Connecting cables

Other industrial cabling components from the STX programme

Whether for cabling in factories, machines or plants, Telegärtner offers you top class, standard compliant Industrial Ethernet solutions with variants 1, 4, 5 and 14 industrial connectors from the STX range and variant 6 industrial connectors.

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DataVoice
Circular connectors
STX M12x1 IP67
Connector series for Railway & Vehicle Applications
Designed for transmitting maximum data rates in transport industry

As roped, angled compact connectors in Cat 6A, the M12 from Telegärtner can transmit data rates of up to 10 Gbit/s in accordance with IEC 61373 Sections, 8 and 9 and 10. As a further test for the connectors, a simulation for long-term use and corrosive resistance, degree of protection and foreign body protection according to IP6X. The submergence test for IPX7 was carried out without any visual defects or corrosion. The salt spray test was also successfully completed according to EN 60069. From a vibration and temperature test point of view, the test results show that the M12 connectors meet the high mechanical requirements for railways and vehicles. Therefore the train manufacturers are obliged to constantly improve individual trains. The cable spay test was also successfully completed according to EN 61373 Sections, 8 and 9 and 10. The tests included all components from Telegärtner’s M12 connect- or series. The tests were performed by an external accredited test laboratory and confirmed the corrosion resistance. The test reports are available on request. As a further test for reliability and reversibility of the railway environment, a thermal shock test with the test quality of the contact between the plug and the cable correnct to respect its applicability in rail vehicles could also be confirmed. During the thermal shock test, the functionality of the connectors was guaranteed at all times and no interruptions were detected.

As a further test for the connectors, a simulation for long-term use and corrosive resistance, degree of protection and foreign body protection according to IP6X. The submergence test for IPX7 was carried out without any visual defects or corrosion. The salt spray test was also successfully completed according to EN 60069. From a vibration and temperature test point of view, the test results show that the M12 connectors meet the high mechanical requirements for railways and vehicles. Therefore the train manufacturers are obliged to constantly improve individual trains. The cable spay test was also successfully completed according to EN 61373 Sections, 8 and 9 and 10. The tests included all components from Telegärtner’s M12 connect- or series. The tests were performed by an external accredited test laboratory and confirmed the corrosion resistance. The test reports are available on request. As a further test for reliability and reversibility of the railway environment, a thermal shock test with the test quality of the contact between the plug and the cable correnct to respect its applicability in rail vehicles could also be confirmed. During the thermal shock test, the functionality of the connectors was guaranteed at all times and no interruptions were detected.

To evaluate the behavior of the connector in different climatic conditions, the connectors went through the climatic test procedure with cyclic stress cold, heat and damp heat. After this, the con- nectors were tested for their insulation resistance and electrical strength according to IEC 61782-1:2015. Before, during and after the climatic tests no thermal effect or other changes were detected, confirming the connector series has passed the tests.

Component tested in vehicles are subject to high requirements due to the harsh environmental conditions. Passenger safety is always the highest priority and has to be taken into account when choosing the different materials. If no secure and continuous data transmission is to be ensured, then the connectors must meet the high mechanical requirements for railways and vehicles. To guarantee these points, different standards were defined spec- ifically for the transport industry. Telegärtner’s M12 components meet these standards and are therefore suitable for installation in transport applications.

The expansion of communication infrastructure in rail and vehicle applications is advancing to make the on-board experience as comfortable and entertaining as possible for the passengers. In addition to real-time information about the train schedule, passengers also expect to be able to work and surf on board. Besides the onboard applications for passengers, even train processes are being automated by the vehicle operators. For example processes like security systems where the carriage is monitored by IP cameras or traffic flows will be managed automatically by the individual trains. Therefore the railway manufacturers are obliged to constantly improve their communication network infrastructure in the vehicles so they can offer a working, safe and reliable network.

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**STX M12x1 Bulkhead Sockets X-coded IP67**

An important part of the STX M12x1 connector series are the bulkhead sockets in Cat. 6A. These are available both with housings for front or rear mounting or as a version without housing which has a quadruple shield contact to the printed circuit board and feature versatile mounting possibilities. The bulkhead sockets are available in both 180° and 90° versions, offering a high degree of flexibility due to the different installation possibilities.

