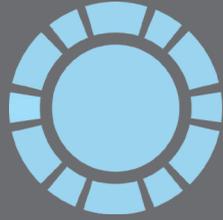




MADE IN USA



RAMPART

PRODUCTS

Custom is our standard.

HERMETIC & RUGGEDIZED INTERCONNECTS



November 2023



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AUTHORIZED DISTRIBUTORS

North America

- United States of America - Rampart Products
- Canada - Elite Seal

Europe

- United Kingdom - Lanson Polymers Engineering Solutions
- Germany and Norway - HSTseals

Asia

- China - PNC Engineering Products Pte Ltd
- China - Culverttech Asia Pte. Ltd.
- Singapore - Winova Pte Ltd

Global

- PEI-Genesis

ABOUT RAMPART PRODUCTS



Rampart provides hermetic & ruggedized interconnect systems and components to many industries including Under Water, Mil/Aero, Oil & Gas, Space, Medical, Pipeline Inspection & Nuclear.

By leveraging an engineering-centric staff from multiple disciplines, Rampart is always thinking about better ways to design, manufacture, and perform. The culture of “change for the better” at Rampart translates to the best products with [competitive pricing and shorter lead times](#).

We are committed to providing the best solution to help lead our valued customer’s success.





CONSTANT INNOVATION

RamTac™ was first introduced in 2019 at the Offshore Technology Conference in Houston, Texas.

After being granted its third patent, at the 2023's Offshore Technology Conference, Rampart won the American Society of Mechanical Engineers' Woelfel Best Mechanical Engineering Award for the Rotary-Fit Connector System containing RamTac™.



Since its inception, we have put thousands of connectors in service, being subjected to the most rugged conditions – logging millions of hours in extreme environments with no failures. When the industry needed a more robust contact design – Rampart showed its innovative process and responded with RamTac™.

The design has passed the most stringent industry standard qualification test by an independent test facility, recorded many hours performing as advertised – but, the real test and measure of achievement, are the satisfied customers that keep coming back.

Our company produces a variety of unique rotary connector designs, ranging from 3 to 10 contacts.

More information on page 13

Patent No. 11,489,278 / 11,217,928 / 11,588,264



Features & Benefits of RamTac™

- Extreme shock and vibration resistance.
- High temperature capable to 500°F.
- Very durable with no risk of damage during cleaning.
- High electrical current capacity.
- No elastomer energizer subject to compression set.

Superior Contact Technology

Our customer required an extreme pressure hermetic connector tolerant of angular misalignment, that could blind wet mate for an oil drilling application. Rampart developed a robust uni-body contact design versus competitors that use a less reliable multi-piece design. Qualified product delivered in only 12 weeks.



QUALITY TESTING & QUALITY CONTROL



Full testing & QC capability allows us to fully qualify our products:

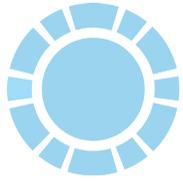
- Bulkhead leak testing 30,000 psi @ 500°F with remote monitoring
- Helium leak testing to 10⁻⁸ atm-cc/sec
- Contact insertion & extraction force
- DWV & IR (even at high temp)
- Shock & vibration
- Thermal shock
- Automated optical dimensional verification

Rampart's stringent full digital Quality Management System is certified for AS9100D & ISO 9001:2015



CERTIFICATE No. AS 0174





**CUSTOM
INTERCONNECTS**

**MEDICAL
SPACE
COAX/RF**



CUSTOM INTERCONNECTS



Custom is our standard.

More than 90% of our assemblies are custom engineered for only one user. The common element in our product line is extreme ruggedness.



RamTac™ Contact Technology Patent No. 11,489,278 / 11,217,928 / 11,588,264



Under Water

- Dry or Splash Mate

PC Board Connectors

- Board to board stackers
- Pogo-pin contact

HPHT - up to 30,000 psi @ 450 °F

- Booted for conductive liquids
- Rotary-fit (Patent RampartProducts.com)
- Multi-pin
- Coaxial

Autoclavable

- For medical use

Non-magnetic

- MRI machines

Coax/RF

- Hermetic specials



CUSTOM INTERCONNECTS SPACE CONNECTOR

Variable Separation Force Connector

- Customer specifies positive, zero, or negative force.
- Reliable in-flight electrical disconnect.
- Blind engagement possible as the system allows for linear and angular misalignment.
- Tapered mating eliminates binding.

Applications

- Satellite, spacecraft and payloads
- Stage separation
- Umbilical disconnects
- Panel disconnect assemblies



CUSTOM INTERCONNECTS COAXIAL/RF



Custom

- Customer issued cable.
Other companies many times don't accept cable other than their own spec.
- Design per customer request:
low profile envelope, 50 Ω impedance rating.
- Delivered in 12 weeks.
- Video transmit on Unmanned Under Water Vehicle (UUV).



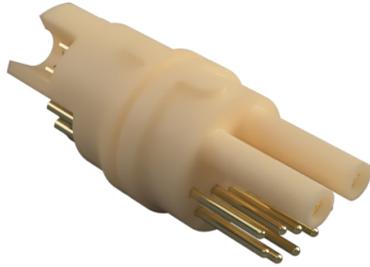
Standard

- Common in drilling applications.
- 2 lines of communication on single axis, but not used for matched impedance as above.
- High pressure / High temperature.



CUSTOM INTERCONNECTS MEDICAL AND INDUSTRIAL

Autoclavable Connector



Success case

Due to long lead times, the customer's supply chain was disrupted, and could not deliver the product to the end user. Rampart delivered the solution in 12 weeks, which included customer inputs for improvements.

Application

Some medical applications require equipment to be sterilized in an autoclave. An autoclave kills bacteria using steam under pressure - PEEK is a great insulator in high heat and moisture.

Circular Plastic Flange Mount Receptacle



Success case

Although this is an industry-standard solution, it was unavailable due to supply chain issues. Rampart delivered on time and offered a stocking program to guarantee a steady supply in the future.

Application

This was for an industrial equipment application that required Rampart engineers to work from a sample to produce a 100% interchangeable option.

Rectangular Micro miniature Plug and Receptacle Connectors

Custom pin configurations and form factors.



Specifications

- Robust PEEK insulator
- Lightweight
- Rapid development and delivery.
- Hermetic available *upon request*.



HPHT
HIGH PRESSURE
HIGH TEMPERATURE
HERMETIC

BOOTED
ROTARY FIT
MULTI-PIN
KTK & CUP X CUP

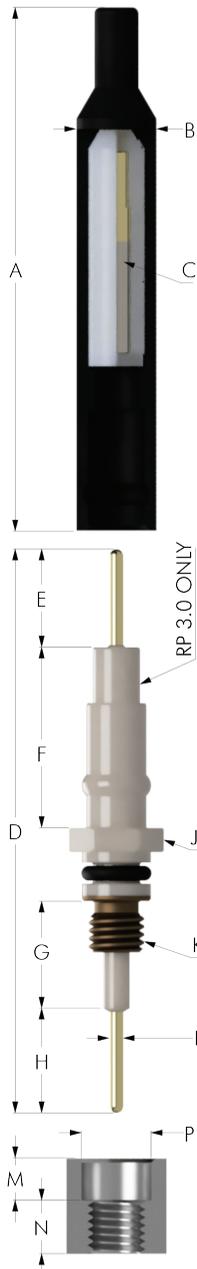




HPHT HERMETIC BOOTED

Rampart Products' Single Pin Connectors & Booted Contacts, available from stock, interchange with industry standards.

