

TEST REPORT

of the accredited test laboratory

TÜV Nr.:INE-AT/FG-17/110

Applicant: PS GmbH
Melisau 1255
6863 Egg
Austria

Tested Product: Electronic Lock

FCC-ID: 2ALMH1

IC-ID: N/A

Manufacturer: See Applicant

Output power / field strength: 74,2 dBµV/m @ 3m distance
power supply: 3V DC
internal battery

Frequency range: 125 kHz
Channel separation: N/A

Standard: FCC: 47 CFR Part 15 (October 1, 2016 edition)
RSS-210 Issue 9, August 2016

Testing Laboratory,
Inspection Body,
Certification Body,
Calibration Laboratory
Verifizierungsstelle**Notified Body 0408**
IC 2932K-1**Non-executive
Board of Directors:**
KR DI Johann
Marihart**Management:**
DI Dr. Stefan Haas
Mag. Christoph
Wenninger**Registered Office:**
Deutschstrasse 10
1230 Vienna/Austria**Branch Offices:**
www.tuv.at/standorte**Company Register**
Court / - Number:
Vienna / FN 288476 f**Bank Details:**
IBAN
AT131200052949001
BIC BKAUATWWIBAN
AT153100000104093
BIC RZBAATWWVAT ATU63240488
DVR 3002476**TUV Austria Services GmbH**
Test laboratory for EMC

Supervisor of EMC-laboratory:

Ing. Wilhelm Seier

19.05.2017

Copy Nbr.:

checked by:

Ing. Michael Emminger

A publication of this test report is only permitted literally.
Copying or reproduction of partial sections needs a written permission of
TUV Austria Services GmbH.

The results of this test report only refer to the provided equipment.

LIST OF MEASUREMENTS

The complete list of measurements called for in 47 CFR 15 and RSS-210 is given below.

SUBCLAUSE	PARAMETER TO BE MEASURED	PAGE
	Intentional Radiators	
	Test object data	3
15.209 RSS-Gen	General emissions limit	4

TEST OBJECT DATA

General EUT Description

This Electronic Lock uses RFID at 125 kHz to read keycards or other forms of RFID-Tags.

2.1033 (c) Technical description

2.1033 (4) Type of emission: pulsed transmission

2.1033 (5) Frequency range: only one operating frequency 125 kHz.

2.1033 (6) Power range and Controls: Fixed output power resulting in 74,2 dB μ V/m field strength in 3m distance.

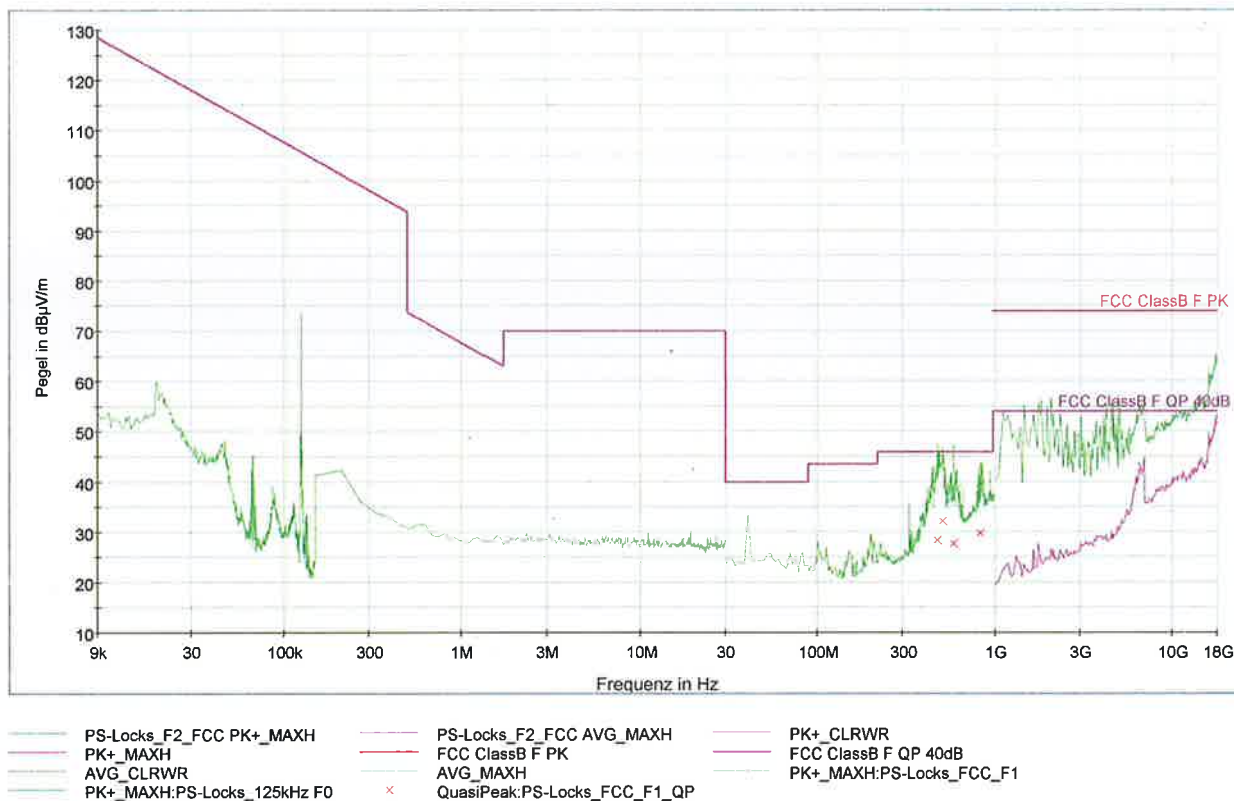
2.1033 (7) Maximum output power rating: 74,2 dB μ V/m @ 3m distance.

