



AUTOMATION SENSORS

Smart Connectivity for Uninterrupted Power,
Signal and Data

WE CREATE A SAFER, SUSTAINABLE, PRODUCTIVE AND CONNECTED FUTURE.



**ADVANCING THE FUTURE
OF TRANSPORTATION**



**REVOLUTIONIZING
MEDICAL TECHNOLOGY**



**MAKING FACTORIES
AND HOMES SMARTER**



**ENABLING GLOBAL
COMMUNICATION NETWORKS**

WITH GREAT POWER COMES GREAT SUSTAINABILITY

Committed to near-term company-wide emissions reductions in line with Science Based Targets initiative (SBTi)

GREENHOUSE GAS ABSOLUTE
(Scope 1 and 2)

FY20 to FY23



ENERGY USE INTENSITY

FY20 to FY23



TOTAL WATER WITHDRAWAL

FY20 to FY23



GLOBAL CHARITABLE GIVING

FY22

\$5.6M

PEOPLE IMPACTED IN NEXT-GENERATION TECHNOLOGY EDUCATION

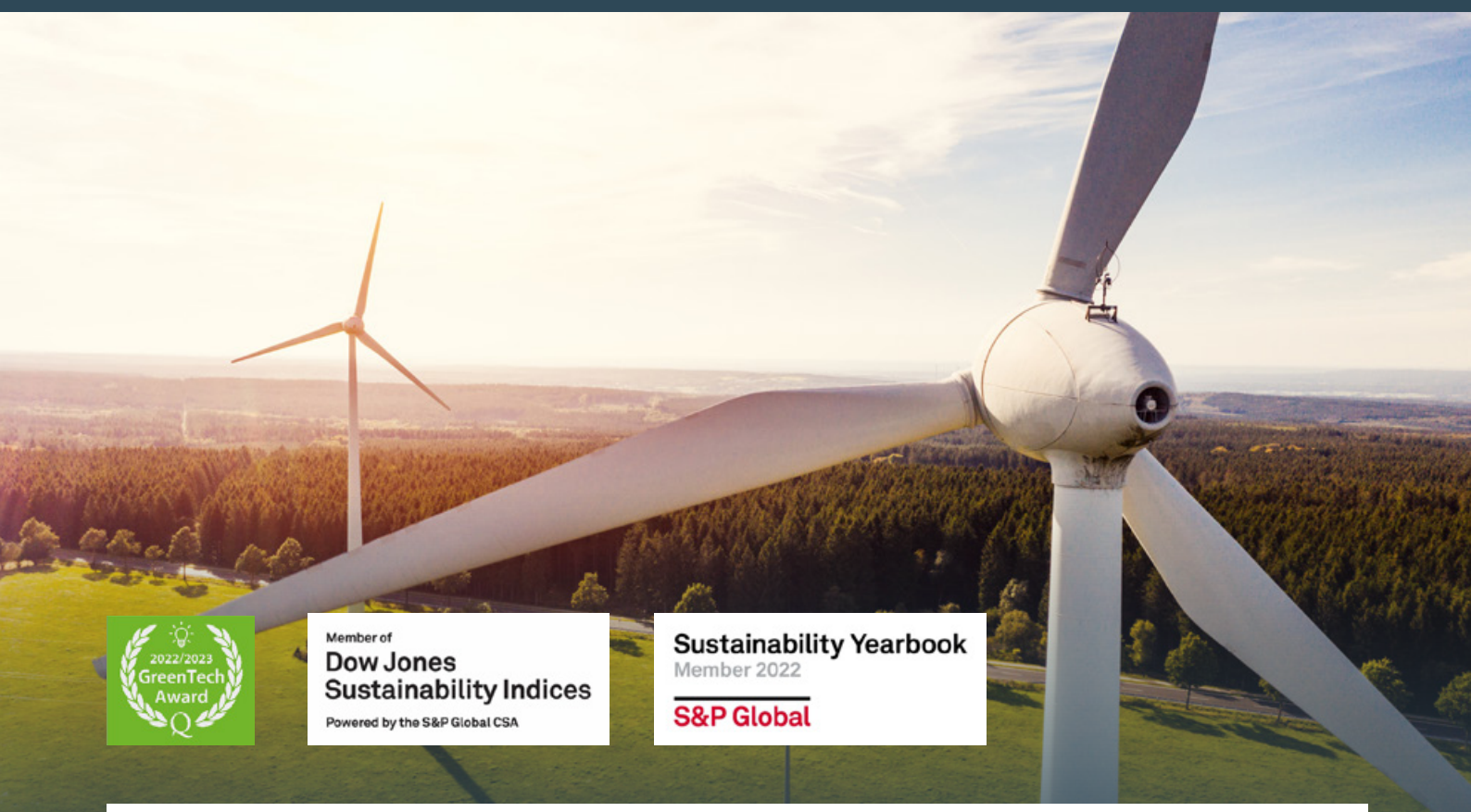
FY20 to FY22

\$3.0M

LOCAL ECONOMIC IMPACT FROM SUPPLY CHAIN

FY20 to FY22

\$3.3M



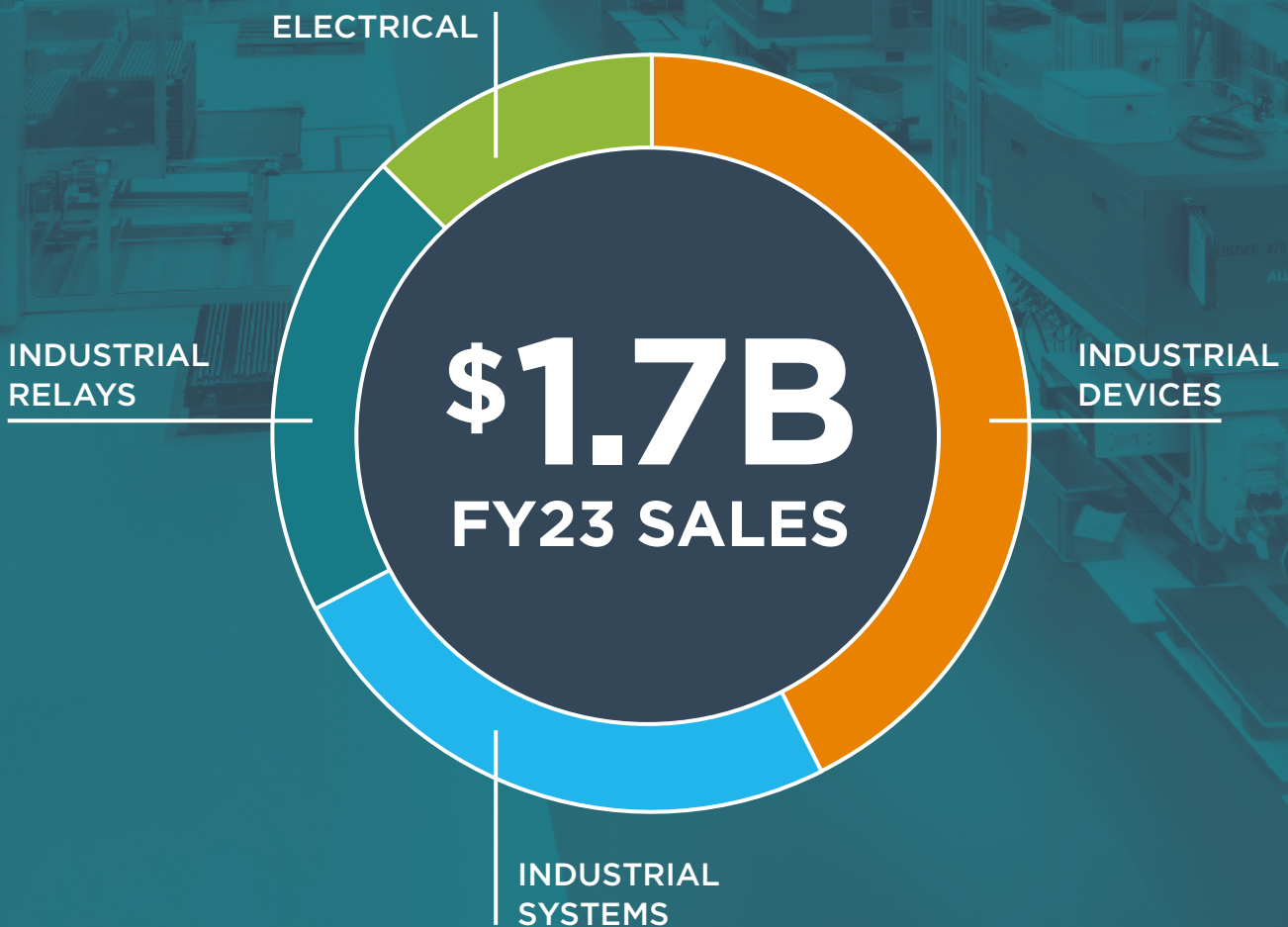
TE INDUSTRIAL

TE INDUSTRIAL IS COMMITTED TO:

- Providing deep application, industry, and integration expertise
- Working with you to drive an extraordinary customer experience
- Offering a broad portfolio and presence across the globe
- Digitally enabled engineering solutions

IN A
12B GLOBAL
MARKET

SERVING OVER
100,000
CUSTOMERS





INDUSTRY DRIVERS

- Technological advances in digitalization and machine learning/artificial intelligence have increased the sensor count per machine
- Optimization of production capacity and minimum down time increases the need for predictive maintenance and therefore the use of sensors
- New development in technologies like 3D vision, RADAR, LIDAR, etc. are extending the use case for sensors

TE supports with:

- Highly engineered connectivity solutions that support virtually uninterrupted operations for power, signal and data