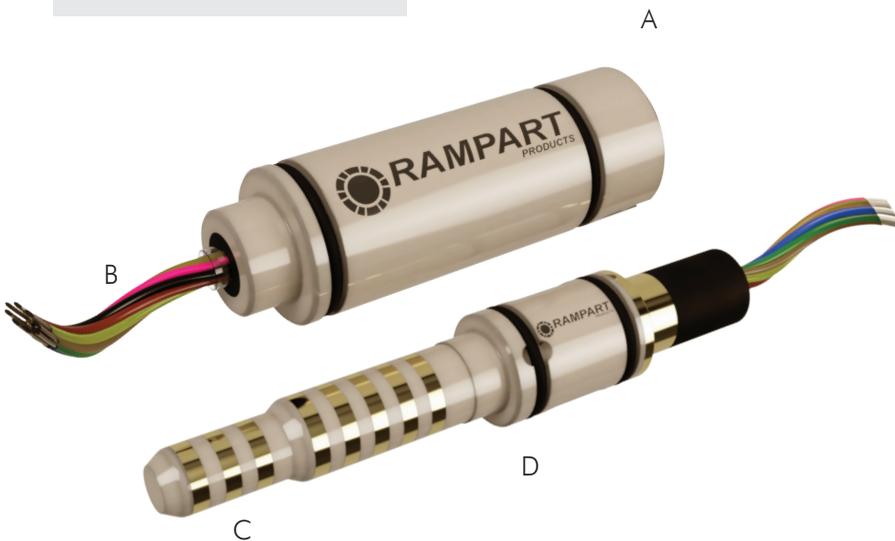
Optional solder cup on low pressure end.



SPECIFICATIONS			
Temperature	400 °F	Pressure	30,000 psi
Voltage	up to 8,000 VDC	Current	6 Amps
MATERIALS			
Boot	FKM and HNBR		
Boot Insulator	PTFE		
Contacts	Beryllium Copper		
Body	PEEK		
Thread	Beryllium Copper		
DIMENSIONS (INCHES)			
	RP 1.0	RP 2.0	RP 3.0
A	1.75	1.75	2.35
B	0.26	0.31	0.36
C	20-24 AWG	14-24 AWG	12-24 AWG
D	1.69	1.95	2.53
E	0.44	0.44	0.44
F	0.37	0.37	0.71
G	0.31	0.35	0.48
H	0.24	0.38	0.47
J	1/4 Hex	1/4 Hex	3/8 Hex
K	10-32 UNF	1/4-28 UNF	1/4-28 UNF
L	0.0625	0.0625	0.0625
M	0.17	0.20	0.19
N	0.20	0.24	0.24
P	0.250/0.251	0.312/0.313	0.312/0.313

HPHT HERMETIC ROTARY FIT

Head to head testing by customers has proven the innovation packed Rampart Rotary-Fit connector system is unquestionably the highest performing and most rugged available in the market.



A	RamTac™* Is superior in shock and vibration resistance: proven by rigorous lab and field testing performed by two of our major customers and DynaQual Labs. *US & International Patents apply.
B	Termination options: <ul style="list-style-type: none"> • Flying leads • Solder cups with HPHT hermetic bulkheads.
C	No solder joints that will fail under shock and vibration.
D	Molded PEEK bodies provide increased rigidity and insulation resistance versus others' assembled systems.

GENERAL		PERFORMANCE SPECIFICATIONS	
# Contacts	Up to 10	Current	Up to 8 Amps
Termination	Solder Cup or Flying Leads	Voltage	1000 VDC
Body Material	PEEK	Temperature	Up to 500 °F
Contact Material	C172 Beryllium Copper or Inconel	Pressure	Up to 30,000 psi
Support Disk Material	Copper alloy	Insulation Resistance	5 GΩ @ 1000 VDC @ ambient

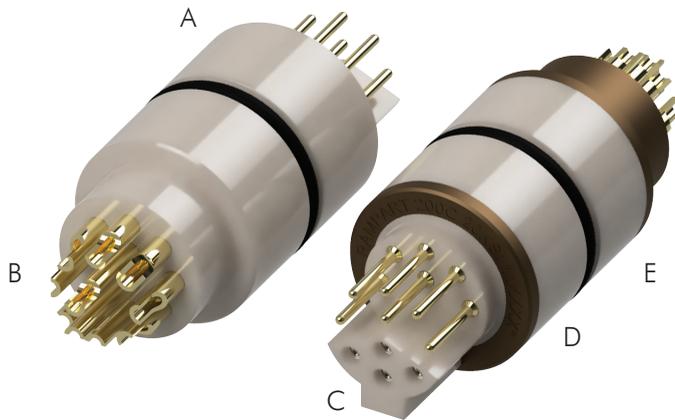
RamTac™ Contact Technology Patent No. 11,489,278 / 11,217,928 / 11,588,264



HPHT HERMETIC MULTI-PIN KTK

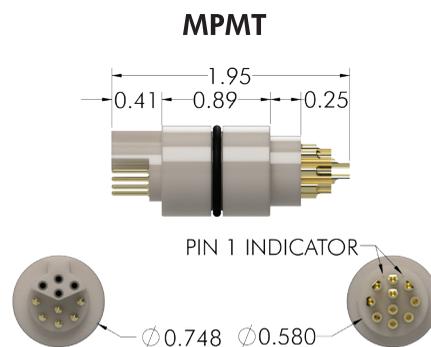
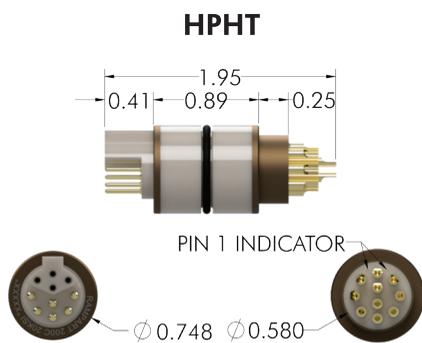
Rampart's KTK interchange with industry standards, and are constructed of superior PEEK eliminating epoxy fragments that cause electrical discontinuities.

Always in stock.



A	Seamless integration with industry standard.
B	Tiered solder cups for easy access.
C	High contact force for reliable connection under shock & vibration.
D	Permanent lot code marking.
E	PEEK body is twice as durable vs glass reinforced epoxy.

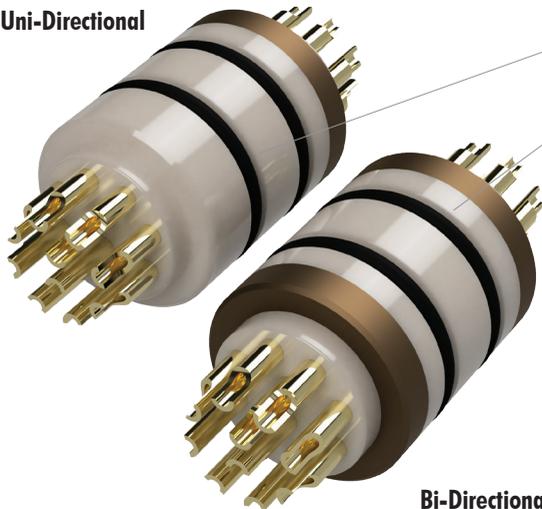
MATERIALS		PERFORMANCE SPECIFICATIONS		
			HPHT	MPMT
Body	PEEK	Temperature	400 °F	329 °F
Contacts	Beryllium Copper	Pressure	20,000 psi	12,000 psi
Support Disk	Naval Brass	Insulation Resistance	500 MΩ @ 1000 VDC @ ambient	



HPHT HERMETIC MULTI-PIN CUP X CUP

Pre-tooled standard configurations available from stock or readily available for manufacture.

