

Report No.

449509-02-R01

# **Test Report**

Product	System for controlling and recording feed intake (CRFI)					
Name and address of the applicant	BioControl AS Gautestadveien 75 1894 Rakkestad, Norway					
Name and address of the manufacturer	BioControl AS Gautestadveien 75 1894 Rakkestad, Norway					
Model	CRFI					
Rating	100-240V AC, 50/60Hz ACDC converters to 24/13.2V DC					
Trademark	##BioControl					
Additional information	134.2 kHz ISO reader FCC ID: VW2CRFI ISED ID: 7523A-CRFI					
Tested according to	FCC Part 15.209 Low Power Device ISED Canada RSS-210, Issue 11 Low Power Licence-Exempt Radio Apparatus, Category I Equipment					
Order number	449509					
Tested in period	2021-11-01 – 2021-12-18					
Issue date	2025-01-23					
Name and address of the testing laboratory	Nemko Scandinavia AS Instituttveien 6 CAB Number: 2007 Kjeller FCC: NO0001 Norway ISED: NO0470 An accredited technical test executed under the Norwegian accreditation scheme					
	Prepared by [ Jan G Eriksen]					
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#### **Revision history**

Revision	Date	Comment	Sign
00	2022-05-06	First edition	JGE
01	2025-01-23	Re-issued	FS

#### **GENERAL REMARKS**

This report applies only to the sample(s) tested. It is the manufacturer's responsibility to ensure the additional production units of this product are manufactured with identical electrical and mechanical components. The manufacturer is solely responsible for any modifications to the product that could result in non-compliance with the relevant regulations.

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Opinions expressed within this report regarding general assessments and qualifications for PASS or FAIL to the standards limits and requirements, are not part of the current accreditation. Neither are opinions expressed regarding model variants covered by the testing of this report.

#### CALIBRATION

All instruments used in the tests given in this test report are calibrated and traceable to national or international standards. Between calibrations all test set-ups are controlled and verified on a regular basis by periodic checks to ensure, with 95% confidence, that the instruments remain within the calibrated levels.

#### **MEASUREMENT UNCERTAINTY**

Measurement uncertainties are calculated or considered for all instruments and instrument set-ups used during these tests. Uncertainty figures are found in a separate clause in this report.



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# 1 INFORMATION

## 1.1 Test Item

Product	System for controlling and recording feed intake (CRFI)			
Manufacturer	BioControl			
Model	CRFI			
FCC ID	VW2CRFI			
ISED ID	7523A-CRFI			
Serial number	-			
Hardware version	WSS3000 1.07.PCB:Station controlCRFI WSS Bootloader version 0.11 RS485BlackBox0.03.PCB:Main controlDLC0.02:Weighing cell controllStationController0.08:Antenna reader			
Software version	PC Software: Version 4.4.0 WSS3000 version 6.5.11 BlackBox version 03.08.07 CRFI DLC v3 SCReader0.04 - For atxmega128A1. Main program uniread3.0 - For atxmega32. RFID-program.			
Frequency Range	134.2 kHz			
Number of Channels	1			
Type of Modulation	AM/PSK when transmit/receive FDK, FSK when receive HDX			
Conducted Output Power	N/A			
Antenna Connector	None			
Number of Antennas	System consists of 2 separate transducers – each contained in a volum together with the loop antenna.			
Antenna Type	Loop antenna.			
Power Supply	110-240V AC AC/DC converts to 24V DC			

#### **Description of Test Item**

The EUT is a system for control and recording of food intake (CRFI) consisting of controller units, weighing cells, RFID transceiver loop antenna, driver for loop antenna.

The diagram below gives detailed information of the system.





#### 1.2 Normal test condition

Temperature:	20 - 24 °C	
Relative humidity:	20 - 50 %	
Normal test voltage:	115C AC, 60Hz	

The values are the limit registered during the test period.

#### 1.3 **Test Engineers**

Jan G Eriksen

#### 1.4 Antenna Requirement

Does the EUT have detachable antenna(s)?		⊠ NO		
If detachable, is the antenna connector(s) non-standard?				
The tested equipment has only loop antenna which are mounted in a dedicated transceiver/antenna volume together with				

transceiver part and transceiver electronics. 

Requirement: FCC 15.203, 15.204

#### 1.5 **EUT Operating Modes**

Description of operating modes	Pulsed transmission of 134 kHz field and simultaneous detection of field change from nearby RFID tag.

#### 1.6 **Comments**

The EUT is an ISO reader at 134.2 kHz.

All measurements were done with the EUT powered from mains AC.



