



# Robotics

The future of technology aims to create intelligent machines that can assist humans in increasing productivity and efficiency significantly. The scope of robotics lies in applications such as drones, warehouse robots, and robotic arms, for which Amphenol offers some of the best connectivity solutions.



# Amphenol Overview

**Amphenol Communications Solutions (ACS), a division of Amphenol Corporation, is a world leader in interconnect solutions for Communications, Mobile Consumer Products, RF, Optics, Broadband and Commercial electronics markets.**

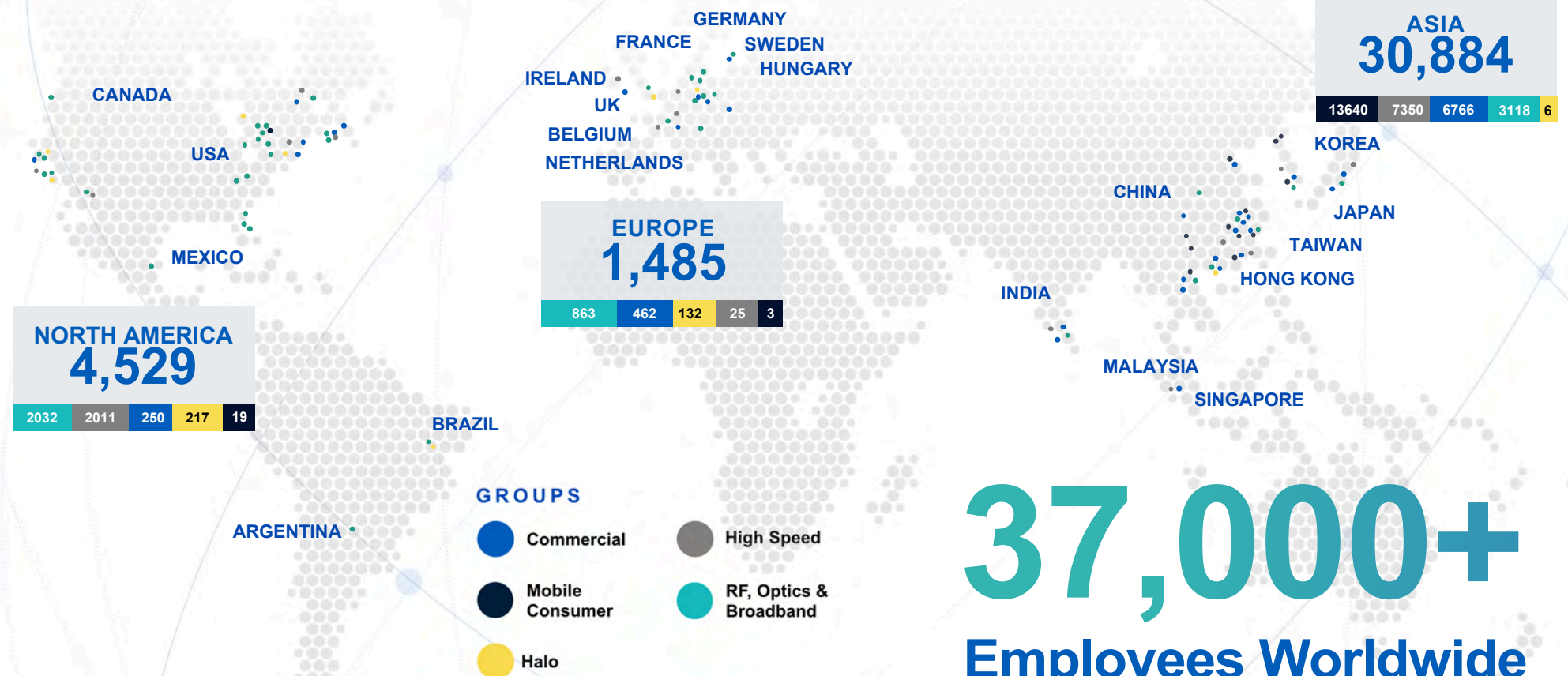
Amphenol Corporation is one of the world's largest designers and manufacturers of electrical, electronic and fiber optic connectors and interconnect systems, antennas, sensors and sensor-based products and coaxial and high-speed specialty cable.

ACS has an expansive global presence in research and development, manufacturing, and sales. We design and manufacture a wide range of innovative connectors as well as cable assemblies for diverse applications including server, storage, data center, mobile, RF, networking, industrial, business equipment and automotive.

