

SEALED PROTECTION WHEN YOU NEED IT MOST

Product Solution Guide



AVNET®

SEAL THE DEAL



CONNECTORS &
HEAT SHRINK
TUBING

CONNECTIONS THAT LAST

When it comes to sealed protection TE Connectivity offers rugged connectors and high-performance heat shrink tubing built for the harshest environments – exposure to moisture, dust, debris, shock, and vibration.

With trends towards more connected devices, there is a need to embed more functionality into constrained design space. Engineers need to design for safety and durability while meeting global industry safety standards. Our optional seals offer a clean, easy, and more cost-effective way to seal applications in the harshest environments.

TE provides connectivity solutions that meet and optimize your complex application needs with a single connection.

TECHNOLOGY DISTRIBUTOR THAT DELIVERS

Avnet Asia Pacific is a technology solutions company that supports customers of all sizes, entrepreneur to enterprise, at each stage of the product lifecycle with a comprehensive ecosystem and portfolio of design and supply chain services.

With deep expertise in design and engineering, coupled with broad line distribution and integration capabilities and services, we are uniquely positioned to meet critical time-to-market needs for customers globally while helping them reduce risk and lower costs.

Avnet experts are ready to deliver the right mix of technology and expertise for your business and success.

INGRESS PROTECTION (IP) RATING CHART

Our sealed connector portfolio offers products with varying degrees of IP rated sealing protection. From splash resistant to water proof - depending on your specific design needs. TE Connectivity (TE) has solutions for applications used in water related or high humidity areas as well as solutions for applications used in harsh environments.

IP ratings are represented by combining the first and second digits of the following columns:

FIRST DIGIT PROTECTION FROM SOLIDS			SECOND DIGIT PROTECTION FROM LIQUIDS		
					
0	ZERO PROTECTION		0	ZERO PROTECTION	
1	PROTECTED Against solid objects >50mm		1	PROTECTED Against vertically dripping water	
2	PROTECTED Against solid objects >12.5mm		2	PROTECTED Against dripping water when tilted up to 15°	
3	PROTECTED Against solid objects >2.5mm		3	PROTECTED Against spraying water at any angle up to 60° from the vertical	
4	PROTECTED Against solid objects >1mm		4	PROTECTED Against splashing water from any direction	
5	DUST PROTECTED Ingress of dust is not entirely prevented but does not interfere with the operation of the equipment		5	PROTECTED Against water jets from a 6.3mm nozzle from any direction	
6	DUST TIGHT No ingress of dust		6	PROTECTED Against high-power water jets from a 12.5mm nozzle from any direction	
EXAMPLE: 			7	PROTECTED Against immersed in water under defined conditions of pressure and time (up to 1m of submersion)	
			8	PROTECTED Against continuous immersion >1m in conditions specified by the manufacturer	
			9	PROTECTED Against high-power, high-temperature water jets	

SEALED CONNECTOR DESIGN NAVIGATOR

Selecting the right connector for harsh environments doesn't need to be difficult. TE Connectivity (TE) offers a robust portfolio of sealed connectors that can help you design for ingress protection, ergonomics, miniaturization and product safety. Explore this design navigator to find the reliable connector suited for your application needs.



Major Home Appliances



Small Home Appliances



Automotive



Lighting



Industrial


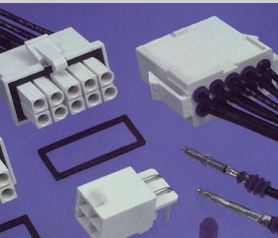
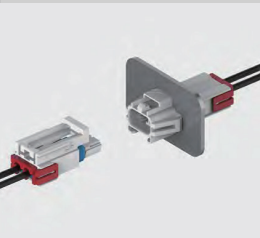



Personal Health Care



Lawn and Garden



	Sealed Signal Double Lock Connectors	Mini-Universal MATE-N-LOK Connectors	Power Versa-Lock Connectors	Universal MATE-N-LOK Connectors
				
Centerline (mm)	2.50	4.41	5.00	6.35
Current Rating (A)	3	9	15	19
Voltage Rating (V)	250	600	600	600
Flammability	UL94 V-0, Glow Wire (GWT)	UL94 V-0, V-2	UL94 V-0, Glow Wire (GWT)	UL94 V-0, V-2
Approvals	UL, CSA, TUV	UL, CSA (250V Max), VDE (II)	UL, CSA, VDE	UL, CSA, VDE
Operating Temp. Range (°C)	-40 to +105	-55 to +105	-40 to +105	-55 to +105 (Up to +125 available)
Wire Size (AWG)	26-22	26-18	26-14	20-14
Number of Positions	2-6	Dual Row 2-10, 16	1-4, 6, 9	2-4, 6, 9, 12, 15
IP Rating	IP67	IP57	IP67	IP57
Color/Keying Availability (Yes/No)	No	No	Yes	Yes
Available Configuration	W-T-W, W-T-B	W-T-W, W-T-B, W-T-P	W-T-W, W-T-P	W-T-W, W-T-B, W-T-P
Link to Product Information	Sealed Signal Double Lock	Mini-Universal MATE-N-LOK	Power Versa-Lock	Universal MATE-N-LOK

