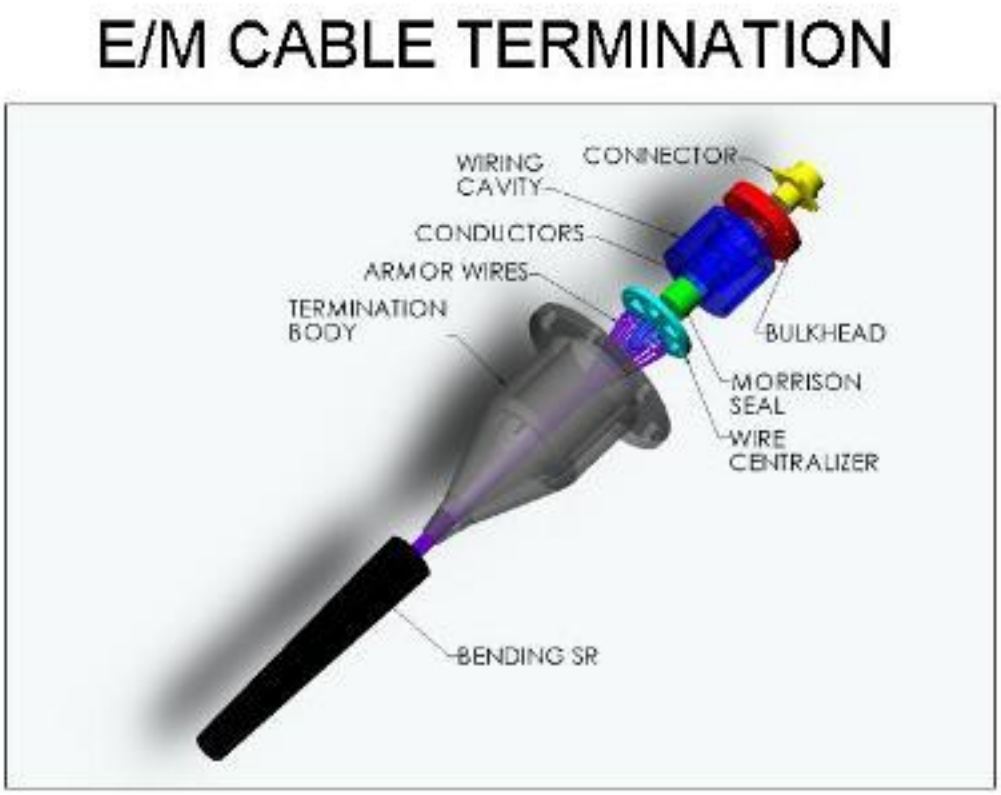
ESP GG EM CABLE FABRICATION/TERMINATION 3/28/11

\\Tornado\projectlibrary\ESP\TopLevelAssy\ShallowWaterMooring

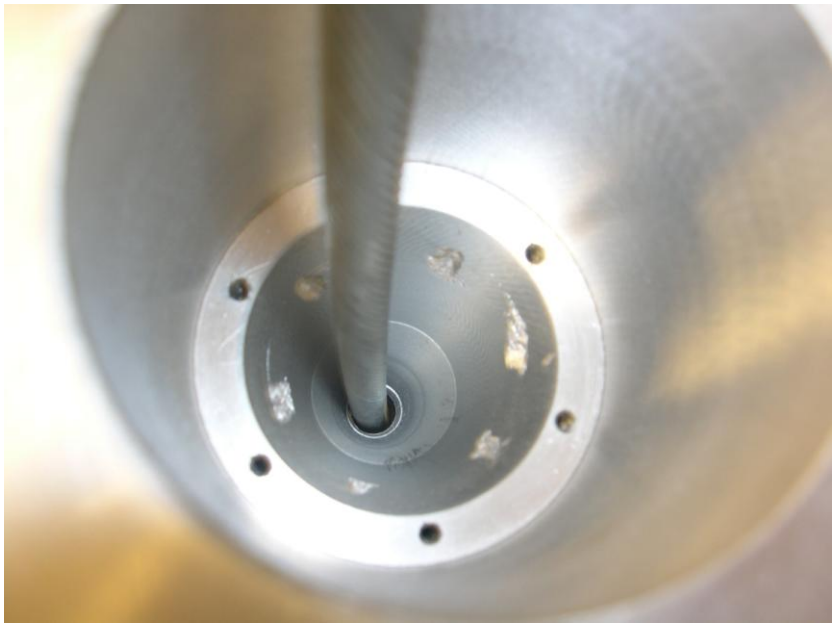
This shallow water version started with a supplied cable cut to 16 meters, finished length to be about 15 meters.

