TEST REPORT
No.: 2-20842790/15-11c

According to:
FCC Regulations
§1.1310
§ 2.1091 & 2.1093
IC Regulations
RSS-102 Issue 5

for

Datalogic ADC S.r.l.

JOYA TOUCH 3-SLOT CRADLE
FCC-ID: U4GJNG3SD

Laboratory Accreditation and Listings			
DAkkS Deutsche Akkreditierungsstelle D-PL-12047-01-01	MRA US-EU 0003	Industry Canada Reg. No.: 3462D-1 Reg. No.: 3462D-2 Reg. No.: 3462D-3	Voluntary Controls for Electromagnetic Emissions Reg. No.: R-2665, R-2666 C-2914, T-1967, G-301
Wi Fi ALLIANCE AUTHORIZED RF LABORATORY	ctia Authorized™ Test Lab Lab Code: 20011130-00		
accredited according to DIN EN ISO/IEC 17025			

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1. Summary of test results

The test results apply exclusively to the test samples as presented in this Report. The CETECOM GmbH does not assume responsibility for any conclusions and generalizations taken in conjunction with other specimens or samples of the type of the item presented to tests.

The Equipment Under Test (in this report, hereinafter referred as EUT) is a wireless charger intended for mobile devices. The wireless charger is operated in at Frequency 130kHz.

TEST OVERVIEW

No. of Diagram group	Test Cases	Port	References, Standards & Limits FCC / IC	Limits	EUT set-up	EUT op-mode	Measured values	Result
1	Electric field strength	10cm distance to EUT	§1.1310 §2.1091 §2.1093	614 (V/m)	1	1 + 2 + 3 + 4	all values are more than 30% below the regulatory limits	passed
			RSS-102 Issue 5 Section 4 Table 4	83 (V/m)				
2	Magnetic field strength	10cm distance to EUT	§1.1310 §2.1091 §2.1093	1.63 (A/m)	1	1 + 2 + 3 + 4	all values are more than 30% below the regulatory limits	passed
			RSS-102 Issue 5 Section 4 Table 4	90 (A/m)				

Remark:
Following tests have been performed to show compliance with applicable Standards:
FCC §1.1310, §2.1091 §2.1093
OET Bulletin 65 Supplement C
KDB 680106 D01v02.
RSS-102 Issue 5

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.....
Dipl.-Ing. Ch. Lorenz
Responsible for test section

.....
W. Markus
Responsible for test report

2. Administrative Data

2.1. Identification of the testing laboratory

Company name:	CETECOM GmbH
Address:	Im Teelbruch 116 45219 Essen - Kettwig Germany
Responsible for testing laboratory:	Dipl.-Ing. Niels Jeß
Deputy:	Dipl.-Ing. Rachid Acharkaoui

2.2. Test location

2.2.1. Test laboratory "CTC"

Company name:	see chapter 2.1. Identification of the testing laboratory

2.3. Organizational items

Responsible for test report and project leader:	W. Markus
Receipt of EUT:	2016-04-04
Date(s) of test:	2016-05-11
Date of report:	2016-12-15
Version of template: 12.11	

2.4. Applicant's details

Applicant's name:	Datalogic ADC S.r.l.
Address:	Via S. Vitalino, 13 40012, Lippo di Calderara di Reno (BO) ITALY
Contact person:	Mr. Eucarpio Guarisco

2.5. Manufacturer's details

Manufacturer's name:	please see Applicant's details
Address:	please see Applicant's details

3. Equipment under test (EUT)

3.1. TECHNICAL DATA OF MAIN EUT DECLARED BY APPLICANT

Main function	Wireless Charger		
Type	JOYA TOUCH 3-SLOT CRADLE		
Frequency range	Fixed frequency 130kHz		
Type of modulation	Initiation of charging: ASK 2kbps Power Transfer: CW		
Number of channels	1, nominal 130kHz		
Max. nominal power	10 Watt		
Antenna Type	9.5uH two layers coil with 50x50mm ferrite		
FCC-ID	U4GJNG3SD		
Power supply	☒ 12V DC over AE 4 (AC/DC adapter)		
Special EMI components	--		
EUT sample type	☐ Production	☒ Pre-Production	☒ Engineering
FCC label attached	☐ yes	☒ no	

3.2. EUT: Type, S/N etc. and short descriptions used in this test report

Short description*)	EUT	Type	S/N serial number	HW hardware status	SW software status
EUT A	JOYA TOUCH 3- SLOT CRADLE	N/A	Z15P00992	Beta 2 HW Version P/N:91ACC0043	Firmware Version: 0.88.0

*) EUT short description is used to simplify the identification of the EUT in this test report.

3.3. Auxiliary Equipment (AE): Type, S/N etc. and short descriptions

AE short description *)	Auxiliary Equipment	Type	S/N serial number	HW hardware status	SW software status
AE 1	JOYA TOUCH	P00AN04HL0HT0W7 -GR0	Z16P00044	Beta HW Version P/N:911350015	SW Version:WEC7 Firmware Version: 2.16
AE 2	JOYA TOUCH	P00AN04HL0GT0W7 -GRR	Z16P00014	Beta HW Version P/N:9113500013	SW Version:WEC7 Firmware Version: 2.16
AE 3	JOYA TOUCH	P00AN04HL0GT0W7 -GRR	Z16P00015	Beta HW Version P/N: 9113500013	SW Version:WEC7 Firmware Version: 2.16
AE 4	AC/DC Adapter EDACPOWER ELEC	EA10681U-120	331210680014C3	230 V AC 50 Hz to 12VDC 6 A	--

*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.

