

SOLUTIONS GUIDE

# INDUSTRIAL CONTROL & AUTOMATION



<http://www.te.com/usa-en/solutions/industrial-control-and-automation.html>

# INDUSTRIAL CONTROL & AUTOMATION

## Table Of Contents

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Networked Factories Count On Connectivity	03
HMI - Innovative Interconnect Solutions for Automation	11
PLC - Innovative Interconnect Solutions for Automation	25
Servo Motor & Servo Drive - Innovative Interconnect Solutions for Automation	39
Robotics - Innovative Interconnect Solutions for the Machinery Industry	53

# INDUSTRIAL CONTROL & AUTOMATION

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NETWORKED FACTORIES COUNT ON CONNECTIVITY

**Browse Products:** <http://www.te.com/usa-en/solutions/industrial-control-and-automation.html>

A photograph of an industrial factory floor. In the foreground, a white car chassis is being assembled. Several orange robotic arms are visible, some holding car parts. The background shows a complex network of pipes, metal structures, and other machinery. The lighting is bright, typical of a factory environment.

# NETWORKED FACTORIES COUNT ON CONNECTIVITY

THAT'S WHY THE WORLD'S MOST ADVANCED  
MANUFACTURERS COUNT ON TE CONNECTIVITY

INDUSTRIAL COMMUNICATIONS

EVERY CONNECTION COUNTS

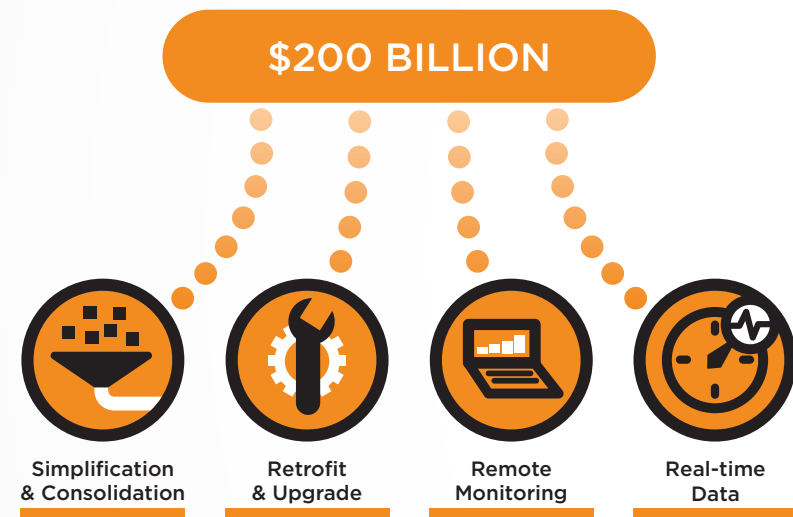


## GREATER PRODUCTIVITY COUNTS ON BETTER CONNECTIVITY.

Today, manufacturing has to be more of everything: more reliable, more automated, more flexible, more scalable, more decentralized. More connected. At TE Automation & Control, we deliver the innovative solutions to reliably connect, power and control the systems that make production more productive. From the circuit board to the harshest working environments, along the production floor and across the world, we make every connection count.

### MARKETPLACE TRENDS DRIVE GROWTH IN INDUSTRIAL AUTOMATION

Experts predict the global Industrial Automation market will grow to more than \$200 billion by 2015\*. At TE, we believe four key trends will not only contribute to this short-term growth, but will also spur the next evolutionary stage of development in Industrial Automation, known as Industry 4.0. TE offers connectivity solutions to help you capitalize on these expanding marketplace opportunities, as well as the emerging trends expected to drive the future of the industry.



### COUNT ON TE FOR HIGH PERFORMANCE NOW AND IN THE FUTURE

Not that long ago, a typical factory floor included equipment from a variety of manufacturers, each performing a specific task in the production process, and each with different protocols for doing so. Multiple technicians, with expertise in each protocol, were needed to operate the machines. Since the process lacked interoperability, a specialized communication bridge, capable of interpreting and communicating with each machine, was also required. A cumbersome resolution to be sure!

The demand for greater throughput and efficiency ultimately led to advances in factory automation, as well as the trend toward a common communication language. TE understood the need for reliable connectivity that delivered greater simplicity, efficiency and uptime—and embarked on an industrial communications and networking solution strategy to meet the most demanding requirements of manufacturers worldwide on the verge of Industry 4.0.

\* IMS Research, 2012.

## TE PRODUCTS HELP YOU COMPETE THROUGHOUT YOUR ENTIRE PRODUCTION ENVIRONMENT.

Networked manufacturing environments enable seamless communication, as well as greater speed and efficiency. In addition to data transfer among equipment on the factory floor, information must be shared throughout the entire production environment—extending beyond the industrial setting and onto desktops. Having access to real-time data regarding productivity and throughput empowers sound and immediate decision-making throughout your entire organization.

With a long history of cross-industry innovation and proven engineering expertise, TE is leading the charge to push the boundaries of efficiency and productivity—enabling simpler, faster and more economic industrial communications solutions.

“Our goal is to help our customers become market leaders, bringing them next generation technologies so they can, in turn, offer next generation products and solutions to their customers.”

Chris M. Zimmerman  
Sales Leader, Automation & Control, Americas



## TE'S INDUSTRIAL ETHERNET PRODUCTS PLAY A VITAL ROLE IN FACTORY AUTOMATION.

TE's industrial Ethernet products are widespread throughout today's networked factories, and play a critical role in driving the efficiency of many manufacturing processes. Used extensively in material handling equipment, our industrial communications solutions are also found throughout the automotive and food and beverage industries, as well as in the many manufacturing applications of industrial robots. With the development of smaller industrial Ethernet products, TE's solutions are also ideal for vision systems, common in security equipment and mail sortation devices.

### PROCESS CONTROL



Process control enables mass production of repetitive processes typically involving the combination of one raw material with another, using a liquid to facilitate the process. TE industrial connectivity solutions are used in many process-intensive industries including converting sewage into clean, potable water; refining crude oil into petroleum; or transforming gold nuggets into bars.

### FOOD & BEVERAGE

TE industrial connectivity solutions are employed throughout the Food and Beverage industry. For example, in a beer bottling plant, industrial Ethernet directives control each step in the process—from washing, to drying, filling, capping and labeling each bottle. A programmable master controller synchronizes each move and communicates progress to the back office. Proven to perform consistently, TE's connectors can dramatically minimize failure and keep the production line moving.



### AUTOMOTIVE ASSEMBLY



TE's Industrial Communications solutions have made a significant impact in automotive assembly industry-wide. The complexity inherent in many inter-dependent steps makes our industrial Ethernet connectors especially invaluable in an environment where many different types of automation and robotic equipment—from riveting and welding to turning screws in dashboards—are synchronized in real time to avoid bottlenecks.

### ROBOTICS



TE's industrial connectivity solutions play a significant role in the growing field of robotics. The International Federation of Robotics reported a 38% increase in industrial robotics—the highest ever, with the automotive, food and beverage, metal and machinery industries all reporting robot orders above average. Whether human-sized for tasks like welding, or SCARAs used to insert pins in round holes without binding, or Cartesian for pick and place applications, TE's industrial connectors communicate to robots of all types and in many diversified environments.

### VISION SYSTEMS

While early machine vision systems were introduced more than three decades ago, the vision systems of today require miniaturized cameras, yet deliver significantly increased power and speed. TE offers a proprietary family of connectivity products, designed specifically for use in restricted spaces, with a 25% smaller footprint than other similarly performing products. Whether used in mail sortation or security cameras, our miniaturized industrial connectors are an ideal solution for vision systems—as they deliver the power and performance required, within significantly smaller spaces.



“ At TE, we have a breadth and depth of experience and capabilities that few others can claim. Many factors impact signal integrity on a factory floor—it's our understanding of the total environment that enables us to provide our customers with solutions that perform flawlessly in real-world applications. ”

Eric Leijtnens  
*Industrial Communications Platform Lead*

## FEATURES YOU EXPECT FROM THE WORLD LEADER IN CONNECTIVITY SOLUTIONS.

TE makes it a practice to maintain an inventory of preferred parts so orders can be fulfilled quickly. Even with specialty, or custom orders, we work to reduce lead times to facilitate effective solutions within the desired timeframe.

### FIELD INSTALLABLE

- Simple and flexible enough to be installed in seconds rather than minutes
- No need for tools or special expertise
- The entire installation process can be completed quickly, easily and by hand

### HIGH RELIABILITY

- Reliable performance even in the harshest industrial manufacturing environments
- Unparalleled longevity
- Eliminate the need for constant replacements and costly disruptions

### ROBUST

- Designed and constructed to withstand the most demanding and inhospitable environments
- Tolerates many hazards including dust, extreme temperature or humidity, and vibration
- Used with immersion in liquids, railways and military war zones

### EMI SHIELDING

- Protected from the interference of external electromagnetic radiation
- Ensures the constant flow of electricity
- Minimizes costly downtime

### COMMON CORE

- RJ 45 Connectors use a common core insert
- Interchangeable with plastic or metal housings or receptacles
- Enables maximum flexibility across many diverse applications

## TE'S INDUSTRIAL COMMUNICATIONS PRODUCTS

### INDUSTRIAL USB CONNECTORS

With over six billion USB ports installed globally, TE's industrial USB connectors are ideal for any industrial USB application requiring a high locking force or a sealed design. Features include:

- Integrated locking mechanism
- Audible & tactile feedback, to prevent accidental plug pullout
- USB2.0 transmission specification compliance
- Four solder connections
- Single- or double-row mating sockets, mountable on PCBs
- Socket & connector mountings: reflow soldering, surface mount, and surface mount with board locks
- A sealed version with a quick-connect bayonet coupling mechanism for harsher environments

### INDUSTRIAL RJ45 CONNECTORS

TE Industrial Ethernet RJ-45 connectors utilize a "common core" design for enhanced flexibility. Additional features include:

- Fast termination technology
- Field installable for IP20, ODVA & push-pull connectors
- Data transmission rates of 100 Mbit/s (4 pos.) up to 1000 Mbit/s (8pos.)
- Rugged locks
- Secondary locking with optional supporting frame

### INDUSTRIAL MINI I/O CONNECTOR

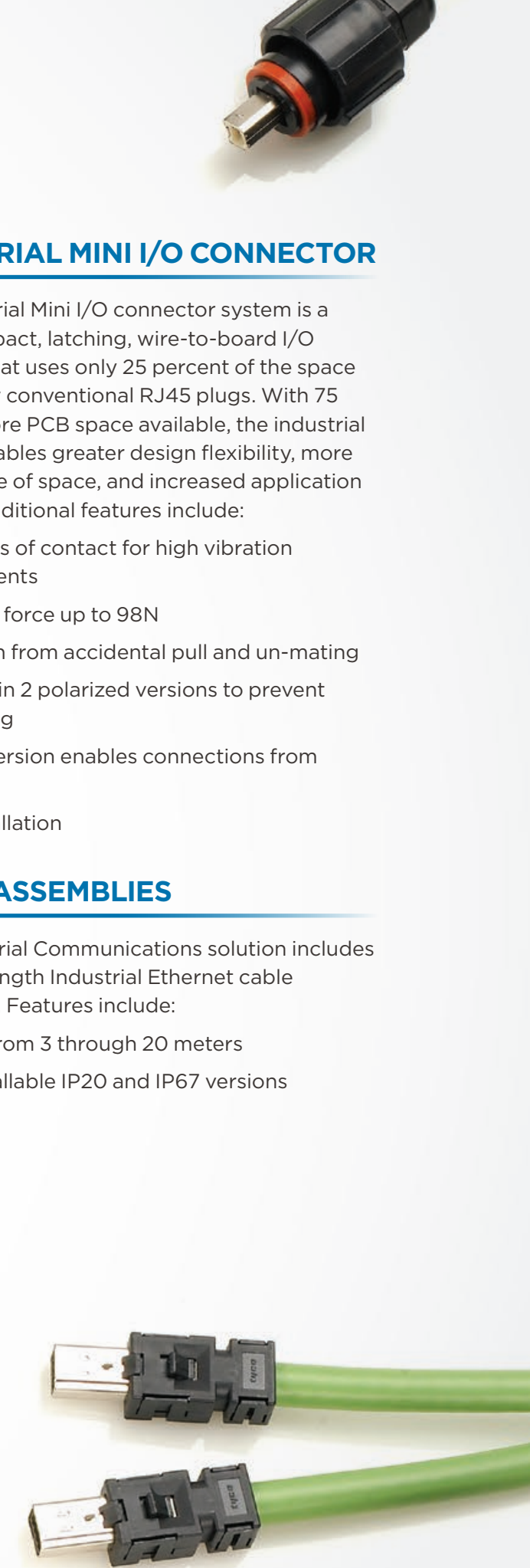
TE's Industrial Mini I/O connector system is a small, compact, latching, wire-to-board I/O interface that uses only 25 percent of the space required by conventional RJ45 plugs. With 75 percent more PCB space available, the industrial Mini I/O enables greater design flexibility, more efficient use of space, and increased application options. Additional features include:

- Two points of contact for high vibration environments
- Retention force up to 98N
- Protection from accidental pull and un-mating
- Available in 2 polarized versions to prevent mis-mating
- Vertical version enables connections from all angles
- Easy installation

### CABLE ASSEMBLIES

TE's Industrial Communications solution includes standard length Industrial Ethernet cable assemblies. Features include:

- Lengths from 3 through 20 meters
- Field installable IP20 and IP67 versions



# TE'S INDUSTRIAL COMMUNICATIONS PRODUCTS

TE Product Group

Connection Type

Environment

Housing Options

Application

Installation



## Industrial Mini I/O

Type I

Type II



## Industrial RJ45

Industrial Ethernet

ODVA (Variant 1)

CPC Product Family

Push/Pull (Variant 14)

Screw Type (Variant 3)



## Industrial USB Series

USB Latching IP20

Circular



## M8/M12

Panel Mount/Board Mount

Y-Adapters

Cable Assemblies

M8/M12 connector

Wire-to-Board

Wire-to-Wire

IP20

IP 65/67

Metal

Plastic

Push/Pull

Latching

Screw

1/4 Turn

Data

Signal

Field Installable

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## INDUSTRY 4.0 COUNTS ON CONNECTIVITY.

As hardware and systems become more advanced, the integration of electronics in industrial automation is becoming increasingly important. Embedding intelligence across the factory floor, for example, will ensure that all devices provide real-time data leading to an optimization of the Global Supply Chain. On the verge of Industry 4.0, the migration of more information technologies and applications in the field relies on the secure and predictable transport of data, signal and power. Industrial communications are key to a seamless integration of all devices and to the reliable transport of a large amount of data through the network. TE Connectivity recognizes this trend and our engaged teams partner with customers around the world to identify and solve their connectivity challenges—now and in the future.

“ In the factories of the future, intelligence needs to be available in all devices, resulting in a large amount of data that needs to be transported and communicated quickly and reliably. With our proven experience as a world leader in connectivity and our broad product and solution portfolio across many industries, TE Connectivity is uniquely positioned to be a thought leader and valuable partner to help turn our customers Industry 4.0 challenges into opportunities. ”

Ulrich Wallenhorst  
CTO TE Industrial



## YOUR PARTNER IN INDUSTRIAL COMMUNICATIONS.

The unique demands of today's networked manufacturing facilities count on reliable connectivity solutions to deliver performance—and to do so faster, more economically and within increasingly smaller spaces. Count on TE Connectivity to deliver all this in your most environmentally demanding industrial applications.



### INCREASE SPEED AND ACHIEVE GREATER THROUGHPUT

With faster load rates, enhanced information flow and deterministic networks.



### IMPROVE QUALITY WITH GREATER CONTROL OVER QA

With finer levels of detail and resolution from machine inspection.



