Semiconductor Manufacturing Equipment

Customer Name Here

EVERY CONNECTION COUNTS

$2.1B

COMMUNICATIONS
Appliances, Data & Devices

$3.8B

INDUSTRIAL
Industrial, Aerospace, Defense & Marine, Medical, Energy

$9.0B

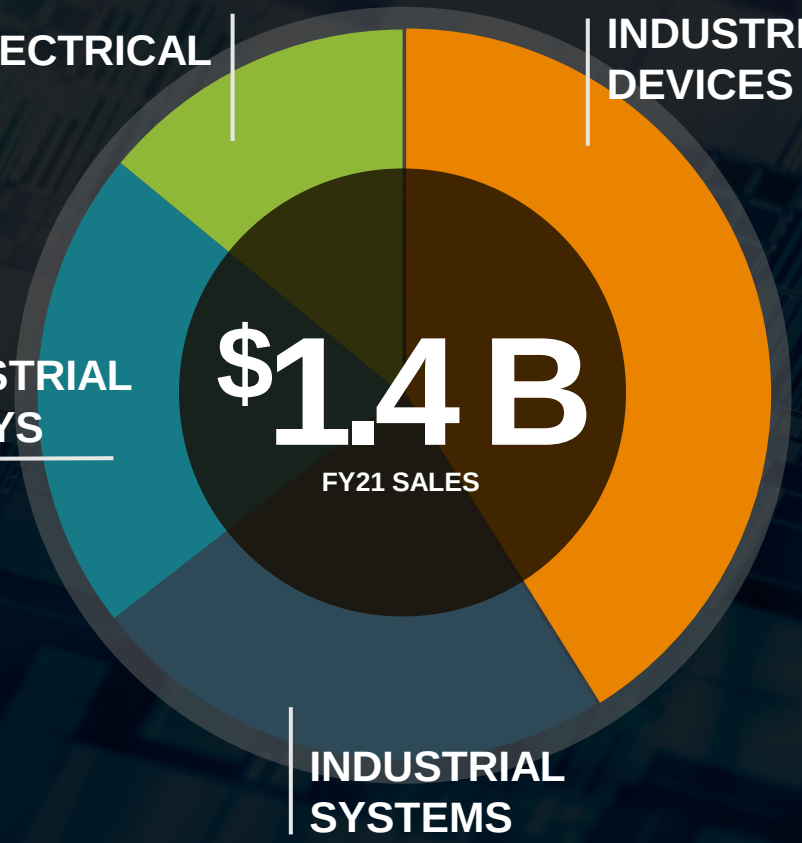
TRANSPORTATION
Automotive, Industrial & Commercial Transportation, Sensors, Application Tooling

CONNECT LIKE THE WORLD DEPENDS ON IT. BECAUSE IT DOES.

247B

PRODUCTS MANUFACTURED ANNUALLY

TE INDUSTRIAL



IN A

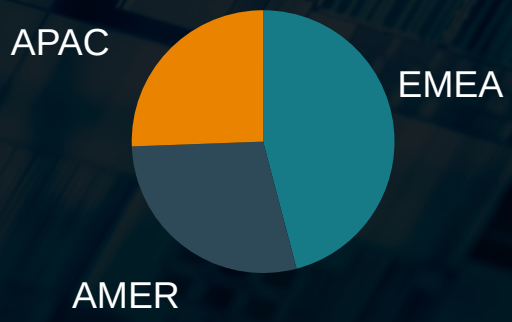
12B

GLOBAL MARKET

SERVING OVER

100,000

CUSTOMERS



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

TE Industrial Employees: ~6,700

GLOBAL APPLICATION FOCUS

Driven by co-creation | Creating something brilliant with you.

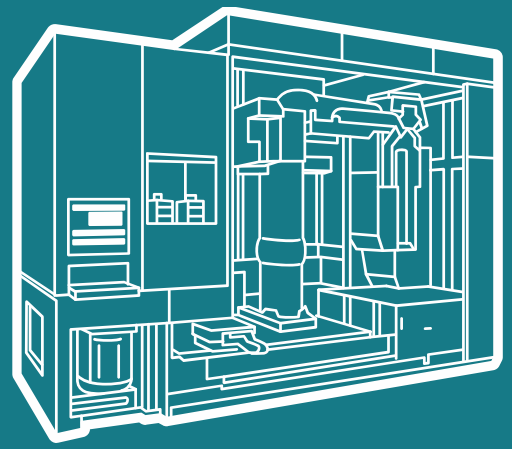
- Trained, skilled engineers understand your needs
- Passionate and highly engaged team
- Expert consultancy

Customer support | Extraordinary customer experience.

- We listen and act (customer pulse, net promoter score)
- Drive operational excellence through TEOA program
- Strong, global footprint serving customers anywhere in the world

Helping you grow | Connecting around the world.

- Global company serving you locally
- Testing capabilities
- Digital advantage: TE.com



SEMICONDUCTOR MANUFACTURING EQUIPMENT (SME)

