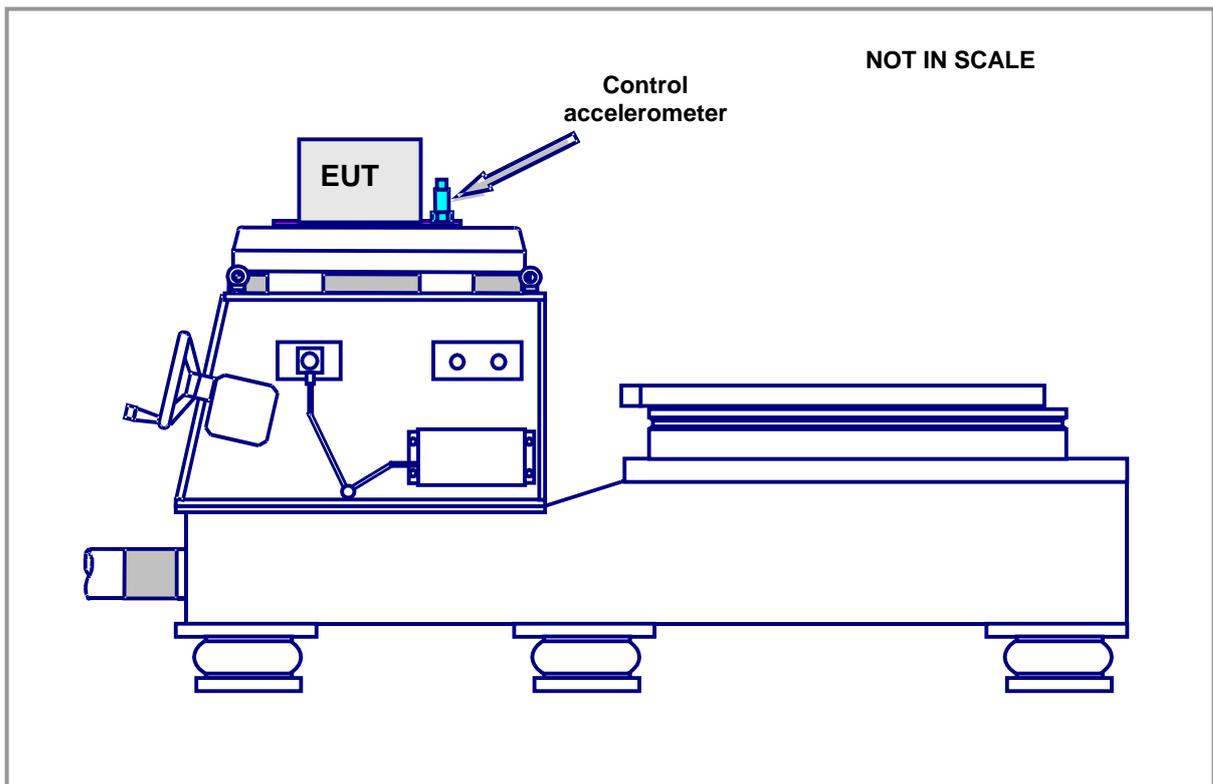
Test specification:		Sinusoidal vibration (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)	
Test mode:		Compliance	
Test Date:		16-May-17	
Atmospheric conditions during the test:		Temperature: 23 °C	Air Pressure: 1011 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 44 %	

Table 6.8.2 Sinusoidal vibration test profile (operational)

Frequency range [Hz]	Frequency [Hz]	Displacement [mm] Peak-Peak	Velocity [m/s] Peak	Acceleration [m/s ²] Peak	Duration (per each axis) [min]
10-150	10	2.533	0.080	5.000	07:49
	150	0.011	0.005	5.000	

Note: Number of sweep cycles / axis / functional mode =1 cycle (1 Octave / min).

Figure 6.8.1 Sinusoidal vibration test setup





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Photograph 6.8.1 Sinusoidal vibration test setup (vertical axis)





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Photograph 6.8.2 Sinusoidal vibration test setup (transverse axis)