### GAIN ECONOMIES OF SCALE AND ACHIEVE MULTIPLE COST REDUCTIONS

With more universal and available parts and without the need for proprietary equipment.



### GET MORE POWER IN A SMALLER PACKAGE

With increasingly capable devices in a space-saving footprint.



### ATTAIN THE ULTIMATE FLEXIBILITY

With TE's common core design.



### INCREASE RELIABILITY

With the most ruggedized industrial connectors.



### ENGINEERING EXCELLENCE DELIVERS SMARTER, FASTER SOLUTIONS TO YOUR MOST COMPLEX PROBLEMS

With 7,400 field engineers in nineteen global design centers.

# LET'S CONNECT

We make it easy to connect with our experts and are ready to provide all the support you need.

Just call your local support number or visit [www.te.com/industrial](http://www.te.com/industrial) to chat with a Product Information Specialist.

Technical Support  
[te.com/support-center](http://te.com/support-center)

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Czech Republic	+42 02-7201-1103	Korea	+02-3415-4607	Spain	+34 932-910-330
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Finland	+46 8-5072-5000	Luxembourg	+31 73-6246999	Taiwan	+86 400-820-6015
France	+33 1-34-20-8686	Netherlands	+31 73-6246999	Turkey	+90 212-282-6053
Germany	+49 6151-607-1999	New Zealand	+86 400-820-6015	United Kingdom	+44 0800-267666
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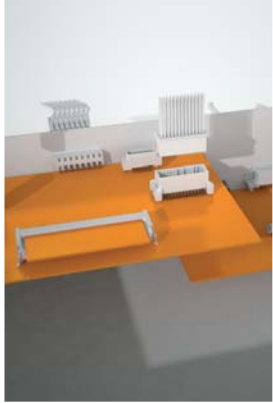


# **INDUSTRIAL CONTROL & AUTOMATION**

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HMI - INNOVATIVE INTERCONNECT SOLUTIONS FOR AUTOMATION

**Browse Products:** <http://www.te.com/usa-en/solutions/industrial-control-and-automation.html>



**HMI**  
INNOVATIVE INTERCONNECT  
SOLUTIONS FOR AUTOMATION

EVERY CONNECTION COUNTS

# LET'S CREATE THE CONNECTIONS THAT COUNT

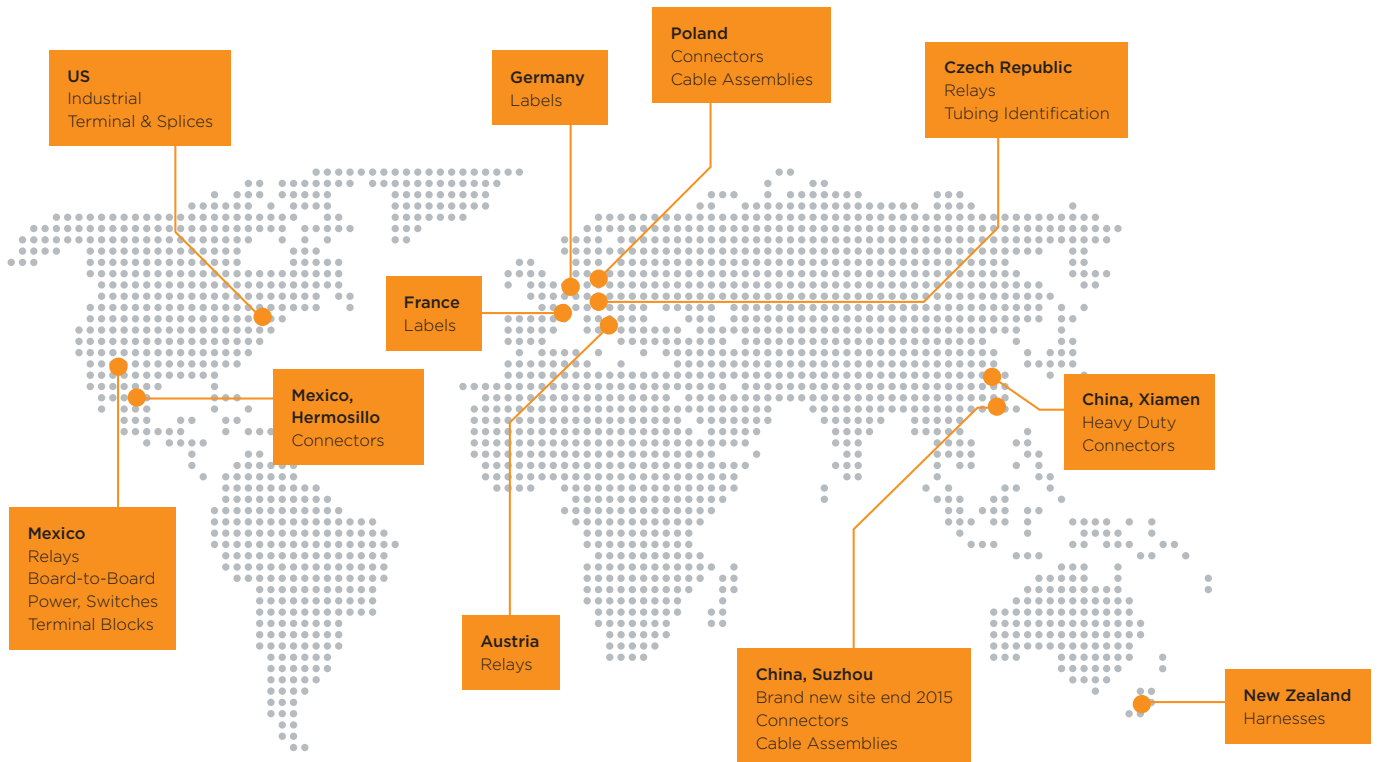


TE Connectivity (NYSE : TE L) is a \$13 billion world leader in connectivity. The company designs and manufactures products at the heart of electronic connections for the world's leading industries including automotive, energy and industrial, broadband communications, consumer devices, healthcare, and aerospace and defense. TE Connectivity's long-standing commitment to innovation and engineering excellence helps its customers solve the needs for more energy efficiency, always-on communications and ever increasing productivity. With nearly 90,000 employees in over 50 countries, TE Connectivity makes connections the world relies on to work flawlessly every day.

To connect with the company, visit: [www.TE.com](http://www.TE.com).

# EVERY VISION IS MORE THAN JUST A COLLECTION OF GOOD IDEAS.

Welcome to Automation & Control. TE Connectivity is a major player in plant and mechanical engineering and industrial automation. We have been maintaining partnerships with leading companies in the automation industry in key markets such as Germany, Japan, the United States and China for around six decades.



TE Connectivity worldwide — our production sites

## COUNT ON TE. FROM DESIGN TO DELIVERY TO WHAT COMES NEXT.

Industrial production is increasingly driven by higher automation. By improved safety. By greater energy efficiency. You can count on TE to work with you every step of the way to develop solutions for every aspect of your production processes.

TE designs and manufactures products and solutions that connect and protect the flow of power, data and signal — in every aspect of our lives. We enable smarter, faster, better technologies to connect materials to end products — for all areas of life. This has made us a globally successful company — a world leader in automation and control technology. When it comes to ensuring the perfect solution, we meet every challenge.

## COUNT ON PRODUCTS THAT HELP YOU COMPETE.

Our broad electromechanical and electronic product portfolio covers all your needs, ranging from simple machinery equipment to fully integrated factory automation and process solutions. For applications in a wide variety of production environments — and always extremely close to the needs of our customers from a wide range of sectors.

With TE as your innovation partner, you'll find everything you need to create and operate a cost-efficient and highly reliable production process. We are at our best when we work with your early design product & process management teams to get the job done right from the start. We also offer continuous improvement programs that give you a real competitive advantage. Because you can't achieve greater productivity and efficiency without better connectivity.

# SMART TECHNOLOGY FOR TODAY AND TOMORROW.

Every vision starts with a big idea — and the absolute desire to face new challenges, develop new solutions and pursue new approaches. Our mission is to provide support for problem solvers in pursuing these approaches throughout the world. Working together to develop outstanding visions from big ideas — for innovations that make our world better.

## THE TE 4.0 MANIFESTO

# 01.

**IDENTIFYING OPPORTUNITIES:**  
FOR PERFECT INTEGRATION — AS EVERY CONNECTION COUNTS

# 02.

**TAKING UP CHALLENGES:**  
A NEW GENERATION OF PRODUCTS —  
FOR A NEW GENERATION OF CUSTOMER NEEDS.

# 03.

**CREATING SOLUTIONS:**  
YOU CAN RELY ON TE — AND ON INTERCONNECT SOLUTIONS THAT MEET THE CHALLENGES OF TOMORROW TODAY.

# 04.

**TURNING AIMS INTO REALITY:**  
GREATER PRODUCTIVITY, GREATER EFFICIENCY AND GREATER COST-EFFECTIVENESS — FOR YOU, YOUR CUSTOMERS AND A SMARTER WORLD.

## INDUSTRY 4.0 — THE NEXT INDUSTRIAL REVOLUTION.

The rising levels of automation and decentralization of industrial production present major challenges. Now more than ever, automation solutions need to impress with their profitability — through long operating times, optimized energy efficiency and lower costs.

Industrial production needs to improve in every aspect — both now and in the future — with increased reliability, flexibility, adaptability and decentralization, more automation and smarter connections. TE Connectivity offers innovative solutions for enhanced connectivity. From the PCB level to the production line, in the toughest production conditions, anywhere in the world.

## CONNECTIONS FOR A NEW GENERATION.

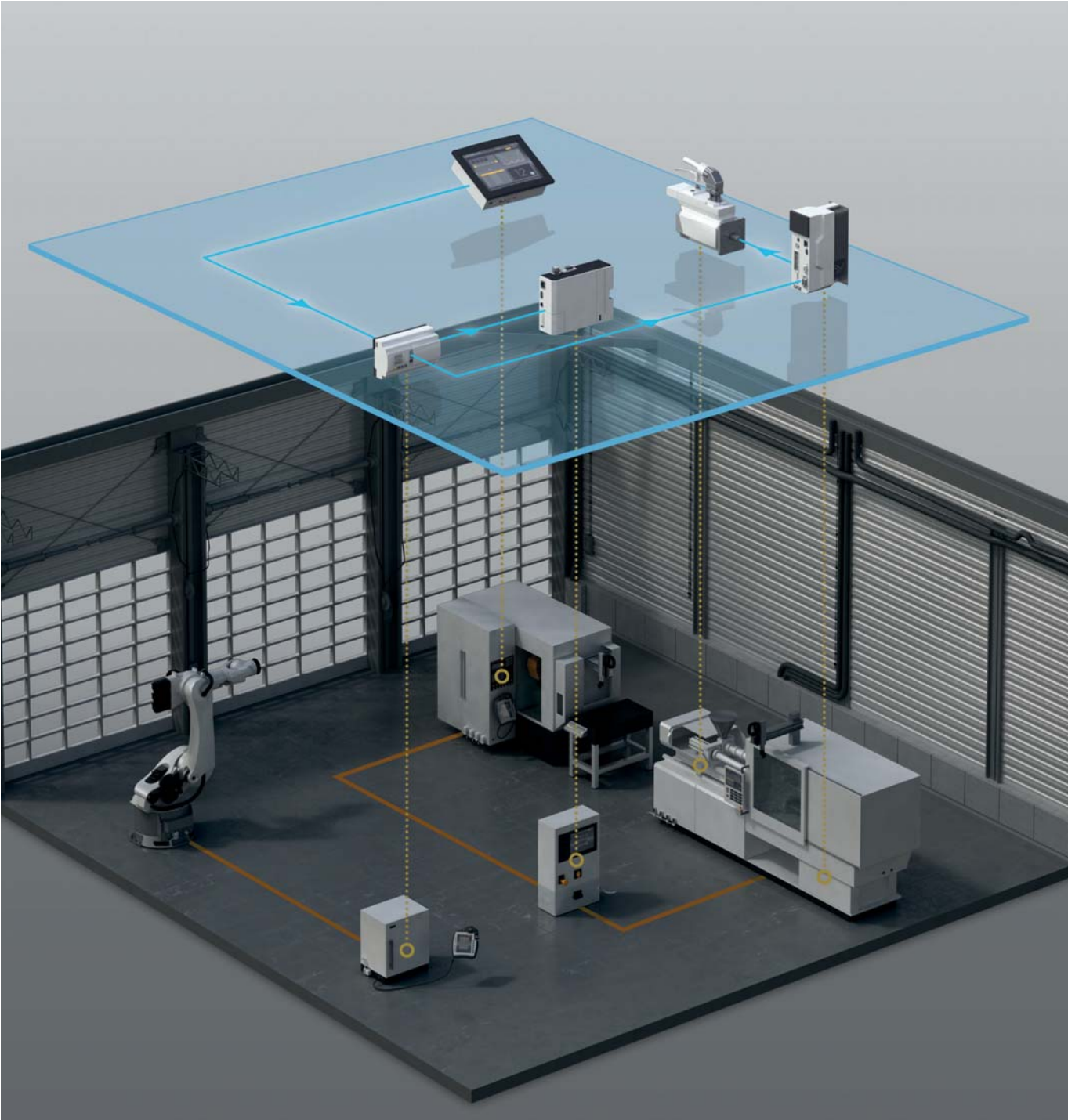
Digital technologies of today are key to the factories of tomorrow. These next-generation plants will be at the forefront of technological development and perfectly integrate and network the Internet, high-tech tools, employees and systems.

Our engineers here at TE are pioneers of this revolution — we are using our innovations to play a key role in turning the next level of industrial production into reality even faster.

# SOLUTIONS FOR AUTOMATION.

“WE ARE A SMALL PART OF YOUR BIG IDEAS, AS BETTER AUTOMATION  
IS FOUNDED ON BETTER CONNECTIONS.”

Gijs Werner, Strategic Marketing at TE Connectivity





# HUMAN MACHINE INTERFACE (HMI). SAFETY AND RELIABILITY WITH TE.

As the extent of automation in industrial production grows, so the need for highly functional HMIs that are intuitive and easy to use is also increasing. Safe, reliable connectors are essential for this. Industry solutions from TE provide the answer — standard connectors that go way beyond “standard” and deliver reliability and protection against system outages.

## COMPLETE CONTROL OF THE PRODUCTION LINE. YOU CAN RELY ON TE.

The HMI serves as the interface between the operating system of an automated production plant and a human operator and as such is a core element in the overall production system. It is here that the plant’s output and productivity are decided.

A high level of user friendliness and large processing capacities are therefore crucial. Fast and smooth input options are just as important as the ability to depict the key control data from the process in real time.

