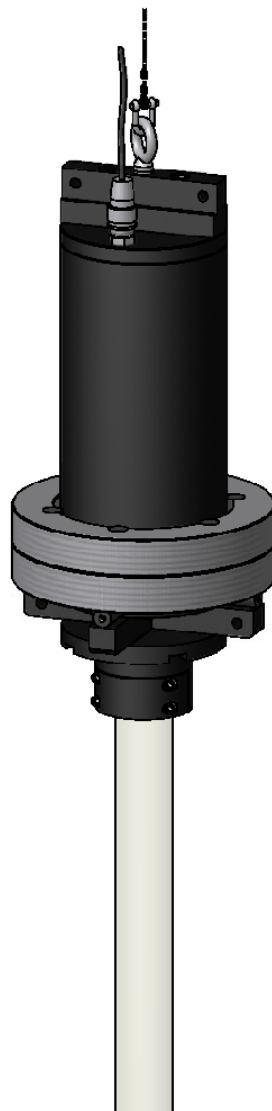




VC-3.5.2 VIBRACORE SYSTEM
OPERATING & MAINTENANCE MANUAL

Version 1.2

Updated February 20, 2011





- ◇ **THIS DEVICE IS TO BE USED ONLY BY QUALIFIED INDIVIDUALS WHO ARE FAMILIAR WITH ITS PROPER OPERATION.**
- ◇ **WHEN USING AN ELECTRIC GENERATOR TO POWER THIS UNIT, IT IS ESSENTIAL THAT THE GENERATOR BE PROPERLY GROUNDED TO MINIMIZE THE RISK OF SERIOUS INJURY OR ELECTROCUTION. FOLLOW THE SAFETY RECOMMENDATIONS FURNISHED WITH THE POWER GENERATING EQUIPMENT.**
- ◇ **BEFORE OPERATING THIS DEVICE, CHECK THE POWER SUPPLY CORD FOR DAMAGE. DO NOT USE THE DEVICE IF ANY DAMAGE IS FOUND OR SUSPECTED.**
- ◇ **ALWAYS USE WITH A SUITABLE GROUND-FAULT CIRCUIT INTERRUPTER (GFCI). BEFORE OPERATING, CHECK THE GFCI FOR PROPER OPERATION BY PUSHING THE TEST BUTTON. IF THE GFCI FAILS TO OPERATE PROPERLY, DO NOT OPERATE THE VC-3.5.2.**
- ◇ **NEVER PULL ON THE POWER CORD. USE A STEEL CABLE ATTACHED TO THE LIFTING EYELET TO RAISE AND LOWER THE VC-3.5.2. DO NOT EXCEED 3,000 LB PULLING FORCE.**
- ◇ **DO NOT OPERATE THE DEVICE IF THE OUTER CASE IS DENTED OR PUNCTURED, OR THERE IS ANY INDICATION OF LACK OF WATER-TIGHTNESS.**
- ◇ **TO MAINTAIN WATER-TIGHTNESS, DO NOT OPEN THE VIBRACORE OR REMOVE OR LOOSEN ANY SCREWS ON THE POWER HEAD**
- ◇ **BEFORE ATTACHING THE POWER CABLE TO THE VC-3.5.2 POWER HEAD, BE CERTAIN THAT BOTH HALVES OF THE SUBMERSIBLE ELECTRICAL CONNECTOR ARE DRY AND FREE OF ANY SALT RESIDUE. APPLYING POWER WITH EVEN A SMALL AMOUNT OF SALT WATER TRAPPED WITHIN THE CONNECTOR WILL BURN IT OUT. IF IN DOUBT, FLUSH WITH FRESH WATER AND DRY THOROUGHLY BEFORE USE.**