- Sensor application knowhow with engineering support in design and customization
- Integrated solutions that help simplify complex manufacturing processes

THE FUTURE

Market Trends

- Sensors becoming more integrated into industrial ethernet networks to support advanced sensor features
- Advanced sensors include edge computing and cloud connectivity
- Increasing amount of data communication driven by machine vision
- Miniaturization of sensors makes it easier for machine builders to integrate the devices

TE's Role

- Providing reliable high-speed connectivity of 1 Gbit/s and beyond for data-intensive applications (e.g., vision)
- Enable compact and cost-efficient ethernet connectivity to the sensor level – including Single Pair Ethernet (future)
- Creating small pitch-size board connectors to enable reduced sensor size



AUTOMATION SENSOR EQUIPMENT COMPONENTS

Demand for sensors in the industrial market continues to grow as manufacturers expect uninterrupted connectivity, as well as real-time insights and intelligence about their operation, to maintain a competitive edge.

Many forward-thinking manufacturers take advantage of new technologies like edge computing, 3D vision, RADAR, and LIDAR. Innovations in digitalization, machine learning, and artificial intelligence have increased the sensor count per machine, and the continued miniaturization of sensors has

made it easier for machine builders to integrate the devices into manufacturing equipment.

These developments have helped simplify process complexity, and they rely on the connectivity that TE provides. We support manufacturers and machine builders with highly engineered, customized connectivity solutions that provide virtually uninterrupted operations for your sensor applications.