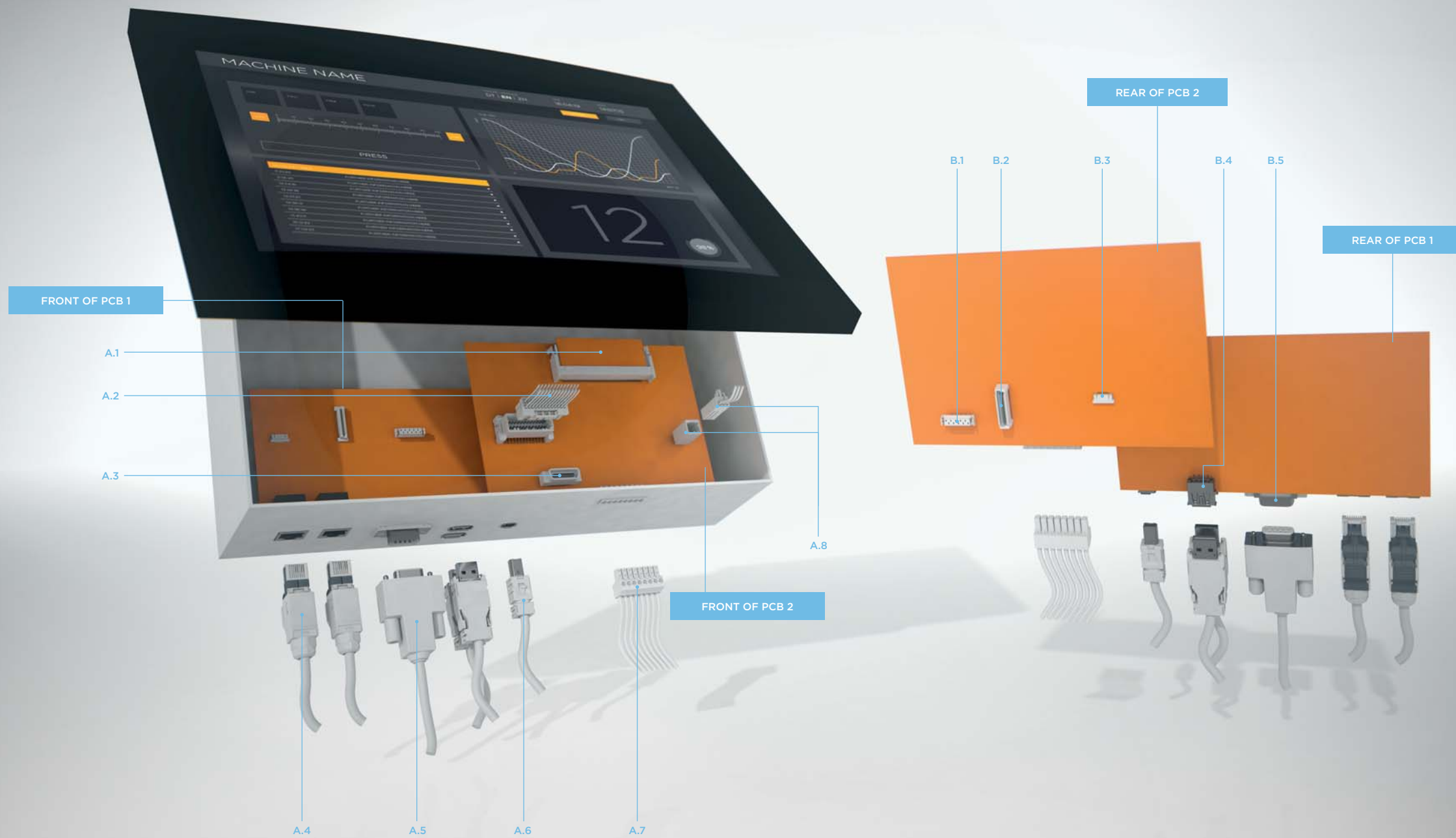
State-of-the-art HMIs are based on the functional design of smartphones and tablet PCs. The combination of easy-to-use touchscreen and hard-wearing equipment provides the basis for a long service life, even under industrial conditions. After all, production outages are not an option — we ensure a level of dependability that your customers can rely on at all times. And that also applies for large volumes of data and in difficult production environments.

## SUCCESSFUL INTERCONNECT SOLUTIONS FOR GREATER PRODUCTIVITY, QUALITY AND EFFICIENCY.

At TE we understand the special challenges facing the HMI market. We know your customers’ requirements and needs and the importance of constant innovation.

To provide you and your customers with the best possible support, we use next-generation technologies to develop future-proof products that are more stable, user-friendly and faster to install. We are committed to growing your success — with reliable connectors that also give you maximum freedom in designing applications.

# PRODUCT OVERVIEW.

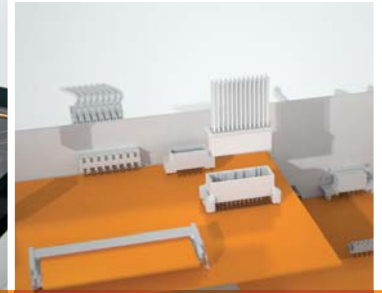


## A. PRODUCTS

- A.1 M3 MEMORY SOCKET
- A.2 DYNAMIC SERIES CONNECTORS
- A.3 CHAMP CONNECTORS
- A.4 INDUSTRIAL RJ45 CONNECTORS
- A.5 D-SUBMINIATURE CONNECTORS
- A.6 MINI I/O CONNECTORS
- A.7 TERMINAL BLOCKS
- A.8 DYNAMIC SERIES CONNECTORS

## B. PRODUCTS

- B.1 1.27 MM MICRO-MATCH CONNECTORS
- B.2 0.80 MM FREE HEIGHT
- B.3 0.50 FFC-FPC CONNECTORS
- B.4 INDUSTRIAL USB CONNECTORS
- B.5 D-SUBMINIATURE CONNECTORS



**LET'S CREATE SOMETHING  
BRILLIANT TOGETHER**

WE ARE DRIVEN BY OUR WISH TO KEEP ON DEVELOPING. THAT'S WHY WE ARE CONSTANTLY WORKING ON INNOVATIVE INTERCONNECT PRODUCTS AND SYSTEMATICALLY IMPROVING EXISTING ONES. WE WORK IN TANDEM WITH YOU IN OVERCOMING EVERY CHALLENGE.

## INTERRUPTION-FREE INTERCONNECT SOLUTIONS FROM TE.

TE can offer you a broad range of industrial I/O interconnect systems such as USB, Ethernet RJ45 or Industrial Mini I/O connectors. They are all geared to the particular needs of the HMI market. As highly robust products they satisfy the relevant industry standards and also perform extremely well in harsh environments. Our USB connectors, for instance, are equipped with an integrated locking mechanism that prevents any unintentional cable releases.

The TE portfolio of Industrial Ethernet RJ45 connectors extends all the way to high-speed versions for data volumes in the Gb range. Our Industrial Mini I/O connectors have also been designed with the future in mind. Two points of contact and a stable lock function ensure robust, interruption-free connections, while the compact design ensures exceptional design flexibility — with a space saving of up to 75% versus Industrial RJ45 connectors.

## INDUSTRIAL RJ45 CONNECTORS

## INDUSTRIAL MINI I/O CONNECTORS

## INDUSTRIAL USB CONNECTORS



TE's Industrial Ethernet RJ45 connectors offer a ruggedized design for use in Industrial Ethernet applications and are equipped with a robust and fast termination technology, utilizing the company's common core design in the RJ45 Modular Plug Series. This solution can be applied in the field without the need for any tools. It significantly reduces installation time and costs. It is used in all of TE's field installable connector series, including IP20, ODVA and push-pull connectors. The Variant 14 push-pull connector is available in a plastic or metal shell, and with its robust termination technology allows fast and flexible field installation that withstands harsher industrial environments such as shock, vibration or temperature.

### BENEFITS

- Field-installable modular plugs
- Easy and tool-less installation
- Ruggedized design for use in Industrial Ethernet applications

TE's Industrial Mini I/O Field Installable connector provides innovative and time-saving wire-termination while also serving as a space-saving and reliable I/O solution for industrial environments. TE's Industrial Mini I/O connector is only one quarter the size of the conventional RJ45 plug and, as a result, provides space saving and the flexibility to use limited space on the PCB more effectively. Designed with two points of contact, this connector is built for the stringent demands of an industrial and high vibration environment, enabling increased productivity through a reliable connection. With its innovative piercing termination, the Mini I/O Field Installable version decreases the time usually needed to terminate the wires through soldering and, with an easy to use hand tool, field assembly in virtually any environment is now possible.

### BENEFITS

- Less downtime and reliable connections due to better vibration resistance than RJ45
- Space saving of up to 75% versus Industrial RJ45 connectors and increased design flexibility
- Easy, field installable solution

TE's Industrial USB connectors are ideal for all industrial USB applications where a high locking force or a sealed design is required. With the IP20 series of Industrial USB connectors that feature an integrated locking mechanism with audible and tactile feedback, TE offers an excellent interconnect solution for internal USB cable routing. The newly designed locking feature helps prevent accidental pull-out of the plug, which enables customers to secure a cable internally without having to worry about the plug coming loose during transit and use.

### BENEFITS

- Rugged IP20 and Sealed IP67 solution for harsher environments
- Excellent lock strength for reliable connections and less downtime

## MEMORY SOCKETS

## DYNAMIC SERIES CONNECTORS

## TERMINAL BLOCKS



TE Connectivity's main Memory connectors are made to JEDEC industry standards for SIMM (Single In-line Memory Modules) and DIMM (Dual In-line Memory Modules). The TE Connectivity product portfolio covers the current SDRAM & DDR memory generations as well as the new DDR2, DDR3 and FB-DIMM generations of sockets. Each product family consists of vertical, right-angle and various angled configurations in solder tail, press fit and SMT mounting options.

### BENEFITS

- Standard plastic latches and extractors ensure proper module retention and extraction
- Reliable in high temperature environments
- Available in variety of angle configurations and mounting options

Dynamic Series is a broad product family that provides connector solutions ranging from signal level circuitry through power circuit connectivity in a ruggedized, industrialized package. The connector family is designed for use in control system applications and is suitable for a wide range of applications requiring high density, signal and power applications.

Dynamic Series consists of wire-to-board, wire-to-panel and wire-to-wire connectors with diverse housings available to meet most applications. Standard crimp and spring clamp variations of parts are available. The standardized contacts limit the amount of application tooling required.

### BENEFITS

- Easy mating and unmating for reduced installation and maintenance time
- Three points of contact provide high electrical reliability
- Reliable and safe connections for increased productivity

TE's Terminal Blocks offer design engineers a reliable connector system with a variety of connection styles and range of centerlines. This solution is used for various data, signal and power applications. This offering provides class leading quality and many different design opportunities.

### BENEFITS

- Mates with industry standard headers on the same centerline spacing
- Fast wire connections
- Custom solutions available

## CHAMP CONNECTORS

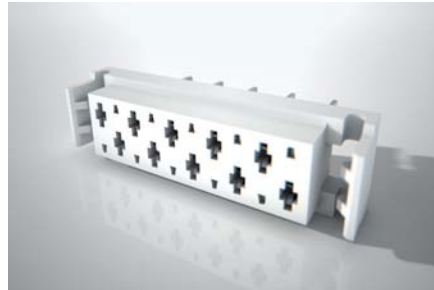


The TE Connectivity CHAMP connector system terminates to a printed circuit board, ribbon cable and discrete wire. This solution is designed on various centerlines. Found in multiple industries, these solutions are used in telecommunication hubs and cabling, computer devices, networking hardware as well as medical instruments, consumer test products and industrial machines.

### BENEFITS

- Reliable and durable in high density applications to withstand repeated mating
- Available in various position sizes and Printed Circuit Board mount styles
- Position range from 20 to 200

## MICRO-MATCH INTERCONNECTION SYSTEM



TE's Micro-MaTch connector family, with its contact spacing of 1.27 mm, offers a variety of wire-to-board and board-to-board interconnections. The Micro-MaTch Interconnection System enables design engineers to cover multiple signal applications with one of the smallest flat ribbon cable connections. The connector family fully complies with the electronic packaging requirements of today and the future. Relative movements caused by vibrations/thermal expansion between male and female contacts are absorbed by an additional positioning spring in the female part. By preventing movements on the contact spot, a gas tight connection can make the Micro-MaTch contact spring system resistant to fretting corrosion, one of the traditional failure modes in tin-plated connections.

### BENEFITS

- One of the smallest systems available at 1.27 mm
- Tooling options provide manufacturing application flexibility
- Insulation displacement contact allows for labor cost savings

## FLEXIBLE PRINTED CIRCUIT BOARD CONNECTORS (FPC)



TE Connectivity's Flexible Printed Circuit Board connectors (FPC) are interconnect solutions that are ideal where small centerline spacing makes larger wire-to-board interconnects impractical. As the market trends towards miniaturization, FPC connectors have been developed to meet the challenges of this expanding market, which demands smaller centerline or pitch spacing, lower profile heights and lighter interconnect solutions. The TE Connectivity FPC solutions are reliable interconnects that utilize an actuator to secure the cable termination and are field terminable (requires no tooling).

### BENEFITS

- Reliable interconnects
- Field terminable — no tooling needed
- Available in Right-Angle and Vertical mounting orientations

# CABLE SERVICES FROM A SINGLE SOURCE — TE CONNECTIVITY MEETS ALL YOUR NEEDS.

TE Cable Assemblies takes care of its customers, with total solutions that fit precise needs. With our decades of experience, global expertise in development and manufacturing and worldwide network of competence centers, TE Cable Assemblies creates customized solutions and standardized products that work exactly as they should — to ensure high performance and cost-efficiency in any operation. Our cumulative experience is formidable — and we never forget that every customer, and every project, is unique.

## **WE DELIVER FAST:**

FAST RESPONSE &  
IMMEDIATE AVAILABILITY

## **WE FOCUS ON SOLUTIONS:**

FLEXIBLE & EXPERIENCED

## **WE SAVE YOUR TIME:**

FAST & ON SCHEDULE

## **WE PROVIDE SECURITY:**

PROVEN RELIABILITY & HIGH QUALITY

## **WE WORK SEAMLESSLY:**

SMOOTH EXECUTION &  
CONSTANT COMMUNICATION

## **WE COMBINE POWER WITH FLEXIBILITY.**

TE Cable Assemblies is on hand to identify our customers' needs and objectives, map out the issues that need resolving, and quickly take all the steps necessary to move from design into production.

To provide fully integrated solutions, TE engineers in cable assemblies development work hand in hand with development teams dedicated to connectors — our engineering teams can leverage our vast portfolio of connectors to make sure any solution provides a perfect fit for a customer's needs. And when it comes to creating the assemblies themselves, numerous automatic and semi-automatic manufacturing technologies are at our disposal — cutting & stripping, soldering, IDC insulation displacement, over-molding, and more.

TE Cable Assemblies' manufacturing footprint is global too — wherever you are, we are well placed to respond to your needs in terms of flexibility, reliability, and lead times.

## **WE MAKE SURE OUR HIGH STANDARDS NEVER SLIP.**

Quality control is completely integrated throughout all our global manufacturing facilities. Furthermore, we apply the TE Operating Advantage (TEOA) — an enterprise-wide focus on business performance and continual improvement through waste elimination and deployment of best practices.

To meet numerous challenges all the way from concept to commercial product, we deploy processes such as Lean Product Development while dedicated project managers take care of your needs and potential issues. If a problem occurs, we will fix it.

## LET'S CONNECT

We make it easy to connect with our experts and are ready to provide all the support you need. Just call your local support number or visit [www.te.com/industrial](http://www.te.com/industrial) to chat with a Product Information Specialist.

