ment angle is zero. If the Beam 3 mark is pointing 45° to starboard (Figure 27), you must turn the ship a +45° to align the two north reference points. Conversely, if the Beam 3 mark is pointing 45° to port, you must turn the ship a -45° to align the two reference points.

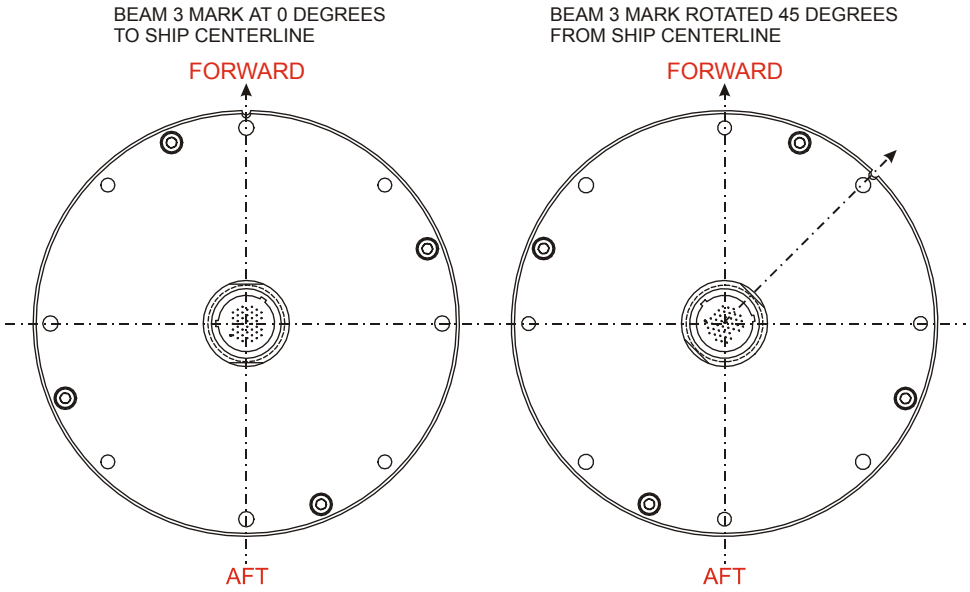


**Figure 27. Transducer Misalignment Reference Points**

# 13 Specifications

A brief review of ADCP operation may help you understand the specifications listed in this section.

**NOTE.** The specifications and dimensions listed in this section are subject to change without notice.

The ADCP emits an acoustic pulse called a PING. Scatterers that float ambiently with the water currents reflect some of the energy from the ping back to the ADCP. The ADCP uses the return signal to calculate a velocity. The energy in this signal is the *echo intensity*. Echo intensity is sometimes used to determine information about the scatterers.

The velocity calculated from each ping has a *statistical uncertainty*; however, each ping is an independent sample. The ADCP reduces this statistical uncertainty by averaging a collection of pings. A collection of pings averaged together is an *ensemble*. The ADCP's maximum *ping rate* limits the time required to reduce the statistical uncertainty to acceptable levels.

The ADCP does not measure velocity at a single point; it measures velocities throughout the water column. The ADCP measures velocities from its transducer head to a specified range and divides this range into uniform segments called *depth cells* (or *bins*). The collection of depth cells yields a *profile*. The ADCP produces two profiles, one for velocity, and one for echo intensity.

The ADCP calculates velocity data relative to the ADCP. The velocity data has both speed and direction information. If the ADCP is moving, and is within range of the bottom, it can obtain a velocity from returns off the bottom. This is called *bottom tracking*. The bottom track information can be used to calculate the absolute velocity of the water. The ADCP can get absolute direction information from a heading sensor.

The following tables list the specifications for the Ocean Surveyor/Observer ADCP. About the specifications:

a. All these specifications assume minimal ADCP motion - pitch, roll, heave, rotation, and translation.

b. Except where noted, this specification table applies to typical setups and conditions. Typical setups use the default input values for each parameter (exceptions include Pings Per Ensemble and Number of Depth Cells). Typical conditions assume uniform seawater velocities at a given depth, moderate shear, moderate ADCP motion, and typical echo intensity levels.

c. The total measurement error of the ADCP is the sum of:

   - Long-term instrument error (as limited by instrument accuracy).
   - The remaining statistical uncertainty after averaging.
   - Errors introduced by measurement of ADCP heading and motion.

d. Because individual pings are independent, the statistical uncertainty of the measurement can be reduced according to the equation:

$$\frac{\text{Statistical Uncertainty for One Ping}}{\sqrt{\text{Number of Pings}}}$$

# 13.1 Water Velocity Specifications

**Table 15: Water Profiling – Long Range Mode**

| Frequency | Vertical Resolution Cell Size (m) [3] | Max Range (m) [1] | Precision (cm/s) [2] |
|---|---|---|---|
| 38kHz | 16 | 800-1000 | 30 |
| | 24 | 800-1000 | 23 |
| 75kHz | 8 | 520-650 | 30 |
| | 16 | 560-700 | 17 |
| 150kHz | 4 | 360-400 | 30 |
| | 8 | 380-425 | 17 |