Uni-Directional

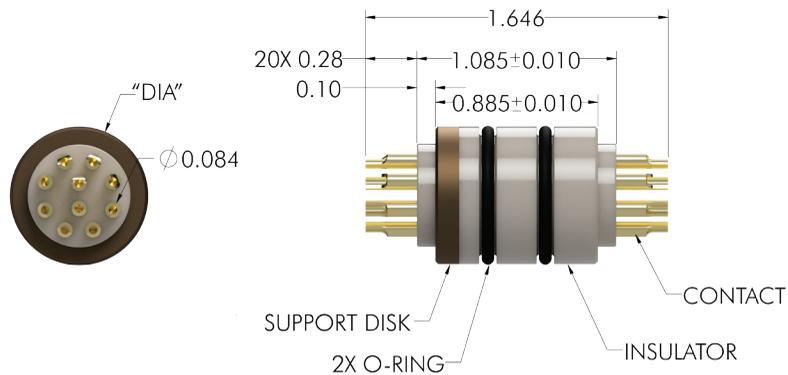


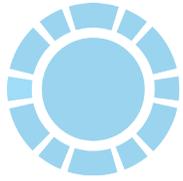
PEEK body is twice as durable vs glass reinforced epoxy.

Bi-Directional

"DIA"	CONDUCTORS
0.750 in	10X 20AWG
0.687 in	10X 20AWG
0.750 in	8X 20AWG
0.687 in	8X 20AWG
0.625 in	6X 20AWG

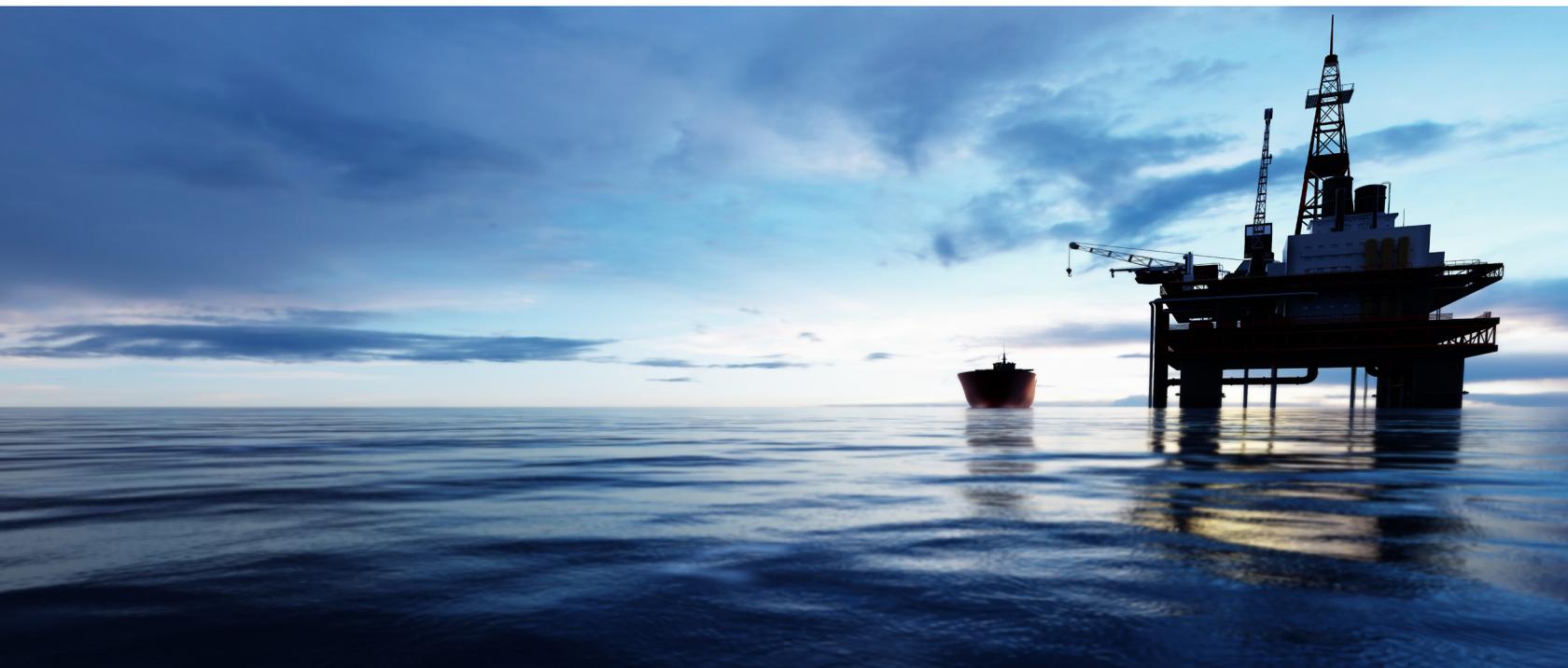
MATERIALS		PERFORMANCE SPECIFICATIONS	
Body	PEEK	Temperature	400 °F
Contacts	Beryllium Copper	Pressure	30,000 psi
Support Disk	Beryllium Copper	Voltage	600 VDC





**UNDER WATER
RP5 SERIES
DRY MATE**

**CORROSION
PROOF**



UNDER WATER RP5 SERIES - DRY MATE



Under water connectors with standard 15,000 psi open face pressure rating, redundant sealing, super rugged PEEK insulators & reliable delivery dates.

Injection Molded PEEK is the most rugged electrical insulator technology available; easily outperforming glass to metal seals or glass reinforced epoxy (GRE). This prevents electrical shorts due to cracked glass seals or chipped glass reinforced epoxy insulators.

The connectors can be sold in kit form, or as factory terminated assemblies.

PEEK Inserts provide standard **15,000 psi open-face pressure** rating & ruggedness beyond glass seal or GRE technologies.

Visual full-mate indicator window

Polyurethane Overmold, straight or right angle options.

Bosses provide improved DWV/IR & easier harnessing.

Reversible inserts

Redundant Dry-Mate sealing

Rapid attach PBOF adjusts for any angle.

