



Xeos
Technologies Inc.

Brizo-X Hardware Manual

GNSS DIRECTIONAL WAVEHEIGHT RECEIVER



Version 1.0
February 2020

Shipped From



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Version History

Version No.	Date	Description
1.0	February 2020	Official Release

This manual is written with respect to the Hardware aspects of the Brizo-X and is meant to be used in combination with the [Brizo and Brizo X Firmware User Manual](#).

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Overview

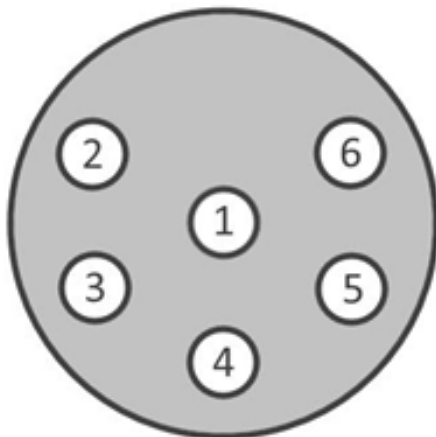
The Brizo-X Directional Wave Height Sensor utilizes Global Navigation Satellite System (GNSS) to measure wave statistics. Since the Brizo-X uses GNSS to calculate its heading, no calibration is required.

The sensor is housed in a robust enclosure for rough environments and to prevent water ingress. The sensor runs autonomously and can record data to SD cards, as well as output over RS-232 or send messages over the Iridium network.

Pin-out Diagrams

The Brizo-X has only one available connection for all physical inputs and outputs. Below are the standard pinouts that can be requested to be configured at the factory.

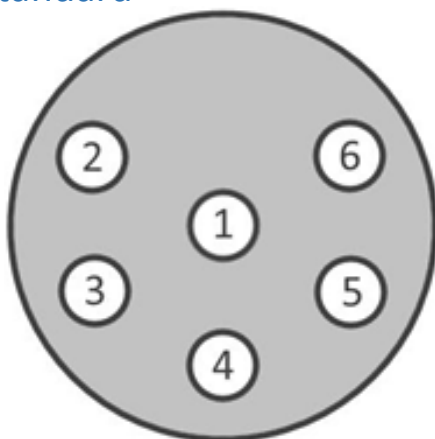
Serial Standard



Connector: MCBH-6F-TI (Female), External View

Pin Number	Function
1	Serial 2 Transmit
2	Serial 1 Transmit
3	Serial 2 Receive
4	Serial 1 Receive
5	V +
6	Ground

SDI-12 Standard



Connector: MCBH-6F-TI (Female), External View

Pin Number	Function
1	SDI-12 Bus
2	Serial 1 Transmit
3	No Connection
4	Serial 1 Receive
5	V +
6	Ground

Telemetry Configurations

Iridium Transceiver

The Brizo-X has the option to be equipped with an Iridium satellite transceiver at the factory if requested. The transceiver can be used to transmit SBD (Short Burst Data) packets for coefficient transmission. Iridium has global coverage and is suitable for any location. An Iridium data plan is required to use these features. Contact Xeos Technologies for a plan suited to your needs.

For more details on Iridium, see [Appendix C: Iridium Service](#).

GNSS

The Brizo-X uses GNSS to gather wave data to calculate parameters for wave statistics and coefficients at programmed intervals. It is a critical component of the Brizo-X of any model.

Local Data Output

Diagnostics

Serial port 1 is the default port for diagnostic output of the Brizo-X. As such, this port displays operational activity, as well as allows for configuration of the device.

Serial Data

Serial port 2 is used for output of wave height data statistics to connected peripheral devices. The Brizo will first acquire a GNSS signal to calculate parameters before outputting results.

The default port settings for serial ports are as follows:

Baud Rate	115.2k
Parity	None
Data Bits	8
Stop Bits	1

SDI-12 Data

A substitute for Serial port 2, all SDI-12 communications are transmitted in ASCII, but operationally outputs the same data as other communication methods.

Port settings for serial ports are as follows:

Baud Rate	1200
Parity	Even
Data Bits	7
Stop Bits	1

SD Cards

Onboard the Brizo-X is one 4GB SD card raw GNSS velocity data. The raw data can be used for post-processing by the user to further analyze the wave data for spectra, etc.

Raw GNSS velocity cannot be sent over the air or serial. When the SD card is 90% full, the device will delete the oldest 10% of data stored.

Devices manufactured with Ethernet capability can download data from these cards without disassembly. Otherwise, returning the device to Xeos for data extraction is the best course of action, if needed.

