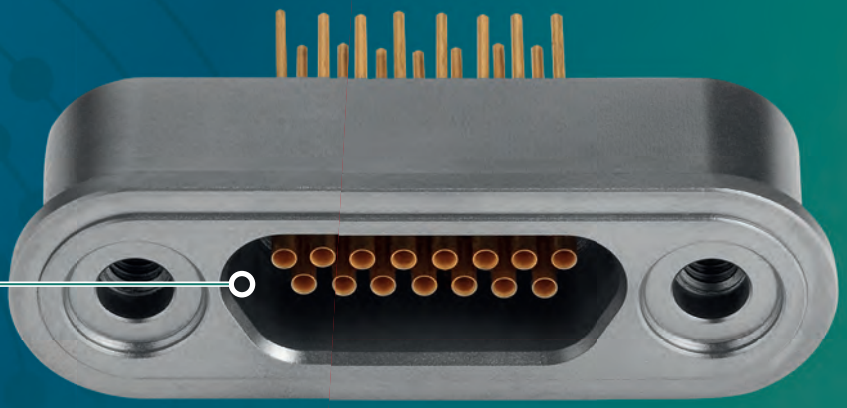
HermAx®

Hermetic Micro-D Connectors



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axon' cables & connectors

HermAx®

Hermetic Micro-D Connectors

AXON' CABLE HermAx® connectors

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Tutorial

Choosing a hermetic connector depends on many different technical considerations. This tutorial includes important theoretical explanations to help you make the most appropriate choice for your hermetic assembly.

HERMETICITY: DEFINITION & NEED

The word "hermetic" is commonly used to define a system or component that is completely gastight. However in reality, perfect hermeticity cannot be achieved. Consequently, hermetic solutions are characterized by their leak rate, and designing a hermetic system essentially consists in keeping that leak rate manageable.

Three main applications require hermeticity. Some advantages of using appropriate hermetic components in each case are presented in the table below:

Application	Advantages of reducing leaks
Vacuum barrier **Pressure barrier**	- Reach lower/higher pressures - Reduce pumping times - Reduce energy consumption - Avoid valuable gas losses
Sensitive equipment protection	- Improve reliability & performances of sensitive sensors, electronics or optical components - Increase component life time - Avoid system maintenance

For vacuum and pressure applications, the acceptable leak rate can be defined by taking into account the system lifetime and its operating pressure.

For sensitive equipment, moisture and contaminant ingress must be avoided. This is especially true in systems exposed to extreme temperatures. Indeed, a certain moisture level inside the system can cause corrosion when cooling down because of condensation. As a consequence, the acceptable leak rate must be determined by taking into account the surrounding environment, the lifetime and sensitivity of components.

Hermetic connectors are not necessarily waterproof. Please consult us!

LEAK RATE DEFINITION

A leak rate is a quantity of a gas escaping/entering per unit of time, ie. a flow:

$$\text{Leak rate} = \frac{\text{amount of gas}}{\text{time}}$$

Using the general gas equation, the quantity of gas can be expressed as follows:

$$n = \frac{P.V}{R.T}$$

Where:

- n: quantity of gas (mol);
- P: pressure (Pa);
- V: volume (m3);
- R: general gas constant (about 8.3 $J.K^{-1}.mol^{-1}$);
- T: temperature (K).

As a consequence at a fixed temperature, the quantity of gas entering/escaping a system can be defined by the pressure drop multiplied by the system volume.
For example, a leak rate of 1 mbar.l/s is the amount of gas removed from a 1 litre system in 1 second to reduce its pressure by 1 mbar.

Some common units and their conversion rates are presented in the table below.

Leak rate

	atm.cc/s	mbar.l/s	torr.l/s	Pa.m3/s	sccm
1 atm.cc/s	1	1	0.76	0.1	60
1 mbar.l/s	1	1	0.76	0.1	60
1 torr.l/s	1.3	1.3	1	0.13	80
1 Pa.m3/s	10	10	7.5	1	600
1 sccm	0.016	0.016	0.0125	0.0016	1

A leak rate is given for a particular gas and pressure differential. Each gas has a different leak rate through the same hole or pore due to molecular size and possible interactions with materials.

HELIUM LEAK DETECTION

The most commonly used technique and the one that allows for easy low leak rate measurement is the Helium Leak Detector (HLD). Helium is the ideal gas for testing because it is inert, small and only present at 5 ppm in the atmosphere. The test is thus safe and highly sensitive.

Axon' follows well-known standards for connector testing, for example the MIL-STD-883, method 1014.13, condition A4. The connector is fixed onto the machine port. The machine is pumped down to create a vacuum, and so the measurement is therefore carried out with a nearly 1 bar of differential pressure. Helium is then sprayed around the outside of the connector. Any helium atoms passing through the connector are then detected and measured by the mass spectrometer inside the HLD.

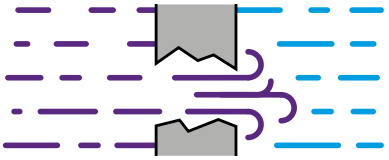
Calibration of the HLD machine is carried out every day to ensure the right leak measurement. Axon's hermetic connectors are **tested 100%** with this method and a test certificate is provided upon request.

LEAKS, MATERIALS & PROCESSING

Multiple phenomena can lead to leaks:

- **Openings**

When the size of the particules is smaller than the opening, they can leak through. Openings can be in materials (porosity, puncture...) or at the interface between different materials (lack of adhesion, gap, unseated O-ring...).



- **Gas permeation**

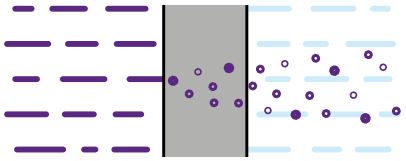
This phenomenon is complex and implies adsorption, diffusion and subsequent desorption of gas atoms or molecules. Gas will travel through the bulk of the material, even when there is no opening.

Permeation depends highly on:

- The materials & gases involved: permeation mechanisms can be different from one to another,
- Temperature.

This phenomenon is generally slow and cannot be measured by a helium test of 1 minute. It is characterized by permeability:

$$\text{permeability} = \frac{\text{amount of gas x material thickness}}{\text{material surface area x time x differential pressure}}$$



Material choices, their processing and assembly are key factors to limit leaks in connectors and other hermetic components.

Metals and glasses are favored when low leak rates are required because of their lower gas permeation compared to plastics & rubbers. However, appropriate rubbers & plastics can be used in less severe applications.

- **Outgassing**

Some material or surface can act as a sponge and store gazeous material, this gas is then realeased when the system is heated or put under vacuum. This kind of leak is a "virtual leak" because the gas is evolving from the material itself due to its nature, manufacturing or storage. To avoid this, an appropriate cleaning and degassing procedure, consisting of heating in a vacuum, must be performed before system use. All materials and different gases are concerned by this phenomenon but rubbers and plastics are again the most critical.

For some applications, outgassing can be a material selection criteria. Databases from ESA (http://esmat.esa.int/materialframe.html) and NASA (https://outgassing.nasa.gov/) are available.

Outgassing is expressed as a leak rate per surface area, in mbar.l/(s.m²) for example.

HERMETIC CONNECTORS

Hermetic connectors are gas barriers that provide a way for electrical signals or power to go in and out of the system. For that, electrical insulation is key and that is why insulating materials such as glass, ceramic or polymers are typically used in conjunction with the conductive metals.

Three main families of hermetic connector exist on the market, based on different insulation materials. The table below sums up their usual characteristics.

Characteristics	Potted	Glass-to-metal seal	Ceramic brazing
Insulation material	Polymer, usually epoxy resin	Glass or glass-ceramic	Ceramic
Shell material	Aluminum, titanium, brass, stainless steel	Steel, Kovar®, stainless steel, titanium, aluminum	Kovar®, titanium, steel, Inconel
Contact material	Usual copper alloys	Kovar®, iron-nickel alloys, copper alloys	Molybdenum, platinum, copper
Best helium leak rate achieved (mbar.l/s)	10^{-8}	10^{-11}	10^{-11}
Max. use temperature (°C)	80-135°C	125-300°C	>300°C
Price	€	€€	€€€

Potted connectors are a cost-effective solution when a helium leak rate lower than 10^{-8} mbar.l/s is not required.

Axon' offers standard ranges of potted and glass-to-metal sealed connector solutions. As an expert in the design and manufacture of cable assemblies and complex harnesses, Axon' supplies a large range of hermetic connectors, in particular with **copper alloy contacts** which are particularly recommended for their high level of conductivity.

Ceramic brazing is suitable for larger connector sizes and higher temperatures, and such applications often require a specific design. Axon' can offer ceramic brazed connectors upon request.

HIGHLY HERMETIC MICRO MINIATURE CONNECTORS

For micro miniature connectors (Micro-D) with low leak rate requirements, glass or glass-ceramic solutions are widely used. Glass and glass-ceramic can withstand high compression stresses but tensile stress must be avoided. This can be achieved in two ways:

- **Matched seal**

In this case, a low expansion iron-nickel-cobalt alloy called Kovar® is used for both the shell and the contacts. Thanks to a metal oxidation step, a chemical bond is made between the glass and metal. Kovar®'s thermal expansion coefficient (CTE) follows closely the CTE of the borosilicate glass insulation across a wide temperature range, making sure stress is kept to a minimum.

- **Compression seal**

In this case, materials are chosen so that **CTE contact** ≤ **CTE glass** ≤ **CTE shell**, in order to ensure that only the stresses of compression are applied to the glass.
The contacts are thus low expansion metals such as iron-nickel or iron-cobalt alloys. The shells are generally steel, stainless steel or Inconel. This technology makes it possible to produce bigger, thicker and more complex designs more economically.

Matched seals have excellent resistance to thermal shocks while compression seals can withstand higher mechanical shocks & pressure.
Both technologies use contacts with low electrical conductivity, consequently the current carrying capacity is limited to 1A or 1.5A in a Micro-D instead of the usual 2.5A to 3A. Furthermore, those materials are heavyweight and strongly magnetic, which is a drawback for most airborne applications and environments sensitive to magnetism.

HERMAX®: HIGH CONTACT CONDUCTIVITY AND LEAD FREE

Axon' has developed a new technology that does not meet the definition of standard "matched" or "compression" seals and has all the advantages of both: a strong chemical bond **plus** a compression from the shell material.

This technology relies on a lower sealing temperature and the use of an innovative glass-ceramic compound to deliver a number of advantages:

- Enables the use of **copper alloy contacts** which:
- Allow 3A per contact (non-derated) as specified in the Micro-D standard MIL-STD-83513;
- Have a lower electrical resistance compatible with very low voltage signals;
- Offers excellent intrinsic electrical and mechanical properties;
- Creates a highly hermetic interface with various metals (copper alloys, stainless steel, Inconel and aluminum);
- Achieves exceptionally low leak rates for harsh environment applications.

