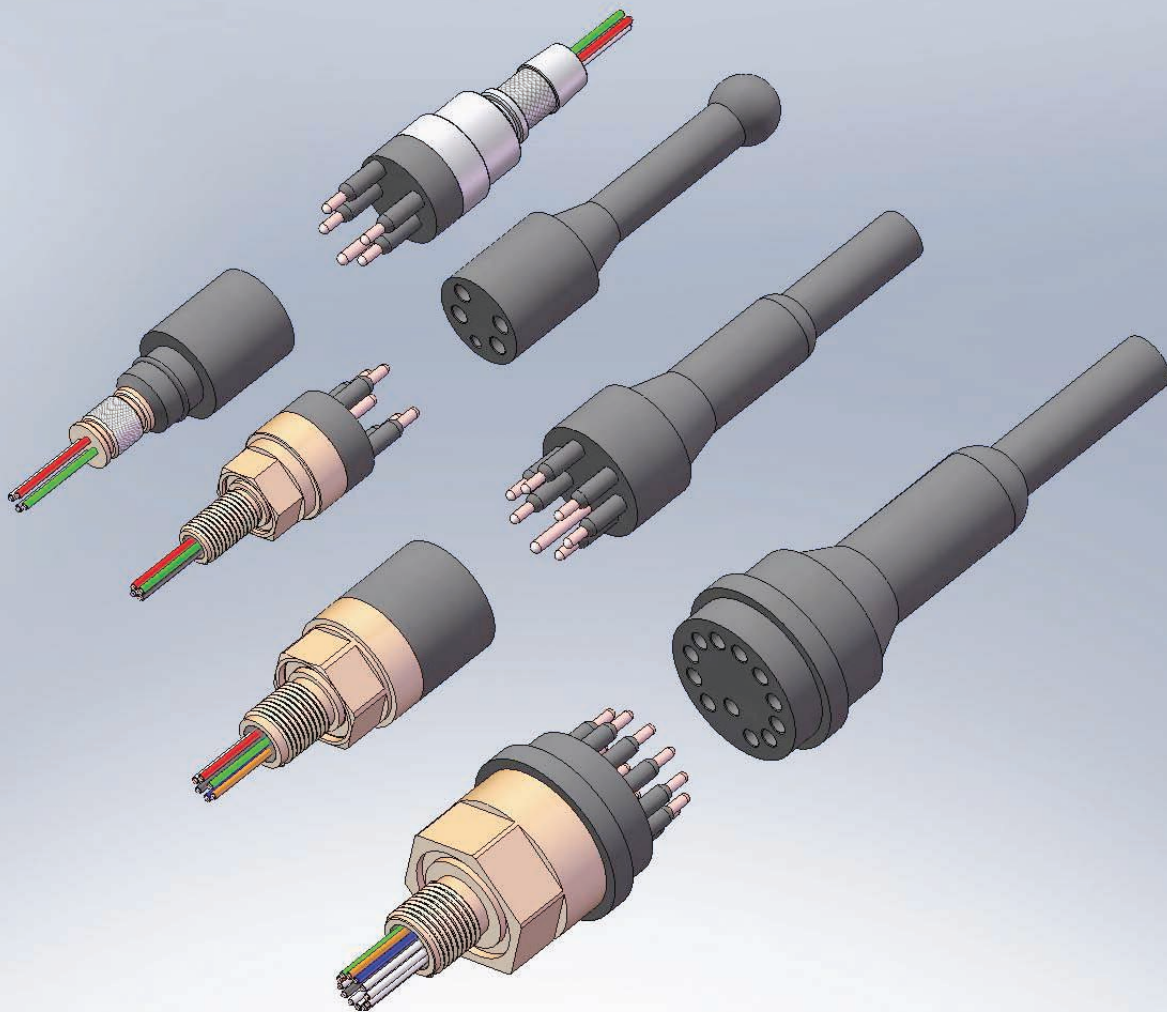


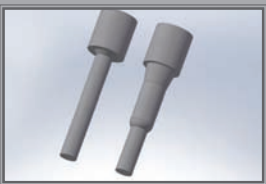

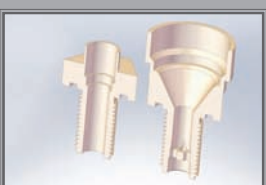

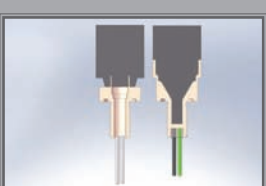


HydroVolt: Underwater Electrical Connectors



Standard HydroVolt: Features & Benefits

HydroVolt is a line of ruggedized, low cost, underwater electrical connector. Previously low cost meant low quality and fragility. Hydro-Volt fills the gap between low cost and rugged high cost connectors. They have many features found only on high cost connectors, yet are price competitive with low cost connectors.

	Molded Bending Strain Relief HydroVolt Inline connectors have an integrally molded bending strain relief. Frequently the cable is flexed right at the cable/connector joint. This is because of the sharp change in the modulus of flexure between the cable and connector. A bending strain relief spreads this change over a distance “relieving” the tendency to bend at one specific point. Image shows comparison between typical competitors connectors and HydroVolt on right.
	Color Coded Leads HydroVolt bulkhead connectors and overmold plugs have color coded leads. The leads are the same color as their mate (the SO cable on the inline connector). This makes conductor tracing easier and more reliable. Non-HydroVolt connectors use a numbered tag on each conductor (which are all the same color, white).
	Bulkhead Pressure Block HydroVolt bulkhead connectors have a true pressure block machined into the metal shell. In case of a catastrophic failure, such as part of the bulkhead being sheared off, a pressure block, can sometimes prevent water intrusion into the pressure vessel. Image shows comparison between typical competitors connectors and HydroVolt on right.
	Improved Overmold Connector HydroVolt has an improved overmold connector which has a much longer sealing area. Additionally, the sealing area has an O-Ring upset to further improve sealing of the boot. Image shows comparison between typical competitors connectors and HydroVolt on right.
	Stronger Neck on Bulkhead A neck is necessary on this style of connector in order to accommodate the industry non-HydroVolt locking sleeve. On non-HydroVolt connectors, it is smaller than necessary. Unfortunately, the head of the bulkhead can therefore be torn off during aggressive disconnection. The neck on the HydroVolt bulk-head, is heavier, and stronger. Damage to the neck of the bulkhead is a frequent complaint for industry non-HydroVolt type connectors. Image shows comparison between typical competitors connectors and HydroVolt on right.

Crimped Contacts

HydroVolt connectors have crimped contacts. Crimped contacts (rather than soldered) are less susceptible to bending fatigue failures. This type of failure occurs because the solder forces the stranded conductor to become a solid conductor at the joint. Connectors are frequently flexed and sometimes pulled by their cable which causes subtle bending and flexing at the contact joint. Crimped joints hold up to flexing better than soldered joints.

Gold Plated Contacts

HydroVolt connectors have gold they reduce the electrical resistance between the pin and socket. Contact resistance can be important in video and digital signal operations. Two, they are not susceptible to normal atmospheric corrosion. Contact corrosion increases contact resistance. Copper and brass contacts corrode right on the shelf. If stored near salt water, such as on a ship, the corrosion can happen quickly. HydroVolt contacts are plated to ASTM B488-01 Type II, which is superseding MIL45204C type II grade C.

Pin Shoulder Radius

The HydroVolt contact pin and insulation shoulder are both radius'd. This makes it easier to mate in darkness or on rough seas. It also reduces the tendency for the shoulder to fray at the pin/shoulder interface, because there is no sharp edge.

