<table>
<thead>
<tr>
<th>INDUSTRIES</th>
<th>PRODUCT CHARACTERISTICS</th>
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<tbody>
<tr>
<td>Automation</td>
<td>Suitable for outdoor use</td>
</tr>
<tr>
<td>e-Mobility</td>
<td>Good chemical resistance</td>
</tr>
<tr>
<td>Food &amp; Beverage</td>
<td>Flame-retardant</td>
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<tr>
<td>Mechanical and Plant Engineering</td>
<td>Wide clamping range</td>
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<tr>
<td>Oil &amp; Gas</td>
<td>Halogen-free</td>
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<tr>
<td>Rail</td>
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<td>Solar Energy</td>
<td>Cold-resistant</td>
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<td>Wind Energy</td>
<td>Corrosion-resistant</td>
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<td>Maximum vibration protection</td>
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<td>Mechanical resistance</td>
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<td>Low weight</td>
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<td>Oil-resistant</td>
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<td>Optimum strain relief</td>
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<td>Space requirement</td>
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<td>Robust</td>
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<td>Acid-resistant</td>
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<tr>
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<td>Reliability</td>
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<td>Integrated SKINTOP® cable gland</td>
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<td>Voltage</td>
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<td>Interference signals</td>
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<td>UV-resistant</td>
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<td>Waterproof</td>
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<td>Variety of approval certifications</td>
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**Please note:**
The purpose of the icons is to provide you with a quick overview and a rough indication of the product features to which the corresponding information relates. You can find details of product characteristics in the “technical data” sections on the product pages.
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Family business and global player

LAPP is both. The history of our company has been one of success and expansion ever since it was founded in 1959 by Ursula Ida and Oskar Lapp. It remains resolutely family owned to this day. We safeguard our success by staying close to our customers and markets, maintaining our innovative strength and brand quality, and being a reliable partner. We provide continuity, always guided in our thoughts and actions by our values.

Success built on family values

At LAPP, we maintain values that promote cooperation and enable relationships with employees, suppliers and customers based on partnership and trust. Good relations and mutual respect are key elements of our company culture and a central plank of company policy. We know that our successful business development of the last decades is down in particular to our 3,770 skilled and dedicated staff around the world, as well as the reliable partnership with our customers.

With 17 production facilities, over 40 sales companies and hundreds of dedicated consultants, we are always close to the individual needs and challenges of our customers all over the globe. We are constantly developing our products and system solutions, setting standards in safety, quality and functionality. This is why we are one of the world’s leading manufacturers of integrated solutions and branded products in cable and connection technology. As our success story enters its third generation, we are aware of our duty to the future.

www.lappkabel.com/company
8 brands

Uncompromising quality – worldwide

ÖLFLEX® has become synonymous with power and control cables. Our flexible and oil-resistant cables satisfy the highest demands and can withstand even the very toughest conditions.

UNITRONIC® data network cables and field bus components provide a forward-looking solution for all applications in industrial machinery and plant engineering. From transmission of simple control signals to field bus signals in complex network structures – we offer a dependable cabling and connection solution for almost every situation.

ETHERLINE® branded products open up a secure, fast and reliable path to the future of Ethernet applications, e.g. PROFINET®. The systems are made up of durable and robust cables and connection components for passive and active network technology, and deliver an effective solution for almost any application, particularly in an industrial environment.

HITRONIC® fibre optic cables make transmitting large data volumes easy: fault free, bug proof and at almost light speed. Even electromagnetic radiation does not interfere with the transmission. The HITRONIC® range includes the ideal solution for indoor or outdoor use, for demanding conditions, and even for use in power chains.

ÖLFLEX® Power and control cables
UNITRONIC® Data communication systems
ETHERLINE® Data communication systems for ETHERNET technology
HITRONIC® Optical transmission systems

EPIC® industrial connectors
EPIC® is a flexible system of housings, inserts and contacts: all extremely robust, absolutely safe and simplicity itself to assemble.

Simply feed in the cable and twist. That’s it. Our SKINTOP® cable glands provide secure connections in no time. The universal systems are simple but effective. They secure and centre the cable, hermetically seal it and guarantee optimum strain relief.

The universal range of SILVYN® protection and guidance systems protect cables effectively against dust, moisture, mechanical, thermal and chemical influences. The versatile SILVYN® CHAIN range of energy supply chains also protects and guides cables in dynamic applications.

The requirement: permanent marking. The solution: FLEXIMARK®. These sophisticated systems mean that a clear overview inside a control cabinet is no longer just a pipe dream. From simple labels for manual marking through to electronic markings, the FLEXIMARK® range is guaranteed to be permanent.

SKINTOP® Cable glands
SILVYN® Protective cable conduit systems and cable carrier systems
FLEXIMARK® Marking systems
Industrial Data Communication by LAPP.

The right solution for every application
Digitalisation is already leading to ever increasing data volumes in production halls. As a result, Ethernet, which has already become a standard in office environments, is also becoming increasingly important in industrial environments. The challenge for industrial data cables lies in reliably transferring ever higher data rates in harsh industrial environments. The cables are often bent millions of times in cable chains or are exposed to corrosive substances and high temperatures.

As we incorporate products into our customers’ automation processes, we are constantly asked to supply innovative ideas to solve important future-oriented challenges. Therefore we offer our customers a wide array of components and system solutions for factory, building and process automation. Our data communication solutions include complete cabling and connectivity systems for integrated networking at the sensor/actuator and control level right through to the inventory management system.

YOUR BENEFITS

- Extremely high availability of materials
- Approx. 800 cable types for Ethernet and Fieldbus
- Approx. 150 different data connectors
- Switches and distribution boxes available in various designs
- Products for all protocol standards
- Protocol-independent expert know-how
- No MOQ on stocked articles
- Cables, patchcords or customer-specific assemblies
- Global availability at 40+ sites

www.lappkabel.com/idc-experience
Product finder – don’t search, find it!

**Productfinder**

With eight brands and more than 40,000 items, providing the perfect cables, connectors and related components. With our intelligent product finder, you can find what you’re looking for right away.

www.lappgroup.com/productfinder

**Assembly finder**

Use smart filters to quickly create your data cable assembly.

www.lappgroup.com/assemblyfinder

**Cable Marking Finder**

Our FLEXIMARK® cable marking finder helps you create your required marking or labelling in next to no time.

www.lappgroup.com/markingfinder

**Cable protection finder**

With our SILVYN® cable protection finder, you can choose the required cable protection and matching accessories with just a few clicks.

www.lappkabel.com/cable-protection-finder
Configure your own individual industrial connector housing with locking concept and cable entries.

The right cable in seconds.

Simply select the application and cable length to find your servo assembly in seconds.

Determine the block and extension length for your spiral cable with just a few clicks.

Design, insert, housing and counterpart – the right connector in just a few clicks.

Use the charging cable configurator to configure the right charging cable and connector in no time at all.

Use the SKINTOP® Finder to help you identify the cable gland you need and the required accessories.

Determine the block and extension length for your spiral cable with just a few clicks.
Our Fast Connect system for PROFINET® and PROFIBUS®.

Industrial production and manufacturing environments require ever larger data volumes to be processed as quickly as possible. As a result, the demands on cabling also increase. This is because the products utilised must not only be designed for steadily growing data rates in the gigabyte range, but also be robust enough to ensure the reliability and operational safety of machines and systems.

The solution from LAPP

Our range of innovative Fast Connect data cables feature a special inner sheath and a cross separator instead of pair screening (Cat.6a). This special cable design reduces assembly time by up to 50%, while perfectly fulfilling all of the requirements for the shielding and application. Furthermore, there is no need to painstakingly remove the pair screening four times on Cat.6a cables, as it is now possible to strip right down to the wire pairs using the right tool.

You can find our Fast Connect system for PROFIBUS® on page 22 and for PROFINET® on page 118.
Perfectly compatible – Our Fast Connect components for Ethernet and fieldbus standards

YOUR BENEFITS

- Up to 50% time saving in assembly
- Perfect processing of EMC screening
- Specially coordinated components
- For Ethernet and fieldbus standards
- UL approval for the US market

How-to video

The step-by-step instruction video can be found here.

www.lappkabel.de/HowtoRJ45EN
Pin assignments

M8 pin assignments (IEC 61076-2-104)

3-pos. A-coded for Sensor/actuator cabling

4-pos. A-coded for Sensor/actuator cabling and Industrial Ethernet

8-pos. A-coded for Sensor/actuator cabling

M12 pin assignments

3-pos. A-coded for Sensor/actuator cabling

4-pos. A-coded for Sensor/actuator cabling

5-pos. A-coded for Sensor/actuator cabling

8-pos. A-coded for Sensor/actuator cabling

12-pos. A-coded for Sensor/actuator cabling

17-pos. A-coded for Sensor/actuator cabling

5-pos. B-coded for PROFIBUS®

4-pos. D-coded for Industrial Ethernet

8-pos. X-coded for Industrial Ethernet

3+PE-pos. S-coded for power supply

4-pos. T-coded for power supply

RJ45 pin assignment (IEC 60603-7)

Connector pin assignments

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<thead>
<tr>
<th>TIA 568-A</th>
<th>TIA 568-B</th>
<th>PROFINET®</th>
<th>RJ45</th>
<th>M12 D-coded</th>
<th>M12 X-coded</th>
<th>M8</th>
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<td>White/Orange</td>
<td>Yellow</td>
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<td>3</td>
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<td>UNITRONIC® BUS LD</td>
<td>UNITRONIC® SENSOR</td>
<td>UNITRONIC® TRAIN</td>
<td>EPIC® DATA CAN Sub-D</td>
<td>EPIC® SENSOR Flush-type M8</td>
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<td>UNITRONIC® BUS IBY</td>
<td>UNITRONIC® SENSOR HD M12 assemblies</td>
<td>EPIC® SENSOR M8</td>
<td>EPIC® SENSOR WD 54 in</td>
</tr>
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<td>UNITRONIC® BUS PB TRAY</td>
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<td>UNITRONIC® BUS PB M12</td>
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<td>UNITRONIC® BUS PB ROBUST</td>
<td>UNITRONIC® BUS PD 105</td>
<td>UNITRONIC® SENSOR</td>
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<td>EPIC® SENSOR M8</td>
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<td>UNITRONIC® BUS Y 7-W FC BK</td>
<td>UNITRONIC® BUS PB Y 7-W FC BK</td>
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<td>UNITRONIC® BUS PB FRNC FC</td>
<td>UNITRONIC® SENSOR master cable</td>
<td>UNITRONIC® SENSOR HD M12 assemblies</td>
<td>EPIC® SENSOR M8</td>
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<td>UNITRONIC® BUS PB Y</td>
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<td>EPIC® SENSOR M8</td>
<td>EPIC® SENSOR WD 54 in</td>
</tr>
</tbody>
</table>
Application areas for bus cables

- Plant engineering and construction
- Factory Automation (field busses like AS-Interface, PROFIBUS®, INTERBUS®, DeviceNet™, CAN etc.)
- Process Automation
  (chemical, petro-chemical industry etc.)
- Building Automation (building management)

Overview of the most common bus systems

**AS-Interface (AS-I)**
Developed to have an inexpensive alternative on the lower Fieldbus level (sensor/actuator) of Automation. Used very often in connection with Ethernet, PROFIBUS®, CAN and DeviceNet™.

**PROFIBUS®**
We distinguish between PROFIBUS® DP and PROFIBUS® PA. The DP variant dominates worldwide with a bit rate of 1.5 Mbit/s up to 12 Mbit/s. PROFIBUS® PA is the leader in Process Automation in Europe.

**CAN/CANopen®**
Originally developed for cars. Used in industry in an extremely broad range of applications.

**DeviceNet™**
Prior Fieldbussystem in North America. Developed by Allen Bradley (Rockwell Automation). Based on CAN.

**Fieldbus Foundation™**
Bus system for use in Process Automation.

**SafetyBUS**
Bus systems are developed especially for safety-relevant areas. They operate either completely independently (e.g. SafetyBUS p®) or are part of an overall system (e.g. PROFIsafe, INTERBUS® Safety, DeviceNet™ Safety etc.).

**INTERBUS®**
One of the first field bus systems used in the automotive industry.

**European Installation Bus EIB/KNX®**
Bus system for Building Automation. Operates primarily with low bit rate.

**Other bus systems**
For dedicated bus systems or modified system solutions based on standardized systems.

---

CAN = Controller Area Network
DeviceNet™ = registered trademark of Open Device Vendors Association (ODVA)
Fieldbus Foundation™ = registered trademark of Fieldbus Foundation™

SafetyBUS p® = registered trademark of Pilz GmbH & Co. KG
INTERBUS® = registered trademark of Phoenix Contact GmbH & Co.
Lapp Kabel is a member of the PROFIBUS® user organisation e. V. (PNO)
Type designations for UNITRONIC® SENSOR

S/A cables
e.g. item no. 22260339

<table>
<thead>
<tr>
<th>Connection</th>
<th>Cable Connection</th>
</tr>
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<tbody>
<tr>
<td>on left</td>
<td>on right</td>
</tr>
</tbody>
</table>

**AB- C4-M12MS- 2.0PUR- M12FA-2L**

- Automation Bus
- Cordset
- Number of pins (4) M12
- Connector/thread (straight connector)
- Connector/design
- Cable length in m (2.0 m)
- Cable material – outer sheath (PUR)
- Connector/thread (M12)
- Connector/design (angled socket)
- Status display/number of LEDs (2L)

Mountable connector e.g. item no. 22260127

**AB- C5-M12FS-PG7-SH**

- Automation Bus
- Connector
- Number of pins (5)
- Connector/thread (M12)
- Connector/design (straight connector)
- Cable connection/screw connection (PG7)
- Screened version (SH)

S/A passive distributor box e.g. item no. 22260025

**AB- B8-M12L-16-10.0PUR**

- Automation Bus
- Box
- Number of slots (8)
- S/A connection/thread (M12)
- Status display/LED signals (L)
- Number of inputs/outputs (16)
- Length of master cable in m (10.0)
- Cable material – outer sheath (PUR)

Further abbreviations:

- **MS** – straight connector
- **MA** – angled connector
- **FS** – straight socket
- **FA** – angled socket
- **M6, M12, M16, M23** – thread
- **L** – status display/LEDs
- **SH** – screened version
- **HD** – Hygienic Design
- **VA** – stainless steel knurl
- **M12Y** – M12 Y connector
- **B** – bridged
- **3-, 4-, 5-, 6-, 7-, 8-, 9-, 10-, 11-, 12-, 13-, 14-, 15-, 16-** number of pins
- **A, AD, B, BI, C, CI** – valve connector type
- **S** – valve connector with 2 diode
- **SV** – valve connector with varistor
- **SVC** – valve connector with varistor and commutator
- **SUP** – valve connector with suppressor diode
- **AB-PC** – Automation Bus Power Cable
- **AB-PB** – Automation Bus PROFIBUS®
- **AB-DN** – Automation Bus DeviceNet™
- **AB-ASI** – Automation Bus AS-Interface
- **AB-ASI-J** – AS-Interface distributor
Data communication systems Overview

Bus systems
Page 44 to page 95

Support of all major fieldbus systems, among others PROFIBUS® (DP and PA), CAN, DeviceNet™, CC-Link®, AS-Interface, ISOBUS, Foundation Fieldbus™, KNX®. Cables for in- and outdoor, extreme temperatures, fixed/flexible installation and high flexible application. M12- and Sub-D connectors, cordsets and accessories.

Sensor/actuator cabling
Page 96 to page 112

The complete range of M8-, M12- and valve connectors, cables, cordsets, matching distribution boxes and accessories. Available as shielded/unshielded version, optional LEDs, with different cable materials and connection technologies.
1. AS-interface cables from page 46
2. PROFIBUS® cables (fixed installation) from page 48
3. PROFIBUS® cables (highly flexible) from page 59
4. PROFIBUS® Sub-D connector from page 67
5. PROFIBUS® M12 cordsets from page 72
6. Sensor/actuator M12 connector from page 103
7. Valve connectors from page 41
8. Sensor/actuator T distributor, page 107
9. Sensor/actuator Y distributor from page 39
10. Sensor/actuator M8 distribution boxes, page 109
11. Sensor/actuator M12 distribution boxes, page 110
## Quickfinder Bus cables

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<th>Bus system</th>
<th>Inst. area</th>
<th>Application/cabling</th>
<th>Outer sheath material</th>
<th>Approval</th>
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<td>PROFIBUS® DP (150 Ω)</td>
<td>indoor (UV = outdoor)</td>
<td>static</td>
<td>PVC</td>
<td>UL/CSA (CMX)</td>
</tr>
<tr>
<td>PROFIBUS® PA (100 Ω)</td>
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<td>static</td>
<td>PVC</td>
<td>UL/CSA (CMG)</td>
</tr>
<tr>
<td>CAN CANopen® (120 Ω)</td>
<td>indoor</td>
<td>static</td>
<td>PVC</td>
<td>UL/CSA (CMX)</td>
</tr>
<tr>
<td>DeviceNet™ (120 Ω)</td>
<td>indoor (UV = outdoor)</td>
<td>static</td>
<td>PVC</td>
<td>UL/CSA (CMG)</td>
</tr>
</tbody>
</table>

**Legend**

*second outer sheath need to be removed before harnessing

°Standard Sub-D plug 9-pin

Please see detailed technical information on the data sheet (www.lappgroup.com/products)

7-W: 7-Wire: 7-stranded litz, dedicated for vibrating machine parts

CAN: Controller Area Network

FC: Fast Connect (cable construction for fast connector harnessing)

FD: high flexible (german: "Flexible Dauerbiegung")

FRNC: Flame Retardant Not Corrosive
<table>
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<td>2170220</td>
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<td>2170219</td>
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<td>105 °C temperature resistant</td>
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<td>2170630</td>
<td>51</td>
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<td>DeviceNet™ (120 Ω)</td>
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Legend
- 7-W: 7-Wire: 7-stranded litz, dedicated for vibrating machine parts
- CAN: Controller Area Network
- FC: Fast Connect (cable construction for fast connector harnessing)
- FD: high flexible (German – "Flexible Dauerbiegung")
- FRNC: Flame Retardant Not Corrosive
- H: halogen-free
- LD: Long Distance
- P: PUR – Polyurethan – oil resistant
- PA: Process Automation
- PB: PROFIBUS®
- PE: Polyethylene: can be used in food & beverage industry
- PROFI®: PROFIBUS® for Process Automation, especially in hazardous areas
- ROBUST: extended use: Water, chemical resistance, soap, tenside
- vibration resistant: Vibration resistant because single core is 7-wire stranded
- Y: PVC – Polyvinylchlorid

*second outer sheath need to be removed before harnessing
**Standard Sub-D plug 9-pin
MC: see current main catalogue

Please see detailed technical information on the data sheet (www.lappgroup.com/products)
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## Quickfinder Connector [UNITRONIC® BUS]

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### UNITRONIC® BUS

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  - Cable outlet: 35°
- **BUS PB A 1x2x0,64**
  - Article number: 2170219
  - Cable outlet: 90°
- **BUS PB FC 1x2x0,64**
  - Article number: 2170820
  - Cable outlet: 180°
- **BUS PB 105 1x2x0,64**
  - Article number: 2170630
  - Cable outlet: 35°
- **BUS PB TRAY 1x2x0,64**
  - Article number: 2170856
  - Cable outlet: 90°
- **BUS PB H FC 1x2x0,64**
  - Article number: 2170326
  - Cable outlet: 180°
- **BUS PB FC 1x2x0,64**
  - Article number: 2170858
  - Cable outlet: 35°
- **BUS PB PE FC 1x2x0,64**
  - Article number: 2170333
  - Cable outlet: 90°
- **BUS PB 105 plus**
  - Article number: 2170635
  - Cable outlet: 180°
- **BUS PB HEAT 180 1x2x0,64**
  - Article number: 3031981
  - Cable outlet: 35°
- **BUS PB 7-W A 1x2x0,64**
  - Article number: 2170824
  - Cable outlet: 90°
- **BUS PB Y 7-W FC BK**
  - Article number: 2170310
  - Cable outlet: 180°
- **BUS PB 7-W FC 1x2x0,64**
  - Article number: 2170826
  - Cable outlet: 35°
- **BUS PB COMBI 7-W 1x2x0,64+3x1**
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  - Cable outlet: 90°
- **BUS PB H-W 1x2x0,64**
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  - Article number: 2170495
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  - Cable outlet: 90°
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  - Article number: 2170332
  - Cable outlet: 35°
- **BUS PB FESTOON 1x2x0,8**
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  - Article number: 2170236
  - Cable outlet: 90°
- **BUS PB BURIAL FC 1x2x0,64**
  - Article number: 2170323
  - Cable outlet: 180°

### UNITRONIC® CANopen® (120Ohm)

- **BUS CAN 1x2x0,22**
  - Article number: 2170219
  - Cable outlet: 35°
- **BUS CAN 2x2x0,22**
  - Article number: 2170220
  - Cable outlet: 90°
- **BUS CAN 1x2x0,34**
  - Article number: 2170263
  - Cable outlet: 180°
- **BUS CAN 2x2x0,34**
  - Article number: 2170264
  - Cable outlet: 35°
- **BUS CAN 1x2x0,5**
  - Article number: 2170266
  - Cable outlet: 90°
- **BUS CAN 2x2x0,5**
  - Article number: 2170267
  - Cable outlet: 180°
- **BUS CAN 1x2x0,75**
  - Article number: 2170269
  - Cable outlet: 35°
- **BUS CAN 2x2x0,75**
  - Article number: 2170270
  - Cable outlet: 90°
- **BUS CAN TRAY 2x2x0,34**
  - Article number: 2170857
  - Cable outlet: 180°
- **BUS CAN FD P 1x2x0,25**
  - Article number: 2170272
  - Cable outlet: 35°
- **BUS CAN FD P 1x2x0,34**
  - Article number: 2170275
  - Cable outlet: 90°
- **BUS CAN FD P 2x2x0,34**
  - Article number: 2170276
  - Cable outlet: 180°
- **BUS CAN FD P 1x2x0,5**
  - Article number: 2170278
  - Cable outlet: 35°
- **BUS CAN FD P 2x2x0,5**
  - Article number: 2170279
  - Cable outlet: 90°
- **BUS CAN BURIAL 4x1x0,5**
  - Article number: 2170500
  - Cable outlet: 180°

### UNITRONIC® BUS Device Net (1200m)

- **BUS DN THICK FRNC**
  - Article number: 2170340
  - Cable outlet: 35°
- **BUS DN THIN FRNC**
  - Article number: 2170341
  - Cable outlet: 90°
- **BUS DN THICK Y**
  - Article number: 2170342
  - Cable outlet: 180°
- **BUS DN THIN Y**
  - Article number: 2170343
  - Cable outlet: 35°
- **BUS DN THICK FD P**
  - Article number: 2170344
  - Cable outlet: 90°
- **BUS DN THIN FD P**
  - Article number: 2170345
  - Cable outlet: 180°
- **BUS DN THICK FD Y**
  - Article number: 2170346
  - Cable outlet: 35°
- **BUS DN THIN FD Y**
  - Article number: 2170347
  - Cable outlet: 90°
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<thead>
<tr>
<th>EPIC® DATA PB Sub-D</th>
<th>EPIC® DATA PB Sub-D PRO</th>
<th>EPIC® DATA PB M12</th>
<th>EPIC® DATA PB CCR</th>
<th>EPIC® DATA CAN Sub-D</th>
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<td>180° Cable outlet</td>
<td>35° Cable outlet</td>
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<td>Socket, straight</td>
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- **DATA COMMUNICATION SYSTEMS**
- **EPIC® DATA**
  - **PB Sub-D FC**
  - **PB Sub-D PRO**
  - **PB M12**
  - **PB CCR**
  - **CAN Sub-D**
  - **CAN Sub-D PRO**
  - **CAN CCR**
- **Cable outlet**
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  - **180°**
  - **35°**
- **Article number**
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- **Article numbers**
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  - **21700590**
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  - **21700592**
  - **21700593**

- **Device Network (120Ohm)**
  - **UNITRONIC® BUS DN THICK**
    - **FRNC**
      - **2170340**
      - **2170341**
    - **Y**
      - **2170342**
      - **2170343**
    - **FD P**
      - **2170344**
      - **2170345**
    - **FD Y**
      - **2170346**
      - **2170347**

- **CANopen® (120Ohm)**
  - **UNITRONIC® BUS CAN**
    - **1x2x0.22**
      - **2170260**
      - **2170261**
    - **1x2x0.34**
      - **2170263**
      - **2170264**
    - **1x2x0.5**
      - **2170266**
      - **2170267**
    - **1x2x0.75**
      - **2170268**
      - **2170269**
    - **UNITRONIC® BUS CAN TRAY**
      - **2x2x0.34**
      - **2170272**
      - **2170273**
    - **UNITRONIC® BUS CAN FD P**
      - **1x2x0.25**
      - **2170275**
      - **2170276**
    - **UNITRONIC® BUS CAN FD P**
      - **1x2x0.34**
      - **2170278**
      - **2170279**
PROFIBUS® Fast Connect – quick and easy system installation!

Personnel expenses represent a significant cost factor in machines or plants. The cabling has a notable share in this. With the Fast Connect system, the amount of time needed to perform this work can be drastically reduced. This is possible through perfectly matched components:

1. Stripping with the FC STRIP stripping tool
   - The special structure of the Fast Connect cables with an inner sheath makes it possible to use the Fast Connect STRIP stripping tool
   - Reduction of connection times by removing outer sheath and braided screen in just one step
   - Specification of the stripping length is not necessary
   - Prevention of short circuits between screening and core due to preset stripping lengths

2. Contacting the cores
   - Flexibility due to assembly of the optimal cable length on site
   - Prevention of incorrect connections with transparent contact lid with imprinted colour coding
   - Contact assignment can be inspected when closed
   - Time and cost savings due to fast and simple connector assembly

3. Fixing and securing
   - When the lid is closed, the precision blades create the contact with the cores
   - The cable is automatically strain relieved
   - A standard screwdriver can be used, no special tool needed
All components from one source

Connectors

<table>
<thead>
<tr>
<th>Article designation</th>
<th>PG</th>
<th>Core type</th>
<th>Dimensions</th>
<th>Diagnostic LEDs</th>
<th>Article number</th>
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Advantages/benefits
- New innovative insulation displacement terminals suitable for solid and flexible conductors
- Adjustable terminating resistor is integrated
- Improved EMC features due to metallised housing
- UL-certified (File E331560)
- Fully compatible with market standard
- Versions with additional programming and diagnostics interface (PG-port) are available

Properties
- For PROFIBUS® FC standard cables, Ø 0.64 mm
- Cable outer diameter 5 to 8 mm
- Operating temperature: 0 °C to +60 °C
See page 101

Cables

<table>
<thead>
<tr>
<th>Article designation</th>
<th>Approval</th>
<th>Sheath material</th>
<th>Temperature fixed installation</th>
<th>Feature</th>
<th>Article number</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNITRONIC® BUS PB FC</td>
<td>UL/CSA CMG</td>
<td>PVC, violet</td>
<td>-40 °C to +80 °C</td>
<td>-</td>
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<td>48</td>
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<td>UNITRONIC® BUS PB-H FC</td>
<td>UL/CSA CMG</td>
<td>halogen-free, violet</td>
<td>-25 °C to +70 °C</td>
<td>halogen-free</td>
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<td>UNITRONIC® BUS PB P FC</td>
<td>UL/CSA CMX</td>
<td>PUR, violet</td>
<td>-40 °C to +70 °C</td>
<td>abrasion-resistant sheath</td>
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<tr>
<td>UNITRONIC® BUS PB PE FC</td>
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<td>PE, black</td>
<td>-40 °C to +60 °C</td>
<td>for the food industry</td>
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<tr>
<td>UNITRONIC® BUS PB FRNC FC</td>
<td>UL/CSA CMG</td>
<td>FRNC, violet</td>
<td>-30 °C to +80 °C</td>
<td>halogen-free/less fumes</td>
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<tr>
<td>UNITRONIC® BUS PB BURIAL FC</td>
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<td>PVC/PE, black</td>
<td>-40 °C to +60 °C</td>
<td>suitable for direct burial UV-resistant</td>
<td>2170323</td>
<td>57</td>
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</table>

Advantages/benefits
- High resistance against electromagnetic interference
- UL-approvals available
- UNITRONIC® PB FC cables can also be connected to EPIC® DATA connectors with screw connection

Properties
- The cables comply with the requirements of the PROFIBUS® User Organization (PNO)
- Double shielding with copper braid and plastic-laminated aluminum foil
See page 79

Tools

<table>
<thead>
<tr>
<th>Article designation</th>
<th>Art. no.</th>
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<tbody>
<tr>
<td>FC STRIP with blade</td>
<td>21124030</td>
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<tr>
<td>FC STRIP without blade</td>
<td>21124040</td>
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<tr>
<td>FC STRIP blade</td>
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</table>
Introduction

Time consuming and costly wiring with terminal blocks and decentralized cabinets is the past. Use UNITRONIC® SENSOR for your sensor/actuator wiring.

UNITRONIC® SENSOR is consistently focused on the modular system of proven M8 and M12 connections. Easy integration into the machine concept through compact dimensions of the components. The signals from the sensors and actuators are collected via trunk lines and transferred to the controller. Timesaving installation and maintenance in troubleshooting. Errors in the signal transmission can be diagnosed by the LEDs on sockets and distribution boxes. Particularly in large machinery and equipment, which will be dismantled again before delivery to the end-customer, the modular connector system pays off. Instead of having to reassemble everything – it’s only putting together and tightening the M8 or M12 threads.

The system is characterized by a high reliability even under difficult environmental conditions. The high demands on material are validated through continuous testing. For example, the several million drag chain cycles of a cable are tested in LAPP’s own test center in Stuttgart. Various chemical or vibration and shock resistances as well as the IP protection classes are tested in our own laboratory.

You can find the right sensor/actuator cordsets with our assembly finder on our website: www.lappgroup.com/assemblyfinder
**Sensor/actuator boxes**
In standardized connection systems, sensor/actuator boxes enable connection with all commonly used sensors and actuators and are the solution for decentralizing small-scale I/O. Regardless of whether the installation is to be performed on profiles, on even surfaces or under challenging conditions, the assembly concept ensures flexibility and reduces installation costs. The devices enable two assembly directions and are suitable for all uses. The allocation of the connectors also ensures that assembly time is kept to a minimum even under challenging conditions.

**Sensor/actuator cables**
Do you need to perform quick cabling of sensors and actuators in the field? Not a problem - thanks to our comprehensive range of overmoulded cables with M8, M12 and valve connectors. Signal statuses can be monitored with ease by means of the sensor/actuator cable designs featuring LEDs. Screened cables comply with the requirements concerning increased EMC compatibility.

**Sensor/actuator flush-type connectors and field mountable connectors**
For the purpose of connecting devices, we recommend M12 flush-type connectors with integrated stranded wire for PCB connection. Use field mountable connectors for rapid configuration of individual cable lengths for M8 and M12 sensor/actuator cables. Whether you need a screw connection or a fast connection, we will deliver according to your requirements.
Field mountable connectors [M8]

<table>
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<th>Meterware for M8</th>
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<th>Design</th>
<th>Connection type</th>
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<th>U (V)(^2)</th>
<th>OD (mm)(^3)</th>
<th>Article number</th>
<th>Page</th>
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Legend
\(^1\) Cross section
\(^2\) Rated current
\(^3\) Feasible outer diameter
*see www.lappgroup.com/products

TECHNICAL DATA: M8

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<th>Number of contacts</th>
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<tr>
<td>Temperature range</td>
<td>– Screw -40 °C to +85 °C</td>
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<td>– Piercing -25 °C to +85 °C</td>
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<tr>
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UNITRONIC® SENSOR
high flexible application
LIP9T11Y LIP9T11Y
Insulation material
PP/PUR PP/PUR
Dimension
No. of cores x mm² 3x0.25 4x0.25
Outer diameter (mm) 4.4 4.7

Field mountable connectors [M8]
- Solid and stranded conductors
- Easy reassembling
- Vibration resistant
- Large contact surface
- Connection cycles
- Short assembly time
- No tools needed
- No stripping of the conductor required

---

26
### Field mountable connectors [M12]

#### TECHNICAL DATA: M12

<table>
<thead>
<tr>
<th>Number of contacts</th>
<th>Coding</th>
<th>Rated current</th>
<th>Material contact</th>
<th>Protection class</th>
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**Legend**
- Cross section
- Rated current
- Feasible outer diameter

* Cables are available upon request. Alternatively we suggest to use connectors with a clamping range of 4 – 6 mm.

**see [www.lappgroup.com/products](http://www.lappgroup.com/products)**
## Field mountable connectors [M12]

### Connector M12

![Connector M12 Diagram](image-url)

**Meterware for M12 suitable for drag chains**

### Table: Specifications

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<thead>
<tr>
<th>Number of contacts</th>
<th>Plug Design</th>
<th>Connection type</th>
<th>( \Phi ) (mm(^2))</th>
<th>( U ) (V) (^{\dagger} )</th>
<th>OD (mm) (^{\ddagger} )</th>
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<tr>
<td>4-pin</td>
<td>Plug</td>
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<td>Screw</td>
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### Legend
- \(^{\dagger}\) Cross section
- \(^{\ddagger}\) Rated current
- \(^{\ddagger\ddagger}\) Feasible outer diameter
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<th>UNITRONIC® SENSOR FD high flexible application</th>
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# M8 Cordsets, A-coded [3-pin]

**TECHNICAL DATA: M8, 3-PIN**

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</table>

Other lengths and variants available upon request.

**Number of contacts**

- M8: 3
- M8 with LED: 3

**Rated current (V)**

- M8: 4 A
- M8 with LED: 24

**Protection class**

- IP65/IP67/IP68

**Material contact**

- CuSn

**Material contact surface**

- Ni/Au

**Material gripping body**

- TPU, flame-retardant, self-extinguishing

**Material knurl M8**

- Zinc die-cast, nickel plated

**Core cross-section (mm²)**

- 0.25

**Colour code**

- bn (1), bu (3), bk (4)

**Material outer sheath**

- PUR

**Colour outer sheath**

- Black

**Suitable for drag chains**

- Yes

**Minimum bending radius**

| | 
|----------------|----------------|
| Fixed installation | 5 x Outer diameter |
| Occasional flexing | 10 x Outer diameter |

**Temperature range**

- Plug/Socket: -25 °C to +90 °C
- Fixed installation: -40 °C to +80 °C
- Occasional flexing: -25 °C to +80 °C

**Flame retardant acc.**

- UL 1581 FT-2

**Halogen free acc.**

- DIN VDE 0472

**Approvals**

- UL: E249137
- ETIM 5.0 Class: EC001855
M8 Cordsets, A-coded [4-pin]

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Other lengths and variants available upon request.

TECHNICAL DATA: M8, 4-PIN

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<td>Rated current</td>
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<tr>
<td>Protection class</td>
<td>IP65/IP67/IP68</td>
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<tr>
<td>Material contact</td>
<td>CuSn</td>
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<tr>
<td>Material contact surface</td>
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<tr>
<td>Material gripping body</td>
<td>TPU, flame-retardant, self-extinguishing</td>
<td></td>
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<tr>
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<tr>
<td>Core cross-section (mm²)</td>
<td>0.25</td>
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<tr>
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<tr>
<td>Material outer sheath</td>
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<td></td>
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<tr>
<td>Colour outer sheath</td>
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<td></td>
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<tr>
<td>Suitable for drag chains</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Minimum bending radius</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Fixed installation</td>
<td>5 x Outer diameter</td>
<td></td>
</tr>
<tr>
<td>– Occasional flexing</td>
<td>10 x Outer diameter</td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td></td>
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</tr>
<tr>
<td>– Plug/Socket</td>
<td>-25 °C to +90 °C</td>
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<tr>
<td>– Fixed installation</td>
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<td>– Occasional flexing</td>
<td>-25 °C to +90 °C</td>
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<tr>
<td>Flame retardant acc.</td>
<td>UL 1581 FT-2</td>
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<tr>
<td>Halogen free acc.</td>
<td>DIN VDE 0472</td>
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<tr>
<td>Approvals</td>
<td>UL E249137</td>
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<tr>
<td>ETIM 5.0 Class</td>
<td>EC001855</td>
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M12 Cordsets, shielded, PUR, A-coded [3-, 4-, 5-, 8-pin]

Free conductor end

<table>
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<th>M12, shielded, 3-, 4-, 5-, 8-pin, PUR</th>
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<th>Article number</th>
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<td>22260454</td>
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<td>10</td>
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<td>M12 socket straight</td>
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Other lengths and variants available upon request.

TECHNICAL DATA: M12, SHIELDED, 3-, 4-, 5-, 8-PIN

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<td>Rated current</td>
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<tr>
<td>Protection class</td>
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<tr>
<td>Material contact</td>
</tr>
<tr>
<td>Material contact surface</td>
</tr>
<tr>
<td>Material gripping body</td>
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<tr>
<td>Material knurl M12</td>
</tr>
<tr>
<td>Core cross-section (mm²)</td>
</tr>
<tr>
<td>Material outer sheath</td>
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<tr>
<td>Colour outer sheath</td>
</tr>
<tr>
<td>Suitable for drag chains</td>
</tr>
<tr>
<td>Minimum bending radius</td>
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<tr>
<td>Temperature range</td>
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<tr>
<td>Halogen free acc.</td>
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M12 Cordsets, A-coded [3-pin]

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Other lengths and variants available upon request.

TECHNICAL DATA: M12, 3-PIN

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<tr>
<td>Rated current</td>
<td>4 A</td>
<td></td>
</tr>
<tr>
<td>Protection class</td>
<td>IP65/IP67/IP68</td>
<td></td>
</tr>
<tr>
<td>Material contact</td>
<td>CuSn</td>
<td></td>
</tr>
<tr>
<td>Material contact surface</td>
<td>Ni/Au</td>
<td></td>
</tr>
<tr>
<td>Material gripping body</td>
<td>TPU, flame-retardant, self-extinguishing</td>
<td></td>
</tr>
<tr>
<td>Material knurl M12</td>
<td>Zinc die-cast, nickel plated</td>
<td></td>
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<tr>
<td>Core cross-section (mm²)</td>
<td>0.34</td>
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<tr>
<td>Colour code</td>
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<tr>
<td>Material outer sheath</td>
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<tr>
<td>Colour outer sheath</td>
<td>black</td>
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<tr>
<td>Suitable for drag chains</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Minimum bending radius</td>
<td>– Fixed installation: 5 x Outer diameter</td>
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<tr>
<td></td>
<td>– Occasional flexing: 10 x Outer diameter</td>
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</tr>
<tr>
<td>Temperature range</td>
<td>– Plug/Socket: -25 °C to +90°C</td>
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<td>– Fixed installation: -40 °C to +80 °C</td>
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<td>– Occasional flexing: -25 °C to +80 °C</td>
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<tr>
<td>Halogen free acc.</td>
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### M12 Cordsets, A-coded [4-pin]

<table>
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<tr>
<th>M12, 4-pin, PUR</th>
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<td>Free conductor end</td>
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<td>-</td>
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<tr>
<td></td>
<td>10</td>
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</table>

| M12 plug straight | 0.3 | 22260328 |
| | 0.6 | 22260329 |
| | 1 | 22260330 |
| | 2 | 22260320 |
| | 5 | 22260321 |
| | 10 | 22260342 |

| M12 plug angled | 0.3 | 22260304 |
| | 0.6 | 22260305 |
| | 1 | 22260306 |
| | 2 | 22260301 |
| | 5 | 22260302 |
| | 10 | 22260303 |

Other lengths and variants available upon request.

### TECHNICAL DATA: M12, 4-PIN

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</tr>
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<td>Rated current</td>
<td>4 A</td>
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<tr>
<td>Protection class</td>
<td>IP65/IP67/IP68</td>
<td></td>
</tr>
<tr>
<td>Material contact</td>
<td>CuSn</td>
<td></td>
</tr>
<tr>
<td>Material contact surface</td>
<td>Ni/Au</td>
<td></td>
</tr>
<tr>
<td>Material gripping body</td>
<td>TPU, flame-retardant, self-extinguishing</td>
<td></td>
</tr>
<tr>
<td>Material knurl M12</td>
<td>Zinc die-cast, nickel-plated</td>
<td></td>
</tr>
<tr>
<td>Core cross-section (mm²)</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>Colour code</td>
<td>bn (1), wh (2), bu (3), bk (4)</td>
<td></td>
</tr>
<tr>
<td>Material outer sheath</td>
<td>PUR</td>
<td></td>
</tr>
<tr>
<td>Colour outer sheath</td>
<td>black</td>
<td></td>
</tr>
<tr>
<td>Suitable for drag chains</td>
<td>Yes</td>
<td></td>
</tr>
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Other information:
- Minimum bending radius:
  - Fixed installation: 5 x Outer diameter
  - Occasional flexing: 10 x Outer diameter
- Temperature range:
  - Plug/Socket: -25 °C to +90 °C
  - Fixed installation: -40 °C to +80 °C
  - Occasional flexing: -25 °C to +80 °C
- Flame retardant acc.: UL 1581 FT-2
- Halogen free acc.: DIN VDE 0472
- Approvals: UL E249137
- ETIM 5.0 Class: EC001855
M12 Cordsets, A-coded [5-pin]

<table>
<thead>
<tr>
<th>M12, 5-pin, PUR</th>
<th>Length (m)</th>
<th>Article number</th>
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<tbody>
<tr>
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Other lengths and variants available upon request.

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<td>Protection class</td>
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<td>Material contact surface</td>
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<tr>
<td>Material gripping body</td>
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<tr>
<td>Material knurl M12</td>
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<tr>
<td>Core cross-section (mm²)</td>
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<tr>
<td>Colour code</td>
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<tr>
<td>Material outer sheath</td>
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<td>Suitable for drag chains</td>
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<td>Minimum bending radius</td>
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<td>Temperature range</td>
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<td>Halogen free acc.</td>
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# M12 Cordsets, A-coded [8-pin]

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<tr>
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<td>2</td>
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<td></td>
<td>5</td>
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<td>10</td>
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</tr>
<tr>
<td>M12 plug angled</td>
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Other lengths and variants available upon request.

---

**TECHNICAL DATA: M12, 8-PIN**

| M12 | 
|---|---|
| Rated current (V) | 30 |
| Rated current | 2 A |
| Protection class | IP65/IP67/IP68 |
| Material contact | CuSn |
| Material contact surface | Ni/Au |
| Material gripping body | TPU, flame-retardant, self-extinguishing |
| Material knurl M12 | Zinc die-cast, nickel plated |
| Core cross-section (mm²) | 0.25 |
| Colour code | wh (1), bn (2), gn (3), ye (4), gy (5), pk (6), bu (7), rd (9) |
| Material outer sheath | PUR |
| Colour outer sheath | black |
| Suitable for drag chains | Yes |
| Minimum bending radius | - Fixed installation: 5 x Outer diameter. 
- Occasional flexing: 10 x Outer diameter. |
| Temperature range | - Plug/Socket: -25 °C to +190 °C  
- Fixed installation: -40 °C to +80 °C  
- Occasional flexing: -25 °C to +80 °C |
| Flame retardant acc. | UL 1581 FT-2 |
| Halogen free acc. | DIN VDE 0472 |
| Approvals | UL: E249143  
ETIM 5.0 Class: EC001855 |
Cordsets M8 on M12, A-coded [3-pin]

<table>
<thead>
<tr>
<th>M8 on M12, 3-pin, PUR</th>
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<th>Article number</th>
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Other lengths and variants available upon request.