Axon's patented glass-ceramic solution is the only one on the market that is fully lead-free and **RoHS compliant**.

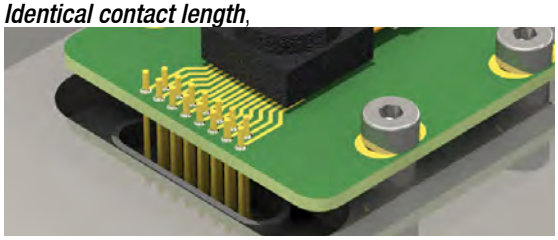
Furthermore, Axon' manufactures HermAx® connectors in Europe with **no** components subject to export regulation (**ITAR, ECL**). The connectors are fully compliant with MIL-STD-83513 tests and comfortably exceed the requirements.

Axon' is equipped with in-house testing capabilities which enable the company to perform custom qualifications according to customers' needs. Axon' can test and qualify connectors to typical environments. Do not hesitate to contact us for further information.

PCB INTEGRATION

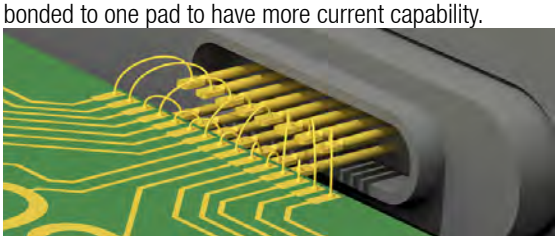
Axon' offers pin connectors with several rear termination configurations:

- ***Identical contact length***,

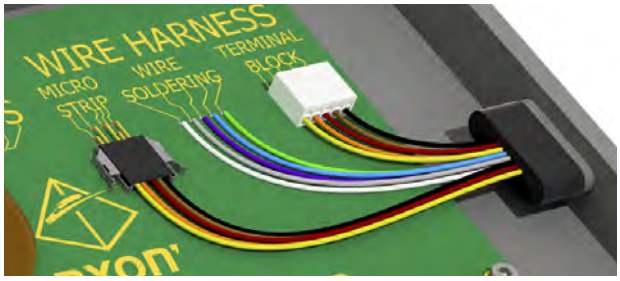


▲ *Example of PCB mounted behind a connector welded to a flange*

- ***Stepped contact length*** facilitate row-by-row insertion into the PCB holes,
- ***Stepped diameter ends*** for direct PCB mount with thinner diameter pin end, allowing only the tip to pass through the PCB hole for soldering,
- ***Flat ends*** (see hereafter) with a special pure gold plate for wire bonding applications. Multiple wire can be bonded to one pad to have more current capability.



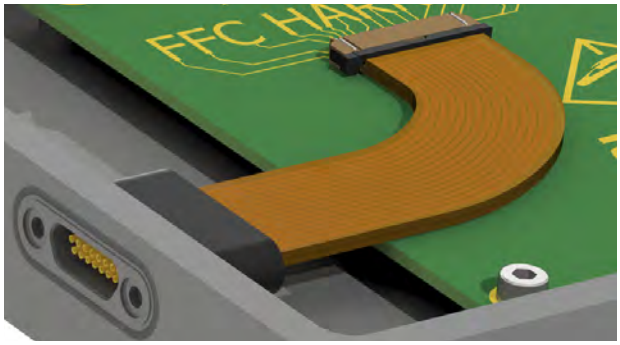
Pigtail connectors (pre-terminated to a specified length of wire) or harnesses are also available.



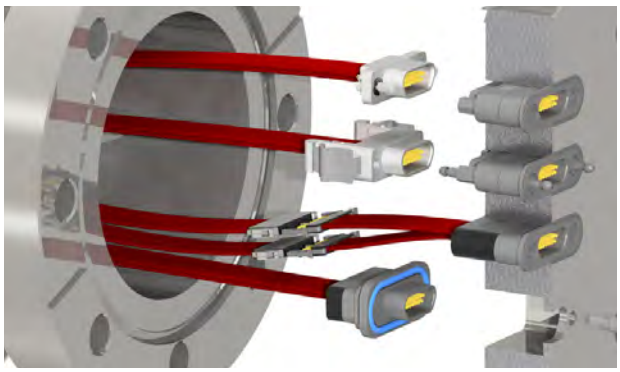
▲ *Example of Hermax® pigtail integration inside a package*

Microstrip (see our Micro-D & Nano-D catalogue) has the advantage to get through the connector welding hole and to be fast to connect.
Direct wire soldering or connecting to a terminal block can be used for prototyping or low volume production.

Hermax® Micro-D can accomodate Flex or Flat Flexible Cables.



FEEDTHROUGH INTEGRATION



Combined with the male Twist Pin connectors, a complete solution withstanding the harshest of environments can be offered by Axon'.

▲ *Twist pin contact*

As a solution for dismountability from each side of the system or panel, a HermAx® saver or dual socket connector is recommended.

For quick & secure connection/disconnection of connectors, fast-latching D-Click versions are available in sizes up to 37 ways.

As a vertically integrated company, Axon' has specialized not only in the design of connectors but also in the manufacture of conductors, cables and complex harnesses for 50 years. Axon' engineers are then able to integrate hermetic connectors into the design of tailor-made assemblies.

▲ *Example of a Micro–D HermAx® connector terminated with two microstrip connectors*

Any termination can be added to the wire end, providing that it can go through the laser welding cutout.

▲ *Example of a Micro–D HermAx® O–ring feedthrough terminated with a standard Micro–D connector*

SEALING SOLUTIONS

Hermetic connectors can only be as good as their mounting on the panel.

O-ring feedthrough can be assembled and removed from the panel, thus assuring great reparability.

Rubber seals have a high permeability and a reduced lifetime. It is recommended to use them only with **potted connectors** or in applications where the connector must be dismountable. In most cases, laser welding is the preferred option for HermAx® connectors. **Laser welding** delivers the most compact solution and covers a higher temperature range.

Axon's stainless steel 304L connector shells allow reliable and repeatable welding onto systems or panels in both 304L and 316L with well-known laser technologies.
When a rubber gasket cannot be avoided, the material should be chosen to reduce permeation but should also be adapted to the system temperature range.

FKM (fluoroelastomer), is a widely used rubber for hermetic integration. Its temperature range goes from -30°C to +200°C. However, because of permeation, even when using FKM the best helium leak rate we could expect would be around 10^{-7}mbar.l/s. And any increase in temperature would increase that leak rate still further.

For applications requiring lower temperatures, the use of a silicon O-ring can be considered, with a temperature range spanning -55°C to +200°C. However, silicone exhibits faster permeation and higher permeability to most gases, leading to a drop in hermeticity. Oxygen permeability is even higher in silicone than helium permeability, whatever the temperature. Silicone must therefore be avoided for protection against oxygen.

HermAx® connector integration: laser welding versus O-ring mounting

	Laser welding	O-ring mounting
Dismountability	No	Yes
Helium leak rate	As specified for connector $<1.10^{-9}$ mbar.l/s	Depending on material choice Example for FKM: $< 5.10^{-7}$ mbar.l/s
Temperature range	As per connector -55° to +125°C (and higher)	Depending on material choice Example for FKM: -30° to +125°C (and higher)
Compactness	++	+
Reliability	++	+

Axon' can advise on the most suitable integration solution for your application. In addition, Axon' can take care of laser welding our **HermAx® connectors** directly on to your system or panel or supply the connectors already welded onto standard or specific flanges.

▲ *Laser welded HermAx® connector*

KEY DATA TO DESIGN THE VERY CONNECTOR YOU NEED

In order to offer you the most appropriate hermetic connector solution, our engineers will ask you the following questions:

- Maximum acceptable helium leak rate;
- Temperature range;
- Material used for panel or system enclosure;
- Pressure or vacuum applied on each side;
- Number of contacts needed;
- Electrical integration considered (connector/contact type), type & value for voltage & current;
- Connector panel integration considered (laser welding or O-ring);
- Requested lifetime.

For Axon' to be able to fully optimize the design of our HermAx® connectors in your application, please let us know if your system is exposed to special environmental conditions including:

- Special thermal shock;
- Special vibration & mechanical shock;
- Other special environments (such as fluids, radiation, etc.)

Contact: sales@axon-cable.com

HermAx®

Axon' Cable offers a range of **hermetic Micro-D connectors** which act as pressure or vacuum seals or as a protection against the environment for sensitive equipment. Allowing electrical connection across both sides of a panel, they are typically used:

- where a panel separates two different environments;
- when an enclosure needs to be isolated from the surrounding area.

A large range of products to fit all applications

	WATERPROOF ENCAPSULANT	HERMETIC ENCAPSULANT	HERMAX®	MIL-DTL- 83513
HELIUM LEAK RATE (mbar.l/s) MIL-STD-883 A4	1.10^{-5}	1.10^{-8}	$< 1.10^{-11}$*	-
TEMPERATURE RANGE (°C)	-55 / +125	-30 / +125	-55 / +200**	-55 / +125
CONTACT MATERIAL	COPPER ALLOY	COPPER ALLOY	COPPER ALLOY	COPPER ALLOY
MAXIMUM CURRENT RATING (A)	3	3	3	3
SHIELD MATERIAL	ALUMINIUM STAINLESS STEEL TITANIUM	ALUMINIUM	STAINLESS STEEL 304L	ALUMINIUM STAINLESS STEEL
MOUNTING METHOD	O-RING	O-RING	O-RING*** LASER WELDING****	-

* Tested at 10^{-9}, 10^{-10} or 10^{-11} mbar.l/s, depending on customer request
** The temperature range depends on the connector reference
*** With O-ring: leak rate limited to 1.10^{-8} mbar.l/s and temperature range limited
**** With compatible materials

HermAx® glass-ceramic technology for excellent performance

HermAx® special glass-ceramic connectors have the following characteristics:

- Excellent intrinsic electrical and mechanical properties;
- Excellent interfaces with metals;
- Exceptionally low leak rates for harsh environment applications;
- Environmental-friendly: lead-free, in compliance with RoHS rules.

• High conductivity contacts

Unlike existing solutions on the market, Axon's contacts are made from a copper alloy, which enables a current up to 3A per contact, as specified in MIL-DTL-83513.

• Low leak rates

Helium leak testing is the usual test method for evaluating hermeticity. Axon' follows MIL-STD-883K, method 1014-16, test condition A4 for single connectors. Axon' can guaranty leak rates lower than 10^{-11} mbar.L.s and all Axon' connectors are 100% leak tested before shipping.

• Harsh environment compatible

Axon' connector performances go far beyond military standards, for example for thermal shocks tests (over 400 cycles compared to 5 cycles in the MIL-STD-83513). They can withstand a large range of temperatures without leakage.

Micro-D connectors

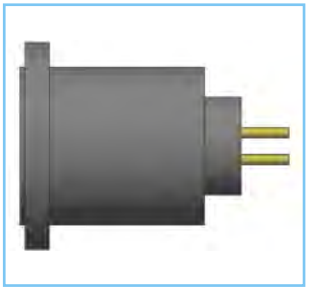
Applications:

- Space;
- Avionics;
- Oil & gas exploration;
- Scientific research;
- Medical electronics.