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**Patch Cable for Railway Applications S/FTP AWG24/19 Cat.7**

Telegärtner's raw cable is ideal for all applications where passenger safety and a reliable and fast data transmission are of the utmost importance. The copper data cables which are installed in vehicles must meet the strict fire protection requirements which are standard in the transport industry. If there is a fire on-board, the highest priority is keeping the passengers safe. Thanks to the special X-FRNC cable jacket, which has been developed specifically for the transportation industry, the cable is resistant to flame dispersion and in case of fire will not give off any toxic substances. The category 7 cable is designed for data transmission of up to 10 Gbit/s, halogen-free and oil-resistant. The cable construction (AWG24/19) offers more flexibility during installation as the cable can achieve very small bend radii.
STX M12x1 Connecting Cable X-coded

For connecting an IP camera, the passenger information system in carriages or other applications where data rates need to be transmitted, Telegärtner also offers factory-made Category 6A connecting cables. The M12x1 X-coded connecting cables guarantee transmission rates of up to 10 Gbit and are available in different configurations and length variants from stock. The overmoulded connectors are tested to IP67 against particle and water ingress. The M12x1 X-coded connecting cables have an S/FTP 4x2xAWG24/19 structure and a jacket material specially developed for transport applications, the cables pass the high requirements for fire safety regulations in the transport industry. The connecting cables are supplied with Telegärtner printing on each cable and in Telegärtner packaging. If required, the packaging and printing can be adjusted to meet the customer’s specific requirements. Other configurations and adapter cables such as X-coded to D-coded or A-coded are available on request.

STX M12x1 Cable Plug and Cable Socket X-coded IP67

The basic structure of the new Telegärtner connector with X-coding corresponds to the M12 system used worldwide. This has found its way into many different industries with extreme conditions thanks to its compact design and industrial compatibility. The extremely robust M12x1 connector in Category 6A can be fitted on site without any special tools. This assembly-friendly connector also features very good shield contacting and covers a wide range of wire diameters (0.9 – 1.6mm) and cable diameters (5.5 – 9mm).

STX M12x1 X-coded Cable Plug and Cable Socket

- **Mechanical Characteristics**
  - Insertion force: ≤ 30 N
  - Durability (inserting cycles): ≥ 100
  - Material: housing: zinc diecast nickel-plated / brass nickel-plated
  - Material: contacts: brass
  - Wire diameter: 0.9 - 1.6 mm
  - Co-Conductor diameter: stranded: 0.46 - 0.76 mm (AWG27 - 22/7)
  - Co-Conductor diameter: solid: 0.51 - 0.64 mm (AWG24 - 22/1)
  - Cable diameter: 5.5 - 9.0 mm

- **Environmental Requirements**
  - Shock: 50 g
  - Protection against particulate ingress: IPX7
  - Protection against water/moisture: IPX7
  - Ambient temperature: -40 °C to +85 °C

- **Electrical Characteristics**
  - Contact resistance: ≤ 10 mΩ
  - Insulation resistance: ≥ 100 mΩ
  - Voltage proof: 500 V, DC
  - Voltage proof: contact-shield: ≥ 500 V, DC
  - PoE+: compatible with IEEE 802.3af

- **Transmission Characteristics**
  - Suitable for 10 Gigabit Ethernet
  - Category 6A: ISO/IEC 11801; DIN EN 50173-1
  - Class 6A: ISO/IEC 11801; DIN EN 50173-1

STX M12 Connecting Cable X-coded

- **Mechanical Characteristics**
  - Life M12: ≥ 100
  - Cable construction: 4x2x0.48 PiMF PUR
  - Co-Conductor diameter: stranded: AWG24 (19x0.24mm)
  - Pair screen: Al-foil, conducting side outward
  - Overall screen: Copper braid, tinned
  - Outer diameter: 0.8 ±0.3 mm
  - Colour: RAL 6018

- **Environmental and Security**
  - Smokiness: IEC 61034, LU1-085
  - Flame retardant: IEC 60332-1-2; IEC 60332-3-25 cat D
  - Fire safety performance in vehicles: ECE R118.02
  - Ambient temperature: -40 °C to 85 °C

The technical data for the connectors can be extracted from the table on the left.
The basic structure of the new Telegärtner connector with X-coding corresponds to the M12 system used worldwide. This has found its way into many different industries due to its compact design and industrial compatibility. The extremely robust M12x1 connector in Category 6A can be fitted on site without any special tools. This assembly-friendly connector also features very good shield contacting and covers a wide range of wire diameters (0.9 – 1.6mm) and cable diameters (3.5 – 9mm).

