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Underwater Connectivity

‘A’ Electrical Connector Subsea / Underwater / Marine

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Introduction:

CRE has developed a wide range of metal shell connectors over the years focussed on delivering high reliability in tough environments. They are designed for heavy duty use in the most rigorous underwater applications on the planet. The design offers a high integrity sealing arrangement, metal key-ways, multiple options, size, pin quantity, voltage and current rating along with our ability to design specific solutions for your application.

Manufactured as standard from stainless steel or custom built with any material specified, they come with high open face pressure resistance. The standard connectors are rated to 6000m WD and are designed for use in moulded, oil filled and PBOF, in power, signal, and electro-mechanical applications.

Common applications:

- ROV, Resident ROV & AUV
- Manned underwater vehicles
- Aquaculture
- Renewables
- Ocean science/research
- Dive / depressurisation systems

Key features:

- Up to 14 contacts
- Mixed contact sizing options
- Custom solutions (contact qty/size/type, glass to metal)
- Rated for 6000m WD mated and open face as standard, higher pressure available on application
- Oil filled (OF) available as standard, pressure balanced oil filled (PBOF) available for certain pin configurations (connector & bulkhead assemblies)
- Working voltage and current dependent on contact density and diameter.

‘A’ Electrical Connector Subsea / Underwater / Marine

Part numbering:

Bulkhead example:

BR	A	07	M		0900	24	01	BP	Ti	
									*	M.O.C., SS std, Ti, AL, Pk etc.
									*	Back pressure (If required), PBOF
										Interface number
										Wire gauge
									*	Wire length in mm.(i.e 900mm), standard cores
										H / H2 / H3 if the connector has a hybrid option
										Male / Female
										Number of contacts, BC (Blanking Cap)
										Connector family 'A', 'B', 'C' etc.

BR - Bulkhead receptacle (Threaded)
FR - Flanged receptacle
RC - Moulded or oil filled receptacle
FC - Flanged moulded or oil filled receptacle.

Notes:

1. For standard assemblies, the part number structure indicated * above is left blank.
2. Where custom wiring is required, Engineering will issue a BA**** (Bulkhead Assembly Part Number) to substitute for the wire length/gauge in the part number structure. For example, in the part number above 090024 would be replaced by BA followed by a four digit number to create a unique identifier.

Component	Material
Bulkhead Body	Stainless steel 316L standard
Contact Insert	Epoxy or Glass to Metal
Electrical contacts	Leaded Nickel Copper C(&or K41)
Plating detail	1um Acid Gold over 2.5 um Nickel Copper Flash
Retaining nut/washer (optional, order if req.)	Stainless steel
Flange retainers (optional, order if req.)	Stainless steel
'O' Rings	Nitrile NI70 or as specified by customer

Notes:

1. Contact CRE for any special-order materials required

'A' Electrical Connector Subsea / Underwater / Marine

Part numbering:

Connector example:

PL	A	07	M		OF	4500	24	01	Ti	
									*	M.O.C., SS std, Ti, AL, Pk etc.
									*	Oil filled interface
										Wire gauge
										Moulded cable tail length in mm (i.e 4500mm), standard cores.
										Oil filled, PBOF (Pressure Balanced Oil Filled)
									*	H / H2 / H3 if the connector has a hybrid option
										Male / Female
										Number of contacts, BC (Blanking Cap)
										Connector family 'A', 'B', 'C' etc.
										PL - Plug in Line PR - Plug Right Angle

Notes:

- For standard moulded assemblies, the part number structure indicated * above is left blank.
- Where custom wired moulded tail is required, Engineering will issue a CA**** (Connector Assembly Part Number) to substitute for the wire length/gauge in the part number structure. For example, in the part number above 090024 would be replaced by CA followed by a four digit number to create a unique identifier.

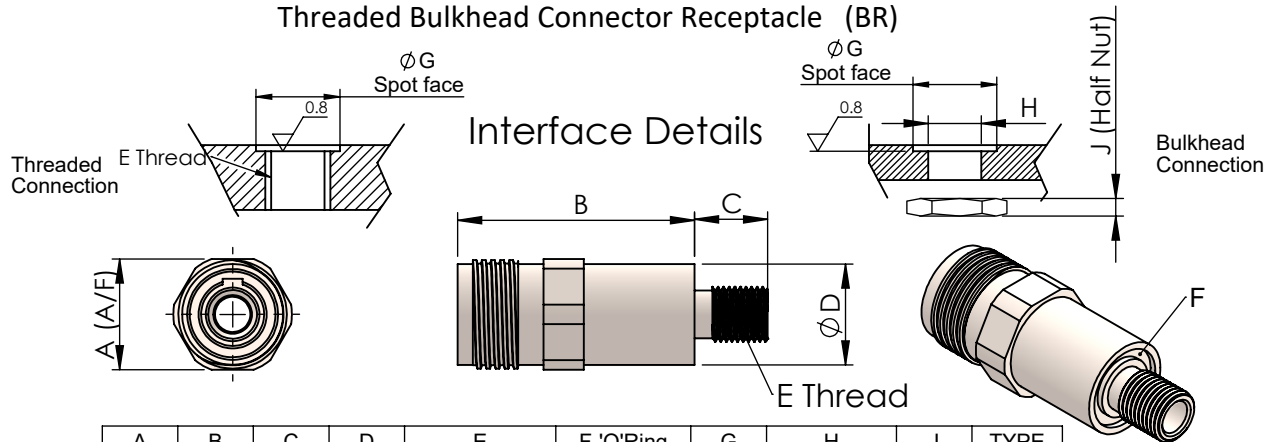
Component	Material
Connector Body	Stainless steel 316L standard
Locking Collar	Aluminium Nickel Bronze
Backing Washer	Acetal
Contact Insert	Epoxy or Glass to Metal
Electrical Contacts	Leaded Nickel Copper C(& or K41)
Plating detail	1um Acid Gold over 2.5 um Nickel Copper Flash
'O' Rings	Nitrile NI70 or as specified by customer

Notes:

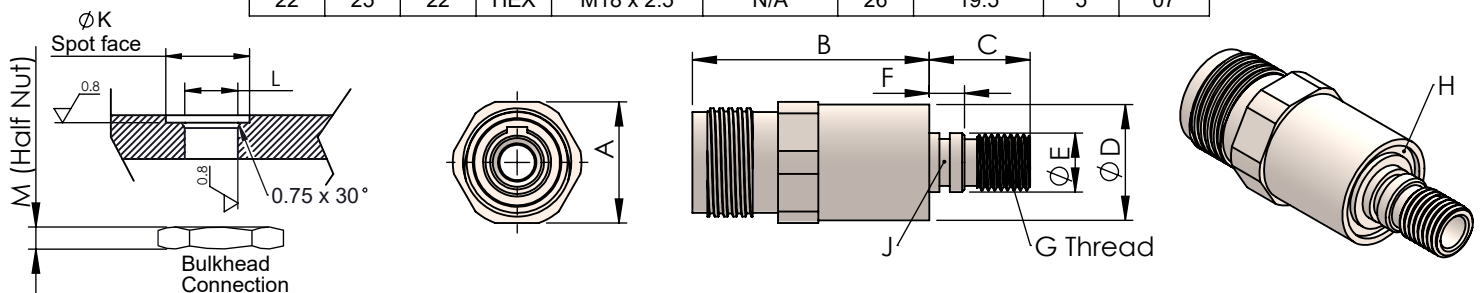
- Contact CRE for any special-order materials required

