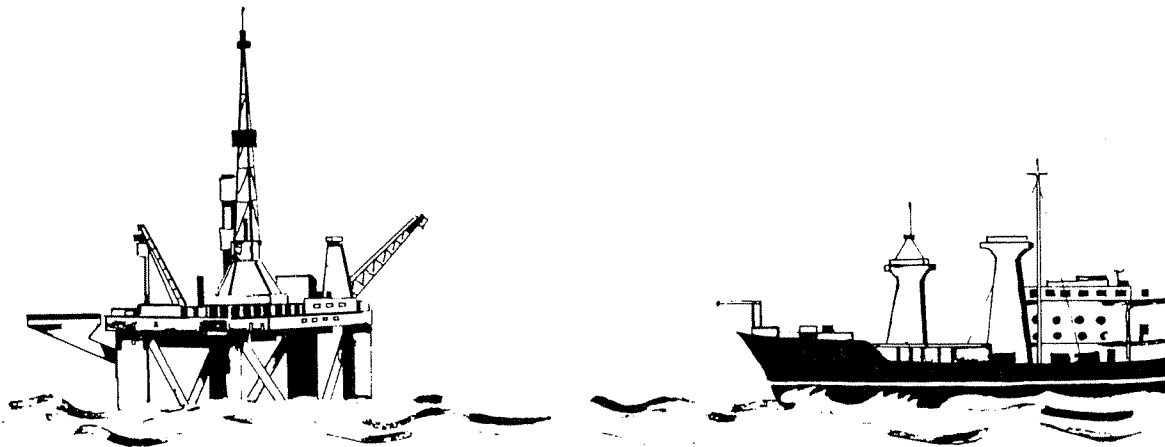


ELECTRO



Underwater Electrical Connectors

COOPER Crouse-Hinds

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ELECTRO PRODUCTS

IMPORTANT NOTICE

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LIMITED WARRANTY

Crouse-Hinds Electro Products are warranted against mechanical, electrical, and physical defects for a period of one year from the date of shipment from the factory, if they have been properly used, and are warranted to be merchantable and fit for the ordinary purposes for which such products are used. THERE ARE NO EXPRESS WARRANTIES OR WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE, or any implied warranties other than those made expressly herein, ALL SUCH WARRANTIES BEING EXPRESSLY DISCLAIMED. THE OBLIGATION OF CROUSE-HINDS ELECTRO PRODUCTS UNDER this limited warranty, including THE LIMITED WARRANTY OF MERCHANTABILITY AND FITNESS FOR THE ORDINARY PURPOSE FOR WHICH THE PRODUCTS ARE USED, and all other warranties IS LIMITED TO THE FURNISHING OF NEW PARTS FREE OF CHARGE in exchange for parts which have proven defective and does not include any other costs such as the cost of removal of defective part, installation, labor or consequential damages of any kind, the exclusive remedy being to require such new parts to be furnished. Crouse-Hinds Electro Products assumes no responsibility for proper selection and installation of its products.

RETURN POLICY

1. Prior return authorization must be obtained.
2. Returns must be accompanied by the following information:
 - a. Date of shipment
 - b. Crouse-Hinds Electro Products sales order number
 - c. Customer purchase order number
 - d. Any relevant test data for failure description and circumstances.
3. Returns from countries outside the U.S. must be sent according to the following procedures. Failure to follow these instructions will result in U.S. Customs tie-ups and unnecessary duties which will not be paid by Crouse-Hinds Electro Products.
 - a. Notify Crouse-Hinds Electro Products as above and include all necessary information with the shipment.
 - b. State that they are returned American goods (U.S.A.)
 - c. State that the goods are defective — NO VALUE DECLARED.
 - d. Send returned parts by air parcel post or parcel post only.

***ELECTRO* PRODUCTS**

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GENERAL INFORMATION

Ratings

Pin Code	Max. No. Pins	Contacts Per Pin	Max. AC Volts	Max. Amps¹	Std. AWG Wire Size²
E	1	1	230	15	#16
E	2	1	230	15	#16
E	3	1	230	15	#16
E	4	1	230	15	#16
F	1	2	115	7.5	#18
F	2	2	115	7.5	#18
F	3	2	115	7.5	#18
F	4	2	115	7.5	#18
H	1	1	440	60	#8*
H	3	1	440	60	#8*
H	4	1	440	60	#8*
L	1	1	440	175	#1
L	3	1	440	100	#4
L	4	1	440	85	#4

NOTES: 1. Rating per contact.
2. Unless otherwise specified.

*51H Series have #6 AWG wire.

SERIES 51, 53, B51 and B53

APPLICATIONS

Some typical uses of underwater pluggable WATERMATE™ Plugs, Receptacles and Connectors are in power and/or control circuits for:

- Underwater instrumentation and control packages
- Underwater cameras
- Sonar equipment
- Underwater electrical power distribution systems
- Underwater lighting systems

These underwater applications are frequently found in:

- Diving bells
- Submarines
- Ships
- Diving helmets
- Submersible pumps

For offshore marine installation of moorings, dock facilities, petroleum production platforms, etc.

IMPORTANT NOTE:

Bulkhead connectors must be installed with pigtails on low pressure side of bulkheads or interior of vessels. Pressure on pigtail side must not exceed the pressure on external side of connector.

FEATURES:

- Exclusive construction of these patented WATERMATE™ electrical connectors permits underwater plugging and unplugging with electrical power de-energized.
- Pressure rated up to 20,000 psi or maximum 45,000 feet of sea water (except Series 53 which is rated up to 10,000 psi).
- Pressure balanced for easy engagement and disengagement in high pressure environments.

ELECTRO PRODUCTS

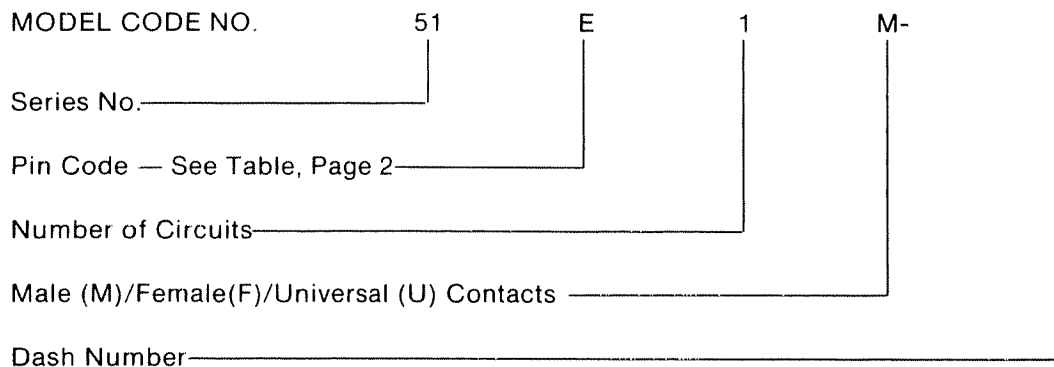
FEATURES: (continued)

- 53 and B53 Series permit leak-proof hull penetration.
- Rubber-to-rubber contact of specially formulated neoprene provides total sealing integrity when properly installed and maintained.
- Locking sleeves are available for positive plug retention.
- B51 and B53 Series have a flanged body to retain locking sleeves.

ELECTRICAL SPECIFICATIONS:

- Guaranteed dry seal insulation resistance is 100 megohms at 500 V-DC, contact-to-contact, or contact-to-ground when plugged in sea water.
- Hi-Pot Specification is 1200 Volts D.C.
- Beryllium copper contact resistance less than .005 ohms.

TYPICAL CATALOG NUMBER



***ELECTRO* PRODUCTS**

INSTALLATION, MAINTENANCE, AND LUBRICATION INSTRUCTIONS

These instructions are applicable for Series 51, 53, B51, B53, 59, 510, 52, 610 and 41 products.

LUBRICATION

To optimize the performance of these products, pins and sockets of mating connectors must be lubricated with silicone grease, (e.g. Dow Corning #4 or General Electric Insulgrease® #635). Grease should be applied to the entire surface of each male contact pin. A small amount of silicone grease should be placed inside the entry hole of the female socket. Products must be relubricated on a regular maintenance cycle.

MATING AND UNMATING

Connector must be well lubricated. Insertion should be accomplished with as little flexing as possible. Separation of multi-conductor connectors can be aided by flexing the connector head up to 15° to help the separation process. Flexing beyond 15° must be avoided.

MOUNTING OF BULKHEAD PENETRATORS

For 59 and 510 Series — Drill holes with sufficient clearance for diameter of threaded body. Coat the rubber skirt on the bottom of connector with silicone grease to insure a good seal. Install washer and jam nut from low pressure side with sufficient pressure to keep connector from turning. Extreme bending of connector during mating may temporarily affect the seal.

For 53 and 41 Series — Drill and tap hole to match thread size of connector. Lubricate the O-ring with silicone grease to improve seal. Torque down hand-tight and, then add 1/4 turn more with a wrench.

Bulkhead connectors must be installed with pigtails on low pressure side of bulkheads or interior of vessels. Pressure on pigtail side must not exceed the pressure on external side of connector.

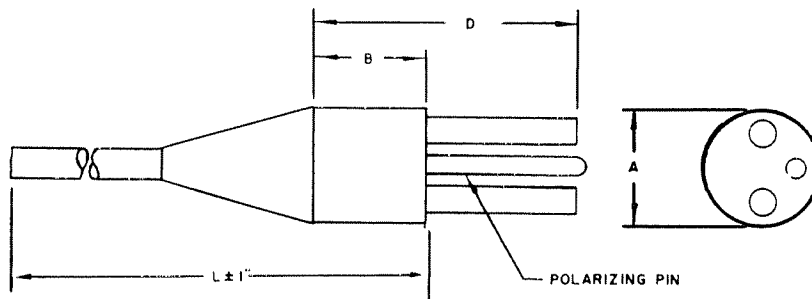
HANDLING

Extreme flexing and rough handling will reduce the useful life of these connectors.

DUMMY CONNECTORS

Unmated connectors should not be exposed to water for an extended period. Dummy connectors should be used to purge water from the contact surfaces to reduce corrosion. Dummy female connectors will help to protect exposed pin contacts from possible physical damage.

