



### SeaGuardII DCP Wave

The SeaGuardII DCP Wave is a 600kHz Doppler Current Profiler able to measure directional wave parameters and currents from a bottom mounted installation.

The Acoustic Wave software 5759 used by the DCPS implements unique features to improve the wave measurement accuracy by optimizing the signal to noise ratio.

Maximum deployment depth is 40m in normal scatter conditions.

Available as a self-recording instrument, it is easily integrable into a real-time system offering reliable two-way communication.

Redundant wave measurement for QA/QC can be implemented by adding the wave and tide sensor 5218.

#### Applications:

- Navigation safety
- Prediction and modelling
- Energy assessment
- Infrastructure design
- Coastal processes, erosion
- Oil & Gas

#### Simple solution to measure waves, currents and water quality in one instrument

- Independent measurement of waves and currents
- Field validated data-comparison with MOTUS buoy, Datawell Waverider and pressure based non directional wave sensor
- Measures wave from centimeters to 20m
- 2Hz or 4Hz wave sampling
- Processing of up to three columns in parallel, provides flexible setup with both surface referred and bottom referred cells.

#### Adaptive pulse technology automatically optimizes wave measurement accuracy

The transmission pulse is automatically adapted to the current sea conditions to provide best measurement achievable; a low noise broadband mode is used for smaller waves, an extended range broadband mode used for medium range waves and a narrowband mode is applied for higher waves.

#### Expandable platform – Multiparameter monitoring

- Wide range of additional parameters available using Aanderaa smart sensors; wave, tide, temperature, conductivity, pressure, oxygen
- 4 analog inputs and 2 serial ports for integration of third party sensors as for instance turbidity, pH, total algae, etc

#### Smart Data quality control

- Automatic flagging of bad data; quality status for each cell
- Redundant wave energy spectrum and other wave parameters when using the wave and tide sensor 5218 (provides time series)
- User selectable advanced autobeam algorithm; automatic selection of the best 3-beams combination in case of obstructions in one beam

#### Enhanced real-time functionality

- Serial port input for direct connection of modem with power control
- Support AIS, GOES, pseudo binary formats
- Independent configuration of the recording and transmission intervals
- Automatic retransmission of missing data

#### User friendly set up and data analysis

- Predeployment configuration software; RT Collector
- Modern post-processing software; Data Studio 3D
- Geoview web-based display for real-time application

#### Wave upgrade of SeaGuardII DCP

- Contact factory

# Specifications

## Velocity profile measurement

Acoustic frequency: 600 kHz  
 Typical profiling range: Broadband: 30-70m<sup>1)</sup>  
   Narrowband 35-80m<sup>1)</sup>  
 Cell size: 0.5m - 5m  
 Cell overlap: 0-90%  
 Velocity range: Narrowband: 0-500cm/s -  
   (1000cm/s with max tilt  $\pm 5^\circ$ )  
   Broadband: 0-400cm/s  
 Velocity accuracy: 0.3cm/s or  $\pm 1\%$  of reading  
 Velocity resolution: 0.1cm/s  
 Velocity precision:  $< 3,3\text{cm}^2$   
 Ping rate: Up to 10Hz (config. dependent)  
 Cell positioning: Instrument or surface referred<sup>3)</sup>  
 Multiple columns: 3 simultaneous columns +  
   Surface cell<sup>3)</sup>  
 Max. number of cells: 150 total, 75 for first column, 50 for  
   second and 25 for third  
 Blanking zone: 1m

## Wave measurement

WAVE	Range	Resolution	Accuracy
Height	0.2m - 20m	1cm	$\pm 5\text{cm}$ or $< 1\%$ of value
Period	3-30 sec	$< 0.05$ sec	$< 1\%$
Direction	0-360°	0.1°	$< 2^\circ(\text{RMS})^4)$

Minimum wave period (s)	10m	20m	30m	40m
Cut-off period ( $H_{\frac{1}{2}}$ )	3.12	3.33	4	5
Cut-off period (Dir)	3.5	4.4	5.9	6.6

Integration time: 5-30min  
 Wave calculation update rate: 10min - 2h  
 Wave sampling rate: 2Hz, 4Hz

