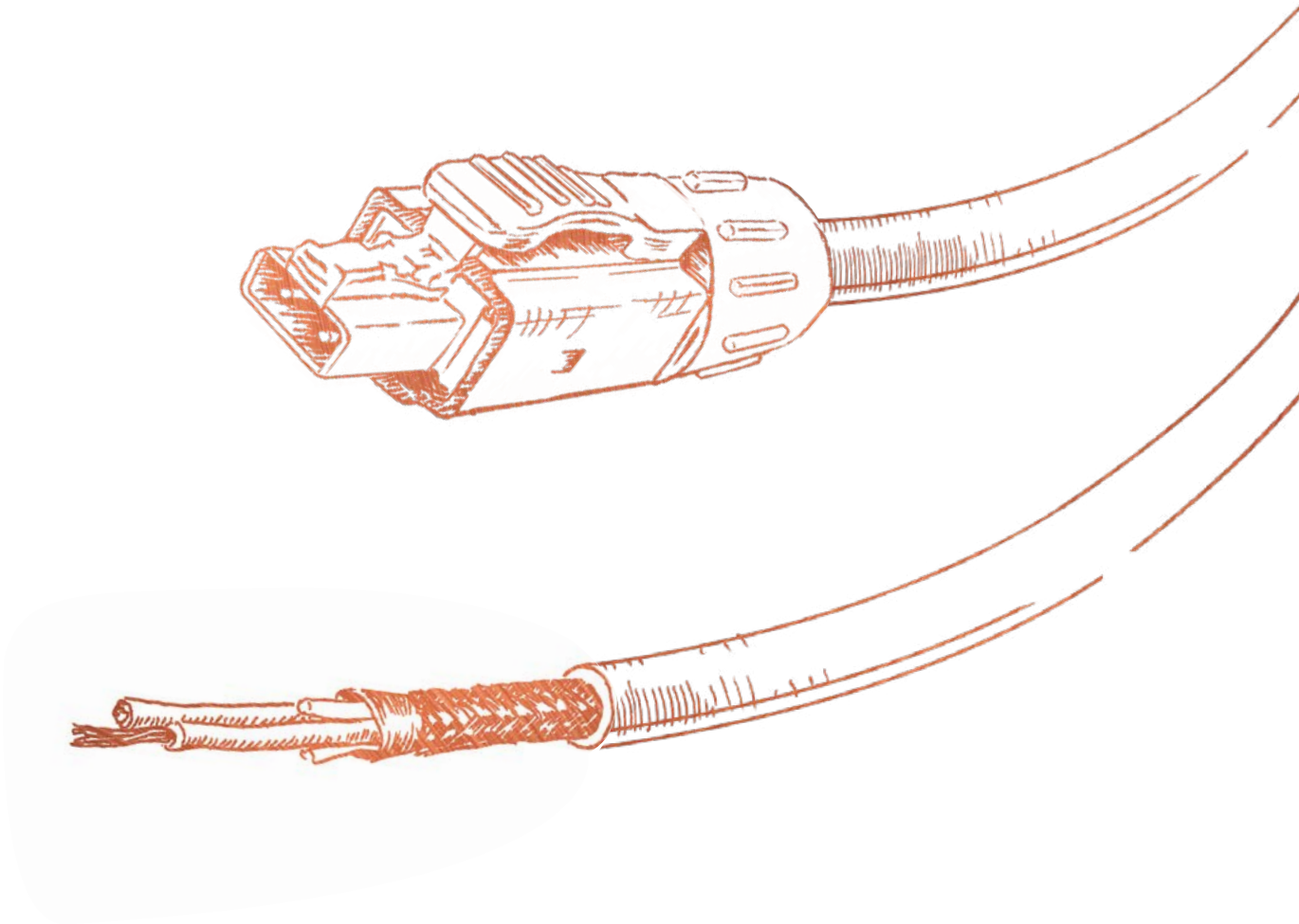


Data, network & bus technology

# SINGLE PAIR ETHERNET

Ed. 2 // EN



**( Channeling  
POWER )** 

# Power and data transfer with only one pair of wires

Single Pair Ethernet (SPE) is seen as the technology of the future in industrial communications. Compared to previous Ethernet variants such as PROFIBUS or PROFINET, SPE promises data transmission at gigabit speeds - using just one pair of wires. Even the power supply can be integrated into the cable. A smart and flexible, space and cost saving solution that enables real-time communication down to the field level.