Series 51 Male Connector "Underwater Pluggable"

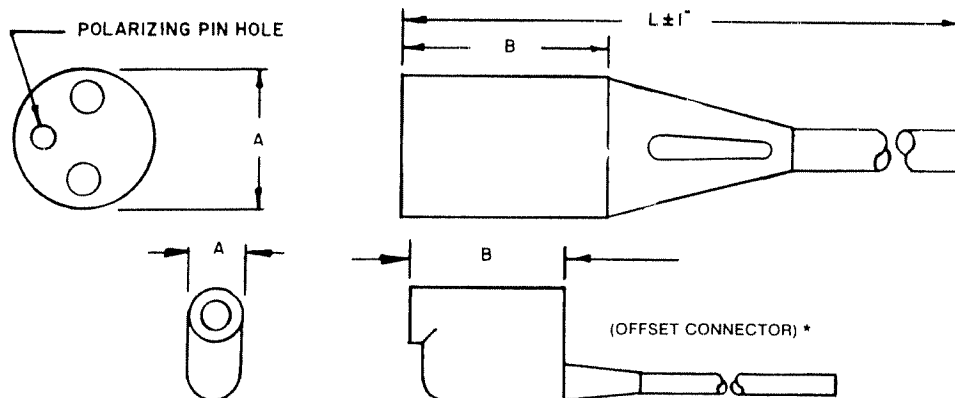


Model	No. of Contacts	No. of Pins	Max. Volts	Contacts Per Pin	Rating Amps ¹	Wire Size AWG	A In.	B In.	D In.	L ± 1 In.	Mates With ²
51E1M-1	1	1	230	1	15	16	7/16	1	2	24	51E1F, 53E1F, 59E1F, Series 54 & 84 J Box
51E1M-80	1	1	230	1	15	16	5/8	1-9/16	2-9/16	24	51E1F, 53E1F, 59E1F, Series 54 & 84 J Box
51H1M-1	1	1	440	1	60	8	1	1-1/2	3-1/2	36	51H1F, 53H1F, Series 54 J Box
51E2M-1	2	2	230	1	15	16	1	3/4	1-3/4	24	51E2F, 53E2F, Series 54 J Box
51F2M-1	2	1	115	2	7.5	18	7/16	1	2	24	51F2F, 53F2F, 59F2F, Series 54 & 84 J Box
51F2M-50	2	1	115	2	7.5	18	5/8	1-9/16	2-9/16	24	51F2F, 53F2F, 59F2F, Series 54 & 84 J Box
51E3M-1	3	3	230	1	15	16	1	3/4	1-3/4	24	51E3F, 53E3F, Series 54 J Box
51H3M-1	3	3	440	1	60	6	2	1-1/2	3-1/2	36	51H3F, 53H3F, Series 54 J Box
51L3M-1	3	3	440	1	100	4	2-1/2	2	4-3/8	36	51L3F, 53L3F, Series 54 J Box
51E4M-1	4	4	230	1	15	16	1-1/4	3/4	1-3/4	24	51E4F, 53E4F, Series 54 J Box
51F4M-1	4	2	115	2	7.5	18	1	3/4	1-3/4	24	51F4F, 53F4F, Series 54 J Box
51H4M-1	4	4	440	1	60	6	2	1-1/2	3-1/2	36	51H4F, 53H4F, Series 54 J Box
51L4M-1	4	4	440	1	85	4	2-1/2	2	4-3/8	36	51L4F, 53L4F, Series 54 J Box
51F6M-1	6	3	115	2	7.5	18	1-1/4	3/4	1-3/4	36	51F6F, 53F6F, Series 54 J Box
51F8M-1	8	4	115	2	7.5	18	1-1/4	3/4	1-3/4	36	51F8F, 53F8F, Series 54 J Box

- NOTES
- 1 Per Contact
 - 2 Add DO for dummy connector, all circuits open
Add DS for dummy connector, all circuits shorted or paired as indicated
- Unless otherwise specified dimensions are nominal

Specification (See Page 3)

Series 51 Female Connector "Underwater Pluggable"

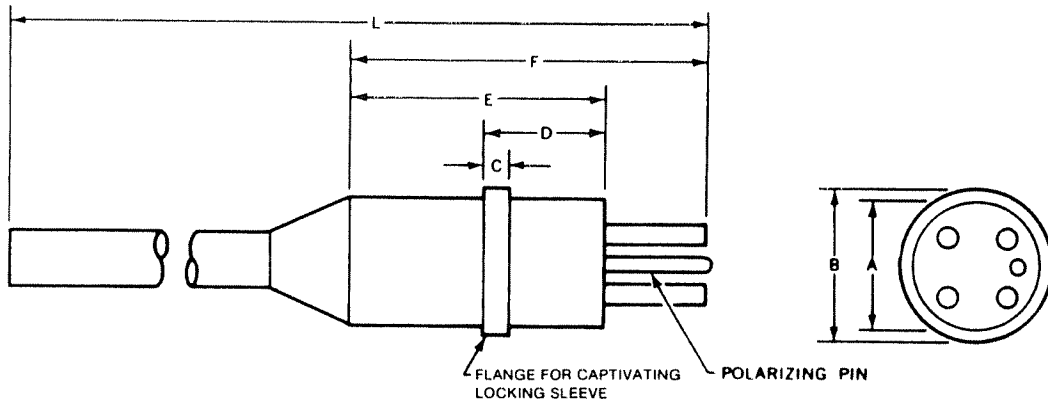


Model	No. of Contacts	Max. Volts	Rating Amps ¹	Wire Size AWG	A In.	B In.	L ± 1 In.	Mates With ²
51E1F-1	1	230	15	16	3/8	1-1/8	24	51E1M, 53E1M, 59E1M
51E1F-80	1	230	15	16	5/8	1-9/16	24	51E1M, 53E1M, 59E1M
51H1F-1	1	440	60	8	1	3-3/4	36	51H1M, 53H1M
51E2F-1	2	230	15	16	1	1-1/8	24	51E2M, 53E2M
51F2F-1	2	115	7.5	18	7/16	1-1/8	24	51F2M, 53F2M, 59F2M
51F2F-10	2	115	7.5	18	5/8	1-9/16	24	51F2M, 53F2M, 59F2M
51E3F-1	3	230	15	16	1	1-1/8	24	51E3M, 53E3M
51H3F-1	3	440	60	6	2	2-1/4	36	51H3M, 53H3M
51L3F-1	3	440	100	4	2-1/2	2-3/8	36	51L3M, 53L3M
51E4F-1	4	230	15	16	1-1/4	1-1/8	24	51E4M, 53E4M
51F4F-1	4	115	7.5	18	1	1-1/8	24	51F4M, 53F4M
51H4F-1	4	440	60	6	2	2-1/4	36	51H4M, 53H4M
51L4F-1	4	440	85	4	2-1/2	2-3/8	36	51L4M, 53L4M
51F6F-1	6	115	7.5	18	1-1/4	1-1/8	36	51F6M, 53F6M
51F8F-1	8	115	7.5	18	1-1/4	1-1/8	36	51F8M, 53F8M

- NOTES
- 1 Per Contact
 - 2 Add DO for dummy connector, all circuits open
Add DS for dummy connector, all circuits shorted or paired as indicated
- Unless otherwise specified dimensions are nominal

Specification (See Page 3)

Series B51 Male Connector "Underwater Pluggable"



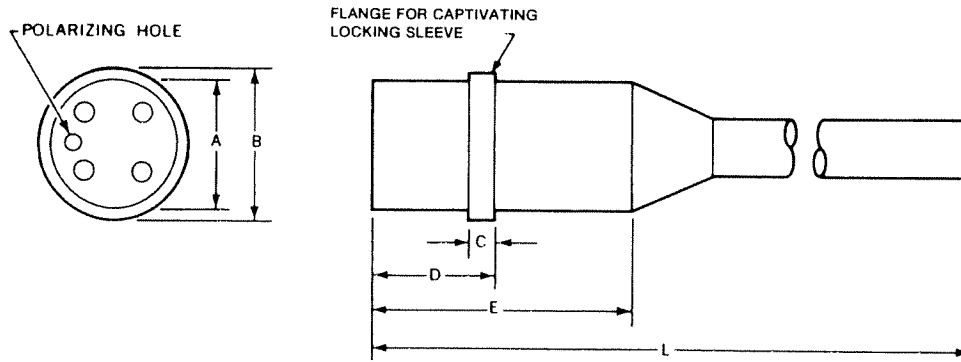
Model	No. of Contacts	No. of Pins	Max. Volts	Wire Size AWG	Rating Amps ²	A Dia	B Dia	C	D	E	F	L In.	Mates With ¹
B51E1M-1	1	1	230	16	15	62	82	25	1 19	2 50	3 50	36	B51E1F-1, B53E1F-1
B51L1M-1	1	1	440	1	175	1 25	1 45	25	1 19	1 50	3 87	36	B51L1F-1, B53L1F-1
B51E2M-1	2	2	230	16	15	1 00	1 20	25	1 19	2 50	3 50	36	B51E2F-1, B53E2F-1
B51F2M-1	2	1	115	18	7 5	62	82	25	1 19	2 50	3 50	36	B51F2F01, B53F2F-1
B51E3M-1	3	3	230	16	15	1 00	1 20	25	1 19	2 50	3 50	36	B51E3F-1, B53E3F-1
B51L3M-1	3	3	440	4	100	2 50	3 00	37	1 87	3 50	6 37	36	B51L3F-1, B53L3F-1
B51E4M-1	4	4	230	16	15	1 25	1 45	25	1 19	2 50	3 50	36	B51E4F-1, B53E4F-1
B51F4M-1	4	2	115	18	7 5	1 00	1 20	25	1 19	2 50	3 50	36	B51F4F-1, B53F4F-1
B51L4M-1	4	4	440	4	100	2 50	3 00	37	1 87	3 50	6 37	36	B51L4F-1, B53L4F-1
B51F6M-1	6	3	115	18	7 5	1 25	1 45	25	1 19	2 50	3 50	36	B51F6F-1, B53F6F-1
B51F8M-1	8	4	115	18	7 5	1 25	1 45	25	1 19	2 50	3 50	36	B51F8F-1, B53F8F-1

- NOTES 1 For DO and DS dummy connectors, see 51 Series, page 6, 7
2 Per contact

Unless otherwise specified dimensions are nominal

Specification (See Page 3)

Series B51 Female Connector "Underwater Pluggable"



