



Shallow Water IMmersion Connectors & Overmolded Cable Assemblies



Presentation

THE MOST RELIABLE CONNECTOR FOR SHALLOW WATER IMMERSION

The SWIM Series (Shallow Water IMmersion) have been created to answer the most demanding needs for immersion down to 300 meters/1,000 feet depth. These dry mate connector series solve the common issues met in shallow water applications such as poor sealing and corroded contacts due to low pressure cycles. SWIM connectors have been designed following customer feedback combined with our 50 year experience in the subsea market.

Overmolded cable assemblies can also be provided for a quick, reliable and easy to use turnkey solution for shallow water immersion applications.

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SWIM SERIES

SWIM Series

Overview

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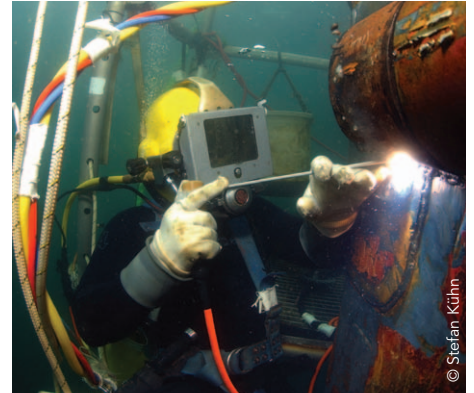
Typical applications



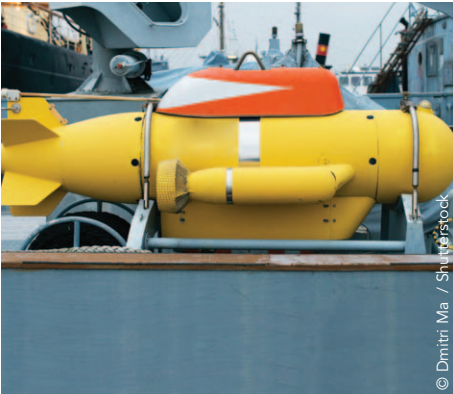
Unmanned Surface Vehicles



Buoys



Commercial Diving



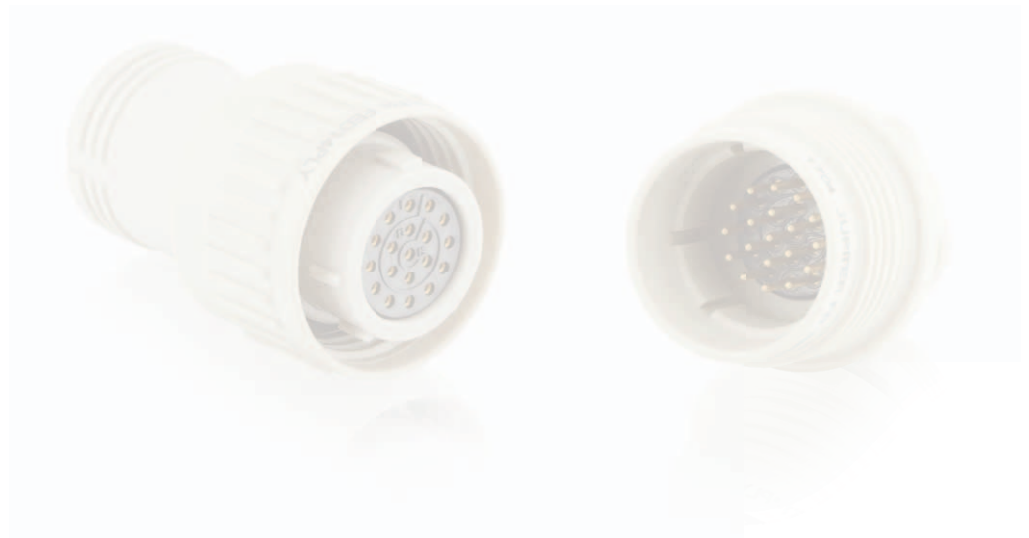
Unmanned Underwater Vehicles



Observation Class ROVs



Aquaculture



Features & Benefits

RELIABLE

THE Connector for Shallow Water Immersion

Perfect watertightness even at low pressure.
Shell to shell sealing with a robust coupling ring.
Double sealing security thanks to 2 O-rings in coupling interface.
No stress on O-rings thanks to a conical mating interface.
Overmolded cable termination.

DURABLE

Designed for Long Term Use

High quality PEEK® thermoplastic shell.
No corrosion.
No cathodic delamination.
UV Resistant.

EASY & SECURE

Keying and Easy Coupling

Up to 19 contacts #20.
Easy to mate even with high number of contacts.
5-key mechanical polarization on shells.
Scoop proof to prevent contact damage.
Lightweight.

VERSATILE

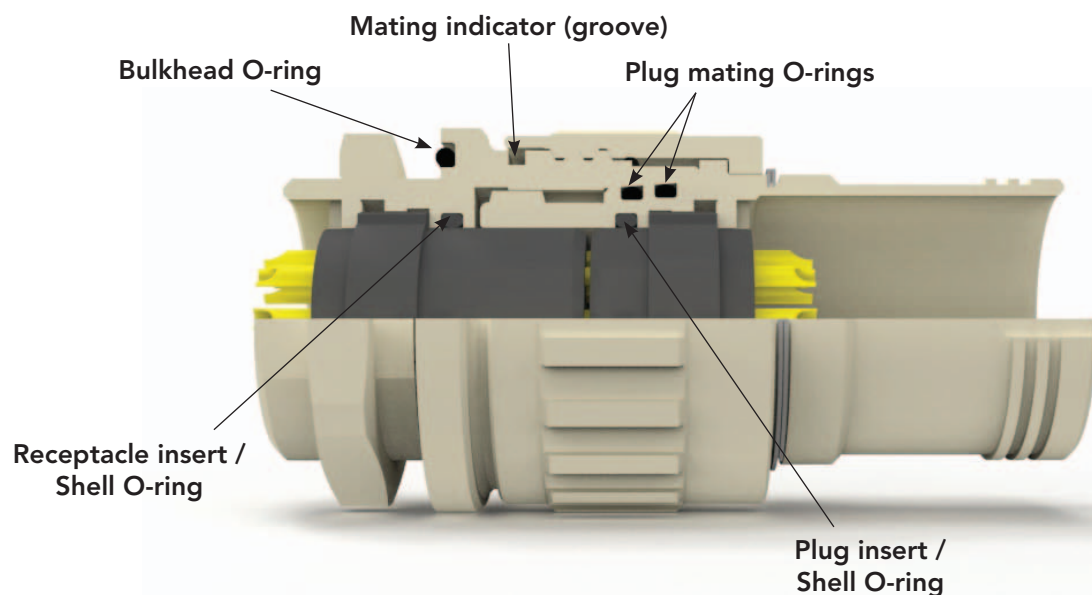
Full Interconnect Solution

Cable plugs, bulkhead receptacles, in-line receptacles, pre-terminated overmolded cable assemblies.
Ready to install.

Features & Benefits

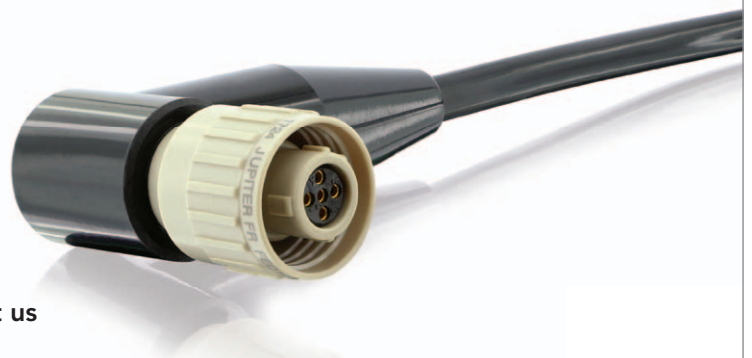
Reliable connectors designed for Shallow Water Immersion

- Shell to shell sealing with robust coupling ring
- Perfect sealing even at low pressure. Once the coupling ring is tightened, the connectors are sealed!
- O-ring for insert to shell sealing on both plug and receptacle for open face sealing
- Redundancy with 2 O-rings on plug taper seat for plug to receptacle sealing
- Conical coupling interface to reduce the stress on O-rings



Overmolded cable assemblies

- Overmolded cable termination
- Standard harness offering:
 - Straight or right angle overmold in Polyurethane
 - Polyurethane cable jacket



For more information, please see page 23 or consult us

Features & Benefits

High grade materials for long term immersion

- Shells are manufactured from Peek®
 - Lightweight
 - No corrosion
 - No cathodic delamination.
- Nylatron molded insulator
- Nitrile O-rings for excellent fluid compatibility (sea water, mineral oil...) and long service life.
- Gold plated copper alloy contacts
- RoHS compliant



Easy wiring and installation

- Scoop proof: No risk of damaging contacts during the coupling operation when using a female plug and a male receptacle
- Easy screw coupling even with a high number of contacts
- Removable insulators: Allows for easier wiring, wiring corrections and servicing. Shells and inserts can be stored separately for a flexible insert configuration.