An Overview

EVERY CONNECTION COUNTS

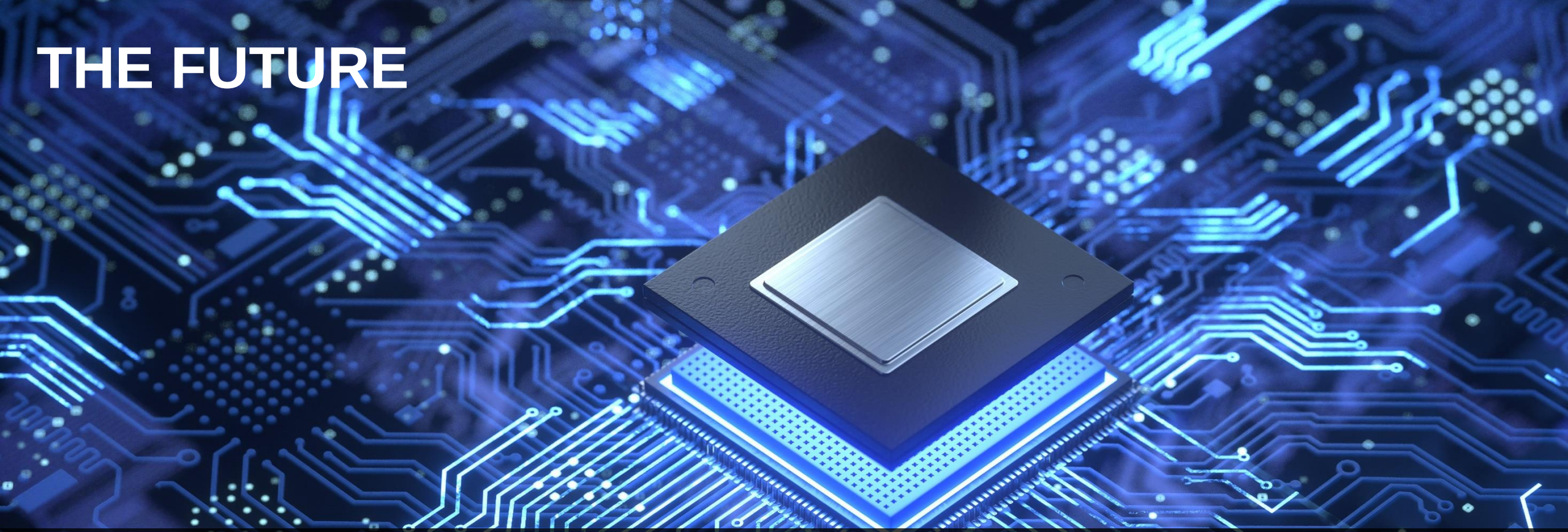
INDUSTRY DRIVERS

- Increasing global semiconductor demand driven by 5G, IoT, AI and autonomous electrical vehicles
- Government support on localizing of manufacturing capacities
- Technology shift to further reduce structure size

TE Supports with:

- Highly engineered connectivity solutions that support **uninterrupted operations** for power, signal and data
- SME application knowhow with **engineering support** in design-in and customization
- SME specific processes ensuring **gapless quality traceability and cleanroom readiness**
- Integrated solution **simplifying complex supply chains**

THE FUTURE



Market Trends

- Increasing **machine complexity** to support higher process complexity necessary to further reduce structure size (Moore's Law)
- Increased **amount of** process and machine **data** to support Industry 4.0 initiatives

TE's Role

Providing **high-speed connectivity** that enables Industry 4.0

Creating **compact connector systems** that enables higher densities inside the machine

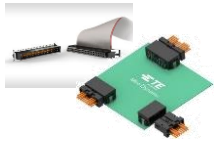
Tailoring **individualized solutions** using prequalified building blocks to ensure exact fit without compromising on quality

SEMICONDUCTOR MANUFACTURING EQUIPMENT COMPONENTS

Components

Identification

Board Connectivity



Relays & Contactors

RF/EMI Filters

Hermetic Connectors

Sensors

Data & Signal Cord Sets (SME Grade)

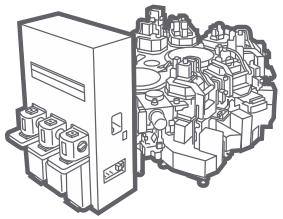
Signal & Data Connectors

Power Connectors

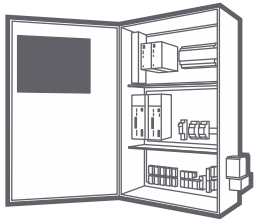
Motor Connectors

Sub Applications

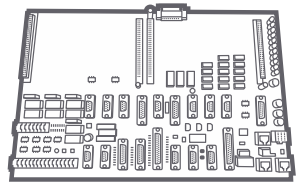
Machine Wiring



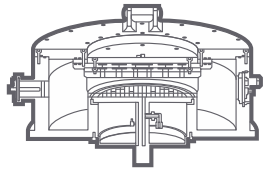
Control Cabinet



Controller & Devices



Vacuum Chamber



Equipment

CVD	PVD	Lithography	CMP
Inspection	Testing	Wire Bonding	Die Bonding
Cleaning	Etching	Ion Implant	

Machine Wiring

EVERY CONNECTION COUNTS

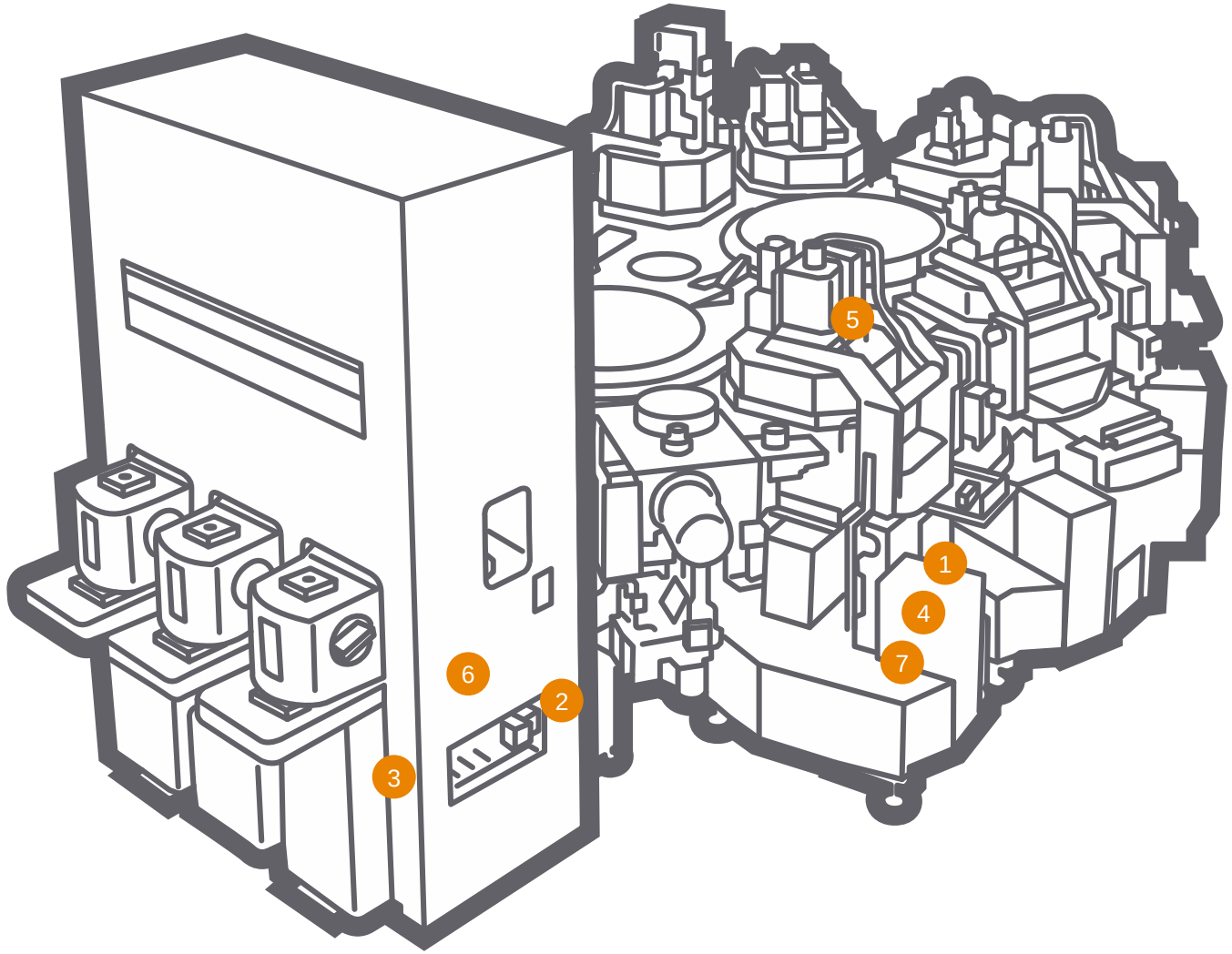
SYSTEM OVERVIEW

Machine Wiring Technology

- Machine wiring used to distribute power, data and signal
- In semiconductor manufacturing, machine wiring is needed to connect controllers, sensors, actuators, motors and other equipment such as plasma generators
- Common connector types include SubD, M12, RJ45, CPC, HDC, Dynamic and RITS