Model	No. of Contacts	Max. Volts	Wire Size AWG	Rating Amps ²	A Dia.	B Dia.	C	D	E	L In.	Mates With ¹
B51E1F-1	1	230	16	15	.62	.82	.25	1.19	2.50	.36	B51E1M-1, B531M-1
B51L1F-1	1	440	1	175	1.25	1.45	.25	1.19	4.12	.36	B51L1M-1, B53L1M-1
B51E2F-1	2	230	16	15	1.00	1.20	.25	1.19	2.50	.36	B51E2M-1, B53E2M-1
B51F2F-1	2	115	18	7.5	.62	.82	.25	1.19	2.50	.36	B51F2M-1, B53F2M-1
B51E3F-1	3	230	16	15	1.00	1.20	.25	1.19	2.50	.36	B51E3M-1, B53E3M-1
B51L3F-1	3	440	4	100	2.50	3.00	.25	2.75	5.00	.36	B51L3M-1, B53L3M-1
B51E4F-1	4	230	16	15	1.25	1.45	.25	1.19	2.50	.36	B51E4M-1, B53E4M-1
B51F4F-1	4	115	18	7.5	1.00	1.20	.25	1.19	2.50	.36	B51F4M-1, B53F4M-1
B51L4F-1	4	440	4	100	2.50	3.00	.25	2.75	5.00	.36	B51L4M-1, B53L4M-1
B51F6F-1	6	115	18	7.5	1.25	1.45	.25	1.19	2.50	.36	B51F6M-1, B53F6M-1
B51F8F-1	8	115	18	7.5	1.25	1.45	.25	1.19	2.50	.36	B51F8M-1, B53F8M-1

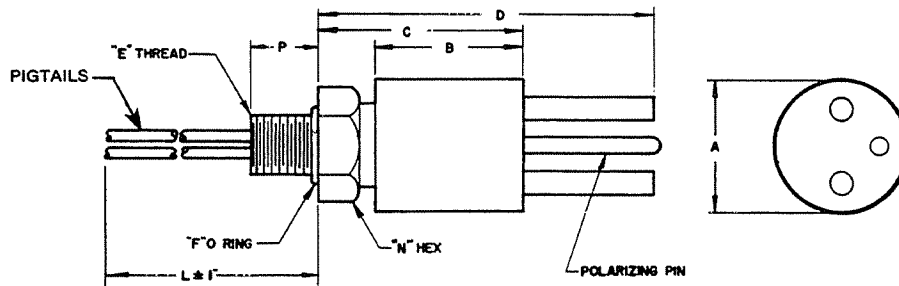
NOTES 1. For DO and DS dummy connectors, see 51 Series, page 6, 7.

2. Per contact.

Unless otherwise specified dimensions are nominal

Specification (See Page 3)

Series 53 Male Connector "Underwater Pluggable"



Bulkhead connectors must be installed with pigtails on low pressure side of bulkheads or interior of vessels. Pressure on pigtail side must not exceed the pressure on external side of connector.

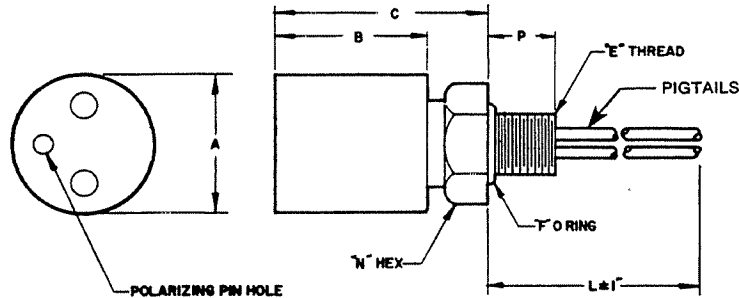
Model	No. of Contacts	No. of Pins	Max. Volts	Contacts Per Pin	Rating Amps ¹	Wire Size AWG	A In.	B In.	C In.	D In.	E	F	L ± .1 In.	N	P ± 1/32 In.	Mates With ²
53E1M-1	1	1	230	1	15	16	5/8	5/8	1-1/8	2-1/8	7/16-20	2-014	12	3/4	1/2	51E1F
53H1M-1	1	1	440	1	60	8	1	1-13/16	2-3/8	4-3/8	3/4-16	2-019	12	1-1/8	3/4	51H1F
53E2M-1	2	2	230	1	15	16	1	1-1/8	1-5/8	2-5/8	7/16-20	2-014	12	3/4	1/2	51E2F
53F2M-1	2	1	115	2	7.5	18	5/8	5/8	1-1/8	2-1/8	7/16-20	2-014	12	3/4	1/2	51F2F
53E3M-1	3	3	230	1	15	16	1	1-1/8	1-5/8	2-5/8	7/16-20	2-014	12	3/4	1/2	51E3F
53H3M-1	3	3	440	1	60	8	2	2-1/2	3-1/8	5-1/8	1-1/4-12	2-125	12	1-3/4	1-1/4	51H3F
53L3M-1	3	3	440	1	100	4	2-1/2	3-3/8	3-7/8	6-1/4	1-3/4-12	2-136	12	2-1/2	1-1/2	51L3F
53E4M-1	4	4	230	1	15	16	1-1/4	1-1/8	1-5/8	2-5/8	1/2-20	2-015	12	7/8	1/2	51E4F
53F4M-1	4	2	115	2	7.5	18	1	1-1/8	1-5/8	2-5/8	7/16-20	2-014	12	3/4	1/2	51F4F
53H4M-1	4	4	440	1	60	8	2	2-1/2	3-1/8	5-1/8	1-1/4-12	2-125	12	1-3/4	1-1/4	51H4F
53L4M-1	4	4	440	1	100	4	2-1/2	3-3/8	3-7/8	6-1/4	1-3/4-12	2-136	12	2-1/2	1-1/2	51L4F
53F6M-1	6	3	115	2	7.5	18	1-1/4	1-1/8	1-5/8	2-5/8	1/2-20	2-015	12	7/8	1/2	51F6F
53F8M-1	8	4	115	2	7.5	18	1-1/4	1-1/8	1-5/8	2-5/8	1/2-20	2-015	12	7/8	1/2	51F8F

- NOTES 1 Per contact.
2 For DO and DS dummy connectors, see 51 Series, page 6, 7

Unless otherwise specified dimensions are nominal.

Specification (See Page 3)

Series 53 Female Connector "Underwater Pluggable"



Bulkhead connectors must be installed with pigtails on low pressure side of bulkheads or interior of vessels. Pressure on pigtail side must not exceed the pressure on external side of connector.

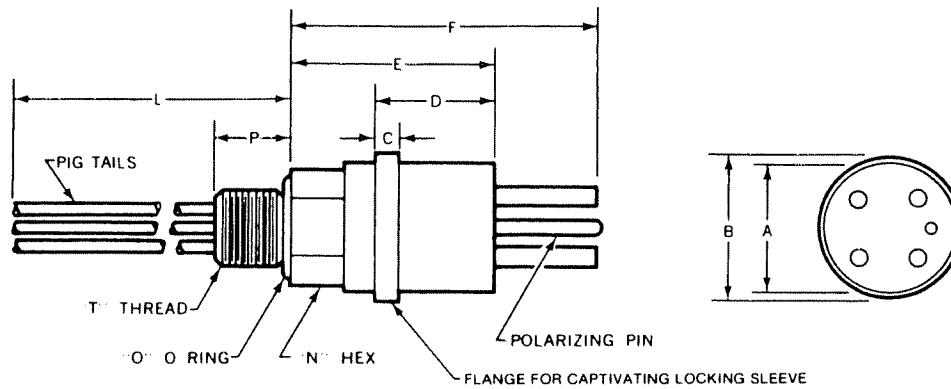
Model	No. of Contacts	Max. Volts	Rating Amps ¹	Wire Size AWG	A Inches	B Inches	C Inches	E	F	L ± 1 Inches	N	P ± 1/32 Inches	Mates With ²
53E1F-1	1	230	15	16	5/8	1-1/2	2	7/16-20	2-014	12	3/4	1/2	51E1M
53H1F-1	1	440	60	8	1	2-15/16	3-1/2	3/4-16	2-019	12	1-1/8	3/4	51H1M
53E2F-1	2	230	15	16	1	1-1/8	1-5/8	7/16-20	2-014	12	3/4	1/2	51E2M
53F2F-1	2	115	7.5	18	5/8	1-1/2	2	7/16-20	2-014	12	3/4	1/2	51F2M
53E3F-1	3	230	15	16	1	1-1/8	1-5/8	7/16-20	2-014	12	3/4	1/2	51E3M
53H3F-1	3	440	60	8	2	2-3/8	3	1-1/4-12	2-125	12	1-3/4	1-1/4	51H3M
53L3F-1	3	440	100	4	2-1/2	3-3/8	3-7/8	1-3/4-12	2-136	12	2-1/2	1-1/2	51L3M
53E4F-1	4	230	15	16	1-1/4	1-1/8	1-5/8	1/2-20	2-015	12	7/8	1/2	51E4M
53F4F-1	4	115	7.5	18	1	1-1/8	1-5/8	7/16-20	2-014	12	3/4	1/2	51F4M
53H4F-1	4	440	60	8	2	2-3/8	3	1-1/4-12	2-125	12	1-3/4	1-1/4	51H4M
53L4F-1	4	440	100	4	2-1/2	3-3/8	3-7/8	1-3/4-12	2-136	12	2-1/2	1-1/2	51L4M
53F6F-1	6	115	7.5	18	1-1/4	1-1/8	1-5/8	1/2-20	2-015	12	7/8	1/2	51F6M
53F8F-1	8	115	7.5	18	1-1/4	1-1/8	1-5/8	1/2-20	2-015	12	7/8	1/2	51F8M

- NOTES 1 Per contact
2 For DO and DS dummy connectors. see 51 Series, page 6, 7

Unless otherwise specified dimensions are nominal

Specification (See Page 3)

Series B53 Male Connector "Underwater Pluggable"



Bulkhead connectors must be installed with pigtails on low pressure side of bulkheads or interior of vessels. Pressure on pigtail side must not exceed the pressure on external side of connector.