DRAWINGS AND PARTS: Connector Plate-100894, Wire Centalizer-100895, Connector Spacer-100896, EM Cable Termination housing-102754 (8/07 100897 DWG), Molded Silicon Wire Morrison Seal (molded here), EVERFLEX 802-DEF-3 Bending Strain relief, (8/07 PMI EVERFLEX #1).



MATERIALS AND TOOLS
ESCO SocketFast Resin for wire rope socketing, 300gms BC Wire, (Alt.-CROSBY W416-7, 100 cc X 2)
Silastic J from Dow Corning or Smooth-Sil 950 from Smooth-On for Morrison seal molding
Seizing Wire, , .025-0.035 dia., Galvanized and Annealed
0.50 " Diameter Heat shrink
Bead Blaster that has good control of stream
DMM to check for electrical isolation between housing and cable
Lineman's, Round Nose and Needle nose pliers
Electrical Tape
6-32 socket head screws, 6 x 3/8" and 6 x 3 ", may have to shorten to 2.9" and bevel threaded end
2-131 O'ring
Food grade Silicon spray Lube

PRELIMINARIES:
Bore out Housings to 0.430 Diameter to clear cable .368" plus 1st layer of heat shrink insulation
Confirm or Fabricate locking grooves in cone area. ¼" x 0.1" ~0.5" below lip, see photo
Clean grease etc. off inside of Housing
Slide Strain Relief and Housing down cable
Morrison Seal cut to 0.70" length, See end of document for details.
Chamfer lead-in edge of Morrison Seal Cavity in Connector Block
MinK10FCR from Sea-Con, sometimes long lead time.



INITIAL PROCEDURE:

Chase 6-32 threads at inside bottom of Termination Body to confirm 0.6 depth, plug or bottom tap

Apply 6- 10 wraps seizing wire about 20" down cable, make sure locking twist will be in coned section of Housing and not jammed in entrance area.

Slip a 3" piece of heat shrink down the cable, shrink into place with upper end just covering the seizing.

Slip a ½" section down and shrink into position just covering the bump made by the seizing. This becomes the seating point and extra electrical isolation (corrosion) for the Housing. See p.4 picture.

Gently tighten a small worm clamp around the heat shrink at the seize wire location to temporarily protect it from damage while we are "brooming" the cable's strength wires.

BROOMING PROCEDURE:

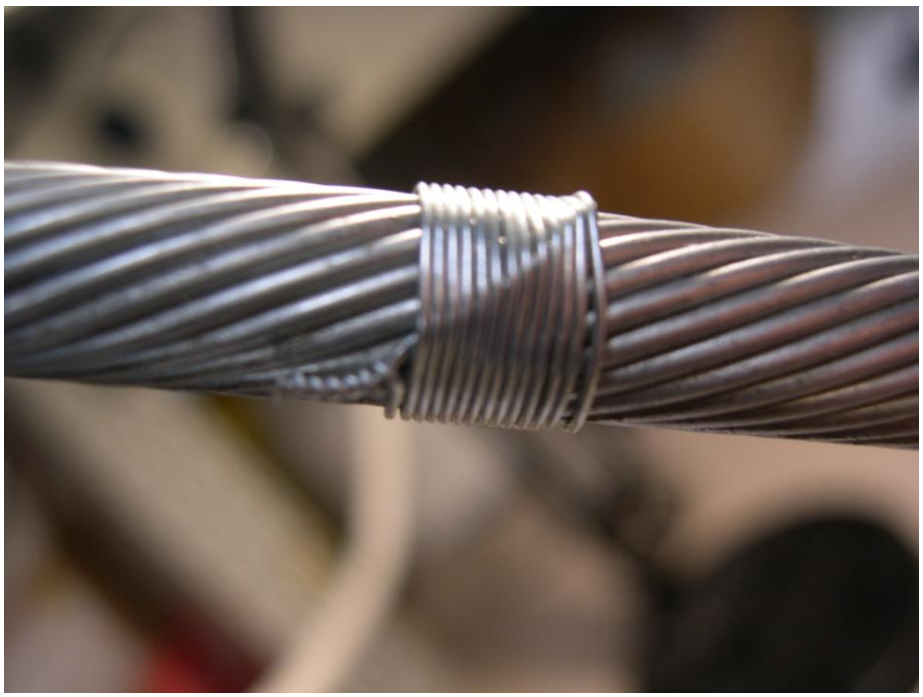
The max width of the spread out wires must be less than 1 ½" at the top.