Machine Wiring Requirements

- **Modular:** Must support modular machine setup so it is easy to connect machines subsystems together in the factory
- **Special materials:** Some machines require special materials to ensure cleanliness or to prevent outgassing from the vacuum chamber
- **Reliability:** Quality control and traceability are of utmost importance to ensure this extremely complex equipment operates reliably
- **Specific procedures:** Many cable assemblies require specific testing, labelling and packaging procedures



1. Sensor & Signal Connectivity
2. Power Connectivity
3. Motor Connectivity
4. Ethernet Connectivity
5. RF Connectivity (Coax)
6. Wire/Cable Identification
7. Build-to-Print & Standard Cord Sets

1 SENSOR & SIGNAL CONNECTIVITY

Highly reliable connectivity that allows for high cabling density

Challenges

- Reliable connectivity over the lifetime of the machine
- Allow for high cabling density
- Variable pin-count

Products

TE Advantage

M8/M12 Connectors
Catalog

- Sealed up to **IP67**
- **Multiple pin-counts and mechanical setups** available to use space more efficiently
- **Shielded version available to improve signal reliability**
- **Reliable, vibration-resistant contact and housing design**
- **Harness-maker and field-installable** version available
- **Signal and power versions available**
- Widely used for factory automation **sensors and actuators**

Industrial Grade Signal & Power Connectors
Dynamic / RITS

- Multiple contact points help **reliability in high vibration environments**
- **Rugged housing and high retention force** design create rugged connectivity
- **Audible locking** mechanism creates a safe connection
- **Complete portfolio** 3A - 100A

Thermocouple Connector
Overview

- Spring clamp termination provides 80% installation efficiency
- "Push-on lock concept" allows easy mating and secure locking to provide a highly reliable connection
- Compact and space saving design

D-Sub Connectors
Amplimite

- **Highly reliable rugged and cost-effective design**
- Large portfolio of position counts and housing styles **enable wide usage and compact designs**
- **Shielded** signals
- Variety of **reliable locking mechanisms** available
- Intermatable **interface is standard**

> Overview of TE Components

2 POWER CONNECTIVITY

Highly reliable connectivity that allows for a variety of power levels

Challenges

- Reliable connectivity over the lifetime of the machine
- Allow for high cabling density
- Flexible combination of pin-count, power levels, etc. required

Products

TE Advantage

Circular Plastic Connectors (CPC)
CPC

- **Rugged** and **cost-effective** design
- Large breadth of **power, signal and hybrid** connectivity solutions
- Polarized interface for **easy and reliable mating**
- **Quick connect/disconnect** capability with threaded assist, positive detent coupling

Industrial Grade Signal & Power Connectors
Dynamic

- Multiple contact points help **reliability in high vibration environments**
- **Rugged housing and high retention force** design create a rugged connectivity
- **Audible locking** mechanism creates a safe connection
- **Complete portfolio** 3A - 100A

Heavy Duty Connectors
HDC

- Rectangular industrial connector solution allows **power, signal and data** transmission
- **Flexible** modular design with **high density up to 288 pos**
- Multiple enclosures with protection covered **IP65, IP68 / IP69K**
- Complete range: 2A - 650A

> Overview of TE Components

2 POWER CONNECTIVITY, continued

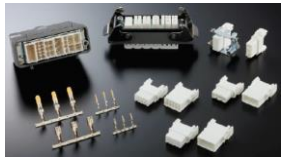
Highly reliable connectivity that allows for a variety of power levels

Challenges

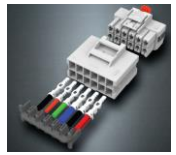
- Reliable connectivity over the lifetime of the machine
- Allow for high cabling density
- Flexible combination of pin-count, power levels, etc. required

Products

Terminals for All Wire Sizes
Ring Terminals



HDC Dynamic Connectors
HDC Dynamic



Power Triple Lock Connector
Power Triple Lock

TE Advantage

- Engineered for **reliable connections**
- **Color coded** insulation for quick identification
- UL, CSA, Mil Spec certifications
- **Robust tooling** options
- Various packaging options

- Dynamic inserts allow for **power and signal**
- **EMC** shielding version available
- **Flexible** modular design with **high density up to 288 pos**
- **Floating fram**e with pre-leading pin allows **tolerance 2mm**
- Current range: 2A - 40A

- Temperatures up to 150°C
- Up to 600V and 20A
- Triple locking mechanism

> Overview of TE Components

3 MOTOR CONNECTIVITY

Wide portfolio of connectors specifically designed for motor applications

Challenges

- Reliable connectivity over the lifetime of the machine
- Power and signal need to be connected
- Shielding is sometimes required as motor controller generates electromagnetic noise
- Connectors must withstand high temperatures at the motors

Products

Circular Motor Connectors
Intercontec

Compact Motor Connectors
Micro Motor

Wire-to-Board, Wire-to-Wire Connectors
Dynamic 3000 Series
Complete Dynamic Series

TE Advantage

- **Rotatable housing** allows for compact mechanical setup
- High EMC/EMI standard thanks to **360° shielding, rugged and shock- and vibration-proof design**
- **Power, signal and hybrid** connectors available
- Scalable power levels **up to 200A and 750VAC / 890VDC**
- **Sealed solutions** IP66/67 or higher

- **Very compact design**
- **Power** and **brake** as well as **encoder** connectors
- Up to **5A and 380V**
- Waterproof **IP67** suited for harsh environments
- **High temperature** (125°C for power and brake, 105°C for encoder)

- Multiple contact points enable **high vibration tolerance**
- Rugged housing and high retention force design provide **rugged connectivity**
- Ergonomic features like a “click” sound during mating **reduce assembly failures**
- Large portfolio of position counts, voltage and current ratings enable **wide usage and compact designs**

> Overview of TE Components

4 ETHERNET CONNECTIVITY

Industrial grade Ethernet connectors increase reliability and reduce package loss