Standard HydroVolt: Part Number System & Technical Material Specifications

B H a - 8 B - M P

Contact Type	
MP	Male Pin
FS	Female Socket
HE	Hermaphroditic

Body Size	
M	0.61” OD (mini)
A	.98” OD
B	1.22” OD
C	1.59” OD
L	Low Profile Type

Number of Contacts	
2	
3	
4	
5	
6	
8	
10	
12	
16	

Bulkhead Material (optional)	
a	Aluminum
s	Stainless Steel
t	Titanium

HydroVolt Type	
BH	Bulkhead Connector, Brass
BR	Bulkhead Connector, Right-Angle
DC	Dummy Connector
IL	Inline Connector
IR	Inline Connector, Right-Angle
OM	Overmold Inline Connector
AT	Attachable Inline Connector

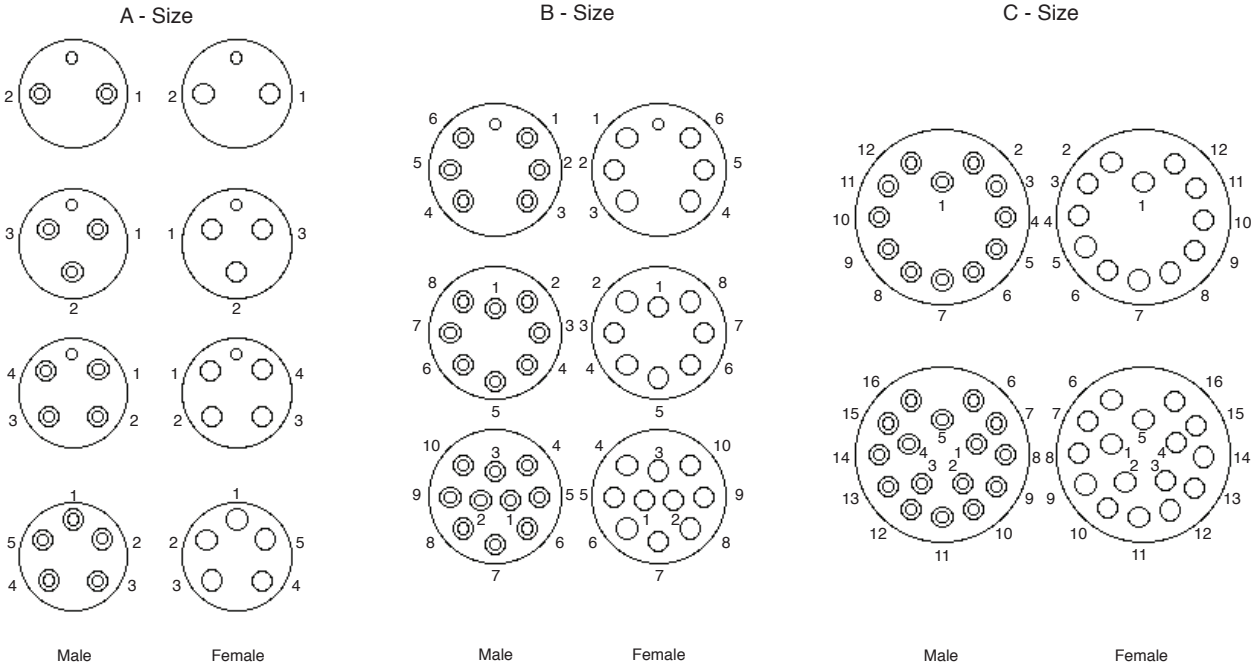
Electrical Specs:	
Component	Spec
Contacts, All	600 Volts
Contacts, 2-4	15 Amps
Contacts, 6-8	10 Amps
Ins. Res.	>200 Meg
Hi-Pot	2500 VAC

Cable Specs:			
# Cond	V rating	OD	Type
2 Mini	300	0.28	SJO
2 Std	600	0.36	SO
3	600	0.37	SO
4	600	0.40	SO
5	600	0.50	SO
6	600	0.53	SO
8	600	0.60	SO
10	600	.066	SO
12	600	0.66	SO
16	600	0.76	SO

Color Code:	
Contacts #	Color
1	Black
2	White
3	Red
4	Green
5	Orange
6	Blue
7	White & Black
8	Red & Black
9	Green & Black
10	Orange & Black
11	Blue & Black
12	Black & White
13	Red & White
14	Green & White
15	Blue & White
16	Black & Red

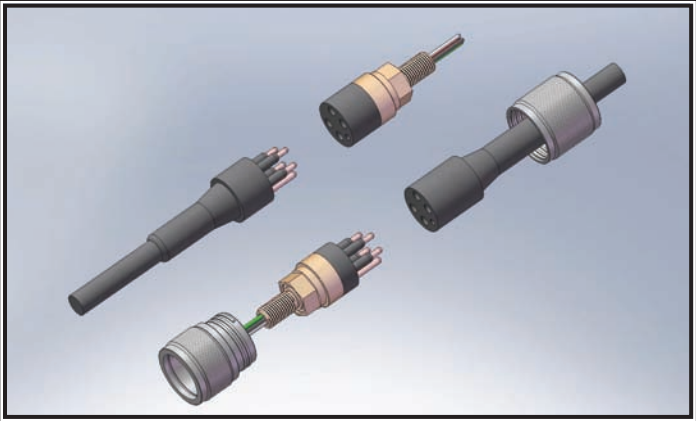
Materials:			
Item	Material	Specifications	Notes
Body	Neoprene	Virgin Electrical Grade	Proprietary Formulation
Bulkheads	Brass	CA-360	Aluminum Optional
Contacts	Brass	CA-360	Gold Plated
Orientation Pin	Brass	CA-360	Gold Plated
Cable	Neoprene	SOW-A	Heavy Duty
Conductors	Teflon	Type E	Color Coded

Standard HydroVolt: Contact Patterns




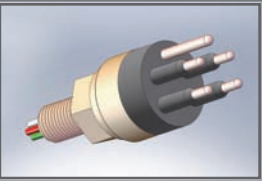
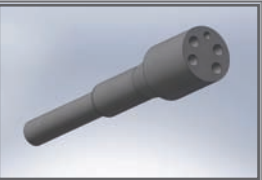
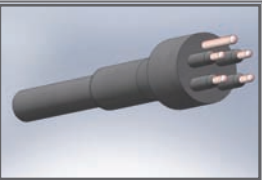
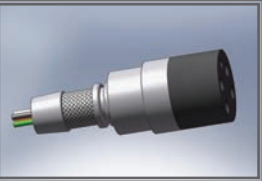
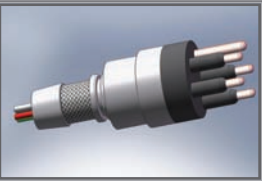

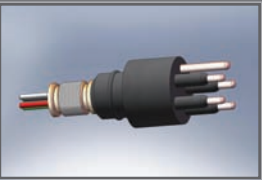

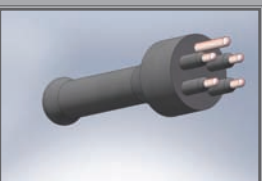

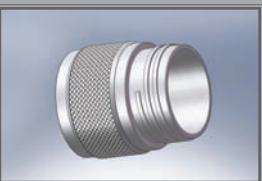
Standard HydroVolt: A - Size, 1" (25mm) dia

HydroVolt: A - Size, 1" (25mm) dia



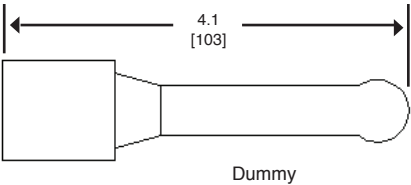
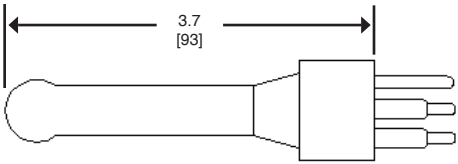
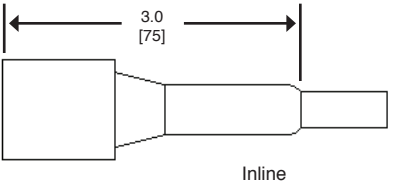
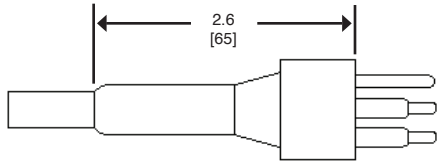
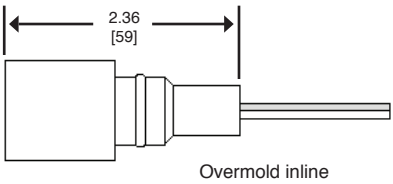
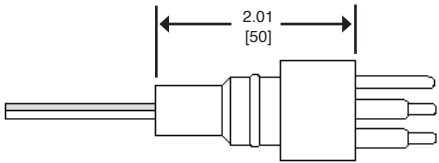
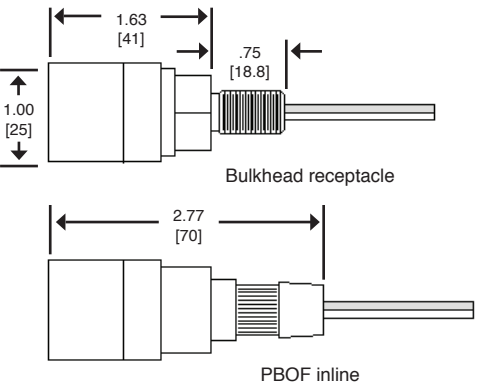
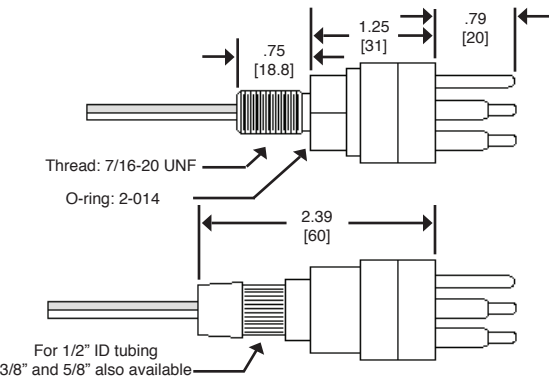
HydroVolt: A - size has a 1.00 inch (25mm) diameter form factor. It is the smallest standard size. Contact patterns available include 2, 3, 4, and 5.