**Table 16: Water Profiling – High Precision Mode**

| Frequency | Vertical Resolution Cell Size (m) [3] | Max Range (m) [1] | Precision (cm/s) [2] |
|---|---|---|---|
| 38kHz | 16 | 520-730 | 12 |
| | 24 | 600-730 | 9 |
| 75kHz | 8 | 310-430 | 12 |
| | 16 | 350-450 | 9 |
| 150kHz | 4 | 200-250 | 12 |
| | 8 | 220-275 | 9 |

(1) Ranges at 1 to 5 knots ship speed are typical and vary with situation; (2) single-ping standard deviation; (3) user's choice of depth cell size is not limited to the typical values specified.

**NOTE.** Ranges are dependent on both background noise levels and environmental issues such as sea state, prop noise, engine noise, sea chest configuration, use of a window, and absorption through the water. The specifications above assume no added background noise from the ship or sea states, and the absorption is based on 4 degree C.

## 13.2 Profile Parameters

**Velocity Long Term Accuracy**: ±1.0% ±0.5 cm/s

**Velocity Range**: -Default setup 22 knots (combined water and vessel speed)

**Number of Depth Cells**: 1 to 128

**Table 17: Water Profile Maximum Ping Rate**

| Frequency (kHz) | Ping Rate (Hz)[1] |
|---|---|
| 38 | 0.5 |
| 75 | 0.7 |
| 150 | 1.1 |

Note – Ping rates specified for maximum range in Long Range mode. Shorter ranges allow faster ping rates.

## 13.3 Bottom Track Specifications

**Table 18: Nominal Bottom Track Altitude**

| Frequency (kHz) | Altitude (m) |
|---|---|
| 38 | 1,500 |
| 75 | 950 |
| 150 | 600 |

Bottom Track Precision: <2 cm/s

Bottom Track Velocity Accuracy: +/-1% 0.5cm/sec

Bottom Track Range Accuracy: <+/-2%*

**NOTE.** *Bottom Track Range is slant range divided by the cosine of the beam angle. Accuracy reported excludes errors introduced by changes in the speed of sound profile, errors caused by tilting of the transducer, and by the slope of the bottom.

## 13.4 Echo Intensity Profile

**Dynamic Range**: 80dB

**Precision**: ±1.5dB

**Relative Accuracy**: 2.5 dB RMS

**Scale Factor**: 0.46 dB/count

## 13.5 Transducer and Hardware Specifications

**Beam angle**: 30°

**Configuration**: 4 beam, Janus

**Communications**: RS-422 or RS-232 Hex-ASCII or binary at 1200 to 115,200 baud

## 13.6 Internal Sensors

**Temperature** (mounted on transducer)

- Range: -5 to 45°C
- Precision: <0.1°C
- Resolution: 0.027°C
- Accuracy: ±0.4°C

**Tilt**

- Range: ±20°
- Accuracy: ±1.0°
- Precision: <0.1°
- Resolution: 0.1°

**Compass** (fluxgate type)

- Accuracy: ±5°
- Precision: <0.1°
- Resolution: 0.1°
- Maximum tilt: ±15°

## 13.7 System Power Specifications

**AC Input**: 90 to 250 VAC, 47 to 63 Hz

**Power**: 1600W peak

**Inrush Current**: 17A @ 115VAC, 34A @230VAC

**Transmit Power**: 1100W typical

**Standby Power**: 60W

## 13.8 Environmental Specifications

**Operating Temperature**:  -5 to +40°C

**Storage Temperature**:  -50 to +80°C

**Standard Depth Rating**: 100m

# 14 Outline Installation Drawings

The following drawings show the standard Ocean Surveyor/Observer dimensions and weights.

**Table 19: Outline Installation Drawings**

| Description | Drawing # |
|---|---|
| Ocean Surveyor/Observer Electronics Chassis | 96A-6000 |
| Ocean Surveyor/Observer 75kHz | 96A-6007 |
| Ocean Surveyor/Observer 75kHz, Wide Flange | 96A-6011 |
| Ocean Surveyor/Observer 150kHz | 96A-6008 |
| Ocean Surveyor/Observer 38kHz | 96A-6009 |
| Ocean Surveyor/Observer 150kHz, Flanged | 96A-6010 |

**CAUTION.** ***Outline Installation Drawings are subject to change between manual updates.*** When an addition or correction to the manual is needed, an Interim Change Notice (ICN) will be posted to our web site on the Customer Service page (www.rdinstrument.com). Please check our web site often.

**NOTE.** Drawing 96A-6011 will be used for new builds starting in March 2003. For systems built prior to March 2003, use the 96A-6007 drawing.