

Wave and Tide Recorders

Model 730W & 730D



A range of wave and tide recorders which utilise sophisticated onboard and post process data analysis techniques to provide high definition wave data in coastal and shallow water areas.

FEATURES

- Wave/Tide & Directional Wave/Tide versions available
- Separate Tide and Wave sampling
- Integral wave statistics and spectral analysis
- Offline recreation of surface elevation
- Offline recreation of directional wave spectra
- Windows based WaveLog™ software
- Programmable sampling/logging regimes
- Correction for tidal slope
- Correction for depth/frequency attenuation
- Optional logging of spectral and full burst data
- Regular time or Storm trigger for wave data
- PRT temperature sensor fitted as standard
- Optional Conductivity sensor
- Up to 32Mbyte memory
- Real time data output
- Data replay direct to PC
- Integral or separate battery packs
- 3 Year Warranty

APPLICATIONS

- Oceanographic studies
- Hydrographic surveys
- Coastal and Estuary surveys
- Offshore and Coastal engineering
- Marine and Environmental studies

Wave and Tide Recorders

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INTRODUCTION

The Valeport Model 730 range of instruments has been developed to provide comprehensive wave and tide data using a combination of high accuracy sensors, sophisticated onboard processing, and simple but versatile user interface software.

There are three instruments in the range:

Model 730D: Directional Wave Recorder, providing tide height, a variety of wave statistics, energy spectrum and directional spectrum.

Model 730W: Wave Recorder, providing tide height, wave statistics and energy spectrum.

Model 730T: Seabed Tide Recorder, providing tide data only. This instrument is covered in a separate brochure

All Model 730s are fitted with onboard memory for use as self recording instruments. They also have real time output of tide and wave data (where appropriate), through hard wire or radio link to PC. The Model 730W has an internal battery pack, and the Model 730D can be supplied with either an internal or separate battery pack. In all cases, power can be supplied externally

WaveLog™, Valeport's own Windows™ based software allows the user to set up the sampling regime, with variable frequency, number of samples and cycle time, as well as storm trigger levels and data saving options. The software also performs data extraction, and basic data displays, although a spreadsheet package will be required for more advanced data handling such as graphical displays of spectral data.

The versatility of the sampling regime, together with the real time data output option, make the Model 730s the most complete range of Wave & Tide Recorders currently available, and ideal for all shallow water applications.

THEORY

The Model 730 Wave Recorders use Linear Wave Theory to measure and recreate wave data from oscillations in hydrostatic pressure. The Model 730D also measures wave direction, again using Linear Wave Theory. As well as a pressure sensor, this instrument is fitted with a Valeport 11cm discus 2 axis Electromagnetic Current Sensor. By sampling current oscillations at the same time as pressure variations, it is therefore possible to deduce the wave direction spectrum.

It is important to note that as depth increases, both pressure and current oscillations are attenuated, and whilst the algorithms in the Model 730 contain filter functions to account for this, it is not possible to measure wave action if the instrument is deployed more than 20m below the surface. Above this limitation, the filters and algorithms used are perfectly valid.

DESCRIPTION

Sensors

Pressure: Precision Resonant Quartz transducer. Optional strain gauge transducer.

Temperature: Platinum Resistance Thermometer (PRT) fitted to all instruments as standard.

Velocity: (Model 730D only). Valeport 11cm discus 2 axis Electromagnetic Current Sensor

Direction: (Model 730D only). Valeport gimbaled fluxgate compass.

Conductivity: Valeport inductive coil conductivity sensor fitted as an option. Allows calculation of additional parameters: Speed of Sound, Salinity, Density Anomaly Gamma.

Setup Options

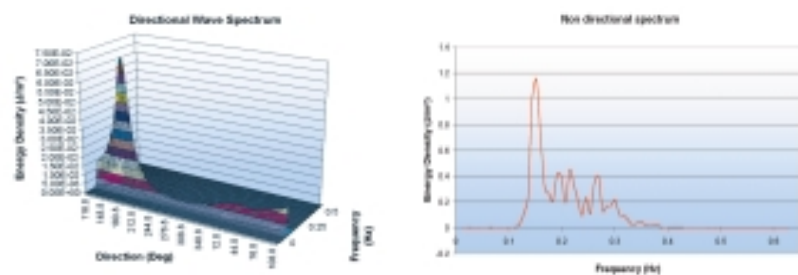
WaveLog™ Windows™ based PC software allows set up of the following parameters. See reverse for illustration.

Scan Rate: 0.2, 0.4, 0.8, 1, 2 or 4Hz.