HydroVolt: A - Size, 1" (25mm) dia - Product Range

	Bulkheads: Bulkhead connector receptacles are designed to be mounted to your pressure vessel. They are capable of handling 10,000 psi pressure differential (open face). Bulkheads are available in aluminum, brass, or stainless steel. Other materials can be made by special request.	
	Inlines: Inline connector plugs are available as pigtails or can be molded onto your cable. The standard pigtail length is 1 meter. However, you may specify any length. Inline connectors plug into a bulkhead receptacle or another inline connector.	
	PBOF: PBOF/Overmold connectors may be used as PBPF (pressure balanced oil filled) or overmolded inline connectors. There is a groove that fits standard size boots for use as an overmold type.	
	Overmold: Overmold connectors are for customers who have their own in-house molding capability. The customer may attach almost any type of cable and overmold it to the connector. They have 2 grooves for tensile strength and a knurled area for rotational strength.	
	Dummies: Dummy connectors are used to blank off either a bulkhead receptacle or an inline connector to prevent salt water from touching the gold plated contacts.	
	Locking Sleeves: Although not necessary for operations, locking sleeves can make sure that connectors will not disengage due to pulling loads on the cable. Locking sleeves are available in Delrin, Aluminum or Stainless Steel.	

Standard HydroVolt: A - Size, 1" (25mm) dia

HydroVolt: A - Size, 1" (25mm) dia - Dimensions



HydroVolt: A - Size, 1" (25mm) dia - Locking Sleeves



Locking sleeves are available in several different materials: Delrin, Aluminum 6061, and Stainless Steel 303. We manufacture our own locking sleeves on a Mori Seiki turning center and so we can easily make them with other materials specified by the customer.

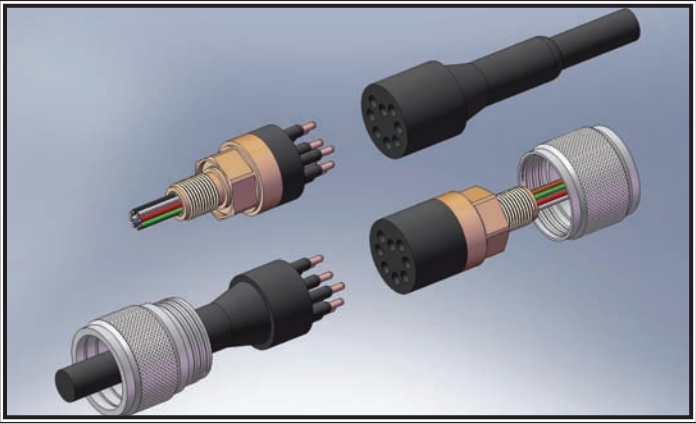
Standard locking sleeves are available with the traditional snap ring groove. They are very convenient for adding a locking sleeve after a bulkhead has been installed, or anytime on a cable assembly. We have snaps made from Stainless Steel 302, and also Aluminum 6061 (mostly for use with aluminum bulkheads). Aluminum snap rings are much better in contact with aluminum bulkheads for galvanic corrosion reasons.

Locking sleeves are also available with a shoulder instead of a snap ring.

Locking sleeves are not necessary for the functionality of HydroVolt connectors. However, some customers prefer the assurance that the connectors will not become disengaged by pulling on a cable.

Standard HydroVolt: B - Size, 1.25" (32mm) dia

HydroVolt: B - Size, 1.25" (32mm) dia



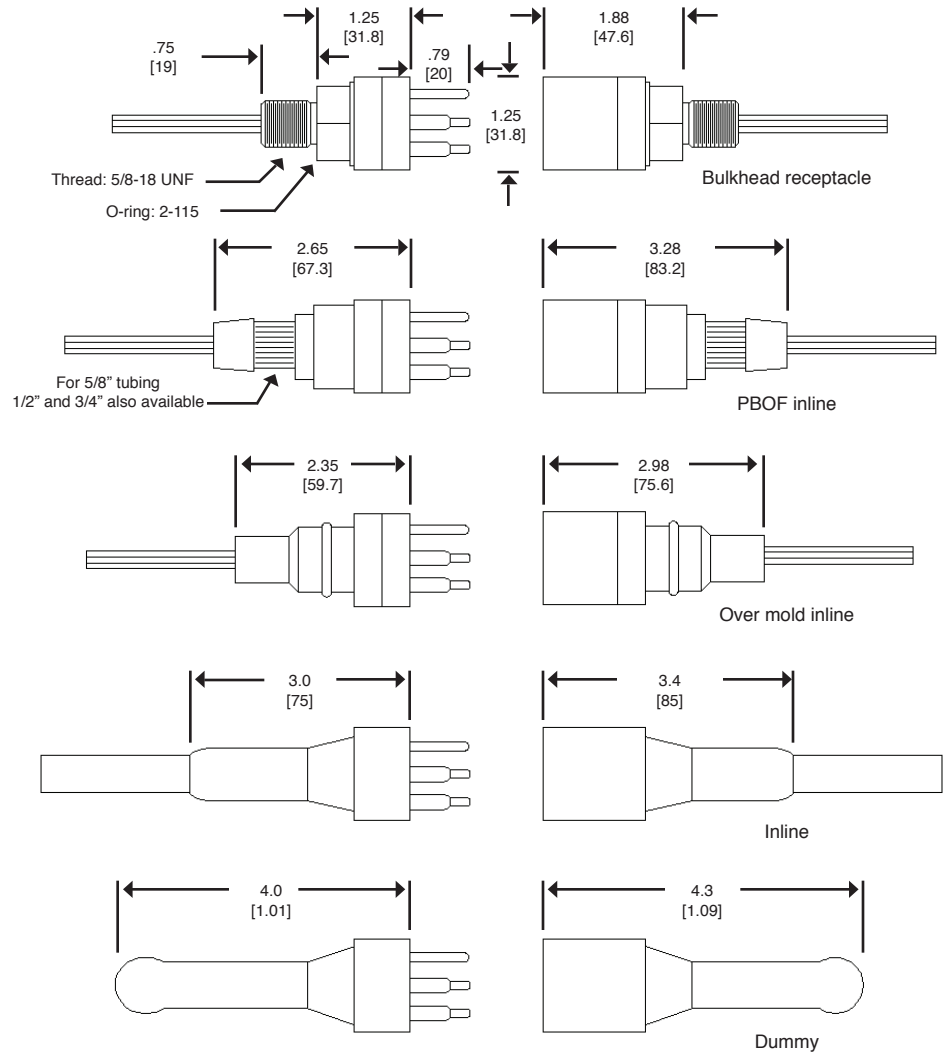
HydroVolt: B - size has a 1.25 inch (32mm) diameter form factor. It is the intermediate standard size. Contact patterns available include 6, 8, and 10.

HydroVolt: B - Size, 1.25" (32mm) dia - Product Range

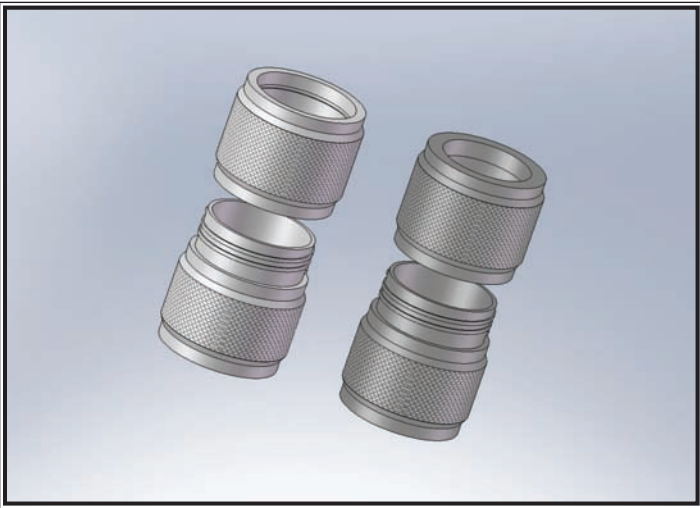
	Bulkheads: Bulkhead connector receptacles are designed to be mounted to your pressure vessel. They are capable of handling 10,000 psi pressure differential (open face). Bulkheads are available in aluminum, brass, or stainless steel. Other materials can be made by special request.	
	Inlines: Inline connector plugs are available as pigtails or can be molded onto your cable. The standard pigtail length is 1 meter. However, you may specify any length. Inline connectors plug into a bulkhead receptacle or another inline connector.	
	PBOF: PBOF/Overmold connectors may be used as PBPF (pressure balanced oil filled) or overmolded inline connectors. There is a groove that fits standard size boots for use as an overmold type.	
	Overmold: Overmold connectors are for customers who have their own in-house molding capability. The customer may attach almost any type of cable and overmold it to the connector. They have 2 grooves for tensile strength and a knurled area for rotational strength.	
	Dummies: Dummy connectors are used to blank off either a bulkhead receptacle or an inline connector to prevent salt water from touching the gold plated contacts.	
	Locking Sleeves: Although not necessary for operations, locking sleeves can make sure that connectors will not disengage due to pulling loads on the cable. Locking sleeves are available in Delrin, Aluminum or Stainless Steel.	

