Data Logger Calibration Report

	VT121181
	Deutsche WindGuard
	12/2012

Prüfschein
Calibration certificate

Gegenstand *Object*	Data Logger	Dieser Kalibrierschein dokumentiert die Rück-führung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Hersteller *Manufacturer*	Geoves Snc Viale Magg.Piovesana, 155/a 31015 Conegliano (TV)	*This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).*
Typ *Type*	MICROVEN	
Fabrikat/Serien-Nr. *Serial number*	M3029; Date 05/11/2012	
Auftraggeber *Customer*	Geoves Snc Viale Magg.Piovesana, 155/a 31015 Conegliano (TV)	
Auftragsnummer *Order No.*	VT121181	
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	4	
Datum der Kalibrierung *Date of calibration*	04.12.2012	

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.

This calibration certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature are not valid.
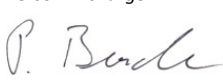
Datum *Date*		Leiter des Kalibrierlaboratoriums *Head of the calibration laboratory*	Bearbeiter *Person in charge*
06.12.2012	Deutsche WindGuard Wind Tunnel Services GmbH Oldenburger Straße 65 D-26316 Varel Tel.: 04451 / 95 15 - 0 · Fax: 95 15 - 29	Dipl. Phys. D. Westermann	Dipl.-Ing. (FH) Peter Busche

Kalibriergegenstand *Object*	Data Logger
Ort der Kalibrierung *Place of calibration*	Laboratory of Deutsche WindGuard, Varel

Kalibrierverfahren
Calibration procedure

The frequency input channel WS1 and WS2 of the Microven are calibrated using an external frequency generator. The generated frequency signal is comprised of a TTL type pulse signal with a 50% duty cycle. The external frequency signal is connected to the reference frequency measuring device (Fluke 45) and in parallel to the logger input channels WS1 and WS2. The presented data of the microven logger are 10 min averages comprised of 600 samples (sampling rate 1Hz). The indicated frequency value (displayed on the Fluke 45 frequency reference instrument) remained constant throughout each of the 10 min durations during the measurement of the 600 x 1 Hz samples depicted in table 2.
The internal logger configuration for channel WS1 is set to: SLOPE1:0.999 and OFFSET1:0.001.
The internal logger configuration for channel WS2 is set to: SLOPE2:0.999 and OFFSET2:0.001.
by the manufacturer. Note attached file M3029002.TXT

Uncertainty components:
The uncertainty of the measured reference frequency is 0.003 %

Reference frequency measurement instrument	Fluke 45 Multimeter , Serial 5680247, calibration certificate 740524 by Fluke Nederland B.V.
Frequency generator for 20, 60 and 120 Hz	Agilent U 1401 B ; serial My52120016
Frequency generator for 130 Hz	HAMEG Function Generator HM 8030-4; Serial 30924 P21353

Umgebungsbedingungen:
Test conditions

air temperature:	21 °C
air pressure:	990 hPa
relative air humidity:	37 %

Kommentar: *Comment*	Frequency input signal is comprised of TTL pulse signal with 50% duty cycle

Dieser Kalibrierschein wurde elektronisch erzeugt
This calibration certificate has been generated electronically

Logger data with recorded frequency values of WS1 and WS2

H	Date	Hours	VBatt	Temp	Wd1	Wsavg1	Wsmin1	Wsraff1	Dst1	Trb1	Wd2	Wsavg2	Wsmin2	Wsraff2	Dst2	Trb2	#
R	04.12.2012	15:40	12.7	*	0	19.98	19.98	20.67	0.05	0.23	0	19.98	19.98	20.67	0.07	0.34	#
R	04.12.2012	15:50	12.65	*	0	19.98	19.98	19.98	0	0	0	19.98	19.98	19.98	0.04	0.2	#
R	04.12.2012	16:10	12.55	*	0	59.94	59.93	59.94	0.12	0.2	0	59.96	59.93	60.61	0.15	0.24	#
R	04.12.2012	16:20	12.7	*	0	59.94	59.93	60.63	0.12	0.2	0	59.95	59.93	59.96	0.14	0.23	#
R	04.12.2012	16:40	12.55	*	0	119.91	119.86	120.57	0.3	0.25	0	119.92	119.84	120.61	0.23	0.19	#
R	04.12.2012	16:50	12.7	*	0	119.89	119.86	120.57	0.29	0.25	0	119.92	119.84	120.6	0.25	0.21	#
R	04.12.2012	17:10	12.7	*	0	129.84	129.81	130.53	0.28	0.21	0	129.92	129.84	130.62	0.28	0.21	#
R	04.12.2012	17:20	12.6	*	0	129.82	129.81	130.6	0.27	0.21	0	129.86	129.82	130.49	0.3	0.23	#

