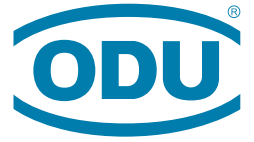


A PERFECT ALLIANCE.



# ADVANCED CIRCULAR CONNECTOR SOLUTIONS

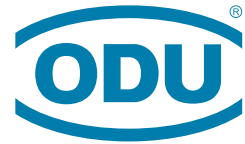
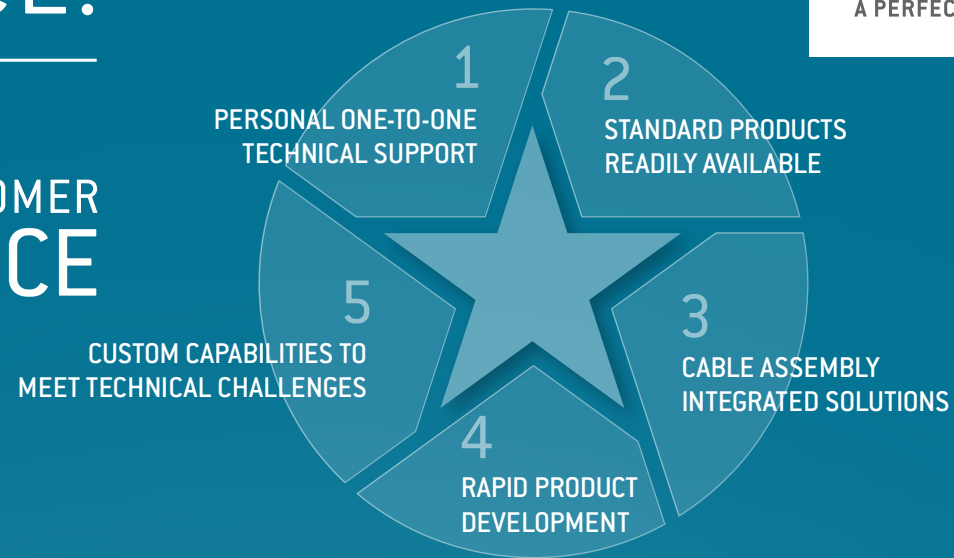
Push-Pull, Break-Away and Screw-Locking

ODU MINI-SNAP®  
ODU MEDI-SNAP®  
ODU MINI-MED®  
ODU MINI-SNAP®PC  
ODU AMC®  
ODU AMC® HIGH-DENSITY  
ODU THREADED CONNECTOR



# A PERFECT ALLIANCE.

## ODU 5 STAR CUSTOMER EXPERIENCE



A PERFECT ALLIANCE.

### ODU GROUP OVERVIEW

- More than 80 years of experience in connector technology
- Over 2,300 employees worldwide
- 10 sales subsidiaries in China, Denmark, France, Germany, Italy, Japan, Korea, Sweden, the UK and the US as well as 5 production and logistics sites
- All technologies under one roof: Design and development, machine tool and special machine construction, injection, stamping, turning, surface technology, assembly and cable assembly

We operate in the following markets: medical, military and security, test and measurement, industrial, energy, and automotive / emobility

