

A permanent underwater sound monitoring station in Belgian North Sea

The Westhinder measurement pile experience

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JOMOPANS - Project (2018-2020)

- JOint Monitoring Programme for Ambient Noise North Sea
- for MSFD purposes D11C2 ambient sound, 13 measuring sites, one in Belgium water
- For the first time, a continuous measurement station was installed at Westhinder measuring pile end May 2019



The Station

RTsys EA-SDA-14 / Hydrophones B&K 8104



The Station

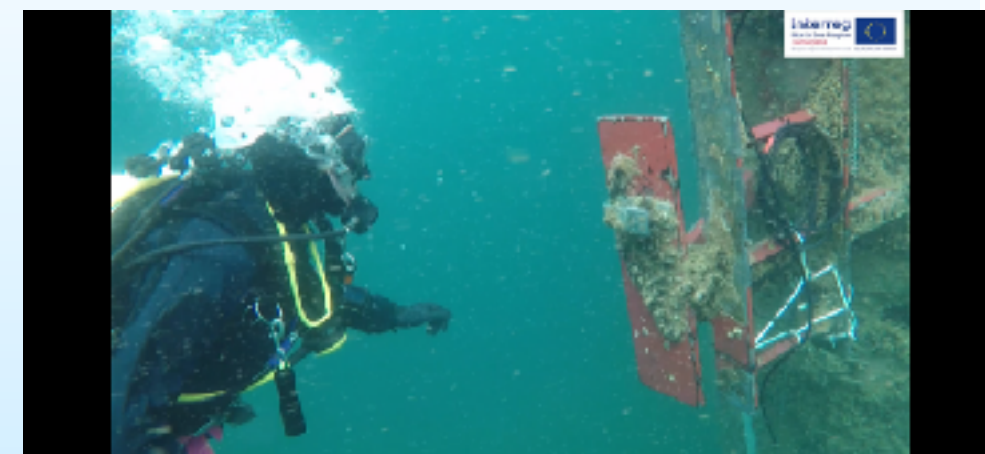
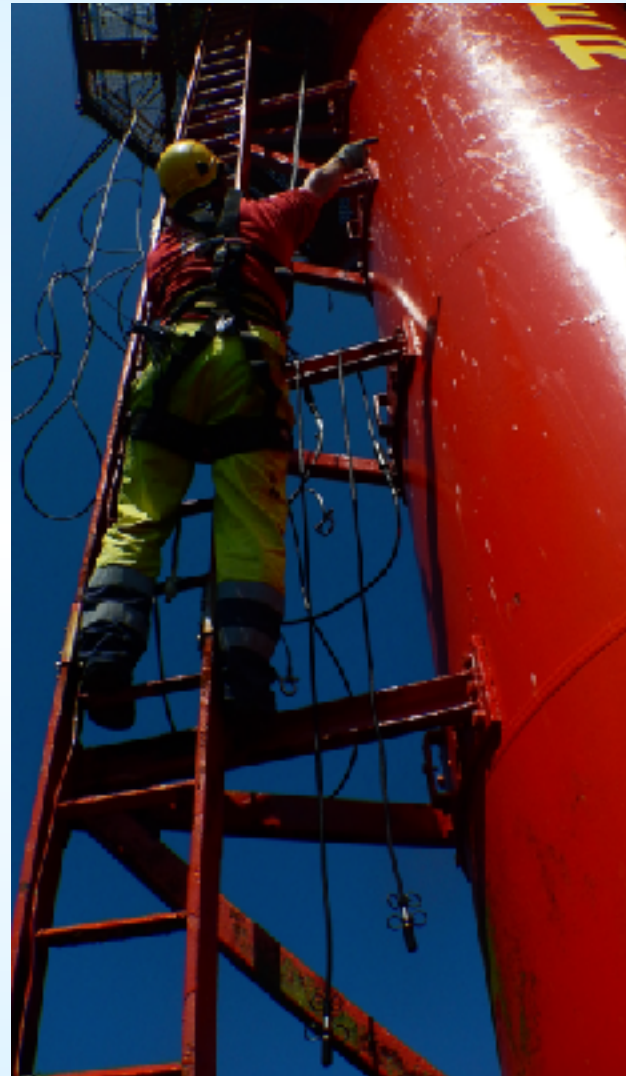
RTsys EA-SDA-14 / Hydrophones B&K 8104