**Receptacle
RER**
See page 18



**Overmolded straight cable assemblies
PCE...SL***
See page 31



**In-line receptacle
PCE**
See page 19



**Plug pressure sealing cap
BEF**
See page 20



*L = cable length

overview

**Plug
FED**
See page 18



**Receptacle pressure sealing cap
BER**
See page 20



**Overmolded straight cable assemblies
FED...SL***
See page 27



**Overmolded right angle cable assemblies
FED...RL***
See page 29



*L = cable length

SWIM SERIES

Connector Details

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■ Contact layouts	17
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■ Cap dimensions	20
■ Tools	21



Connector technical features

Materials

- **Housing:**
Thermoplastic (Peek®)
- **Insulator:**
Nylatron® (PA 6/6 + MoS2)
- **Contacts:**
Gold over Nickel plated copper alloy solder cup contacts

Environmental

- **Operating temperature range:**
From -20°C to +70°C
From -4°F to +158°F
- **Watertightness:**
30 bar mated or unmated (430PSI)

Electrical

Voltage category	SOURIAU recommended service voltage (Vrms 50Hz)	Dielectric withstanding voltage (Vrms 50Hz)
Service 0	350	1,000
Service 1	600	1,500
Service 2	1,000	2,300

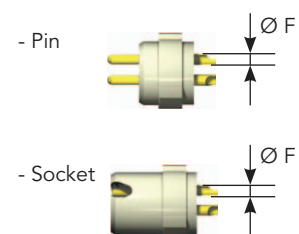
- **Insulation resistance:**
 - Unmated connectors: $\geq 10^4$ MΩ
 - Mated connectors: $\geq 5 \times 10^3$ MΩ at 500Vcc

- **Current rating and contact resistance:**

Shell size	Contact size	Current rating per contact(A)	Contact Resistance (mΩ)
10PL 14PL	20	7	≤ 4
	16	14	≤ 3
	14	20	≤ 2.5
	12	26	≤ 2
10PL	Coaxial 50Ω	20	≤ 2.5
	Coaxial 75Ω	7	≤ 4

- **Contact dimensions:**

Contact size	Ø F Contact termination OD	AWG	Conductor Section
20	0.9 mm 0.035"	26 to 22	0,14 to 0,38 mm ²
16	1.4 mm 0.055"	22 to 18	0,38 to 0,93 mm ²
14	1.87 mm 0.074"	18 to 16	0,93 to 1,34 mm ²
12	2.3 mm 0.091"	16 to 14	1,34 to 1,91 mm ²



Connector part numbers

Shell type: FED: Straight plug RER: Jam-nut receptacle PCE: In-line receptacle	FED	M	14PL	N	0720	SA	Y
Type of contact: M: Pin contacts F: Socket contacts							
Shell size: 10PL: size 10 14PL: size 14							
Insert Material: N: PA66+MoS2 (Nylatron®)							
Contact layouts: See contact layout designation p.17							
Cable termination: SA: Overmolded cable termination (Only for FED and PCE)							
Product version: Index: Y							

Examples:

- Size 14 receptacle with 19 male contacts #20 ➡ RERM14PLN1920Y
- Size 10 plug with 4 female contacts #16 ➡ FEDF10PLN0416SAY

Pressure sealing cap part numbers

Cap type: BER: Cap for receptacles BEF: Cap for plugs	BER	C	10PL	Y
Cord set: C: With cord -: Without cord (leave blank)				
Shell size: 10PL: size 10 14PL: size 14				
Product version: Index: Y				

Insert sub assembly part numbers (Inc. pre-loaded contacts)

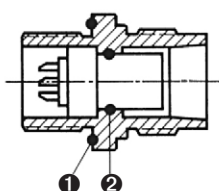
Insert + contact	BIS	14PL	N	04 12	M
Shell size: 10PL: size 10 14PL: size 14					
Insert material: N: Nylatron®					
Contact layouts: See contact layout designation p.17					
Type of contact: M: Pin contacts F: Socket contacts					

Shell sub assembly part numbers

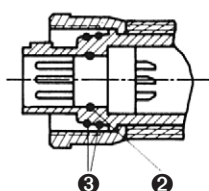
Shell type:	CFE	14PL	SA	Y
CFE: Plug CRER: Receptacle CPE: In-line receptacle				
Shell size: 10PL: size 10 14PL: size 14				
Cable termination: SA: Overmolded cable termination (only for FED and PCE)				
Product version: Index: Y				

O-ring part numbers

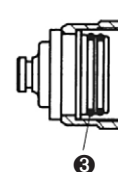
O-ring type	10PL	14PL
❶ Panel O-ring (for REC-RER)	10-01 (Ø1.78 x 18.77 mm) (Ø0.070" x 0.739")	14-01 (Ø2.5 x 26 mm) (Ø0.098" x 1.0236")
❷ Insulator/shell O-ring	10-02 (Ø1.78 x 8.73 mm) (Ø0.070" x 0.344")	14-02 (Ø1.9 x 16 mm) (Ø0.075" x 0.629")
❸ Taper seat O-rings	10-03 (Ø1.78 x 12.42 mm) (Ø0.070" x 0.489")	14-03 (Ø1.78 x 20.35 mm) (Ø0.070" x 0.801")



RER receptacle



FED plug



BER cap

Contact layouts

Size 10PL

1C75 1C50 1C50SMA *	0214	0314	0416	0516	0720	0920
1C#75 or 1C#50 or 1C#50SMA Service 1	2#14 Service 2	3#14 Service 2	4#16 Service 2	5#16 Service 1	7#20 Service 1	9#20 Service 0

* Please consult us.