Reference Dimensions 'A' Connector

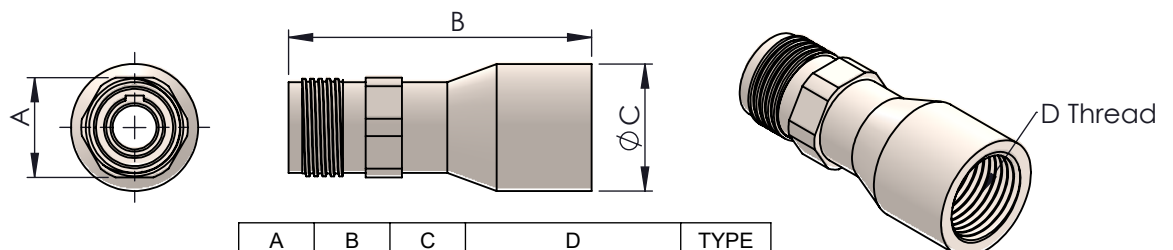
Threaded Bulkhead Connector Receptacle (BR)



A	B	C	D	E	F-O'Ring	G	H	J	TYPE
22	42	19	20	7/16-20 UNF	BS014	21	11.5/11.9	4	13
22	42	9	20	7/16-20 UNF	BS014	21	11.5/11.9	4	09
22	42.5	14.5	20	7/16-20 UNF	BS014	21	11.5/11.9	4	02
22	47	14.5	20	7/16-20 UNF	BS014	21	11.5/11.9	4	01
22	47	25	20	7/16-20 UNF	BS014	21	11.5/11.9	4	06
22	47	35	20	7/16-20 UNF	BS014	21	11.5/11.9	4	05
25	43	10.5	23	1/2-20 UNF	BS015	24	13.1/13.5	4	10
25	40.5	14.5	23.5	9/16-18 UNF	BS016	25	14.7/15.1	4	03
25	33.5	10	23.5	9/16-18 UNF	BS016	25	14.7/15.1	4	04
25	32.25	14.75	25	5/8-18 UNF	BS017	26	16.3/16.7	4	08
25	32.25	45	25	5/8-18 UNF	BS017	26	16.3/16.7	4	11
25	38	18	25	5/8-18 UNF	BS017	26	16.3/16.7	4	12
25	38	25.4	25	5/8-18 UNF	BS017	26	16.3/16.7	4	16
35	23	22	35	3/4-16 UNF	BS119	36	19.4/19.9	5	19
22	25	22	HEX	M18 x 2.5	N/A	26	19.5	5	07



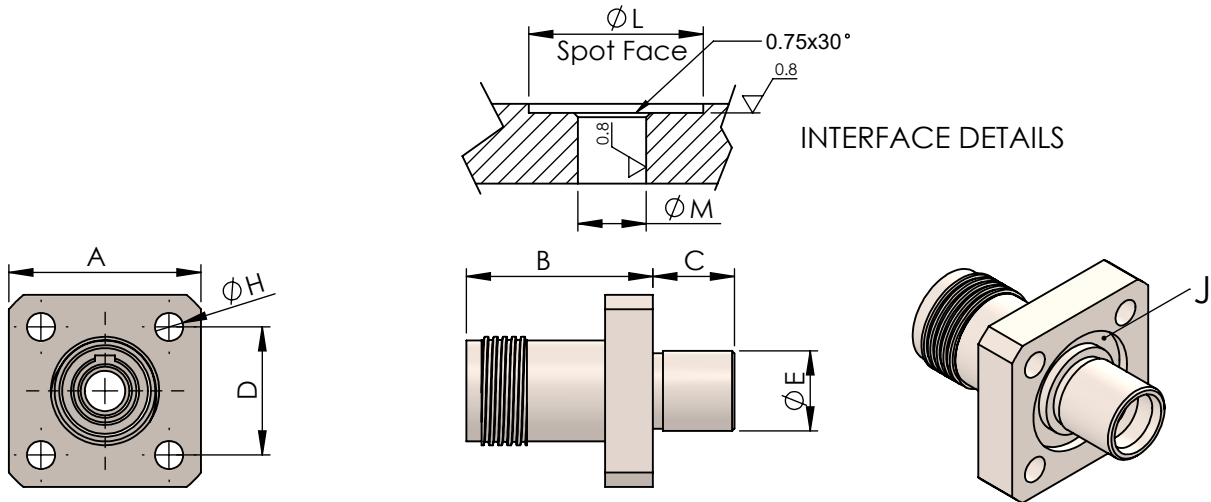
A	B	C	D	E	F	G	H-O'Ring	J-O'Ring	K	L	M	TYPE
22	43	19	HEX	12	10	7/16-20 UNF	BS015	BS012	36	12.1/12.127	4	20
24	47	20	23	11.7	7	7/16-20 UNF	BS016	9 x 1.5	24	11.8/11.827	4	14
24	47	35	23	11.7	7	7/16-20 UNF	BS016	9 x 1.5	24	11.8/11.827	4	21
28.4	29.5	25.4	HEX	17.4	8	5/8-18 UNF	BS019	BS015	32	17.5/17.527	4	18
25	38	20	25	16.5	7	5/8-18 UNF	BS018	14 x 1.5	26	16.6/16.627	4	15
25	40	74	25	16	60	5/8-18 UNF	BS017	N/A	26	16.05/16.1	4	17
24	47	35	27	15.5	7	9/16-18 UNF	BS018	13 x 1.5	28	15.6/15.627	4	22
24	47	35	27.5	19	7	11/16-20 UNEF	BS019	BS016	28.5	19.1/19.133	4	23



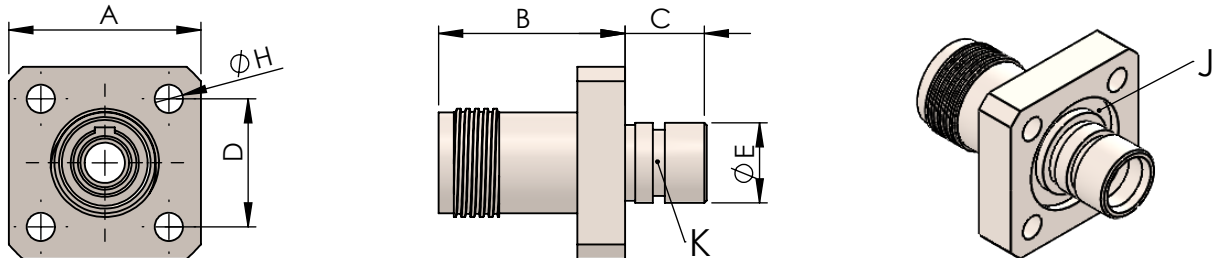
A	B	C	D	TYPE
22	66.8	28	1/2 NPT x 19 DEEP	24