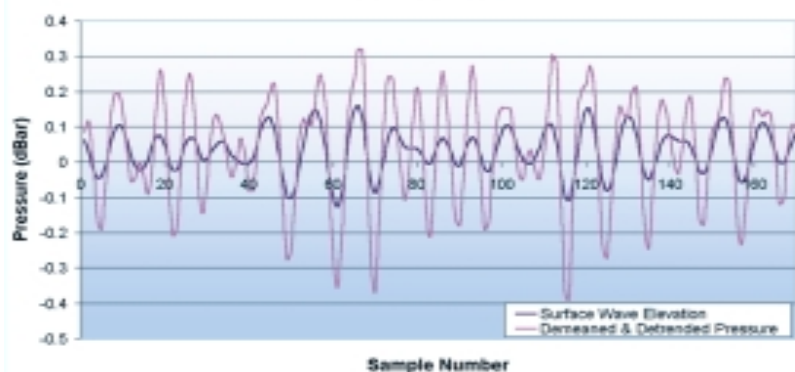
Tide Sampling: Burst duration and cycle time.

Wave Sampling: Number of scans (512, 1024 or 2048), and cycle time.

Storm Trigger: Only sample waves if standard deviation of tidal data exceeds user set level.



Recreation of Surface Wave Elevation from Detrended & Demeaned Pressure Wave



Data Saving: Unit always records tidal data. For wave data, the user has the following options:

- Spectral Data:* Never save, Always save, or Save only if user set Significant Wave Height Trigger is exceeded.
- Raw Pressure Data:* Never save, Always save, or Save only if user set Significant Wave Height Trigger is exceeded.

Note that on the 730D, directional wave data is calculated in post processing, so raw pressure data must be saved.

Tidal Data (All versions)

Unit records mean pressure over tidal burst, standard deviation of burst, temperature and conductivity (if fitted). In addition, the Model 730D will record mean current data over the tidal burst. All records from each deployment are stored in a single file.

Wave Data (Model 730W)

Wave Statistics: Unit records following parameters for each wave burst:

- Mean Level (h)
- Tidal Slope over burst (hts)
- Significant Wave Height (Hs)
- Maximum Elevation from mean (η_{max})
- Minimum Elevation from mean (η_{min})
- Mean Period (T_1)
- Mean Zero Up-Crossing Period (T_z)
- Peak Period (T_p)
- Significant Wave Period ($T_{1/3}$)
- Maximum Wave Height (Hmax)
- Total Energy (E)

Spectral Analysis Data: Calculated on board. Scale and resolution defined by sampling regime (option to save).

Raw Pressure Data: All data in burst saved as absolute value (option to save).

Wave Data (Model 730D)

Wave Statistics: Unit records following parameters for each wave burst:

- Mean Level (h)
- Tidal Slope over burst (hts)
- Significant Wave Height (Hs)
- Maximum Elevation from mean (η_{max})
- Minimum Elevation from mean (η_{min})
- Mean Period (T_1)
- Mean Zero Up-Crossing Period (T_z)
- Peak Period (T_p)
- Significant Wave Period ($T_{1/3}$)
- Maximum Wave Height (Hmax)
- Total Energy (E)
- Mean 2 axis current over burst (U & V)
- Compass

Non-Directional Spectral Data:

Calculated on board. Scale and resolution defined by sampling regime.

Raw Pressure Data: All data in burst saved as absolute value.

Directional Spectral data:

Calculated in post-processing

Real Time Data

RS232 output of tide data every tidal cycle, and wave statistics every wave

cycle (not $T_{1/3}$, Hmax or E). Data can be transmitted over hard wire or radio links such as that fitted to the Model 750 Radio Buoy (illustrated), and displayed on WaveLog™ software.

Offline Data

WaveLog™ enables recreation of time series of surface elevation, and recalculation of wave statistics and spectral analysis from uploaded raw data file. The software also allows the creation of directional wave spectra from raw data files uploaded from the Model 730D.

Memory

Solid state, 16 Mbyte RAM memory, expandable to 32Mbyte. Capacity varies according to sampling regime and instrument type. If only tidal data is saved it is several years. For tide and wave, with tide every 10 minutes and waves for 2048 samples at 2 Hz every 3 hours with all data saved, 16Mbyte will last 420 days for non-directional and 156 days for directional units.

Power

730W: 8 x "D" cells, either alkaline or lithium. Capacity depends on regime but for the same regime as above, 8 alkaline cells will last for over 37 days, and 8 lithium cells over 99 days. *730D:* 32 x "D" cells, either alkaline or lithium. Capacity depends on regime but for the same regime as above, 32 alkaline cells will last for over 48 days, and 32 lithium cells over 130 days.

External Power

The units can be powered externally. Input voltage range 12 to 30 VDC.



Model 750 Radio Buoy

SPECIFICATION

Parameter	Type	Range	Accuracy	Resolution
Pressure	Resonant quartz crystal	100psi (approx 60m depth) 200psi (approx 130m depth)	± 0.01% FS ± 0.01% FS	0.001% FS 0.001% FS
Pressure (Option)	Strain gauge	up to 200 dBar	± 0.1% FS	0.001% FS
Temperature	PRT	-3 to 35 °C	± 0.01 °C	0.002 °C
Conductivity (Option)	Inductive coils	0.1 to 60mS/cm	± 0.02 mS/cm	0.003 mS/cm
Speed (Model 730D only)	11cm discus electromagnetic	± 5m/s	± 1% of reading + 5mm/s	0.001 mm/s
Direction (Model 730D only)	Fluxgate compass	0 to 360° (up to 20° gimbal)	± 1°	0.25°

PHYSICAL: All housings in painted anodised aluminium, 200m depth rated. All frames in 316 grade stainless steel.

