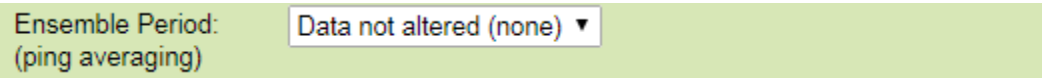
Ensemble Averaging, Bin-mapping, Three-beam Solutions and Filtering Options For RDI ADCPs

Ensemble Period (ping averaging)

For RDI ADCP data file products (MAT and netCDF formats)



Ensemble Period:

- Data not altered (none)
  Oceans 3.0 API filter: `dpo_ensemblePeriod=0`

- 1 Minute
  Oceans 3.0 API filter: `dpo_ensemblePeriod=60`
- 10 Minute
  Oceans 3.0 API filter: `dpo_ensemblePeriod=600`
- 15 Minute
  Oceans 3.0 API filter: `dpo_ensemblePeriod=900`
- 1 Hour
  Oceans 3.0 API filter: `dpo_ensemblePeriod=3600`

When selecting any of the ensemble periods, this option will cause the search to perform the standard box-car average resampling on the data. 'Boxes' of time are defined based on the ensemble period, e.g. starting every 15 minutes on the 15s, with the time stamp given as the center of the 'box'. Acoustic pings that occur within that box are averaged and the summary statistics are updated. This process is often called 'ping averaging'. The process uses log scale averaging on the intensity data, which involves backing out the logarithmic scale, compute the weighted average, and then compute the logarithmic scale again. Weighted averages are used when raw files bridge an ensemble period and when the data is already an ensemble or ping average.

New files are started when the maximum records per file is exceeded (usually set to make files that will use less than 1 GB of memory when loaded), or when there is a configuration, device or site changes. In the case where there is data from either side of a configuration change within the one ensemble period, two files will be produced with the same ensemble period, with the same time stamps, but different data. Users may use the ensemble statistics on the number of pings or samples per ensemble to filter out ensembles that do not have enough data. (As an aside, we do this by default with clean averaged scalar data - each ensemble period needs to have at least 70% of it's expected data to be reported as good.)

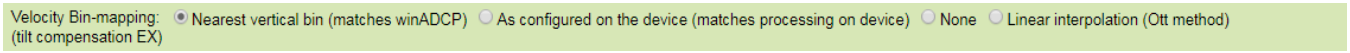
The default value is no averaging, meaning the data is not altered. This option is only available for **MAT** and **NETCDF** files.

File-name mode field

Selecting an ensemble period will add 'Ensemble' followed by the ensemble period. For example '-Ensemble600s'.

Velocity Bin-mapping (tilt compensation EX)

For all RDI ADCP data products (PNG/PNG and MAT and netCDF formats)



This option specifies the bin-mapping processing method to be applied. Bin-mapping is also known as 'depth cell mapping' or 'tilt compensation' or even 'map to vertical'. There are two methods, both correct for tilt effects on ADCP velocity data, while the none option leaves the velocity data as is. For details on the two methods, see the section on correction and rotation of velocities (included below). The 'None' option is the default for Nortek ADCPs since the free version of the manufacturer's software does not apply bin-mapping (a core goal of our data products is to replicate the functionality offered by the manufacturer's software). The 'Nearest vertical bin' is the default for RDI ADCPs as *winADCP* applies this method for Instrument or Beam co-ordinate data. The 'As configured on the device' option uses the configuration onboard to determine whether to apply bin-mapping, this matches processing on-board the device (for Earth-co-ordinate data, while for Instrument or Beam co-ordinate data winADCP ignores the device configuration and always uses 'Nearest vertical bin'). The best method has been shown to be the linear interpolation method (Ott, 1992).

- Nearest vertical bin
  Oceans 3.0 API filter: `dpo_velocityBinmapping=1`
- As configured on the device (matches processing on device)
  Oceans 3.0 API filter: `dpo_velocityBinmapping=-1`
- None
  Oceans 3.0 API filter: `dpo_velocityBinmapping=0`
- Linear interpolation (Ott method)
  Oceans 3.0 API filter: `dpo_velocityBinmapping=2`

File-name mode field

The velocity bin-mapping option will be appended to the filename. For example: '-binMapNone', 'binMapLinearInterp', 'binMapNearest'.

Three-beam Solutions (EX)

For all RDI ADCP data products (PNG/PNG and MAT and netCDF formats)

Three-beam solutions allow computation of velocity from three beams when the fourth beam has been masked or screened to NaN, as described in ADCP Velocity Computation: Correction and Rotation to East-North-Up Co-ordinate System, Three-beam Solutions and Screening (included below). This option allows the user to use the on-device configured value or override it and select whether or not to use three-beam solutions. The default value retains the previous behaviour of ONC data products: off. Only available on Instrument or Beam co-ordinate data.

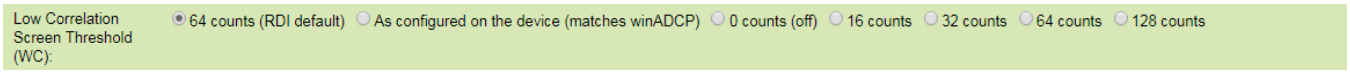
- Off
  Oceans 3.0 API filter: `dpo_3beam=Off`
- As configured on the device (matches winADCP)
  Oceans 3.0 API filter: `dpo_3beam=config`
- On
  Oceans 3.0 API filter: `dpo_3beam=On`

File-name mode field

If a value other than the default is used, a '-3beam'<value> will be appended to the file-name, where <value> is the value of the option matching the API filter.