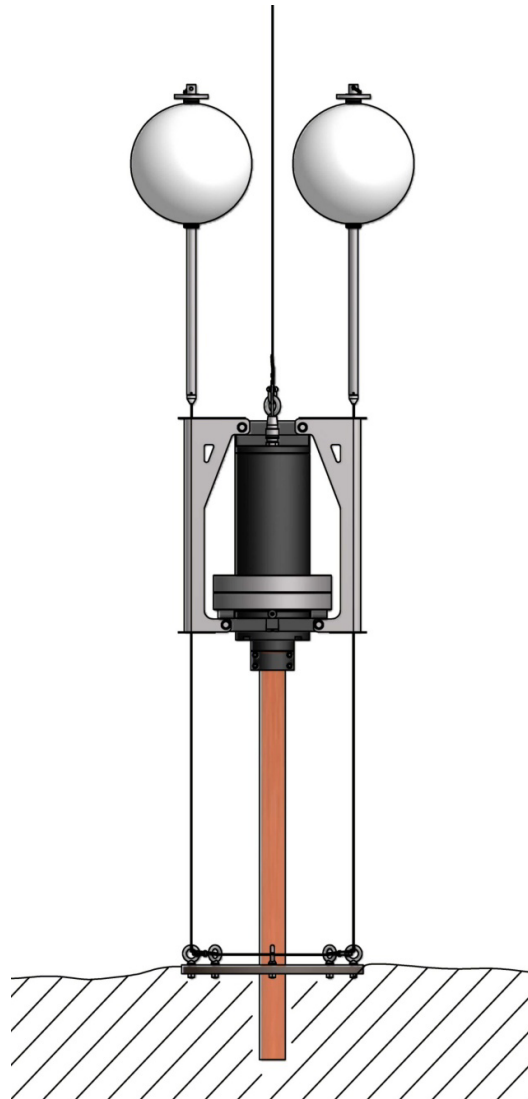


Figure 1. View showing VC-3.5.2 Power Head, Plastic Core-tube, and Stabilizer Accessory. It is depicted with the core-tube partially extended into the sediment and with the stabilizer cable shortened by wrapping it around the stabilizer base plate.

DESCRIPTION

The VC-3.5.2 Vibratory Core Tube Driver (Vibracore) facilitates sampling of soft or loosely sedimented saturated soil deposits using lined or unlined core tubes. It is designed for use with core tubes having nominal diameters ranging from 2" to 4" OD.

The vibracore uses an electric motor to drive a pair of masses that are eccentrically mounted on their respective shafts. These masses rotate about a common (horizontal) axis but in opposite directions, producing a rectilinear vibratory force vertically, and a vibratory torque about the vertical axis. The nominal frequency of vibration is approximately 9,000 RPM (150 Hz). The actual vibrational displacement of the vibracore is on the order of a few tens of thousandths of an inch, so essentially no mixing of the sediment within the tube occurs.

When a core tube is rigidly attached to the VC-3.5.2 power head, the vibrational energy is propagated along the tube and into the sediments. This vibrational energy tends to re-orient the soil particles at the lower end of the core tube, causing them to move out of the way of the advancing core tube and into a more efficient (i.e. denser) packing. Because the soil is saturated, the pore water pressure in the region around the core tube increases. As pore pressure increases, the effective confining stress in the soil decreases (according to the principle of effective stress), and the strength of the soil diminishes. With the penetration resistance (i.e. shear strength) of the soil thereby reduced, the core tube penetrates the soil under the static weight of the VC-3.5.2/core tube assembly. To provide additional penetration capability, clamp-on weights are available which utilize a vibration-isolation system to effectively increase the static driving force without significantly diminishing the vibrational energy transmitted to the sediments.

The VC 3.5.2 is designed to achieve a compromise between small vibrations, which produce limited penetration capability, and large vibrations, which can be destructive to the sample. While some densification of the material within the tube can occur, the stratigraphy is maintained, which is important for establishing a timeline for sedimentation processes. It has been designed to be light in weight and small in size, since much of the vibracoring work is in shallow areas, often where subsequent dredging will occur, and where small sampling rigs are used.

A winch is required to use the vibracore, particularly since the force required to extract the buried core tube can be quite large (>500 kgf). When assembled with the core tube, the vibracore is top-heavy and must be guided to keep it in an upright position. For sampling at very shallow depths such as in rivers, marshes and in estuaries, it is small enough and light enough in weight that it can be guided by hand (a two-person team is preferable). Even when sampling in deeper waters, when surface conditions permit it can be manually guided by keeping a small amount of tension on the support cable and jogging the winch to gradually lower it into the sediment. This approach is most successful when direct visual observation of the vibracore is possible. If difficulty is encountered in keeping the vibracore upright the stabilizer accessory may be used to guide the vibracore.

The stabilizer (Figure 1) consists of a weighted base and submersible buoys attached to the base with wire rope. Once the buoys are submerged, the wire ropes are kept in tension and keep the vibracore upright, while permitting it to slide along the wire ropes as it penetrates into the sediment.

Figure 1 also shows how the Clamp-on Weight Accessory is used to provide additional penetration force.

OPERATION

Be sure to review the important safety information on page 2 of this manual before operating the unit.

Before connecting the power cable to the VC-3.5, make sure the mating halves of the connector are clean, dry, and in good condition.

WARNING! Connectors that are damaged or dirty may not seal correctly, posing a risk of serious injury or death by electrocution!

When using the vibracore in a marine (salt water) environment, it is particularly important to keep salt water away from the contact areas of the submersible connectors, since the presence of salt water or its residue will burn the connector upon application of power.