3.4. EUT set-ups

EUT set-up no.*)	Combination of EUT and AE	Remarks
Set. 1	EUT A + AE 1 + AE 2 + AE 3 + AE 4	

*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

3.5. EUT operating modes

EUT operating mode no.*)	Description of operating modes	Additional information
op. 1	Wireless Charging Mode	Power Transfer Mode between EUT A & AE1, AE2 , AE3 with all three Primary Coils activated in EUT A.
op. 2	NFC	NFC activated only in AE 1. NFC is polling in background, simultaneously to the WLC, testing the presence of the Terminals in each slot (the NFC cycle period is about 100ms)
op. 3	Bluetooth	BT (continuous TX) activated in AE1, AE2 , AE3
op. 4	WLAN	WLAN 5GHz (continuous TX, Ch. 36) activated in AE1, AE2 , AE3

*) EUT operating mode no. is used to simplify the test report.
Remark: operating mode 2, 3 and 4 have been only activated to find the maximum power of state of charge

3.6. Additional declaration and description of EUT

(Applicant's declaration, ☐ = not selected, ☒ = selected)

Set 1	☒ table-top with tipping device ☐ floor-standing ☒ wall-mounted ☐ not defined	typical use ☐ portable use ☒ fixed use ☐ vehicular use	typical operating cycle of EUT. ☒ < 0,5 sec. ☐ :
Place of use	☒ Residential, commercial and light industry ☐ Industrial environment ☐ vehicular use		
Power line: ☒ AC ☒ L1, ☐ L2, ☐ L3, ☒ N ☒ 230 V AC 50 Hz	EUT-grounding: ☐ none (in case of deviation during tests the single details are described on chapter 4)		
Secondary side: ☒ DC ☒ 12V over AE4	☒ with power supply ☐ additional:		
Does EUT contain devices susceptible to magnetic fields, e.g. Hall elements, electrodynamics microphones, etc.?			☒ yes ☐ no
Is mounting position / usual operating position defined?			☒ yes ☐ no

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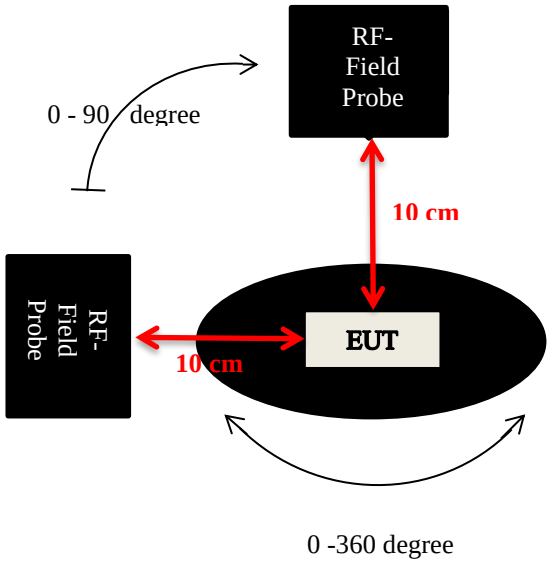
4. DESCRIPTION OF TEST SET-UP's

4.1. Test Set-up for configuration

The RF exposure test is performed in shielded room.

The EUT was placed on a table.
The measurement probe was moved from 0 to 90 degrees at a distance of 10cm from the EUT and the EUT on the table was rotated 360 degrees around the EUT to maximize the captured field strength.



Schematic: Test set-up for Rf exposure measurements

5. Maximum Permissible RF Exposure

5.1.FCC References & Limits

FCC Rules: §1.1310, § 2.1093

The criteria used for the evaluation of human exposure to radio frequency radiation is listed in table 1 according FCC §1.1307(b, except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this.

Note 1 to table 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provide those persons are fully aware for a exposure and can control over their exposure. Limits for occupational/controlled exposures also apply in situations when an individual is transient through a location where occupational/controlled apply provided he or she is made aware of the potential for exposure.

Note 2 to table 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz

So applicable limits in this case are as follows:

§1.1310 LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)
Table 1(B) Limits for General Population/Uncontrolled Exposure
0.3–30 MHz: Electric field: 614 V/m
0.3–30 MHz: Magnetic field: 1.63 A/m

5.2. RSS-102 Issue 5 References & Limits

A device requiring an RF exposure evaluation shall be made in accordance with the latest version of IEEE C95.3. If the device is designed such that more than one antenna can functionally transmit at the same time, the RF exposure evaluation shall be conducted while all antennas are transmitting. The individual exposure level ratios shall be totalled and used for compliance purposes.

If the device has more than one antenna, but is not designed to have more than one antenna functionally transmit at the same time, the RF exposure evaluation of the device shall be performed for each of the individually transmitting antennas. The maximum RF field strength value shall be recorded and used for compliance purposes. If the device combines groups of simultaneous and non-simultaneous transmitting antennas, the worst-case of the above scenarios applies.

For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

RF-Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	**Electric Field (V/m rms)**	**Magnetic Field (A/m rms)**	**Power Density (W/m^2)**	**Reference Period (minutes)**
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142f^{0.3417}$	$0.008335f^{0.3417}$	$0.02619f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
* Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

5.3. E-Field Results

5.3.1. Test location and equipment (for reference numbers please see chapter 'List of test equipment')

test location	☒ CETECOM Essen (Chapter 2.2.1)		☐ Please see Chapter 2.2.2		☐ Please see Chapter 2.2.3	
equipment	☒ 686 EHP-200A	☐	☐	☐	☐	☐
signaling	☐ 017 CMD 65	☐ 323 CMD 55	☐ 340 CMD 55			
signaling	☐ 298 CMU	☐ 460 CMU	☐ 295 RACAL	☐ 392 MT8820A		
line voltage	☒ 120 V 60 Hz via public mains					

5.3.2. Test condition and test set-up

link to test system (if used):	☐ air link	☐ cable connection	
EUT-grounding (if different to chapter 3.5)	☐ none	☐ with power supply	☐ additional connection
Equipment set up	-		-
Climatic conditions	Temperature: 24 °C		Rel. humidity: 31 %

5.3.3. Results

EUT Type and S/N or EUT set-up no.		EUT set-up 1			
EUT operating mode or operating mode no.		EUT operating mode 1 + 2 + 3 + 4			
Frequency Range (kHz)	Distance between EUT and Field probe (m)	E-field (V/m)	E-field Limit (V/m)	E-field Limit – 30% (V/m) [1])	Result
FCC Results					
131	0.10	10.7	614	430	passed
RSS-102 Issue 5 Results					
131	0.10	10.7	83	24.9	passed