Size 14PL

0312	0412	0714	1216
3#12 Service 2	4#12 Service 2	7#14 Service 2	12#16 Service 2

Layout caption

Layout ID for part number

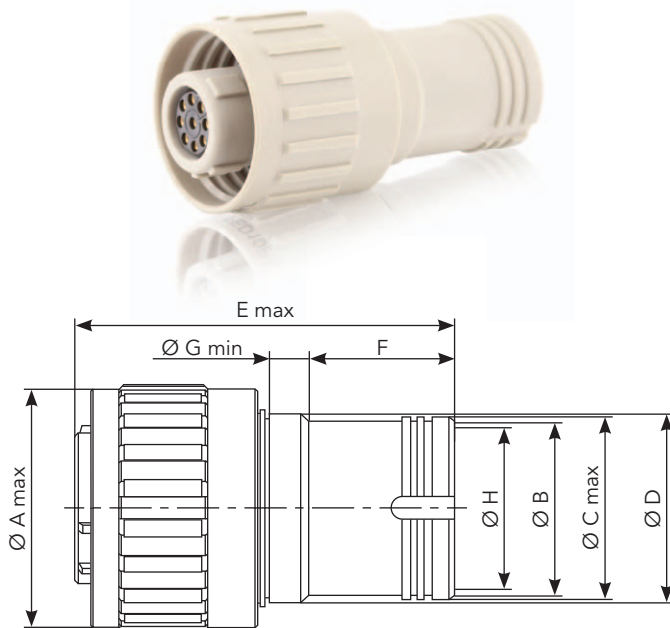
Number of contact & Size

Voltage service rating

1920	03121020
19#20 Service 1	3#12 & 10#20 Service 1

Connector dimensions

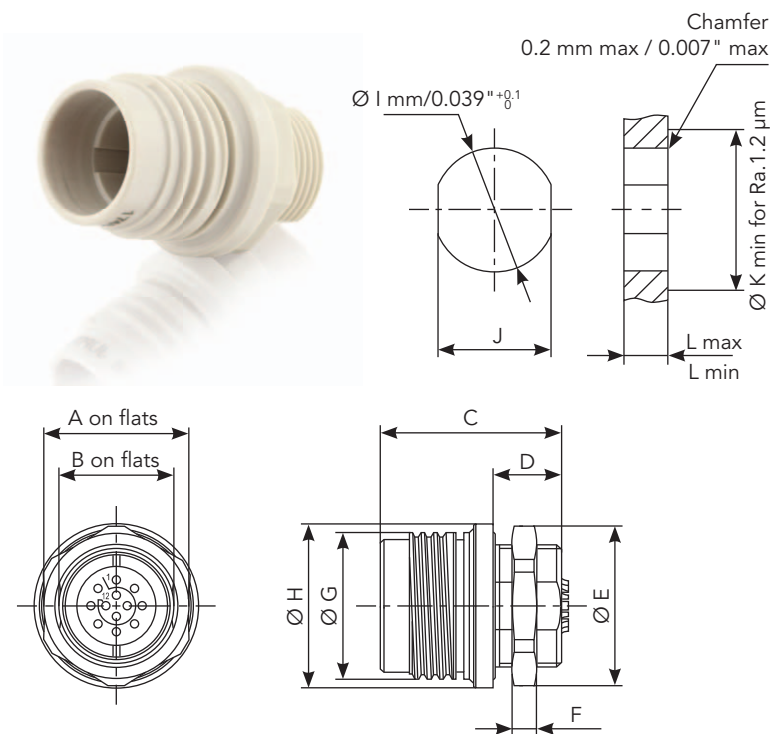
FED - Straight plug



Shell size	10PL	14PL
Ø A max	25.9 mm 1.020"	34 mm 1.339"
Ø B	17.8 mm 0.701"	24 mm 0.945"
Ø C max	18.75 mm 0.738"	25 mm 0.984"
Ø D	18.75 mm 0.738"	25.75 mm 1.014"
E max	52.5 mm 2.067"	52.5 mm 2.067"
F	20 mm 0.787"	20 mm 0.787"
G min	5 mm 0.197"	5 mm 0.197"
Ø H	15 mm 0.591"	22 mm 0.866"

Maximum outer cable diameter = ØH (depending on the fluidity of the compound)

RER - Jam-nut receptacle

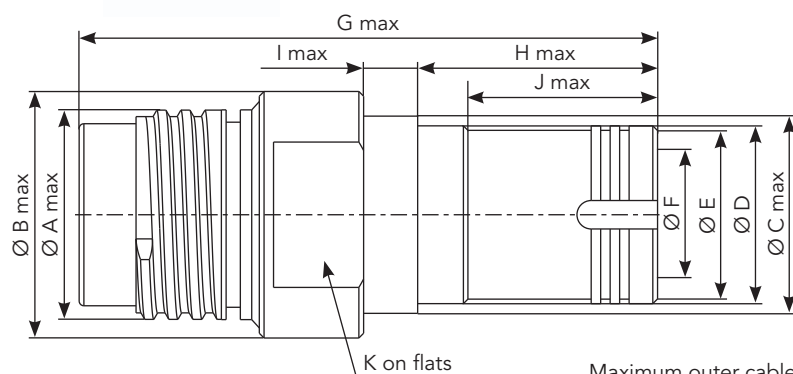


10PL: Jam-nut recommended torque: 3.5 N.m
14PL: Jam-nut recommended torque: 5.5 N.m

Shell size	10PL	14PL
A	22 mm 0.866"	30 mm 1.181"
B	16 mm 0.630"	23 mm 0.906"
C	37 mm 1.457"	37 mm 1.457"
D	14 mm 0.551"	14 mm 0.551"
Ø E	24 mm 0.945"	33 mm 1.299"
F	4 mm 0.157"	5 mm 0.197"
Ø G (ACME)	7/8"	1" 3/16
Ø H	26 mm 1.024"	34 mm 1.339"
Ø I	18.2 mm 0.717"	25.2 mm 0.992"
J	16.2 mm 0.638"	23.2 mm 0.913"
Ø K min	25 mm 0.984"	34 mm 1.339"
L min	4 mm 0.157"	4 mm 0.157"
L max	9 mm 0.354"	9 mm 0.354"

Connector details dimensions

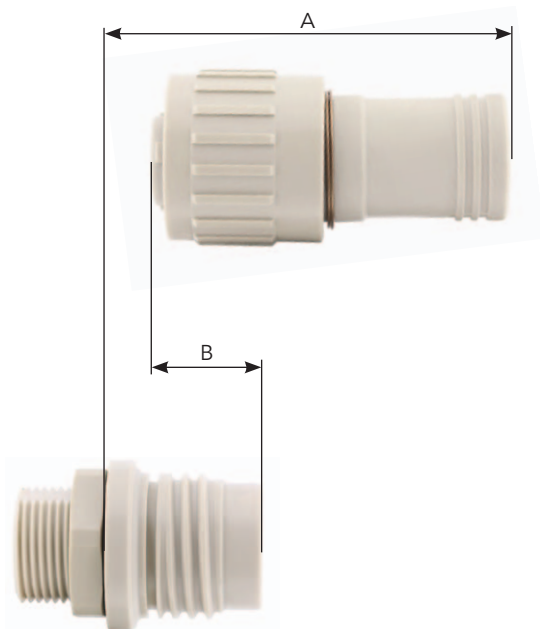
PCE - In-line receptacle



Maximum outer cable diameter = ØH (depending on the fluidity of the compound)

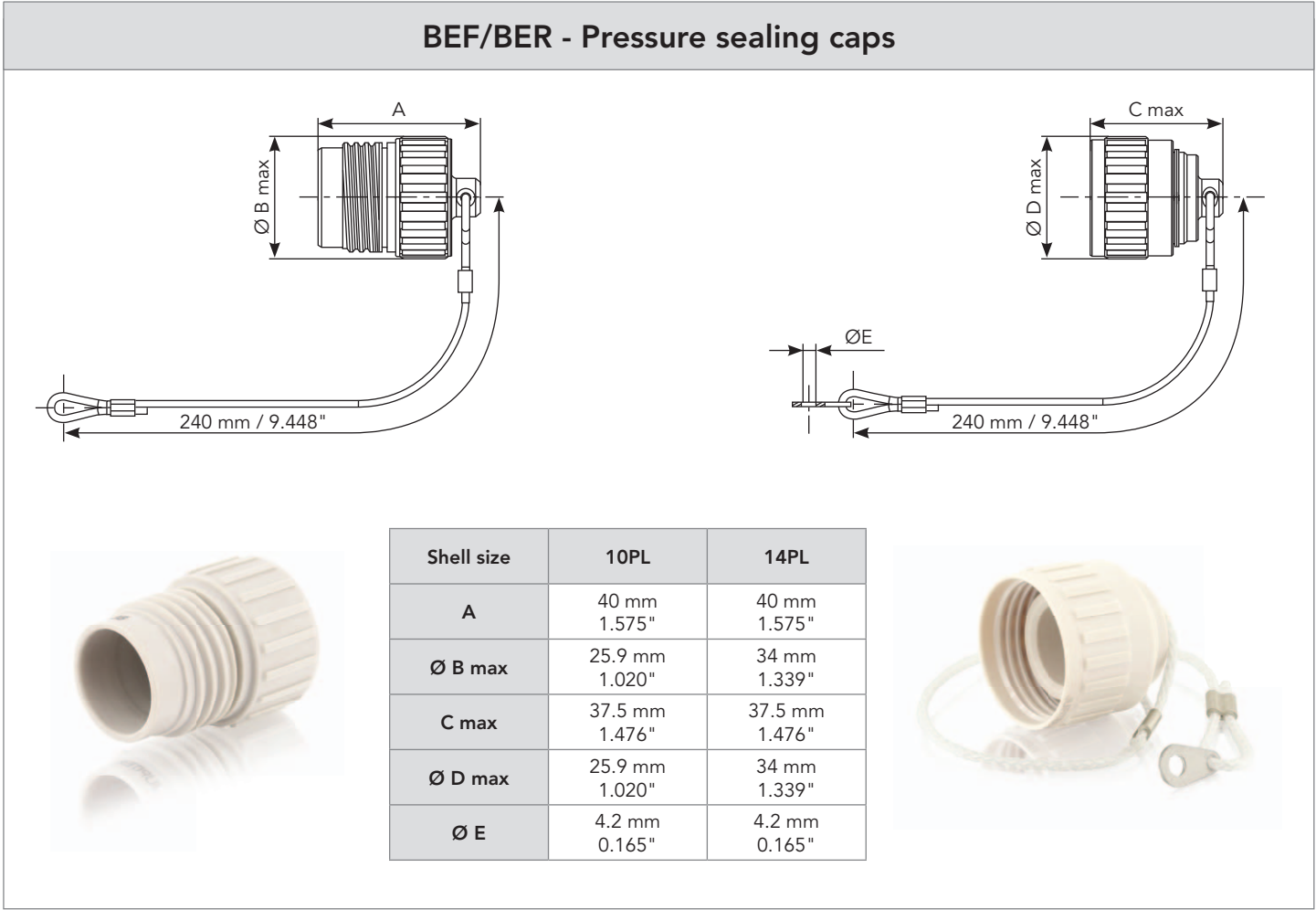
Shell size	10PL	14PL
Ø A (ACME)	7/8"	1"3/16"
Ø B	26.2 mm 1.031"	34.2 mm 1.346"
Ø C max	20.8 mm 0.819"	28.6 mm 1.126"
Ø D	18.75 mm 0.738"	25 mm 0.984"
Ø E	17.8 mm 0.701"	24 mm 0.945"
Ø F	15 mm 0.591"	22 mm 0.866"
G max	61.3 mm 2.413"	61.3 mm 2.413"
H max	25.4 mm 1.000"	25.4 mm 1.000"
I min	5 mm 0.197"	5 mm 0.197"
J max	20 mm 0.787"	20 mm 0.787"
K	21 mm 0.827"	29 mm 1.142"