2.1033 (8) DC Voltage and Current: 3 V DC powered by internal battery
maximum current consumption: 280 mA

General emissions limit

§ 15.209 RSS-Gen

Green line: Peak measurement; Magenta line: Average measurement



Field strength at 125 kHz: 74,2 dBµV/m = 5129 µV/m at 3 m distance. Converted with 40dB per decade for the 300m Limit this would be a Level of -5,8 dBµV/m or 0,513 µV/m. The Limit at 125 kHz is 19,2 µV/m at a distance of 300m.

Highest Quasipeak value at 3m distance: 500,00 MHz: 32,0 dBµV/m

LIMIT

15.209 (RSS-Gen)

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100**	3
88–216	150**	3
216–960	200**	3
Above 960	500	3

Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-112; EMV-200

Appendix 1

Test equipment used

☐	Anechoic Chamber with 3m measurement distance	NT-100	☐	Spectrum analyzer – FSP7 9 kHz – 7 GHz	NT-200
☐	Stripline according to ISO 11452-5	NT-108	☐	ESCI - Test receiver 9 kHz - 7 GHz	NT-203/1
☐	MA4000 - Antenna mast 1 - 4 m height	NT-110/1	☐	ESI26 – Test receiver 20 Hz – 26,5 GHz	NT-207
☐	DS - Turntable 0 - 400 ° Azimuth	NT-111/1	☐	Digital Radio Tester CTS55	NT-208
☐	CO3000 Controller Mast+Turntable	NT-112/1	☐	Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209
☐	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121	☐	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
☐	HFH-Z2 - Loop Antenna 9 kHz - 30 MHz	NT-122	☐	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
☐	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123	☐	Digital Radio Tester Aeroflex 3920	NT-212/1
☐	3121C - Dipole Antenna 28 - 1000 MHz	NT-124	☐	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
☐	3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125	☐	RubiSource T&M Timing reference	NT-216
☐	3116 - Horn Antenna 18 - 40 GHz	NT-126	☐	Radiocommunication analyzer SWR 1180 MD	NT-217
☐	SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127	☐	Mixer M19HWD 40 GHz – 60 GHz	NT-218
☐	AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128	☐	Mixer M12HWD 60 GHz – 90 GHz	NT-219
☐	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129	☐	DSO9104 Digital scope	NT-220/1
☐	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130	☐	TPS 2014 Digital scope	NT-222
☐	3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131	☐	Artificial Ear according to IEC 60318	NT-224
☐	VULB 9163 Trilog Antenna 30 – 3000 MHz	NT-131/1	☐	1 kHz Sound calibrator	NT-225
☐	Loop Antenna H-Field	NT-132	☐	B10 - Harmonics and flicker analyzer	NT-232
☐	Horn Antenna 500 MHz - 2900 MHz	NT-133	☐	SRM-3000 Spectrum analyzer	NT-233
☐	Horn Antenna 500 MHz - 6000 MHz	NT-133/1	☐	SRM-3006 Spectrum analyzer	NT-233/1a
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-134	☐	E-field probe SRM 75 MHz – 3 GHz	NT-234
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-135	☐	Field Meter NBM-500 incl. E- and H-Field probes	NT-240a-d
☐	BiConiLog Antenna 26 MHz – 2000 MHz	NT-137	☐	Hall-Teslameter ETM-1	NT-241
☐	Conical Dipol Antenna PCD8250	NT-138	☐	EFA-3 H-field- / E-field probe	NT-243
☐	HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139	☐	EHP-50F H-field- / E-field probe	NT-243/1
☐	HZ-1 Antenna tripod	NT-150	☐	Field Meter EMR-200 100 kHz – 3 GHz	NT-244
☐	BN 1500 Antenna tripod	NT-151	☐	E-field probe 100 kHz – 3 GHz	NT-245
☐	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156	☐	H-field probe 300 kHz – 30 MHz	NT-246
☐	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-173			

Division:
Industry & Energy

Department: FG

Test report number:
INE-AT/FG-17/110

Page: 1 of 4

Date: 19.05.2017

Checked by: 

Appendix 1 (continued)