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

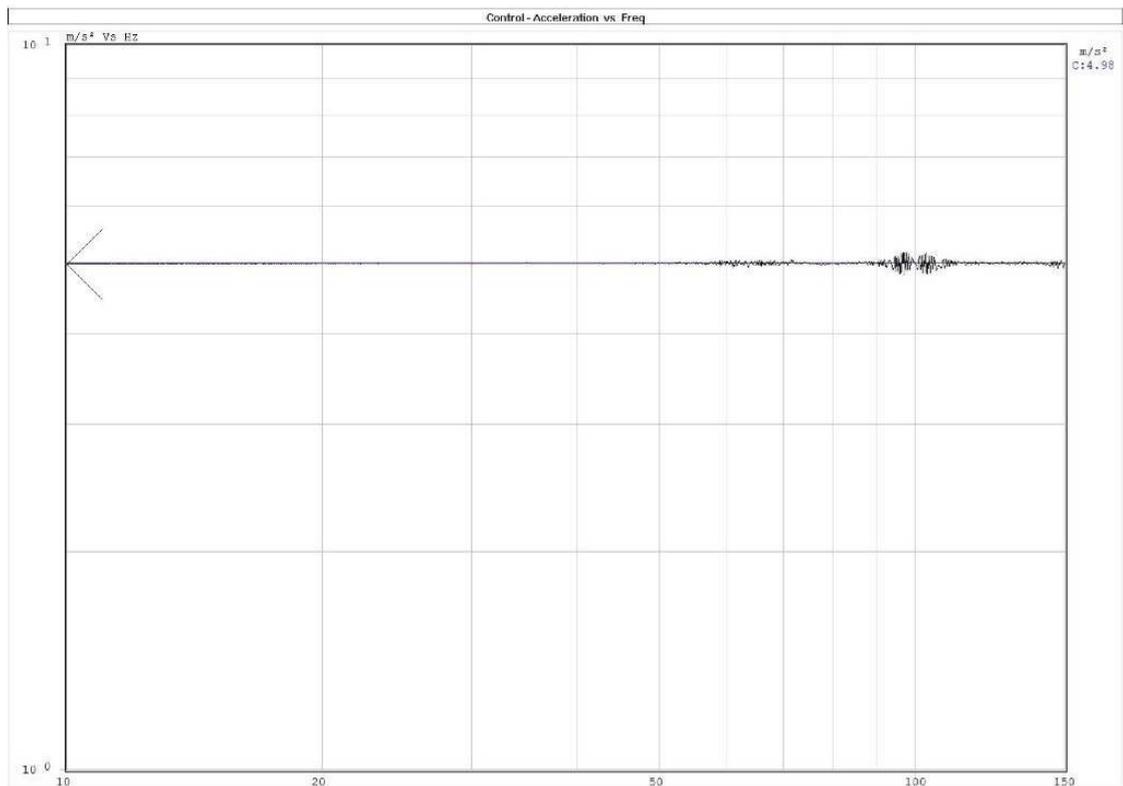
Photograph 6.8.3 Sinusoidal vibration test setup (longitudinal axis)





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

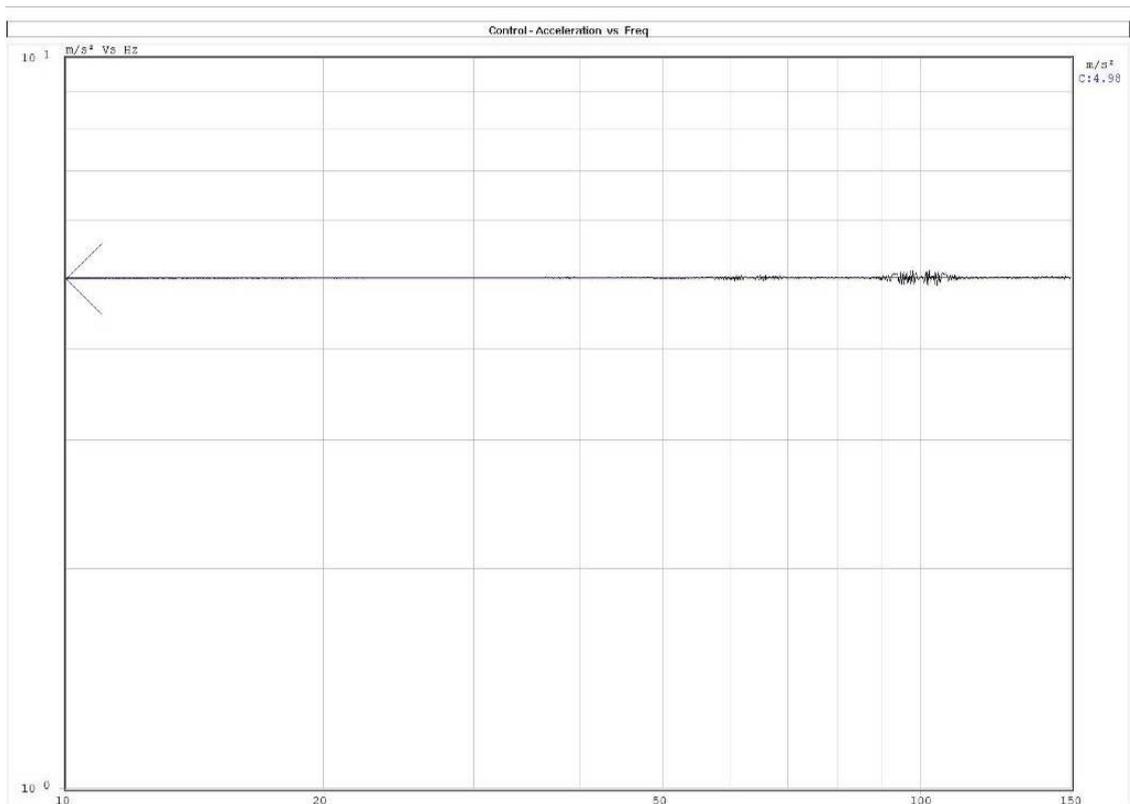
Plot 6.8.1 Sinusoidal vibration along vertical axis (operational)





