

**TEST REPORT CONCERNING THE COMPLIANCE OF A
RADAR LEVEL TANK GAUGE,
BRAND HONEYWELL ENRAF,
MODEL SMARTRADAR FLEXLINE
WITH 47 CFR PART 15 (10-1-10) AND THE
REQUIREMENTS OF INDUSTRY CANADA:
RSS-GEN AND RSS-210 (ISSUE 8, DECEMBER 2010).**

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November 30, 2012**

FCC listed : 90828
Industry Canada : 2932G-2
VCCI Registered : R-1518, C-1598
R&TTE, LVD, EMC Notified Body : 1856

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MEASUREMENT/TECHNICAL REPORT

HONEYWELL-ENRAF
Model : SmartRadar Flexline
FCC ID: LOM990SRFL-2
IC: 8554A-990SRFL

This report concerns: Original Certification ~~Class 2 change~~ Verification

Equipment type: Radar Level Tank Gauge

Report prepared by:	Name	: Richard van der Meer
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-10 edition), RSS-GEN (ISSUE 3 DECEMBER 2010, RSS-210 ISSUE 8 DECEMBER 2010) and the measurement procedures of ANSI C63.4-2009. TÜV Rheinland EPS B.V. at Leek, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: November 30, 2012

Signature:



O. Hoekstra
Senior Engineer Telecom TÜV Rheinland EPS B.V.

Summary

The device under test does:

- fulfill the general approval requirements as identified in this test report
- not fulfill the general approval requirements as identified in this test report

Description of test item

Test item	:	Radar Level Tank Gauge
Manufacturer	:	Enraf B.V.
Brand	:	Honeywell Enraf
Model	:	SmartRadar FlexLine
Serial number(s)	:	990-proto
FCC ID	:	LOM990SRFL-2
IC	:	8554A-990SRFL
Contains FCC ID / IC	:	S57500025034 IC:5731-50025034

Applicant information

Applicant's representative	:	Mr. J. Bok and Mr. W. Vellekoop
Company	:	Honeywell Enraf
Address	:	Delftechpark 39
Postal code	:	2628 XJ
City	:	Delft
Country	:	The Netherlands
Telephone number	:	+31 15 2701187
Telefax number	:	+31 15 2701138

Test(s) performed

Location	:	Leek
Test(s) started	:	November 22, 2012
Test(s) completed	:	November 23, 2012
Purpose of test(s)	:	Original certification of the 9.5 -10.6 GHz radar unit.

Test specification(s)	:	47 CFR Part 15 (10-1-10 Edition) and RSS-GEN (ISSUE 3, DECEMBER 2010) AND RSS-210 (ISSUE 8, DECEMBER 2010)
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Test engineer(s)	:	R. van der Meer
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Report written by	:	R. van der Meer
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Report date	:	November 30, 2012
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The test results relate only to the item(s) tested.**

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1 General information.

1.1 Product description.

1.1.1 Introduction.

The EUT is designed to measure the level of liquid in storage tanks.

The SmartRadar Flexline consist of 3 versions, knowing: Xtreme performance, Advanced performance and High performance. The difference in these version is purely software, which provide different measurement accuracies.

The content of this report and measurement results have not been changed other than the way of presenting the data.

1.2 Related submittal(s) and/or Grant(s).

1.2.1 General.

This test report summarizes testdata of compliances testing intended to support equipment certification.

1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	Radar Level Tank Gauge
Manufacturer	:	Enraf B.V.
Brand	:	Honeywell Enraf
Model	:	SmartRadar Flexline
Serial number	:	990-proto
Operating frequency	:	9.5 – 10.6 GHz
Voltage input rating	:	24-65 V DC and 65 – 240 V AC
Remarks	:	During the tests the following internal modules were functional: CAN-PSX/TII-PSX (power supply), CAN BPM/HCI-BPM (field communication bus), TII-XR+Art2b, HMI-TSI/FII-SMV, HCI-1WL(WiFi-board) and SV(smartview).
AUX 1	:	CIU858
Manufacturer	:	Honeywell-Enraf
Brand	:	Honeywell-Enraf
Model	:	CIU858
Serial number	:	---
Voltage input rating	:	---
Remarks	:	communication interface unit
AUX 2	:	PC
Manufacturer	:	Dell
Brand	:	Dell
Model	:	Latitude
Serial number	:	---
Voltage input rating	:	---
Remarks	:	---