Remarks: [1]) according KDB 680106 D01 V02

5.4. H-Field Results

5.4.1. Test location and equipment (for reference numbers please see chapter 'List of test equipment')

test location	☒ CETECOM Essen (Chapter 2.2.1)		☐ Please see Chapter 2.2.2		☐ Please see Chapter 2.2.3	
equipment	☒ 686 EHP-200A	☐	☐	☐	☐	☐
signaling	☐ 017 CMD 65	☐ 323 CMD 55	☐ 340 CMD 55			
signaling	☐ 298 CMU	☐ 460 CMU	☐ 295 RACAL	☐ 392 MT8820A		
line voltage	☒ 120 V 60 Hz via public mains					

5.4.2. Test condition and test set-up

link to test system (if used):	☐ air link	☐ cable connection	
EUT-grounding (if different to chapter 3.5)	☐ none	☐ with power supply	☐ additional connection
Equipment set up	-		-
Climatic conditions	Temperature: 24 °C		Rel. humidity: 31 %

EUT Type and S/N or EUT set-up no.		EUT set-up 1			
EUT operating mode or operating mode no.		EUT operating mode 1 + 2 + 3 + 4			
Frequency Range (KHz)	Distance between EUT and Field probe (m)	H-field (A/m)	H-field Limit (A/m)	H-field Limit – 30% (A/m) [1])	Result
FCC Results					
131	0.10	0.95	1.63	1.14	passed
RSS-102 Issue 5 Results					
131	0.10	0.95	90	27	passed

Remarks: [1]) according KDB 680106 D01 V02

6. Measurement uncertainties

The reported uncertainties are calculated based on the standard uncertainty multiplied with the appropriate coverage factor **k**, such that a confidence level of approximately 95% is achieved.
For uncertainty determination, each component used in the concrete measurement set-up was taken in account and it's contribution to the overall uncertainty according it's statistical distribution calculated.

Following table shows expectable uncertainties for each measurement type performed.

RF-Measurement	Frequency range	Calculated uncertainty based on a confidence level of 95%	Remarks:
Power Output conducted	9 kHz .. 20 GHz	1.0 dB	--
Power Output radiated	30 MHz .. 4 GHz	3.17 dB	Substitution method
Conducted emissions on antenna ports	9 kHz .. 20 GHz	1.0 dB	--
Radiated emissions enclosure	9 kHz .. 30 MHz	5.0 dB	Magnetic field
	9 MHz .. 1 GHz	5.0 dB	E-Field
	30 MHz .. 1 GHz	4.2 dB	E-Field
	1 GHz .. 20 GHz	3.17 dB	Substitution method
Occupied bandwidth	9 kHz .. 4 GHz	0.1272 ppm (Delta Marker)	Frequency error
		1.0 dB	Power
Emission bandwidth	9 kHz .. 4 GHz	0.1272 ppm (Delta Marker)	Frequency error
		1.0 dB	Power
Frequency stability	9 kHz .. 20 GHz	0.0636 ppm	--
Conducted emissions on AC-mains port (U_{CISPR})	9 kHz .. 150 kHz	4.0 dB	--
	150 kHz .. 30 MHz	3.6 dB	

Table: measurement uncertainties, valid for conducted/radiated measurements

7. Accreditation details of CETECOM's laboratories and test sites

Ref.-No.	Accreditation Certificate	Valid for laboratory area or test site	Accreditation Body
-	D-PL-12047-01-01	All laboratories and test sites of CETECOM GmbH, Essen	DAkkS, Deutsche Akkreditierungsstelle GmbH
337 487 558 348 348	MRA US-EU 0003	Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS) Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements above 1 GHz, 3 m (FAR) Mains Ports Conducted Interference Measurements Telecommunication Ports Conducted Interference Measurem.	FCC, Federal Communications Commission Laboratory Division, USA (MRA US-EU 0003)
337 487 550 558	3462D-1 3462D-2 3462D-2 3462D-3	Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS) Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR) Radiated Measurements above 1 GHz, 3 m (FAR)	IC, Industry Canada Certification and Engineering Bureau
337 487 550 348 348	R-2665 R-2666 G-301 C-2914 T-1967	Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS) Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR) Mains Ports Conducted Interference Measurements Telecommunication Ports Conducted Interference Measurem.	VCCI, Voluntary Control Council for Interference by Information Technology Equipment, Japan
OATS = Open Area Test Site, SAR = Semi Anechoic Room, FAR = Fully Anechoic Room			

8. Instruments and Ancillary

8.1. Used equipment "CTC"

The "Ref.-No" in the left column of the following tables allows the clear identification of the laboratory equipment.

