

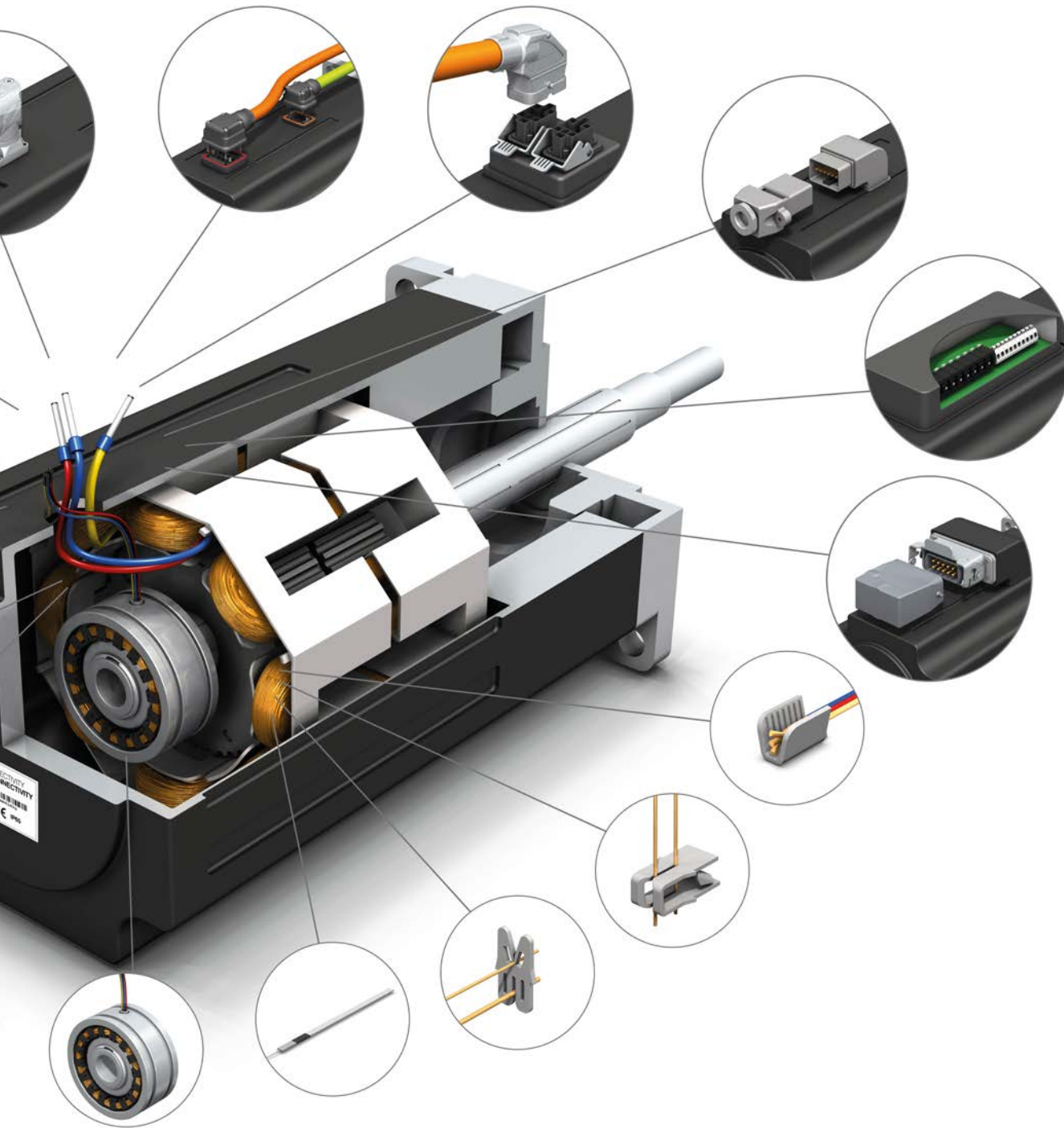


# MOTOR CONNECTIVITY

Solution Guide

No matter which industrial motor you use, you need reliable connections. TE Connectivity is your expert for all types of industrial motor connectivity solutions, helping you save time and money. From our established, standard connectors and customized cable assemblies on the outside - to our latest sensor and magnet wire innovations inside the motor. From the first idea to the final design, your TE industrial motor experts provide the service you expect at every step of the way, wherever you are.