Attach the power cable strain relief to the lifting eye as shown using the steel s-hook (1), the wire rope lanyard (2) and the cable grip (3) as shown in Figure 2.

NOTE: Hoist wire rope is not shown.

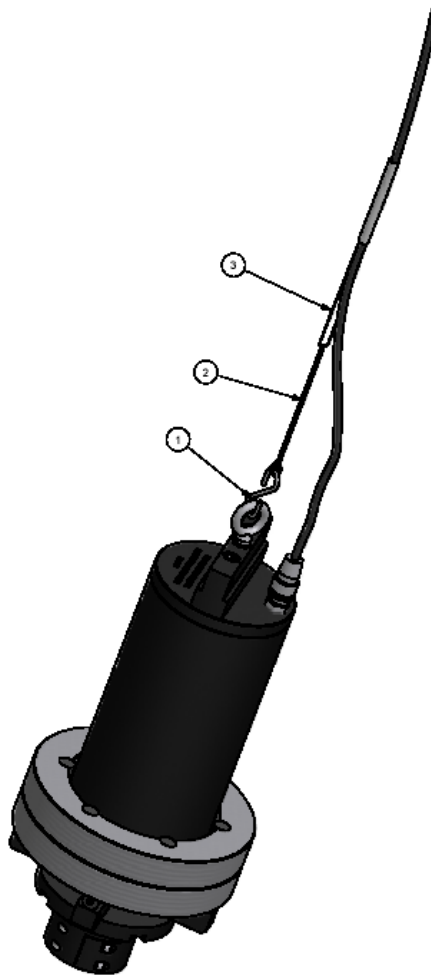


Figure 2. Attachment of Power Cable Strain Relief

Use a steel cable attached to the eyebolt for raising and lowering the VC-3.5.2. Do not attempt to lift the vibracore by the power cable.

Perform a careful visual inspection of the power cord before each use of the VC-3.5.2. Never operate the device if the cable jacket shows any sign of having been punctured.

Visually inspect the case of the VC-3.5.2 for dents, punctures, or any other indication that the unit may permit water leakage. **Do not operate the device if the outer case is dented or punctured, or there is any indication of lack of water-tightness!**

It is strongly recommended that a Ground Fault Circuit Interrupter (GFCI) be used for protection against injury due to electric shock. This device is to be tested for proper operation before submerging the VC-3.5.2. Proper operation of the GFCI can be verified as follows:

- 1 - Place the VC-3.5.2 on the ground or stable flat surface in a dry location.
- 2 - Connect the power cable to the VC-3.5.2.
- 3 - Plug the GFCI into a 'live' power receptacle.
- 4 - Press the RESET button. The VC-3.5.2 should start operating.
- 5 - Press the TEST button on the GFCI. The VC-3.5.2 should stop.

If the GFCI fails to operate as described above, do not operate the VC-3.5.2 until the unit is replaced with a properly functioning unit.

The vibracore motor generates heat during operation. To prevent damage caused by excessive heating it is recommended that the vibracore be operated using a 6 minute 33% duty cycle. That is, the vibracore can be operated continuously for 6 minutes after which it should remain off for a period of at least 12 minutes to permit the motor to cool down.

Before and after each day's use, the vibracore should be checked for loose screws.

MAINTENANCE

The motor utilized in the VC-3.5.2 is a universal type 1 HP motor. This motor uses replaceable carbon brushes for commutation. The brushes have a typical useful life of 250 hours of motor operation.

The gearbox and all bearings are pre-lubricated and sealed and should not require additional lubrication.

It is suggested that the unit be returned to the manufacturer after every 200 hours of operation for brush replacement, inspection, testing and change of lubrication.

To maintain water-tightness, do not open the vibracore or remove or loosen any screws on the power head.

POWER HEAD SPECIFICATIONS

Dimensions	8.6" Diameter x 26" H
Weight	83 lbs
Power Requirements	115 VAC, Single Phase, 60 Hz, 15 Amps
Max. Operating Depth	500 ft
Typical Frequency of Vibration	150 Hz (9000 RPM)
Operating Duty Cycle	6 Minutes @ 33% Duty Cycle