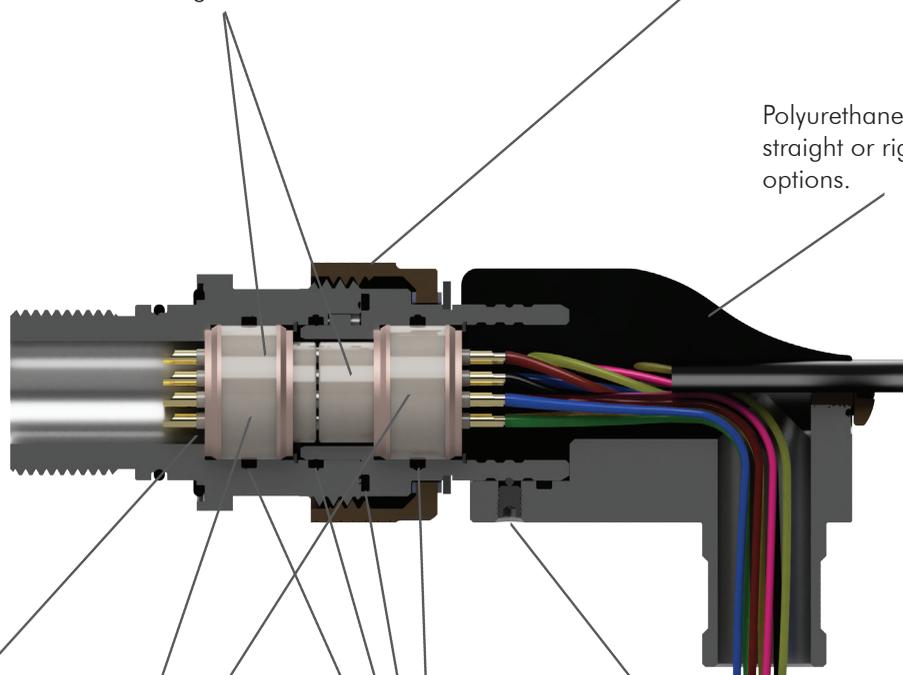


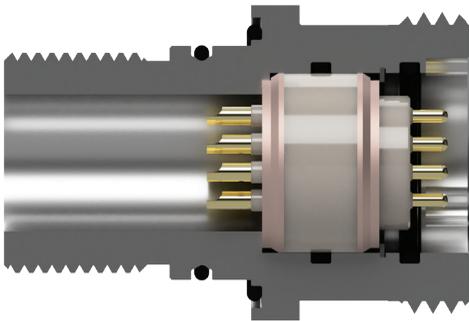
Image showing two options: right angle PBOF and straight overmold.



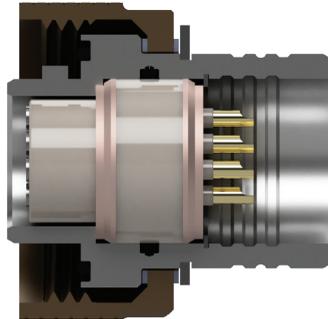
UNDER WATER RP5 SERIES - DRY MATE

Rampart Under Water connectors are available in all common shell types as well as custom solutions.

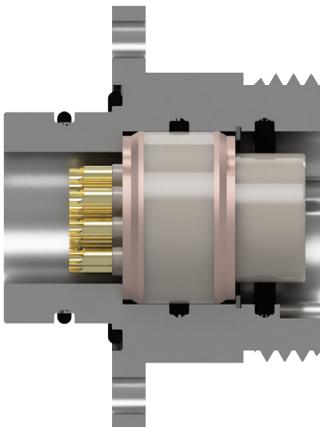
BCR



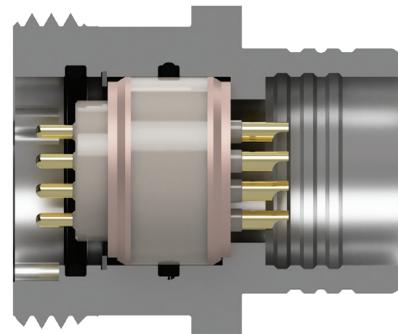
CCP



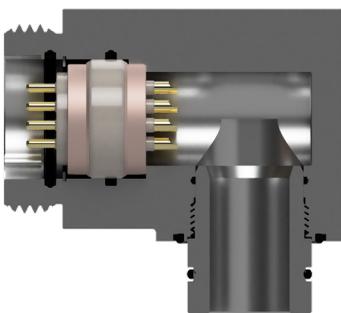
FCR



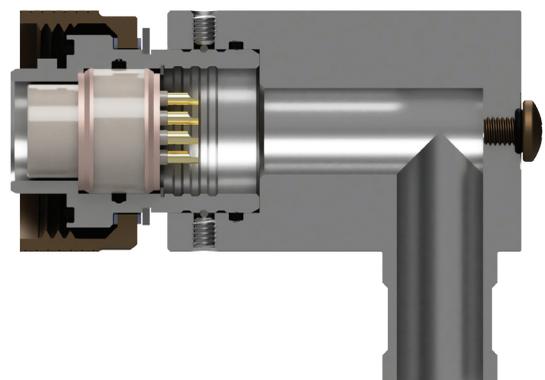
CCR



FCR90



PBOF
(Straight & Right Angle)



UNDER WATER RP5 SERIES - DRY MATE



RP5 PERFORMANCE SPECIFICATIONS	
Pressure	REC: 15,000 psi Open Face and Mated
	PLUG: 10,000 psi Mated
	PBOF: 10,000 psi Mated
Temperature	STD: -40°F - 350°F *
Voltage	STD: 600 VDC *
Amperage	#22: 7 Amps
	#20: 11 Amps
	#16: 22 Amps
	#10: 42 Amps
Insulation Resistance	5 GΩ @ 1000 VDC @ ambient

* Higher temperature and higher voltage upon request.



RP5 MATERIALS	
Shells	STD: 316 Stainless Steel - Passivated
	OPT: Titanium (other materials available upon request)
CCP Nut	STD: C630 Bronze
	Non-mag use: Inquire
Insert Body	PEEK
Support Disk	Copper Alloy
Electrical Contacts	Gold Plated Copper Alloy
Retaining Rings	316 Stainless Steel
PBOF Locking Screws & Ring	
CCP Nut Washers	Acetal
O-ring Seals	FKM 90A Durometer

Rampart UWC - How to Order RP5BCR-K6#22-MSAX									
Sample Part number		RP5	BCR	-K	6#22	-M	S	A	X
Series	RP5 (Metal Shell)								
Connector Style	FCR, FCR90, BCR, CCP, CCR								
Shell Size	G, K, M, O, R								
Contact Arrangement	See contact arrangement standard options in catalog.								
Contact Style	M = Male (Pins), F = Female (Sockets)								
Shell Material	S = 316 Stainless Steel, T = Titanium								
Key Position	A = Standard, B, C								
Standard:	NO OPTION								

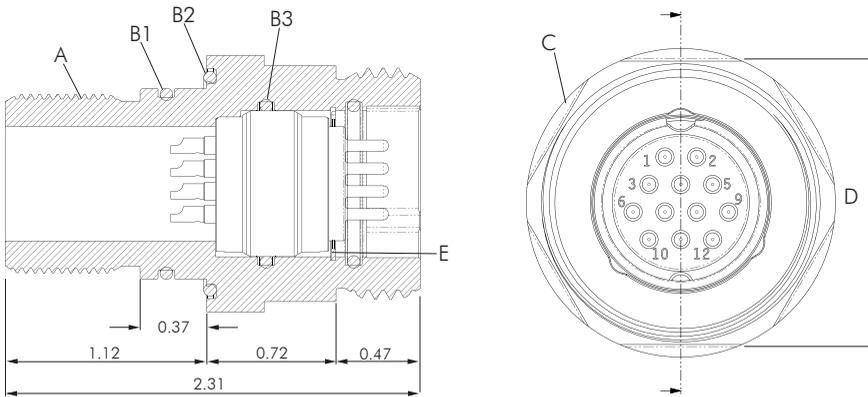
Items quoted separately:

- BCR Nut and Washer
- Cable and Overmold (CCP & CCR)
- PBOF Adapters, straight and right angle
- Receptacle flying leads
- Splash and pressure proof caps