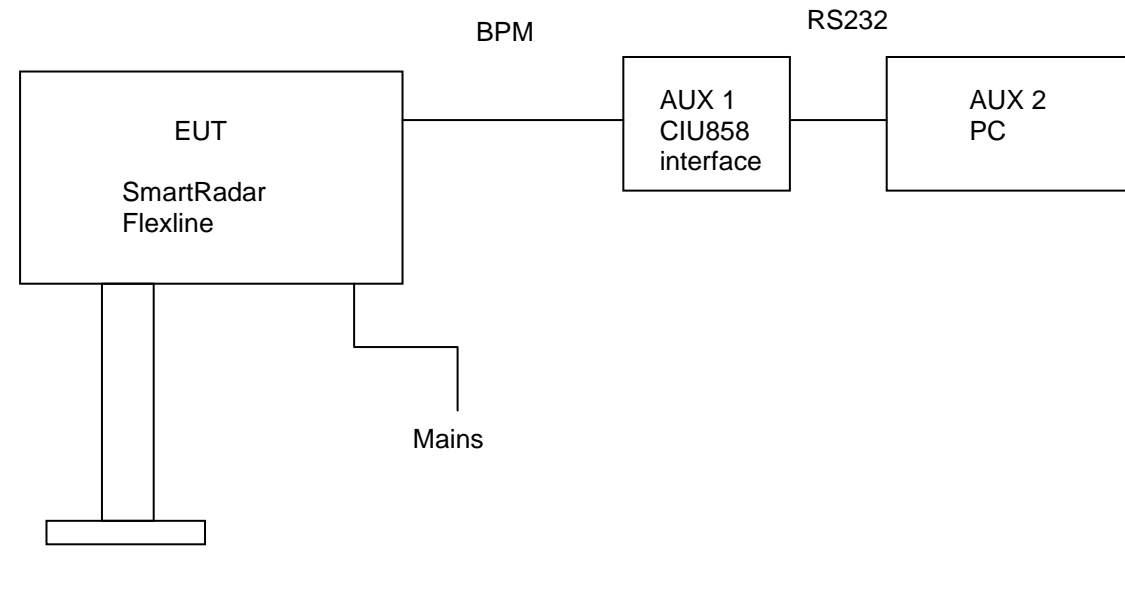


Figure 1. Basic set-up total system during testing

1.4 Test Summary

The EUT was tested in accordance with the specifications given in the table below.

Test Standard		Description	Page	Pass / Fail
FCC 47 CFR Part 15 (10-1-10 Edition)	IC			
15.209	RSS-Gen(4.9 and 7.2.5)	Radiated emissions	10 - 11	Pass
15.207	RSS-Gen(7.2.4)	Conducted emissions	12 - 13	Pass
15.215(c)	RSS-Gen(4.6.1)	Occupied bandwidth	14	Pass

Table : testspecifications

Testmethods: ANSI C63:2009 and RSS-Gen Issue 3, December 2010

1.5 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-10 Edition), sections 15.31, 15.207 and 15.209, RSS-GEN (ISSUE 3, DECEMBER 2010) RSS-210 (ISSUE 8, DECEMBER 2010).

The test methods, which have been used, are based on ANSI C63.4: 2009.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.

The measuring receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

1.6 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland EPS B.V., located in Niekerk, 9822 TL Smidshornerweg 18, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948 (10-1-10 edition).

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The description of the test facilities has been filed to Industry Canada under registration number 2932G-2. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

1.7 Test conditions.

Normal test conditions:

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: 120VAC/60Hz
Air pressure	: 950 – 1050 hPa

When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.

2 System test configuration.

2.1 Justification.

The system was configured for testing in a typical situation as a customer would normally use it.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2009.

2.2 EUT mode of operation.

The intentional radiator tests have been performed with a complete functioning EUT and interconnections. Final tests have been performed with Antenna W06 which has the highest gain (26 dB) and from pre-tests proved to be the worst case.

The EUT is swept frequency equipment working in the frequency band 9.5 GHz to 10.6 GHz. Conducted emission tests and Radiated emission tests were performed in normal operational mode with the frequency sweep turned on, and with the sweep stopped at the following frequencies. Worst case results were noted down:

Test Channel	Frequency (GHz)
1	9.538
2	10.049
3	10.0561

The EUT is tested built on a test tank (dummy). In normal operation mode with the frequency sweep turned on, it continuously reads the height level and displays it on the standard display.