Challenges

- Reliable connectivity over the lifetime of the machine
- Industrial grade connectivity
- Performance buffer in data integrity to allow for extra low package loss
- 100MBit and 1GBit capability, future proof 10GBit capability

Products

Industrial IP 20 Ethernet Connector
Mini I/O

Industrial RJ45
Industrial RJ45

M12 Ethernet
Overview

TE Advantage

- **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

- **Extended vibration performance**
- **Rugged housing and locking mechanism**

- Sealed up to **IP67 or higher**
- **D- and X-coded** versions with data rates **up to 10Gbit/s** possible
- **Reliable, vibration-resistant design**
- Widely used for factory automation **sensors and actuators**

> Overview of TE Components

5 RF CONNECITIVTY (COAX)

Rugged solutions to reliably transmit high frequency or sensitive analog signals

Challenges

- Transmit analog signals with high frequency components
- Sometimes signals also must be especially shielded against electromagnetic noise

Products

Coax Connectivity
Coax

TE Advantage

- Portfolio of **connectors, adapters, terminators and cable assemblies**
- High number of **coax types (standards)** available
- **Rugged designs** according to **MIL specs** available

> Overview of TE Components

6 WIRE/CABLE IDENTIFICATION

Durable identification solutions to identify cables

Challenges

- During machine setup and maintenance, technicians need to keep a clear record and overview
- Cable and the port they belong to must be easy to identify
- In case of failure the cable and all its components must be traceable
- Identification must be durable and readable for many years

Products

Wrap Around Labels
Products

Printable Tubing
Products

Standard Labels
Products

TE Advantage

- Used for cable identification and color coding
- **Long lasting** proven performance
- Large portfolio of colors and dimensions to meet cable assembly specifications and allow **versatile use**
- Applicable during cable assembly or during machine commissioning
- **Cost efficient**

- Dedicated to cable identification in ladder or continuous format
- Large portfolio of materials, colors and sizes to comply with **many kinds of environments**
- **Extremely high printing durability**

- Large portfolio of materials, colors and sizes allow for **versatile use**
- Diverse **adhesive performance options** to match component specificities
- **Large assortment** of colors and preprinted signs

> Overview of TE Components

7 BUILD-TO-PRINT & STANDARD CORD SETS

Highly reliable and traceable cord sets for signal and data connectivity

Challenges

- Extremely high reliability
- Advanced functional testing
- Traceability of all parts and test results
- Special materials for cable, labels, connectors
- Cleanroom-ready cleaning and packaging
- Fast reaction on-demand changes required

Products

Standard Cord Set
Mini – IO / M8/12

Build-to-Print Cable
Product

TE Advantage

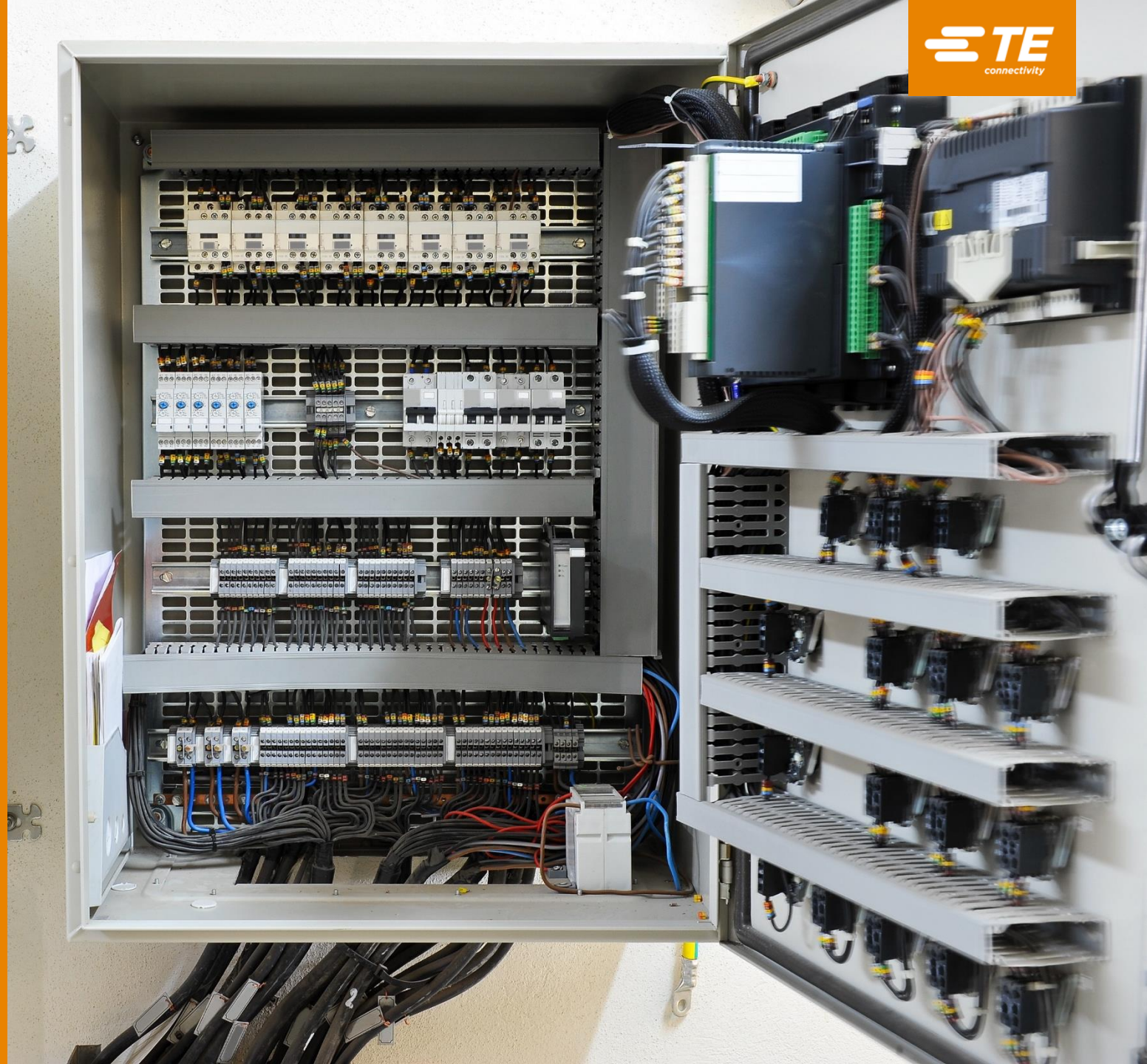
- **Large portfolio of standard cord sets** for industrial signal and network communication
- Various cable types allow for **versatile use**

- **Component combinations** for your specific needs (TE and 3rd party components)
- Wide range of **qualification testing** possible
- **Customization of components** possible
- **100% test of cable** (including signal Integrity testing) possible; **data base for test data**
- **Special cleaning and packaging** in **cleanroom environment** possible
- Assembly to order processes allow for **flexible adaption of demand shift** between different variants