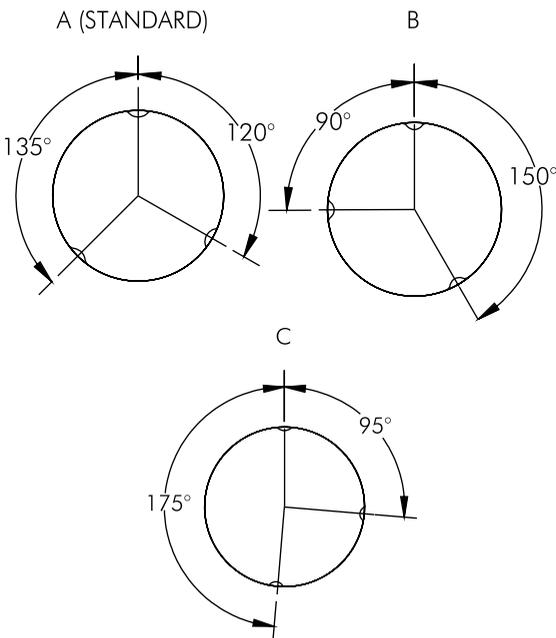
UNDER WATER RP5 SERIES - BCR

Bulkhead connector, receptacle

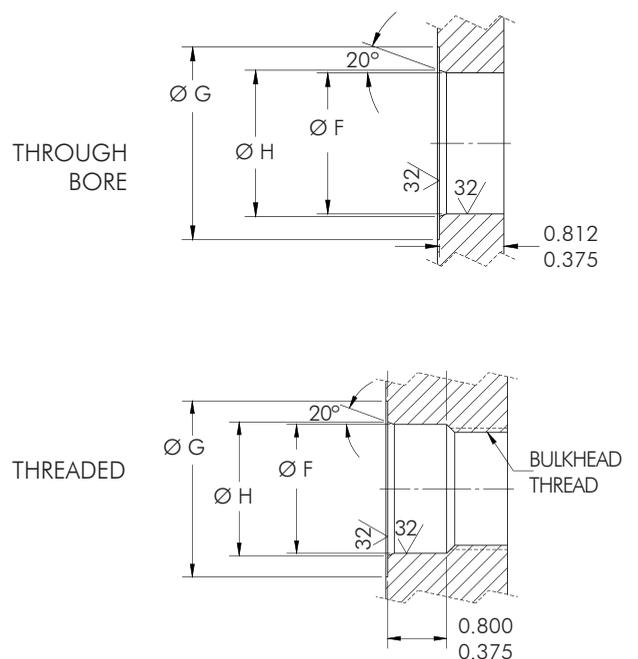


BCR COMPONENTS / DIMENSIONS (INCHES)								MOUNTING DIMENSIONS			
SIZE	A BULKHEAD THREAD (CL 2)	ϕC	B1 EXTERNAL O-RING (RADIAL SEAL)	B2 EXTERNAL O-RING (FACE SEAL)	2X B3 INTERNAL O-RINGS	D (HEX FLATS)	E RETAINING RING	ϕF +002 -000	ϕG MIN SPOTFACE	ϕH +/- 0.01	MOUNTING TORQUE (UNLUBRICATED) FT-LB +/- 10%
G	5/8 - 24 UNEF	1.06	2-015	2-019	2-014	0.938	VH-50	0.687	1.08	0.737	30
K	3/4 - 20 UNEF	1.18	2-017	2-020	2-016	1.063	VH-62	0.812	1.20	0.862	35
M	1 - 20 UNEF	1.43	2-021	2-024	2-019	1.313	VH-81	1.062	1.45	1.112	35
O	1 1/8 - 16 UN	1.68	2-023	2-027	2-023	1.563	VH-106	1.187	1.70	1.237	50
R	1 1/2 - 16 UN	2.06	2-029	2-031	2-029	1.938	VH-150	1.625	2.08	1.675	60

KEY POSITION



MOUNTING

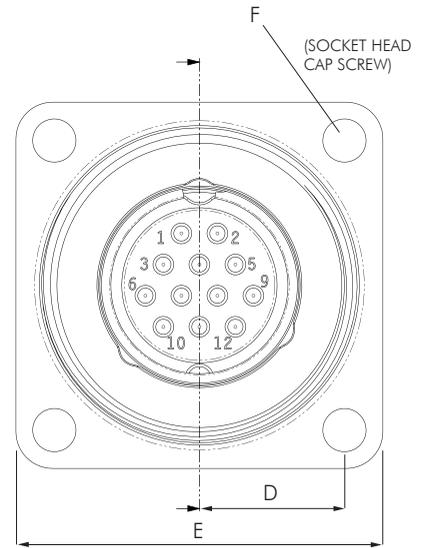
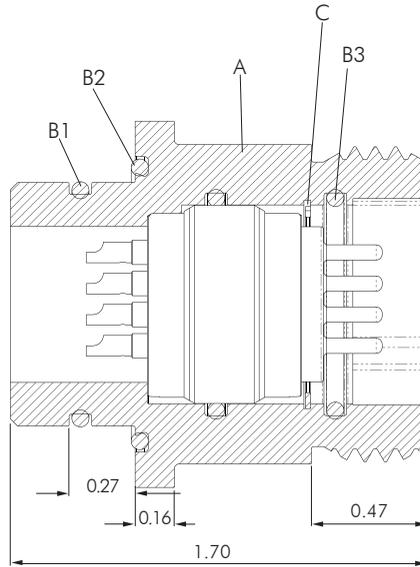




UNDER WATER RP5 SERIES - FCR

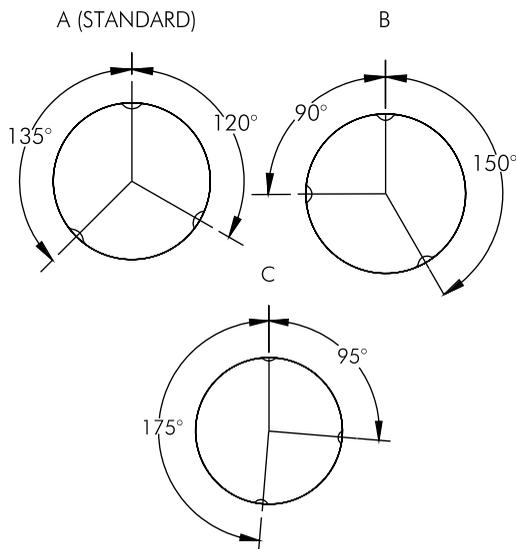


Flange connector, receptacle

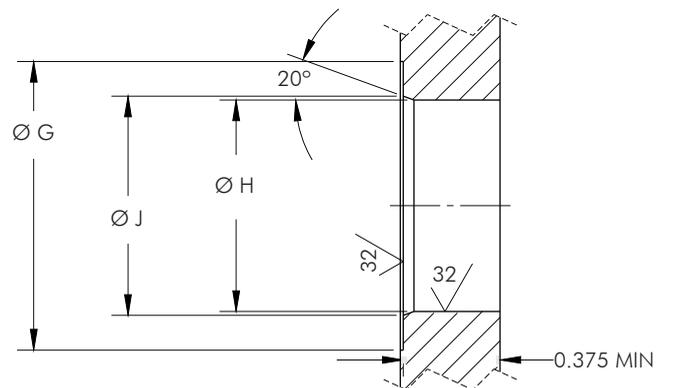


FCR COMPONENTS / DIMENSIONS (INCHES)									MOUNTING DIMENSIONS			
SIZE	øA	B1 EXTERNAL O-RING (RADIAL SEAL)	B2 EXTERNAL O-RING (FACE SEAL)	2X B3 INTERNAL O-RINGS	C RETAINING RING	D	E SQUARE	4X øF	øG MIN SPOTFACE		øH +002 -000	øJ +/- 0.01
									DEPTH <0.001	DEPTH >0.001		
G	0.933	2-015	2-019	2-014	VH-50	0.453	1.12	4-40 UNC-2A	1.00	1.56	0.687	0.737
K	1.058	2-016	2-020	2-016	VH-62	0.510	1.25	6-32 UNC-2A	1.12	1.75	0.750	0.800
M	1.308	2-020	2-023	2-019	VH-81	0.593	1.50	8-32 UNC-2A	1.31	2.12	1.000	1.050
O	1.558	2-022	2-026	2-023	VH-106	0.723	1.75	8-32 UNC-2A	1.50	2.44	1.125	1.175
R	1.933	2-028	2-030	2-029	VH-150	0.884	2.12	10-24 UNC-2A	1.87	3.00	1.500	1.550