## Output parameters:

- Mean Spreading Angle:  $\theta_{\kappa}$
- First Order Spread:  $\sigma$
- Energy Spectrum:  $E(f)$
- Directional Spectrum:  $DWS_m(f)$
- Principal Directional Spectrum:  $DWSp(f)$
- Fourier Coefficients Spectrum:  $A1(f), B1(f), A2(f), B2(f)$
- Wave Mean Direction:  $\theta_{\text{avg}}$
- Wave Peak Direction:  $\theta$
- Significant Wave Height:  $H_{m0}$
- Wave Mean Period:  $T_{m02}$
- Wave Peak Period:  $T_p$
- Wave Energy Period:  $T_e$

## Echo intensity

Dynamic range:  $> 50\text{dB}$   
 Resolution:  $< 0.01\text{dB}$   
 Precision:  $< 0.01\text{dB}$

## Tilt and compass

Type: Internal solid state  
 Pitch / roll range:  $\pm 90^\circ$ <sup>5)</sup> /  $\pm 180^\circ$ <sup>5)</sup>  
 Tilt accuracy:  $< 0.5^\circ(\text{RMS}), \pm 1.5^\circ$   
 Heading accuracy:  $< 2^\circ(\text{RMS}), \pm 3.5^\circ$   
 Tilt / Heading resolution:  $< 0.1^\circ$



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## Embedded temp sensor 4080 (optional, on request)

Range -4- +40°C  
 Resolution 0,001°C  
 Accuracy  $\pm 0,05^\circ\text{C}$   
 Response Time (63%):  $< 5$  sec

## Pressure sensor 4117 (needed for surface distance)

Resolution:  $< 0.0001\%$  FSO  
 Accuracy:  $\pm 0.02\%$  FSO standard  
 $\pm 0,01\%$  FSO on request

## Wave sensor 5218 (recommended)

Wave max 1000kPa  
 Resolution :  $< 0,0001\%$  FSO  
 Accuracy:  $\pm 0,02\%$  FSO standard  
 $\pm 0,01\%$  FSO on request

Wave: Sampling rate: 2Hz, 4Hz  
 Samples: 256, 512, 1024, 2048

## Communication and recording

Data storage: 2GB SD Card /remote download  
 Available telemetry Cable, radio modem, GPRS, GOES,  
 Iridium

Configuration and real-time data software:  
 Real Time Collector

Configuration interface: USB / RS232 / RS422  
 Recording interval: From 30 sec to 3 hrs

## Power options

External power supply: 12-30V  
 Internal battery: 2 batteries in the instrument: Alkaline  
 3988: 9V, 15Ah<sup>6)</sup>  
 Lithium 3908: 7V, 35Ah

Additional rechargeable battery 4021 for the bottom mooring  
 frame 3448

Current drain example: 1.4W<sup>7)</sup>

## Environmental

Depth rating: 300m  
 Operating temperature: -5 to +40°C  
 Dimensions: D: 160mm  
 H: 585mm

Weight: In Air In Water  
 SW 10.8 kg 3.6kg  
 Materials: PET, PUR, Titanium, Stainless steel 316,  
 polyurethane

## Optional additional sensors

Temperature Sensor 4060  
 Tide sensor 5217  
 Conductivity Sensor 4319  
 Turbidity Sensor 4112  
 Oxygen Optode 4835/4330

## Analog and serial inputs

Analog: 4 channels 0-5V  
 Serial: 2 channels with sensor and power switching  
 one RS232 port and one RS422<sup>8)</sup>

<sup>1)</sup> Typical range with normal backscatter conditions. The measurement range is highly dependent on the scattering conditions. For waters with low amount of scatters, expect a shorter range than for waters with a high amount of scatters  
<sup>2)</sup> Standard deviation for the horizontal velocity in broadband mode, 3m cell size  
<sup>3)</sup> Requires information from pressure sensor 4117 / 5217 / 5218  
<sup>4)</sup> For Wave height ( $H_{m0}$ )  $> 0.5\text{m}$

<sup>5)</sup> Compensation calibrated up to  $\pm 35^\circ$   
<sup>6)</sup> It is not recommended to use alkaline battery in the upper compartment of the instrument, as it may interfere with the compass  
<sup>7)</sup> Typical power consumption at 30 min. interval, 20 min. for wave measurement, 10 min. current measurement, 20m depth, 20 cells, 2m cell  
<sup>8)</sup> The serial ports may be used either as serial sensor inputs or serial real-time outputs

Specifications subject to change without prior notice.