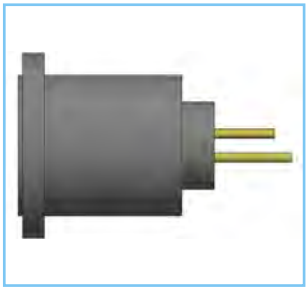
HermAx® range

Depending on the application, Axon' offers different versions:

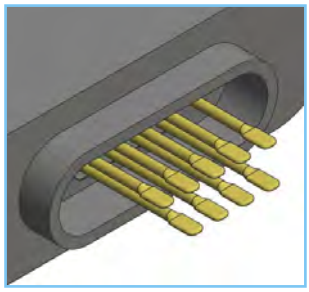
- O-ring pigtail connectors;
- Female / male feedthrough;
- Female / female feedthrough;
- PCB connectors;
- With different rear termination styles
  - > Identical contact length,
  - > Stepped contact length,
  - > Wirebond flat ends,
  - > Stepped ends.



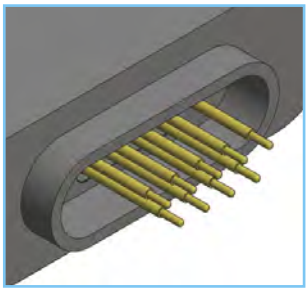
▲ Identical contact length



▲ Stepped contact length



▲ Wirebond flat ends



▲ Stepped ends

How to integrate HermAx® connectors?

- Welding

For optimum size and leak rate performance, HermAx® connectors can be (laser) welded directly to a panel, port or enclosure. This technology is particularly recommended for applications with temperature requirements and high lifetime.
Integrating connectors to panels is one of the areas of expertise that Axon' Cable is able to offer.

- O-ring mounting

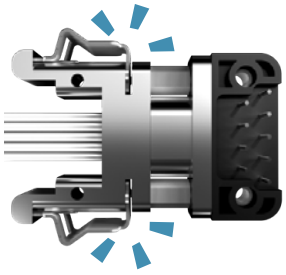
This solution is designed for applications where hermetic Micro-D connectors need to be removed. Axon' engineers will choose the right o-ring material depending on customer's application. As a multi-skilled company, Axon' has integrated the manufacture of elastomer components within the group.

▲ Welded connector

▲ O-ring connector

D-Click® fast locking Micro-D: Mates in a click!

HermAx® connectors can be supplied with Axon's fast locking D-Click technology, for near instant mating and de-mating with no need for tools.



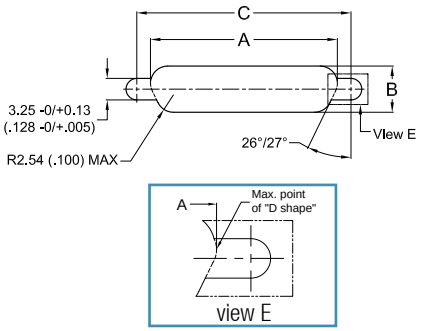
▲ D-Click system

PANEL CUTOUTS

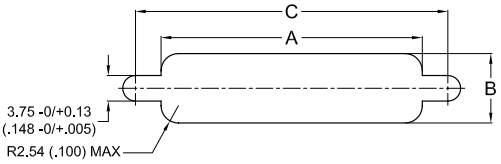
O–RING MOUNT CUTOUT

Dimensions are in millimetres (inches).

9 TO 51 CONTACTS

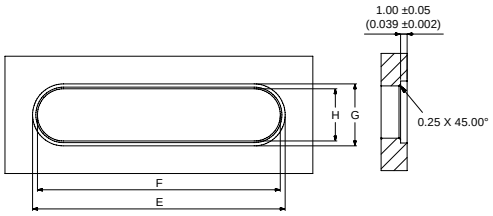


100 CONTACTS



LASER WELDING CUTOUT

Dimensions are in millimetres (inches).



O-RING MOUNT CONNECTORS				LASER WELDING CONNECTORS			
A -0/+0.1 (-0/+.004)	B -0/+0.13 (-0/+.005)	C -0/+0.1 (-0/+.004)		E -0/+0.02 (-0/+.0008)	F ±0.2 (±0.008)	G -0/+0.02 (-0/+.0008)	H ±0.2 (±0.008)
10.36 .408	6.55 .258	14.48 .570	9 S	22.35 .880	20.85 .821	8.45 .333	6.95 .274
14.20 .559	6.55 .258	18.29 .720	15 S	26.16 1.030	24.66 .971	8.45 .333	6.95 .274
18.00 .709	6.55 .258	22.10 .870	21 S	29.97 1.180	28.47 1.121	8.45 .333	6.95 .274
20.55 .809	6.55 .258	24.64 0.970	25 S	32.51 1.280	31.01 1.221	8.45 .333	6.95 .274
24.36 .959	6.55 .258	28.45 1.120	31 S	36.32 1.430	34.82 1.371	8.45 .333	6.95 .274
28.17 1.109	6.55 .258	32.26 1.270	37 S	40.13 1.580	38.63 1.521	8.45 .333	6.95 .274
26.90 1.059	7.64 .301	31.00 1.220	51 S	38.86 1.530	37.36 1.471	9.53 .375	8.03 .316
37.03 1.458	6.55 .258	41.15 1.620	51DR S	49.02 1.930	47.52 1.871	8.45 .333	6.95 .274
37.06 1.459	10.31 .406	45.85 1.805	100 S	55.58 2.188	54.08 2.129	10.66 .420	9.16 .361

HARDWARE

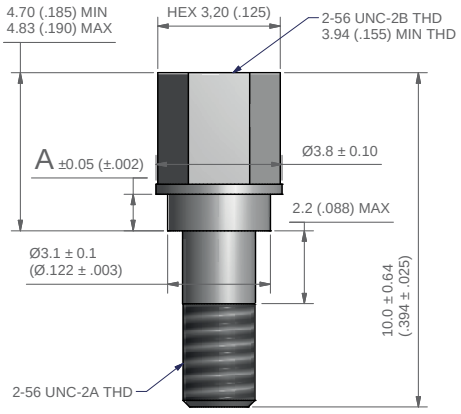
Jackposts for O-ring panel mount connectors

- 2 sizes of jackpost: one version for shell sizes from 9 to 51 ways and another version for the 100-way shell size.
- 1 kit consists of 2 jackposts.
- Material: passivated 300 series stainless steel.

Dimensions are given in millimetres (inches).

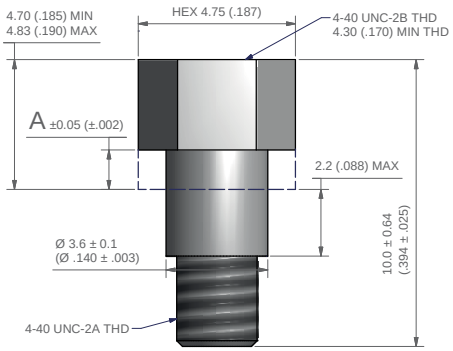
HARDWARE CODE	Px	P1	P2	P3	P4	P5
PANEL THICKNESS -0.0 / +0.2 (-.000 / +.008)	mm	0.8	1.2	1.6	2	2.4
	inch	.031	.047	.062	.079	.094
9-69 way	part numbers	MDAHMSP01	MDAHMSP02	MDAHMSP03	MDAHMSP04	MDAHMSP05
100 way	part numbers	MDAHMSP11	MDAHMSP12	MDAHMSP13	MDAHMSP14	MDAHMSP15
DIMENSIONS A	mm	0.7	1.1	1.5	1.9	2.3
	inch	.028	.043	.059	.075	.091

9-51 WAY JACKPOST



KIT PART NUMBER: **MDAHMSP0x**
Hardware code: **Px**

100 WAY JACKPOST



KIT PART NUMBER: **MDAHMSP1x**
Hardware code: **Px**

RECOMMENDED TORQUE:
- 9 to 51 way jackpost: 0.35 N.m / 3.1 inch-pounds
- 100 way jackpost: 0.55 N.m / 4.9 inch-pounds

HARDWARE

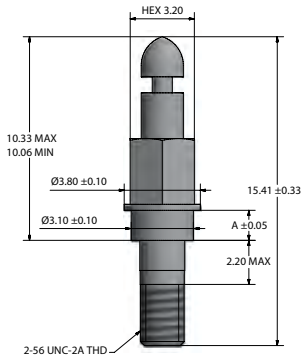
D-Click jackposts for O-ring panel mount connectors

- 1 kit consists of 2 latch-posts for PCB connectors
- Material: passivated 300 series stainless steel.

Dimensions are given in millimetres (inches).

HARDWARE CODE	Pigtails	G1	G2	G3	G4	G5
PANEL THICKNESS -0.0 / +0.2 (-.000 / +.008)	mm	0.8	1.2	1.6	2	2.4
	inch	.031	.047	.062	.079	.094
DIM. A ±0.05 (±.002)	mm	0.7	1.1	1.5	1.9	2.3
	inch	.028	.043	.059	.075	.091

9-37 WAY D-CLICK

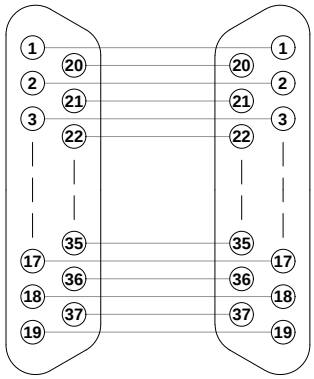


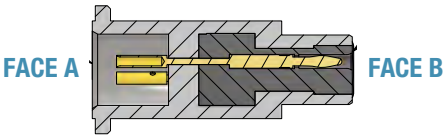
RECOMMENDED TORQUE: 0.35 N.m / 3.1 inch–pounds

DIRECT / INDIRECT WIRING

Direct wiring for HermAx® connector savers

Example with a 37 way connector

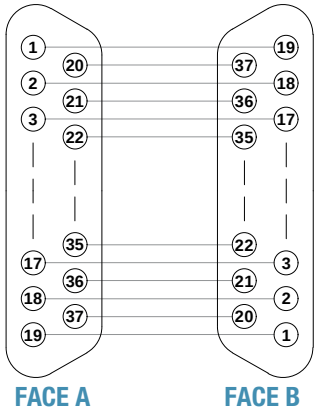


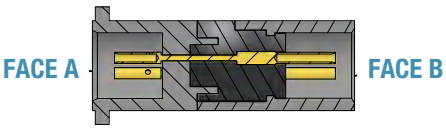


Point X of Face A is connected to point X of Face B.