Table 1: Logger data file of 10 min average values recorded during calibration by the logger Microven (only valid data is depicted)

Frequency Calibration Data

Date	Hours	measured frequency Fluke 45 /Hz	logger indicated frequency WS1 /Hz	logger indicated frequency WS2 /Hz
04.12.2012	15:40	20.00	19.98	19.98
04.12.2012	15:50	20.00	19.98	19.98
04.12.2012	16:10	60.00	59.94	59.96
04.12.2012	16:20	60.00	59.94	59.95
04.12.2012	16:40	120.00	119.91	119.92
04.12.2012	16:50	120.00	119.89	119.92
04.12.2012	17:10	130.00	129.84	129.92
04.12.2012	17:20	130.00	129.82	129.86

Table 2: Calibration data of the reference frequency measuring equipment (Fluke 45) and logger data (10 min average values) of logger channel WS1 and WS2 during the calibration run

Raw data file of the recorded values

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MICROVEN
SERIAL:M3029
SLOPE1:0.999
OFFSET1:0.001
SLOPE2:0.999
OFFSET2:0.001
N.FILE:002
H,Date,Hours,VBatt,Temp,Wd1,Wsavg1,Wsmin1,Wsraff1,Dst1,Trb1,Wd2,Wsavg2,Wsmin2,Wsraff2,Dst2,Trb2,#
R,04/12/2012,15:30,12.60,*,0.00,19.98,19.98,19.98,0.00,0.00,0.00,19.98,19.98,19.98,0.00,0.00,#
R,04/12/2012,15:40,12.70,*,0.00,19.98,19.98,20.67,0.05,0.23,0.00,19.98,19.98,20.67,0.07,0.34,#
R,04/12/2012,15:50,12.65,*,0.00,19.98,19.98,19.98,0.00,0.00,0.00,19.98,19.98,19.98,0.04,0.20,#
R,04/12/2012,16:00,12.65,*,0.00,51.68,19.98,59.94,16.15,31.25,0.00,51.69,19.97,60.61,16.17,31.27,#
R,04/12/2012,16:10,12.55,*,0.00,59.94,59.93,59.94,0.12,0.20,0.00,59.96,59.93,60.61,0.15,0.24,#
R,04/12/2012,16:20,12.70,*,0.00,59.94,59.93,60.63,0.12,0.20,0.00,59.95,59.93,59.96,0.14,0.23,#
R,04/12/2012,16:30,12.55,*,0.00,105.97,59.93,120.58,25.31,23.89,0.00,105.98,59.93,120.61,25.30,23.87,#
R,04/12/2012,16:40,12.55,*,0.00,119.91,119.86,120.57,0.30,0.25,0.00,119.92,119.84,120.61,0.23,0.19,#
R,04/12/2012,16:50,12.70,*,0.00,119.89,119.86,120.57,0.29,0.25,0.00,119.92,119.84,120.60,0.25,0.21,#
R,04/12/2012,17:00,12.50,*,0.00,112.63,0.00,130.32,43.01,38.19,0.00,112.68,0.00,130.70,43.04,38.19,#
R,04/12/2012,17:10,12.70,*,0.00,129.84,129.81,130.53,0.28,0.21,0.00,129.92,129.84,130.62,0.28,0.21,#
R,04/12/2012,17:20,12.60,*,0.00,129.82,129.81,130.60,0.27,0.21,0.00,129.86,129.82,130.49,0.30,0.23,#
```

Table 3: Raw Logger data file (M30029002.txt) comprised of 10 min average values recorded during calibration by the logger Microven.