8.1.1. Test software and firmware of equipment

Ref.-No.	Equipment	Type	Serial-No.	Version of Firmware or Software during the test
001	EMI Test Receiver	ESS	825132/017	Firm.= 1.21 , OTP=2.0, GRA=2.0
012	Signal Generator (EMS-cond.)	SMY 01	839069/027	Firm.= V 2.02
013	Power Meter (EMS cond.)	NRVD	839111/003	Firm.= V 1.51
017	Digital Radiocommunication Tester	CMD 60 M	844365/014	Firmware = V 3.52 .22.01.99, DECT = D2.87 13.01.99
053	Audio Analyzer	UPA3	860612/022	Firm. V 4.3
119	RT Harmonics Analyzer dig. Flickermeter	B10	G60547	Firm.= V 3.1DHG
140	Signal Generator	SMHU	831314/006	Firm.= 3.21
261	Thermal Power Sensor	NRV-Z55	825083/0008	EPROM-Datum 02.12.04, SE EE 1 B
262	Power Meter	NRV-S	825770/0010	Firm.= 2.6
263	Signal Generator	SMP 04	826190/0007	Firm.=3.21
264	Spectrum Analyzer	FSEK 30	826939/005	Bios=2.1, Analyzer= 3.20
295	Racal Digital Radio Test Set	6103	1572	UNIT Firmware= 4.04, SW-Main=4.04, SW-BBP=1.04, SW-DSP=1.02, Hardboot=1.02, Softboot=2.02
298	Univ. Radio Communication Tester	CMU 200	832221/091	R&S Test Firmware =3.53 /3.54 (current Testsoftw. f. all band used
323	Digital Radiocommunication Tester	CMD 55	825878/0034	Firm.= 3.52 .22.01.99
331	Climatic Test Chamber -40/+80 Grad	HC 4055	43146	TSI 1.53
335	CTC-EMS-Conducted	System EMS Conducted	-	EMC 32 V 8.52
340	Digital Radiocommunication Tester	CMD 55	849709/037	Firm.= 3.52 .22.01.99
355	Power Meter	URV 5	891310/027	Firm.= 1.31
365	10V Insertion Unit 50 Ohm	URV5-Z2	100880	Eprom Data = 31.03.08
366	Ultra Compact Simulator	UCS 500 M4	V0531100594	Firm. UCS 500=001925/3.06a02, rc=ISMIEC 4.10
371	Bluetooth Tester	CBT32	100153	CBT V5,30+ SW-Option K55, K57
377	EMI Test Receiver	ESCS 30	100160	Firm.= 2.30, OTP= 02.01, GRA= 02.36
378	Broadband RF Field Monitor	RadiSense III	03D00013SNO-08	Firm.= V.03D13
383	Signal Generator	SME 03	842 828 /034	Firm.= 4.61
389	Digital Multimeter	Keithley 2000	0583926	Firm. = A13 (Mainboard) A02 (Display)
392	Radio Communication Tester	MT8820A	6K00000788	Firm.= 4.50 #005, IPL=4.01#001,OS=4.02#001, GSM=4.41#013, W-CDMA= 4.54#004, scenario= 4.52#002
436	Univ. Radio Communication Tester	CMU 200	103083	R&S Test Firmware Base=5.14, Mess-Software= GSM:5.14 WCDMA:5.14 (current Testsoftw. F. all band
441	CTC-SAR-EMI Cable Loss	System EMI field (SAR)	-	EMC 32 Version 8.52
442	CTC-SAR-EMS	System EMS field (SAR)	-	EMC 32 Version 8.40
443	CTC-FAR-EMI-RSE	System CTC-FAR-EMI-RSE	-	Spuri 7.2.5 or EMC 32 Ver. 8.53
444	CTC-FAR-EMS field	System-EMS-Field (FAR)	-	EMC 32 Version 8.40
460	Univ. Radio Communication Tester	CMU 200	108901	R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used,
489	EMI Test Receiver	ESU40	1000-30	Firmware=4.43 SP3, Bios=V5.1-16-3, Spec. =01.00
491	ESD Simulator dito	ESD dito	dito307022	V 2.30
524	Voltage Drop Simulator	VDS 200	0196-16	Software Nr: 000037 Version V4.20a01
526	Burst Generator	EFT 200 A	0496-06	Software Nr. 000034 Version V2.32
527	Micro Pulse Generator	MPG 200 B	0496-05	Software-Nr. 000030 Version V2.43
528	Load Dump Simulator	LD 200B	0496-06	Software-Nr. 000031 Version V2.35a01
546	Univ. Radio Communication Tester	CMU 200	106436	R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used
547	Univ. Radio Communication Tester	CMU 200	835390/014	R&S Test Firmware Base=V5.1403 (current Testsoftw., f. all band used, GSM = 5.14 WCDMA: = 5.14
584	Spectrum Analyzer	FSU 8	100248	2.82_SP3
594	Wideband Radio Communication Tester	CMW500	101757	Firmware Base=2.0.20.9, LTE=2.0.20.8. CDMA= 2.0.10
597	Univ. Radio Communication Tester	CMU 200	100347	R&S Test Firmware Base=5.01, GSM=5.02 WCDMA= not installed, Mainboard= µP1=V.850
598	Spectrum Analyzer	FSEM 30 (Reserve)	831259/013	Firmware Bios 3.40 , Analyzer 3.40 Sp 2
620	EMI Test Receiver	ESU 26	100362	4.43_SP3
642	Wideband Radio Communication Tester	CMW 500	126089	Setup V03.26, Test programm component V02.12.01

