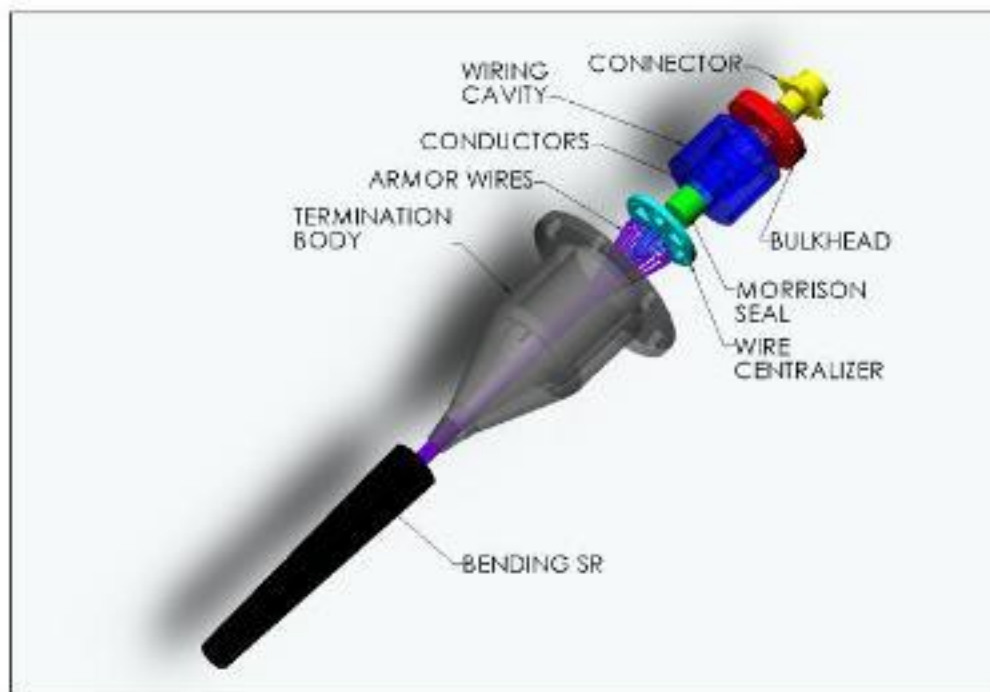


[\\Tornado\projectlibrary\ESP\TopLevelAssy\ShallowWaterMooring\EM](#) Term March 09

This shallow water version started with a supplied cable cut to 16 meters, finished length to be about 15 meters. Typically- Rochester Wireline 3/8" 7-H-375A.

DRAWINGS AND PARTS: Connector Plate-100894, Wire Centralizer-100895, Connector Spacer-100896, EM Cable Termination housing- 100897 –Rev. B DWG, Molded Silicon Wire Morrison Seal (molded here), Bending Strain relief - PMI EVERFLEX #1).

E/M CABLE TERMINATION



MATERIALS AND TOOLS

ESCO SocketFast Resin for wire rope socketing, 300gms BC Wire (usually case (24) ,
 (Alt.-CROSBY W416-7, 250cc)
 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 3/4", 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. 1/4" x 0.1" ~0.5" below lip, see photo

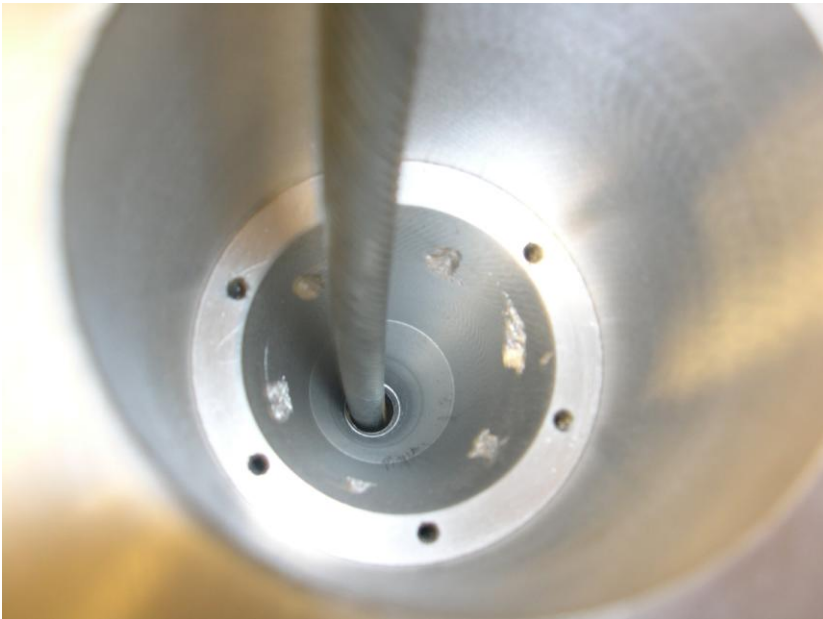
Clean grease etc. off inside of Housing

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.