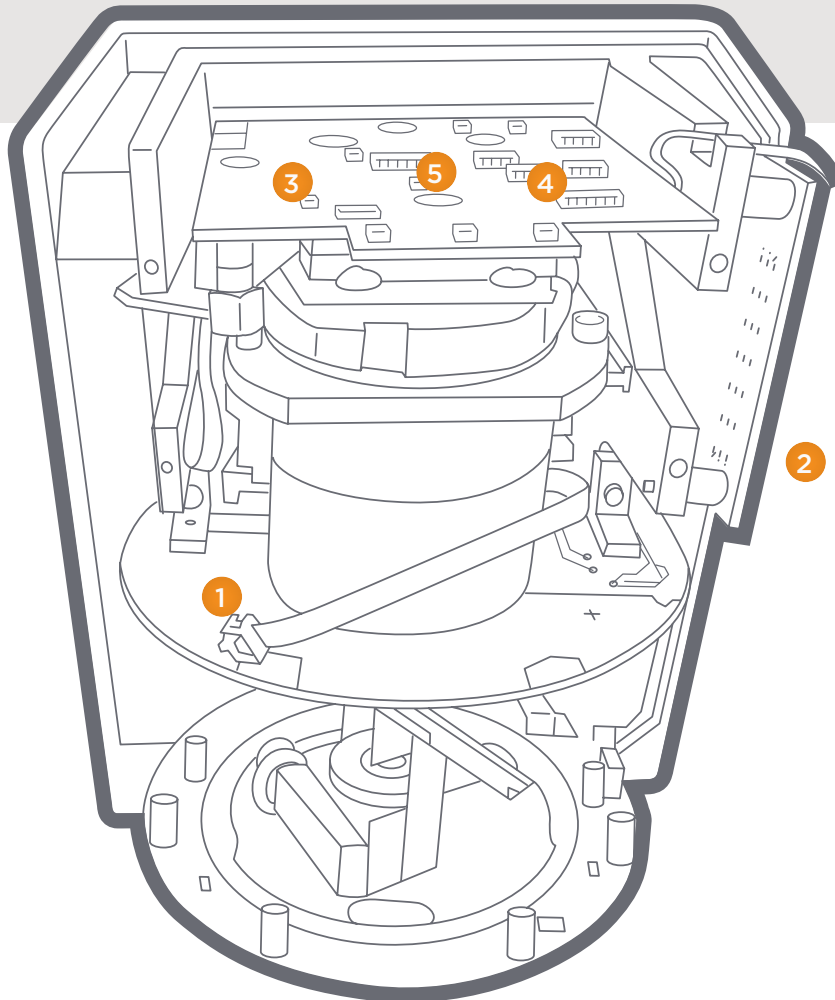
PCB INTERCONNECT

Multiple PCBs

- Modular design enabling sensor variances use two or more PCBs inside the sensor.
- PCBs can be interconnected with board-to-board connectors or via small cable assemblies.
- Compact sensor design is needed for maximum flexibility and ease of integration into machinery.
- To minimize space, fine pitch connectors are common in sensor units. They need a rugged design for harsh environments (temperature, vibration, shock).
- To support an optimized assembly process, connectors need to follow the assembly technology of other components used on the PCB (SMD, THR or THT)

Trends to Watch

- **High-volume / low-mix sensors:** To improve sensor cost and size for high-volume / low-mix sensors, it's often beneficial to reduce the number of PCBs. This can be done by integrating higher functionality into ICs or by using flex PCBs.
- **Switching / relay functions:** As sensors become more powerful, they can take over decentralized control functionality. For example, in complex metrology or process instrumentation, switching relays are integrated into the sensor to provide a switching output for other devices.



1 PCB Interconnect

2 Identification

3 Precision Resistors

4 Switching / Relays

5 Switches / Buttons

1. PCB INTERCONNECT

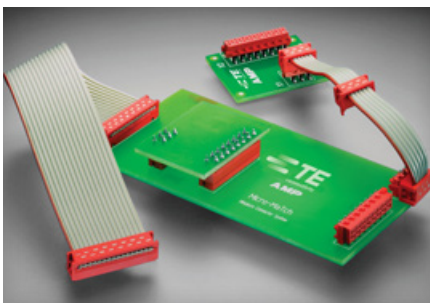
Enable complex and compact PCB setups inside the sensor

Challenges:

- Complex sensors often have multiple PCBs inside the housing, which may require a modular design approach
- Interconnecting PCBs need to be compact and reliable in harsh industrial environments (shock, vibration, temperature ranges)
- Efficient SMD design can reduce assembly costs and reduce the PCB real estate needed

RIBBON CABLE CONNECTORS

[Micro-Match /MicroBridge](#)
[MiniBridge](#)



MODULAR SIGNAL INTERCONNECTS

[AMPMODU](#)
[SMC](#)
[MicroCon](#)



MODULAR SIGNAL INTERCONNECTS

[MicroStac](#)



BENEFITS:

- Special spring contact design for high vibration tolerance helps minimize fretting corrosion
- Gas tight connection at contact interface allows for tin plating (no gold required), driving cost savings
- Automotive grade (LV214) for high reliability in the application
- More reliable, automated assembly possible with high PCB retention force
- Robust positive or friction latching options available

BENEFITS:

- More reliable and highly miniaturized connector families applicable for severe space constraints
- Maximum design flexibility because of available configurations – different pin counts, different stacking heights, different orientations as well as board-to-board, wire-to-board and on-board-IDC in the same product family available
- Used in different industrial applications because of features like high temperature resistance and dual-beam contact system

BENEFITS:

- Hermaphroditic connector: identical male and female for reduced storage costs
- Anti-magnetic versions are available
- Design freedom given through 1- and 2-row versions, different stacking heights and the realization of two contact points to compensate tolerances – all with a 0.8 mm pitch

2. IDENTIFICATION

Apply durable identification and product information

Challenges:

- Identification markers hold important information, and products need to be identifiable over years in the field
- Prints need to be applied to multiple kinds of material and need to last years

PCB LABELS

Products



WRAP AROUND LABELS

Products



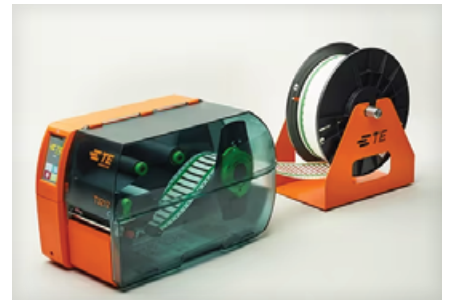
PRINTABLE HEAT SHRINK

Products



PRINTER AND SOFTWARE

Products



BENEFITS:

- Large portfolio of polyimide labels to **identify circuit boards** and suitable for **direct wave and IR reflow** PCB applications
- **UL recognized** and suitable for the **extreme high-temperature** environments
- **T1K** labels **for manual apply**, **T2K** labels **for manual and auto apply** applications
- **TSK** labels **for auto apply**, Withstands surface mount board processes top or bottom side of PCB

BENEFITS:

- **SBP self-laminated vinyl labels** are excellent for **wire, cables and cord sets identification**. Available in **several colors** to allow color coding among **prints**.
- Large offering of **ladder and continuous printable tubing** in **different series, sizes and colors** adapted to the most demanding environments

BENEFITS:

- A variety of **thermal transfer printers, software and ink ribbons** are available as part of our **vast identification solution** package
- Using all recommended TE products will help you make a lasting mark

3. PRECISION RESISTORS

Enabling high precision electronics

Challenges:

- Limited PCB space available
- High precision electronics often need high precision passives
- Requirements for high reliability and durability

SMD PRECISION RESISTORS // THT PRECISION RESISTORS

[Holsworthy Precision Resistors](#)



BENEFITS:

- **Highly reliable** resistors
- **AEC-Q200 compliant and qualified options**
- **Various metal film options available** (e.g., NiCr / TanNi / AlNi)
- Package sizes **between 0201 and 2512**
- **SMD and THT options available**
- **Available in 1 K and/or 5 K reels packaging**
- Tolerances **as low as 0.01%**
- TCR **as low as 2 ppm**
- Power dissipation capability **up to 1 W at 0805 size** (RA73 Series)

4. SWITCHING / RELAYS

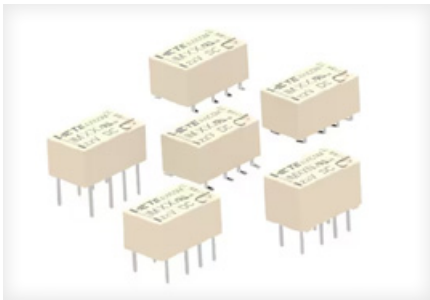
Support several Ampere of output current