For connecting an IP camera, the passenger information system in carriages or other applications where data rates need to be transmitted, Telegärtner also offers factory-made Category 6A connecting cables. The M12x1 X-coded connecting cables guarantee transmission rates of up to 10 Gbit and are available in different configurations and length variants from stock. The overmoulded connectors are tested to IP67 against particle and water ingress. The M12x1 X-coded connecting cables have an S/FTP 4x2xAWG24/19 structure and a jacket material specially developed for transport applications, the cables pass the high requirements for fire safety regulations in the transport industry. The connecting cables are supplied with Telegärtner printing on each cable and in Telegärtner packaging. If required, the packaging and printing can be adjusted to meet the customer’s specific requirements. Other configurations and adapter cables such as X-coded to D-coded or A-coded are available on request.

STX M12x1 Connecting Cable X-coded

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STX M12 Connecting Cable X-coded

The M12 system used worldwide has found its way into many different industries due to its compact design and industrial compatibility. The extremely robust M12x1 connector in Category 6A can be fitted on site without any special tools. This assembly-friendly connector also features very good shield contacting and covers a wide range of wire diameters (0.9 – 1.6mm) and cable diameters (3.5 – 9mm).

STX M12x1 Cable Plug and Cable Socket X-coded IP67

The basic structure of the new Telegärtner connector with X-coding corresponds to the M12 system used worldwide. This has found its way into many different industries due to its compact design and industrial compatibility. The extremely robust M12x1 connector in Category 6A can be fitted on site without any special tools. This assembly-friendly connector also features very good shield contacting and covers a wide range of wire diameters (0.9 – 1.6mm) and cable diameters (3.5 – 9mm).
An important part of the STX M12x1 connector series are the bulkhead sockets in Cat 6. These are available both with housings for front or rear mounting or as a version without housing which has a quadruple shield contact to the printed circuit board and feature versatile mounting possibilities. The bulkhead sockets are available in both 180° and 90° versions, offering a high degree of flexibility due to the different installation possibilities.

### Mechanical Characteristics

- **Connectors**: IEC 61076-2-109:2014
- **Insertion force**: ≤ 30 N
- **Durability (mating cycles)**: ≥ 100
- **Material: housing**: zinc diecast nickel plated / brass nickel plated
- **Material: contact body**: PA
- **Material: contacts**: CuSn
- **Material: contact finish**: Au
- **Material: gaskets**: FKM; NBR

### Environmental Requirements

- **Shock**: 50 g
- **Protection against particle ingress**: IP6X
- **Protection against water / immersion**: IPX7
- **Ambient temperature**: -40 °C to +85 °C

### Electrical Characteristics

- **Contact resistance**: ≤ 5 mΩ
- **Insulation resistance**: ≥ 1000 MΩ
- **Voltage proof: contact-contact**: ≥ 500 V DC
- **Voltage proof: contact-shield**: ≥ 500 V DC

### Transmission Characteristics

- **PoE+ acc to IEEE 802.3at**: Adequate for Power over Ethernet+
- **10 Gigabit Ethernet acc to IEEE 802.3an**: Adequate for 10 Gigabit Ethernet

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### Patch Cable for Railway Applications

**S/FTP AWG24/19 Cat.7**

Telegärtner’s raw cable is ideal for all applications where passenger safety and a reliable and fast data transmission are of the utmost importance. The copper data cables which are installed in vehicles must meet the strict fire protection requirements which are standard in the transport industry. If there is a fire on board, the highest priority is keeping the passengers safe. Thanks to the special X-FRNC cable jacket, which has been developed specifically for the transportation industry, the cable is resistant to flame dispersion and in case of fire will not give off any toxic substances. The category 7 cable is designed for data transmission of up to 10 Gbit/s, halogen-free and od-resistant. The cable construction (AWG24/19) offers more flexibility during installation as the cable can achieve very small bend radii.