## What is Single Pair Ethernet?

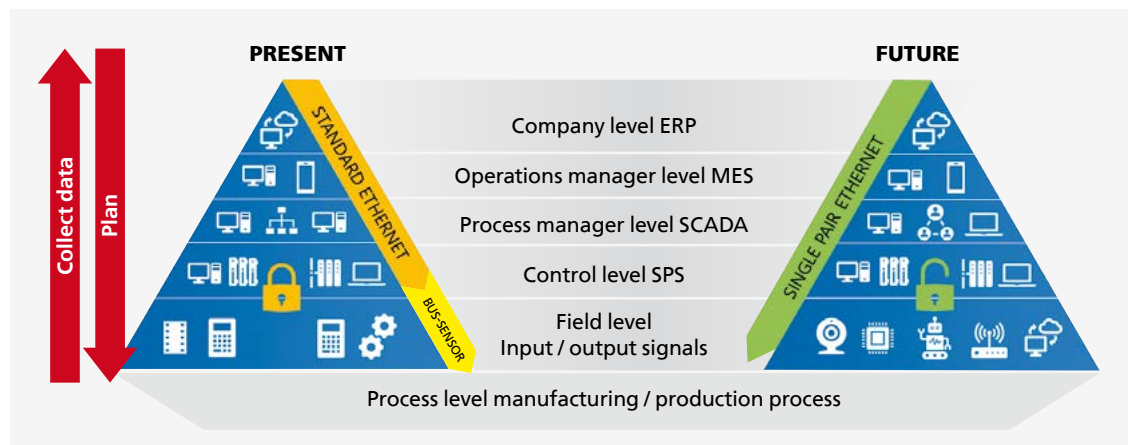
Single Pair Ethernet (SPE) is a technology for transmitting data over wired networks. Data cables with Single Pair Ethernet technology differ from previous solutions in that they have only one pair of copper wires. Previous PROFINET cabling required two pairs of wires, and Gigabit Ethernet requires four. In addition,

SPE offers the possibility of simultaneous power supply via the same pair of wires. This is known as Power over Data Line (PoDL). As a result, the cables are slimmer and lighter, offering numerous advantages and new application possibilities.

## Applications for Single Pair Ethernet

SPE technology originated in the automotive industry, where space and weight savings are key issues. However, other industries are now looking to take advantage of Single Pair Ethernet, particularly where high data rates are required. For the first time, Single Pair Ethernet enables end-to-end automation down to the field level, i.e. the integration of sensors,

actuators and other devices. Traditionally, these are connected to the higher control level via fieldbus systems, which are not part of the Ethernet network. Single Pair Ethernet closes this gap and, thanks to real-time communication down to the field level, is considered a key technology for the Industrial Internet of Things (IIoT) and Industry 4.0.



## The benefits of Single Pair Ethernet at a glance:

- Slim, light and flexible cables
- Easy installation and assembly
- Low purchase price
- Saves resources
- Data rates up to 1 Gbit (AWG 22, AWG 26)
- Range up to 1,000 m (AWG 18)
- Real-time communication down to field level
- Small bending radii for moving applications

## What types of Single Pair Ethernet exist?

To make it easier for users to get started with the technology, there are a number of standards for Single Pair Ethernet. Depending on the range and data transmission, SPE is divided into different categories, just like previous Industrial Ethernet solutions:

Traditional Industrial Ethernet			Single Pair Ethernet		
ISO IEC 11801 Category	Data rate	No. of pairs	Standard	Data rate	No. of pairs
Cat 3	10 Mbit / 100 m	2	10BASE-T1L	10 Mbit / 1000 m*	1
Cat 5	100 Mbit / 100 m	2	100BASE-T1	100 Mbit / 40 m*	
Cat 5e	1 Gbit / 100 m	4	1000BASE-T1	1 Gbit / 40 m*	
Cat 6	5-10 Gbit/100 m	4	MultiGigBASE-T1 (in development)	2.5-10 Gbit to 15m	
Cat 6A	10 Gbit / 100 m	4			
Cat 7	10 Gbit / 100 m	4			

\* Larger ranges in planning.