As of February 2019

### CERTIFIED QUALITY

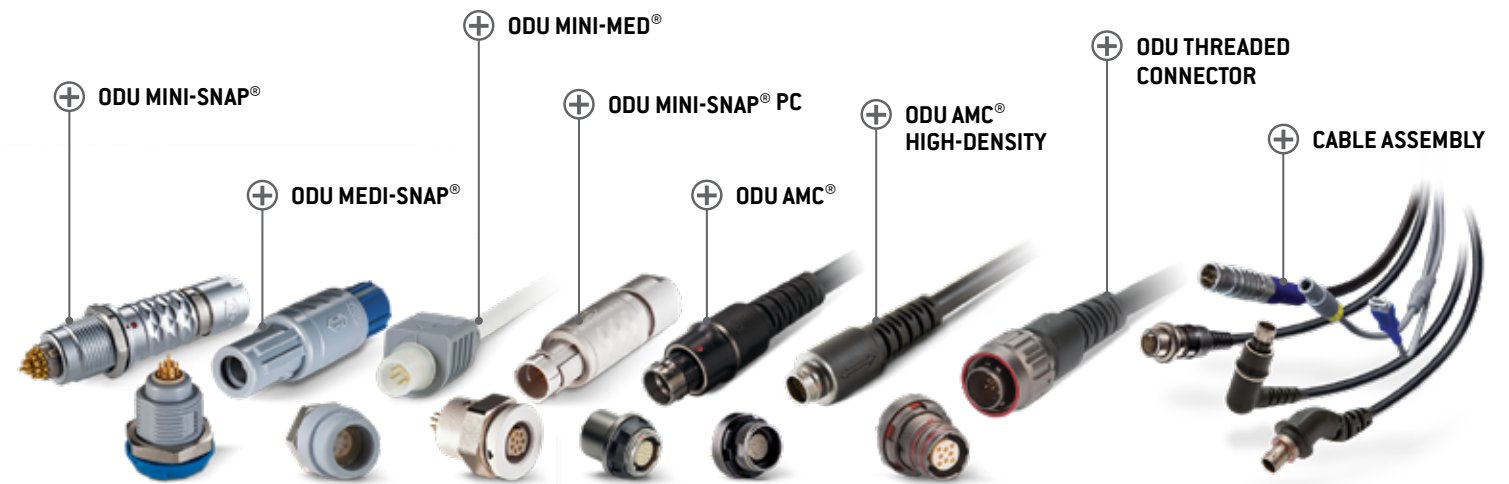
- ISO 9001
- IATF 16949
- ISO 13485
- ISO 14001
- ISO 50001
- Wide range of UL, CSA, VG and VDE licenses
- UL certified cable assembly

For a complete list of our certifications, please visit our website.



www.odu-usa.com

## ODU CIRCULAR CONNECTOR SOLUTIONS AND CAPABILITIES



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	ODU MINI-SNAP®	ODU MEDI-SNAP®	ODU MINI-MED®	ODU MINI-SNAP® PC	ODU AMC®	ODU AMC® High-Density	ODU Threaded Connector
Push-Pull locking	•	•		•	•		
Break-Away locking	•	•	•		•	•	
High-speed data transmission (> 480 Mbit/S)	•				•	•	•
Mechanical coding	•	•	•	•	•	•	•
Blind mate/ blind insertion	•	•	•	•	•	•	•
360° Shielding	•				•	•	•
Watertight	•	•	•	•	•	•	•
High mating cycles (> 5,000)	•			•	•	•	
Vibration & shock resistant	•	•		•	•	•	•
Threaded technology							•
Silicone overmold	•	•*				•**	

\* Approved for ODU MEDI-SNAP® Break-Away Plugs in PSU

\*\* Available in ODU-AMC® High-Density Chrome-Plated

# ODU HIGH-DENSITY & LIGHTWEIGHT CONNECTOR PORTFOLIO

**FAST SAMPLE AVAILABILITY**  
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**RAPID CABLE ASSEMBLY MANUFACTURING**