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# **INDUSTRIAL CONTROL & AUTOMATION**

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PLC - INNOVATIVE INTERCONNECT SOLUTIONS FOR AUTOMATION

**Browse Products:** <http://www.te.com/usa-en/solutions/industrial-control-and-automation.html>



**PLC**  
INNOVATIVE INTERCONNECT  
SOLUTIONS FOR AUTOMATION

EVERY CONNECTION COUNTS

# LET'S CREATE THE CONNECTIONS THAT COUNT

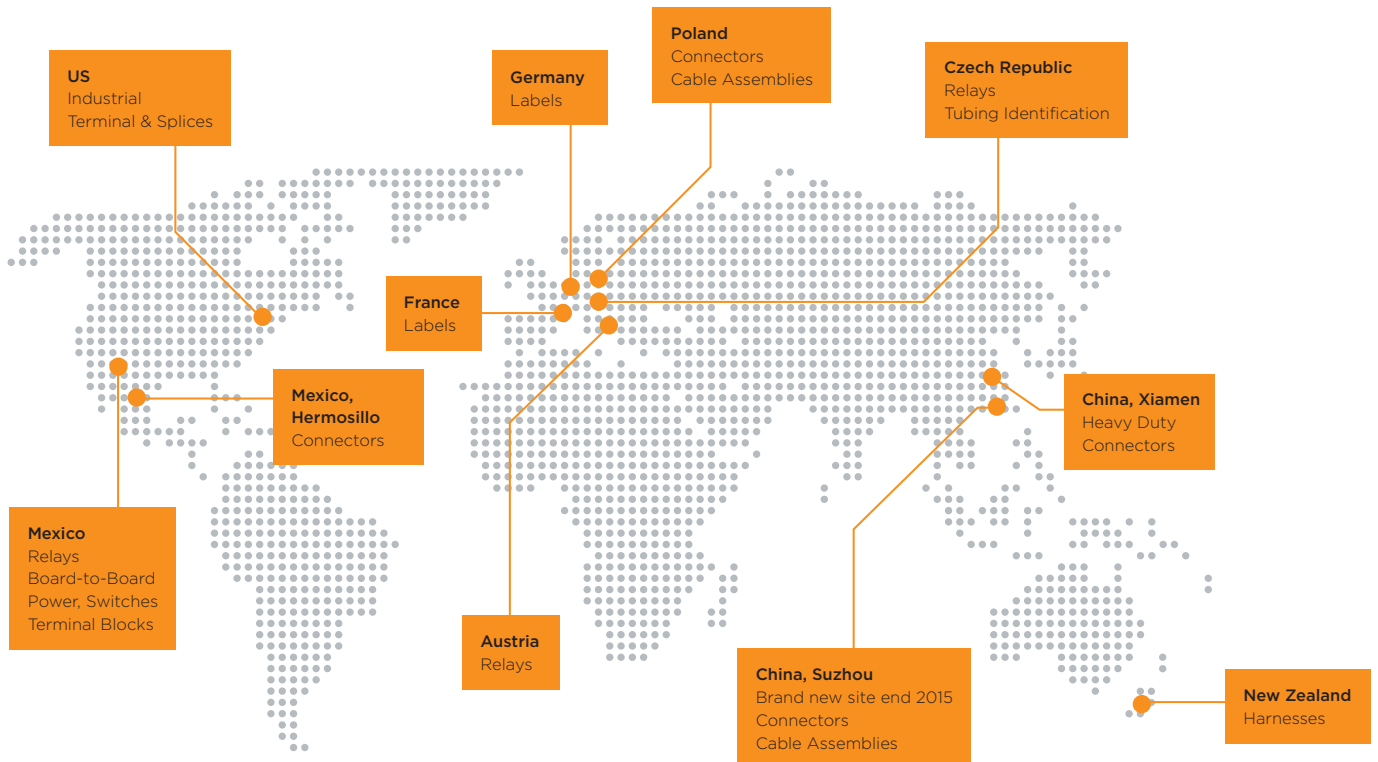


TE Connectivity (NYSE : TE L) is a \$13 billion world leader in connectivity. The company designs and manufactures products at the heart of electronic connections for the world's leading industries including automotive, energy and industrial, broadband communications, consumer devices, healthcare, and aerospace and defense. TE Connectivity's long-standing commitment to innovation and engineering excellence helps its customers solve the needs for more energy efficiency, always-on communications and ever increasing productivity. With nearly 90,000 employees in over 50 countries, TE Connectivity makes connections the world relies on to work flawlessly every day.

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Welcome to Automation & Control. TE Connectivity is a major player in plant and mechanical engineering and industrial automation. We have been maintaining partnerships with leading companies in the automation industry in key markets such as Germany, Japan, the United States and China for around six decades.



TE Connectivity worldwide — our production sites

## COUNT ON TE. FROM DESIGN TO DELIVERY TO WHAT COMES NEXT.

Industrial production is increasingly driven by higher automation. By improved safety. By greater energy efficiency. You can count on TE to work with you every step of the way to develop solutions for every aspect of your production processes.

TE designs and manufactures products and solutions that connect and protect the flow of power, data and signal — in every aspect of our lives. We enable smarter, faster, better technologies to connect materials to end products — for all areas of life. This has made us a globally successful company — a world leader in automation and control technology. When it comes to ensuring the perfect solution, we meet every challenge.

## COUNT ON PRODUCTS THAT HELP YOU COMPETE.

Our broad electromechanical and electronic product portfolio covers all your needs, ranging from simple machinery equipment to fully integrated factory automation and process solutions. For applications in a wide variety of production environments — and always extremely close to the needs of our customers from a wide range of sectors.

With TE as your innovation partner, you'll find everything you need to create and operate a cost-efficient and highly reliable production process. We are at our best when we work with your early design product & process management teams to get the job done right from the start. We also offer continuous improvement programs that give you a real competitive advantage. Because you can't achieve greater productivity and efficiency without better connectivity.

# SMART TECHNOLOGY FOR TODAY AND TOMORROW.

Every vision starts with a big idea — and the absolute desire to face new challenges, develop new solutions and pursue new approaches. Our mission is to provide support for problem solvers in pursuing these approaches throughout the world. Working together to develop outstanding visions from big ideas — for innovations that make our world better.

## THE TE 4.0 MANIFESTO

# 01.

**IDENTIFYING OPPORTUNITIES:**  
FOR PERFECT INTEGRATION — AS EVERY CONNECTION COUNTS

# 02.

**TAKING UP CHALLENGES:**  
A NEW GENERATION OF PRODUCTS —  
FOR A NEW GENERATION OF CUSTOMER NEEDS.

# 03.

**CREATING SOLUTIONS:**  
YOU CAN RELY ON TE — AND ON INTERCONNECT SOLUTIONS THAT MEET THE CHALLENGES OF TOMORROW TODAY.

# 04.

**TURNING AIMS INTO REALITY:**  
GREATER PRODUCTIVITY, GREATER EFFICIENCY AND GREATER COST-EFFECTIVENESS — FOR YOU, YOUR CUSTOMERS AND A SMARTER WORLD.

## INDUSTRY 4.0 — THE NEXT INDUSTRIAL REVOLUTION.

The rising levels of automation and decentralization of industrial production present major challenges. Now more than ever, automation solutions need to impress with their profitability — through long operating times, optimized energy efficiency and lower costs.

Industrial production needs to improve in every aspect — both now and in the future — with increased reliability, flexibility, adaptability and decentralization, more automation and smarter connections. TE Connectivity offers innovative solutions for enhanced connectivity. From the PCB level to the production line, in the toughest production conditions, anywhere in the world.

## CONNECTIONS FOR A NEW GENERATION.

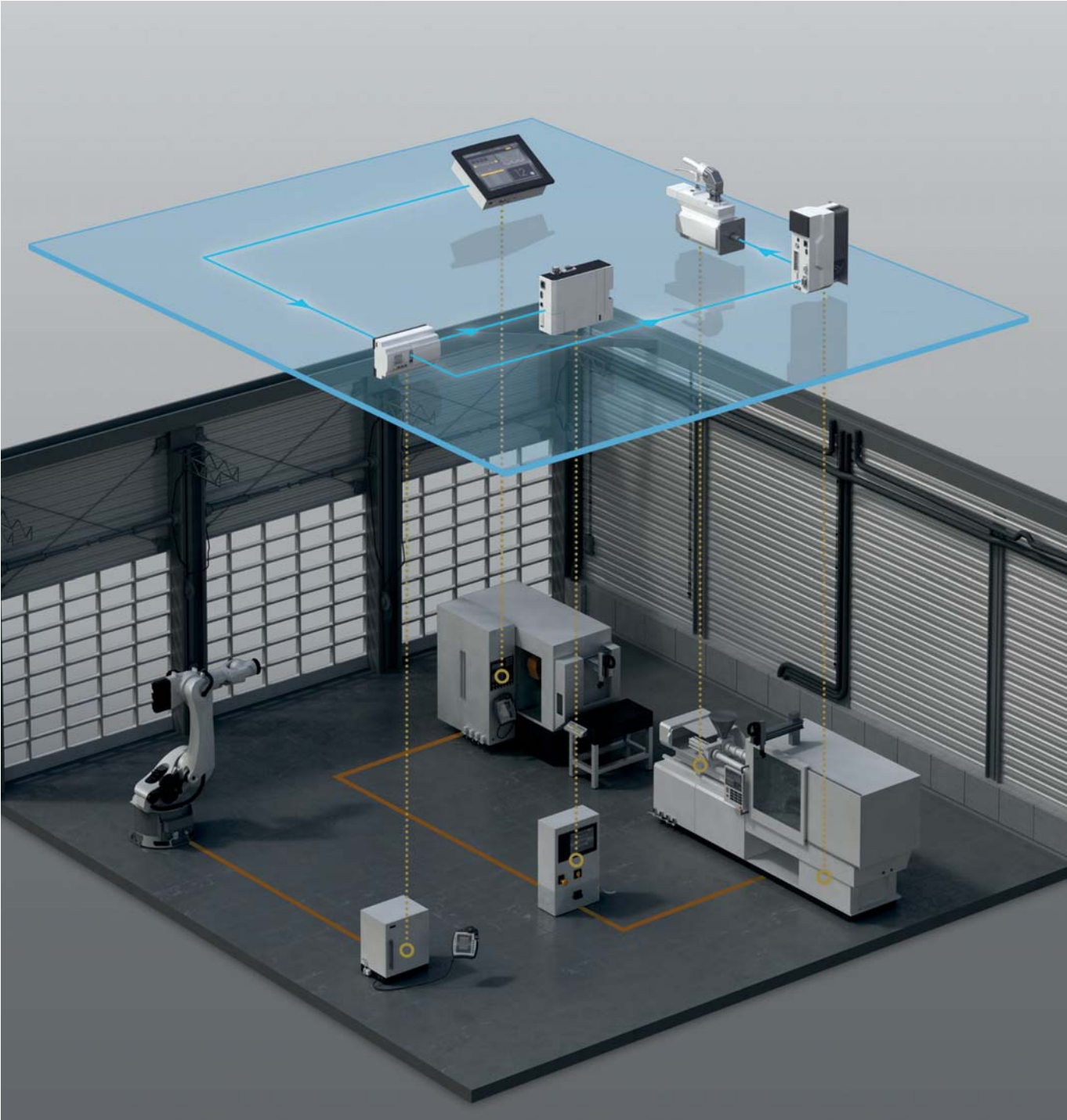
Digital technologies of today are key to the factories of tomorrow. These next-generation plants will be at the forefront of technological development and perfectly integrate and network the Internet, high-tech tools, employees and systems.

Our engineers here at TE are pioneers of this revolution — we are using our innovations to play a key role in turning the next level of industrial production into reality even faster.

# SOLUTIONS FOR AUTOMATION.

“WE ARE A SMALL PART OF YOUR BIG IDEAS, AS BETTER AUTOMATION  
IS FOUNDED ON BETTER CONNECTIONS.”

Gijs Werner, Strategic Marketing at TE Connectivity



# PLC. STABLE HIGH-SPEED INTERCONNECTION WITH TE.

As the level of automation in production sequences increases, so does the need for intelligent controls that can continuously monitor, measure and regulate processes in real time. To enable Programmable Logic Controllers (PLCs) to handle these extensive real-time functions effectively, TE Connectivity is developing products and solutions that allow a fast, absolutely reliable and interruption-free flow of data, even in large volumes.

## THE BASIS FOR INTELLIGENT PROCESS CONTROL. YOU CAN RELY ON TE.

In industrial automation, PLCs communicate with other control levels, assume monitoring and reporting functions and identify any process errors that occur. As intelligent entities, they assume important control functions and, despite the requirements placed on them growing all the time, they are becoming smaller, faster and more powerful.

This development is opening up new application options. And bringing new challenges. As the range of tasks they have to perform expands, the volume of data they need to manage is growing significantly. This makes high-speed connections vital for ensuring secure and reliable data flows.

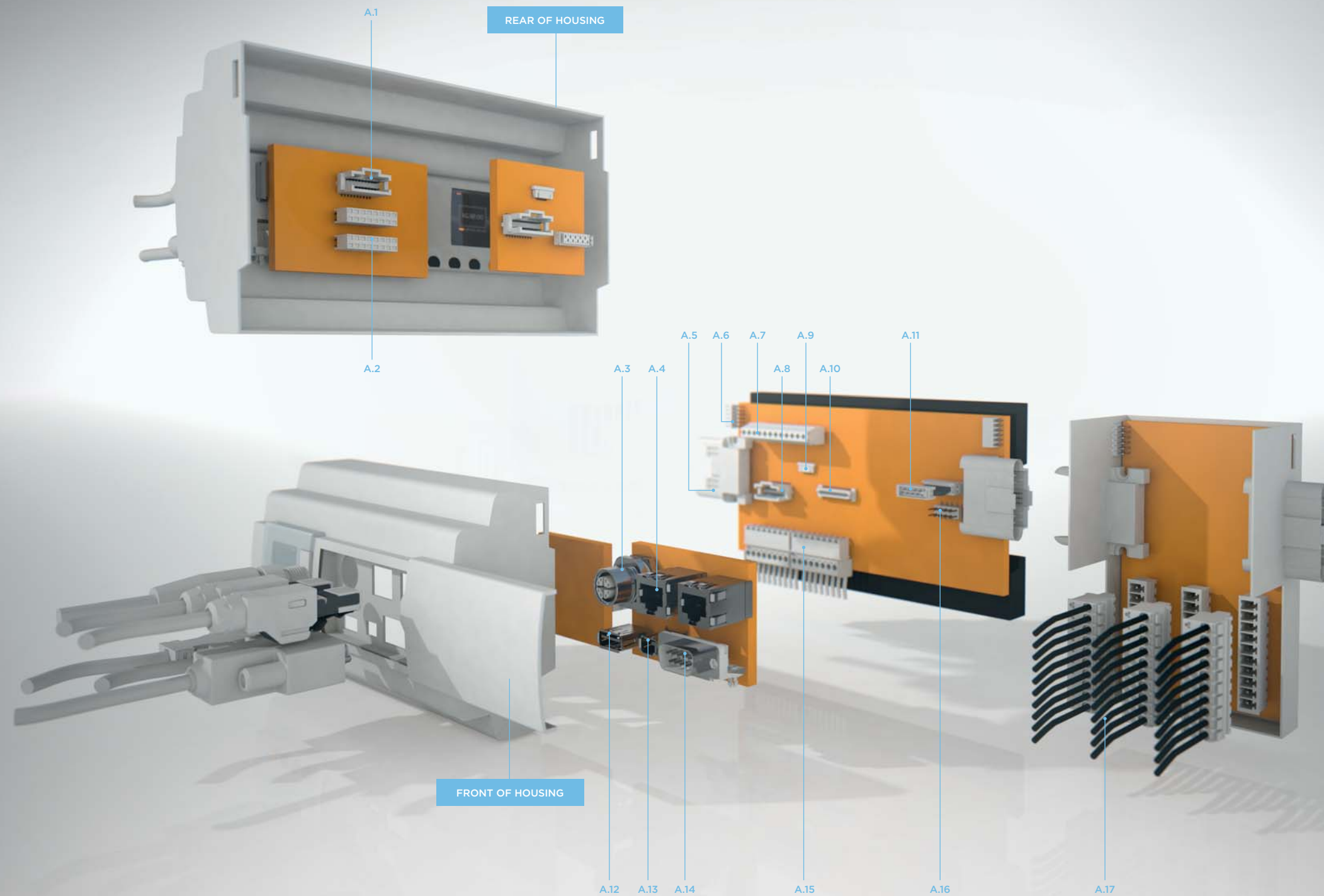
TE can offer you the perfect solution for this and other, future challenges. We are working on connections that are ever faster, more stable and more compact — to give you process control technology that is reliable, efficient and cost-effective.

## FOR GREATER RELIABILITY AND STABILITY — OUR SOLUTIONS ENSURE INTERRUPTION-FREE DATA FLOWS.

At TE we understand the special challenges facing the PLC market. We know your customers' requirements and needs and the importance of constant innovation.