## Single Pair Ethernet cables from HELUKABEL

These are divided into different types according to their cross section and application:

Cross section	Data rate	Application
AWG 26	1 Gbit 1000BASE-T1 to 40 m	Type A - fixed installation, cables with solid wire
AWG 22	1 Gbit 1000BASE-T1 to 40 m	Type B - flexible installation, cables with stranded wire, occasionally moved
AWG 22 + AWG 18 (Hybrid data + power)	1 Gbit 1000BASE-T1 to 40 m	Type C - dynamic application e.g. drag chain Type R - robotics with torsional stresses
AWG 18	10 Mbit 10BASE-T1 to 1000 m	Type A - flexible installation
AWG 16		Type B - flexible installation

Within each application class, different jacket materials are used, for example:

- PVC for standard applications
- FRNC for halogen-free, low smoke, low toxicity on request
- PUR for drag chains and robotics, abrasion and oil resistance
- PE for outdoor or underground installation
- FEP for high-temperature applications

## SPE Industrial Partner Network: Strong network for technological progress

As a Premium Member of the SPE Industrial Partner Network and a member of the Technology Working Group, HELUKABEL plays a key role in the further development of Single Pair Ethernet

technology. The focus is on the development of an end-to-end, standardised infrastructure to make the transition to SPE as easy as possible for manufacturers and users.



INDUSTRIAL  
PARTNER  
NETWORK



# SPE TECHNOLOGY CABLE TYPES

## Industrial automation

Standard	Type	Dimensions	Part no.	Nom. cross section	IEC	UL
1000BASE-T1	B	1x2xAWG22/7 PVC	11024883	5.8 mm	61156-12	AWM
		1x2xAWG26+4xAWG16 PUR	11022604	9.0 mm		
	C	1x2xAWG26/19 PUR	11018067	4.8 mm		
		1x2xAWG22/19 PUR	11018068	6.2 mm		
		1x2xAWG26+2xAWG18 PUR	11019876	6.9 mm		
		1x2xAWG24+2xAWG18 PUR	11019817	7.5 mm		
	R	1x2xAWG26/19 PUR	11019818	5.4 mm		



Part no. 11022604



Part no. 11018067



Part no. 11018068

## Process automation

Standard	Type	Dimension	Part no.	Nom. cross section	IEC	UL
10BASE-T1L	A	1x2xAWG18 PVC	11017748	7.0 mm	61156-13	AWM
		1x2xAWG18 PVC armoured	11019819	9.8 mm		
	B	1x2xAWG18/7 PVC	11019820	7.9 mm	61156-14	
		1x2xAWG16/7 PVC	11023764	9.3 mm		
		1x2xAWG22/7 PVC	11024990	5.7 mm		



Part no. 11017748

## Building technology

Standard	Dimension	Part no.	Nom. cross section	IEC	CPR approval
1000BASE-T1	1x2xAWG23/1 FRNC	11024992	5.1 mm	61156-11	Dca s2,d2,a1 or B2ca
	1x2xAWG22/7 FRNC	11024991	5.7 mm	61156-12	
	1x2xAWG26/7 FRNC	11024993	4.3 mm	61156-12	

## Connectors for industrial automation

Standard	Connector type	Part no.	AWG	IEC
10/100/1000BASE-T1	Data connector SPE IP20	11023902	26-22	IEC 60171-6
	Data connector SPE M12 IP67	11023903	26-22	IEC 60171-6
	Hybrid connector SPE M8 IP 67 2+2	11023904	26-22 (SPE) 18 (Power)	IEC 60171-6
	Hybrid connector SPE Type 2 IP67	11025262	*	IEC 60171-7
	Hybrid connector SPE Type 6 IP67	11025263	*	IEC 60171-7

\* in development



Part no. 11023902



Part no. 11023903



Part no. 11023904



Part no. 11025262

## Contact



Our product portfolio, like Single Pair Ethernet technology, is constantly growing. Please contact us if you are looking for a solution and have not found what you are looking for here:

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