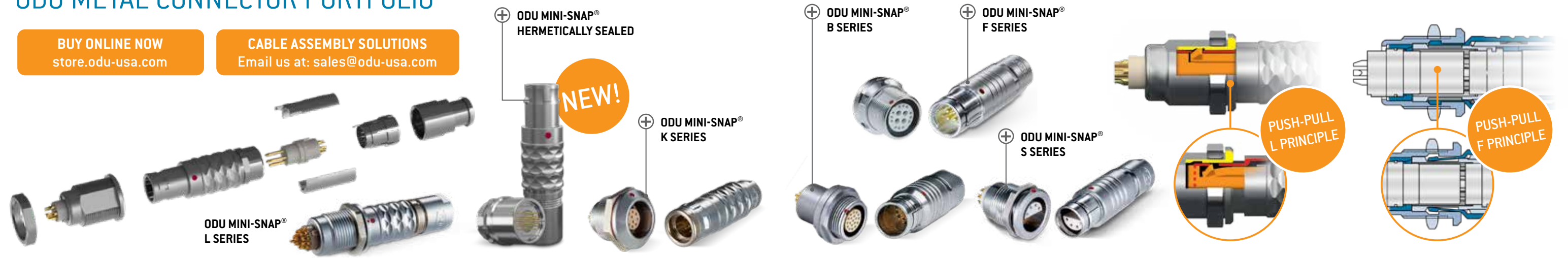
	Coding	Sizes	No. of possible mechanical coding	Diameter plug (mm)	Max. cable diameter (mm)	Max. no. of contacts	Solder	Crimp	Print	IP Class in mated condition	IP Class in unmated condition	Shell material	RoHS compliant	Operating temperature range	Advanced plating technologies for corrosion resistance	Coax transmission	Rapid cable assembly manufacturing	High speed data transfer: USB® 3.2 Gen 1x1 <sup>1</sup>	High speed data transfer: USB® 2.0 <sup>1</sup>	High speed data transfer: HDMI® <sup>1</sup>	High speed data transfer: Ethernet CAT 5 and 10 GBit Ethernet <sup>1</sup>
<b>ODU AMC® High-Density Break-Away</b> <ul style="list-style-type: none"> <li>70 % weight and size reduction</li> <li>Cable assembly solutions</li> <li>IP68 (20 m submersion)</li> <li>Chrome plated version available</li> <li>USB® 3.2 Gen 1x1 + USB® 2.0 + HDMI® 2.0 + Ethernet<sup>1</sup></li> </ul>	Pin and groove	00	4	9.8	5.0	7	•	•	•	IP6K8	IP68	Brass	•	-51° C [-60° F] to +125° C [+257° F]	•	•	•	•	•	•	•
		0		12.8	7.0	16															
		1		14.8	8.5	27															
		1.5		16.8	10.5	40															
<b>ODU AMC® High-Density Screw-Lock</b> <ul style="list-style-type: none"> <li>High vibration resistance</li> <li>High speed data transfer</li> <li>IP68</li> <li>High contact density: 2-16 contacts / 2 sizes</li> </ul>	Pin and groove	00	4	9.8	5.0	7	•	•	•	IP6K8	IP68	Brass	•	-51° C [-60° F] to +125° C [+257° F]	•	•	•	•	•	•	
		0		12.8	7.0	16															
<b>ODU AMC® Push-Pull</b> <ul style="list-style-type: none"> <li>IP68 and IP6K9K</li> <li>&gt; 5,000 mating cycles</li> <li>High speed data technology</li> <li>Quick and easy mating and locking</li> </ul>	Pin and groove	0	4	14.0	5.5	10	•	•	•	Up to IP6K9K	IP68	Aluminum	•	-51° C [-60° F] to +125° C [+257° F]	•	•	•	•	•	•	•
		1		15.9	6.5	16															
		1.5		16.5	8.0	19															
		2		19.6	10.0	26															
		3		23.9	11.5	37															
		4.5		33.0	17.5	55															
<b>ODU AMC® Break-Away</b> <ul style="list-style-type: none"> <li>IP68 and IP6K9K</li> <li>&gt; 5,000 mating cycles</li> <li>High speed data technology</li> <li>Quick and easy demating and locking</li> </ul>	Pin and groove	0	4	11.9	5.5	10	•	•	•	Up to IP6K9K	IP68	Aluminum	•	-51° C [-60° F] to +125° C [+257° F]	•	•	•	•	•	•	•
		1		13.9	6.5	16															
		1.5		15.9	8.0	19															
		2		17.6	10.0	26															
		3		21.9	11.5	37															
<b>ODU AMC® Easy-Clean</b> <ul style="list-style-type: none"> <li>Fast and easy cleaning</li> <li>Break-Away function</li> <li>&gt; 5,000 mating cycles</li> <li>Contact inserts with pogo pins</li> </ul>	Pin and groove	0	4	11.9	5.5	7	•	•	•	Up to IP6K9K	IP6K8	Aluminum	•	-51° C [-60° F] to +125° C [+257° F]	•	•	•	•	•	•	
		1		13.9	6.5	16															
		1.5		15.9	8.0	19															
<b>ODU THREADED CONNECTOR</b> <ul style="list-style-type: none"> <li>High shock and vibration</li> <li>Signal and power</li> <li>IP68</li> </ul>	Pin and groove	1.5	2	17.5	8.5	19	•	•	•	IP6K8	IP68	Aluminum	•	-51° C [-60° F] to +125° C [+257° F]	•	•	•	•	•	•	
		3		24.9	12.8	26															