> Overview of TE Components

Control Cabinet

EVERY CONNECTION COUNTS



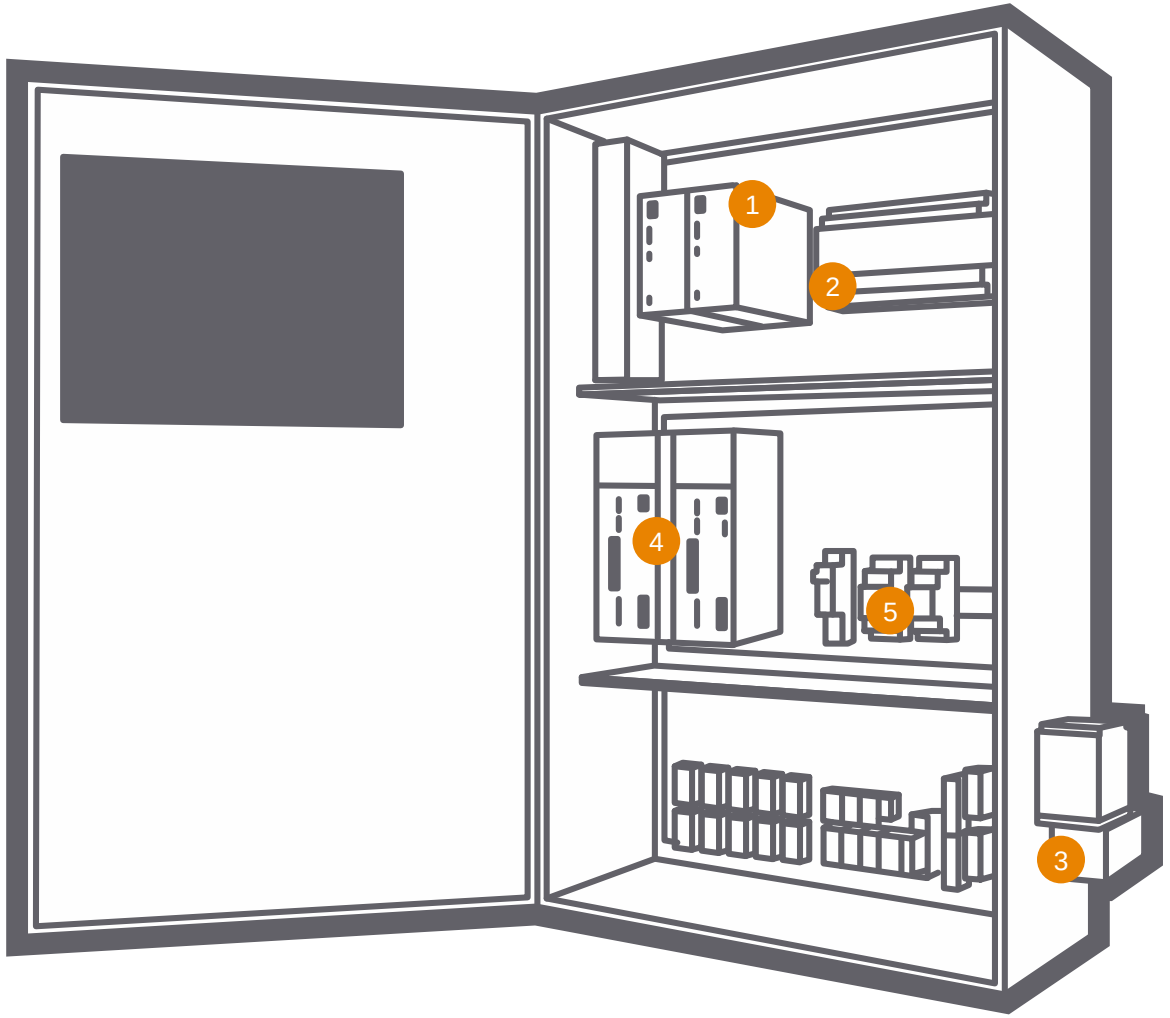
SYSTEM OVERVIEW

Control Cabinet Technology

- In semiconductor manufacturing, a significant number of controllers are based on proprietary electronics
- While connectivity is important, high-accuracy switching/relays, resistors and filters are also in high demand

Control Cabinet Requirements

- **Shielded from EMI:** A lot of semiconductor manufacturing equipment is sensitive to electromechanical noise (EMI), but a lot of the equipment itself – lasers, plasma generators, etc. – generate significant EMI. Thus it's important for the control cabinet and connectivity to include RF/EMI filters to shield against EMI.



1. EMI Filters
2. In-Cabinet Power Distribution
3. Modular Machine Connectivity
4. Cord Sets
5. Connecting / Disconnecting Power

1 EMI FILTERS

Choose the right filtering solution for EMI sensitive equipment

Challenges

- Equipment such as plasma generators, servo controllers, etc. generate electromagnetic noise
- Accuracy of sensors and precision controller is dependent on noise-free power

Products

AC Power Line Filters
3-phase

AC Power Line Filters
1-phase

TE Advantage

- More than six decades of EMI/EMC engineering and application knowhow for designing filters for the most demanding loads and harshest environments
- Broad product portfolio
- DIN rail variant offers easy mounting
- Trusted supplier for global leading semiconductor OEMs (AMAT and LAM, etc.)

- High attenuation and low heat dissipation
- Small footprint and low leakage current variants available
- Extensive experience in customized design for semiconductor applications
- Global manufacturing footprint, distribution network and stock availability

> Overview of TE Components

2 IN-CABINET POWER DISTRIBUTION

Enabling reliable, safe and easy to use power distribution

Challenges

- Power must be distributed within the cabinet as well as to devices outside the cabinet
- Power ranges from high power from the power inlet all the way to 24VDC distribution for supplying power to the electronics
- Power distribution needs to be flexible, easy and fast to assemble
- Reliable and maintenance-free terminals are preferred

Products

Terminal Blocks
ENTRELEC portfolio

Identification & Labelling
Products

Ferrules & Tabs
Products

TE Advantage

- Power distribution block is an economical and **convenient** way to distribute an electrical circuit from a **single input source** to **several devices** in the branch circuit
- **Easy and versatile installation**
- Up to **50% space savings** in the cabinet
- Reduce assembly time by **80%** compared to conventional systems

- Large portfolio of labels and markers to **identify cabinets, cables, component and devices**
- **Large assortment** of colors and signs to cover in-cabinet identification
- **High performance products** compliant in **many kinds of environments**

- Large portfolio of type, sizes and colors allow for **versatile use**
- Enables **reliable connection** for flexible leads in **push-in and spring clamps**
- **Conductor protection** from breakage due to bending, stress or vibrations
- Funneled entry for **fast and splice-free cable insertion**