Mated connectors



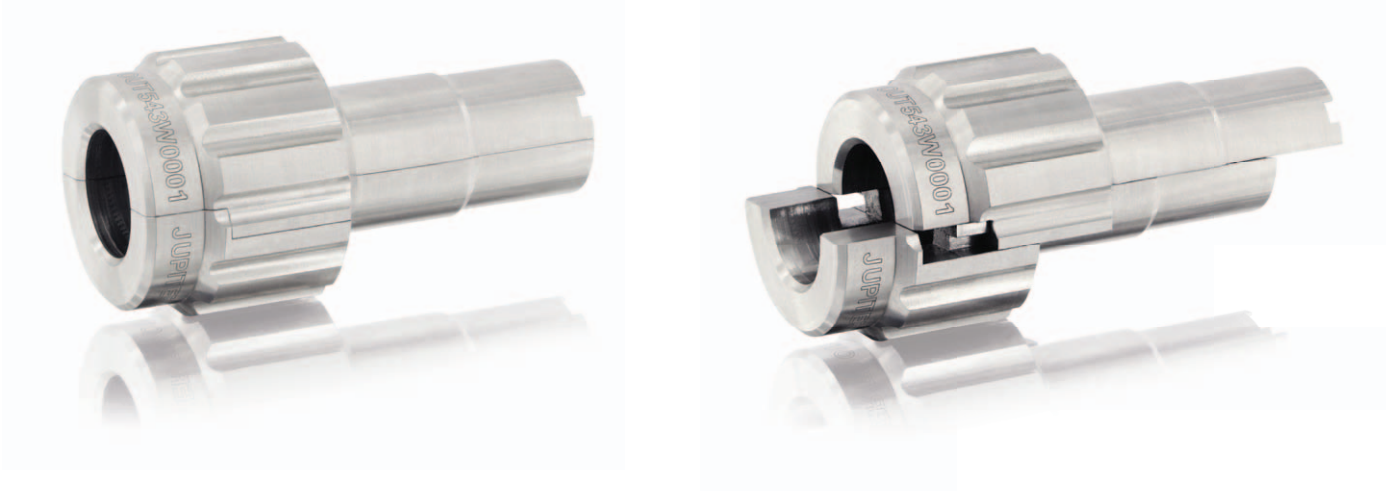
Shell size	10PL	14PL
A	55.5 mm 2.185"	55.5 mm 2.185"
B	19.5 mm 0.768"	19.5 mm 0.768"

Cap dimensions



Tools

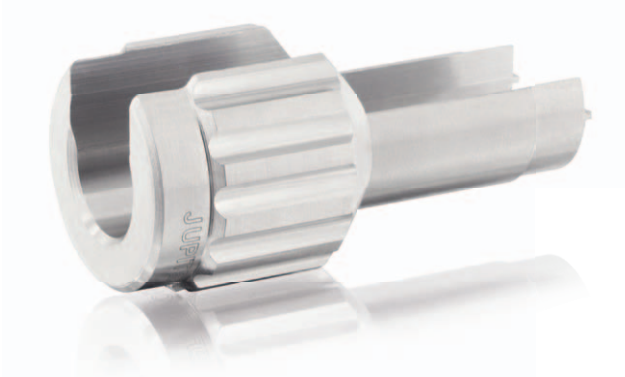
Insert insertion tool



Connector size	Part numbers
10	OUT542W0000
14	OUT543W0000

Connector Details

Insert retention nut installation tool



Connector size	Part numbers
10	OUT542W5000
14	OUT543W5000

SWIM SERIES

SWIM Series

Overmolded Cable Assemblies

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■ Cable assembly dimensions	27



Standard overmolded cable assembly features

Cable

- Polyurethane outer sheath
- Silicone compound filled
- FEP insulated conductors
- Operating temperature: -30°C + 70°C
-22°F + 158°F
- Operating voltage: 1000V
- Unshielded
- Cable length tolerance: +2% up to 100m
100 m (328.08 ft)
+5% above 100 m (328.08 ft)

Overmolding

- Polyurethane overmolding

Cable details

Shell size	Connector contact layout	Cable conductor number and section	Cable outer diameter	Static bending radius
10	0214	2 x 2.0 mm ² / 2 x 14 AWG	8 mm / 0.315"	≥ 50 mm / 1.969"
	0314	3 x 2.0 mm ² / 3 x 14 AWG	8 mm / 0.315"	≥ 50 mm / 1.969"
	0416	4 x 0.93 mm ² / 4 x 18 AWG	8 mm / 0.315"	≥ 50 mm / 1.969"
	0516	5 x 0.93 mm ² / 5 x 18 AWG	8 mm / 0.315"	≥ 55 mm / 2.165"
	0720	7 x 0.38 mm ² / 7 x 22 AWG	8 mm / 0.315"	≥ 50 mm / 1.969"
	0920	9 x 0.34 mm ² / 9 x 22 AWG	8 mm / 0.315"	≥ 50 mm / 1.969"
14	1216	12 x 0.6 mm ² / 12 x 20 AWG	12.7 mm/ 0.500"	≥ 130 mm / 5.118"
	1920	19 x 0.34 mm ² / 19 x 22 AWG	11 mm/ 0.433"	≥ 65 mm / 2.559"

Cable assembly electrical characteristics

Shell size	Connector contact layout	Harness Service Voltage	Harness current rating per line
10	0214	1,000V	20A
	0314	1,000V	20A
	0416	1,000V	14A
	0516	600V	14A
	0720	600V	7A
	0920	350V	5A
14	1216	1,000V	10A
	1920	600V	5A

Overmolded cable assembly part numbers

Shell type: FED: Straight plug PCE: In-line receptacle	FED	M	14PL	N	0720	SA	Y	S	1
Type of contact: M: Pin contacts F: Socket contacts									
Shell size: 10PL: size 10 14PL: size 14									
Insert Material: N: PA66+MoS2 (Nylatron®)									
Contact layouts: See contact layout designation p.17									
Cable termination: SA: Overmolded cable termination									
Product version: Index: Y									
Overmolded type: S: Straight R: Right angle									
Standard available cable length (For custom cable length, please consult us): 1: 1m (3.28 ft) 5: 5m (16.40 ft) 10: 10m (32.81 ft)									

Example:

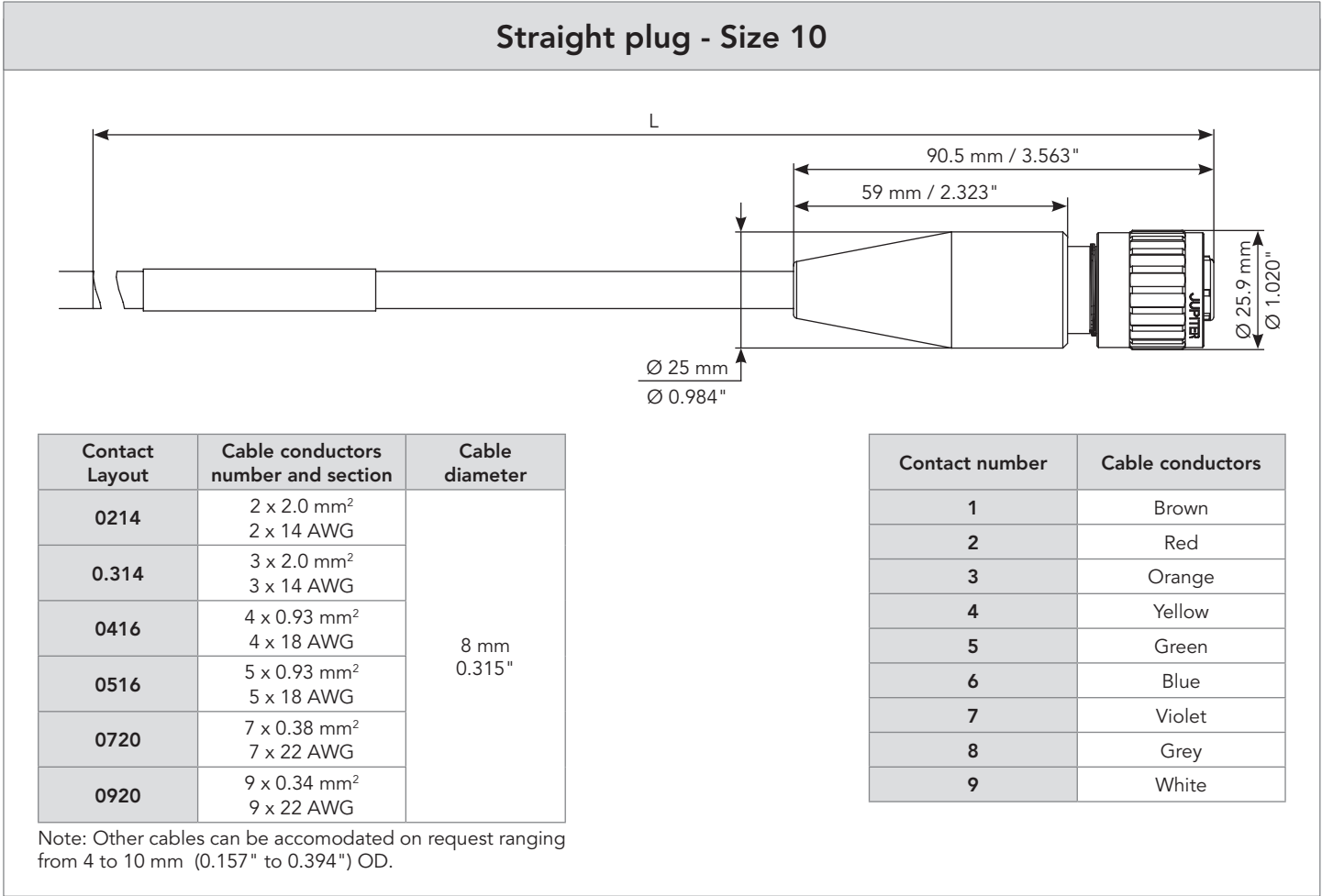
- Size 14 plug right angled overmolded cable assembly with 12 female contacts size 16 and 5m cable: FEDF14PLN1216SAYR5

Contacts layouts (Please consult us for other layouts)

Size 10PL					
0214	0314	0416	0516	0720	0920
2#14	3#14	4#16	5#16	7#20	9#20
Service 2	Service 2	Service 1	Service 1	Service 1	Service 0

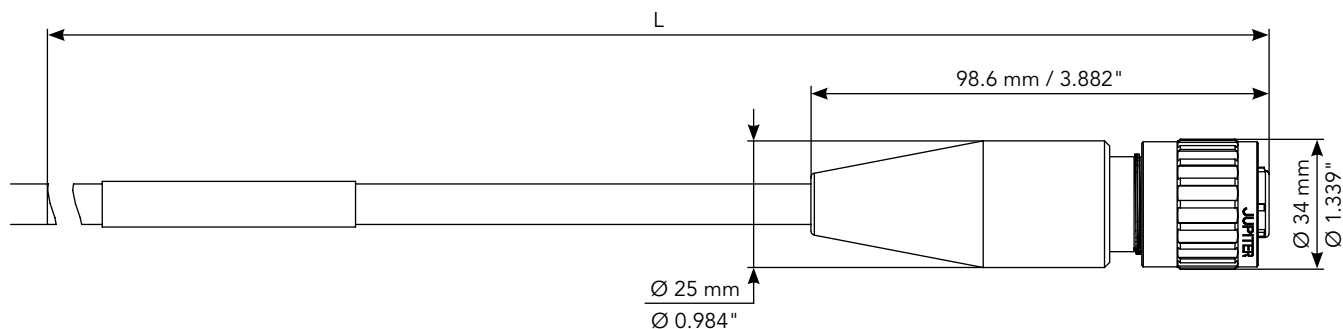
Size 14PL		Layout caption
1216	1920	Layout ID for part number
12#16	19#20	Number of contact & Size
Service 2	Service 1	Voltage service rating

Overmolded cable assembly dimensions



Overmolded cable assembly dimensions

Straight plug - Size 14 - Contact layouts 1216 and 1920



Layout 1216

	Contact number	Cable conductors
Outer layer	1	Brown
	2	Red
	3	Orange
	4	Yellow
	5	Green
	6	Blue
	7	Violet
	8	Grey
	9	White
Inner layer	10	Black
	11	Brown
	12	Red