<sup>1</sup> These ODU specific connectors can transmit common data transmission protocols such as USB® 3.2 Gen 1x1, USB® 2.0, HDMI® 2.0, Ethernet, CAT 5 and CAT 6<sub>A</sub>, but they are not USB®, HDMI® and Ethernet- standard connectors.

# ODU METAL CONNECTOR PORTFOLIO

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	Coding	Sizes	No. of possible mechanical coding	Diameter plug (mm)	Max. cable diameter (mm)	Max. no. of contacts	Solder	Crimp	Print	IP Class in mated condition	IP Class in unmated condition	Mating cycles	Locking principle	Transmission options
<b>ODU MINI-SNAP® L</b> <ul style="list-style-type: none"> <li>IP50</li> <li>5,000 mating cycles</li> <li>Hermetically sealed option</li> <li>USB® 3.1 Gen 1 + USB® 2.0 + Ethernet<sup>1</sup></li> </ul>  <p>AVAILABLE IN 48 HR</p>	Pin and groove	00	4	6.4	3.5	04	•	•	•	IP50	Up to IP68	> 5,000	Push-Pull (L principle)	Signal, data, power
		0		9	5.6	10								
		1		11.5	7.7	16								
		2		14.5	9.9	26								
		3		17.5	11.9	30								
<b>ODU MINI-SNAP® K</b> <ul style="list-style-type: none"> <li>IP68</li> <li>5,000 mating cycles</li> <li>USB® 2.0 + Ethernet<sup>1</sup></li> </ul>  <p>AVAILABLE IN 48 HR</p>	Pin and groove	0	8	11.0	5.0	10	•	•	•	IP68	Up to IP68	> 5,000	Push-Pull (L principle)	Signal, data, power
		1		13.0	7.0	16								
		2		16.0	9.0	26								
		3		19.0	10.5	30								
		4		25.0	14.0	40								
<b>ODU MINI-SNAP® B</b> <ul style="list-style-type: none"> <li>IP68</li> <li>5,000 mating cycles</li> <li>USB® 2.0 + Ethernet<sup>1</sup></li> </ul> 	Pin and groove	0	8	9.4	5.0	10	•	•	•	IP68	Up to IP68	> 5,000	Push-Pull (F principle)	Signal, data, power
		1		12.0	7.0	16								
		2		15.0	9.0	26								
		3		18.0	10.5	30								
<b>ODU MINI-SNAP® S</b> <ul style="list-style-type: none"> <li>IP50 and IP68</li> <li>Coax and triax</li> </ul> 	Insulator	0	1	9.4	5.0	04	•		•	Up to IP68	Up to IP68	> 5,000	Push-Pull (F principle)	Signal, data
		1		12.0	7.0	06								
		2		15.0	9.0	10								
<b>ODU MINI-SNAP® F</b> <ul style="list-style-type: none"> <li>IP50 and IP68</li> <li>5,000 mating cycles</li> <li>Ethernet<sup>1</sup></li> </ul> 	Half shell	0	3	9.4	5.0	09	•	•	•	Up to IP68	Up to IP68	> 5,000	Push-Pull (F principle)	Signal, data, power
		1		12.0	7.5	14								
		1.5		13.0	7.5	19								
		2		15.0	9.5	19								
		3		18.0	11.5	27								