Challenges:

- In some cases, the sensor acts as a small control unit controlling simple devices
- Limited possibility of heat generation as sensor units are often compact and completely sealed
- Restricted space requires relays to be very compact

SIGNAL RELAYS

IM



MINIATURE POWER PCB RELAYS

PE

RE

RT



BENEFITS:

- **Extremely compact design** reduces PCB dimensions. The narrow THT and J-leg SMD versions **reduce the PCB size even further** while providing more design flexibility
- Two parallel, galvanically isolated contacts available as well as changeover contacts, making this signal relay **significantly more durable and cost-efficient than solid state solutions**
- **Low and extremely low coil power versions** available, which improves cost and PCB performance with large relay quantities

BENEFITS:

- **PE / RE: Less PCB space and lower height** as standard power relays such as MSR/RV11 or RT
- **PE / RT latching version** available for power sensitive sensor applications
- **RT:** Can switch **high loads** even up to inrush applications (LED, lighting, transformer, motors)

5. SWITCHES / BUTTONS

Enable simple sensor setup and programming

Challenges:

- Advanced sensors sometimes require a setup or programming of the sensor after installation
- Field bus addresses need to be set up, ranges or sensitivities need to be adjusted to the use case
- Toolless setup or programming is often preferred by the installer

DIP- / SIP-SWITCHES

[Products](#)



SLIDE SWITCHES

[Products](#)



ROTARY SWITCHES

[Products](#)



TACTILE SWITCHES

[Products](#)



BENEFITS:

- Extremely compact and rugged switch for configuration directly on the PCB
- Up to 30 parallel switches enable a significant amount of configuration data

BENEFITS:

- From simple on / off to multi-function switches
- Often used as main switch for low power electronics

BENEFITS:

- Configuration in several different modes
- Depending on the model it can be actuated with a screwdriver on board or via a knob from the outside of the housing

BENEFITS:

- Ultra-miniature options available
- In combination with a flashing LED, tactile switches are excellent for setup of complex self-configurations

COMMUNICATION & I/O CONNECTIVITY

Most Typical Connectors

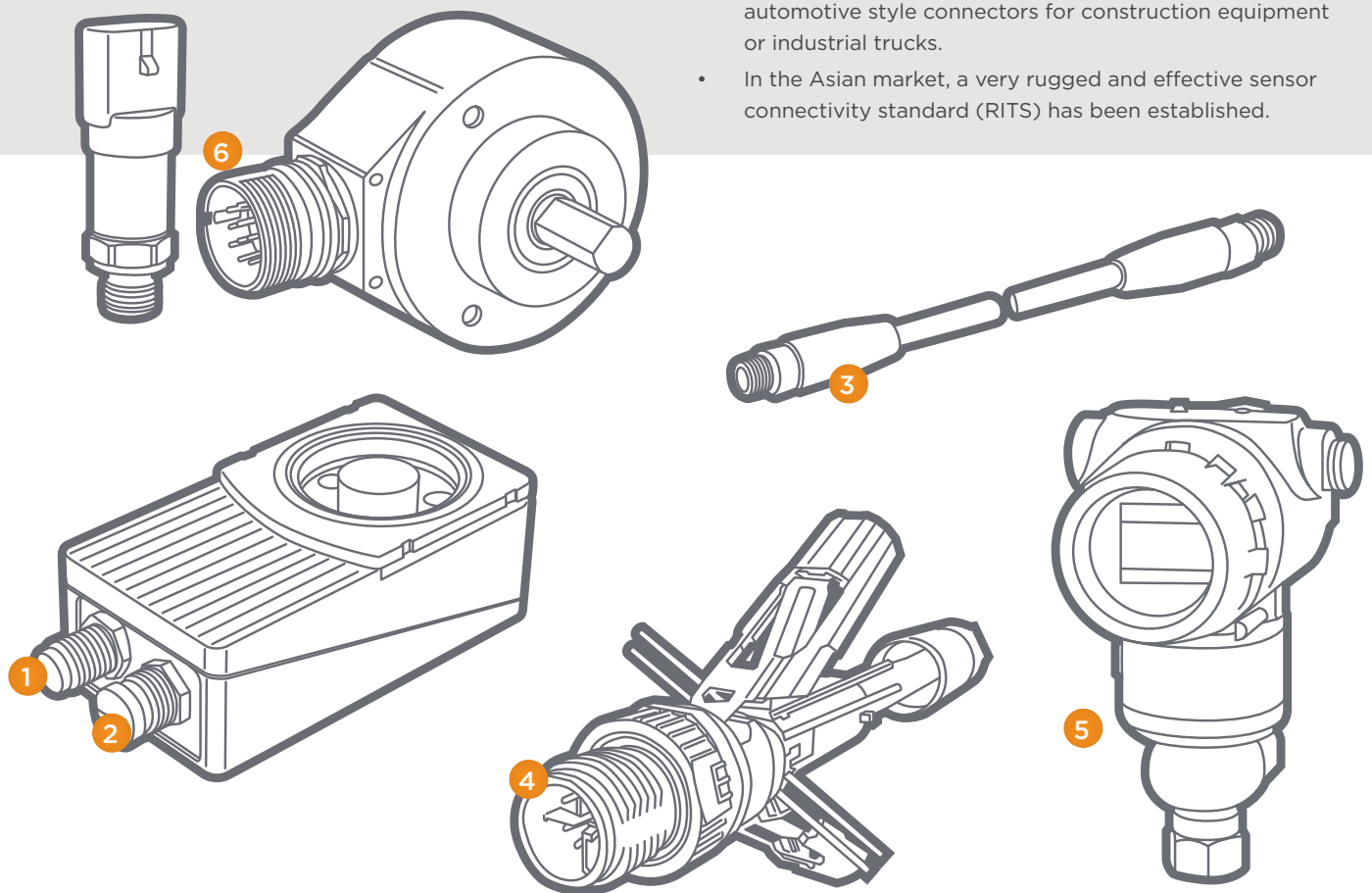
- A-coded M12 connectors — or when smaller dimensions are required, M8 connectors — are among the most popular connectors in sensor applications for sealed environments. There are three typical setups:
 1. Open-end pig tail (very compact solution but with high replacement cost)
 2. Connector integrated into the housing (the standard solution for larger sensors)
 3. Connectors on the end of a short pig tail (combines compactness with flexibility but costs the most)
- A-coded M12 connectors are also widely used as the I/O-link for data communication.
- In non-sealed environments, traditional sub-D connectors are still commonly used.