To provide you and your customers with the best possible support, we use next-generation technologies to develop future-proof products that are more stable, user-friendly and faster to install. We are committed to growing your success — with reliable connectors that also give you maximum freedom in designing applications.

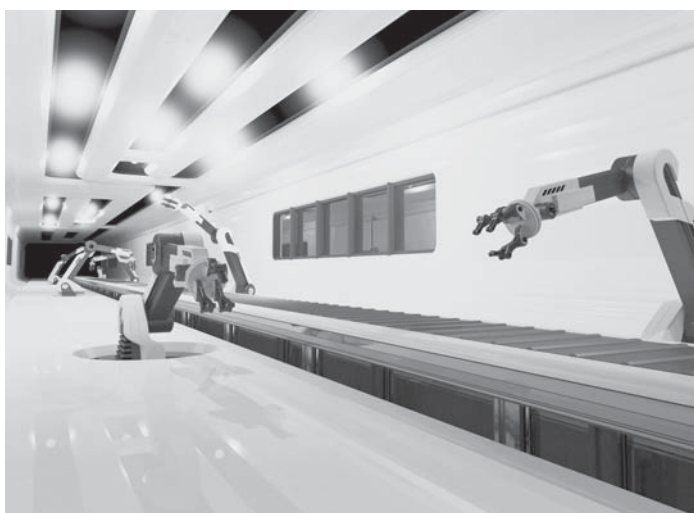
# PRODUCT OVERVIEW.



## A. PRODUCTS

A.1	1.27 MM AMPMODU CONNECTORS
A.2	2.54 MM AMPMODU CONNECTORS
A.3	M12-X-CODE CONNECTORS
A.4	INDUSTRIAL USB CONNECTORS
A.5	2.00 MM MINIPAK CONNECTORS
A.6	2.00 MM AMPMODU CONNECTORS
A.7	TERMINAL BLOCKS
A.8	1.27 MM AMPMODU CONNECTORS
A.9	0.50 MM FFC-FPC CONNECTORS
A.10	0.80 MM FREE HEIGHT
A.11	1.27 MM MICRO-MATCH CONNECTORS
A.12	INDUSTRIAL USB CONNECTORS
A.13	MINI I/O CONNECTORS
A.14	D-SUBMINIATURE CONNECTORS
A.15	TERMINAL BLOCKS
A.16	2.54 MM AMPMODU CONNECTORS
A.17	TERMINAL BLOCKS





**LET'S CREATE SOMETHING  
BRILLIANT TOGETHER**

WE ARE DRIVEN BY OUR WISH TO KEEP ON DEVELOPING. THAT'S WHY WE ARE CONSTANTLY WORKING ON INNOVATIVE INTERCONNECT PRODUCTS AND SYSTEMATICALLY IMPROVING EXISTING ONES. WE WORK IN TANDEM WITH YOU IN OVERCOMING EVERY CHALLENGE.

## THE LATEST GENERATION OF THE SIGNAL STANDARD IN AUTOMATION AND CONTROL.

TE's Industrial Mini I/O connectors are the latest generation of robust contact carriers for interruption-free interconnect solutions. Our Mini I/O connectors deliver greater vibration resistance and performance in harsh environments than other interconnect systems. They are also far more compact and require up to 75% less space versus Industrial RJ45 connectors.

Other key features: The AMPMODU family of connectors offers a wide range of modular PCB connectors in various configurations and centerline spacings — make sure you benefit from a new benchmark in design flexibility.

## TERMINAL BLOCKS

## AMPMODU CONNECTORS

## FLEXIBLE PRINTED CIRCUIT BOARD CONNECTORS (FPC)



TE's Terminal Blocks offer design engineers a reliable connector system with a variety of connection styles and range of centerlines. This solution is used for various data, signal and power applications. This offering provides class leading quality and many different design opportunities.

### BENEFITS

- Mates with industry standard headers on the same centerline spacing
- Fast wire connections
- Custom solutions available

The AMPMODU interconnect system is the proven TE solution and signal standard for Automation & Control applications. Designed to reliably and economically meet the packaging and interconnection requirements of today's industrial environments. It includes board-to-board, wire-to-board and wire-to-wire connectors. The large variety of components and application possibilities, combined with small size and outstanding quality, make the AMPMODU interconnect system ideal for many industrial applications and systems.

### BENEFITS

- Unique modular concept, utilizing precision formed receptacle contacts and mating posts
- Different configuration possibilities offer design flexibility
- Economic and compact design allows for space saving

TE Connectivity's Flexible Printed Circuit Board connectors (FPC) are interconnect solutions that are ideal where small centerline spacing makes larger wire-to-board interconnects impractical. As the market trends towards miniaturization, FPC connectors have been developed to meet the challenges of this expanding market, which demands smaller centerline or pitch spacing, lower profile heights and lighter interconnect solutions. The TE Connectivity FPC solutions are reliable interconnects that utilize an actuator to secure the cable termination and are field terminable (requires no tooling).

### BENEFITS

- Reliable interconnects
- Field terminable — no tooling needed
- Available in Right-Angle and Vertical mounting orientations

## FREE HEIGHT CONNECTORS



TE's Free Height surface-mount connectors are designed for parallel board stacking applications using subminiature connectors to meet today's electronic industry requirements for high density packaging. These FH connectors fit a broad spectrum of interconnect uses and are ideal for application downsizing, such as notebook PCs, scanners, data storage devices, and many other applications which require parallel stacked PCBs.

### BENEFITS

- Stack heights from 4 mm to 20 mm
- 40 – 440 positions
- Locating posts for proper positioning

## INDUSTRIAL MINI I/O CONNECTORS



TE's Industrial Mini I/O Field Installable connector provides innovative and time-saving wire-termination while also serving as a space-saving and reliable I/O solution for industrial environments. TE's Industrial Mini I/O connector is only one quarter the size of the conventional RJ45 plug and, as a result, provides space saving and the flexibility to use limited space on the PCB more effectively. Designed with two points of contact, this connector is built for the stringent demands of an industrial and high vibration environment, enabling increased productivity through a reliable connection. With its innovative piercing termination, the Mini I/O Field Installable version decreases the time usually needed to terminate the wires through soldering and, with an easy to use hand tool, field assembly in virtually any environment is now possible.

### BENEFITS

- Less downtime and reliable connections due to better vibration resistance than RJ45
- Space saving of up to 75% versus Industrial RJ45 connectors and increased design flexibility
- Easy, field installable solution

## M8/M12 CONNECTOR SYSTEM



TE Connectivity's M8/M12 Connector System for machine industrial automation and control applications provides a solution that safely and reliably ensures communication in industrial environments. TE's solution includes an extensive connector range of receptacles, cable assemblies and IO boxes, and provides users with an interface that supports higher bandwidth needs meeting the requirements of up to 10 Gb/s.

TE's broad product portfolio provides customers with shielded and unshielded cable assembly options in both Cat5e and Cat6A cable types. For re-wiring on site, a range of field serviceable connectors are provided that include male and female versions in multiple positions and codings. Additional styles are available on request including alternative mounting arrangements for panel mount connectors and double ended cable assemblies.

### BENEFITS

- Easily installable connector system reduces maintenance time
- M8/M12 Connector System provides full industry standard solution including quick turn, prototype cable assemblies

## D-SUBMINIATURE CONNECTORS

## INDUSTRIAL USB CONNECTORS

## INDUSTRIAL RJ45 CONNECTORS



TE Connectivity, the industry leader in D-Subminiature solutions, provides a complete range of quality, time-tested D-Sub connectors that have become the standard in the D-Sub industry. Our complete line of D-Subminiature connectors ranges from Right Angle and Vertical Posted connectors and Cable connectors to the AMPLIMITE .050 Series D-Sub connectors — for any complex application.

### BENEFITS

- Cable and PCB mounted D-Sub connectors
- PCB mounted D-Subminiature connectors available in either right-angle or straight configurations
- Stacked headers reduce overall total header volume by 48% and PC board area by 38%

TE's Industrial USB connectors are ideal for all industrial USB applications where a high locking force or a sealed design is required. With the IP20 series of Industrial USB connectors that feature an integrated locking mechanism with audible and tactile feedback, TE offers an excellent interconnect solution for internal USB cable routing. The newly designed locking feature helps prevent accidental pull-out of the plug, which enables customers to secure a cable internally without having to worry about the plug coming loose during transit and use.

### BENEFITS

- Rugged IP20 and Sealed IP67 solution for harsher environments
- Excellent lock strength for reliable connections and less downtime

TE's Industrial Ethernet RJ45 connectors offer a ruggedized design for use in Industrial Ethernet applications and are equipped with a robust and fast termination technology, utilizing the company's common core design in the RJ45 Modular Plug Series. This solution can be applied in the field without the need for any tools. It significantly reduces installation time and costs. It is used in all of TE's field installable connector series, including IP20, ODVA and push-pull connectors. The Variant 14 push-pull connector is available in a plastic or metal shell, and with its robust termination technology allows fast and flexible field installation that withstands harsher industrial environments such as shock, vibration or temperature.

### BENEFITS

- Field-installable modular plugs
- Easy and tool-less installation
- Ruggedized design for use in Industrial Ethernet applications

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# **INDUSTRIAL CONTROL & AUTOMATION**

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SERVO MOTOR & SERVO DRIVE - INNOVATIVE INTERCONNECT  
SOLUTIONS FOR AUTOMATION

**Browse Products:** <http://www.te.com/usa-en/solutions/industrial-control-and-automation.html>



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EVERY CONNECTION COUNTS



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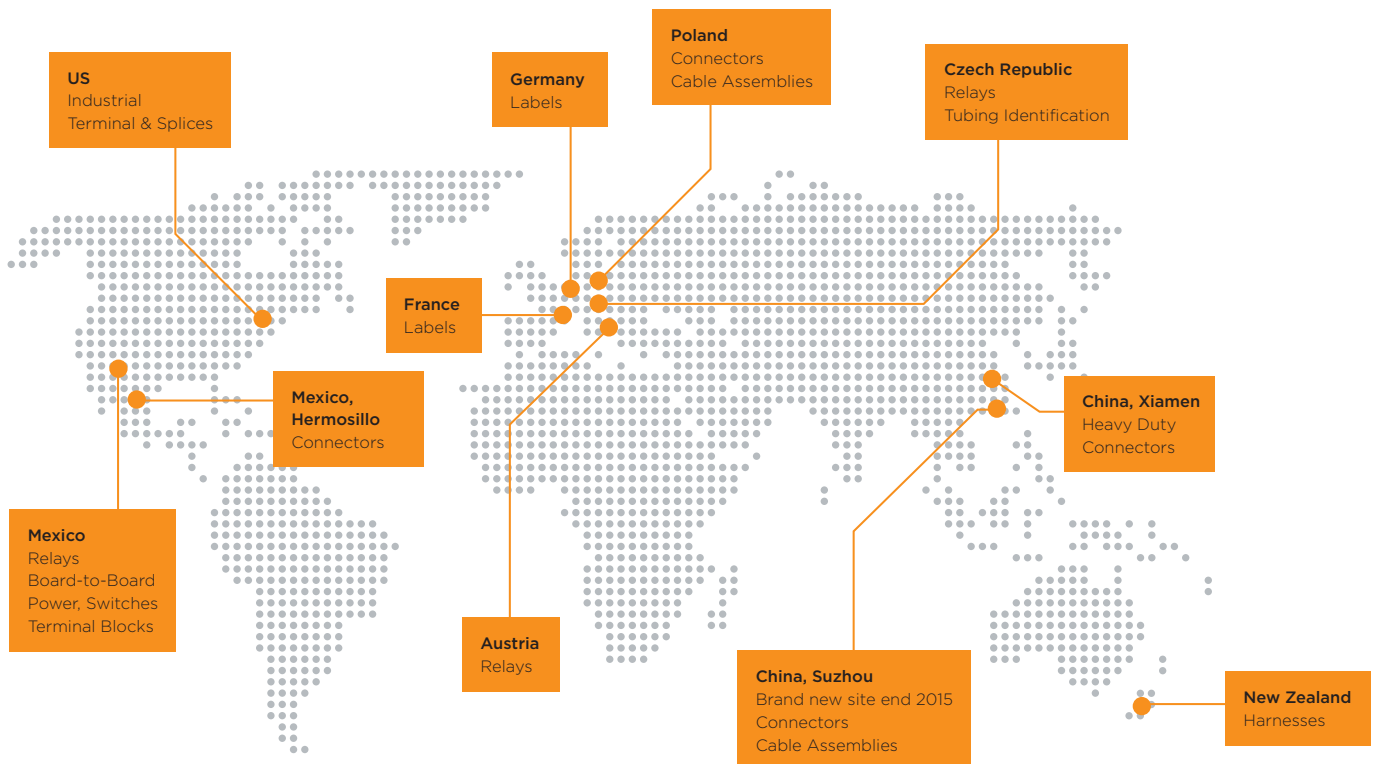


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**TAKING UP CHALLENGES:**  
A NEW GENERATION OF PRODUCTS —  
FOR A NEW GENERATION OF CUSTOMER NEEDS.

# 03.

**CREATING SOLUTIONS:**  
YOU CAN RELY ON TE — AND ON INTERCONNECT SOLUTIONS THAT MEET THE CHALLENGES OF TOMORROW TODAY.

# 04.

**TURNING AIMS INTO REALITY:**  
GREATER PRODUCTIVITY, GREATER EFFICIENCY AND GREATER COST-EFFECTIVENESS — FOR YOU, YOUR CUSTOMERS AND A SMARTER WORLD.

## INDUSTRY 4.0 — THE NEXT INDUSTRIAL REVOLUTION.

The rising levels of automation and decentralization of industrial production present major challenges. Now more than ever, automation solutions need to impress with their profitability — through long operating times, optimized energy efficiency and lower costs.

Industrial production needs to improve in every aspect — both now and in the future — with increased reliability, flexibility, adaptability and decentralization, more automation and smarter connections. TE Connectivity offers innovative solutions for enhanced connectivity. From the PCB level to the production line, in the toughest production conditions, anywhere in the world.