Reference Dimensions 'A' Connector

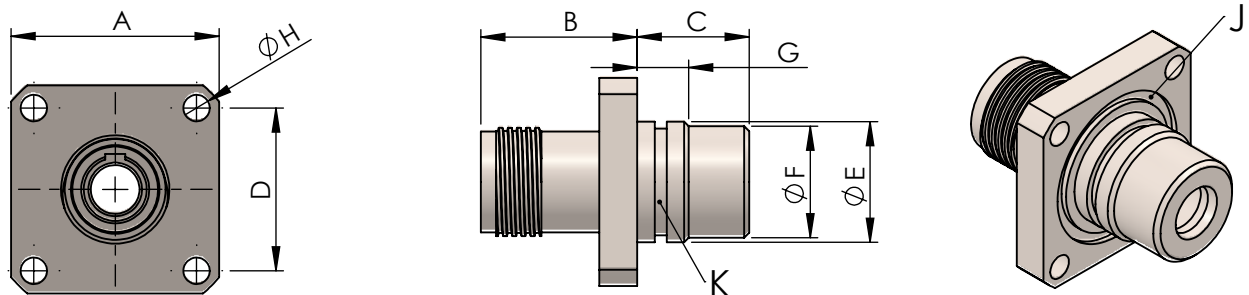
Flanged Bulkhead Connector Receptacle (FR)



A	B	C	D	E	F	G	H	J-'O'Ring	K-'O'Ring	L	M	TYPE
26.9	32.5	9.5	19	12.7	N/A	N/A	3.8	BS016	N/A	36	12.75/12.8	15
31.75	23.85	13.4	25.4	16.5	N/A	N/A	3.65	BS020	N/A	45	16.55/16.6	16
32	25	18	24	18	N/A	N/A	4.3	BS116	N/A	45	18.05/18.1	07
38.1	37	16.2	25.4	15.88	N/A	N/A	5.6	BS116	N/A	54	15.92/16.0	01
41.25	37	16.2	28.6	15.88	N/A	N/A	5.6	BS116	N/A	55	15.92/16.0	04



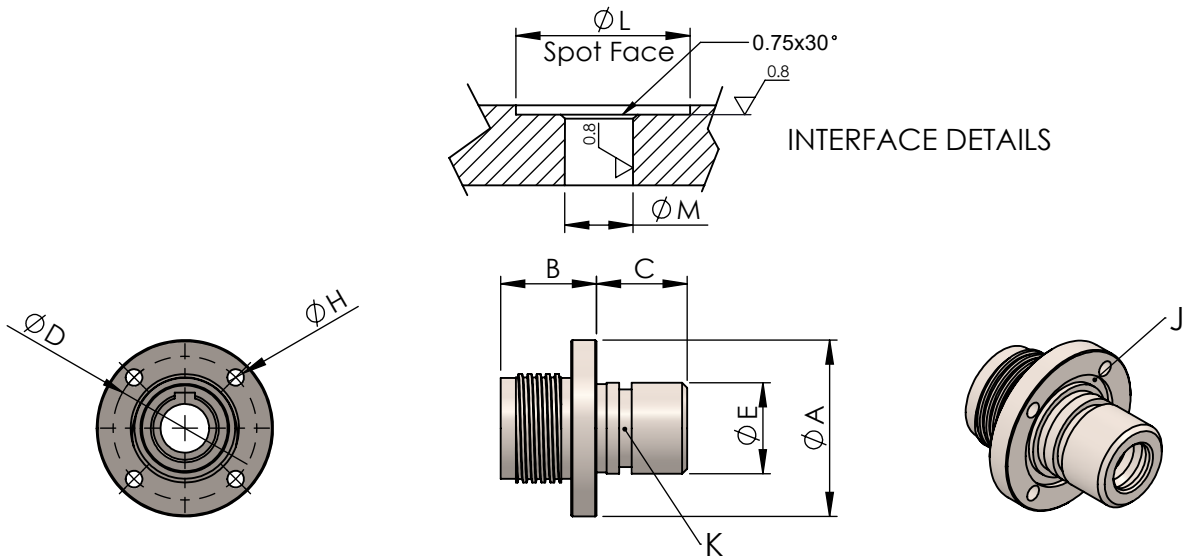
A	B	C	D	E	F	G	H	J-'O'Ring	K-'O'Ring	L	M	TYPE
28.45	30.5	9.5	22.86	14.6	N/A	N/A	3.18	BS017	12.5 x 1	42	14.7/14.727	08
28.45	27	13	23	17.4	N/A	N/A	3.18	BS019	BS015	42	17.5/17.527	10
31.75	19	18.7	25.9	19	N/A	N/A	3.65	BS019	BS016	45	19.1/19.133	06
38.1	37	16.2	25.4	15.88	N/A	N/A	5.6	BS116	BS014	54	15.98/16.007	02
38.1	27	13	30	25.35	N/A	N/A	4	BS023	BS020	54	25.45/25.483	14
41.25	37	16.2	28.6	15.88	N/A	N/A	5.6	BS116	BS014	55	15.98/16.007	03
38.1	38	16.2	25.4	18.8	N/A	N/A	5.3	BS118	BS016	52	18.9/18.933	12



A	B	C	D	E	F	G	H	J-'O'Ring	K-'O'Ring	L	M	TYPE
41.3	31	22.2	32.3	23.9	22.1	10.2	5.25	BS024	BS019	55	24.0/24.033	09
32	19.05	N/A	24	19	N/A	18.7	4.3	BS019	BS016	45	19.1/19.133	13

Reference Dimensions 'A' Connector

Flanged Bulkhead Connector Receptacle (FR)

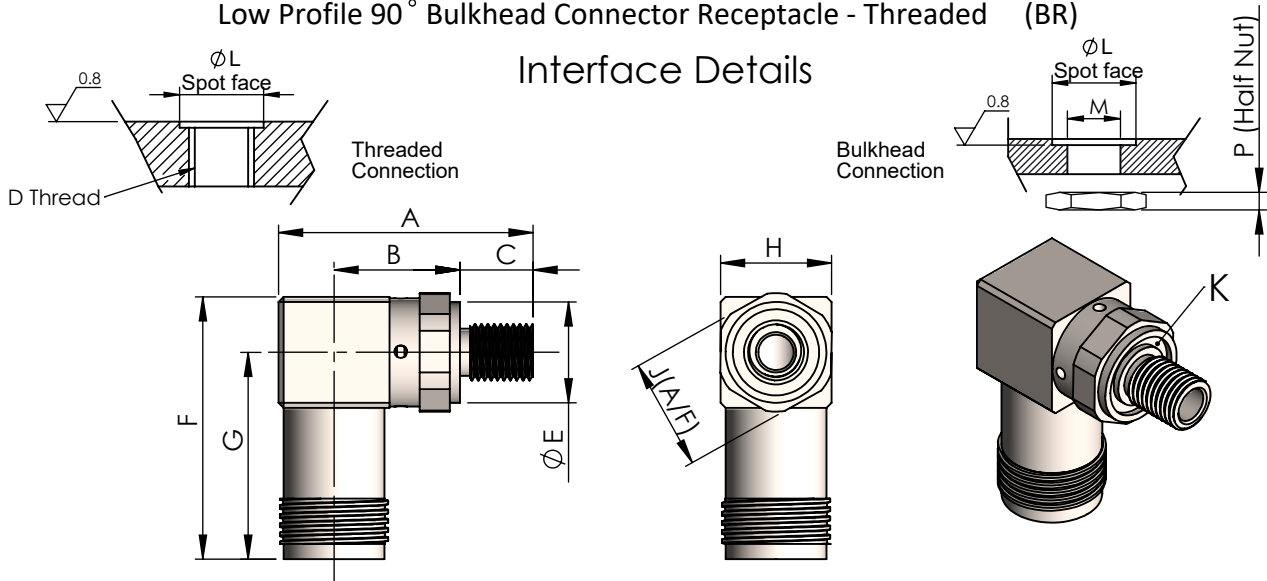


A	B	C	D	E	F	G	H	J-'O'Ring	K-'O'Ring	L	M	TYPE
35	19	18	28.5	18	N/A	N/A	3.3	BS018	15.1 x 1.6	36	18.1/18.133	11