### Construction

- **Construction**: S/FTP
- **Conductor**: stranded bare copper wire, Ø 0.61 mm (AWG24/19)
- **Insulation**: E-beam X-linked foam/skin polyethylene, max. Ø 1.5 mm
- **Pair screen**: Aluminium laminated plastic foil, conducting side outward
- **Overall screen**: Copper braid, tinned, coverage ≥ 80%
- **Outer jacket**: E-beam X-FRNC/LNH, Blue RAL 5015

### Fire Behaviour

- **Flame retardant**: IEC 60332-1-2; IEC 60332-3-25 cat D
- **Smoke density**: IEC 61034; LU 1-085
- **Preventive fire protection**: DIN 5510-2 protection level 1 e.4; EN 50305 (9.1.1)
- **Fire protection in railway vehicles**: EN 45545-2:2013.H1-L3
- **Fire safety performance in vehicles**: ECE R18.02

### Mechanical Properties

- **Outer diameter**: 8.1 ± 0.3 mm
- **Bending radius**: during operation: ≥ 32 mm
- **Tensile force**: max. 80 N
- **Weight**: 78 kg/km

### Environment and Safety

- **Temperature range**: -40 °C to +90 °C
- **Fire load**: max. 730 MJ/km

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### STX M12x1 Bulkhead Socket X-coded IP67

An important part of the STX M12x1 connector series are the bulkhead sockets in Cat 6. These are available both with housings for front or rear mounting or as a version without housing which has a quadruple shield contact to the printed circuit board and feature versatile mounting possibilities. The bulkhead sockets are available in both 180° and 90° versions, offering a high degree of flexibility due to the different installation possibilities.
Designed for transmitting maximum data rates in transport industry

Components installed in vehicles are subject to high requirements due to the harsh environmental conditions. Passenger safety is always the highest priority and has to be taken into account when choosing the different materials. If a secure and continuous data transmission needs to be ensured, then the connectors used must meet the high mechanical requirements for railways and vehicles. To guarantee these properties, different standards were defined specifically for the transport industry. Telegärtner’s M12 connectors meet these standards and are therefore suitable for installation in transport applications.

**Components:**
- **STX M12x1 IP67 connector series**
  - Designed for transmitting maximum data rates in transport industry
  - 360° shielding. This shielding ensures safe and reliable data transmission.
  - Suitable for connecting to cables in harsh environments.
  - STX M12x1 IP67 connector series (X-coding).
  - Remote powering of end devices is also possible.
  - Bandwidth is ensured by separating the four pairs with a cross shield.

**Approvals:**
- Telegärtner can transmit data rates of up to 10 Gbit/s in accordance with DIN EN 61373 Sections, 8 and 9 and 10.
- The tests included all components from Telegärtner’s M12 connector series. The tests were performed by an external accredited test laboratory and confirmed the corrosion resistance. The tests were conducted in accordance with IEC 60529 Sections, 10, 13.2, 13.4, 14.2.
- The test to verify the IP67 protection class was carried out according to EN 60529 Sections, 10, 12.2, 13.4, 14.2.
  - The test to verify the IP67 protection class was carried out according to the above-mentioned standard. This test confirmed both touch protection and foreign body protection according to IEC. The submergence test for IP67 was carried out without any visual defects or interruptions detected.
- The test to verify the IEC 61373 Sections, 10, 12.2, 13.4, 14.2 was also successfully completed according to EN 61373 Sections, 12.2.5, 12.2.10.
  - As a further test for the connectors, a simulation for long-term use was conducted instead of the normal tear test. With this test the quality of the contact between the pin and the cable core was verified as regards its capability in rail vehicles could also be confirmed. During the mechanical stress, the functionality of the connectors was guaranteed at all times and no interruptions were detected.
- Components installed in vehicles are subject to high requirements due to the harsh environmental conditions. Passenger safety is always the highest priority and has to be taken into account when choosing the different materials. If a secure and continuous data transmission needs to be ensured, then the connectors used must meet the high mechanical requirements for railways and vehicles. To guarantee these properties, different standards were defined specifically for the transport industry. Telegärtner’s M12 connectors meet these standards and are therefore suitable for installation in transport applications.
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**Bulk cable:**