Depending on the environment, technical requirements or industry, industrial motors need many different types of connections. At TE, customers can benefit from finding a complete solution around standard circular or rectangular connectors, cable assemblies to the latest technologies inside a motor.

**Claus Kleedörfer**

- Global Product Manager, TE Connectivity

## SERVO MOTORS



Servo Motors are becoming increasingly popular due to their high efficiency, especially in material handling systems and robotics. And with the integration of controls, energy efficient servo motors are more and more replacing inefficient hydraulic or pneumatic systems. From the inside to the outside, TE offers sensors, magnet wire termination, resolvers for reliable feedback and great variety of reliable circular and rectangular connectors for any size of motor.

- INTERCONTEC Connectors
- MOTORMAN Hybrid Connectors
- Micro Motor Connectors
- Heavy Duty Connectors
- Resolvers
- Magnet Wire
- Terminals & Splices
- Cable Assemblies
- Sensors

## SPINDLE MOTORS



Driven by advancements in machine tooling, which require high precision and reliability, spindle motors are becoming the heart of modern production systems, delivering high quality end products.

TE offers reliable resolver technology and matching hybrid connector systems to support precise control and reliable feedback in harsh environments. Whether in circular or rectangular form - TE's connectors provide you with the design flexibility for your requirements.

- INTERCONTEC Connectors
- MOTORMAN Hybrid Connectors
- Heavy Duty Connectors
- Magnet Wire
- Cable Assemblies
- Terminals & Splices
- Sensors

MOTOR TYPE	INTERCONTEC CONNECTORS	MOTORMAN HYBRID CONNECTORS	MICRO MOTOR CONNECTORS	HEAVY DUTY CONNECTORS
Servo	✓	✓	✓	✓
Linear	✓			
Spindle	✓			✓
Stepper	✓		✓	

# Motors

## LINEAR MOTORS



Linear systems meet the need for low friction and high flexibility. These motors can be found in a wide variety of industries and applications, from robotics, processing up to packaging applications.

To enable easy installation of linear motors, TE offers a broad range of quick connect solutions, which allow easy and fast installation, while providing reliable performance over time.

- INTERCONTEC Connectors
- Micro Motor Connectors
- Magnet Wire
- Cable Assemblies
- Terminals & Splices
- Sensors

## STEPPER MOTORS



These typically compact, lower cost stepper motors offer precise positioning and speed control. Typical applications include 3D printers, CNC systems, camera platforms and X,Y plotters. From the standard, proven plastic rectangular interconnect up to metric harsh circular connectors, TE offers a complete connector portfolio to build your motor of choice.

- INTERCONTEC Connectors
- Micro Motor Connectors
- Magnet Wire
- Terminals & Splices
- Cable Assemblies
- Sensors

RESOLVERS	MAGNET WIRE	SENSORS	TERMINALS & SPLICES	CABLE ASSEMBLIES
✓	✓	✓	✓	✓
	✓	✓	✓	✓
		✓	✓	✓
	✓	✓	✓	✓






# INTERCONTEC CONNECTORS








With the new INTERCONTEC portfolio, TE Connectivity offers a large variety of solutions that make connecting easy. Our connectors consist of only a few single parts with a modular architecture which makes them highly compatible and usable in many different combinations. Unique features like the speedtec quick locking system, the rotatable housing or the crown clamp shield termination enable fast and reliable use of the connector system. With know-how and market expertise we challenge existing standards. We take a visionary approach to determine the connector technology of the future to provide our customers with innovative and market-oriented solutions. Our connectors follow highly sophisticated engineering principles safeguarding an extremely easy and efficient assembly process. Thanks to their reliable performance, the connectors also reduce downtime, making your motor applications more productive.



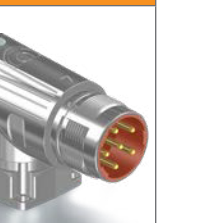
[te.com/intercontec](http://te.com/intercontec)

# Overview

Power Connectors	Signal Connectors	Hybrid Connectors
		
912 915 917 923 940 958	615 617 623 627	723 740

Product families: Power connectors = 9, signal connectors = 6, hybrid connectors = 7 (eg. 912 means size 12 power connector)

Locking System Connector	SpeedTec Locking System		locktec / 4.tec Connector	singletec Connector	htec Connector	
Connector	itec Connector	ytec Connector				
						