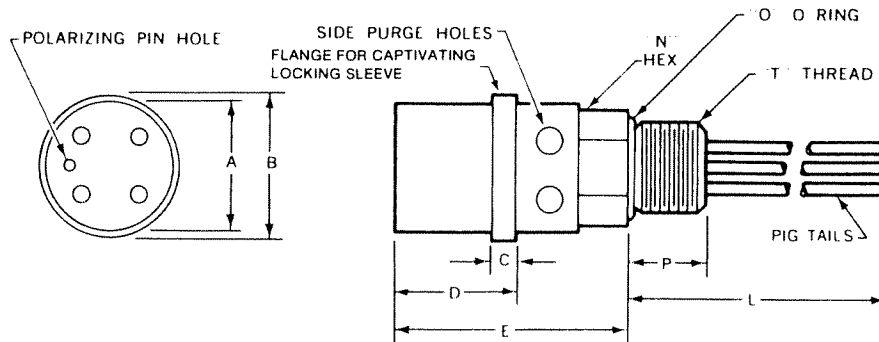
Model	No of Con- tacts	No of Pins	Volts Max.	Wire Size AWG	Rating Amps ²	A Dia.	B Dia.	C	D	E	F	O	L In.	P	T	N	Mates With ¹
B53E1M-1	1	1	230	16	15	.62	.82	.25	1.19	2.00	3.00	2-015	12	50	1/2-20 UNF	7/8	B51E1F-1
B53L1M-1	1	1	440	1	175	1.25	1.45	.25	1.19	2.50	4.87	2-122	12	100	1-14 UNF	1-1/2	B51L1F-1
B53E2M-1	2	2	230	16	15	1.00	1.20	.25	1.19	2.00	3.00	2-015	12	50	1/2-20 UNF	7/8	B51E2F-1
B53F2M-1	2	1	115	18	7.5	.62	.82	.25	1.19	2.00	3.00	2-015	12	50	1/4-20 UNF	7/8	B51F2F-1
B53E3M-1	3	3	230	16	15	1.00	1.20	.25	1.19	2.00	3.00	2-015	12	50	1/2-20 UNF	7/8	B51E3F-1
B53L3M-1	3	3	440	4	100	2.50	3.00	.37	1.87	5.00	6.37	2-136	12	150	1-3/4-12 UNF	2-1/2	B51L3F-1
B53E4M-1	4	4	230	16	15	1.25	1.45	.25	1.19	2.00	3.00	2-019	12	75	3/4-16 UNF	1-1/8	B51E4F-1
B53F4M-1	4	2	115	18	7.5	1.00	1.20	.25	1.19	2.00	3.00	2-015	12	50	1/2-20 UNF	7/8	B51F4F-1
B53L4M-1	4	4	440	4	100	2.50	3.00	.37	1.87	5.00	6.37	2-136	12	150	1-3/4-12 UNF	2-1/2	B51L4F-1
B53F6M-1	6	3	115	18	7.5	1.25	1.45	.25	1.19	2.00	3.00	2-019	12	75	3/4-16 UNF	1-1/8	B51F6F-1
B53F8M-1	8	4	115	18	7.5	1.25	1.45	.25	1.19	2.00	3.00	2-019	12	75	3/4-16 UNF	1-1/8	B51F8F-1

- NOTES 1. For DO and DS dummy connectors, see 51 Series, page 6, 7.
2. Per contact

Unless otherwise specified dimensions are nominal

Specification (See Page 3)

Series B53 Female Connector "Underwater Pluggable"



Bulkhead connectors must be installed with pigtails on low pressure side of bulkheads or interior of vessels. Pressure on pigtail side must not exceed the pressure on external side of connector.

Model	No. of Contacts	Max. Volts	Wire Size AWG	Rating Amps ²	A Dia.	B Dia.	C	D	E	O	L In.	P	T	N	Mates With ¹
B53E1F-1	1	230	16	15	.62	.82	25	1.19	2.31	2-015	12	50	1/2-20 UNF	7/8	B51E1M-1
B53L1F-1	1	440	1	175	1.25	1.95	25	1.19	5.12	2-122	12	1.00	1-14 UNF	1-1/2	B51L1M-1
B53E2F-1	2	230	16	15	1.00	1.20	25	1.19	2.31	2-015	12	50	1/2-20 UNF	7/8	B51E2M-1
B53F2F-1	2	115	18	7.5	.62	.82	25	1.19	2.31	2-015	12	50	1/2-20 UNF	7/8	B51F2M-1
B53E3F-1	3	230	16	15	1.00	1.20	25	1.19	2.31	2-015	12	50	1/2-20 UNF	7/8	B51E3M-1
B53L3F-1	3	440	4	100	2.50	3.00	37	1.87	6.50	2-136	12	1.50	1-3/4-12 UNF	2-1/2	B51L3M-1
B53E4F-1	4	230	16	15	1.25	1.45	25	1.19	2.31	2-019	12	75	3/4-16 UNF	1-1/8	B51E4M-1
B53F4F-1	4	115	18	7.5	1.00	1.20	25	1.19	2.31	2-015	12	50	1/2-20 UNF	7/8	B51F4M-1
B53L4F-1	4	440	4	100	2.50	3.00	37	1.87	6.50	2-136	12	1.50	1-3/4-12 UNF	2-1/2	B51L4M-1
B53F6F-1	6	115	18	7.5	1.25	1.45	25	1.19	2.31	2-019	12	75	3/4-16 UNF	1-1/8	B51F6M-1
B53F8F-1	8	115	18	7.5	1.25	1.45	25	1.19	2.31	2-019	12	75	3/4-16 UNF	1-1/8	B51F8M-1

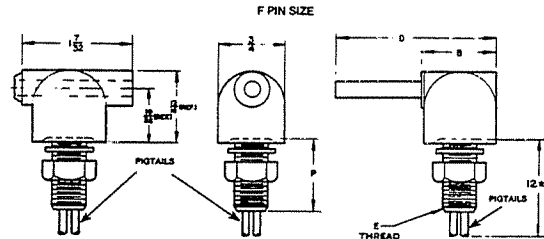
- NOTES 1 For DO and DS dummy connectors, see 51 Series, page 6, 7
2 Per contact.

Unless otherwise specified dimensions are nominal

Specification (See Page 3)

ELECTRO PRODUCTS

Series 59 Single Pin Male/Female Right Angle Connectors "Underwater Pluggable"



Bulkhead connectors must be installed with pigtails on low pressure side of bulkheads or interior of vessels. Pressure on pigtail side must not exceed the pressure on external side of connector.

Model	No of Circuits	No of Pins or Sockets	Max. Volts	Pin or Socket Dia. Inches	Circuits Per Pin or Socket	Amps Per Connector (Max.)	Wire Size AWG	P : 1/32	B Inch	D Inch	E Thread	Mates With ¹
59F2M or F-1	2	1	115	3/16	2	7.5	18	1/2	13/16	1-13/16	3/8-24	51F2F or M
59F2M or F-2	2	1	115	3/16	2	7.5	18	3/4	13/16	1-13/16	3/8-24	51F2F or M
59F2M or F-3	2	1	115	3/16	2	7.5	18	1	13/16	1-13/16	3/8-24	51F2F or M
59F2M or F-4	2	1	115	3/16	2	7.5	18	1/2	13/16	1-13/16	7/16-20	51F2F or M
59F2M or F-5	2	1	115	3/16	2	7.5	18	3/4	13/16	1-13/16	7/16-20	51F2F or M
59F2M or F-6	2	1	115	3/16	2	7.5	18	1	13/16	1-13/16	7/16-20	51F2F or M

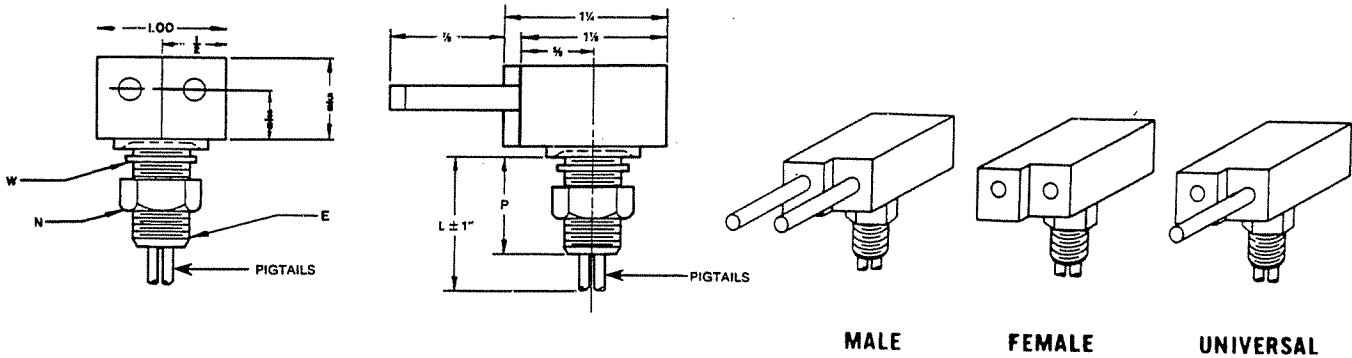
NOTES 1. Physical dimensions for 59E1F or 59E1M - 1 thru 6 are the same as those listed above for - 1 thru 6. Electrical ratings for 59E series are listed on page 2.

Unless otherwise specified dimensions are nominal

GENERAL SPECIFICATIONS

- Series 59 right angle receptacles are designed for bulkhead mounting where space is limited. Exclusive construction of these patented WATERMATE™ electrical connectors permits underwater plugging and unplugging with electrical power de-energized.
- Pressure rated up to 10,000 psi or maximum 22,000 feet of sea water. (Optional to 20,000 psi)
- Pressure balanced for easy engagement and disengagement in high pressure environments.
- Body is specially formulated neoprene rubber. Contacts are beryllium copper.
- Electrical specification similar to Series 51 and 53. (See Page 3)

Series 510 Two Pin Male/Female/Universal Connector Right Angle Connector "Underwater Pluggable"



Bulkhead connectors must be installed with pigtails on low pressure side of bulkheads or interior of vessels. Pressure on pigtail side must not exceed the pressure on external side of connector.

