SINGLE-PAIR ETHERNET

SPE-SOLUTIONS – IDEAL FOR
INDUSTRIAL DATA COMMUNICATION

2024

DATWYLER

Single Pair Ethernet
System Alliance

SINGLE-PAIR ETHERNET

THE NETWORK INFRASTRUCTURE FOR THE INDUSTRIAL IOT

The increasing digitalisation of industrial systems requires further development of existing Ethernet cabling. Especially when it comes to sensors and local, modular control devices, conventional cabling concepts are no longer able to cope with the new challenges in terms of space requirements and installation effort.

Single-Pair Ethernet (SPE) was developed to simplify and improve data transmission in industrial applications. It offers a simple and cost-effective way to build Ethernet networks using the existing cabling infrastructure.

CONSISTENT NETWORK CONNECTIONS UP TO THE FIELD LEVEL

Single-Pair Ethernet (SPE) is an Ethernet standard for data transmission over a single pair of wires (2-wire Ethernet) and is perfect for integrating intelligent sensors, RFID systems or high-resolution cameras into the existing industrial IP network.

When developing new industry standards, Datwyler and its partners rely on innovative Single-Pair Ethernet technology. SPE enables the consistent and economical connection of a large number of end devices in the Industrial IoT – from sensors in the field to the cloud.

SINGLE-PAIR ETHERNET (SPE)
CABLE

SINGLE PAIR ETHERNET IEC 61156-11 FRNC/LS0H

THIS IS WHAT MAKES OUR ETHERNET CABLES SO UNIQUE:

- Datwyler produces more than 120,000 km of Ethernet cables per year in Switzerland
- Specialized manufacturer of Ethernet-based data technology
- Development partner for Cat.5/5e to Cat.6$_A$ and Cat.7 products including Single-Pair Ethernet (SPE)
- Cost savings thanks to an optimised design
- Highest quality: We test our materials and cables in our own laboratory
- UL and CSA approved for worldwide use

ETHERNET CABLES
FROM THE SPECIALIST

One of Datwyler's core competencies is the development and manufacture of high-quality copper data cables, including Single-Pair Ethernet cables, in order to offer complete solutions for building and factory automation.

All SPE cables from Datwyler are compatible with today's SPE connectors according to IEC 63171 and support current and future SPE transmission protocols.

As a member of the SPE System Alliance, Datwyler offers a wide SPE cable portfolio: all of our cables meet the SPE transmission properties according to IEC 611156-11 and -12, from AWG 18 to AWG 26, in rigid and flexible versions as well as with various sheaths in PUR and LS0H.

The products are available with both UL/CSA certification and the necessary fire resistance rating (CPR).

Datwyler IT Infra is currently in the process of further completing the SPE cable portfolio in the direction of factory automation and, for example, developing versions with a PVC jacket and a highly flexible product.

Selection of SPE solutions (as of March 2024)

Standard IEC 61156	Category/Class	Cable type	Cores	Dimensions n x n x AWG	Applikation (type) [1]	Flexibility	UL Appoval	PoDL IEEE 802.3	CPR	Flame propagation	Zero halogen	Outdoor	Sheath material	Shielding	Max. bandwidth	Max. length	Typical application	Unique feature	Availability	Compatible connectors	Article number
Single-pair Ethernet (SPE) Cables IEC 61156	IEC 61156-11	Single-pair installation cable with transmission properties up to 600 MHz (fixed installation)	1 pair	1 x 2 x AWG22/1	A	fixed	✘	✔	✔	✔	✔	✘	LSZH FRNC	S/FTP	1000 Mbit/s	40 m	Horizontal wiring building	High flame retardance	available	IEC 63171	19143100DK
					B	flexible													not provided		
					C	drag chain													not provided		
					R	torsion													not provided		
	IEC 61156-12	Single-pair connection/patch cable with transmission properties up to 600 MHz (flexible)	1 pair		A	fixed													not provided		
				1 x 2 x AWG22/7	B	flexible	UL 444 CMG	✔	✔	✔	✔	✘	LSZH FRNC	S/FTP	1000 Mbit/s	40 m	Industrial communication machinery cabling	Space saving	available	IEC 63171	19471300EK
				1 x 2 x AWG22/7			UL AWM 758	✔	✔	✔	✔	✘	TPU	S/FTP	1000 Mbit/s	40 m	Industrial communication machinery cabling	Space saving	available	IEC 63171	19468300EK
				1 x 2 x AWG26/7			UL AWM 758	✔	✔	✔	✔	✘	TPU	S/FTP	1000 Mbit/s	40 m	Industrial communication machinery cabling	Space saving	available	IEC 63171	19468400EK
				1 x 2 x AWG22/19	C	drag chain	UL AWM 758	✔	✔	✔	✔	✘	TPU	S/FTP	1000 Mbit/s	40 m	Industrial communication machinery cabling	Highly flexible design	in development	IEC 63171	-
				1 x 2 x AWG22/19	R	torsion	UL AWM 758	✔	✔	✔	✔	✘	TPU	S/FTP	1000 Mbit/s	40 m	Industrial communication machinery cabling	Highly flexible design	in development	IEC 63171	-
	IEC 61156-13	Single-pair installation cable with transmission properties up to 20 MHz (fixed installation)	1 pair	1 x 2 x AWG22/1	A	fixed	✘	✔	✔	✔	✔	✘	LSZH FRNC	S/FTP	10 Mbit/s	1000 m	Horizontal wiring building	High flame retardance	available	IEC 63171	19143100DK
				1 x 2 x AWG18/1			✘	✔	✔	✔	✔	✘	LSZH FRNC	S/FTP	10 Mbit/s	1000 m	Horizontal wiring building	Long distance reach	on request	IEC 63171	-
					B	flexible													not provided		
					C	drag chain													not provided		
					R	torsion													not provided		
	IEC 61156-14	Single-pair connection/patch cable with transmission properties up to 20 MHz (flexible)	1 pair		A	fixed													not provided		
				1 x 2 x AWG22/7	B	flexible	✘	✔	✔	✔	✔	✘	LSZH FRNC	S/FTP	10 Mbit/s	1000 m	Horizontal wiring building	High flame retardance	available	IEC 63171	19463000DK
				1 x 2 x AWG22/7			UL 444 CMG	✔	✔	✔	✔	✘	LSZH FRNC	S/FTP	10 Mbit/s	1000 m	Industrial communication machinery cabling	Space saving	available	IEC 63171	19471300EK
				1 x 2 x AWG22/7			UL AWM 758	✔	✔	✔	✔	✘	TPU	S/FTP	10 Mbit/s	1000 m	Industrial communication machinery cabling	Space saving	available	IEC 63171	19468300EK
				1 x 2 x AWG26/7			UL AWM 758	✔	✔	✔	✔	✘	TPU	S/FTP	10 Mbit/s	1000 m	Industrial communication machinery cabling	Space saving	available	IEC 63171	19468400EK