Test equipment used

☐ E-field probe 3 MHz – 18 GHz	NT-247	☐ Oscillatory Wave Simulator incl. Coupling networks	NT-328a+b+c
☐ H-field probe 27 MHz – 1 GHz	NT-248	☐ BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330
☐ ELT-400 1 Hz – 400 kHz	NT-249	☐ T82-50 RF-Amplifier 2 GHz – 8 GHz	NT-331
☐ MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250	☐ 500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
☐ FCC-203I EM Injection clamp	NT-251	☐ AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
☐ FCC-203I-DCN Ferrite decoupling network	NT-252	☐ APA01 – RF-Amplifier 0,5 GHz – 2,5 GHz	NT-334
☐ PR50 Current Probe	NT-253	☐ Preamplifier 1 GHz - 4 GHz	NT-335
☐ i310s Current Probe	NT-254/1	☐ Preamplifier for GPS MKU 152 A	NT-336
☐ Fluke 87 V True RMS Multimeter	NT-260	☐ Preamplifier 100 MHz – 23 GHz	NT-337
☐ Model 2000 Digital Multimeter	NT-261	☐ DC Block 10 MHz – 18 GHz Model 8048	NT-338
☐ Fluke 87 V Digital Multimeter	NT-262/1	☐ 2-97201 Electronic load	NT-341
☐ ESH2-Z5-U1 Artificial mains network 4x25A	NT-300	☐ TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
☐ ESH3-Z5-U1 Artificial mains network 2x10A	NT-301	☐ TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
☐ ESH3-Z6-U1 Artificial mains network 1x100A	NT-302	☐ VDS 200 Mobil-impuls-generator	NT-350
☐ ESH3-Z6-U1 Artificial mains network 1x100A	NT-302a	☐ LD 200 Mobil-impuls-generator	NT-351
☐ PHE 4500/B Power amplifier	NT-304	☐ MPG 200 Mobil-Impuls-Generators	NT-352
☐ EZ10 T-Artificial Network	NT-305	☐ EFT 200 Mobil-impuls-generator	NT-353
☐ SMG - Signal generator 0,1 - 1000 MHz	NT-310	☐ AN 200 S1 Artificial Network	NT-354
☐ SMA100A - Signal generator 9 kHz - 6 GHz	NT-310/1	☐ FP-EFT 32M 3 ph. Coupling filter (Burst)	NT-400/1
☐ RefRad Reference generator	NT-312	☐ PHE 4500 - Mains impedance network	NT-401
☐ SMP 02 Signal generator 10 MHz - 20 GHz	NT-313	☐ IP 6.2 Coupling filter for data lines (Surge)	NT-403
☐ 40 MHz Arbitrary Generator TGA1241	NT-315	☐ TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
☐ Artificial mains network NSLK 8127-PLC	NT-316	☐ ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
☐ PEFT - Burst generator up to 4 kV	NT-320	☐ IP 4 - Capacitive clamp (Burst)	NT-411
☐ ESD 30 System up to 25 kV	NT-321	☐ Highpass-Filter 100 MHz – 3 GHz	NT-412
☐ PSURGE 4.1 Surge generator	NT-324	☐ Highpass-Filter 600 MHz – 4 GHz	NT-413
☐ IMU4000 Immunity test system	NT-325/1	☐ Highpass-Filter 1250 MHz – 4 GHz	NT-414
☐ VCS 500-M6 Surge-Generator	NT-326	☐ Highpass-Filter 1800 MHz – 16 GHz	NT-415

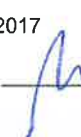
Division:
Industry & Energy

Department: FG

Test report number:
INE-AT/FG-17/110

Page: 2 of 4

Date: 19.05.2017

Checked by: 

Appendix 1 (continued)

Test equipment used

☐ Highpass-Filter 3500 MHz – 18 GHz	NT-416	☐ FCC-801-S25 Coupling decoupling network	NT-462
☐ RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417	☐ FCC-801-T4 Coupling decoupling network	NT-463
☐ RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418	☐ FCC-801-C1 Coupling decoupling network	NT-464
☐ RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419	☐ SW 9605 - Current probe 150 kHz – 30 MHz	NT-465/1
☐ RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421	☐ 95242-1 – Current probe 1 MHz – 400 MHz	NT-468
☐ RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423	☐ 94106-1L-1 – Current probe 100 kHz – 450 MHz	NT-471
☐ RF-Attenuator 30 dB	NT-424	☐ GA 1240 Power amplifier according to EN 61000-4-16	NT-480
☐ RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425	☐ Coupling networks according to EN 61000-4-16	NT-481 - NT-483
☐ RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426	☐ Van der Hoofden Test Head	NT-484
☐ RF-Attenuator 6 dB	NT-428	☐ PC P4 3 GHz Test computer	NT-500
☐ RF-Attenuator 0 dB - 81 dB	NT-429	☐ PC P4 1700 MHz Notebook	NT-505
☐ WRU 27 - Band blocking 27 MHz	NT-430	☐ Monitoring camera with Monitor	NT-511
☐ WHJ450C9 AA - High pass 450 MHz	NT-431	☐ ES-K1 Version 1.71 SP2 Test software	NT-520
☐ WHJ250C9 AA - High pass 250 MHz	NT-432	☐ EMC32 Version 10.20.01 Test software	NT-520/1
☐ RF-Load 150 W	NT-433	☐ SRM-TS Version 1.3 software for SRM-3000	NT-522
☐ Impedance transducer 1:4 ; 1:9 ; 1:16	NT-435	☐ SRM-TS Version 1.3.1 software for SRM-3006	NT-522/1
☐ RF-Attenuator DC – 18 GHz 6 dB	NT-436	☐ Spitzenberger und Spies Test software V4.1	NT-525
☐ RF-Attenuator DC – 18 GHz 6 dB	NT-437	☐ Noise power test apparatus according to EN 55014	NT-530
☐ RF-Attenuator DC – 18 GHz 10 dB	NT-438	☐ Vertical coupling plane (ESD)	NT-531
☐ RF-Attenuator DC – 18 GHz 20 dB	NT-439	☐ Test cable #4 for EN 61000-4-6	NT-553
☐ I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	☐ Test cable #3 for conducted emission	NT-554
☐ ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	☐ Test cable #5+#6 ESD-cable (2x470k)	NT-555 + NT-556
☐ Power Divider 6 dB/1 W/50 Ohm	NT-443	☐ Test cable #8 Sucoflex 104EA	NT-559
☐ Directional coupler 0,1 MHz – 70 MHz	NT-444	☐ Test cable #9 (for outdoor measurements)	NT-580
☐ Directional coupler 0,1 MHz – 70 MHz	NT-445	☐ Test cable #10 (for outdoor measurements)	NT-581
☐ Tube imitations according to EN 55015	NT-450	☐ Test cable #13 Sucoflex 104PE	NT-584
☐ FCC-801-M3-16A Coupling decoupling network	NT-458	☐ Test cable #21 for SRM-3000	NT-592
☐ FCC-801-M2-50A Coupling decoupling network	NT-459	☐ Shield chamber	NT-600
☐ FCC-801-M5-25 Coupling decoupling network	NT-460	☐ Climatic chamber	M-1200
☐ FCC-801-AF10 Coupling decoupling network	NT-461		