Work methodically and carefully

Start with the outer layer, unraveling the strands, do not bend outward too much, hard to bend back to 1 ½"

Cut these off at about 4" to make it easier to handle and do the straightening process.

Reasonably straighten the outer larger wires avoiding kinks and nicks, round nose pliers help



Mark at 3” length from the bottom of the seizing (seating point in the cone)

Cut off at 3”, looping the top later will bring finished length to ~2 .7” so clears centralizing ring

Leave the black covering on the Copper wires as protection for now

Continue the Brooming with the thinner inner layer

Use the same procedure, access to base is more difficult for straighting, OK if not perfect

Cut off at 3” and spread all wires somewhat evenly noting 1 1/2” dia. Max.

Carefully put a small loop (round nose) bringing tip back under slightly on all cable wires

Sand blast carefully, avoiding damage to Copper wires and Heat Shrink, this will clean and abrade the cable wires for better resin adhesion. Blow-out and chase 6-32 threads to clean out grit (Alt. procedure is to solvent clean and sand each one)

Remove the black covering from the Cu wires down to ~ 1/2 ” below the level of the loops.

Separate and solvent clean the Copper wires, black in the middle. NOTE twist direction.

This cleaned section and the loops will lock into the socketing resin

Now fit check the broomed ass’y , remove temp. clamp, check for about ¼” clearance beneath centralizer mounting lip and ***no*** electrical contact of the cable to the alum housing, use a DVM

Adjust cable wires as req'd. When potted, loops must be covered and resin still be below centralizer

Solvent clean all parts again, fingerprints, etc.

Carefully slide the centralizer part way down the wire loom maintaining the sequence as they exit the covered portion. This will make final connector wiring easier. Use a DVM, clocking from red wire, one end will be clockwise, the other CCW to follow the twist direction.

Slide loom into the housing, recheck clearances and isolation, fix cable below the housing so is stabile.

Seal exit so resin will not leak out or foul threads of strain relief, electrical tape work well

THE OTHER END

Repeat all the above making sure to slide strain relief and housing onto cable before starting brooming

POURING RESIN

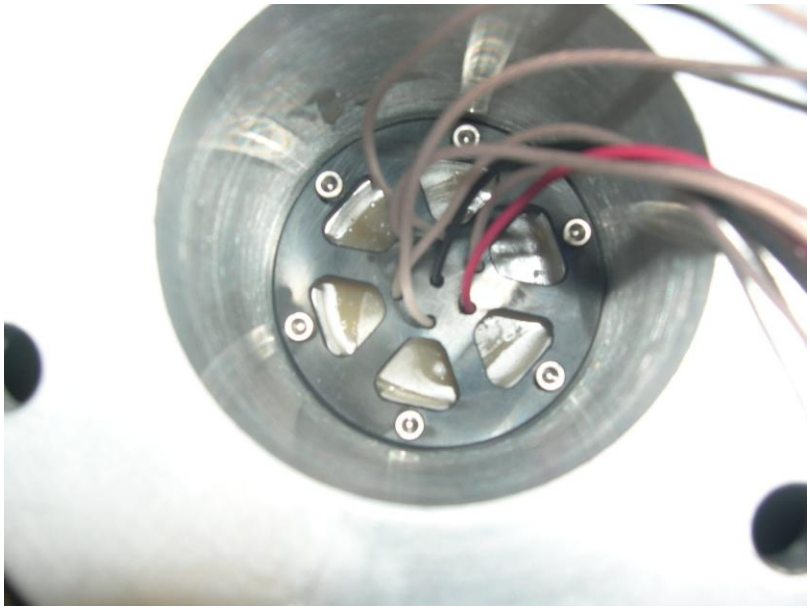
Get 6 x 6-32 x 3/8 screws, allen drive, gloves, ventilation on, and potting resin on hand

We won't use much of the 250/300 grms, but need 2 x 100 cc of Crosby Wirelock, but need to use whole thing since catalyst volume is pre-measured for the can-full. Mix very thoroughly, scaping edges and bottom. Total of ~130 CC.

Thoroughly mix resin, scraping settled contents off bottom of can

Open catalyst and mix all of it into the can, mix well, you have about 15 minutes working time. Degas if sufficient working time available.