Quick lock fastener fully connected with just a click self locking connection	itec is available in all ytec pin layouts and is compatible with all mating ytec plugs	The ytec system requires only one mounting flange	Quick lock fastener fully connected with just an eighth rotation	Assembled connectors with the characteristics of a molded version	One single pin power connector	Power, signal and data in one connector

Plug	Plug, angled	Bulkhead	Extension	Extension, angled	Receptacle	Receptacle, angled
						
Cable connector with coupling nut	Angled cable connector with coupling nut	Device connector with coupling nut. Interface: flange, thread, lock nut, etc.	Cable connector with outside thread	Angled cable connector with outside thread	Device connector with outside thread	Angled device connector with outside thread

Product Categories



## MOTORMAN HYBRID CONNECTORS

A hybrid connectivity solution for decentralized motors and drives with two fast Ethernet cores, signal and power transmission. Decentralized servo motors are widely used in many industries and are typically connected via a deterministic system and power-fed by a separate cable. Recently, motors are becoming increasingly networked via fast Ethernet, which offers the benefits of real-time control. However, this does not solve the nuisance of having dual cabling for signal and power.

TE Connectivity offers the MOTORMAN hybrid connector, which integrates communication, signal and power transmission of locally controlled motors within a compact rectangular connector. Two fast Ethernet sockets offer the full benefits of real-time automation control, while reducing cabling complexity and cost. Crimped and soldered receptacles can be mounted onto PCB or as a cable-to-cable solution.

[te.com/products/motorman](https://te.com/products/motorman)



# MOTORMAN Hybrid Connectors

## STANDARDS & SPECIFICATIONS

- Cat 5e (ISO/IEC11801)
- VDE
- CSA-C22.2
- UL 508C (cable side)
- UL 1977 (motor side)  
Category P V V A 2
- UL E 346616 for 90° version  
and UL E 28476 for 180° version
- TE supports the OEM in the  
process to get UL and VDE  
approvals for de-central servo  
motors with the Motorman  
hybrid connector

MOTORMAN connector, metal version



## PERFORMANCE DATA

### Environmental:

- IP65 (water & dust protection)
- 50 g (physical shock)
- 156 N cable strain relief
- Electro-magnetic compatibility in  
metal enclosures

### Electrical:

- Rated Voltage: 900 V
- Operating temperature:  
- 40°C till + 85°C
- 1 x Ground (protection earth)
- 1 x Braid
- 5 x 2 A / 50 V
- 3 x 20 A + PE / 900 V  
and 2 x 20 A / 50 V
- Durability: 20 Mating cycles

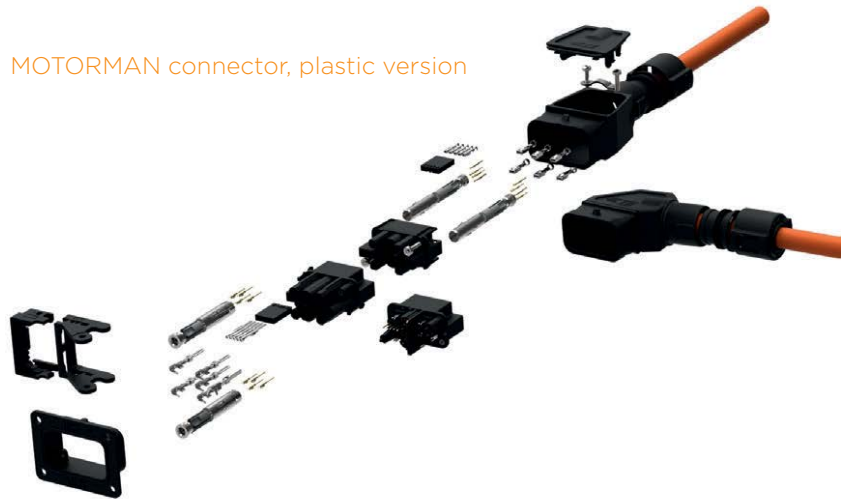
### Communication:

- 2 x Cat 5e (AWG 22)

### Solderability:

- Reflow capable

MOTORMAN connector, plastic version



## PRODUCT SPECIFICATION

- 108-94252
- 114-94442-1



# MICRO MOTOR CONNECTORS

A small and robust rectangular plastic connector solution for compact motors that can reduce motor assembly time by 30%. The combined power and brake connector offers a more compact solution compared to existing dedicated power or brake connector solutions. Widely recognized in the servo motor market, TE Connectivity's Micro Motor connectors are especially suitable for applications with space constraints. TE's latest Micro Motor connection solutions include a 9 position encoder connector and a 4+2 power and brake connector. Combining power and brake into one connector allows a more compact design with an IP67 degree of protection for enhanced vibration and shock resistance.