## Strong Global Presence

We place heavy emphasis on R&D for both new product and technology development, focusing on the advancement of the next generation of high-speed interconnects and power distribution solutions as well as innovative manufacturing solutions.

- Our R&D centers worldwide have registered thousands of patents and licensing agreements, developing some of the world's first innovations in connectors such as Shield-less High-Speed Connectors, Ball-Grid-Array Attachments, economical Stamped High-Power Contacts and cost effective yet reliable plating processes.
- We relentlessly seek improvements of our products, increasing our solutions' overall cost effectiveness, precision and reliability. This ensures that we meet or even surpass the ever changing needs and expectations of market trends.



# 37,000+ Employees Worldwide

## APPLICATION SCOPE

# Robotics

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## APPLICATION SCOPE



### Control and communication

Amphenol's robust connectors and cable assembly solutions are suitable for a wide range of robotics applications, including industrial robotic arms, collaborative robots (cobots), drones, autonomous robots, and more - whether it's for precision control, real-time communication, or data-intensive tasks



### Battery and Charger

Battery and chargers are required for robots to function, and choosing the right power solution is crucial to achieving ideal performance. Since robots should be constantly plugged into power, they demand durability. The battery, the connectors, and the electric source used to power robots ensure the longevity and optimum current supply of these machines.



### Motor drives and Controllers

Motion controllers serve as a critical component in the field of robotics, enabling precise and coordinated movements of robotic systems. Robotic controllers are also systems responsible to control the movements of components such as robotic arms. Motor drives play a crucial role in the operation and control of motors within robotic systems.



### Battery Management Systems

In robotics, the battery holds significant strategic importance as a core component. Just as in electric vehicles (EVs), robotics systems are equipped with a Battery Management System (BMS) that plays a crucial role in regulating battery charge and safeguarding it against operations that exceed safe limits.



### Vision and Sensing

A robotic vision sensor is a compact and self-contained unit that incorporates an integrated camera, lights, and a controller (and sometimes a laser) into a single device. Computer vision and sensor technologies are integral components of drone AI as they enable object detection, classification, tracking, and other crucial functions during



**EnergyKlip™ EK160**

- Rated up to 160A per contact
- IP67 seal available
- Robust latching system



**EnergyKlip™ EK350**

- Rated up to 350A per contact
- IP67 seal
- Robust latching system



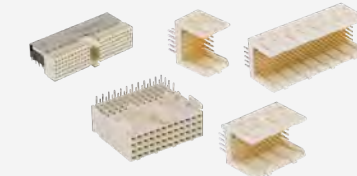
**IPC-M50 Connector**

- Rated up to 50A per 6AWG contact (UL rated currents up to 120A)
- Rated up to 10,000 mating cycles
- UL tested and approved when cross-mated with competitive connectors



**PCIe® Gen 4/5/6 Card Edge Connectors**

- X1, X4, X8, X16, X24, X32 standard links
- 1.00mm pitch, vertical and right angle with options for ridge, locked latch, side latch, blade hold down, open wall
- Extensive range include options for surface mount, through-hole solder, press-fit and straddle mount terminations and keying options offered



**Industrial Backplane Connectors**

- 2.00 mm Millipacs® series hard metric connector, 2mm Metral® series future bus connector & 2.54mm DIN 41612 connector for robust applications in the Industrial segment
- Features 2-beam twisted tulip contact which provides an equalized signal path



**BergStak® 0.40mm Connector**

- Fine pitch, vibration-proof.
- Wide range of positions.
- Signal speed up to 16 Gb/s.



**IPC-M350 Connector**

- Rated up to 500A per 350MCM (185mm<sup>2</sup>) contact
- Rated up to 10,000 mating cycles
- UL tested and approved when cross-mated with competitive connectors



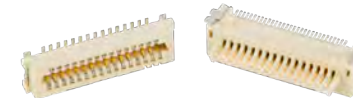
**ix Industrial™ Ethernet**

- Next gen ruggedized interface
- IEC 61076-3-124, Cat6A, PoE++
- IP20 & IP67 connectors & cables
- ix-Mag with integrated magnetics
- Factories, Robotics applications



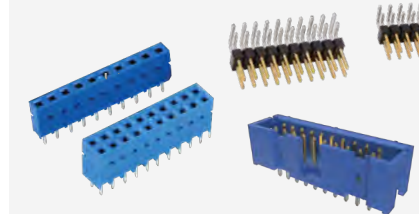
**Single Pair Ethernet**

- Next gen ruggedized interface
- IEC 63171-6, PoDL
- IP20 & IP67 connectors & cables
- Industrial Ethernet to the sensor and actuator level
- Multidrop Solutions



**Conan® Lite 1.00mm**

- Secure, Reliable connector.
- Audible “click” to ensure perfect mating.
- Speed up to 8Gb/s.