Avoiding the Copper wires, pour mixed resin slowly so air bubbles leave and wires are fully covered. Stop when about 1/8" below the level of the screw holes (bottom of centralizer)



Slide centralizer into position, temporarily hold down with 6-32's

Quickly check for resin on wire insulation, clean off, this is the watertight seal area and must be smooth

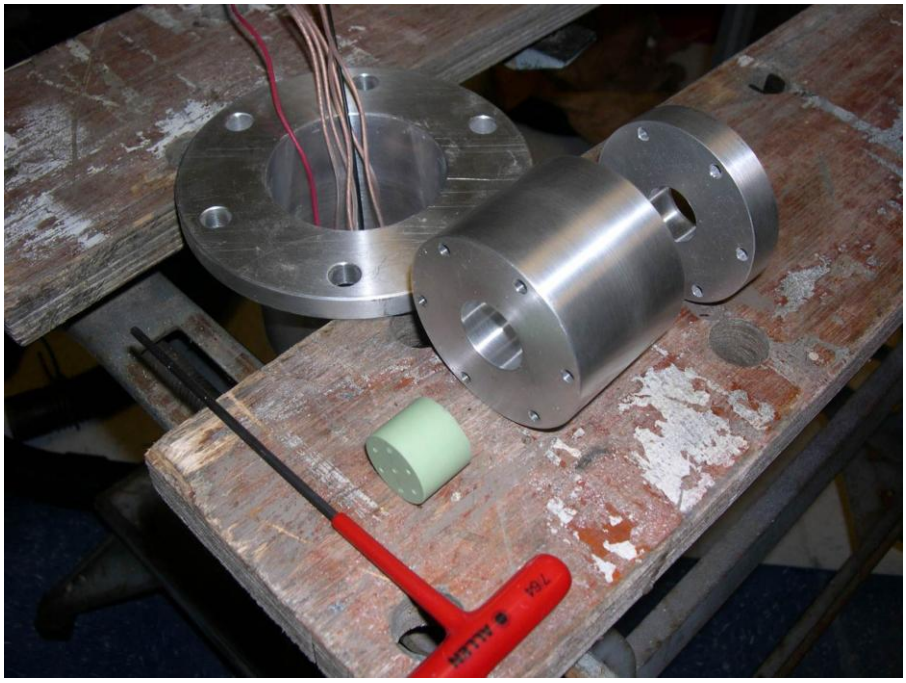
Resin will set up in about an hour at RT, let sit several hours before moving however.

FINISHING THE WATERTIGHT SEALS

Check all remaining parts for cleanliness and burrs

Check Cu wires for rough spots and resin drops, clean as necessary

Spray with Silicon Lube all sides of wires



Sprayon
LUBRICANTS
S00210
FOOD GRADE
SILICONE
LUBE
Net. Wt. 10 oz

Slide Morrison seal onto wires noting sequence until 3-4 inches above housing

Slide Connector Spacer onto wires noting sequence

Coat Seal and Recess with Silicon Lube

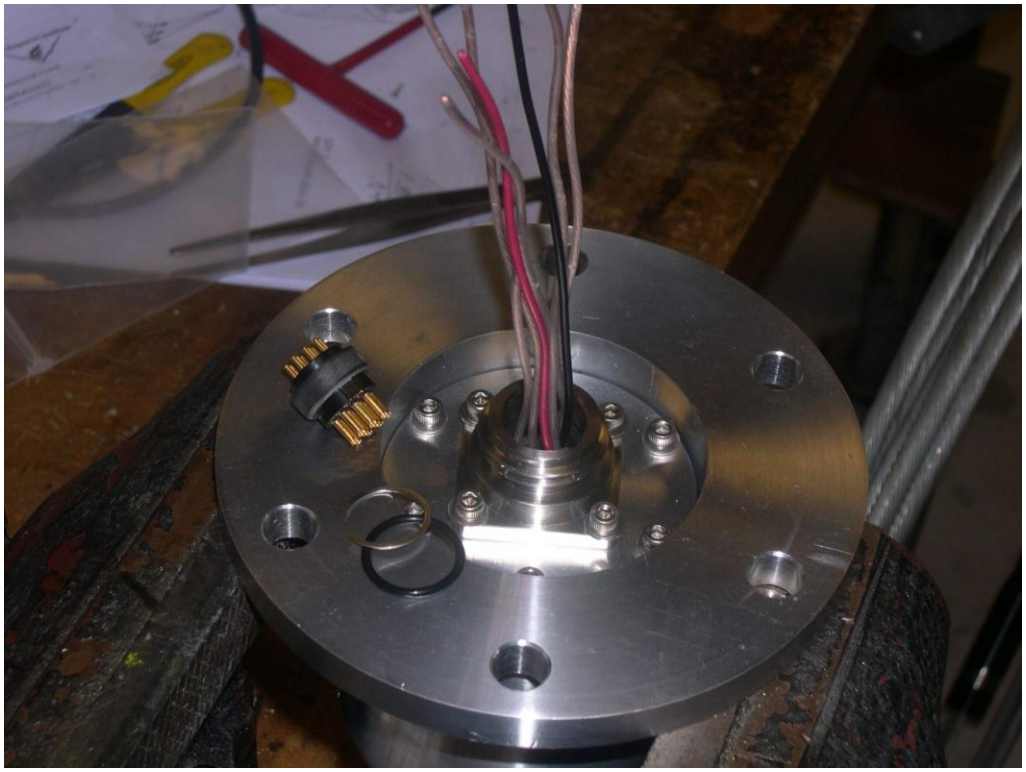
Carefully align the wires/holes then slide Seal most of the way into the Connector , 1/8" proud OK