Indirect wiring for HermAx® dual socket connectors

Example with a 37 way connector



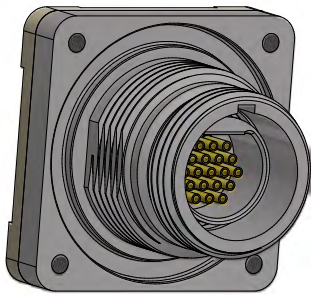


Each Face A contact is linked to the opposite contact of Face B.

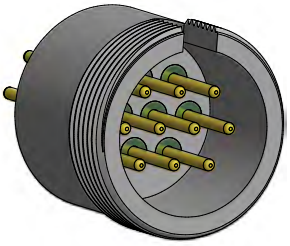
CUSTOM CONNECTORS

Tailor-made connectors

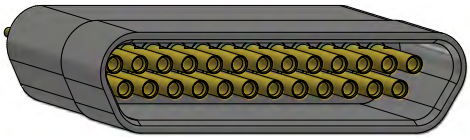
Offering tailor-made solutions is the core of our business. Based on your applications and specifications, Axon' Cable develops solutions that meet your needs. Hereafter are shown a few examples of **custom-designed HermAx®** connectors with large flange panel mount, low profile or multiple connection. Do not hesitate to contact our experts at *sales@axon-cable.com*.



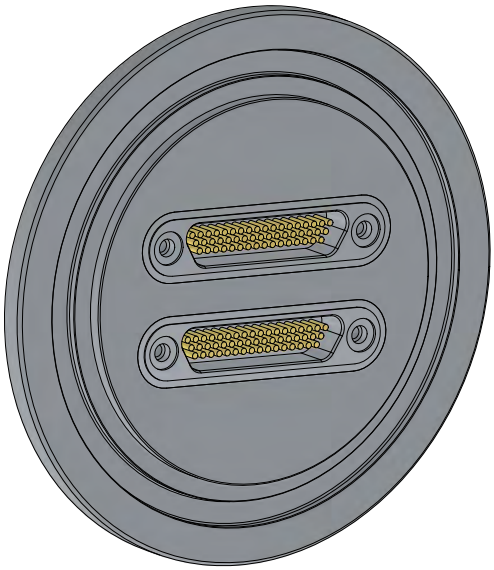
LARGE FLANGE PANEL MOUNT CIRCULAR



CUSTOM DESIGNED CIRCULAR



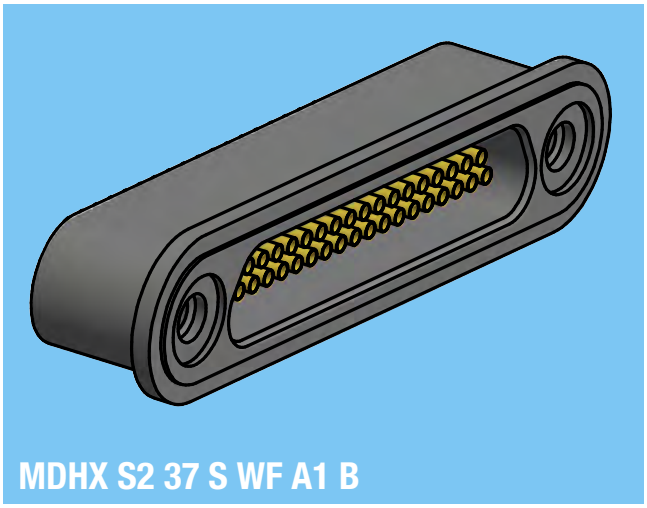
SPECIAL CUTOUT LOW PROFILE



CUSTOM FLANGE WITH MULTIPLE CONNECTORS

AXON' CABLE HermAx® connectors

HermAx® connectors



MDHX S2 37 S WF A1 B

LASER WELDED

– High performance hermetic metal connector for panel welding
– Stainless steel 304L shell
– Copper alloy contact
– 9 to 100 contacts, custom size on request
– According to MIL–DTL–83513
– Operating temperature: from –55°C to 150°C or 200°C
– Helium leak rate: lower than $1x10^{-9}$ mbar.l.s^{-1}

HERMAX® PIN CONNECTOR

IDENTIFICATION CODE

MDHX	S2	37	S	WF	A1	B

SERIES
MDHX: Micro-D HermAx.

SHELL & POTTING MATERIAL
S: SST 304L 200°C (without potting).
S1: SST 304L + potting 150°C.
S2: SST 304L + potting 200°C.

NUMBER OF CONTACTS
09, **15**, **21**, **25**, **31**, **37**, **51**, **51DR**, **100**.

CONNECTOR GENDER
S: Female (socket contacts).

SHELL TYPE
WF: Weldable front mount.

CONTACT TYPE
A1: 2.8 mm (0.100") tail.
A2: 3.6 mm (0.118") tail.
A3: 4.4 mm (0.157") tail.
A4: 5.2 mm (0.196") tail.
B1: Stepped lengths.
C1: Flatened ends.
D1: Stepped ends.
See page 20 for contact types details.

HARDWARE
B: No hardware. Machined thread.
G: D-Click (only available for connectors up to 37 contacts).

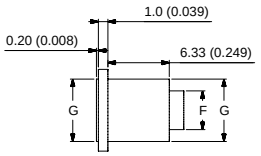
WEIGHTS

Approximate weights are in grams.

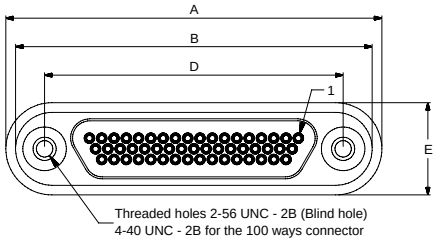
WEIGHT (in g) with 2.8 mm pins								
9 S	15 S	21 S	25 S	31 S	37 S	51 S	51 DR S	100
6.1	7.0	7.9	8.4	9.3	10.2	11.2	12.2	18.4

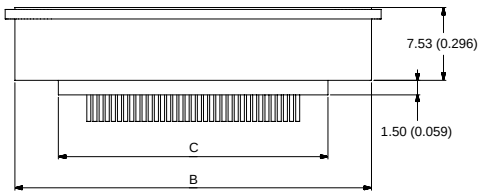
DIMENSIONS

Dimensions are in millimetres (inches).



Contact spacing:
- 1.27 mm (.050") contact spacing.
- 1.10 mm (.043") spacing between rows.

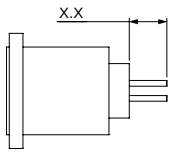
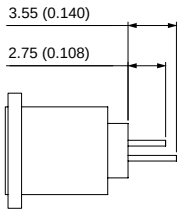
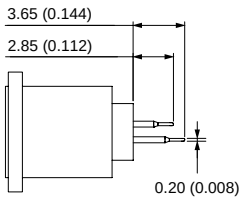
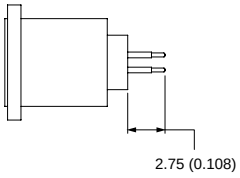
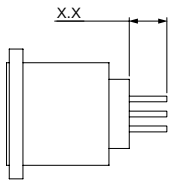
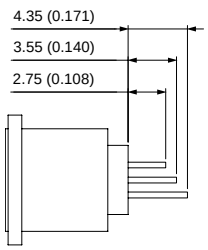
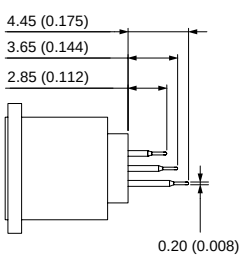
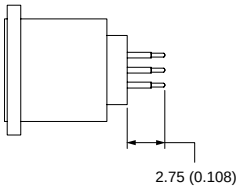
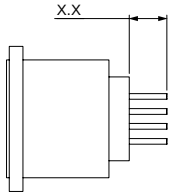
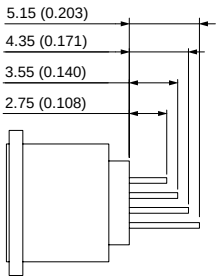
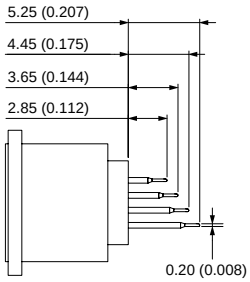
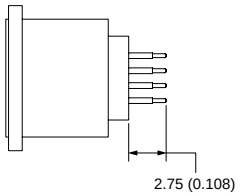
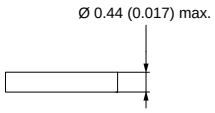
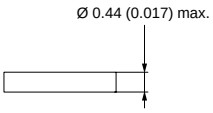
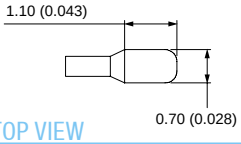
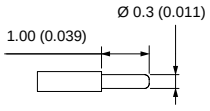




	A -0.02/+0 -.0008/+0	B max.	C max.	D ±0.13 ±.005	E -0.02/+0 -.0008/+0	F max.	G max.
9 S	22.35 .880	20.45 .805	11.50 .453	14.35 .565	8.45 .333	4.15 .163	6.55 .258
15 S	26.16 1.030	24.26 .955	15.31 .603	18.16 .715	8.45 .333	4.15 .163	6.55 .258
21 S	29.97 1.180	28.07 1.105	19.12 .753	21.97 .865	8.45 .333	4.15 .163	6.55 .258
25 S	32.51 1.280	30.61 1.205	21.66 .853	24.51 .965	8.45 .333	4.15 .163	6.55 .258
31 S	36.32 1.430	34.42 1.355	25.47 1.003	28.32 1.115	8.45 .333	4.15 .163	6.55 .258
37 S	40.13 1.580	38.23 1.505	29.28 1.153	32.13 1.265	8.45 .333	4.15 .163	6.55 .258
51 S	38.86 1.530	36.96 1.455	28.01 1.103	30.86 1.215	9.53 .375	5.23 .206	7.63 .300
51DR S	49.02 1.930	47.12 1.855	37.98 1.495	41.02 1.615	8.45 .333	4.15 .163	6.55 .258
100 S	55.58 2.188	53.68 2.113	38.14 1.502	45.72 1.800	10.66 .420	6.31 .248	8.76 .345

CONTACT OPTIONS & DIMENSIONS

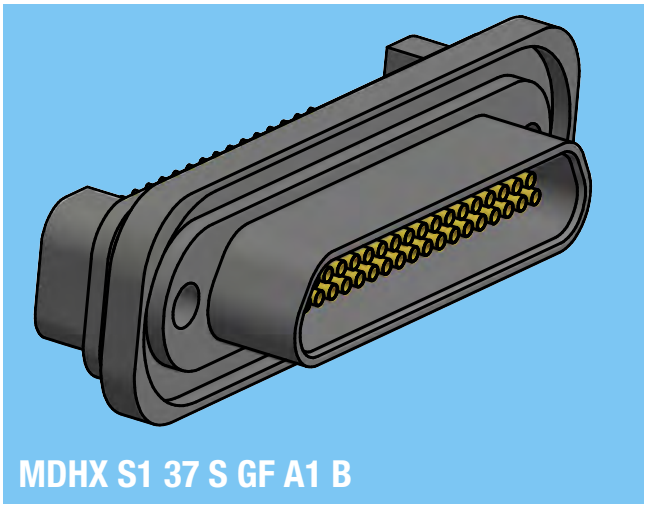
Dimensions are in millimetres (inches).