VC-3.5.2 VIBRACORE SYSTEM AND AVAILABLE ACCESSORIES

- VC-3.5.2 Power Head (Figure A1.1) – a submersible electro-mechanical device incorporating a 115 VAC, 1 HP Universal (AC/DC) motor to drive counter-rotating masses and develop high frequency (7,000 – 10,000 RPM) vibrations to enhance penetration of core tubes in offshore sediments. Included with the Power Head are
 - Add-on Weight Accessory (Figure A1.3) – each weight adds 43 lb (20 kg) of static driving force to increase penetration. Up to 4 weights can be used to add up to 172 lb (80 kg) of additional static driving force. Two weights are provided with the power head as part of the standard system configuration; additional weights can be ordered separately.
 - Flange Accessory (Figure A1.2) – used for attachment of core. Our standard flange accommodates 4.00 inch O.D. core tubes; other diameters are available by special order. One flange is included in the standard system configuration; additional flanges can be ordered separately.
- Stabilizer Accessory (Figure A1.4-Figure A1.6) – an system for maintaining the vibracore and attached core tube in an approximately upright position when manual guidance by the operator is undesirable or unfeasible. The Stabilizer is not included in the standard system configuration and is ordered separately.

Limited Warranty

PVL Technologies, Inc. offers a 1 year limited warranty, valid from the date of purchase. The warranty covers parts and labor due to any defects in materials and workmanship.

The warranty applies only to the vibracore system (power head, flange, weights and submersible electrical cable). The warranty does not apply to accessories such as core tubes, core noses, core catches or other components and accessories sold with the vibracore system, not manufactured by PVL Technologies, Inc.

This warranty does not apply to damage caused by improper use, electrical damage due to improper electrical supplies and connections, or voltage loss due to voltage drops along long cable lengths greater than 100 feet. All power cables come with a strain relief to prevent strain on the electrical cable and connector to aid in prevention of cable/connector damage. Cable/connector damage due to any excessive strain on the cable is not warranted. If it is determined by PVL Technologies, Inc that returned equipment was used improperly, opened, or altered, the warranty is null and void.

Warranty service will be authorized once a request is made and a return authorization number provided to the customer by PVL Technologies, Inc.

Freight must be pre-paid and insured, and securely packaged in a wooden crate.

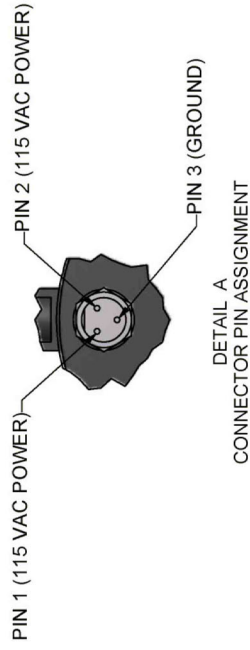
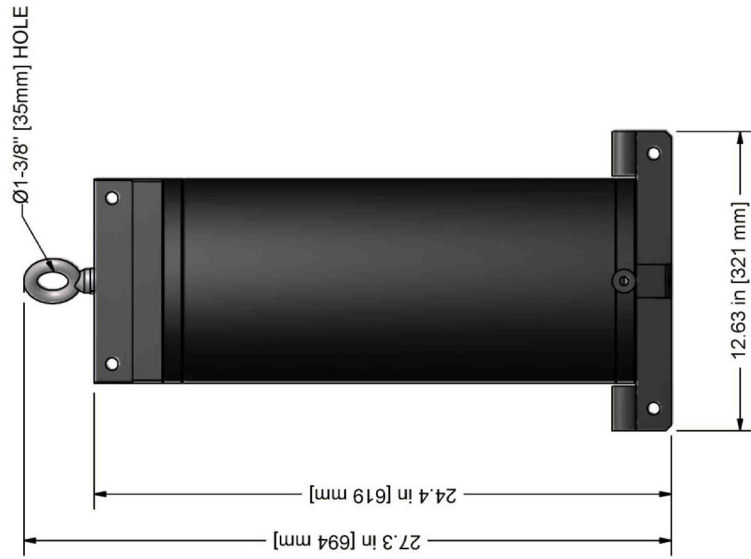
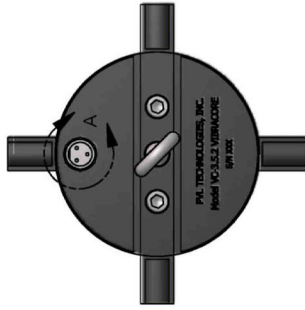
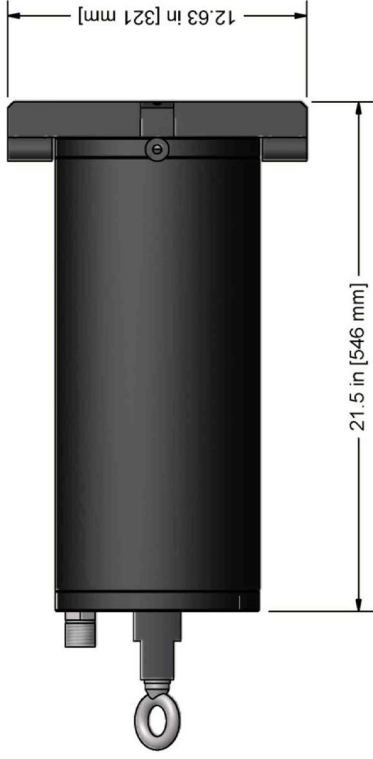
Return freight will be pre-paid by the customer, or collect.