TECHNICAL DATA: M8 ON M12

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<tr>
<td>Protection class</td>
<td>IP65/IP67/IP68</td>
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<tr>
<td>Material contact</td>
<td>CuSn</td>
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<tr>
<td>Material contact surface</td>
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<tr>
<td>Material gripping body</td>
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<td>Zinc die-cast, nickel plated</td>
</tr>
<tr>
<td>Core cross-section (mm²)</td>
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</tr>
<tr>
<td>Colour code</td>
<td>bn (1), bu (3), bk (4)</td>
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<tr>
<td>Material outer sheath</td>
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<tr>
<td>Colour outer sheath</td>
<td>black</td>
</tr>
<tr>
<td>Suitable for drag chains</td>
<td>Yes</td>
</tr>
<tr>
<td>Minimum bending radius</td>
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<tr>
<td>- Fixed installation</td>
<td>5 x Outer diameter</td>
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<tr>
<td>- Occasional flexing</td>
<td>10 x Outer diameter</td>
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<tr>
<td>Temperature range</td>
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<tr>
<td>- Plug/Socket</td>
<td>-25 °C to +90 °C</td>
</tr>
<tr>
<td>- Fixed installation</td>
<td>-40 °C to +80 °C</td>
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Cordsets M12 on M8, A-coded [3-/4-pin]

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Other lengths and variants available upon request.

**TECHNICAL DATA: M12 ON M8**

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<th>M12 on M8 with LED</th>
<th>M12 on M8</th>
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</thead>
<tbody>
<tr>
<td>Number of contacts</td>
<td>3</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Rated current (V)</td>
<td>60</td>
<td>24</td>
<td>30</td>
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<td>Rated current</td>
<td>4 A</td>
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<tr>
<td>Protection class</td>
<td>IP65/IP67/IP68</td>
<td></td>
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<tr>
<td>Material contact</td>
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<td></td>
<td></td>
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<tr>
<td>Material contact</td>
<td>Ni/Au</td>
<td></td>
<td></td>
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<tr>
<td>Material gripping</td>
<td>TPU, flame-retardant, self-extinguishing</td>
<td></td>
<td></td>
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<tr>
<td>Material knurl</td>
<td>Zinc die-cast, nickel plated</td>
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</tr>
<tr>
<td>Core cross-section</td>
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<td>Colour code</td>
<td>bn (1), bu (3), bk (4)</td>
<td>bn (1), wh (2), bu (3), bk (4)</td>
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<td>Material outer sheath</td>
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<td>Colour outer sheath</td>
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<tr>
<td>Suitable for drag</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum bending</td>
<td>5 x Outer diameter</td>
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<tr>
<td>Temperature range</td>
<td>-25 °C to +90 °C</td>
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<td>Flame retardant acc.</td>
<td>UL 1581 FT-2</td>
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<td>Halogen free acc.</td>
<td>DIN VDE 0472</td>
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<td>Approvals</td>
<td>UL: E249137</td>
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<td>ETIM 5.0 Class</td>
<td>EC001855</td>
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Y-distributor, A-coded [M12 3-pin]

<table>
<thead>
<tr>
<th>M12 3-pin, 2 x 3 x 0.34 mm²</th>
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Other lengths and variants available upon request.

Please observe the technical information on the next page.

Y-distributor, A-coded [M12 3-pin]

<table>
<thead>
<tr>
<th>M12 3-pin, 2 x 3 x 0.25 mm²</th>
<th>Length (m)</th>
<th>Article number</th>
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<td>22260521</td>
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</table>

Other lengths and variants available upon request.
Y-distributor, A-coded [M12 3-pin]

<table>
<thead>
<tr>
<th>M12 3-pin, 2 x 0.34 mm²</th>
<th>Length [m]</th>
<th>Article number</th>
</tr>
</thead>
<tbody>
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Other lengths and variants available upon request.

CIRCUIT DIAGRAM

Y-distributor M12Y on M12

Y-distributor M12Y on M12 LED

TECHNICAL DATA: M12

- Rated current (V): 250, 60, 24, 250, 24
- Protection class: IP65/IP67/IP68
- Material contact: CuSn
- Material contact surface: Ni/Au
- Material gripping body: TPU, flame-retardant, self-extinguishing
- Material knurl: Zinc die-cast, nickel plated
- Colour code: bn (1), bu (3), bk (4)
- Material outer sheath: PUR
- Colour outer sheath: black
- Suitable for drag chains: Yes
- Minimum bending radius:
  - Fixed installation: 5 x Outer diameter
  - Occasional flexing: 10 x Outer diameter
- Temperature range:
  - Plug/Socket: -25 °C to +90 °C
  - Fixed installation: -40 °C to +80 °C
  - Occasional flexing: -25 °C to +80 °C
- Approvals: UL: E249137
- ETIM 5.0 Class: EC001855
## Valve connector cordsets [3-pin]

<table>
<thead>
<tr>
<th>Type</th>
<th>Z-Diode</th>
<th>1 LED</th>
<th>Design Length (m)</th>
<th>Article number</th>
<th>Length (m)</th>
<th>Article number</th>
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<tbody>
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<td>Z-Diode</td>
<td>1 LED</td>
<td>2.0</td>
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<td>0.3</td>
<td>22260550</td>
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<td>5.0</td>
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<td>Z-Diode</td>
<td>1 LED</td>
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<td>Type C</td>
<td>Z-Diode</td>
<td>1 LED</td>
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Other lengths and variants available upon request.

### TECHNICAL DATA

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<tr>
<th>Valve connectors</th>
<th>on free conductor end</th>
<th>on M12</th>
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<tbody>
<tr>
<td>Rated current (V)</td>
<td>24</td>
<td></td>
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<tr>
<td>Rated current</td>
<td>4 A</td>
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</tr>
<tr>
<td>Protection class</td>
<td>IP65/IP67</td>
<td></td>
</tr>
<tr>
<td>Material contact</td>
<td>CuSn</td>
<td></td>
</tr>
<tr>
<td>Material gripping</td>
<td>TPU, flame-retardant, self-extinguishing</td>
<td></td>
</tr>
<tr>
<td>Material knurl M12</td>
<td>Zinc die-cast, nickel plated</td>
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</tr>
<tr>
<td>Core cross-section (mm²)</td>
<td>0.75 (3-pin)</td>
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</tr>
<tr>
<td>Colour code</td>
<td>black with white numbers and green/yellow</td>
<td></td>
</tr>
<tr>
<td>Material outer sheath</td>
<td>PUR</td>
<td></td>
</tr>
<tr>
<td>Colour outer sheath</td>
<td>black</td>
<td></td>
</tr>
<tr>
<td>Outer diameter (mm)</td>
<td>4.5 (3-pin)</td>
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<tr>
<td>Suitable for drag chains</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Minimum bending radius</td>
<td>- Fest verlegt 5 x Outer diameter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Occasional flexing 10 x Outer diameter</td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>- Plug/Socket -25 °C to +90 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Valve connector -20 °C to +85 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Fixed installation -40 °C to +80 °C</td>
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</tr>
<tr>
<td></td>
<td>- Occasional flexing -20 °C to +80 °C</td>
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<tr>
<td>Halogen free acc.</td>
<td>DIN VDE 0472</td>
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<tr>
<td>ETIM 5.0 Class</td>
<td>EC001855</td>
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### CIRCUIT DIAGRAM

Valve connector 3-pin

BK 2
BK 1
GNYE (PE)

2 1 PE
Valve connector cordsets [5-pin]

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<tr>
<th>Design</th>
<th>Length (m)</th>
<th>Article number</th>
<th>Length (m)</th>
<th>Article number</th>
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<tbody>
<tr>
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Other lengths and variants available upon request.

CIRCUIT DIAGRAM

Valve connector 5-pin (type AD) on M12

TECHNICAL DATA

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<th>Description</th>
<th>Specification</th>
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<td>on free conductor end</td>
</tr>
<tr>
<td>Rated current (V)</td>
<td>24</td>
</tr>
<tr>
<td>Rated current</td>
<td>4 A</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP65/IP67</td>
</tr>
<tr>
<td>Material contact</td>
<td>CuSn</td>
</tr>
<tr>
<td>Material gripping body M12</td>
<td>TPU, flame-retardant, self-extinguishing</td>
</tr>
<tr>
<td>Material knurl M12</td>
<td>Zinc die-cast, nickel plated</td>
</tr>
<tr>
<td>Core cross-section (mm²)</td>
<td>0.5 (5-pin)</td>
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<tr>
<td>Colour code</td>
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<td>Material outer sheath</td>
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<tr>
<td>Colour outer sheath</td>
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<tr>
<td>Outer diameter (mm)</td>
<td>5.3 (5-pin)</td>
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<tr>
<td>Suitable for drag chains</td>
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<tr>
<td>Minimum bending radius</td>
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<tr>
<td>- Fast verlegt</td>
<td>5 x Outer diameter</td>
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<tr>
<td>- Occasional flexing</td>
<td>10 x Outer diameter</td>
</tr>
<tr>
<td>Temperature range</td>
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</tr>
<tr>
<td>- Plug/Socket</td>
<td>-25 °C to +90 °C</td>
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<tr>
<td>- Valve connector</td>
<td>-20 °C to +85 °C</td>
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<td>- Fixed installation</td>
<td>-40 °C to +80 °C</td>
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<tr>
<td>- Occasional flexing</td>
<td>-20 °C to +80 °C</td>
</tr>
<tr>
<td>Halogen free acc.</td>
<td>DIN VDE 0472</td>
</tr>
<tr>
<td>ETIM 5.0 Class</td>
<td>EC001855</td>
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</tbody>
</table>
Further Portfolio

PVC – Portfolio

UNITRONIC® SENSOR PVC
In addition to our PUR standard range we offer M8 and M12 assemblies with PVC material. These are particularly suitable for medium mechanical stress in dry areas.

Shielded M12 Cordsets
The shielded UNITRONIC® SENSOR M12 SH protects against electromagnetic interference, giving you peace of mind when transmitting signals in electromagnetic environments.

Distribution boxes and accessories
Distributor in M8/M12 for simple signal bundling and for optimising individual wiring. Available with master cable attached or for individual assembly.

Hygienic design for Food & Beverage
At direct contact with food, components must meet the highest hygienic requirements. With an optimized design, stainless steel and resistant materials at UNITRONIC® SENSOR HD M12 you get with optimum cleaning results.

Flush-type connectors
EPIC® SENSOR M8/M12 flush-type connectors, particularly suitable as a panel feed-through and for the cabinet. Versions for rear and front mounting offer flexible connection solutions for individual device concepts.

EPIC® SENSOR
Our wide range of field-mountable EPIC® SENSOR M8/M12 connectors enables you to individually adapt the cabling to a perfect match at your application. With different types of connection in shielded and unshielded versions.

M12 power wiring
We offer UNITRONIC® SENSOR M12 Power assemblies with A-coding and T-coded, field-mountable EPIC® POWER M12 60 V connectors for safe power transmission cabling.

This and other information can be found here:
www.lappgroup.com/sensoractuator-cabling
UNITRONIC® BUS LD
Flexible busicable with PVC outer sheath, for use in different bus systems

Benefits
• Suitable for multiple Bus systems based on RS485 / RS422
• UNITRONIC® BUS LD A: UL versions with certification: UL/CSA type CMX acc. to UL 444 and CSA C22.2 no. 214-02
• Flame retardant acc. to IEC 60332-1-2

Application range
• For fixed installation
• Maximum electromagnetic screening
• Bus cables for bus systems such as e.g. Modbus, SUConet P, Modulink P, Varinet-P)
• Dry or damp rooms

Product features
• The stated bit rates result in the following cable lengths (maximum) of one bus segment:
  • 9.6-93.75 kbit/s = 1200m
  • 187.5 kbit/s = max. 1,000 m
  • 500 kbit/s = max. 400 m

Norm references / Approvals
• UNITRONIC® BUS LD A: UL versions with certification: UL/CSA type CMX acc. to UL 444 and CSA C22.2 no. 214-02
• Flame retardant acc. to IEC 60332-1-2

Product Make-up
• Stranded conductor, bare, 7-wire
• Core insulation: PE
• Colour code DIN 47100
• Overall screening of braided tinned-copper strands
• Outer sheath: PVC, violet (RAL 4001)

Norm references / Approvals
• UNITRONIC® BUS LD A: UL versions with certification: UL/CSA type CMX acc. to UL 444 and CSA C22.2 no. 214-02
• Flame retardant acc. to IEC 60332-1-2

Technical data

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<th>Article number</th>
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<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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<td>UNITRONIC® BUS LD</td>
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<td>45</td>
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<td>UNITRONIC® BUS LD</td>
<td>3 x 2 x 0.22</td>
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<td>72</td>
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<td></td>
<td>For fixed installation - UL/CSA CMX certification</td>
<td>1 x 2 x 0.22</td>
<td>5.7</td>
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<td>39</td>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Copper price basis: EUR 150 / 100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

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Photographs and graphics are not to scale and do not represent detailed images of the respective products.
UNITRONIC® BUS LD FD P
Highly flexible buscable with PUR outer sheath, for use in different bussystems

Benefits
- Suitable for multiple Bus systems based on RS485 / RS422
- PUR outer sheath, tear and notch-resistant, resistant to mineral oils and abrasion when used in power chains
- Under consideration of the temperature range also suitable for outdoor use

Application range
- For highly flexible applications (power chains, moving machine parts)
- Bus cables for bus systems such as e.g. Modbus, SUCOnet P, Modulink P, VariNet-P)

Product features
- The stated bit rates result in the following cable lengths (maximum) of one bus segment:
  - 9.6-93.75 kbit/s = 1200m
  - 187.5 kbit/s = max. 1,000 m
  - 500 kbit/s = max. 400 m
- UV-resistant (but colour may change after some time)

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable
- Mutual capacitance (800 Hz) max. 60 nF/km
- Peak operating voltage (not for power applications) 250 V
- Conductor resistance (loop): max. 159.8 ohm/km
- Minimum bending radius
  - Fixed installation: 6 x core diameter
  - One bend at end of core: 3 x cable diameter
  - Flexing: 15 x outer diameter
- Test voltage
  - Core/core: 1500 V rms
- Characteristic impedance
  - 100 - 120 Ohm
- Temperature range
  - Fixed installation: -40°C to +80°C
  - Flexing: -30°C to +70°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and mm² per conductor</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2170213</td>
<td>UNITRONIC® BUS LD FD P</td>
<td>1 x 2 x 0.25</td>
<td>6</td>
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<td>39</td>
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<td>UNITRONIC® BUS LD FD P</td>
<td>3 x 2 x 0.25</td>
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<tr>
<td>2170813</td>
<td>UNITRONIC® BUS LD FD P A</td>
<td>1 x 2 x 0.25</td>
<td>6.2</td>
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<td>2170814</td>
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</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum.

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

Modbus is owned by the Modbus-IDA Organisation. SUCOnet P is a registered trademark of the Moeller Group. Modulink P is a registered trademark of Weidmüller GmbH & Co. VariNet is a registered trademark of Pepperl+Fuchs GmbH.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- SMART STRIP stripping tool refer to main catalogue 2018/19
UNITRONIC® BUS ASI
AS-INTERFACE cables for networking systems in the field

Benefits
- The new BUS ASI LD 2 x 2.5 (Long Distance) allows even modules located further away to be connected. AS-I power supplies can be reduced. The BUS ASI LD is downwards-compatible with version 1.5.
- The rubber versions are halogen-free

Application range
- Communication at sensor/actuator level
- Sensor-/actuator wiring
- For fixed installation as well as occasional flexing at free, non-continuously recurring movement without tensile load
- The TPE version has an oil-resistant outer sheath. It is suitable for wet areas, in particular in conjunction with water-soluble cooling lubricants.

Product features
- Data and power are transmitted via an unscreened, geometrically coded two-core flat cable (protection against polarity reversal).
- The conductor is contacted by „piercing technology” within the ASI modules.
- The sensors are connected to the ASI modules (coupling modules) using round cables (connection cables).

Norm references / Approvals
- ASI is standardised Europe-wide in EN 50295 and internationally in IEC 62026-2.
- PVC A version with UL/CSA (CMX) certification
- UL/CSA version: CMG c(UL)us or (UL)CL2 or AWM 300V FT4 certified

Product Make-up
- Conductor: fine-wire tinned-copper strands
- Core insulation: blue and brown
- Outer sheath: rubber (G), halogenfree thermoplastic elastomers (TPE)
- PVC
- Outer sheath: yellow (RAL 1023), black (RAL 9005), red (RAL 3000)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage
  Yellow: 300 V (not for power applications)
  Black: 300 V (not for power applications)
  Red: 300 V
- Conductor resistance
  1.5 mm²: max. 13.7 Ohm/km
  2.5 mm²: max. 8.21 Ohm/km
- Minimum bending radius
  Fixed installation: 12 mm
  Flexible use: 24 mm
- Test voltage
- Core/core: 2000 V

Temperature range
- Dependent on outer sheath material:
  PVC: -30°C to +90°C
  Other materials: -40°C to +85°C
- During installation:
  PVC -20°C to +90°C
  Other materials: -30°C to +85°C

Table:

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Outer sheath colour</th>
<th>Application</th>
<th>Number of cores and mm² per conductor</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2170228</td>
<td>UNITRONIC® BUS ASI (G)</td>
<td>yellow</td>
<td>Data and power transmission</td>
<td>2 x 1,5</td>
<td>29</td>
<td>85</td>
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<tr>
<td>2170229</td>
<td>UNITRONIC® BUS ASI (G)</td>
<td>black</td>
<td>Transmission of 30 V DC auxiliary power</td>
<td>2 x 1,5</td>
<td>29</td>
<td>85</td>
</tr>
<tr>
<td>2170371</td>
<td>UNITRONIC® BUS ASI LD (G)</td>
<td>yellow</td>
<td>Data and power transmission</td>
<td>2 x 2,5</td>
<td>48</td>
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<td>2170372</td>
<td>UNITRONIC® BUS ASI LD (G)</td>
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<td>Transmission of 30 V DC auxiliary power</td>
<td>2 x 2,5</td>
<td>48</td>
<td>85</td>
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<tr>
<td>2170230</td>
<td>UNITRONIC® BUS ASI (TPE)</td>
<td>yellow</td>
<td>Data and power transmission</td>
<td>2 x 1,5</td>
<td>29</td>
<td>64</td>
</tr>
<tr>
<td>2170231</td>
<td>UNITRONIC® BUS ASI (TPE)</td>
<td>black</td>
<td>Transmission of 30 V DC auxiliary power</td>
<td>2 x 1,5</td>
<td>29</td>
<td>64</td>
</tr>
<tr>
<td>2170232</td>
<td>UNITRONIC® BUS ASI (TPE)</td>
<td>red</td>
<td>Transmission of 30 V DC auxiliary power</td>
<td>2 x 1,5</td>
<td>29</td>
<td>64</td>
</tr>
<tr>
<td>2170842</td>
<td>UNITRONIC® BUS ASI (PVC) A</td>
<td>yellow</td>
<td>Data and power transmission</td>
<td>2 x 1,5</td>
<td>29</td>
<td>70</td>
</tr>
<tr>
<td>2170843</td>
<td>UNITRONIC® BUS ASI (PVC) A</td>
<td>black</td>
<td>Transmission of 30 V DC auxiliary power</td>
<td>2 x 1,5</td>
<td>29</td>
<td>70</td>
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<tr>
<td>2170844</td>
<td>UNITRONIC® BUS ASI (PVC) A</td>
<td>red</td>
<td>Transmission of 230 V AC auxiliary power</td>
<td>2 x 1,5</td>
<td>29</td>
<td>70</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- SKINTOP® DIX-M AUTOMATION refer to main catalogue 2018/19
- AS-I clip clamp / AS-I end sealing refer to main catalogue 2018/19
- UNIVERSAL STRIP stripping tool refer to main catalogue 2018/19
- AS-I STRIP special stripping tool refer to main catalogue 2018/19
- AS-I STRIP special refer to main catalogue 2018/19
- SKINTOP® DIX ASI refer to main catalogue 2018/19
UNITRONIC® BUS ASI FD
High flexible AS-INTERFACE cables for networking systems in the field

Benefits
• The new BUS ASI LD 2 x 2.5 (Long Distance) allows even modules located further away to be connected. AS-I power supplies can be reduced. The BUS ASI LD is downwards-compatible with version 1.5.
• For highly flexible applications (power chains, moving machine parts)
• High oil-resistance

Application range
• Communication at sensor/actuator level
• Sensor-/actuator wiring

Product features
• PUR versions are halogen-free according to IEC 60754-1
• Flame-retardant according to IEC 60332-1-2, UL FT-2 flame test
• Data and power are transmitted via an unscreened, geometrically coded two-core flat cable (protection against polarity reversal).
• The conductor is contacted by „piercing technology” within the ASI modules.
• The sensors are connected to the ASI modules (coupling modules) using round cables (connection cables).

Norm references / Approvals
• ASI is standardised Europe-wide in EN 50295 and internationally in IEC 62026-2.
• TPE variant: UL AWM Style 2103
• PUR versions: UL AWM Style 20549

Product Make-up
• Extra-fine wire, tinned copper strands
• Core insulation: halogen-free compound
• Outer sheath: TPE
• Outer sheath: yellow (RAL 1023), black (RAL 9005)

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID: EC000830</td>
</tr>
<tr>
<td>ETIM 5.0/6.0 Class-Description: Data cable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Peak operating voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 V (not for power applications)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conductor resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 mm²: max. 13.7 Ohm/km</td>
</tr>
<tr>
<td>2.5 mm²: max. 8.21 Ohm/km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minimum bending radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed installation: 12 mm</td>
</tr>
<tr>
<td>Flexing without fixing: 24 mm</td>
</tr>
<tr>
<td>Flexing with fixing: 60 mm (15 x D)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core/core: 2000 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed installation: -40°C to +80°C (TPE +105°C)</td>
</tr>
<tr>
<td>Flexing without fixing: -30°C to +70°C (TPE +105°C)</td>
</tr>
</tbody>
</table>

Table: Article numbers and characteristics

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Outer sheath colour</th>
<th>Application</th>
<th>Number of cores and mm² per conductor</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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<tbody>
<tr>
<td>2170357</td>
<td>UNITRONIC® BUS ASI FD P FRNC yellow</td>
<td>Data and power transmission</td>
<td>2 x 1,5</td>
<td>29</td>
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<tr>
<td>2170358</td>
<td>UNITRONIC® BUS ASI FD P FRNC black</td>
<td>Transmission of 30 V DC auxiliary power</td>
<td>2 x 1,5</td>
<td>29</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>2170317</td>
<td>UNITRONIC® BUS ASI LD FD P yellow</td>
<td>Data and power transmission</td>
<td>2 x 2,5</td>
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<td>74</td>
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<tr>
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<td>UNITRONIC® BUS ASI LD FD P black</td>
<td>Transmission of 30 V DC auxiliary power</td>
<td>2 x 2,5</td>
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<td>74</td>
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</tr>
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</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

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Accessories
• SKINTOP® DIX-M AUTOMATION refer to main catalogue 2018/19
• AS-I clip clamp / AS-I end sealing refer to main catalogue 2018/19
• UNIVERSAL STRIP stripping tool refer to main catalogue 2018/19
• AS-I STRIP special stripping tool refer to main catalogue 2018/19
• AS-I STRIP special refer to main catalogue 2018/19
• SKINTOP® DIX ASI refer to main catalogue 2018/19

For current information see: www.lappgroup.com
Data communication systems

Bus system PROFIBUS-DP/FMS/FIP • Fixed Installation

UNITRONIC® BUS PB
PROFIBUS cables for fixed applications

Application range
- For fixed installation
- Maximum electromagnetic screening
- Dry or damp rooms
- Item nos. 2170233, 2170333, 2170820, 2170824, 2170826 are all UV-resistant

Product features
- These bus cables can be used for PROFIBUS-DP as well as for PROFIBUS-FMS and FIP
- Based on the bit rates listed, in accordance with PNO specifications the following maximum cable lengths for a bus segment apply:
  (cable type A, PROFIBUS-DP):
  - 93.75 kbit/s = 1200 m
  - 187.5 kbit/s = 1000 m
  - 500 kbit/s = 400 m
  - 1.5 Mbit/s = 200 m
  - 12.0 Mbit/s = 100 m

Norm references / Approvals
- In accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC NET, also suitable for FIP (Factory Instrumentation Protocol)
- See below for UL certification type

Product Make-up
- FC: Fast Connect cable design
- P: Polyurethane
- H: Halogen-free
- PE: polyethylene outer sheath, black
- 7-W: 7-wire, e.g. for applications where vibrations occur
- COMBI: Data transmission and power supply in one cable

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID: EC000830</td>
</tr>
<tr>
<td>ETIM 5.0/6.0 Class-Description: Data cable</td>
</tr>
</tbody>
</table>

| Mutual capacitance (800 Hz): max. 30 nF/km |
| Peak operating voltage (not for power applications) 250 V |
| Conductor resistance (loop): max. 184 Ohm/km. see also datasheet |
| Minimum bending radius: Fixed installation: see data sheet |
| Test voltage: Core/core: 1500 V rms |
| Characteristic impedance: 150 ± 15 Ohm |

Article number   Article designation  Number of pairs and conductor diameter (mm)  Outer diameter [mm]  Copper index (kg/km)  Weight (kg/km)

Conventional cable makeup
2170220 UNITRONIC® BUS PB 1 x 2 x 0.64 8 30.1 74
2170233 UNITRONIC® PB PE 1 x 2 x 0.64 8 30.1 57
2170226 UNITRONIC® BUS PB H 7-W 1 x 2 x 0.64 8 30.1 55
2170225 UNITRONIC® BUS PB COMBI 7-W 1 x 2 x 0.64 Ø + 3 x 1.0 mm² 9.8 59 92

Conventional cable makeup - UL/CSA CMX certification
2170219 UNITRONIC® BUS PB A 1 x 2 x 0.64 8 30.1 57

Conventional cable makeup - UL/CSA CMG certification
2170824 UNITRONIC® BUS PB 7-W A 1 x 2 x 0.64 8 30.1 55

Fast Connect
2170333 UNITRONIC® BUS PB PE FC 1 x 2 x 0.64 8 26 67

Fast Connect - UL/CSA CMX certification
2170330 UNITRONIC® BUS PB PE FC 1 x 2 x 0.64 8 26 67

Fast Connect cable makeup - UL/CSA CMG certification
2170820 UNITRONIC® BUS PB FC 1 x 2 x 0.64 8 26 67
2170826 UNITRONIC® BUS PB H FC 1 x 2 x 0.64 8 26 67
2170326 UNITRONIC® BUS PB-H FC 1 x 2 x 0.64 8 26 67

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please refer to our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

SIMATIC®NET is a registered trademark of Siemens AG
Lapp Kabel is a member of the PROFIBUS user organisation (PNO)
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Similar products
- UNITRONIC® BUS PB ROBUST refer to page 50
- UNITRONIC® BUS PB 105 refer to page 51

Accessories
- Sub-D Bus-Connectors refer to main catalogue 2018/19
- FC STRIP stripping tool refer to main catalogue 2018/19
- SENSOR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
UNITRONIC® BUS PB TRAY

PROFIBUS cable with PLTC-ER approval for unprotected use on cable trays

Product features
- Based on the bit rates listed, in accordance with PNO specifications the following maximum cable lengths for a bus segment apply (cable type A, PROFIBUS-DP):
  - 93.75 kbit/s = 1200 m
  - 187.5 kbit/s = 1000 m
  - 500 kbit/s = 400 m
  - 1.5 Mbit/s = 200 m
  - 12.0 Mbit/s = 100 m
- UV-resistant UL SUN RES
- Flame retardant acc. UL 1685 - FT4 (vertical tray)

Norm references / Approvals
- C(UL)us Typ CMG (75°C) acc.to UL 444 / CSA 22.2
- UL Type PLTC-ER acc. to UL 13

Product Make-up
- Bare copper wire, 0,64 mm diameter
- Core colours: red, green
- Overall screening with copper braid and plastic-laminated aluminium foil
- PVC inner sheath and outer sheath
- Colour: violet (RAL 4001)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Mutual capacitance
  (1 kHz): max. 30 nF/km
- Peak operating voltage
  (not for power applications) 250 V
- Impedance
  150 ± 15 Ohm
- Conductor resistance
  Core/core: 2000 V
- Minimum bending radius
  Fixed installation: 8 x outer diameter
- Test voltage
  Core/core: 2000 V
- Characteristic impedance
  150 ± 15 Ohm
- Temperature range
  Flexing: -10°C to +70°C
  Fixed installation: -40°C to +80°C

Table:

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and conductor diameter (mm)</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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</thead>
<tbody>
<tr>
<td>2170856</td>
<td>UNITRONIC® BUS PB TRAY</td>
<td>1x2x0.64</td>
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<td>82</td>
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</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Data communication systems

Bus system PROFIBUS-DP/FMS/FIP • Fixed Installation

UNITRONIC® BUS PB ROBUST

PROFIBUS cable - resistant to a wide range of chemical media

**Benefits**
- Robust PROFIBUS cable for use under harsh environmental conditions

**Application range**
- For use for PROFIBUS-DP or FIP in harsh industrial environments
- Fixed Installation

**Product features**
- Significantly extended use and application areas, water and chemical resistance for use in industrial conditions.
- High resistance to tensides, soaps etc.
- UV-resistant
- Flame-retardant according IEC 60332-1-2
- Based on the bit rates listed, in accordance with PNO specifications the following maximum cable lengths for a bus segment apply
  - (cable type A, PROFIBUS-DP):
    - 3.75 kbit/s = 1200 m
    - 187.5 kbit/s = 1000 m
    - 500 kbit/s = 400 m
    - 1.5 Mbit/s = 200 m
    - 12.0 Mbit/s = 100 m

**Product Make-up**
- Solid and bare copper conductor
- Core insulation: cellular PE, O2Y(S)
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath: Specially formulated TPE, violet (RAL 4001)
- With conventional cable design

**Technical data**

- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable

- **Mutual capacitance**
  - (1 kHz): approx. 28.5 nF/km

- **Peak operating voltage**
  - (not for power applications): 250 V

- **Minimum bending radius**
  - Fixed installation: 75 mm

- **Test voltage**
  - Core/core: 1500 V rms
  - Core/screen: 1500 V

- **Characteristic impedance**
  - (3 - 20 MHz): 150 ± 15 Ohm

- **Temperature range**
  - -40°C to +80°C

**Article number**   **Article designation**   **Number of pairs and conductor diameter (mm)**   **Outer diameter [mm]**   **Copper index (kg/km)**   **Weight (kg/km)**
---   ---   ---   ---   ---   ---
2170620   UNITRONIC® BUS PB ROBUST   1 x 2 x 0.64   8   26   55

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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Lapp Kabel is a member of the PROFIBUS user organisation (PNO)

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- Sub-D Bus-Connectors refer to main catalogue 2018/19
UNITRONIC® BUS PB 105
PROFIBUS cable with an extended temperature range up to +105°C

Application range
- Cable has been designed for use in factory halls where temperatures up to max. 105°C may occur.

Product features
- High temperature resistance
- Flame-retardant according IEC 60332-1-2
- Oil-resistant

Product Make-up
- Stranded conductor, 7-wire, bare
- Conductor diameter: 0,64 mm (AWG24)
- Core insulation: PP
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath: PVC, violet (RAL 4001)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Mutual capacitance
  Approx. 28.5 nF/km
- Peak operating voltage
  max. 100 V (not for power applications)
- Minimum bending radius
  Fixed installation: 45 mm once
  Flexing: 65 mm
- Test voltage
  Core/core: 1500 V rms
  Core/screen: 1500 V
- Characteristic impedance
  (3 - 20 MHz): 150 ± 15 Ohm
- Temperature range
  -30°C to +105°C

Article number | Article designation | Number of pairs and conductor diameter (mm) | Outer diameter [mm] | Copper index (kg/km) | Weight (kg/km)
--- | --- | --- | --- | --- | ---
2170630 | UNITRONIC® BUS PB 105 | 1 x 2 x 0.64 | 8 | 30.1 | 72

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- Multipurpose shears A and B refer to main catalogue 2018/19

UNITRONIC® BUS PB 105 plus
PROFIBUS cable with an extended temperature range up to +105°C; short term +120°C

Benefits
- No need for additional cable protection against high temperatures
- High temperature resistance

Application range
- For installation in hollow shaft between gear units and pitch system
- Suitable for fixed installation and occasionally flexible use in high temperature areas

Product features
- Permanent load up to +105°C, temporary load +120°C

Norm references / Approvals
- In accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC NET, also suitable for FIP (Factory Instrumentation Protocol)

Product Make-up
- Stranded conductor, 7-wire, bare
- Core insulation: polypropylene (PP)
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath: TPE, violet (RAL 4001)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Mutual capacitance
  (800 Hz): max. 30 nF/km
- Peak operating voltage
  (not for power applications) 250 V
- Minimum bending radius
  Fixed installation: 45 mm once
  Flexing: 65 mm
- Test voltage
  Core/core: 1500 V rms
  Core/screen: 1500 V eff.
- Characteristic impedance
  (3 - 20 MHz): 150 ± 15 Ohm
- Temperature range
  -40°C to +105°C
  Short-term: up to +120°C

Article number | Article designation | Number of pairs and conductor diameter (mm) | Outer diameter [mm] | Copper index (kg/km)
--- | --- | --- | --- | ---
2170635 | UNITRONIC® BUS PB 105 plus | 1x2x0.64 | 8 | 30.1

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
UNITRONIC® BUS PB HEAT 180
PROFIBUS cable with an extended temperature range up to +180°C

**Benefits**
- No need for additional cable protection against high temperatures
- High temperature resistance

**Application range**
- Fixed Installation
- For use in high temperature areas with up to 180 °C

**Product features**
- High oil-resistance

**Product Make-up**
- Solid and bare copper conductor
- Wire insulation Fluorethylen
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath: FEP, violet (RAL 4001)

**Technical data**
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- Mutual capacitance
  - approx. 28 nF / km
- Peak operating voltage
  - (not for power applications) 250 V
- Minimum bending radius
  - Repeated: 7 x Outer Diameter
  - Single: 5 x Outer Diameter
- Test voltage
  - 3600 V DC (3 sec.)
- Characteristic impedance
  - (3 - 20 MHz): 150 ± 15 Ohm
- Temperature range
  - -50 to +180°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
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<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

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UNITRONIC® BUS PB FRNC FC
FRNC PROFIBUS cable UL/CSA certified

**Info**
- FRNC = Flame Retardant Non Corrosive
  - Reduction of flame-propagation and density and toxicity of smoke gases in the event of fire
  - Minimisation of damage to buildings and production facilities
  - Safety for staff and in areas with high density of people

**Benefits**
- Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP
- For use where the combination of a halogen-free outer sheath with properties similar to PUR and enhanced flame-retardance is required
- Fast Connect (FC) cable design

**Application range**
- This cable provides special advantages for use in sensitive areas where fire propagation must be avoided and the presence of toxic fumes would cause personal injury and damage to equipment.

**Product features**
- Halogen-free
- High flame retardancy in accordance with IEC 60332-3 and FT4
- Oil-resistant
- Based on the bit rates listed, in accordance with PNO specifications the following maximum cable lengths for a bus segment apply (cable type A, PROFIBUS-DP):
  - 93.75 kbit/s = 1200 m
  - 187.5 kbit/s = 1000 m
  - 500 kbit/s = 600 m
  - 1.5 Mbit/s = 200 m
  - 12.0 Mbit/s = 100 m

**Norm references / Approvals**
- UL/CSA-certified

**Product Make-up**
- Solid and bare copper conductor
- Core insulation: PE
- Inner sheath, screening foil and braiding
- Outer sheath: PUR, violet (RAL 4001)

**Technical data**
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable

- **Certifications**
  - UL/CSA (CMG)

- **Mutual capacitance**
  - Approx. 28.5 nF/km

- **Peak operating voltage**
  - (not for power applications) 250 V

- **Minimum bending radius**
  - 80 mm

- **Test voltage**
  - Core/core: 1500 V rms
  - Core/screen: 1500 V

- **Characteristic impedance**
  - (3 - 20 MHz): 150 ± 15 Ohm

- **Temperature range**
  - -30°C to +80°C

**Article number | Article designation | Number of pairs and conductor diameter (mm) | Outer diameter [mm] | Copper index (kg/km) | Weight (kg/km)**

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<tr>
<th>Fixed Installation</th>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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**Accessories**
- Sub-D Bus-Connectors refer to main catalogue 2018/19
- FC STRIP stripping tool refer to main catalogue 2018/19
Data communication systems
Bus system PROFIBUS-DP/FMS/FIP • Fixed Installation

UNITRONIC® BUS PB ARM
Armored PROFIBUS cable for use in harsh industrial environments

Benefits
• EMC-optimised design

Application range
• For use for PROFIBUS-DP or FIP in harsh industrial environments
• PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).

Product features
• Flame-retardant according IEC 60332-1-2
• UV-resistant

Product Make-up
• Solid and bare copper conductor
• Core insulation: cellular PE, O2Y(S)
• Overall screening with copper braid and plastic-laminated aluminium foil
• Overlapping plastic tape
• Copper tape, welded longitudinally
• Outer sheath: PVC, violet (RAL 4001)

Technical data

<table>
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<tr>
<th>Classification ETIM 5/6</th>
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<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID: EC000830</td>
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<tr>
<td>ETIM 5.0/6.0 Class-Description: Data cable</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Mutual capacitance (800 Hz): max. 30 nF/km</th>
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</thead>
<tbody>
<tr>
<td>Peak operating voltage (not for power applications) 100 V</td>
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<tr>
<td>Minimum bending radius Fixed installation: 7.5 x outer diameter</td>
</tr>
<tr>
<td>Test voltage 3600 V DC (3 sec.)</td>
</tr>
<tr>
<td>Characteristic impedance 150 ± 15 Ohm</td>
</tr>
<tr>
<td>Temperature range -40°C to +70°C</td>
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</table>

<table>
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<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and conductor diameter (mm)</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

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**UNITRONIC® BUS PB Yv**

PROFIBUS cable with reinforced PVC outer sheath for outdoor/direct burial use

### Benefits
- Rugged, UV-resistant and weatherproof
- Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP

### Application range
- PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).

### Product features
- Reinforced outer sheath made of PVC

### Product Make-up
- Solid and bare copper conductor
- Foam Skin - core isolation (O2YS)
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath: reinforced PVC, black

### Technical data
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- Mutual capacitance (800 Hz): max. 30 nF/km
- Peak operating voltage (not for power applications) 250 V
- Minimum bending radius
  - Fixed installation: 75 mm once
  - Fixed installation: 150 mm
- Test voltage
  - Core/core: 1500 V rms
  - Core/screen: 1500 V
-Characteristic impedance
  - 150 ± 15 Ohm
- Temperature range
  - Flexing: -5°C to +50°C
  - Fixed installation: -40°C to +80°C

### Article number | Article designation | Number of pairs and conductor diameter (mm) | Outer diameter [mm] | Copper index (kg/km) | Weight (kg/km) |
--- | --- | --- | --- | --- | --- |
2170223 | UNITRONIC® BUS PB Yv | 1 x 2 x 0.64 | 9.4 | 30.1 | 106 |

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils)

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For current information see: www.lappgroup.com
**UNITRONIC® BUS PB YY**

**PROFIBUS cable with double PVC outer sheath for outdoor/direct burial use - Fast Connect cable make up**

**Benefits**
- Rugged, UV-resistant and weatherproof
- Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP

**Application range**
- PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).

**Product features**
- Double PVC outer sheath

**Product Make-up**
- Solid and bare copper conductor
- Core insulation: PE
- Overall screening with copper braid and plastic-laminated aluminium foil
- Inner sheath: PVC, violet RAL (4001), outer diameter: 7.4 mm
- Outer sheath, PVC, black RAL (9005), outer diameter: 9.5 mm

**Technical data**
- Mutual capacitance (800 Hz): max. 30 nF/km
- Peak operating voltage (not for power applications) 250 V
- Minimum bending radius: Fixed installation: 75 mm once, Fixed installation: 10 x outer diameter
- Test voltage: Core/core: 1500 V rms, Core/screen: 1500 V
- Characteristic impedance: 150 ± 15 Ohm
- Temperature range: Flexing: -5°C to +50°C, Fixed installation: -40°C to +80°C

<table>
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<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and conductor diameter (mm)</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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<td>87</td>
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</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

**Accessories**
- Sub-D Bus-Connectors refer to main catalogue 2018/19
- Multipurpose shears A and B refer to main catalogue 2018/19
UNITRONIC® BUS PB BURIAL FC
PROFIBUS cable with double outer sheath for outdoor/direct burial use

Benefits
• Fast Connect (FC) cable design
• Rugged, UV-resistant and weatherproof
• Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP

Product features
• Second PE outer sheath

Product Make-up
• Solid and bare copper conductor
• Core insulation: foam skin, (O2YS)
• Overall screening with copper braid and plastic-laminated aluminium foil
• Inner sheath: PVC, violet RAL (4001), outer diameter: 8.0 mm
• Outer sheath, PE, black RAL (9005), outer diameter: 10.8 mm

Application range
• PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC000830
ETIM 5.0/6.0 Class-Description: Data cable
Mutual capacitance
(800 Hz): max. 30 nF/km
Peak operating voltage
(not for power applications) 100 V
Minimum bending radius
Fixed installation: 3.5 x cable diameter once
Fixed installation: 7.5 x outer diameter
Test voltage
3600 V DC (3 sec.)
Characteristic impedance
150 ± 15 Ohm
Temperature range
-40 °C to +60 °C

Article number | Article designation | Number of pairs and conductor diameter (mm) | Outer diameter [mm] | Copper index (kg/km) | Weight (kg/km)
--- | --- | --- | --- | --- | ---
2170323 | UNITRONIC® BUS PB BURIAL FC | 1 x 2 x 0.64 | 10.8 | 26 | 115

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standard-lengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).
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Accessories
• Sub-D Bus-Connectors refer to main catalogue 2018/19
• FC STRIP stripping tool refer to main catalogue 2018/19
UNITRONIC® BUS PB Y 7-W FC BK
UV-resistant PROFIBUS cable for outdoor applications

Benefits
- Fast Connect (FC) cable design
- 7-W: 7-wire, e.g. for applications where vibrations occur
- Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP

Application range
- PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).