	SAME LENGTH ENDS A1, A2, A3 OR A4	STEPPED LENGTHS B1	FLATENED ENDS C1	STEPPED ENDS D1
2 ROWS				
3 ROWS				
4 ROWS				
CONTACT DETAILS				

SUMMARY OF CHARACTERISTICS

ELECTRICAL & MECHANICAL PERFORMANCE	
CURRENT RATING	3 A max.
CONTACT RESISTANCE	8 mΩ max.
INSULATION RESISTANCE	1000 MΩ min. @ 500 VDC
DIELECTRIC WITHSTANDING VOLTAGE	Sea level: 600 VAC
	Altitude 21 km (70.000 ft): 150 VAC
CONTACT ENGAGING FORCE	230 g max. (6 oz)
CONTACT SEPARATING FORCE	14 g min. (0.5 oz)
DURABILITY	500 mating cycles min.
VIBRATION	20g's – No discontinuity > 1 µs
SHOCK	50g's – No discontinuity > 1 µs

MATERIAL & FINISH	
SHELL	304L stainless steel
INTERFACIAL SEAL	Fluorosilicone rubber
SOCKET CONTACT	Copper alloy, gold over nickel plating
INSULATION MATERIAL	Proprietary glass-ceramic
ENCAPSULANT	Epoxy resin



MDHX S1 37 S GF A1 B

O–RING MOUNTED

– High performance hermetic metal connector for panel mount
– Stainless steel 304L shell
– Copper alloy contact
– 9 to 100 contacts, custom size on request
– According to MIL–DTL–83513
– Operating temperature: from –55°C to 150°C or 200°C
– Helium leak rate: see o–ring material

HERMAX® PIN CONNECTOR

IDENTIFICATION CODE

MDHX	S1	37	S	GF	A1	B

SERIES
MDHX: Micro-D HermAx.

SHELL & POTTING MATERIAL
S1: SST 304L + potting 150°C.
S2: SST 304L + potting 200°C.

NUMBER OF CONTACTS
09, **15**, **21**, **25**, **31**, **37**, **51**, **51DR**, **100**.

CONNECTOR GENDER
S: Female (socket contacts).

O-RING MATERIAL
GF: FKM (from -30°C, helium leak rate $<1x10^{-8}$ mbar.l.s^{-1}).
GS: FVMQ (from -55°C, helium leak rate $<1x10^{-5}$ mbar.l.s^{-1}).

CONTACT TYPE
A1: Same length ends (2,2 mm for all contact).
D1: Stepped ends.
See page 23 for contact types details.

HARDWARE
B: No hardware. Machined thread.
Px: Jackposts.
Gx: D-Click (only available for connectors up to 37 contacts).
See page 13 & 14 for D–Click hardware.

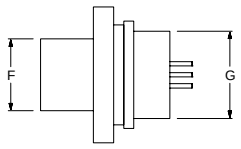
WEIGHTS

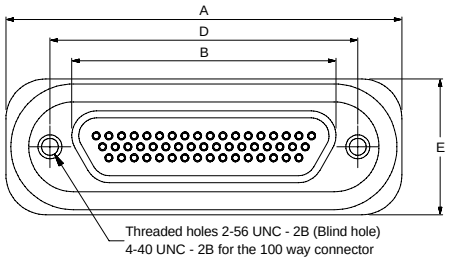
Approximate weights are in grams.

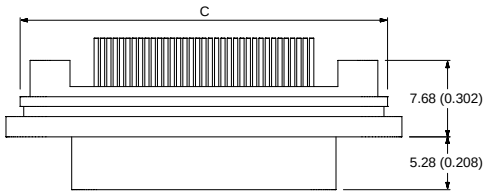
WEIGHT (in g)								
9 S	15 S	21 S	25 S	31 S	37 S	51 S	51 DR S	100
8.2	9.3	10.4	11.2	12.3	13.5	14.2	16.2	21

DIMENSIONS

Dimensions are in millimetres (inches).





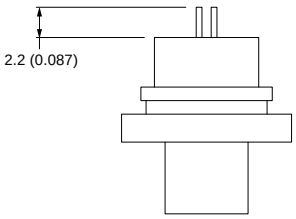
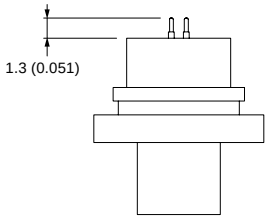
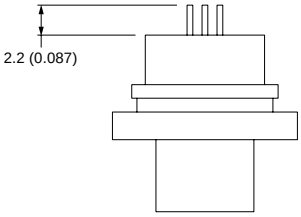
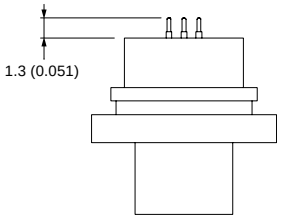
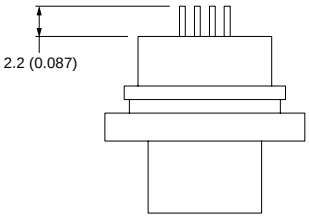
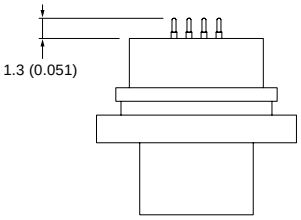
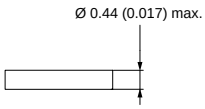
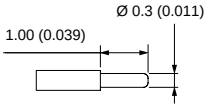


Contact spacing:
- 1.27 mm (.050") contact spacing.
- 1.10 mm (.043") spacing between rows.

	A ±0.25 (±0.01)	B max.	C max.	D ±0.13 (±.005)	E ±0.25 (±0.01)	F max.	G max.
9 S	23.20 .913	10.16 .400	20.55 .809	14.35 .565	12.50 .492	6.35 .250	9.85 .388
15 S	27.00 1.063	14.00 .551	24.35 .959	18.16 .715	12.50 .492	6.35 .250	9.85 .388
21 S	30.81 1.213	17.81 .701	28.16 1.109	21.97 .865	12.50 .492	6.35 .250	9.85 .388
25 S	33.40 1.315	20.35 .801	30.75 1.211	24.51 .965	12.50 .492	6.35 .250	9.85 .388
31 S	37.17 1.463	24.16 .951	34.52 1.359	28.32 1.115	12.50 .492	6.35 .250	9.85 .388
37 S	41.00 1.614	27.96 1.101	38.35 1.510	32.13 1.265	12.50 .492	6.35 .250	9.85 .388
51 S	39.70 1.563	26.70 1.051	37.05 1.459	30.86 1.215	13.60 .535	7.44 .293	10.95 .431
51DR S	50.00 1.969	36.83 1.450	47.35 1.864	41.02 1.615	12.50 .492	6.35 .250	9.85 .388
100 S	55.00 2.165	36.86 1.451	52.35 2.061	45.72 1.800	14.70 .579	8.46 .333	12.05 .474

CONTACT OPTIONS & DIMENSIONS

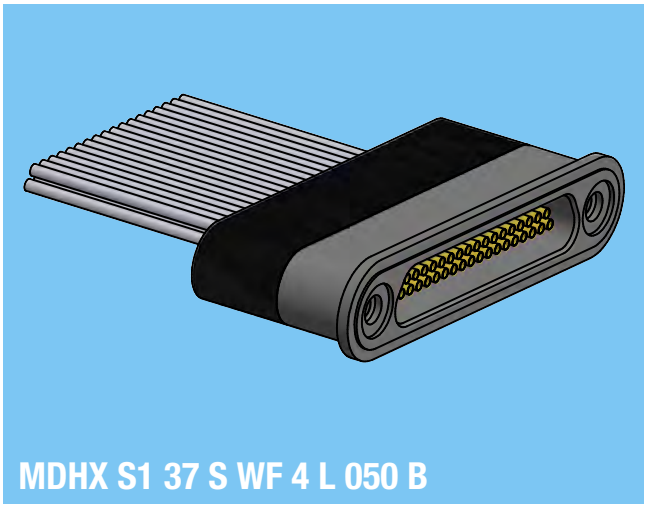
Dimensions are in millimetres (inches).

	SAME LENGTH ENDS A1	STEPPED ENDS D1
2 ROWS		
3 ROWS		
4 ROWS		
CONTACT DETAILS		

SUMMARY OF CHARACTERISTICS

ELECTRICAL & MECHANICAL PERFORMANCE	
CURRENT RATING	3 A max.
CONTACT RESISTANCE	8 mΩ max.
INSULATION RESISTANCE	1000 MΩ min. @ 500 VDC
DIELECTRIC WITHSTANDING VOLTAGE	Sea level: 600 VAC
	Altitude 21 km (70.000 ft): 150 VAC
CONTACT ENGAGING FORCE	230 g max. (6 oz)
CONTACT SEPARATING FORCE	14 g min. (0.5 oz)
DURABILITY	500 mating cycles min.
VIBRATION	20g's – No discontinuity > 1 µs
SHOCK	50g's – No discontinuity > 1 µs

MATERIAL & FINISH	
SHELL	304L stainless steel
INTERFACIAL SEAL	Fluorosilicone rubber
SOCKET CONTACT	Copper alloy, gold over nickel plating
INSULATION MATERIAL	Proprietary glass-ceramic
ENCAPSULANT	Epoxy resin



MDHX S1 37 S WF 4 L 050 B

LASER WELDED

– High performance hermetic metal connector for panel welding
– Stainless steel 304L shell
– Copper alloy contact
– 9 to 100 contacts, custom size on request
– According to MIL–DTL–83513
– Operating temperature: from –55°C to 150°C or 180°C
– Helium leak rate: < $1x10^{-9}$ mbar.l.s^{-1}

HERMAX® PIGTAIL CONNECTOR

IDENTIFICATION CODE

MDHX	S1	37	S	WF	4	L	050	B

SERIES
MDHX: Micro-D HermAx.

SHELL & POTTING MATERIAL
S1: SST 304L + potting 150°C.
S2: SST 304L + potting 180°C.

NUMBER OF CONTACTS
09, **15**, **21**, **25**, **31**, **37**, **51**, **51DR**, **100**.

CONNECTOR GENDER
S: Female (socket contacts).

SHELL TYPE
WF: Weldable front mount.

WIRE TYPE
1: E 2607, AWG26, 7 strand, 600V, PTFE insulated.
2: ET 2607, AWG26, 7 strand, 250V, PTFE insulated.
4: E 2619, AWG26, 19 strand, 600V, PTFE insulated.
5: ET 2619, AWG26, 19 strand, 250V, PTFE insulated.

