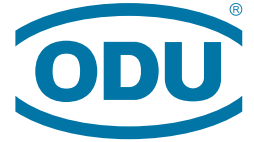
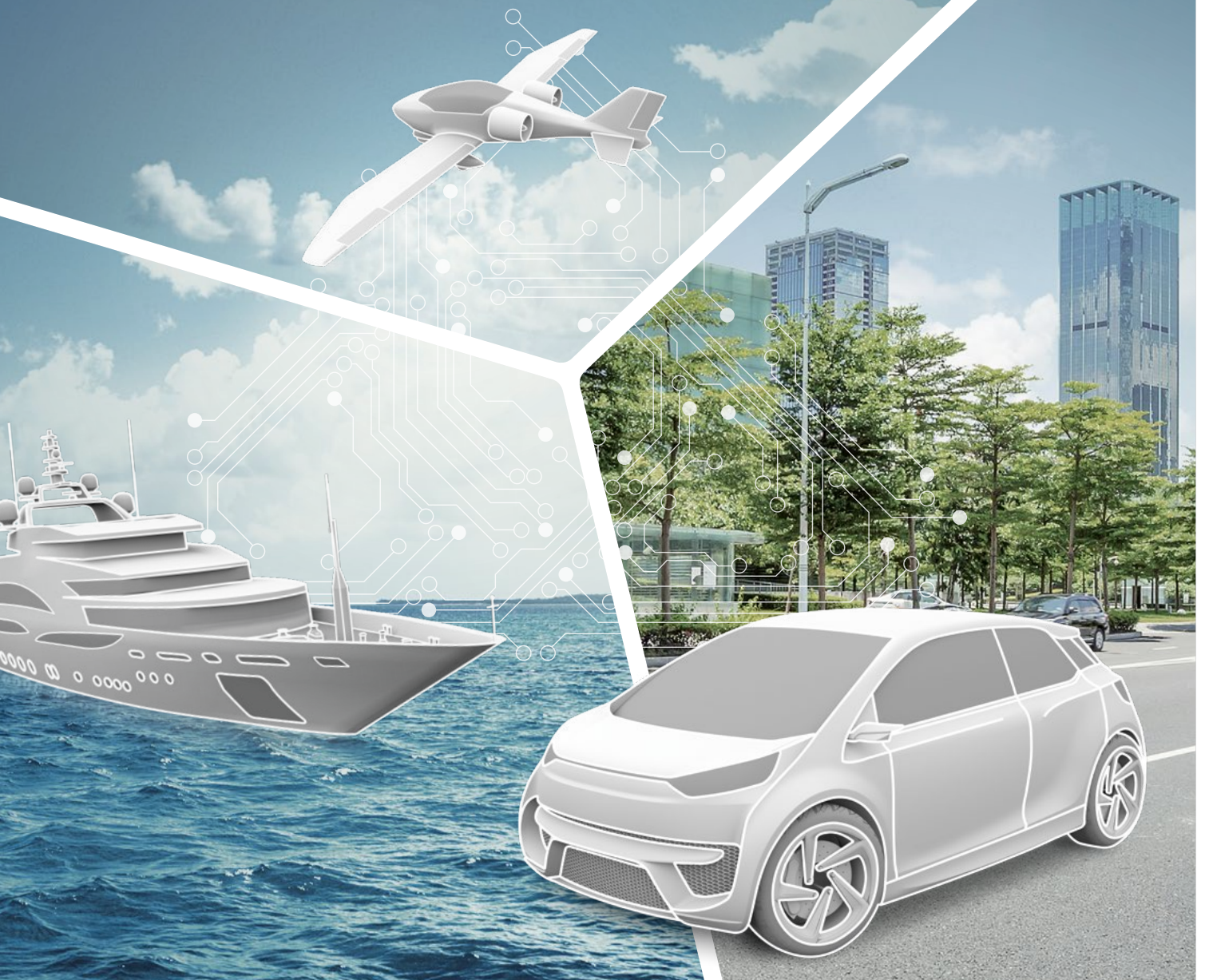


A PERFECT ALLIANCE.



CONTACT EXPERTISE FOR THE FUTURE OF MOBILITY

Contact technologies and connectors from ODU.



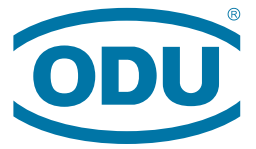
THE FUTURE IS IN THE CONNECTION

The eMobility market is already a key market of the future with enormous development potential. This applies both to numerous applications and almost all industries. The contact technologies and transmission systems used are an important foundation for the successful implementation of sustainable eMobility applications.

As an established specialist in high-performing contact technology and connections in many industries, development work at ODU has been focusing on innovative approaches and optimizations in eMobility for several years. This makes ODU a strong and experienced development partner for you – including for application-specific and customized solutions in current and future eMobility technology.