Device Preparation

Iridium

Iridium Subscription

If the Brizo-X in application is equipped with an Iridium modem, the IMEI of the device must be provisioned to send data on an Iridium data plan. If the modem is not activated, messages transmitted will not be received at any location.

For more details on Iridium, see [Appendix C: Iridium Service](#).

Iridium SIM Card

The Iridium SIM card (if Iridium is included) is installed at the factory and should not be changed or modified by the user. If necessary, the device can be sent back to the factory for repairs relating to Iridium telemetry issues.

Data Output

If wave height statistic data is to be output to a peripheral device, proper interfacing should be tested, both with regards to the Brizo-X's port functionality via command, and to any interfacing device such as a data logger.

Orientation

The bottom plate of the Brizo-X designed to streamline the mounting process, whether that be plate-mounted or pole-mounted. It is crucial the top of the Brizo-X is facing the sky directly, flat, with as much overhead view of the sky as possible. If obstruction is unavoidable, effort should be made to have as little as possible. This will allow for a stronger connection to the satellites and in turn, more accurate and consistent wave height results.

Power

The Brizo-X requires power supply capable of sourcing three amp surge currents at 12 V. This can be reduced to one amp if no Iridium modem is present.

The MCBH connector on the Brizo-X is the only external connection present. The mating connector on the end of the cable provided with the device supplies power and serial communication (if needed). It is a standard Subconn connection with female bulkhead, male inline connector and locking sleeve.

Prior to making the connection, inspect both connectors and remove any dirt, water or other debris. If either connector is damaged, contact Xeos Technologies.

The majority of units in the field will be powered by battery and solar panel. It is recommended to utilize a charge controller for the battery that is equipped with a low voltage disconnect, which will increase the lifespan of the battery.

Installation of the Brizo-X

Mounting the device

The Brizo-X is housed in a waterproof enclosure. As a consequence, all components of operation except for input power are fully integrated.

For the performance of the sensor it is important for the GNSS antenna to have a clear view of the sky. The GNSS antenna is placed under the risen circle on top of the enclosure.

It is recommended to install the Brizo-X flat, at the highest point on a buoy, or closest to the top with reasonable space to mount.

Due to the nature of GNSS wave height measurements, the Brizo does not have to be at the center of gravity of the buoy, but it is favorable to **have it as close the center z-axis as possible**. Some reasonable offset (up to 18 inches) away from the center z-axis is acceptable.

Depending on the application, varying mounting methods can be explored. The Brizo-X's enclosure has features that lend themselves to mounting to a baseplate, or pole-mounting.

It is crucial to mount the Brizo-X before connecting power to avoid damage to the Brizo-X or its cabling.