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

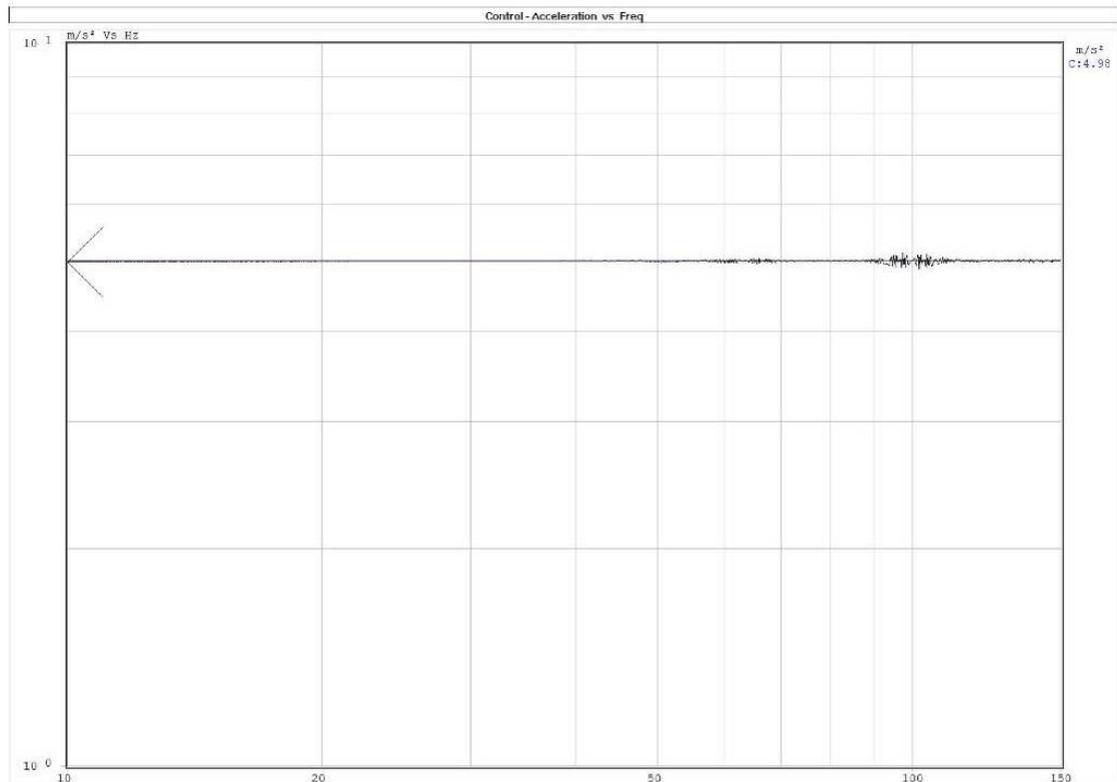
Plot 6.8.2 Sinusoidal vibration along transverse axis (operational)





Test specification:	Sinusoidal vibration (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 16 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-6 Test Fc: Vibration (sinusoidal)		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Plot 6.8.3 Sinusoidal vibration along longitudinal axis (operational)





Test specification:		Shock (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock	
Test mode:		Compliance	
Test Date:		16-May-17	
Atmospheric conditions during the test:		Temperature: 23 °C	Air Pressure: 1011 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 44 %	

6.9 Shock (Operational) test procedure and results

6.9.1 Test purpose

This test was performed to demonstrate the EUT immunity to mechanical shocks, which are likely to occur, in the service environment.

6.9.2 Test procedure

6.9.2.1 After RFT, the EUTs in operational mode were fastened to the shaker's armature, as presented in Figure 6.9.1 and Photograph 6.9.1.

6.9.2.2 The shocks were applied to the EUTs along the vertical axis, according to EN 50130-5 standard Class II, as presented in Table 6.9.2.

6.9.2.3 The Paragraphs 6.9.2.1 and 6.9.2.2 were repeated along the transverse and longitudinal axes, as presented in Figure 6.9.1, Photograph 6.9.2 and Photograph 6.9.3.

6.9.2.4 The control accelerometer signal is presented in Plots from 6.9.1 to 6.9.6.

6.9.2.5 RFT and a visual inspection were performed after shock test.

6.9.3 Test results

Table 6.9.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. RFT passed before and after test No change in system status (armed), no alarm recorded.	Pass

Reference numbers of test equipment used:

HL 2190	HL 3460	HL 4020	HL 4888	HL 3953	HL 2916
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Full description is given in Appendix A.