## CONNECTIONS FOR A NEW GENERATION.

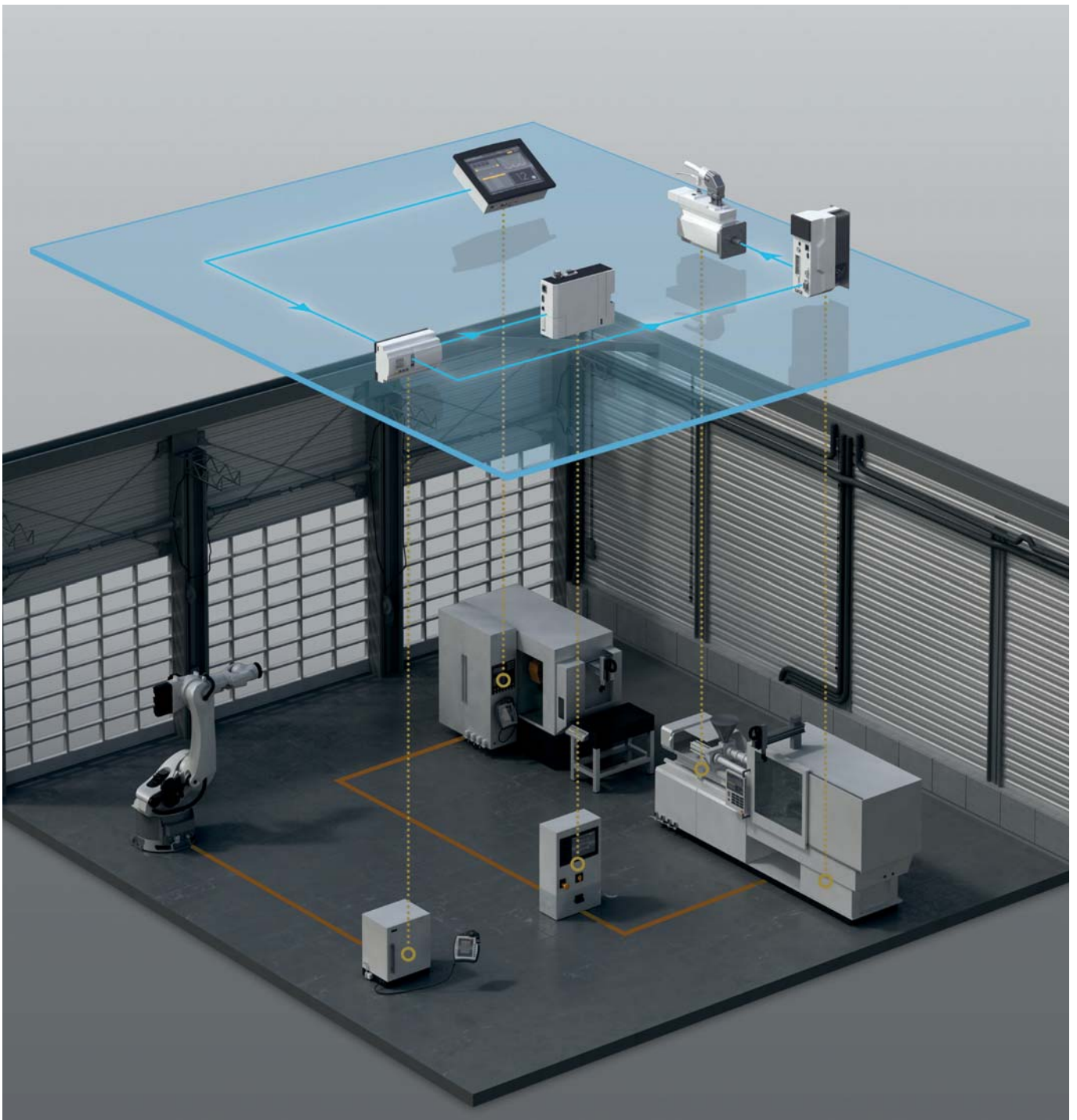
Digital technologies of today are key to the factories of tomorrow. These next-generation plants will be at the forefront of technological development and perfectly integrate and network the Internet, high-tech tools, employees and systems.

Our engineers here at TE are pioneers of this revolution — we are using our innovations to play a key role in turning the next level of industrial production into reality even faster.

# SOLUTIONS FOR AUTOMATION.

“WE ARE A SMALL PART OF YOUR BIG IDEAS, AS BETTER AUTOMATION  
IS FOUNDED ON BETTER CONNECTIONS.”

Gijs Werner, Strategic Marketing at TE Connectivity



# SERVO MOTORS AND SERVO DRIVES. TE DELIVERS GREATER FLEXIBILITY AND RELIABILITY FOR YOUR CUSTOMERS.

The demand for ecological, efficient and flexible production systems in a globalized and industrialized world is also advancing the development of servo motors and servo drives. We at TE Connectivity ensure that you are always able to meet your customers' growing requirements — thanks to servo technology that combines compact design, flexibility and reliability with very impressive results.

## COMPACT TECHNOLOGY FOR AUTOMATION THAT ALSO MEETS YOUR FUTURE NEEDS. YOU CAN RELY ON TE.

Automation solutions are already standard in many industrial sectors. The automotive, packaging and textile industries are just some of the sectors where automated production plants controlled by servo technology are boosting productivity and cost-efficiency. Further advances can only be achieved through even faster and more precise feedback and control processes — made possible through the interaction of servo motors and servo drives.

Motors today are becoming increasingly compact but are housing an ever greater range of functions. Given the increased volume of data involved in communication with the drive, it is essential to have absolutely reliable connections that operate at the highest possible speeds. What's more, the numerous internal data and power interfaces need to be connected quickly, reliably and efficiently.

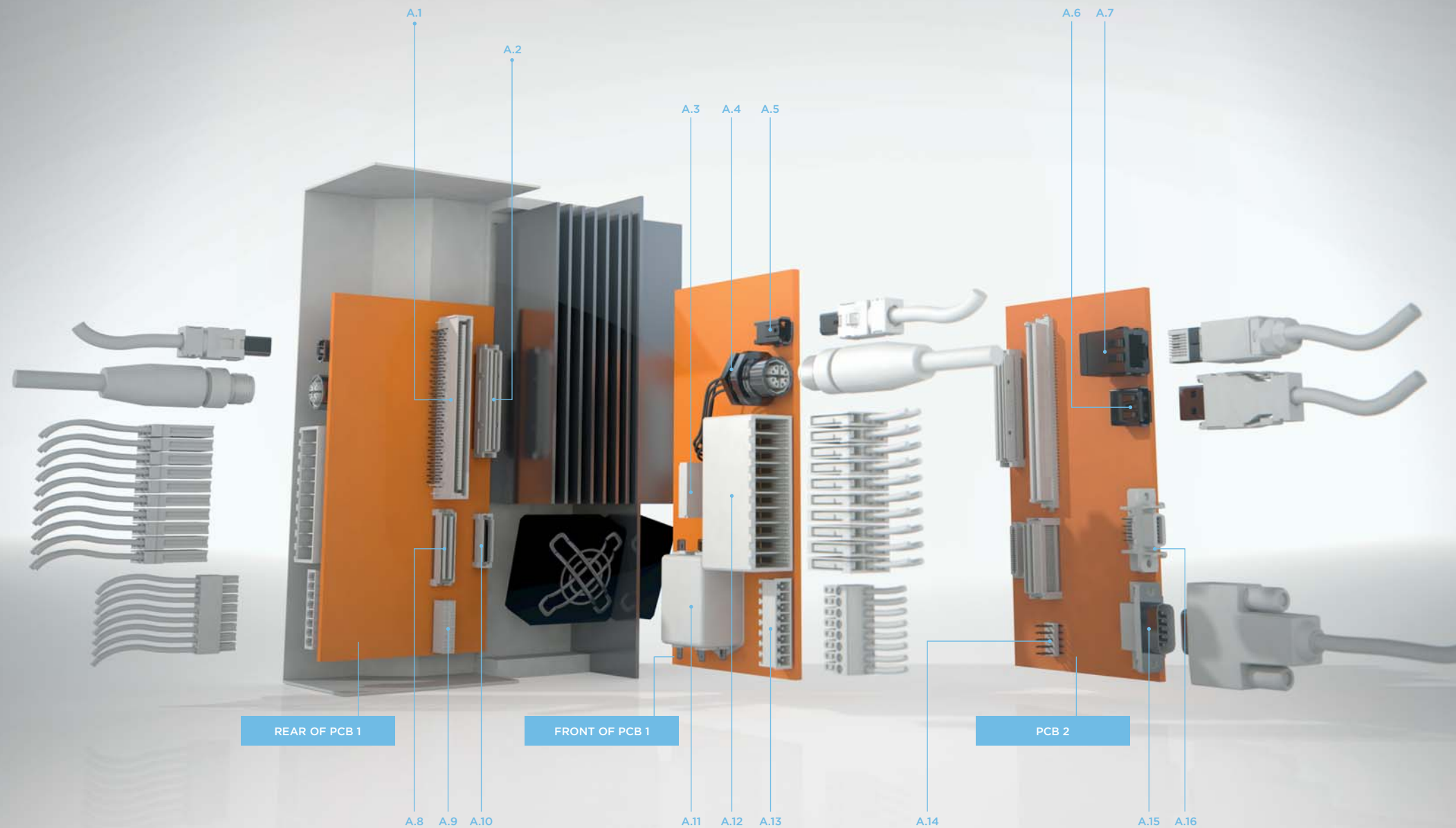
Our solutions are focused precisely on meeting these conditions for cutting-edge production — after all, every individual connection is important.

## PROVEN INDUSTRY STANDARDS FORM THE BASIS FOR INNOVATION AT TE.

At TE we understand the special challenges facing the market. We know your customers' requirements and needs and the importance of constant innovation.

To provide you and your customers with the best possible support, we use next-generation technologies to develop future-proof products — we work in tandem with you in making servo technologies even more reliable, efficient and cost-effective. We are committed to growing your success — with reliable connectors that also give you maximum freedom in designing applications.

# PRODUCT OVERVIEW.



## A. PRODUCTS

- A.1 1.27 MM INDUSTRIAL EXPRESS
- A.2 0.60 MM Z-STACK
- A.3 INDUSTRIAL RELAYS
- A.4 M12-X-CODE CONNECTORS
- A.5 MINI I/O CONNECTORS
- A.6 INDUSTRIAL USB CONNECTORS
- A.7 INDUSTRIAL RJ45 CONNECTORS
- A.8 0.60 MM MICRO-STACK CONNECTORS
- A.9 2.54 MM AMPMODU CONNECTORS
- A.10 0.80 MM FREE HEIGHT
- A.11 EMI/RFI FILTER
- A.12 DYNAMIC SERIES CONNECTORS
- A.13 TERMINAL BLOCKS
- A.14 2.54 MM AMPMODU CONNECTORS
- A.15 D-SUB CONNECTORS
- A.16 CHAMP CONNECTORS

## B. SERVO MOTOR 1

- B.1 MOTORMAN HYBRID CONNECTORS
- B.2 M8/M12 CONNECTOR SYSTEM
- B.3 RESOLVER

## C. SERVO MOTOR 2

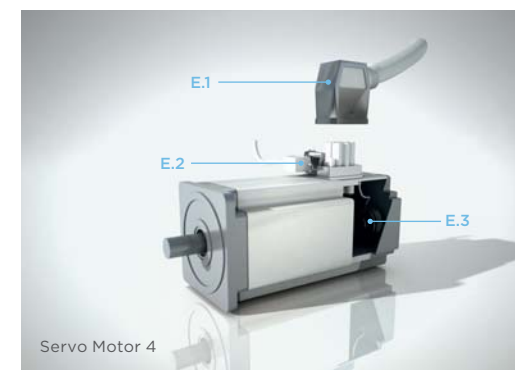
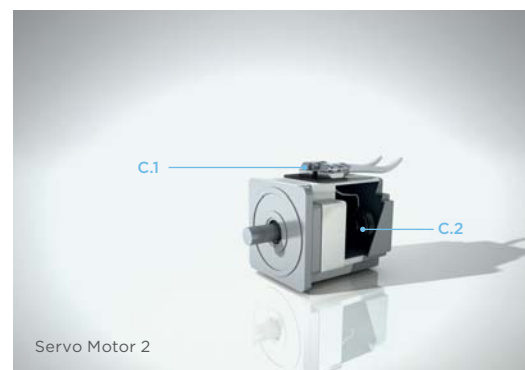
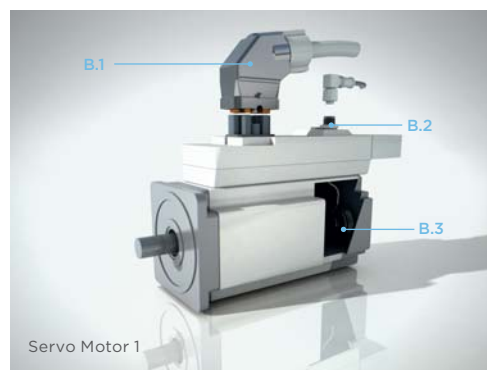
- C.1 MICRO MOTOR CONNECTORS
- C.2 RESOLVER

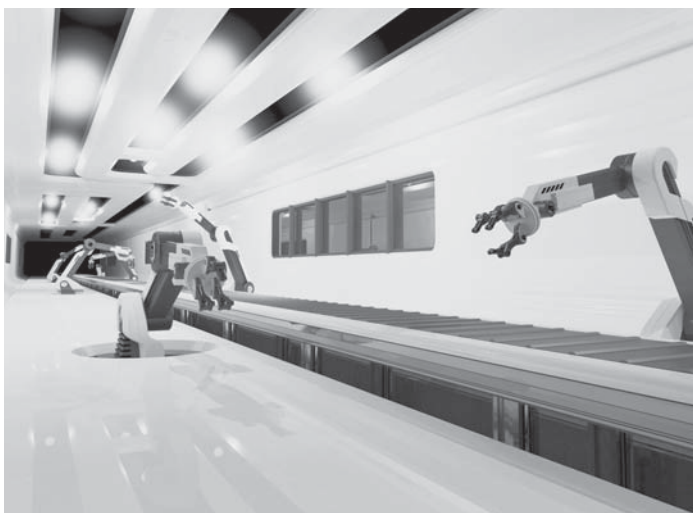
## D. SERVO MOTOR 3

- D.1 CIRCULAR POWER & SIGNAL I/O CONNECTORS
- D.2 RESOLVER

## E. SERVO MOTOR 4

- E.1 HDC RECTANGULAR
- E.2 HDC RECTANGULAR
- E.3 RESOLVER





**LET'S CREATE SOMETHING  
BRILLIANT TOGETHER**

WE ARE DRIVEN BY OUR WISH TO KEEP ON DEVELOPING. THAT'S WHY WE ARE CONSTANTLY WORKING ON INNOVATIVE INTERCONNECT PRODUCTS AND SYSTEMATICALLY IMPROVING EXISTING ONES. WE WORK IN TANDEM WITH YOU IN OVERCOMING EVERY CHALLENGE.

## OUR FLEXIBLE SOLUTIONS FOR SERVO MOTORS AND SERVO DRIVES.

TE offers you a broad range of connectors for use in servo motors. For motors with integrated drives, the Motorman hybrid connector represents a space-saving hybrid interconnect solution. With its compact design, it enables integrated power, signal and communication transmission in just one connector and thus satisfies customer requirements for a whole range of production environments. This concept supports simple, fast and reliable installation. This is because a single hybrid interface also means there is only a single cable to be integrated.

Our Dynamic Series provides you with a whole family of ruggedized connectors. These reliable, easily-fitted connectors for a broad spectrum of cable thicknesses maximize productivity. Their three points of contact also ensure high electronic reliability — making sure you're already equipped for Industry 4.0.

## AMPMODU CONNECTORS



The AMPMODU interconnect system is the proven TE solution and signal standard for Automation & Control applications. Designed to reliably and economically meet the packaging and interconnection requirements of today's industrial environments. It includes board-to-board, wire-to-board and wire-to-wire connectors. The large variety of components and application possibilities, combined with small size and outstanding quality, make the AMPMODU interconnect system ideal for many industrial applications and systems.

### BENEFITS

- Unique modular concept, utilizing precision formed receptacle contacts and mating posts
- Different configuration possibilities offer design flexibility
- Economic and compact design allows for space saving

## M8/M12 CONNECTOR SYSTEM



TE Connectivity's M8/M12 Connector System for machine industrial automation and control applications provides a solution that safely and reliably ensures communication in industrial environments. TE's solution includes an extensive connector range of receptacles, cable assemblies and IO boxes, and provides users with an interface that supports higher bandwidth needs meeting the requirements of up to 10 Gb/s.

TE's broad product portfolio provides customers with shielded and unshielded cable assembly options in both Cat5e and Cat6A cable types. For re-wiring on site, a range of field serviceable connectors are provided that include male and female versions in multiple positions and codings. Additional styles are available on request including alternative mounting arrangements for panel mount connectors and double ended cable assemblies.

### BENEFITS

- Easily installable connector system reduces maintenance time
- M8/M12 Connector System provides full industry standard solution including quick turn, prototype cable assemblies

## INDUSTRIAL MINI I/O CONNECTORS



TE's Industrial Mini I/O Field Installable connector provides innovative and time-saving wire-termination while also serving as a space-saving and reliable I/O solution for industrial environments. TE's Industrial Mini I/O connector is only one quarter the size of the conventional RJ45 plug and, as a result, provides space saving and the flexibility to use limited space on the PCB more effectively. Designed with two points of contact, this connector is built for the stringent demands of an industrial and high vibration environment, enabling increased productivity through a reliable connection. With its innovative piercing termination, the Mini I/O Field Installable version decreases the time usually needed to terminate the wires through soldering and, with an easy to use hand tool, field assembly in virtually any environment is now possible.