Confirming Device Operation

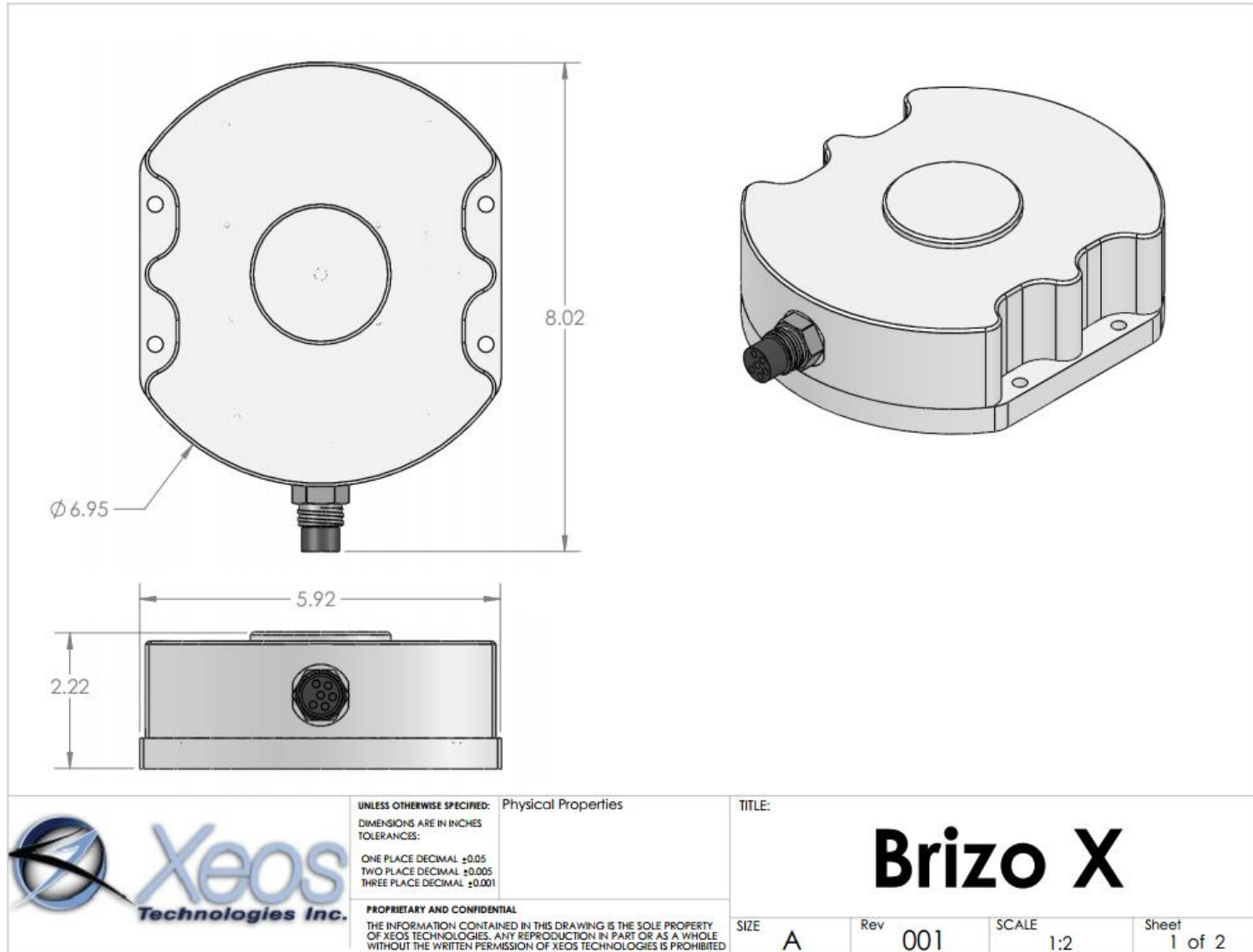
Confirm Power to the Unit

Plugging the power connector into the unit, the LEDs on top of the unit will flash. These can be difficult to see in daylight conditions currently. If the Serial 1 port is accessed by a device capable of reading its output, diagnostics will also immediately be visible.

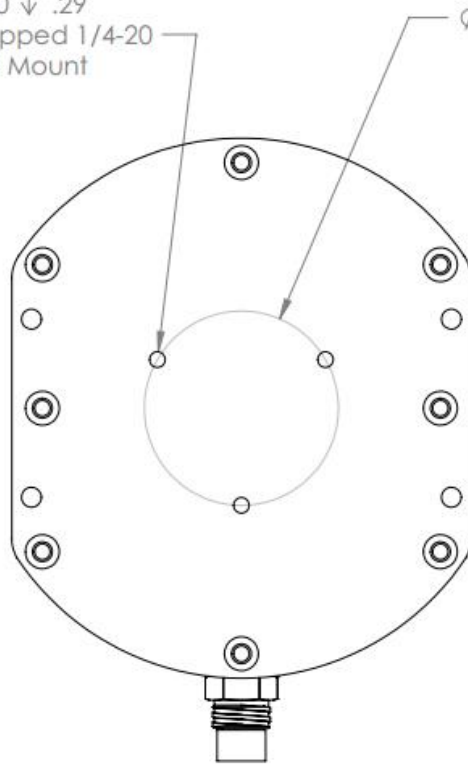
Confirming Iridium Operation

A startup message will be sent upon power-up of the device to confirm power to the unit and Iridium satellite connection. This message will not include any wave statistics or Status of Health data.