Wrap a few turns of electrical tape around the heat shrink then 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:

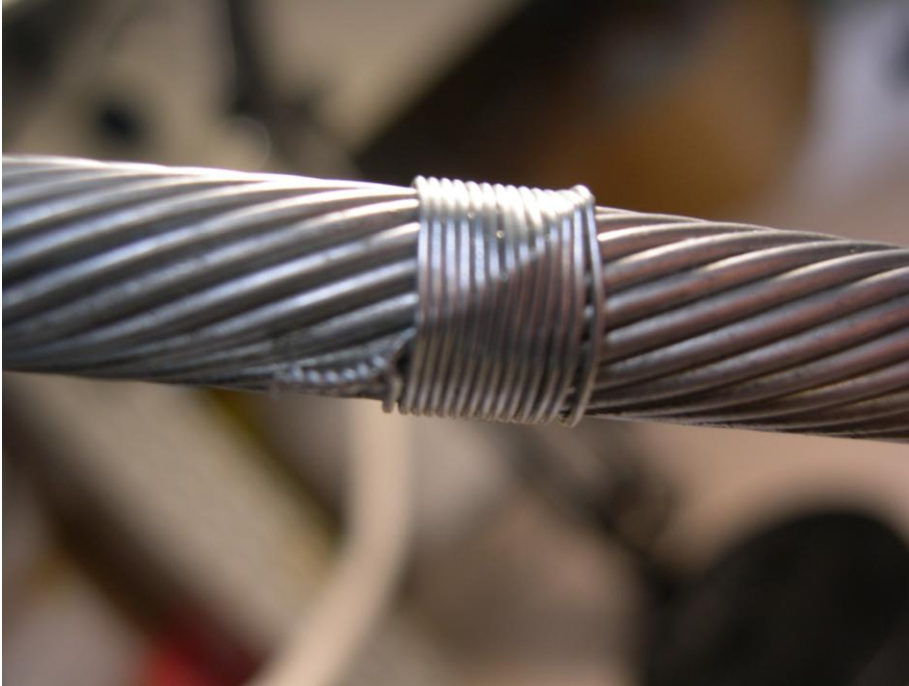
The max width of the spread out wires must be less than 1 ½" at the top.

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, be especially careful to not damage the wires

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.

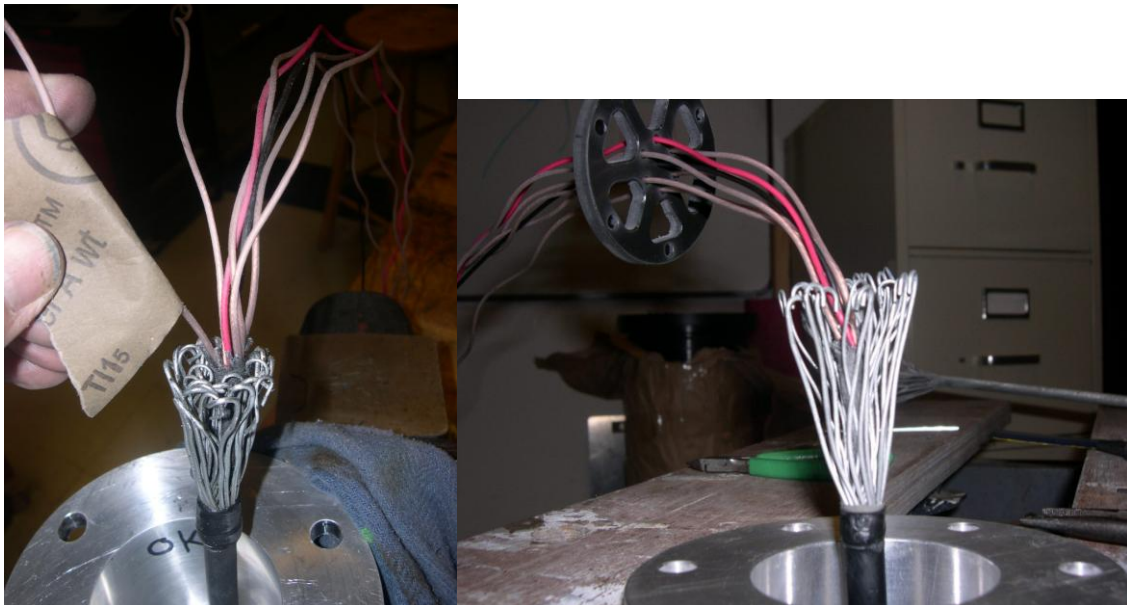
This cleaned section and the loops will lock into the socketing resin