> Overview of TE Components

3 **MODULAR MACHINE CONNECTIVITY**

Reliable and flexible wiring into the cabinet

Challenges

- Easily and smoothly connect the machine harness to the cabinet
- Reliable connectivity over the lifetime of the machine
- Allow for high cabling density
- Flexible combination of pin-count, power levels, etc. required

Products

Circular Plastic Connectors (CPC)
CPC

TE Advantage

- **Rugged** and **cost-effective** design
- Large breadth of **power, signal and hybrid** connectivity solutions
- Polarized interface for **easy and reliable mating**
- **Quick connect/disconnect** capability with threaded assist, positive detent coupling

Heavy Duty Connectors
HDC

- Modular design allows to transmit **power, signal and data**
- **High density** solution **up to 288 pos**
- EMC modular insert with **max 32 pos**
- Data transmission with **Cat 6a** and **Cat 5e** inserts
- Modular inserts range: 2.2A - 200A

> Overview of TE Components

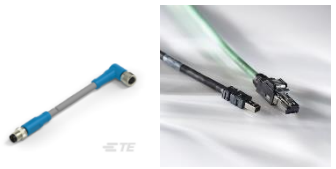
4 CORD SETS

Highly reliable and traceable cord sets for signal and data connectivity

Challenges

- Extremely high reliability
- Advanced functional testing
- Traceability of all parts and test results
- Special materials for cable, labels, connectors
- Cleanroom-ready cleaning and packaging
- Fast reaction on-demand changes required

Products



Standard Cord Set
Mini – IO / M8/12

Build-to-Print Cable
Product

TE Advantage

- **Large portfolio of standard cord sets** for industrial signal and network communication
- Various cable types allow for **versatile use**

- **Component combinations** for your specific needs (TE and 3rd party components)
- Wide range of **qualification testing** possible
- **Customization of components** possible
- **100% test of cable** (including signal Integrity testing) possible; **data base for test data**
- **Special cleaning and packaging** in **cleanroom environment** possible
- Assembly to order processes allow for **flexible adaption of demand shift** between different variants

> Overview of TE Components

5 CONNECTING / DISCONNECTING POWER

Your reliable DC power disconnect solution

Challenges

- Extremely high reliability
- Traceability of all parts and test results

Products

DC Contactors
IHV series

TE Advantage

- DC high current relay (DC900V / 50A - 250A)
- High reliability with integrated economizer circuit
- Hermetically sealed

> Overview of TE Components

Controller & Devices

EVERY CONNECTION COUNTS

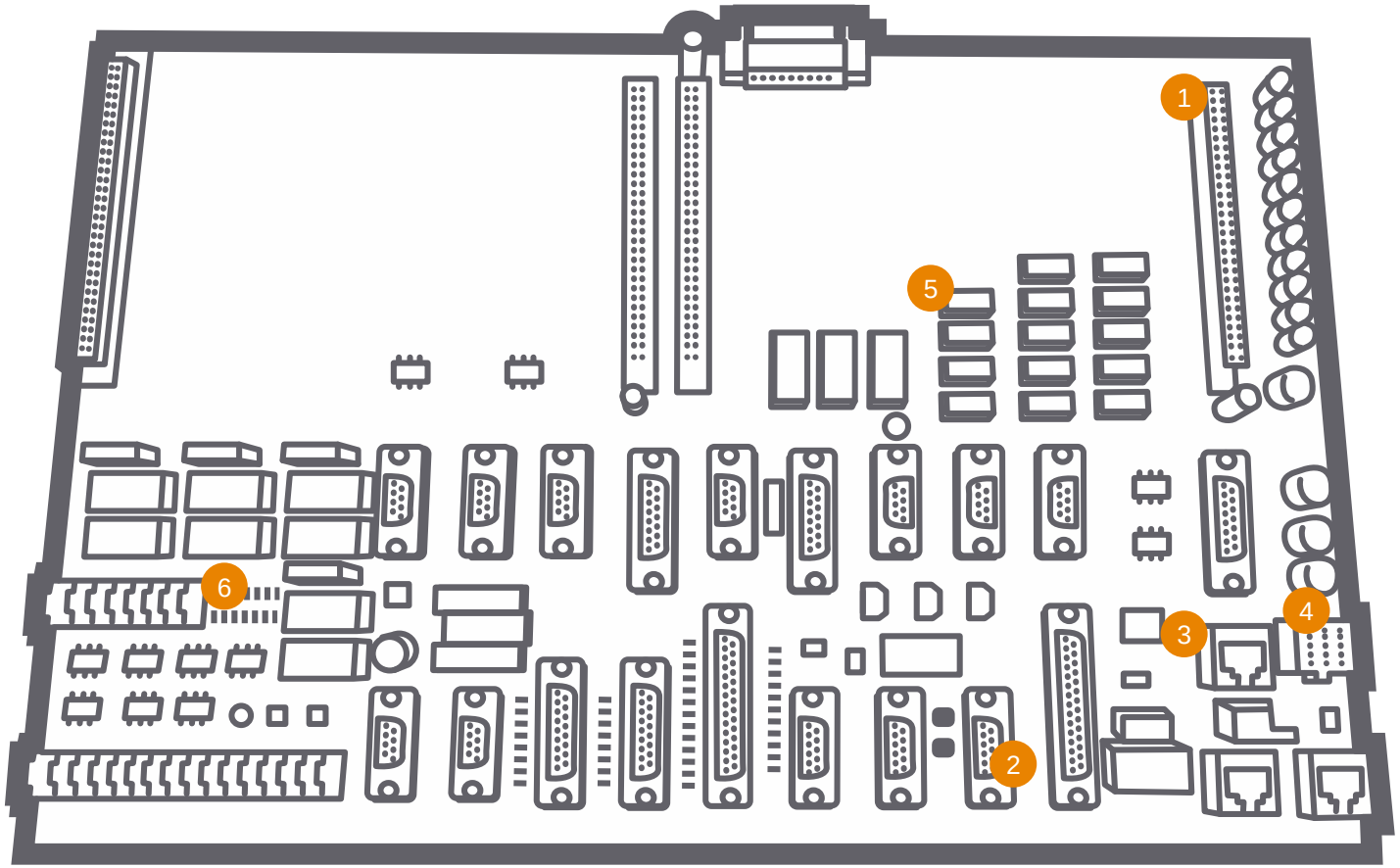
SYSTEM OVERVIEW

Controller Technology & Requirements

- **Proprietary:** In semiconductor manufacturing, a significant number of controllers are based on proprietary electronics
- **Flexible:** Given the demand for high-mix / low-volume control cabinets, flexible solutions are needed (e.g., backplane setups)
- **Accurate:** In addition to connectivity, high-accuracy switching/relays and resistors are also in high demand