BY WATER



A PERFECT ALLIANCE.



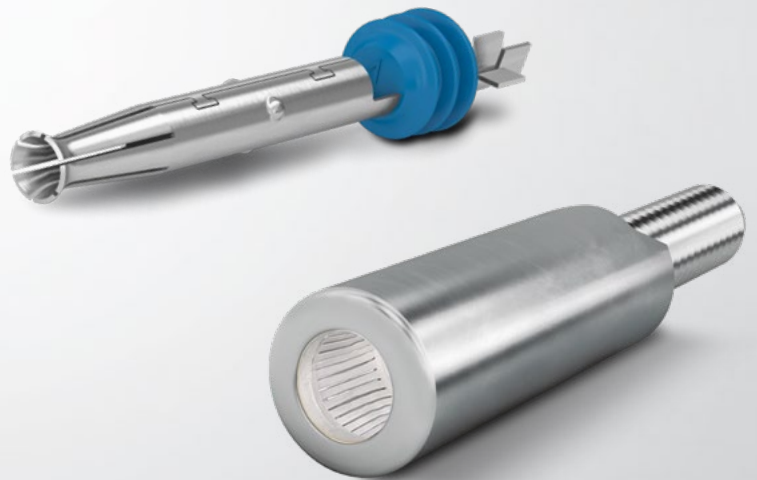
BY AIR



BY LAND

PROVEN ODU CONTACT TECHNOLOGY IN INNOVATIVE DESIGNS

ODU offers a wide variety of the highest-quality contacts for use in and around the serial production of both electric and plug-in hybrid electric vehicles. ODU thereby provides contact systems for the important charging standards in the markets of Europe, the USA, China and Japan. This includes the contact system with lamella technology ODU LAMTAC as well as the stamped contact solution ODU STAMPTAC. The robust and universal contact system ODU TURNTAC, however, is almost always used for this, since it is perfectly suited for these applications.



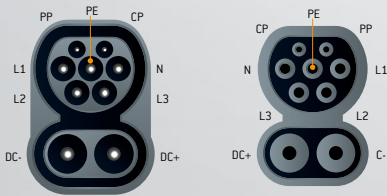
IEC 62196 (VDE 0623-5)



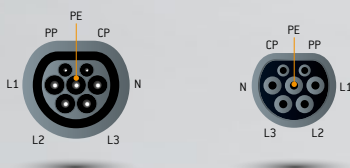
DC – DIRECT CURRENT



AC – ALTERNATING CURRENT



| Nominal current | Nominal current CP/PP | Number of contacts |
|-----------------|-----------------------|--|
| AC – see below | | 2 (contact-Ø: 3 mm) 5 (contact-Ø: 6 mm) |
| DC – 250 A | | 2 (contact-Ø: 8 mm) |

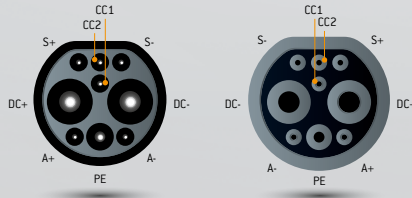


AC – ALTERNATING CURRENT

| Nominal current 1-Phase / 3-Phase | Nominal current CP/PP | Number of contacts |
|---|-----------------------|--|
| 16 A / 32 A (2.5 / 6 mm ²) 63 A (16 mm ²) | 2 A | 2 (contact-Ø: 3 mm) 5 (contact-Ø: 6 mm) |



GB/T 20234



DC – DIRECT CURRENT

| Nominal current DC | Nominal current CP/PP | Number of contacts |
|--------------------|-----------------------|--|
| 125 A / 250 A | 2 A | 6 (contact-Ø: 3 mm) 1 (contact-Ø: 6 mm) 2 (contact-Ø: 12 mm) |

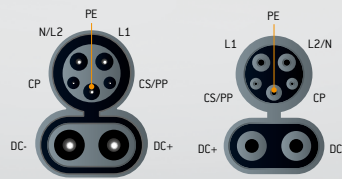


AC – ALTERNATING CURRENT

| Nominal current 1-Phase / 3-Phase | Nominal current CP/PP | Number of contacts |
|---|-----------------------|--|
| 16 A / 32 A (2.5 / 6 mm ²) 63 A (16 mm ²) | 2 A | 2 (contact-Ø: 3 mm) 5 (contact-Ø: 6 mm) |



SAE J1772



DC – DIRECT CURRENT

AC – ALTERNATING CURRENT

| Nominal current | Nominal current CP/PP | Number of contacts |
|-----------------|-----------------------|---|
| AC – see below | | 2 (contact-Ø: 1.5 mm) 1 (contact-Ø: 2.8 mm) 2 (contact-Ø: 3.6 mm) |
| DC – 200 A | | 2 (contact-Ø: 8 mm) |