Although guidelines for vibracore usage, operation and energy requirements for the VC 3.5 are provided, PVL Technologies, Inc. cannot warrant its vibracoring units to be able to penetrate an underwater substrate to any particular depth, nor obtain a specific length of core. Many factors can affect core-depth-penetration, including type of depositional material, grain size distribution, water content, depositional environment, subsurface obtrusions, etc. Customers must therefore assess their specific application prior to purchase. PVL Technologies, Inc. does not warranty its product's performance to be equal or similar to other products on the market in its ability to penetrate substrate or produce specific lengths of core.

Indemnification Notice:

Vibracoring equipment sold or leased by PVL Technologies, Inc. is to be operated and handled by persons knowledgeable in the utilization and operation of electrical coring and drilling equipment, and from overwater vessels or platforms properly outfitted and equipped to handle and support its use and operation. The client agrees, in accepting the delivery of the equipment, to indemnify and hold harmless PVL Technologies, Inc., its officers and employees from and against all claims, damages, losses and expense, including reasonable attorney's fees, which are for bodily injury or death or for property damage including loss of use, arising out of or in connection with the operation of such equipment at sea or otherwise. Furthermore, the client agrees to hold harmless, PVL Technologies, Inc., its officers and employees from and against claims of performance.

PVL Technologies, Inc.



APPROXIMATE TOTAL WEIGHT = 83 lb (38 kg)

Figure A1.1 VC-3.5.2 Power Head Assembly.

Parts List		
ITEM	PART NUMBER	QTY
1	VC3.5.2 Power Head Assembly	1
2	Flange Assembly	1
3	Hex SHCS, 3/8-16 x 1", 316 SS	4
4	Hi-Collar Lock Washer, 3/8", 18-8 SS	4



Figure A1.2 Flange Installation.

Parts List		
ITEM	PART NUMBER	QTY
1	Add-On Weight Assembly	2
2	VC3.5.2 Power Head Assembly	1

