Miniature high performance twist pin Connectors

Micro-D & Nano-D, Rectangular & Circular

www.axon-cable.com
INTRODUCTION TO MICRO-D CONNECTORS

D-LINE® CONNECTORS & ASSEMBLIES

- D-Line® Twist Pin contact technology
- Micro-D test & inspection

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ABOUT AXON’

Headquartered in the beautiful Champagne region of France, AXON’ is a worldwide leader in specialist interconnect. The company excels in the design and manufacture of wires, cables, terminated harnesses and interconnect solutions for high technology applications.

With numerous manufacturing sites across Europe, North America and Asia and a comprehensive range of quality approvals, AXON’ is able to locally design and build a world beating range of microminiature interconnect solutions tailored to your specific needs.

As a specialist in advanced interconnect solutions, AXON’ CABLE has extensive experience in micro-miniature solutions based on the highly reliable Twist Pin contact technology, including:

- Pigtail and PCB connectors, metal or plastic bodies, regular or low profile versions.
- Solder cup connectors: metal or plastic bodies, regular or low profile.
- QPL qualified Micro-D to MIL-DTL-83513
- Micro-strip and saver connectors
- Combo Micro-D connectors: making it possible to put higher power or RF signals through Micro-D connectors.
- Hermetic connectors, typically used in the oil and gas industry, defence and scientific research.
- Non-magnetic connectors for oil and gas, scientific research, space and medical electronics.
- Nano-D connectors (0.635 mm contact spacing) for extreme miniaturization.
- Micro-D and Nano-D connectors specifically designed for space applications.
- Micro-D circular connectors.

MICRO-D: WEIGHT SAVING & ROBUSTNESS

By its very design, the Micro-D connector system meets all the requirements of robustness, durability, low contact resistance, high current, dielectric strength, shock and vibration. With 1.27 mm (.050") contact spacing, Micro-D connectors, half the size of D-sub connectors, represent an excellent solution for saving both space and weight. In addition to a complete range of QPL qualified Micro-D connectors to MIL-DTL-83513, AXON’ also offers Micro-D PCB connectors and cable assemblies in both metal and plastic bodied versions.

With its many possible configurations, Micro-D technology is perfectly suited to a multitude of systems where weight, miniaturization or signal transmission integrity is paramount: applications benefiting from this technology include everything from missiles and their guidance systems, through oil well drilling tools to medical devices, satellites and scientific research. For very specific applications such as medical MRI scanners or low magnetic field detection systems, AXON’ has developed a range of non-magnetic connectors using new materials and surface treatments, avoiding ferromagnetic materials. Hermetic connectors are also offered for applications where an enclosure needs to be fully sealed from the outside world.
& assemblies

NANO-D: EXTREME MINIATURIZATION

In addition to circular and rectangular Micro-D connectors and assemblies, AXON’ CABLE offers Nano-D connectors and jumpers based on the highly reliable Twist Pin contact technology. This is the connector of choice for any application requiring extreme miniaturization combined with high reliability, and is used in a variety of fields from military and medical devices to oil and gas exploration. Nanominiature connectors are based on the Nano-D technology with 0.635 mm (.025") contact spacing and nanominiature shells. The performance of AXON’’s Nano-D is fully compliant to the MIL-DTL-32139 specification, giving a guarantee of interchangeability and intermateability between suppliers.

MINIATURE CONNECTORS FOR SPACE

AXON’ CABLE has developed a range of Micro-D connectors suitable for the challenging requirements of on-board electronics in Space. The Space Micro-D range benefits from the expertise in the AXON’ MIL-DTL-83513 D-shape connectors. Small, lightweight and reliable, AXON’’s Space Micro-D connectors are approved to ESCC 3401/029 EPPL2. In order to meet the necessarily high levels of quality and reliability they are produced with increased plating protection and manufactured in class 100 000 clean rooms. For extreme miniaturization in Space, AXON’ also offers ESCC3401/086 EPPL2 approved Space Nano-D connectors.

QUALITY ASSURANCE

ISO 9001  EN 9100  ISO 14001  TS 16949  OHSAS 18001
**CIRCULAR MICRO-D: SMALL AND EASY TO USE**

The **Circular Micro-D Connector** range benefits from the expertise in the AXON’ D-Line® MIL-DTL-83513 D-shape connectors and features easy-to-use connect and disconnect functionality. The MIL-DTL-83513 standard dictates the design and performance for Micro-D connectors. These small connectors meet the requirements of the most demanding applications and harsh environments. Military equipment, research centres and on-board electronics are just a few examples. Despite their high pin density, small size and lightweight bodies, the AXON’ miniature circular connectors offer similar performances to their rectangular Micro-D cousins.

The standard range of Circular Micro-D connectors consists of 5 basic types:
- Metric thread connectors - MCAT.
- Three lug bayonet connectors - MCA3B.
- Triple start connectors (with anti-decoupling) - MCAC.
- Breakaway connectors - MCABK.
- Plastic shells - MCA.