[te.com/products/micro-motor](https://te.com/products/micro-motor)

## Micro Motor Connectors

### ELECTRICAL

	Power+Brake	Encoder
Rated voltage	380 V AC (Power) / 48 V DC (Brake)	10 V AC
Rated current	5A (Power) / 2A (Brake)	1A
Dielectric withstanding voltage	2500 V for 1 minute	500 V for 1 minute

### STANDARDS & SPECIFICATIONS

	Power+Brake	Encoder
Certificated by	TUV & UL	UL
Product specification	108-137039	108-5864
Application specification	114-137039	114-5335
Instruction sheet	411-137039	411-78082

### KEY FEATURES AND BENEFITS

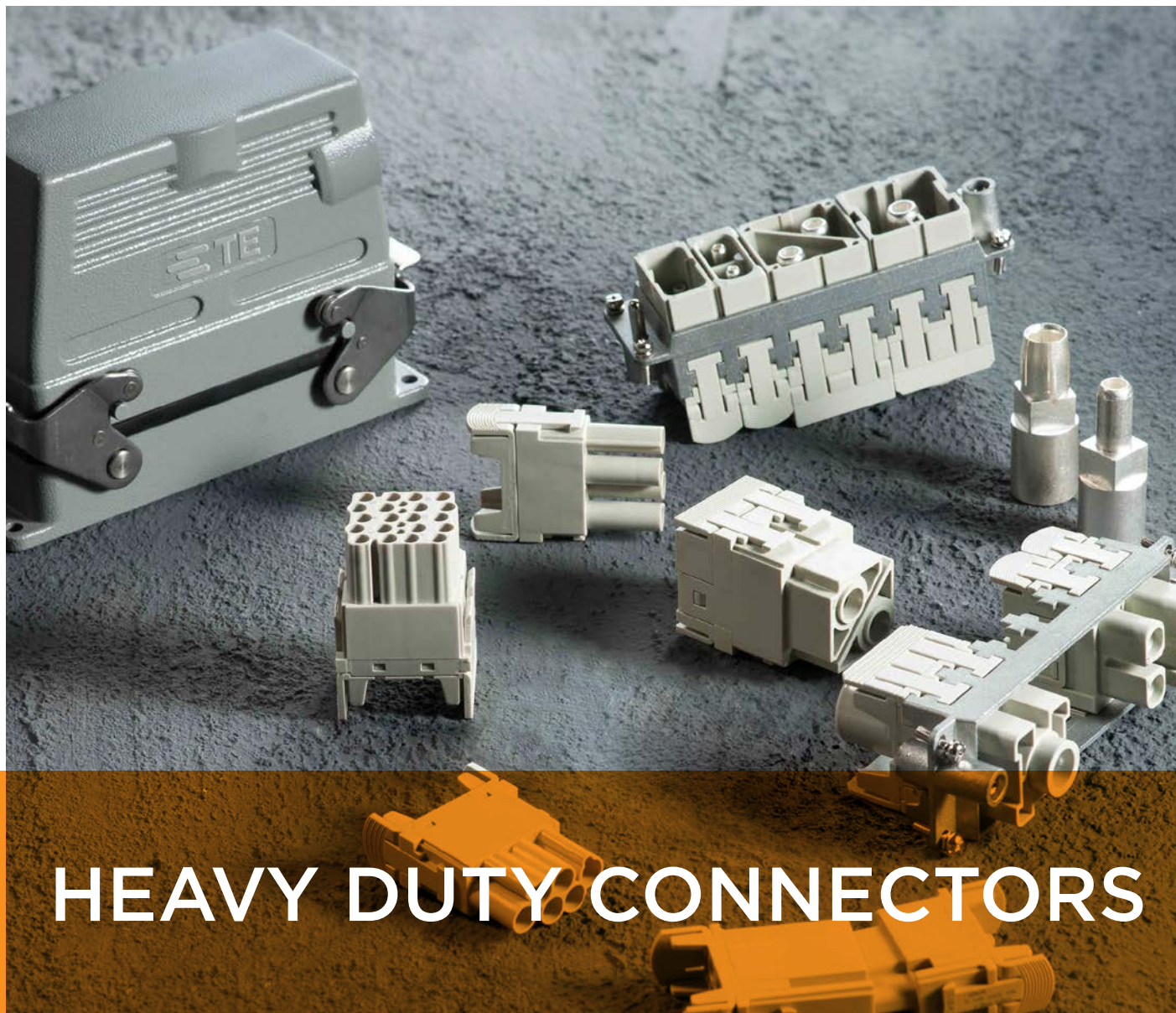
#### Features

#### Benefits

Power and brake combined in one connector	Hybrid connector for lowest applied cost
Field installable connector	Easy to install in the field
Micro Motor connector uses standard cable sizes	Compatible with commercially available cable
High temperature rating for power and brake 125°C, High voltage rating (380 V)	High performance in a small design
IP67	Suited for harsh environment
TUV/UL certification	Meets European and American standards
Uses robust contact	Box design provides vibration resistance

### MECHANICAL

	Power+Brake	Encoder
	4 Positions + 2 Positions	9 Positions
Temperature rating	-40°C - 125°C	-30°C - 105°C
Wire sizes	0.32 mm - 0.75 mm	0.13 mm - 0.33 mm
Wire OD	Ø 8.6 mm - Ø 9.4 mm	Ø 6.8 mm - Ø 7.4 mm