Continue sliding into position keeping wires straight

2-131 oring will seal connector area, be careful with seal area of Connector Plate

6-6-32 x 3" screws will do final seating of the Morrison seal, be careful screws do not bottom out.

Ready for MinK connector wiring.



Soldering to pins is in a very tight space. Let Electronics techs do it.

MORRISON SEAL FABRICATION

Clean all parts of mold and pins.

Assemble mold, insert pins, typically 0.070

Coat mold surfaces with suitable release agent, dry film PTFE or Ease Release 200 from Smooth-On

Check mat'l for shelf life. Use either Silastic J from Dow Corning (preferred due to Shore 56A)or Smooth-Sil 950, (Shore 50A) from Smooth-On. (SmoothSil shone.)

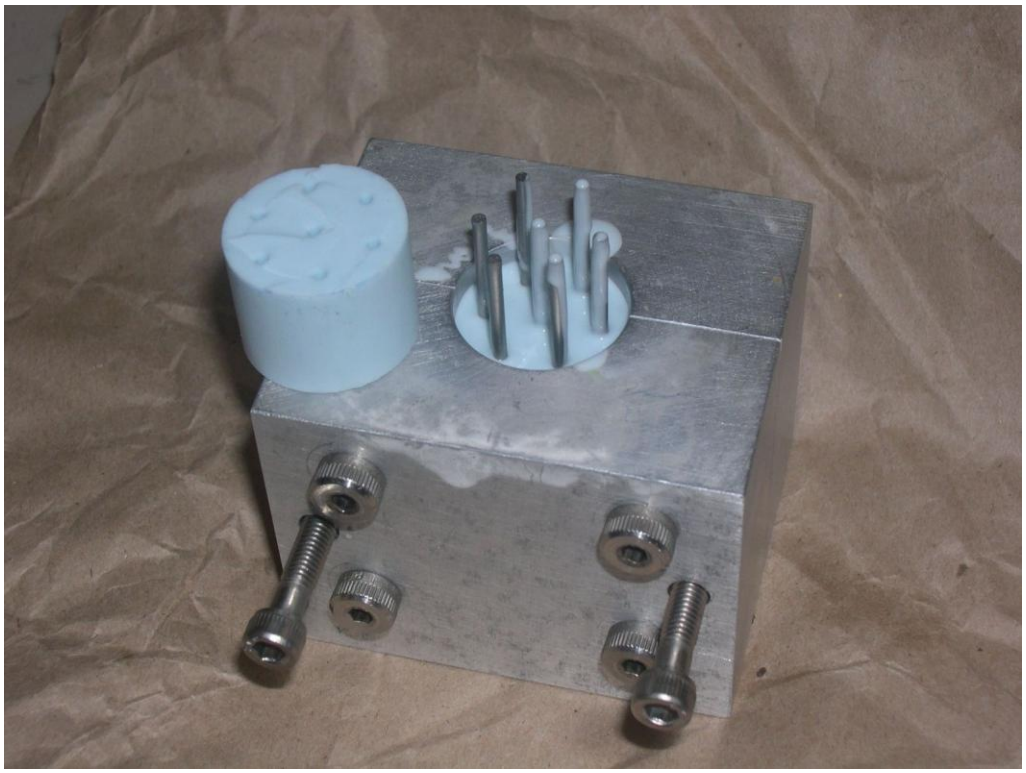
Follow mixing instructions after carefully cleaning mix cups and strirers. 60 grams total is plenty.