Standard HydroVolt: B - Size, 1.25" (32mm) dia

HydroVolt: B - Size, 1.25" (32mm) dia - Dimensions



HydroVolt: B - Size, 1.25" (32mm) dia - Locking Sleeves



Locking sleeves are available in several different materials. Delrin, Aluminum 6061, and Stainless Steel 303. We manufacture our own locking sleeves on a Mori Seiki turning center and so we can easily make them with other materials specified by the customer.

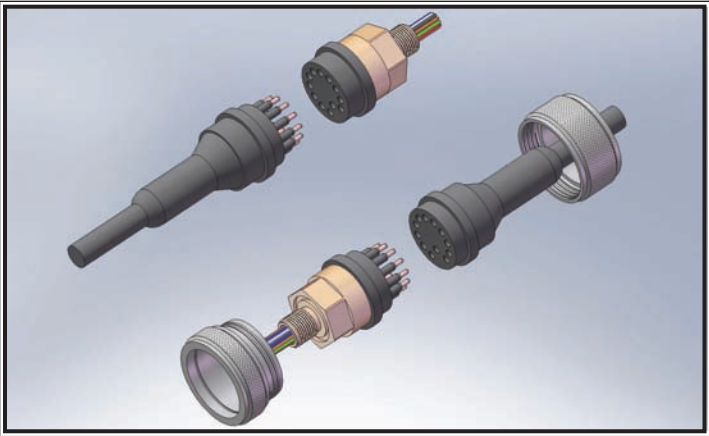
Standard locking sleeves are available with the traditional snap ring groove. They are very convenient for adding a locking sleeve after a bulkhead has been installed, or anytime on a cable assembly. We have snap rings made from Stainless Steel 302, and also Aluminum 6061 (mostly for use with aluminum bulkheads.) Aluminum snap rings are much better in contact with aluminum bulkheads for galvanic corrosion reasons.

B - size male locking sleeves have a second groove. That is because the female bulkhead in the B - size is approximately 0.25" longer than the inline. The reason is due to the contact pattern bolt circle is close to the outer edge. That forced the sockets forward lest they be to close to the shell.

Locking sleeves are not necessary for the functionality of Hydro-Volt connectors. However, some customers prefer the assurance that the connectors will not become disengaged by pulling on a cable.

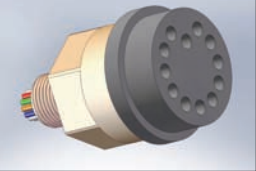
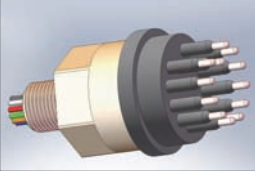



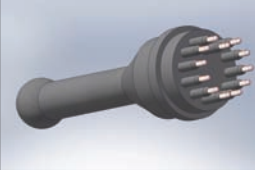
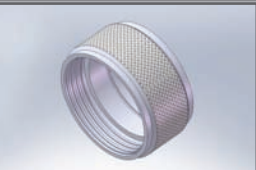
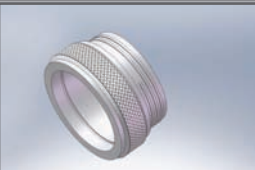
Standard HydroVolt: C - Size, 1.60" (41mm) dia

HydroVolt: C - Size, 1.60" (41mm) dia



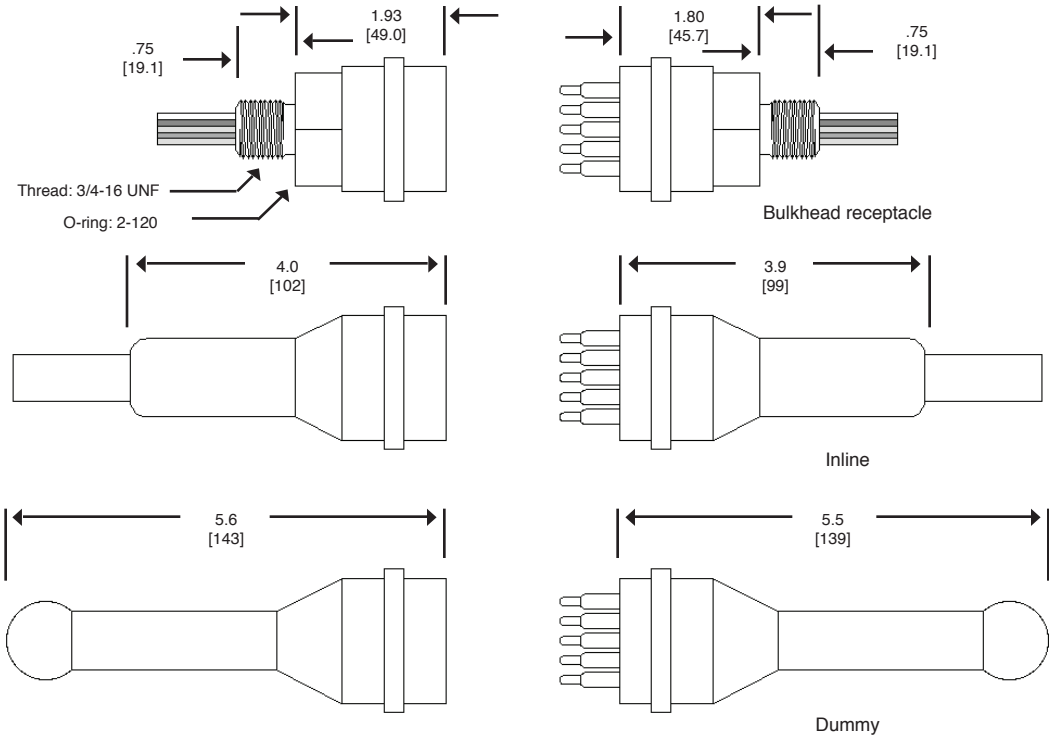
HydroVolt: C - size has a 1.60 inch (41mm) diameter form factor. It is the largest standard size. Contact patterns available include 12 and 16.

HydroVolt: C - Size, 1.60" (41mm) dia - Product Range

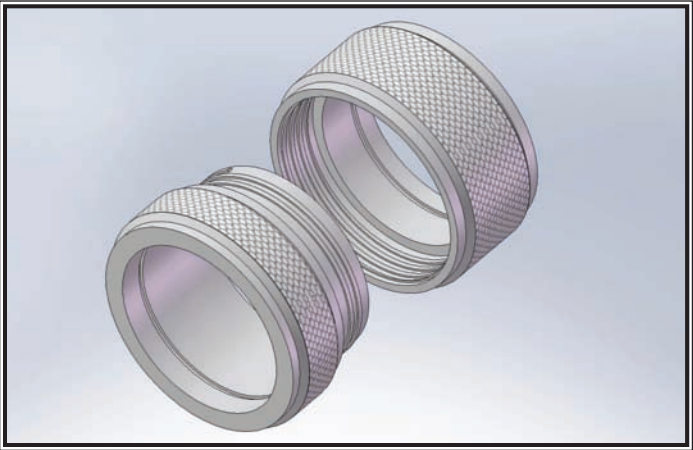
	Bulkheads: Bulkhead connector receptacles are designed to be mounted to your pressure vessel. They are capable of handling 10,000 psi pressure differential (open face). Bulkheads are available in aluminum, brass, or stainless steel. Other materials can be made by special request	
	Inlines: Inline connector plugs are available as pigtails or can be molded onto your cable. The standard pigtail length is 1 meter. However, you may specify any length. Inline connectors plug into a bulkhead receptacle or another inline connector.	
	Dummies: Dummy connectors are used to blank off either a bulkhead receptacle, or an inline connector to prevent salt water from touching the gold plated contacts.	
	Locking Sleeves: Although not necessary for operations, locking sleeves can make sure that connectors will not disengage due to pulling loads on the cable. Locking sleeves are available in Delrin, Aluminum or Stainless Steel.	