# HEAVY DUTY CONNECTORS

Industrial motors must often operate reliably in harsher environments such as high vibration or corrosion. TE offers a broad range of heavy duty connectors (HDC) that are designed for reliably performing under the most demanding operating and harsh environmental conditions. With a tested salt spray and corrosion resistance of over 500 hours, 200A and an IP 69 K rating, these connectors are suited for industrial motors and various applications in industrial environments. Thanks to their modular system, TE's heavy duty connectors offer power, signal and data transmission in one connector, covering all motor needs in a compact form.

[te.com/hdc](https://te.com/hdc)

# Heavy Duty Connectors

Crimp terminal (order crimp contacts separately)




Screw terminal

Spring terminal

DESCRIPTION	TYPE	PART NUMBER	
		Male Insert	Female Insert
	HQ-017-M	T2080172101-000	
	HQ-017-F		T2080172201-000
	HQ-4/2-M	T2080062101-100	
	HQ-4/2-F		T2080062201-100
	HQ-008-M	T2019092101-000	
	HQ-008-F		T2019092201-000
	HE-010-MC	T2040104101-000	
	HE-010-FC		T2040104201-000
	HA-010-M	T2010102101-000	
	HA-010-F		T2010102201-000
	HE-010-M	T2040102101-000	
	HE-010-F		T2040102201-000
	HE-010-MS	T2040103101-000	
	HE-010-FS		T2040103201-000
	HE-010-MSS	T2040105101-000	
	HE-010-FSS		T2040105201-000

For suitable hoods and housings, please refer to [te.com/hdc](http://te.com/hdc)

Crimp terminal (order crimp contacts separately)

DIMENSIONS (MM)	TYPE	PART NUMBER	
		Male insert	Female insert
	HQ-005-M	T2080052101-000	
	HQ-005-F		T2080052101-000
	HQ-007-M	T2080072101-000	
	HQ-007-F		T2080072201-000
	HQ-012-M	T2080122101-000	
	HQ-012-F		T2080122201-000