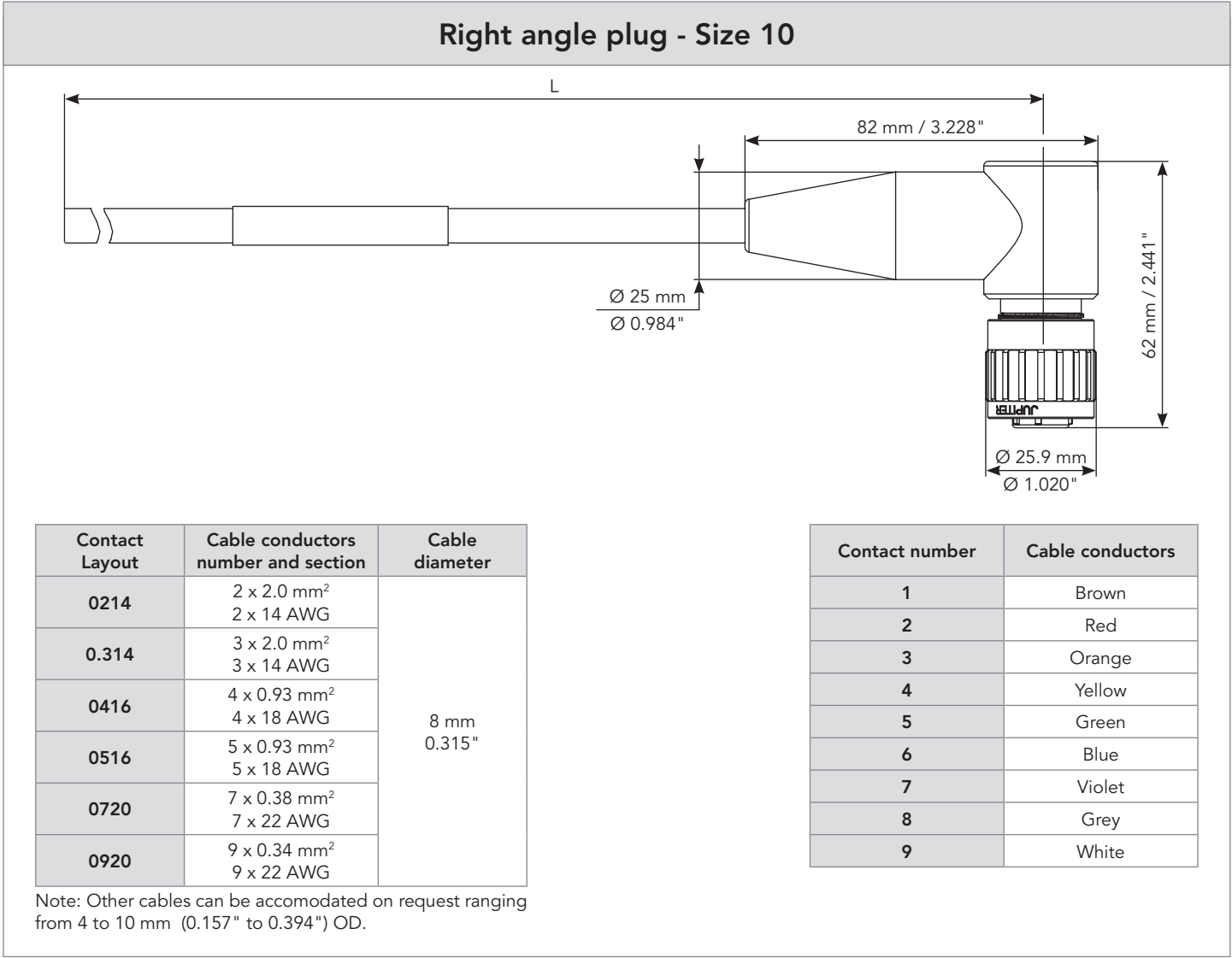
Layout 1920

	Contact number	Cable conductors
Outer layer	1	Red
	2	Black
	3	White
	4	Yellow
	5	White
	6	Yellow
	7	White
	8	Yellow
	9	White
	10	Yellow
	11	White
	12	Yellow
Inner layer	13	Black
	14	White
	15	Yellow
	16	White
	17	Yellow
	18	Red
	19	Grey

Contact Layout	Cable conductors number and section	Cable diameter
0312	Consult us	-
0412	Consult us	-
0714	Consult us	-
1216	12 x 0.6 mm ² 12 x 20 AWG	12.7 mm 0.500"
1920	19 x 0.34 mm ² 19 x 22 AWG	11 mm 0.433"
03121020	Consult us	-

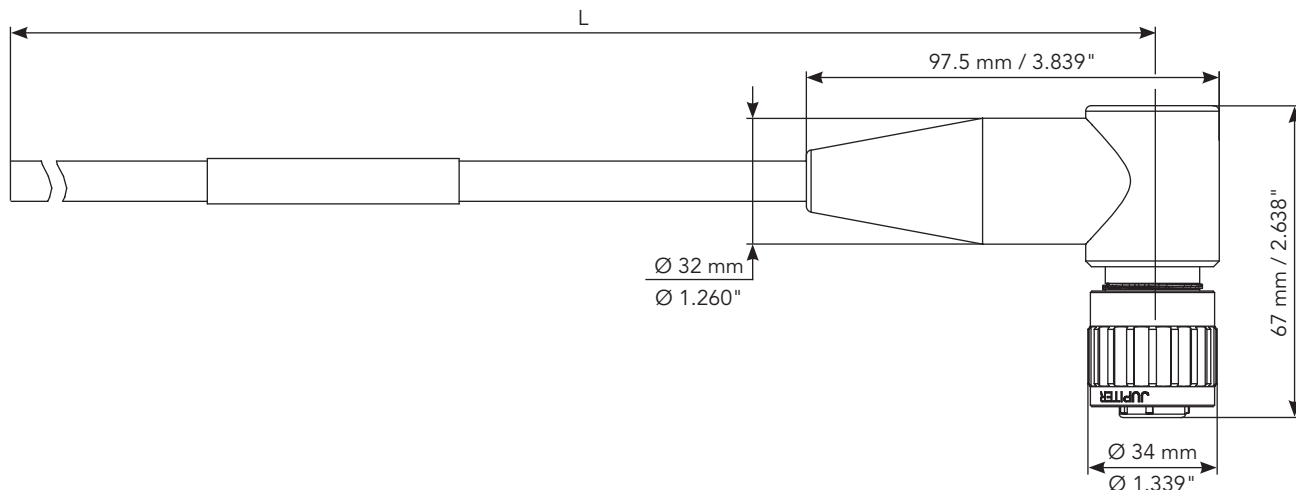
Note: Other cables can be accommodated on request ranging from 8 to 16 mm (0.315" to 0.630") OD.

Overmolded cable assembly dimensions



Overmolded cable assembly dimensions

Right angle plug - Size 14 - Contact layouts 1216 and 1920



Layout 1216

	Contact number	Cable conductors
Outer layer	1	Brown
	2	Red
	3	Orange
	4	Yellow
	5	Green
	6	Blue
	7	Violet
	8	Grey
	9	White
Inner layer	10	Black
	11	Brown
	12	Red

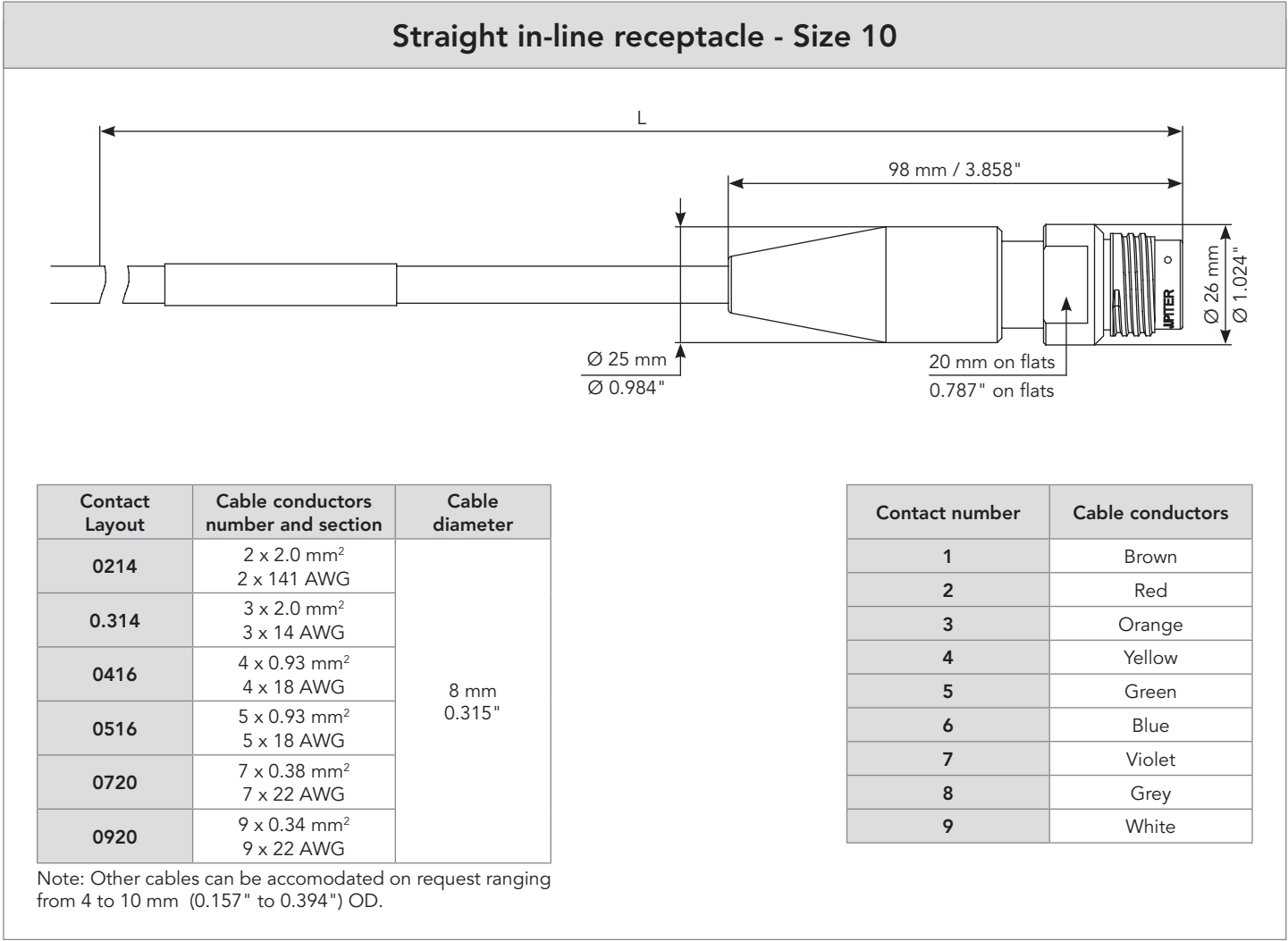
Layout 1920

	Contact number	Cable conductors
Outer layer	1	Brown
	2	Red
	3	Orange
	4	Yellow
	5	Green
	6	Blue
	7	Violet
	8	Grey
	9	White
Inner layer	10	Yellow
	11	White
	12	Yellow
	13	Black
	14	White
	15	Yellow
	16	White
	17	Yellow
	18	Red
	19	Grey

