CERTIFICATE OF CALIBRATION

ISSUED BY: Racelogic Ltd

DATE OF ISSUE: 05-OCT-21 CERTIFICATE NUMBER: 1002

UKAS CALIBRATION
21354

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Clare Armitage
(003)
Calibration Engineer &
Approved Signatory
(Electronically)

Customer		Model	VBSS20
Location	Japan	Description	GNSS Data Equipment
Recalibration (Y/N)	N/A (New Unit)		
Date of Receipt	N/A (New Unit)	Serial Number	093
Date of Calibration	05-Oct-21		
Temperature	22 °C ± 3 °C	Process Instruction Issue	33
Relative Humidity	40 %rh ± 20 %rh		

Calibration Procedure

The Unit Under Test, was subjected to the latest Production Process Instruction Calibration procedure as detailed above against the reference standards.

Equipment Used

	Equipment	Serial Number	CAL Cert No.	CAL Due
Simulation of GPS	C025	021999	3546130001	30-MAR-22
Analogue Voltage Measurement	C029	2091209	3432450003	03-NOV-21
Digital Frequency Measurement	C024	329067	3589210001	15-JUN-22
10MHz Reference Measurement	C026	319946	3546050001	31-MAR-22
10MHz Reference Generator	TF346/3	21042448		

Calibration Summary

The results within this certificate only relate to the Unit Under Test, as detailed above, which has Passed to the Manufacturer's Specification at the measured points with due consideration of the measurement uncertainty and in accordance with the agreed and applied Decision Rule.

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UKAS Accredited Calibration Laboratory No. 21354

Certificate Number: 1002

Results (As found)

Analogue Voltage Output Signals

Analogue output voltages are calibrated against simulated speed, the Analogue output range is configured to 5 Volts at 100 km/h.

Applied Speed	Analogue Voltage Output 1			
	Nominal Value	Measured Value	Tolerance	Uncertainty
30 km/h	1.500 V	1.501 V	±0.005 V	±0.0005 V
60 km/h	3.000 V	3.002 V	±0.005 V	±0.0005 V
100 km/h	5.000 V	5.002 V	±0.005 V	±0.0005 V

Digital Frequency Output Signals

Digital output frequencies are calibrated against simulated speed, the Digital output is configured to 25 Hz per km/h.

Applied Speed	Digital Frequency Output			
	Nominal Value	Measured Value	Tolerance	Uncertainty
30 km/h	750 Hz	750.00 Hz	±2.5 Hz	±0.25 Hz
60 km/h	1500 Hz	1500.00 Hz	±2.5 Hz	±0.25 Hz
100 km/h	2500 Hz	2500.00 Hz	±2.5 Hz	±0.25 Hz

GNSS Simulation

The Production Process Instruction Calibration procedure covers measured Velocity and Heading by the Unit over a simulated test course.

GPS Simulation Data is provided via a UKAS calibrated GPS simulator using a GPS based 10 MHz Reference Clock as follows:

10 MHz GPS Based Reference Clock

Nominal Frequency	Measured Value	Specification	Uncertainty
10 000 000.00 Hz	10 000 000.00 Hz	±0.01 Hz	±0.0015 Hz

The Unit Under Test indicated values for Velocity and Heading are taken from recorded data.

The Unit outputs are configured as: Analogue: Speed: 5 V at 400 km/h and / or Heading 5 V at 360 ° with Digital at 25 Hz per km/h
Note: Distance is calculated by integration of the Speed signal, which is calibrated using the GPS simulator, this ensures that the distance accuracy satisfies the specification of 0.05 % and <50 cm per km.

The reported expanded uncertainty is based on a standard uncertainty (1σ) multiplied by a coverage factor k=2, providing a coverage probability of approximately 95 %. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Information without Analogue or Digital values stated in table is included for completeness but is outside the scope of Accreditation.

Simulation of constant Speed by GPS simulator

Applied simulated value	VBOX indicated Speed			Analogue Output 1 Voltage			
	Measured Value	Tolerance	Uncertainty (1σ)	Nominal Value	Measured Value	Tolerance	Uncertainty (1σ)
30 km/h	30.00 km/h	±0.1 km/h	0.04 km/h	0.375 V	0.37754 V	±0.005 V	±0.0005 V
60 km/h	60.00 km/h	±0.1 km/h	0.04 km/h	0.750 V	0.75206 V	±0.005 V	±0.0005 V
100 km/h	100.00 km/h	±0.1 km/h	0.04 km/h	1.250 V	1.25251 V	±0.005 V	±0.0005 V
400 km/h	400.00 km/h	±0.1 km/h	0.04 km/h	5.000 V	5.00266 V	±0.005 V	±0.0005 V

Simulation of constant Heading by GPS simulator

Applied simulated value	VBOX indicated Heading		
	Measured Value	Tolerance	Uncertainty (1σ)
0 °	0.02 °	±0.1 °	0.02 °
90 °	89.99 °	±0.1 °	0.04 °
180 °	179.99 °	±0.1 °	0.03 °
270 °	270.00 °	±0.1 °	0.04 °

End of Report