Test specification:		Shock (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock	
Test mode:		Compliance	
Test Date:		16-May-17	
Atmospheric conditions during the test:		Temperature: 23 °C	Air Pressure: 1011 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 44 %	

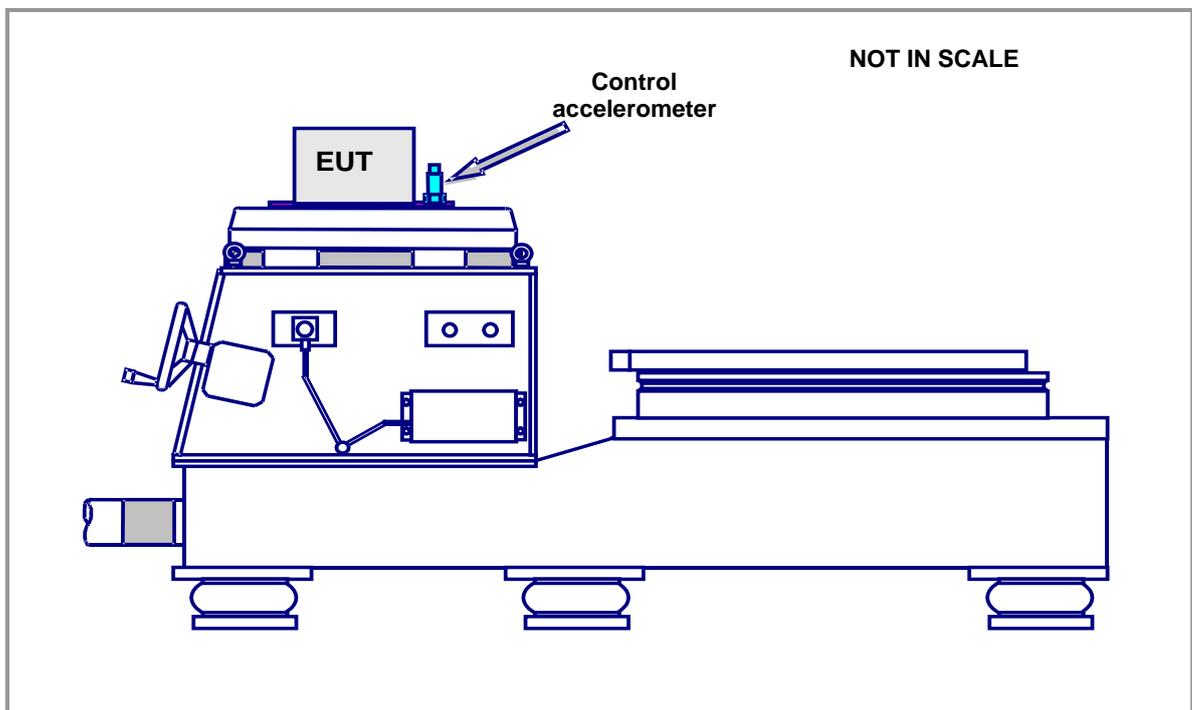
Table 6.9.2 Shock test specification (Operational)

Parameter	Unit	Severity
Amplitude	m/s ²	960*
Pulse type	N/A	Half sine
Pulse width	ms	5.7
Direction of shocks	±Z, ±X, ±Y	6
Number of pulses per direction	N/A	3
Total number of pulses	N/A	18

*Note: Per EN50130-5 formula $A[m/s^2]=1000-200 \times M [kg]$.

The test was performed in one batch per worst case (calculation per lightest unit in the batch- 0.2 kg)
The Box (> 5kg is excluded from this test)

Figure 6.9.1 Shock test setup





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Photograph 6.9.1 Shock vibration test setup (vertical axis)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Photograph 6.9.2 Shock test setup (transverse axis)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

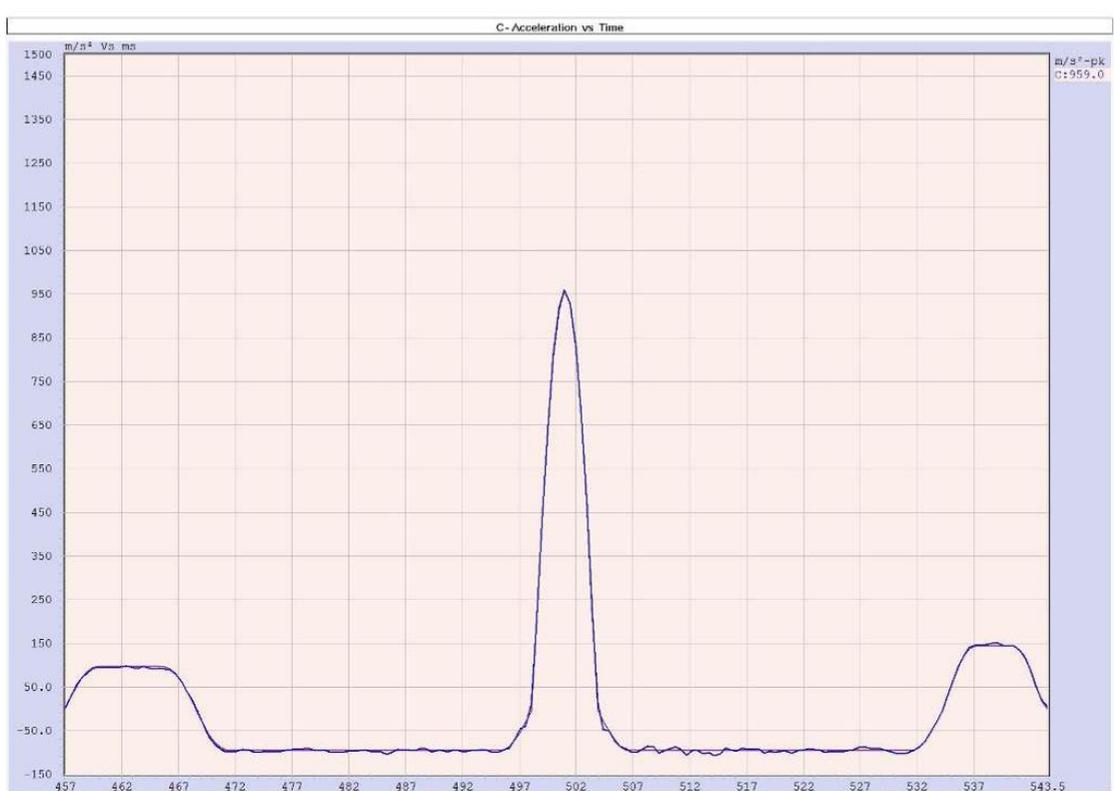
Photograph 6.9.3 Shock test setup (longitudinal axis)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Plot 6.9.1 The positive shock pulse along vertical axis (operational)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