Product features
- UV-resistant and weather-resistant
- Resistant to acids, alkalis and certain oils at room temperature

Product Make-up
- Stranded conductor, 7-wire, bare
- Core insulation: foam skin, (O2YS)
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath: PVC, black RAL (9005)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Mutual capacitance (800 Hz): max. 30 nF/km
- Peak operating voltage (not for power applications) 250 V
- Minimum bending radius
  Fixed installation: 8 outer diameter
  Flexing: 15 x outer diameter
- Test voltage
  Core/core: 1500 V rms
  Core/screen: 1500 V
- Characteristic impedance
  150 ± 15 Ohm
- Temperature range
  Flexing: -10°C to +70°C
  Fixed installation: -40°C to +80°C

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<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and conductor diameter (mm)</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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<td>80</td>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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Accessories
- Sub-D Bus-Connectors refer to main catalogue 2018/19
- FC STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
UNITRONIC® BUS PB FD P
Halogenfree, highly flexible PROFIBUS cable

Benefits
- Due double screening it is suitable for installation in electromagnetically demanding areas
- Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP
- For use where the combination of a halogen-free outer sheath with properties similar to PUR and enhanced flame-retardance is required

Application range
- PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).
- For highly flexible applications (power chains, moving machine parts)
- Suitable for torsional applications which are typical for the loop in wind turbine generators (WTG)

Product features
- Halogen-free
- Flame-retardant according IEC 60332-1-2
- Oil-resistant
- Based on the bit rates listed, in accordance with PNO specifications the following maximum cable lengths for a bus segment apply (cable type A, PROFIBUS-DP):
  - 93.75 kbit/s = 1200 m
  - 187.5 kbit/s = 1000 m
  - 500 kbit/s = 400 m
  - 1.5 Mbit/s = 200 m
  - 12.0 Mbit/s = 100 m

Application range
- PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).
- For highly flexible applications (power chains, moving machine parts)
- Suitable for torsional applications which are typical for the loop in wind turbine generators (WTG)

Product Make-up
- Stranded bare copper wire
- Core insulation: foam skin, (O2YS)
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath: PUR, violet (RAL 4001)

Technical data
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- Mutual capacitance
  - (800 Hz): max. 30 nF/km
- Peak operating voltage
  - (not for power applications) 250 V
- Torsion movement in WTG (wind turbine generator)
  - TW-0 & TW-2, refer to Appendix T0
- Minimum bending radius
  - 65 mm
- Test voltage
  - Core/core: 1500 V rms
- Characteristic impedance
  - 150 ± 15 Ohm
- Temperature range
  - Flexing: -30°C to +70°C
  - Fixed installation: -40°C to +80°C

Article number | Article designation | Number of pairs and conductor diameter (mm) | Outer diameter (mm) | Copper index (kg/km) | Weight (kg/km)
--- | --- | --- | --- | --- | ---
2170222 | UNITRONIC® BUS PB FD P | 1 x 2 x 0.64 | 8 | 30.1 | 64

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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Accessories
- Sub-D Bus-Connectors refer to main catalogue 2018/19

For current information see: www.lappgroup.com
Data communication systems

Bus system PROFIBUS-DP/FMS/FIP • Continuous flexing application

UNITRONIC® BUS PB FD P A
Halogenfree, highly flexible PROFIBUS cable - UL/CSA certified

**Benefits**
- For use where the combination of a halogen-free outer sheath with properties similar to PUR and enhanced flame-retardance is required
- Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP

**Application range**
- PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).
- For highly flexible applications (power chains, moving machine parts)
- Suitable for torsional applications which are typical for the loop in wind turbine generators (WTG)

**Product features**
- Halogen-free
- Flame-retardant according IEC 60332-1-2
- Oil-resistant
- Based on the bit rates listed, in accordance with PNO specifications the following maximum cable lengths for a bus segment apply:
  - (cable type A, PROFIBUS-DP):
    - 93.75 kbit/s = 1200 m
    - 187.5 kbit/s = 1000 m
    - 500 kbit/s = 400 m
    - 1.5 Mbit/s = 200 m
    - 12.0 Mbit/s = 100 m

**Norm references / Approvals**
- Certification: UL/CSA type CMX in accordance with UL 444 and CSA C22.2 no. 214

**Product Make-up**
- Stranded bare copper wire
- Core insulation: foam skin, (O2YS)
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath: PUR, violet (RAL 4001)

**Technical data**
- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- **Mutual capacitance**
  - (800 Hz): max. 30 nF/km
- **Peak operating voltage**
  - (not for power applications) 250 V
- **Torsion movement in WTG (wind turbine generator)**
  - TW-0 & TW-2, refer to Appendix T0
- **Minimum bending radius**
  - 65 mm
- **Test voltage**
  - Core/core: 1500 V rms
- **Characteristic impedance**
  - 150 ± 15 Ohm
- **Temperature range**
  - Flexing: -30°C to +70°C
  - Fixed installation: -40°C to +80°C

**Accessories**
- Sub-D Bus-Connectors refer to main catalogue 2018/19

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**Article number** | **Article designation** | **Number of pairs and conductor diameter (mm)** | **Outer diameter [mm]** | **Copper index (kg/km)** | **Weight (kg/km)**
--- | --- | --- | --- | --- | ---
2170822 | UNITRONIC® BUS PB FD P A | 1 x 2 x 0.64 | 8 | 30.1 | 58

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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For current information see: www.lappgroup.com
**UNITRONIC® BUS PB FD P FC**

Halogen-free, highly flexible PROFIBUS cable – with fast connect cable make up, UL/CSA certified

**Benefits**
- Fast Connect (FC) cable design
- Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP

**Application range**
- PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP – Factory Instrumentation Protocol).
- For highly flexible applications (power chains, moving machine parts)

**Product features**
- Flame-retardant according IEC 60332-1-2
- Oil-resistant
- Based on the bit rates listed, in accordance with PNO specifications the following maximum cable lengths for a bus segment apply (cable type A, PROFIBUS-DP):
  - 93.75 kbit/s = 1200 m
  - 187.5 kbit/s = 1000 m
  - 500 kbit/s = 400 m
  - 1.5 Mbit/s = 200 m
  - 12.0 Mbit/s = 100 m

**Norm references / Approvals**
- Certification: UL/CSA type CMX in accordance with UL 444 and CSA C22.2 no. 214

**Product Make-up**
- Stranded bare copper wire
- Core insulation: foam skin, (O2YS)
- Overall screening with copper braid and plastic-laminated aluminium foil
- Fast connect inner sheath: PVC, nature
- Outer sheath: PUR, violet (RAL 4001)

### Technical data

**Classification ETIM 5/6**
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable

**Mutual capacitance (800 Hz):** max. 30 nF/km

**Peak operating voltage**
- (not for power applications) 250 V

**Minimum bending radius**
- Flexing: 15 x outer diameter
- Test voltage: 3600 V DC (3 sec.)

**Characteristic impedance**
- 150 ± 15 Ohm

**Temperature range**
- Flexing: -30°C to +70°C
- Fixed installation: -40°C to +80°C

### Article number Article designation Number of pairs and conductor diameter (mm) Outer diameter [mm] Copper index (kg/km) Weight (kg/km)

| Highly flexible application | UNITRONIC® BUS PB FD P FC | 1 x 2 x 0.64 | 8 | 26 | 79 |

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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**Accessories**
- Sub-D Bus-Connectors refer to main catalogue 2018/19
- FC STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
UNITRONIC® BUS PB FD FRNC FC
Flame retardant, highly flexible PROFIBUS cable - with fast connect cable make up, UL/CSA certified

Benefits
- Fast Connect (FC) system
- For use where the combination of a halogen-free outer sheath with properties similar to PUR and enhanced flame-retardance is required
- Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP

Application range
- For highly flexible use in energy supply chains or permanently moving machines and linear robots
- This cable provides special advantages for use in sensitive areas where fire propagation must be avoided and the presence of toxic fumes would cause personal injury and damage to equipment.

Product features
- Halogen-free
- Oil-resistant
- High flame retardancy in accordance with IEC 60332-3 and FT4
- Based on the bit rates listed, in accordance with PNO specifications the following maximum cable lengths for a bus segment apply (cable type A, PROFIBUS-DP):
  - 93.75 kbit/s = 1200 m
  - 187.5 kbit/s = 1000 m
  - 500 kbit/s = 400 m
  - 1.5 Mbit/s = 200 m
  - 12.0 Mbit/s = 100 m

Norm references / Approvals
- The cable is UL/CSA-certified (CMG)

Product Make-up
- Stranded bare copper wire
- Core insulation: foam skin, (O2YS)
- Overall screening with copper braid and plastic-laminated aluminium foil
- Fast connect inner sheath: PVC, nature
- Outer sheath: PUR, violet (RAL 4001)

Technical data

* Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable

* Mutual capacitance
  nom. 28 nF/km

* Peak operating voltage
  (not for power applications) 250 V

* Minimum bending radius
  Fixed installation: 10 x outer diameter
  Flexing: 15 x outer diameter

* Test voltage
  Core/core: 1500 V rms

* Characteristic impedance
  (3 - 20 MHz): 150 ± 15 Ohm

* Temperature range
  Flexing: -30°C to +70°C
  Fixed installation: -40°C to +80°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and conductor diameter (mm)</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2170854</td>
<td>UNITRONIC® BUS PB FD FRNC FC</td>
<td>1x2x0.64</td>
<td>8</td>
<td>26</td>
<td>75</td>
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</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Copper price basis: EUR 150/100 kg. Refer to catalogue appendix 1.17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).
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Accessories
- Sub-D Bus-Connectors refer to main catalogue 2018/19
- FC STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
UNITRONIC® BUS PB FD P COMBI

Highly flexible, halogenfree PROFIBUS HYBRID cables

Benefits

- For use where the combination of a halogen-free outer sheath with properties similar to PUR and enhanced flame-retardance is required
- For highly flexible applications (power chains, moving machine parts)
- Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP

Application range

- PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).

Product features

- HYBRID: cable for data transmission + power supply
- Flame-retardant according IEC 60332-1-2

Product Make-up

UNITRONIC® BUS PB FD P COMBI

- Fine-wire, bare copper strand
- 1x2x0.64: red, green
- 3x1.0 (AWG18): green/yellow, black, blue
- Core insulation: PE
- Tin-plated copper wire braiding
- Outer sheath: PUR, violet (RAL 4001)

UNITRONIC® BUS PB FD P HYBRID

- Fine-wire, bare copper strand
- 1x2x0.64: red, green
- 4 x 1.5 (AWG16): black with white numbers
- Core insulation: PE
- Tin-plated copper wire braiding
- Outer sheath: PUR, violet (RAL 4001)

Technical data

- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- Mutual capacitance (800 Hz): max. 30 nF/km
- Peak operating voltage (not for power applications) 100 V
- UNITRONIC® BUS PB FD P HYBRID
  - Flexing: 15 x outer diameter
- Test voltage
  - UNITRONIC® BUS PB FD P COMBI
    - Core/core: 600 V
  - UNITRONIC® BUS PB FD P HYBRID
    - Core/core: 600 V
    - Core/screen: 600 V
- Characteristic impedance
  - 150 ± 15 Ohm
- Temperature range
  - UNITRONIC® BUS PB FD P COMBI
    - Flexing: -5°C to +50°C
  - UNITRONIC® BUS PB FD P HYBRID
    - Flexing: -30°C to +60°C
    - Fixed installation: -40°C to +70°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and conductor diameter (mm)</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2170237</td>
<td>UNITRONIC® BUS PB FD P COMBI</td>
<td>1 x 2 x 0.64 Ø + 3 x 1.0 mm²</td>
<td>10.1</td>
<td>59</td>
<td>125</td>
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<tr>
<td>2170495</td>
<td>UNITRONIC® BUS PB FD P HYBRID</td>
<td>1 x 2 x 0.64 Ø + 4 x 1.5 mm²</td>
<td>11.3</td>
<td>89</td>
<td>148</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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For current information see: www.lappgroup.com
UNITRONIC® BUS PB FD Y HYBRID
Highly flexible PROFIBUS HYBRID cable, UL-verified

Benefits
- For highly flexible applications (power chains, moving machine parts)
- Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP
- CL3 for installation on trays

Application range
- PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).

Product features
- HYBRID: cable for data transmission + power supply

Norm references / Approvals
- With UL/CSA certification (CMG, CL3, SUN RES, Oil RES I)
- Flame-retardant according to CSA FT4
- UL Vertical-Tray Flame Test
- Oil-resistant according to UL OIL RES I
- Oil-resistant according to UL OIL RES I

Product Make-up
- Fine-wire, bare copper strand
- 1x2x0.64: red, green
- Core insulation: Foam Skin PE
- 4x1.5: black with white numbers 1-4
- Core insulation: PVC
- Tin-plated copper wire braiding
- Outer sheath: PVC, violet (RAL 4001)

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage
  600 V (not for power applications)
- Minimum bending radius
  Fixed installation: 5 x outer diameter
  Flexing: 15 x outer diameter
- Test voltage
  Core/core: 2000 V
  Core/screen: 2000 V
- Characteristic impedance
  150 ± 15 Ohm
- Temperature range
  -5°C to +80°C

<table>
<thead>
<tr>
<th>Highly flexible application</th>
<th>Article designation</th>
<th>Number of pairs and conductor diameter (mm)</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2170875</td>
<td>UNITRONIC® BUS PB FD Y HYBRID</td>
<td>1 x 2 × 0.64 Ø + 4 x 1.5 mm²</td>
<td>11.3</td>
<td>89</td>
<td>155</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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UNITRONIC® BUS PB TORSION

Flame retardant, highly flexible PROFIBUS cable for torsion load

Benefits
• For use where the combination of a halogen-free outer sheath with properties similar to PUR and enhanced flame-retardance is required
• Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP

Application range
• PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).

Product features
• TORSION: for torsional stress, e.g. robot application; ± 180° per 1 m
• Halogen-free
• Flame-retardant according IEC 60332-1-2
• Based on the bit rates listed, in accordance with PNO specifications the following maximum cable lengths for a bus segment apply
  (cable type A, PROFIBUS-DP):
  93.75 kbit/s = 1200 m
  187.5 kbit/s = 1000 m
  500 kbit/s = 400 m
  1.5 Mbit/s = 200 m
  12.0 Mbit/s = 100 m

Norm references / Approvals
• Certification: UL type CMX in accordance with UL 444

Product Make-up
• Stranded bare copper wire
• Core insulation: PE
• Overall screening with copper braid and plastic-laminated aluminium foil
• Outer sheath: PUR, violet (RAL 4001)

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
<th>ETIM 5.0/6.0 Class-ID: EC000830</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutual capacitance</td>
<td>(800 Hz): max. 30 nF/km</td>
</tr>
<tr>
<td>Peak operating voltage</td>
<td>(not for power applications)</td>
</tr>
<tr>
<td>Torsion movement in WTG</td>
<td>300 V</td>
</tr>
<tr>
<td>Minimum bending radius</td>
<td>(wind turbine generator)</td>
</tr>
<tr>
<td>Test voltage</td>
<td>3600 V DC (3 sec.)</td>
</tr>
<tr>
<td>Characteristic impedance</td>
<td>150 ± 15 Ohm</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Operating temperature: -25°C to 75°C</td>
</tr>
<tr>
<td></td>
<td>Storage temp.: -40°C to 80°C</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of cores and mm² per conductor</th>
<th>Dimension and cross section in mm²</th>
<th>Outer diameter [mm]</th>
<th>Copper index [kg/km]</th>
<th>Weight [kg/km]</th>
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<tbody>
<tr>
<td>2170332</td>
<td>UNITRONIC® BUS PB</td>
<td>1 x 2 x 0.38</td>
<td>1 x 2 x 0.38</td>
<td>8</td>
<td>31</td>
<td>66</td>
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</table>

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Accessories
• Sub-D Bus-Connectors refer to main catalogue 2018/19

For current information see: www.lappgroup.com
UNITRONIC® BUS PB FESTOON
PROFIBUS cable for cable trolley applications

Benefits
- Cables can be used for PROFIBUS-DP as well as PROFIBUS-FMS and FIP
- CL3 for installation on trays

Application range
- PROFIBUS DP (in accordance with DIN 19245 and EN 50170, e.g. for SIEMENS SIMATIC® NET, also suitable for FIP - Factory Instrumentation Protocol).

Product features
- FESTOON: for cable trolley (festoon)
- Based on the bit rates listed, in accordance with PNO specifications the following maximum cable lengths for a bus segment apply (cable type A, PROFIBUS-DP):
  - 93.75 kbit/s = 1200 m
  - 187.5 kbit/s = 1000 m
  - 500 kbit/s = 400 m
  - 1.5 Mbit/s = 200 m
  - 12.0 Mbit/s = 100 m

Norm references / Approvals
- With UL/CSA certification (CMG, CL3, SUN RES, Oil Res I)
- Flame-retardant according to CSA FT4 UL Vertical-Tray Flame Test
- Oil-resistant according to UL OIL RES I

Product Make-up
- Outer sheath: special PVC compound

Technical data
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- Mutual capacitance
  - (800 Hz): max. 30 nF/km
- Peak operating voltage
  - 600 V (not for power applications)
- Minimum bending radius
  - Flexing: 70 mm
  - Fixed installation: 30 mm once
- Test voltage
  - Core/core: 2000 V
- Characteristic impedance
  - 150 ± 15 Ohm
- Temperature range
  - Flexing: -5°C to +70°C
  - Fixed installation: -40°C to +80°C

** Highly flexible application
<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of cores and mm² per conductor</th>
<th>Dimension and cross section in mm²</th>
<th>Outer diameter [mm]</th>
<th>Copper index [kg/km]</th>
<th>Weight [kg/km]</th>
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</thead>
<tbody>
<tr>
<td>2170331</td>
<td>UNITRONIC® BUS PB Festoon</td>
<td>1 x 2 x 0.64</td>
<td>1 x 2 x 0.64</td>
<td>8</td>
<td>26</td>
<td>64</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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Accessories
- Sub-D Bus-Connectors refer to main catalogue 2018/19
EPIC® DATA PB Sub-D
PROFIBUS connectors with screw terminals | REPEATER function | ATEX

Benefits
- Easy connection with tried-and-tested M12 / screw terminal technology
- Sensor/ ac
- Terminating resistor (integrated) can be switched
- REPEATER version: Regeneration of data signal (slope, power and mark-to-space ratio)
- ATEX version: For use within intrinsically-safe circuits in zone 2 areas with an explosion hazard (explosive gas atmosphere occurs only rarely and briefly)

Product features
- Max. transmission rate 12 Mbit/s possible
- Current consumption max. 12,5 mA (with LED 35 mA / REPEATER 100 mA)
- Supply voltage 4,75 - 5.25 V DC (supplied from the terminal)
- Terminating resistor „ON“ - the outbound bus cable is disconnected
- REPEATER version: Easy extension of the PROFIBUS network:
  - up to 3 repeaters
  - 1 additional PROFIBUS segment

Norm references / Approvals
- IEC 61158, IEC 61784
- UL File No. E331560

Product Make-up
- D-Sub plug, 9-pin, fixing screws 4-40 UNC
- Improved electromagnetic compatibility (EMC) by metallized housing
- Versions with additional Sub-D interface for programming/diagnostic (PG)
- For cable outer diameter: 5   8 mm / M12 B-coded cordsets
- LED Version indicate:
  - bus operation - (green)
  - station transmission - (blue)
  - terminating resistor „on“ - (orange)

Suitable cables
- UNITRONIC® BUS PB Page 48
- UNITRONIC® BUS PB M12 Page 72
- UNITRONIC® BUS PB M12-M12 Page 72

Suitable tools
- Kraftform® adjustable torque screwdriver/
Kraftform Kompakt® Set refer to main catalogue 2018/19

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC001132
  ETIM 5.0/6.0 Class-Description: D-Sub connector

Dimensions
- 54 mm x 40 mm x 17 mm - 35°
- 64 mm x 40 mm x 17 mm - 90°
- 68 mm x 40 mm x 17 mm - 180°
- 70 mm x 40 mm x 17 mm - M12
(LxWxH)

Connection type
- Screwing
- M12

Protection rating
- IP 20

Terminating resistor
- 150 Ω

Interfaces
- Sub-D socket, 9-pin
- Terminal blocks up to 1.0 mm² / M12 B-coded

Permissible ambient conditions
- Operating temperature: -25 °C to +85 °C
- *The max. temperature for UL is 60 °C

Suitable cables
- UNITRONIC® BUS PB Page 48
- UNITRONIC® BUS PB M12 Page 72
- UNITRONIC® BUS PB M12-M12 Page 72

Suitable tools
- Kraftform® adjustable torque screwdriver/
Kraftform Kompakt® Set refer to main catalogue 2018/19

Article number | Article designation | Version | PG-Interface | Diagnostic LEDs | PU
---|---|---|---|---|---
35° cable outlet
21700507 | ED-PB-35 | no | no | 1
21700506 | ED-PB-35-PG | yes | no | 1
90° cable outlet
21700504 | ED-PB-90 | no | no | 1
21700503 | ED-PB-90-PG | yes | no | 1
21700530 | ED-PB-90-LED | no | yes | 1
21700529 | ED-PB-90-PC-LED | yes | yes | 1
21700541 | ED-PB-90-RP-PG | REPEATER | yes | yes | 1
21700543 | ED-PB-90-ATEX | ATEX | no | no | 1
21700542 | ED-PB-90-PG-ATEX | ATEX | yes | no | 1
180° (AX) cable outlet
21700505 | ED-PB-AX | no | no | 1

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**EPIC® DATA PB Sub-D FC**
PROFIBUS Connectors Fast Connect

**Benefits**
- Quick installation with Fast Connect (‘FC’) technology
- Sensor/ ac
- No loose parts
- Visual bus connection control
- Terminating resistor (integrated) can be switched

**Product features**
- Fully compatible with market standard
- Max. transmission rate 12 Mbit/s possible
- Current consumption max. 12,5 mA (with LED 35 mA)
- Supply voltage 4.75 - 5.25 V DC (supplied from the terminal)
- Terminating resistor „ON“ - the outbound bus cable is disconnected

**Norm references / Approvals**
- IEC 61158, IEC 61784
- UL File No. E331560

**Technical data**
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC001132
- ETIM 5.0/6.0 Class-Description: D-Sub connector

**Dimensions**
- 95 mm x 70 mm x 17 mm - 35°
- 72 mm x 40 mm x 17 mm - 90°
- 70 mm x 35 mm x 17 mm - 180° (LxWxH)

**Connection type**
- Fast Connect

**Protection rating**
- IP 20

**Terminating resistor**
- 150 Ω

**Interfaces**
- Sub-D socket, 9-pin
- PROFIBUS standard cable, Ø 0.64 mm

**Permissible ambient conditions**
- Operating temperature: -25°C to +85°C
- The max. temperature for UL is 60 °C

- Photographs and graphics are not to scale and do not represent detailed images of the respective products.

### Article number | Article designation | PG-Interface | Diagnostic LEDs | PU  
--- | --- | --- | --- | ---  
21700511 | ED-PB-35-FC | no | no | 1  
21700513 | ED-PB-35-PG-FC | yes | no | 1  
21700514 | ED-PB-35-FC-FLEX | no | no | 1  
21700515 | ED-PB-35-PG-FC-FLEX | yes | no | 1  
21700502 | ED-PB-90-FC | no | no | 1  
21700501 | ED-PB-90-PG-FC | yes | no | 1  
21700504 | ED-PB-90-LED-FC | no | yes | 1  
21700546 | ED-PB-90-PG-LED-FC | yes | yes | 1  
21700544 | ED-PB-AX-FC | no | no | 1  

For current information see: www.lappgroup.com
**Info**

- Plug & Play together with ready-to-use PROFIBUS M12 cordsets

**Benefits**

- Cost-efficient due to quick installation (Plug & Play)
- Sensor/ ac
- No loose parts
- Terminating resistor (integrated) can be switched
- Suitable for assembled M12 PB cables

**Product features**

- Max. transmission rate 12 Mbit/s possible
- Current consumption max. 12.5 mA
- Supply voltage 4.75 - 5.25 V DC (supplied from the terminal)
- Switch can also be operated when the connector is plugged and setting is clearly visible
- Terminating resistor „ON“ - the outbound bus cable is disconnected

**Norm references / Approvals**

- IEC 61158, IEC 61784
- UL File No. E331560

**Product Make-up**

- D-Sub plug, 9-pin, fixing screws 4-40 UNC
- Connector M12, B-coded
- Improved electromagnetic compatibility (EMC) by metallized housing
- Version with additional Sub-D port for programming/diagnostic (PG)

**Suitable cables**

- UNITRONIC® BUS PB M12 Page 72
- UNITRONIC® BUS PB M12-M12 Page 72

**Technical data**

- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC001132
  - ETIM 5.0/6.0 Class-Description: D-Sub connector

- Dimensions
  - 70 mm x 40 mm x 17 mm (L x W x H)
- Connection type
  - M12
- Protection rating
  - IP 20
- Terminating resistor
  - 150 Ω
- Interfaces
  - PROFIBUS station:
    - D-Sub socket, 9-pin
  - PROFIBUS cable:
    - M12 PB system cabling
- Permissible ambient conditions
  - Operating temperature: -25°C to +85°C
  - The max. temperature for UL is 60 °C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Version</th>
<th>PG-Interface</th>
<th>Diagnostic LEDs</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPIC® DATA PB Sub-D M12</td>
<td>ED-PB-PG-90-M12</td>
<td>M12</td>
<td>yes</td>
<td>no</td>
<td>1</td>
</tr>
</tbody>
</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Data communication systems

Bus system PROFINET-FMS/FIP • Sub-D Bus-Connectors

EPIC® DATA PB Sub-D PRO
PROFINET Connectors full-metall M12 connection /spring type connection

Benefits
• Optimum EMC protection
• Robust housing material for harsh environments
• No loose parts
• Cost-efficient due to quick installation (Plug & Play)
• Terminating resistor (integrated) can be switched

Product features
• Extended temperature range
• High mechanical strength
  (200 contact durability)
• Less transmission loss
• Max. transmission rate 12 Mbit/s possible
• Supply voltage 4.75 - 5.25 V DC
  (supplied from the terminal)

Norm references / Approvals
• IEC 61158, IEC 61784

Info
• For high mechanical stress
• High EMC protection

Product Make-up
• D-Sub plug, 9-pin, fixing screws 4-40 UNC
• 360° shielding due full-metall housing (ZnAl)
• With additional Sub-D port for programming/diagnostic „PG“ (35° and 90° version)
• With EMC connector protection (PG port)
• M12 version: 5-pin connector, M12 B-coded

Suitable cables
• UNITRONIC® BUS PB M12 Page 72
• UNITRONIC® BUS PB M12-M12 Page 72

Suitable tools
• Kraftform® adjustable torque screwdriver/
  Kraftform Kompakt® Set refer to main catalogue 2018/19

Technical data

Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC001132
ETIM 5.0/6.0 Class-Description: D-Sub connector

Dimensions
see technical data sheet

Connection type
M12 or Internal spring type terminal

Protection rating
IP 30

Terminating resistor
150 Ω

Interfaces
Sub-D socket, 9-pin
Spring terminal for solid conductors / M12 B-coded
0.08 - 0.5 mm² (AWG28 - AWG14)
Cable diameter: 8 - 9 mm

Permissible ambient conditions
Operating temperature: -20°C to +70°C

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Connection type</th>
<th>PG-Interface</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPIC® DATA PB Sub-D PRO</td>
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<td></td>
</tr>
<tr>
<td>21700563</td>
<td>ED-PB-AX-M12-PRO</td>
<td>M12</td>
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<td>1</td>
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<tr>
<td>21700561</td>
<td>ED-PB-35-PG-M12-PRO</td>
<td>M12</td>
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<tr>
<td>21700562</td>
<td>ED-PB-90-PG-M12-PRO</td>
<td>M12</td>
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<tr>
<td>180° (AX) cable outlet</td>
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<td>Internal spring type</td>
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<tr>
<td>21700566</td>
<td>ED-PB-AX-M12-PRO</td>
<td>Internal spring type</td>
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<tr>
<td>35° cable outlet</td>
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<tr>
<td>21700564</td>
<td>ED-PB-35-PG-ST-PRO</td>
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<td>90° cable outlet</td>
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<td>21700565</td>
<td>ED-PB-90-PG-ST-PRO</td>
<td>Internal spring type</td>
<td>yes</td>
<td>1</td>
</tr>
</tbody>
</table>

For current information see: www.lappgroup.com
UNITRONIC® HITRONIC® ETHERLINE®
Data communication systems
Bus system PROFIBUS-DP/FMS/FIP • Sub-D Bus-Connectors

EPIC® DATA PB Sub-D FO
PROFIBUS Connectors Optical Link Modul

Benefits
• Easy covering of large distances (PCF 250 m / POF 65 m)
• Cost-efficient due to quick installation (Plug & Play)
• Galvanic isolation in case of potential differences within PROFIBUS network
• For EMC critical environments
• Integrated repeater functionality: Regeneration of data signal (slope, power and mark-space ratio)

Product features
• Max. distance:
  - POF fiber: 65 m
  - PCF fiber: 250 m
• Diagnostic LEDs (blue, green, red, yellow)
• Bus termination is integrated
• Current consumption typ. 100 mA
• Supply voltage 5.0 V DC (supplied from the terminal)

Norm references / Approvals
• IEC 61158, IEC 61784

Product Make-up
• D-Sub plug, 9-pin, fixing screws 4-40 UNC
• Improved electromagnetic compatibility (EMC) by metallized housing
• Versions with additional Sub-D interface for programming/diagnostic (PG)
• An external 24 V supply is not necessary
• Connection for optical cable (POF or PCF)

Suitable cables
• HITRONIC® POF DUPLEX BUFFERED FIBRES Page 210
• HITRONIC® POF DUPLEX CABLE Page 211
• HITRONIC® POF cables for PROFINET Applications Page 212

Suitable connectors
• HBFR, SMA and BFOC(ST)

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC001132
ETIM 5.0/6.0 Class-Description: D-Sub connector

Dimensions
64 mm x 40 mm x 17 mm (LxWxH)

Protection rating
IP 20

Interfaces
Sub-D socket, 9-pin
Fibre optic cable: POF / PCF, 650 nm

Permissible ambient conditions
Operating temperature: 0°C to +60°C

Article number   Article designation  PG-Interface  Diagnostic LEDs  PU

90° cable outlet
For HFBR connector
21700568  ED-PB-90-PG-FO-HFBR-650  yes  yes  1
21700569  ED-PB-90-PG-FO-SMA-650  yes  yes  1

For SMA connector
21700569  ED-PB-90-PG-FO-SMA-650  yes  yes  1

For BFOC(ST) connector
21700570  ED-PB-90-PG-FO-BFOC-650  yes  yes  1

Applicable optical connectors (POF) included
Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Note: For one optical link 2 modules are required

Accessories
• PCF Assembly Sets refer to main catalogue 2018/19
• PCF Connector HFBR refer to page 223
• POF Assembly Sets refer to page 216
• PCF Connector F-SMA and ST(BFOC) refer to page 224
• POF Connector SC-RJ refer to page 215
Data communication systems

Bus system PROFIBUS-DP/FMS/FIP • M12 Cordsets

UNITRONIC® BUS PB M12 / UNITRONIC® BUS PB M12-M12

PROFIBUS cable: M12 plug/socket on free conductor end
PROFIBUS Cable: M12 connector on M12 socket

Benefits
• Cost efficient and rational wiring for PROFIBUS installations
• Space-saving due to compact dimensions
• Fast and easy error tracking

Application range
• Mechanical and plant engineering

Product features
• 2-core PROFIBUS cable, shielded
• Connector M12, B-coded with quick locking system
• Suitable for drag chains
• Including tag carrier

Norm references / Approvals
• UL-AWM-Style 21198 (80 °C / 300 V)

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
</tr>
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<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID: EC001855</td>
</tr>
<tr>
<td>ETIM 5.0/6.0 Class-Description: Sensor-actuator patch cord</td>
</tr>
</tbody>
</table>

Material
Contact: CuSn
Contact surface: Ni/Au
Knurl: Zinc die-cast, nickel-plated
Gripping body: TPU, flame-retardant, self-extinguishing

Protection rating
IP65/IP67

Ambient temperature (operation)
Plug/ socket: -25°C to +90°C
Fixed installation: -40°C to +80°C
Flexing: -30°C to +80°C
Drag chain application ≤ 70 °C

Coding
B - inverse

Rated current (A)
4 A

Product Make-up
• Core cross section: 0.25 mm²
• Core colours: red, green
• Outer sheath: PUR halogen-free, violet
• Outer diameter: 7.8 mm
• Shielded version
• Shielding is conducted over the knurl

Suitable connectors
• Sub-D Bus-Connectors refer to main catalogue 2018/19
• EPIC® DATA PB M12 refer to page 73
• EPIC® DATA PB M12/M12 refer to page 74
• EPIC® DATA PB Sub-D M12 refer to page 69

Accessories
• FLEXIMARK® Label LMB refer to main catalogue 2018/19

Article number | Article designation | Length (m) | Number of pins | Design | Rated voltage (V) | PU |
---|---|---|---|---|---|---|
Plug
22260767 | AB-PB-M12MS-2,0PUR | 2 | 2 | straight | 250 | 1 |
22260768 | AB-PB-M12MS-5,0PUR | 5 | 2 | straight | 250 | 1 |
22260769 | AB-PB-M12MS-10,0PUR | 10 | 2 | straight | 250 | 1 |
22260956 | AB-PB-M12MA-2,0PUR | 2 | 2 | angled | 250 | 1 |
Socket
22260770 | AB-PB-2,0PUR-M12FS | 2 | 2 | straight | 250 | 1 |
22260771 | AB-PB-5,0PUR-M12FS | 5 | 2 | straight | 250 | 1 |
Plug on socket
22260955 | AB-PB-M12MS-0,2PUR-M12FS | 0.2 | 2 | straight-straight | 250 | 1 |
22260773 | AB-PB-M12MS-0,3PUR-M12FS | 0.3 | 2 | straight-straight | 250 | 1 |
22260774 | AB-PB-M12MS-1,0PUR-M12FS | 1 | 2 | straight-straight | 250 | 1 |
22260775 | AB-PB-M12MS-2,0PUR-M12FS | 2 | 2 | straight-straight | 250 | 1 |
22260869 | AB-PB-M12MS-3,0PUR-M12FS | 3 | 2 | straight-straight | 250 | 1 |
22260776 | AB-PB-M12MS-5,0PUR-M12FS | 5 | 2 | straight-straight | 250 | 1 |
22260777 | AB-PB-M12MS-10,0PUR-M12FS | 10 | 2 | straight-straight | 250 | 1 |
22260907 | AB-PB-M12MS-15,0PUR-M12FS | 15 | 2 | straight-straight | 250 | 1 |
22260908 | AB-PB-M12MS-20,0PUR-M12FS | 20 | 2 | straight-straight | 250 | 1 |
22260879 | AB-PB-M12MS-5,0PUR-M12FA | 5 | 2 | angled-angled | 250 | 1 |
22260904 | AB-PB-M12MA-10,0PUR-M12FA | 10 | 2 | angled-angled | 250 | 1 |

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: inclusive of copper. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
**Data communication systems**

**Bus system PROFIBUS-DP/FMS/FIP • M12 Connectors and accessories**

**EPIC® DATA PB M12**

Field mountable M12 BUS-connectors, shielded for PROFIBUS

**Benefits**
- Quick and easy on-site assembly
- For creating of individual cable lengths
- Cost efficient and rational wiring for BUS installations
- Space-saving due to compact dimensions

**Product features**
- Screened version
- Connector M12, B-coded
- PG9- / PG11-thread
- Screw connection

**Suitable cables**
- Bus system PROFIBUS-DP/FMS/FIP refer to main catalogue 2018/19
- UNITRONIC® BUS PB M12 Page 72

**Technical data**

**Classification ETIM 5/6**
ETIM 5.0/6.0 Class-ID: EC002062
ETIM 5.0/6.0 Class-Description: Sensor-actuator connector

**Material**
- Contact: CuSn
- Contact surface: Au
- Contact carrier: PA66
- Sealing: NBR
- Knurl: Nickel-plated brass
- Gripping body: Zinc die-cast, nickel-plated

**Protection rating**
- IP 67

**Ambient temperature (operation)**
- Plug/socket -40°C to +85°C

**Coding**
- B - inverse (PROFIBUS)

**Rated current (A)**
- 4 A

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Conductor cross-section (mm²)</th>
<th>Cable diameter in mm</th>
<th>Rated voltage (V)</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plug, straight</td>
<td>AB-C5-M12M5B-PG9-SH-AU</td>
<td>5</td>
<td>0.25 - 0.75</td>
<td>6.0 - 8.5</td>
<td>60</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>AB-C5-M12M5B-PG11-SH-AU</td>
<td>5</td>
<td>0.25 - 0.75</td>
<td>8.0 - 10.0</td>
<td>60</td>
<td>1</td>
</tr>
<tr>
<td>Socket, straight</td>
<td>AB-C5-M12FSB-PG9-SH-AU</td>
<td>5</td>
<td>0.25 - 0.75</td>
<td>6.0 - 8.5</td>
<td>60</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>AB-C5-M12FSB-PG11-SH-AU</td>
<td>5</td>
<td>0.25 - 0.75</td>
<td>8.0 - 10.0</td>
<td>60</td>
<td>1</td>
</tr>
</tbody>
</table>

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Data communication systems
Bus system PROFIBUS-DP/FMS/FIP • M12 Connectors and accessories

EPIC® DATA PB M12/M12
PROFIBUS M12 control cabinet feed-through, shielded

Benefits
- M12 connector on both sides
- Plug & Play for flexible connection solutions

Application range
- Mechanical and plant engineering

Product features
- For PROFIBUS applications
- Bipolar/screw mounting

Product Make-up
- 5-pin control cabinet feed-through, M12 B-coded
- M12 plug on M12 socket
- Screened version

Suitable cables
- UNITRONIC® BUS PB M12 Page 72
- UNITRONIC® BUS PB M12-M12 Page 72

Suitable connectors
- EPIC® DATA PB M12 refer to page 73

Technical data

<table>
<thead>
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<th>Classification ETIM 5/6</th>
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<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID: EC002061</td>
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<tr>
<td>ETIM 5.0/6.0 Class-Description: Sensor-actuator connector chassis</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact: CuZn</td>
</tr>
<tr>
<td>Contact surface: Au (gold)</td>
</tr>
<tr>
<td>Contact carrier: PA 66</td>
</tr>
<tr>
<td>Knurl: Nickel-plated brass</td>
</tr>
<tr>
<td>Sealing: FKM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protection rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 67</td>
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</table>

<table>
<thead>
<tr>
<th>Ambient temperature (operation)</th>
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<tbody>
<tr>
<td>Plug/socket -25°C to +85°C</td>
</tr>
<tr>
<td>Coding B - inverse (PROFIBUS)</td>
</tr>
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<td>Rated current (A) 4 A</td>
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<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Rated voltage (V)</th>
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<tbody>
<tr>
<td>22262021</td>
<td>AB-C5-DSI-M12MSB-M12FSB-M16-SH</td>
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</tbody>
</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

EPIC® DATA PB TR M12
M12 Terminating resistor for PROFIBUS

Benefits
- Cost efficient termination of a bus systems
- Space-saving due to compact dimensions
- Robust design

Application range
- Mechanical and plant engineering

Product features
- 150 Ω terminating resistor for PROFIBUS

Product Make-up
- Straight connector M12 with integrated termination resistor
- Straight connector M12, with integrated termination resistor, shielded

Technical data

<table>
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<tr>
<th>Classification ETIM 5/6</th>
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<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID: EC000448</td>
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<tr>
<td>ETIM 5.0/6.0 Class-Description: Terminal resistor</td>
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<table>
<thead>
<tr>
<th>Protection rating</th>
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<tbody>
<tr>
<td>IP65/IP67 (plug)</td>
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<tr>
<td>IP 67 (socket)</td>
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</table>

<table>
<thead>
<tr>
<th>Ambient temperature (operation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plug/socket -25°C to +90°C (plug)</td>
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<tr>
<td>-40°C to +85°C (socket)</td>
</tr>
<tr>
<td>Coding B - inverse (PROFIBUS)</td>
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<tr>
<td>Rated current (A) 4 A</td>
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</table>

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Rated voltage (V)</th>
<th>PU</th>
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<tr>
<td>22260722</td>
<td>AB-C4-M12MS-PB-TR</td>
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<td>22261001</td>
<td>AB-CS-M12FS-PB-TR-SH</td>
<td>4</td>
<td>32</td>
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</tr>
</tbody>
</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Data communication systems
Bus system PROFIBUS-PA • Fixed Installation

UNITRONIC® BUS PA
PROFIBUS cables for applications in manufacturing and process automation

i Info

• PA = Process Automation
• Variant with UL/CSA CMG

Benefits
• FC (Fast Connect) version is oil and UV-resistant

Application range
• Process-automation application for connecting sensors and actuators - including areas with risks of explosion.
• Fixed Installation

Product features
• Bit rate = 31.25 kbit/s. Transmission technology RS485 also possible but bit rate is limited to 1.5 Mbit/s
• Maximum cable length is dependent on several factors (e.g. supply voltage, current demand).
• Technical Data: refer to the overview on „UNITRONIC® Bus Cables“
• Flame-retardant according IEC 60332-1-2

Norm references / Approvals
• PROFIBUS® PA is standardised in EN 50170 as PROFIBUS® DP and PROFIBUS® FMS
• Transmission technology for PROFIBUS-PA in accordance with international standard IEC 61158-2
• FC variant with UL/CSA certification (CMG / PLTC)

Product Make-up
• UNITRONIC® BUS PA
  Stranded conductor
  Copper braiding
  Outer sheath: PVC, blue, (RAL 5015)
  Intrinsically safe area, black (RAL 9005)
• UNITRONIC® BUS PA FC
  Bare copper wire
  Fast Connect inner sheath
  Cu-Geflecht
  Outer sheath: PVC, blue (RAL 5015), black (RAL 9005)

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC000830
ETIM 5.0/6.0 Class-Description: Data cable

Peak operating voltage
(not for power applications) 250 V

Conductor resistance
(loop): max. 44 ohm/km

Minimum bending radius
Fixed installation: 10 x outer diameter

Test voltage
Core/core: 1500 V rms

Characteristic impedance
100 ± 20 Ohm

Temperature range
Fixed installation: -30°C to +80°C
During installation: -5°C to +50°C

Table: Article number, Article designation, Number of pairs and cable diameter per conductor in mm, Outer diameter (mm), Copper index (kg/km), Weight (kg/km)

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and cable diameter per conductor in mm</th>
<th>Outer diameter (mm)</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2170234</td>
<td>UNITRONIC® BUS PA (BU)</td>
<td>1 x 2 x 1,3</td>
<td>8</td>
<td>45</td>
<td>84</td>
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<tr>
<td>2170235</td>
<td>UNITRONIC® BUS PA (BK)</td>
<td>1 x 2 x 1,3</td>
<td>8</td>
<td>45</td>
<td>84</td>
</tr>
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<td>2170334</td>
<td>UNITRONIC® BUS PA FC (BU)</td>
<td>1 x 2 x 1,00</td>
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<td>45,5</td>
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<td>2170335</td>
<td>UNITRONIC® BUS PA FC (BK)</td>
<td>1 x 2 x 1,00</td>
<td>8</td>
<td>45,5</td>
<td>103</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standard-lengths

Armoured
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
• Multipurpose shears A and B refer to main catalogue 2018/19
• STAR STRIP stripping tool refer to main catalogue 2018/19
• FC STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com

75
### Application range
- Fixed Installation
- DeviceNet™ connects industrial devices e.g. limit switches, photoelectric switches, valve islands, motor starters, drives, PLCs, etc.