8.1.2. Single instruments and test systems

Ref.-No.	Equipment	Type	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
001	EMI Test Receiver	ESS	825132/017	Rohde & Schwarz	12 M	-	30.04.2017
005	AC - LISN (50 Ohm/50µH, test site 1)	ESH2-Z5	861741/005	Rohde & Schwarz	12 M	-	30.04.2017
007	Single-Line V-Network (50 Ohm/5µH)	ESH3-Z6	892563/002	Rohde & Schwarz	12 M	-	30.04.2017
009	Power Meter (EMS-radiated)	NRV	863056/017	Rohde & Schwarz	24 M	-	30.04.2018
011	Insertion Unit (EMS-radiated)	URV5-Z2	864169/004	Rohde & Schwarz	24 M	-	30.04.2018
012	Signal Generator (EMS-cond.)	SMY 01	839069/027	Rohde & Schwarz	24 M	-	30.04.2018
013	Power Meter (EMS cond.)	NRVD	839111/003	Rohde & Schwarz	24 M	-	30.04.2018
014	Insertion Unit (EMS cond.)	URV5-Z2	838519/029	Rohde & Schwarz	24 M	-	30.04.2018
015	Insertion Unit (EMS cond.)	URV5-Z4	838570/024	Rohde & Schwarz	24 M	-	30.04.2018
016	Line Impedance Simulating Network	Op. 24-D	B6366	Spitzenberger+Spies	36 M	-	30.03.2019
017	Digital Radiocommunication Tester	CMD 60 M	844365/014	Rohde & Schwarz	pre-m	3	
020	Horn Antenna 18 GHz (Subst 1)	3115	9107-3699	EMCO	36 M	-	31.03.2017
021	Loop Antenna (H-Field)	6502	9206-2770	EMCO	36 M	-	30.04.2018
030	Loop Antenna (H-field)	HFH-Z2	879604/026	Rohde & Schwarz	36 M	-	30.04.2018
031	Absorbing Clamp	MDS-21	863325/015	Rohde & Schwarz	36 M	-	30.04.2018
033	RF-current probe (100kHz-30MHz)	ESH2-Z1	879581/18	Rohde & Schwarz	24 M	-	30.04.2017
049	Current Clamp (injection)	F-120-2	48	FCC	24 M	-	30.04.2018
050	3-ph Coupling Decoupling Netw. (Burst)	CDN 300	176	Schaffner	36 M	-	30.04.2019
051	VHF-Current Probe 20-300 MHz	ESV-Z1	872421	Rohde & Schwarz	36 M	-	30.04.2018
052	Notch Filter DECT	WRCB 1887,82/1889,55SS	12	Wainwright Industries	pre-m	2	
053	Audio Analyzer	UPA3	860612/022	Rohde & Schwarz	36 M	-	31.03.2017
057	relay-switch-unit (EMS system)	RSU	494440/002	Rohde & Schwarz	pre-m	1a	
058	capacitive clamp (Burst)	IP 4	99	Haefely	36 M	-	30.04.2018
060	power amplifier (DC-2kHz)	PAS 5000	B6363	Spitzenberger+Spies	-	3	
065	attenuator, (6 dB) 50 Ohm, 250W	AT 50-6-250	521057	BNOS Electronics	12 M	1b	30.09.2016
066	notch filter (WCDMA; FDD1)	WRCT 1900/2200-5/40-10EEK	5	Wainwright GmbH	12 M	1g	31.07.2016
067	coupling decoupling-network	CDN 801-M2/M3	272	Lüthi	36 M	-	31.03.2017
068	coupling decoupling-network	CDN 801-M5	95226	Lüthi	36 M	-	31.03.2017
069	EM - clamp	EM101	9535159	Lüthi	36 M	-	30.04.2019
072	coupling decoupling-network	CDN 801-M2/M3	276	Lüthi	36 M	-	31.03.2017
083	AC - power supply, 0-10 A	EAC/MT 27010	910502096	EURO TEST	pre-m	2	
084	AC - power supply, 0-5 A	ELABO-8-34214	-	ELABO	pre-m	2	
085	AC - power supply, 0-10 A	R250	-	Schunterm.&Benningh.	pre-m	2	
086	DC - power supply, 0 -10 A	LNG 50-10	-	Heinzinger Electronic	pre-m	2	
087	DC - power supply, 0 -5 A	EA-3013 S	-	Elektro Automatik	pre-m	2	
090	Helmholtz coil: 2x10 coils in series	Helmholtz coil: 2x10 coils in	-	RWTÜV	12 M	4	31.03.2017
091	USB-LWL-Converter	OLS-1	007/2006	Ing. Büro Scheiba	-	4	
094	artificial head (No.1)	4905	1566990	Brüel & Kjaer	pre-m	2	
099	passive voltage probe	ESH2-Z3	299.7810.52	Rohde & Schwarz	36 M	-	30.04.2018
100	passive voltage probe	Probe TK 9416	without	Schwarzbeck	36 M	-	30.04.2018
110	USB-LWL-Converter	OLS-1	-	Ing. Büro Scheiba	-	4	
119	RT Harmonics Analyzer dig. Flickermeter	B10	G60547	BOCONSULT	36 M	-	30.04.2019
121	notch filter GSM 1900	WRCB 1879,5/1880,5EE	15	Wainwright GmbH	12 M	1d	31.07.2016
122	notch filter GSM 1800	WRCB 1747/1748	12	Wainwright GmbH	12 M	1c	31.07.2016
131	RF-Current Probe	F-52	19	FCC	36 M	-	31.03.2017
136	adjustable dipole antenna (Dipole 1)	3121C-DB4	9105-0697	EMCO	36 M	-	30.04.2018
140	Signal Generator	SMHU	831314/006	Rohde & Schwarz	24 M	-	30.04.2018
142	attenuator (6 dB) 2 W, 8 GHz	DGL N	-	Radiall	12 M	1b	30.04.2017
248	attenuator	SMA 6dB 2W	-	Radiall	pre-m	2	
249	attenuator	SMA 10dB 10W	-	Radiall	pre-m	2	
252	attenuator	N 6dB 12W	-	Radiall	pre-m	2	
254	high pass GSM1800/1900/DECT	5HC 2600/12750-1.5KK	23042	Trilithic	12 M	1c	31.07.2016
256	attenuator	SMA 3dB 2W	-	Radiall	pre-m	2	
257	hybrid	4031C	04491	Narda	pre-m	2	
260	hybrid coupler	4032C	11342	Narda	pre-m	2	
261	Thermal Power Sensor	NRV-Z55	825083/0008	Rohde & Schwarz	24 M	-	30.04.2018
262	Power Meter	NRV-S	825770/0010	Rohde & Schwarz	24 M	-	30.04.2018
263	Signal Generator	SMP 04	826190/0007	Rohde & Schwarz	36 M	-	30.04.2019
265	peak power sensor	NRV-Z33, Model 04	840414/009	Rohde & Schwarz	24 M	-	30.04.2018
266	Peak Power Sensor	NRV-Z31, Model 04	843383/016	Rohde & Schwarz	24 M	-	30.04.2018
267	notch filter GSM 850	WRCA 800/960-6EEK	9	Wainwright GmbH	pre-m	2	
270	termination	1418 N	BB6935	Weinschel	pre-m	2	
271	termination	1418 N	BE6384	Weinschel	pre-m	2	
272	attenuator (20 dB) 50 W	Model 47	BF6239	Weinschel	pre-m	2	
273	attenuator (10 dB) 100 W	Model 48	BF9229	Weinschel	pre-m	2	
274	attenuator (10 dB) 50 W	Model 47 (10 dB) 50 W	BG0321	Weinschel	pre-m	2	
275	DC-Block	Model 7003 (N)	C5129	Weinschel	pre-m	2	
276	DC-Block	Model 7006 (SMA)	C7061	Weinschel	pre-m	2	
279	power divider	1515 (SMA)	LH855	Weinschel	pre-m	2	