Standard HydroVolt: C - Size, 1.60" (41mm) dia

HydroVolt: C - Size, 1.60" (41mm) dia - Dimensions



HydroVolt: C - Size, 1.60" (41mm) dia - Locking Sleeves



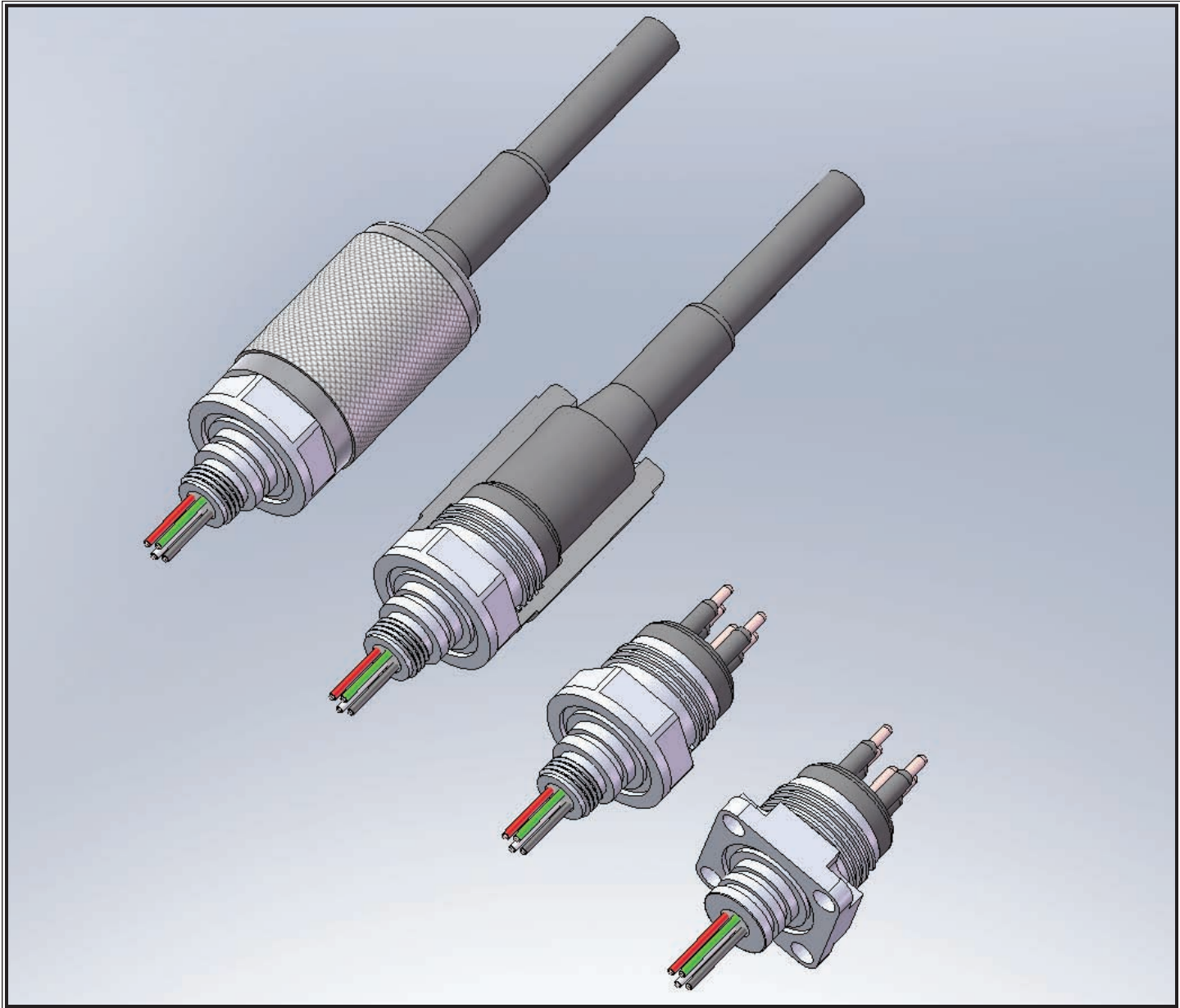
Locking sleeves are not necessary for the functionality of Hydro-Volt connectors. However, some customers prefer the assurance that the connectors will not become disengaged by pulling on a cable.

Locking sleeves are available in several different materials. Delrin, Aluminum 6061, and Stainless Steel 303. We manufacture our own locking sleeves on a Mori Seiki turning center and so we can easily make them with other materials specified by the customer.

Standard locking sleeves are available with the traditional snap ring groove. They are very convenient for adding a locking sleeve after a bulkhead has been installed, or anytime on a cable assembly. We have snap rings made from Stainless Steel 302, and also Aluminum 6061 (mostly for use with aluminum bulkheads).

HydroVolt: BOS (Bulkhead on Steroids)

HydroVolt: A - Size, BOS



The HydroVolt BOS is a very rugged receptacle. The acronym stands for “bulkhead on steroids.” It has the same contact patterns as existing HydroVolt. Therefore it mates to all existing inline, PBOF, and overmold connectors. Use the BOS for your most difficult and demanding applications.

The advantages of the BOS are:

- Ruggedness of the shell
- Off-axis load capability
- Dual O-ring seals.

Ruggedness of the shell

The BOS shell is heavier and stronger. Every cross sectional wall is at least 50% thicker than our standard HydroVolt. This is a very rugged connector.

Off-axis load capability

Used in conjunction with our new heavy wall, tight fitting locking

sleeve, the BOS provides off-axis load capability. This capability has never been available before in a low cost connector.

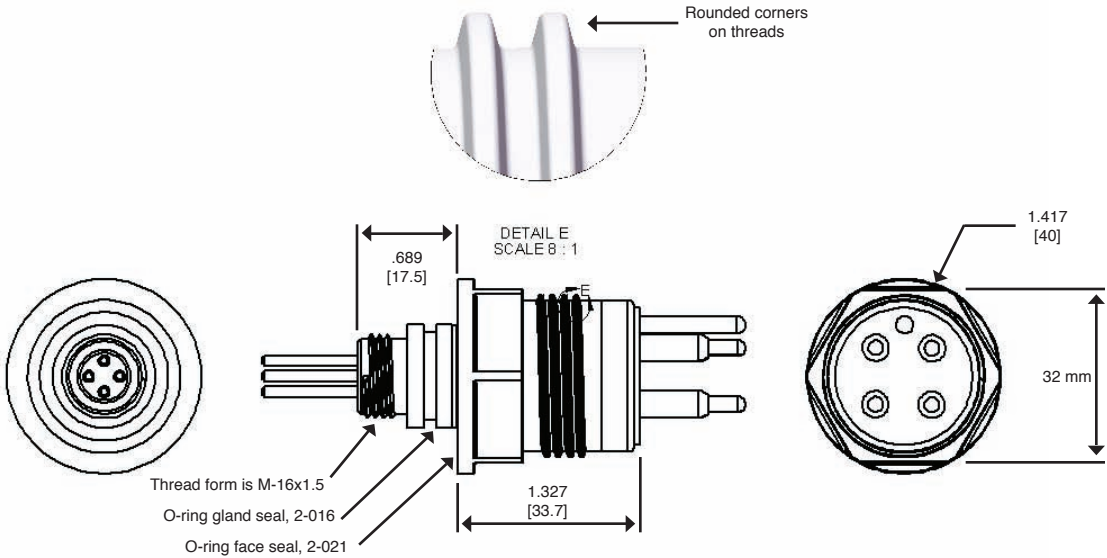
Dual O-ring seals

The BOS receptacle has dual O-ring seals. In addition to the traditional face seal, it also a gland type O-ring seal. The gland seal provides a backup to the face seal. It also is a better type of seal for internal or backpressure situations such as pressurized J-boxes or motors.

There are 2 disadvantages to switching to the BOS. One, it has a larger diameter shank so existing drilled and tapped holes will be too small. Customers will have to do additional machining to existing equipment. Two, it uses a different locking sleeve in order to provide off-axis strength.