The Station

RTsys EA-SDA-14 / Hydrophones B&K 8104

- Cables are used to connect the station to the hydrophone
- One is close to the monopile (4 m depth) the other on is on the seafloor away from the pile and by 12 m depth



The Station

RTsys EA-SDA-14 / Hydrophones B&K 8104

- System is Powered in 12 v (9 -14) ~ 6 w from the pile power station
- Transmission by VHF to the shore of a limited number of data every minute they are 95 percentile of 1/3 octave level at 63 Hz, 125 Hz and 1kHz

Signal is amplified close by the hydrophone and not close to the recorder

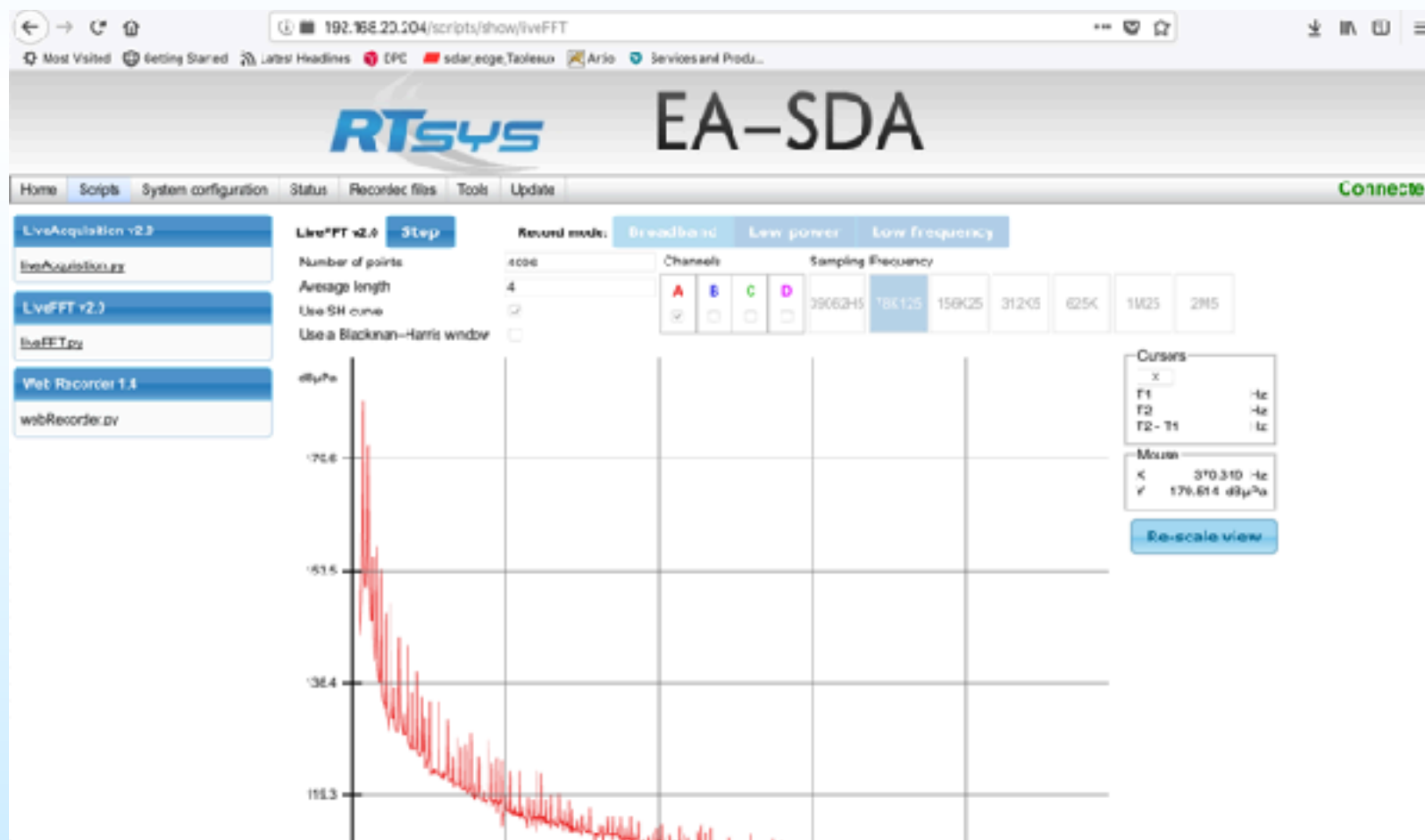
Acquisition is made at 78125 Hz
24 bit signal