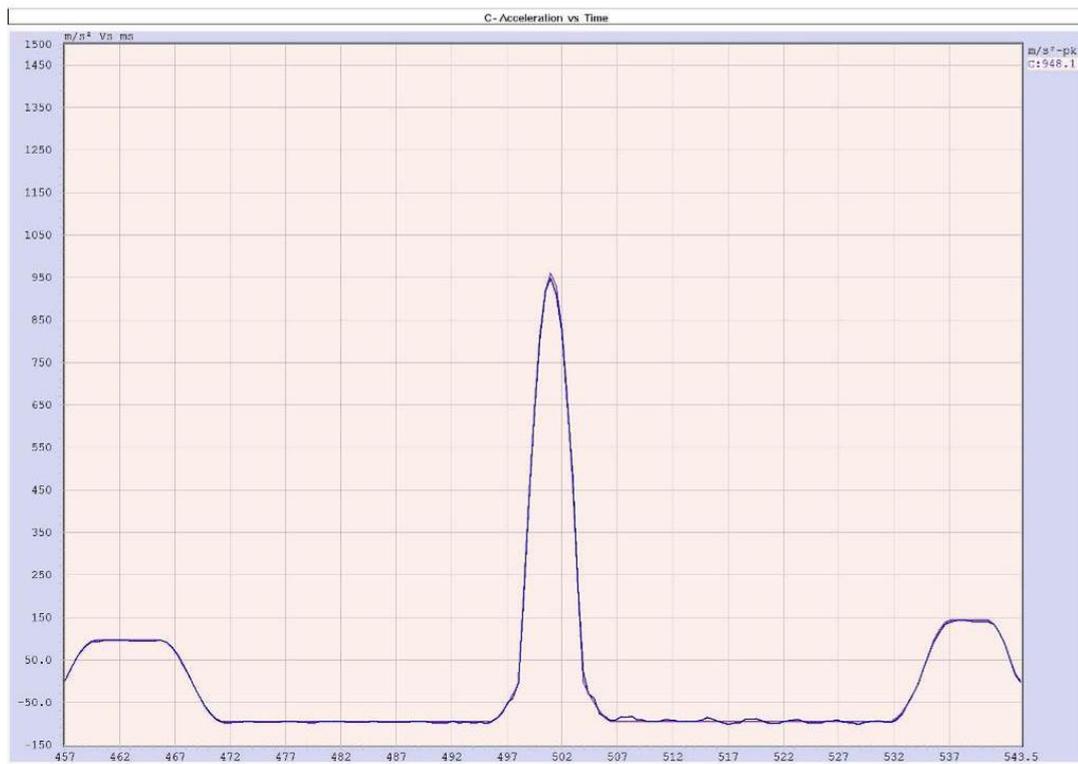
Plot 6.9.2 The negative shock pulse along vertical axis (operational)





Test specification:		Shock (Operational) test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock	
Test mode:		Verdict: PASS	
Test Date:		16-May-17	
Atmospheric conditions during the test:		Temperature: 23 °C	Air Pressure: 1011 hPa Relative Humidity: 44 %
Remarks:			

Plot 6.9.3 The positive shock pulse along transverse axis (operational)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