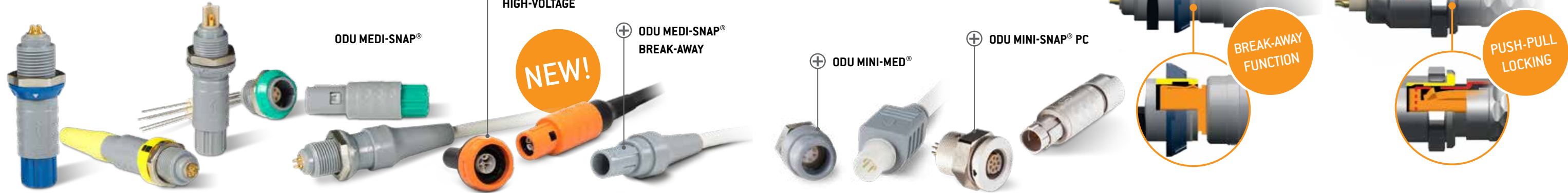
<sup>1</sup> These ODU specific connectors can transmit common data transmission protocols such as USB® 3.1 Gen 1, USB® 2.0, and Ethernet, but they are not USB®- and Ethernet- standard connectors.


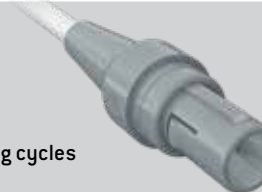



# ODU PLASTIC CONNECTOR PORTFOLIO

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	Coding	Sizes	No. of possible mechanical coding	Diameter plug (mm)	Max. cable diameter (mm)	Max. No. of contacts	Solder	Crimp	Print	IP Class in mated condition	IP Class in unmated condition	Mating cycles	Locking principle	Coding options (optical)	Transmission options
<b>ODU MEDI-SNAP® PUSH-PULL</b>  <ul style="list-style-type: none"> <li>IP50 and IP64</li> <li>Autoclavable &amp; fully sterilizable</li> <li>High voltage insert up to 1,000 V AC</li> <li>IEC 60601-1 compliant housings<sup>†</sup></li> <li>Right angle version available</li> </ul>	Pin and groove	1	6	13.7		14	•	•	•	Up to IP64	IP68	> 2,000	Push-Pull	Arrow marking, color coding	Signal, power, fluids (liquids and gases)
		2	3	18.5	9.2	26									
<b>ODU MEDI-SNAP® BREAK-AWAY</b>  <ul style="list-style-type: none"> <li>IP64 / IP67</li> <li>Autoclavable</li> <li>Break-Away for minimum of 2,000 mating cycles</li> </ul>	Pin and groove	1	6	15.8	5.5	14	•			Up to IP67	IP68	5,000	Break-Away	Arrow marking	Signal, power
		2	1	18.3	11.5	26				Up to IP64		2,000			
<b>ODU MEDI-SNAP® HIGH-VOLTAGE</b>  <ul style="list-style-type: none"> <li>Touch proof according to IEC-60664-1</li> <li>2X HV, 2X Signal interlock, 1X Ground/FMLB</li> <li>Nominal voltage up to 1,000 V AC / 16 A</li> <li>Hot-plugging prevention</li> </ul>	Pin and groove	2	3	18.5	9.2	5	•			Up to IP64	IP50	> 2,000	Push-Pull	Arrow marking, color coding	Signal, power
<b>ODU MINI-MED®</b>  <ul style="list-style-type: none"> <li>Space saving design</li> <li>Pre-assembled solution</li> <li>Up to 1,000 mating cycles</li> </ul>	Pin and groove	1	1	11.5 / 11.2	4.4	6	•			IP67	IP50	> 1,000	Break-Away	Arrow marking	Signal
<b>ODU MINI-SNAP® PC</b>  <ul style="list-style-type: none"> <li>Plastic connector</li> <li>IP50 and IP67</li> <li>Shielded version available</li> </ul>	Half shell	1	3	12.5	6.0	14	•	•	•	Up to IP67	IP50	> 5,000	Push-Pull	Arrow marking	Signal
		2		15.7	9.0	19									
		3		18.7	10.5	27									