Reference Dimensions 'A' Connector

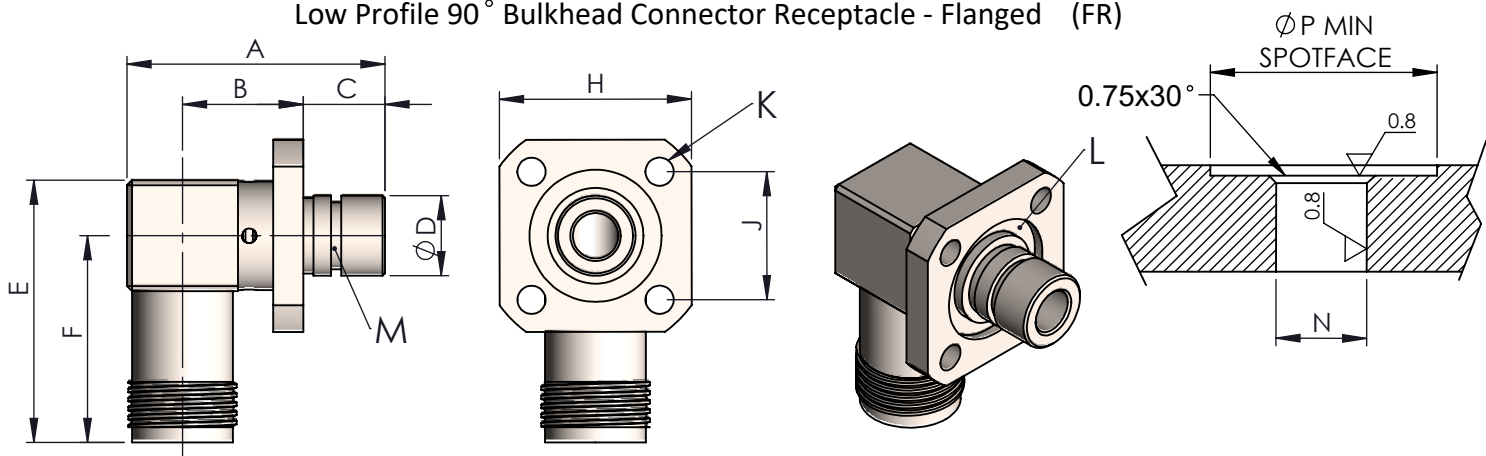
Low Profile 90° Bulkhead Connector Receptacle - Threaded (BR)

Interface Details



A	B	C	D	E	F	G	H	J	K-O'Ring	L	M	P	TYPE
50.2	25	14.5	7/16-20 UNF	20	52	41	22	22	BS014	23	11.5/11.9	4	LPT01
54.7	25	19	7/16-20 UNF	20	52	41	22	22	BS014	23	11.5/11.9	4	LPT02
60.7	25	25	7/16-20 UNF	20	52	41	22	22	BS014	23	11.5/11.9	4	LPT03
73.7	25	38	7/16-20 UNF	20	52	41	22	22	BS014	23	11.5/11.9	4	LPT04
45.7	25	10	1/2-20 UNF	22	52	41	22	22	BS015	25	13.1/13.5	4	LPT05
50.2	25	14.5	1/2-20 UNF	22	52	41	22	22	BS015	25	13.1/13.5	4	LPT06
54.7	25	19	1/2-20 UNF	22	52	41	22	22	BS015	25	13.1/13.5	4	LPT07
60.7	25	25	1/2-20 UNF	22	52	41	22	22	BS015	25	13.1/13.5	4	LPT08
73.7	25	38	1/2-20 UNF	22	52	41	22	22	BS015	25	13.1/13.5	4	LPT09
50.2	25	14.5	5/8-18 UNF	25	52	41	22	25	BS017	28	16.3/16.7	4	LPT10
49.9	23	15.9	1/2 NPT x 13.8	21.36	52	41	22	27	N/A	N/A	N/A	N/A	LPT11

Low Profile 90° Bulkhead Connector Receptacle - Flanged (FR)

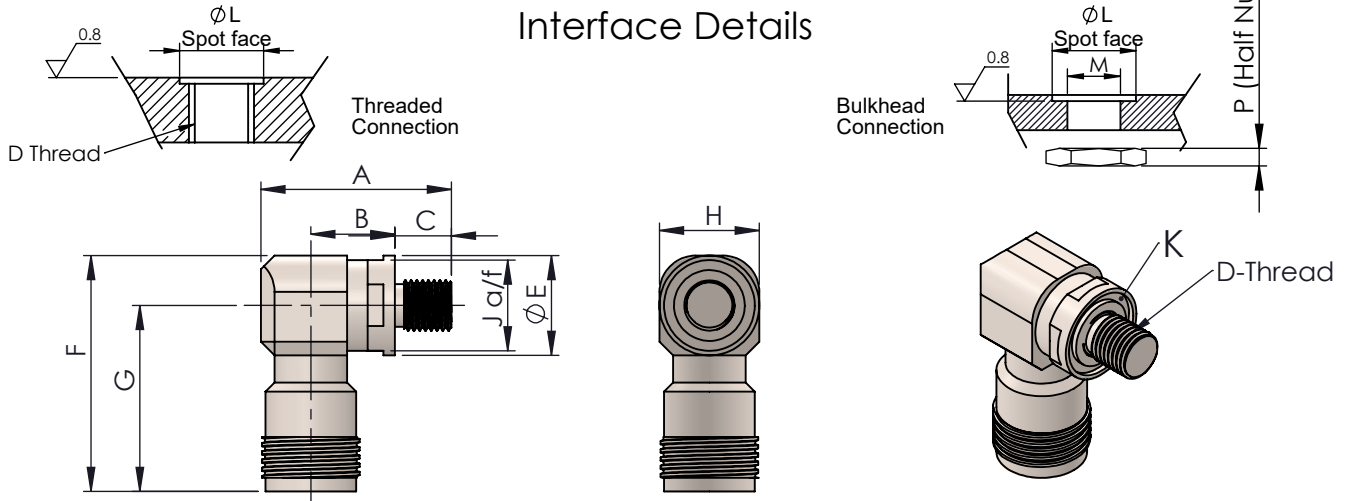


A	B	C	D	E	F	H	J	K	L'O'Ring	M'O'Ring	N	P	TYPE
47	24	12	17.5	52	41	28.45	22.86	3.2	BS019	BS015	17.6/17.627	42	LFP03
51.2	24	16.2	15.88	52	41	38.1	25.4	5.6	BS116	N/A	15.92/15.96	50	LFP01
51.2	24	16.2	15.88	52	41	38.1	25.4	5.6	BS116	BS014	15.98/16.007	50	LFP02
55	24	20	18	52	41	32	24	5.6	BS117	N/A	18.1/18.15	45	LFP04