### Product features
- Resistant to oils
- Based on proven CAN (Controller Area Network) technology.
- Permissible cable lengths vary with the data rate and the cable thickness
- FRNC Version: Halogen free and flame retardant
- Refer to data sheet for more details

### Norm references / Approvals
- CMG UL/CSA certification 75°C or PLTC, Sun Res
- FRNC variant additionally with Germanischer Lloyd certification

### Product Make-up
- Tinned copper wire
- Core insulation: foam skin
- Tinned-copper braiding with drain wire
- Outer sheath: FRNC or PVC

### Technical data
- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- **Core identification code**
  - Data pair: light blue + white
  - Power supply: red + black
- **Mutual capacitance**
  - (800 Hz): max. 39.8 nF/km
- **Peak operating voltage**
  - 300 V (not for power applications)
- **Conductor resistance**
  - Thick (loop): max. 45 ohm/km
  - Thin (loop): max. 180 ohm/km
- **Minimum bending radius**
  - Fixed installation: 15 x outer diameter
- **Test voltage**
  - Core/core: 2000 V
- **Characteristic impedance**
  - 120 ohm
- **Temperature range**
  - Fixed installation: -25°C to +80°C

### Article number | Article designation | Number of pairs and AWG size | Outer diameter [mm] | Copper index [kg/km] | Weight [kg/km]
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2170340</td>
<td>UNITRONIC® BUS DN THICK FRNC</td>
<td>1x2xAWG18 + 1x2xAWG15</td>
<td>12.2</td>
<td>82.8</td>
<td>195</td>
</tr>
<tr>
<td>2170341</td>
<td>UNITRONIC® BUS DN THIN FRNC</td>
<td>1x2xAWG24 + 1x2xAWG22</td>
<td>6.9</td>
<td>33.4</td>
<td>69.5</td>
</tr>
<tr>
<td>2170342</td>
<td>UNITRONIC® BUS DN THICK Y</td>
<td>1x2xAWG18 + 1x2xAWG15</td>
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<td>2170343</td>
<td>UNITRONIC® BUS DN THIN Y</td>
<td>1x2xAWG24 + 1x2xAWG22</td>
<td>6.9</td>
<td>33.4</td>
<td>66.9</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

FRNC means Flame Retardant, Non-Corrosive; and DeviceNet is a registered trademark of ODVA.

Lapp Kabel is a member of the PROFIBUS user organisation (PNO).

ECO is the cost-efficient version of article no. 2170342 and 2170343, with a slight modification to the outer sheath and UL/CSA-approved (CMG).

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
UNITRONIC® DeviceNet FD THICK+THIN
High flexible DeviceNet Buscable based on the CAN technology

Application range
- For highly flexible applications
- DeviceNet™ connects industrial devices e.g. limit switches, photoelectric switches, valve islands, motor starters, drives, PLCs, etc.

Product features
- Based on proven CAN (Controller Area Network) technology.
- Permissible cable lengths vary with the data rate and the cable thickness
- Refer to data sheet for more details
- PUR (P) Version: Halogen free
  PVC (Y) Version: Flame retardant (UL FT4)
- UV-resistant (but colour may change after some time)

Norm references / Approvals
- PUR: UL/CSA-certified (CMX)
- PVC: UL/CSA CMG 75°C FT4 Sun Res Oil Res, at 2170346 also PLTC

Product Make-up
- Core insulation: PE
- Outer sheath of Polyurethan (PUR) or Polyvinylchlorid (PVC)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable

- Core identification code
  Data pair: light blue + white
  Power supply: red + black

- Mutual capacitance
  (800 Hz): max. 39.8 nF/km

- Peak operating voltage
  300 V (not for power applications)

- Conductor resistance
  Thick (loop): max. 45 ohm/km
  Thin (loop): max. 180 ohm/km

- Minimum bending radius
  Fixed installation: 7.5 x outer diameter
  Flexing: 15 x outer diameter

- Test voltage
  Core/core: 2000 V
  Characteristic impedance
  120 ohm

- Temperature range
  PUR: -40°C to +80°C
  PVC: -10°C to +80°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and AWG size</th>
<th>Outer diameter [mm]</th>
<th>Copper index [kg/km]</th>
<th>Weight [kg/km]</th>
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</thead>
<tbody>
<tr>
<td>2170344</td>
<td>UNITRONIC® BUS DN THICK FD P</td>
<td>1x2xAWG18 + 1x2xAWG15</td>
<td>12.2</td>
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<td>UNITRONIC® BUS DN THIN FD Y</td>
<td>1x2xAWG24 + 1x2xAWG22</td>
<td>6.9</td>
<td>33.4</td>
<td>69.8</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Accessories
- SMART STRIP stripping tool refer to main catalogue 2018/19
UNITRONIC® BUS CAN
CAN Buscables for fixed installation - UL/SCA certified

LAPP KABEL STUTTGART UNITRONIC® BUS CAN

Application range
UNITRONIC® BUS CAN
• Fixed Installation
UNITRONIC® BUS CAN FD P
• For highly flexible applications

Product features
UNITRONIC® BUS CAN
• Maximum bit rate: 1 Mbit/s for 40 m segment length
• Larger conductor cross-section is necessary with increasing length. Refer to the table below (reference values from ISO 11898).
• ISO 11898 makes recommendations for the segment length, cable cross section and bit rate
• Flame retardant according IEC 60332-1-2

UNITRONIC® BUS CAN FD P
• Halogen-free
• Maximum bit rate: 1 Mbit/s for 40 m segment length
• Larger conductor cross-section is necessary with increasing length. Refer to the table below (reference values from ISO 11898).
• ISO 11898 makes recommendations for the segment length, cable cross section and bit rate
• Flame retardant according IEC 60332-1-2

Norm references / Approvals
• Standardised internationally in ISO 11898
• UL/CSA type CMX (UL 444)

Product Make-up
UNITRONIC® BUS CAN
• 0.22 + 0.34 + 0.5: bare stranded conductor, 7-wire
• Core insulation: foam skin
• Colour coded in accordance with DIN 47100
• Copper braid
• Outer sheath: PVC, violet (RAL 4001)

UNITRONIC® BUS CAN FD P
• Stranded bare conductor
• Core insulation: foam skin
• Copper braid
• Outer sheath: PUR, violet (RAL 4001)
• UV-resistant (but colour may change after some time)

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC000830
ETIM 5.0/6.0 Class-Description: Data cable
Mutual capacitance
(800 Hz) max. 40 nF/km
Peak operating voltage
UNITRONIC® BUS CAN (not for power applications) 250 V
UNITRONIC® BUS CAN FD P (not for power transmission)
Conductor resistance
UNITRONIC® BUS CAN (loop): max. 186 ohm/km
UNITRONIC® BUS CAN FD P (loop): max. 159.8 ohm/km
Minimum bending radius
UNITRONIC® BUS CAN
Flexing: 15 x outer diameter
UNITRONIC® BUS CAN FD P
Flexing: 15 x outer diameter
Test voltage
Core/core: 1500 V rms
Characteristic impedance
120 ohm
Temperature range
UNITRONIC® BUS CAN
Fixed installation: -30°C to +80°C
Flexing: -5°C to +70°C
UNITRONIC® BUS CAN FD P
Fixed installation: -40°C to +80°C
Flexing: -30°C to +70°C

Article number   Article designation  Number of pairs/conductor cross section (mm²)  Outer diameter [mm]  Conductor resistance  Copper index (kg/km)  Weight (kg/km)
for fixed installation
2170260  UNITRONIC® BUS CAN  1 x 2 x 0.22  5.7  186  16.7  42
2170261  UNITRONIC® BUS CAN  2 x 2 x 0.22  7.6  186  34.8  68
2170263  UNITRONIC® BUS CAN  1 x 2 x 0.34  6.8  115  29  55
2170264  UNITRONIC® BUS CAN  2 x 2 x 0.34  8.5  115  44.4  88
2170266  UNITRONIC® BUS CAN  1 x 2 x 0.5  7.5  78  41.6  90
2170267  UNITRONIC® BUS CAN  2 x 2 x 0.5  9.6  78  59.4  106
2170269  UNITRONIC® BUS CAN  1 x 2 x 0.75  8.7  52  52.7  108
2170270  UNITRONIC® BUS CAN  2 x 2 x 0.75  11.5  52  80.6  142

For highly flexible applications (power chains, moving machine parts)
2170272  UNITRONIC® BUS CAN FD P  1 x 2 x 0.25  6.4  159.8  24  40
2170273  UNITRONIC® BUS CAN FD P  2 x 2 x 0.25  8.4  159.8  33  65
2170275  UNITRONIC® BUS CAN FD P  1 x 2 x 0.34  6.8  122  32.8  60
2170276  UNITRONIC® BUS CAN FD P  2 x 2 x 0.34  9.6  122  52.4  88
2170278  UNITRONIC® BUS CAN FD P  1 x 2 x 0.5  8  72.8  41.9  74
2170279  UNITRONIC® BUS CAN FD P  2 x 2 x 0.5  10.8  72.8  59.4  100

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Accessories
• Multipurpose shears A and B refer to main catalogue 2018/19
• SENSOR STRIP stripping tool refer to main catalogue 2018/19
• SMART STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
UNITRONIC® BUS CAN TRAY

CAN Bus cable with PLTC-ER approval - for open wiring between cable trays and industrial machines

Info

- CAN = Controller Area Network

Benefits

- PLTC-ER approval for open wiring between cable tray and industrial machines/plants acc. to NEC 725.154 (D)
- No additional protection of the cable needed

Application range

- Fixed Installation

Product features

- Maximum bit rate: 1 Mbit/s for 40 m segment length
- ISO 11898 makes recommendations for the segment length, cable cross section and bit rate
- UV-resistant UL SUN RES
- Oil-resistant according to UL OIL RES I
- Flame-retardant according to CSA FT4 UL Vertical-Tray Flame Test

Norm references / Approvals

- Standardised internationally in ISO 11898
- C(UL)us Typ CMG (75°C) acc. to UL 444 / CSA 22.2
- UL Type PLTC-ER acc. to UL 13

Product Make-up

- 7-wire bare stranded copper conductor
- Core insulation: foam skin
- Inner sheath: PVC
- Copper braid
- Outer sheath: PVC, violet (RAL 4001)

Technical data

- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Mutual capacitance (800 Hz) max. 40 nF/km
- Peak operating voltage (not for power applications) 250 V
  Rated voltage: 600 V (UL)
- Conductor resistance (loop): max. 110.8 ohm/km
- Minimum bending radius
  Fixed installation: 8 x outer diameter
  Flexing: 15 x outer diameter
- Test voltage
  Core/core: 2000 V
- Characteristic impedance 120 ohm
- Temperature range
  Fixed installation: -40°C to +80°C
  Flexing: -10°C to +70°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of cores and mm² per conductor</th>
<th>Outer diameter [mm]</th>
<th>Copper index [kg/km]</th>
<th>Weight [kg/km]</th>
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<tbody>
<tr>
<td>2170857</td>
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<td>35</td>
<td>81</td>
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</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories

- Multipurpose shears A and B refer to main catalogue 2018/19
- SMART STRIP stripping tool refer to main catalogue 2018/19
Data communication systems

Bus system CAN / DeviceNet • CAN - fixed installation

UNITRONIC® BUS CAN BURIAL

CAN bus cable with double outer sheath for outdoor/direct burial use

Benefits
• Suitable for CAN communication according to ISO 11898
• Double-sheathed version, extremely tough, for installation without corrugated tubing
• Rugged, UV-resistant and weatherproof
• Diameter of inner sheath suitable for common connectors

Application range
• Useable for CAN based communication systems like CANopen
• Suitable for direct burial
• For outdoor applications
• For fixed installation or applications with occasional movements

Product Make-up
• Copper stranded 7x0,32
• Core insulation: PE
• Overall screening of braided tinned-copper strands
• Inner sheath: PVC, violet RAL (4001), outer diameter: 7.1 mm
• Outer sheath: PE, black RAL (9005), outer diameter: 9.0 mm

Technical data

Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC000830
ETIM 5.0/6.0 Class-Description: Data cable

Mutual capacitance (1 kHz): max. 40 nF/km

Peak operating voltage
300 V (not for power applications)

Conductor resistance (Loop): max. 74 Ohm / km

Minimum bending radius
Flexible use: 8 x Outer Diameter
Fixed installation: 4 x Outer Diameter

Test voltage
Core/core: 1500 V rms

Characteristic impedance
120 ohm

Temperature range
Fixed installation: -40°C to +80°C

Table

<table>
<thead>
<tr>
<th>Article number</th>
<th>Number of cores and mm² per conductor</th>
<th>Outer diameter [mm]</th>
<th>Copper index [kg/km]</th>
<th>Weight [kg/km]</th>
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</thead>
<tbody>
<tr>
<td>UNITRONIC® BUS CAN BURIAL</td>
<td>4 x 1 x 0,5</td>
<td>9</td>
<td>41.8</td>
<td>91</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
• Sub-D Bus-Connectors refer to main catalogue 2018/19

For current information see: www.lappgroup.com
UNITRONIC® BUS HEAT 6722
CAN bus cable for utility vehicles

**Info**
- Designed according to ISO 6722
- Tested acc. to ECE-R 118.01

**Benefits**
- Extended temperature range
- Good resistance to oil, petrol, acids and alkalis

**Application range**
- Suitable for connecting to e.g. camera systems, enter-/ infotainment for passengers, ticketing systems
- For fixed, occasionally flexible and protected use inside of utility vehicles

**Product features**
- Halogen-free outer sheath
- Maximum bit rate: 1 Mbit/s for 40 m segment length
- Temperature class B on the basis of ISO 6722-1
- ISO 11898 makes recommendations for the segment length, cable cross section and bit rate
- Flame-retardant according IEC 60332-1-2

**Norm references / Approvals**
- Standardised internationally in ISO 11898

**Product Make-up**
- Stranded bare conductor
- PUR outer sheath
- Colour: black
- UV-resistant (but colour may change after some time)
- Screening: wrapped with braided copper wires

**Technical data**
- **Classification ETIM 5/6**
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- **Mutual capacitance**
  40 nF/km (800 Hz)
- **Peak operating voltage**
  250 V (not for power transmission)
- **Conductor resistance**
  (loop): max. 159.8 ohm/km
- **Minimum bending radius**
  Flexing: 15 x outer diameter
- **Test voltage**
  Core/core: 1500 V rms
- **Characteristic impedance**
  120 ohm
- **Temperature range**
  Fixed installation: -40°C to +105°C
  Occasionally flexing: -30°C to +105°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of cores and mm²</th>
<th>Outer diameter [mm]</th>
<th>Copper index [kg/km]</th>
<th>Weight [kg/km]</th>
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<td>2170386</td>
<td>UNITRONIC® BUS HEAT 6722</td>
<td>1 x 4 x 0.34</td>
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<tr>
<td>2170387</td>
<td>UNITRONIC® BUS HEAT 6722</td>
<td>1 x 4 x 0.5</td>
<td>8.36</td>
<td>41</td>
<td>70</td>
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<tr>
<td>2170388</td>
<td>UNITRONIC® BUS HEAT 6722</td>
<td>1 x 4 x 0.75</td>
<td>9.79</td>
<td>59</td>
<td>95</td>
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</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- Multipurpose shears A and B refer to main catalogue 2018/19
- SENSOR STRIP stripping tool refer to main catalogue 2018/19
- SMART STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
UNITRONIC® TRAIN
Bus cables - MVB and WTB - Electron beam cross-linked for high requirements in railway applications

Benefits
• Good chemical resistance
• Resistant to mechanical influences in harsh environmental conditions
• Extended temperature range
• Reduced flame spreading increases the protection against damage to persons and property in the event of a fire
• EMC-optimised design

Application range
• The communication systems WTB (wire train bus) and MVB (multifunction vehicle bus) make up the so-called TCN (train communication network)
• UNITRONIC® TRAIN bus cables are designed for use in TCN acc. IEC 61375 MVB according IEC 61375-3-1 WTB according IEC 61375-2-1
• For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
• Also applicable within oily environments and areas with increased ambient temperature

Product features
• Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60754-1
  - No corrosive gases acc. to EN 60754-2
  - No fluorine acc. to EN 6084-2
  - No toxic gases acc. to EN 50305
  - Low smoke density acc. to EN 61034-2
  - Flame-retardant acc. to EN 60332-1-2
  - No flame propagation acc. to EN 60332-3-25
• Fire behaviour according to NF:
  - Toxicity of gases acc. to NF X 70-100
  - Low smoke density acc. to NF X 10-702
  - No flame propagation acc. to NF C 32-070, Cat. C1 and C2
• Chemical properties:
  - Oil resistant acc. to EN 50264-1
  - Fuel resistant acc. to EN 50264-1
  - Acid resistant acc. to EN 50264-1
  - Alkali resistant acc. to EN 50264-1
  - Ozone resistant acc. to EN 50264-3-2

Norm references / Approvals
• EN 45545-2 HL1, HL2, HL3
• EN 50264-1

Product Make-up
• Stranded tinned 19-wire conductor
• Core insulation: Based on Polyolefin
class polymer-compound EM 104
• Outer sheath colour: Black

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
<th>ETIM 5.0/6.0 Class-ID: EC000830</th>
</tr>
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<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-Description: Data cable</td>
<td></td>
</tr>
<tr>
<td>Peak operating voltage</td>
<td>(not for power applications) 125 V</td>
</tr>
<tr>
<td>Minimum bending radius</td>
<td>Flexing: 10 x outer diameter</td>
</tr>
<tr>
<td></td>
<td>Fixed installation: 6 x outer diameter</td>
</tr>
<tr>
<td>Test voltage</td>
<td>Core/core: 1000 V</td>
</tr>
<tr>
<td></td>
<td>Core/screen: 1000 V</td>
</tr>
<tr>
<td>Characteristic impedance</td>
<td>120 ohm (±10%)</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Fixed installation: -45°C to +90°C</td>
</tr>
<tr>
<td></td>
<td>Occasional flexing: -35°C up to +90°C</td>
</tr>
</tbody>
</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of cores and mm² per conductor</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
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<tbody>
<tr>
<td>2173000</td>
<td>UNITRONIC® TRAIN MVB 1x2x0,5</td>
<td>1x2x0,5</td>
<td>7.6</td>
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<td>2173001</td>
<td>UNITRONIC® TRAIN MVB 1x2x0,5+1x0,5</td>
<td>1x2x0,5+1x0,5</td>
<td>7.6</td>
<td>34</td>
</tr>
<tr>
<td>2173002</td>
<td>UNITRONIC® TRAIN MVB 2x2x0,5</td>
<td>2x2x0,5</td>
<td>8.3</td>
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<td>2173003</td>
<td>UNITRONIC® TRAIN MVB 2x2x0,5+4x0,25</td>
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<td>8.3</td>
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<td>2173004</td>
<td>UNITRONIC® TRAIN WTB 1x2x0,75</td>
<td>1x2x0,75</td>
<td>8.4</td>
<td>41</td>
</tr>
</tbody>
</table>

For current information see: www.lappgroup.com
**EPIC® DATA CAN Sub-D**

CAN Bus-Connectors with screw connection

**Benefits**
- Terminating resistor (integrated) can be switched
- Sensor/ ac
- No loose parts
- With additional 24 V DC output to supply external devices (90° version only)

**Product features**
- Max. transmission rate 1 Mbit/s possible
- Terminating resistor „ON“ - the outbound bus cable is disconnected
- The integrated, connectable terminating resistor enable the CAN-Bus to be terminated or connected through
- Sub-D pin assignment:
  - CAN Low = Pin 2
  - CAN High = Pin 7
  - GND = Pin 3
  - CAN V+ = Pin 9 (90° version only)
  (shield = housing)

**Norm references / Approvals**
- UL File No. E331560

**Product Make-up**
- D-Sub plug, 9-pin, fixing screws 4-40 UNC
- Screw connection
- Improved electromagnetic compatibility (EMC) by metallized housing
- For cable outer diameter: 5 - 8 mm

**Suitable cables**
- Bus system CAN / DeviceNet refer to main catalogue 2018/19

**Suitable tools**
- Kraftform® adjustable torque screwdriver/ Kraftform Kompakt® Set refer to main catalogue 2018/19

**Technical data**

| Classification ETIM 5/6 | ETIM 5.0/6.0 Class-ID: EC001132
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-Description:</td>
<td>D-Sub connector</td>
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</tbody>
</table>

**Dimensions**
- 60 mm x 40 mm x 17 mm - 90°
- 67,5 mm x 35 mm x 17 mm - 180°
(90° version only)

**Connection type**
- Screwing

**Protection rating**
- IP 20

**Terminating resistor**
- 120 Ω

**Interfaces**
- CAN bus station:
  - D-Sub socket, 9-pin
  - CAN bus cable:
    - 6 terminal blocks for wires up to 0.8 mm²

**Permissible ambient conditions**
- Operating temperature: -25°C to +85°C
- The max. temperature for UL is 60 °C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Cable outlet</th>
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<tr>
<td>21700537</td>
<td>ED-CAN-90</td>
<td>90°</td>
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<td>21700536</td>
<td>ED-CAN-90-PG</td>
<td>90°</td>
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<td>21700538</td>
<td>ED-CAN-AX</td>
<td>180° axial</td>
<td>no</td>
<td>1</td>
</tr>
</tbody>
</table>

DeviceNet is a registered trademark of ODVA
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
Data communication systems

Bus system CAN / DeviceNet • Sub-D Bus-Connectors

EPIC® DATA CAN Sub-D PRO
CAN Bus-Connectors full-metall

Benefits
- High flexibility by extended cable clamping range
- Cost-saving due to quick and easy installation
- Robust housing material for harsh environments
- For EMC critical environments

Product features
- Extended temperature range
- High mechanical strength (200 contact durability)
- Less transmission loss
- Bus termination is integrated
- Sub-D pin assignment:
  - CAN Low = Pin 2
  - CAN High = Pin 7
  - CAN Gnd = Pin 3
  - GND = Pin 6 (90° version only)
  - CAN V+ = Pin 9 (90° version only)
    (shield = housing)

Product Make-up
- D-Sub plug, 9-pin, fixing screws 4-40 UNC
- 360° shielding due full-metall housing (ZnAl)
- External cable clamp connection (7-10 mm)
- 90° version: With additional Sub-D port for programming/diagnostic (‘PG’)
- 90° version: PG port with undetachable EMC Sub-D protection

Suitable cables
- UNITRONIC® DeviceNet THICK + THIN Page 76
- UNITRONIC® BUS CAN Page 78
- UNITRONIC® DeviceNet FD THICK+THIN Page 77
- UNITRONIC® BUS CAN FD Page 78
- UNITRONIC® BUS CAN TRAY Page 79
- UNITRONIC® BUS HEAT 6722 Page 81
- UNITRONIC® BUS CAN BURIAL Page 80

Suitable tools
- Kraftform® adjustable torque screwdriver/
  Kraftform Kompakt® Set refer to main catalogue 2018/19

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC001132
  ETIM 5.0/6.0 Class-Description: D-Sub connector
- Dimensions
  63 x 45 x 18 - 90°
  81 x 36 x 15 - 180° (LxWxH)
- Connection type
  Screwing
- Protection rating
  IP 30
- Terminating resistor
  120 Ω
- Interfaces
  CAN-Bus station:
    D-SUB socket, 9-pin
  CAN-Bus cable:
    - screw terminals for wires
      0.14 - 0.5 mm²
- Permissible ambient conditions
  Operating temperature: -20°C to +70°C

Table:

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Cable outlet</th>
<th>PG-Interface</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>21700590</td>
<td>ED-CAN-90-PC-PRO</td>
<td>90°</td>
<td>yes</td>
<td>1</td>
</tr>
<tr>
<td>21700591</td>
<td>ED-CAN-AX-PRO</td>
<td>180° axial</td>
<td>no</td>
<td>1</td>
</tr>
</tbody>
</table>

DeviceNet is a registered trademark of ODVA
Photographs and graphics are not to scale and do not represent detailed images of the respective products.
UNITRONIC® BUS CAN M12 / UNITRONIC® BUS CAN M12-M12
DeviceNet/CANopen Cable: M12 plug/socket on free conductor end

Benefits
• Cost-effective, efficient wiring of fieldbus and sensor/actuator installations
• Space-saving due to compact dimensions
• Fast and easy error tracking
• Robust design

Application range
• Mechanical and plant engineering

Product features
• 5-core DeviceNet/CANopen cable, shielded
• M12 connector, A-coded with quick-locking system
• Suitable for drag chains
• Including tag carrier

Norm references / Approvals
• UL-AWM-Style 21198 (80 °C / 300 V)

Product Make-up
• Signal line: 2 x 0.25 mm²
• Power supply: 2 x 0.34 mm²
• Drain wire: 1 x 0.34 mm²
• Core colours: red/black, blue/white
• Outer sheath: PUR halogen-free, violet
• Outer diameter: 6.7 mm
• Shielded version

Suitable connectors
• Sub-D Bus-Connectors refer to main catalogue 2018/19
• EPIC® DATA CAN M12 Page 86
• EPIC® DATA CAN M12/M12 Page 86
• EPIC® DATA CAN TR M12 Page 87
• EPIC® DATA CAN M12T Page 88
• EPIC® DATA CAN CCR Page 88

Technical data

Material
Contact: CuSn
Contact surface: Ni/Au
Knurl: Zinc die-cast, nickel-plated
Gripping body: TPU, flame-retardant, self-extinguishing

Protection rating
IP65/IP67

Ambient temperature (operation)
Plug/Socket: -25°C to +80°C
Fixed installation: -40°C to +80°C
Flexing: -20°C to +80°C
Drag chain application: 70°C

Coding
A-standard

Rated current (A)
4 A

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: inclusive of copper. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Article number | Article designation | Length (m) | Number of pins | Design | Rated voltage (V) | PU
--- | --- | --- | --- | --- | --- | ---
Plug
22260789 | AB-DN-M12MS-2,0PUR | 2 | 5 | straight | 60 | 1
22260790 | AB-DN-M12MS-5,0PUR | 5 | 5 | straight | 60 | 1
22260791 | AB-DN-M12MS-10,0PUR | 10 | 5 | straight | 60 | 1
22260204 | AB-DN-M12MA-2,0PUR | 2 | 5 | angled | 60 | 1
Socket
22260792 | AB-DN-2,0PUR-M12FS | 2 | 5 | straight | 60 | 1
22260793 | AB-DN-5,0PUR-M12FS | 5 | 5 | straight | 60 | 1
22260794 | AB-DN-10,0PUR-M12FS | 10 | 5 | straight | 60 | 1
Plug on socket
22260795 | AB-DN-M12MS-0,3PUR-M12FS | 0.3 | 5 | straight-straight | 60 | 1
22260796 | AB-DN-M12MS-1,0PUR-M12FS | 1 | 5 | straight-straight | 60 | 1
22260797 | AB-DN-M12MS-2,0PUR-M12FS | 2 | 5 | straight-straight | 60 | 1
22260798 | AB-DN-M12MS-5,0PUR-M12FS | 5 | 5 | straight-straight | 60 | 1
22260799 | AB-DN-M12MS-10,0PUR-M12FS | 10 | 5 | straight-straight | 60 | 1

Accessories
• FLEXIMARK® Label LMB refer to main catalogue 2018/19

For current information see: www.lappgroup.com
EPIC® DATA CAN M12
Field mountable M12 BUS-connectors shielded for DeviceNet/CANopen

Benefits
- Quick and easy on-site assembly
- For creating of individual cable lengths
- Cost efficient and rational wiring for BUS installations
- Space-saving due to compact dimensions

Product Make-up
- M12 plug, 5-pins, A-coded
- Screw connection
- PG9 thread
- Screened version

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC002062
  ETIM 5.0/6.0 Class-Description: Sensor-actuator connector
- Connection type
  Screwing
- Material
  Contact: CuSn
  Contact surface: Au
  Contact carrier: PA66
  Sealing: NBR
  Knurl: Nickel-plated brass
  Gripping body: Zinc die-cast, nickel-plated
- Protection rating
  IP 67
- Ambient temperature (operation)
  Plug/socket: -40°C to +85°C
- Coding
  A - Standard
  (CANopen/DeviceNet/CC-Link)
- Rated current (A)
  4 A

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Design</th>
<th>Number of pins</th>
<th>Cross-section in mm²</th>
<th>Cable diameter in mm</th>
<th>Rated voltage (V)</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>22260135</td>
<td>AB-C5-M12MS-PG9-SH</td>
<td>screw</td>
<td>5</td>
<td>0.25 - 0.75</td>
<td>6.0 - 8.0</td>
<td>60</td>
<td>1</td>
</tr>
<tr>
<td>22260136</td>
<td>AB-C5-M12FS-PG9-SH</td>
<td>screw</td>
<td>5</td>
<td>0.25 - 0.75</td>
<td>6.0 - 8.0</td>
<td>60</td>
<td>1</td>
</tr>
</tbody>
</table>

EPIC® DATA CAN M12/M12
M12 control cabinet feed-through, shielded for CAN/DeviceNet/ S/A cabling

Benefits
- M12 connector on both sides
- Plug & Play for flexible connection solutions

Product features
- For CANopen/DeviceNet applications
- For sensor/actuator cabling
- Bipolar/screw mounting

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC002061
  ETIM 5.0/6.0 Class-Description: Sensor-actuator connector chassis
- Material
  Contact: CuZn
  Contact surface: Au (gold)
  Contact carrier: PA 66
  Knurl: Nickel-plated brass
  Sealing: FKM
- Protection rating
  IP 67
- Ambient temperature (operation)
  Plug/socket: -25°C to +85°C
- Coding
  A - Standard
  (CANopen/DeviceNet/CC-Link)
- Rated current (A)
  4 A

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Rated voltage (V)</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>22262020</td>
<td>AB-C5-DSI-M12MS-M12FS-M16-SH</td>
<td>5</td>
<td>24</td>
<td>1</td>
</tr>
</tbody>
</table>
**EPIC® DATA CAN TR M12**

M12 Terminating resistor for DeviceNet/CANopen

**Product features**
- 120 Ω terminating resistor for DeviceNet/CANopen

**Product Make-up**
- Straight connector M12 with integrated termination resistor

**Benefits**
- Cost efficient termination of a bus systems
- Space-saving due to compact dimensions
- Robust design

**Application range**
- Mechanical and plant engineering

**Technical data**

<table>
<thead>
<tr>
<th>Classification ETIM</th>
<th>ETIM 5.0/6.0 Class-ID: EC000448</th>
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<tbody>
<tr>
<td>Protection rating</td>
<td>IP65/IP67</td>
</tr>
<tr>
<td>Ambient temperature (operation)</td>
<td>-25°C to +90°C</td>
</tr>
<tr>
<td>Contact material</td>
<td>CuSn</td>
</tr>
<tr>
<td>Coding</td>
<td>A - Standard (CANopen/DeviceNet)</td>
</tr>
<tr>
<td>Rated current (A)</td>
<td>4 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Rated voltage (V)</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>22260766</td>
<td>AB-C5-M12MS-DN-TR</td>
<td>5</td>
<td>60</td>
<td>5</td>
</tr>
</tbody>
</table>

DeviceNet is a registered trademark of ODVA. Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- EPIC® DATA CAN M12T refer to page 88
Data communication systems
Bus system CAN / DeviceNet • M12 Connectors and accessories

EPIC® DATA CAN M12T
M12 T parallel distributor for CAN/ DeviceNet/ S/A cabling

Benefits
• Cost-effective, efficient wiring of fieldbus and sensor/ actuator installations
• Space-saving due to compact dimensions
• Robust design

Product Make-up
• 5-pin parallel distributor
• M12 socket on M12 plug and M12 socket

Product features
• For CANopen/DeviceNet applications
• PWIS-free

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC002585
ETIM 5.0/6.0 Class-Description: Passive sensor-actuator interface

Material
Contact: CuZn
Contact surface: Ni/Au
Contact carrier: TPU GF
Knurl: Zinc die-cast, nickel-plated
Gripping body: TPU, flame-retardant, self-extinguishing
Sealing: NBR

Protection rating
IP65/IP67

Ambient temperature (operation)
Plug/ socket: -25°C to +90°C

Coding
A - Standard
(CANopen/DeviceNet/CC-Link)
Rated current (A)
4 A

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Rated voltage (V)</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>22260765</td>
<td>AB-C5-M12T-2XM12FS DN</td>
<td>5</td>
<td>60</td>
<td>5</td>
</tr>
</tbody>
</table>

DeviceNet is a registered trademark of ODVA
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

EPIC® DATA CAN CCR
Cable coupler round, shielded for e.g. sensor-actuator / PROFIBUS / CAN cables

Benefits
• Time-saving assembly with IDC connection technology
• Optimum EMC protection with 360 ° shielding

Product features
• 5-pin cable coupler round
• Screened version

Application range
• To extend existing cable systems
• Repairkit for damaged cables

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC002925
ETIM 5.0/6.0 Class-Description: Sensor-actuator adapting connector

Material
Contact: CuZn
Contact surface: Ni/Au
Knurl: Zinc die-cast, nickel-plated
Gripping body: Zinc die-cast, nickel-plated

Protection rating
IP65/IP67

Ambient temperature (operation)
-40°C to +85°C

Rated current (A)
4 A

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Cross-section in mm²</th>
<th>Cable diameter in mm</th>
<th>Rated voltage (V)</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>21700641</td>
<td>AB-C5-CCR-SH</td>
<td>5</td>
<td>0.14 - 0.50</td>
<td>5.0 - 9.7</td>
<td>60</td>
<td>1</td>
</tr>
</tbody>
</table>

DeviceNet is a registered trademark of ODVA
Photographs and graphics are not to scale and do not represent detailed images of the respective products.
**Benefits**
- Cables meet the requirements of ISA/SP50 and the FOUNDATION™ field bus for the cable type A.

**Application range**
- FOUNDATION™ Fieldbus is used in intrinsically safe areas, especially in the field of Process Automation
- Fixed Installation

**Product features**
- UV-resistant
- Extended temperature range

**Norm references / Approvals**
- With UL/CSA certification (CMG/PLTC)

**Product Make-up**
- 2-core, not armoured, with device ground
- 3-core, unarmoured, with device ground
- 3-core, armoured (longitudinally welded, spiral corrugated copper sheath) with device ground
- Outer sheath: PVC, yellow
- Armoured Version: PVC, yellow and blue

**Technical data**
- **Classification ETIM 5/6**
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- **Peak operating voltage**
  300 V
- **Conductor resistance**
  ≤ 24 Ohm/km
- **Minimum bending radius**
  15 x outer diameter
- **Test voltage**
  1500 V
- **Characteristic impedance**
  100 ± 20 Ohm at 31.25 kHz
- **Temperature range**
  -40 °C or -25 °C to +105 °C, see data sheet

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and cable diameter</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>UNITRONIC® BUS FF 2</td>
<td>1 x 2 x 1.1</td>
<td>7.9</td>
<td>39.7</td>
<td>82</td>
</tr>
<tr>
<td>2170350</td>
<td>UNITRONIC® BUS FF 3</td>
<td>1 x 2 x 1.1 + 1 x 1.1</td>
<td>7.9</td>
<td>48.3</td>
<td>93</td>
</tr>
<tr>
<td>PVC - Armoured</td>
<td>UNITRONIC® BUS FF 3 ARM (YE)</td>
<td>1 x 2 x 1.1 + 1 x 1.1</td>
<td>12.3</td>
<td>125</td>
<td>182</td>
</tr>
<tr>
<td>2170353</td>
<td>UNITRONIC® BUS FF 3 ARM (BU)</td>
<td>1 x 2 x 1.1 + 1 x 1.1</td>
<td>12.3</td>
<td>125</td>
<td>182</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Foundation™ is a trademark of the Fieldbus Foundation

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Data communication systems

Bus system CC-Link • Fixed / continuous flexing application

UNITRONIC® BUS CC
CC-Link bus cable for fixed installation - UL-verified

LAPP KABEL STUTTGART UNITRONIC® BUS CC

Benefits
- The CC-Link® system was developed by Mitsubishi Electric Automation, Japan.
- This CC-Link® bus cable has successfully passed the CC-Link® Conformance Test in Japan.

Application range
- CC-Link® (Control & Communication Link) = field bus network, for both control as well as information data to provide efficient, integrated factory and process automation.
- Fixed installation of the CC-Link® network

Product features
- Transmission rate in relation to the distance

<table>
<thead>
<tr>
<th>Transmission rate</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>156 kbit/s</td>
<td>1200 m</td>
</tr>
<tr>
<td>625 kbit/s</td>
<td>600 m</td>
</tr>
<tr>
<td>2.5 Mbit/s</td>
<td>200 m</td>
</tr>
<tr>
<td>5.0 Mbit/s</td>
<td>110–150 m</td>
</tr>
<tr>
<td>10 Mbit/s</td>
<td>50–100 m</td>
</tr>
</tbody>
</table>

- Flame-retardant according to CSA FT4
- SUN RES acc. to UL 1581

Technical data

**ETIM**
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable

**Certifications**
- UL AWM Style 20233
- UL Vertical Tray Flame Test

**Peak operating voltage**
300 V

**Conductor resistance**
11 ohm/1000 ft. (305 m) at 20°C

**Minimum bending radius**
- Fixed installation: 5 x outer diameter Flexing: 8 x outer diameter

**Test voltage**
2000 V

**Characteristic impedance**
110 ohm at 1 MHz

**Temperature range**
-40°C to +70°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of cores and AWG size</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2170360</td>
<td>UNITRONIC® BUS CC</td>
<td>3 x 1 x AWG20</td>
<td>7.7</td>
<td>38.8</td>
<td>76.6</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

UNITRONIC® BUS CC FD P FRNC
CC-Link bus cable for highly flexible applications - UL-verified

LAPP KABEL STUTTGART UNITRONIC® BUS CC FD P

Benefits
- The CC-Link® system was developed by Mitsubishi Electric Automation, Japan.