2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance.

2.4 Equipment modifications.

No modifications have been made to the equipment in order to achieve compliance.

2.5 Product Labelling

The product labeling information is available in the technical documentation package.

2.6 Block diagram of the EUT.

The block diagram is available in the technical documentation package.

2.7 Schematics of the EUT.

The schematics are available in the technical documentation package.

2.8 Part list of the EUT.

The part list is available in the technical documentation package.

3 Radiated emission data.

3.1 Radiated field strength measurements (30 MHz – 40 GHz, E-field) with WiFi-board operational

Frequency (MHz)	Test Results Vertical (dBµV/m)	Test Results Horizontal (dBµV/m)	Detector	Correction factor (dB)	Test Results Vertical (dBµV/m)	Test Results Horizontal (dBµV/m)	Limits @3m (dBµV/m)	Pass/Fail
304.000	18.1	19.2	Qp	14.6	32.7	33.8	46.0	Pass
384.000	8.3	10.7	Qp	17.2	25.5	27.9	46.0	Pass
448.000	8.4	3.0	Qp	19.2	27.6	22.2	46.0	Pass
1002.9	25.4	26.9	Pk	24.4	49.8	51.3	74.0 Pk / 54.0 Av	Pass
1136.0	25.5	26.7	Pk	24.4	49.9	51.1	74.0 Pk / 54.0 Av	Pass
3167.9	19.5	20.8	Pk	31.0	50.5	51.8	74.0 Pk / 54.0 Av	Pass
3822.0	9.8	12.8	Pk	32.2	42.0	45.0	74.0 Pk / 54.0 Av	Pass
3920.4	11.4	8.3	Pk	33.8	45.2	42.1	74.0 Pk / 54.0 Av	Pass
4337.2	8.2	11.7	Pk	33.8	42.0	45.5	74.0 Pk / 54.0 Av	Pass
4257.6	-3.8	2.0	Pk	33.8	30.0	35.8	74.0 Pk / 54.0 Av	Pass
6681.6	12.6	14.1	Pk	35.7	48.3	49.8	74.0 Pk / 54.0 Av	Pass
7908.8	11.6	12.8	Pk	38.0	49.6	50.8	74.0 Pk / 54.0 Av	Pass
8916.1	11.2	12.9	Pk	38.4	49.6	51.3	74.0 Pk / 54.0 Av	Pass
8974.0	12.0	13.0	Pk	38.4	50.4	51.4	74.0 Pk / 54.0 Av	Pass
9538.0 fundamental	11.3	12.8	Pk	38.5	49.8	51.3	74.0 Pk / 54.0 Av	Pass
10049.0 fundamental	11.4	12.6	Pk	38.5	49.9	51.1	74.0 Pk / 54.0 Av	Pass
100561.0 fundamental	12.0	13.3	Pk	38.5	50.5	51.8	74.0 Pk / 54.0 Av	Pass
17933.0	15.8	14.3	Pk	46.9	49.6	49.0	74.0 Pk / 54.0 Av	Pass
18353.0	1.2	-0.8	Pk	46.1	47.3	45.3	74.0 Pk / 54.0 Av	Pass
21548.0	8.9	8.6	Pk	44.2	53.1	52.8	74.0 Pk / 54.0 Av	Pass

Table 1a Radiated emissions of the EUT. with WiFi-board operational

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.209, RSS-210 and RSS-Gen are depicted in Table 1a. The system is tested as in whole, so with all equipment as shown in Figure.1 in place and functioning. Being the worst case situation.

Notes:

1. Field strength values of radiated emissions at frequencies not listed in the Table 1a are more than 20 dB below the applicable limit.
2. Measurement uncertainty is ± 5.0 dB
3. The reported field strength values are the worst case values at the indicated frequency. The EUT was varied in three positions, the antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).
4. A Quasi-peak detector was used with a resolution bandwidth of 120 kHz below 1 GHz. Above 1 GHz a bandwidth of 1 MHz was used.
5. Tested with Wifi-board in transmit mode. Low, mid and high Wifi TX channels tested, worst case noted. Wifi carrier is not included in the test result and disregarded since it is an already certified module.
6. Pk values already within Av limits. Therefore Av not tested.
7. Tested with and without the communication connection.