<sup>†</sup> Up to 2 MOPP / 2 MOOP

# ODU CUSTOM CONNECTOR CAPABILITIES

## EXTREME DESIGNS - PUSHING THE LIMITS

See below some of our technical capabilities that have been used for specific custom applications. We continuously work with our customers to meet the most extreme technical challenges.



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Email us at: [myapplications@odu-usa.com](mailto:myapplications@odu-usa.com)

Requirement	Extremes ODU has achieved
High current	2,400 A
High voltage	56 kV (DC) 36 kV (AC)
Water protection	IP67 / IP68 / IP69K / IP6K9K
Vacuum tightness	$1 \times 10^{-9}$ mbar l/s
Salt spray	700 hours
EMC / EMI protection	> 75 dB [0 – 5 MHz] / > 65 dB [5 MHz – 500 MHz]
High speed data rate	USB <sup>®</sup> 3.2 Gen 1x1 – 5 GBit/s <sup>1</sup> / HDMI <sup>®</sup> 2.0 – 14.4 Gbit/s <sup>1</sup> / 10 Gbit Ethernet – 10 Gbit/s <sup>1</sup>
Operating temperature	Up to 300 °C
Pressure	650 bar [9427 psi] operating receptacle / 500 bar [7251 psi] operating mated condition / 1,000 bar [14503 psi] burst
Vibration	LV214 Severity Level 4 [20 g, 10 – 2000 Hz, 22 h] Four-time multisinus per three-dimensional axis [16 g, 20 – 2000 Hz, 65 h per axis]
Mating cycles	> 1 Million
Hydraulic connection	25 bar [362 psi] operating
Pneumatic connection	20 bar [290 psi] operating
Fiber optic	< 1 dB typical @ 100,000 mating cycles single mode/multimode
Magnetic permeability	Magnetic permeability $\mu_r < 1.0005$
Environmental	Salt spray / fog, chemical resistance, UV, Arizona dust, radiation, sterilization
Shock	1,000 g
Contact density	1 contact/mm <sup>2</sup>
Smallest contact diameter	0.3 mm
Smallest circular connector diameter	5 mm
On driving test	Electric vehicle adapter
Self finding solutions	+/- 5 mm float (shield and tight)

<sup>1</sup> These ODU specific connectors can transmit common data transmission protocols such as USB<sup>®</sup> 3.2 Gen 1x1, HDMI<sup>®</sup> 2.0 and Ethernet, but they are not USB<sup>®</sup>, HDMI<sup>®</sup> and Ethernet-standard connectors.

## ODU PRODUCT AVAILABILITY



# ODU HYBRID CONNECTOR SOLUTIONS

## TYPES OF TRANSMISSION YOU CAN COMBINE IN A HYBRID CONNECTOR

**Electrical:** Signal, power, data, special designs (e.g., coax)

**Physical:** Gas, liquids

## MOST COMMONLY REQUESTED COMBINATIONS

- Power + signals
- Signals + coax
- Power + data
- Coax + liquid
- Signals + data
- Coax + gas