Application range
- CC-Link® (Control & Communication Link) = field bus network, for both control as well as information data to provide efficient, integrated factory and process automation.
- For highly flexible applications (power chains, moving machine parts)

Product features
- Transmission rate in relation to the distance

<table>
<thead>
<tr>
<th>Transmission rate</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>156 kbit/s</td>
<td>1200 m</td>
</tr>
<tr>
<td>625 kbit/s</td>
<td>600 m</td>
</tr>
<tr>
<td>2.5 Mbit/s</td>
<td>200 m</td>
</tr>
<tr>
<td>5.0 Mbit/s</td>
<td>110–150 m</td>
</tr>
<tr>
<td>10 Mbit/s</td>
<td>50–100 m</td>
</tr>
</tbody>
</table>

- Halogen-free
- Flame-retardant according IEC 60332-1-2

Technical data

**ETIM**
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable

**Certifications**
- UL AWM Style 20233
- UL Vertical Tray Flame Test

**Peak operating voltage**
300 V

**Conductor resistance**
11 ohm/1000 ft. (305 m) at 20°C

**Minimum bending radius**
- Fixed installation: 4 x outer diameter Flexing: 10 x outer diameter

**Test voltage**
2000 V

**Characteristic impedance**
110 ohm at 1 MHz

**Temperature range**
-40°C to +80°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of cores and AWG size</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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<tbody>
<tr>
<td>2170370</td>
<td>UNITRONIC® BUS CC FD P FRNC</td>
<td>3 x 1 x AWG20</td>
<td>8.5</td>
<td>39.9</td>
<td>84</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
UNITRONIC® BUS SAFETY

SafetyBUS cables for transmission of safety-oriented data

Benefits
• For serial transmission of safety-oriented data

Application range
• UNITRONIC® BUS SAFETY - fixed installation
• UNITRONIC® BUS SAFETY FD P - highly flexible applications
• For systems such as SafetyBUS p®, based on the well-known CAN bus system

Product features
• The stated bit rates result in the following cable lengths (maximum) for a bus segment:
  - 500 kbit/s = max. 100 m
  - 250 kbit/s = max. 250 m
  - 125 kbit/s = max. 500 m
  - 50 kbit/s = max. 1,000 m

Norm references / Approvals
• Flame retardant acc. to IEC 60332-1-2

Product Make-up
• Bare stranded copper wires
• Core insulation: foam skin
• Tin-plated copper wire braiding
• Outer sheath: halogen-free, flame-retardant compound
• Outer sheath: yellow

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
<th>ETIM 5.0/6.0 Class-ID: EC000830</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-Description: Data cable</td>
<td></td>
</tr>
</tbody>
</table>

Certifications
• Version UNITRONIC® BUS SAFETY FC:
  AWM Style 2464 (80°C 300 V)
• Mutual capacitance
  (800 Hz): max. 45 nF/km
• Peak operating voltage
  (not for power applications) 250 V
• Conductor resistance
  (loop): max. 52 ohm/km
• Minimum bending radius
  Fixed installation: 5 x outer diameter
• Test voltage
  Core/core: 3000 V
  Core/core: 1500 V (FD- version)
• Characteristic impedance
  120 ohm
• Temperature range
  UNITRONIC BUS SAFETY:
    Fixed installation: -30°C to +80°C
    UNITRONIC BUS SAFETY FD P:
    Fixed installation: -40°C to +80°C
    Moved: -30 to +80°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of cores and mm² per conductor</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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</thead>
<tbody>
<tr>
<td>Fixed Installation</td>
<td></td>
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<td>2170295</td>
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<td>3 x 0.75</td>
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<td>Highly flexible applications</td>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Copper price basis: EUR 150/100 kg. Refer to catalogue appendix 1.17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum.
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).
SafetyBUS p® is a registered trademark of Pilz GmbH & Co.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
• FC STRIP stripping tool refer to main catalogue 2018/19
Data communication systems
Bus system INTERBUS (IBS) • Fixed Installation

UNITRONIC® BUS IBS
INTERBUS cables for fixed installation

Benefits
• Certified by INTERBUS CLUB

Application range
• Fixed Installation

Product features
• IBS cable - for fixed installation
• Remote bus cable + installation remote bus cable
• The stated bit rates result in the following cable lengths (maximum) of one bus segment:
  500 kbit/s = max. 400 m
• Halogen-free
• Flame-retardant according IEC 60332-1-2

Norm references / Approvals
• According to DIN EN 61158

Product Make-up
• UNITRONIC® BUS IBS
  Bare copper wire
  Core insulation: PE
  Overall copper braid screen
  Outer sheath: PVC, violet (RAL 4001)
• UNITRONIC® BUS IBS P COMBI
  Bare copper wire
  Core insulation: PE
  Overall copper braid screen
  Outer sheath: PUR, violet (RAL 4001)
• UNITRONIC® BUS IBS A
  similar to UNITRONIC BUS IBS, but with UL/CSA certification

Technical data

<table>
<thead>
<tr>
<th>Classification</th>
<th>ETIM 5/6</th>
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<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID:</td>
<td>EC000830</td>
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<td>ETIM 5.0/6.0 Class-Description:</td>
<td>Data cable</td>
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<table>
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<tr>
<th>Mutual capacitance</th>
<th>Flexible use: 10 x outer diameter</th>
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<tr>
<td>Peak operating voltage</td>
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<tr>
<td>Conductor resistance</td>
<td>(loop): max. 186 ohm/km</td>
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<tr>
<td>Minimum bending radius</td>
<td>Fixed installation: 8 x outer diameter</td>
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<tr>
<td>Test voltage</td>
<td>Core/core: 1500 V rms</td>
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<td>Characteristic impedance</td>
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<td>Temperature range</td>
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<td>Flexing:</td>
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<tr>
<th>Article number</th>
<th>Cable type</th>
<th>Article designation</th>
<th>Number of pairs and mm² per conductor</th>
<th>Outer diameter [mm]</th>
<th>Copper Index [kg/km]</th>
<th>Weight [kg/km]</th>
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</table>
| Fixed Installation
2170206 | Remote bus cable (RBC) | UNITRONIC® BUS IBS | 3 x 2 x 0.22 | 7.2 | 37 | 72 |
| 2170208 | Installation remote bus cable (INBC) | UNITRONIC® BUS IBS P COMBI | 3 x 2 x 0.22 + 3 x 1.0 | 7.9 | 60 | 85 |
| For fixed installation - UL/CSA CMX certification
2170209 | Remote bus cable (RBC) | UNITRONIC® BUS IBS A | 3 x 2 x 0.22 | 7.2 | 37 | 72 |

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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Accessories
• SENSOR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
UNITRONIC® BUS IBS Yv COMBI
INTERBUS cables for fixed installation - outdoor/direct burial

Benefits
- Certified by INTERBUS CLUB

Application range
- Suitable for outdoor use and direct burial

Product features
- IBS cable - for outdoor use or direct burial, UV-resistant (remote bus cable + installation remote bus cable)
- The stated bit rates result in the following cable lengths (maximum) of one bus segment:
  - 500 kbit/s = max. 400 m
- Flame-retardant according IEC 60332-1-2

Norm references / Approvals
- According to DIN EN 61158

Product Make-up
- UNITRONIC® BUS IBS Yv
  - Stranded bare conductor
  - Core insulation: PE
  - Tinned copper screen braiding
  - Outer sheath: PVC, black (RAL 9005)
- UNITRONIC® BUS IBS Yv COMBI
  - Stranded bare conductor
  - Core insulation: PE
  - 3x2x0,22: white/brown, green/yellow, grey/pink
  - 3x1,0: red, blue, green/yellow
  - Tinned copper screen braiding
  - Inner sheath: PVC, violet RAL (4001)
  - Outer diameter: 7,9 mm
  - Outer sheath: PVC, black (RAL 9005)
  - Outer diameter: 9,4 mm

Technical data

<table>
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<th>Classification ETIM 5/6</th>
<th>ETIM 5.0/6.0 Class-ID: EC000830</th>
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<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-Description: Data cable</td>
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</table>

- Peak operating voltage (not for power applications) 250 V
- Conductor resistance (loop): max. 186 ohm/km
- Minimum bending radius Fixed installation: 8 x outer diameter
- Test voltage Core/core: 1500 V rms
- Characteristic impedance 100 Ohm
- Temperature range Fixed installation: -40°C to +70°C

Table: Article number, Cable type, Article designation, Number of pairs and mm² per conductor, Outer diameter (mm), Copper index (kg/km), Weight (kg/km)

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<th>UNITRONIC® BUS IBS Yv COMBI</th>
<th>2170207</th>
<th>Remote bus cable (RBC)</th>
<th>UNITRONIC® BUS IBS Yv COMBI</th>
<th>3 x 2 x 0.22</th>
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<th>37</th>
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<td>2170217</td>
<td>Installation remote bus cable (INBC)</td>
<td>UNITRONIC® BUS IBS Yv COMBI</td>
<td>3 x 2 x 0.22 + 3 x 1.0</td>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

INTERBUS is a registered trademark of Phoenix Contact GmbH & Co.

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UNITRONIC® BUS IBS FD P
INTERBUS cables for use in high flexible applications

Benefits
- Certified by INTERBUS CLUB

Application range
- For highly flexible use in energy supply chains or permanently moving machines and linear robots
- Dry or damp rooms
- Harsh industrial environment

Product features
- Halogen-free
- Remote bus cable + installation remote bus cable
- 500 kbit/s = max. 400 m (remote bus cable)
- Max. 50 m (installation remote bus cable)
- PUR outer sheath, tear and notch-resistant, resistant to mineral oils and abrasion when used in power chains

Norm references / Approvals
- According to DIN EN 61158
- Flame retardant acc. to IEC 60332-1-2

Product Make-up
- UNITRONIC® BUS IBS FD P
  - Bare copper wire, extra fine core identification: acc. to DIN 47100
  - Overall copper braid screen
  - Outer sheath: PUR, violet (RAL 4001)
- UNITRONIC® BUS IBS FD P COMBI
  - Stranded bare conductor
  - Core insulation: PE
  - 3x2x0.25: white/brown, green/yellow, grey/pink
  - 3x1.0: red, blue, green/yellow
  - Tinned copper screen braiding
  - Outer sheath: PUR, violet (RAL 4001)

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable

- Mutual capacitance (800 Hz) max. 60 nF/km
- Peak operating voltage (not for power applications) 250 V
- Conductor resistance (loop): max. 159.8 ohm/km
- Minimum bending radius: 15 x outer diameter
- Test voltage: Core/core: 1500 V rms
- Characteristic impedance: 100 Ohm
- Temperature range: Fixed installation: -40°C to +80°C
  - Flexing: -30°C to +70°C

Article number | Cable type | Article designation | Number of pairs and mm² per conductor | Outer diameter (mm) | Copper index (kg/km) | Weight (kg/km)
--- | --- | --- | --- | --- | --- | ---
Highly flexible applications
2170216 | Remote bus cable (RBC) | UNITRONIC® BUS IBS FD P | 3 x 2 x 0.25 | 7.9 | 39 | 64
2170218 | Installation remote bus cable (INBC) | UNITRONIC® BUS IBS FD P COMBI | 3 x 2 x 0.25 + 3 x 1.0 | 7.9 | 62 | 92
Highly flexible applications - with UL/CSA (CMX) certification
2170818 | Installation remote bus cable (INBC) | UNITRONIC® BUS IBS FD P COMBI A | 3 x 2 x 0.25 + 3 x 1.0 | 7.9 | 62 | 92

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix 117 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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**Application range**
- The product is designed for use in building management, e.g. for decentralised control of lighting, heating, air-conditioning, ventilation, energy management, blinds, time management, locking systems etc.
- The cable can be laid on or under plaster; in pipes, cable ducts; in dry, damp or wet environments.
- EIB installation mainly consists of sensors/command-transmitters (e.g. light barriers, switches, thermostats, infrared, wind meters, timers), and actuators (e.g. engines, heaters, ventilators, lights, blinds).
- KNX technology was formed from the merging of three established European bus standards: EIP, EHS (household appliances and consumer electronics) and Batibus (heating/ventilation/air conditioning).

**Product features**
- Serial data transmission
- EIB cable has been tested at 4 kV (1 min.) in a water bath

**Product Make-up**
- **UNITRONIC® BUS EIB**
  - Bare solid copper wire
  - Core insulation: PVC
  - 2x2x0.8: red and black, white and yellow
  - Overall aluminum foil
  - Outer sheath: PVC, green (RAL 6017)
- **UNITRONIC® BUS EIB COMBI**
  - Bare solid copper wire
  - Core insulation: PVC
  - 2x2x0.8 mm² + 3x1.5 mm²
  - Overall aluminum foil
  - Outer sheath: PVC, green (RAL 6017)

**Technical data**
- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- **Mutual capacitance**
  - (800 Hz) max. 100 nF/km
- **Peak operating voltage**
  - (not for power applications) 250 V
- **Conductor resistance**
  - (loop): max. 73.2 ohm/km
- **Minimum bending radius**
  - Fixed installation: 5 x outer diameter
- **Test voltage**
  - Core/core: 4000 V
- **Temperature range**
  - Fixed installation: -30°C to +70°C

**Article number** | **Article designation** | **Number of pairs and mm or mm² per conductor** | **Outer diameter [mm]** | **Copper index (kg/km)** | **Weight (kg/m)**
---|---|---|---|---|---
PVC
2170240 | UNITRONIC® BUS EIB | 2 x 2 x 0.8 | 6.6 | 21 | 54
2170242 | UNITRONIC® BUS EIB COMBI | 2 x 2 x 0.8 mm² + 3 x 1.5 mm² | 12.7 | 64 | 128
Halogen-free
2170241 | UNITRONIC® BUS EIB H | 2 x 2 x 0.8 | 6.6 | 21 | 54

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 100/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum.

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- SENSOR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
 UNITRONIC® SENSOR master cable

Benefits
- Cost efficient and rational wiring for S/A boxes with detachable master cable connection
- Can be used universally for S/A installations

Application range
- Automation technology
- Mechanical engineering
- Plant engineering
- Tool shop
- Automotive industry

Product features
- Cores for Power Supply: 3 x 0.75 mm² and 3 x 1.0 mm²
- Cores for Signalling cable: 4 x 0.34 mm², 8 x 0.5 mm², 16 x 0.5 mm²
- Suitable for drag chains
- Halogen-free according to VDE 0472-815
- Flame-retardant according to UL 1581 FT-2

Norm references / Approvals
- UL-AWM-Style 21198 (80 °C / 300 V)

Product Make-up
- Fine-wire, bare copper strand
- Single wire diameter: 0.34 mm² = (43 x 0.10 mm)
- 0.5 mm² = (19 x 0.18 mm)
- 0.75 mm² = (21 x 0.205 mm)
- 1.0 mm² = (55 x 0.15 mm)
- Core insulation: PP
- Outer sheath: PUR, black

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC001578
- ETIM 5.0/6.0 Class-Description: Flexible cable
- Conductor stranding: Stranded conductor, fine-wire
- Minimum bending radius: Flexing: 10 x outer diameter
- Temperature range:
  - Fixed installation: -40°C to +80°C
  - Flexing: -5°C to +80°C

Product Make-up
- Fine-wire, bare copper strand
- Single wire diameter: 0.34 mm² = (43 x 0.10 mm)
- 0.5 mm² = (19 x 0.18 mm)
- 0.75 mm² = (21 x 0.205 mm)
- 1.0 mm² = (55 x 0.15 mm)
- Core insulation: PP
- Outer sheath: PUR, black

Article number   Article designation  Dimensions (mm²)  Outer diameter [mm]  Core/outer sheath material  Copper index [kg/km]

UNITRONIC® SENSOR COMBI
7038880  Li9Y11Y  3 x 0.75 + 4 x 0.34  6.6  PP/PUR  34.5
7038881  Li9Y11Y  3 x 1.0 + 8 x 0.5  8.4  PP/PUR  67.2
7038882  Li9Y11Y  3 x 1.0 + 16 x 0.5  9.8  PP/PUR  105.6

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Packaging size: Coil 100m
Cables are printed
Other variations are available upon request.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.
For detailed technical information please refer to the data sheet.

Accessories
- Distribution Box M12 refer to page 110

For current information see: www.lappgroup.com
UNITRONIC® SENSOR
Flexible cable for sensor/actuator cabling

**Benefits**
- Easy cable preparation
- UL recognized (LiFYY A)

**Product make-up**
- Core/outer sheath material: PVC, PUR
- Colour-code: 3-pin: bn, bu, bk
- 4-pin: bn, wh, bu, bk
- 5-pin: bn, wh, bu, bk, bk
- Core insulation: PVC
- UL recognized (LiFYY A)
- Space-saving due to compact dimensions
- Easy installation (through cable trays, tubes, cabinets)
- Easy stripping and processing

**Application range**
- Automation technology
- Sensor/actuator cabling

**Norm references / Approvals**
- UL recognized (LiFYY A)

**Technical data**
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC001578
- ETIM 5.0/6.0 Class-Description: Flexible cable
- Peak operating voltage: 300 V (not for power applications)
- Conductor stranding: Extra-fine wire according to VDE 0295, class 6
- Minimum bending radius: 15 x outer diameter (fixed installation), 8 x outer diameter (flexing)
- Temperature range:
  - PVC/PVC: Fixed installation: -40°C to +80°C, Flexing: -5°C to +80°C
  - PVC/PUR: Fixed installation: -30°C to +80°C, Flexing: -10°C to +80°C

**Article number**
- UNITRONIC® SENSOR PVC
- UNITRONIC® SENSOR PVC UL
- UNITRONIC® SENSOR PVC/PUR

**Article designation**
- LifYY
- LifYY A
- LifYY11Y

**Dimensions**
- Outer diameter [mm] 3.8 4.2 4.1 4.4 4.8

**Core material**
- PVC/PVC

**Colour**
- Black

**UL Copper index [kg/km]**
- 7.5
- 10.2
- 9.8
- 13.1
- 13.5

**Other accessories**
- EPIC® SENSOR M12 refer to page 103
- EPIC® SENSOR M8 refer to page 100
- SENSOR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
UNITRONIC® SENSOR FD
High flexible cable for sensor/actuator cabling for use in drag chains, halogen-free

**Benefits**
- Designs for highly flexible use
- Abrasion-resistant
- Wear-resistant
- Space-saving due to compact dimensions

**Application range**
- Automation technology
- Sensor/actuator cabling
- Mechanical and plant engineering
- Assembly and production lines

**Product features**
- UV-resistant
- Halogen-free according to VDE 0472-815
- Flame-retardant according to IEC 60332-2-2, UL 1581 FT-2
- Suitable for drag chains
- Designed for 4 million alternating bending cycles and travel distances up to 10 m

**Norm references / Approvals**
- UL AWM Style 20549

**Product Make-up**
- Extra-fine wire strand made of bare copper wires
- Core insulation: PP
- Colour-code:
  - 3-pin: bn, bu, bk
  - 4-pin: bn, wh, bu, bk
  - 5-pin: bn, wh, bu, bk, gy
  - 8-pin: bn, wh, gn, ye, gy, pk, bu, rd
- Outer sheath: PUR, black

**Technical data**
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC001578
  - ETIM 5.0/6.0 Class-Description: Flexible cable
- Peak operating voltage
  - 300 V (not for power applications)
- Conductor stranding
  - Extra-fine wire acc. to VDE 0295, class 6/ IEC 60228 class 6
- Minimum bending radius
  - Fixed installation: 5 x outer diameter
  - Flexing: 10 x outer diameter
- Temperature range
  - Occasional flexing: -25°C to +80°C
  - Fixed installation: -40°C to +80°C

**Article numbers and specifications**

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Dimensions (mm²)</th>
<th>Outer diameter [mm]</th>
<th>Core/outer sheath material</th>
<th>Colour</th>
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<td>27.5</td>
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</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Other types of composition are available upon request.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- EPIC® SENSOR M12 refer to page 103
- EPIC® SENSOR M12 V4A refer to page 104
- EPIC® SENSOR M8 refer to page 100
- STAR STRIP stripping tool refer to main catalogue 2018/19
- SMART STRIP stripping tool refer to main catalogue 2018/19
UNITRONIC® ROBUST S/A FD
High flexible, halogen-free sensor/actuator cable - resistant to a wide range of chemical media

Benefits
- Outstanding weather, ozone and UV resistance together with a wide temperature range enable versatile use for indoor and outdoor applications
- Resistant against organic oils, emulsions, greases and waxes based on organic, animal or synthetic
- Good resistance to cold and hot water as well as water-soluble cleaning and cooling agents
- Well-suited to steam cleaning
- Good resistance to ammonia compounds and bio-gases

Application range
- Automation technology
- Machine tool building, medical technology, laundries, car washing equipment, chemical industry, composting plants, sewage works
- Food and beverage industry, especially for production and processing equipment of milk and meat products

Product features
- Good chemical resistance to ester-based hydraulic fluids
- Ozone, UV and weather-resistant according to EN 50396 and HD 605 S2
- Suitable for drag chains
- Torsion-resistant
- Halogen-free

Norm references / Approvals
- Certified resistance to disinfection and cleaning solutions used in food and beverage industry
- ECOLAB® Industry standard in the field of professional cleaning and disinfection in the food and beverage industry

Product Make-up
- Extra-fine wire strand made of bare copper
- Core insulation: PE
- Colour-code:
  - 3-pin: bn, bu, bk
  - 4-pin: bn, wh, bu, bk
  - 5-pin: bn, wh, bu, bk, gy
- Outer sheath made of special TPE
- Color of the outer jacket: Black

Technical data
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC001578
  - ETIM 5.0/6.0 Class-Description: Flexible cable
- Core identification code acc. to EN 60947-5-2
- Conductor stranding
  - Extra-fine wire according to VDE 0295, class 6/IEC 60228 class 6
- Minimum bending radius
  - Flexing: 5 x outer diameter
  - Fixed installation: 3 x outer diameter
- Temperature range
  - Flexing: -40°C to +90°C
  - Fixed installation: -50°C to +90°C

Artwork number | Dimensions (mm²) | Outer diameter [mm] | Colour | Copper index [kg/km]
--- | --- | --- | --- | ---
UNITRONIC® ROBUST S/A FD
7038897 | 4x0.25 | 4.9 | black | 10.2
7038895 | 3 x 0.34 | 5 | black | 9.6
7038894 | 4 x 0.34 | 5.4 | black | 13.1
7038896 | 5 x 0.34 | 5.9 | black | 16

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Other types of composition are available upon request.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- EPIC® SENSOR M12 refer to page 103
- EPIC® SENSOR M8 refer to page 100
- EPIC® SENSOR M12 V4A refer to page 104
- STAR STRIP stripping tool refer to main catalogue 2018/19
Data communication systems
Sensor/actuator cabling • M8 Field mountable connectors and wall ducts

EPIC® SENSOR M8
Field mountable connectors M8

Benefits
- Easy connection with proven screw clamp connection
- For creating of individual cable lengths
- Quick and easy on-site assembly
- No special tools required for connecting the cables
- Time-saving assembly with IDC connection technology

Product features
- 3 and 4-pin version
- Version with piercing, insulation displacement contacts (IDC) or screw connection
- PWIS-free

Suitable cables
- UNITRONIC® SENSOR Page 97
- UNITRONIC® SENSOR FD Page 98
- UNITRONIC® ROBUST S/A FD Page 99

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
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<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID: EC002062</td>
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<tr>
<td>ETIM 5.0/6.0 Class-Description: Sensor-actuator connector</td>
</tr>
</tbody>
</table>

Material
- Contact: CuZn
- Contact surface: Au (gold)

Protection rating
- IP 65/67 (IDC)
- IP 68 (piercing)
- IP 67 (screw)

Ambient temperature (operation)
- Plug/socket
  - -25°C to +80°C (IDC)
  - -25°C to +85°C (piercing)
  - -40°C to +85°C (screw)

Coding
- A-standard

Rated current (A)
- 4 A

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Connection type</th>
<th>Cross-section in mm²</th>
<th>Cable diameter in mm</th>
<th>Rated voltage (V)</th>
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</tbody>
</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
Benefits
- Flexible connection solutions for individual device concepts
- Simple installation in devices (e.g., cabinet)

Application range
- Connection of enclosures and cabinets

Product features
- M8 fastening thread
- Designs for front mounting
- PWIS-free

Product Make-up
- TPE single strands, l = 0.5 m
- Core cross section: 0.25 mm²

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC002061
  ETIM 5.0/6.0 Class-Description: Sensor-actuator connector chassis
- Material
  Contact: CuSn
  Contact surface: Ag
- Protection rating
  IP 67
- Ambient temperature (operation)
  Plug/socket
  -25°C to +85°C
- Coding
  A-standard
- Rated current (A)
  4 A

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Rated voltage (V)</th>
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- Matching fitting nut: 22260104

For current information see: www.lappgroup.com
UNITRONIC® SENSOR HD M12
S/A cable: Hygienic Design for Food&Beverage

**Benefits**
- Hygienic Design for ideal cleaning results
- Guaranteed density by meeting the highest protection class
- Stainless steel knurl to ensure protection against corrosion
- Bright colors to detect contamination quickly

**Application range**
- Food production and packaging machinery
- Freezing plants, cold storage
- Washdown area with frequent contact with cleaning agents

**Product features**
- Suitable for drag chains
- 4-pin plug/socket M12 on free conductor end

**Norm references / Approvals**
- ECOLAB® Industry standard in the field of professional cleaning and disinfection in the food and beverage industry
- FDA 21 CFR 177.2600
- Special sealing element for food and beverage industry in North America

**Product Make-up**
- Wire cross-section: 0.34 mm²
- Colour-code: 4-pin: bn (1), wh (2), bu (3), bk (4)
- Outer sheath: TPE halogen-free, grey (similar to RAL 7035)

**Technical data**
- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC001855
  - ETIM 5.0/6.0 Class-Description: Sensor-actuator patch cord
- **Material**
  - Contact: CuSn
  - Contact surface: Ni/Au
  - Knurl: Stainless steel (V4A)
  - Gripping body: PP
- **Minimum bending radius**
  - Fixed installation: 5 x outer diameter
  - Flexing: 10 x outer diameter
- **Protection rating**
  - IP65/IP67/IP68/IP69
- **Ambient temperature (operation)**
  - Fixed installation: -40°C to +105°C
  - Flexing: -25°C to +105°C
- **Coding**
  - A-standard
- **Rated current (A)**
  - 4 A

**Table**

<table>
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<tr>
<th>Article number</th>
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<th>Number of pins</th>
<th>Length (m)</th>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

No copper surcharge.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- EPIC® SENSOR M12 refer to page 103
- EPIC® SENSOR M12 V4A refer to page 104
- EPIC® SENSOR M12/M12 refer to page 105
### Benefits
- For creating of individual cable lengths
- No special tools required for connecting the cables
- Time-saving assembly with IDC connection technology
- Easy connection with proven screw clamp connection

### Product features
- 4, 5 and 8-pin version
- Screened and non-screened version
- Screw connection or insulation displacement contacts (IDC)
- PWIS-free

### Technical data
- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC002062
  - ETIM 5.0/6.0 Class-Description: Sensor-actuator connector
- **Material**
  - Contact: CuZn
  - Contact surface: CuSnZn
- **Protection rating**
  - IP 65/IP 67 (IDC)
  - IP 67 (screw)
- **Ambient temperature (operation)**
  - Plug/socket: -25°C to +80°C (IDC), -40°C to +85°C (screw)
- **Coding**
  - A-standard
- **Rated current (A)**
  - 4 A
  - 2 A (8-pin)

### Article data

<table>
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
Data communication systems

Sensor/actuator cabling • M12 Field mountable connectors and wall ducts

**EPIC® SENSOR M12 V4A**
Field mountable connectors M12 for Food & Beverage/Outdoor

**Benefits**
- Stainless steel knurl to ensure protection against corrosion
- Quick and easy on-site assembly
- For creating of individual cable lengths
- Space-saving due to compact dimensions
- Easy connection with proven screw clamp connection

**Application range**
- Automation systems
- Conveyor and transport systems
- Food production and packaging machinery
- Version SKINTOP® for Outdoor applications

**Product features**
- 4-pin connector
- Screw connection
- PWIS-free

**Technical data**
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC002062
  - ETIM 5.0/6.0 Class-Description: Sensor-actuator connector
- Material
  - Contact: CuZn
  - Contact surface: Au (gold)
  - Knurl: Stainless steel (V4A)
- Protection rating
  - IP 67
- Ambient temperature (operation)
  - Plug/socket -40°C to +85°C
- Coding
  - A-standard
  - Rated current (A)
  - 4 A

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Cross-section in mm²</th>
<th>Cable diameter in mm</th>
<th>Rated voltage (V)</th>
<th>PU</th>
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<td>Plug, straight</td>
<td>22262049</td>
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<td>0.25 - 0.75</td>
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<td>AB-C4-M12MS-PG7-VA-SKINTOP</td>
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</tbody>
</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
EPIC® SENSOR M12/M12

M12 control cabinet feed-through, shielded for CAN/DeviceNet/ S/A cabling

**Benefits**
- Plug & Play for flexible connection solutions
- M12 connector on both sides

**Product features**
- For CANopen/DeviceNet applications
- For sensor/actuator cabling
- Bipolar/screw mounting

**Product Make-up**
- 5-pin control cabinet feed-through, M12 A-coded
- M12 plug on M12 socket
- Screened version

**Technical data**

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
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<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID: EC002061</td>
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<tr>
<td>ETIM 5.0/6.0 Class-Description: Sensor-actuator connector chassis</td>
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</tbody>
</table>

**Material**
- Contact: CuZn
- Contact surface: Au (gold)
- Contact carrier: PA 66
- Knurl: Nickel-plated brass
- Sealing: FKM

**Protection rating**
- IP 67

**Ambient temperature (operation)**
- Plug/socket: -25°C to +85°C

**Coding**
- A - Standard
- (CANopen/DeviceNet/CC-Link)

**Rated current (A)**
- 4 A

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Rated voltage (V)</th>
<th>PU</th>
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<td>AB-C5-DS-M12MS-M12FS-M16-SH</td>
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<td>24</td>
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Data communication systems
Sensor/actuator cabling • M12 Field mountable connectors and wall ducts

EPIC® SENSOR Flush-type M12

Benefits
• Flexible connection solutions for individual device concepts
• Simple installation in devices (e.g. cabinet)
• Outside plugable with M12 connection, inside housing connected with fixed wires

Application range
• Connection of enclosures and cabinets

Product features
• With M12, M16 or PG9 fastening thread
• Designs for front and rear wall-mounting
• M12 connector, A-coded with quick-locking system
• PWIS-free
• Rear wall-mounting versions inclusive fitting nut

Norm references / Approvals
• UL File Number: E249137

Product Make-up
• TPE single strands, l = 0.5 m
• Wire cross-section: 0,34 mm²

Article number   Article designation   Number of pins   Fastening thread   Rated voltage (V)   PU
Plug for front-mounting
22260108   AB-C4-M12MS-M16-0,5   4   M16   250   1
22260106   AB-C5-M12MS-M16-0,5   5   M16   60   1
22260083   AB-C4-M12MS-M16-PG9-0,5   4   M16 positional   250   1
22260084   AB-C5-M12MS-M16-PG9-0,5   5   M16 positional   60   1
22260113   AB-C4-M12MS-PG9-0,5   4   PG9   250   1
22260112   AB-C5-M12MS-PG9-0,5   5   PG9   60   1
22260087   AB-C4-M12MS-PG9-PO-0,5   4   PG9 positional   250   1
22260088   AB-C5-M12MS-PG9-PO-0,5   5   PG9 positional   60   1
Plug for rear-mounting
22260999   AB-C4-DSI-M12MS-M12-0,5   4   M12   250   1
22260117   AB-C4-DSI-M12MS-PG9-0,5   4   PG9   250   1
22260115   AB-C5-DSI-M12MS-PG9-0,5   5   PG9   60   1
Socket for front-mounting
22260107   AB-C4-M12FS-M16-0,5   4   M16   250   1
22260105   AB-C5-M12FS-M16-0,5   5   M16   60   1
22260085   AB-C4-M12FS-M16-PG9-0,5   4   M16 positional   250   1
22260086   AB-C5-M12FS-M16-PG9-0,5   5   M16 positional   60   1
22260114   AB-C4-M12FS-PG9-0,5   4   PG9   250   1
22260111   AB-C5-M12FS-PG9-0,5   5   PG9   60   1
22260089   AB-C4-M12FS-PG9-PO-0,5   4   PG9 positional   250   1
22260090   AB-C5-M12FS-PG9-PO-0,5   5   PG9 positional   60   1
Socket for rear-mounting
22260118   AB-C4-DSI-M12FS-PG9-0,5   4   PG9   250   1
22260116   AB-C5-DSI-M12FS-PG9-0,5   5   PG9   60   1

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: inclusive of copper. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC002061
ETIM 5.0/6.0 Class-Description: Sensor-actuator connector chassis
Material
Contact: CuZn
Contact surface: Au (gold)
Protection rating
IP 67
Ambient temperature (operation)
Plug/socket
-25°C to +85°C
Coding
A-standard
Rated current (A)
4 A

Accessories
• Matching fitting nut: 22261062 (M12), 52003500 (PG9), 22260110 (M16)
**EPIC® SENSOR M12 T-distributor**

M12 T parallel distributor for CAN/ DeviceNet/ S/A cabling

**Benefits**
- Cost-effective, efficient wiring of fieldbus and sensor/actuator installations
- Space-saving due to compact dimensions
- Robust design

**Product features**
- PWIS-free

**Product Make-up**
- 5-pin parallel distributor
- M12 socket on M12 plug and M12 socket

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### Technical data

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<td>ETIM 5.0/6.0 Class-Description: Passive sensor-actuator interface</td>
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**Material**
- Contact: CuZn
- Contact surface: Ni/Au
- Contact carrier: TPU GF
- Knurl: Zinc die-cast, nickel-plated
- Gripping body: TPU, flame-retardant, self-extinguishing
- Sealing: NBR

**Protection rating**
- IP65/IP67

**Ambient temperature (operation)**
- Plug/Socket: -25°C to +90°C

**Coding**
- A - Standard
- (CANopen/DeviceNet/CC-Link)
- Rated current (A): 4 A

### Article number | Article designation | PU
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<td>22260765</td>
<td>AB-C5-M12T-2XM12FS DN 5</td>
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**EPIC® SENSOR CCR**

Cable coupler round, shielded for e.g. sensor-actuator / PROFIBUS / CAN cables

**Benefits**
- Optimum EMC protection with 360 ° shielding
- Time-saving assembly with IDC connection technology

**Application range**
- To extend existing cable systems
- Repairkit for damaged cables

**Product features**
- 5-pin cable coupler round
- Screened version

### Technical data

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**Material**
- Contact: CuZn
- Contact surface: Ni/Au
- Knurl: Zinc die-cast, nickel-plated
- Gripping body: Zinc die-cast, nickel-plated

**Protection rating**
- IP65/IP67

**Ambient temperature (operation)**
- -40°C to +85°C

**Rated current (A):** 4 A

### Article number | Article designation | Number of pins | Cross-section in mm² | Cable diameter in mm | Rated voltage (V)
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<td>21700641</td>
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<td>5</td>
<td>18.00 - 26.00</td>
<td>5.0 - 9.7</td>
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DeviceNet is a registered trademark of ODVA

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Data communication systems
Sensor/actuator cabling • Y connectors

EPIC® SENSOR M8Y | M12Y
Y distributor M8 | M12

Benefits
• Cost-saving due to quick and easy installation
• Space-saving due to compact dimensions
• Fast and easy error tracking

Product features
• Design: Plug on 2x socket
• M12 design with screw hole
• PWIS-free

Product Make-up
• 22260600: M12, 3-pin+ PE, straight M12 plug on 2x straight M12 socket, pin 2+4 bridged
• 22260601: M12, 3-pin+ PE, straight M12 plug on 2x straight M12 socket
• 22260602: M12, 5-pin straight M12 plug on 2x 3-pin straight M8 socket, parallel distributor
• 22260603: M8, 4-pin M8 plug on 2x 3pin M8 socket
• 22260604: M8 plug on M8 socket, 3-pin parallel distributor

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC002062
ETIM 5.0/6.0 Class-Description: Sensor-actuator connector

Material
Contact: CuZn
Contact surface: Ni/Au
Knurl: Zinc die-cast, nickel-plated
Gripping body: TPU, flame-retardant, self-extinguishing

Protection rating
IP65/IP67

Ambient temperature (operation)
Plug/socket: -25°C to +90°C

Coding
A-standard
Rated current (A)
4 A

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<th>Article number</th>
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<td>5</td>
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</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Benefits
- Cost efficient and rational wiring of sensors and actuators
- Instead of numerous individual conductors, one master cable is laid to the control unit
- Hybrid cable for signal and power transmission
- There are no assembly costs as the master cable is already pre-assembled
- Suitable for drag chains

Product features
- Single-occupied boxes
- With fixed master cable or M12/M16 socket
- LEDs indicate the operating mode of the distributor and the status of the sensors
- PWIS-free

Norm references / Approvals
- E-File number: E75770

Product Make-up
- Core insulation: PVC
- Outer sheath: PUR, black

Suitable cables
- M12 master cable
  - 8-pos. 5/10 m: 22260065/22260616
  - M16 master cable
    - 8-pos 5/10m: 22260607/22260608
    - 10-pos 5/10m: 22260609/22260610
    - 12-pos 5/10m: 22260611/22260612
    - 14-pos 5/10m: 22260613/22260614

Suitable tools
- Suitable tools are available upon request (e.g. M8 torque screwdriver)

Technical data
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC002585
  - ETIM 5.0/6.0 Class-Description: Passive sensor-actuator interface

Protection rating
- IP65/IP67

Ambient temperature (operation)
- -30°C to +80°C
- Fixed installation: -40°C to +90°C
- Flexing: -5°C to 80°C

Current rating per slot
- 2 A

Article number | Article designation | Connection cable (No. of poles) | Length (m) | Number of slots | Status display
---|---|---|---|---|---
Fixed master cable
22260026 | AB-B4-M8L-4-5,0PUR | 5 | 4 | With LEDs
22260027 | AB-B4-M8L-4-10,0PUR | 10 | 4 | With LEDs
22260028 | AB-B6-M8L-6-5,0PUR | 5 | 6 | With LEDs
22260029 | AB-B6-M8L-6-10,0PUR | 10 | 6 | With LEDs
22260030 | AB-B8-M8L-8-5,0PUR | 5 | 8 | With LEDs
22260031 | AB-B8-M8L-8-10,0PUR | 10 | 8 | With LEDs
22260032 | AB-B10-M8L-10-5,0PUR | 5 | 10 | With LEDs
22260033 | AB-B10-M8L-10-10,0PUR | 10 | 10 | With LEDs
M12 connection
22260038 | AB-B4-M8L-4-M12 | 8 | 4 | With LEDs
22260039 | AB-B6-M8L-6-M12 | 8 | 6 | With LEDs
M16 connection
22260034 | AB-B4-M8L-4-M16 | 8 | 4 | With LEDs
22260035 | AB-B6-M8L-6-M16 | 10 | 6 | With LEDs
22260036 | AB-B8-M8L-8-M16 | 12 | 8 | With LEDs
22260037 | AB-B10-M8L-10-M16 | 14 | 10 | With LEDs

Copper price basis: inclusive of copper. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Unoccupied slots must be covered with protective caps - ArtNo. 22260606 (M8); 22260605 (M12).
Data communication systems
Sensor/actuator cabling • Distribution boxes

Distribution Box M12
Distribution box with M12 slots and master cable/mountable/M23 connection

Benefits
• Cost efficient and rational wiring of sensors and actuators
• Instead of numerous individual conductors, one master cable is laid to the control unit
• Hybrid cable for signal and power transmission
• Suitable for drag chains
• PWIS-free

Product features
• With fixed master cable, mountable or M23 socket
• Single or double-occupied sensor/actuator box
• M12 quick-locking system, optional LED diagnostic

Norm references / Approvals
• E-File number: E75770

Product Make-up
• Core insulation: PVC
• Outer sheath: PUR, black

Suitable cables
• UNITRONIC® SENSOR master cable

Suitable tools
• Suitable tools are available upon request (e.g. M12 torque screwdriver)

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID: EC002585</td>
</tr>
<tr>
<td>ETIM 5.0/6.0 Class-Description: Passive sensor-actuator interface</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protection rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP65/IP67 (M23 connection)</td>
</tr>
<tr>
<td>IP65/IP67/IP69</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Ambient temperature (operation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25°C to +75°C (M23 connection)</td>
</tr>
<tr>
<td>-30°C to +90°C</td>
</tr>
<tr>
<td>Fixed installation -40°C to +90°C</td>
</tr>
<tr>
<td>Flexing -5°C bis +80°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Max. current rating per path</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current rating per slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Length (m)</th>
<th>Number of slots</th>
<th>Status display</th>
</tr>
</thead>
</table>

Single-occupied boxes

<table>
<thead>
<tr>
<th>Fixed master cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>22260010 AB-B4-M12-4-5,PUR 5 4 no</td>
</tr>
<tr>
<td>22260011 AB-B4-M12-4-10,PUR 10 4 no</td>
</tr>
<tr>
<td>22260014 AB-B8-M12-8-5,PUR 5 8 no</td>
</tr>
<tr>
<td>22260015 AB-B8-M12-8-10,PUR 10 8 no</td>
</tr>
<tr>
<td>22260018 AB-B4-M12L-4-5,PUR 5 4 With LEDs</td>
</tr>
<tr>
<td>22260019 AB-B4-M12L-4-10,PUR 10 4 With LEDs</td>
</tr>
<tr>
<td>22260970 AB-B6-M12L-6-5,PUR 5 6 With LEDs</td>
</tr>
<tr>
<td>22260022 AB-B8-M12L-8-5,PUR 5 8 With LEDs</td>
</tr>
<tr>
<td>22260023 AB-B8-M12L-8-10,PUR 10 8 With LEDs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field mountable</th>
</tr>
</thead>
<tbody>
<tr>
<td>22260005 AB-B4-M12-4-C 4 no</td>
</tr>
<tr>
<td>22260007 AB-B8-M12-8-C 8 no</td>
</tr>
<tr>
<td>22260001 AB-B4-M12L-4-C 4 With LEDs</td>
</tr>
<tr>
<td>22260003 AB-B8-M12L-8-C 8 With LEDs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M23 connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>22260618 AB-B8-6-L-M23 6 With LEDs</td>
</tr>
<tr>
<td>22260619 AB-B8-8-L-M23 8 With LEDs</td>
</tr>
</tbody>
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Double-occupied boxes

<table>
<thead>
<tr>
<th>Fixed master cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>22260012 AB-B4-M12-8-5,PUR 5 4 no</td>
</tr>
<tr>
<td>22260013 AB-B4-M12-8-10,PUR 10 4 no</td>
</tr>
<tr>
<td>22260016 AB-B8-M12-16-5,PUR 5 8 no</td>
</tr>
<tr>
<td>22260017 AB-B8-M12-16-10,PUR 10 8 no</td>
</tr>
<tr>
<td>22260020 AB-B4-M12L-8-5,PUR 5 4 With LEDs</td>
</tr>
<tr>
<td>22260021 AB-B4-M12L-8-10,PUR 10 4 With LEDs</td>
</tr>
<tr>
<td>22260024 AB-B8-M12L-16-5,PUR 5 8 With LEDs</td>
</tr>
<tr>
<td>22260025 AB-B8-M12L-16-10,PUR 10 8 With LEDs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field mountable</th>
</tr>
</thead>
<tbody>
<tr>
<td>22260006 AB-B4-M12-8-C 4 no</td>
</tr>
<tr>
<td>22260008 AB-B8-M12-16-C 8 no</td>
</tr>
<tr>
<td>22260002 AB-B4-M12L-8-C 4 With LEDs</td>
</tr>
<tr>
<td>22260004 AB-B8-M12L-16-C 8 With LEDs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M23 connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>22260621 AB-B8-16-M23 8 no</td>
</tr>
<tr>
<td>22260620 AB-B8-16-L-M23 8 With LEDs</td>
</tr>
</tbody>
</table>

Copper price basis: inclusive of copper. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Unoccupied slots must be covered with protective caps - ArtNo. 22260606 (M8); 22260605 (M12). UL certifications can be found in the data sheet.

