



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 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.

Expendable 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

Preliminary Specifications

Velocity profile measurement

Acoustic frequency: 600 kHz
 Typical profiling range: Broadband: 30-70m¹⁾
 Narrowband 35-80m¹⁾
 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 referred³⁾
 Multiple columns: 3 simultaneous columns +
 Surface cell³⁾
 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 _c)	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: θ_k
- First Order Spread: σ
- Energy Spectrum: E(f)
- Directional Spectrum: DWSm(f)
- Principal Directional Spectrum: DWSp(f)
- Fourier Coefficients Spectrum: A1(f), B1(f), A2(f), B2(f)
- Wave Mean Direction: θ_{avg}
- Significant Wave Height: H_{m0}
- Wave Peak Period: T_p
- Wave Peak Direction: θ
- Wave Mean Period: T_{m02}
- 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: $\pm 90^\circ$ ⁵⁾ / $\pm 180^\circ$ ⁵⁾
 Tilt accuracy: $< 0.5^\circ(\text{RMS}), \pm 1.5^\circ$
 Heading accuracy: $< 2^\circ(\text{RMS}), \pm 3.5^\circ$
 Tilt / Heading resolution: $< 0.1^\circ$

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, 15Ah⁶⁾
 Lithium 3908: 7V, 35Ah
 Additional rechargeable battery 4021 for the bottom mooring
 frame 3448
 Current drain example: 1.4W⁷⁾

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 RS422⁸⁾

xylem
 Let's Solve Water

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¹⁾ 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

²⁾ Standard deviation for the horizontal velocity in broadband mode, 3m cell size

³⁾ Requires information from pressure sensor 4117 / 5217 / 5218

⁴⁾ For Wave height (H_{m0}) $> 0.5\text{m}$

⁵⁾ Compensation calibrated up to $\pm 35^\circ$

⁶⁾ It is not recommended to use alkaline battery in the upper compartment of the instrument, as it may interfere with the compass

⁷⁾ Typical power consumption at 30 minutes interval, 20 minutes for wave measurement, 10 min current measurement, 20m depth, 20 cells, 2m cell

⁸⁾ The serial ports may be used either as serial sensor inputs or serial real-time outputs