Instrument	Dimensions	Shipping Dimensions	Frame Dimensions
730W	300mm Ø x 250mm, 14kg	50 x 43 x 40cm, 22kg	98 x 98 x 32cm, 26kg
730D (Integral Batteries)	300mm Ø x 415mm, 21kg	50 x 43 x 62cm, 32kg	124 x 124 x 43cm, 31kg
730D (Remote Batteries)	300mm Ø x 285mm, 12kg	50 x 43 x 62cm, 39kg	98 x 132 x 32cm, 32kg
Remote Battery Pack	300mm Ø x 190mm, 16kg		

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SOFTWARE

Parameter	Value
Memory Free	4,153,344/1,756,306 bytes
Instrument Time	4/13/99 9:43:25 AM
Logging Mode	BOTH
Density Value	+1025.970
Gravity Value	+9.807
Latitude Value	0
Instrument Datum	+0.5
Sample Rate	2 Hz
Tide Burst Duration	20 secs
Tide Cycle Time	8 mins
Wave Sampling Mode	Always
Wave Burst Duration	1024 samples
Wave Cycle Time	184 mins
Storm Trigger Level	0.000 dBar
Spectral Resolution	0.01563 Hz
Spectral Save Mode	Always
Burst Save Mode	Always
Wave Data Save Trigger Level	0.000 dBar
Freq. min	.0078125
Freq. max	.5859375
No. of spectral points	38

Buttons: Save to file, OK, Cancel

Example of the Configuration confirmation page produced prior to deployment, which user can file to disc.

Sample Rate: 0.2Hz 1Hz 0.4Hz 2Hz 0.8Hz 4Hz

Tide Sampling setup: Tide Burst Duration (secs) Tide Cycle Time (minutes)

Wave Sampling Mode: Never Always Storm Trigger

Wave Burst Duration: 512 samples in burst 256 secs 1024 samples in burst 512 secs 2048 samples in burst 1024 secs

Wave Cycle Time: Multiple of Tide Cycle Time 184 mins

Wave Burst Trigger: Sig. Wave Height (dBar)

Wave Data Save Trigger: Sig. Wave Height (dBar)

Spectral Data Save: Never Always Storm Trigger

Burst Data Save: Never Always Storm Trigger

Spectral Settings: Resolution 0.01563 Hz, Freq. min .0078125, Freq. max .5859375, No. of points 38

Logging limits: Max. available logging time (based on memory free) Max. available logging time (based on # new cells) (Alk.) (Lith.)

Example of set up page showing some of the user definable settings.

ORDERING

0730001: Model 730W Wave & Tide Recorder, fitted with 100psi or 200psi resonant quartz pressure sensor (please specify range), PRT temperature sensor, 8 alkaline D cells (will take Lithium) and 16Mbyte RAM memory. Includes WaveLog software.

0730002: As above but fitted with strain gauge pressure sensor (please specify range)

0730018: Model 730D Directional Wave Recorder with integral battery pack, fitted with 100psi or 200psi resonant quartz pressure sensor (please specify range), PRT temperature sensor, 32 alkaline D cells (will take Lithium) and 16Mbyte RAM memory. Includes WaveLog software.

0730019: As above but fitted with strain gauge pressure sensor (please specify range required)

0730022: Model 730D Directional Wave Recorder, sensor pod only, fitted with 100psi or 200psi resonant quartz pressure sensor (please specify range), PRT temperature sensor and 16Mbyte RAM memory. Includes WaveLog software.

0730023: As above but fitted with strain gauge pressure sensor (please specify range required)

0730024: Remote battery pod containing 32 alkaline D cells (will take Lithium) for use

with 0730022 or 0730023. Supplied with connection lead.

0730012: Optional Conductivity sensor

0730028: Memory upgrade to 32Mbyte

0730020: Deployment frame for Model 730W

0730025: Deployment frame for Model 730D (Integral battery pack)

0730026: Deployment frame for Model 730D (Remote battery pack)

Consult Valeport for other configurations e.g. shore or jetty mounted systems.

Valeport manufactures a wide range of oceanographic and hydrometric instruments including self-recording and direct reading multi-parameter current meters, sound velocity probes, CTD probes, wave recorders, tide gauges, open channel flow meters, water and plankton samplers, winches, sinker weights, connectors and accessories.

VALEPORT

Valeport Limited
Townstal Industrial Estate
Dartmouth, Devon TQ6 9LX
United Kingdom
Tel: +44 (0)1803 834031
Fax: +44 (0)1803 834320
e-mail: sales@valeport.co.uk
Web Site: <http://www.valeport.co.uk>