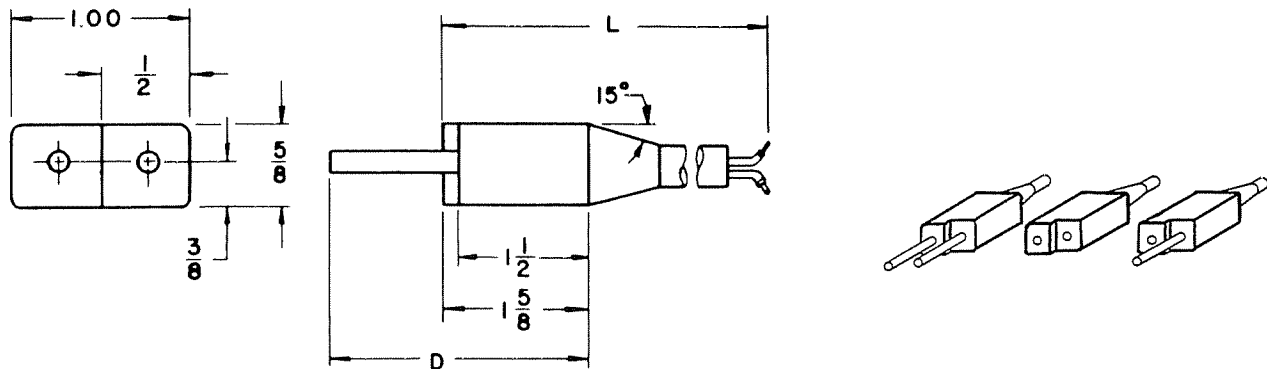
Model	No. of Circuits	No. of Pins or Sockets			Max. Volts	No. of Circuits Per Pin or Socket	Amps Per Connector (Max.)	Wire Size AWG	P Inch	L Inch	E Thread	Mates With
		M	F	U								
510E2M or F or U-4	2	1	1	1/1	230	1	15	16	1/2	12	7/16-20	52E2F or M or U-1
510E2M or F or U-5	2	1	1	1/1	230	1	15	16	3/4	12	7/16-20	53E2F or M or U-1
510E2M or F or U-6	2	1	1	1/1	230	1	15	16	1	12	7/16-20	52E2F or M or U-1
510F4M or F or U-4	4	1	1	1/1	115	2	7.5	18	1/2	12	7/16-20	52F4F or M or U-1
510F4M or F or U-5	4	1	1	1/1	115	2	7.5	18	3/4	12	7/16-20	52F4F or M or U-1
510F4M or F or U-6	4	1	1	1/1	115	2	7.5	18	1	12	7/16-20	52F4F or M or U-1

NOTES: Unless otherwise specified dimensions are nominal

GENERAL SPECIFICATIONS

- Series 510 right angle receptacles are designed for bulkhead mounting where space is limited. Exclusive construction of these patented WATERMATE™ electrical connectors permits underwater plugging and unplugging with electrical power de-energized.
- Pressure rated up to 5,000 psi or equivalent to maximum 11,000 feet of sea water. (Optionally available to 20,000 psi).
- Pressure balanced for easy engagement and disengagement in high pressure environments.
- Body is specially formulated neoprene rubber. Contacts are beryllium copper.
- Longer shanks (P) and pigtail (L) lengths are optionally available.
- Electrical specification similar to Series 51 and 53. (See Page 3)

Series 52 Two Pin Male/Female/Universal Connector Connector "Underwater Pluggable"



Model	No. of Circuits	No. of Pins or Sockets			Max. Volts	No. of Circuits Per Pin or Socket	Amps Per Connector (Max.)	Wire Size AWG	D Inch	L - 1 Inch	Mates With
		M	F	U							
52E2M or F or U-1	2	2	2	2/2	230	1	15	16	2-1/2	24	52E2F or M or U, 510E2F or M or U
52F4M or F or U-1	4	2	2	2/2	115	2	7.5	18	2-1/2	24	52F4F or M or U, 510F4F or M or U

NOTES: Unless otherwise specified dimensions are nominal

GENERAL SPECIFICATIONS

- Exclusive construction of these patented WATERMATE™ electrical connectors permits underwater plugging and unplugging with electrical power de-energized.
- Pressure rated up to 20,000 psi or maximum 45,000 feet of sea water.
- Pressure balanced for easy engagement and disengagement at high pressure.
- Body is specially formulated neoprene rubber. Contacts are beryllium copper.
- Electrical specification similar to Series 51 and 53. (See Page 3)

ELECTRO PRODUCTS

Series 610 Magnetically Operated Waterproof Switches

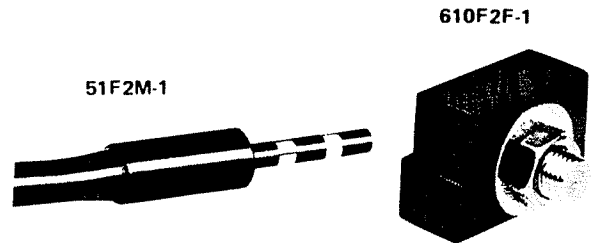
DESCRIPTION

Magnetically operated switches are designed for resistance to water and oily environments.

Connection is made through an underwater pluggable connector. Operation is by remote magnet.

APPLICATIONS

- Water-current meter: activating magnet mounts to propeller blade.
- Valve-position indicator: activating magnet, mounted on valve, triggers switch.
- Mechanical-movement monitoring; activating magnet mounts on moving machinery.



Catalog Number	Contact Rating	Maximum Amperes	Maximum Volts	Maximum Contact Resistance	Voltage Breakdown	Mating Series Connector
610F2F-1	10 w dc	0.5 amp	200 vdc	0.100 ohm	400 vdc	51F2M

CONSTRUCTION DETAILS

SWITCH

Contact arrangement: SPST-NO

Contact material: Rhodium Standard

ENCLOSURE

Internal construction: Switch potted in Micarta base block, screw attached to brass mounting stud.

Stud mounting: 3/8"—24, 1/2" long with 3/8" washer and 3/8"—24 hex nut.

Enclosure: Specially formulated neoprene rubber, nonwetting surface.

Insulation resistance: 100 megohms contact-to-contact in water.

SWITCH ELECTRICAL SPECIFICATIONS

Insulation resistance: 100 megohms.

Life expectancy: 10 x 10⁶, full rating.

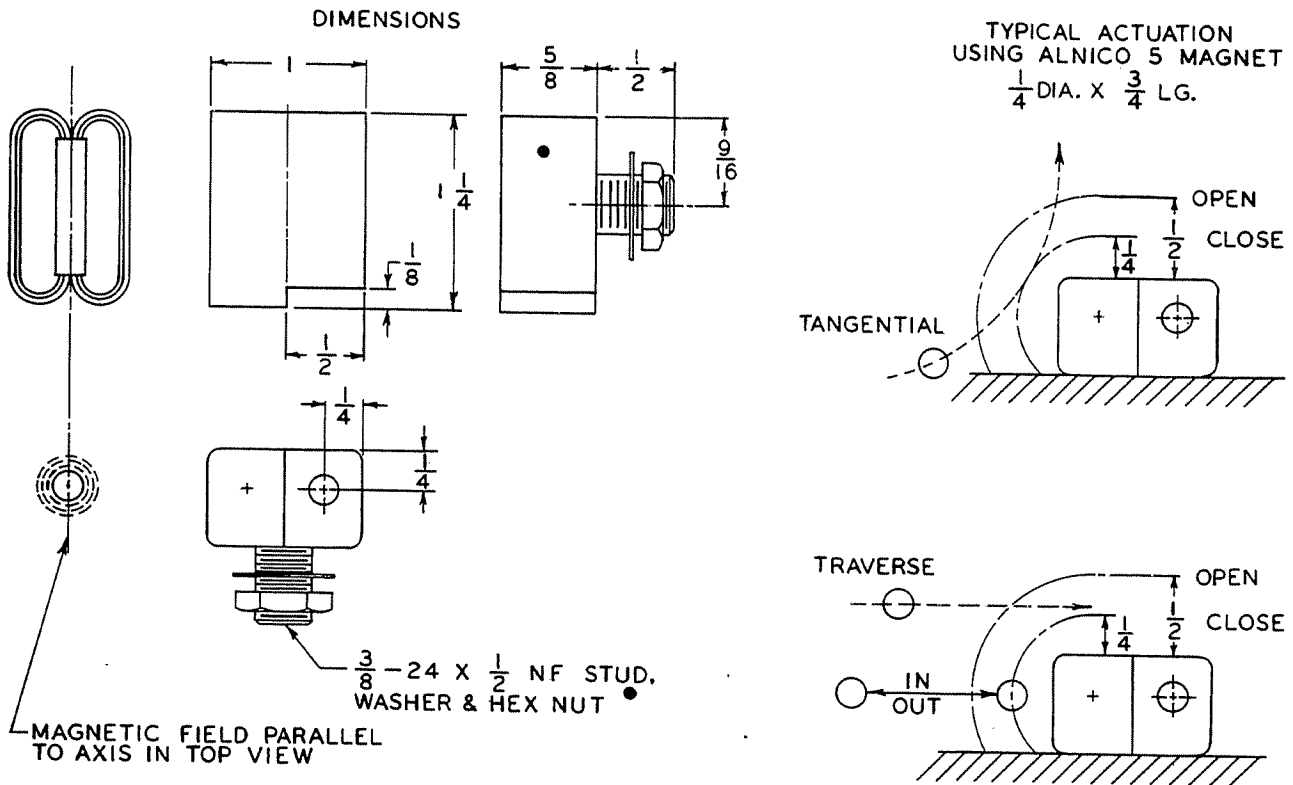
Contact rating: 10 w dc, 0.5 amp maximum.

Actuating time: 1 millisecond.

Contact bounce: 1 millisecond.

Actuating rate: Depending on drive, can follow up to 400 cycles per second.

Series 610



GENERAL SPECIFICATIONS

The magnetically operated switch assembly, Catalog Number 610F2F-1, includes:

- Exclusive construction of the patented WATERMATE™ electrical connector permits underwater plugging and unplugging with electrical power de-energized.
- Pressure rated up to 5,000 psi or maximum 11,000 feet of sea water.
- Pressure balanced for easy engagement and disengagement in high pressure environments.
- Body of specially formulated neoprene. Connector contacts are beryllium copper.

Series 41 Penetrators

APPLICATION

The Series 41 Penetrators are suitable where a watertight electrical penetration is required through a bulkhead.

CONSTRUCTION

Series 41 Penetrators consist of the penetrator stainless steel body, a length of molded cable on the high pressure side and leads on the low pressure side. Series 41 Penetrators feature an internal "waterstop" construction which prevents wicking of water through the penetrator leads, even if the molded section is cut completely through.

This unique construction is pressure rated up to 20,000 psi or maximum 45,000 feet of sea water.

SPECIALS

Modification of the standard design can be supplied to meet specific applications.