Hydrophones B&K
8104
connected to the recorder



The recorder can display real time data 'calibrated' in dB (Pa) or 'not calibrated' in dB(Volt)

Hydrophones B&K 8104 connected to the recorder



Serial No.: 3087939

Reference Sensitivity at 150 MHz: ± 2 %, ± 3.5 %
including integral cable

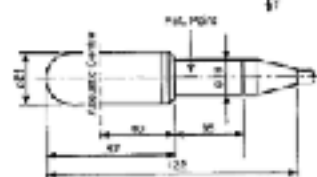
Voltage Sensitivity (Open Circuit Sensitivity):
286.7 dB @ 1 V/m, 46.8 pV/m

Charge Sensitivity: 0.370 pC/mV

Capacitance (including integral cable): 7.935 pF

Stable Capacitance: 100 pF/m

Locking Mechanism: 9 out of 32.0 °C



Color	grayed out sides with no contrasting waterlockers to left and right
Weight (including 17in tail)	1.6 lb

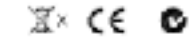
Operating Temperature range:
 Storage temp. = -55°C to $+125^{\circ}\text{C}$
 Operating temp. = -55°C to $+85^{\circ}\text{C}$

Change of Sensitivity with Temperature:
 Change β is $0.04\%/^{\circ}\text{C}$
 Voltage β is $-0.04\%/^{\circ}\text{C}$

Frequency (magnitudes)	Response (Treatment Fail. rate/die)
0.1 Hz to 10 Hz	± 1.2 dB
0.1 Hz to 80 Hz	± 0.8 dB
0.1 Hz to 120 kHz	± 0.38 dB

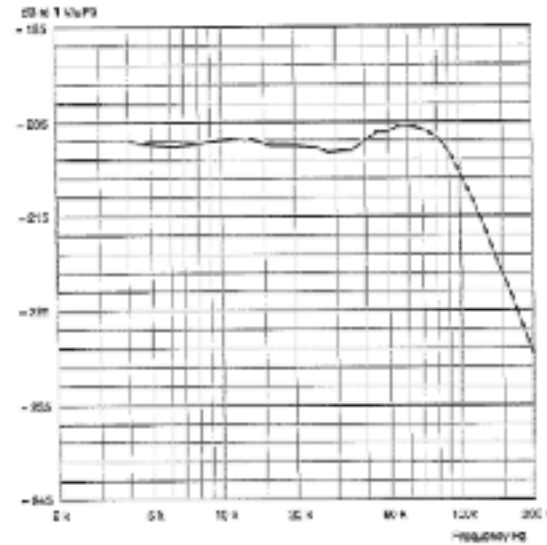
Horizontal Directivity: 100 kHz
(10°-pattern) ± 2 dB

Vertical Directivity: 80 kHz
(10°-pattern) ± 2 dB



Copyright Information: © 2001 Sony Music Entertainment Inc.
Produced by: David Byrne