# 2 TEST REPORT SUMMARY

#### 2.1 General

All measurements are tracable to national standards.

The tests were conducted for demonstrating compliance with FCC CFR 47 Part 15, paragraph 15.209 and ISED Canada RSS-210 Issue 11 and RSS-GEN Issue 5.

Tests were performed in accordance with ANSI C63.4-2014 and and ANSI C63.10-2013.

Radiated tests were made in a semi-anechoic chamber at measuring distance of 10m.

A description of the test facility is on file with FCC and ISED.

⊠ New Submission		Production Unit
Clas	s II Permissive Change	Pre-production Unit
DCD	Equipment Code	☐ Family Listing

## 2.2 Test Summary

Name of test	FCC Part 15 reference	RSS-210 Issue 11 ICES-003 Issue 7 RSS-GEN Issue 5 reference	ANSI C63.10-2013 Reference	Result
Supply Voltage Variations	15.31(e)	6.11 (RSS-GEN)	5.13	Complies
Antenna Requirement	15.203	6.8 (RSS-GEN)	5.8	Complies
Power Line Conducted Emission	15.207	3.2 (ICES-003) 8.8 (RSS-GEN)	7.3 (C63.4-2014) 6.2	Complies
Occupied Bandwidth (99% BW)	N/A	6.7 (RSS-GEN)	6.9.3	Complies
Radiated Emissions at Fundamental	15.209(a)	7.3 (RSS-210)	6.4	Complies
Spurious Emissions (Radiated)	15.109(a) 15.209(a)	7.3 (RSS-210) 8.9 (RSS-GEN)	6.3, 6.4, 6.5, 6.6	Complies



# 3 TEST RESULTS

### 3.1 Supply Voltage Variations

#### FCC Part 15.31(e)

ISED ICES-003 Issue 7, Clause 3.2

RSS-GEN Issue 5, Clause 6.11

Measurement procedure: ANSI C63.4-2014

Test Results:

Measurement Data: Manually observation of signal on spectrum analyzer.

Complies

The nature of this signal is such that it varies slightly even under normal conditions - typically ± 1.5 dB.

During variation of the mains AC voltage level it was not possible to see any additional variation in the ouput from the 134 kHz signal level

#### Frequency measurement at nominal and varied mains voltage

The frequency of the device was measured with the spectrum analyzer.

Test Conditions		Limit of measured signal
Temperature	Voltage	Frequency (kHz)
T <sub>nom</sub> (20 °C)	V <sub>nom</sub>	134.202
T <sub>nom</sub> (20 °C)	V <sub>nom</sub> + 10%	134.202
T <sub>nom</sub> (20 °C)	V <sub>nom</sub> – 10%	134.202
T <sub>min</sub> (-20 °C)	V <sub>nom</sub>	134.202
T <sub>min</sub> (-20 °C)	V <sub>nom</sub> + 10%	134.202
T <sub>min</sub> (-20 °C)	V <sub>nom</sub> – 10%	134.202
T <sub>max</sub> (+55 °C)	V <sub>nom</sub>	134.202
T <sub>max</sub> (+55 °C)	V <sub>nom</sub> + 10%	134.202
T <sub>max</sub> (+55 °C) V <sub>nom</sub> – 10%		134.202
Measurement uncertainty		

Voltage: 115V ±15%, 60Hz



#### 3.2 Power Line Conducted Emissions

 FCC Part 15.207

 ISED ICES-003 Issue 7, Clause 3.2

 RSS-GEN Issue 5, Clause 8.8

 Measurement procedure:
 ANSI C63.4-2014 using 50 μH/50 ohms LISN.

 Test Results:
 Complies with Class B limits

 Measurement Data:
 See attached plots.

#### Highest measured value (L1 and N):

[	Frequency	QuasiPeak	Average	Limit	Margin	Meas. Time	Bandwidth	Line	Filter
	(MHz)	(dBµV)	(dBµV)	(dBµV)	(dB)	(ms)	(kHz)		
	2.456	39.60		56.00	16.40	1000	9	Ν	OFF
	2.996	46.93		56.00	9.07	1000	9	L1	OFF
ĺ	3.048		33.47	46.00	12.53	1000	9	Ν	OFF

#### Operating, 120V 60Hz



#### Full Spectrum



## 3.3 Occupied Bandwidth (99% BW)

ISED Canada RSS-GEN Issue 5, Clause 6.7

#### Measurement procedure: ANSI C63.10-2013 Clause 6.9.3

#### **Measurement Data:**

Carrier Frequency	Occupied Bandwidth (99% BW)
134.2 kHz	625 Hz

See attached plots.