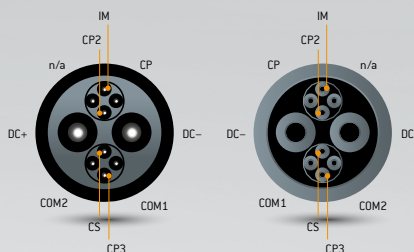


AC – ALTERNATING CURRENT

| Nominal current 1-Phase / 3-Phase | Nominal current CP/PP | Number of contacts |
|-----------------------------------|-----------------------|---|
| up to 80 A | 2 A | 2 (contact-Ø: 1.5 mm) 1 (contact-Ø: 2.8 mm) 2 (contact-Ø: 3.6 mm) |



CHADEMO



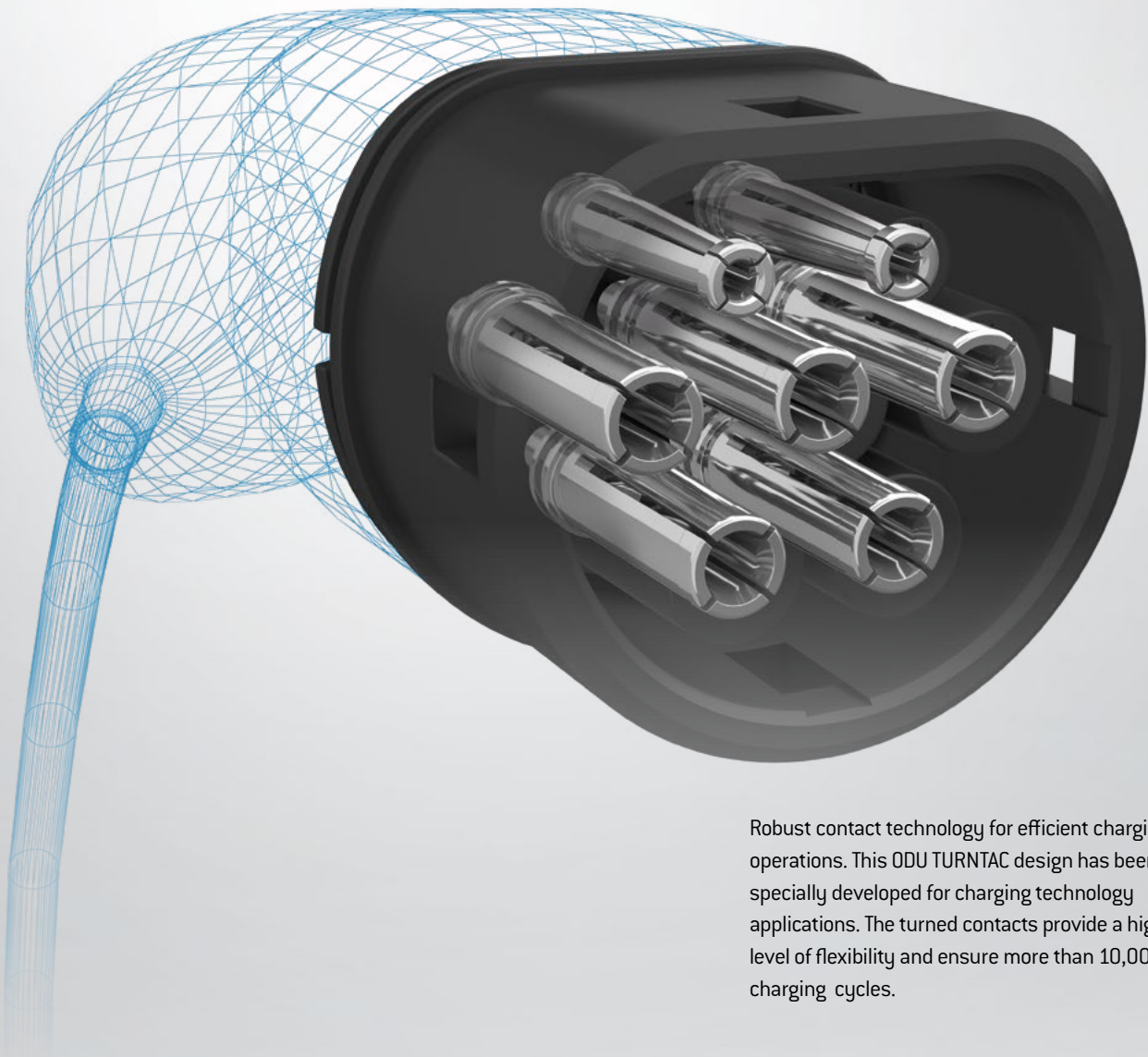
DC – DIRECT CURRENT

| Nominal current DC | Nominal current CP/PP | Number of contacts |
|--------------------|-----------------------|--|
| 50 A – 250 A | 2 A | 2 (contact-Ø: 9 mm) 8 (contact-Ø: 1.6 mm) |



CONTACT TECHNOLOGIES FOR A WIDE VARIETY OF SPECIFICATIONS

The mature contact technology, which is used in very diverse fields, offers a full range of modification and optimization options for eMobility applications. As a result, the specially developed contact designs are already being used successfully – in small-scale and large-scale production for high-quality, economical solutions.