CONNECTORS

MATE-N-LOK CONNECTORS

UNIVERSAL MATE-N-LOK CONNECTORS



APPLICATIONS:



Vending Machine



Architectural Lighting



Refrigeration



Welding Equipment



Power Supplies



Production Equipment



Wiring Harness Assemblies

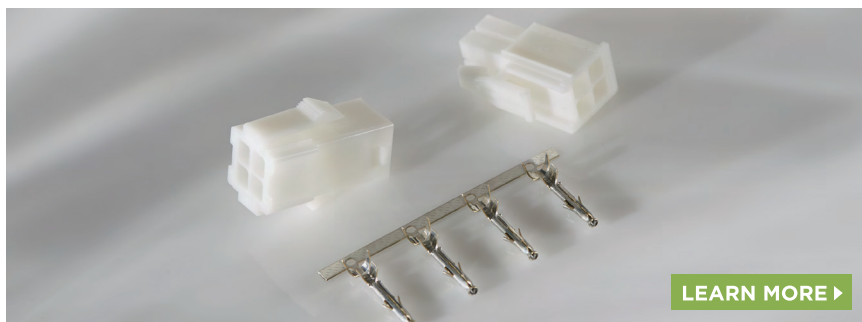


Rack-mount Servers

BENEFITS:

- Existing applications using Universal MATE-N-LOK connectors can be upgraded to a splash-proof system with two wire seals and one interface seal
- Flanged twist and lock (TNL), bulkhead, and in-line cap and plug housings available
- New terminal position assurance (TPA) for single row 2-5 position cap and plug housings
- Positive polarization, positive locking, and rear cavity identification for error-resistant assembly

MINI UNIVERSAL MATE-N-LOK CONNECTORS



APPLICATIONS:



HVAC



Security Systems



Refrigeration



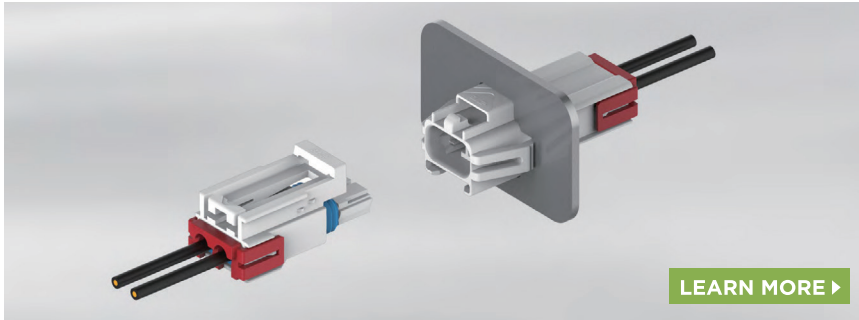
Storage & Networking Systems

BENEFITS:

- IP57 rated, splash-proof design for applications that require sealing
- Lanceless contacts for tangle-free handling
- Three-point stabilization to provide better terminal position
- Compact, durable housings that accommodate both pins and sockets

CONNECTORS

POWER VERSA-LOCK CONNECTORS



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APPLICATIONS:



Marine



Automotive



Refrigeration



Lighting



Vending
Machine



Industrial
Machinery



Gaming
Equipment



HVAC



Coffee
Machines

BENEFITS:

- IP67 optional sealing system using gang seals with perimeter interface seal for lower mating force, easing assembly
- Terminal position assurance (TPA) for unsealed applications to prevent terminal backouts for enhanced reliability
- Various keys and colors available to assist in fail-proof assembly
- 18° angled twist and lock (TNL) connector that allows condensation to drip away from the connection
- Tab and receptacle contact design with four points of contact for higher reliability

2.5MM SEALED SIGNAL DOUBLE LOCK CONNECTORS



[LEARN MORE ▶](#)

APPLICATIONS:



Lighting



Refrigeration



Automotive



Agricultural



Lawn & Garden
Equipment

BENEFITS:

- IP67 rated protection against water and dust
- 2.5mm centerline to provide a compact design solution
- Snag-proof latch for ease of assembly
- Optional terminal position assurance (TPA) that helps ensure proper assembly
- Lance-less polarized terminals that help to prevent incorrect insertion, reducing assembly errors

Heat Shrink Tubing

Your Guide to Selecting the Correct Size

Heat Shrink Tubing changes shape when installed. Correctly sized tubing will conform to the substrate over which it is applied shrinking in both diameter and length which can make it difficult to select the correct size.

STEP 1:

Recovered ID vs. Size of Substrate

Proper installations require tubes to shrink by at least 20% of its supplied size but not so far that the tube reaches its fully recovered size. It's ideal to have a minimum of 10% unresolved recovery after installation.