#### **Requirements:**

No requirement for 99% BW, reported for information only.



Date: 26.NOV.2021 08:13:47

99% Occupied Bandwidth, 134.2 kHz



## 3.4 Frequency Tolerance

FCC Part 15.209

ISED Canada RSS-GEN Issue 5, Clause 6.11

Measurement procedure: ANSI C63.10-2013 Clause 6.8.1

#### Measurement Data:

Temperature	Nominal Freq (kHz)	Measured Freq (kHz)	Deviation (%)	Requirement
Nominal (+20 °C)	134.2	134.2016	0.1504	
-20 °C	134.2	134.2014	0.1503	No requirement
+50 °C	134.2	134.2017	0.1505	

Measured with the counter function of the Spectrum Analyzer.



#### 3.5 Peak Power Output

FCC Part 15.209 (a) ISED Canada RSS-210 Issue 10, Clause B.6 (a) Measurement procedure: ANSI C63.10-2013 Clause 6.4 Test Results: Complies

#### Measurement Data:

Carrier Frequency	Measured Field Strength	Calculated Field Strength	Limit @300m	Margin
(kHz)	@10m (dBμV/m)	@300m (dBµV/m)	(dBµV/m)	(dB)
134.2	78.5	19.4	25	5.6

Measured with Average Detector

The measurement was performed at 10m, the measured value is converted to 300m with conversion factor 40 dB/decade. See attached plot.

#### **Requirements:**

The maximum radiated field strength shall not exceed the following limits:



Date: 24.NOV.2021 13:19:52

Fundamental Emissions 134 kHz, HP @10m, Maximum loop longitudinal.



## 3.6 Radiated Emissions, 9 kHz – 30 MHz.

FCC Part 15.209 (a) ISED Canada RSS-GEN Issue 5, Clause 8.9 Measurement procedure: ANSI C63.10-2013 Clause 6.4 Test Results: Complies

Measuring distance 10m, Peak detector.

No components detected, see attached plots.

Limit on plots is converted to 10m using 40 dB/decade according to 15.31 (f) (2).



Date: 24.NOV.2021 13:17:27

Radiated Emissions 9 kHz - 30 MHz, 134.2 kHz, loop longitudinal @10m



Date: 24.NOV.2021 13:09:41

Radiated Emissions 9 kHz - 30 MHz, 134.2 kHz, loop transversal @10m



# 4 Measurement Uncertainty

Measurement Uncertainty Values		
Test Item	Uncertainty	
Output Power	±0.5 dB	
Power Spectral Density		±0.5 dB
Out of Band Emissions, Conducted	< 3.6 GHz	±0.6 dB
	> 3.6 GHz	±0.9 dB
Spurious Emissions, Radiated	< 1 GHz	±2.5 dB
	> 1 GHz	±2.2 dB
Emission Bandwidth		±4 %
Power Line Conducted Emissions		+2.9 / -4.1 dB
Spectrum Mask Measurements	Frequency	±5 %
	Amplitude	±1.0 dB
Frequency Error	±0.6 ppm	
Temperature Uncertainty		±1 °C

All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor k=2



# 5 LIST OF TEST EQUIPMENT

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

No.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
1	FSU26	Spectrum Analyzer	Rohde & Schwarz	LR 1504	2020-01	2021-01
2	ESU40	Measuring Receiver	Rohde & Schwarz	LR 1639	2020-01	2021-01
3	HFH2-Z2	Loop Antenna	Rohde & Schwarz	LR 1660	2019-06	2022.06
4	6502	Active Loop	EMCO	N 3488	N/A	
5	RG223	RF Cables	Suhner	N/A	COU	
6	ENV216	LISN	Rohde & Schwarz	LR 1665	2019-11	2021-11
7	ESCI3	EMI Receiver	Rohde & Schwarz	N 4259	2019-10	2021-10*

\*Only used for Power-Line Conducted Tests, not used after 2021-10

The software listed below has been used for one or more tests.

No.	Manufacturer	Name	Version	Comment
1	Rohde & Schwarz	EMC32	10.30.10	Power Line Conducted test software
2	Nemko AS	RSPlot	1.0.10.0	Screenshots from R&S Spectrum Analyzers



# 6 Test Setups

## 6.1 Power Line Conducted Emission

#### Shielded Room



## 6.2 Test Site Radiated Emission



Frequency tolerance is measured outside the anechoic chamber, with the EUT inside the climatic chamber and with the antenna outside.