Reference Dimensions 'A' Connector

Low Low Profile 90° Bulkhead Connector Receptacle - Threaded (BR)

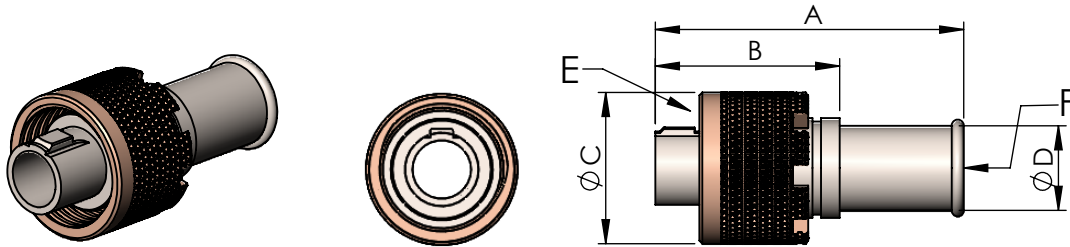
Interface Details



A	B	C	D	E	F	G	H	J	K-'O'Ring	L	M	P	TYPE
38	18.5	8.5	7/16-20 UNF	22	52	41	22	20	BS016	23	11.5/11.9	4	LLPT02
42	18.5	12.5	7/16-20 UNF	22	52	41	22	20	BS016	23	11.5/11.9	4	LLPT01
42	18.5	12.5	5/8-18 UNF	24	52	41	22	22	BS017	25	16.3/16.7	4	LLPT03

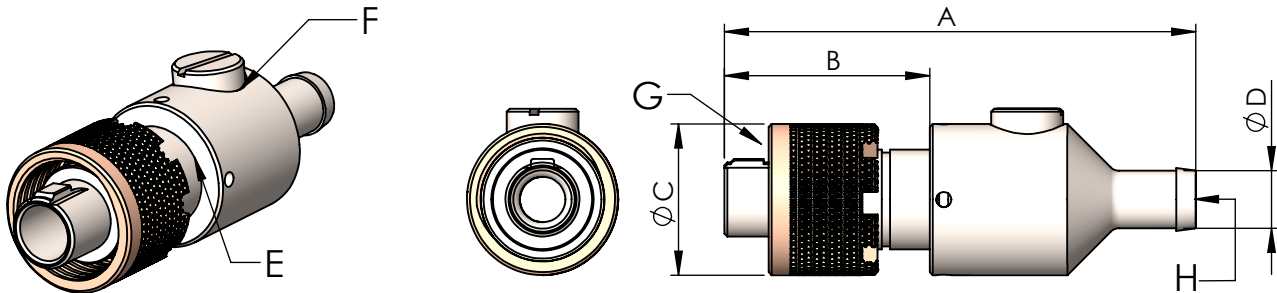
Reference Dimensions 'A' Connector

Oil Filled Cable Connector Receptacle (PL)



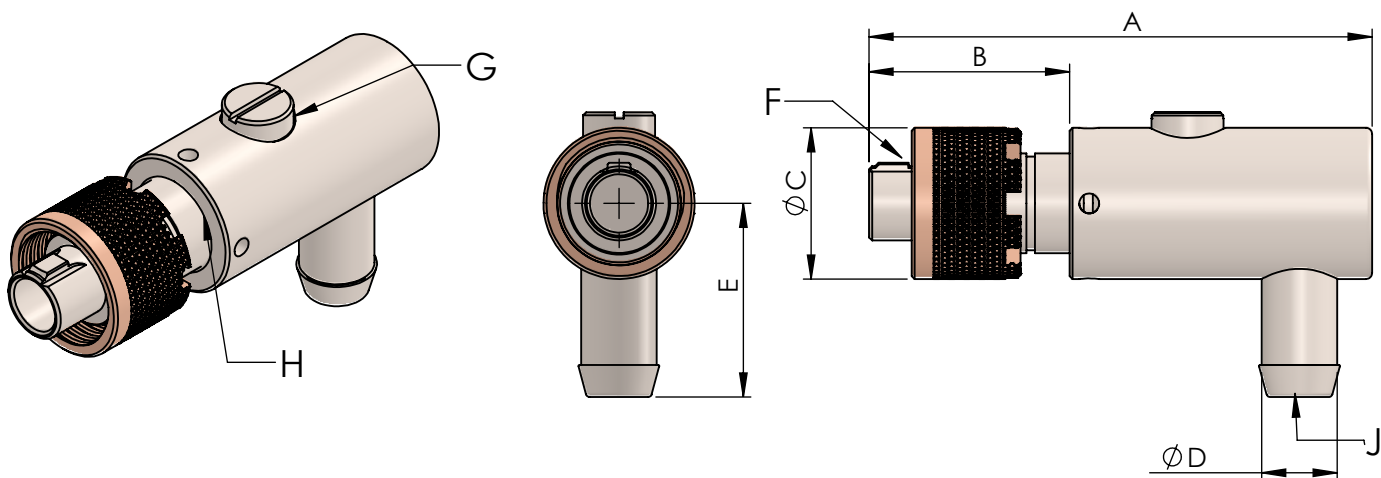
A	B	C	D	E-'O' Ring	BORE F	TYPE
51	30.4	25	14	14.1x1.6	11	01

Backshell Cable Connector Receptacle (PL)



A	B	C	D	E-'O'Ring	F-'O'Ring	G-'O'Ring	BORE H	TYPE
78	34	25	8	16 x 1.5	6 x 1.5	14.1 x 1.6	6	03
78	34	25	9.5	16 x 1.5	6 x 1.5	14.1 x 1.6	7.5	02
78	34	25	12.5	16 X 1.5	6 X 1.5	14.1 X 1.6	9.7	04

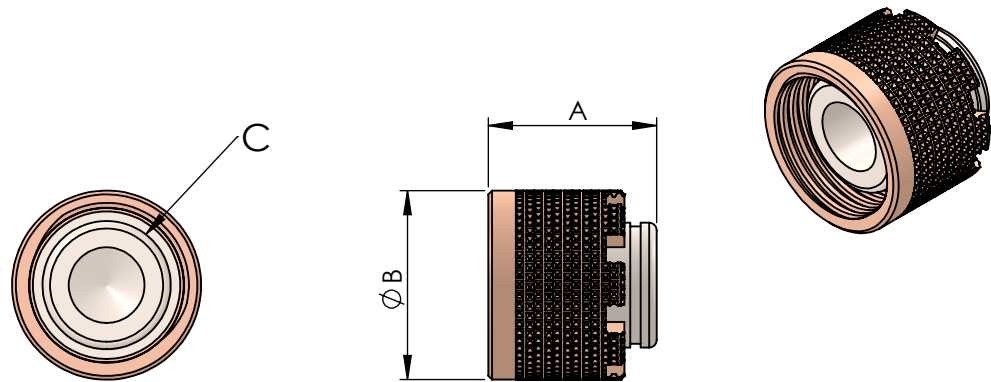
Backshell Cable Connector Receptacle-90 Deg. (PR)