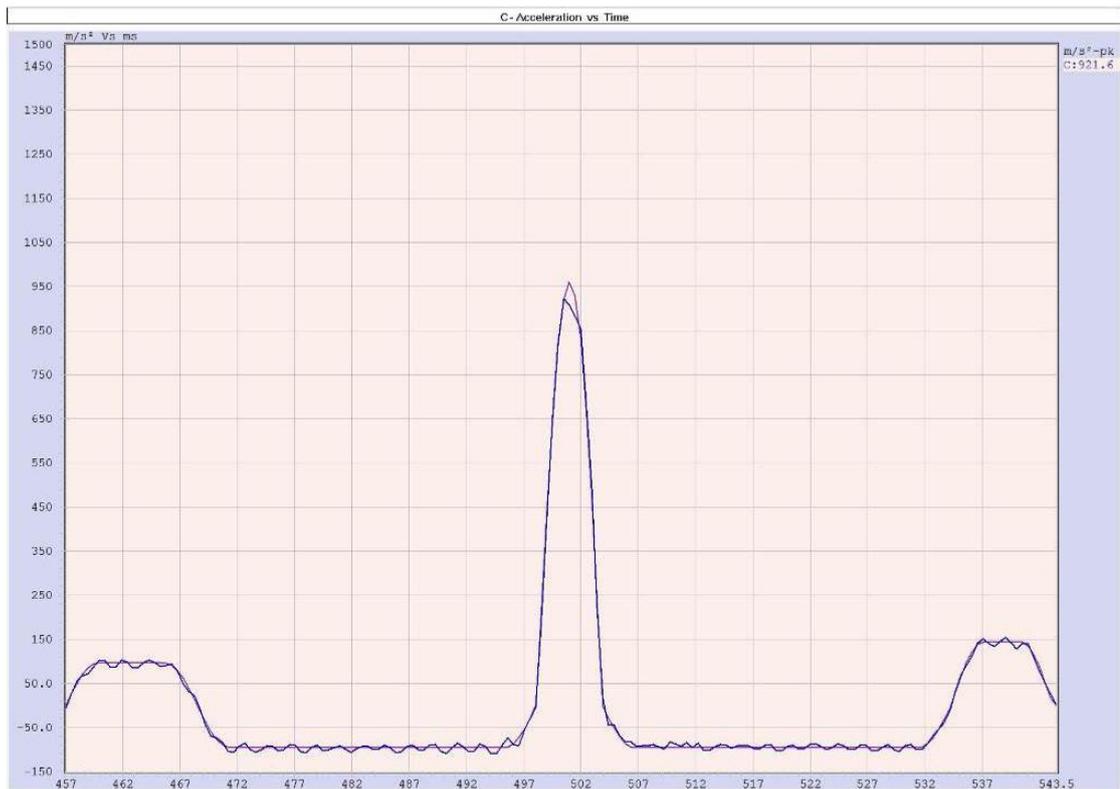
Plot 6.9.4 The negative shock pulse along transverse axis (operational)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Plot 6.9.5 The positive shock pulse along longitudinal axis (operational)





Test specification:	Shock (Operational) test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 13 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-27 Test Ea and guidance: Shock		
Test mode:	Compliance	Verdict:	PASS
Test Date:	16-May-17		
Atmospheric conditions during the test:	Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 44 %
Remarks:			

Plot 6.9.6 The negative shock pulse along longitudinal axis (operational)





Test specification:		Impact test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 14 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-75 Test Eh: Hammer tests	
Test mode:		Compliance	
Test Date:		17-May-17	
Atmospheric conditions during the test:		Temperature: 24 °C	Air Pressure: 1010 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 50 %	

6.10 Impact test procedure and results

6.10.1 Test purpose

The impact test was performed to demonstrate EUT immunity to mechanical impacts upon the surface, which it may sustain in the normal service environment.

6.10.2 Test procedure

6.10.2.1 The EUTs were installed in their operational position, as presented in Photographs 6.10.1 and 6.10.2.

6.10.2.2 The EUTs were subjected to impacts (according to Table 6.10.2) from a small hemispherical hammer-head on any exposed surfaces of the each EUT.

6.10.2.3 A visual inspection followed by a functional test (RFT) was performed after the impact test.

6.10.3 Test results

Table 6.10.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. No any un intentional signal or messages recorded. All RFT passed The EUT passed the impact test.	Pass

Reference numbers of test equipment used:

HL 3013

Full description is given in Appendix A.



Test specification:	Impact test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 14 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-75 Test Eh: Hammer tests		
Test mode:	Compliance	Verdict:	PASS
Test Date:	17-May-17		
Atmospheric conditions during the test:	Temperature: 24 °C	Air Pressure: 1010 hPa	Relative Humidity: 50 %
Remarks:			

Table 6.10.2 Impact test configuration

EUT name	Impact energy [J]	Number of points	Number of impacts per point	Number of exposed surfaces
Keypad model TM70	1	5	3	5
TM50 – Wired Keypad	1	5	3	5
Metal BOX (including the parts as per Table 5.1)	1	5	3	5
PCS250 - GSM/GPRS Communication Module	1	5	3	5
PCS250G - GSM/GPRS Communication Module	1	5	3	5
RTX3 – Wireless Zones Expander (Transceiver)	1	5	3	5