## ESSENTIAL CONSIDERATIONS TO BE MADE PRIOR TO DETERMINING YOUR HYBRID INTERFACE

### General application characteristics

- Description of the application
- What types of transmissions are needed in your interface?
- How many transmission types do you want to combine?
- Available space
- Environmental conditions (e.g., temperature, water, dust, chemicals)

### Electrical characteristics

- Number of contacts
- Protocols
- Nominal voltage
- Nominal current

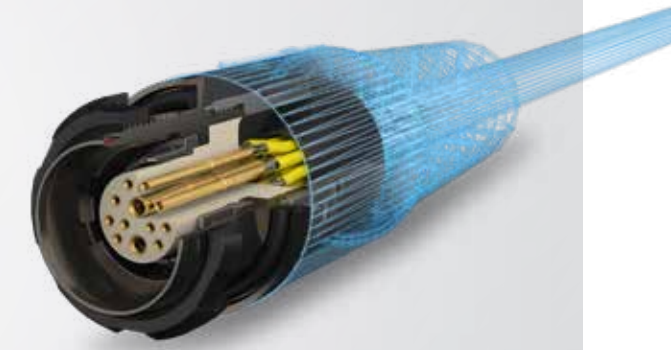
### Physical characteristics

- Media type
- Tube diameter
- Nominal pressure



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# ODU CABLE ASSEMBLY SOLUTIONS & CONNECTORS FROM ONE SOURCE



OVERMOLDS WITH SILICONE, TPE, TPU & TPV



POTTING AND ENVIRONMENTAL SEALING



CUSTOM COMPONENT OVERMOLD  
[Custom Requirement]

NON ODU CONNECTORS

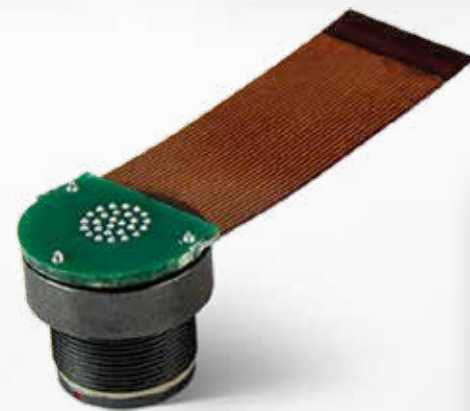
- High-speed standard connectors such as: USB® 3.2 Gen 1x1, USB® 2.0, HDMI® 2.0 and Ethernet CAT 5<sup>1</sup>
- Military and medical connectors
- Wire to board connectors

<sup>1</sup>ODU specific connectors can transmit common data transmission protocols such as USB® 3.2 Gen 1x1, USB® 2.0, HDMI® 2.0, and Ethernet CAT 5, but they are not USB®, HDMI®, Ethernet- or CAT - standard connectors.

CUSTOMIZED CONNECTOR SOLUTIONS



FLEX LAYER ASSEMBLY



## ODU TESTING & QUALITY



- In-process checking
- Data rate testing
- 100% final inspection
- EMC compatible assembly

- Potting and environmental sealing
- IPC/WHMA-A-620
- Production possible in cleanroom in accordance with EN ISO 14644-1



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# ODU CABLE ASSEMBLY SERVICES

## WORLDWIDE PRESENCE SERVING LOCAL MARKETS

**ODU NORTH AMERICA CABLE ASSEMBLY FACILITY**

**VALUE ADDED SERVICES**

The ODU North America facility specializes in rapid prototyping and projects ranging from medium to large sized volumes.