# RESOLVERS

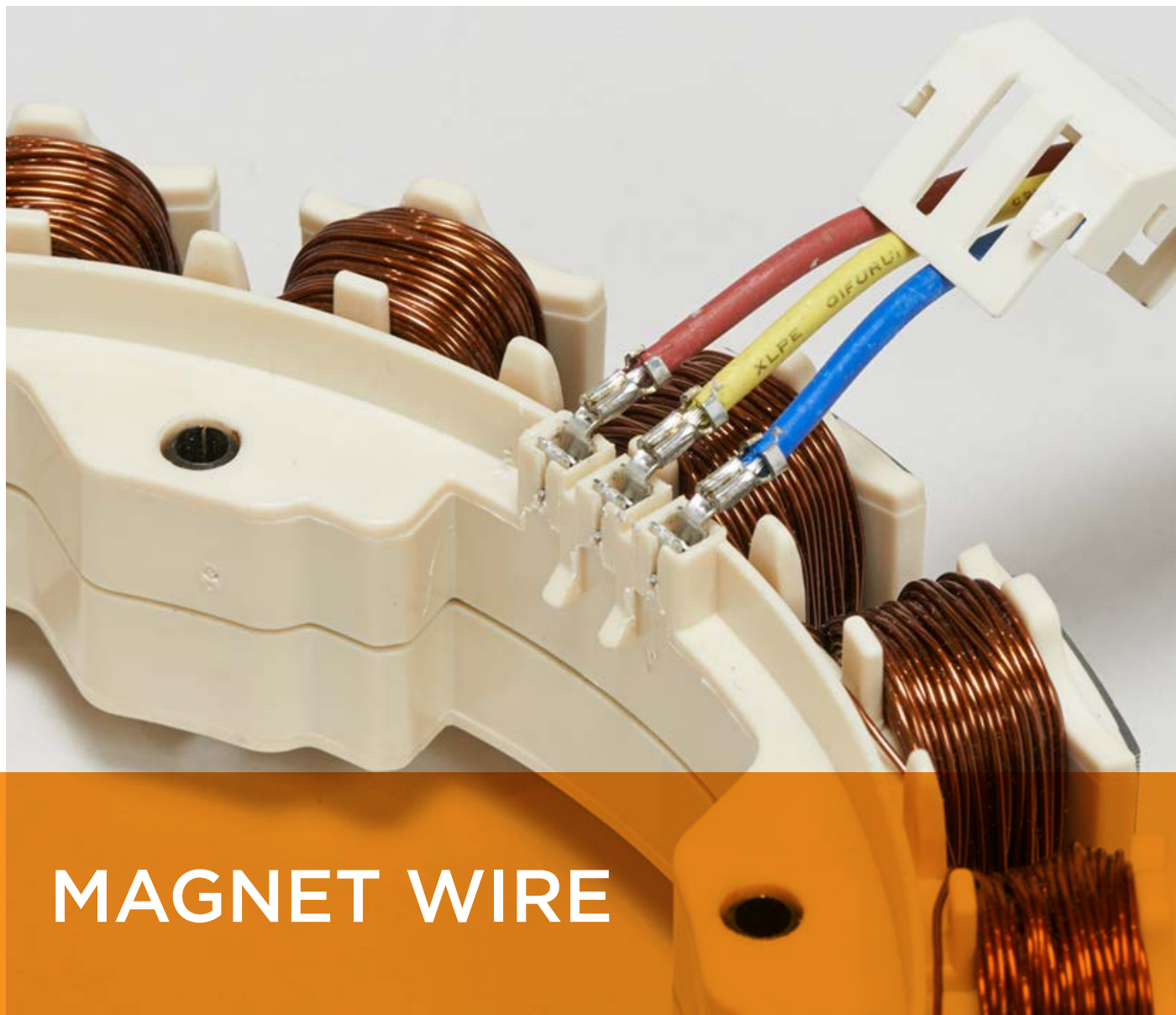
**The use of sensors for determining angles increases with progressive automation.** The hollow shaft resolver has long won its own steady position on the market and can nowadays be found in many modern, high-precision control systems. Due to its design, the hollow shaft resolver enables a service life above average. This includes reliability even under extreme environmental conditions such as an operating temperature range of  $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$ , a maximal permissible speed of 20 000 rpm, a shock resistance (11 ms sine) of up to  $1000\text{ m/s}^2$  as well as a vibration fatigue limit (0 ... 2 kHz) of  $200\text{ m/s}^2$ . Resolver supply high precision angular position measurement ( $\pm 10'$  to  $4'$ ) in addition to low space requirements. In this regard, TE Connectivity offers customized hollow shaft as well as housing geometries. As one of the largest sensor and connectivity companies in the world, TE Connectivity offers a resolver portfolio, which can be connected with a wide range of servo motor connectors.

[te.com/products/industrial-resolvers](https://te.com/products/industrial-resolvers)