KEY POSITION



MOUNTING

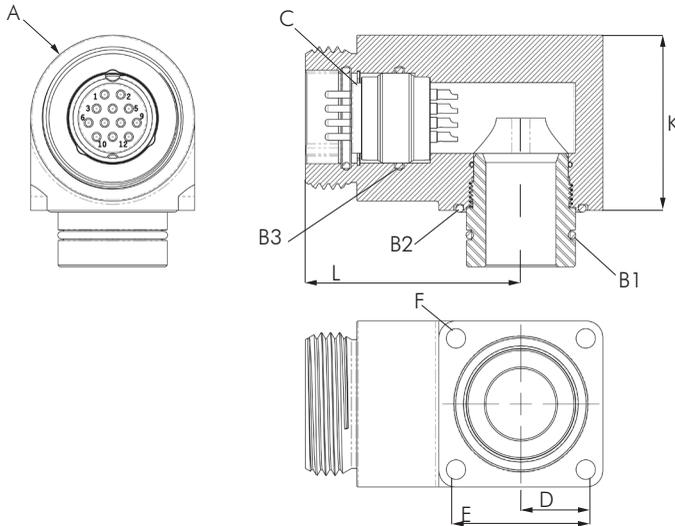




UNDER WATER RP5 SERIES - FCR90

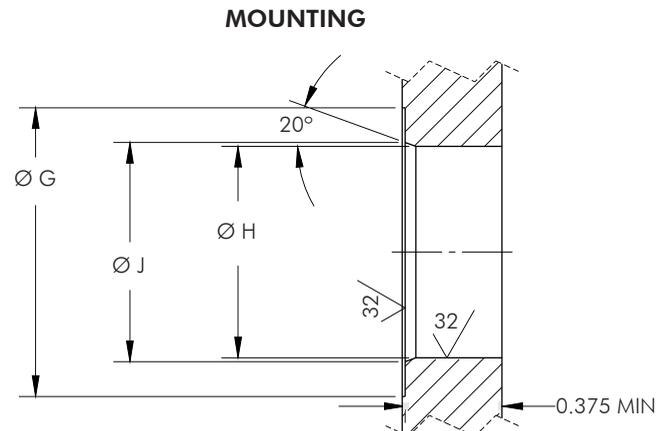
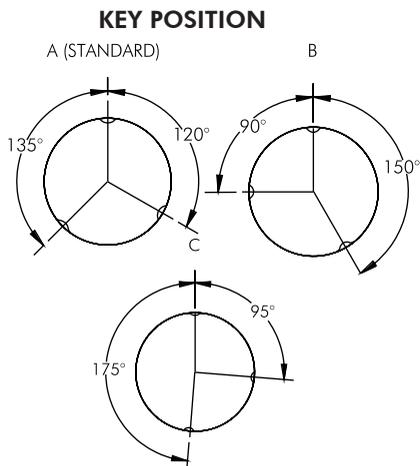


Flange connector, receptacle, right angle, low profile



MOUNTING DIMENSIONS				
SIZE	ØG MIN SPOTFACE		ØH +002 -000	ØJ +/- 0.01
	DEPTH <0.001	DEPTH >0.001		
G	1.00	1.56	0.687	0.737
K	1.12	1.75	0.750	0.800
M	1.31	2.12	1.000	1.050
O	1.50	2.44	1.125	1.175
R	1.87	3.00	1.500	1.550

FCR COMPONENTS / DIMENSIONS (INCHES)										
SIZE	ØA	B1 EXTERNAL O-RING (RADIAL SEAL)	B2 EXTERNAL O-RING (FACE SEAL)	2X B3 INTERNAL O-RINGS	C RETAINING RING	D	E SQUARE	4X ØF	K	L
G	1.120	2-015	2-019	2-014	VH-50	0.453	1.12	4-40 UNC-2A	1.395	1.845
K	1.250	2-016	2-020	2-016	VH-62	0.510	1.25	6-32 UNC-2A	1.460	1.845
M	1.500	2-020	2-023	2-019	VH-81	0.593	1.50	8-32 UNC-2A	1.585	1.969
O	1.750	2-022	2-026	2-023	VH-106	0.723	1.75	8-32 UNC-2A	1.710	2.032
R	2.120	2-028	2-030	2-029	VH-150	0.884	2.12	10-24 UNC-2A	1.895	2.219

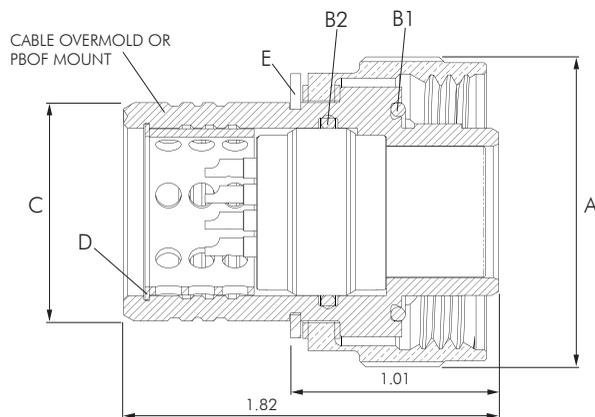




UNDER WATER RP5 SERIES - CCP

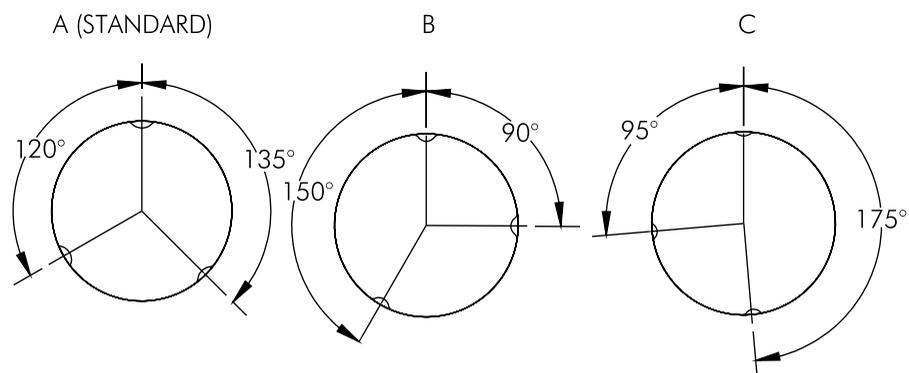


Cable connector, plug



CCP COMPONENTS / DIMENSIONS (INCHES)						
SIZE	ϕA	B1 INTERNAL O-RING (FACE SEAL)	B2 INTERNAL O-RING (RADIAL SEAL)	ϕC	D RETAINING RING	E RETAINING RING
G	1.15	2-016	2-014	0.750	VH-50	RSSE-075-CSOP
K	1.27	2-018	2-016	0.875	VH-62	RSSE-087-CSOP
M	1.51	2-021	2-019	1.062	VH-81	RSSE-106-CSOP
O	1.74	2-025	2-023	1.250	VH-106	RSSE-125-CSOP
R	2.14	2-030	2-029	1.750	VH-150	RSSE-175-CSOP