Ref.-No.	Equipment	Type	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
284	coupling decoupling network	CDN 801-M1	1661	Lüthi	36 M	-	31.03.2017
285	coupling decoupling network	CDN 801-S1	1642	Lüthi	36 M	-	31.03.2017
287	pre-amplifier 25MHz - 4GHz	AMF-2D-100M4G-35-10P	379418	Miteq	12 M	1c	31.07.2016
290	notch filter GSM 900	WRCA 901,9/903,1SS	3RR	Wainwright GmbH	12 M	1c	31.07.2016
291	high pass filter GSM 850/900	WHJ 2200-4EE	14	Wainwright GmbH	12 M	1c	31.07.2016
295	Racal Digital Radio Test Set	6103	1572	Racal	pre-m	3	
296	audio measurement amplifier	2636C (Reserve)	R=316568/004 B=1537541	Brüel & Kjaer	pre-m	2	
298	Univ. Radio Communication Tester	CMU 200	832221/091	Rohde & Schwarz	pre-m	3	
299	audio microphone	134	-	Brüel & Kjaer	pre-m	2	
300	AC LISN (50 Ohm/50µH, 1-phase)	ESH3-Z5	892 239/020	Rohde & Schwarz	12 M	-	30.04.2017
301	attenuator (20 dB) 50W, 18GHz	47-20-33	AW0272	Lucas Weinschel	pre-m	2	
302	horn antenna 40 GHz (Meas 1)	BBHA9170	155	Schwarzbeck	36 M	-	31.03.2017
303	horn antenna 40 GHz (Subst 1)	BBHA9170	156	Schwarzbeck	36 M	-	31.03.2017
304	fix dipole antenna 1,6 GHz	EMCO 3125-307	9907-1001	ETS	pre-m	-	
305	fix dipole antenna 1,8-2,0 GHz	EMCO 3125-306	9907-1001	ETS	pre-m	-	
306	fix dipole antenna 2,45 GHz	EMCO 3125-308	9907-1001	ETS	pre-m	-	
307	fix dipole antenna 3 GHz	EMCO 3125-309	9907-1001	ETS	pre-m	-	
317	1000 Hz calibrator 94 dB SPL	4230 94dB	1542286	Brüel & Kjaer	12 M	-	
323	Digital Radiocommunication Tester	CMD 55	825878/0034	Rohde & Schwarz	pre-m	3	
331	Climatic Test Chamber -40/+80 Grad	HC 4055	43146	Heraeus Vötsch	24 M	-	30.11.2016
335	CTC-EMS-Conducted	System EMS Conducted	-	Rohde & Schwarz	12 M	5	30.09.2016
337	System CTC OATS NSA	System EMI OATS NSA	-	HD GmbH	36 M	5	31.07.2017
340	Digital Radiocommunication Tester	CMD 55	849709/037	Rohde & Schwarz	pre-m	3	
341	Digital Multimeter	Fluke 112	81650455	Fluke	24 M	-	30.04.2018
342	Digital Multimeter	Voltcraft M-4660A	IB 255466	Voltcraft	24 M	-	30.04.2018
344	adaptor 150/50 Ohm	150/50	-	Krohne	36 M	-	31.03.2017
345	adaptor 150/50 Ohm	150/50	-	Krohne	36 M	-	31.03.2017
347	laboratory site	radio lab.	-	-	-	5	
348	laboratory site	EMI conducted	-	-	-	5	
349	car battery 12 V	car battery 12 V	without	-	-	3	
350	car battery 12 V	car battery 12 V	without	-	-	3	
354	DC - Power Supply 40A	NGPE 40/40	448	Rohde & Schwarz	pre-m	2	
355	Power Meter	URV 5	891310/027	Rohde & Schwarz	24 M	-	30.04.2018
356	power sensor	NRV-Z1	882322/014	Rohde & Schwarz	24 M	-	30.04.2017
357	power sensor	NRV-Z1	861761/002	Rohde & Schwarz	24 M	-	30.04.2017
365	10V Insertion Unit 50 Ohm	URV5-Z2	100880	Rohde & Schwarz	24 M	-	30.04.2018
366	Ultra Compact Simulator	UCS 500 M4	V0531100594	EM-Test	12 M	-	30.04.2017
368	ROD-Antenna	HFH 2-Z1	879283/31	Rohde & Schwarz	60 M	-	17.07.2019
369	insertion unit (SAR-EMS, Ch. A)	URV5-Z2	100301	Rohde & Schwarz	24 M	-	30.04.2017
370	insertion unit (SAR-EMS, Ch. B)	URV5-Z2	100302	Rohde & Schwarz	24 M	-	30.04.2017
371	Bluetooth Tester	CBT32	100153	R&S	24 M	-	30.04.2018
373	Single-Line V-Network (50 Ohm/5µH)	ESH3-Z6	100535	Rohde & Schwarz	24 M	-	30.04.2018
374	Power Amplifier 0,8-3 GHz	60S1G3	306528	Amplifier Research	-	1a	02.08.2016
375	Directional Coupler	DC7144M1	306498	Amplifier Research	-	1a	30.07.2016
376	Horn Antenna 6 GHz	BBHA9120 E	BBHA 9120 E 179	Schwarzbeck	12 M	-	30.04.2017
377	EMI Test Receiver	ESCS 30	100160	Rohde & Schwarz	12 M	-	30.04.2017
386	Coupling Decoupling Network	CDN USB/p	19397	Schaffner	36 M	-	31.04.2017
387	Coupling Decoupling Network	CDN L-801 M2	2051	Lüthi	36 M	-	31.04.2017
388	Coupling Decoupling Network	CDN L-801 T2	1929	Lüthi	36 M	-	31.04.2017
389	Digital Multimeter	Keithley 2000	0583926	Keithley	24 M	-	30.04.2017
390	Industry Acoustic System	MO 2000 Set	2127100123	Sennheiser	pre-m	2	
392	Radio Communication Tester	MT8820A	6K00000788	Anritsu	12 M	-	30.04.2017
394	Power Amplifier 80-1000 MHz	BLWA 0810-250/200	045610	Bonn-Elektronik	-	1a	30.04.2017
399	Sound Calibrator	Sound Calibrator 4231	2665101	Brüel & Kjaer	12 M	-	30.04.2017
431	Model 7405	Near-Field Probe Set	9305-2457	EMCO	-	4	
436	Univ. Radio Communication Tester	CMU 200	103083	Rohde & Schwarz	12 M	-	30.04.2017
439	UltraLog-Antenna	HL 562	100248	Rohde & Schwarz	36 M	-	31.04.2017
440	CDN for Datacable	CDN-UTP	CDN-UTP 029	EMC Partner AG, CH	24 M	-	30.04.2018
441	CTC-SAR-EMI Cable Loss	System EMI field (SAR) Cable	-	CETECOM	12 M	5	31.10.2016
442	CTC-SAR-EMS	System EMS field (SAR)	-	ETS-Lindgren / CETECOM	12 M	5	30.07.2016
443	CTC-FAR-EMI-RSE	System CTC-FAR-EMI-RSE	-	ETS-Lindgren / CETECOM	12 M	5	31.07.2016
444	CTC-FAR-EMS field	System-EMS-Field (FAR)	-	ETS Lindgren/CETECOM	12 M	5	30.09.2016
448	notch filter WCDMA_FDD II	WRCT 1850.0/2170.0-5/40-	5	Wainwright Instruments GmbH	12 M	1c	31.07.2016
449	notch filter WCDMA FDD V	WRCT 824.0/894.0-5/40-8SSK	1	Wainwright	12 M	1c	31.07.2016
454	Oscilloscope	HM 205-3	9210 P 29661	Hameg	-	4	
455	Oscilloscope	HP 54602B	US 350 336 45	Hawlett Packard	-	4	
456	DC-Power supply 0-5 A	EA 3013 S	207810	Elektro Automatik	pre-m	2	
459	DC -Power supply 0-5 A , 0-32 V	EA-PS 2032-50	910722	Elektro Automatik	pre-m	2	
460	Univ. Radio Communication Tester	CMU 200	108901	Rohde & Schwarz	12 M	-	30.04.2017