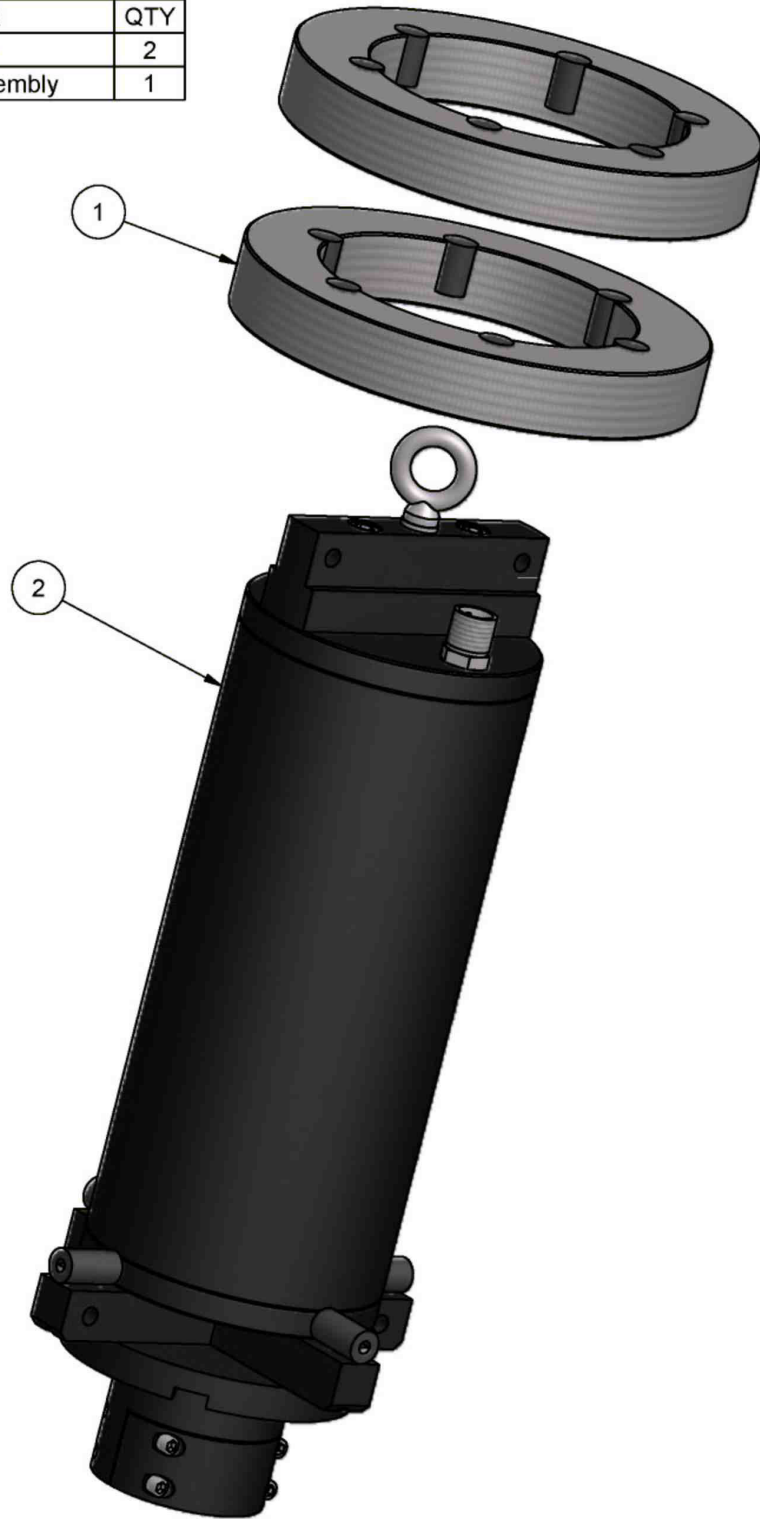


Figure A1.3 Add-on Weight Accessory Installation.