A	B	C	D	E	F-'O'Ring	G-'O'Ring	H-'O'Ring	BORE J	TYPE
84	34	25	12.5	29	14.1 x 1.6	6 x 1.5	16 x 1.5	8.5	01

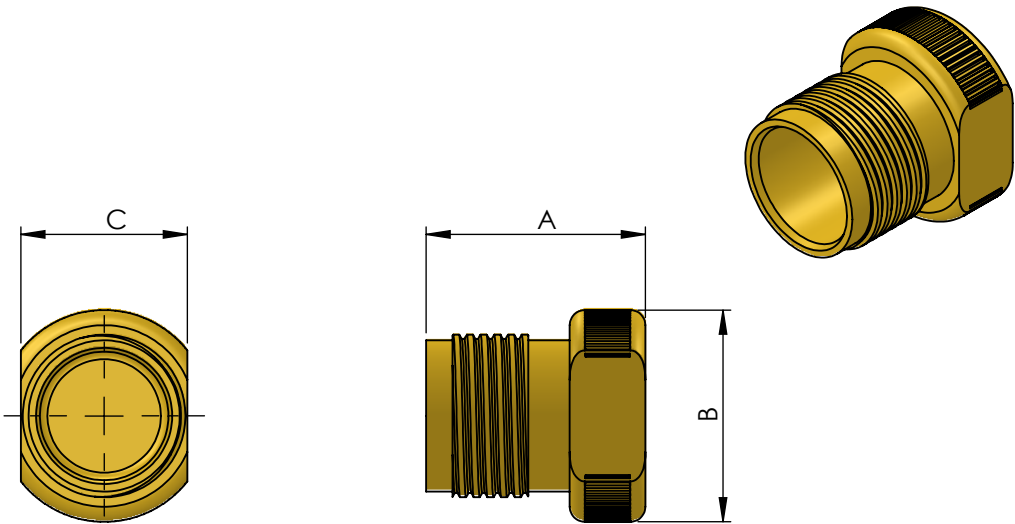
Reference Dimensions 'A' Connector

Bulkhead Blanking Plug - PLABC



A	B	C-'O'Ring
22.25	25	14.1 x 1.6

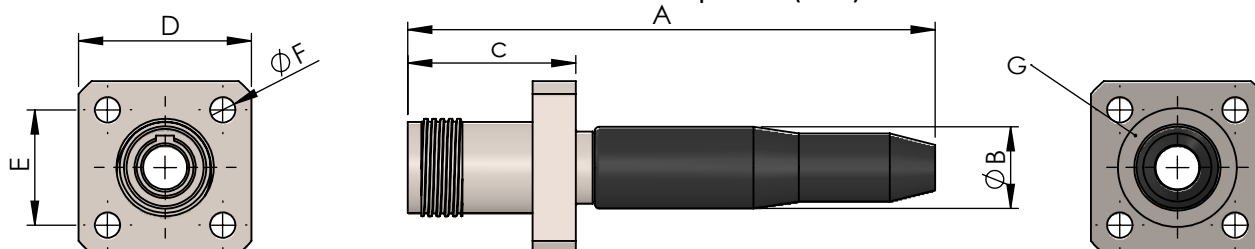
Cable Connector Blanking Plug - BRABC



A	B	C
29	28	22

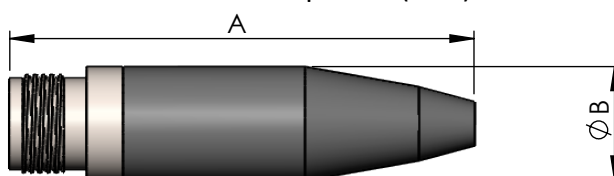
Reference Dimensions 'A' Connector

Moulded Bulkhead Receptacle (FCA)



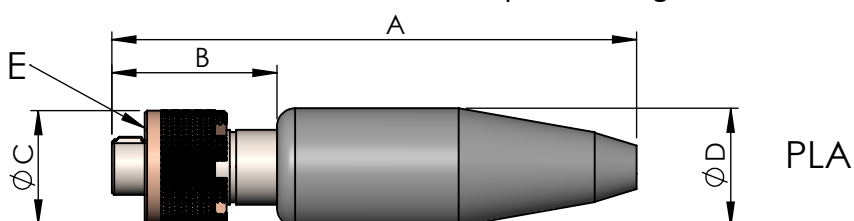
A	B	C	D	E	F	G-'O' RING	TYPE
116	18	37	38.1	25.4	5.6	BS116	01

Moulded Bulkhead Receptacle (RCA)



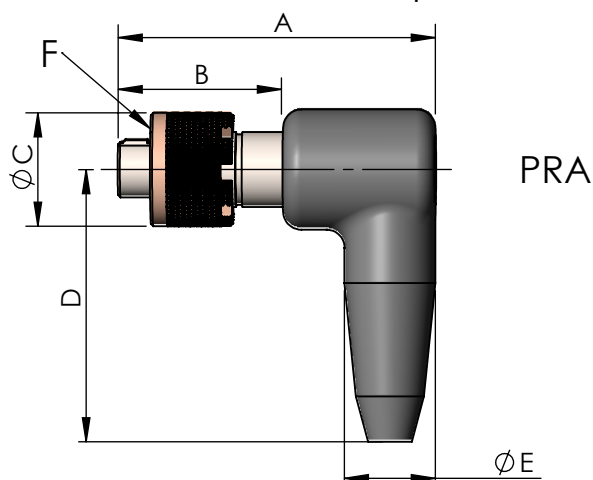
A	B	TYPE
100	25	02

Moulded Cable Connector Receptacle-Straight



A	B	C	D	E-'O'Ring
115	36.7	25	25	14.1x1.6

Moulded Cable Connector Receptacle-90°

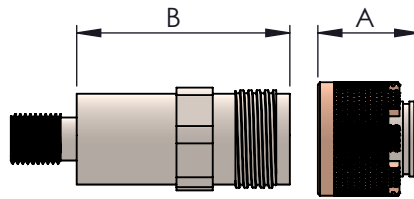


A	B	C	D	E	F-'O'Ring
70	36.7	25	60	20	14.1 x 1.6

Mould Sizes Are Indicative

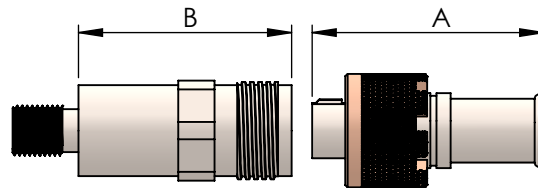
Note: Step files for design purposes available from engineering@CRE-marine.com