### BENEFITS

- Less downtime and reliable connections due to better vibration resistance than RJ45
- Space saving of up to 75% and increased design flexibility
- Easy, field installable solution



## TERMINAL BLOCKS

## D-SUBMINIATURE CONNECTORS

## INDUSTRIAL RJ45 CONNECTORS



TE's Terminal Blocks offer design engineers a reliable connector system with a variety of connection styles and range of centerlines. This solution is used for various data, signal and power applications. This offering provides class leading quality and many different design opportunities.

### BENEFITS

- Mates with industry standard headers on the same centerline spacing
- Fast wire connections
- Custom solutions available

TE Connectivity, the industry leader in D-Subminiature solutions, provides a complete range of quality, time-tested D-Sub connectors that have become the standard in the D-Sub industry. Our complete line of D-Subminiature connectors ranges from Right Angle and Vertical Posted connectors and Cable connectors to the AMPLIMITE .050 Series D-Sub connectors — for any complex application.

### BENEFITS

- Cable and PCB mounted D-Sub connectors
- PCB mounted D-Subminiature connectors available in either right-angle or straight configurations
- Stacked headers reduce overall total header volume by 48% and PC board area by 38%

TE's Industrial Ethernet RJ45 connectors offer a ruggedized design for use in Industrial Ethernet applications and are equipped with a robust and fast termination technology, utilizing the company's common core design in the RJ45 Modular Plug Series. This solution can be applied in the field without the need for any tools. It significantly reduces installation time and costs. It is used in all of TE's field installable connector series, including IP20, ODVA and push-pull connectors. The Variant 14 push-pull connector is available in a plastic or metal shell, and with its robust termination technology allows fast and flexible field installation that withstands harsher industrial environments such as shock, vibration or temperature.

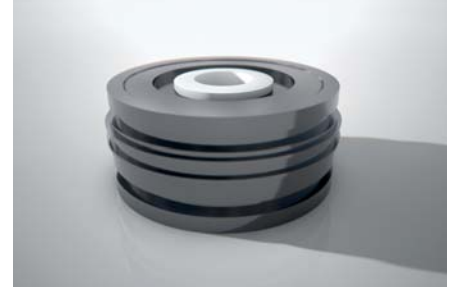
### BENEFITS

- Field-installable modular plugs
- Easy and tool-less installation
- Ruggedized design for use in Industrial Ethernet applications

## MOTORMAN HYBRID CONNECTOR

## DYNAMIC SERIES CONNECTORS

## RESOLVERS



The fully configurable Motorman connectivity solution integrates communication, signals and power for real-time control at higher performance and half the size of current standards. The innovative design and compact size of the Motorman hybrid connector allows for significant space savings in comparison with traditional rectangular industrial connectors. It also helps to keep costs to a minimum by reducing the amount of overall cabling needed as well as shortening cable length.

### BENEFITS

- Spacious side access to the inside assists easy and safe configuration
- Robust contact system to help minimize effects of impact and vibration
- Integration of power, signals and communication in compact design offers considerable space saving

Dynamic Series is a broad product family that provides connector solutions ranging from signal level circuitry through power circuit connectivity in a ruggedized, industrialized package. The connector family is designed for use in control system applications and is suitable for a wide range of applications requiring high density, signal and power applications.

Dynamic Series consists of wire-to-board, wire-to-panel and wire-to-wire connectors with diverse housings available to meet most applications. Standard crimp and spring clamp variations of parts are available. The standardized contacts limit the amount of application tooling required.

### BENEFITS

- Easy mating and unmating for reduced installation and maintenance time
- Three points of contact provide high electrical reliability
- Reliable and safe connections for increased productivity

As automation progresses, there is also a steady increase in the use of sensors for determining angles. Resolvers can be found in many modern, high-precision control systems across multiple industries. TE's resolver portfolio offers low space requirements with high reliability even under harsh environmental conditions.

### BENEFITS

- High rotational speed
- Shock and vibration resistant
- Very high signal-noise ratio

# CABLE SERVICES FROM A SINGLE SOURCE — TE CONNECTIVITY MEETS ALL YOUR NEEDS.

TE Cable Assemblies takes care of its customers, with total solutions that fit precise needs. With our decades of experience, global expertise in development and manufacturing and worldwide network of competence centers, TE Cable Assemblies creates customized solutions and standardized products that work exactly as they should — to ensure high performance and cost-efficiency in any operation. Our cumulative experience is formidable — and we never forget that every customer, and every project, is unique.

## **WE DELIVER FAST:**

FAST RESPONSE &  
IMMEDIATE AVAILABILITY

## **WE FOCUS ON SOLUTIONS:**

FLEXIBLE & EXPERIENCED

## **WE SAVE YOUR TIME:**

FAST & ON SCHEDULE

## **WE PROVIDE SECURITY:**

PROVEN RELIABILITY & HIGH QUALITY

## **WE WORK SEAMLESSLY:**

SMOOTH EXECUTION &  
CONSTANT COMMUNICATION

## **WE COMBINE POWER WITH FLEXIBILITY.**

TE Cable Assemblies is on hand to identify our customers' needs and objectives, map out the issues that need resolving, and quickly take all the steps necessary to move from design into production.

To provide fully integrated solutions, TE engineers in cable assemblies development work hand in hand with development teams dedicated to connectors — our engineering teams can leverage our vast portfolio of connectors to make sure any solution provides a perfect fit for a customer's needs. And when it comes to creating the assemblies themselves, numerous automatic and semi-automatic manufacturing technologies are at our disposal — cutting & stripping, soldering, IDC insulation displacement, over-molding, and more.

TE Cable Assemblies' manufacturing footprint is global too — wherever you are, we are well placed to respond to your needs in terms of flexibility, reliability, and lead times.

## **WE MAKE SURE OUR HIGH STANDARDS NEVER SLIP.**

Quality control is completely integrated throughout all our global manufacturing facilities. Furthermore, we apply the TE Operating Advantage (TEOA) — an enterprise-wide focus on business performance and continual improvement through waste elimination and deployment of best practices.

To meet numerous challenges all the way from concept to commercial product, we deploy processes such as Lean Product Development while dedicated project managers take care of your needs and potential issues. If a problem occurs, we will fix it.

## LET'S CONNECT

We make it easy to connect with our experts and are ready to provide all the support you need. Just call your local support number or visit [www.te.com/industrial](http://www.te.com/industrial) to chat with a Product Information Specialist.

## TECHNICAL SUPPORT

[te.com/support-center](http://te.com/support-center)

Australia	+86 400 8206015	Hungary	+36 1 2892040	Portugal	+34 91 6630420
Austria	+43 1 90560	India	+86 400 8206015	Russia	+74 95 7907902200
Belgium	+31 73 6246999	Ireland	+1 800 882391	Slovakia	+42 02 7201102
Brazil	+55 11 21036000	Italy	+39 011 4012111	Slovenia	+38 615 602132
China	+86 400 8206015	Japan	+044 844 8052	South Africa	+97 150 4570806
Czech Republic	+42 02 7201103	Korea	+02 3415 4607	Spain	+34 932 910330
Denmark	+46 8 50725000	Latvia	+37 2 6778673	Sweden	+46 8 50725000
Estonia	+37 2677 8673	Lithuania	+37 037426900	Switzerland	+41 71 4470447
Finland	+46 8 50725000	Luxembourg	+31 73 6246999	Taiwan	+86 400 8206015
France	+33 1 34208686	Netherlands	+31 73 6246999	Turkey	+90 212 2826053
Germany	+49 6151 6071999	New Zealand	+86 400 8206015	United Kingdom	+44 0800 267666
Greece	+97 1 43470226	Norway	+46 8 50725000	United States of America	+1 800 5226752
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### te.com

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### BROCHURE

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Phone +49 6151 71696  
[te.com](http://te.com)

# **INDUSTRIAL CONTROL & AUTOMATION**

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ROBOTICS - INNOVATIVE INTERCONNECT SOLUTIONS  
FOR THE MACHINERY INDUSTRY

**Browse Products:** <http://www.te.com/usa-en/solutions/industrial-control-and-automation.html>



# ROBOTICS

INNOVATIVE INTERCONNECT SOLUTIONS  
FOR THE MACHINERY INDUSTRY

EVERY CONNECTION COUNTS

# LET'S CREATE THE CONNECTIONS THAT COUNT

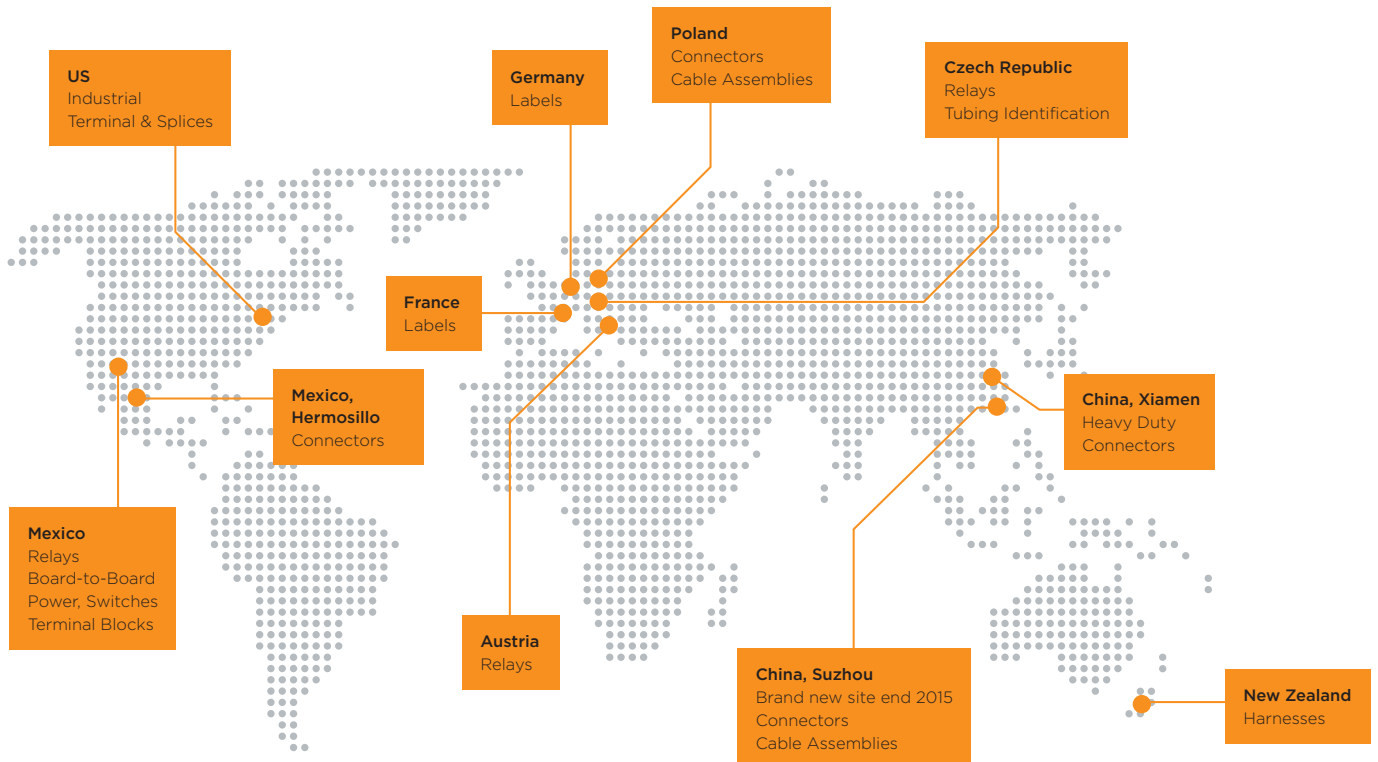


TE Connectivity (NYSE : TE L) is a \$13 billion world leader in connectivity. The company designs and manufactures products at the heart of electronic connections for the world's leading industries including automotive, energy and industrial, broadband communications, consumer devices, healthcare, and aerospace and defense. TE Connectivity's long-standing commitment to innovation and engineering excellence helps its customers solve the needs for more energy efficiency, always-on communications and ever increasing productivity. With nearly 90,000 employees in over 50 countries, TE Connectivity makes connections the world relies on to work flawlessly every day.

To connect with the company, visit: [www.TE.com](http://www.TE.com).

# EVERY VISION IS MORE THAN JUST A COLLECTION OF GOOD IDEAS.

Welcome to Automation & Control. TE Connectivity is a major player in plant and mechanical engineering and industrial automation. We have been maintaining partnerships with leading companies in the automation industry in key markets such as Germany, Japan, the United States and China for around six decades.



TE Connectivity worldwide — our production sites

## COUNT ON TE. FROM DESIGN TO DELIVERY TO WHAT COMES NEXT.

Industrial production is increasingly driven by higher automation. By improved safety. By greater energy efficiency. You can count on TE to work with you every step of the way to develop solutions for every aspect of your production processes.

TE designs and manufactures products and solutions that connect and protect the flow of power, data and signal — in every aspect of our lives. We enable smarter, faster, better technologies to connect materials to end products — for all areas of life. This has made us a globally successful company — a world leader in automation and control technology. When it comes to ensuring the perfect solution, we meet every challenge.

## COUNT ON PRODUCTS THAT HELP YOU COMPETE.

Our broad electromechanical and electronic product portfolio covers all your needs, ranging from simple machinery equipment to fully integrated factory automation and process solutions. For applications in a wide variety of production environments — and always extremely close to the needs of our customers from a wide range of sectors.

With TE as your innovation partner, you'll find everything you need to create and operate a cost-efficient and highly reliable production process. We are at our best when we work with your early design product & process management teams to get the job done right from the start. We also offer continuous improvement programs that give you a real competitive advantage. Because you can't achieve greater productivity and efficiency without better connectivity.



# SMART TECHNOLOGY FOR TODAY AND TOMORROW.

Every vision starts with a big idea — and the absolute desire to face new challenges, develop new solutions and pursue new approaches. Our mission is to provide support for problem solvers in pursuing these approaches throughout the world. Working together to develop outstanding visions from big ideas — for innovations that make our world better.