Mix thoroughly, degas 29”Hg for at least a minute, pour smoothly into mold avoiding bubbles.

You have about an hour of working time. Let cure overnight before demold. Pull pins first.

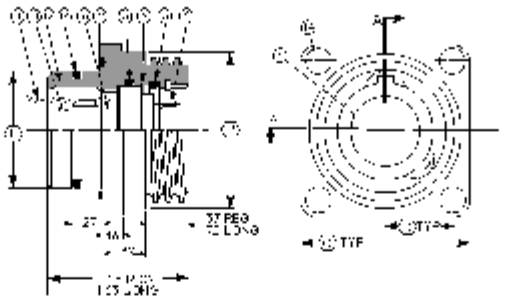
Smooth-Sil 950 requires a post-cure of 80 deg. C for 2 hrs. to guarantee a full cure.

Cut off square ended cylinder 0.70 “ long.



FLANGED CONNECTOR RECEPTACLE (FCR)

FCR (MATES TO CCP)

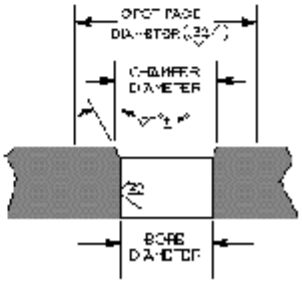


NOTE:
Reference pages 30-26 – 30-29 for pattern availability.

PART NAME	(B) INCHES	(C) INCHES	(D) INCHES	(E) INCHES	MOUNTING HOLE DIAMETER*	(13) O-RING	(7) SPIROLOX	(2) O-RING	(14) SOCKET HEAD CAPSCREW	(3) O-RING
MING-FCR	1.00	1.12	0.453	0.685	0.689/0.687	2-015	UB50	2-018	4-40 UNC-2A	2-014
MINK-FCR	1.12	1.25	0.510	0.748	0.752/0.750	2-016	UB62	2-019	6-32 UNC-2A	2-016
MINL-FCR	1.25	1.37	0.562	0.873	0.877/0.875	2-018	UB75	2-021	6-32 UNC-2A	2-018
MINM-FCR	1.37	1.50	0.593	0.998	1.002/1.000	2-020	UB81	2-023	8-32 UNC-2A	2-019
MINO-FCR	1.62	1.75	0.723	1.123	1.127/1.125	2-022	UB106	2-026	8-32 UNC-2A	2-023
MINP-FCR	1.75	1.87	0.777	1.248	1.252/1.250	2-024	UB118	2-028	8-32 UNC-2A	2-025
MINQ-FCR	1.87	2.00	0.831	1.373	1.377/1.375	2-026	UB137	2-029	10-24 UNC-2A	2-028
MINR-FCR	2.00	2.12	0.884	1.498	1.502/1.500	2-028	UB150	2-029	10-24 UNC-2A	2-029
MINT-FCR	2.50	2.62	1.043	1.998	2.002/2.000	2-032	UB175	2-034	1/4-20 UNC-2A	2-031
MINU-FCR	2.75	2.87	1.130	2.248	2.252/2.250	2-034	UB200	2-036	1/4-20 UNC-2A	2-033
MINX-FCR	3.50	3.62	1.470	2.748	2.752/2.750	2-038	UB250	2-041	3/8-16 UNC-2A	2-037

FCR MOUNTING REQUIREMENTS

SIZE	BORE Ø +0.002" - 0.000"	CHAMFER Ø (± .010")	*SPOTFACE Ø (± 0.015")	**SPOTFACE Ø (± 0.015")
G	0.687"	0.727"	1.00"	1.56"
K	0.750"	0.800"	1.12"	1.75"
L	0.875"	0.915"	1.25"	1.87"
M	1.000"	1.040"	1.31"	2.12"
O	1.125"	1.175"	1.50"	2.44"
P	1.250"	1.290"	1.62"	2.62"
Q	1.375"	1.425"	1.81"	2.81"
R	1.500"	1.540"	1.87"	3.00"
T	2.000"	2.050"	2.50"	3.75"
U	2.250"	2.290"	2.75"	4.00"
X	2.750"	2.800"	3.31"	5.06"



NOTE: CHAMFER IS TO BE 20° ± 5°

* This dimension is to be used if spotface is less than or equal to 0.001 inches deep.

**This dimension is to be used if spotface is greater than 0.001 inches deep.

SEACON