Assembled Dimensions 'A' Connector



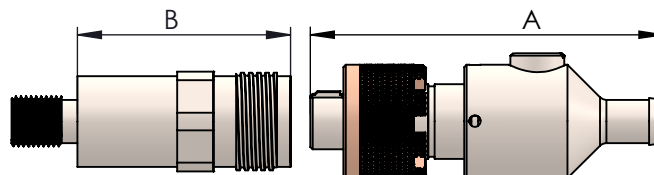
PLABC

Assembled Dimension = 'B' + 9mm



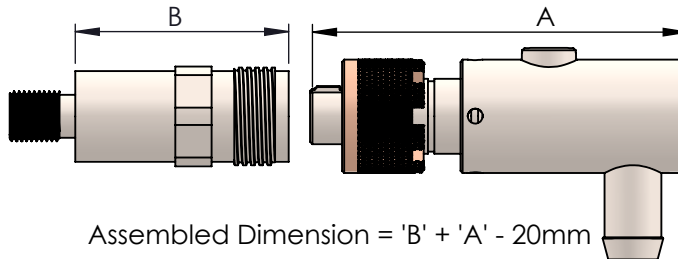
PLAOF01

Assembled Dimension = 'B' + 'A' - 20mm



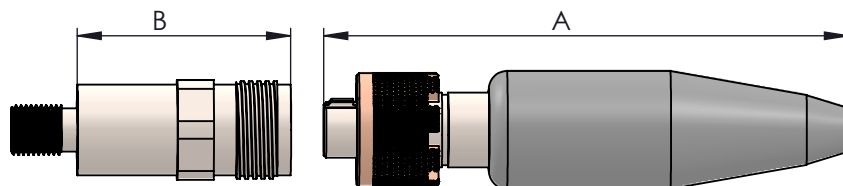
PLAOF02
 PLAOF03
 PLAOF04

Assembled Dimension = 'B' + 'A' - 20mm



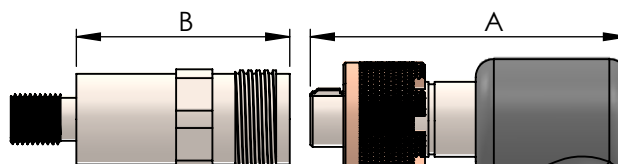
PRAOF01

Assembled Dimension = 'B' + 'A' - 20mm



PLA

Assembled Dimension = 'B' + 'A' - 20mm



PRA

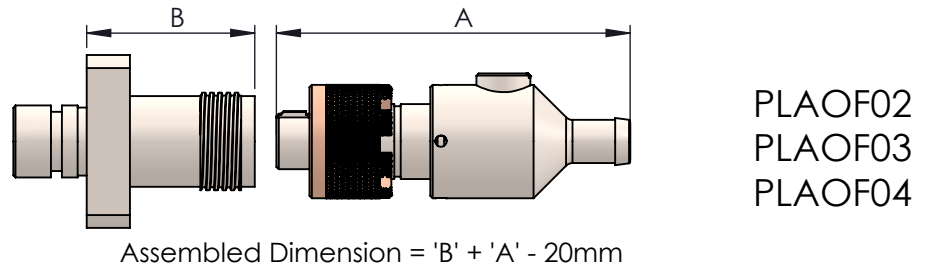
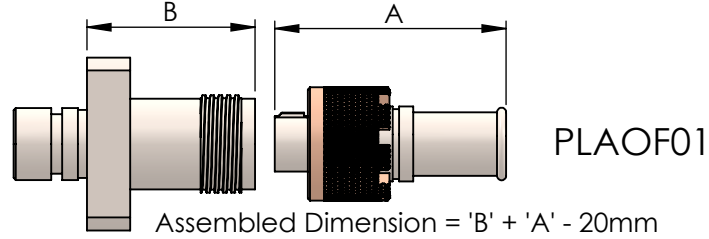
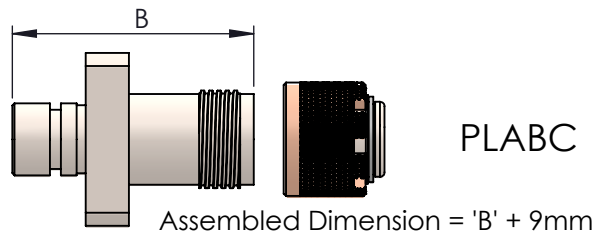
Assembled Dimension = 'B' + 'A' - 20mm

EXAMPLE: BRA01 'B' = 47, PLAOF02 'A' = 78
 THEREFORE ASSEMBLED DIMENSION IS 47 + 78 - 20 = 105

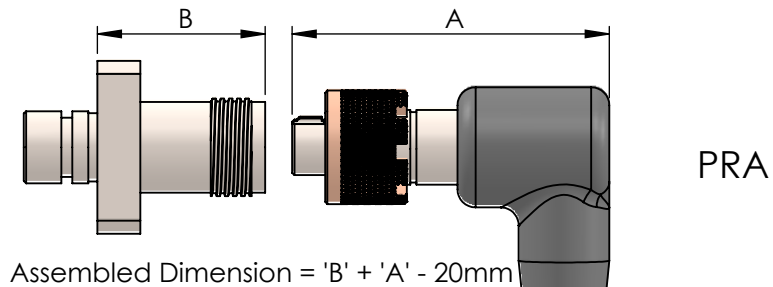
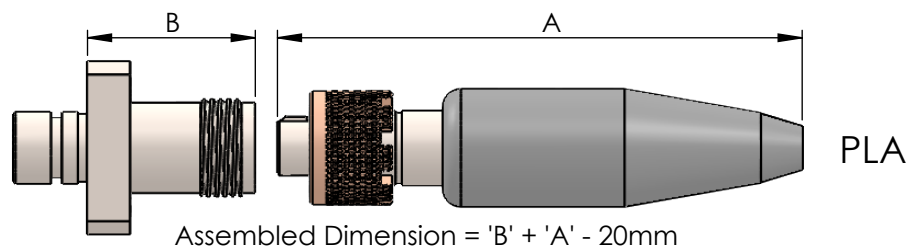
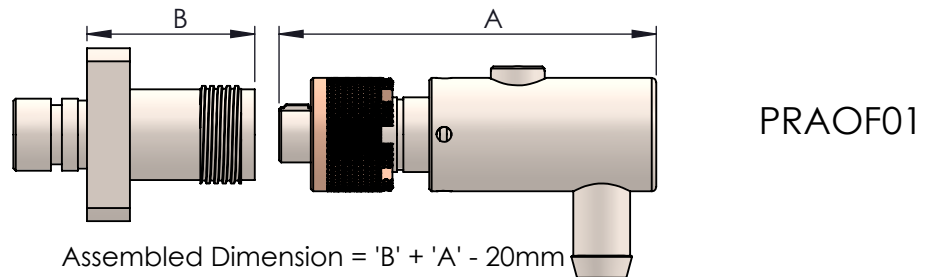
Mould Sizes Are Indicative

