Integrated solutions from one source
Your partner for system solutions

The HUBER+SUHNER Group is a leading international manufacturer of electrical and optical interconnectivity components and systems. Under one roof, we combine technological capabilities in the three core fields of radio frequency, fiber optics and low frequency.

As one of Europe’s leading suppliers, HUBER+SUHNER offers a wide range of products which provide the platform to build modern rail vehicles and trackside infrastructure. New and innovative products based on our proven technologies support you in fulfilling the demanding requirements of the railway industry.
Making mass transit operations reliable

Communication based train control (CBTC) systems evolved as dominating technology in the railway industry. Implementation of CBTC reduces headways thus increasing line capacity and enabling more flexible train operations. Furthermore CBTC ensures a higher level of safety. In order to guarantee system availability it is crucial that every single connectivity component in the data communication system continues to operate – regardless of external factors such as environmental, mechanical or operational constraints.

With HUBER+SUHNER you can collaborate with a single partner offering the entire range of passive components for such data communication systems. Smart plug and play solutions allow quick and easy installation while shortening migration to CBTC in upgrade as well as new projects.

References

In numerous CBTC systems worldwide, HUBER+SUHNER products have proven reliable performance. The products are trusted by renowned manufacturers, system integrators and operators throughout the world. Among others, HUBER+SUHNER products are successfully in operation in the following CBTC projects:

- Toronto TTC Y-U-S Line
- Metro Sao Paulo Lines 1, 2, 3
- Metro Santiago L1
- Metro Mexico Line 12
- Metro Milan Line 1
- Metro Dubai Red Line
- Metro Shanghai L10
- Metro Beijing Line 2
Standards

Products for trackside and rolling stock installations are exposed to harsh environmental conditions. Railway products from HUBER+SUHNER therefore comply with the following standards and certifications, depending on the area of application:

- Fire performance: DIN-5510-2; NF-F16 101/102; BS 6853; CEN/TS 45545; LUL 1-085
- Environmental requirements: EN 50125-3; EN 50155
- IEEE 802.11 a/g/p/n

Trackside connectivity solutions can be tested according to country-specific or operator’s requirements. Customised products can also be engineered on request.

Features of HUBER+SUHNER products

- Proven performance
- Robust solutions
- High level of safety
- Easy and quick to install
- Compact design, reduced size
Components for the trackside backbone network

Radio-based CBTC enables continuous two-way communication between train and control centre. A fiber optic backbone connects the control centre with a chain of zone control units. In addition, the network redundancy ensures a secure and highly available communication link between train and control unit. HUBER+SUHNER can serve the physical layer of backbone networks with high capacity, single mode fiber optic cables. These cables are made of selected sheath materials in order to comply with stringent fire and smoke performance requirements. They are also designed to withstand harsh environmental conditions such as acids, alkalis or tunnel-cleaning products. Fiber management systems are also specifically tailored by our engineers to meet project and customer requirements.

Fiber optic cables
- High fire safety performance
- Anti-termite jacket material
- Rodent protection (corrugated steel, fiber glass)
- Jelly-free
- Special approvals for tunnel use (e.g. London underground)
- Various designs available

LISA fiber optic management systems
- Customised frames, boxes, enclosures
- From low to high fiber capacity
- Suitable for indoor and outdoor environment

Fiber optic splice closures
- Easy fiber management for looping through/uncut fibers
- Sealing optical fiber connections
- Re-opening and sealing without special tools
- Fittings to mast, walls, cable ducts or direct buried
- Splicing of up to 96 fibers
- IP 67
Components for the radio network

The radio network ensures continuous and reliable data communication between the train and the trackside backbone network. HUBER+SUHNER provides all passive components to build up this train-to-track network, including trackside antennas, the corresponding low loss coaxial cables and accessories, such as lightning protectors and power splitters. The train borne RF equipment such as roof top antennas, multiplexers and the appropriate cabling solutions is also provided.