Date: 8 Sept. 2018 15:04... Operator: KAT



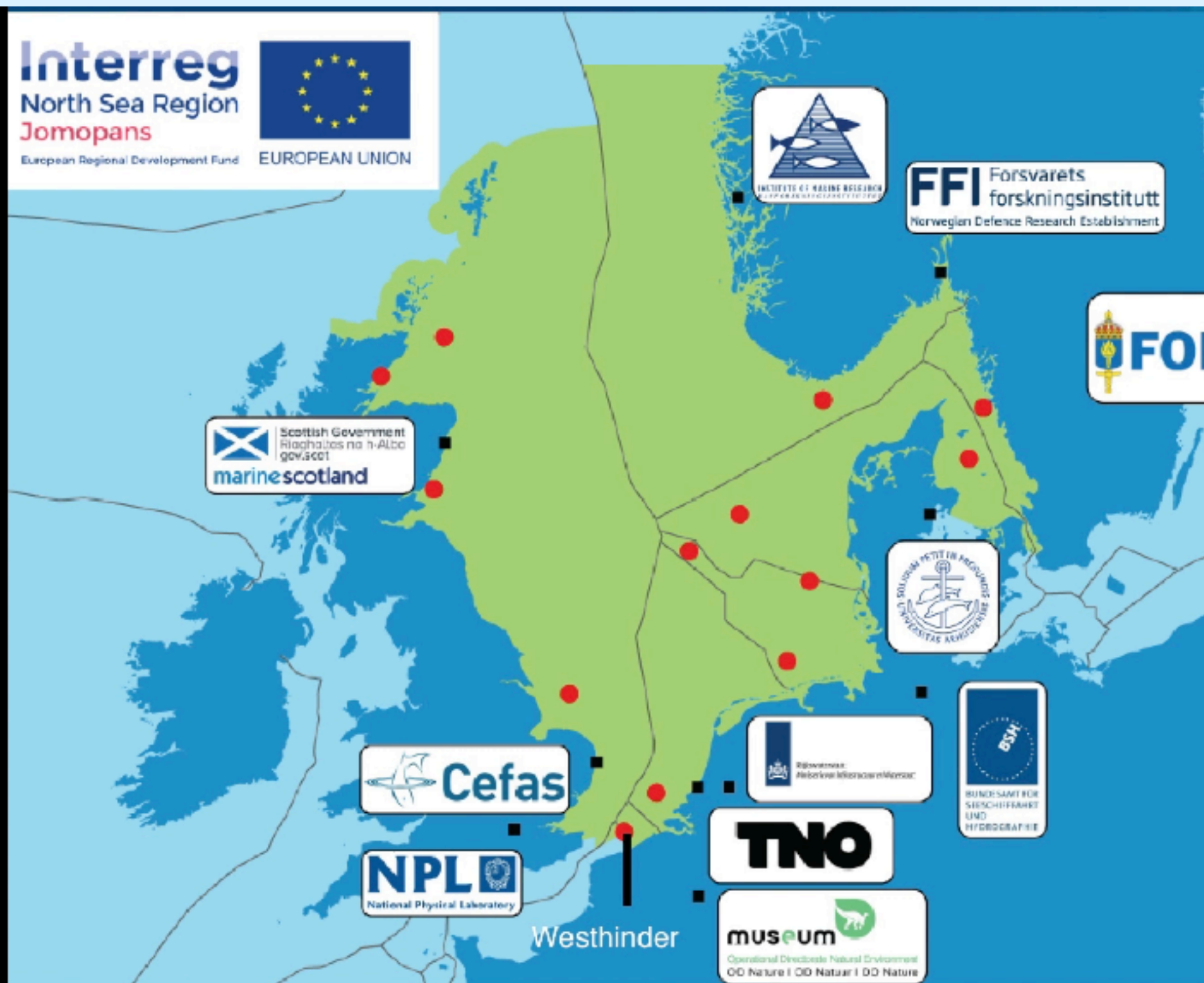
Frequency [kHz]	Sensitivity [dB re 1 W/Hz]	Frequency [kHz]	Sensitivity [dB re 1 W/Hz]
4.0	-207.7	58.0	-206.0
5.0	-207.5	59.1	-206.4
6.3	-207.7	63.0	-206.6
8.0	-207.9	71.0	-206.9
10.0	-207.0	80.0	-206.6
12.5	-206.7	90.0	-206.4
16.0	-207.6	100.0	-210.8
20.0	-207.6	112.0	-213.8
25.0	-207.8	125.1	-216.0
31.5	-212.3	140.0	-219.3
39.8	-216.2	150.0	-222.9
50.0	-220.0	160.0	-226.6
63.1	-227.0	200.1	-229.6
80.0	-228.0		