IMPORTANT NOTE

Penetrators must be installed with pigtailed on low pressure side of bulkheads or interior of vessels. Pressure on pigtail side must not exceed the pressure on external side of penetrator.

OPTIONS AND SPECIALS

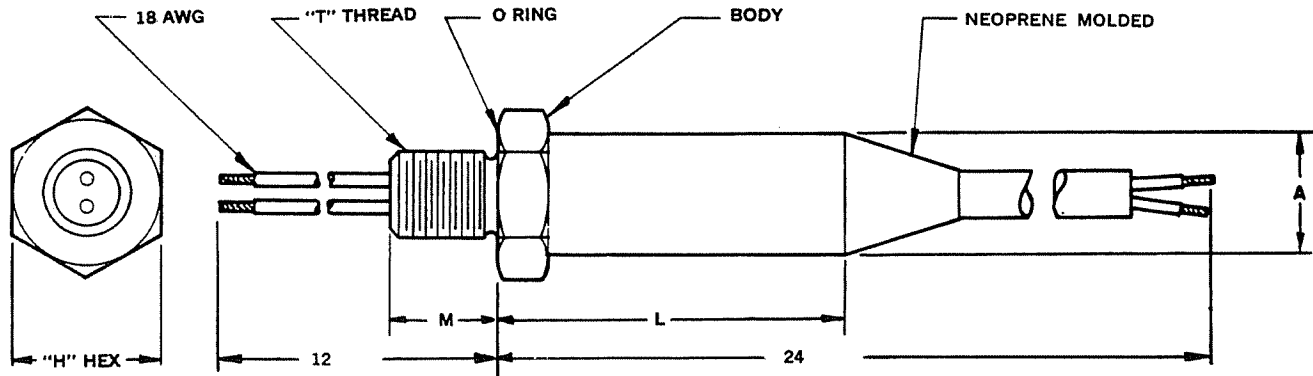
To fit the wide range of possible applications, the 41 Series Penetrators are available with a broad selection of options, as follows:

- **Body** Stainless steel is standard; other materials optional.*
- **Thread** Other thread sizes with length as required.*
- **Wire Length** The wire length on the high or low pressure side can be made as long as desired.*
- **Wire Gage** See table on page 20.
- **Termination** Any compatible connector or junction box may be molded to the cable.*
- **Number of Wires** Designs are available for up to 168 conductors per penetrator.*

*Optional at extra cost.

ELECTRO PRODUCTS

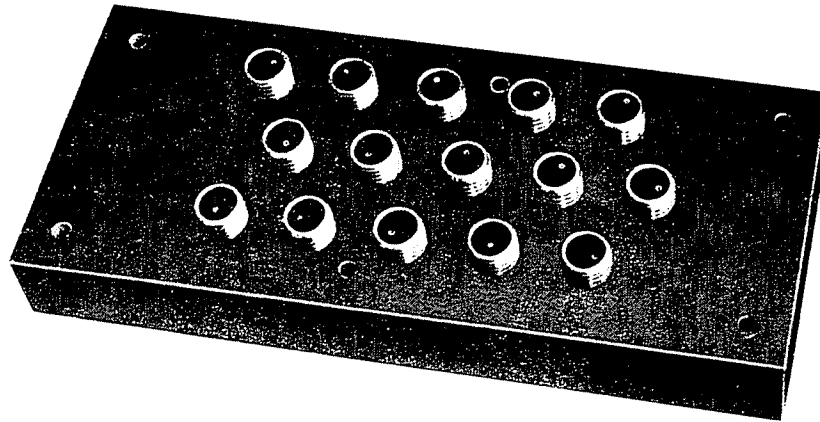
Series 41 Penetrators



Model Number	No. of Circuits	L ± 1/32 In.	H ± 1/32 In.	A ± 1/32 In.	T	"O" Ring	M ± 1/32 In.	Wire Size AWG
41-02	2	1-3/4	3/4	3/4	7/16-20 NF	2-014	1/2	16
41-03	3	2-3/16	1-1/8	7/8	5/8-18 NF	2-019	1/2	16
41-04	4	2-3/16	1-1/8	7/8	5/8-18 NF	2-019	1/2	18
41-06	6	2-3/8	1-1/4	1-1/8	7/8-14 UNF	2-021	1/2	18
41-08	8	2-3/8	1-1/4	1-1/8	7/8-14 UNF	2-021	1/2	18
41-12	12	3-1/8	1-1/2	1-1/4	1-14 UNF	2-122	7/8	18

NOTES Unless otherwise specified, dimensions are nominal

Series 54 Junction Boxes



APPLICATION

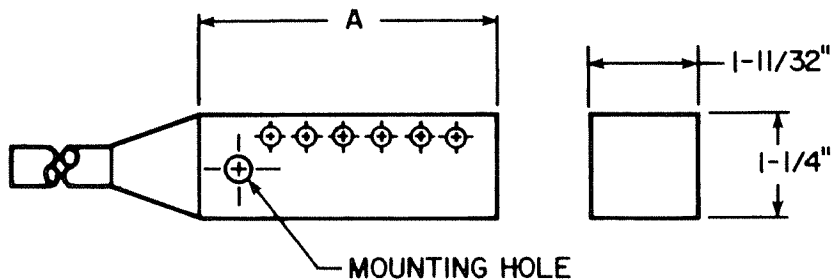
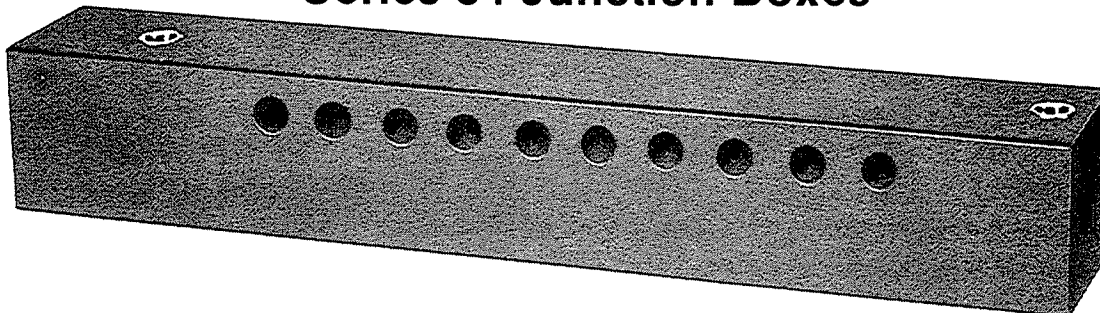
Series 54 Junction Boxes combine exclusive construction of the patented WATERMATE™ electrical connectors with modular assembly to provide mateable underwater connections while circuits are not energized. Dummy plugs (with "DO" Suffix) can be installed in unused positions so other receptacle positions may be used. Circuit variations are limited only by user's dimensional requirements and the total number of conductors entering the Junction Box.

These Junction Boxes are pre-molded socket modules which are factory assembled in various combinations to meet specific design requirements. Junction Boxes may be molded to virtually any underwater cable including armored types. Pressure rated to 20,000 psi or maximum 45,000 feet of sea water, Series 54 Junction Boxes eliminate the need for expensive water-blocked cable.

To order, consult factory with specific design requirements.

ELECTRO PRODUCTS

Series 84 Junction Boxes



Model	No. of Circuits	Amps Per Contact	Wire Size AWG	A Dim.	Mates With
84E6F	6	15	16	5-13/16	All 51E1M -1 -80 -80 RA
84E7F	7	15	16	6-1/2	
84E8F	8	15	16	7-3/16	
84E9F	9	15	16	7-7/8	
84E10F	10	15	16	8-9/16	
84E11F	11	15	16	9-1/4	
84E12F	12	15	16	10-1/8	

Model	No. of Circuits	Amps Per Contact	Wire Size AWG	A Dim.	Mates With
84F12F	12	7.5	18	5-13/16	All 51F2M -1 -50 -50 RA
84F14F	14	7.5	18	6-1/2	
84F16F	16	7.5	18	7-3/16	
84F18F	18	7.5	18	7-7/8	
84F20F	20	7.5	18	8-9/16	
84F22F	22	7.5	18	9-1/4	
84F24F	24	7.5	18	10-1/8	

The Series 84 Neoprene — molded, multiple-circuit junction box is a flexible, reliable means for:

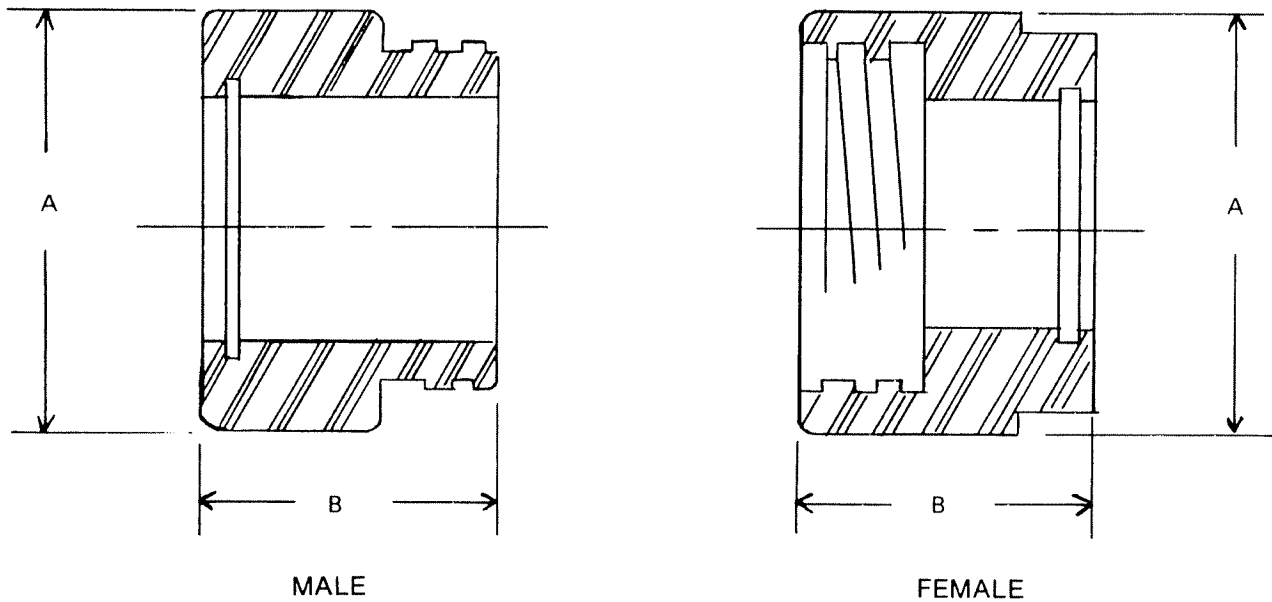
- Patching power or instrumentation underwater
- Electrical bussing

WATERMATE™ construction permits plugging or unplugging underwater de-energized, with minimum insulation resistance of 100 megohms at 500 VDC contact to contact or contact to water. Hi-Pot specification is 1200 VDC.