Photograph 6.10.1 Impact test setup





Test specification:	Impact test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 14 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-75 Test Eh: Hammer tests		
Test mode:	Compliance	Verdict:	PASS
Test Date:	17-May-17		
Atmospheric conditions during the test:	Temperature: 24 °C	Air Pressure: 1010 hPa	Relative Humidity: 50 %
Remarks:			

Photographs 6.10.2 Impact test setup





Test specification:		Free fall test	
Test procedure:		TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 15 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-31 Test Ec: Rough handling shocks	
Test mode:		Compliance	
Test Date:		05-Jun-17	
Atmospheric conditions during the test:		Temperature: 26 °C	Air Pressure: 1010 hPa
Remarks:		Verdict:	PASS
		Relative Humidity: 50 %	

6.11 Free fall test procedure and results

6.11.1 Test purpose

The free fall test was performed to demonstrate EUT immunity to mechanical impacts upon the surface, which it may sustain in the normal service environment and which it can reasonably be expected to withstand.

6.11.2 Test procedure

6.11.2.1 The EUT was raised at 1.5 m height and subjected to free falls on to a concrete impact surface, as presented in Photograph 6.11.1.

6.11.2.2 The EUT was dropped twice on the upper surface, twice on the lower surface and twice on a random edge.

6.11.2.3 A visual inspection followed by a functional test were performed after the impact test.

6.11.3 Test results

Table 6.11.1 Test results

Observation	Verdict
No structural or mechanical damages were registered during the visual inspection. RFT passed. The EUT passed the free fall test	Pass

Reference numbers of test equipment used:

HL 3822

Full description is given in Appendix A.



Test specification:	Free fall test		
Test procedure:	TEST SPECIFICATION: EN 50130-5:2011 TABLE: Table 15 ENVIRONMENTAL CLASS: II TEST METHOD: IEC 60068-2-31 Test Ec: Rough handling shocks		
Test mode:	Compliance	Verdict:	PASS
Test Date:	05-Jun-17		
Atmospheric conditions during the test:	Temperature: 26 °C	Air Pressure: 1010 hPa	Relative Humidity: 50 %
Remarks:			

Table 6.11.2 Free fall test configuration

Tested unit	Height of free fall [mm]	Number of free falls/faces
REM1, REM3, REM15, REM101	1500	2 on each face (side)

Photograph 6.11.1 The EUT free fall test setup





7 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./Check	Due Cal./Check
2906	Temperature / Humidity Test Chamber, -60°C to +180°C, 15-95% RH	Thermotron	S-8C	557/12808 RF	08-May-17	08-May-18
4755	Digital Hygrometer / Thermometer, (0 to +50) deg., (20 to 99) %RH	WESTERN Humidor Corporation	Caliber 4	NA	06-Nov-16	06-Nov-17
4987	Temperature & Humidity incubator, 0°C to +60°C, 20% to 95% RH	Thermo Tec	TCS 501	075005001 12134	20-Jun-17	20-Jun-18
2939	Water drip box 600X600X250 mm, droplet size 0.5 to 4.5 mm	Hermon Laboratories	WDB-40	2939	10-Jul-16	10-Jul-17
3990	Temperature & Humidity chamber, -73 to 177 degr.C, 20 to 95 % RH	Thermotron	F-52-CHMV-25-25-2	28795	30-Apr-17	30-Apr-18
4019	Temp. & Humidity Meter, (-50 - +70) deg, (20 - 99)% RH	Mad Electronics	HTC-1	NA	19-Jun-16	19-Jun-17
2190	Vibration Test System (Amplifier #SP6893-011/1, Remote Control Panel #SP6963-008/1, Vibrator #SP6893-005/1, Slip Table, Driver Bar, Pomp, Fan, Head Expander)	Ling Dynamic Systems	V875	SP6963-005/1-011/1	08-May-17	08-May-18
3460	Precision Barometer, 870 - 1050 hPa	LUFFT Mess- und Regeltechnik GmbH	DKD-K-26701	100469	31-May-16	31-May-18
4020	Temp. & Humidity Meter, (-50 - +70) deg, (20 - 99)% RH	Mad Electronics	HTC-1	NA	20-Sep-16	20-Sep-17
4888	APEX SL VIBRATION CONTROLLER	Unholtz-Dickie	Apex SL	1244	23-Jun-16	23-Jun-17
3953	Isotron Accelerometer 100.2 mV/g	Dytran Instruments Inc.	3256A2	10373	01-Feb-17	01-Feb-19
2916	ICP Accelerometer, 104 mV/g, 50 g pk	PCB PIEZOTRONIC S INC. Associated Research INC	353B34	108478	01-Feb-17	01-Feb-19
3013	ED&D Universal Spring Hammer	Educated Design & development, Inc.	F 22.50	I1145127	17-Jan-17	17-Jan-19
3822	Tape-measure, 3 m	The Stanley works Israel Ltd	33-218	NA	29-Dec-15	29-Dec-17



8 APPENDIX B Test laboratory description

The tests were performed at Hermon Laboratories Ltd., which is a fully independent, private Environmental, EMC, Radio, Product safety and telecommunication testing facility recognized through the entire world. The Laboratory is accredited by American Association for Laboratory Accreditation (A2LA, USA) for Environmental testing (Certificate No. 0839.04, Mechanical testing).