## Resolvers

FEATURES	BENEFITS	APPLICATIONS
<ul style="list-style-type: none"> <li>• Operating temperature range -55°C to +150°C</li> <li>• The brushless design without bearings is free of wear and friction</li> </ul>	<ul style="list-style-type: none"> <li>• Reliability and high precision with low space requirements</li> <li>• Fully operable even under extreme environmental conditions</li> <li>• Stable against humidity and many lubricants</li> <li>• Resistant to shock and vibration</li> <li>• Lifetime above average due to the design of the mechanical structure and automated coil incorporation</li> <li>• Available as singleturn and multiturn variants</li> <li>• Direct confection with TE's INTERCONTEC connectors</li> </ul>	<ul style="list-style-type: none"> <li>• Servo motors</li> <li>• Robotics</li> <li>• Factory automation equipment</li> </ul>
ELECTRICAL	MECHANICAL	STANDARDS/SPECIFICATIONS
<ul style="list-style-type: none"> <li>• Input voltage: 5.0 V to 14.0 V</li> <li>• Operational frequency: 5.00 to 10.00 kHz</li> <li>• Transformation ration ca. 0.46 to 0.50</li> <li>• Angular error of <math>\pm 4'</math> to <math>\pm 10'</math></li> </ul>	<ul style="list-style-type: none"> <li>• Rotor inertia: approx. 20 g x cm<sup>2</sup></li> <li>• Max. rotational speed: 20,000 rpm</li> <li>• Shock resistance (11 ms sine): 1,000 m/s</li> <li>• Vibration (0 ... 2 kHz): 200 m/s</li> </ul>	<ul style="list-style-type: none"> <li>• 100% EOL testing, stored. Available up on request</li> </ul>
		PRODUCT DIMENSIONS
		<ul style="list-style-type: none"> <li>• Available in sizes 15 and 21</li> </ul>

SIZE	SPEED	ACCURACY	PART NUMBER
15	1	$\pm 10'$	1-1414620-0
15	3	$\pm 10'$	1-1824645-0
21	1	$\pm 8'$	6-1393048-3
21	3	$\pm 10'$	4-1393048-3
21	4	$\pm 8'$	1-1414400-0



# MAGNET WIRE

Many manufacturers of motors, solenoids, coils and other assemblies utilizing magnet wire in the assemblies' construction continue to use traditional, manual soldering techniques to make connections to the magnet wire in those products. This can be a costly process, both in terms of the time required to make these manual connections, and in terms of quality, given that such processes are difficult to control and may result in poor connections. When you are terminating any type of magnet wire applications, TE can offer a full range of solutions from hand insertion tools up to customer specific machines. High speed, fully automated, integrated systems provide uniform terminations reliably at a very low applied cost. TE offers a broad range of terminals specifically designed to terminate magnet wire whether you are using copper wire, aluminum wire, or a combination of both.

[te.com/magnetwire](https://te.com/magnetwire)



## Magnet Wire

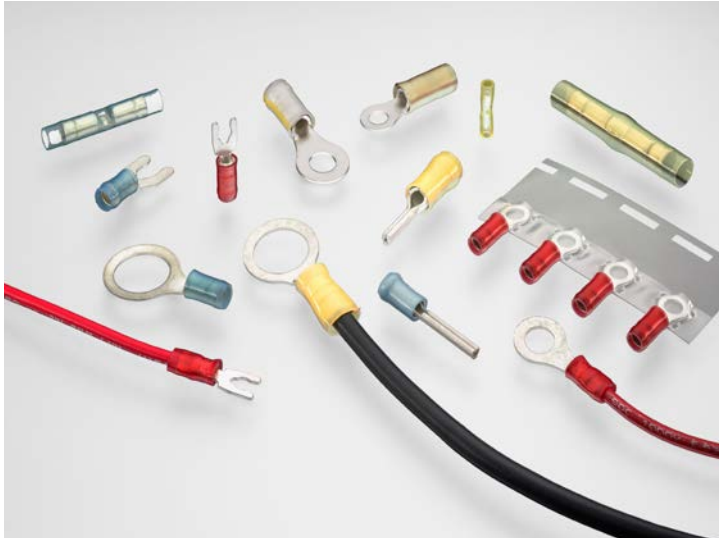
MAG-MATE	SIAMEZE	AMPLIVAR
MAG-MATE terminals are insulation displacement connection (IDC) terminals for magnet wire (copper and aluminum) terminations. They are available as poke-in, poke-in tab, splice, crimp wire barrel, solder post, quick connect tab, Multispring pin and receptacle styles.	SIAMEZE terminals are insulation displacement connection (IDC) terminals for interconnecting copper magnet wires, lead wires and other components. They are available as wire-to-wire, Lead Lok, quick disconnect tabs, posts, pin, and receptacle terminals.	AMPLIVAR terminals and splices are crimp terminals specially designed to terminate magnet wires (both copper and aluminum), in combination with solid or stranded lead wire. They have machined, sharp-edged serrations inside their crimp barrels.