Note: Step files for design purposes available from engineering@CRE-marine.com

Assembled Dimensions 'A' Connector



FLANGED BULKHEADS
 FRA01 - FRA16

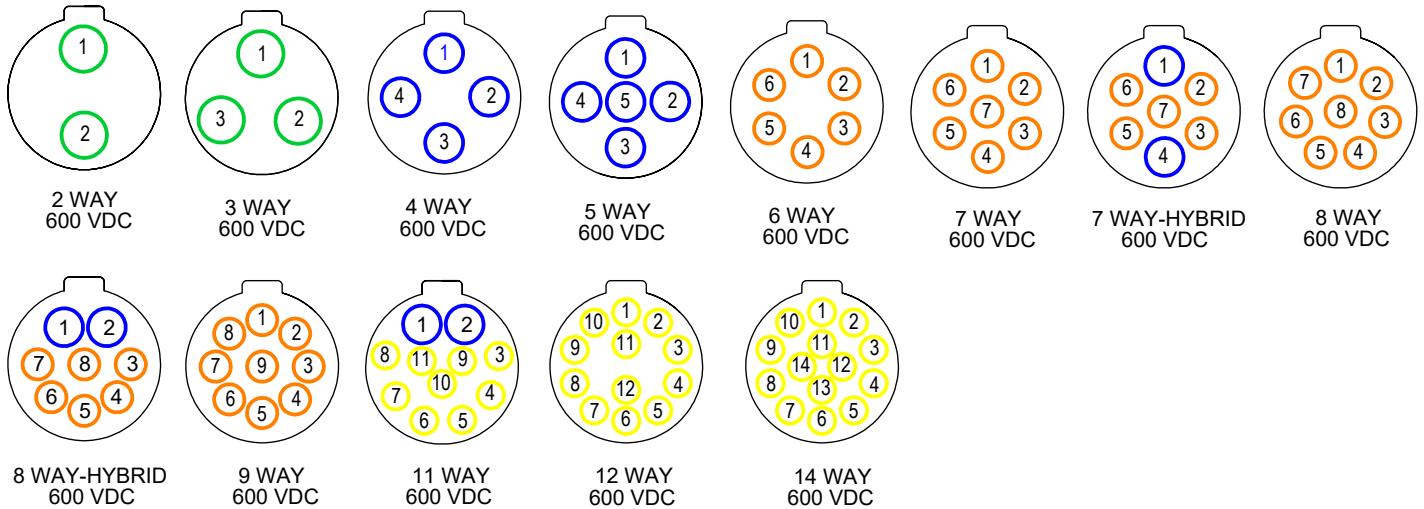


EXAMPLE: FRA01 'B' = 37, PLAOF02 'A' = 78
 THEREFORE ASSEMBLED DIMENSION IS 37 + 78 - 20 = 95

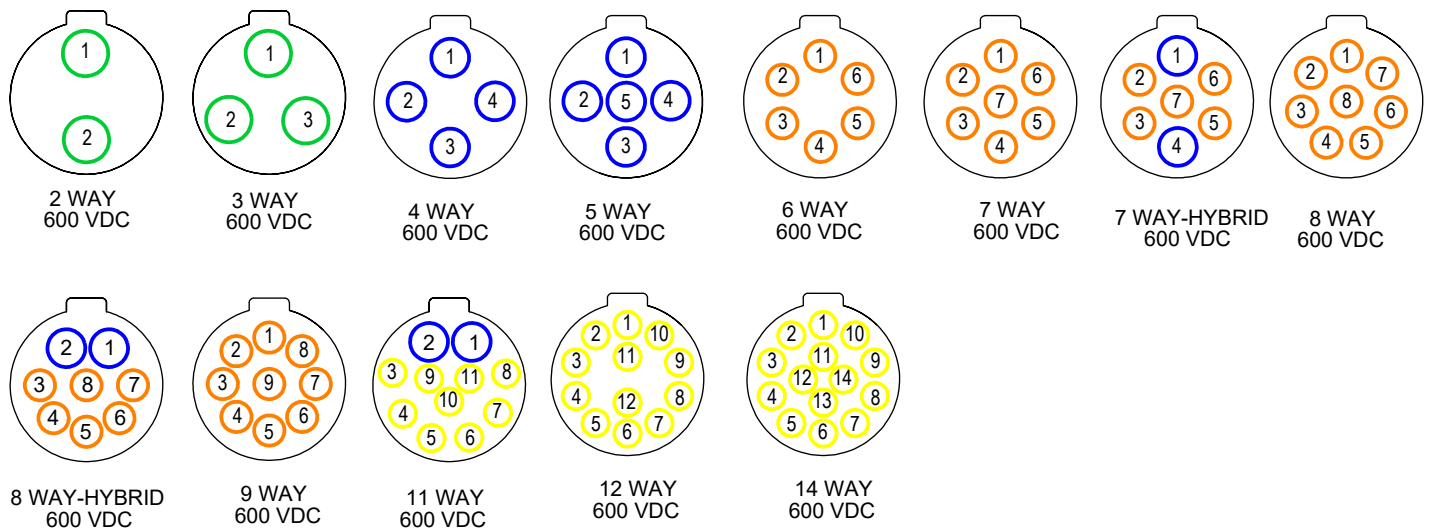
Mould Sizes Are Indicative

Note: Step files for design purposes available from engineering@CRE-marine.com

Pin Face View



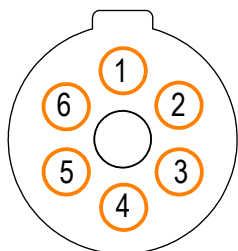
Socket Face View



CRE recommend using a mating Bulkhead or Connector tail when carrying out continuity testing on Connectors with the 0.75mm contacts to minimise the risk of accidental damage to the contacts

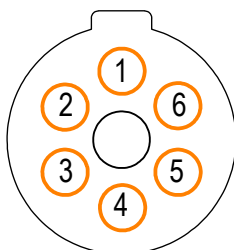
For current carrying capacity and wiring recommendations see page 17

Pin Face View



6 WAY-PBOF
600 VDC

Socket Face View



6 WAY-PBOF
600 VDC


Ø 1.0 Pin

For current carrying capacity and wiring recommendations see page 17

Current Capacity and Wire Recommendations

- The wire options for bulkheads are governed by the through bore of the bulkhead body and the dimensions of the solder bucket on the contact.
- Heat, caused by an electrical current flowing through a conductor will determine the amount of current that the wire will handle.
- The current rating follows industry standards for a single wire in free air at 30 deg. C with derating for bundled wires.
- The table below shows the current required to raise the temperature of a single insulated conductor to the limits of its insulation temperature.

Contact dia.	0.75	1.0	1.56	1.9
Wire size	24 awg	22 awg	16 awg	14 awg
Current	8 amps	11 amps	26 amps	40 amps
Contact rating based on PTFE type C cable				

Derating Factors for Bundled Conductors	
Bundle #	Derating Factor (x Amps)
2 - 5	0.8
6 - 15	0.7
16 - 30	0.5

Recommended torque for threaded interfaces manufactured in 316L Stainless Steel assembled into metallic housings.

Thread	Torque N/m (Lubricated)	Torque Inch Pounds (Lubricated)
7/16-20 UNF	3-4	30-35
1/2-20 UNF	4-6	40-45
9/16-18 UNF	5-7	50-55
5/8-18 UNF	5-7	50-55
11/16-18 UNF	7-9	60-65
3/4-16 UNF	7-9	60-65

The table above shows the recommended tightening torque values for threaded bulkhead interfaces into metallic housings.

We recommend the use of a small quantity of anti-seize lubricant such as Copaslip applied to the pin thread as a lubricant to aid the make-up process.

Should you require any further information or advice please contact CRE direct on sales@cre-marine.com