Ref.-No.	Equipment	Type	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
462	AF-Generator	MX-2020	-	Conrad	-	4	
463	Universal source	HP3245A	2831A03472	Agilent	-	4	
466	Digital Multimeter	Fluke 112	89210157	Fluke USA	24 M	-	30.04.2018
467	Digital Multimeter	Fluke 112	89680306	Fluke USA	36 M	-	30.04.2018
468	Digital Multimeter	Fluke 112	90090455	Fluke USA	36 M	-	30.04.2018
477	ReRadiating GPS-System	AS-47	-	Automotive Cons. Fink	-	3	
480	power meter (Fula)	NRVS	838392/031	Rohde & Schwarz	24 M	-	30.04.2017
482	filter matrix	Filter matrix SAR 1	-	CETECOM (Brl)	-	1d	
484	pre-amplifier 2,5 - 18 GHz	AMF-5D-02501800-25-10P	1244554	Miteq	12 M	-	31.07.2016
487	System CTC NSA-Verification SAR-EMI	System EMI field (SAR) NSA	-	ETS Lindgren / CETECOM	24 M	-	30.06.2017
489	EMI Test Receiver	ESU40	1000-30	Rohde & Schwarz	12 M	-	30.04.2017
491	ESD Simulator dito	ESD dito	dito307022	EM-Test	24 M	-	30.04.2017
498	Power Supply	NGPE 40/40	402	Rohde & Schwarz	pre-m	2	
500	Industry Acoustic System	MO 2000 Set	100048	Sennheiser	pre-m	2	
502	band reject filter	WRCG 1709/1786-1699/1796-	SN 9	Wainwright	pre-m	2	
503	band reject filter	WRCG 824/849-814/859-	SN 5	Wainwright	pre-m	2	
512	notch filter GSM 850	WRCA 800/960-02/40-6EEK	SN 24	Wainwrght	12 M	1c	31.07.2016
517	relais switch matrix	HF Relais Box Keithley	SE 04	Keithley	pre-m	2	
523	Digital Multimeter	L4411A	MY46000154	Agilent	24 M	-	30.04.2017
524	Voltage Drop Simulator	VDS 200	0196-16	EM Test	24 M	-	30.04.2017
525	CDN coupling network	CNA 200	1196-01	EM Test	24 M	-	30.04.2017
526	Burst Generator	EFT 200 A	0496-06	EM Test	24 M	-	30.04.2017
527	Micro Pulse Generator	MPG 200 B	0496-05	EM Test	24 M	-	30.04.2017
528	Load Dump Simulator	LD 200B	0496-06	EM Test	24 M	-	30.04.2017
529	6 dB Broadband resistive power divider	Model 1515	LH 855	Weinschel	pre-m	2	
530	10 dB Broadband resistive power divider	R 416110000	LOT 9828	-	pre-m	2	
533	Impedance Stabilization Network	ISN T200A	25706	Teseq	36 M	-	31.03.2017
534	Impedance Stabilization Network	ISN T400A	24881	Teseq	36 M	-	31.03.2017
535	Impedance Stabilization Network	ISN T800	26321	Teseq	36 M	-	31.03.2017
536	Impedance Stabilization Network	ISN ST08	25867	Teseq	36 M	-	31.03.2017
541	Impedance Stabilization Network	ISN T8-Cat6	26373	Teseq Berlin	36 M	-	31.03.2017
546	Univ. Radio Communication Tester	CMU 200	106436	R&S	12 M	-	30.04.2017
547	Univ. Radio Communication Tester	CMU 200	835390/014	Rohde & Schwarz	12 M	-	30.04.2017
549	Log.Per-Antenna	HL025	1000060	Rohde & Schwarz	36 M	-	30.04.2018
550	System CTC S-VSWR Verification SAR-EMI	System EMI Field SAR S-VSWR	-	ETS Lindgren/CETECOM	24 M	-	30.06.2017
552	high pass filter 2,8-18GHz	WHKX 2.8/18G-10SS	4	Wainwright	12 M	1c	31.07.2016
558	System CTC FAR S-VSWR	System CTC FAR S-VSWR	-	CTC	24 M	-	31.07.2016
574	Biconilog Hybrid Antenna	BTA-L	980026L	Frankonia	36 M	-	31.03.2019
584	Spectrum Analyzer	FSU 8	100248	Rohde & Schwarz	pre-m	-	
592	CDN-HDMI	CDN-HDMI	A3029004	Frankonia / Dr.Hubert	36 M	-	31.03.2017
595	Analog Adder	TS8910	-	Rohde & Schwarz	pre-m	2	
611	DC power supply	E3632A	KR 75305854	Agilent	pre-m	2	
612	DC power supply	E3632A	MY 40001321	Agilent	pre-m	2	
613	Attenuator	R416120000 20dB 10W	Lot. 9828	Radiall	pre-m	2	
615	Analog Adder	TS8920	-	Rohde & Schwarz	pre-m	2	
616	Digitalmultimeter	Fluke 177	88900339	Fluke	24 M	-	30.04.2018
620	EMI Test Receiver	ESU 26	100362	Rohde-Schwarz	12 M	-	30.04.2017
625	Generic Test Load USB	Generic Test Load USB	-	CETECOM	-	2	
627	data logger	OPUS 1	201.0999.9302.6.4.1.43	G. Lufft GmbH	36 M	-	30.05.2018
637	High Speed HDMI with Ethernet 1m	HDMI cable with Ethernet 1m	-	KogiLink	-	2	
638	HDMI Kabel with Ethernet 1,5 m flach	HDMI cable with Ethernet	-	Reichelt	-	2	
640	HDMI cable 2m rund	HDMI cable 2m rund	-	Reichelt	-	2	
641	HDMI cable with Ethernet	Certified HDMI cable with	-	PureLink	-	2	
642	Wideband Radio Communication Tester	CMW 500	126089	Rohde&Schwarz	12 M	-	31.06.2016
644	Amplifierer	ZX60-2534M+	SN865701299	Mini-Circuits	-	-	
645	Power Amplifier	CBA 230M-080	T44236	TESEQ	-	1g	
671	DC-power supply 0-5 A	EA-3013S	-	Elektro Automatik	pre-m	2	
672	Digitalmultimeter	Keithley 2700	1182075	Keithley	pre-m	-	
673	Diditalmultimeter	Keithley 2700	1181408	Keithley	pre-m	-	
674	Digitalmultimeter	Keithley 2700	1182090	Keithley	pre-m	-	
675	Digitalmultimeter	Keithley 2700	1162865	Keithley	pre-m	-	
676	Digitalmaultimeter	Keithley 2700	1182092	Keithley	pre-m	-	
677	Digitalmultimeter	Keithley 2700	1182089	Keithley	pre-m	-	
678	Power Meter	NRP	101638	Rohde&Schwarz	pre-m	-	
679	Power Supply	High Speed Power Supply	0783417	Keithley	pre-m	-	
680	Power Sensor	NRP-Z21	100622	Rohde & Schwarz	pre-m	-	
682	Vector Signal Generator	SMU 200A	101319	Rohde & Schwarz	pre-m	-	
683	Spectrum Analyzer	FSU 26	200571	Rohde & Schwarz	12 M	-	30.04.2017
684	Widerstand 100 Ohm	SL 403-403	72973	Teseq	pre-m	-	