Contact Layout	Cable conductors number and section	Cable diameter
0312	Consult us	-
0412	Consult us	-
0714	Consult us	-
1216	12 x 0.6 mm ² 12 x 14 AWG	12.7 mm 0.500"
1920	19 x 0.34 mm ² 19 x 22 AWG	11 mm 0.433"
03121020	Consult us	-

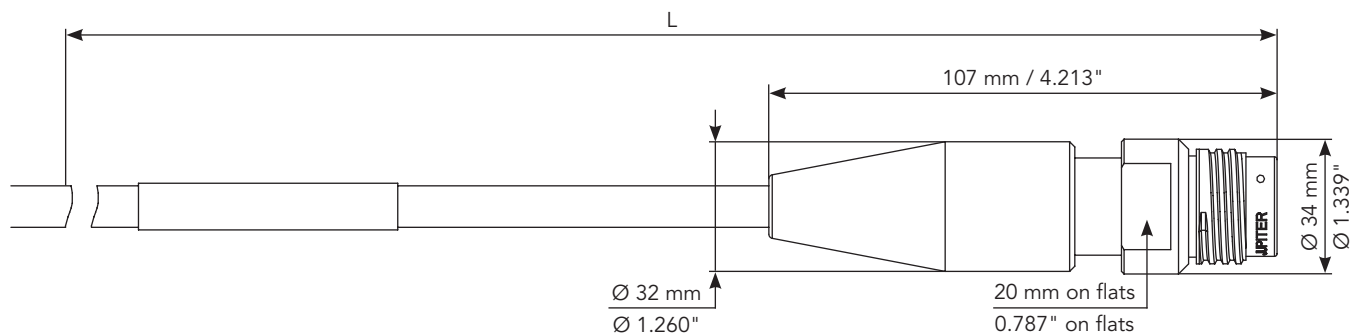
Note: Other cables can be accommodated on request ranging from 8 to 16 mm (0.315" to 0.630") OD.

Overmolded cable assembly dimensions



Overmolded cable assembly dimensions

Straight in-line receptacle - Size 14 - Contact layouts 1216 and 1920



Layout 1216

	Contact number	Cable conductors
Outer layer	1	Brown
	2	Red
	3	Orange
	4	Yellow
	5	Green
	6	Blue
	7	Violet
	8	Grey
	9	White
Inner layer	10	Black
	11	Brown
	12	Red

Layout 1920

	Contact number	Cable conductors
Outer layer	1	Red
	2	Black
	3	White
	4	Yellow
	5	White
	6	Yellow
	7	White
	8	Yellow
	9	White
	10	Yellow
	11	White
	12	Yellow
Inner layer	13	Black
	14	White
	15	Yellow
	16	White
	17	Yellow
	18	Red
	19	Grey

Contact Layout	Cable conductors number and section	Cable diameter
0312	Consult us	-
0412	Consult us	-
0714	Consult us	-
1216	12 x 0.6 mm ² 12 x 20 AWG	12.7 mm 0.500"
1920	19 x 0.34 mm ² 19 x 22 AWG	11 mm 0.433"
03121020	Consult us	-

Note: Other cables can be accommodated on request ranging from 8 to 16 mm (0.315" to 0.630") OD.

Notes

SWIM SERIES

Cabling, Mounting and Maintenance

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Plug and in-line receptacle cable overmolding

Recommendations

SWIM plugs and In-line receptacles are designed for overmolded cable termination.

We suggest the use of a polyurethane cable jacket with a polyurethane overmold.

It is recommended to encapsulate the inside of plugs and in-line receptacles bodies with an appropriate potting compound prior to overmolding.

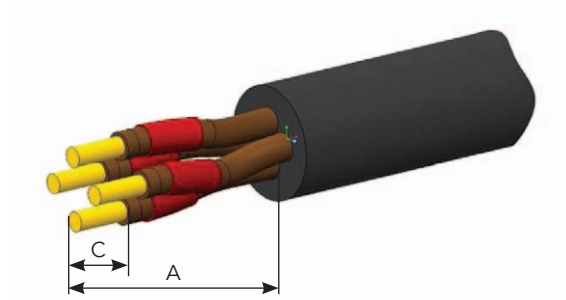
Note:

- **We provide SWIM overmolded cable assemblies.** Please consult page 23 of SWIM Series catalog.
- Receptacles can be backpotted to increase the pressure rating and to provide greater strain relief to the conductors.

Insert wiring

The following procedure is recommended:

- 1 - Slide the insert retaining nut over the cable with the notches oriented backward.
- 2 - Strip off the cable outer sheath as shown.
- 3 - Fit a heat shrink sleeve on each wire.
- 4 - Strip off the wires as shown.



Shell size	Size 10	Size 14
A	13 mm 0.512"	19 mm 0.748"
C	4 mm 0.157"	4 mm 0.157"

- 5 - Solder the conductors into the contact buckets starting with the central pin, then in a circular motion, move outwards toward the periphery until all contacts have been soldered.
- 6 - Slide the heat shrink sleeves over the terminations and up against the insulator; then with a heat gun, shrink the sleeves ensuring that they are correctly positioned against the insulator.

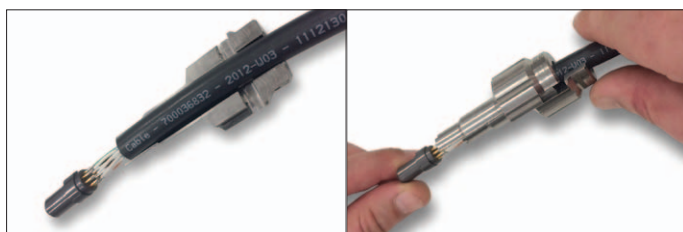
Insert mounting

Tools:

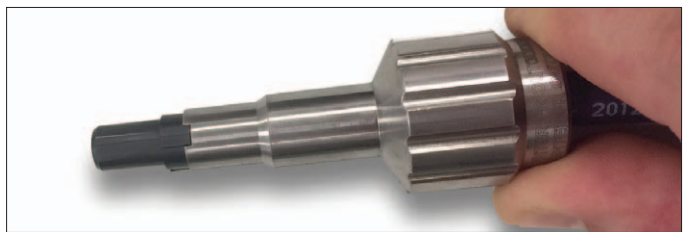
Size	Insert insertion tool	Retaining nut mounting tool
10	OUT542W0000	OUT542W5000
14	OUT543W0000	OUT543W5000
		

Once the insulator is wired, the following procedure is recommended:

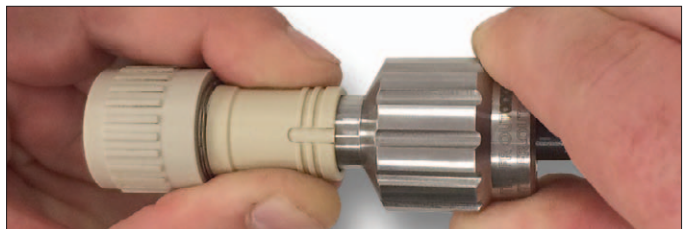
1 - Assemble the insertion tool around the cable.



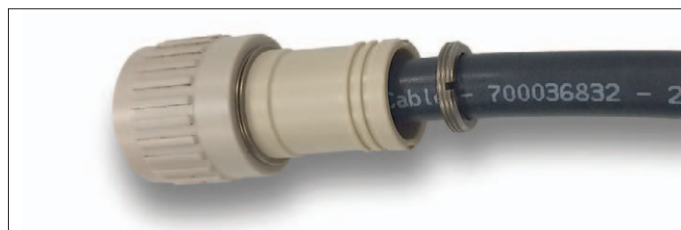
2 - Align the insertion tool with the insulator keys.



3 - Pre align the main insert keyway with the plug main keyway and fully push the insert into the plug body from the rear. Make sure the insulator is fully engaged in the connector body and that it can't rotate.



4 - Tighten the retaining nut using the retaining nut mounting tool.



5 - Check that the insulator is fully engaged and aligned.