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website: www.hermonlabs.com

Person for contact: Mr. Mihaeli Feldmann, Environmental Group Manager.

9 APPENDIX C Abbreviations and acronyms

°C	degree Celsius
cm	centimeter
dB	decibel
EUT	equipment under test
g_n	acceleration due to gravity
HL	Hermon Laboratories
hPa	hectopascal
Hz	Hertz
kg	kilogram
m	meter
min	minute
ms	millisecond
oct	octave
pH	acidity scale
RMS	root mean square
RH	relative humidity
s	second

10 APPENDIX D Tests specifications

- | | | |
|-----|-------------------------------------|---|
| 1. | EN 50130-5:2011 | Alarm systems -
Part 5: Environmental test methods |
| 2. | IEC 60068-2-1:07 | Environmental Testing - Part 2: Tests – Tests A: Cold |
| 3. | IEC 60068-2-2:07 | Environmental Testing - Part 2: Tests - Tests B:
Dry Heat |
| 4. | IEC 60068-2-6:07 | Environmental testing - Part 2: Tests - Test Fc: Vibration
(Sinusoidal) |
| 5. | IEC 60068-2-14:09 | Environmental Testing - Part 2: Tests - Test N:
Change of Temperature |
| 6. | IEC 60068-2-27:08 | Environmental Testing - Part 2:
Tests - Test Ea and Guidance: Shock |
| 7. | IEC 60068-2-30:05 | Environmental Testing - Part 2-30: Tests - Test Db:
Damp Heat, Cyclic (12 h + 12 h cycle) |
| 8. | IEC 60068-2-31:08 | Environmental Testing - Part 2: Tests - Test Ec: Topple |
| 9. | IEC 60068-2-56:88 | Environmental Testing Part 2: Tests - Test Cb:
Damp Heat, Steady State, Primarily for Equipment |
| 10. | IEC 60068-2-75:97 | Environmental testing - Part 2: Tests - Test Eh:
Hammer Tests |
| 11. | IEC 60068-2-78:01 | Environmental Testing - Part 2-78: Tests - Test 2-78: Body Cab:
Damp Heat, Steady State |
| 12. | IEC 60529:89+A1:99 | Degrees of Protection Provided by Enclosure (IP Code) |
| 13. | Free fall TP-5_2013 | Free Fall Test Procedure according MIL-STD - 810 B, C, D, E, F, G
IEC 60068-2-31, 32, ASTM D 5276-98, DEF STAN 00-35 and GR-
63-CORE standards |
| 14. | Impact_TP-2_2011 | Impact Test Procedure according to EN 50130-5 and
IEC 60068-2-75 Test Ehb |
| 15. | Temperature and humidity TP-10_2017 | Temperature And Humidity Test Procedure according to
ETSI EN 300 019-2-0,-1,-2,-3,-4,-5,-6,-7,-8, IEC 60721-4-1,-2,-3,-4,
MIL-STD- 810 B, C, D, E, F, G, RTCA DO-160D, E, F, G,
IEC 60068-2-1, -2, -14, -30, -38, -56, -78, ASTM D4332, ASTM
F1980, DEF STAN 00-35, IEEE 1613, IEC 61850-3, GR-63-CORE,
ISO 11608-1, ISO 1608-4 and IEC 60601-1-11 STANDARDS |
| 16. | Vibration and shock TP-8_2017 | Vibration And Shock Test Procedure according to MIL-STD – 810 B,
C, D, E, F, G, MIL-STD-167 -1A, GR-63-CORE, IEC 60068-2-6, -27,
-29, -55, -64, -75, RTCA DO-160D, E, F, G, ASTM D999, ASTM
D4169, ASTM D4728, DEF STAN 00-35, IEC 61373, IEC 60601-1-
11, ISO 11608-1, ISO 11608-4, IEC 61850-3, IEEE Std 1613 and
ISTA 2A STANDARDS |



17. Water IP Code TP-7_2014

Water Test Procedure according to IEC 60068-2-18, IEC 60529 standards

11 APPENDIX E Measurement uncertainties

Parameter	Uncertainty estimation at 95% confidence	
	Calculated	Limit
Air pressure	± 1.16 mBar	± 4.1 mBar
High (Low) temperature – HL 2906	± 1.4°C	± 2 (3)°C
High (Low) temperature – HL 3990, HL 4987	± 1.8°C	± 2 (3)°C
Relative humidity	± 2.86 %	± 5.0 %
Sine acceleration	+14.8/-13.8 %	+41/-30 %
Shock acceleration	+7.2/-8.2 %	±20.0 %
Water rate	3.6 %	5 %
Wind velocity	5 %	10 %

END OF TEST REPORT