Example:

RNF-100 size 1" recovers to a maximum of 0.50". For applications where the expected recovered size is between 0.50" + 0.05" (i.e., 10% of 0.5") = 0.55" to; 1" - .2" (i.e., - 20% of 1.0") = 0.80"

STEP 2:

Leak Shrinkage

- Tubing will shrink in diameter and in overall length during the recovery process.
(NOTE: In certain cases, it will grow in length.)
- Products differ in longitudinal shrinkage %'s.
- Account for shrinkage when specifying the cut length.
- Cut lengths of tubing longer than the distance being covered.

Insufficient Recovery

The Best Installation Window

Too Much Recovery

10%

20%

% Recovery

90%

100%



DO's

Always use the specified Expanded ID dimension.

Use the specified dimensions for the recovered internal diameter of the tube. Sometimes the tube will shrink more than the Recovered ID, but it will ALWAYS meet the maximum specified dimension.

Follow the installation instructions, especially temperature guidelines:

- Too cold - tubing may not fully recover.
- Too hot - tubing may show burn marks or split.



DON'Ts

Do not force the tube over something by stretching as it can tear during recovery.

Do not cut the tube to the required final length. The tube changes length during recovery. The more it shrinks, the greater the longitudinal change.

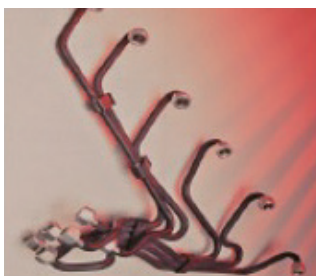
Do not recover the tubing over anything with sharp edges.



BRST TUBING



DWFR TUBING



ATUM TUBING



SCT 1 TUBING

HEAT SHRINK TUBING

PROTECTION WHERE YOU NEED IT



INSULATION

Protects and minimizes heat transfer for solid thermal and electrical insulation with operating temperatures ranging from -55°C to 150°C



STRAIN RELIEF

Allows for greater flexibility in areas where stress can cause failures, such as connector pins and splices, enabling a reliable connection



PROTECTION

Designed for the harshest environments with cut-through, chemical, fluid, abrasion, and anti-fungal resistance



SEALING

Keeps out moisture, water, bacteria, fuels, and fungus



IDENTIFICATION AND SAFETY

Helps identify wires for grounding and color-coding capabilities to reduce safety hazards

ES-2000 HEAT SHRINK TUBING



[LEARN MORE >](#)

BENEFITS:

- 4:1 shrink ratio allows a few sizes to cover a wide range of splice and component diameters
- Flame-retardant and mechanically tough, the tubing provides strain relief and abrasion protection of wire splices, terminals, and other components
- Thick adhesive liner forms an effective barrier against fluids and moisture and performs well at an extended temperature range

APPLICATIONS:



Specially designed for environmental sealing and electrical insulation of wire splices, terminations, and components.

HEAT SHRINK TUBING

ATUM AND DWFR HEAT SHRINK TUBING

ATUM HEAT SHRINK TUBING



[LEARN MORE ▶](#)

BENEFITS:

- Tubing environmentally seals and protects components and interconnections (moisture and corrosion)
- Higher shrink ratios allow for connector-to-cable sealing
- Medium wall provides increased mechanical protection
- ATUM heat shrink tubing's adhesive bonds to a wide variety of materials (plastics, rubbers, and metals, including polyethylene, aluminum, steel, and copper)
- DWFR adhesive bonds to variety of materials

DWFR HEAT SHRINK TUBING



[LEARN MORE ▶](#)

APPLICATIONS:



Sealing and protection of connector backshells, breakouts, and connector-to-cable transitions



High shrink ratio that allows for repair of damaged cable jackets without removing connectors

HEAT SHRINK TUBING

QSZH HEAT SHRINK TUBING



BENEFITS:

- Excellent environmental sealing
- Quick installation
- Zero halogen
- Mechanical protection against flexing, abrasion and cut-through
- RoHS/ELV compliant

APPLICATIONS:



Zero halogen, dual wall heat shrinkable tubing designed to provide environmental sealing and mechanical and electrical protection of in-line splices in automotive T2 environment



One tubing size that covers a broad range of ground wire sizes and wire combinations

CONDUCTIVE ELASTOMER



BENEFITS:

- Thickness from 0.5mm
- Wide temperature range: -55°C to +200°C
- Fluorosilicone for harsh environments: fuel oils and solvents
- Choice of materials for galvanic compatibility
- Flame-retardant to UL94 V-0
- Available with conductive self-adhesive backing on sheets

APPLICATIONS:



Industrial Controls



Test & Measurement Instruments



Military Equipment



Avionics



Medical Electronics



Electronic Equipment

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APPLIANCES / SEALED PROTECTION WHEN YOU NEED IT MOST