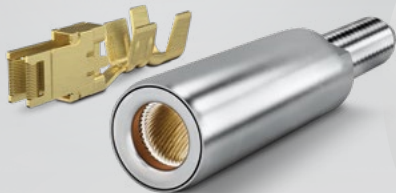


Robust contact technology for efficient charging operations. This ODU TURNTAC design has been specially developed for charging technology applications. The turned contacts provide a high level of flexibility and ensure more than 10,000 charging cycles.

+ THE MARATHON RUNNER:

Outstanding reliability and durability with up to 1 million mating cycles

- Contact with springwire technology
- Very high contact security
- Low mating and demating forces
- Very high vibration resistance
- Low contact resistances
- High current-carrying capacity



ODU SPRINGTAC®

+ THE RUGGED ONE:

Rugged and universal contact system suitable even for harsh environment

- Turned, slotted contacts
- > 10,000 mating cycles
- Low and stable mating and demating forces
- Tiniest dimensions possible, down to 0.3 mm contact diameter
- Mating possible at an angle of up to 5°



ODU TURNTAC®

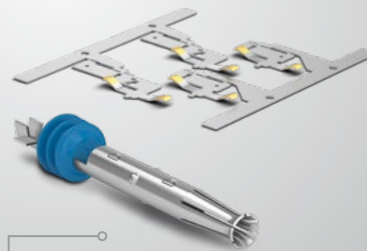


ODU LAMTAC®

+ THE ALL-ROUNDER:

Powerful contact system for versatile requirements

- Contact with lamella technology
- Current-carrying capacity of up to 2,400 amperes
- > 10,000 mating cycles
- High vibration resistance
- Low contact resistance
- Automated lamella assembly
- High contact security



ODU STAMPTAC®

+ THE HIGH-VOLUME CONTACT:

Economical contact systems for automatic processing

- Stamped and formed contacts
- > 10,000 mating cycles
- Standard contacts for use in charging plugs (IP 67)
- Cost-efficient alternative for high volumes

HIGH-TECH CONTACTS AND CONNECTIONS IN PRIVATE AND PUBLIC TRANSPORT

The future is already on the road with special contact and connection technology from ODU. Including connections installed in vehicles and in special contacts for use in charging plugs. For high drive power and ultra-fast loading: ODU has the skill, manufacturing capabilities and special expertise for present and future eMobility requirements.

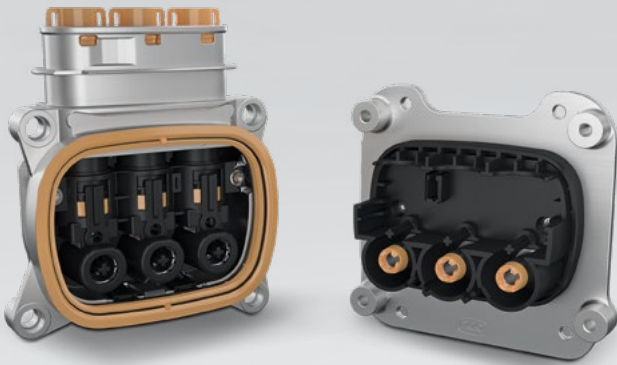
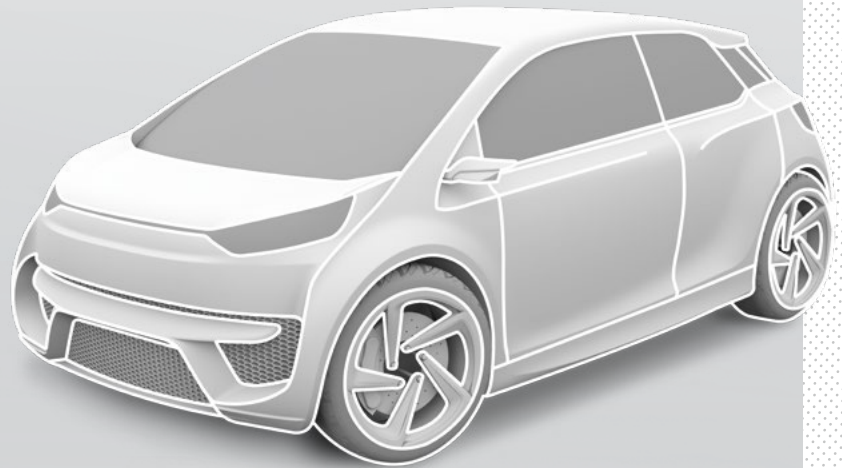