The insulation over the wires is often rough and needs to be sanded relatively smooth in the area of the Morrison Seal. Use 250 grit to smooth the insulation 2-3 Inches above the broomed solid wires.

Now fit check the broomed ass'y , remove temp. clamp, check for about 1/4" 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. See images below .



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

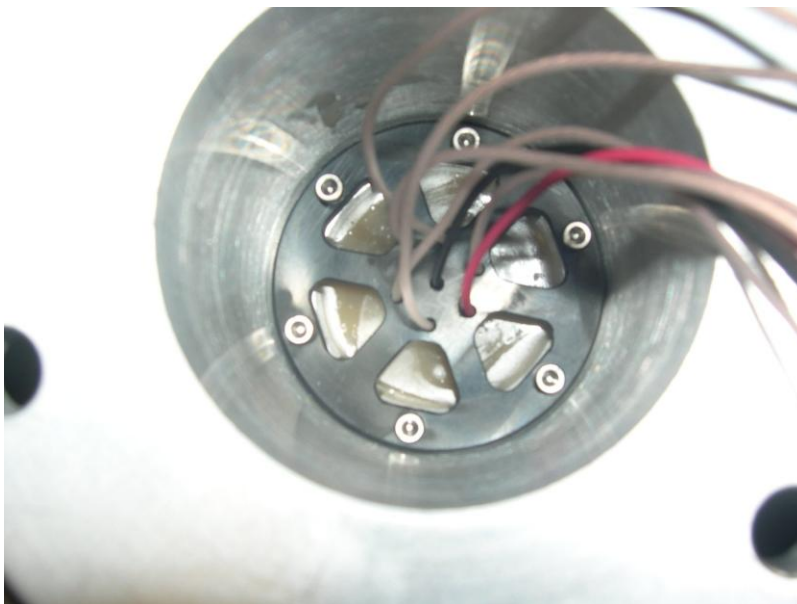
Get 6 x 6-32 x 3/8 screws, allen drive, gloves, ventilation on, and potting resin on hand

We won't use much of the 250/300 grms, need to use whole thing since catalyst volume is pre-measured for the can-full. Mix very thoroughly, scraping edges and bottom. Total of ~110 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 short 6-32's

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

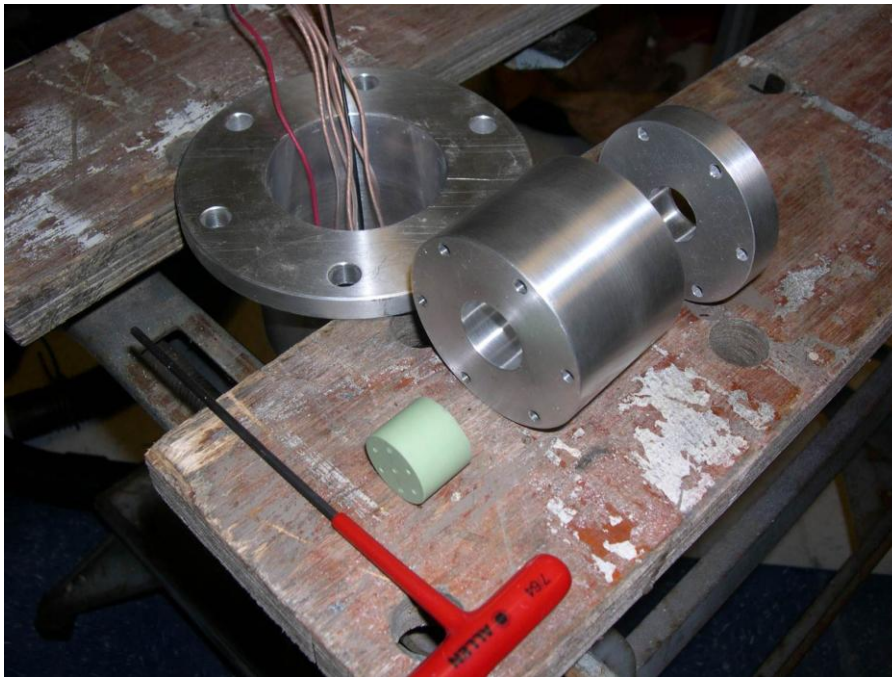
Resin will set up in about an hour at RT, let sit several hours before moving however.