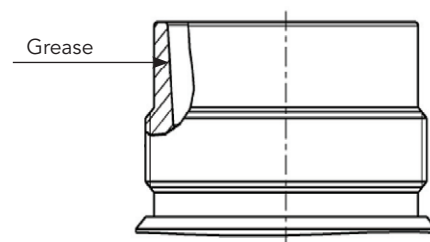


Bulkhead receptacles preparation

Before installing the bulkhead receptacle, the following procedure is recommended:

- 1 - Inspect the bulkhead receptacle groove and panel O-ring.
- 2 - If necessary, clean the groove, the O-ring and panel seal surface with isopropyl alcohol.
- 3 - Always apply silicone grease (Loctite 8104®, Rodhorsil Paste 4® or equivalent) on the receptacle panel O-ring, preferably with the finger.

It is recommended to apply silicone grease also on the inner cone of the receptacle body.



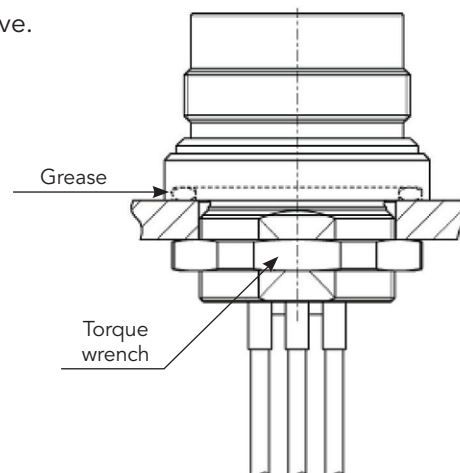
Panel mounting bulkhead receptacles

Fit the receptacle to the panel and check that the O-ring remains in its groove.

Locate the jam nut and tighten by hand. Use a torque wrench to complete the process using the following recommended torque values:

Shell size	Torque	On flats dim.
10M	3.5 N.m	22 mm 0.866"
14M	5.5 N.m	30 mm 1.181"

Panel cut-outs are available page 18 of the catalog



Plug and receptacle coupling

Offer the plug to the receptacle, align the keyways and screw the coupling ring by hand until the receptacle groove mating indicator is fully covered by the coupling ring.



Additional recommendations

- Don't pull on the cable when unmating plug and receptacle
- Avoid sharp bends in cable

Maintenance

It is recommended to place a cap on the connector whenever it is unmated (a plastic cap is delivered and pressure sealed caps are available).

In case mated connectors have been underwater for a long time and are recovered with fouling growth or are particularly dirty, apply the following procedure.

To unmate the connectors:

- Remove shells and other large deposits from the coupling rings by hands or using a pressure jet.
- If necessary, brush any remaining deposits in the mating area and on the coupling ring with a hard nylon brush.
- Rinse with fresh water.
- Unscrew the coupling ring by hand.

After the connectors are unmated:

- Rinse the mating face of the connectors with fresh water.
- Clean the mating face of the connectors using compressed air.
- Inspect the O-rings
- Clean O-rings seal seats with isopropyl alcohol
- Apply grease on the O-rings
- Place a cap on the connectors

SWIM SERIES

SWIM Series

Other Series

■ Brass shell - TP Series	42
■ Stainless steel shell - U Series	42
■ Bronze shell - M Series	43
■ Wet/Underwater mateable - 8810 Series	43

Other Series

TP Series

Economic connectors similar to M Series with nickel plated brass shells and PA6/6 molded inserts.
See specific catalog available online.

Sealed:

- . Down to 300 meters depth.

Large range:

- . 4 shell sizes: 8TP, 10TP, 14TP and 20TP.
- . Receptacles, cable receptacles, plugs and feedthroughs.
- . Signal, power, high voltage, coax and triax contacts.

Economic underwater connectors

RoHS compliant 



See «Marine TP Series» catalog on
www.esterline-connection-technologies.com

U Series

Dry mate connectors for deep immersion with 316L stainless steel shells.

High sealing performances:

- . Down to 3,000 meters depth.

High pressure withstand:

- . High corrosion resistant stainless steel shell (AISI 316L).
- . Robust screw coupling mechanism.
- . High temperature resistance (up to 170°C with PTFE insulators).
- . Nylatron, Teflon or Tefzel insulators.

RoHS compliant 



See «Marine U Series» catalog on
www.esterline-connection-technologies.com

Other Series

M Series

Dry mate connectors for deep immersion with marine bronze stainless steel shells.

High sealing performances:

- . Down to 3,000 meters.

Large range:

- . 5 shell sizes.
- . Receptacles, cable receptacles, plugs and feedthroughs.
- . Signal, power, high voltage, coax and triax contacts.

Robust:

- . High corrosion resistant marine bronze shells.
- . Robust screw coupling mechanism.

RoHS compliant 



See «Marine M Series» catalog on
www.esterline-connection-technologies.com

8810 Series

Wet mate/underwater mateable connectors for deep immersion.

High sealing performances:

- . Down to 3,000 meters.

High pressure withstand:

- . Marine bronze shells.
- . Robust screw coupling mechanism.

RoHS compliant 

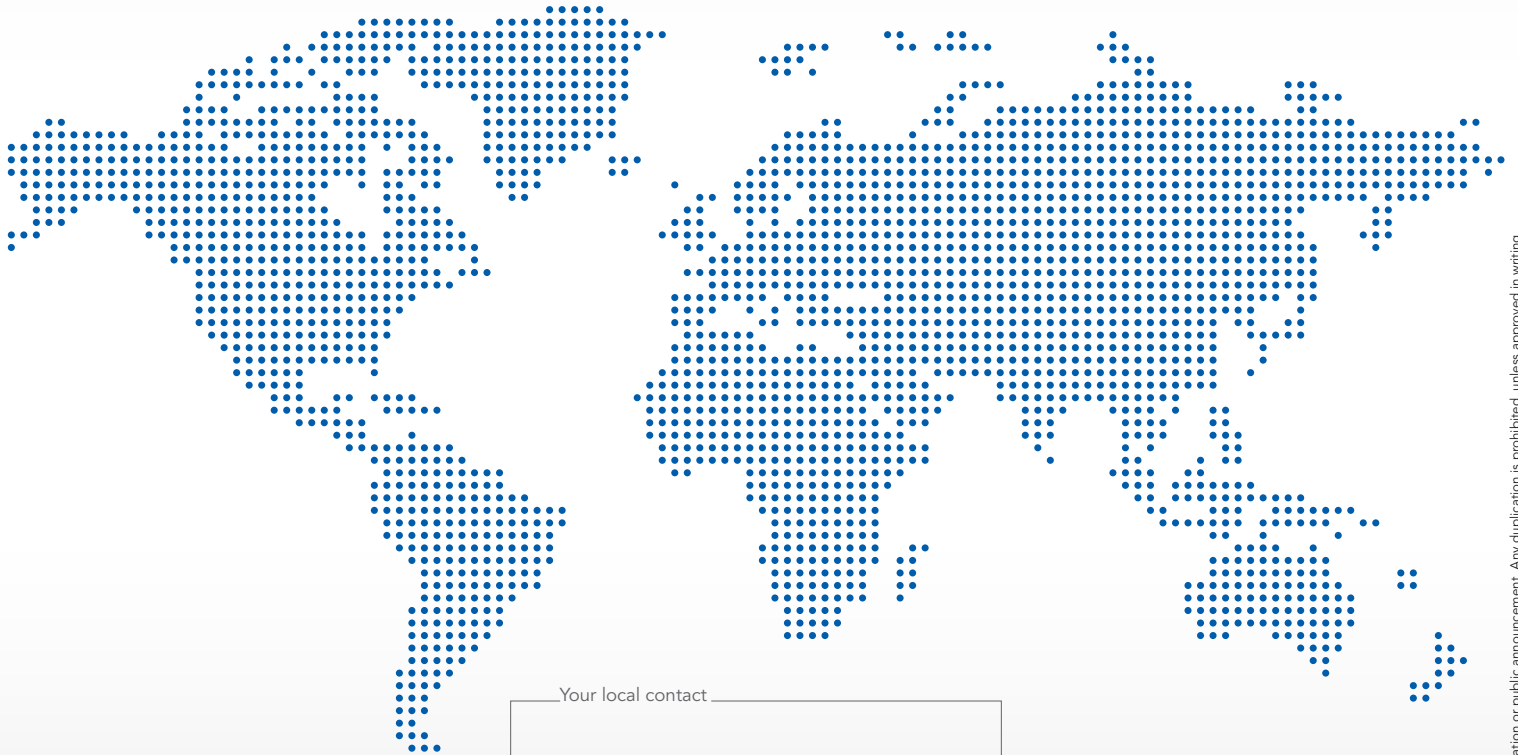


Notes

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