Device Technology & Requirements

- **Specialized:** Semiconductor manufacturing equipment is comprised of a multitude of special devices
- **Complex:** These devices are often complex in themselves, consisting of multiple PCBs and components
- **Increased data bandwidth:** The increasing hunger for data requires devices to have higher bandwidth interfaces



1. Interconnecting PCBs
2. Signal Connectivity
3. Ethernet Connectivity
4. High-Speed Connectivity
5. Relays
6. Precision Resistors
7. Sensors

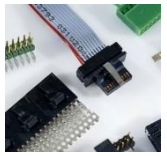
1 INTERCONNECTING PCBs

Highly reliable connectivity and high contact density

Challenges

- Reliable connectivity over the lifetime of the machine
- Allow for modular design of electronic system

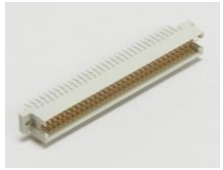
Products



Modular Signal Interconnects
AMPMODU, SMC, MicroCon

Mini Bridge
Product

Power Distribution
Mini UML



Backplane Connectors
Overview

TE Advantage

- **Reliable and economical** family of connectors
- **Extensive portfolio** of modular interconnects with ability to offer **customized solutions**
- Vast portfolio breadth allows for **compact and ergonomic designs**
- Widely used across nearly all industrial applications
- Proven global manufacturing expertise to produce **highly reliable, high-quality** connectors

- **Compact** connector with 1.27mm pitch reduces occupied space on PCB
- Automotive grade (LV214) for **high reliability in the application**
- Robust positive or friction latching options available
- **Reliable, automated assembly** possible with **high PCB retention force**

- **Highly reliable contact system** with a **wide range of sizes, plating and positions** available
- **Polarized connectors** to prevent assembly errors and **splash-proof** for use in harsh environments

- Supports modular PCB setup with a **multitude of mechanical options**
- Various **solder post lengths** and **press fit connections**
- High signal integrity with data rates of **up to 56GBit/s** possible

> Overview of TE Components

2 SIGNAL CONNECTIVITY

Highly reliable connectivity that allows for high cabling density

Challenges

- Reliable connectivity over the lifetime of the machine
- Allow for high cabling density
- Variable pin-count

Products

M8/M12 Connectors
Catalog

Industrial Grade Signal & Power Connectors
Dynamic / RITS

D-Sub Connectors
Amplimite

TE Advantage

- Sealed up to **IP67**
- **Multiple pin-counts and mechanical setups** available to use space most efficiently
- **Shielded version available to improve signal reliability**
- **Reliable, vibration-resistant contact and housing design**
- **Harness-maker and field-installable** version available
- **Signal and power versions available**
- Widely used for factory automation **sensors and actuators**

- Multiple contact points enable **high vibration reliability**
- **Rugged housing and high retention force** design create rugged connectivity
- **Audible locking** mechanism creates a safe connection
- **Complete portfolio** 3A - 100A

- **Rugged and cost-effective design with high reliability**
- Large portfolio of position counts and housing styles **enable wide usage and compact designs**
- **Shielded** signals
- Variety of reliable **locking mechanisms** available
- Intermatable **interface is standard**

> Overview of TE Components

3 ETHERNET CONNECTIVITY

Industrial grade Ethernet connectors increase reliability and reduce package loss

Challenges

- Reliable connectivity over the lifetime of the machine
- Industrial grade connectivity
- Performance buffer in data integrity to allow for extra low package loss
- 100MBit and 1GBit capability, future proof 10GBit capability

Products

Industrial IP 20 Ethernet Connector
Mini I/O

TE Advantage

- **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

Industrial RJ45
Industrial RJ45

- **Extended vibration performance**
- **Rugged housing and locking mechanism**

M12 Ethernet
Overview

- Sealed up to **IP67 or higher**
- **D- and X-coded** versions with data rates **up to 10Gbit/s** possible
- **Reliable, vibration-resistant design**
- Widely used for factory automation **sensors and actuators**

> Overview of TE Components

4 **HIGH-SPEED CONNECTIVITY**

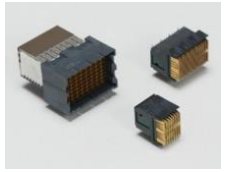
Enabling large data rates and low latency

Challenges

- Reliable connectivity over the lifetime of the machine
- Allow for modular design of electronic system

Products

MicroSpeed
Product



High Speed Backplane Connectors
Overview

Multi-Lane Interconnect
SAS / Mini-SAS

TE Advantage

MicroSpeed	High Speed Backplane Connectors	Multi-Lane Interconnect

• **High signal integrity** and external shielding allow for data rates **up to 25Gbit/s**
• **Flexible stacking heights** (5mm – 20mm) and product variants allow for multiple PCB mating options
• **High connector robustness** enabled through:
  ○ Dual beam female contact
  ○ Blind mating capability
  ○ Polarization features
  ○ Shrouded housings
• **Power module** available to support 18A/contact
	• Supports modular PCB setup with a **variety of mechanical setups**
	• High signal integrity with data rates of **up to 112GBit/s** possible
		• Supports SAS 4.0 applications
		• External data rates of **up to 12GBit/s** possible
		• Internal data rates of up to 192GBit/s possible

> Overview of TE Components

5 RELAYS

Reliable switching enabling even, safe switching applications

Challenges

- IM relay
- Reliable connect and disconnect
- Small footprint
- Lower power consumption
- High durability
- True insulation
- 2 pole NO, NC, CO Mono and Bi stable

Products

Signal Relays
IM

Force Guided Relays
FGR

TE Advantage

- **Extremely compact,** reducing PCB real estate. THT and SMD versions available to **reduce PCB real estate even further**
- Two parallel, galvanically isolated contacts available as well as changeover contacts – which makes this signal relay **significantly more durable and cost-efficient than solid state solutions**
- Low and extremely **low coil power version** available – which improves cost and PCB performance with large relay quantities

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

> Overview of TE Components

6 PRECISION RESISTORS

Enabling high precision electrics

Challenges

- Limited PCB space available
- High precision electronics often need high precision passives

Products

Precision Resistors
SMD Resistors

TE Advantage

- **Highly reliable** resistors
- Package sizes **between 0102 and 2512**
- Tolerances **as low as 0.01%**

> Overview of TE Components

7 SENSORS

Stable sensing technology combined with semi-compliant materials and surface finishes

Challenges

- Highly accurate pressure and flow measurements are required to control media flow (mostly gases) into the processing chambers of deposition or etching equipment
- Sensors cannot contaminate the media and must also be resistant to aggressive media
- Sensors need to be integrated into compact devices such as mass flow controllers