ODU 2+4pol HV connector system

ODU PRODUCTS ON THE KTM FREERIDE E

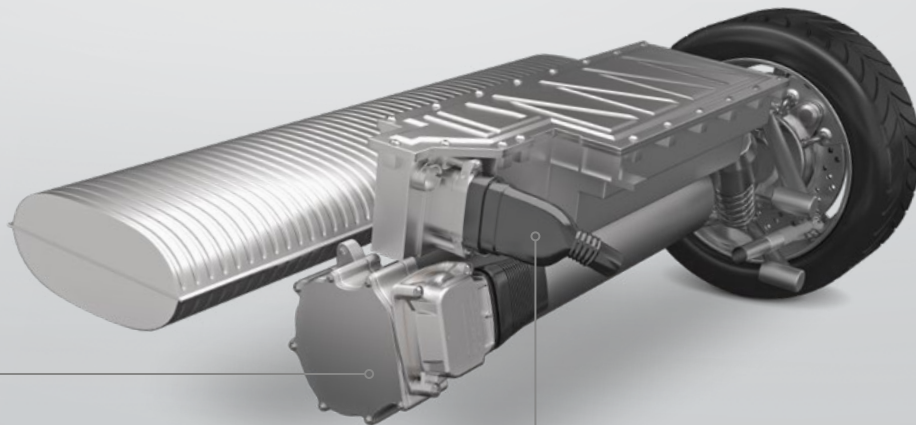
Electric motorcycles enable an easy, noiseless and agile driving on any terrain. ODU supplies three connector systems for this application: the docking connector, the plug-in charging connection and the connection to the ECU (electrical control unit).





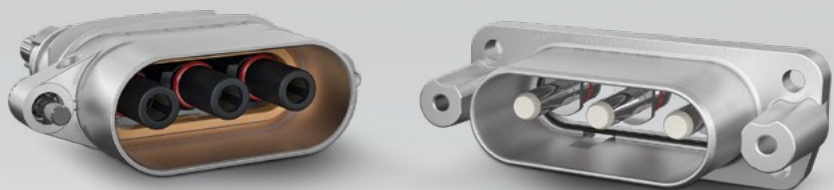
ODU 3-PIN HV CONNECTOR SYSTEM 90°

This connector is characterized by its extremely high vibration resistance. It uses all the standard ODU design features: ODU LAMTAC high-performance contacts, a corrosion-resistant aluminum housing and simple assembly processes. These features provide a high shielding attenuation, combined with a high current carrying capacity and cost effective connector assembly.



ODU 3-PIN HV CONNECTOR SYSTEM 180°

This is also a connector that is specifically adjusted to customer specifications. Consequently, it also has all of the typical ODU features. In addition, the concept of this connector has been shown to be highly adaptable to assembly spaces.



HIGH PERFORMANCE NEEDS RELIABLE CONNECTIONS

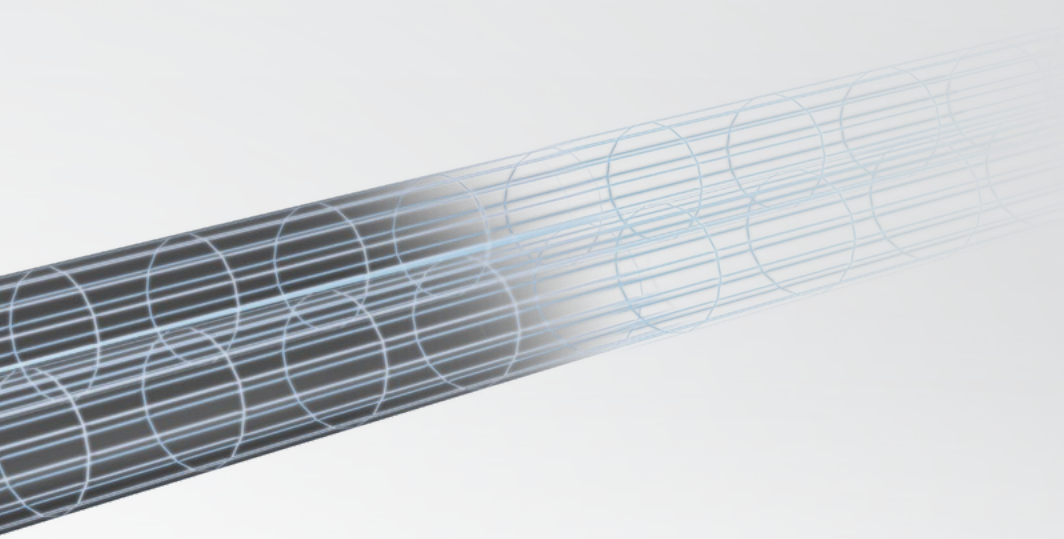
Increased performance in eMobility leads to higher currents. In order to meet these requirements, ODU has further developed its proven 2-pole HV connector system. The result is a connector system that combines efficiency with compact design and practical handling: the new ODU POWER MATE 400.