Division:
Industry & Energy

Department: FG

Test report number:
INE-AT/FG-17/110

Page: 3 of 4

Date: 19.05.2017

Checked by: 

Appendix 1 (continued)

Test equipment used

☐	Anechoic Chamber 3 m / 5 m measuring distance	EMV-100	☐	Log.per Antenna 80-2700 MHz STLP 9128 E special	EMV-304
☐	Turntabel 6 m diameter	EMV-101	☐	Log.per Antenna 0,7 – 9 GHz STLP9149	EMV-305
☐	Antenna mast 1 – 4 m	EMV-102	☐	Load Dump Generator LD 200N	EMV-350
☐	Mast and Turntable controller FC-06	EMV-103	☐	Ultra Compact Symulator UCS 200N100	EMV-351
☐	EMC Video/Audiosystem	EMV-104	☐	Automotive Power fail module PFM 200N100.1	EMV-352
☐	EMC Software EMC32 Version 10.20.01	EMV-105	☐	Voltage Drop Symulator VDS 200Q100	EMV-353
☐	Hornantenna 1 – 18 GHz HF 907	EMV-110	☐	Arb. Generator AutoWave	EMV-354
☐	Antennapre.amp. 1 – 18 GHz ERZ-LNA0200-1800-30-2	EMV-111	☐	Ultra Compact Symulator UCS 500N7	EMV-355
☐	Trilog Antenna 30-3000 MHz VULB9163	EMV-112	☐	Coupling decoupling network CNI 503B7 / 32 A	EMV-356
☐	Monopol 9 kHz – 30 MHz VAMP 9243	EMV-113	☐	Coupling decoupling network CNI 503B7 / 63 A	EMV-357
☐	Antennapre.amp 18 – 40 GHz BBV 9721	EMV-114	☐	Telecom Surge Generator TSurge 7	EMV-358
☐	DC Artificial Network PVDC 8300	EMV-150	☐	Coupling decoupling network CNI 508N2	EMV-359
☐	AC Artificial Network NNLK 8121 RC	EMV-151	☐	Coupling decoupling network CNV 504N2.2	EMV-360
☐	EMI Receiver ESR26	EMV-200	☐	Immunity generator NSG4060/NSG4060-1	EMV-361
☐	Signalgenerator 9 kHz – 40 GHz N5173B	EMV-201	☐	Coupling network CDND M316-2	EMV-362
☐	GPS Frequency normal B-88	EMV-202	☐	Coupling network CT419-5	EMV-363
☐	DC Power supply N5745A	EMV-203	☐	ESD Generator NSG 437	EMV-364
☐	DC Power supply N5745A	EMV-204	☐	Pulse Limiter VTSD 9561-F BNC	EMV-405
☐	Spektrum Analyzator FSV40	EMV-205	☐	Transient emission BSM200N40+BS200N100	EMV-450+451
☐	Thd Multimeter Model 2015	EMV-206	☐	Cap. Coupling Clamp HFK	EMV-455
☐	Poweramplifier PAS15000	EMV-207/abc	☐	Mag. Field System MS100N+MC26100+MC2630	EMV-456-458
☐	Inrush Current Source	EMV-208/abc	☐	Coupling network CDN M2-100A	EMV-459
☐	Arb.-generator Sycore	EMV-209	☐	Coupling network CDN M3-32A	EMV-460
☐	Harmonics/Flicker analyzer ARS 16/3	EMV-210	☐	Coupling network CDN M5-100A	EMV-461
☐	HF- Amplifier 9 kHz-250 MHz BBA150	EMV-300	☐	Current Clamp CIP 9136A	EMV-462
☐	HF- Amplifier 80 -1000 MHz BBA150	EMV-301	☐	DC Artificial Network HV-AN 150	EMV-464+465
☐	HF- Amplifier 0,8 - 6 GHz BBA150	EMV-302	☐	Coupling Clamp EM 101	EMV-466
☐	High Power Ant. 20-200 MHz VHBD 9134	EMV-303	☐	Decoupling Clamp FTC 101	EMV-467
			☐	Power attenuator DG 250 W 6 GHz 6 dB	EMV-469

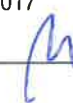
Division:
Industry & Energy

Department: FG

Test report number:
INE-AT/FG-17/110

Page: 4 of 4

Date: 19.05.2017

Checked by: 