Used test equipment and ancillaries:

99855	99538	12484	99714	99710	12486	99580/99847	99609	99608
99861	15633	99606	99858	99136	99596			

Test engineer

Signature :



Name : Richard van der Meer

Date : November 22, 2012

4 Conducted emission data.

4.1 Conducted emission data of the EUT

Frequency (MHz)	Measurement results dB(μV) Line 1		Measurement results dB(μV) Neutral		Limits dB(μV)		Result
	QP	AV	QP	AV	QP	AV	
0.254	47.5	31.3	<40	<30	61.8	51.8	PASS
0.258	49.7	38.2	51.8	40.7	61.4	51.4	PASS
0.390	41.2	30.6	45.9	35.2	58.1	48.1	PASS
0.402	38.7	25.9	44.2	29.6	57.9	47.9	PASS
0.514	47.5	28.9	47.4	30.6	56.0	46.0	PASS
0.530	47.6	32.2	45.1	24.2	56.0	46.0	PASS
1.046	43.5	23.5	41.2	20.5	56.0	46.0	PASS
1.190	41.1	19.8	39.7	15.7	56.0	46.0	PASS
1.330	36.2	15.8	37.0	16.2	56.0	46.0	PASS
1.534	38.7	14.7	35.2	14.0	56.0	46.0	PASS
1.690	43.4	18.9	<35	<20	56.0	46.0	PASS
1.810	39.7	16.3	39.4	14.2	56.0	46.0	PASS
1.946	35.0	14.3	37.7	15.8	56.0	46.0	PASS
2.454	38.0	13.7	38.8	13.4	56.0	46.0	PASS
3.982	36.2	19.8	37.9	20.3	56.0	46.0	PASS
4.510	36.7	21.8	38.5	21.1	56.0	46.0	PASS
17.386	37.5	17.6	34.9	16.5	56.0	46.0	PASS
20.374	46.5	<35	<35	<20	60.0	50.0	PASS

Table 2 Conducted emission measurements

The results of the conducted emission tests carried out in accordance with 47 CFR Part 15 section 15.107 and ICES-003 RSS-Gen section 7.2.4. at the 120 Volts AC mains connection terminals of the EUT are depicted in Table 2. The system is tested as in whole, so with all equipment as shown in Figure.1 in place and functioning. Being the worst case situation.

Notes:

1. Measurement uncertainty is ± 3.5 dB
2. The resolution bandwidth used was 9 kHz.

Used test equipment and ancillaries:

99852	99161	12512	99699			

Test engineer

Signature

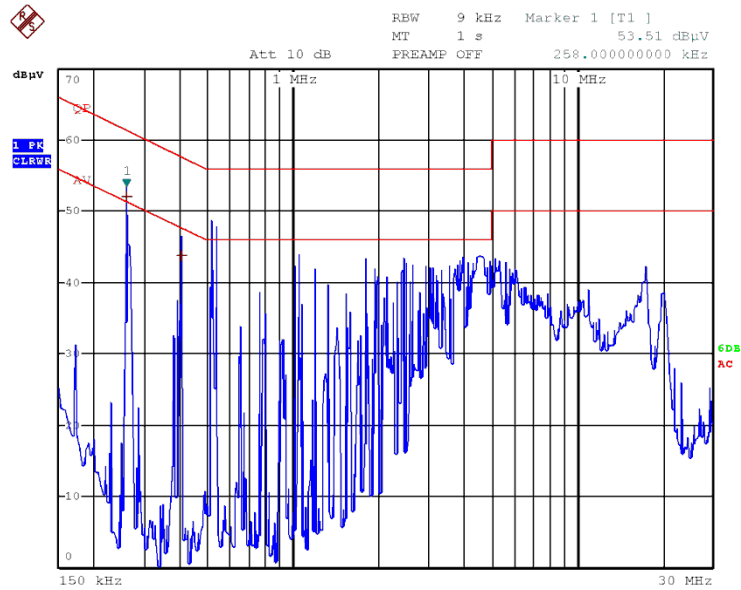
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Name

