



# T1 INDUSTRIAL SINGLE-PAIR ETHERNET CONNECTORS AND CABLE ASSEMBLIES

NEW PRODUCT INTRODUCTION

*creating connections for life*

**molex**

# T1 INDUSTRIAL SINGLE-PAIR ETHERNET CONNECTORS AND CABLE ASSEMBLIES

Molex T1 Industrial Single-Pair Ethernet Connectors and Cable Assemblies provide the standard T1 industrial interface and single-twisted-pair cabling to make Ethernet connectivity easy and affordable, including the transmission of data from the cloud to devices and sensors, while supporting miniaturization.

## Key Product Information

Category: SPE Connectors and Cable Assemblies

Current (max.): 4.0A

Voltage (max.): 60V DC

Cable Structure: AWG26 (T1 SPE IP20)  
AWG22 (M12 T1 SPE IP65/67)



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**Series**  
220957

**Single-Pair Ethernet Connectors and Cable Assemblies**

# PRODUCT OVERVIEW

## Faster Data Speeds

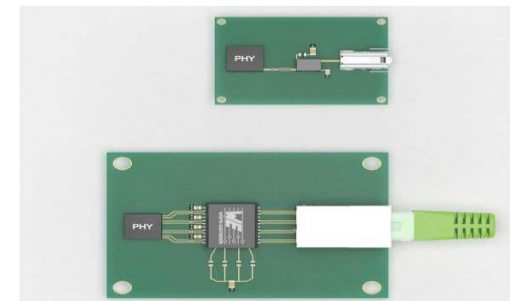
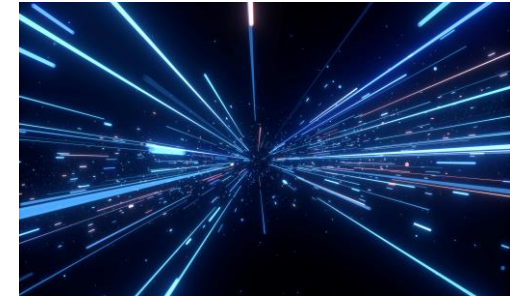
Single-pair Ethernet set-ups enable data transmission by Ethernet using only two wires and simultaneous power supply for terminals via PoDL up to 50W. Being able to integrate Ethernet interfaces with simple sensors, cameras, reading/ID devices or similar equipment makes implementation of integrated industry and IIoT possible.

## End-to-End TCP/IP-Based Communication

Standardized T1 SPE connectivity enables smart technology at the field level and simplifies parameter setting, initialization and programming. As a result, the set-up, operation and maintenance of equipment becomes more efficient and more cost-effective

## Miniaturization SPE vs MPE

Molex's T1 SPE cable assemblies use only one twisted-pair with a gauge as small as 26 AWG (T1 SPE IP20) and 22 AWG (M12 T1 SPE IP65/67). Customers will have an easier time routing these small and flexible T1 SPE cable assemblies from Molex, which also weigh less and cost less due to the fact that they require less copper.



# MARKETS AND APPLICATIONS



## Industrial Automation

- Smart sensors
- Valves
- Actuators
- Drives
- Control panels
- Process automation & control
- Factory automation
- Robotics



## Internet of Things

- Building automation
- Intelligent lighting systems/Networks
- Lift/Escalator control systems
- Security/Access control systems  
Fire alarm systems



## Commercial Vehicles

- Railway

# FREQUENTLY ASKED QUESTIONS

## **Why does Industry 4.0 need single-pair Ethernet (SPE) technology?**

The digitization of industrial plants has led to an increased need for Ethernet cabling. In fact, while transmission rates are fine in most instances, Industry 4.0 and the IIoT present new requirements for longer cable runs and miniaturization. Consequently, SPE technology is being embraced by standardization committees and has become a fixture in the next generation of communication architecture.

For the very first time, SPE ensures the cost-effective use of Ethernet in every aspect of industrial automation. The technology uses one pair of wires to transmit data at speeds from 10 Mbps up to 1 Gbps and can work well in a cable run up to 1,000m making SPE ideal.

## **What are the advantages of SPE over conventional Ethernet?**

Conventional Ethernet requires two or four pairs of wires; SPE requires only one pair. This newer arrangement reduces cabling costs and weight. Slim cables and connectors allow comprehensive connection of the most sophisticated sensors at field level, including PoDL with an output of up to 50W which means the sensors can be supplied with a both power and data interface even in extremely cramped conditions.

# FREQUENTLY ASKED QUESTIONS

## What data rate can be transmitted over SPE?

The single-pair Ethernet technology based on IEEE 802.3bp 1000BASE-T1, a standard for industrial sensors, delivers 1 Gbps transmission speed over only one pair of copper wires. IEEE professionals are currently working on a standard for even higher data rates of up to 10 Gbps (IEEE 802.3ch), which is required for high-resolution sensors and video transmissions.