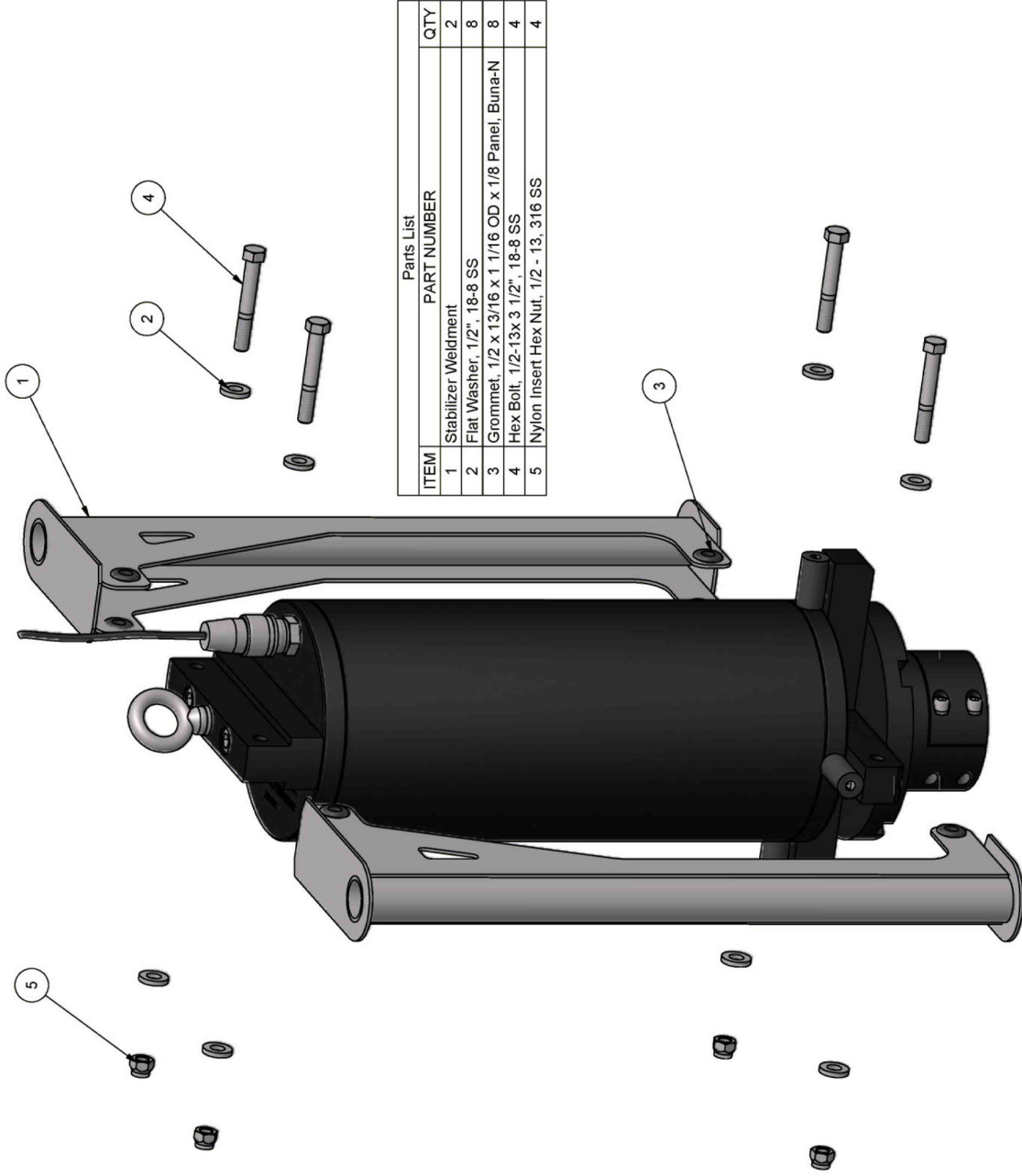


Figure A1.4 Attachment of Stabilizer Accessory to Power Head.

