

## Technical Information

---

### RDI WORKHORSE ADCP

#### DESCRIPTION

The Workhorse ADCP is designed for general-purpose shallow-water current monitoring at instrument depths ranging from 5-200m. Its small size, its mooring accessories, and its comprehensive software makes it easy and inexpensive to use. Its plastic housing will not corrode or degrade with time, and every surface can be painted with anti-fouling paint.

The internal electronics retain the time-tested signal processing used in RDI's BroadBand product line to give you the best measurement performance possible. The electronics have been redesigned for miniature size, lower cost and easier manufacturing.

While large, expensive components (i.e. for high power or lower frequencies) were eliminated, no compromise was made that fundamental design is the same as a BroadBand, you can be confident that it will work from the outset.

#### INSIDE A MONITOR

The Monitor consists of a transducer assembly and a three-board system electronics. The transducer housing and pressure case are made from high-strength plastic composite, internally reinforced with metal where required.

Data are transmitted in either an ASCII or binary format. Monitor software assists users in the following operations: testing; data collection planning; real-time data collection; display and recording data listing; display and conversion to engineering units in an ASCII format.

#### MOORING ACCESSORIES

A PVC bottom frame, filled with 50kg of lead shot, can be deployed in shallow water from a small boat. The frame is available in kits that are assembled on site.



#### THE WORKHORSE SENTINEL

The Sentinel, a self-contained instrument, is about twice the length of the Monitor. The Sentinel can function in real-time mode the same as a Monitor. It can use its internal batteries and data recording as backup. The Monitor can also function like a Sentinel by adding internal recording and an external battery case.

## SPECIFICATION

### Water Velocity Profiles

Depth Cell Size: 1-16m  
 Number of Cells: 1-128  
 Max. Velocity: 10 m/s  
 Minimum Ping interval: 0.07 s plus sound travel time  
 (use 1.4 ms/m of range; multiply sound travel time by 1.8  
 for 1 m cells)

### Measurement Performance

Cell size (m)	Standard deviation (mm/s)	First Cell range (m)	Min depth (m)	Max range (m)	
1	130	3	5	110	
2	45	4	8	120	
4	25	6	12	130	
8	12	10	22	150	
16	5	18	40	165	

Notes: (1) standard deviation is ADCP uncertainty given a single-ping, (2) the first cell range is the distance from the transducer to the centre of the first cell. (3) the minimum depth assumes one good depth cell. (4) max range is a nominal value based on typical oceanic backscatter; actual range will vary depending on environmental conditions. Assuming the ADCP is pointed vertically (0° tilt), the maximum range is limited to 94% of the distance to the surface.

### Echo Intensity

Sampling: uses same depth cells and time intervals as velocity.  
 Uncertainty: ±1.5 dB

### Maximum Resistance of Power Conductors

The peak current depends on the transmit pulse which depends on the cell depth size. The maximum cable resistance (the sum of both power conductors) assumes a ping rate of 2/second, a supply voltage of 48 VDC and a voltage drop across the cable of 15 VDC.

Depth cell (m)	Maximum Cable resistance (Ω)
1	100
2	88
4	71
8	42

### Power

DC input: 20-60 VDC

Power Required:  
 Transmit: 200 W  
 Process: 3 W  
 Standby: 0.3 mW

### Approximate Energy Consumption:

$E = N \{ \alpha R + \beta (R + 50 \text{ m}) \} + \gamma D$  where:  
 N = total number of pings  
 E = energy consumption (W-hours)  
 R = depth cell size (m)  
 R = profiling range (m)  
 D = deployment duration (days)  
 $\alpha = 8 \times 10^{-5}$  W-hour/m  
 $\beta = 1.2 \times 10^{-6}$  W-hour/m  
 $\gamma = 8 \times 10^{-3}$  W-hour/day

Note: multiply R by 1.8 (for 1-m cells)

### Transducer and Hardware

Frequency: 300 kHz  
 Bandwidth: 75 kHz  
 Beam Angle: 20°  
 Configuration: 4-beam, convex  
 Max Tilt: 20°  
 Housing & Transducer Material: Composite plastic  
 External Connector: 7-pin low-profile underwater-mateable

### Other Sensors

#### Water Level (Optional)

Type: Strain Gauge  
 Range: 0-256 m  
 Accuracy: ± 5 m over 0-200 m depth  
 Resolution: 0.25 m

#### Temperature

Transducer mounted  
 Range: -5° to +45°C  
 Uncertainty: ± 0.4°C

#### Tilt

Range: ± 20°  
 Uncertainty: ± 2°

#### Compass

Type: flux gate  
 Uncertainty: ± 5° @ 60° magnetic dip angle  
 Max Tilt: 20°  
 Downloadable user calibration

### Environmental

Max. Depth: 200m  
 Operating Temperature: -5° to 60 °  
 Storage Temperature: -5° to 80°  
 Vibration: MIL-STD-167.1 type 1  
 Shock: 20 δ Static

### Data Communication

Serial: RS232, RS422 or RS485  
 Baud Rate: 300-115,200 baud. 9600 is standard  
 Data Format: ASC11 or binary

### Anti-Fouling Paint

Any anti-fouling paint may be applied to any surface. Care should be taken on the transducer surfaces to ensure the paint is applied uniformly.

### Standard Accessories

Bottom-mounted frame: PVC filled with lead shot, assembled on-site. External battery pack.

### Standard Software

The Monitor comes with software that assists in the following operations: testing, data collection, display and recording, data listing, and data conversion into engineering units in an ASC11 format.