ODU POWER MATE 400

The ODU POWER MATE 400 is predestined for use with a HV battery. Its compact design and innovative locking system enable it to ensure reliable transfer of power and shielding in a compact package.

- Innovative ODU 12 mm contact system with lamella technology
- Up to 95 mm cable connection is possible
- 400 A current transmission



2-PIN HV CONNECTOR SYSTEM – ODU GEN2

For durably high current-carrying capacity in a limited assembly space. Combined with the ODU LAMTAC high voltage contact, the ODU GEN2 is the perfect connector solution.

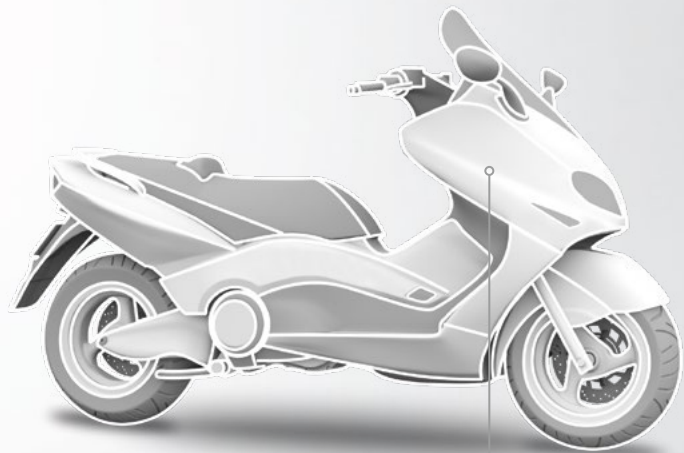
- **Compact:** Connector width < 60 mm
- **Variable:** 16/25/35 mm² cable cross-section possible
- **Robust:** Aluminum housing
- **Reliable:** Central screw-locking system
- **Trouble-free:** Shielding attenuation > 60 db
- **Tested:** as per the requirements of LV215
- **Sealing:** IP 6K9K sealing class
- **Easy:** Assembly using standard processes
- **Controlled:** with HV interlock



Typical fields of application of the ODU GEN2 connector system are connections to high-voltage batteries and inverters.

TOLERANCE-COMPENSATING CONNECTOR SYSTEMS ENABLE A WIDE RANGE OF APPLICATIONS

Tolerance-compensating systems are a perfect connection solution for the broadest range of applications. Due to the fact that they practically “find themselves”, connections can even be easily implemented in inaccessible places.



ODU DOCKING MATE B

This connector system achieves a tolerance compensation of ± 1 mm by means of floating mounting. The simple structure as well as the application of ODU TURNTAC provides for robustness and long service life in use.

Not even connector systems can avoid the increasing requirements regarding automatable assembly processes. If you need reliable and secure electrical connections without manual operation, then it's time for the "tolerance-compensating connector system".