Low Correlation Screen Threshold (WC)

For all RDI ADCP data products (PNG/PNG and MAT and netCDF formats)



This option allows the user to control the RDI correlation screening step. The default value retains the previous behaviour of ONC data products: a threshold of 64 counts. Beam-velocities that have associated correlation values lower than this threshold are are masked / screened to NaN values. Only available on Instrument or Beam co-ordinate data. The WC command configures this value on-board the device which is then used for on-board processing (Earth co-ordinate data only). ONC data products can use the WC set value to match winADCP output or the user can override it.

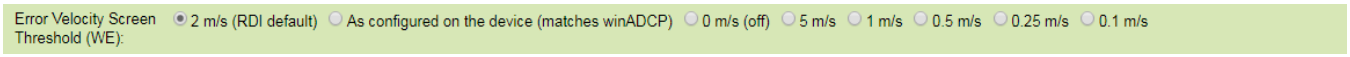
- 64 counts (RDI default)
  Oceans 3.0 API filter: `dpo_corScreen=64`
- As configured on the device (matches winADCP)
  Oceans 3.0 API filter: `dpo_corScreen=-1`
- Off (0 counts)
  Oceans 3.0 API filter: `dpo_corScreen=0`
- Any value between 1 and 255
  Oceans 3.0 API filter: `dpo_corScreen=<1:255>`

File-name mode field

If a value other than the default is used, a '-corr'<value> will be appended to the file-name, where <value> is the value of the option matching the API filter.

Error Velocity Screen Threshold (WE)

For all RDI ADCP data products (PNG/PNG and MAT and netCDF formats)



This option allows the user to control the RDI error velocity screening step. The default value retains the previous behaviour of ONC data products: a threshold of 2 m/s. Final East-North-Up co-ordinate velocities that have associated error velocity values higher than this threshold are masked / screened to NaN values (lower values are more stringent). Available on all data, except for velocities are the result of a three-beam solution, see ADCP Velocity Computation: Correction and Rotation to East-North-Up Co-ordinate System, Three-beam Solutions and Screening (included below) for more information on how three-beam solutions and the error velocites are related. The WE command configures this value on-board the device which is then used for on-board processing (Earth co-ordinate data only). ONC data products can use the WE set value to match winADCP output or the user can override it.

- 2 m/s
  Oceans 3.0 API filter: `dpo_errVelScreen=2`
- As configured on the device (matches winADCP)
  Oceans 3.0 API filter: `dpo_errVelScreen=-1`
- 0 m/s (off)
  Oceans 3.0 API filter: `dpo_errVelScreen=0`
- 5 m/s
  Oceans 3.0 API filter: `dpo_errVelScreen=5`
- 1 m/s
  Oceans 3.0 API filter: `dpo_errVelScreen=1`
- 0.5 m/s
  Oceans 3.0 API filter: `dpo_errVelScreen=0.5`
- 0.25 m/s
  Oceans 3.0 API filter: `dpo_errVelScreen=0.25`

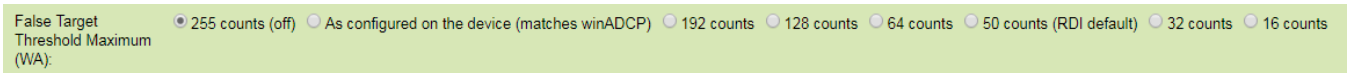
- 0.1 m/s
  Oceans 3.0 API filter: `dpo_errVelScreen=0.1`

File-name mode field

If a value other than the default is used, a '-errVal'<value> will be appended to the file-name, where <value> is the value of the option matching the API filter.

False Target Threshold Maximum (WA)

For all RDI ADCP data products (PNG/PNG and MAT and netCDF formats)



This option controls the False Target Detection algorithm, which is also known as the Fish Rejection algorithm. See chapter 7 in the adcp coordinate transformation_Jan10.pdf documentation from RDI. Essentially, the algorithm looks at the echo levels from bins at the same depth/range and if there is a large difference in their levels, it rejects them in two steps: reject one bin (then the 3-beam solution may apply, so it is suggested to use Fish Rejection and Three-beam solutions together), and if that does not resolve the difference, reject all bins at that depth/range. Lower values of the threshold are more stringent. Available on Beam and Instrument co-ordinate data only, Earth co-ordinate data may have had this algorithm to it onboard the device, see the WA command and configuration value. ONC data products can use the WA configuration value to match winADCP output or the user can override it.

- 255 counts
  Oceans 3.0 API filter: `dpo_falseTarScreen=255`
- As configured on the device (matches winADCP)
  Oceans 3.0 API filter: `dpo_falseTarScreen=-1`
- 192 counts
  Oceans 3.0 API filter: `dpo_falseTarScreen=192`
- 128 counts
  Oceans 3.0 API filter: `dpo_falseTarScreen=128`
- 64 counts
  Oceans 3.0 API filter: `dpo_falseTarScreen=64`
- 50 counts (RDI default)
  Oceans 3.0 API filter: `dpo_falseTarScreen=50`
- 32 counts
  Oceans 3.0 API filter: `dpo_falseTarScreen=32`
- 16 counts
  Oceans 3.0 API filter: `dpo_falseTarScreen=16`

File-name mode field

If a value other than the default is used, a '-falseTar'<value> will be appended to the file-name, where <value> is the value of the option matching the API filter.