Appendix 2 Photodocumentation

Description: General view

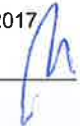
Division:
Industry & Energy

Department: FG

Test report reference:
INE-AT/FG-17/110

Page: 1 of 7

Date: 19.05.2017

checked by: 



Appendix 2 Photodocumentation

Description: Front view

Division:
Industry & Energy

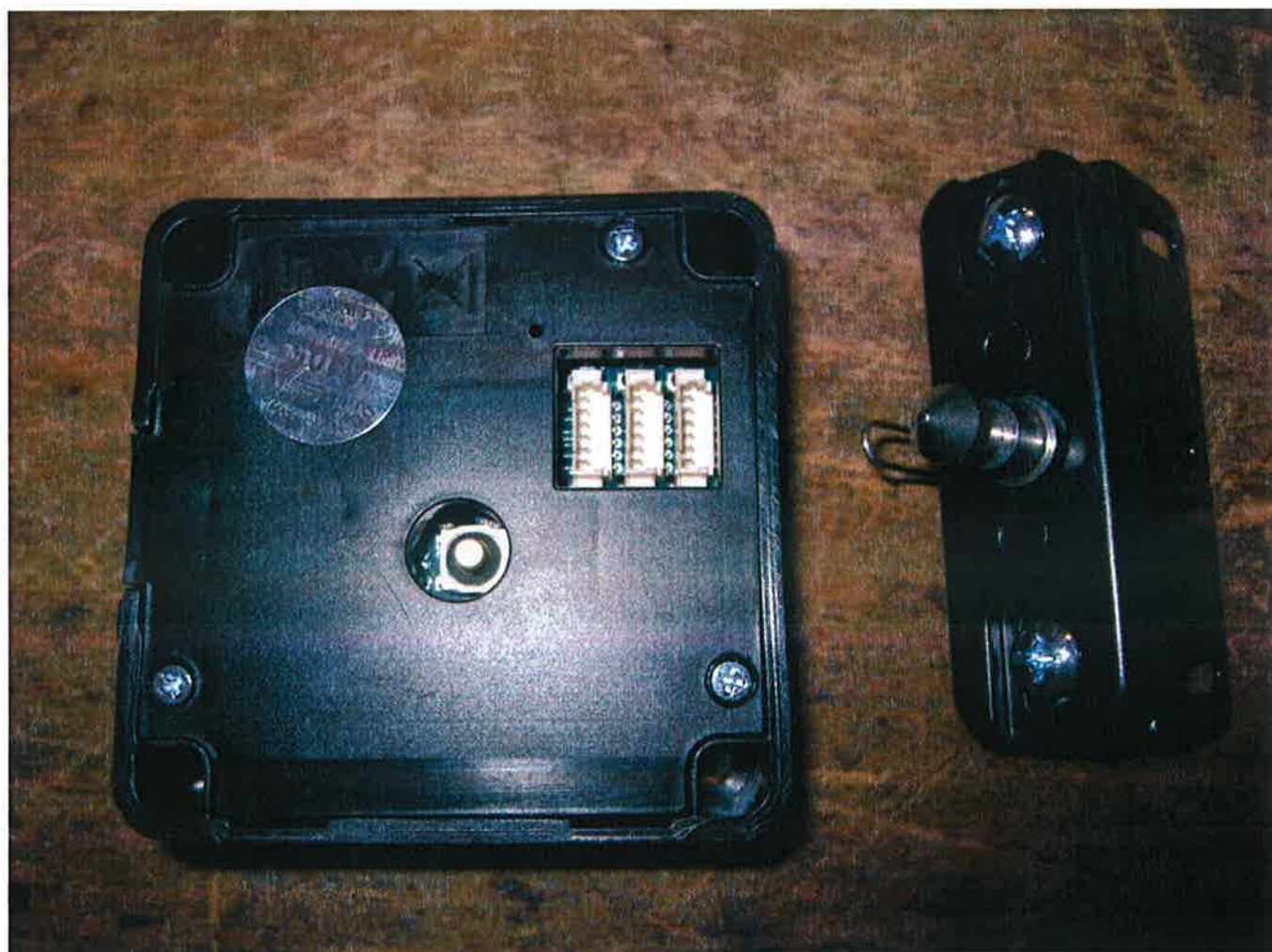
Department: FG