AXON’ also offers PCB connectors designed for out 4 types of metal shell connectors.

**TWIST PIN CONTACT**

At the heart of the AXON’ Micro-D connector is the **Twist Pin contact** which by its design and performance enables the system to meet the most severe requirements - often significantly more so than stipulated in the MIL-DTL-83513 standard. It must be stated that even if meeting the standard, not all Micro-D contacts will behave in the same way when subjected to certain specific requirements. This is not the case for AXON’ s 100% vision inspected Twist Pin contact.

**EXPERTISE IN CABLING AND ASSEMBLIES**

AXON’ CABLE specializes in the design and manufacture of custom designed assemblies, interconnect systems and complex harnesses often integrating several branches. The company has brought its expertise in the manufacture of precision conductors, wires, cables, cable assemblies and connectors together with its knowledge of overmoulding techniques and EMI protection to be able to offer optimally engineered solutions for the most challenging requirements.
The male Micro-D contact is made up of 10 strands of beryllium-copper and copper alloy twisted together, welded then bumped. These sprung strands are in fact compressed during insertion into the turned female contact and therefore a high number of electrical contact points is permanently assured, while retaining flexibility and ease of insertion/extraction.

The plating of these contacts is a minimum of 1.27 microns of gold in accordance with MIL-G-45204 type 2, class 1, and this gives additional operational security. Furthermore, the Twist Pin contact is auto-guided into its female contact, even if it is not centred in its recess.

As with all contacts conforming to MIL-DTL-83513, the AXON’ Micro-D contacts accept as standard 24, 26, 28 and 30 AWG wires. In order to meet specific customer requests, AXON’ can also offer solutions for large section wires up to 22 AWG and for miniature wires as small as 36 AWG.

### Twist pin performance versus MIL-DTL-83513 specification

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>AXON’ TWIST PIN</th>
<th>MIL REQUIREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF CONTACT POINTS WITH FEMALE CONTACT</td>
<td>7</td>
<td>No requirement</td>
</tr>
<tr>
<td>CONTACT RESISTANCE</td>
<td>Max 3 mΩ (under 3 A)</td>
<td>8 mΩ (under 2.5 A)</td>
</tr>
<tr>
<td>VIBRATION</td>
<td>200 g*</td>
<td>20 g*</td>
</tr>
<tr>
<td>SHOCK</td>
<td>500 g*</td>
<td>50 g*</td>
</tr>
<tr>
<td>CRIMPING</td>
<td>22 to 36 AWG</td>
<td>24 to 26 AWG</td>
</tr>
</tbody>
</table>

*: Vibration & shock values depending on test profiles.
### Before insertion

- **Bump area will be compressed inside the socket during insertion.**
- **Insertion and retention performance of the twist-pin and socket mated pair.**
- **Both socket contact chamfer and twist-pin hemispherical radius contribute to ensuring adequate insertion even in case of misalignment.**

![Diagram of before insertion](image)

### After insertion

![Diagram of after insertion](image)
Quality innovation: 100% vision inspection of twist-pin contacts.

To ensure consistently high quality levels, AXON carry out 100% automatic vision inspection of the shape and dimensions of every twist-pin produced.
TEST & INSPECTION

Micro-D components

METAL SHELLS
- Dimensions measured with non-contact optical equipment.
- Plating thickness measured with X-ray spectrometer.

PLASTIC COMPONENTS
(shells, inserts, trays for PCB connectors, ...).
- Dimensions measured with non-contact optical equipment.

CONTACTS
- Dimensions 100% controlled by precision automated vision inspection, see page 13.
- Plating thickness measured with X-ray spectrometer.
- Insertion and retention forces.
- Electrical resistance of mated contacts.
Micro-D assemblies

AXON' carries out electrical tests on all the manufactured Micro-D harnesses and connectors.

TYPICAL TESTS

<table>
<thead>
<tr>
<th>FOR MICRO-D HARNESSES</th>
<th>FOR MICRO-D PCB CONNECTORS</th>
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<tbody>
<tr>
<td>- continuity.</td>
<td>- contact resistance.</td>
</tr>
<tr>
<td>- insulation resistance.</td>
<td>- insulation resistance.</td>
</tr>
<tr>
<td></td>
<td>- dielectric strength.</td>
</tr>
</tbody>
</table>

If requested by the customer for special products, AXON' can carry out other tests such as:

- Transfer impedance Z₁ for shielded harnesses.
- Insertion and return loss for Micro-D with coaxial contacts.
- Attenuation plots for filtered products.
- Waterproofness tests.
- X-ray inspection.
- Mating and de-mating tests.
- And other specific tests as required.

AXON' carries out sample inspection for visual and dimensional criteria. The goods are delivered with:

- a Certificate Of Compliance.
- a test report (on request).

AXON' maintains batch traceability records for 10 years (or more if required). In order to guarantee a high quality level for each product, AXON' uses a wide variety of production tools, systems, machines and jigs. These include optimized line design, poka yoke, standardized operations and TPM (Total Productive Maintenance).