Ref.-No.	Equipment	Type	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
685	Widerstand 100 OHM	SL 403-403	72974	Teseq	pre-m	-	
686	Field Analyzer	EHP-200A	160WX30702	Narda Safety Test Solutions	24 M	-	30.04.2017
687	Signal Generator	SMF 100A	102073	Rohde&Schwarz	12 M	-	30.04.2017
692	Bluetooth Tester	CBT 32	100236	Rohde & Schwarz	12 M	-	30.04.2017
695	ReRadiating GPS-System	AS-47	G1406003500001	Automotive Cons. Fink	-	3	
696	Signal Generator	SME 03	830829/018	Rohde & Schwarz	36 M	-	10.01.2018

8.1.3. Legend

Note / remarks		Calibrated during system calibration:
	1a	System CTC-SAR-EMS (Ref.-No. 442)
	1b	System-CTC-EMS-Conducted (Ref.-No. 335)
	1c	System CTC-FAR-EMI-RSE (Ref.-No . 443)
	1d	System CTC-SAR-EMI (Ref.-No . 441)
	1e	System CTC-OATS (EMI radiated) (Ref.-No. 337)
	1 f	System CTC-CTIA-OTA (Ref.-No . 420)
	1 g	System CTC-FAR-EMS (Ref.-No . 444)
	2	Calibration or equipment check immediately before measurement
	3	Regulatory maintained equipment for functional check or support purpose
	4	Ancillary equipment without calibration e.g. mechanical equipment or monitoring equipment
	5	Test System

Interval of calibration	12 M	12 month
	24 M	24 month
	36 M	36 month
	24/12 M	Calibration every 24 months, between this every 12 months internal validation
	36/12 M	Calibration every 36 months, between this every 12 months internal validation
	Pre-m	Check before starting the measurement
	-	Without calibration

9. Versions of test reports (change history)

Version	Applied changes	Date of release
--	Initial release	2016-12-15
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