Pressure rated to 20,000 psi.

Available with or without molded cable and connector/penetrator options.

Series 58 Locking Sleeves Delrin Screw Type (Heavy Duty)



DIMENSION TABLE

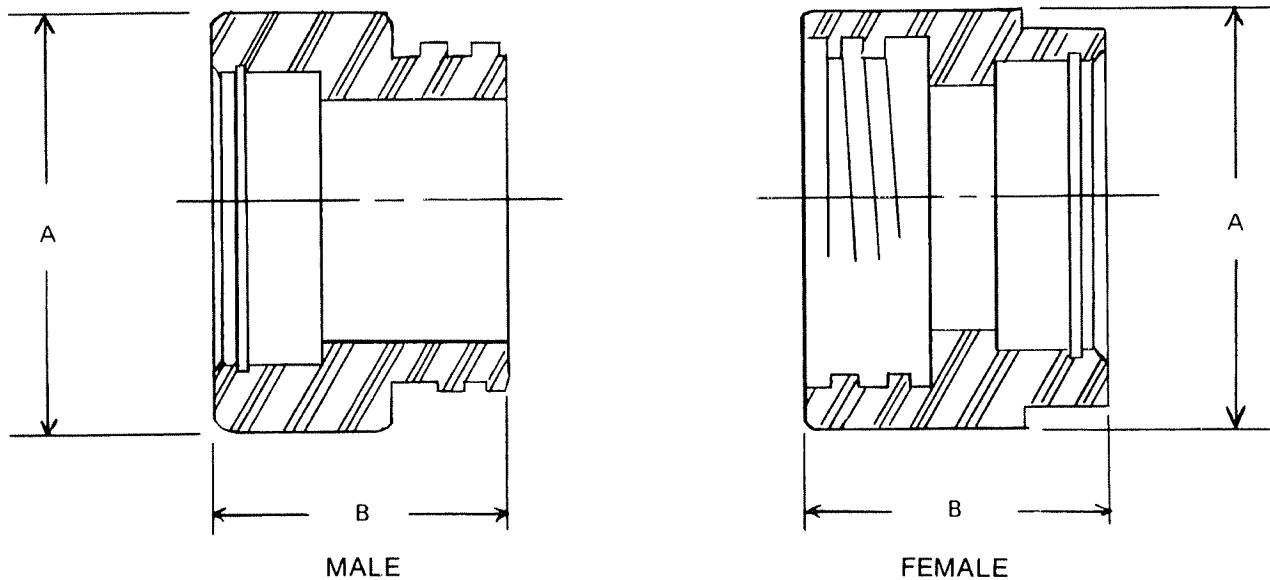
	"A"	"B"
58TF8-2	2"	1-3/8"
58TM8-2	2"	1-1/2"
58TM10-2	2"	1-1/2"
58TF10-2	2"	1-3/8"
58TF16-2	3"	2-5/8"
58TM16-2	3"	2-3/4"
58TF16-2B	3"	3-5/8"
58TF20-2	3½"	3-9/16"
58TM20-2	3½"	2-15/16"

APPLICATION TABLE

<u>58TM8-2</u>	<u>58TM10-2</u>	<u>58TF8-2</u>	<u>58TF10-2</u>	<u>58TM16-2</u>	<u>58TF16-2</u>	<u>58TF16-2B</u>
51E2F-1	51E4F-1	51E2M-1	51E4M-1	51H3F-1	51H3M-1	53H3M-1
51E3F-1	51F6F-1	51E3M-1	51F6M-1	51H4F-1	51H4M-1	53H4M-1
51F4F-1	51F8F-1	51F4M-1	51F8M-1	53H3F-1		
53E2F-1	53E4F-1	53E2M-1	53E4M-1	53H4F-1		
53E3F-1	53F6F-1	53E3M-1	53F6M-1			
53F4F-1	53F8F-1	53F4M-1	53F8M-1			
				<u>58TM20-2</u>	<u>58TF20-2</u>	
				51L3F-1	51L3M-1	
				51L4F-1	51L4M-1	

ELECTRO PRODUCTS

Series 58 Locking Sleeves for "B" Series Connectors Delrin Screw Type (Heavy Duty)



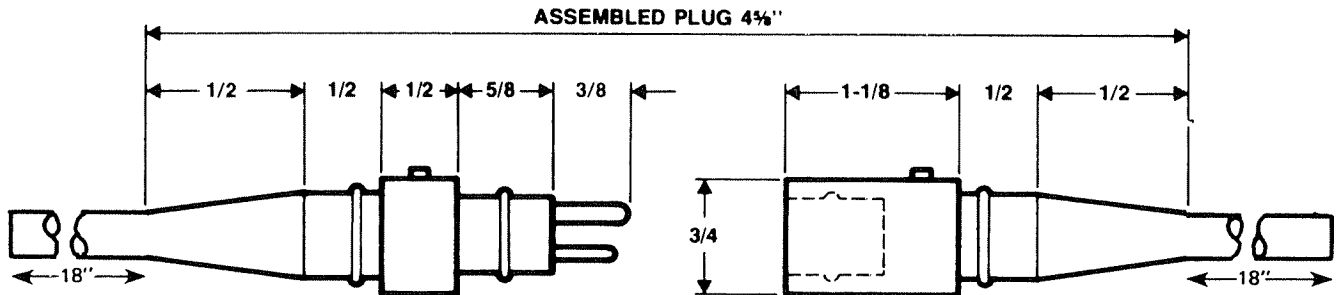
DIMENSION TABLE

	"A"	"B"
58TM8-4	2"	1-1/2"
58TF8-4	2"	2"
58TM10-4	2"	2"
58TF10-4	2"	1-1/2"
58TF5-4	1-1/2"	2"
58TM5-4	1-1/2"	1-1/2"
58TM20-4	3-1/2"	3-5/16"
58TF20-4	3-1/2"	4-1/16"

APPLICATION TABLE

<u>58TM5-4</u>	<u>58TM8-4</u>	<u>58TM10-4</u>	<u>58TF5-4</u>	<u>58TF8-4</u>	<u>58TF10-4</u>	<u>58TM20-4</u>	<u>58TF20-4</u>
B51E1F-1	B51E2F-1	B51E4F-1	B51E1M-1	B51E2M-1	B51E4M-1	B51L3F-1	B51L3M-1
B51F2F-1	B51E3F-1	B51F6F-1	B51F2M-1	B51E3M-1	B51F6M-1	B51L1F-1	B51L4M-1
	B51F4F-1	B51F8F-1		B51F4M-1	B51F8M-1	B53L3F-1	B53L3M-1
	B53E2F-1	B51L1F-1		B53E2M-1	B51L1M-1	B53L4F-1	B53L4M-1
	B53E3F-1	B53L1F-1		B53E3M-1	B53L1M-1		
	B53F4F-1			B53F4M-1			
		B53E4F-1			B53E4M-1		
		B53F6F-1			B53F6M-1		
		B53F8F-1			B53F8M-1		

Waterproof Connectors WP Series



FACE VIEW				LOCKING SLEEVES
FEMALE	WP-2-FS	WP-3-FS	WP-4-FS	58FLS-1 58MLS-1
MALE	WP-2-MP	WP-3-MP	WP-4-MP	
CONTACTS	1-#10 1-#14	1-#10 2-#14	1-#14 3-#16	
VOLTS/AMPS	300/7	300/7	300/7	
CABLE	18/2 SJO	18/3 SJO	18/4 SJO	

DESCRIPTION

The WP and WPS series are transfer molded from the same specially compounded neoprene formula used with underwater pluggable line of connectors. All WP and WPS connectors are vulcanized directly to the cable to provide a positive seal at all pressures up to 20,000 psi.

QUALITY ASSURANCE

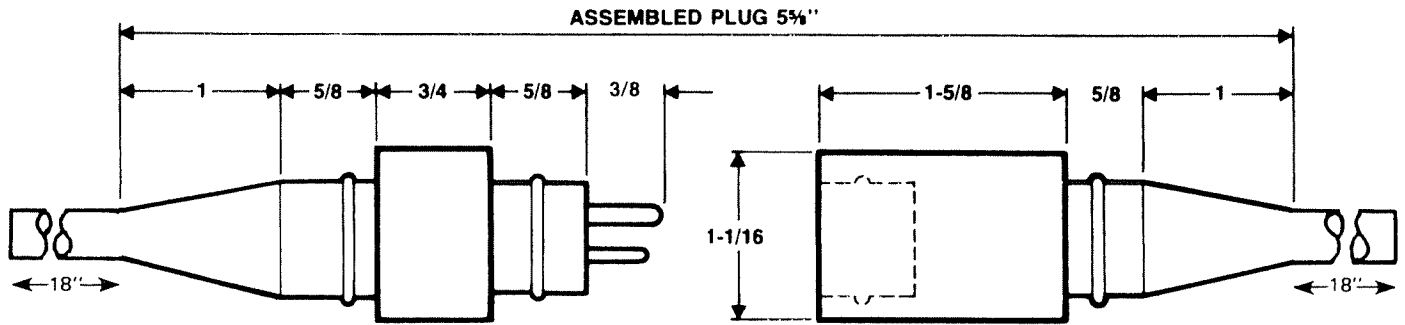
WP and WPS connector series are designed to meet the highest standards of reliability for this type of connector.


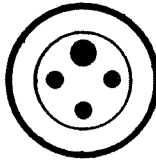
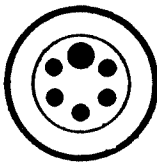
TYPICAL APPLICATIONS

Underwater instrumentation and control systems — underwater cameras — underwater lighting systems — underwater habitats.