For current information see: www.lappgroup.com
UNITRONIC® SENSOR M12 Power
Power cable: M12 plug/socket on free conductor

Benefits
• Cost-effective, efficient wiring of fieldbus and sensor/actuator installations
• Space-saving due to compact dimensions
• Customise assembly of the free conductor end

Product features
• 4-core power cable
• M12 connector, A-coded with quick-locking system
• Including tag carrier
• Suitable for drag chains
• PWIS-free

Product Make-up
• 4 x 0.75 mm²
• 4-pin: bn (1), wh (2), bu (3), bk (4)
• Core insulation: PVC
• Outer sheath: PUR, black
• Outer diameter: 5.9 mm

Suitable tools
• DATA STRIP stripping tool refer to main catalogue 2018/19

Suitable connectors
• EPIC® SENSOR M12 Page 103

Technical data

Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC001855
ETIM 5.0/6.0 Class-Description: Sensor-actuator patch cord

Material
Contact: CuSn
Contact surface: Ni/Au
Knurl: Zinc die-cast, nickel-plated
Gripping body: TPU, flame-retardant, self-extinguishing

Minimum bending radius
Flexing: 10 x outer diameter

Protection rating
IP65/IP67

Ambient temperature (operation)
Plug/socket -25°C to +90°C
Fixed installation -25°C to +80°C
Flexing: -5°C to +80°C

Coding
A-standard

Rated current (A)
4 A

Table: Article numbers and specifications

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pins</th>
<th>Length (m)</th>
<th>Design</th>
<th>Rated voltage (V)</th>
<th>PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight connector</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22260778</td>
<td>AB-PC4-M12MS-2,0PUR</td>
<td>4</td>
<td>2</td>
<td>straight</td>
<td>250</td>
<td>1</td>
</tr>
<tr>
<td>22260779</td>
<td>AB-PC4-M12MS-5,0PUR</td>
<td>4</td>
<td>5</td>
<td>straight</td>
<td>250</td>
<td>1</td>
</tr>
<tr>
<td>22260780</td>
<td>AB-PC4-M12MS-10,0PUR</td>
<td>4</td>
<td>10</td>
<td>straight</td>
<td>250</td>
<td>1</td>
</tr>
<tr>
<td>Straight socket</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22260781</td>
<td>AB-PC4-2,0PUR-M12FS</td>
<td>4</td>
<td>2</td>
<td>straight</td>
<td>250</td>
<td>1</td>
</tr>
<tr>
<td>22260782</td>
<td>AB-PC4-5,0PUR-M12FS</td>
<td>4</td>
<td>5</td>
<td>straight</td>
<td>250</td>
<td>1</td>
</tr>
<tr>
<td>22260783</td>
<td>AB-PC4-10,0PUR-M12FS</td>
<td>4</td>
<td>10</td>
<td>straight</td>
<td>250</td>
<td>1</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Copper price basis: inclusive of copper. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
• FLEXIMARK® Label LMB refer to main catalogue 2018/19
EPIC® POWER M12 60V
Field mountable M12 POWER connectors

Benefits
- Compact and standardized M12 design saves space and costs
- Fault proof connection through M12 T coding of the connector face
- Low voltage drop
- Safety use in field environment by high protection class

Application range
- Power Supply for small devices
- Tool shop
- Wiring of machines, tools, devices, appliances and control cabinets
- Suitable for use in measuring, control and regulating circuits

Product features
- Robust M12 circular connector with screw connection and knurled screw
- Screw-on terminals for different conductors

Norm references / Approvals
- UL File Number: E249137

Product Make-up
- PVC single stranded wires, l = 0.2 m (4x AWG16)
- 4-pin: bn (1), wh (2), bu (3), bk (4)
- High quality gold-plated contacts
- For screw contacts: 0.75 mm² - 1.5 mm² (AWG 18 - AWG 16)

Suitable cables
- ÖLFLEX® FD 855 P refer to main catalogue 2018/19
- ÖLFLEX® FD 855 P: Example for harsh conditions

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC002062
ETIM 5.0/6.0 Class-Description: Sensor-actuator connector

Material
Contact: CuZn
Contact surface: Au (gold)
Knurl: Zinc die-cast, nickel-plated
Gripping body: PA

Protection rating
IP 67

Ambient temperature (operation)
Plug/socket -40°C to +85°C

Coding
T - Power

Rated current (A)
12 A

Article number  Article designation  Design  Number of pins  Cable diameter in mm  Rated voltage (V)  PU
EPIC® POWER M12 60V
Plug
22262010  AB-C4-M12MST-PG11  straight  4  8.0 - 10.0  60  1
22262012  AB-C4-M12MAT-PG11  angled  4  8.0 - 10.0  60  1
Socket
22262011  AB-C4-M12FST-PG11  straight  4  8.0 - 10.0  60  1
22262013  AB-C4-M12FAT-PG11  angled  4  8.0 - 10.0  60  1

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
ETHERLINE®
Data communication systems for ETHERNET technology
Industrial Data Communication by LAPP.
The right solution for every application

- ETHERLINE® ACCESS U05T, U08T
- ETHERLINE® PN FLEX Cat.5 RJ45/RJ45
- EPIC® DATA RJ45
- ETHERLINE® TRAY ER PN Y FC
• HITRONIC® HRH Breakout Cable
• LC Connector Multimode
• ETHERLINE® LAN 1600 S/FTP Cat.7a LSZH
• EPIC® DATA HS RJ45F Cat.6a (DIN Rail Adapter)

• EPIC® DATA M12X
• ETHERLINE® TORSION Cat.7
• EPIC® DATA RJ45

• ETHERLINE® PN FD Cat.5 M12D
• EPIC® DATA M12 D Cabinet Feedthrough
Data communication systems for ETHERNET technology

Ethernet is the leading standard for computer networks in office buildings. However, due to its widespread availability, reliability, and performance, it is increasingly prevalent in industrial environments as well.

Our ETHERLINE® portfolio offers comprehensive solutions for your Ethernet network. You can always rely on our high-quality products to avoid downtimes and expensive breakdowns.

LAPP places great importance on fitting products and strives to offer the best solution possible for your application. Our large ETHERLINE® portfolio offers solutions for varied applications in industrial environments as well as for structured building cabling. We offer matching field-mountable connectors and pre-assembled patch cables for your applications.

The portfolio is completed by our ETHERLINE® ACCESS-products. These robust, managed and unmanaged switches are the perfect network devices for a demanding and industrial environment. This allows us to provide you with end-to-end solutions from just one source.

Our products are thoroughly tested in our in-house laboratory to ensure that we can provide the quality that you have come to expect from us.

ETHERLINE® – Industrial Ethernet

- Resilient cabling solutions for demanding industrial Ethernet applications
- Compliance with international standards (e.g. PROFINET®)
- Field-mountable connectors – quick assembly and reliable without special tools
- Pre-assembled patch cables with overmolded connectors

ETHERLINE® LAN – Structured building cabling

- Cables ranging from Cat.5e up to Cat.7a
- Transmission frequencies up to 1600MHz
- Office patch cables complying with Cat.6a
- Field-mountable connectors as well as accessories

ETHERLINE® ACCESS – Industrial data communication

- Reliable and robust industrial Ethernet switches
- Easy construction of redundant networks with quick reconfiguration time of less than 20 ms
- High quality and availability of industrial networks
- Wide range of diagnosis functions

The solution for all industrial communication systems

The ETHERLINE® system supports all common industrial Ethernet systems like PROFINET®, EtherNet/IP®, CC-Link® IE or EtherCAT®.

**Type specification according to the PROFINET® Guideline**

PROFINET® is an international standard for communication systems that defines the cabling within and between production islands. The PROFINET® system specifies copper-based as well as fibre optic transmission media. Its foundation, the ‘PROFINET® Cabling and Interconnection Technology Guideline’, defines three cable types for copper-based cables. These types specify the exact structure and the mechanical and electrical properties.

<table>
<thead>
<tr>
<th>Number of pairs / Type of cable</th>
<th>Typ A</th>
<th>Typ B</th>
<th>Typ C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>For fixed installation</td>
<td>For flexible installation</td>
<td>For special application</td>
</tr>
<tr>
<td>2-pair (2x2)</td>
<td>AWG22/1</td>
<td>AWG22/7</td>
<td>AWG22/1...19</td>
</tr>
<tr>
<td>4-pair (4x2)</td>
<td>min. AWG23/1</td>
<td>min. AWG23/7</td>
<td>min. AWG24/1...19</td>
</tr>
</tbody>
</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Choosing the right cable material

Selection criterion Insulation and sheath materials

Every application makes its own demands of the cabling. The selection of the outer sheath material can be decisive in finding the suitable cable for an application.

To provide an overview of the properties of different sheath materials, the table (below left) lists four typical sheath materials that are used in PROFINET® applications.

The technical tables and the appendix in the LAPP main catalogue provide a detailed overview of all the properties of the ETHERLINE® and HITRONIC® cables.

Polyurethane (PUR) is used in cables and wires that are designed for permanent flexing, e.g. in drag chain applications or torsion applications. In this context, these cables must withstand high mechanical loads such as abrasion and lateral pressure.

Polyvinylchloride (PVC) is used in cables and wires that must meet requirements concerning resistance to chemical media or oil-resistance. PVC cables are also highly flame-retardant.

FRNC (flame-retardant non-corrosive) sheath materials are used wherever the absence of halogens is required in the context of a minor release of poisonous flue gas during a fire. These cables are frequently used as installation cables in the building infrastructure.

Polyethylene (PE) is normally used as a sheath material for cables that are suitable for direct burial. Further application areas include semi-permanent installation in water or outdoor applications. Together with carbon black (black sheath material), PE provides optimum protection against UV radiation.

Properties of insulation and sheathing of cables and wires

<table>
<thead>
<tr>
<th></th>
<th>PUR</th>
<th>PVC</th>
<th>FRNC</th>
<th>PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absence of halogens</td>
<td>+</td>
<td>--</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Flame retardance</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>*</td>
</tr>
<tr>
<td>Low flue gas development</td>
<td>*</td>
<td>-</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td>Low emissions of corrosive gases</td>
<td>*</td>
<td>--</td>
<td>++</td>
<td>*</td>
</tr>
<tr>
<td>Low flue gas toxicity</td>
<td>*</td>
<td>-</td>
<td>++</td>
<td>*</td>
</tr>
<tr>
<td>Abrasion resistance</td>
<td>++</td>
<td>+</td>
<td>-</td>
<td>*</td>
</tr>
<tr>
<td>Stripping</td>
<td>--</td>
<td>+</td>
<td>+</td>
<td>*</td>
</tr>
<tr>
<td>Oil-resistance</td>
<td>++</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Acids</td>
<td>--</td>
<td>+</td>
<td>--</td>
<td>++</td>
</tr>
</tbody>
</table>

Legend:  ++ = very good  + = good  * = moderate  - = low  -- = poor
Customized Fast Connect assembly solutions for data rates up to 10 Gbit/s

**The challenge**

In industrial production and manufacturing environments, ever larger data volumes must be processed within the shortest period of time. This results in increasing requirements for the cabling. This is because the products utilised must not only be designed for steadily growing data rates in the gigabyte range, but also be robust enough to ensure the reliability and operational safety of machines and systems.

**The solution**

As a systems supplier for connectivity solutions, we know precisely what is required in these situations. We can help you optimise your processes and offer you access to our comprehensive portfolio of innovative Fast Connect data cables. The Fast Connect structure facilitates assembly thanks to a specially-designed internal sheath and a cross separator instead of pair screening. Assembly time is reduced and all of the requirements for shielding and application are optimally fulfilled. There is no need for the time-consuming four-fold removal of the pair screening. With the appropriate tool, it is possible to directly strip down the cable to its twisted pairs. A proficient mechanic can remove both sheaths effortlessly on-site within five seconds.

**Incidentally:** To ensure faster identification, all of our Fast Connect data cables are marked with "FC" in the article designation.

<table>
<thead>
<tr>
<th>Article designation</th>
<th>Sheath material</th>
<th>Temperature range</th>
<th>Feature</th>
<th>Art. no.</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETHERLINE® PN Cat.6, Y FC 4x2xAWG23/1</td>
<td>PVC, green RAL6018</td>
<td>Fixed: -30°C to +80°C</td>
<td>Fast Connect, PROFINET®</td>
<td>2170583</td>
<td>157</td>
</tr>
<tr>
<td>ETHERLINE® PN Cat.6, FRNC FC 4x2xAWG23/1</td>
<td>PVC, green RAL6018</td>
<td>Fixed: -30°C to +80°C</td>
<td>Fast Connect, halogen-free, PROFINET®</td>
<td>2170584</td>
<td>157</td>
</tr>
<tr>
<td>ETHERLINE® PN Cat.6, P FC 4x2xAWG23/1</td>
<td>PUR, green RAL6018</td>
<td>Fixed: -40°C to +80°C</td>
<td>Fast Connect, halogen-free, PROFINET®</td>
<td>2170585</td>
<td>157</td>
</tr>
<tr>
<td>ETHERLINE® PN Cat.6, Y FLEX FC 4x2xAWG23/7</td>
<td>PUR, green RAL6018</td>
<td>Fixed: -30°C to +80°C, Flexing: -30°C to +75°C</td>
<td>Fast Connect, PROFINET®</td>
<td>2170586</td>
<td>159</td>
</tr>
<tr>
<td>ETHERLINE® PN Cat.6, FRNC FLEX FC 4x2xAWG23/7</td>
<td>FRNC, green RAL6018</td>
<td>Fixed: -30°C to +80°C, Flexing: -30°C to +75°C</td>
<td>Fast Connect, halogen-free, PROFINET®</td>
<td>2170587</td>
<td>159</td>
</tr>
<tr>
<td>ETHERLINE® PN Cat.6, P FD FC 4x2xAWG24/7</td>
<td>PUR, green RAL6018</td>
<td>Fixed: -40°C to +80°C, Flexing: -30°C to +75°C</td>
<td>Fast Connect, halogen-free, PROFINET®</td>
<td>2170590</td>
<td>*</td>
</tr>
<tr>
<td>ETHERLINE® PN Cat.6, Y FD FC 4x2xAWG24/7</td>
<td>PVC, green RAL6018</td>
<td>Fixed: -30°C to +80°C, Flexing: -30°C to +75°C</td>
<td>Fast Connect, PROFINET®</td>
<td>2170591</td>
<td>*</td>
</tr>
</tbody>
</table>

**Article designation | Item description | Minimum cable diameter | Maximum cable diameter | Art. no. | Page**

| EPIC® DATA ED-IE-AXS-6A-B-20-FC | Straight RJ45 connector, as per EIA/TIA 568B | 5.5 mm | 10.0 mm | 21706553 | 173 |
| EPIC® DATA ED-IE-90-6A-B-20-FC | Straight RJ45 connector, as per EIA/TIA 568B | 5.5 mm | 10.0 mm | 21706377 | 173 |
| EPIC® DATA ED-IE-AX-M12X-6A-67-FC | Straight M12 X-coded connector | 5.0 mm | 9.7 mm | 21706020 | 176 |
| EPIC® DATA ED-IE-AX-M12XF-RM-6A-67-FC | Straight M12 X-coded flange coupler | 5.0 mm | 9.7 mm | 21706222 | 176 |
| FC STRIP VARIO | Stripping tool for Fast Connect cables with adjustable blade spacing | 2.5 mm | 8.0 mm | 21124045 | * |

**Legend:** *see www.lappgroup.com/products
Assembling a Fast Connect cable for PROFINET® Cat.6A with RJ45

An experienced systems supplier, LAPP is your powerful partner in all aspects of assembly. You can get everything you need from one source: from the cable to the connector to the right tool for the job. All of this, of course, with the first-class quality that our brand provides.

**Step 1: Positioning**
- Position the FC tool on the cable at least 50 mm from the end
- Close the tool around the cable
- Twist the tool around the cable three times

**Step 2: Stripping**
- Remove the cable insulation using the FC tool
- The braided shield is automatically shortened to 10 mm
- Fold back the braided shield towards the outer sheath

**Step 3: Preparing cores**
- Sort the core pairs
- Cut the cross-separator as close as possible at the sheath
- Untwist and smooth the core pairs

**Step 4: Pressing core manager**
- Matching the colours, insert the cores into the core manager
- Slide the core manager as close to the sheath as possible (maximum of 10 mm distance)
- Press the core manager with pliers

**Step 5: Preparing connector**
- Cut the protruding cores as flush as possible at the core manager
- Remove the installation tool (black plastic sleeve)

**Step 6: Inserting core manager**
- Insert core manager until the connector can be closed
- Press the half shells together and screw
## Quickfinder cable

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**Legend:** PN = PROFINET®, cables acc. to PROFINET® standard, *see www.lappgroup.com/products
Please see detailed technical information on the data sheet (www.lappgroup.com/products).
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*see www.lappgroup.com/products
Please see detailed technical information on the data sheet (www.lappgroup.com/products).
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### Quickfinder Connector [ETHERLINE® Industrial 4-pairs]

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#### Fixed installation

- **ETHERLINE® H Cat.5e**
  - Art. no.: 2170296
  - RJ45: 131
- **ETHERLINE® FIRE Cat.5e PH120**
  - Art. no.: 2170905
  - RJ45: 168
- **ETHERLINE® H-H Cat.5e**
  - Art. no.: 2170298
  - RJ45: 131
- **ETHERLINE® P Cat.5e**
  - Art. no.: 2170297
  - RJ45: 131

#### Flexible application

- **ETHERLINE® H FLEX Cat.5e**
  - Art. no.: 2170299
  - RJ45: 132
- **ETHERLINE® Y FLEX Cat.5e**
  - Art. no.: 2170486
  - RJ45: 132
- **ETHERLINE® P FLEX Cat.5e**
  - Art. no.: 2170300
  - RJ45: 132
- **ETHERLINE® HEAT Cat.5e**
  - Art. no.: 2170850
  - RJ45: 167

#### Drag chain

- **ETHERLINE® FD P Cat.5e**
  - Art. no.: 2170489
  - RJ45: 134

#### Light & sound technology

- **ETHERLINE® FD P BK Cat.5**
  - Art. no.: CEE17489
  - RJ45: 135

#### Rail sector

- **ETHERLINE® TRAIN Cat.5e**
  - Art. no.: 2170907
  - RJ45: 166

---

#### Industrial 4-pairs, Cat.6/Cat.6a

#### Fixed installation

- **ETHERLINE® Cat.6 Y**
  - Art. no.: 2170444
  - RJ45: 156
- **ETHERLINE® Cat.6 P**
  - Art. no.: 2170445
  - RJ45: 156
- **ETHERLINE® Cat.6 H**
  - Art. no.: 2170446
  - RJ45: 156
- **ETHERLINE® HEAT Cat.6a**
  - Art. no.: 2170581
  - RJ45: 167

#### Flexible application

- **ETHERLINE® PN Cat.6 Y FLEX**
  - Art. no.: 2170930
  - RJ45: 158
- **ETHERLINE® PN Cat.6 FRNC FLEX**
  - Art. no.: 2170931
  - RJ45: 158

#### Drag chain

- **ETHERLINE® FD P Cat.6**
  - Art. no.: 2170488
  - RJ45: 139
- **ETHERLINE® FD Cat.6**
  - Art. no.: 2170485
  - RJ45: 160
- **ETHERLINE® FD P Cat.6**
  - Art. no.: 2170484
  - RJ45: 160

#### Torsion

- **ETHERLINE® TORSION Y Cat.6**
  - Art. no.: 2170482
  - RJ45: 161
- **ETHERLINE® TORSION P Cat.6**
  - Art. no.: 2170483
  - RJ45: 161

#### Rail sector

- **ETHERLINE® TRAIN FLEX Cat.6**
  - Art. no.: 2170908
  - RJ45: 166

---

#### Industrial 4-pairs, Cat.7

#### Fixed installation

- **ETHERLINE® Cat.7 Y**
  - Art. no.: 2170474
  - RJ45: *
- **ETHERLINE® Cat.7 P**
  - Art. no.: 2170475
  - RJ45: *
- **ETHERLINE® Cat.7 H**
  - Art. no.: 2170476
  - RJ45: *
- **ETHERLINE® PN Cat.7 Y A**
  - Art. no.: 2170605
  - RJ45: 163
- **ETHERLINE® PN Cat.7 FRNC A**
  - Art. no.: 2170606
  - RJ45: 163
- **ETHERLINE® PN Cat.7 P A**
  - Art. no.: 2170607
  - RJ45: 163

#### Flexible application

- **ETHERLINE® HEAT Cat.7**
  - Art. no.: 2170582
  - RJ45: 167
- **ETHERLINE® Cat.7 FLEX**
  - Art. no.: 2170934
  - RJ45: 142
- **ETHERLINE® PN Cat.7 Y FLEX A**
  - Art. no.: 2170608
  - RJ45: 164
- **ETHERLINE® PN Cat.7 FRNC FLEX A**
  - Art. no.: 2170609
  - RJ45: 164

#### Burial

- **UNITRONIC® LAN 1000 S/FTP Cat.7 [L]PE**
  - Art. no.: 2170198
  - RJ45: *
- **UNITRONIC® LAN 1000 S/FTP Cat.7 PE**
  - Art. no.: 2170197
  - RJ45: *

#### Food & beverage

- **ETHERLINE® ROBUST PN Cat.7**
  - Art. no.: 2170452
  - RJ45: 169
- **ETHERLINE® ROBUST Cat.7 FLEX**
  - Art. no.: 2170453
  - RJ45: 169
- **ETHERLINE® ROBUST PN FR Cat.7**
  - Art. no.: 2170455
  - RJ45: 170
- **ETHERLINE® ROBUST FR Cat.7 FLEX**
  - Art. no.: 2170456
  - RJ45: 170

#### Rail sector

- **ETHERLINE® TRAIN FLEX Cat.7**
  - Art. no.: 2170909
  - RJ45: 166

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**Legende:**
X = Our recommendation, X* = Transmission properties limited by connector

*see www.lappgroup.com/products
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**X-coded, plug**

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**Angled, with cable gland**

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# Quickfinder Connector [ETHERLINE® Industrial 2-pairs]

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### Fixed installation

- **ETHERLINE® PN Cat.5e Y** 2170891 143 X  
- **ETHERLINE® Y FC Cat.5** 2170893 143 X  
- **ETHERLINE® Cat.5e YY** 2170933 143 X  
- **ETHERLINE® H Cat.5e** 2170280 131 X X  
- **ETHERLINE® P Cat.5e** 2170281 131 X X  
- **ETHERLINE® TRAY ER PN Y FC** 2170879 143 X  

### Flexible application

- **ETHERLINE® PN Cat.5 Y FLEX FC** 2170886 144 X  
- **ETHERLINE® PN Cat.5e FRNC FLEX FC** 2170890 144 X  
- **ETHERLINE® MARINE FRNC FC Cat.5** 2170889 147 X  
- **ETHERLINE® Y EC FLEX Cat.5e** 2170430 133  
- **ETHERLINE® P EC FLEX Cat.5e** 2170431 133  
- **ETHERLINE® H FLEX Cat.5** 2170283 132 X X  
- **ETHERLINE® Y Cat.5e BK** 2170901 145 X  
- **ETHERLINE® Cat.5e 105 plus** 2170636 146 X  
- **ETHERLINE® P FLEX Cat.5e** 2170284 132 X X  

### Drag chain

- **ETHERLINE® FD P FC Cat.5** 2170894 149 X  
- **ETHERLINE® FD P Cat.5e** 2170289 134 X  

### Burial

- **ETHERLINE® Cat.5 ARM** 2170496 152 X  

### Food & beverage

- **ETHERLINE® ROBUST PN Cat.5** 2170451 149 X  
- **ETHERLINE® ROBUST PN FR Cat.5** 2170454 170 X  

### Rail sector

- **ETHERLINE® TRAIN FLEX Cat.5e** 2170906 166 X  

### Festoon

- **ETHERLINE® FESTOON PN Cat.5e** 2170936 151 X  

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**Legende:** X = Our recommendation, X* = Transmission properties limited by connector
## RJ45

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- PROFINET®
- TIA 568 A
- TIA 568 B

### Art. no.

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- 21700651
- 21700652
- 21700653
- 21700654
- 21700655
- 21700638
- 21700636
- 21700637
- 21700639
- 21700640
- 21700611
- 21700612
- 22261016
- 21700647
- 21700648

### Industrial 2-pairs, Cat.5/Cat.5e

- Fixed installation
- ETHERLINE® PN Cat.5e Y 2170891
- ETHERLINE® Y FC Cat.5 2170893
- ETHERLINE® Cat.5e YY 2170933
- ETHERLINE® H Cat.5e 2170280
- ETHERLINE® P Cat.5e 2170281
- ETHERLINE® TRAY ER PN Y FC 2170879
- ETHERLINE® PN Cat.5 Y FLEX FC 2170886
- ETHERLINE® PN Cat.5e FRNC FLEX FC 2170890
- ETHERLINE® MARINE FRNC FC Cat.5 2170889
- ETHERLINE® Y EC FLEX Cat.5e 2170430
- ETHERLINE® P EC FLEX Cat.5e 2170431
- ETHERLINE® H FLEX Cat.5 2170283
- ETHERLINE® Y Cat.5e BK 2170901
- ETHERLINE® Cat.5e 105 plus 2170636
- ETHERLINE® P FLEX Cat.5e 2170284
- ETHERLINE® FD P FC Cat.5 2170894
- ETHERLINE® FD P Cat.5e 2170289
- ETHERLINE® Cat.5 ARM 2170496
- ETHERLINE® ROBUST PN Cat.5 2170451
- ETHERLINE® ROBUST PN FR Cat.5 2170454
- ETHERLINE® TRAIN FLEX Cat.5e 2170906
- ETHERLINE® FESTOON PN Cat.5e 2170936

### Flexible application

- ETHERLINE® PN Cat.5 Y FLEX FC 2170886
- ETHERLINE® PN Cat.5e FRNC FLEX FC 2170890
- ETHERLINE® MARINE FRNC FC Cat.5 2170889
- ETHERLINE® Y EC FLEX Cat.5e 2170430
- ETHERLINE® P EC FLEX Cat.5e 2170431
- ETHERLINE® H FLEX Cat.5 2170283
- ETHERLINE® Y Cat.5e BK 2170901
- ETHERLINE® Cat.5e 105 plus 2170636
- ETHERLINE® P FLEX Cat.5e 2170284
- ETHERLINE® FD P FC Cat.5 2170894
- ETHERLINE® FD P Cat.5e 2170289
- ETHERLINE® Cat.5 ARM 2170496
- ETHERLINE® ROBUST PN Cat.5 2170451
- ETHERLINE® ROBUST PN FR Cat.5 2170454
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**LEGEND**

- X = Our recommendation
- X* = Transmission properties limited by connector

**Quickfinder Connector** [ETHERLINE® building cabling]
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UL approvals for data cables

The initial category defines fixed cabling in buildings for residential purposes, as well as commercial and industrial use. Listed cables and wires not only have to meet individual UL product standards, but must also comply with the relevant articles of the National Electrical Code (NEC).

The NEC contains detailed specifications relating to the correct usage of listed cables and wires. The listed cables and wires can be used for factory wiring of electrical equipment, devices, appliances and machinery as well as for on-site or field cabling of industrial machinery and plants according to NFPA 79.

Appliance Wiring Material (AWM)
AWM includes cables and wires intended for the use of electrical equipment, devices, appliances, control cabinets and industrial machinery that are fully wired ex works. AWM is not intended for field wiring purposes. Cables and wires with AWM-style UL labelling must be used for individual applications as stipulated by the relevant style designation. The use of cables with AWM classification is restricted to the applications that are stated in the corresponding description (www.ul.com).

NEC
Article 800 of the NEC dedicates the chapter 'Communication Circuits' to data network cables. This chapter distinguishes between different fire behaviour levels: the higher the level, the higher the requirements relating to fire behaviour. All levels are downward compatible (see table).

Application areas of the respective approvals:
- Plenum: no additional protection in closed cable ducts via suspended ceilings or air supply
- Riser: installation in riser duct between a minimum of two storeys
- General purpose: general applications; standard in machinery and plant engineering
- CMG/CM: connection of machine or production cell to control cabinet
- PLTC: metallically protected installation on open cable conduits and between other devices
- PLTC-ER: free and open installation on cable conduit and between cable conduit and industrial machinery/plant
- Residential: CMX: limited to use within a machine or production cell (automation island)

NEC hierarchy

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<td>TC-ER</td>
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<tr>
<td>FR-02</td>
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<tr>
<td>UL 1581, VW-1</td>
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<td>TC</td>
</tr>
<tr>
<td>(Vertical Flame)</td>
<td></td>
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</tr>
</tbody>
</table>
ETHERLINE® Cat.5e

Ethernet cable Category 5e, Class D for fixed installation - verified up to 100 MHz

Benefits
- Seamless communication from the sensor/actuator level to the Internet
- Screened against interference
- Can be used in dry or damp rooms
- Can be used for Industrial Ethernet in harsh industrial environments
- Cables with PUR jacket: 1000 V UL-rating for installation next to power cables

Application range
- 2-pair: 10/100 Mbit/s for Industrial Ethernet
- 4-pair: 10/100/1000 Mbit/s for Industrial Ethernet
- Suitable for EtherCAT and EtherNet/IP applications
- Industrial use
- Fixed Installation

Product features
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference
- PUR outer sheath is highly resistant to mineral oils and abrasion
- Halogen-free outer sheath

Norm references / Approvals
- PUR versions: UL AWM Style 21576
- Flame retardant acc. to IEC 60332-1-2
- Halogen-free according to IEC 60754-1 (amount of halogen acid gas)
- Corrosiveness of combustion gases according to IEC 60754-2 (degree of acidity)

Product Make-up
- Solid conductor
- Core insulation made of foam skin
- 2 or 4-pair version
- SF/UTP: braid of tinned copper wire and plastic laminated aluminum foil as overall screening
- Outer sheath as either PUR or LSZH
- Colour: water blue (RAL 5021)

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage (not for power applications) 125 V
- Minimum bending radius
  - Fixed installation: 7.5 x outer diameter (2 pair cable)
- Test voltage
  - Core/core: 1000 V
  - Core/screen: 500 V
- Characteristic impedance nom. 100 Ω acc. to IEC 61156-5
- Temperature range
  - Cable with PUR jacket:
    - Fixed installation: VDE -30°C to +80°C; UL/CSA -30°C to +80°C
    - Flexing: VDE -5°C to +50°C; UL/CSA -5°C to +80°C

Article number | Article designation | Number of pairs and AWG per conductor | Core diameter in mm | Outer diameter [mm] | Copper index (kg/km) | Weight (kg/km) |
--- | --- | --- | --- | --- | --- | --- |
2-pair version
HALOGEN-FREE JACKET
2170280 | ETHERLINE® H CAT.5e | 2 x 2 x AWG24/1 | 1,0 | 5,6 | 22 | 45 |
PUR OUTER SHEATH, HALOGEN-FREE
2170281 | ETHERLINE® P CAT.5e | 2 x 2 x AWG24/1 | 1,0 | 5,6 | 22 | 45 |
4-pair version
HALOGEN-FREE JACKET
2170296 | ETHERLINE® H CAT.5e | 4 x 2 x AWG24/1 | 1,0 | 6,1 | 32 | 54 |
2170298 | ETHERLINE® H-H CAT.5e | 4 x 2 x AWG24/1 | 1,0 | 6,1 / 8,1 | 32 | 80 |
PUR OUTER SHEATH, HALOGEN-FREE
2170297 | ETHERLINE® P CAT.5e | 4 x 2 x AWG24/1 | 1,0 | 6,1 | 32 | 62 |

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix 117 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix 117 for the definition and calculation of copper-related surcharges.

Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- EPIC® SENSOR M8 refer to page 173
- EPIC® DATA HS RJ45F Cat.6A refer to page 175
- EPIC® DATA M12D refer to page 176
- EPIC® DATA M12X refer to page 176
- KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
- EPIC® DATA CCR FA refer to page 177
- DATA STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
**ETHERLINE® Cat.5e FLEX**

Ethernet cable Category 5e, Class D for flexible use - verified up to 100 MHz

Benefits
- Seamless communication from the sensor/actuator level to the Internet
- Screened against interference
- Can be used in dry or damp rooms
- Can be used for Industrial Ethernet in harsh industrial environments
- Cables with PUR jacket: 1000 V UL-rated for installation next to power cables

Application range
- 2pair: 10/100 Mbit/s for Industrial Ethernet
- 4pair: 10/100/1000 Mbit/s for Industrial Ethernet
- Suitable for EtherCAT and EtherNet/IP applications
- For flexible applications (7-wire stranded conductor)
- Only for patch cable applications (max. 60 m)

Product features
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference
- PUR outer sheath is highly resistant to mineral oils and abrasion

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage (not for power applications) 125 V
- Minimum bending radius Fixed installation: 8 x outer diameter Flexing: 15 x outer diameter
- Test voltage Core/core: 1000 V Core/screen: 500 V
- Characteristic impedance nom. 100 Ω acc. to IEC 61156-5
- Temperature range cable with PUR jacket Fixed installation: VDE -30°C to +80°C; UL/CSA -30°C to +80°C
testing: VDE -5°C to +50°C; UL/CSA -5°C to +80°C
- cable halogenfree compound Fixed installation: -30°C to +80°C testing: -5°C to +60°C cable with PVC jacket Fixed installation: -40°C to +80°C testing: -10°C to +70°C

### Norm references / Approvals
- PVC version with UL/CSA (CMX) certification
- PUR versions: UL AWM Style 21576
- Flame-retardant according IEC 60332-1-2
- Cable with PUR or halogenfree compound: Halogen-free according to IEC 60754-1 (amount of halogen acid gas)
- Corrosiveness of combustion gases according to IEC 60754-2 (degree of acidity)

### Article number | Article designation | Number of pairs and AWG per conductor | Core diameter in mm | Outer diameter [mm] | Copper index (kg/km) | Weight (kg/km)
--- | --- | --- | --- | --- | --- | ---
2-pair version
- Halogen-free jacket
  - 2170283 | ETHERLINE® H Flex Cat.5e | 2 x 2 x AWG26/7 | 1,0 | 5,6 | 19 | 43
- PUR outer sheath, halogen-free
  - 2170284 | ETHERLINE® P Flex Cat.5e | 2 x 2 x AWG26/7 | 1,0 | 5,6 | 19 | 45

4-pair version
- Halogen-free jacket
  - 2170299 | ETHERLINE® H Flex Cat.5e | 4 x 2 x AWG26/7 | 1,0 | 6,1 | 25 | 48
- PUR outer sheath, halogen-free
  - 2170300 | ETHERLINE® P Flex Cat.5e | 4 x 2 x AWG26/7 | 1,0 | 6,1 | 25 | 54
- PVC outer sheath
  - 2170486 | ETHERLINE® Y Flex Cat.5e | 4 x 2 x AWG26/7 | 1,0 | 6,2 | 30 | 54

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

For current information see: www.lappgroup.com

**Accessories**
- Field-Terminable Connector RJ45 Cat.5e FM45 refer to main catalogue 2018/19
- EPIC® SENSOR M8 refer to page 173
- EPIC® DATA HS RJ45C Cat.6, refer to page 175
- EPIC® DATA M12D refer to page 176
- EPIC® DATA M12X refer to page 176
- KNIPEx Electronics Super Knips® refer to main catalogue 2018/19
- EPIC® DATA CCR FA refer to page 177
- DATA STRIP stripping tool refer to main catalogue 2018/19
**ETHERLINE® EC FLEX Cat.5e**
Flexible use

**Benefits**
- Can be used for Industrial Ethernet in harsh industrial environments
- Can be used in dry or damp rooms
- Lower space requirement

**Application range**
- Suitable for EtherCAT and EtherNet/IP applications
- For flexible applications (7-wire stranded conductor)
- Many applications with Industrial Ethernet, i.e. fixed installation and flexible use.
- For internal wiring of electric and electronic equipment in switch cabinets
- Only for patch cable applications (max. 60 m)

**Product features**
- PUR (Polyurethane) Version with increased robustness, UV- resistance and halogen free
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference

**Norm references / Approvals**
- Certification: UL/CSA type CMX in accordance with UL 444 and CSA C22.2 no. 214
- Flame-retardant according to UL VW1/CSA FT1

**Product Make-up**
- Stranded tinned 7-wire conductor
- Core insulation: PE
- Insulation colour-codes: orange/white-orange; green/white-green
- Star quad
- SF/UTP: braid of tinned copper wire and plastic laminated aluminum foil as overall screening
- PVC or PUR jacket material
- Colour: green (based on RAL 6018)

**Technical data**
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable

**Peak operating voltage**
- max. 100 V (not for power applications)

**Minimum bending radius**
- Fixed installation: 4 x outer diameter
- Moved: 8 x outer diameter

**Characteristic impedance**
- nom. 100 Ω acc. to IEC 61156-5

**Temperature range**
- Cable with PVC jacket
  - Fixed installation: -30°C to +80°C
  - Flexing: -5°C bis +50°C
- Cable with PUR jacket
  - Fixed installation: -40°C to +80°C
  - Flexing: -30°C to +50°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and AWG per conductor</th>
<th>Core diameter in mm</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC outer sheath</td>
<td>ETHERLINE® Y EC FLEX Cat.5e</td>
<td>1 x 4 x AWG26/7</td>
<td>1,0</td>
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<td>20</td>
<td>32</td>
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<tr>
<td>PUR outer sheath, halogen-free</td>
<td>ETHERLINE® P EC FLEX Cat.5e</td>
<td>1 x 4 x AWG26/7</td>
<td>1,0</td>
<td>4.8</td>
<td>20</td>
<td>31</td>
</tr>
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</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- EPIC® SENSOR M8 refer to page 173
- EPIC® DATA HS RJ45F Cat.6, refer to page 175
- EPIC® DATA M12D refer to page 176
- KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
- DATA STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
ETHERLINE® Cat.5e FD
Ethernet cable Category 5e, Class D for use in drag chain applications - verified up to 100 MHz

Benefits
• Seamless communication from the sensor/actuator level to the Internet
• Screened against interference
• Can be used in dry or damp rooms
• Industrial use
• Cables with PUR jacket: 1000 V UL-rating for installation next to power cables

Application range
• 2pair: 10/100 Mbit/s for Industrial Ethernet
• 4pair: 10/100/1000 Mbit/s for Industrial Ethernet
• Only for patch cable applications (max. 60 m)
• Suitable for EtherCAT and EtherNet/IP applications
• Power chain applications

Product features
• Premium screening against electromagnetic interference
• PUR outer sheath is highly resistant to mineral oils and abrasion
• Halogen-free outer sheath

Norm references / Approvals
• PUR versions: UL AWM Style 21576
• Flame-retardant according IEC 60332-1-2
• Halogen-free according to IEC 60754-1 (amount of halogen acid gas)
• Corrosiveness of combustion gases according to IEC 60754-2 (degree of acidity)

Product Make-up
• Bare stranded copper wire, 26AWG (19 x 0.10), (0.14 mm²)
• Inner sheath: thermoplastic elastomer, halogen-free
• 2 or 4-pair version
• Screening: wrapped with braided tinned-copper wires
• PUR outer sheath
• Colour: water blue (RAL 5021)

Technical data

<table>
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<tr>
<th>Classification ETIM 5/6</th>
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<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID: EC000830</td>
</tr>
<tr>
<td>ETIM 5.0/6.0 Class-Description: Data cable</td>
</tr>
</tbody>
</table>

Peak operating voltage
(not for power applications) 125 V

Minimum bending radius
Fixed installation: 8 x outer diameter
Flexing: 15 x outer diameter

Test voltage
Core/core: 1000 V
Core/screen: 500 V

Characteristic impedance
nom. 100 Ω acc. to IEC 61156-5

Temperature range
Cable with PUR jacket
Fixed installation: VDE -30°C to +80°C; UL/CSA -30°C to +80°C
Flexing: VDE -5°C to +50°C; UL/CSA -5°C to +80°C

Article number | Article designation | Number of pairs and AWG per conductor | Core diameter in mm | Outer diameter [mm] | Copper index (kg/km) | Weight (kg/km) |
<table>
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<tr>
<td>2170289</td>
<td>ETHERLINE® FD P CAT.5e</td>
<td>2 x 2 x AWG26/19</td>
<td>1.0</td>
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<td>48</td>
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<td>2170489</td>
<td>ETHERLINE® FD P CAT.5e</td>
<td>4 x 2 x AWG26/19</td>
<td>1.0</td>
<td>6.3</td>
<td>27</td>
<td>56</td>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: EUR 150/100 kg. Refer to catalogue appendix 117 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: Coil 100 m; Drum (500; 1000) m
Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable. Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
• EPIC® DATA RJ45 refer to page 173
• KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
• DATA STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
ETHERLINE® Cat.5 FD BK
Ethernet cable Category 5e, Class D for installation in events - verified up to 100 MHz

**Info**
- For highly flexible industrial applications
- Cat.5e-Performance
- Only for patch cable applications (max. 60 m)

**Benefits**
- Additional application options thanks to suitability for outdoor use, UV-resistant
- Good flexibility - easy installation with tight space requirements
- Screened against interference
- Easy to coil for mobile use

**Application range**
- IEEE 802.3: 10/100/1000Base-T
- IEEE 802.5: ISDN; FDDI; ATM
- Suitable for the transfer of audio signals (ETHERSOUND), light control signals (DMX over Ethernet), or for computer networking
- Only for patch cable applications (max. 60 m)
- Suitable for EtherCAT and EtherNet/IP applications
- 4pair: 10/100/1000 Mbit/s for Industrial Ethernet

**Product features**
- Specifically developed for road environments
- Suitable for outdoor use, UV-resistant
- PUR outer sheath is highly resistant to mineral oils and abrasion
- Premium screening against electromagnetic interference

**Norm references / Approvals**
- UL AWM Style 21576
- Flame retardant acc. to IEC 60332-1-2
- Halogen-free according to IEC 60754-1 (amount of halogen acid gas)
- Corrosiveness of combustion gases according to IEC 60754-2 (degree of acidity)

**Product Make-up**
- Bare stranded copper wire, 26AWG (19 x 0.10), (0.14 mm²)
- Insulation: foam skin, max. core diameter 1.0 mm
- Twisting: 2 twisted-pair cores, stranding from 4 pairs
- Inner sheath: thermoplastic elastomer, halogen-free
- Screening: wrapped with braided tinned-copper wires
- Outer sheath: halogen-free PUR, black

**Technical data**
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage
  (not for power applications) 125 V
- Minimum bending radius
  Flexing: 15 x outer diameter
  Fixed installation: 10 x outer diameter
- Test voltage
  Core/core: 1000 V
  Core/screen: 500 V
- Characteristic impedance
  nom. 100 Ω acc. to IEC 61156-5
- Temperature range
  cable with PUR jacket
  Fixed installation: VDE -30°C to +80°C;
  UL/CSA -30°C to +80°C
  Flexing: VDE -5°C to +50°C;
  UL/CSA -5°C to +80°C

**Article number** | **Article designation** | **Number of pairs and AWG per conductor** | **Core diameter in mm** | **Outer diameter [mm]** | **Copper index (kg/km)** | **Weight (kg/km)**
--- | --- | --- | --- | --- | --- | ---
ETHERLINE® Cat.5 FD BK | CE217489 | ETHERLINE® FD P BK Cat.5 | 4x2xAWG26/19 | 1,0 | 6.3 | 27 | 54

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Standard lengths: (100; 500; 1000) m
Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- EPIC® DATA RJ45 refer to page 173
- KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
- DATA STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
**ETHERLINE® EC FD Cat.5e**

Highly flexible application

**Benefits**
- Can be used for Industrial Ethernet in harsh industrial environments
- Can be used in dry or damp rooms
- Lower space requirement

**Application range**
- Suitable for EtherCAT and EtherNet/IP applications
- For highly flexible applications (power chains, moving machine parts)
- Many applications with Industrial Ethernet, e.g. EtherCat, i.e. fixed installation, flexible and highly flexible use
- For internal wiring of electric and electronic equipment in switch cabinets
- Only for patch cable applications (max. 60 m)

**Product features**
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference

**Norm references / Approvals**
- UL/CSA type CMX in accordance with UL 444 and CSA C22.2 no. 214-02
- Flame-retardant according to UL VW1/CSA FT1
- Halogen-free according to VDE 0472-815

**Product Make-up**
- Bare stranded copper wire, 26AWG (19 x 0.10), (0.14 mm²)
- Insulation colour-codes: orange/white-orange; green/white-green
- Star quad
- SF/UTP: braid of tinned copper wire and plastic laminated aluminum foil as overall screening
- Outer sheath: PUR compound, halogen-free
- Colour: green (based on RAL 6018)

**Technical data**

- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable

- **Peak operating voltage**
  - max. 100 V (not for power applications)

- **Minimum bending radius**
  - Fixed installation: 4 x Outer diameter
  - Flexing: 16 x outer diameter

- **Characteristic impedance**
  - nom. 100 Ω acc. to IEC 61156-5

- **Temperature range**
  - Fixed installation: -40°C to +80°C
  - Flexing: -30°C to +50°C

**Article number**

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and AWG per conductor</th>
<th>Core diameter in mm</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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</thead>
<tbody>
<tr>
<td>2170433</td>
<td>ETHERLINE® P EC FD Cat.5e</td>
<td>1 x 4 x AWG26/19</td>
<td>1.0</td>
<td>4.8</td>
<td>20</td>
<td>36</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150 / 100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
- DATA STRIP stripping tool refer to main catalogue 2018/19
Data communication systems for ETHERNET technology
Industrial Ethernet, Cat.5/Cat.5e • Patch cables for flexible applications

ETHERLINE® H Flex Cat.5e Patch cables

Benefits
• Non-permanent connections allow for easy change of equipment
• For directly connecting two electric components

Application range
• Suitable for EtherCAT and EtherNet/IP applications
• Suitable for use in industrial applications
• For indoor use
• For flexible applications

Product features
• Meets the requirements according to Cat.5e and class D
• 2 pairs: 10/100 Mbit/s for Industrial Ethernet

Product Make-up
• Braided conductor, 2x2x AWG26/7
• Twisted pair construction permits largely interference-free operation (decoupling).
• Overall screening with copper braid and plastic-laminated aluminium foil
• Outer sheath: halogen-free, flame-retardant compound, 5.6mm in diameter
• Colour: water blue (based on RAL 5021)

Technical data

Classification
ETIM 5.0/6.0: EC002599
Description: Patch cord copper (twisted pair) industry

Minimum bending radius
Flexing: 15 x outer diameter
Fixed installation: 6 x outer diameter

Protection rating
M12: IP 67
RJ45: IP 20

Temperature range
During installation: -5°C to +60°C
Fixed installation: -30°C to +80°C

Coding
M12: D-Standard

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Other lengths are available upon request.
## Data communication systems for ETHERNET technology

**Industrial Ethernet, Cat.5/5e • Patch cables for continuous flexing applications**

### ETHERLINE® EC FD Cat.5e Patch cables

#### Benefits
- Non-permanent connections allow for easy change of equipment
- For directly connecting two electric components

#### Application range
- Suitable for EtherCAT and EtherNet/IP applications
- Suitable for use in industrial applications
- For indoor use
- For highly flexible applications

#### Product features
- Meets the requirements according to Cat.5e and class D
- 2 pairs: 10/100 Mbit/s for Industrial Ethernet

#### Product Make-up
- Braided conductor, 1x4x AWG26/19
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath made of PUR, 4.8mm in diameter
- Colour: green (based on RAL 6018)

### Info
- Suitable for drag chains
- Additional variants are available at www.lappgroup.com/assemblyfinder or on request
- Based on 2170433

### Technical data

- **Classification**
  - ETIM 5.0/6.0: EC002599
  - Description: Patch cord copper (twisted pair) industry
- **Minimum bending radius**
  - Flexing: 8 x outer diameter
  - Fixed installation: 4 x outer diameter
- **Protection rating**
  - M8: IP 67
  - M12: IP 67
  - RJ45: IP 20
- **Temperature range**
  - During installation: -30°C to +50°C
  - Fixed installation: -40°C to +80°C
- **Coding**
  - M8: A-Standard
  - M12: D-Standard

### Product Make-up
- Braided conductor, 1x4x AWG26/19
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath made of PUR, 4.8mm in diameter
- Colour: green (based on RAL 6018)

### Technical data

<table>
<thead>
<tr>
<th>Classification</th>
<th>ETIM 5.0/6.0: EC002599</th>
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<tbody>
<tr>
<td>Description</td>
<td>Patch cord copper (twisted pair) industry</td>
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</tbody>
</table>

### Minimum bending radius

- Flexing: 8 x outer diameter
- Fixed installation: 4 x outer diameter

### Protection rating

- M8: IP 67
- M12: IP 67
- RJ45: IP 20

### Temperature range

- During installation: -30°C to +50°C
- Fixed installation: -40°C to +80°C

### Coding

- M8: A-Standard
- M12: D-Standard

### Length | Article number
---|---
RJ45 1.0m | 2171765 2171751 2171924
2.0m | 2171766 2171752 2171925
5.0m | 2171768 2171754 2171927
10.0m | 2171769 2171755 2171928
On request

M12, plug, straight 1.0m | 2171751 2171779 2171907
2.0m | 2171752 2171780 2171787 2171738 2171946
5.0m | 2171754 2171782 2171789 2171740 2171948
10.0m | 2171755 2171783 2171790 2171741 2171949
On request

M12, plug, angled 1.0m | 2171924 2171786 2171907 2171944
2.0m | 2171925 2171787 2171908 2171945
5.0m | 2171927 2171789 2171910 2171748
10.0m | 2171928 2171790 2171911 2171749
On request

M12, socket, straight 1.0m | 2171737 2171744 2171916
2.0m | 2171738 2171745 2171917
5.0m | 2171740 2171747 2171919
10.0m | 2171741 2171748 2171920
On request

M8, plug, straight 1.0m | 2171758 2171945
2.0m | 2171759 2171946
5.0m | 2171761 2171948
10.0m | 2171762 2171949
On request

M8, plug, angled 1.0m | 2171719 2171949
2.0m | 2171720 2171951
5.0m | 2171722 2171963
10.0m | 2171724 2171945 2171733
On request

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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Other lengths are available upon request.