Test report reference:
INE-AT/FG-17/110

Page: 2 of 7

Date: 19.05.2017

checked by: M



Appendix 2 Photodocumentation

Description: Backside view

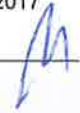
Division:
Industry & Energy

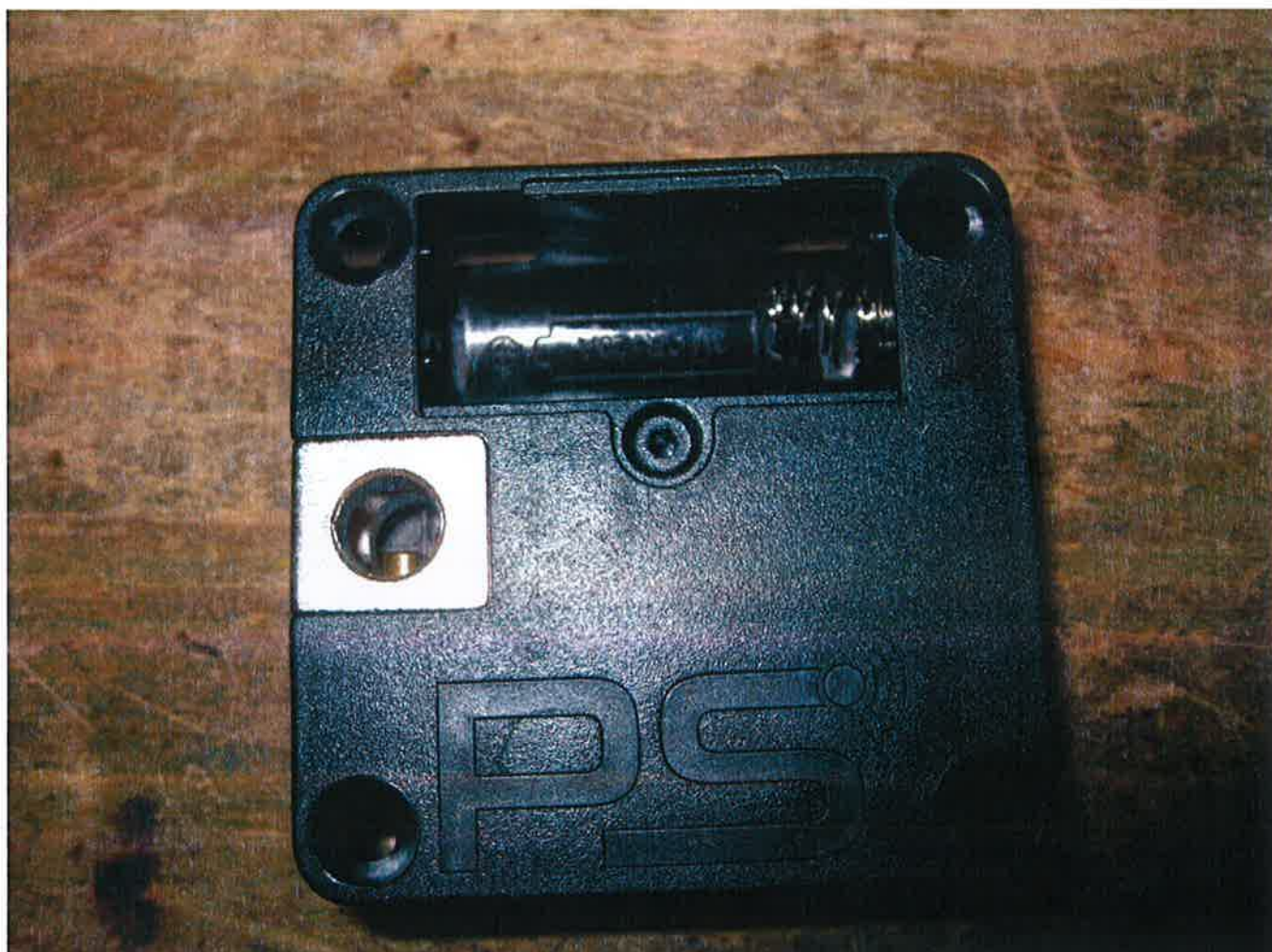
Department: FG

Test report reference:
INE-AT/FG-17/110

Page: 3 of 7

Date: 19.05.2017

checked by: 