Ethernet

- For years, the percentage of sensors with an ethernet interface has continued to rise since it enables easy and powerful integration of sensors into control networks.
- In sealed applications, M12 D-coded (100 MBit/s) or X-coded (1-10 Gbit/s) connectors are primarily used. In non-sealed environments, classic RJ45 ethernet connectors are most popular.
- The upcoming standard for Single Pair Ethernet (SPE) provides a smaller footprint and more cost-effective ethernet connectivity. This new standard is expected to dramatically increase ethernet connectivity in sensor applications.

Special Application

- Some end-market applications use market-specific connectors as a sensor interface. A couple of examples are M23 connectors used in motor applications and automotive style connectors for construction equipment or industrial trucks.
- In the Asian market, a very rugged and effective sensor connectivity standard (RITS) has been established.



1 Signal I/O Connectors

2 Ethernet Connectivity

3 Cord Set

4 Field Installable Connectors

5 Cable Glands / Terminals

6 Special Applications

1. SIGNAL I/O CONNECTORS

Reliable and easy to use connectivity between sensing device and controller

Challenges:

- Most sensors use power and transfer signals over the same cable / signal connector
- Analog signals often require shielded connectivity due to EMI conditions

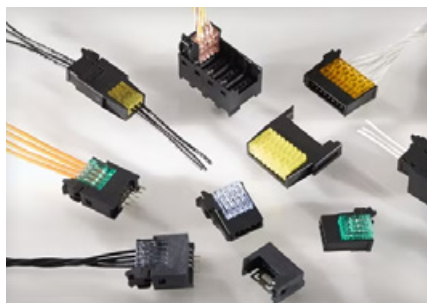
M8/M12 CONNECTORS

[Catalog](#)



IP20 SIGNAL CONNECTORS

[RITS](#)



D-SUB CONNECTORS

[AMPLIMITE](#)



BENEFITS:

- M8 and M12 are the most popular I/O connectors for sensors IP65 and higher
- Different codings and pin counts from 2 to 17 are available
- Different mounting options available and can be used with wires or can be soldered to the PCB to allow for greater flexibility
- Inserts without tread for PCB mount enable high integration
- 90° version allows for tubular sensor setups
- THR and SMD version allow for cost efficient PCB assembly

BENEFITS:

- Reliable and very compact connection (2 mm pitch) to connect sensor into controllers
- Easy assembly in the field via IDC contacts
- 5 different colors for easy identification
- Junction boxes allow for modular wiring
- Component recognized by UL to US and Canadian standards, File No. E28476
- 3 to 8 positions available

BENEFITS:

- Reliable and very flexible connector solution with a large number of pin counts and versions available
- Shielding allows for precise transfer of analog signal

2. ETHERNET CONNECTORS

Enabling rugged standard data connectivity

Challenges:

- High-end sensors need to be directly connected into industrial ethernet networks
- Machine vision cameras often need to transfer data at rates >100 Mbit/s
- Sensor devices are often applied in harsh environments, but the ethernet connection needs to be reliable and stable

M12 ETHERNET

D-coded / X-coded



INDUSTRIAL IP20 ETHERNET

Mini IO



RJ45

Products



SPE

Header / Cordset



BENEFITS:

- M12 standard is the most popular I/O connector for sensors IP65 and higher
- D-coded connectors enable 100 Mbit/s ethernet (Cat5), X-coded connectors enable 10 Gbit/s (Cat6A)
- THR and SMD version allow for cost efficient PCB assembly

BENEFITS:

- Completely designed for industrial applications
- Excellent vibration performance with multiple contact points
- Rugged housing, retention force and locking mechanism
- 4x smaller than standard RJ45 connector
- Virtually toolless, accurate installation
- Integrated power (PoE)

BENEFITS:

- Standard ethernet connector for less harsh environments
- Well suited for machine vision cameras
- Integrated magnetics can improve the EMI performance

BENEFITS:

- New standard for ethernet connectivity
- Reduced size allows ethernet to be implemented in even smaller sensors
- The new IEC63171-7 hybrid connector allows for power (11 kW /16 A) and ethernet connection (1 Gbit/s) via one cable

3. CORD SETS

Reliable connection of sensors

Challenges:

- Prefabricated cord sets allow for fast installation in the field without additional tools or specific operator skills
- Significant variety of configurations and length must be available

M12 ETHERNET

Product



FIELDBUS CORD SETS

Product



SENSOR/ACTUATOR CORD SETS

Product



BENEFITS:

- Up to Cat6A performance available
- D- and X-coded type (also mixed with RJ45) are available
- IP67 performance
- Available in a variety of connector geometry, cable types and lengths

BENEFITS:

- Cord sets for Profibus, DeviceNet, CanOpen and CC-Link
- IP67 performance
- Available in a variety of connector geometry, cable types and lengths

BENEFITS:

- A-Coded types
- IP67 performance
- Available in a variety of connector geometry, cable types and lengths

3. CORD SETS

Reliable connection of sensors

Challenges:

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- Significant variety of configurations and length must be available

M12 POWER CORD SETS

Product



INDUSTRIAL IP20 ETHERNET

Product



BENEFITS:

- Up to 40% less space required and almost 80% more power (16 A / 63 VDC) than 7/8" connectors
- IP67 protection allows for harsh environments
- PNO approved for PROFINET standard

BENEFITS:

- Mini-IO and RJ45 cord sets
- IP20 rated
- Available in a variety of connector geometry, cable types and lengths

4. FIELD INSTALLABLE CONNECTORS

Improved wiring flexibility and easy to install

Challenges:

- Routing a prefabricated cord set through a machine is often more cumbersome (or even impossible) than routing an unterminated cable
- Preplanning and ordering exact cable length is sometimes not efficient
- Must be able to attach connectors on already routed cable
- Connector installation must be possible with few components, easy to learn steps and done without special tools

M8/M12 SIGNAL

Product



M12 ETHERNET

Product



INDUSTRIAL IP20 ETHERNET

Industrial RJ45 / Mini I/O



BENEFITS:

- No special tools needed
- Large variety of geometries, coding and materials available

BENEFITS:

- Wire gauges AWG 22-24-26, solid or stranded wire, cable diameter 6.5-8.5 mm are possible with the same connector
- Completely tool-free installation
- Cat6A performance

BENEFITS:

- Increased ruggedness of RJ45 connector
- Mini I/O is 4x smaller than standard RJ45 connector
- No special tools needed
- Cat6A performance