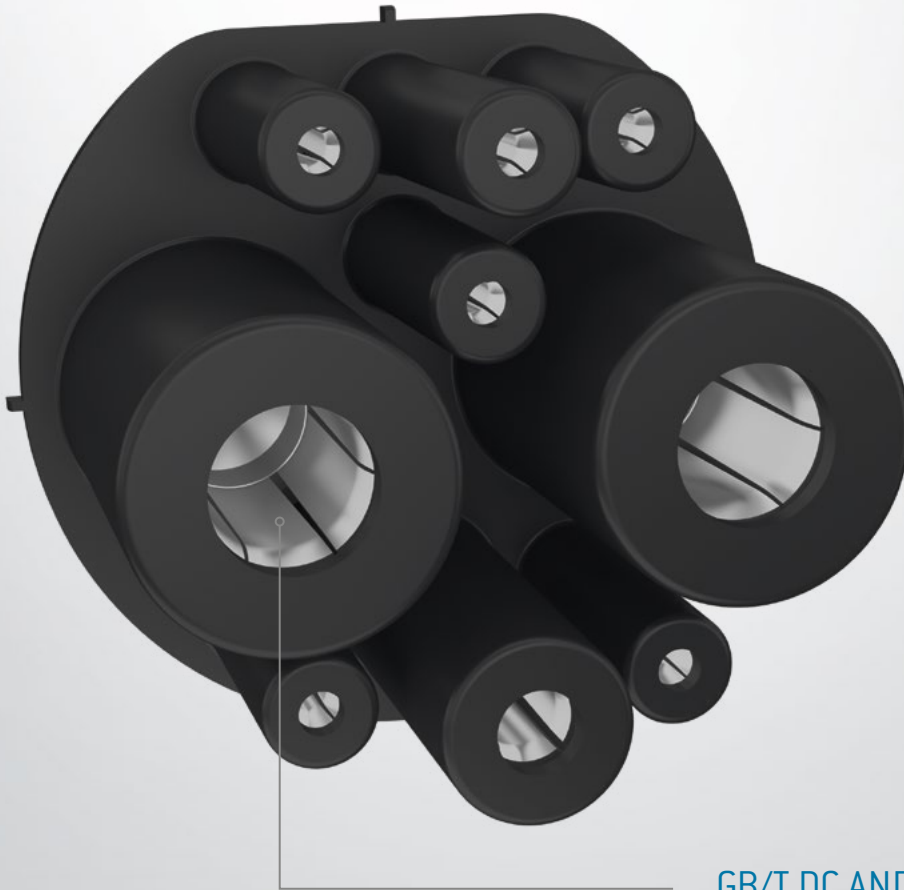


ODU DOCKING MATE A

The clever design of this connector system makes the compensation of tolerances of up to ± 5 mm possible. This enables reliable connections even under extreme conditions.

GB/T VEHICLE CHARGING INTERFACES

Charging interfaces are subject to a high degree of stress. The contacts in particular must optimally fulfill numerous requirements. The ODU TURNTAC contact technology provides the ideal framework conditions for durability and reliability in this regard: repeatedly proven design, ideal selection of materials, special surface coatings.



GB/T DC AND AC INTERFACE

The special feature of this interface is that the receptacle side is located on the vehicle side. Our development experience allows us to simply adapt the solution to the geometrical requirements of the vehicles. All of the contact sizes required in the GB/T area from 3 to 12 mm are offered for the ODU TURNTAC. The GB/T vehicle charging interfaces are suitable for higher charging currents. This is attributable to low mating forces. In addition, established principles ensure a high power transfer.

QUALITY AND EFFICIENCY IN EVERY DETAIL

Two different metal machining processes are particularly important in contact manufacturing for eMobility: stamping or stamp-bending and machining. For the assembly as well as for further processing of the electrical contacts efficient automated processes are used – quality inspection included. All of the processes are implemented under one roof, thanks to the high level of vertical manufacturing at ODU.



TURNERY

Over 150 automatic lathes equipped with up to 13 axes, numerous special tools, some equipped with high frequency spindles, provide significant production flexibility with consistently high quality.



STAMPING TECHNOLOGY

High-precision, mass-produced contacts are manufactured from various materials at 1,400 strokes/min and 300 kN in material thicknesses of 0.07 mm to 1.0 mm. The tooling technologies for this are naturally from ODU.



SURFACE ENGINEERING

ODU is a leading provider of high-quality finishing systems, or “functional surfaces”. Through the integration of surface treatment technology at an early stage of all development and production processes, ODU connectors are guaranteed to have a finishing quality that is precisely tailored to each special requirement.

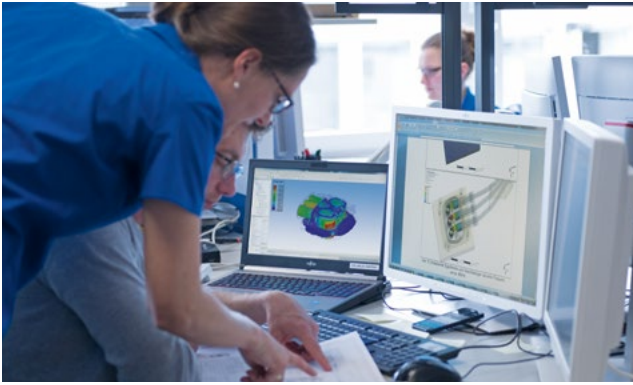
INNOVATION BEGINS WITH EXPERTISE

Mature contact and connection technology that meets additional requirements and offers innovative solutions. This drives ODU development work forward and continuously opens new technical approaches for further development and optimization.

The special expertise at ODU is based on over 80 years of experience and skills – as well as on the latest technologies and procedures.