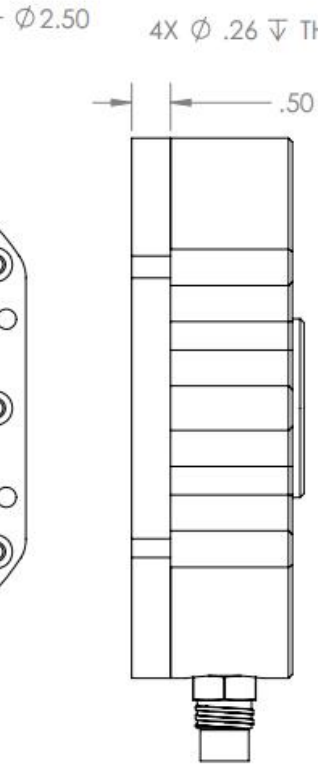
Appendix A: Mechanical Specifications



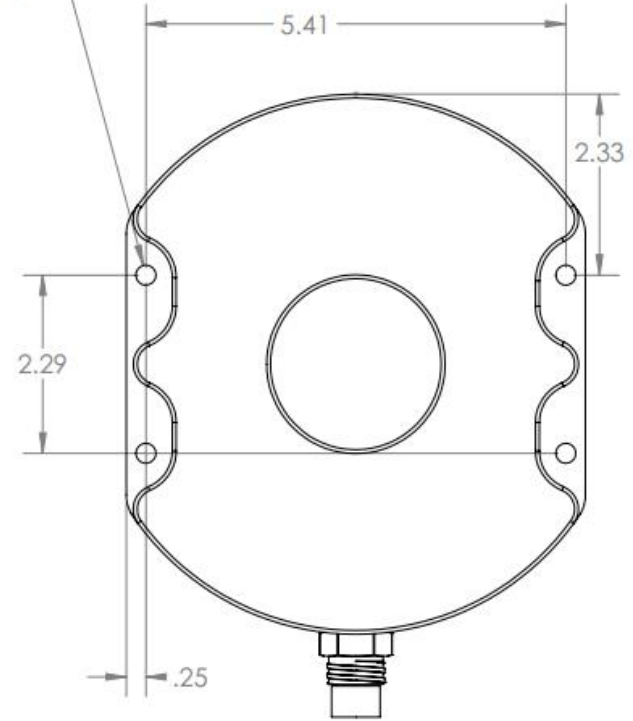
3X ϕ .20 ∇ .29
 Optionally Tapped 1/4-20
 for Pole Mount



Pole Mount



4X ϕ .26 ∇ THRU



Deck Mount

UNLESS OTHERWISE SPECIFIED: Physical Properties

DIMENSIONS ARE IN INCHES
 TOLERANCES:

ONE PLACE DECIMAL ± 0.05
 TWO PLACE DECIMAL ± 0.005
 THREE PLACE DECIMAL ± 0.001

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TITLE:

Brizo X

SIZE	Rev	SCALE	Sheet
A	001	1:2	2 of 2

Appendix B: Power Requirements

The following section specifies power requirements for various configurations of the Brizo-X with various use cases of duty cycling the GNSS. Measurements can fluctuate as receivers and modems use varying power depending on the rate of transmitting, tracking settings and other factors.

GNSS Measurement Periods
1 measure period per hour
Power Requirement: 0.7 W
2 measurement periods per hour
Power Requirement: 1 W
3 measurement periods per hour
Power Requirement: 1.3 W
IRIDIUM SBD
SBD Message Check (Average Power, per check, Average check 36 seconds)
Power Requirement: 0.5W (36 seconds)

Appendix C: Iridium Service

This section is relevant if your Brizo-X comes equipped with an Iridium Transceiver which makes use of the Iridium satellite system's Short Burst Data (SBD) services.

SBD service is a global, two-way, real-time, email-based data delivery service that has a maximum outbound (from unit) message size of 340 bytes and a maximum inbound (to unit) message size of 270 bytes.

Brizo-X end users/integrators must set up an approved data delivery account with their preferred service provider. Xeos is an Iridium VAR and can provide Iridium service if you wish. Using our web form is a quick and easy way to setup service. It can be found at www.xeostech.com and selecting Iridium Service from the Product menu.

Setting up service requires the International Mobile Equipment Identity (IMEI) number. Each Iridium modem has a unique IMEI number that must be registered with the preferred service provider. Xeos will make these numbers available as the product is delivered.

Each IMEI number is capable of being associated with up to five (5) unique email addresses. This may vary between service providers. When registering your IMEI number, please provide the service provider with the temporary Xeos testing account email address. This account is:

`xeosbeaconb@gmail.com`

Setting up this email address allows for better technical support during the initial learning period for the product. Once service is activated, please notify the technical support team.

While any email application can be used to send and receive messages to the Brizo-X, XeosOnline is the easiest way to manage and monitor the unit. The messages contain a lot of information and XeosOnline presents the information in a "readable" format, as well as has the ability to graph data.

Warranty, Support and Limited Liability

Xeos Technologies Inc. warrants the Brizo-X to be free of defects in material or manufacturing for a period of one year following delivery. Liability is limited to repair or replacement of the defective part and will be done free of charge.

LIMITED WARRANTY: Xeos Technologies Inc. warrants that the product will perform substantially in accordance with the accompanying written materials for a period of one year from the date of receipt.

CUSTOMER REMEDIES: Xeos Technologies Inc. entire liability and your exclusive remedy shall be at Xeos Technologies Inc. option, either (a) return of the price paid or (b) repair or replacement of the product that does not meet Xeos Technologies Inc. Limited Warranty and that is returned to Xeos Technologies Inc. with a copy of your receipt. This Limited Warranty is void if failure of the product has resulted from accident, abuse, or misapplication. Any replacement product will be warranted for the remainder of the original warranty period or ninety (90) days, whichever is longer.

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