5. CABLE GLANDS / TERMINAL BLOCKS

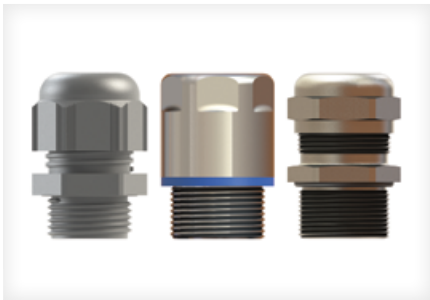
Enable individual wiring without connectors

Challenges:

- Reliably connect individual wires to a terminal
- Seal the cable to ensure the housing is sealed overall

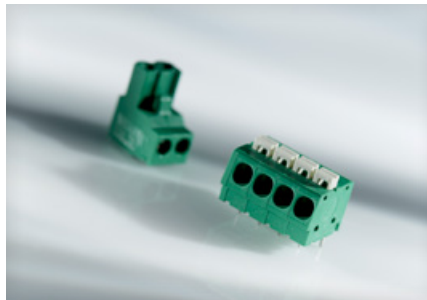
CABLE GLANDS

Product



EUROSTYLE PCB TERMINAL BLOCKS

Product



BENEFITS:

- Broad range of applications available, from economic to high-performance
- High ingress protection up to IP69
- Specialized products available for RJ45, EMC, and hygienic use
- 3 material choices: polyamide, brass, and stainless
- 3 thread types: metric, PG, and NPT
- Vast range of accessories, including washers, locknuts and various plugs to provide drainage, ventilation, or sealing

BENEFITS:

- Reflow compatible cage clamp enables reliable connections/disconnections at field installations
- Housing material is halogen-free and UL94V-0
- Interlocks on the housings makes assembly easy
- Terminal block connectors are interchangeable

6. SPECIAL APPLICATIONS

Adapt sensors to special customer requests

Challenges:

- Different market verticals follow different standards, which requires different connector compatibility

MOTOR / ENCODER CONNECTOR

[Intercontec](#)



AUTOMOTIVE CONNECTORS

[Products](#)



BENEFITS:

- Popular in motion control applications
- High EMC/EMI standard thanks to 360° shielding, rugged and shock- and vibration-resistant design
- Power, signal and hybrid connectors available
- Sealed solutions IP66/67 or higher
- SpeedTec connector with quick locking mechanism available

BENEFITS:

- Popular application in commercial vehicles
- TE offers one of the largest portfolios worldwide
- Follows automotive standard
- Extremely rugged design and high vibration tolerance

COMPUTING & SWITCHING DEVICES

Switching Devices

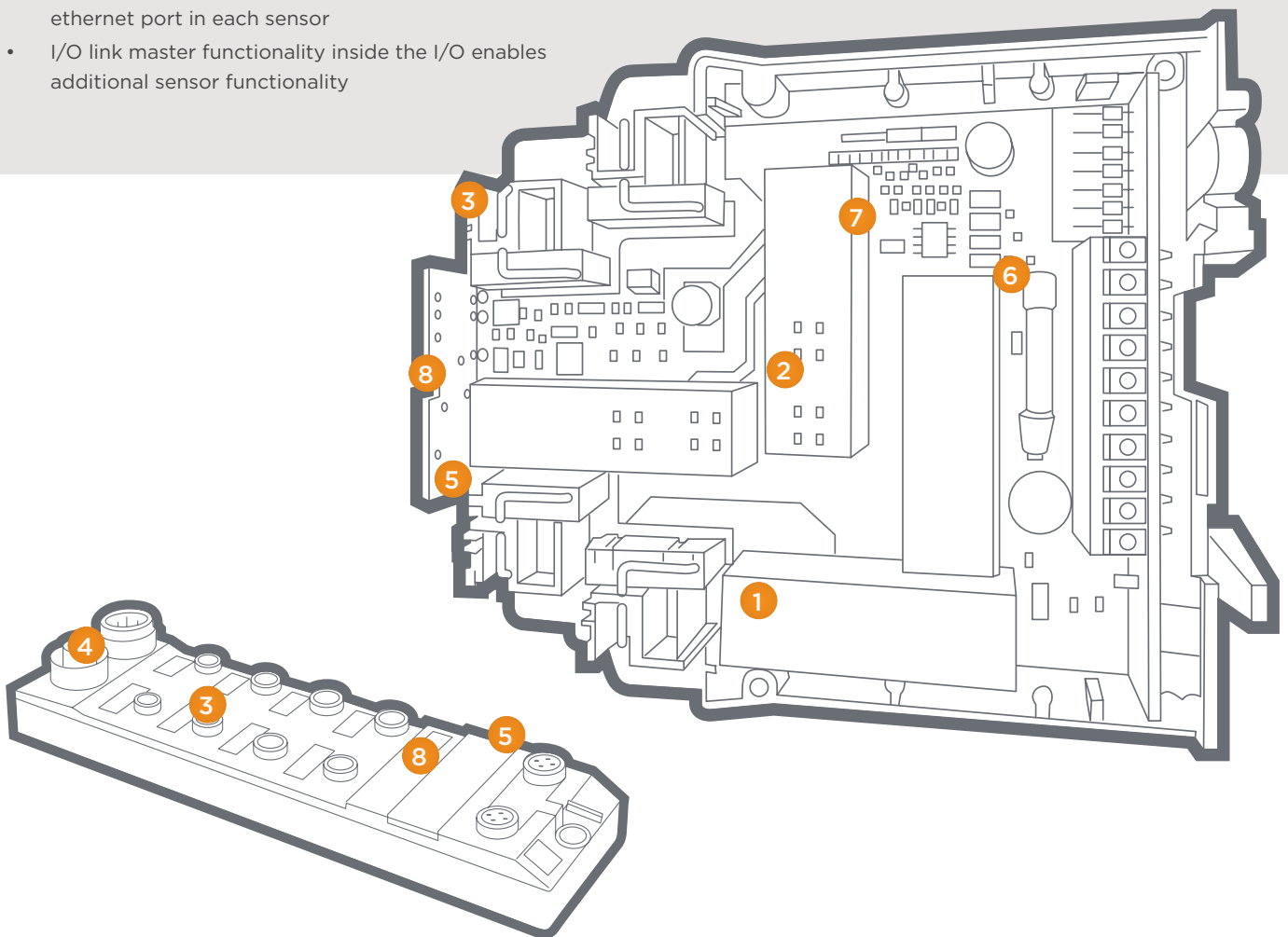
- Some sensors come with additional electronics in the cabinet that enables switching functionality
- A typical application in this area is a safety controller or safety relays for safety sensors