KEY POSITION

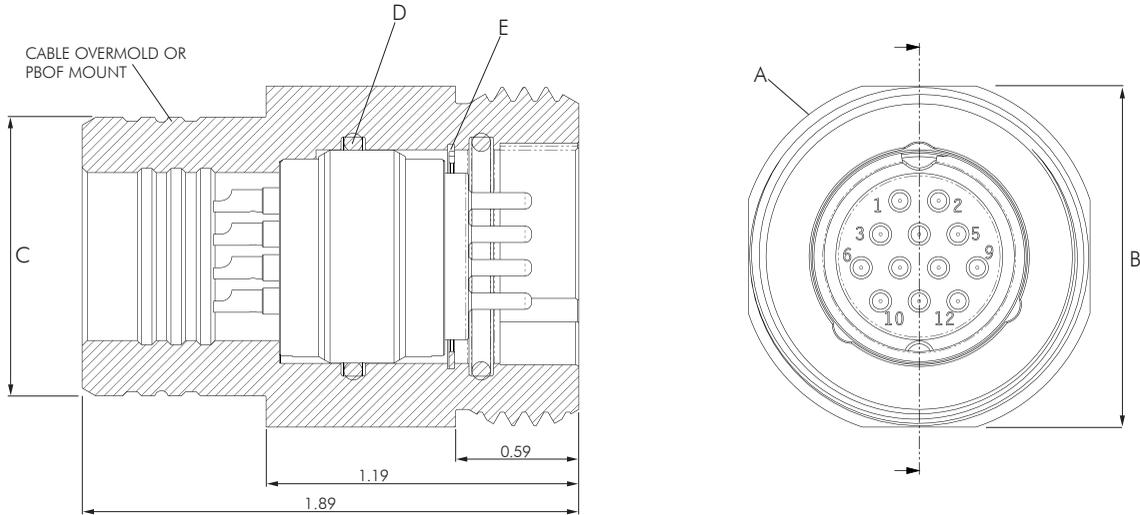




UNDER WATER RP5 SERIES - CCR

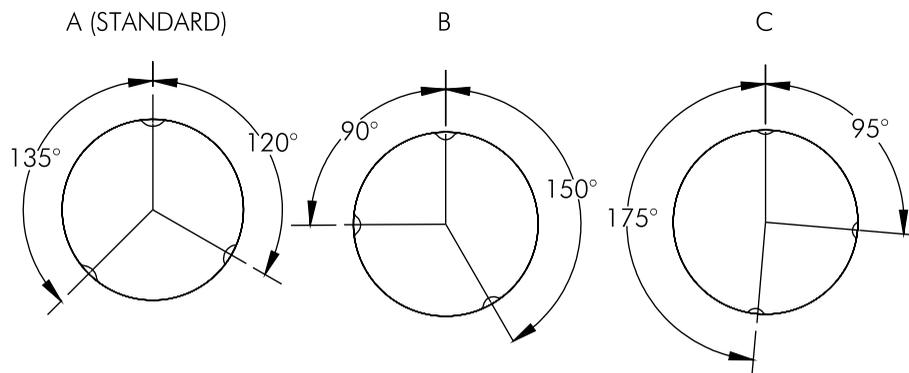


Cable connector, receptacle



CCR COMPONENTS / DIMENSIONS (INCHES)					
SIZE	øA	B (FLATS)	øC	2X D INTERNAL O-RING	E RETAINING RING
G	1.00	0.92	0.75	2-014	VH-50
K	1.12	1.05	0.875	2-016	VH-62
M	1.37	1.30	1.062	2-019	VH-81
O	1.62	1.55	1.250	2-023	VH-106
R	2.00	1.90	1.750	2-029	VH-150

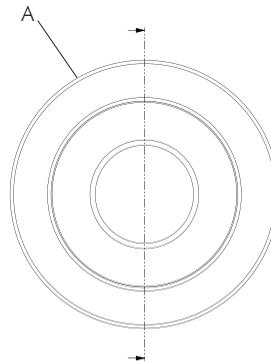
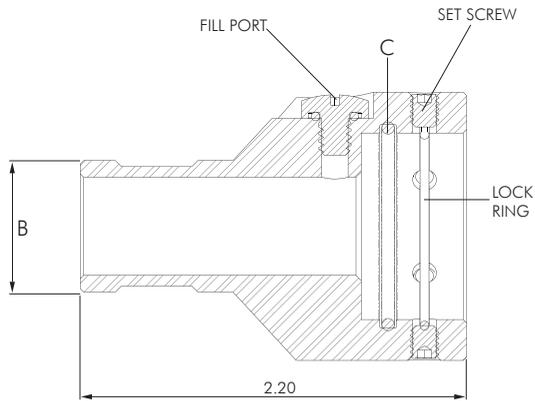
KEY POSITION



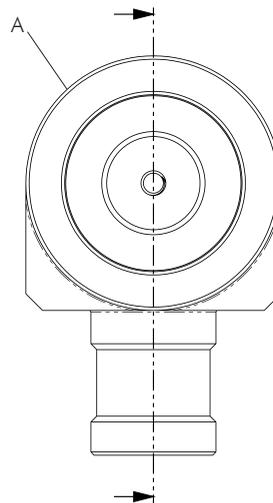
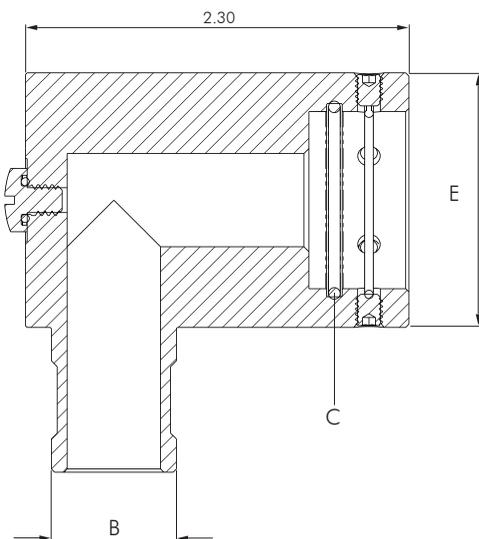
UNDER WATER RP5 SERIES - PBOF ADAPTER



Pressure balanced oil filled, use with CCP and CCR.



STRAIGHT



RIGHT ANGLE



PBOF COMPONENTS / DIMENSIONS (INCHES)					P/N'S	
SIZE	øA	øB	C	E	STRAIGHT	RIGHT ANGLE
G	1.24	0.62	2-018	2.11	RP5PBOF-G	RP5PBOF-90-G
K	1.33	0.62	2-020	2.20	RP5PBOF-K	RP5PBOF-90-K
M	1.53	0.75	2-023	2.40	RP5PBOF-M	RP5PBOF-90-M
O	1.74	1.12	2-026	2.61	RP5PBOF-O	RP5PBOF-90-O
R	2.21	1.25	2-031	3.08	RP5PBOF-R	RP5PBOF-90-R



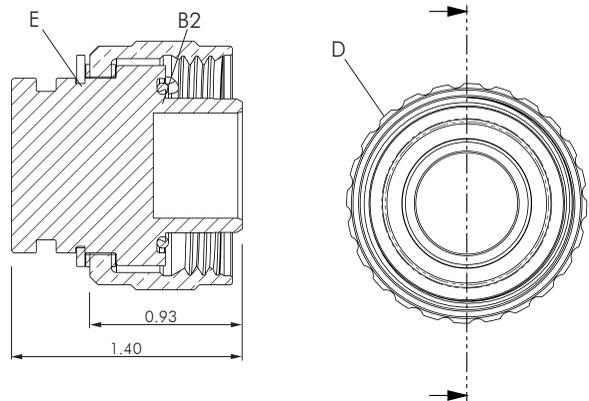
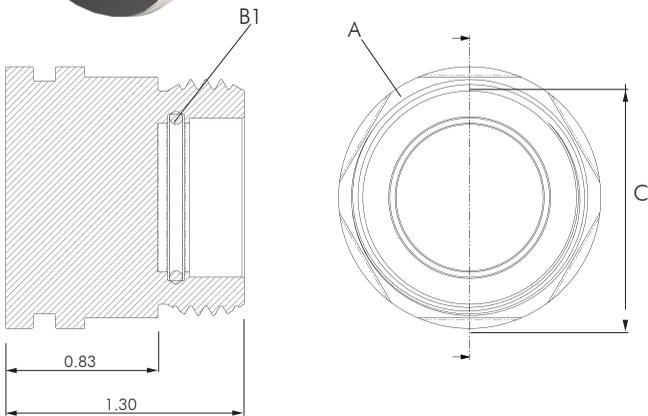
SPLASH AND PRESSURE PROOF