Appendix 2 Photodocumentation

Description: Case opened view #1

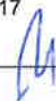
Division:
Industry & Energy

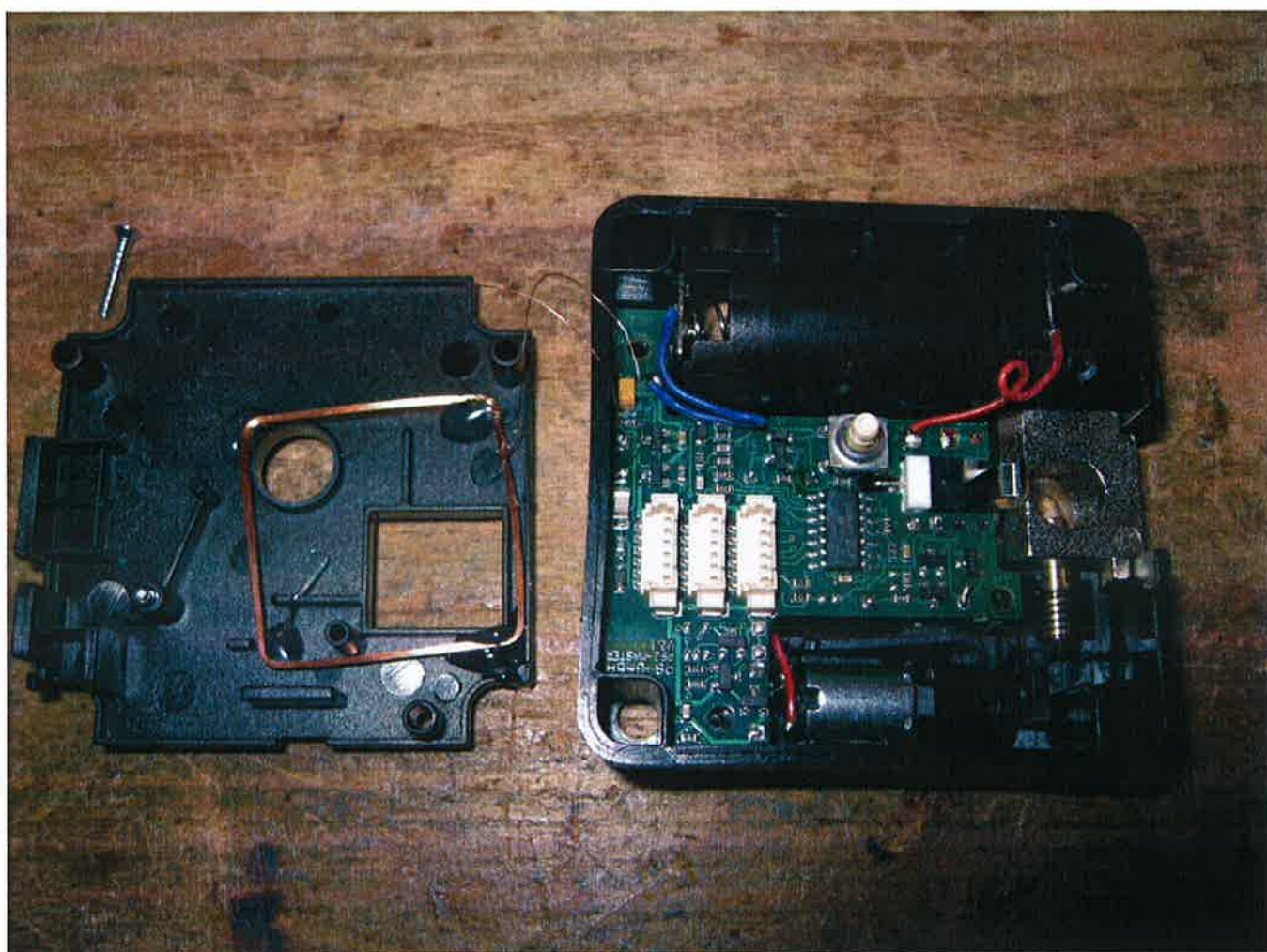
Department: FG

Test report reference:
INE-AT/FG-17/110

Page: 4 of 7

Date: 19.05.2017

checked by: 