COLOUR CODE
F: All yellow.
L: All white.
W: 10 color repeat.
Other colours available on request.

WIRE LENGTH (in cm)
Attention! Wire length in centimeters.
1 cm = 10 mm = 0.394" // 1" = 25.4 mm = 2.54 cm

HARDWARE
B: No hardware. Machined threads.
G: D-Click (only available for connectors up to 37 contacts).

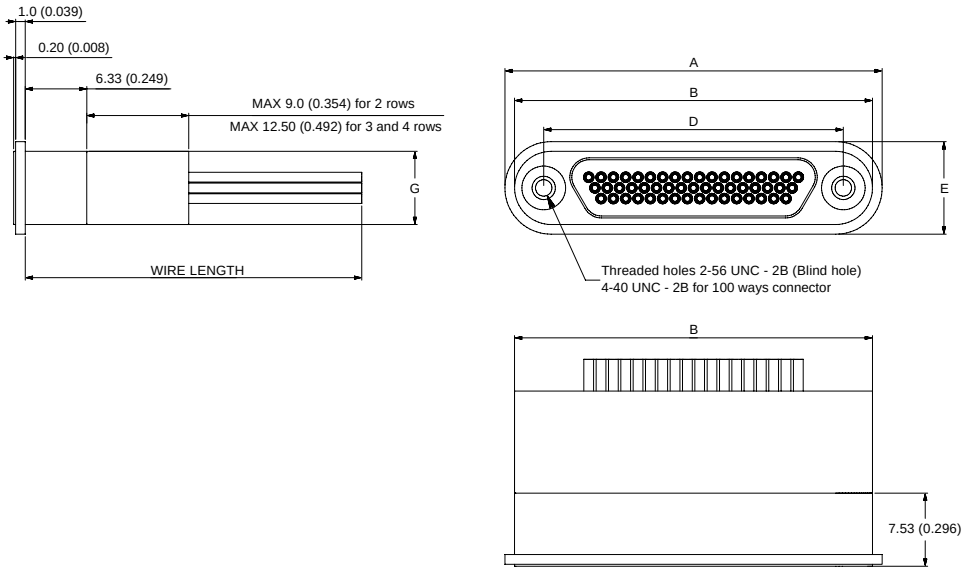
WEIGHTS

Approximate weights are in grams (without wires).

WEIGHT								
9 S	15 S	21 S	25 S	31 S	37 S	51 S	51 DR S	100
9.8	11.3	13.0	14.1	15.7	17.3	19.8	21.2	30.4

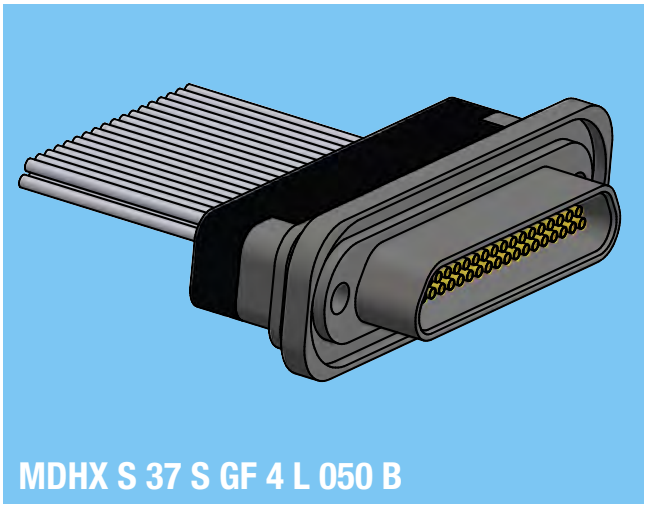
DIMENSIONS

Dimensions are in millimetres (inches).



	A -0.02/+0 (-.0008/+0)	B max.	D ±0.13 (±.005)	E -0.02/+0 (-.0008/+0)	G max.
9 S	22.35 .880	20.45 .805	14.35 .565	8.45 .333	6.55 .258
15 S	26.16 1.030	24.26 .955	18.16 .715	8.45 .333	6.55 .258
21 S	29.97 1.180	28.07 1.105	21.97 .865	8.45 .333	6.55 .258
25 S	32.51 1.280	30.61 1.205	24.51 .965	8.45 .333	6.55 .258
31 S	36.32 1.430	34.42 1.355	28.32 1.115	8.45 .333	6.55 .258
37 S	40.13 1.580	38.23 1.505	32.13 1.265	8.45 .333	6.55 .258
51 S	38.86 1.530	36.96 1.455	30.86 1.215	9.53 .375	7.6 .299
51DR S	49.02 1.930	47.12 1.855	41.02 1.615	8.45 .333	6.55 .258
100 S	55.58 2.188	53.68 2.113	45.72 1.800	10.66 .420	8.71 .343

FOR CHARACTERISTICS, SEE PAGE 20



MDHX S 37 S GF 4 L 050 B

O–RING MOUNTED

– High performance hermetic metal connector for panel mount
– Stainless steel 304L shell
– Copper alloy contact
– 9 to 100 contacts, custom size on request
– According to MIL–DTL–83513
– Operating temperature: from –55°C to 150°C or 180°C
– Helium leak rate: see o–ring material

HERMAX® PIGTAIL CONNECTOR

IDENTIFICATION CODE

MDHX	S	37	S	GF	4	L	050	B

SERIES
MDHX: Micro-D HermAx.

SHELL & POTTING MATERIAL
S1: SST 304L + potting 150°C.
S2: SST 304L + potting 180°C.

NUMBER OF CONTACTS
09, **15**, **21**, **25**, **31**, **37**, **51**, **51DR**, **100**.

CONNECTOR GENDER
S: Female (socket contacts).

O-RING MATERIAL
GF: FKM (from -30°C, helium leak rate $<1x10^{-8}$ mbar.l.s^{-1}).
GS: FVMQ (from -55°C, helium leak rate $<1x10^{-5}$ mbar.l.s^{-1}).

WIRE TYPE
1: E 2607, AWG26, 7 strand, 600V, PTFE insulated.
2: ET 2607, AWG26, 7 strand, 250V, PTFE insulated.
4: E 2619, AWG26, 19 strand, 600V, PTFE insulated.
5: ET 2619, AWG26, 19 strand, 250V, PTFE insulated.

COLOUR CODE
F: All yellow.
L: All white.
W: 10 color repeat.
Other colours available on request.

WIRE LENGTH (in cm)
Attention! Wire length in centimeters.
1 cm = 10 mm = 0.394" // 1" = 25.4 mm = 2.54 cm

HARDWARE
B: No hardware. Machined threads.
Px: Jackposts.
Gx: D-Click (only available for connectors up to 37 contacts).
See page 13 & 14 for hardware.

CONNECTORS ARE SUPPLIED WITH ANTI-STATIC PROTECTIVE DUST CAPS

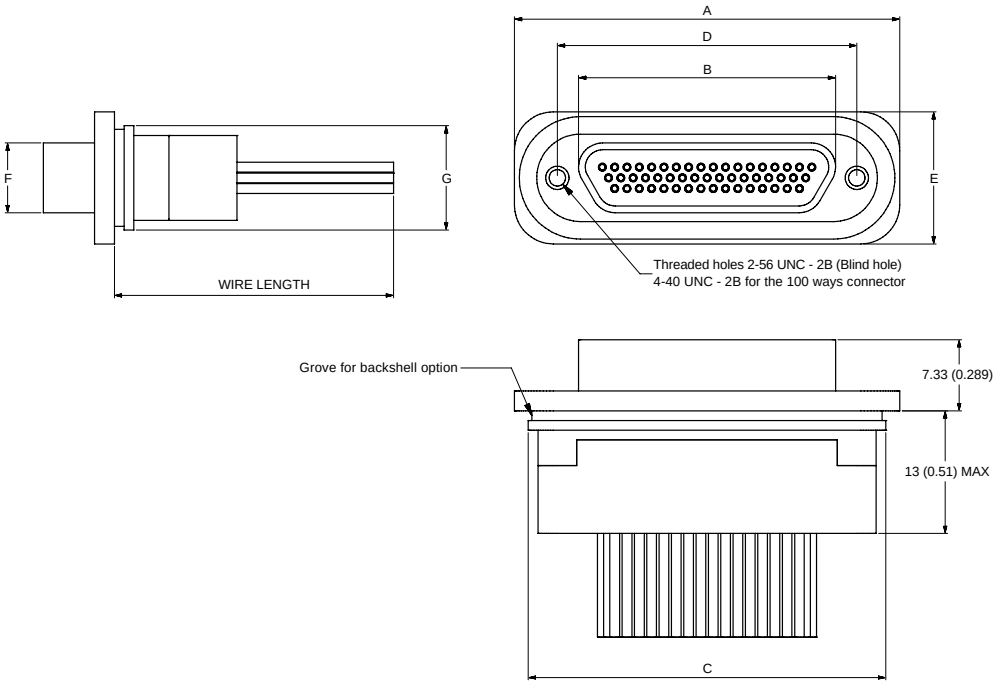
WEIGHTS

Approximate weights are in grams (without wires).

WEIGHT (in g)								
9 S	15 S	21 S	25 S	31 S	37 S	51 S	51 DR S	100
9.6	11.1	12.7	13.8	15.3	16.9	19.2	20.6	29.5

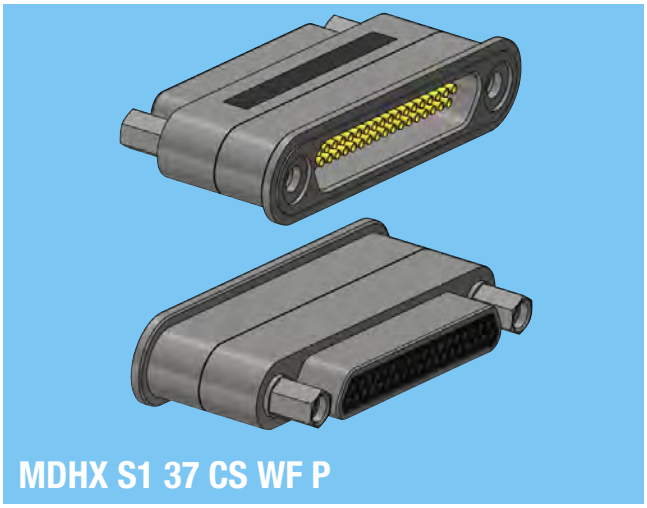
DIMENSIONS

Dimensions are in millimetres (inches).