Copper Wire	AWG / MM <sup>2</sup>	MINI MAG-MATE	MAG-MATE	SIAMEZE	CMA [MM <sup>2</sup> ]	AMPLIVAR
	52-30 / 0.0254 - 0.198	✓			100-22000 [0.05-9.45]	✓
	34-12 / 0.160 - 2.05		✓	✓		

Aluminum Wire	AWG / MM <sup>2</sup>	MINI MAG-MATE	MAG-MATE	SIAMEZE	CMA [MM <sup>2</sup> ]	AMPLIVAR
	0.18 - 1.54MM		✓		400-22000 [0.26-9.45]	✓

Typical Available Interface	INTERFACE	MINI MAG-MATE	MAG-MATE	SIAMEZE	AMPLIVAR
	RAST 2.5 - RAST 5 Connectors		✓		
	FASTON Connector	✓	✓	✓	✓
	MATE-N-LOK Connector		✓	✓	
	PCB Connectors	✓	✓	✓	
	Press-fit / soldering Connectors	✓	✓	✓	
	Lead wire	✓	✓	✓	✓
Ring tongue				✓	

# TERMINALS & SPLICES



TE Connectivity offers one of the broadest portfolios of terminals and splices for industrial applications that include UL and MIL specifications. We will work with you to find an engineered solution that consists of terminal and tooling customized for your requirements. To take advantage of the broad range of terminals and splices from TE Connectivity, we also offer the tooling solution that goes along with it. The quality of the termination is critical and depends on several factors: trained personnel, wire, documentation, inspection - and of course the terminal and tooling. With TE's matching terminal and tooling solutions, we enable the complete crimp, avoiding scrap, product recalls or even possible litigation.

**SOLISTRAND** terminals and splices are uninsulated closed barrel products.

**Wire range:** 26 AWG - 600 MCM

**Voltage rating:** designed for recommended wire  
Uses W crimp

**PLASTI-GRIP** terminals and splices are insulated closed barrel products.

**Wire range:** 22 AWG-2/0

**Voltage rating:** 600V  
Uses C crimp

**PIDG** terminals and splices are insulated closed barrel products that include metallic sleeves for additional wire insulation support.

**Wire range:** 26 AWG - 10 AWG

**Voltage rating:** 300V  
Uses C crimp

36160	PIDG ring tongue 16-14 AWG #10 STUD
51864-1	PIDG ring tongue 16-14 AWG #8 STUD
320559	PIDG butt splice 22-16 AWG
33457	SOLISTRAND ring tongue 12-10 AWG #10 STUD
2-34161-1	PLASTI-GRIP ring tongue 16-14 AWG
34071	PLASTI-GRIP butt splice 16-14 AWG
320560	PIDG ring tongue 16-14 AWG #8 STUD
31819	SOLISTRAND butt splice 16-14 AWG
32151	SOLISTRAND butt splice 12-10 AWG
320564	PIDG ring tongue 16-14 AWG 3/8 STUD

# CABLE ASSEMBLIES

With decades of experience, global expertise in development and manufacturing and worldwide network of competence centers, TE creates customized cable assemblies solutions and standardized products that provide an excellent fit for your motor. When it comes to creating the assemblies, numerous automatic and semi-automatic manufacturing technologies are at our disposal – cutting & stripping, soldering, IDC insulation displacement, over-molding, and more.



# SENSORS



As one of the largest sensor companies in the world, we provide sensors that are vital to the next generation of data-driven technology. Our technologies enable measurement capabilities such as pressure, temperature, torque, motion control, vibration – and many more.

[te.com/sensors](https://te.com/sensors)

For questions about our motor connectivity solutions, please go to [te.com/motor](http://te.com/motor), or contact us at:

<b>USA:</b>	+1 800 522 6752
<b>Canada:</b>	+1 800 522 6752
<b>Mexico:</b>	+51 1 319 7900
<b>Brazil:</b>	+55 11 3404 6000
<b>China:</b>	+86 400 820 6015
<b>Japan:</b>	+81 44 844 8052
<b>UK:</b>	+44 800 267 666
<b>France:</b>	+33 1 3420 86 86
<b>Germany:</b>	+49 6 151 607 1999
<b>Italy:</b>	+39 011 401 2632

## te.com/motor

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**TE Connectivity**

**Industrial**  
64293 Darmstadt

[www.te.com](http://www.te.com)