For the actual connection of the trackside radio and the fiber optic distribution loop, it is beneficial to use HUBER+SUHNER MASTERLINE systems. These pre-terminated cables are equipped with fiber optic connectors for trackside radio connection and are thus ready to install, providing a time-saving plug and play connection.
SPOT-S and SPOT-M – antennas

- Directional gain trackside antenna
- Small design for tunnel installations
- Supports WiFi 2.4 or 5.6 / 5.9 GHz
- Vibration and shock resistant
- Designed and tested according to railway specifications
- Enhanced fire performance for use in tunnels
- Solar radiation
- Air pressure resistant

RF cable assemblies

- Low attenuation and high flexibility
- Flame-retardant, low smoke and halogen free
- Designed and tested according to railway specifications
- Vibration and shock resistant
- Wide temperature range
- Salt mist
MASTERLINE - pre-terminated fiber optic cable systems
• Plug and play installation
• No field termination of connectors
• All lengths possible
• Wide choice of cable types
• All standard connector types available
• High mechanical stability

SENCITY® Rail Excel antenna
• Universal railway antenna for covering large distances between the base stations along the track
• Permits high data transfer
• Directional and bi-directional rooftop antenna with an extremely rugged design
• High directivity
• High voltage and high current protection
• Flexible installation options

For a detailed description of rooftop antennas please check our “Train-to-shore communication” brochure.

Further products
• Power splitters
• Lightning protectors
• Antenna brackets
• Cable clamps
Components for on-board backbone network

HUBER+SUHNER also offers reliable connections for safety-critical train backbone networks. Customers are able to freely combine their connections, regardless of the technologies on which the systems are based, or which data transmission protocol (TCN or Ethernet) is implemented. RADOX® RAILCAT CAT5 and CAT7 as well as RADOX fiber optic cabling offer reliable transmission capabilities for safety-critical applications. These cables are ideal for use in the on-board CBTC bus.

RADOX Databus cables
- RADOX electron-beam cross-linked cables
- Sheath material RADOX EM 104 according to EN 50264-1
- Developed and tested for rolling stock applications
- High data transmission rates
- High resistance to heat, cold, fluids and weathering
- Good mechanical properties
- Flame-retardant, halogen free, low smoke

Fiber optic components and systems
- RADOX electron-beam cross-linked cables
- Flame-retardant, halogen free, low smoke
- In-carriage and inter-vehicle cable systems
- Conduit for additional cable protection
- Customer-specific designs
- Waterproof assemblies
- 100 % tested, ready-to-install
Choice of suitable products

**Trackside antennas**

<table>
<thead>
<tr>
<th>Antenna family</th>
<th>Type designation</th>
<th>Dimensions (mm)</th>
<th>Frequency range (MHz)</th>
<th>Gain (dBi)</th>
<th>Polarisation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPOT-S</strong></td>
<td>1324.170098</td>
<td>101 x 80 x 35</td>
<td>2400 – 2485</td>
<td>8.5</td>
<td>vertical</td>
</tr>
<tr>
<td></td>
<td>1356.170077</td>
<td>101 x 80 x 35</td>
<td>5150 – 5925</td>
<td>14</td>
<td>vertical</td>
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<tr>
<td><strong>SPOT-M</strong></td>
<td>1324.170105</td>
<td>80 x 80 x 390</td>
<td>2400 – 2485</td>
<td>14</td>
<td>vertical</td>
</tr>
<tr>
<td></td>
<td>1324.170051</td>
<td>190 x 190 x 30.5</td>
<td>2400 – 2485</td>
<td>13.5</td>
<td>vertical</td>
</tr>
<tr>
<td></td>
<td>1356.170024</td>
<td>190 x 190 x 30.5</td>
<td>5150 – 5925</td>
<td>18</td>
<td>vertical</td>
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</tbody>
</table>