For current information see: www.lappgroup.com
ETHERLINE® CAT.6 FD
Ethernet cable Category 6, Class E for use in drag chain applications - verified up to 250 MHz

Benefits
- Highly flexible data cable with PUR outer sheath, meets the highest service life requirements, even under harsh climatic conditions
- Premium screening against electromagnetic interference

Application range
- For use in drag chains and moving machinery parts in dry or damp rooms
- Only for patch cable applications (max. 60 m)
- Suitable for EtherCAT and EtherNet/IP applications
- Plant engineering, machinery manufacturing
- 4pair: 10/100/1000 Mbit/s for Industrial Ethernet

Product features
- PUR outer sheath is resistant to most oils and hydraulic fluids
- CAT.6 for drag chain
- Min. 1 million bending cycles in the drag chain

Norm references / Approvals
- Flame-retardant according IEC 60332-1-2
- UL/CSA type CMX (UL 444)

Product Make-up
- Stranded conductor, tinned
- AWG 26 (19-wire)
- PP core insulation
- Inner sheath: thermoplastic copolymer (FRNC)
- SF/UTP: braid of tinned copper wire and plastic laminated aluminum foil as overall screening
- PUR outer sheath, halogen-free
- Colour: green (based on RAL 6018)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage max. 100 V (not for power applications)
- Minimum bending radius
  Fixed installation: 4 x outer diameter
  Flexing: 7.5 x outer diameter
- Test voltage 700 V
- Characteristic impedance nom. 100 Ω acc. to IEC 61156-6
- Temperature range
  Fixed installation: -40°C to +80°C
  Flexing: -30°C to +70°C

Table: Article number, Article designation, Number of pairs and AWG per conductor, Core diameter in mm, Outer diameter [mm], Copper index (kg/km), Weight (kg/km)

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and AWG per conductor</th>
<th>Core diameter in mm</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETHERLINE® CAT.6 FD</td>
<td>ETHERLINE® CAT.6 FD</td>
<td>4 x 2 x AWG26/19</td>
<td>1.0</td>
<td>7.8</td>
<td>31.7</td>
<td>63</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum.
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- EPIC® DATA RJ45 refer to page 173
- KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
- DATA STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
ETHERLINE® FD Cat.6 Patch cables

Benefits
- Non-permanent connections allow for easy change of equipment
- For directly connecting two electric components

Application range
- Continuous flexing applications
- Suitable for EtherCAT and EtherNet/IP applications
- Suitable for use in industrial applications
- For indoor use

Product features
- Meets the requirements according to Cat.6 and class E
- Suitable for drag chain applications
- Braided conductor, 4x2x AWG26/19
- S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
- Outer sheath made of PUR, 7.8mm in diameter
- Colour: green (based on RAL 6018)

Technical data
- Classification
  ETIM 5.0 Class-ID: EC002599
  ETIM 5.0 Class-Description: Patch cord copper (twisted pair) industry
- Minimum bending radius
  Flexing: 7.5 x outer diameter
  Fixed installation: 4 x outer diameter
- Protection rating
  IP 67
- Temperature range
  Flexing: -30°C to +70°C
  Fixed installation: -30°C to +80°C
- Coding
  M12: X-Standard

<table>
<thead>
<tr>
<th>Length</th>
<th>Article number</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12, plug, straight</td>
<td></td>
</tr>
<tr>
<td>1.0m</td>
<td>2172238</td>
</tr>
<tr>
<td>2.0m</td>
<td>2172239</td>
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<tr>
<td>3.0m</td>
<td>2172240</td>
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<td>5.0m</td>
<td>2172241</td>
</tr>
<tr>
<td>10.0m</td>
<td>2172243</td>
</tr>
<tr>
<td>M12, socket, straight</td>
<td></td>
</tr>
<tr>
<td>1.0m</td>
<td>2172208</td>
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<tr>
<td>2.0m</td>
<td>2172209</td>
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<td>3.0m</td>
<td>2172210</td>
</tr>
<tr>
<td>5.0m</td>
<td>2172211</td>
</tr>
<tr>
<td>10.0m</td>
<td>2172213</td>
</tr>
</tbody>
</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products. Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Other lengths are available upon request.
EtherNet/IP®

Data communication systems for ETHERNET technology
Industrial Ethernet, Cat. 6A • Patch cables for flexible applications

ETHERLINE® Cat. 6A Flex Patch cables

Info
• Additional variants are available at www.lappgroup.com/assemblyfinder or on request
• Based on 2170934

Benefits
• Only for patch cable applications (max. 60m)
• Plug & Play for flexible connection solutions

Application range
• Cat. 6A qualified for 10Gbit/s
• M12 X-coded connectors, comp. with IEC 61076-2-109
• RJ45 connectors, comp. with IEC 60603-7-51

Product features
• Meets the requirements according to Cat. 6A and Class E

Product Make-up
• Braided conductor, 4x2x AWG26/7
• Twisted pair construction permits largely interference-free operation (decoupling).
• High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference
• Outer sheath: PUR compound, halogenfree, 6.4mm in diameter
• Colour: green (based on RAL 6018)

Technical data
Classification
ETIM 5.0 Class-ID: EC002599
ETIM 5.0 Class-Description: Patch cord copper (twisted pair) industry

Minimum bending radius
Fixed installation: 4 x outer diameter
Flexing: up from 10 x outer diameter

Protection rating
M12: IP 67
RJ45: IP 20

Temperature range
Flexing: -30°C to +80°C (M12)
Flexing: -40°C to +70°C (RJ45)

Coding
M12: X-Standard

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Other lengths are available upon request.

For current information see: www.lappgroup.com

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ETHERLINE® Cat.7 FLEX
Ethernet cable for Category 7, class F for flexible use

Benefits
- Can be used in dry or damp rooms
- Screened against interference
- Can be used for Industrial Ethernet in harsh industrial environments
- 4 pair: 100 Mbit/s up to 10 Gbit/s for Industrial Ethernet

Application range
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s is 60 m
- Max. cable length for 10 Gbit/s is 60 m
- Suitable for EtherCAT and EtherNet/IP applications

Product features
- PUR outer sheath is highly resistant to mineral oils and abrasion
- Robust, halogen-free outer sheath
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference

Norm references / Approvals
- Electrical requirements acc. to IEC 61156-6
- AWM certification for USA and Canada
- UL AWM Style 21576
- Flame retardant acc. to IEC 60332-1-2
- Halogen free acc. to VDE 0472-815

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable

- Peak operating voltage
  (not for power applications) 125 V
- Test voltage
  Core/core: 1000 V
  Core/screen: 500 V
- Minimum bending radius
  Fixed installation: 4 x outer diameter
  Flexing: 10 x outer diameter
- Characteristic impedance
  nom. 100 Ω acc. to IEC 61156-6
- Temperature range
  Fixed installation: -50°C to +80°C
  Flexing: -40°C to +80°C

Product Make-up
- Stranded conductor, bare, 7-wire
- Core insulation made of polyethylene (PE)
- S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
- Outer sheath made of PUR
- Colour: green (based on RAL 6018)

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Article number  Article designation  Number of pairs and AWG per conductor  Core diameter in mm  Outer diameter [mm]  Copper index (kg/km)  Weight (kg/km)
ETHERLINE® Cat.7 FLEX 2170934 ETHERLINE® Cat.7 FLEX  4x2xAWG26/7 1,0  6.4  28  46

Accessories
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA M12X refer to page 176
- EPIC® DATA CCR FA refer to page 177
- KNIPEX Elektronik Super Knips® refer to main catalogue 2018/19
- DATA STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
Data communication systems for ETHERNET technology
PROFINET, Cat.5 • Type A – Cables for fixed installation

**ETHERLINE® PN Cat.5**
Ethernet cable for Category 5, class D for fixed installation

**Benefits**
- Can be used in dry or damp rooms
- Screened against interference
- Can be used for Industrial Ethernet in harsh industrial environments
- 2-pair: 10/100 Mbit/s for Industrial Ethernet

**Application range**
- For industrial secondary and tertiary cabling according to EN 50173-3 ISO/IEC 24702
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s is 100 m
- Suitable for EtherCAT and EtherNet/IP applications
- ETHERLINE® TRAY ER PN Y FC: installation in open cable trays without any conduit

**Product features**
- Fixed Installation
- CAT.5-Performance
- FC: “Fast Connect” cable design
- ETHERLINE® Y FC, ETHERLINE® Y, ETHERLINE® TRAY ER PN Y FC: flame-retardant according to CSA FT-4

**Norm references / Approvals**
- Flame-retardant according IEC 60332-1-2
- ETHERLINE® Y FC with PLTC approbation and AWM Style 21694
- ETHERLINE® PN Cat.5e YY with UL CMX
- ETHERLINE® PN Cat.5e Y with UL CMX
- ETHERLINE® TRAY ER PN Y FC with PLTC ER approval

**Technical data**

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
<th>ETIM 5.0/6.0 Class-ID: EC000830</th>
</tr>
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<tbody>
<tr>
<td>Peak operating voltage</td>
<td>(not for power applications) 125 V</td>
</tr>
<tr>
<td>Minimum bending radius</td>
<td>See data sheet</td>
</tr>
<tr>
<td>Test voltage</td>
<td>See data sheet</td>
</tr>
<tr>
<td>Characteristic impedance</td>
<td>nom. 100 Ω acc. to IEC 61156-5</td>
</tr>
<tr>
<td>Temperature range</td>
<td>See data sheet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and AWG per conductor</th>
<th>Core diameter in mm</th>
<th>Outer diameter [mm]</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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<tr>
<td>2170891</td>
<td>ETHERLINE® PN Cat.5e Y</td>
<td>1 x 4 x AWG22/1</td>
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<td>6.3</td>
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<td>56</td>
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<td>2170933</td>
<td>ETHERLINE® PN Cat.5e YY</td>
<td>1 x 4 x AWG22/1</td>
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<td>7.7</td>
<td>30.4</td>
<td>62</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

**Accessories**
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA RJ45F Cat.6, refer to page 175
- EPIC® DATA M12D refer to page 176
- KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
- DATA STRIP stripping tool refer to main catalogue 2018/19
- FC STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
ETHERLINE® PN Cat.5 FLEX
Ethernet cable for Category 5, class D for flexible use

Benefits
• For PROFINET applications type B
• Can be used in dry or damp rooms
• Screened against interference
• Can be used for Industrial Ethernet in harsh industrial environments
• 2-pair: 10/100 Mbit/s for Industrial Ethernet

Application range
• For industrial secondary and tertiary cabling according to EN 50173-3 ISO/IEC 24702
• Wiring of machines, tools, devices, appliances and control cabinets
• Max. cable length for 100 Mbit/s is 85 m
• Suitable for EtherCAT and EtherNet/IP applications
• For flexible applications (7-wire stranded conductor)

Product features
• Flame-retardant according to CSA FT4 UL Vertical-Tray Flame Test
• CAT-5-Performance
• FRNC Version: Halogen free and flame retardant
• Fast Connect (FC) cable design

Norm references / Approvals
• The cable is UL/CSA-certified (CMG)
• ETHERLINE® PN Cat.5 Y FLEX FC: ECOLAB® Industry standard for innovation and efficiency in the field of professional cleaning and disinfection

Product Make-up
• Stranded tinned 7-wire conductor
• Core insulation: PE or PP
• Star quad
• Inner sheath made of PVC or FRNC
• Overall screening with copper braid and plastic-laminated aluminium foil
• PVC or FRNC jacket material
• Colour: green (based on RAL 6018)

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
<th>ETIM 5.0/6.0 Class-ID: EC000830</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak operating voltage</td>
<td>(not for power applications) 125 V</td>
</tr>
<tr>
<td>Minimum bending radius</td>
<td>FRNC cable: during installation: 8 x outer diameter fixed: 4 x outer diameter</td>
</tr>
<tr>
<td>PVC cable: Flexing: 7 x outer diameter Fixed installation: 3 x outer diameter</td>
<td></td>
</tr>
<tr>
<td>Test voltage</td>
<td>Core/core: 2000 V Core/screen: 2000 V</td>
</tr>
<tr>
<td>Characteristic impedance</td>
<td>nom. 100 Ω acc. to IEC 61156-5</td>
</tr>
<tr>
<td>Temperature range</td>
<td>cable halogenfree compound Fixed installation: -25°C to +80°C Moved: -25°C to +80°C</td>
</tr>
<tr>
<td></td>
<td>cable with PVC jacket Fixed installation: -40°C to +80°C Moved: -20°C to +60°C</td>
</tr>
</tbody>
</table>

Article number   Article designation  Number of pairs and AWG per conductor  Core diameter in mm  Outer diameter [mm]  Copper index (kg/km)  Weight (kg/km)

PVC jacket
2170886   ETHERLINE® PN Cat.5 Y FLEX FC 1 x 4 x AWG22/7 1.5 6.5 31.3 67
FRNC outer sheath
2170890   ETHERLINE® PN Cat.5e FRNC FLEX FC 1 x 4 x AWG22/7 1.5 6.5 31.2 65

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

PROFINET® is a registered trademark of the PNO (PROFIBUS user organisation)

Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
• EPIC® DATA RJ45 refer to page 173
• EPIC® DATA RJ45 Cat.6, refer to page 175
• EPIC® DATA M12D refer to page 176
• KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
• FC STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
Data communication systems for ETHERNET technology
PROFINET, Cat.5 • Type B - Cables for flexible applications

ETHERLINE® PN Y Cat.5e BK
Flexible application

Info
- For PROFINET applications
- CAT.5-Performance

Benefits
- UV and weather-resistant in black
- Can be used in dry or damp rooms
- Screened against interference
- Suitable for outdoor use, UV-resistant
- 2pair: 10/100 Mbit/s for Industrial Ethernet

Application range
- Many applications with Industrial Ethernet, e.g. PROFINET type B, i.e. fixed installation and flexible use.
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s is 85 m
- Suitable for EtherCAT and EtherNet/IP applications

Product features
- PVC compound TM2 acc. to EN 50363-4-1
- Resistant to acids, alkalis and certain oils at room temperature
- Flame retardant acc. to IEC 60332-1-2

Product Make-up
- Stranded conductor, 7-wire, bare
- Core insulation: Based on Polyolefin
- Colour-coded in accordance with PROFINET for Cat.5 applications
- Star quad
- Overall screening with copper braid and plastic-laminated aluminum foil
- PVC outer sheath, black

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage
  (not for power applications) 125 V
- Minimum bending radius
  Fixed installation: 10 x outer diameter
  Flexing: 15 x outer diameter
- Test voltage
  Core/core: 1000 V
  Core/screen: 500 V
- Characteristic impedance
  nom. 100 Ω acc. to IEC 61156-5
- Temperature range
  Flexible: -10°C to +70°C
  Fixed installation: -40°C to +80°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and AWG per conductor</th>
<th>Outer diameter (mm)</th>
<th>Core diameter in mm</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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<tbody>
<tr>
<td>2170901</td>
<td>ETHERLINE® Y CAT.5e BK 2x2xAWG22/7</td>
<td>1 x 4 x AWG22/72 x 2 x AWG22/7</td>
<td>6.2</td>
<td>1.5</td>
<td>30.4</td>
<td>59</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum.
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).
PROFINET® is a registered trademark of the PNO (PROFIBUS user organisation).
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Similar products
- ETHERLINE® PN FLEX refer to page 144

Accessories
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA HS RJ45F Cat.6, refer to page 175
- EPIC® DATA M12D refer to page 176
- DATA STRIP stripping tool refer to main catalogue 2018/19
- KNIPEX Elektronik Super Knips® refer to main catalogue 2018/19

For current information see: www.lappgroup.com
ETHERLINE® Cat.5e 105 plus
Ethernet cable for Category 5e, class D for flexible use

Benefits
• No need for additional cable protection against high temperatures
• High temperature resistance
• Industrial use
• Premium screening against electromagnetic interference
• 2pair: 10/100 Mbit/s for Industrial Ethernet

Application range
• For installation in hollow shaft between gear units and pitch system
• Suitable for fixed installation and occasionally flexible use in high temperature areas
• Max. cable length for 100 Mbit/s is 85 m
• Suitable for EtherCAT and EtherNet/IP applications
• Wiring of machines, tools, devices, appliances and control cabinets

Product features
• Optimum EMC protection
• Permanent load up to +105°C, temporary load +120°C

Norm references / Approvals
• Electrical requirements acc. to IEC 61156-5
• Flame retardant acc. to IEC 60332-1-2

Product Make-up
• Stranded conductor, 7-wire, bare
• Core insulation: PE
• Colour-coded in accordance with PROFINET for Cat.5 applications
• Overall screening with copper braid and plastic-laminated aluminium foil
• Outer sheath: TPE-based
• Colour: green (based on RAL 6018)

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC000830
ETIM 5.0/6.0 Class-Description: Data cable

Minimum bending radius
Fixed installation: 10 x outer diameter
Flexing: 15 x outer diameter

Characteristic impedance
nom. 100 Ω acc. to IEC 61156-5

Temperature range
Fixed installation: -40°C to +105°C
Occasionally flexing: -30°C to +105°C

Article number   Article designation  Number of pairs and AWG per conductor  Core diameter in mm  Outer diameter [mm]  Copper index (kg/km)  Weight (kg/km)
ETHERLINE® Cat.5e 105 plus
2170636      ETHERLINE Cat.5e 105 plus  1 x 4 x AWG22/7  1.5  6.2  30.4  59

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
• EPIC® DATA RJ45 refer to page 173
• EPIC® DATA RJ45F Cat.6, refer to page 176
• EPIC® DATA M12D refer to page 176
• KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
• DATA STRIP stripping tool refer to main catalogue 2018/19
ETHERLINE® MARINE FRNC FC CAT.5
Flexible application

Info
- Certified for maritime applications
- Flexible use in conjunction with light mechanical stress
- CAT.5-Performance

Benefits
- Can be used for Industrial Ethernet in harsh industrial environments
- For use in dry, damp and wet rooms
- Premium screening against electromagnetic interference
- 2pair: 10/100 Mbit/s for Industrial Ethernet

Application range
- Shipbuilding
- Wiring of machines, tools, devices, appliances and control cabinets
- Suitable for EtherCAT and EtherNet/IP applications
- Onshore and offshore applications
- Max. cable length for 100 Mbit/s is 85 m

Product features
- Fast Connect (FC) cable design

Norm references / Approvals
- CMG UL/CSA certification 75 °C or PLTC, Sun Res
- Flame-retardant according to CSA FT4 UL Vertical-Tray Flame Test
- High flame retardancy in accordance with IEC 60332-3 and FT4

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage
  (not for power applications) 125 V
- Minimum bending radius
  Fixed installation: 3 x outer diameter
  Flexing: 7.5 x outer diameter
- Characteristic impedance
  nom. 100 Ω acc. to IEC 61156-5
- Temperature range
  Operating temperature: -25 °C to +70 °C
  During installation: 0 °C to +50 °C

Product Make-up
- Fine-wire strand made of tinned-copper wires
- Colour-coded in accordance with PROFIBUS for Cat.5 applications
- Star quad
- Inner sheath: thermoplastic copolymer (FRNC)
- SF/UTP: braid of tinned copper wire and plastic laminated aluminum foil as overall screening
- Halogen-free and flame-retardant FRNC outer sheath
- Colour: green (based on RAL 6018)

Article number | Article designation | Number of pairs and AWG per conductor | Core diameter in mm | Outer diameter [mm] | Copper index (kg/km) | Weight (kg/km)
---|---|---|---|---|---|---
2170889 | ETHERLINE® MARINE FRNC FC CAT.5 | 1 x 4 x AWG22/7 | 1.5 | 6.5 | 32 | 68

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
PROFINET® is a registered trademark of the PNO (PROFIBUS user organisation).
Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA M12D refer to page 176
- KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
- FC STRIP stripping tool refer to main catalogue 2018/19
**ETHERLINE® Cat.5 FRNC HYBRID**

Hybrid cable for ethernet and power transmission

**Benefits**
- Industrial use
- Screened against interference

**Application range**
- Industrial Ethernet cable
- 2pair: 10/100 Mbit/s for Industrial Ethernet
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference
- Max. cable length for 100 Mbit/s is 85 m
- Suitable for EtherCAT and EtherNet/IP applications

**Product features**
- HYBRID: cable for data transmission + power supply
- Robust, halogen-free outer sheath

**Norm references / Approvals**
- UL AWM Style 21282
- Flame-retardant according IEC 60332-1-2

**Product Make-up**
- Cores for Power Supply:
  4 x 1.5 mm² (AWG16)
- Data transfer:
  - 7-wire, bare
  - Pair screening: wrapped with foil and braided copper wires
  - Twisting: data pairs and power supply pairs twisted together
  - Overlapping plastic tape
  - FRNC outer sheath
  - Colour: green (based on RAL 6018)

**Technical data**

<table>
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<tr>
<th>Classification ETIM 5/6</th>
<th>ETIM 5.0/6.0 Class-ID: EC000830</th>
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<td>ETIM 5.0/6.0 Class-Description: Data cable</td>
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</table>

**Minimum bending radius**
- Occasional flexing: 10 x outer diameter
- Fixed installation: 5 x outer diameter

**Test voltage**
- See data sheet

**Characteristic impedance**
- nom. 100 Ω acc. to IEC 61156-5

**Temperature range**
- Operation: -20 °C to +70 °C

**Article number**
- 2170887

**Article designation**
- ETHERLINE® Cat.5 FRNC HYBRID

**Number of pairs and AWG per conductor**
- 2x2xAWG22/7 + 4x1.5

**Outer diameter [mm]**
- 10.3

**Copper index (kg/km)**
- 94.2

**Weight (kg/km)**
- 153

**Flexible use**
- 2170887

**Article designation**
- ETHERLINE® Cat.5 FRNC HYBRID

**Number of pairs and AWG per conductor**
- 2x2xAWG22/7 + 4x1.5

**Outer diameter [mm]**
- 10.3

**Copper index (kg/km)**
- 94.2

**Weight (kg/km)**
- 153

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

PROFINET® is a registered trademark of the PNO (PROFIBUS user organisation)

Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
- STAR STRIP stripping tool refer to main catalogue 2018/19
**Info**

- Highly flexible application
- For PROFINET applications
- CAT.5-Performance

---

### Benefits

- Can be used in dry or damp rooms
- Screened against interference
- Can be used for Industrial Ethernet in harsh industrial environments
- 2pair: 10/100 Mbit/s for Industrial Ethernet

### Application range

- Power chain applications
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s is 85 m
- Suitable for EtherCAT and EtherNet/IP applications

### Product features

- PUR outer sheath is highly resistant to mineral oils and abrasion
- Optimized cable construction for power chain use
- Broad usages due to halogen-free materials

---

### Norm references / Approvals

- UL/CSA type CMX (UL 444)
- Flame retardant acc. to UL CW1 / CSA FT1
- Halogen free acc. to VDE0472-815

### Product Make-up

- Fine-wire strand made of tinned-copper wires
- Star quad
- Colour-coded in accordance with PROFINET for Cat.5 applications
- Inner sheath: thermoplastic copolymer (FRNC)
- Overall screening with copper braid and plastic-laminated aluminium foil
- PUR outer sheath, halogen-free
- Colour: green (based on RAL 6018)

### Technical data

- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable

- **Peak operating voltage**
  - (not for power applications) 125 V

- **Minimum bending radius**
  - 8 x outer diameter

- **Test voltage**
  - Core/core: 700 V
  - Core/screen: 700 V

- **Characteristic impedance**
  - nom. 100 Ω acc. to IEC 61156-5

- **Temperature range**
  - Fixed installation: -30°C to +70°C
  - Flexing: -20°C to +60°C

---

### Article number | Article designation | Number of pairs and AWG per conductor | Core diameter in mm | Outer diameter [mm] | Copper index (kg/km) | Weight (kg/km) | Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

| ETHERLINE® PN Cat.5 FD | ETHERLINE® FD P FC Cat.5 | 1 x 4 x AWG22/7 | 1.5 | 6.5 | 31.3 | 61 |

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Accessories

- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA M12D refer to page 176
- KNIFEPEX Electronics Super Knips® refer to main catalogue 2018/19
- FC STRIP stripping tool refer to main catalogue 2018/19

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For current information see: www.lappgroup.com
ETHERLINE® TORSION Cat. 5
Ethernet cable for Category 5, class D for highly flexible applications

**Benefits**
- Can be used in dry or damp rooms
- Screened against interference
- Can be used for Industrial Ethernet in harsh industrial environments
- Industrial Ethernet Cable, 2-pair, suitable for torsion stress
- 2pair: 10/100 Mbit/s for Industrial Ethernet

**Application range**
- Many applications with Industrial Ethernet, e.g. PROFINET, i.e. fixed installation, flexible use as well as TORSION.
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s is 55 m
- Suitable for EtherCAT and EtherNet/IP applications

**Product features**
- Cable suitable for high torsion stress. Tested with more than 1 million bending cycles and a right/left movement of 180° per metre.
- Outer sheath with high abrasion-resistance
- Broad usages due to halogen-free materials
- PUR outer sheath is highly resistant to mineral oils and abrasion

**Norm references / Approvals**
- UL AWM (Style 2161)
- Halogen-free according to VDE 0472-815
- Flame retardant acc. to IEC 60332-1-2

**Product Make-up**
- Stranded conductor, tinned
- AWG 22 (19-wire)
- PE core insulation
- Star quad
- Screening: wrapped with braided tinned-copper wires
- Non-woven wrapping
- PUR outer sheath, green (RAL 6018)

**Technical data**
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage
  - max. 100 V (not for power applications)
- Minimum bending radius
  - Flexing: up from 5 x outer diameter
- Test voltage
  - 700 V
- Characteristic impedance
  - nom. 100 Ω acc. to IEC 61156-5
- Temperature range
  - -40°C to +80°C

**Article number**
- Article designation
- Number of pairs and AWG per conductor
- Core diameter in mm
- Outer diameter [mm]
- Copper index (kg/km)
- Weight (kg/km)

| ETHHERLINE® TORSION Cat. 5 | 2170888 | ETHERLINE® TORSION CAT.5 | 1 x 4 x AWG22 / 19 | 1.5 | 6.5 | 31.3 | 52 |

---

**Accessories**
- KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
- DATA STRIP stripping tool refer to main catalogue 2018/19
ETHERLINE® FESTOON PN Cat.5e
Ethernet cable for Category 5e, Class D for Festoon applications - verified up to 100 MHz

Info
- Fast and easy cable preparation by FC inner sheath
- For PROFINET applications
- Cat.5e-Performance

Benefits
- Can be used in dry or damp rooms
- Screened against interference
- Can be used for Industrial Ethernet in harsh industrial environments
- 2pair: 10/100 Mbit/s for Industrial Ethernet

Application range
- For conveying systems and cable trolleys
- Power chain applications
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s is 85 m
- Suitable for EtherCAT and EtherNet/IP applications

Product features
- Cat.5e-Performance
- Optimized cable construction for use in Festoon applications
- Fast Connect (FC) cable design
- The oil-resistant PVC sheath enables usage in industrial environments

Norm references / Approvals
- The cable is UL/CSA-certified (CMG)
- UL AWM Style 21694
- High flame retardance acc. to IEC 60332-3-24 and FT4

Product Make-up
- Fine-wire strand made of tinned-copper wires
- Star quad
- Colour-coded in accordance with PROFINET for Cat.5e applications
- Inner sheath: PVC
- Overall screening with copper braid and plastic-laminated aluminium foil
- PVC outer sheath
- Colour: green (based on RAL 6018)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage (not for power applications) 125 V
- Minimum bending radius
  Moved: 10 x outer diameter
  Fixed installation: 4 x outer diameter
- Test voltage
  Core/core: 2000 V
  Core/screen: 2000 V
- Characteristic impedance nom. 100 Ω acc. to IEC 61156-6
- Temperature range
  Fixed installation: -40°C to +80°C
  Flexing: -10°C to +70°C

Article number | Article designation | Number of pairs and AWG per conductor | Core diameter in mm | Outer diameter [mm] | Copper index (kg/km) | Weight (kg/km)
--- | --- | --- | --- | --- | --- | ---
2170936 | ETHERLINE® FESTOON PN Cat.5e | 1 x 4 x AWG22/7 | 1,5 | 6,5 | 32 | 69

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

PROFINET® is a registered trademark of the PNO (PROFIBUS user organisation)

Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

UL certifications can be found in the data sheet.

Accessories
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA M12D refer to page 176
- KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
- FC STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
Data communication systems for ETHERNET technology

PROFINET, Cat.5 • Type C - Cables for special applications

ETHERLINE® Cat.5 ARM
Fixed Installation

Benefits
• Can be used for Industrial Ethernet in harsh industrial environments
• EMC-optimised design
• With armouring for improved rodent protection
• Screened against interference
• 2pair: 10/100 Mbit/s for Industrial Ethernet

Application range
• Suitable for outdoor use, UV-resistant
• Suitable for direct burial
• Max. cable length for 100 Mbit/s is 100 m
• PROFINET application Type C but for fixed installation
• Suitable for EtherCAT and EtherNet/IP applications

Product features
• Fast Connect (FC) cable design

Product Make-up
• Solid and bare copper conductor
• Core insulation: PE
• Colour-coded in accordance with PROFINET for Cat.5 applications
• Star quad
• SF/UTP: braid of tinned copper wire and plastic laminated aluminum foil as overall screening
• Inner sheath made of PVC (green RAL6018)
• 2 layer galvanised steel tape
• Outer sheath made of black polyethylene (PE)

Technical data

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<th>Classification ETIM 5/6</th>
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<td>ETIM 5.0/6.0 Class-ID: EC000830</td>
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<tr>
<td>ETIM 5.0/6.0 Class-Description: Data cable</td>
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</tbody>
</table>

Peak operating voltage
(not for power applications) 125 V

Minimum bending radius
Fixed installation: 10 x outer diameter
Flexing: 15 x outer diameter

Test voltage
Core/core: 2000 V
Core/screen: 2000 V

Characteristic impedance
nom. 100 Ω acc. to IEC 61156-5

Temperature range
Fixed installation: -40°C to +70°C
Flexing: -20°C to +60°C

Article number | Article designation | Number of pairs and AWG per conductor | Core diameter in mm | Outer diameter [mm] | Copper index (kg/km) | Weight (kg/km) |
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: EUR 150 / 100 kg. Refer to catalogue appendix 117 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

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Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
• EPIC® DATA RJ45 refer to page 173
• EPIC® DATA M12D refer to page 176
• KNIPEX Electronics Super Knips® refer to main catalogue 2018/19
• DATA STRIP stripping tool refer to main catalogue 2018/19
**ETHERLINE® PN Cat.5 Patch cables**

**Benefits**
- Non-permanent connections allow for easy change of equipment

**Application range**
- For PROFINET® applications type A
- Suitable for EtherCAT and EtherNet/IP applications
- Suitable for use in industrial applications
- For indoor use

**Product features**
- Meets the requirements according to Cat.5e and class D
- 2pair: 10/100 Mbit/s for Industrial Ethernet

**Norm references / Approvals**
- The cable is UL/CSA-certified (CMG)

**Product Make-up**
- Solid conductor, 2x2x AWG22/1
- Star quad
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath made of PVC, 6.5mm in diameter
- Colour: green (based on RAL 6018)

**Technical data**
- **Classification**
  - ETIM 5.0 Class-ID: EC002599
  - ETIM 5.0 Class-Description: Patch cord copper (twisted pair) industry
- **Minimum bending radius**
  - During installation: 15 x outer diameter
  - Fixed installation: 10 x outer diameter
- **Protection rating**
  - M12: IP 67
  - RJ45: IP 20
- **Temperature range**
  - During installation: -20°C to +60°C
  - Fixed installation: -40°C to +80°C
- **Coding**
  - M12: D-Standard

**Photographs and graphics are not to scale and do not represent detailed images of the respective products.**

**Length**

<table>
<thead>
<tr>
<th>RJ45</th>
<th>M12, plug, straight</th>
<th>M12, plug, angled</th>
<th>M12, socket, straight</th>
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For current information see: www.lappgroup.com
Data communication systems for ETHERNET technology

PROFINET®, Cat.5 • Type B - Patch cables for flexible applications

ETHERLINE® PN Flex Cat.5 Patch cables

Benefits

- Non-permanent connections allow for easy change of equipment
- For directly connecting two electric components

Application range

- For PROFINET® applications type B
- Flexible applications
- Suitable for EtherCAT and EtherNet/IP applications
- Suitable for use in industrial applications
- For indoor use

Product features

- Meets the requirements according to Cat.5e and class D
- 2pair: 10/100 Mbit/s for Industrial Ethernet

Norm references / Approvals

- The cable is UL/CSA-certified (CMG)

Product Make-up

- Braided conductor, 2x2x AWG22/7
- Star quad
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath made of PVC, 6.5mm in diameter
- Colour: green (based on RAL 6018)

Technical data

Classification

- ETIM 5.0 Class-ID: EC002599
- ETIM 5.0 Class-Description: Patch cord copper (twisted pair) industry

Minimum bending radius

- Flexing: 15 x outer diameter
- Fixed installation: 10 x outer diameter

Protection rating

- M12: IP 67
- RJ45: IP 20

Temperature range

- Flexing: -20°C to +60°C
- Fixed installation: -40°C to +80°C

Coding

- M12: D-Standard

Photographs and graphics are not to scale and do not represent detailed images of the respective products. Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Other lengths are available upon request.