## THE TE 4.0 MANIFESTO

# 01.

**IDENTIFYING OPPORTUNITIES:**  
FOR PERFECT INTEGRATION — AS EVERY CONNECTION COUNTS

# 02.

**TAKING UP CHALLENGES:**  
A NEW GENERATION OF PRODUCTS —  
FOR A NEW GENERATION OF CUSTOMER NEEDS.

# 03.

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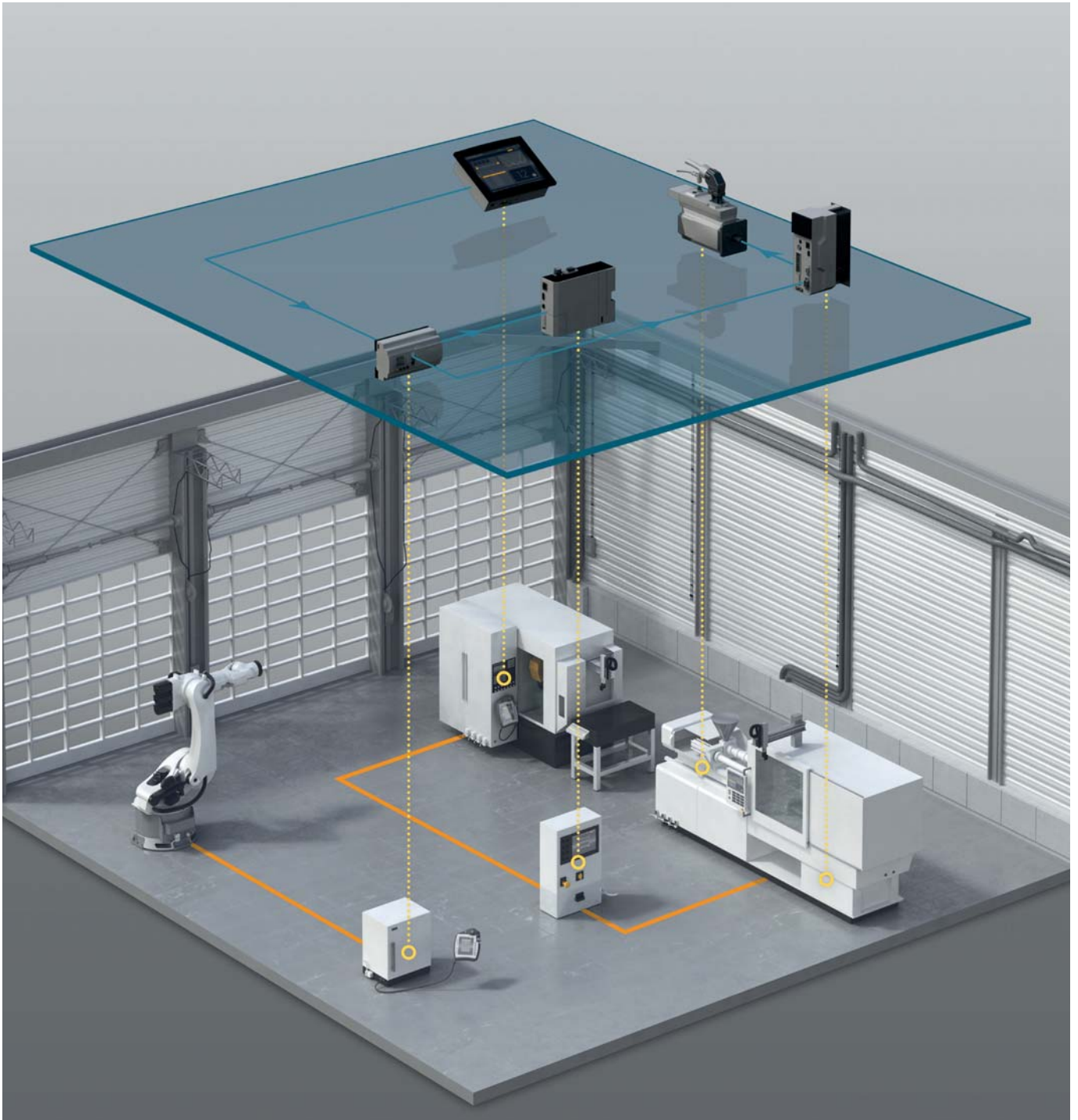
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# ROBOTICS. SHAPE THE FUTURE WITH TE SOLUTIONS.

Industrial production today is shaped by a market that is changing at an unprecedented speed. Growing demand for personalized products, a never-ending stream of new market requirements and the need for consistently high product quality make the use of highly advanced production systems a must. Industrial robots provide the basis for this flexible production — ensuring you are ready to meet the needs of the future head on.

## BUILDING A COMPETITIVE EDGE. YOU CAN RELY ON TE.

The applications for state-of-the-art industrial robots are growing all the time. From automotive and aircraft construction through to the pharmaceutical industry, logistics and metal or plastics processing — the latest generation of industrial robots can handle ever more complex tasks in a whole range of different environments.

Flexibility, optimum configuration options, high productivity and efficiency are the key factors determining your customers' success. As a manufacturer of robot and control technology, you face the constant challenge of making sure you are ready for everything the future brings your way.

We at TE stand shoulder to shoulder with you in meeting this challenge. Thanks to innovative technology, extensive experience, creativity and a dynamic approach, we can develop the precise products your company needs. In doing so, we are helping to boost reliability, precision and energy efficiency. To give you a competitive edge on the market.

## FOR 360° FLEXIBILITY — CONTACTLESS INTERCONNECTS FROM TE.

Robot systems can be adapted to production processes with ever greater complexity and precision. The range of applications they can handle is also expanding. This is making unlimited flexibility a crucial factor — a requirement that traditional cable connections can no longer satisfy.

TE's interconnect solution has been developed with the future in mind and is known as ARISO Contactless Connectivity. ARISO can reliably transmit power, signals and data without physical contact in virtually any environment. This is made possible by the seamless integration of contactless power supply and high-frequency technology. ARISO is particularly at home in applications involving moving parts and electronic components that need to stay reliably connected in harsh environments.

# PRODUCT OVERVIEW.



## A. ROBOTIC ARM

- A.1 ARISO CONTACTLESS CONNECTIVITY
- A.2 HDC RECTANGULAR
- A.3 CIRCULAR POWER & SIGNAL I/O CONNECTORS
- A.4 DYNAMIC SERIES CONNECTORS
- A.5 CIRCULAR PLASTIC CONNECTORS (CPC)
- A.6 HDC RECTANGULAR
- A.7 CIRCULAR PLASTIC CONNECTORS (CPC)
- A.8 HDC RECTANGULAR
- A.9 M12-X-CODE CONNECTORS

## B. PENDANT

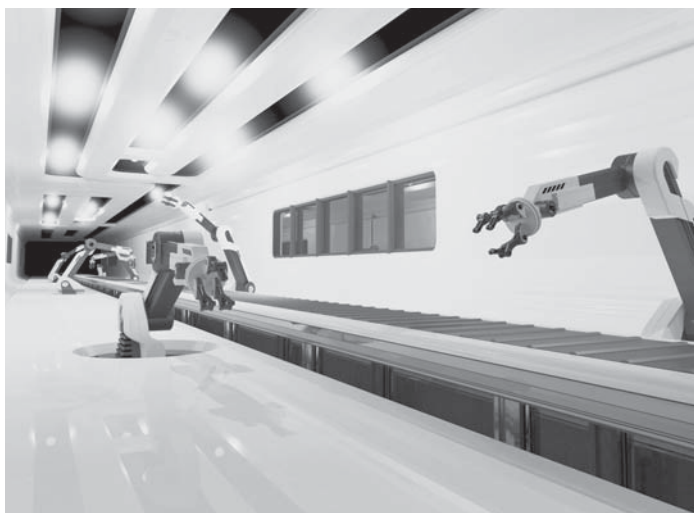
- B.1 CIRCULAR PLASTIC CONNECTORS (CPC)
- B.2 0.80 MM FREE HEIGHT
- B.3 0.50 MM FFC-FPC CONNECTORS
- B.4 PCI EXPRESS CONNECTORS
- B.5 INDUSTRIAL USB CONNECTORS

## C. ROBOTIC CONTROL

- C.1 INDUSTRIAL USB CONNECTORS
- C.2 INDUSTRIAL RJ45 CONNECTORS
- C.3 DYNAMIC SERIES CONNECTORS
- C.4 FORCE GUIDED RELAYS
- C.5 MULTIMODE RELAYS
- C.6 DYNAMIC SERIES CONNECTORS
- C.7 MICRO MOTOR CONNECTORS
- C.8 MINI I/O CONNECTORS
- C.9 INDUSTRIAL USB CONNECTORS
- C.10 HDC RECTANGULAR
- C.11 CIRCULAR PLASTIC CONNECTORS (CPC)

## D. AUTOMATION APPLICATIONS

- D.1 PLC
- D.2 IO MODULE
- D.3 SERVO MOTOR



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## SHAPING SUCCESS — SMALL CONNECTORS. BIG PERFORMANCE.

Powerful solutions are needed if control technology is to meet the requirements of cutting-edge robot systems. The more diverse the capabilities of highly specialized automated production plants become, the more important it is to employ reliable interfaces to secure the growing volumes of data and power — using interconnect solutions that are as compact and space-saving as possible.

## DISCOVER OUR HIGH-SPEED SOLUTIONS — CIRCULAR CONNECTORS FROM TE.

TE can offer you an extensive range of circular connectors — high-speed solutions optimized for use in controlling intelligent robots. They can be installed very easily and quickly. The robust plastic connectors are cost-effective solutions that comply with industrial standards in every regard and are geared precisely to the manufacturer's needs. They make success controllable — thanks to TE.

## M8/M12 CONNECTOR SYSTEM



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### BENEFITS

- Easily installable connector system reduces maintenance time
- M8/M12 Connector System provides full industry standard solution including quick turn, prototype cable assemblies

## ARISO CONTACTLESS CONNECTIVITY



Unconstrained innovation relies on connectivity. Connectivity that's not subject to any of the old design parameters. Unconfined by movement restrictions.

With ARISO Contactless Connectivity, issues typically affecting connectivity in harsh environments, such as water, dust or vibrations, will no longer impact the reliable delivery of power, data and signals. ARISO Contactless Connectivity can replace complex and expensive harness constructions and slip rings — enabling connectivity where you could not connect before.

### BENEFITS

- Freedom of movement that includes tilt, angle or misalignment
- Rotational freedom that enables faster rotation around more than 360°
- Vibration resistance that enables safe and reliable connections in harsher environments
- Design flexibility and cost savings by transfer of power and signals through fluids and walls

## HEAVY DUTY CONNECTORS



TE Connectivity provides a broad product portfolio of reliable and safe connectors and accessories. The harsh environment connectors are suitable for a wide variety of applications, ranging from industrial machinery to railway facilities or electrical power utilities. The broad portfolio includes standard products, latest innovations as well as customer-specific solutions. Apart from the well-known standard connectors (6 — 24 pins), the product range also offers product series featuring a high number of pins (up to 216) and high current connectors of up to 500 A. The housings are made from die-cast aluminum and are classed IP code 65 — 68. A large variety of customer applications (EMI-protected, corrosion-protected, etc.) rounds off the product range.

### BENEFITS

- Broad portfolio for harsh connectivity, industrial environments
- High quality solution for reliable and safe connectivity

## INDUSTRIAL RJ45 CONNECTORS

## CIRCULAR PLASTIC CONNECTORS

## TERMINAL BLOCKS



TE's Industrial Ethernet RJ45 connectors offer a ruggedized design for use in Industrial Ethernet applications and are equipped with a robust and fast termination technology, utilizing the company's common core design in the RJ45 Modular Plug Series. This solution can be applied in the field without the need for any tools. It significantly reduces installation time and costs. It is used in all of TE's field installable connector series, including IP20, ODVA and push-pull connectors. The Variant 14 push-pull connector is available in a plastic or metal shell, and with its robust termination technology allows fast and flexible field installation that withstands harsher industrial environments such as shock, vibration or temperature.

### BENEFITS

- Field-installable modular plugs
- Easy and tool-less installation
- Ruggedized design for use in Industrial Ethernet applications

Circular Plastic Connectors (CPC) enable engineers to design rugged products quickly, reliably and affordably by offering a versatile range of power and signal connectivity solutions. The circular configuration provides designers with an efficient use of real estate and the mounting options include panel mount, free-hanging and wire-to-board. These rugged, cost-effective and reliable connectors can be used virtually anywhere signals and/or power are needed.

### BENEFITS

- F1 rated material withstands UV exposure per industry standards, prolonging equipment life
- Removable contacts and replaceable coupling ring make field repair easy
- Circular design maximizes contact density, lowering equipment space requirements for power and signal interconnections

TE's Terminal Blocks offer design engineers a reliable connector system with a variety of connection styles and range of centerlines. This solution is used for various data, signal and power applications. This offering provides class leading quality and many different design opportunities.

### BENEFITS

- Mates with industry standard headers on the same centerline spacing
- Fast wire connections
- Custom solutions available

## RELAYS



TE's broad relays portfolio includes low power PCB relays, panel-plug-in relays or force guided relays that are key electromechanical switching components used within safety relay circuits. They enable the recognition of a contact's switching condition in a simple and safe manner. With the normally open (NO) and normally closed (NC) contacts of a force guided relay being insulated from each other, the load and monitoring circuit may have different voltage potentials. Monitoring machines and processes, relays help protect people's lives when danger needs to be averted.

### BENEFITS

- Overcurrent protection and safety
- Small and compact size offers space saving
- Broad range of industry-leading relays

## DYNAMIC SERIES CONNECTORS



Dynamic Series is a broad product family that provides connector solutions ranging from signal level circuitry through power circuit connectivity in a ruggedized, industrialized package. The connector family is designed for use in control system applications and is suitable for a wide range of applications requiring high density, signal and power applications.

Dynamic Series consists of wire-to-board, wire-to-panel and wire-to-wire connectors with diverse housings available to meet most applications. Standard crimp and spring clamp variations of parts are available. The standardized contacts limit the amount of application tooling required.

### BENEFITS

- Easy mating and unmating for reduced installation and maintenance time
- Three points of contact provide high electrical reliability
- Reliable and safe connections for increased productivity

## MOTORMAN HYBRID CONNECTOR



The fully configurable Motorman connectivity solution integrates communication, signals and power for real-time control at higher performance and half the size of current standards. The innovative design and compact size of the Motorman hybrid connector allows for significant space savings in comparison with traditional rectangular industrial connectors. It also helps to keep costs to a minimum by reducing the amount of overall cabling needed as well as shortening cable length.

### BENEFITS

- Spacious side access to the inside assists easy and safe configuration
- Robust contact system to help minimize effects of impact and vibration
- Integration of power, signals and communication in compact design offers considerable space saving
- Contacts may be mounted selectively allowing for design flexibility



# CABLE SERVICES FROM A SINGLE SOURCE — TE CONNECTIVITY MEETS ALL YOUR NEEDS.

TE Cable Assemblies takes care of its customers, with total solutions that fit precise needs. With our decades of experience, global expertise in development and manufacturing and worldwide network of competence centers, TE Cable Assemblies creates customized solutions and standardized products that work exactly as they should — to ensure high performance and cost-efficiency in any operation. Our cumulative experience is formidable — and we never forget that every customer, and every project, is unique.

## **WE DELIVER FAST:**

FAST RESPONSE &  
IMMEDIATE AVAILABILITY

## **WE FOCUS ON SOLUTIONS:**

FLEXIBLE & EXPERIENCED

## **WE SAVE YOUR TIME:**

FAST & ON SCHEDULE

## **WE PROVIDE SECURITY:**

PROVEN RELIABILITY & HIGH QUALITY

## **WE WORK SEAMLESSLY:**

SMOOTH EXECUTION &  
CONSTANT COMMUNICATION

## **WE COMBINE POWER WITH FLEXIBILITY.**

TE Cable Assemblies is on hand to identify our customers' needs and objectives, map out the issues that need resolving, and quickly take all the steps necessary to move from design into production.

To provide fully integrated solutions, TE engineers in cable assemblies development work hand in hand with development teams dedicated to connectors — our engineering teams can leverage our vast portfolio of connectors to make sure any solution provides a perfect fit for a customer's needs. And when it comes to creating the assemblies themselves, numerous automatic and semi-automatic manufacturing technologies are at our disposal — cutting & stripping, soldering, IDC insulation displacement, over-molding, and more.

TE Cable Assemblies' manufacturing footprint is global too — wherever you are, we are well placed to respond to your needs in terms of flexibility, reliability, and lead times.

## **WE MAKE SURE OUR HIGH STANDARDS NEVER SLIP.**

Quality control is completely integrated throughout all our global manufacturing facilities. Furthermore, we apply the TE Operating Advantage (TEOA) — an enterprise-wide focus on business performance and continual improvement through waste elimination and deployment of best practices.

To meet numerous challenges all the way from concept to commercial product, we deploy processes such as Lean Product Development while dedicated project managers take care of your needs and potential issues. If a problem occurs, we will fix it.

## LET'S CONNECT

We make it easy to connect with our experts and are ready to provide all the support you need. Just call your local support number or visit [www.te.com/industrial](http://www.te.com/industrial) to chat with a Product Information Specialist.

## TECHNICAL SUPPORT

[te.com/support-center](http://te.com/support-center)

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