	A ±0.25 (±0.01)	B max.	C max.	D ±0.13 (±.005)	E ±0.25 (±0.01)	F max.	G max.
9 S	23.20 .913	10.16 .400	20.55 .809	14.35 .565	12.50 .492	6.35 .250	9.85 .388
15 S	27.00 1.063	14.00 .551	24.35 .959	18.16 .715	12.50 .492	6.35 .250	9.85 .388
21 S	30.81 1.213	17.81 .701	28.16 1.109	21.97 .865	12.50 .492	6.35 .250	9.85 .388
25 S	33.40 1.315	20.35 .801	30.75 1.211	24.51 .965	12.50 .492	6.35 .250	9.85 .388
31 S	37.17 1.463	24.16 .951	34.52 1.359	28.32 1.115	12.50 .492	6.35 .250	9.85 .388
37 S	41.00 1.614	27.96 1.101	38.35 1.510	32.13 1.265	12.50 .492	6.35 .250	9.85 .388
51 S	39.70 1.563	26.70 1.051	37.05 1.459	30.86 1.215	13.60 .535	7.44 .293	10.95 .431
51DR S	50.00 1.969	36.83 1.450	47.35 1.864	41.02 1.615	12.50 .492	6.35 .250	9.85 .388
100 S	55.00 2.165	36.86 1.451	52.35 2.061	45.72 1.800	14.70 .579	8.46 .333	12.05 .474

FOR CHARACTERISTICS, SEE PAGE 20



MDHX S1 37 CS WF P

LASER WELDED

– High performance hermetic metal connector for panel mount
– Stainless steel 304L shell
– Copper alloy contact
– 9 to 51 contacts, custom size on request
– According to MIL–DTL–83513
– Operating temperature: from –55°C to 150°C or 180°C
– Helium leak rate: < $1x10^{-9}$ mbar.l/s

HERMAX® CONNECTOR SAVER

IDENTIFICATION CODE

MDHX	S1	37	CS	WF	P

SERIES
MDHX: Micro-D HermAx.

SHELL & POTTING MATERIAL
S1: SST 304L + potting 150°C.
S2: SST 304L + potting 180°C.

NUMBER OF CONTACTS
09, **15**, **21**, **25**, **31**, **37**, **51**, **51DR**.

CONNECTOR TYPE
CS: Connector saver (direct wiring).
See page 15 for wiring information.

SHELL TYPE
WF: Weldable front mount.

HARDWARE
P: Machined threads socket side ; jackposts plug side.
G: D-Click studs socket side ; D-Click posts plug side
(only available for connectors up to 37 contacts).

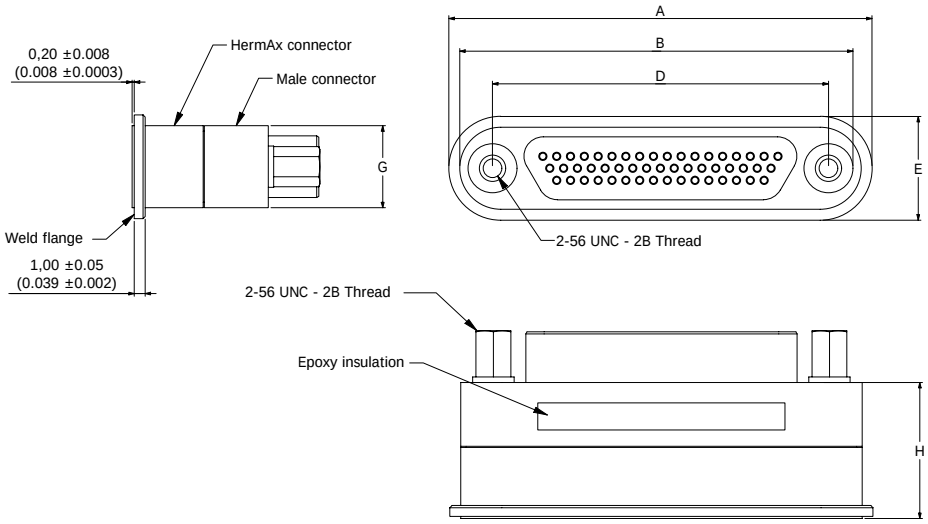
WEIGHTS

Approximate weights are in grams.

WEIGHT (in g)							
9 S	15 S	21 S	25 S	31 S	37 S	51 S	51 DR S
11	13	14	16	17	19	21	23

DIMENSIONS

Dimensions are in millimetres (inches).



	A +0/-0,02 (+0/-0,001)	B max.	D ±0.13 (±0.005)	E +0/-0,02 (+0/-0,001)	G max.	H max.
9 S	22.35 .866	20.45 .805	14.35 .565	8.45 .333	6.55 .258	13.50 .531
15 S	26.16 1.024	24.26 .955	18.16 .715	8.45 .333	6.55 .258	13.50 .531
21 S	29.97 1.141	28.07 1.105	21.97 .865	8.45 .333	6.55 .258	13.50 .531
25 S	32.51 1.260	30.61 1.205	24.51 .965	8.45 .333	6.55 .258	13.50 .531
31 S	36.32 1.417	34.42 1.355	28.32 1.115	8.45 .333	6.55 .258	13.50 .531
37 S	40.13 1.575	38.23 1.505	32.13 1.265	8.45 .333	6.55 .258	13.50 .531
51 S	38.86 1.496	36.96 1.455	30.86 1.215	9.53 .375	7.63 .300	19.50 .768
51DR S	49.02 1.929	47.12 1.855	41.02 1.615	8.45 .333	6.55 .258	13.50 .531

FOR CHARACTERISTICS, SEE PAGE 20

MDHX S1 37 CS GF Px

O–RING MOUNTED

– High performance hermetic metal connector for panel mount
– Stainless steel 304L shell
– Copper alloy contact
– 9 to 51 contacts, custom size on request
– According to MIL–DTL–83513
– Operating temperature: from –55°C to 150°C or 180°C
– Helium leak rate: see o–ring material

HERMAX® CONNECTOR SAVER

IDENTIFICATION CODE

MDHX	S1	37	CS	GF	Px

SERIES
MDHX: Micro-D HermAx.

SHELL & POTTING MATERIAL
S1: SST 304L + potting 150°C.
S2: SST 304L + potting 180°C.

NUMBER OF CONTACTS
09, **15**, **21**, **25**, **31**, **37**, **51**, **51DR**.

CONNECTOR TYPE
CS: Connector saver (direct wiring).
See page 15 for wiring information.

O-RING MATERIAL
GF: FKM (from -30°C, helium leak rate $<1x10^{-8}$ mbar.l.s^{-1}).
GS: FVMQ (from -55°C, helium leak rate $<1x10^{-5}$ mbar.l.s^{-1}).

HARDWARE
B: No hardware panel socket side ; jackposts plug side.
Px: Panel mount jackposts panel socket side ; jackposts plug side.
Gx: Panel mount D-Click jackposts panel socket side ; D-Click jackposts plug side (only available for connectors up to 37 contacts).
See page 13 & 14 for hardware.

CONNECTORS ARE SUPPLIED WITH ANTI-STATIC PROTECTIVE DUST CAPS

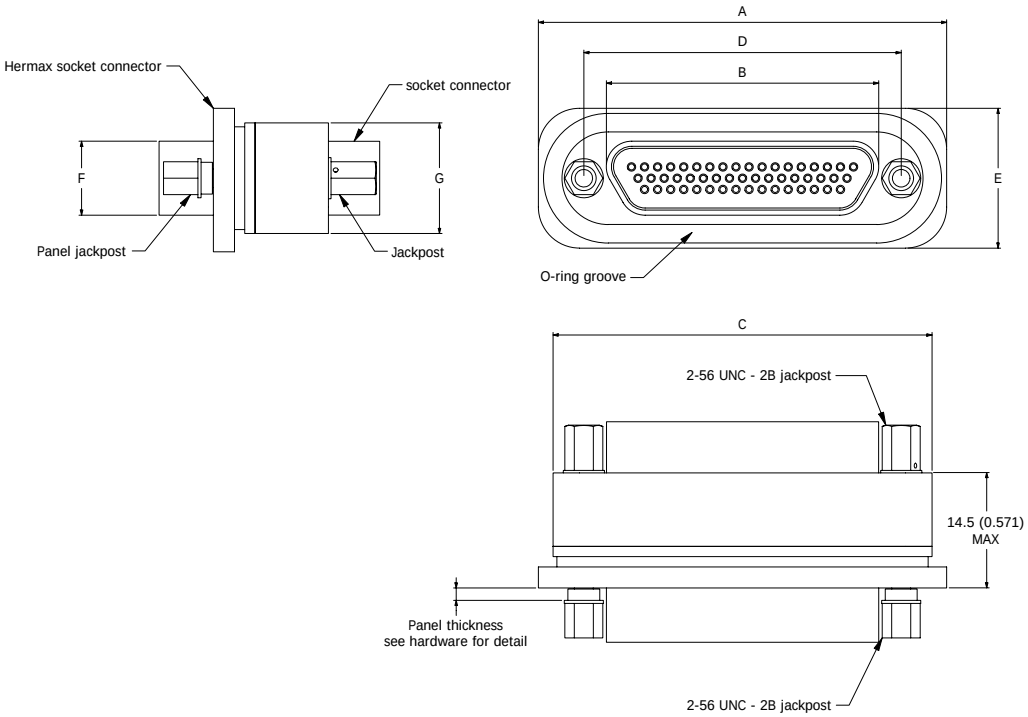
WEIGHTS

Approximate weights are in grams.

WEIGHT (in g)							
9 S	15 S	21 S	25 S	31 S	37 S	51 S	51 DR S
17.6	20.4	23.8	25	27.7	30.6	32.1	37.1

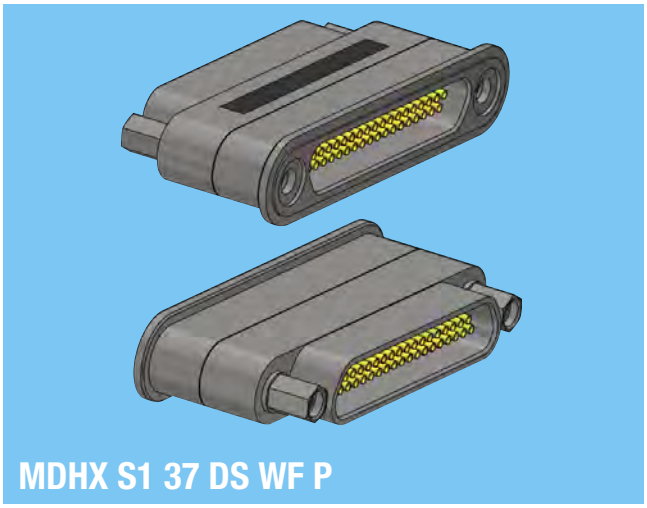
DIMENSIONS

Dimensions are in millimetres (inches).