<table>
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For current information see: www.lappgroup.com
ETHERLINE® PN FD Cat.5 Patch cables

**Benefits**
- For directly connecting two electric components
- Non-permanent connections allow for easy change of equipment

**Application range**
- For PROFINET® applications type C
- Continuous flexing applications
- Suitable for EtherCAT and EtherNet/IP applications
- Suitable for use in industrial applications
- For indoor use

**Product features**
- Meets the requirements according to Cat.5e and class D
- 2pair: 10/100 Mbit/s for Industrial Ethernet

**Norm references / Approvals**
- The cable is UL/CSA-certified (CMX)

**Product Make-up**
- Braided conductor, 2x2x AWG22/7
- Star quad
- Overall screening with copper braid and plastic-laminated aluminium foil
- Outer sheath made of PUR, 6.5mm in diameter
- Colour: green (based on RAL 6018)

**Technical data**

<table>
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<tr>
<th>Length</th>
<th>RJ45 Article number</th>
<th>M12, plug, straight Article number</th>
<th>M12, plug, angled Article number</th>
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Other lengths are available upon request.
Data communication systems for ETHERNET technology
PROFINET, Cat.6A • Type A - Cables for fixed installation

ETHERLINE® Cat.6A
Ethernet cable Category 6A, Class E, for fixed installation - verified up to 500 MHz

Benefits
- Can be used in dry or damp rooms
- Screened against interference
- Can be used for Industrial Ethernet in harsh industrial environments
- 4pair: 100Mbit/s up to 10 Gbit/s for Industrial Ethernet

Application range
- For industrial secondary and tertiary cabling according to EN 50173-3 ISO/IEC 24702
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s up to 10 Gbit/s is 100 m
- Suitable for EtherCAT and EtherNet/IP applications

Product features
- PUR outer sheath is highly resistant to mineral oils and abrasion
- Robust, halogen-free outer sheath
- The oil-resistant PVC sheath enables usage in industrial environments
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference

Product Make-up
- Solid bare copper wire AWG22
- Core insulation made of polyethylene (PE)
- S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
- Colour: green (based on RAL 6018)

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage (not for power applications) 125 V
- Minimum bending radius
  - Fixed installation: 10 x outer diameter
- Characteristic impedance
  - 100 ± 5 Ω (> 1 MHz)
- Temperature range
  - Cable with PUR sheath
    - Fixed installation: -40°C to +80°C
  - Cable, halogen-free outer sheath
    - Fixed installation: -25°C to +80°C
  - Cable with PVC sheath
    - Fixed installation: -30°C to +80°C

Article number | Article designation | Number of pairs and AWG per conductor | Outer diameter [mm] | Core diameter in mm | Copper index (kg/km) | Weight (kg/km)
--- | --- | --- | --- | --- | --- | ---
2170464 | ETHERLINE® PN CAT.6A, Y FC | 4x2xAWG22/1 | 8.7 | 1.5 | 53 | 98
2170466 | ETHERLINE® PN CAT.6A, FRNC FC | 4x2xAWG22/1 | 8.7 | 1.5 | 53 | 91
2170465 | ETHERLINE® PN CAT.6A, P FC | 4x2xAWG22/1 | 8.7 | 1.5 | 53 | 99

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standard-lengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

PROFINET® is a registered trademark of the PNO (PROFIBUS user organisation)
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA RJ45F Cat.6A refer to page 175
- EPIC® DATA M12X refer to page 176
- EPIC® DATA CCR FA refer to page 177
- DATA STRIP® stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
ETHERLINE® PN Cat.6 A, FC

Ethernet cable Category 6 A, Class E A for fixed installation with FC inner sheath - verified up to 500 MHz

Benefits
- Can be used in dry or damp rooms
- Screened against interference
- Can be used for Industrial Ethernet in harsh industrial environments
- 4pair: 100Mbit/s up to 10 Gbit/s for Industrial Ethernet

Application range
- For industrial secondary and tertiary cabling according to EN 50173-3
- ISO/IEC 24702
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s up to 10 Gbit/s is 100 m
- Suitable for EtherCAT and EtherNet/IP applications

Product features
- The oil-resistant PVC sheath enables usage in industrial environments
- Robust, halogen-free FRNC outer sheath
- PUR outer sheath is highly resistant to mineral oils and abrasion
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference

Norm references / Approvals
- PVC version with PLTC approval and UL CMG listingPUR version with UL AWM Style 21576
- Flame retardant acc. to IEC 60332-1-2

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage (not for power applications) 125 V
- Minimum bending radius
- Fixed installation: 8 x outer diameter
- Test voltage see datasheet
- Characteristic impedance nom. 100 Ω acc. to IEC 61156-5
- Temperature range cable with PUR jacket
- Fixed installation: VDE -30°C to +80°C; UL/CSA -30°C to +80°C
- Flexing: VDE -5°C to +50°C; UL/CSA -5°C to +80°C

Table:

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<th>PUR outer sheath, halogen-free</th>
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Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

PROFINET® is a registered trademark of the PNO (PROFIBUS user organisation)

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA RJ45F Cat.6, refer to page 175
- EPIC® DATA M12X refer to page 176
- EPIC® DATA CCR FA refer to page 177
- FC STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
**ETHERLINE® PN Cat.6A FLEX**
Flexible use

**Benefits**
- Can be used in dry or damp rooms
- Screened against interference
- Can be used for Industrial Ethernet in harsh industrial environments
- 4 pair: 100Mbit/s up to 10 Gbit/s for Industrial Ethernet

**Application range**
- For industrial secondary and tertiary cabling according to EN 50173-3 ISO/IEC 24702
- At 100 Mbit/s: max 90 m cable length
- Wiring of machines, tools, devices, appliances and control cabinets
- Suitable for EtherCAT and EtherNet/IP applications
- For flexible applications (7-wire stranded conductor)

**Product features**
- CAT.6A, for flexible application, qualified for 10Gbit/s
- Meets the requirements according to CAT.6A, ISO/IEC 11801 and EN 50173
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference
- The oil-resistant PVC sheath enables usage in industrial environments

**Norm references / Approvals**
- UL approvals see datasheet
- ETHERLINE® PN Cat.6A Y FLEX: ECOLAB® Industry standard for innovation and efficiency in the field of professional cleaning and disinfection

**Product Make-up**
- 7-wire tinned stranded copper conductor
- Core insulation: PE
- S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
- PVC or FRNC jacket material
- Colour: green (based on RAL 6018)

**Technical data**
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage (not for power applications) 125 V
- Minimum bending radius
  - Flexing: 15 x outer diameter
  - Fixed installation: 8 x outer diameter
- Characteristic impedance nom. 100 Ω nach IEC 61156-5
- Temperature range
  - Cable halogen-free compound
    - Fixed installation: -25°C to +80°C
    - Fixed installation: -40°C to +80°C
  - Gelegentlich bewegt: -10°C bis +70°C

**Copper price basis:** EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

**Accessories**
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA RJ45F Cat. 6, refer to page 175
- EPIC® DATA M12X refer to page 176
- EPIC® DATA CCR FA refer to page 177
- DATA STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
ETHERLINE® PN Cat.6A FLEX FC
Ethernet cable Category 6A, Class E for flexible use with FC inner sheath - verified up to 500 MHz

Benefits
- Can be used in dry or damp rooms
- Screened against interference
- Can be used for Industrial Ethernet in harsh industrial environments
- 4pair: 100Mbit/s up to 10 Gbit/s for Industrial Ethernet

Application range
- For industrial secondary and tertiary cabling according to EN 50173-3 ISO/IEC 24702
- Max. cable length for 100 Mbit/s up to 100 m
- Wiring of machines, tools, devices, appliances and control cabinets
- Suitable for EtherCAT and EtherNet/IP applications
- For flexible applications (7-wire stranded conductor)

Product features
- CAT.6A for flexible application, qualified for 10Gbit/s
- Meets the requirements according to CAT.6A, ISO/IEC 11801 and EN 50173
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference
- The oil-resistant PVC sheath enables usage in industrial environments
- Robust, halogen-free FRNC outer sheath

Norm references / Approvals
- UL approvals see datasheet
- Flame retardant acc. to IEC 60332-1-2

Product Make-up
- 7-wire bare stranded copper conductor
- Core insulation: PE
- SF/UTP: braid of tinned copper wire and plastic laminated aluminum foil as overall screening, 2 cores stranded to pair, 4 pairs stranded to bundle with central cross
- Inner sheath: halogen-free compound
- PVC or FRNC jacket material
- Colour: green (based on RAL 6018)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage
  (not for power applications) 125 V
- Minimum bending radius
  Flexing: 8 x outer diameter
  Fixed installation: 4 x outer diameter
- Test voltage
  Core/Core: 1500 V AC
  Core/Screen: 1000 V AC
- Characteristic impedance
  nom. 100 Ω acc. to IEC 61156-5
- Temperature range
  PVC: fixed: -30 °C up to +80 °C
  moving: -25 °C up to +70 °C
  FRNC: fixed: -25 °C up to +80 °C
  moved: -25 up to +80 °C

Accessories
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA RJ45 Cat.6, refer to page 175
- EPIC® DATA M12X refer to page 176
- EPIC® DATA CCR FA refer to page 177
- DATA STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
ETHERLINE® FD CAT.6 A
Ethernet cable Category 6A, Class E, for highly flexible use with FC inner sheath - verified up to 500 MHz

Benefits
- For use in power chains and moving machinery parts in dry or damp rooms
- 4 pair: 100 Mbit/s up to 10 Gbit/s for Industrial Ethernet
- Premium screening against electromagnetic interference
- Can be used for Industrial Ethernet in harsh industrial environments

Application range
- For highly flexible applications (e.g. power chains)
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s is 85 m
- Max. cable length for 100 Mbit/s is 85 m
- Suitable for EtherCAT and EtherNet/IP applications

Product features
- PUR version is halogen-free according to IEC 60754
- CAT.6, for drag chain, qualified for 10 Gbit/s
- Meets the requirements according to CAT.6, ISO/IEC 11801 and EN 50173
- Min. 2.5 million bending cycles in the power chain

Norm references / Approvals
- Electrical requirements acc. to IEC 61156-6
- PUR cable is UL/CSA-certified (CMX)
- PUR versions: UL AWM Style 21576
- PVC cable is UL/CSA-certified (CM)
- Flame retardant acc. to IEC 60332-1-2
- Oil-resistant acc. IEC 60811-2-1

Product Make-up
- 7-wire tinned stranded copper conductor
- Core insulation: Based on Polyolefin
- S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
- Outer sheath: PUR, halogen-free/PVC
- Colour: green (based on RAL 6018)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Minimum bending radius
  Flexing: 15 x outer diameter
  Fixed installation: 8 x cable diameter
- Characteristic impedance
  nom. 100 Ω nach IEC 61156-6
- Temperature range
  Cable with PUR jacket
  Fixed installation: -40°C to +80°C
  Flexing: -30°C to +70°C
  Cable with PVC jacket
  Fixed installation: -40°C to +80°C
  Flexing: -10°C bis +70°C

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<th>Article number</th>
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<th>Number of pairs and AWG per conductor</th>
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<th>Core diameter in mm</th>
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Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA M12X refer to page 176

For current information see: www.lappgroup.com
Data communication systems for ETHERNET technology
PROFINET, Cat.6A • Type C - Cables for continuous flexing applications

ETHERLINE® TORSION Cat.6A
Highly flexible application

Info

- Industrial Ethernet Cable, 4-pair, suitable for torsion stress
- CAT.6, acc. to ISO/IEC 11801
- For PROFINET applications

Benefits
- Many applications with Industrial Ethernet, e.g. PROFINET, i.e. fixed installation, flexible use as well as TORSION.
- 4pair: 100Mbit/s up to 10 Gbit/s for Industrial Ethernet
- Premium screening against electromagnetic interference
- Can be used for Industrial Ethernet in harsh industrial environments

Application range
- Suitable for torsional applications which are typical for the loop in wind turbine generators (WTG)
- Can be used for Industrial Ethernet in harsh industrial environments
- Max. cable length for 100 Mbit/s is 85 m
- Max. cable length for 100 Mbit/s is 85 m
- Suitable for EtherCAT and EtherNet/IP applications

Product features
- PUR version is halogen-free according to IEC 60754
- Cable suitable for high torsion stress. Tested with more than 1 million bending cycles and a right/left movement of 180° per metre.
- Meets the requirements according to CAT.6A, ISO/IEC 11801 and EN 50173

Norm references / Approvals
- Electrical requirements acc. to IEC 61156-6
- PUR cable is UL/CSA-certified (CMX)
- PUR versions: UL AWM Style 21576
- PVC cable is UL/CSA-certified (CM)
- Flame retardant acc. to IEC 60332-1-2
- Oil-resistant acc. IEC 60811-2-1

Product Make-up
- 7-wire tinned stranded copper conductor
- Core insulation made of polyethylene (PE)
- S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
- Outer sheath: PUR, halogen-free/PVC
- Colour: green (based on RAL 6018)

Technical data

| Classification ETIM 5/6 | ETIM 5.0/6.0 Class-ID: EC000830
|------------------------|--------------------------
| ETIM 5.0/6.0 Class-Description: Data cable |

Minimum bending radius
- Flexing: 15 x outer diameter
- Fixed installation: 8 x cable diameter

Characteristic impedance
nom. 100 Ω nach IEC 61156-6

Temperature range
- Cable with PUR jacket
  - Fixed installation: -40°C to +80°C
  - Flexing: -30°C to +70°C
- Cable with PVC jacket
  - Fixed installation: -40°C to +80°C
  - Flexing: -10°C to +70°C

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<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and AWG per conductor</th>
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<th>Core diameter in mm</th>
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<td>ETHERLINE® TORSION P CAT6, 4 x 2 x AWG24/7</td>
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<td>1.3</td>
<td>44</td>
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</table>

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA M12X refer to page 176
- EPIC® DATA CCR FA refer to page 177

For current information see: www.lappgroup.com
ETHERLINE® TORSION Cat.6A Patch cables

**Benefits**
- Non-permanent connections allow for easy change of equipment
- For directly connecting two electric components

**Application range**
- Suitable for torsional applications which are typical for the loop in wind turbine generators (WTG)
- Suitable for EtherCAT and EtherNet/IP applications
- Suitable for use in industrial applications
- For indoor use

**Product features**
- Meets the requirements according to Cat.6A and class E
- Suitable for torsion stress

**Product Make-up**
- Braided conductor, 4x2x AWG24/7
- S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
- Outer sheath made of PUR, 9.4mm in diameter
- Colour: green (based on RAL 6018)

**Technical data**

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<td>Flexing: -30°C to +70°C</td>
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<td>Fixed installation: -30°C to +80°C</td>
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**Coding**
- M12: X-Standard

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Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Other lengths are available upon request.
**ETHERLINE® PN Cat.7**

Ethernet cable Category 7, Class F for fixed installation - verified up to 600 MHz

---

**Benefits**
- Can be used in dry or damp rooms
- Screened against interference
- Can be used for Industrial Ethernet in harsh industrial environments
- 4 pair: 100 Mbit/s up to 10 Gbit/s for Industrial Ethernet

**Application range**
- For industrial secondary and tertiary cabling according to EN 50173-3 ISO/IEC 24702
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s up to 10 Gbit/s is 100 m
- Suitable for EtherCAT and EtherNet/IP applications

**Product features**
- PUR outer sheath is highly resistant to mineral oils and abrasion
- Robust, halogen-free FRNC outer sheath
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference

**Norm references / Approvals**
- Flame retardant acc. to IEC 60332-1-2
- Oil-resistant acc. IEC 60811-2-1
- UL approvals see datasheet

**Product Make-up**
- Solid bare copper wire AWG23
- Core insulation: foamed polyethylene (PE)
- S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
- Colour: green (based on RAL 6018)

**Technical data**
- Classification ETIM 5/6 ETIM 5.0/6.0 Class-ID: EC000830 ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage (not for power applications) 125 V
- Minimum bending radius Fixed installation: 8 x outer diameter
- Test voltage Core/core: 1500 V rms Core/screen: 1500 V eff.
- Characteristic impedance 100 ± 5 Ω (> 1 MHz)
- Temperature range PVC/FRNC: -30 °C bis +80 °C PUR: -40 °C bis +80 °C

---

**Article Number**

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**Accessories**
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA M12X refer to page 176
- EPIC® DATA CCR FA refer to page 177

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Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils)

PROFINET® is a registered trademark of the PNO (PROFIBUS user organisation)

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
ETHERLINE® PN Cat.7 FLEX
Ethernet cable Category 7, Class F for flexible application - verified up to 600 MHz

Benefits
- Can be used in dry or damp rooms
- Screened against interference
- Can be used for Industrial Ethernet in harsh industrial environments
- 4-pair: 100 Mbit/s up to 10 Gbit/s for Industrial Ethernet

Application range
- For industrial secondary and tertiary cabling according to EN 50173-3 ISO/IEC 24702
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s up to 10 Gbit/s is 100 m
- Suitable for EtherCAT and EtherNet/IP applications

Product features
- FRNC Version: Halogene free and flame retardant
- The oil-resistant PVC sheath enables usage in industrial environments
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference

Norm references / Approvals
- Flame retardant acc. to IEC 60332-1-2
- UL approvals see datasheet

Product Make-up
- 7-wire bare stranded copper conductor
- Core insulation: foamed polyethylene (PE)
- S/FTP: copper braid as overall screening and pair screening with aluminum compound foil
- Colour: green (based on RAL 6018)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage
  (not for power applications) 125 V
- Minimum bending radius
  Fixed installation: 4 x outer diameter Flexing: 8 x outer diameter
- Test voltage
  Core/core: 1500 V rms
  Core/screen: 1500 V eff.
- Characteristic impedance
  100 ± 5 Ω (> 1 MHz)
- Temperature range
  Fixed installation: -30°C to +80°C
  Occasional flexing: -5°C to +50°C

Article number | Article designation | Number of pairs and AWG per conductor | Outer diameter [mm] | Core diameter in mm | Copper index (kg/km) | Weight (kg/km)
---|---|---|---|---|---|---
PVC Außenmantel 2170608 | ETHERLINE® PN CAT.7 Y FLEX A | 4x2xAWG23/7 | 8.7 | 1.5 | 45 | 81
Halogenfreier Außenmantel 2170609 | ETHERLINE® PN CAT.7 FRNC FLEX A | 4x2xAWG23/7 | 8.7 | 1.5 | 45 | 81

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).
PROFINET® is a registered trademark of the PNO (PROFIBUS user organisation).
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA M12X refer to page 176
- EPIC® DATA CCR FA refer to page 177

For current information see: www.lappgroup.com
ETHERLINE® TORSION Cat.7
Highly flexible application

Info
- For Torsion applications (±180°)
- For PROFINET applications with 4 pairs
- Cat.7 qualified for 10Gbit/s

Benefits
- Many applications with Industrial Ethernet, e.g. PROFINET, i.e. fixed installation, flexible use as well as TORSION.
- 4pair: 100Mbit/s up to 1 Gbit/s for Industrial Ethernet
- Premium screening against electromagnetic interference
- Can be used for Industrial Ethernet in harsh industrial environments

Application range
- For industrial secondary and tertiary cabling according to EN 50173-3 ISO/IEC 24702
- Wiring of machines, tools, devices, appliances and control cabinets
- Max. cable length for 100 Mbit/s is 85 m
- Max. cable length for 1 Gbit/s is 85 m
- Suitable for EtherCAT and EtherNet/IP applications

Product features
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference
- Cable suitable for high torsion stress. Tested with up to 5 million bending cycles and a right/left movement of 180° per metre.

Norm references / Approvals
- Electrical requirements acc. to IEC 61156-6
- UL/CSA-certified (CMX)
- UL AWM Style 21576
- Flame-retardant according IEC 60332-1-2
- Halogen-free according to IEC 60754-1
- Oil-resistant acc. IEC 60811-2-1

Product Make-up
- 7-wire tinned stranded copper conductor
- Core insulation made of polyethylene (PE)
- S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
- Outer sheath made of PUR
- Colour: green (based on RAL 6018)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000830
  ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage
  (not for power applications) 125 V
- Minimum bending radius
  Fixed installation: 8 x outer diameter
  Flexing: 15 x outer diameter
- Characteristic impedance
  100 ± 5 Ω (> 1 MHz)
- Temperature range
  Fixed installation: -40°C to +80°C
  Flexing: -30°C to +70°C

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
UL certifications can be found in the data sheet.

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<tr>
<th>Article number</th>
<th>Number of pairs and AWG per conductor</th>
<th>Outer diameter [mm]</th>
<th>Core diameter in mm</th>
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Accessories
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA M12X refer to page 176
- EPIC® DATA CCR FA refer to page 177

For current information see: www.lappgroup.com
Data communication systems for ETHERNET technology

Industrial Ethernet • Industrial Ethernet for special applications

ETHERLINE® TRAIN
Ethernet cables according to EN 50264-3-1 Type XM for high requirements in railway applications

Benefits
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increases the protection against damage to persons and property in the event of a fire

Application range
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for connecting to e.g. camera systems, enter-/infotainment for passengers, ticketing systems
- Also applicable within oily environments and areas with increased ambient temperature

Product features
- Fire behaviour according to NF:
  - Toxicity of gases acc. to NF X 70-100
  - Low smoke density acc. to NF X 10-702
  - No flame propagation acc. to NF C 32-070,
    - Cat. C1 and C2
  - Chemical properties:
    - Oil resistant acc. to EN 50264-1
    - Fuel resistant acc. to EN 50264-1
    - Acid resistant acc. to EN 50264-1
    - Alkali resistant acc. to EN 50264-1
    - Ozone resistant acc. to EN 50264-3-2

Norm references / Approvals
- Electrical requirements acc. to IEC 61156-6
- EN 50264-1
- EN 45545-2 HL1, HL2, HL3

Product Make-up
- 7-wire tinned stranded copper conductor
- Core insulation: Based on Polyolefin
- Cat.5e: SF/UTP - copper braid and foil screening as overall screening
- Cat.6, /Cat.7: S/FTP - copper braid as overall screening and pair screening with aluminium compound foil
- Outer sheath: electron beam cross-linked polymer-compound EM 104
- Outer sheath colour: Black

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<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and AWG per conductor</th>
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Copper price basis: EUR 150 / 100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
ETHERLINE® HEAT 6722

Benefits
- Easy to strip and dismantle
- Extended temperature range
- Good resistance to oil, petrol, acids and alkalis
- Abrasion and cut-resistant, halogen-free, oil-resistant
- Reduction of flame propagation, density and toxicity of smoke gases in event of fire

Application range
- For flexible applications (7-wire stranded conductor)
- For fixed, flexible and protected installations inside buses
- Suitable for connecting to e.g. camera systems, enter-/infotainment for passengers, ticketing systems
- 4-pair: 100 Mbit/s up to 10 Gbit/s for Industrial Ethernet

Product features
- Good chemical resistance
- Temperature class B on the basis of ISO 6722-1

Norm references / Approvals
- DIN/ISO 6722
- Electrical requirements acc. to IEC 61156-6
- Tested acc. to ECE-R 118.01
- LV 112-1, LV 212-2, LV 213-2
- Halogen-free according to VDE 0472-815
- Flame retardant acc. to ISO 6722-1

Product Make-up
- Stranded tinned 7-wire conductor
- Core insulation: Based on Polyolefin
- Colour-coded in accordance with EIA/TIA 568A and B
- Cat.5e: SF/UTP - copper braid and foil screening as overall screening
- Cat.6 / Cat.7: S/FTP - copper braid as overall screening and pair screening with aluminium compound foil
- Outer sheath: PUR compound, halogen-free
- Outer sheath colour:
  - Cat.5e green (RAL 6018)
  - Cat.6 yellow (RAL 1003)
  - Cat.7 blue (RAL 5021)

Technical data
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage
  - (not for power applications) 125 V
- Minimum bending radius
  - Flexing: 15 x outer diameter
  - Fixed installation: 10 x outer diameter
- Characteristic impedance
  - nom. 100 Ω acc. to IEC 61156-6
- Temperature range
  - Flexing: -30 °C to +105 °C
  - Fixed installation: -40 °C to +105 °C

Table:
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<th>Article number</th>
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Copper price basis: EUR 150 / 100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

For current information see: www.lappgroup.com
**ETHERLINE® FIRE**

Industrial Ethernet cable with insulation integrity

**Benefits**
- Ensures that the cable can still transmit data during and after a fire for 120 min (according to EN50200)
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference

**Application range**
- In industrial areas that use fire as a tool
- Highly combustible or fire-prone areas
- For fixed installation
- For indoor use

**Product features**
- Fire behaviour:
  - Halogen-free (IEC 60754-1 & EN50267-2-1)
  - Flame-retardant (IEC 60332-1)
  - Fire retardant (IEC 60332-3-24)
  - Low smoke density (IEC 61034-2)
  - Circuit integrity (EN50200); 120 min

**Product Make-up**
- Solid bare copper conductor
- Core insulation: Based on Polyolefin
- Each insulation will be wrapped with a special tape (anti-fire barrier)
- Twisting: 2 twisted-pair cores, stranding from 4 pairs
- Halogen-free and flame-retardant FRNC outer sheath, colour: red (similar to RAL3000)

**Technical data**
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable
- Peak operating voltage (not for power applications) 125 V
- Minimum bending radius
  - Fixed installation: 15 x outer diameter
- Characteristic impedance
  - nom. 100 Ω nach IEC 61156-5
- Temperature range
  - Operation: -20 °C to +70 °C

**Article number** | **Article designation** | **Number of pairs and AWG per conductor** | **Outer diameter [mm]** | **Core diameter in mm** | **Copper index (kg/km)** | **Weight (kg/km)**
--- | --- | --- | --- | --- | --- | ---
2170905 | ETHERLINE® FIRE Cat.5e PH120 | 4 x 2 x AWG23/1 | 8.6 | 1.0 | 24 | 75
2170913 | ETHERLINE® FIRE Cat.6 PH120 | 4 x 2 x AWG22/1 | 10.2 | 1.5 | 24 | 145

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).
Photographs and graphics are not to scale and do not represent detailed images of the respective products.
**Info**
- For PROFINET applications
- Good chemical resistance

**Benefits**
- Outstanding weather, ozone and UV resistance together with the wide temperature range enable versatile use for indoor and outdoor applications
- Resistant to contact with plant, animal or synthetic-based organic substances, oils, greases, waxes and the related emulsions
- Good resistance to ammonia compounds and bio-gases
- Good resistance to cold and hot water as well as water-soluble cleaning and cooling agents
- Well-suited to steam cleaning

**Application range**
- For flexible applications (7-wire stranded conductor)
- Machine tool building, medical technology, laundries, car washing equipment, chemical industry, composting plants, sewage works
- Food and beverage industry, especially for production and processing equipment of milk and meat products
- For industrial secondary and tertiary cabling according to EN 50173-3 ISO/IEC 24702

**Product features**
- Halogen-free materials
- Good chemical resistance to ester-based hydraulic fluids
- UV-resistant acc. to ISO 4892-2
- Ozone-resistant acc to. EN 50396
- Low smoke density according to IEC 61034-2

**Product Make-up**
- 7-wire bare stranded copper conductor
- Core insulation: Based on Polyolefin
- Screening: wrapped with braided tinned-copper wires
- Outer sheath made of special TPE
- Colour: black

**Technical data**

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<tr>
<td>ETIM 5.0/6.0 Class-Description: Data cable</td>
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</tbody>
</table>

**Minimum bending radius**
- Flexing: 10 x outer diameter
- Fixed installation: 4 x outer diameter

**Characteristic impedance**
- nom. 100 Ω acc. to IEC 61156-6

**Temperature range**
- Occasional flexing: -40°C to +80°C
- Fixed installation: -50°C to +80°C

**Article number | Article designation | Number of pairs and AWG per conductor | Outer diameter [mm] | Core diameter in mm | Copper index (kg/km) | Weight (kg/km)**

| PROFINET Cat.5e | ETHERLINE® ROBUST PN Cat.5 | 2x2xAWG22/7 | 6.5 | 1.5 | 30.4 | 50 |
| PROFINET Cat.7 | ETHERLINE® ROBUST PN Cat.7 | 4x2xAWG23/7 | 8.7 | 1.5 | 48 | 75 |
| Industrial Ethernet Cat.7 | ETHERLINE® ROBUST Cat.7 FLEX | 4x2xAWG26/7 | 6.2 | 1 | 27 | 36 |

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

**Packaging size:** coil ≤ 30 kg or ≤ 250 m, otherwise drum
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).
PROFINET® is a registered trademark of the PNO (PROFIBUS user organisation)
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA M12D refer to page 176

For current information see: www.lappgroup.com
**ETHERLINE® ROBUST FR**

**Benefits**
- Outstanding weather, ozone and UV resistance together with the wide temperature range enable versatile use for indoor and outdoor applications.
- Good resistance to cold and hot water as well as water-soluble cleaning and cooling agents.
- Well-suited to steam cleaning.

**Application range**
- For flexible applications (7-wire stranded conductor).
- Machine tool building, medical technology, laundries, car washing equipment, chemical industry, composting plants, sewage works.
- Food and beverage industry, especially for production and processing equipment of milk and meat products.
- For industrial secondary and tertiary cabling according to EN 50173-3 ISO/IEC 24702.
- Suitable for EtherCAT and EtherNet/IP applications.

**Product features**
- High-quality, double screening ensures high transmission reliability in areas with electromagnetic interference.
- Flame retardance makes it suitable for indoor and outdoor installations.
- 2pair: 10/100 Mbit/s for Industrial Ethernet.
- 4pair: 100Mbit/s up to 10 Gbit/s for Industrial Ethernet.
- Many applications with Industrial Ethernet, e.g., PROFINET type B, i.e., fixed installation and flexible use.

**Norm references / Approvals**
- UV-resistant according to ISO 4892-2.
- Ozone-resistant according to EN 50396.
- Flame-retardant according to IEC 60332-1-2.

**Product Make-up**
- 7-wire bare stranded copper conductor.
- Core insulation: Based on Polyolefin.
- Screening: wrapped with braided tinned-copper wires.
- Outer sheath made of special TPE.
- Colour: black.

**Technical data**

<table>
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<tr>
<th>Classification ETIM 5/6</th>
<th>ETIM 5.0/6.0 Class-ID: EC000830</th>
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<td>Number of pairs and AWG per conductor 2x2xAWG22/7</td>
<td></td>
</tr>
<tr>
<td>Outer diameter [mm] 6.5</td>
<td></td>
</tr>
<tr>
<td>Core diameter in mm 1.5</td>
<td></td>
</tr>
<tr>
<td>Copper index (kg/km) 30.4</td>
<td></td>
</tr>
<tr>
<td>Weight (kg/km) 55</td>
<td></td>
</tr>
</tbody>
</table>

| **PROFINET Cat.7** | ETHERLINE® ROBUST PN FR Cat.7 |
| Article number 2170455 | Article designation ETHERLINE® ROBUST PN FR Cat.7 |
| Number of pairs and AWG per conductor 4x2xAWG23/7 |
| Outer diameter [mm] 8.7 |
| Core diameter in mm 1.5 |
| Copper index (kg/km) 48 |
| Weight (kg/km) 80 |

| **Industrial Ethernet Cat.7** | ETHERLINE® ROBUST FR Cat.7 FLEX |
| Article number 2170456 | Article designation ETHERLINE® ROBUST FR Cat.7 FLEX |
| Number of pairs and AWG per conductor 4x2xAWG26/7 |
| Outer diameter [mm] 6.2 |
| Core diameter in mm 1 |
| Copper index (kg/km) 27 |
| Weight (kg/km) 40 |

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths. Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum. Please specify the preferred type of packaging (e.g., 1 x 500 m drum or 5 x 100 m coils). PROFINET® is a registered trademark of the PNO (PROFIBUS user organisation). Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA M12D refer to page 176
- EPIC® DATA M12X refer to page 176
- EPIC® DATA CCR FA refer to page 177

For current information see: www.lappgroup.com
ETHERLINE® ACCESS M05T/M08T
Managed switches for industrial communication

**Info**
- Redundant power inputs
- Robust metal housing and DIN rail mounting
- Fanless maintenance free

**Benefits**
- Improve your total cost of ownership with faster installation and lower downtime
- Most flexible and globally present solutions from one hand

**Product features**
- Simple setup of redundant network topologies with reconfiguration time < 20 ms
- RJ45 Ports: 10/100BaseT(X)
- Packet Buffer Size: 1 Mbit
- Supported protocols: HTTP, Telnet, EtherNet/IP, Modbus/TCP, IPv6, and many more
- Redundant Power Input: 24 VDC

**Norm references / Approvals**
- Shock IEC 60068-2-27
- Freefall IEC60068-2-32
- Vibration IEC 60068-2-6

**Technical data**

<table>
<thead>
<tr>
<th>Classification ETIM 5/6 ETIM 5.0/6.0 Class-ID: EC000734 ETIM 5.0/6.0 Class-Description: Network switch</th>
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<tbody>
<tr>
<td>Protection rating</td>
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<tr>
<td>IP 30</td>
</tr>
<tr>
<td>Temperature range</td>
</tr>
<tr>
<td>0°C to +60°C</td>
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**Technical data**

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Ports RJ45</th>
<th>Ports RJ45</th>
<th>MTBF in years</th>
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</thead>
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<tr>
<td>21700121</td>
<td>ETHERLINE® ACCESS M05T Managed</td>
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<td>ETHERLINE® ACCESS M08T Managed</td>
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<td>&gt; 125</td>
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</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- ETHERLINE® EC FD Cat.5e RJ45 refer to page 138
ETHERLINE® ACCESS U05T/U08T
Unmanaged switches for industrial communication

Benefits
• Improve your total cost of ownership with faster installation and lower downtime
• Most flexible and globally present solutions from one hand

Product features
• RJ45 Ports: 10/100BaseT(X)
• Packet Buffer Size: 512 kbit
• Broadcast storm protection
• Redundant Power Input: 24 VDC

Info
• Redundant power inputs
• Robust metal housing and DIN rail mounting
• Fanless maintenance free

Norm references / Approvals
• Shock IEC 60068-2-27
• Freefall IEC60068-2-32
• Vibration IEC 60068-2-6

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
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<tr>
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<td>ETIM 5.0/6.0 Class-Description: Network switch</td>
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</table>

Protection rating
IP 30

Temperature range
-10°C to +60°C

Table:

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Ports RJ45</th>
<th>Ports RJ45</th>
<th>MTBF in years</th>
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</thead>
<tbody>
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<td>21700118</td>
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
• ETHERLINE® EC FD Cat.5e RJ45 refer to page 138
Data communication systems for ETHERNET technology
Industrial Ethernet, Cat.6A • RJ45 Connectors

EPIC® DATA RJ45

Info

- CAT.6 acc. to ISO/IEC 11801
- Colour-coded assembly aid
- Installation without tools

Product features
- Field assembly Industrial Ethernet RJ45 connector
- Suitable for 10BASE-T / 100BASE-T / 1000BASE-T / 10GBASE-T
- Housing: zinc die-casting, grey
- 4 different angled cable outlets possible
- Suitable for use in industrial applications

Norm references / Approvals
- ISO/IEC 11801, Cat.5e
- ISO/IEC 60603-7-51, RJ45 up to 500 MHz
- UL-listed (E-File E353543)

Technical data

Protection rating
IP 20

Ambient temperature (operation)
-40°C to +85°C

Technical data table:

<table>
<thead>
<tr>
<th>Article number</th>
<th>Design</th>
<th>Min. outer diameter (mm)</th>
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<th>Min. Core diameter in mm</th>
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<th>AWG 7-wire</th>
<th>AWG 19-wire</th>
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<td>21700551</td>
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<td>24 - 22</td>
<td>27 - 22</td>
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<td>24 - 22</td>
<td>27 - 22</td>
<td>22*</td>
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<td>21700652</td>
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<td>27 - 22</td>
<td>22*</td>
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<td>26 - 24</td>
<td>27 - 24</td>
<td>26*</td>
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</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
An approval is necessary for 19-wire cables by Lapp Group
Approved cables: 2170289 & 2170489 ETHERLINE® Cat.5e FD; CE217489 ETHERLINE® Cat.5 FD BK; 2170488 ETHERLINE® Cat.6 FD

For current information see: www.lappgroup.com
**EPIC® DATA AX RJ45 Cat.6 A IP68**

RJ45 connector in IP68 housing

**Product features**

- Housing: brass nickel plated
- Qualified for 10 Gigabit/s Ethernet
- Suitable for stranded cores with AWG27/7-22/7 and for solid conductors with AWG26/1-22/1

**Norm references / Approvals**

- Field assembly Industrial Ethernet connector, RJ45 according to IEC 60603-7-51
- UL-listed (E-File E353543)

**Technical data**

- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC002062
  - ETIM 5.0/6.0 Class-Description: Sensor-actuator connector
- **Protection rating**
  - IP 68
- **Ambient temperature (operation)**
  - -40°C to +85°C
- **circular housing**: -40°C to +85°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
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<tbody>
<tr>
<td>21700630</td>
<td>ED-IE-AX-RJ45-6A-B-68-FC</td>
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<td>dust cap for Protective housing (male)</td>
<td>ED-IE-AX-RJ45-AC-DC</td>
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<td>21700631</td>
<td>ED-IE-RJ45F-6A-B-68-FC</td>
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<tr>
<td>Protective housing (female) containing RJ45 connector (article 21700612)</td>
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<td>21700632</td>
<td>ED-IE-RJ45F-AC-DC</td>
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Data communication systems for ETHERNET technology
Industrial Ethernet, Cat.6A • RJ45 Connectors

UNITRONIC®
HITRONIC®
ETHERLINE®

EPIC® DATA HS RJ45F Cat.6A
DIN-rail adapter with RJ45 socket

Product features
• Plastic housing including Easy Connect RJ45 Modul Cat.6A 10G
• Suitable for use in industrial applications
• Colour: light grey (RAL 7035)
• Suitable for stranded cores with AWG27/7 -22/7 and for solid conductors with AWG26/1-22/1

Norm references / Approvals
• Field assembly Industrial Ethernet module RJ45 according to IEC 60603-7-51

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
<th>ETIM 5.0/6.0 Class-ID: EC001121 ETIM 5.0/6.0 Class-Description: Modular connector</th>
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<tr>
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<td>IP 20</td>
</tr>
<tr>
<td>Ambient temperature (operation)</td>
<td>-40°C to +70°C</td>
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Technical data

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<tr>
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<th>ETIM 5.0/6.0 Class-ID: EC001121 ETIM 5.0/6.0 Class-Description: Modular connector</th>
</tr>
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<tr>
<td>Protection rating</td>
<td>IP 20</td>
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<tr>
<td>Ambient temperature (operation)</td>
<td>-40°C to +70°C</td>
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Technical data

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<td>24</td>
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</tbody>
</table>

For current information see: www.lappgroup.com
Data communication systems for ETHERNET technology

Industrial Ethernet, Cat.5 / 5e • M12 Field mountable connectors and wall ducts

EPIC® DATA M12D

Product features
- Field assembly Industrial Ethernet connector, M12 D-coded according to IEC 61076-2-101
- Suitable for use in industrial applications
- Robust and vibrations-resistant
- Toolfree installation, small and compact design

Norm references / Approvals
- Data transmission is conform to category Cat.5 acc. to ISO 11801

Technical data

| Classification ETIM 5/6 | ETIM 5.0/6.0 Class-ID: EC00121 |
| ETIM 5.0/6.0 Class-Description: | Modular connector |

Protection rating
- IP 67

Ambient temperature (operation)
- -25°C to +85°C

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Min. outer diameter (mm)</th>
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<td>ED-IE-AX-M12D-5-67</td>
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<td>26-22</td>
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</table>

EPIC® DATA M12X

Product features
- Field assembly Industrial Ethernet connector, M12 X-coded according to IEC 61076-2-109
- Qualified for 10 Gigabit/s Ethernet
- Suitable for use in industrial applications
- Robust and vibrations-resistant
- Housing: zinc die-casting, grey

Norm references / Approvals
- Data transmission is conform to category Cat.6 acc. to ISO/IEC 11801:2010

Technical data

| Classification ETIM 5/6 | ETIM 5.0/6.0 Class-ID: EC00121 |
| ETIM 5.0/6.0 Class-Description: | Modular connector |

Protection rating
- IP 67

Ambient temperature (operation)
- Plug/socket -40°C to +85°C

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
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<td>1.6</td>
<td>1</td>
<td>26-22</td>
<td>26-22</td>
</tr>
</tbody>
</table>
**Product features**

- Designs for front and rear wall-mounting
- M12 panel feed-throughs for direct connecting with PCB
- Can be used for Industrial Ethernet in harsh industrial environments
- Housing: zinc die-casting, grey

**Norm references / Approvals**

- Acc. to standard IEC 61076-2
- D-coded: Cat.5 acc. to ISO 11801
  X-coded: Cat.6a acc. to ISO 11801

**Technical data**

- **Classification** ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC002061
  ETIM 5.0/6.0 Class-Description: Sensor-actuator connector chassis
- **Protection rating** IP 67
- **Ambient temperature (operation)** -25°C to +85°C

**Article number** | **Article designation** | **Min. outer diameter (mm)** | **Max. outer diameter (mm)** | **Min. Core diameter in mm** | **Max. Core diameter in mm** | **AWG solid** | **AWG 7-wire**
--- | --- | --- | --- | --- | --- | --- | ---
22262022 | AB-C4-DSI-M12FSD-M12FSD-M16-SH | | | | | | |
21700617 | ED-IE-M12F-X-FM | | | | | | |
21700618 | ED-IE-M12F-X-RM | | | | | | |

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

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**Product features**

- Field mountable cable coupler for data cables up to Cat.7A
- Compact, round design
- Qualified for 10 Gigabit/s Ethernet
- Suitable for use in industrial applications
- Robust and vibrations-resistant
- Housing: zinc die-casting, grey

**Norm references / Approvals**

- Compliance to class FA up to 1000 MHz in connection with Cat.7A cables
- Data transmission is conform to category Cat.7A acc. to ISO/IEC 11801

**Technical data**

- **Classification** ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC001121
  ETIM 5.0/6.0 Class-Description: Modular connector
- **Protection rating** IP 67
- **Ambient temperature (operation)** Plug/socket -40°C to +85°C

**Article number** | **Article designation** | **Min. outer diameter (mm)** | **Max. outer diameter (mm)** | **Min. Core diameter in mm** | **Max. Core diameter in mm** | **AWG solid** | **AWG 7-wire**
--- | --- | --- | --- | --- | --- | --- | ---
21700623 | EPIC® DATA CCR FA | 5 | 9.7 | 0.85 | 1.6 | 26 - 22 | 26 - 22 |

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Structured building cabling, Cat.5e • Cables for fixed installation

**ETHERLINE® LAN 200 Cat.5e**
Ethernet cable for Category 5e/class D - verified up to 200 MHz

**Benefits**
- LAN cables for structured building cabling according to EN 50173 and ISO/IEC 11801

**Application range**
- Areas where the end device density is very high
- For office wiring, administration and development buildings in the tertiary sector (floor wiring).
- Cable length in tertiary area (horizontal area, floor) should not exceed a length of 100 m in accordance with the ISO/IEC 11801 and EN 50173 standards (90 m in cable duct + 10 m in working area)

**Product features**
- Transfer of digital and analogue data signals
- IEEE 802.3: 10/100/1000Base-T
- Flame retardant acc. to IEC 60332-1-2

**Norm references / Approvals**
- LAN CAT.5e cables from Lapp Kabel for „Structured Cabling Systems“ meet the requirements in accordance with EIA/TIA-568 and TSB36, as well as ISO/IEC 11801 or EN 50173 (Class D).

**Product Make-up**
- Solid conductor 4x2xAWG24/1
- U/UTP: no overall or pair screening
- F/UTP: foil screening as overall screening
- SF/UTP: braid of tinned copper wire and plastic laminated aluminum foil as overall screening
- Outer sheath either as PVC (grey RAL 7035) or LSZH (orange RAL 2003)

**Technical data**
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable
- Minimum bending radius during installation: 8 x outer diameter
- Fixed installation: 4 x outer diameter
- Characteristic impedance nom. 100 /uni03A9 nach IEC 61156-5
- Temperature range
  - Fixed installation: -20 °C to +60 °C
  - During installation: 0 °C to +50 °C

**Article number | Article designation | Number of pairs and AWG per conductor | Core diameter in mm | Outer diameter (mm) | Colour | Copper index (kg/km) | Weight (kg/km)
--- | --- | --- | --- | --- | --- | --- | ---
PVC
2170950 | 200 U/UTP Cat.5e | 4 x 2 x AWG24/1 | 0.9 | 5.1 | grey | 17 | 32
2170951 | 200 SF/UTP Cat.5e | 4 x 2 x AWG24/1 | 1.05 | 6.3 | grey | 28 | 46
LSZH
2170952 | 200 F/UTP Cat.5e LSZH | 4 x 2 x AWG24/1 | 1.05 | 6.3 | orange | 18 | 40
2170953 | 200 SF/UTP Cat.5e LSZH | 4 x 2 x AWG24/1 | 1.05 | 6.4 | orange | 28 | 46

Copper price basis: EUR 100/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Packaging size: Drum
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- Field-Terminable Connector RJ45 CAT.5e FM45 refer to main catalogue 2018/19

For current information see: www.lappgroup.com
Data communication systems for ETHERNET technology
Structured building cabling, Cat.6 • Cables for fixed installation

ETHERLINE® LAN 350 Cat.6
Ethernet cable for Category 6/ class E - verified up to 350 MHz

Benefits
• LAN cables for structured building cabling according to EN 50173 and ISO/IEC 11801

Application range
• Areas where the end device density is very high
• For office wiring, administration and development buildings in the tertiary sector (floor wiring).
• Cable length in tertiary area (horizontal area, floor) should not exceed a length of 100 m in accordance with the ISO/IEC 11801 and EN 50173 standards (90 m in cable duct + 10 m in working area)

Product features
• Transfer of digital and analogue data signals
• IEEE 802.3: 10/100/1000Base-T
  IEEE 802.5: ISDN; FDDI; ATM
• Flame retardant acc. to IEC 60332-1-2

Norm references / Approvals
• LAN Cat.6 cables from Lapp Kabel for „Structured Cabling Systems“ meet the requirements in accordance with EIA/TIA-568 and TSB36, as well as ISO/IEC 11801 or EN 50173 (Class E - permanent link).
• Class E out of the standard ISO/IEC 11801 corresponds to CAT.6

Product Make-up
• Solid conductor
• U/UTP: no overall or pair screening, 2 cores stranded to pair, 4 pairs stranded to bundle with central cross
• F/UTP: Foil shielding as overall shielding, 2 cores stranded to pair, 4 pairs stranded to bundle with central cross
• Outer sheath either as PVC (grey RAL 7035) or LSZH (orange RAL 2003)

Technical data

<table>
<thead>
<tr>
<th>Classification ETIM 5/6</th>
</tr>
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<tbody>
<tr>
<td>ETIM 5.0/6.0 Class-ID: EC000830</td>
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<tr>
<td>ETIM 5.0/6.0 Class-Description: Data cable</td>
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Minimum bending radius
during installation: 8 x outer diameter
Fixed installation: 4 x outer diameter

Characteristic impedance
nom. 100 Ω acc. to IEC 61156-5

Temperature range
Fixed installation: -20°C to +60°C
During installation: 0 °C to +50 °C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Number of pairs and AWG per conductor</th>
<th>Core diameter in mm</th>
<th>Outer diameter [mm]</th>
<th>Colour</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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<td></td>
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Copper price basis: EUR 100/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardslengths