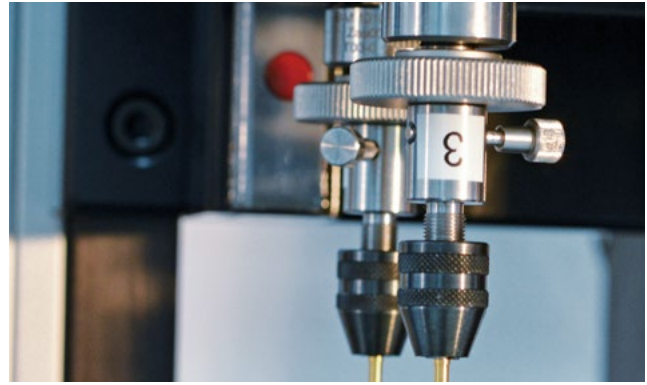


MULTIPHYSICS FEM SIMULATION



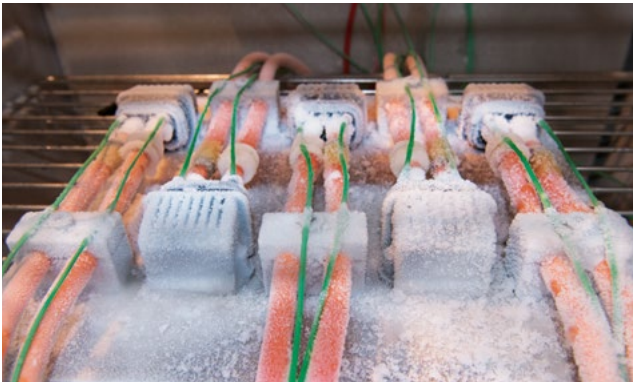
To benefit from reliable forecasting models at the earliest possible time, ODU has opted for targeted FEM simulations to run alongside development.

MATING CYCLES TEST



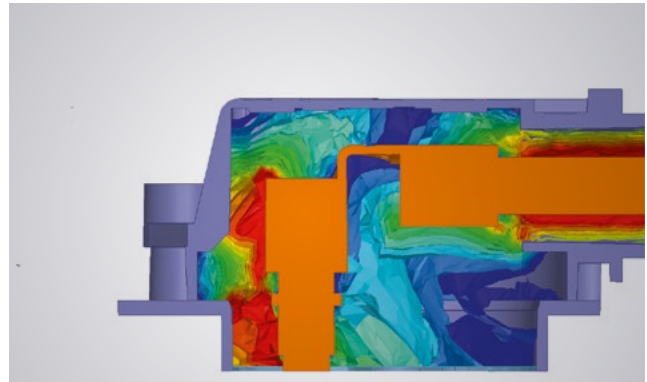
Mating cycle tests are conducted over the entire service life under a variety of environmental conditions and demands – for example mating at angles, heavy pollution and damp conditions.

ALTERNATING THERMAL STRESS TEST



In this test, the test specimens are subjected to a variety of temperature cycles in the -40 °C to +130 °C range. Components are artificially aged by the thermal movements this causes.

EMC ANALYSIS



Representation of the electric field strength magnitude for testing the connector plug housing for EMC leakage or points of failure. In this case, the housing is ideally sealed. No radiation is escaping.

STEAM JET TEST



This IP X9K protection type testing makes special demands on the sealing system. An 80 bar high-pressure jet at a water temperature of 80 °C acts on the test specimen from all three spatial axes at a distance of 100 mm to 150 mm.

DERATING



The measurement to determine the derating curve is performed in the laboratory. A derating curve describes the permissible current load of a contact system depending on the ambient temperature.

INGENIOUS IDEAS PERFECT SOLUTIONS

ODU'S PRODUCT PORTFOLIO.



COMPACT MODULAR CONNECTOR SOLUTIONS

- Application-specific hybrid interface
- For manual mating and automatic docking
- The highest packing density
- Flexible modular construction
- Multitude of data transmission modules
- Variety of locking options available
- For the transmission of signals, power, high current, high voltage, coax, high-speed data, fiber optics and other media such as air or fluid.
- Mating cycles scalable as required from 10,000 to over 100,000 (1 million)



PUSH-PULL CIRCULAR CONNECTORS

- Circular connector series in robust metal or plastic housing
- Contacts for soldering, crimping and PCB termination
- Optional selectable Push-Pull locking ensuring a secure connection at all times as well as easy to release Break-Away function
- 2 up to 55 contacts
- IP 50 to IP 69
- Autoclavable for medical applications
- Hybrid inserts for combined transmission



ELECTRICAL CONTACTS

- Versatile connector technologies
- Outstanding reliability, lifetime and durability
- Up to 1 million mating cycles
- Current-carrying capacity of up to 2,400 amperes and more
- Rugged contact systems, suitable even for harsh environments
- Economical solutions for automatic processing



+ Versatile connector solutions for transmission of power, signals, data, or media – ODU never fails to offer the right interface when quality and absolute reliability are the top priorities.



HEAVY-DUTY & DOCKING AND ROBOTIC CONNECTOR SOLUTIONS

- Extremely durable even under extreme /harsh environments
- Interference-free and secure connection, even under vibration
- Up to 500 A (higher currents upon request)
- High contact security due to the springwire technology
- High pin density due to a minimum contact diameter
- Low contact resistance



APPLICATION AND CUSTOMER-SPECIFIC SOLUTIONS

- Contacts, connectors and assemblies for the highest technical requirements as well as special applications
- First-class implementation expertise
- High level of vertical manufacturing – all competences and key technologies under one roof
- Expert advice based on mutual partnership
- Fast development and production



CABLE ASSEMBLY

- Complete systems from a single source based on years of assembly expertise
- State-of-the-art production facilities with 100% end testing, high-voltage testing, component testing and pressure testing up to 100 bar
- Cleanroom production
- Hot-melt and high-pressure injection molding
- Customer-specific labeling
- Rapid prototyping of samples