PLUG
HIGH
PRESSURE
PROTECTOR



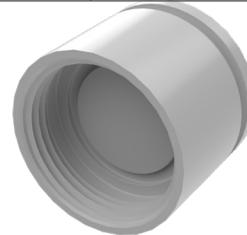
RECEPTACLE
HIGH
PRESSURE
PROTECTOR



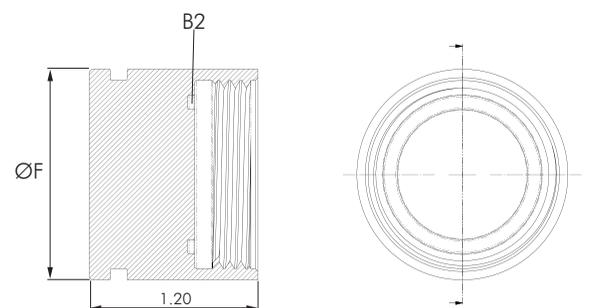
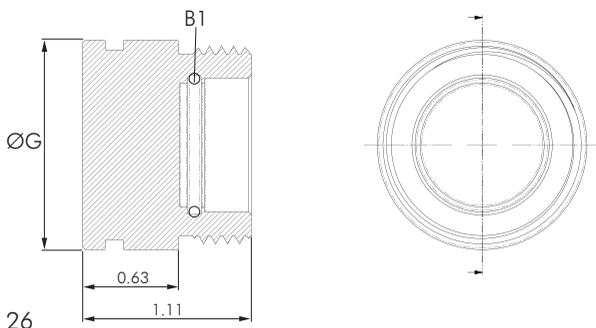
CAPS' DIMENSIONS (INCHES)									P/N'S			
SIZE	A	B1 O-RING	B2 O-RING	C HEX	ØD	E RETAINING RING	ØF	ØG	PLUG HIGH PRESSURE PROTECTOR	RECEPTACLE HIGH PRESSURE PROTEC- TOR	PLUG SPLASH PROOF PROTEC- TOR	RECEP- TACLE SPLASH PROOF PROTEC- TOR
G	1.06	2-014	2-016	0.938	1.15	RSSE-075-CSOP	1.25	1.10	RP5-PP-HP-G	RP5-RP-HP-G	RP5-PP-SP-G	RP5-RP-SP-G
K	1.18	2-016	2-018	1.063	1.27	RSSE-087-CSOP	1.40	1.25	RP5-PP-HP-K	RP5-RP-HP-K	RP5-PP-SP-K	RP5-RP-SP-K
M	1.43	2-019	2-021	1.313	1.51	RSSE-106-CSOP	1.50	1.43	RP5-PP-HP-M	RP5-RP-HP-M	RP5-PP-SP-M	RP5-RP-SP-M
O	1.68	2-023	2-025	1.563	1.74	RSSE-125-CSOP	1.80	1.68	RP5-PP-HP-O	RP5-RP-HP-O	RP5-PP-SP-O	RP5-RP-SP-O
R	2.06	2-029	2-030	1.938	2.14	RSSE-175-CSOP	2.38	2.12	RP5-PP-HP-R	RP5-RP-HP-R	RP5-PP-SP-R	RP5-RP-SP-R



PLUG
SPLASH
PROOF
PROTECTOR



RECEPTACLE
SPLASH
PROOF
PROTECTOR

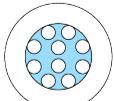


UNDER WATER RP5 SERIES - DRY MATE



Standard insert configurations are rapidly available and at low cost.

Custom configurations available. View shown is front of male.



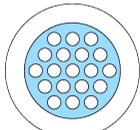
Size G
10#22



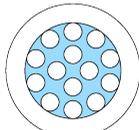
Size G
8#20



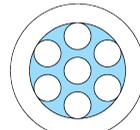
Size G
3#16



Size K
19#22



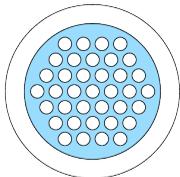
Size K
14#20



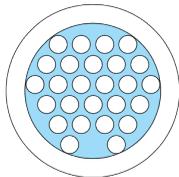
Size K
7#16



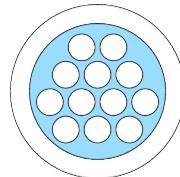
Size K
6#22 + 75Ω or 50Ω COAX



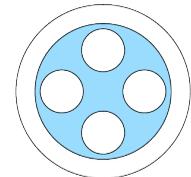
Size M
37#22



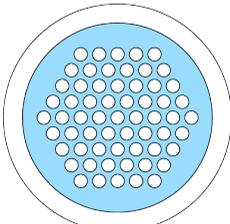
Size M
26#20



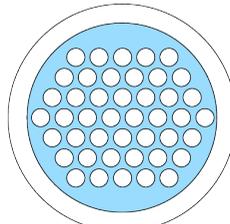
Size M
12#16



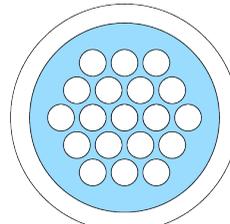
Size M
4#10



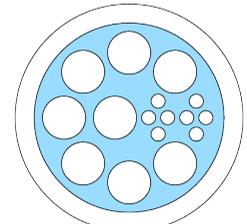
Size O
61#22



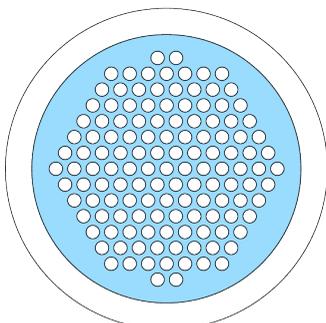
Size O
44#20



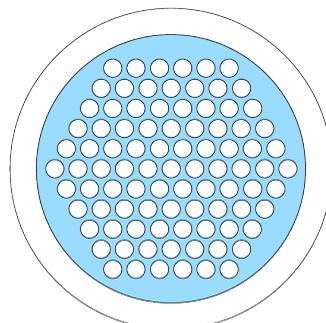
Size O
19#16



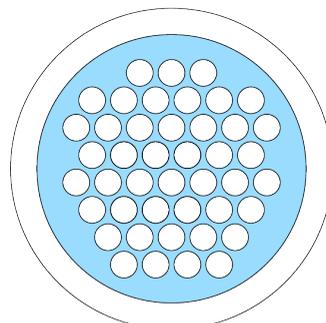
Size O
8#10 + 8#22



Size R
131#22



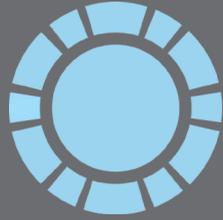
Size R
91#20



Size R
44#16



MADE IN USA



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challenging application!