: R. van der Meer

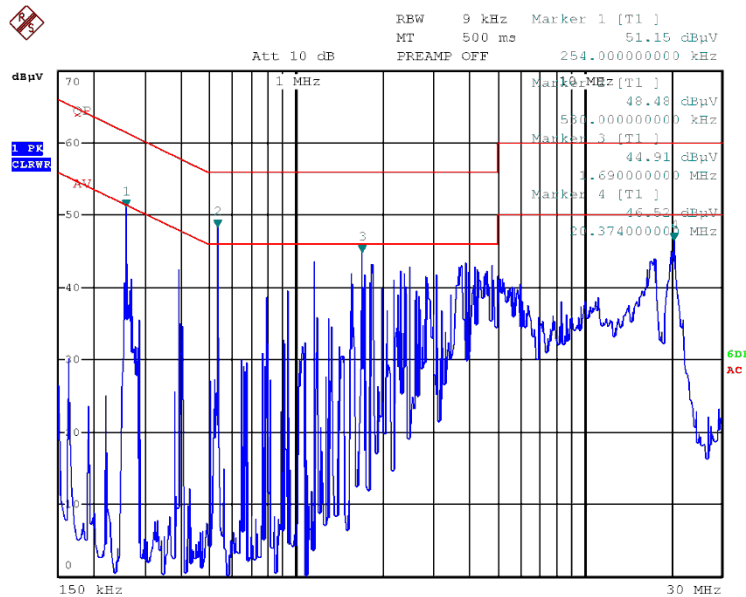
Date

: November 23, 2012



Date: 23.NOV.2012 09:41:28

Plot 1: Conducted emissions on L1 (Pk)



Date: 23.NOV.2012 10:17:45

Plot 2: Conducted emissions on L2 (Pk)

5 Frequency band of operation

The table below shows compliance with the 47 CFR Part 15 section 15.215(c). this section requires the 20 dB emission bandwidth is within the frequencyband designated.

Lower frequency f_L (GHz)	Center frequency f_C (GHz)	Higher frequency f_H (GHz)
9.525	10.505	10.570

The table below shows compliance with the RSS-210 and RSS-Gen that requires the 99% emission bandwidth is within the frequencyband designated.

Lower frequency f_L (GHz)	Center frequency f_C (GHz)	Higher frequency f_H (GHz)
9.520	10.505	10.571

5.1.1 Test equipment used (for reference see test equipment listing).

12483	99580/99847	99538	99858			
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6 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12483	Guidehorn	EMCO	3115	04/2012	04/2013
12484	Guidehorn	EMCO	3115	04/2012	04/2013
12486	Guidehorn 18 -40 GHz	EMCO	RA42-K-F-4B-C	04/2012	04/2013
12512	LISN	EMCO	3625/2	01/2012	01/2014
13078	Preamplifier 0.1 GHz - 12 GHz	Miteq	AMF-3D-001120-35-14p	NA	NA
13954	Preamplifier 10 GHz - 25 GHz	Miteq	AMF-6D-100250-10p	NA	NA
15633	Biconilog Testantenna	Chase	CBL 6111B	02/2012	02/2013
99136	Bandpass filter 10-26 GHz	Reactel	9HS-10G/26.5G-S11	NA	NA
99596	Preamplifier 0.5 - 18 GHz	Miteq	AMF-5D-005180-28-13p	NA	NA
99858	RF Cable S-AR	Gigalink	APG0500	02/2012	02/2013
99710	Power supply Pre-test setup	EMCS EMCS	--	NA	NA
99606	Filterbox	EMCS	RFS06S	10/2012	10/2013
99107	Controller	Heinrich Deisel	4630-100	NA	NA
99136	Bandpassfilter 10 - 26.5 GHz	Reactel	9HS-10G/26.5G-S11	NA	NA
99161	Variac 250V 6A	RFT	LTS006	NA	NA
99852/ 99855	Temperature-Humiditymeter	Extech	SD500	02/2012	10/2013
99580/ 99847	Testsite registration	Comtest	FCC listed: 90828	08/2011	08/2013
99608	Controller	EMCS	DOC202	NA	NA
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99714	RF cable	Huber + Suhner	Sucoflex102	04/2012	04/2013
99538	Spectrum analyzer	R&S	FSP	11-25/2011	11-25/2012
99699	Measuring receiver	R&S	ESCI	03/2012	03/2013
99861	Controller	Maturo	SCU/088/8090811	NA	NA

NA= Not Applicable