ELECTRO PRODUCTS

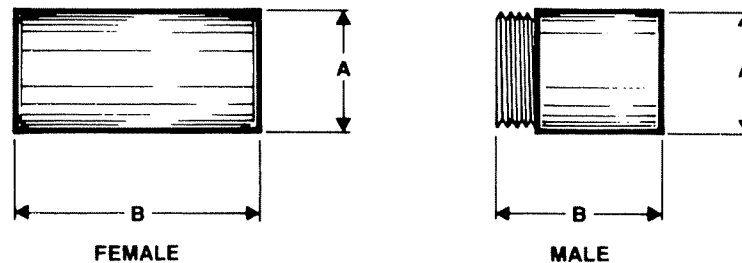
Waterproof Connectors—WP Series



FACE VIEW				LOCKING SLEEVES
FEMALE	WPS-3-FS	WPS-4-FS	WPS-6-FS	58FLS-2
MALE	WPS-3-MP	WPS-4-MP	WPS-6-MP	58MLS-2
CONTACTS	1-#10 1-#14	1-#10 3-#14	1-#14 5-#16	
VOLTS/AMPS	600/7	600/7	300/7	
CABLE	16/3 SO	18/4 SO	18/6 SO	

DUMMY PLUGS—Dummy Plugs (Caps) are available for purposes of sealing off connectors when not in use and also when possible environmental exposure could damage the connector. When ordering write "DO" after connector designation.

LOCKING SLEEVES



		DIMENSION TABLE		APPLICATION TABLE
		A	B	
FEMALE MALE	58 FLS-1	1"	1-3/8"	WP-2, 3 & 4 FS
	58 MLS-1	1"	5/8"	WP-2, 3 & 4 MP
	58 FLS-2	1-3/8"	1-7/8"	WPS-3, 4 & 6 FS
	58 MLS-2	1-3/8"	7/8"	WPS-3, 4 & 6 MP

NOTES Unless otherwise specified dimensions are nominal

Miniature Connectors Series 56 "Underwater Pluggable" (20,000 psi Rated)

The Series 56 is specifically designed to meet the need for a fluid-immersed, instrumentation-quality, multiconductor electrical connector. As in all Series 50 products, the 56 is based on the proven, exclusive, WATERMATE™ principle. This permits plugging underwater, with insulation resistance guaranteed to be greater than 100 megohms. Electrical integrity of all connectors is preserved to full ocean depths. The Series 56 features the following characteristics:

Miniature — the contact size has been reduced with no loss of current-carrying capacity.

Low Contact Resistance — the female connector employs a closed entry beryllium copper contact for low contact resistance and low noise. Contact resistance is in the order of 5 milliohm and repeatable.

Modular Construction — the series is designed for complex interconnections and branching, permitting an almost limitless number of input-output combinations.

The connector comes in 1, 2, 3, 4 & 8 circuit modules. 2, 4 & 8 circuit connectors are available in "universal" (combination male and female) designs. In the 1, 2, 3, 4 & 8 circuit designs there are male and female connectors.

The Series 56 features a conical entry section to ease blind engagement underwater. The universal feature completely eliminates polarization problems.

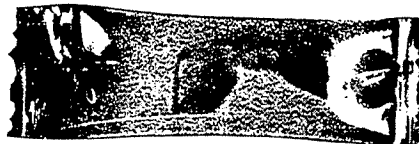
Miniature Connectors Series 56 "Underwater Pluggable" (20,000 psi Rated)

GENERAL SPECIFICATIONS

- Series 56 Miniature Connectors features the exclusive WATERMATE™ construction, permitting plugging and unplugging underwater **WITH ELECTRICAL POWER DE-ENERGIZED.**
- Pressure rated to 20,000 psi
- Pressure balanced for low engagement-and-disengagement forces at high pressure.
- Body is specifically formulated neoprene rubber.
- Minimum guaranteed insulation resistance is 100 megohms at 500 vac contact-to-contact or contact-to-water when plugged underwater.
- Hipot specification is 1200 VDC.
- Current rating is 7.5 amperes per circuit.
- Contacts are beryllium copper with less than 1 milliohm contact resistance.
- Each connector is individually inspected for workmanship, dielectric breakdown, continuity, and insulation resistance.

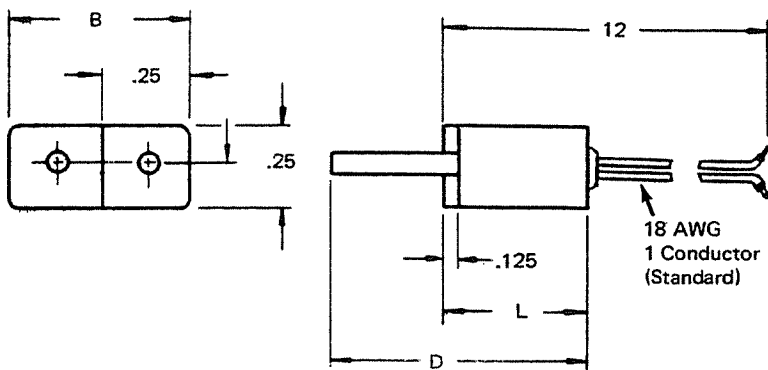
NOTE

Mating surfaces of connectors must be coated with silicone grease for lubrication. Grease is available in convenient .1 oz packages.

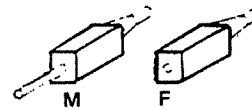


P/N 1315747 Silicone Grease

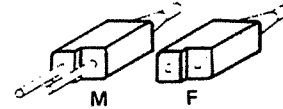
Miniature Connectors Series 56 Male/Female/Universal "Underwater Pluggable" (20,000 psi Rated)



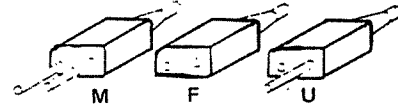
ONE CIRCUIT



TWO CIRCUITS - OFFSET



TWO CIRCUITS - FLAT



Model	No of Circuits	No of Pins or Sockets			Max Volts	Face Style	Amps Per Connector (Max)	Wire Size AWG	B Inch	D Inch	L Inch	Mates With
		M	F	U								
56B1 M or F-1	1	1	1	—	230	Flat	7.5	18	.25	1.56	1.000	56B1 M or F-1
56B2 M or F-52	1	2	2	—	230	Offset	7.5	18	.50	1.87	1.125	56B2 M or F-52
56B2 M or F-1	2	2	2	—	230	Flat	7.5	18	.50	1.64	1.080	56B2 M or F-1
56B2U-1	2	—	—	1/1	230	Flat	7.5	18	.50	1.64	1.080	56B2U-1

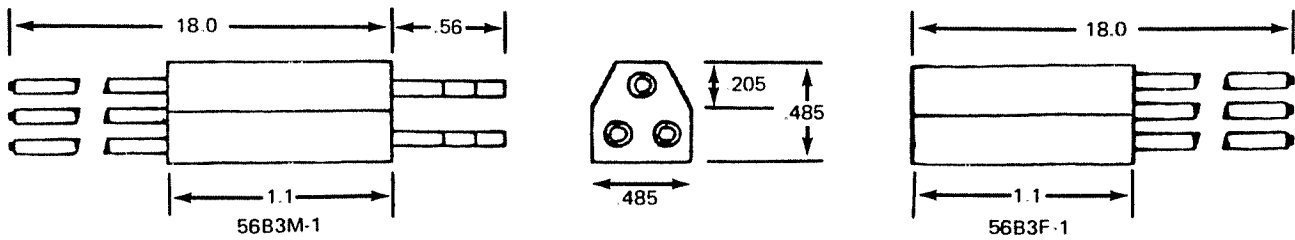
NOTE: All dimensions are nominal

GENERAL SPECIFICATIONS

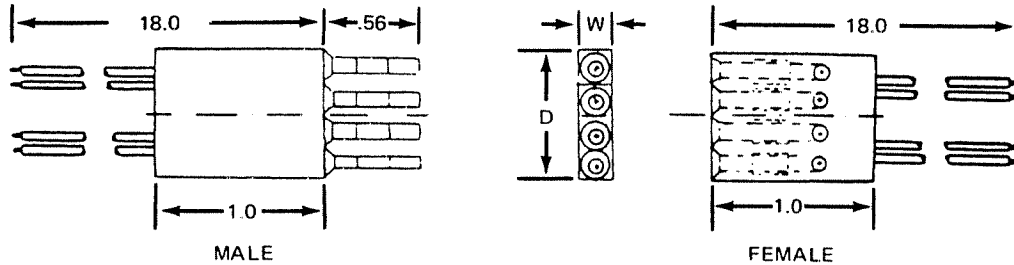
- Exclusive construction of these patented WATERMATE™ electrical connectors permits underwater plugging and unplugging with electrical power de-energized.
- Pressure rated up to 20,000 psi or maximum 45,000 feet of sea water.
- Pressure balanced for easy engagement and disengagement at high pressure.
- Body is specially formulated neoprene rubber. Contacts are beryllium copper.
- Ad DO to base model number for dummy connector, all circuits open.
Ad DS to base model number for dummy connector, both circuits shorted.
- Standard leads are #18 AWG — 1 conductor Hypalon insulated wire. Connectors can be supplied on 2 conductor cords as specials.

Miniature Connectors Series 56 Male/Female/Universal "Underwater Pluggable" (20,000 psi Rated)

3 Circuit Male/Female



4 and 8 Circuit Male/Female/Universal



Model	No. of Circuits	No. of Pins or Sockets	Max Volts	No. of Circuits Per Pin or Socket	Amps Per Connector (Max)	Wire Size AWG	D Inch	W Inch	Mates With
56B3 M or F-1	3	3	230	1	7.5	18	*	*	56B3 M or F-1
56B4 M or F-1	4	4	230	1	7.5	18	1	25	56B4 M or F-1
56B4 MU-1	4	2/2	230	1	7.5	18	1	25	56B4 MU-1
56B8 M or F-1	8	8	230	1	7.5	18	2 1/2	26	56B8 M or F-1
56B8 MU-1	8	4/4	230	1	7.5	18	2 1/2	26	56B8 MU-1

* See top illustration for 3 circuit male and female connectors

NOTE: All dimensions are nominal.

GENERAL SPECIFICATIONS

- Standard leads are #18-1/conductor Hypalon insulated wire.
- Ad DO to base model number for dummy connector, all circuits open.
Ad DS to base model number for dummy connector, both circuits shorted.
- Pressure rated up to 20,000 psi or maximum 45,000 feet of sea water.
- Pressure balanced for easy engagement and disengagement at high pressure.
- Body is specially formulated neoprene rubber. Contacts are beryllium copper.