	A ±0.25 (±0.01)	B max.	C max.	D ±0.13 (±.005)	E ±0.25 (±0.01)	F max.	G max.
9 S	23.20 .913	10.16 .400	20.55 .809	14.35 .565	12.50 .492	6.35 .250	9.85 .388
15 S	27.00 1.063	14.00 .551	24.35 .959	18.16 .715	12.50 .492	6.35 .250	9.85 .388
21 S	30.81 1.213	17.81 .701	28.16 1.109	21.97 .865	12.50 .492	6.35 .250	9.85 .388
25 S	33.40 1.315	20.35 .801	30.75 1.211	24.51 .965	12.50 .492	6.35 .250	9.85 .388
31 S	37.17 1.463	24.16 .951	34.52 1.359	28.32 1.115	12.50 .492	6.35 .250	9.85 .388
37 S	41.00 1.614	27.96 1.101	38.35 1.510	32.13 1.265	12.50 .492	6.35 .250	9.85 .388
51 S	39.70 1.563	26.70 1.051	37.05 1.459	30.86 1.215	13.60 .535	7.44 .293	10.95 .431
51DR S	50.00 1.969	36.83 1.450	47.35 1.864	41.02 1.615	12.50 .492	6.35 .250	9.85 .388

FOR CHARACTERISTICS, SEE PAGE 20



MDHX S1 37 DS WF P

LASER WELDED

– High performance hermetic metal connector for panel mount
– Stainless steel 304L shell
– Copper alloy contact
– 9 to 51 contacts, custom size on request
– According to MIL–DTL–83513
– Operating temperature: from –55°C to 150°C or 180°C
– Helium leak rate: < $1x10^{-9}$ mbar.l/s

HERMAX® DUAL SOCKET CONNECTOR

IDENTIFICATION CODE

MDHX	S1	37	DS	WF	P

SERIES
MDHX: Micro-D HermAx.

SHELL & POTTING MATERIAL
S1: SST 304L + potting 150°C.
S2: SST 304L + potting 180°C.

NUMBER OF CONTACTS
09, **15**, **21**, **25**, **31**, **37**, **51**, **51DR**.

CONNECTOR TYPE
DS: Dual socket (indirect wiring).
See page 15 for wiring information.

SHELL TYPE
WF: Weldable front mount.

HARDWARE
P: Machined threads socket side ; jackposts plug side.
G: D-Click stud both sides (only available for connectors up to 37 contacts).

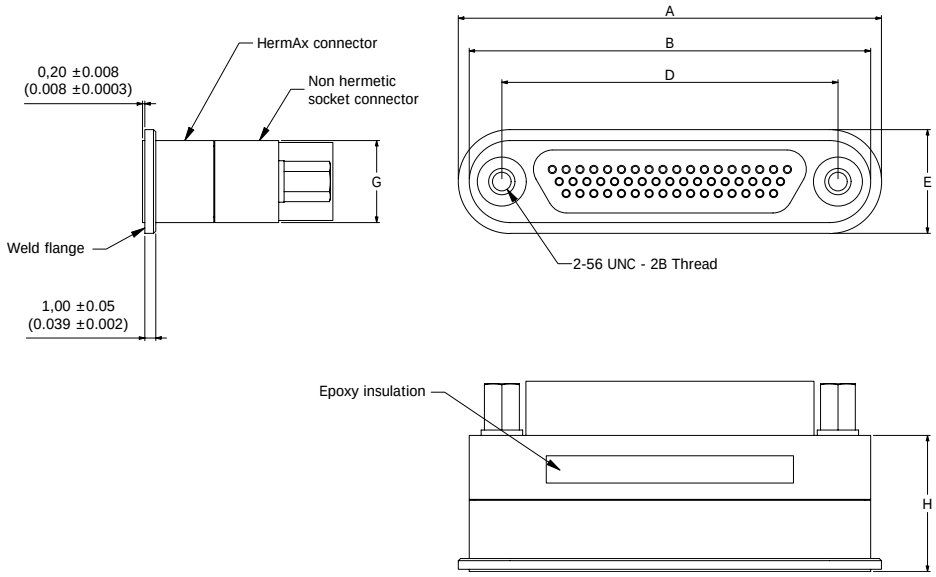
WEIGHTS

Approximate weights are in grams.

WEIGHT (in g)							
9 S	15 S	21 S	25 S	31 S	37 S	51 S	51 DR S
13	14	16	17	18	20	22	23

DIMENSIONS

Dimensions are in millimetres (inches).



	A +0/-0,02 (+0/-0,001)	B max.	D ±0.13 (±0.005)	E +0/-0,02 (+0/-0,001)	G max.	H max.
9 S	22.35 .866	20.45 .805	14.35 .565	8.45 .333	6.55 .258	13.50 .531
15 S	26.16 1.024	24.26 .955	18.16 .715	8.45 .333	6.55 .258	13.50 .531
21 S	29.97 1.141	28.07 1.105	21.97 .865	8.45 .333	6.55 .258	13.50 .531
25 S	32.51 1.260	30.61 1.205	24.51 .965	8.45 .333	6.55 .258	13.50 .531
31 S	36.32 1.417	34.42 1.355	28.32 1.115	8.45 .333	6.55 .258	13.50 .531
37 S	40.13 1.575	38.23 1.505	32.13 1.265	8.45 .333	6.55 .258	13.50 .531
51 S	38.86 1.496	36.96 1.455	30.86 1.215	9.53 .375	7.63 .300	19.50 .768
51DR S	49.02 1.929	47.12 1.855	41.02 1.615	8.45 .333	6.55 .258	13.50 .531

FOR CHARACTERISTICS, SEE PAGE 20

MDHX S1 37 DS GF Px

O–RING MOUNTED

– High performance hermetic metal connector for panel mount
– Stainless steel 304L shell
– Copper alloy contact
– 9 to 51 contacts, custom size on request
– According to MIL–DTL–83513
– Operating temperature: from –55°C to 150°C or 180°C
– Helium leak rate: see o–ring material

HERMAX® DUAL SOCKET CONNECTOR

IDENTIFICATION CODE

MDHX	S1	37	DS	GF	Px

SERIES
MDHX: Micro-D HermAx.

SHELL & POTTING MATERIAL
S1: SST 304L + potting 150°C.
S2: SST 304L + potting 180°C.

NUMBER OF CONTACTS
09, **15**, **21**, **25**, **31**, **37**, **51**, **51DR**.

CONNECTOR TYPE
DS: Dual socket (indirect wiring).
See page 15 for wiring information.

O-RING MATERIAL
GF: FKM (from -30°C, helium leak rate $<1x10^{-8}$ mbar.l.s^{-1}).
GS: FVMQ (from -55°C, helium leak rate $<1x10^{-5}$ mbar.l.s^{-1}).

HARDWARE
B: No hardware panel socket side ; jackposts socket.
Px: Panel mount jackposts panel socket side ; jackposts socket side.
Gx: Panel mount D-Click jackpost panel socket side ; D-Click jackposts socket side (only available for connectors up to 37 contacts).
See page 13 & 14 for hardware.

CONNECTORS ARE SUPPLIED WITH ANTI-STATIC PROTECTIVE DUST CAPS

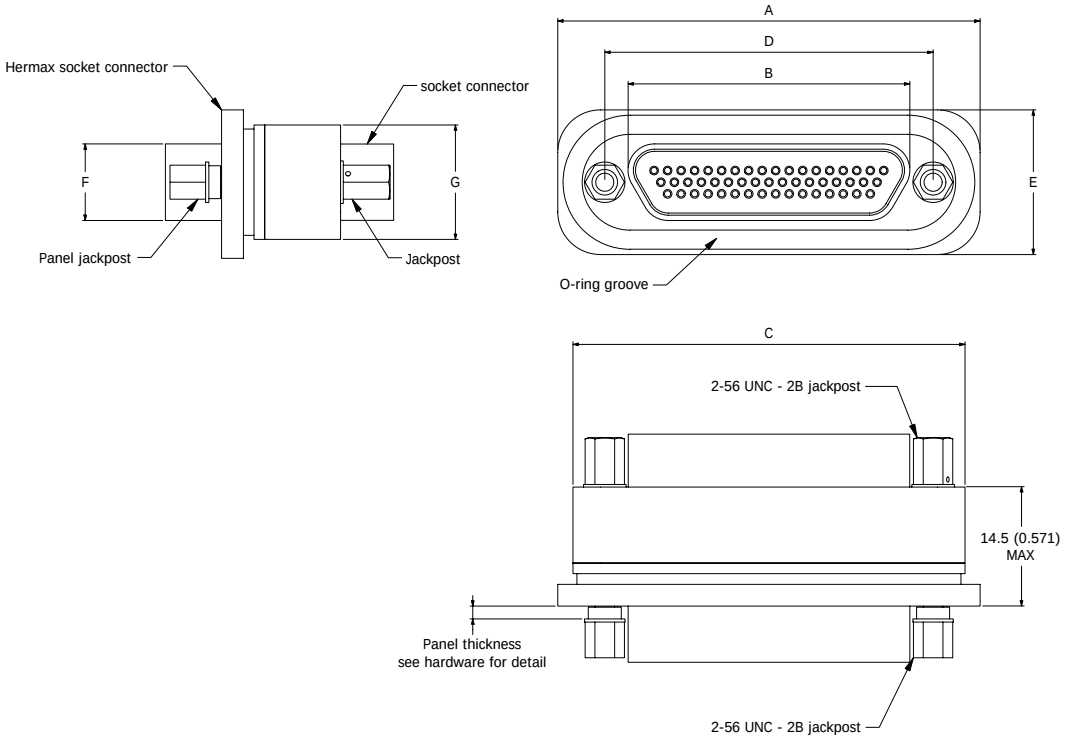
WEIGHTS

Approximate weights are in grams.

WEIGHT (in g)							
9 S	15 S	21 S	25 S	31 S	37 S	51 S	51 DR S
16.8	19.2	21.7	23.3	25.7	28.2	29.2	33.9

DIMENSIONS

Dimensions are in millimetres (inches).



	A ±0.25 (±0.01)	B max.	C max.	D ±0.13 (±.005)	E ±0.25 (±0.01)	F max.	G max.
9 S	23.20 .913	10.16 .400	20.55 .809	14.35 .565	12.50 .492	6.35 .240	9.85 .388
15 S	27.00 1.063	14.00 .551	24.35 .959	18.16 .715	12.50 .492	6.35 .240	9.85 .388
21 S	30.81 1.213	17.81 .701	28.16 1.109	21.97 .865	12.50 .492	6.35 .240	9.85 .388
25 S	33.40 1.315	20.35 .801	30.75 1.211	24.51 .965	12.50 .492	6.35 .240	9.85 .388
31 S	37.17 1.463	24.16 .951	34.52 1.359	28.32 1.115	12.50 .492	6.35 .240	9.85 .388
37 S	41.00 1.614	27.96 1.101	38.35 1.510	32.13 1.265	12.50 .492	6.35 .240	9.85 .388
51 S	39.70 1.563	26.70 1.051	37.05 1.459	30.86 1.215	13.60 .535	7.44 .293	10.95 .431
51DR S	50.00 1.969	36.83 1.450	47.35 1.864	41.02 1.615	12.50 .492	6.35 .250	9.85 .388

FOR CHARACTERISTICS, SEE PAGE 20

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