**Modular Systems 2.54mm/2.00mm**

- Dubox®, Quickie®, BergStik®, PV® 2.54mm, Minitex® 2.00mm.
- Industry proven connector system.
- Board to Board, Wire/Cable to Board.



**ComboLock® 1.00mm /3.00mm**

- Compact, hybrid wire-to-board connector.
- Active Positive Latching.
- 1.5A signal, 10A power.



**Industrial RJ Plugs**

- Ruggedized RJ plugs & cables
- IDC termination, field installable
- Metal latching, full metal construction
- Cat6A, fully shielded
- Multiple cable entry angle options
- Factory and other applications



**Ruggedized**

- Ruggedized, IP67 sealed
- Connectors & cables
- RJ, USB, USB-C, D-Sub, HDMI
- MRD Circular latching
- FLH rectangular latching
- Industrial, commercial, lighting



**DDR5 SO-DIMM Connectors**

- 262 positions connector in high-density design of 0.50mm pitch
- 4.00mm, 8.00mm, 5.20mm and 9.20mm height
- Right angle and vertical orientation with SMT mechanical hold-downs



**MicroSpace™ / MicroSpaceXS™ 1.27mm**

- Compact, robust and versatile.
- LV214 severity-2 / 3, USCAR-T2V2 compatible.
- 4A per contact, TPA, CPA features.



**Minitex® Pwr Connector and Cable Assembly**

- Wire-to-wire and wire-to-board solutions
- Current rating from 5A to 25A
- Available in pitch sizes of 3.00mm, 4.20mm, and 5.70mm



**DuraSWAP™ Swappable battery connectors**

- IP67 rated swappable battery docking connectors
- Contact system provides continuous current of 100A and withstands 10,000 Mating cycles
- Connector mates in four different orientations



**DuraSWAP™ Swappable Battery Connectors**

- IP67 rated swappable battery connector
- Provides continuous current of 100A and withstands 10,000 mating cycles
- Connector mates in four different orientations



**EnergyEdge™ X-treme**

- 3000W at 12V
- Available in straddle mount, right angle, right angle coplanar, and vertical configurations
- 25% increase in current linear density



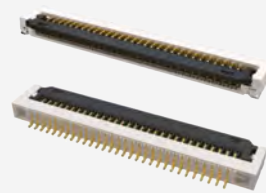
**BrightConnX™ Lighting Connectors**

- Lighting connectors & cables
- NEMA/ANSI C136.41
- Zhaga Book 18 and Book 20
- LED indoor, outdoor, street lighting applications



**PwrBlade® MiniMezz**

- Rated up to 50A per high power contact, 25A per low power contact
- Available in stack heights from 8mm to 20mm (tooled in 1mm increments)
- +/- 0.80mm of gatherability for blind-mate applications



**FFC/FCP Connectors**

- From 0.21mm to 2.0mm pitch with various heights ranging from 0.5mm to 6.25mm.
- Easy to operate and high vibration-proof performance
- Automotive grade versions compliant with USCAR2 and LV214 are available
- FFC cable can be supported as a whole solution
- Autolock option available



**Ruggedized**

- Ruggedized, IP67 sealed
- Connectors & cables
- RJ, USB, USB-C, D-Sub, HDMI
- MRD Circular latching
- FLH rectangular latching
- Industrial, commercial, lighting



**PwrMAX® G2**

- Highest density blind-mate Power and Signal connector series
- Up to 130A per contact and 18% size reduction
- Orthogonal, mezzanine, coplanar and right-angle configurations available for both PCB and busbar applications



**FloatCombo™ Floating Board-to-Board Connector System with Power Pin**

- 0.50mm pitch connector with 4 independent power pins
- Supports 5A current per power pin and high-speed data rates up to 16Gb/s
- Various stacking heights from 8mm to 30mm with large floating allowance
- USCAR-2 T3V2 qualified



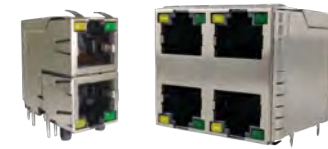
**USB Type-C Connectors**

- Performs to USB4 and Thunderbolt4 high-speed specifications, and backward compatible with USB3.2 Gen1 and Gen2
- Waterproof versions featuring unique O-ring technology (LIM) perform up to IPX8
- Supports up to 240W (5A/48V) power supply