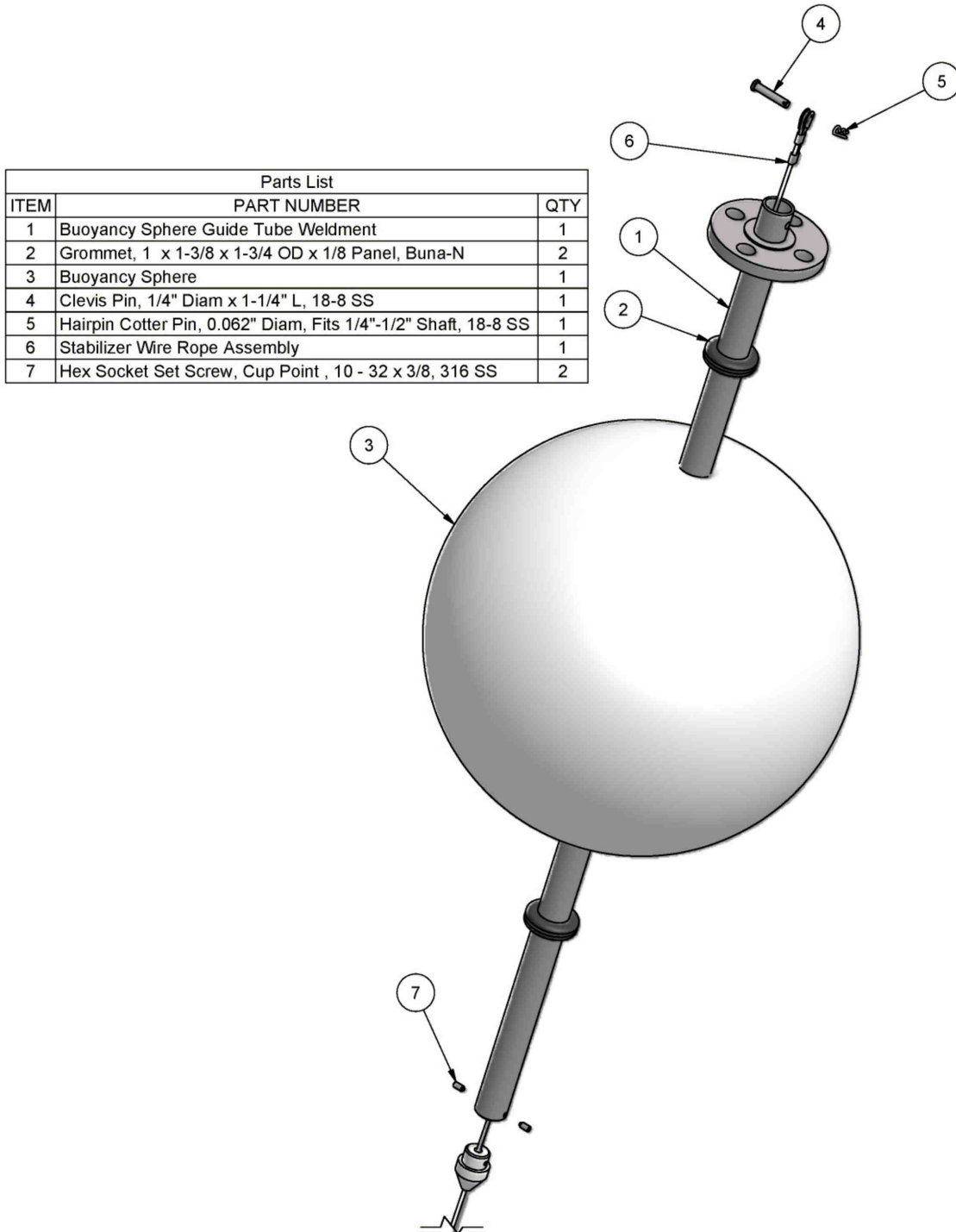
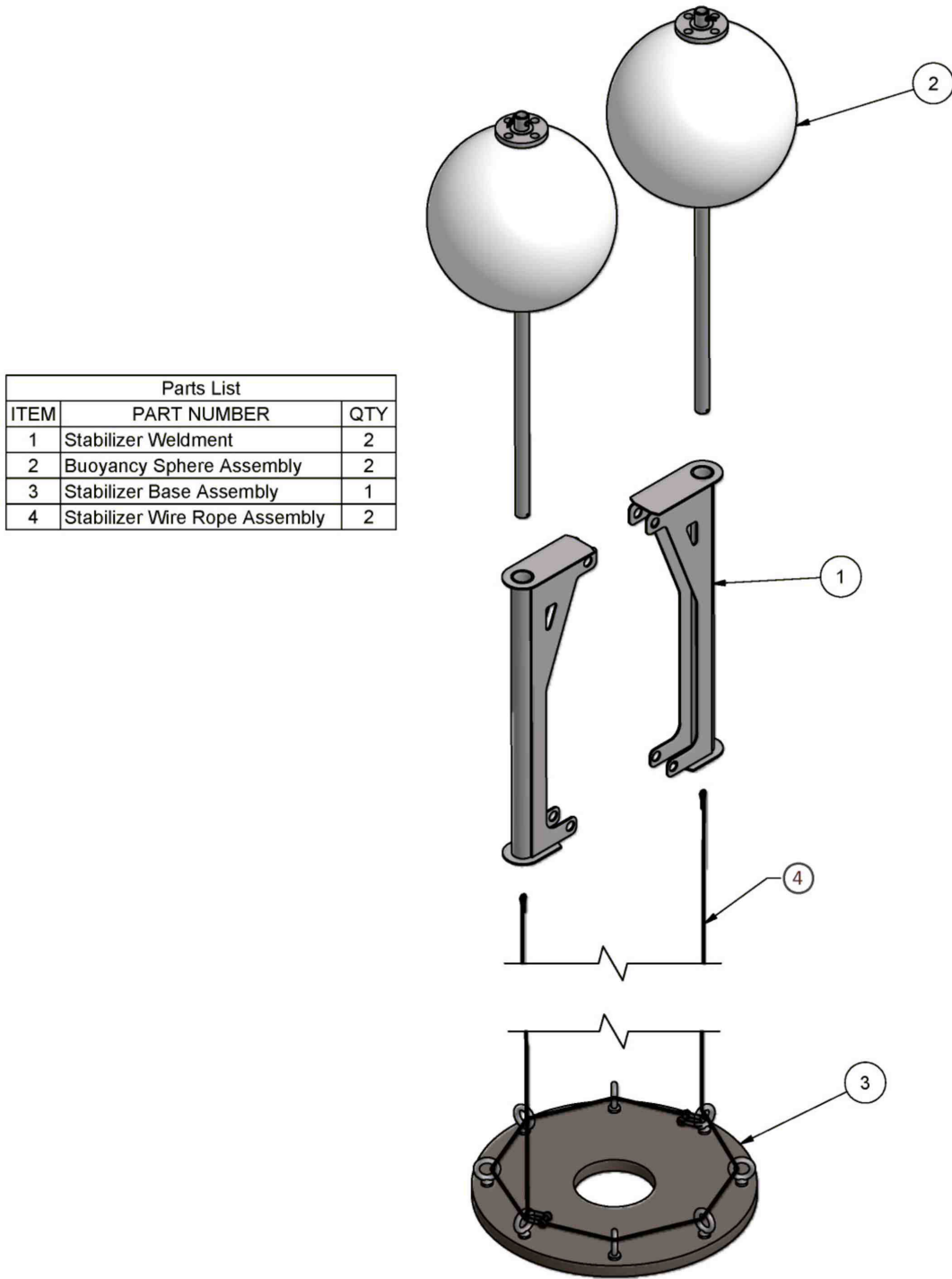


Figure A1.5 Stabilizer Accessory Buoyancy Sphere Assembly Drawing.



Parts List		
ITEM	PART NUMBER	QTY
1	Stabilizer Weldment	2
2	Buoyancy Sphere Assembly	2
3	Stabilizer Base Assembly	1
4	Stabilizer Wire Rope Assembly	2

Figure A1.6 Stabilizer Accessory Assembly Drawing.