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





Slide Morrison seal onto wires part way noting sequence , note photos

Coat Seal and Recess with Silicon Lube

Slide Wiring Cavity onto wires noting sequence, respray wires and seal with silicon lube

Carefully aligning wires to holes, slide Morrison seal partway into cavity. The lead-in chamfer will help.

Spray more silicon lube on wires and seal.

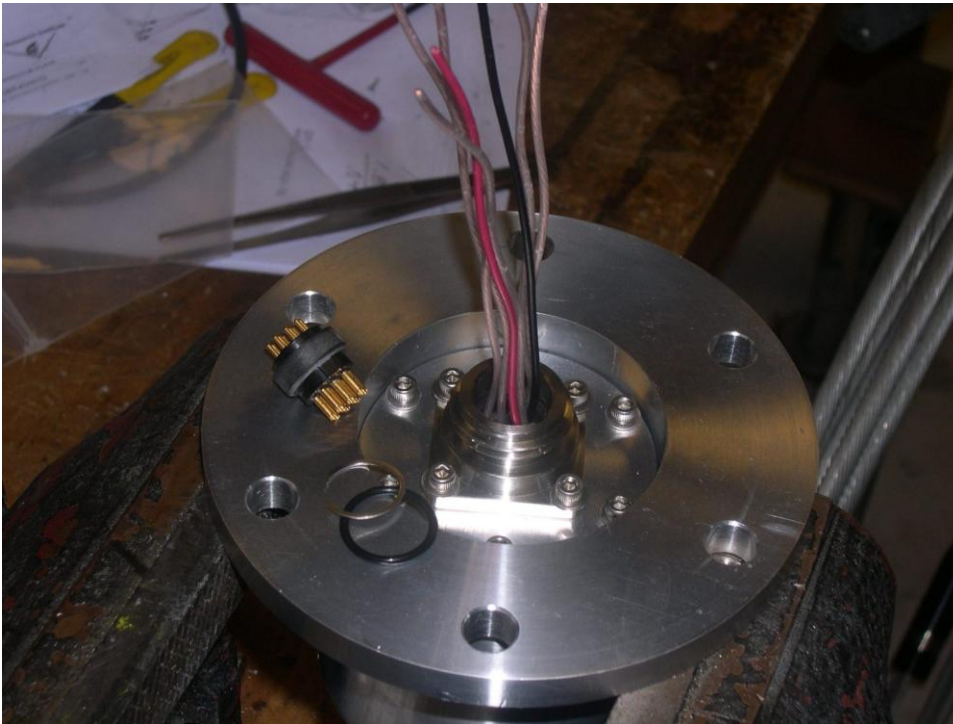
Now slide whole assembly down wires, may have to pull each wire in turn taut to assure no kinks develop.

Slide right down to centralizer.

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

6-6-32 x 2.9" screws will do final seating/alignment 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, smaller need to be held in place with red molding compatible clay.

Coat mold surfaces with suitable release agent, silicon spray 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.)