Remote I/Os

- Sealed remote I/Os became very popular in the last year, enabling clusters of sensors to be connected via one power and data cable (e.g., on moving machinery parts)
- Sealed remote I/Os allow for cost efficient integration of sensors into control networks without requiring an ethernet port in each sensor
- I/O link master functionality inside the I/O enables additional sensor functionality

Other Electronics

- Splitting sensor and evaluation electronics is a popular way to allow for modularity, easy and cost-effective maintenance, and easy-to-reach interfaces for setup in process instrumentation
- In machine vision, additional computing units allow the integration of multiple cameras, a very powerful computing device, or a modular setup with various camera options



1 Switching Relays

2 Safe Switching / Force Guided Relays

3 I/O Connections / Terminals

4 Power Connectors

5 Data Connectivity and Programming Ports

6 PCB Interconnect

7 Precision Resistors

8 Switches / Buttons

1. SWITCHING / RELAYS

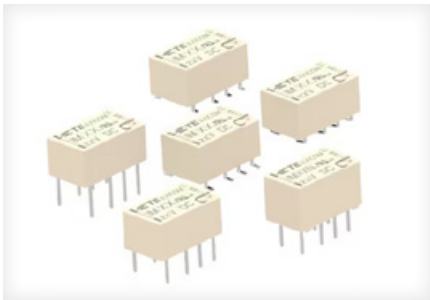
Enable reliable relay outputs of switching devices

Challenges:

- Switching devices and small sensor controllers often require relay outputs for third-party devices

SIGNAL RELAYS

IM



MINIATURE POWER PCB RELAYS

PE

RE

RT



BENEFITS:

- **Extremely compact design** reduces PCB dimensions. The narrow THT and J-leg SMD versions **reduce the PCB size even further** while providing more design flexibility.
- Two parallel, galvanically isolated contacts available as well as changeover contacts, making this signal relay **significantly more durable and cost-efficient than solid state solutions**
- **Low and extremely low coil power versions** available, which improves cost and PCB performance with large relay quantities

BENEFITS:

- **PE / RE: Less PCB space and lower height** as standard power relays such as MSR/RV11 or RT
- **PE / RT latching** version available for power sensitive sensor applications
- **RT:** Can switch **high loads** even up to inrush applications (LED, lighting, transformer, motors)

2. SAFE SWITCHING / FORCE GUIDED RELAYS

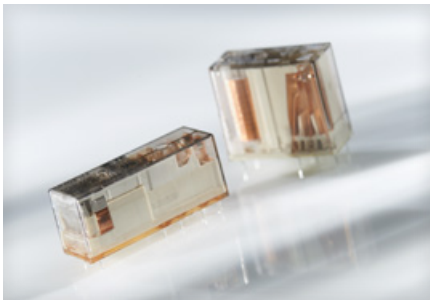
Enable safe switching

Challenges:

- Safety sensors are connected to either a safety controller or a safety relay
- In most applications, safe switching is needed
- Safety relays are mostly realized with force guided relays that allow operators to double check the switching status

FORCE GUIDED RELAYS

FGR



DIN RAIL FORCE GUIDED RELAYS

FGR



LOW PROFILE FORCE GUIDED RELAYS

FGR



BENEFITS:

- Enables engineers to build electronics for **safe switching**
- **Proven technology that is extremely reliable** and used for safety functions in industrial machinery, elevators, railways and medical devices
- **Multiple pole numbers and sizes** available

BENEFITS:

- Enables mounting on Din rail to safely connect safety critical applications to PLC or **compact safety I/O outputs**
- Often used as bridging / coupling function between PLC and load

BENEFITS:

- Enables engineer to build electronics in **slim safety I/O module (17.5 mm)** instead of standard 22.5 mm module

3. SIGNAL CONNECTORS / TERMINALS

Enable reliable signal connectivity for each use case

Challenges:

- Signals from the sensors in the field must be connected to switching devices and I/Os
- Some signals (especially data and analog signals) must be shielded
- Connectors must be reliable in harsh environments and easy to use

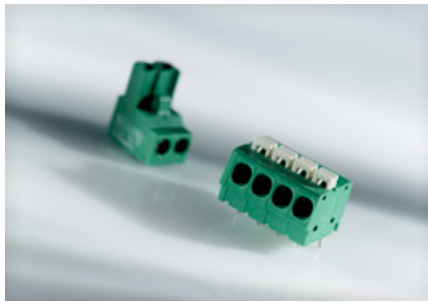
M8/M12 CONNECTORS

[Catalog](#)



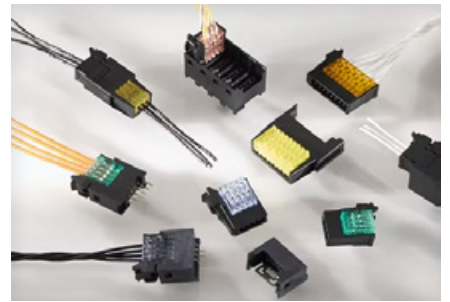
EUROSTYLE PCB TERMINAL BLOCKS

[Products](#)



IP20 SIGNAL CONNECTORS

[RITS](#)



BENEFITS:

- M8 and M12 are the most popular I/O connectors for sensors for IP65 and higher
- Different codings and pin counts from 2 to 17 are available
- Different mounting options available and can be used with wires or can be soldered to the PCB for greater flexibility
- Inserts without tread for PCB mount enable high integration
- THR and SMD version allow for cost efficient PCB assembly

BENEFITS:

- Reflow compatible cage clamp enables reliable connections / disconnections at field installations
- Housing material is halogen-free and UL 94V-0
- Interlocks on the housings provide easy assembly
- Terminal block connectors are interchangeable

BENEFITS:

- Reliable and very compact connection (2 mm pitch) to connect sensor into controllers
- Easy assembly in the field via IDC contacts
- 5 different colors for easy identification
- Junction boxes allow for modular wiring
- Component recognized by UL to US and Canadian standards, File No. E28476
- 3 to 8 positions available

3. SIGNAL CONNECTORS / TERMINALS

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- Some signals (especially data and analog signals) must be shielded
- Connectors must be reliable in harsh environments and easy to use

SHIELDED SIGNAL LINE

Mini IO



D-SUB CONNECTORS

AMPLIMITE



BENEFITS:

- Often used for encoder signals
- Completely designed for industrial applications
- Excellent vibration performance with multiple contact points
- Rugged housing, retention force and locking mechanism
- 4x smaller than standard RJ45 connector

BENEFITS:

- Reliable and flexible connector solution with a variety of pin counts and versions available
- Shielding allows for precise transfer of analog signal

4. ETHERNET CONNECTORS

Enabling rugged standard data connectivity

Challenges:

- High-end sensors need to be directly connected into industrial ethernet networks
- Machine vision cameras often need to transfer data at rates >100 Mbit/s

M12 ETHERNET

D-coded / X-coded



INDUSTRIAL IP20 ETHERNET

Mini IO



RJ45

Products



SPE

Header / Cordset



BENEFITS:

- M12 standard is the most popular I/O connector for sensors IP65 and higher
- D-coded connectors enable 100 Mbit/s ethernet (Cat5), X-coded connectors enable 10 Gbit/s (Cat6A)
- THR and SMD version allow for cost efficient PCB assembly

BENEFITS:

- Completely designed for industrial applications
- Excellent vibration performance with multiple contact points
- Rugged housing, retention force and locking mechanism
- 4x smaller than standard RJ45 connector
- Virtually toolless, accurate installation
- Integrated power (PoE)

BENEFITS:

- Standard ethernet connector for less harsh environments
- Well suited for machine vision cameras
- Integrated magnetics can improve the EMI performance

BENEFITS:

- New standard for ethernet connectivity
- Reduced size allows ethernet to be implemented in even smaller sensors
- The new IEC63171-7 hybrid connector allows for power (11 kW /16 A) and ethernet connection (1 Gbit/s) via one cable

5. POWER CONNECTORS

Compact and reliable power distribution for field I/Os

Challenges:

- Remote/sealed I/Os need to aggregate signals and distribute power to the attached sensors
- Significant power levels are required when daisy chaining I/Os
- Compact setup and often sealing is required

M12 L-CODED

[Catalog](#)



BENEFITS:

- Up to 40% less space required and almost 80% more power (16 A / 63 VDC) than 7/8" connectors
- IP67 protection allows for harsh environments
- PNO approved for PROFINET standard

6. PCB INTERCONNECT

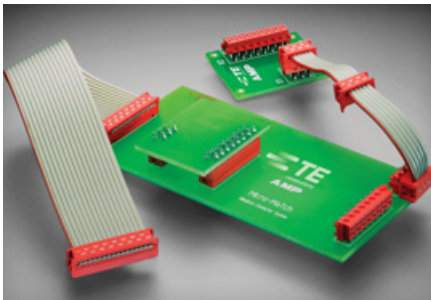
Enable compact and modular setups in harsh environments

Challenges:

- Complex sensors often have multiple PCBs inside the housing
- Interconnecting PCBs need to be compact and reliable in harsh industrial environments (shock, vibration, temperature ranges)
- Some devices are connected to a control via backplane
- Efficient SMD design can reduce assembly costs and PCB real estate

RIBBON CABLE CONNECTORS

[Micro-Match / MicroBridge](#)
[MiniBridge](#)



MODULAR SIGNAL INTERCONNECTS

[AMPMODU](#)
[SMC](#)
[MicroCon](#)



MODULAR SIGNAL INTERCONNECTS

[MicroStac](#)



BENEFITS:

- Special spring contact design for high vibration tolerance helps significantly reduce fretting corrosion
- Gas tight connection at contact interface allows for tin plating (no gold required), driving cost savings
- Automotive grade (LV214) for high reliability in the application
- Reliable, automated assembly possible with high PCB retention force
- Robust positive or friction latching options available

BENEFITS:

- Reliable and highly miniaturized connector families applicable for severe space constraints
- Maximum design flexibility because of available configurations – different pin counts, different stacking heights, different orientations as well as board-to-board, wire-to-board and on-board-IDC at the same product family available
- Used in different industrial applications because of features like high temperature resistance and dual-beam contact system

BENEFITS:

- Hermaphroditic connector: identical male and female for reduced storage costs
- Anti-magnetic versions are available
- Design freedom given through 1- and 2-row versions, different stacking heights and the realization of two contact points to compensate tolerances – all with a 0.8 mm pitch

7. PRECISION RESISTORS

Enabling high precision electronics

Challenges:

- Limited PCB space available
- High precision electronics often need high precision passives
- Requirements for high reliability and durability

SMD PRECISION RESISTORS // THT PRECISION RESISTORS

[Holsworthy Precision Resistors](#)



BENEFITS:

- **Highly reliable** resistors
- **AEC-Q200 compliant and qualified options**
- **Various metal film options available (e.g., NiCr / TanNi / AlNi)**
- Package sizes **between 0201 and 2512**
- **SMD and THT options available**
- **Available in 1 K and/or 5 K reels packaging**
- Tolerances **as low as 0.01%**
- TCR **as low as 2 ppm**
- Power dissipation capability **up to 1 W at 0805 size (RA73 Series)**

8. SWITCHES / BUTTONS

Enable simple sensor setups and programming

Challenges:

- Devices often require setup or programming after installation
- Field bus addresses need to be set up, ranges or sensitivities need to be adjusted to the use case
- Toolless setup or programming is often preferred by the installer

DIP- / SIP-SWITCHES

[Products](#)



SLIDE SWITCHES

[Products](#)



ROTARY SWITCHES

[Products](#)



TACTILE SWITCHES

[Products](#)



BENEFITS:

- Extremely compact and rugged switch for configuration directly on the PCB
- Up to 30 parallel switches enable a significant amount of configuration data

BENEFITS:

- From simple on / off to multi-function switches
- Often used as main switch for low power electronics

BENEFITS:

- Configuration in several different modes
- Depending on the model it can be actuated with a screwdriver on board or via a knob from the outside of the housing

BENEFITS:

- Ultra-miniature options available
- In combination with a flashing LED, tactile switches are excellent for setup of complex self-configurations

SENSOR COMPONENT TECHNOLOGY

SYSTEM OVERVIEW

Most Typical Connectors

- To operate well, some sensor technologies require specific sensor components
- Typical sensor components are:
 - Magnetic sensors (e.g. magneto resistive elements) for proximity sensors or end-point switches
 - Pressure sensor elements (e.g. oil-filled cells) or transducers for pressure measurements
 - PTCs or NTCs for temperature measurement
 - Force sensors
 - Laser drivers and highly sensitive photo diodes for LIDAR-based sensor systems
- TE offers a wide range of the elements or subassemblies that integrate into sensor systems



SENSOR COMPONENT TECHNOLOGY

TE OFFERS ADVANCED, INNOVATIVE AND HIGH-PERFORMING SENSORS ACROSS MULTIPLE INDUSTRIES

For a more in-depth look at TE's extensive portfolio of sensor component technology offerings, we will put you in touch with our expert TE Sensor Solutions sales team.



MAGNETIC



TEMPERATURE



FORCE



PRESSURE



LASER & LIGHT

We are here to help



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