DIN EN 60545-2: 2013-11

The bulk cable contains both standards DIN EN 60545-2: 2013-11 and IEC 61076-2-109:2014. Even in harsh environments, the high bandwidth is ensured by separating the four pairs with a cross shield with IEC 61076-2-109:2014. Components installed in vehicles are subject to high requirements due to the harsh environmental conditions. Passenger safety is always the highest priority and has to be taken into account when choosing the different materials. If a secure and continuous data transmission is to be ensured, then the connectors used must meet the high mechanical requirements for railways and vehicles. To guarantee these points, different standards were defined specifically for the transport industry. Telegärtner’s M12x1 component series meets these standards and are therefore suitable for installation in transport applications.

**Connectors:**

The connectors have been tested in laboratory conditions, dynamic and corrosion resistance, degree of protection and functionality in transport applications. The tests included all components from Telegärtner’s M12x1 connector series. The tests were performed by an external accredited test laboratory and confirmed the corrosion resistance. The tests reported in the test reports included a verification of all components and their individual tests. EN 60555 Sections, 12.2, 12.4, 12.5, 12.8, 12.9, 12.10

To evaluate the behaviour of the connector in different dynamic conditions, the connectors went through the climatic test procedures with cyclic stresses cold, heat and damp heat. For this, the connections were tested for their insulation resistance and dielectric strength according to IEC 61782-2-110. Before, during and after the climatic tests no thermal defect or other changes were observed, confirming the connector series has passed the tests.

The ball-spring test was also successfully completed according to EN 61363 section 12.9 and as such the connector assembly can be used in railway vehicles. ECE R118.02: 

As a further test for the connectors, a simulative for long-term use in railway vehicles was undertaken with the help of EN 55022 Sections, 13.2, 13.4. The test confirmed the visual defects or and foreign body protection according to IP6X. The submergence test for IPX7 was carried out without any visual defects or environmental testing. The submergence test for IPX7 was carried out without any visual defects or environmental testing.

**Order Information**

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<th>Product</th>
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<th>Description</th>
<th>Coding</th>
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<td>M12x1 plug protection cap with wrist strap</td>
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<td>M12x1 IP 67  Socket</td>
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<td>J80020A0122</td>
<td>M12x1 coupler protection cap with wrist strap</td>
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Note: Illustrations may differ from the original.
Connecting cables

M12x1 X-coded
M12 x1 cable plug black, 2x M12 x1 connector PA66/UL94-V0 4x2xAWG24/19, Cat.7, jacket color blue
Length 0.5m L80000A0003
Length 1.0m L80000A0004
Length 2.0m L80001A0003
Length 3.0m L80002A0001
Length 5.0m L80003A0002
Length 7.5m L80004A0002
Length 10.0m L80005A0002

M12x1 X-coded
M12 x1 cable plug black, 2x M12 x1 connector PA66/UL94-V0 4x2xAWG24/19, Cat.7, jacket color blue
Length 0.5m L80400A0008
Length 1.0m L80400A0009
Length 2.0m L80401A0007
Length 3.0m L80402A0003
Length 5.0m L80403A0008
Length 7.5m L80404A0006
Length 10.0m L80405A0009

Other industrial cabling components from the STX programme

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No Delays.

DataVoice
Circular connectors
STX M12x1 IP67
Connector series for Railway & Vehicle Applications
Connecting cables

### STX M12x1 IP67

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### STX M12x1 IP67

- M12x1 cable plug black, overmoulded IP67 to M12x1 cable plug black, overmoulded IP67
- M12x1 cable plug black, overmoulded IP67 to M12x1 cable socket black IP67
- M12x1 cable plug black, overmoulded IP67 to RJ45 MFP8 IE

### STX M12x1 X-coded IP67

- M12x1 cable plug black, overmoulded IP67 to M12x1 cable plug black, overmoulded IP67
- M12x1 cable plug black, overmoulded IP67 to M12x1 cable socket black IP67

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