HydroVolt: BOS (Bulkhead on Steroids)

HydroVolt: A - Size, BOS - Dimensions

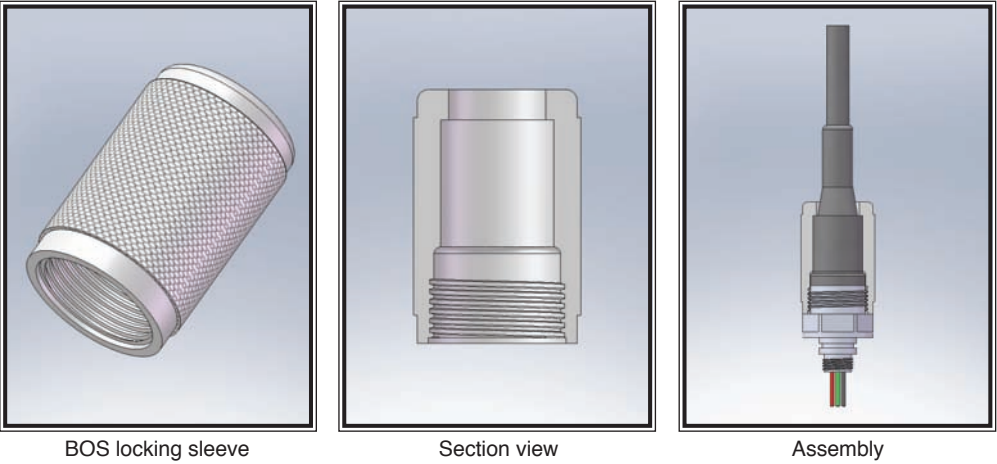


HydroVolt: A - Size, BOS - Locking Sleeves

The BOS locking sleeve is different from, and not compatible with standard HydroVolt locking sleeves. This is unfortunate but necessary.

The BOS locking sleeves are different in several ways:

- 1) They use a new optimized thread form that has rounded corners for better anodization on the bulkhead shell.
- 2) They are longer and have a tighter fit to provide off-axis load capability (in addition to tensile load).
- 3) They are heavier and stronger.



BOS locking sleeve

Section view

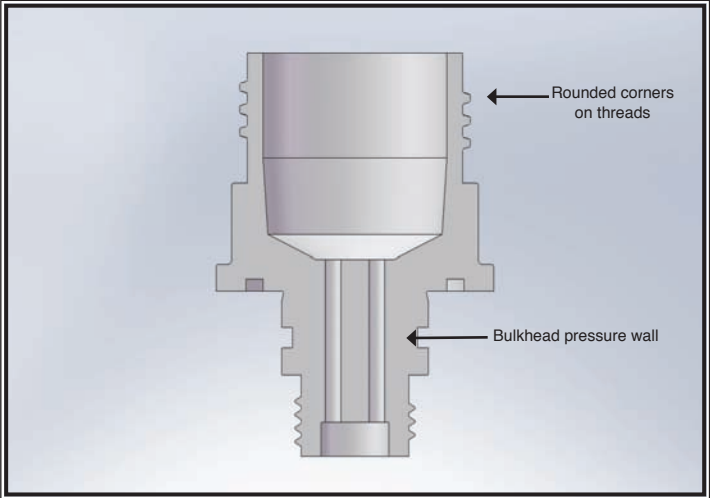
Assembly

HydroVolt: A - Size, BOS - Shell Diagram

This is a cross section of the BOS shell. As you can see, it is very rugged. To the best of our knowledge, it is the strongest and most rugged shell available for this type of connector.

In this drawing, you can see several unique features only available with HydroVolt. Please take note of the bulkhead pressure wall. All other manufactures have a thru-hole where the conductors pass through together. The bulkhead pressure wall is more expensive to machine, but makes for a stronger shell.

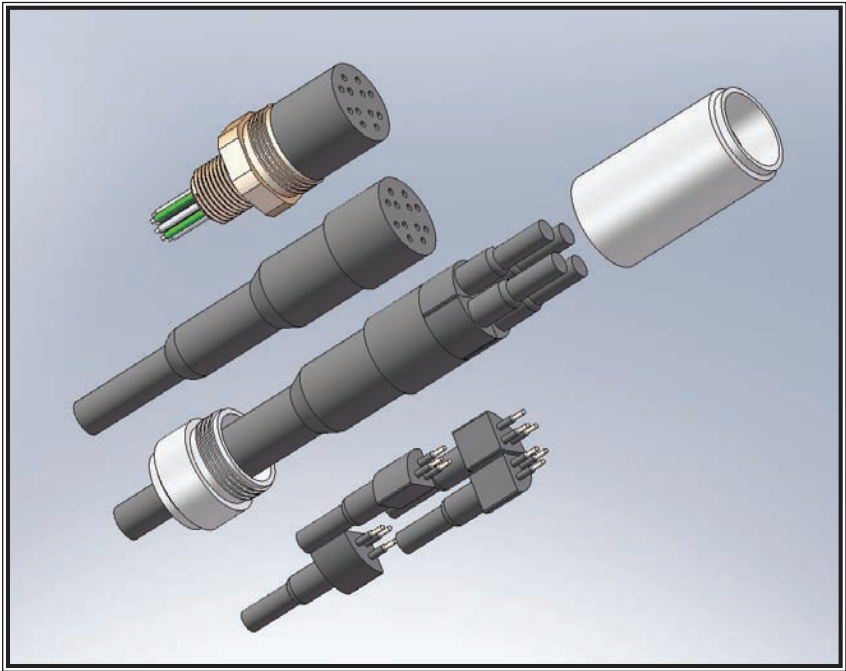
Another unique feature is rounded corners on the threads. This is a major advantage for aluminum body connectors. Anodizing does not like sharp corners. HydroVolt BOS has no sharp corners exposed to the environment.



BOS bulkhead shell, section view

HydroVolt: Segmented Connector (HSC)

HydroVolt: Segmented Connector (HSC)



Advantages of the HSC (HydroVolt Segmented Con-
nector)

- Smaller total footprint
- Simplified wiring for power distribution
- Cost savings overall

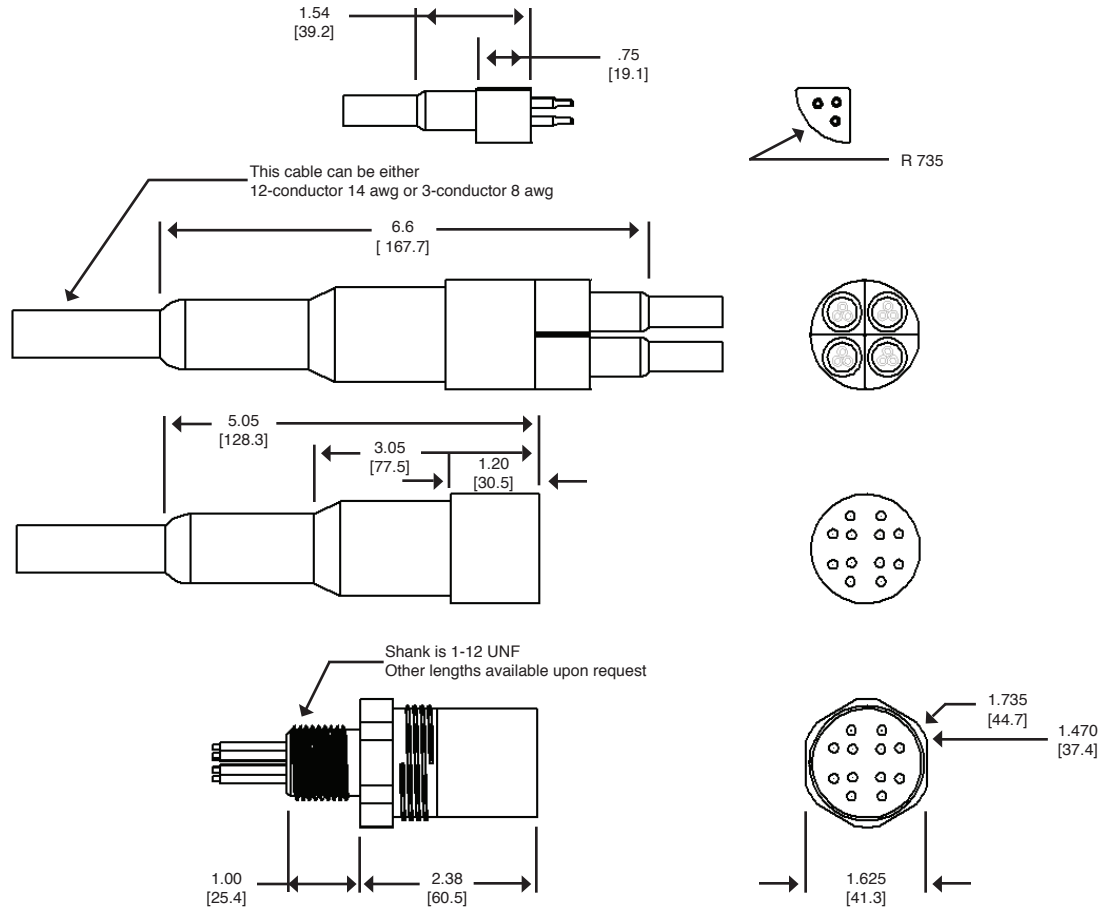
Smaller total footprint
The HSC receptacle footprint is large. However, it is smaller than 4 individual receptacles.