Products

Media Isolated Pressure Sensors
Overview

Pressure Transducers & Transmitters
Overview

TE Advantage

- Oil-filled stainless steel pressure sensors separate media from the sensor and ensure **high media resistance and no media contamination**
- **Highly stable sensing technology** allows for premium system performance and minimizes recalibration
- **Absolute and differential sensors** with high vacuum enable accurate and robust system designs

- High variance in pressure ranges and type as well as process connections allow for **versatile use**
- **Range of polished ports and fittings** manufactured from 316L meet SEMI F20 and SEMI F19 surface finish
- **Custom designs possible** to fit your exact application needs
- **Approvals** for various **hazardous** locations and **intrinsically safe** options available

> Overview of TE Components

Vacuum Chamber

EVERY CONNECTION COUNTS

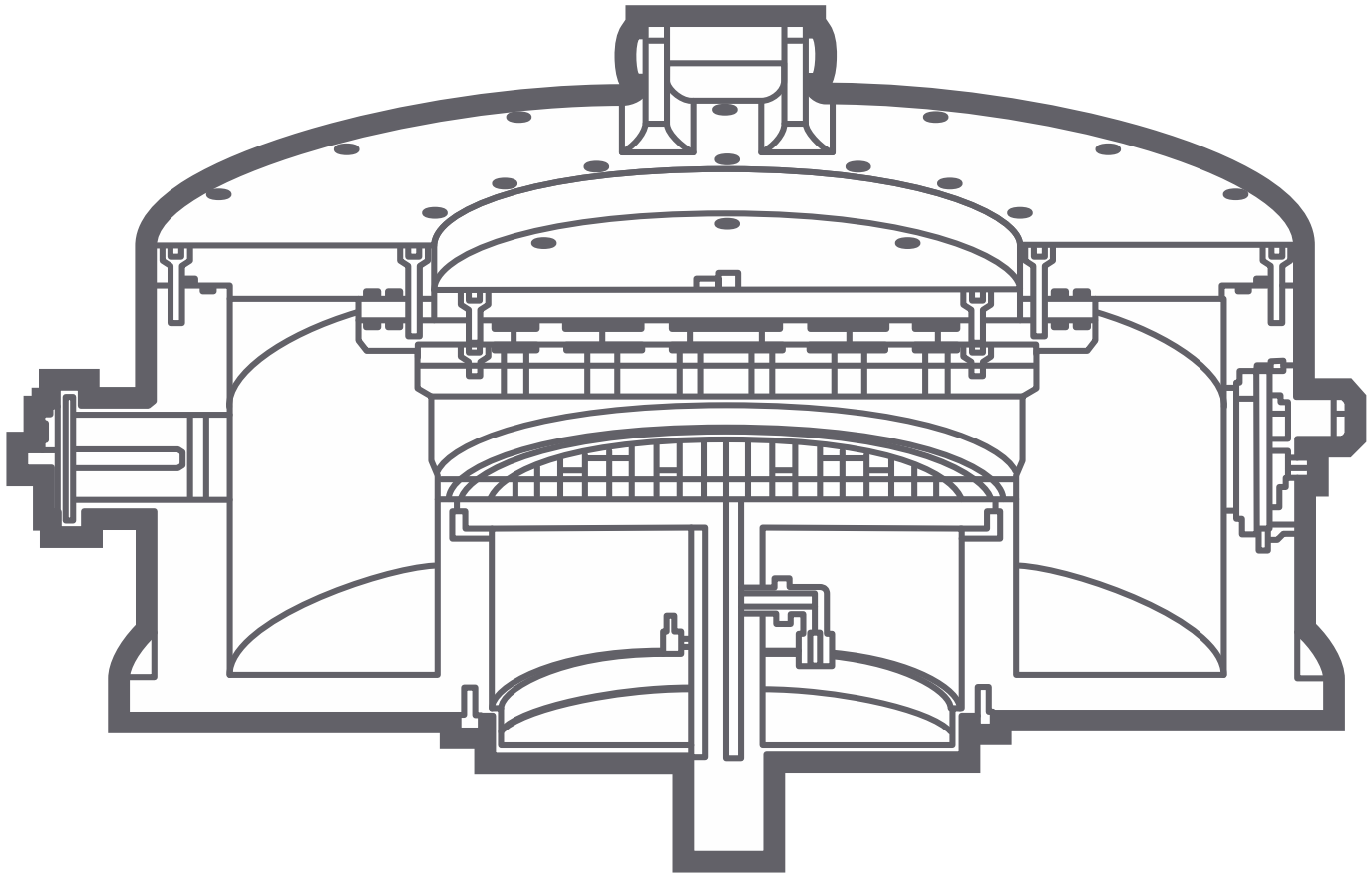
SYSTEM OVERVIEW

Vacuum Chamber Technology

- When semiconductor wafers are manufactured, many processes take place in a vacuum chamber, including deposition and wafer etching
- Newer processes – such as atomic layer deposition (ALD) – require higher vacuum levels

Vacuum Chamber Requirements

- **Minimize volume:** Vacuum pressure must be applied and maintained each time a chamber is loaded and unloaded. The larger the volume, the more time and effort required to maintain the vacuum. Because vacuum space is expensive, semiconductor equipment manufacturers try to minimize volume as much as possible.
- **Minimize outgassing:** In order to prevent contamination of the process chamber, material in the vacuum must be low outgassing.
- **Sealed:** Electric connections going in and out of the vacuum must be sealed appropriately.
- **Control:** As process needs increase and vacuum levels rise, it becomes critical to constantly control for the above requirements.



1 Connecting Into the Vacuum Chamber

2 Wires in Vacuum

1 CONNECTING INTO THE VACUUM CHAMBER

Enabling electrical connections into vacuum while saving vacuum volume

Challenges

- Depending on the vacuum grade, extremely low leakage values are required
- Due to the proximity to the wafers and the reaction gases, specially approved materials and seals are required

Products

Hermetic Connectors
Product Page

TE Advantage

- Highly engineered products for different temperatures ranges, high pressure, chemical resistance, vibration and shock
- Different pic counts, mechanical arrangements and mounting variants
- High level of customization possible

> Overview of TE Components

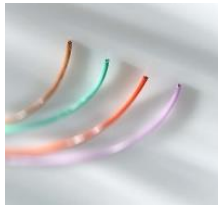
2 WIRES IN VACUUM

Special material to wire in vacuum

Challenges

- To prevent contaminating the vacuum and the wafers, wires with low outgassing are required
- Special material (low fluoride) is required

Products



Space-Grade Wires
Product Page

TE Advantage

- Low fluoride SPEC 55 wires
- Rated for -65°C to 200°C
- Standard wires, shielded, coax and GiG Ethernet ready cable are available as well as fibers

> Overview of TE Components

CONNECT
LIKE THE WORLD
DEPENDS ON IT.
BECAUSE IT DOES.

EVERY CONNECTION COUNTS

TE connectivity