**SD/Micro SD Express Series Connectors**

- PCIe Gen3\*1/ Gen4\*1 lane
- Backward compatible to UHS-I/UHS-II in one socket (3-in-1 solution)
- Push push/push pull structure



**RJ / Modular Jacks**

- Cat5, Cat5e, Cat6, Cat6A
- Single port, ganged, stacked multi-port, LEDs, shielded
- Vertical, right angle
- PoE++ capability
- Industrial, commercial, medical, consumer, military applications
- Cable Assemblies



**FAKRA Connectors**

Color-coded and mechanically keyed for easy installation and to prevent mismatching, the FAKRA interface is available in IP67 and non-IP67 PCB and cable-mount configurations designed to perform up to 6 GHz. Commonly used in compute modules, wire harnesses and camera applications.



**Mini HSbridge+ /HSbridge+**

- Compliant with USCAR-30 USB and USCAR-2
- High data rate up to 10Gb/s, current rating up to 5 amps of power output
- Multiple volume and colour coding effectiveness complaint with automotive requirements



**AUTOMATE® Mini-FAKRA Connectors**

The AUTOMATE® Mini-FAKRA connector series is a space-conscious, high-performance interface capable of supporting data transfer rates up to 20 Gbps. Ideal for compute modules, wire harnesses and camera applications. Custom sealed solutions available.



**FAKRA to FAKRA Cable Assemblies**

FAKRA to FAKRA assemblies are used to connect cameras, antennas, sensors and other devices to a vehicle's ECU or compute modules. Standard configurations feature straight and right-angle FAKRA plugs and jacks terminated to RG-174 or RG-58 low loss cable. Custom FAKRA cable assemblies and harnesses are available in any configuration utilizing a wide array of automotive cable types.



**RJMG / Magnetic Modular Jacks**

- 10/100T, 1GBT (10/100/1000-BT), 2.5G, 5G, 10G, Power Over Ethernet (PoE, 15W~150W), integrated with surge protection.
- Commercial 0~70°C and industrial -40~85°C & -40~105°C.
- Meets IEEE802.3ab and supports various Ethernet PHY



**AUTOMATE® Mini-FAKRA Cable Assemblies**

AUTOMATE® Mini-FAKRA cables assemblies are designed with a compact, modular housing and available in multi-port configurations for camera and other high-bandwidth automotive applications. High-performance up to 9 GHz with secure and easy mating and unmating.



**FAKRA to AMC/AMC4 Cable Assemblies**

FAKRA to AMC and AMC4 assemblies combine the automotive industry-standard FAKRA connector with remove ultraminiature AMC or AMC4 connectors on micro-coax cable. Ideal for tight spaces, these configurations are commonly used to connect cameras, antennas, sensors or other devices in the cab of a vehicle. Custom solutions are available.

## Robotics



### SMA

Versatile 50 ohm threaded connector series available in various PCB and cable-mount configurations provide lightweight, compact and vibration-proof design option. High-strength designs are ideal for harsh environments.



### HD-BNC

Engineered to enhance electrical and mechanical performance, the HD-BNC connector series features the trusted bayonet coupling mechanism which provides tactile feedback and a positive lock for quick and guaranteed mating. Available in 50 ohm configurations that operate up to 6 GHz and 75 ohm options that provide excellent electrical performance up to an extended range of 12 GHz.



### SMA to AMC/AMC4 Cable Assemblies

SMA to AMC or AMC4 ultraminiature cable assemblies feature a small footprint and low profile with reliable electrical performance up to 9 GHz (supports Wi-Fi 6E). Available in IP67 configurations for additional protection from external elements. Vibration resistant designs to accommodate a variety of cable types and panel thicknesses. More secure locking versions available.



### MCX

PCB and cable-mount 50 and 75 ohm options feature quick connect/disconnect snap-on mating which reduces installation time. 50 ohm configurations support applications up to 6 GHz while 75 ohm 12G versions operate up to 12 GHz.



### TNC

Rugged, threaded 50 ohm interface ensures connector will not de-couple in vibration-intense applications. Expansive product line includes designs for most industry-standard coaxial cable types. Durable construction for harsh environments.



### External Antennas

External antennas are mounted on the outside of a device by means of an RF connector interface. They are engineered for indoor or outdoor use with robust designs available for harsher environments. Monopole or dipole designs are available for higher power transmission and reception. Hinge and swivel features are available.

# Amphenol

COMMUNICATIONS SOLUTIONS

[amphenol-cs.com](http://amphenol-cs.com)