Simplified wiring for power distribution
If the customer is powering multiple lights or motors from the same source, wiring can be much simpler. That is because the receptacle can have either 3 or 4 power leads (instead of 9 or 12). Power distribution is done inside the receptacle. You can think of it as a junction box within a receptacle.

Cost savings overall
It is less expensive to use the HSC than individual sets of receptacles and inlines. It is also less expensive than using a single power line and a junction box.

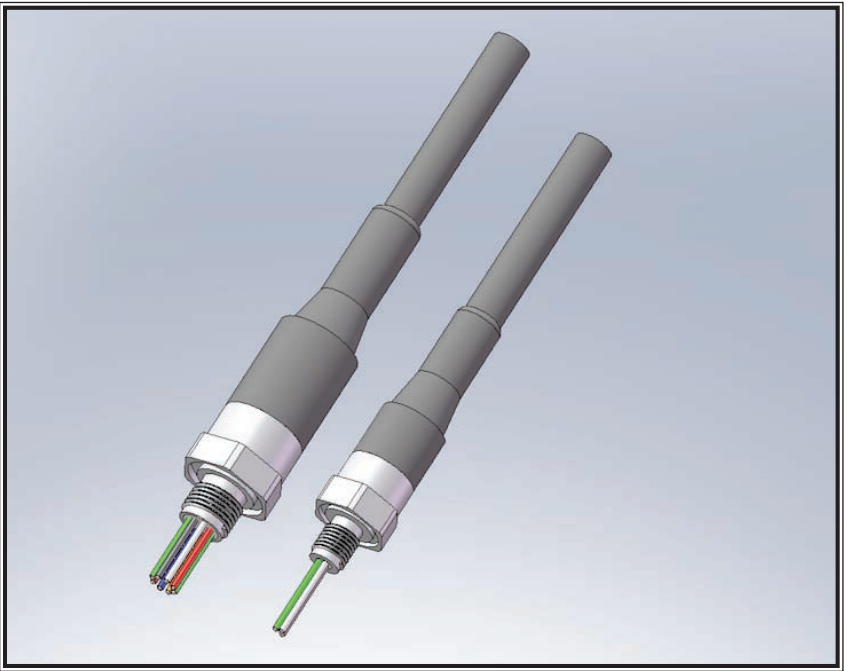
The HydroVolt Segmented Connector is an innovative way to have multiple independent or common inline connections to a single receptacle.

HydroVolt: Segmented Connector (HSC) - Dimensions



HydroVolt: Penetrators (BP)

HydroVolt: Penetrators (BP)



though they do not have pins and sockets, they do have “blind” conductor level water-blocking.

The advantages of the HydroVolt penetrator are:

- Cannot be accidentally disconnected
- Lower cost than an equivalent mated set
- Smaller form factor than a mated set

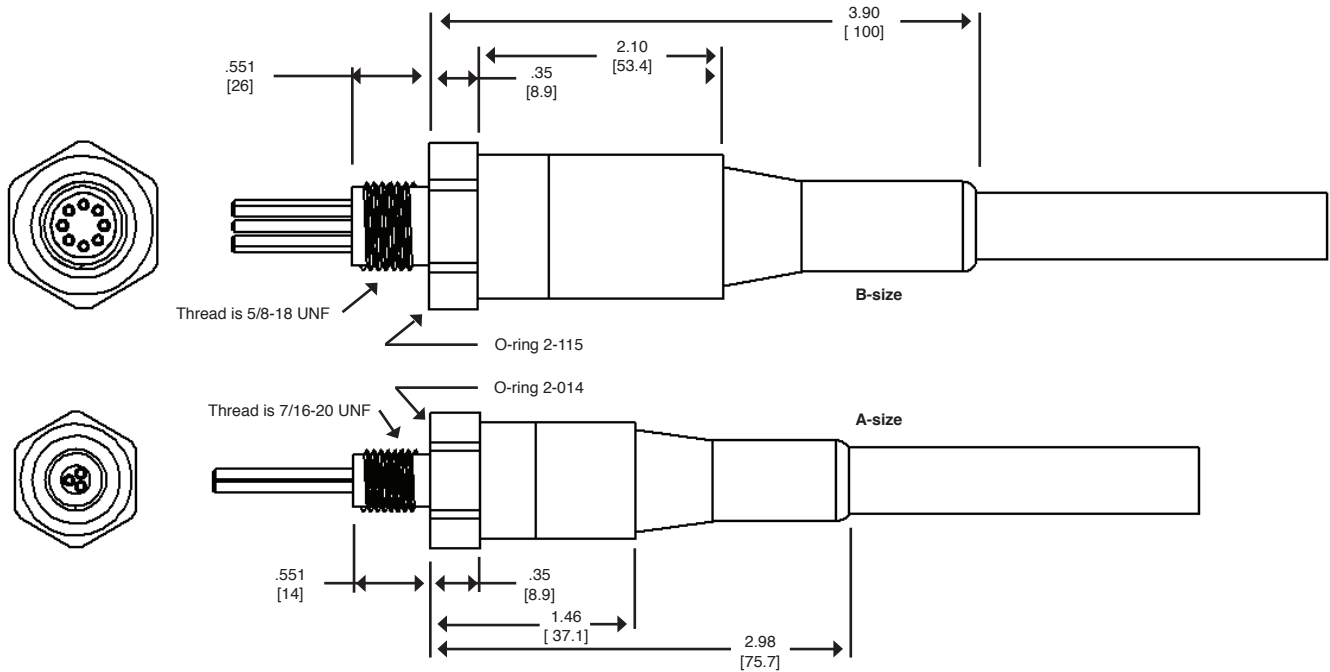
Cannot be accidentally disconnected
HydroVolt penetrators are an integrally molded unit. They cannot be disconnected.

Lower cost than an equivalent mated set
HydroVolt penetrators cost less than a mated set of connectors.

Smaller form factor than a mated set
Because HydroVolt penetrators do not have traditional pins and sockets, the same number of circuits can exist in a smaller space.

HydroVolt penetrators are used in situations where disconnection is unnecessary or undesirable. They are less expensive than a set of bulkhead and inline. All contact patterns are available as penetrators, and they are slightly smaller than a mated set. Even

HydroVolt: Penetrators (BP) - Dimensions



HydroVolt: Low Profile Series (LP)

HydroVolt: Low Profile Series (LP)

The HydroVolt Low Profile series is a rugged and compact right-angle receptacle series of connectors. It is the most rugged low profile design available. It also has a number of other advantages over its competitors.

Advantages of the HydroVolt Low Profile series

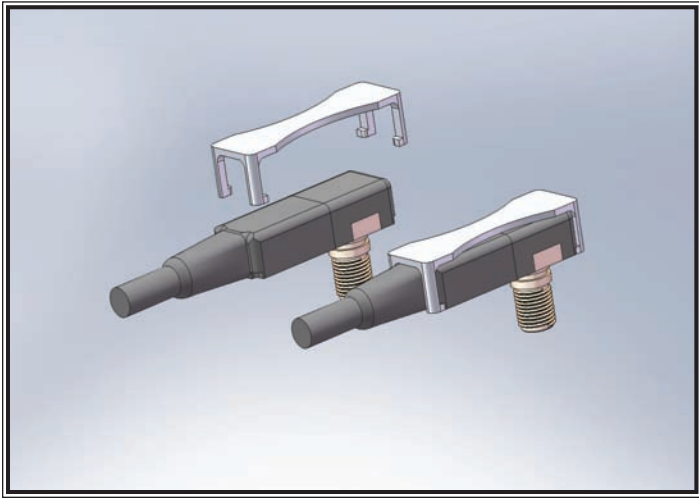
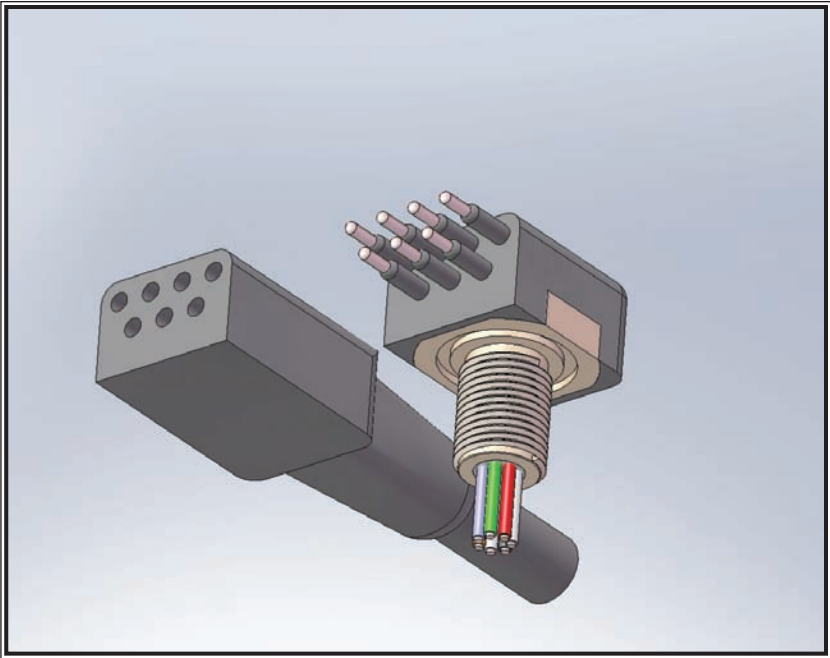
- Extremely rugged design
- Innovative new retaining system
- Multiple shank lengths to choose from

Extremely rugged design

The HydroVolt Low Profile series is much more rugged than any other low profile designs that we are aware of. The shell is machined from large stock and is not symmetrical around the primary axis. This means that it is virtually impossible to twist the head off of the shell (that is a know weakness with other low profile connectors).