Appendix 2 Photodocumentation

Description: Case opened view #2

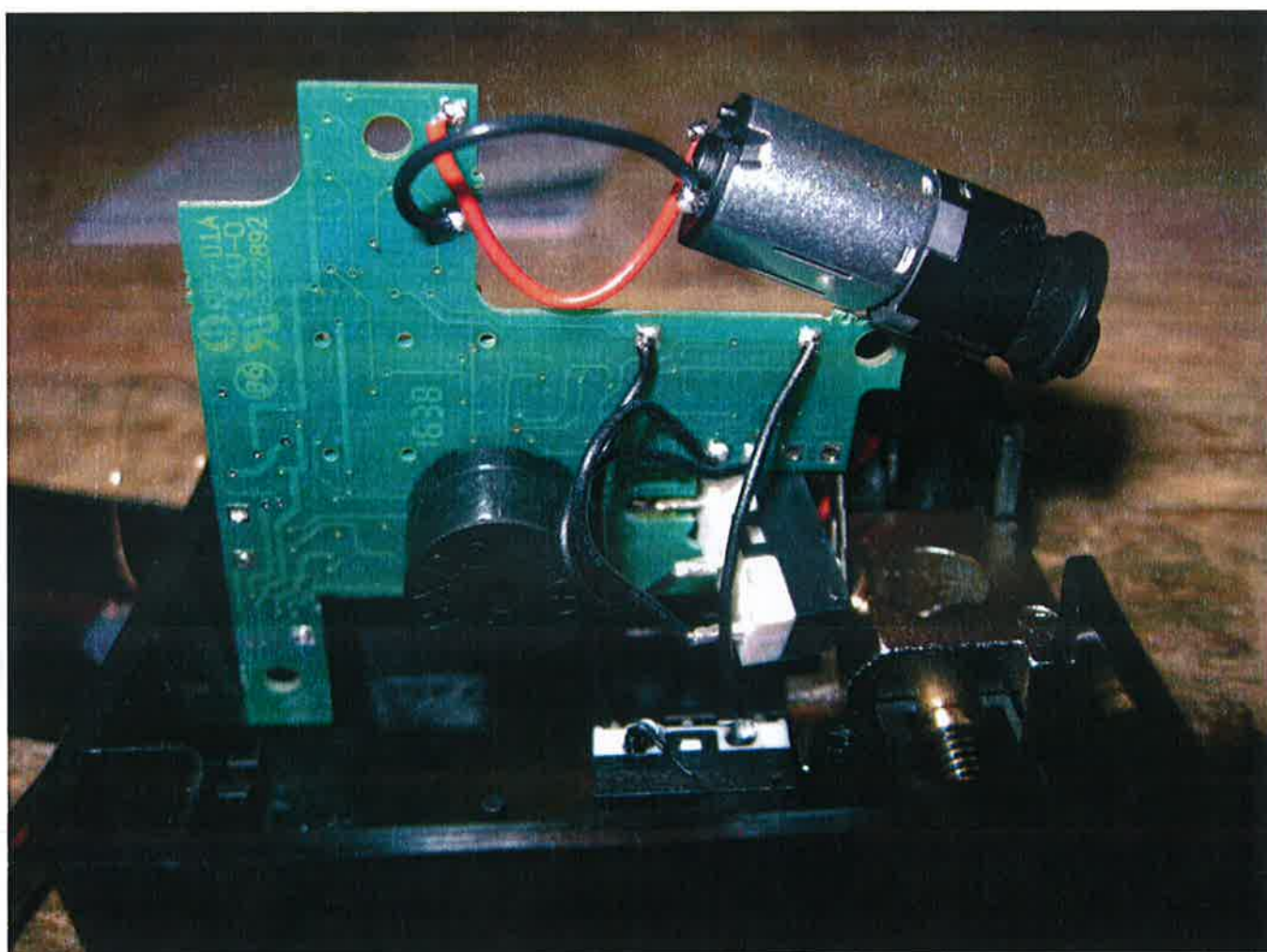
Division:
Industry & Energy

Department: FG

Test report reference:
INE-AT/FG-17/110

Page: 5 of 7

Date: 19.05.2017
checked by: 



Appendix 2 Photodocumentation

Description: Test setup view #1

Division:
Industry & Energy

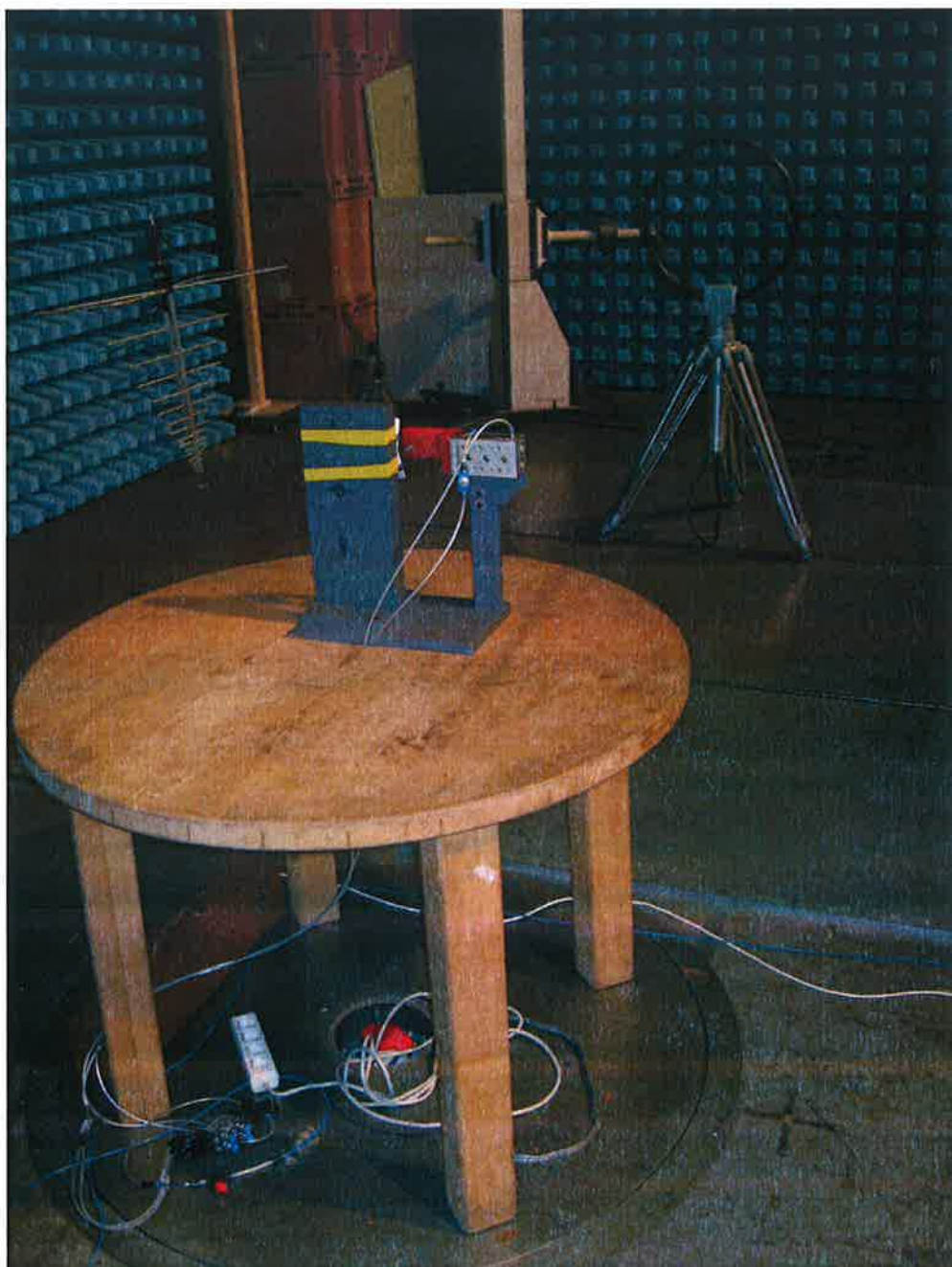
Department: FG

Test report reference:
INE-AT/FG-17/110

Page: 6 of 7

Date: 19.05.2017

checked by: AA



Appendix 2 Photodocumentation

Description: Test setup view #2

Division:
Industry & Energy

Department: FG

Test report reference:
INE-AT/FG-17/110

Page: 7 of 7

Date: 19.05.2017

checked by: M