[1] Definition of cable types in accordance with current Profinet guidelines
https://www.profibus.com/download/profinet-cabling-and-interconnection-technology

Click here to go directly to the
PROFINET GUIDELINE
(PDF)

OUR CURRENT PORTFOLIO FOR YOU

Explore the comprehensive world of Single-Pair Ethernet with our SPE components that optimise your industrial network infrastructure. By supplementing our cables with other passive components such as field connectors, adapters and patch cables, we offer you consistent solutions.

SPE TRANSMISSION CLASSES

The IEEE 802.3 has already published various SPE standards that can be used for applications with SPE.
The standard ISO/IEC 11801-1 specifies the requirements for the SPE transmission classes T1-A, T1-B and T1-C (generic SPE cabling).

Application IEEE 802.3	Standards ISO/IEC 11801-1 AMD1 ED1	SPE transmission classes	SPE transmission classes (Channel)	Frequency	Datwyler CU SPE 1P / SPE 1P flex AWG22	Datwyler CU SPE 1P flex AWG26	Datwyler CU SPE 1P AWG18	PoDL (Power-over Data Line) possible
10BASE-T1	IEEE 802.3cg	T1-A-1000	1000 m	20 MHz			✓	✓
		T1-A-400	400 m	20 MHz	✓		✓	✓
		T1-A-100	100 m	20 MHz	✓		✓	✓
100BASE-T1	IEEE 802.3bw (supported transmission distance max. 15 m)	T1-B-100	100 m	600 MHz	✓		N/A	✓
		T1-B-40	40 m	600 MHz	✓	✓	N/A	✓
		T1-B-15	15 m	600 MHz	✓	✓	N/A	✓
1000BASE-T1	IEEE 802.3bp (supported transmission distance max. 40 m)	T1-C-100	100 m	1250 MHz (at Datwyler under review)	✓		N/A	✓
100BASE-T1	IEEE 802.3dg (at IEEE in progress)		500 m					

The table shows which Datwyler CU SPE 1P cable type can be used to achieve the maximum intended transmission distance (Channel).
When using PoDL at the same time over the same pair of wires, the transmission length must, among other things, be shortened depending on the remote power supply class.

SPE connectors and patch cords

Article	Description	Connector Standard	Part number
SPE patch cable, PVC, plug/plug	IP20, 1 m	63171-2	655401002ZY
	IP20, 2 m		655402002ZY
	IP20, 3 m		655403002ZY
	IP20, 5 m		655404002ZY
	IP20, 10 m		655405002ZY
	IP20, 15 m		655406002ZY
Patchkabel SPE, PVC, jack/jack	IP67, 2 m	63171-5	655407002ZY
	IP67, 5 m		655408002ZY
	IP67, 10 m		655409002ZY
	IP67, 15 m		655410002ZY
SPE plug for field assembly	IP20, straight	63171-2	655445002ZY
SPE adapter	IP65, angled	63171-2/63171-5	655446002ZY
SPE rail adapter	IP30, straight	63171-2	655447002ZY

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