In addition, a standard for 10 Mbps (IEEE 802.3cg) is being developed. This standard enables transmission distances of up to 1,000m and can therefore replace almost all fieldbus types.

# PRODUCT FEATURES AND ADVANTAGES

**Provides protection from objects up to 12.00mm, and is touchproof**

Plug, jack and cable assembly with IP20

**Reduces implementation time with plug-and-play connectivity; eliminates the need to source cable assembly or invest in tooling and avoids the need for cable testing**

Preassembled cable assemblies available

**Enables easy-to-implement wire-to-board connectivity; ensures superior signal integrity performance by shielding**

Through-hole jack with 2 contacts plus shielding

**Withstands harsh industrial environments**

Halogen-free, oil-resistant, flame-retardant off-the-shelf cable assemblies



# PRODUCT FEATURES AND ADVANTAGES

## Provides faster data speeds

Cable assemblies enable the transmission of data using only two wires and the simultaneous power supply for terminals via PoDL up to 50W

## Permits a barrier-free connection of equipment, and sensor/actuator technology

End-to-End TCP/IP-Based Communication

## Facilitates miniaturization so that the customer has an easier time routing the small, flexible cable assemblies.

Cable assemblies use only one twisted-pair with a gauge as small as 26 AWG and 22 AWG





# SPECIFICATIONS AND SUPPORTING INFORMATION

## Electrical

Voltage (max.): 60V DC

Current (max.): 4.0A @ 60°C / 1.5A @ 85°C

Test voltage UDC (voltage proof): 1.0KV DC (pin to pin),  
2.25kV DC (pin to pin)

Contact Resistance:  $\leq 20 \text{ m}\Omega$

Shielding Resistance:  $\leq 100 \text{ m}\Omega$

## MICE3 Performance

EMC Resistance: According to E3 for all connector versions

Shock and vibration resistance: According to IEC 61373 Category 1B (railway standards)

Degree of protection according to IEC 60529: IP20 (IP20) and IP65 / IP67 mated condition (M12)

Operating Temperatures: -40 to +85°C

## Mechanical

Number of contacts: 2 industrial pin-socket contact design for high reliability and mating security (2 contact points per contact)

Mating Cycles: Minimum 1.000 mating cycles for the core element and the IP20 version  
For the M8 and M12 versions >500 mating cycles based on the locking mechanism

## Physical

Housing: LCP UL 94 V-0

Contact: Copper Alloy

Plating: Gold over Nickel

# SPECIFICATIONS AND SUPPORTING INFORMATION

## Jacks and Receptacles

Category: Connectors/PCB connectors

Termination method: Reflow soldering termination (THR)

Shielding: Fully shielded, 360° shielding contact

Transmission characteristics: 4 GHz Bandwidth

Data rate: 10 Mbit/s, 100 Mbit/s, 1 Gbit/s, 2.5 Gbit/s, 5 Gbit/s, 10 Gbit/s

Moisture sensitivity level (MSL): 1 according to ECA/IP/JEDEC J-STD-020D

Process Sensitivity Level (PSL): R0 according to ECA/IP/JEDEC J-STD-020D

RoHS: Compliant

ELV status: Compliant

China RoHS: e

## Specifications and approvals Jacks and Plugs

Specifications: IEC 63171-6

IEEE 802.3bu (remote power supply over power over data line (PoDL))

IEEE 802.3cg (10BASE-T1)

IEEE 802.3bw (100BASE-T1)

IEEE 802.3bp (1000BASE-T1)

IEEE 802.3ch (2.5GBASE-T1/5GBASE-T1/10GBASE-T1)

# SPECIFICATIONS AND SUPPORTING INFORMATION

## Cabling

Category: System cabling

Conductor cross-section: AWG 26/19 (IP20) and  
AWG22/19 (M12)

Transmission characteristics: 600 MHz Bandwidth

Data Rate: 10 Mbit/s, 100 Mbit/s, 1 Gbit/s

Limiting temperature: 40 to +80°C (unmoved), -25 to  
+80°C (moved)

Mating cycles:  $\geq 1000$

Material (cable): PUR

Color (cable): Green

RoHS: Compliant

ELV status: Compliant

China RoHS: e

## Specifications and approvals cabling

Specifications: IEC 63171-6

IEEE 802.3bu (remote power supply  
over power over data line (PoDL))

IEEE 802.3cg (10BASE-T1)

IEEE 802.3bw (100BASE-T1)

IEEE 802.3bp (1000BASE-T1)

IEC 60332-1-2 Flame retardancy

EN 60811-404 Oil resistance



THANK YOU

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