**Trackside cable assemblies**

<table>
<thead>
<tr>
<th>Type</th>
<th>Cable</th>
<th>N-interface plug (male)</th>
<th>N-interface jack (female)</th>
<th>Attenuation @ 6 GHz (dB/m)</th>
<th>Outer diameter (mm)</th>
<th>Min. bending radius (static) (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeder cable</td>
<td>SPUMA_400</td>
<td>11_N-50-7-69</td>
<td>21_N-50-7-32</td>
<td>0.35</td>
<td>10.25</td>
<td>25</td>
</tr>
<tr>
<td>Jumper cable</td>
<td>S_04162_B</td>
<td>11_N-50-4-11</td>
<td>21_N-50-4-6</td>
<td>0.77</td>
<td>5.5</td>
<td>25</td>
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<tr>
<td>Feeder cable</td>
<td>SPUMA_400-FR</td>
<td>11_N-50-7-69</td>
<td>21_N-50-7-32</td>
<td>0.35</td>
<td>10.25</td>
<td>25</td>
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<tr>
<td>*Tunnel applications</td>
<td>S_10162_B-10</td>
<td>11_N-50-10-5</td>
<td>21_N-50-10-1</td>
<td>0.28</td>
<td>12.9</td>
<td>100</td>
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<tr>
<td>Jumper cable</td>
<td>SX_04172_B-60</td>
<td>11_N-50-4-11</td>
<td>21_N-50-4-6</td>
<td>0.92</td>
<td>5.5</td>
<td>25</td>
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<tr>
<td>*Tunnel applications</td>
<td>ENVIROFLEX_400</td>
<td>11_N-50-3-59</td>
<td>21_N-50-3-20</td>
<td>1.65</td>
<td>5.0</td>
<td>10</td>
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</table>

* Cables for tunnel applications with enhanced fire performance acc. to CEN/TS 45545 or DIN 5510-2.
Power splitter

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Frequency range (MHz)</th>
<th>IP rating</th>
<th>Connector</th>
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<tbody>
<tr>
<td>5504.170005</td>
<td>broadband power splitter</td>
<td>2000 – 6000</td>
<td>65</td>
<td>N(f)/N(f)</td>
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</table>

Lightning protectors

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Frequency range (MHz)</th>
<th>IP rating</th>
<th>Connector</th>
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</thead>
<tbody>
<tr>
<td>3407.170085</td>
<td>broadband inline EMP protector</td>
<td>2000 – 6000</td>
<td>68</td>
<td>N(m)/N(f)</td>
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<tr>
<td>3414.99.0022</td>
<td>data line protector</td>
<td>DC – 250</td>
<td>68</td>
<td>RJ45/RJ45</td>
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</tbody>
</table>

RADOX® Dabus cables

<table>
<thead>
<tr>
<th>Dabus cable</th>
<th>Item no.</th>
<th>Construction</th>
<th>Outer diameter</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>RADOX RAILCAT CAT5 (100 Ω)</td>
<td>12584038</td>
<td>4 x 22 AWG</td>
<td>6.6 mm</td>
<td>RJ 45 / M12</td>
</tr>
<tr>
<td>RADOX RAILCAT CAT5 (100 Ω)</td>
<td>12568935</td>
<td>4 x 22 AWG</td>
<td>7.25 mm</td>
<td>M12</td>
</tr>
<tr>
<td>RADOX RAILCAT CAT5 (100 Ω)</td>
<td>12585489</td>
<td>4 x 0.5 mm²</td>
<td>8.3 mm</td>
<td>M12</td>
</tr>
<tr>
<td>RADOX RAILCAT CAT5 (100 Ω)</td>
<td>12583107</td>
<td>4 x 2 x 22 AWG</td>
<td>12.6 mm</td>
<td>special</td>
</tr>
<tr>
<td>RADOX RAILCAT CAT7 (100 Ω)</td>
<td>84124806</td>
<td>4 x 2 x 24 AWG</td>
<td>8.5 mm</td>
<td>special</td>
</tr>
</tbody>
</table>

Fiber optic solutions

For fiber optic solutions please get in touch with your local sales contact. All country-specific contact details can be found under www.hubersuhner.com.
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Further publications

- Railway Products Catalogue
  Item no. 84110507

- Train-to-Shore Communication
  Item no. 84112422

- CBTC Connectivity Solutions
  White paper

- Fiber Optic Cabling Systems
  Item no. 84104358
HUBER+SUHNER is certified according to ISO 9001, ISO 14001, ISO/TS 16949 and IRIS.

WAIVER
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