Calibration Chart for Hydrophone Type 6104

Serial No.: 2087832

- Hydrophones are fully calibrated after manufacture by B&K
- Acquisition board is calibrated by RTsys after manufacture of the recorder (cross talk & frequency response of every channel)
- The complete system (hydro - amplifier - cable & acquisition board) calibration is further verified at 250Hz with a B&K pistonphone & B&K reference microphone

deployment



Information sent to the coast

MP7BP3_001_MP7JMPBP3001.txt	
Westhinder - Measuring pile (UTC time) Channel B - 63 Hz percentile (Hz)	
2019-06-01T00:00:00:00:00:00	125.00
2019-06-01T00:01:00:00:00:00	125.00
2019-06-01T00:02:00:00:00:00	125.00
2019-06-01T00:03:00:00:00:00	125.00
2019-06-01T00:04:00:00:00:00	125.00
2019-06-01T00:05:00:00:00:00	125.00
2019-06-01T00:06:00:00:00:00	124.00
2019-06-01T00:07:00:00:00:00	124.00
2019-06-01T00:08:00:00:00:00	124.00
2019-06-01T00:09:00:00:00:00	124.00
2019-06-01T00:10:00:00:00:00	124.00
2019-06-01T00:11:00:00:00:00	123.00
2019-06-01T00:12:00:00:00:00	123.00
2019-06-01T00:13:00:00:00:00	123.00
2019-06-01T00:14:00:00:00:00	123.00
2019-06-01T00:15:00:00:00:00	123.00
2019-06-01T00:16:00:00:00:00	123.00
2019-06-01T00:17:00:00:00:00	123.00
2019-06-01T00:18:00:00:00:00	123.00

MP7BP2_001_MP7JMPBP2001.txt	
Westhinder - Measuring pile (UTC time) Channel B - 125 Hz percentile (Hz)	
2019-06-01T00:00:00:00:00:00	122.00
2019-06-01T00:01:00:00:00:00	123.00
2019-06-01T00:02:00:00:00:00	123.00
2019-06-01T00:03:00:00:00:00	123.00
2019-06-01T00:04:00:00:00:00	123.00
2019-06-01T00:05:00:00:00:00	124.00
2019-06-01T00:06:00:00:00:00	124.00
2019-06-01T00:07:00:00:00:00	124.00
2019-06-01T00:08:00:00:00:00	124.00
2019-06-01T00:09:00:00:00:00	124.00
2019-06-01T00:10:00:00:00:00	124.00
2019-06-01T00:11:00:00:00:00	124.00
2019-06-01T00:12:00:00:00:00	124.00
2019-06-01T00:13:00:00:00:00	124.00
2019-06-01T00:14:00:00:00:00	124.00
2019-06-01T00:15:00:00:00:00	124.00
2019-06-01T00:16:00:00:00:00	124.00
2019-06-01T00:17:00:00:00:00	124.00
2019-06-01T00:18:00:00:00:00	124.00
2019-06-01T00:19:00:00:00:00	124.00
2019-06-01T00:20:00:00:00:00	124.00
2019-06-01T00:21:00:00:00:00	124.00

MP7BP1_001_MP7JMPBP1001.txt	
Westhinder - Measuring pile (UTC time) Channel B - 1 kHz percentile (Hz)	
2019-06-01T22:00:00:00:00:00	116.00
2019-06-01T22:01:00:00:00:00	116.00
2019-06-01T22:02:00:00:00:00	116.00
2019-06-01T22:03:00:00:00:00	116.00
2019-06-01T22:04:00:00:00:00	116.00
2019-06-01T22:05:00:00:00:00	116.00
2019-06-01T22:06:00:00:00:00	116.00
2019-06-01T22:07:00:00:00:00	116.00
2019-06-01T22:08:00:00:00:00	116.00
2019-06-01T22:09:00:00:00:00	116.00
2019-06-01T22:10:00:00:00:00	116.00
2019-06-01T22:11:00:00:00:00	116.00
2019-06-01T22:12:00:00:00:00	116.00
2019-06-01T22:13:00:00:00:00	116.00
2019-06-01T22:14:00:00:00:00	116.00
2019-06-01T22:15:00:00:00:00	116.00
2019-06-01T22:16:00:00:00:00	116.00

- 95 Percentile of 1/3 Octave band 63 Hz & 125 Hz (D11C2) and 1 kHz
- Size of both hard drive
- Raw data logged on 2 time 4 TB HDD on compressed format