Innovative new retaining system

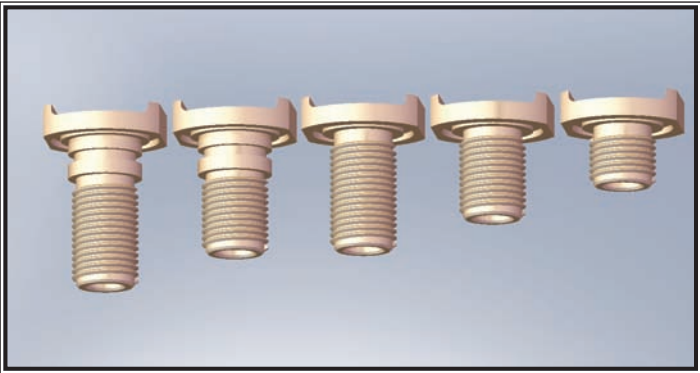
The disadvantage of low profile designs has always been the difficulty of adding any kind of locking device to hold the plug and receptacle together. We have developed an innovative new retaining system. We call it a retaining spider. It can be snapped into place after mating. It is the same width as the connectors so does not interfere with mounting in a channel.



Retaining system

Multiple shank lengths and styles to choose from

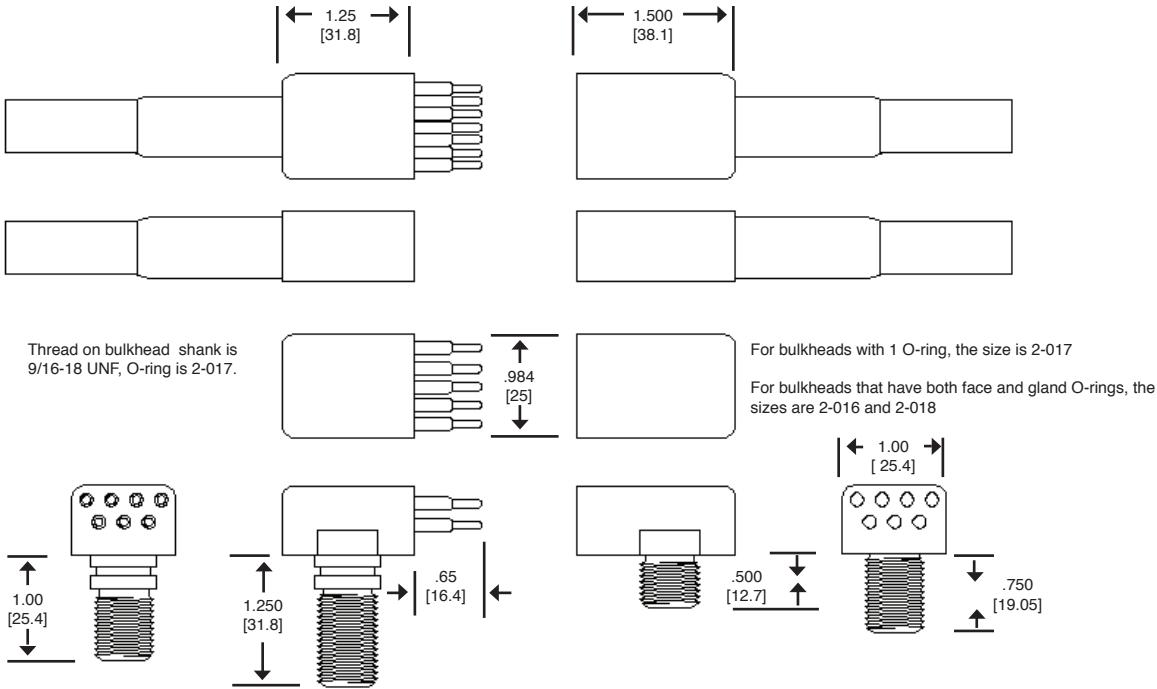
With a right angle receptacle, the customer usually needs to control the clocking (axis of direction). With a bulkhead type of receptacle, this requires that a retaining nut arrangement be used. However, mounting thickness' are different depending on application and depth. With HydroVolt LP connectors, the customer may specify the shank length and type for his application.



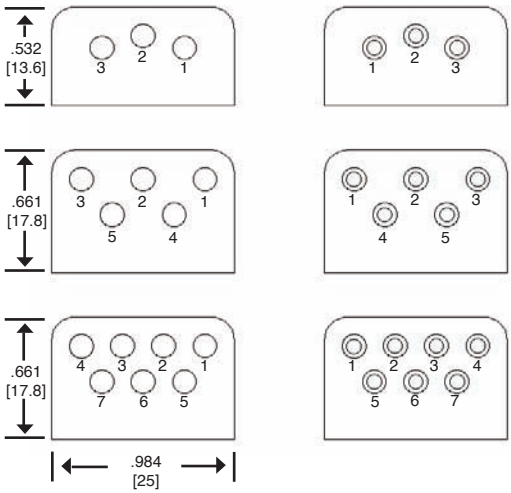
Shank lengths

HydroVolt: Low Profile Series (LP)

HydroVolt: Low Profile Series (LP) - Dimensions



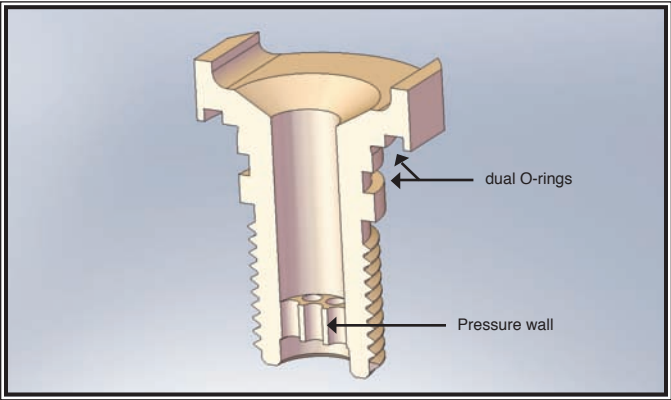
HydroVolt: Low Profile Series (LP) - Contact Patterns



HydroVolt: Low Profile Series (LP) - Shell Diagram

The HydroVolt Low Profile bulkhead shell is stronger than any competing connector. The HydroVolt shank is larger with 9/16-18 threads. Our competitors all use 7/16-20. Also, the HydroVolt shank has a pressure wall. Our competitors do not have that feature. Their shank is drilled through and all conductors go through the same hole.

Another major feature is that the HydroVolt LP shell is asymmetric about the axis. Please note the "ears" that protrude up the sides. They make it essentially impossible to twist off the rubber head.



Locking sleeve shell, sectional view

AK Industries: About Us

AK Industries was started in 1995 by Allan Kidd who is the sole owner. Previously he was the long time Product Manager for Burton Electrical Engineering's underwater division. Mr. Kidd maintains his relationship with Burton, now Cooper Interconnect, as a technical consultant. AK Industries and Burton share many of the same distributors and work together at trade shows and on special projects.

Over the last 12 years, AK Industries has grown substantially. Today they employ approximately 10 persons and work out of a 17,000 square foot building.

AK Industries is committed to the highest quality standards. We operate a world class machine shop, fabrication shop, and molding facility. By manufacturing virtually all of the components in-house, we can assure quality as well as deliverability.



In our humble opinion, we offer the highest quality underwater electrical connectors, fast delivery, and best value in the industry, of the product types that we supply. Please browse our website and see for yourself if we can back up this claim.



For additional questions or information regarding AK Industries please visit our website www.ak-ind.com or e-mail info@ak-ind.com.

We are also committed to the fastest possible deliver. Virtually all standard products are in substantial quantities.

Special products can be delivered relatively quickly due to the in-house design and tooling capability.

Thank you for your interest in AK Industries.

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