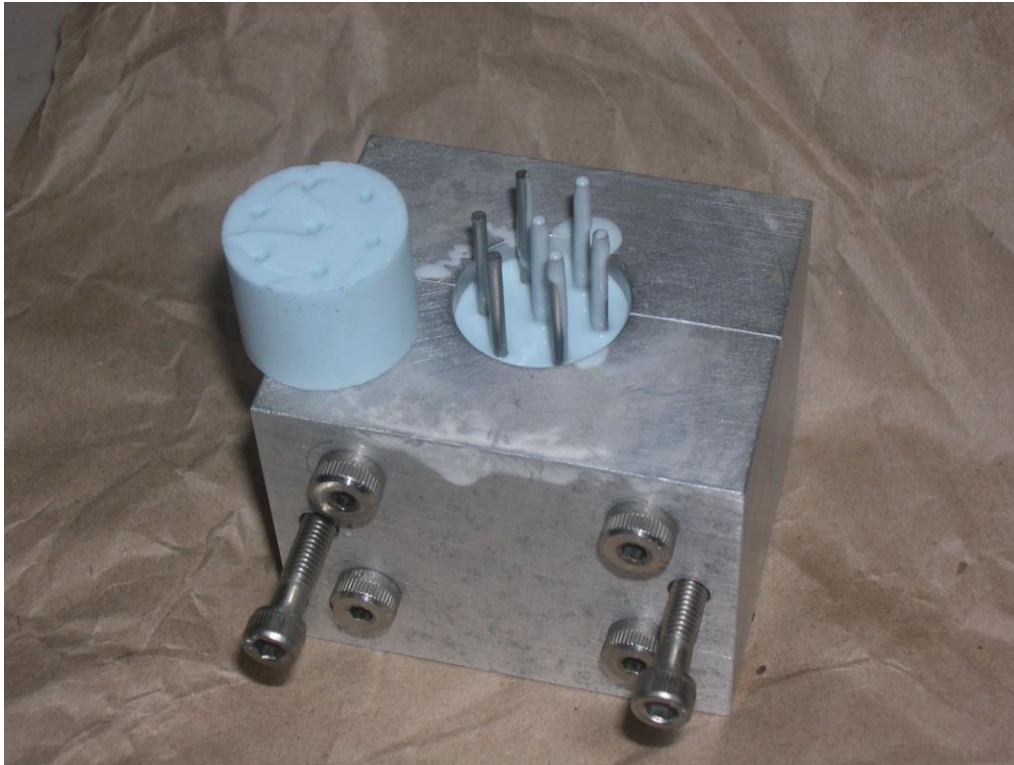
Follow mixing instructions after carefully cleaning mix cups and stirrers. 40 grams total is plenty.

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

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

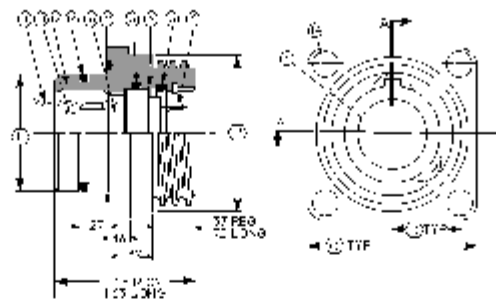
You have about an hour of working time. Let cure overnight and do post-cure heat treatment before demold. Pull pins first.

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.

	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
PART NAME	INCHES	INCHES	INCHES	INCHES	MOUNTING HOLE DIAMETER*	O-RING	SPROLOX	O-RING	SKID RING CAPSCREEN
HWMS-PCR	1.00	1.12	0.433	0.685	0.649/0.687	2.015	UB50	2.418	4.40 UNC-2A
HWML-PCR	1.12	1.25	0.510	0.748	0.752/0.758	2.016	UB62	2.419	6.32 UNC-2A
HWML-PCR	1.25	1.37	0.542	0.873	0.877/0.875	2.018	UB75	2.421	6.32 UNC-2A
HWML-PCR	1.37	1.58	0.593	0.998	1.002/1.000	2.020	UB81	2.423	8.32 UNC-2A
HWML-PCR	1.62	1.75	0.723	1.123	1.127/1.125	2.022	UB106	2.426	8.32 UNC-2A
HWML-PCR	1.75	1.87	0.777	1.248	1.252/1.258	2.024	UB118	2.428	8.32 UNC-2A
HWML-PCR	1.87	2.00	0.831	1.373	1.377/1.375	2.026	UB127	2.429	10.24 UNC-2A
HWML-PCR	2.00	2.12	0.884	1.498	1.502/1.500	2.028	UB158	2.429	10.24 UNC-2A
HWML-PCR	2.50	2.62	1.043	1.998	2.002/2.000	2.032	UB175	2.434	1/4-20 UNC-2A
HWML-PCR	2.75	2.87	1.130	2.248	2.252/2.250	2.034	UB200	2.436	1/4-20 UNC-2A
HWML-PCR	3.50	3.62	1.470	2.748	2.752/2.750	2.038	UB250	2.441	3/8-16 UNC-2A

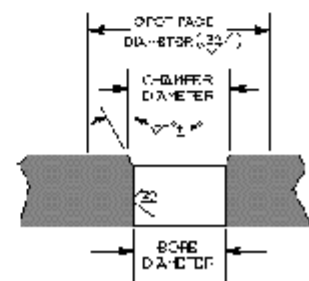
FCR MOUNTING REQUIREMENTS

SIZE	BORE Ø $+0.002"$ $-0.000"$	CHAMFER Ø ($\pm .010"$)	*SPOTFACE Ø ($\pm 0.015"$)	**SPOTFACE Ø ($\pm 0.015"$)
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 $20^{\circ} \pm 5^{\circ}$

* 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.



30-5 (REV 0304)

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