**ADVANCED CUSTOMER BENEFITS**

- One-to-one technical support
- Global & regional footprint
- Rapid product development
- Vertically integrated connector manufacturer

ISO 9001 | IATF 16949 | ISO 13485 | ISO 14001 | ISO 50001 | UL Certified Cable Assembly | ITAR Authorized Operation

## ODU COMPLETE CABLE ASSEMBLY SOLUTIONS ACROSS MULTIPLE MARKETS:

**MEDICAL**

**MILITARY AND SECURITY**

**TEST AND MEASUREMENT**

**AUTOMOTIVE**

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# ODU SILICONE CABLE ASSEMBLY SOLUTIONS

## + CUSTOMER BENEFITS

- Up to 500 autoclave cycles
- Approved LSR and HTV processes globally available
- Tested for medical technology use
- Individual laser labeling possible
- Various standard overmolding inserts available
- Halogen and latex-free



SECONDARY SILICONE SURFACE TREATMENT – OPTIONAL



AUTOCLAVABILITY



BEND PROTECTION AND SMOOTH TRANSITIONING OVERMOLDING

## + ODU NORTH AMERICA CAPABILITIES

- Environmentally controlled pressurized workroom
- Dedicated silicone overmold work area
- ARBURG-ALLROUNDER 275 V:
  - Vertical free-space system
  - Clamping force: 28 tones
  - Injection unit: 1.4 oz, 2.3 oz



## + ODU INTERNATIONAL CAPABILITIES



- Cleanroom EN ISO14644-1
- ISO 13485
- Tool shop customized molds
- Electroplating shop: The turned or stamped contact can be coated based on customer requirements
- On-site laboratory
- On-site technology test center



ARBURG-ALLROUNDER 275 V

## + TEST AND VALIDATION

### ISO 10993-5 CERTIFIED

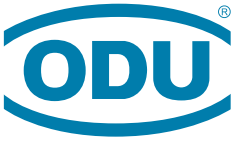
- Cytotoxicity test according to DIN EN ISO 10993-5
- Management system certified according to ISO 9001
- Documentation of tests available

- High-voltage and insulation tests
- Functional and component tests for cable systems
- Runtime measurement
- Tensile strength tests
- Torsional and bending fatigue tests
- Leakage tests for molded components

\* Available upon request

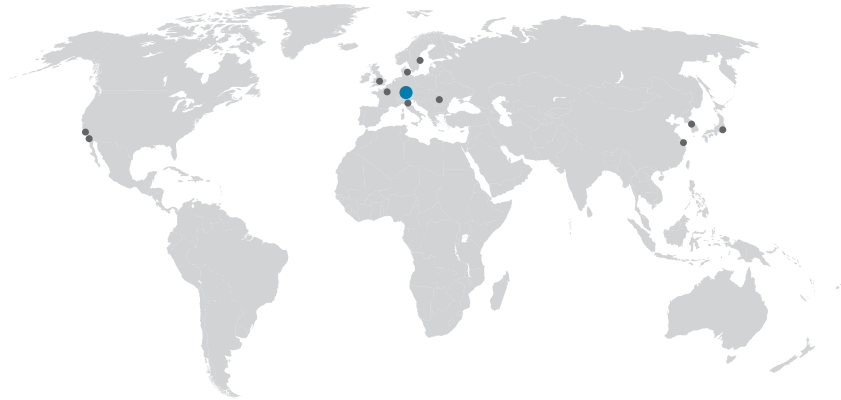
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## ODU GROUP WORLDWIDE



### ODU USA

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Fax: +49 8631 6156-49  
E-mail: sales@odu.de  
www.odu.de

### PRODUCTION AND LOGISTICS SITES

<b>Germany</b>	Otto Dunkel GmbH
<b>China</b>	ODU (Shanghai) Connectors Manufacturing Co.Ltd
<b>Mexico</b>	ODU Mexico Manufacturing S.R.L. de C.V.
<b>Romania</b>	ODU Romania Manufacturing S.R.L.
<b>USA</b>	ODU North American Logistics

### SALES LOCATIONS

#### ODU (Shanghai)

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www.odu.com.cn

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E-mail: sales@odu-denmark.dk  
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E-mail: sales@odu.fr  
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#### ODU Korea Inc.

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E-mail: sales@odu-korea.kr  
www.odu-korea.kr

#### ODU Romania Manufacturing S.R.L.

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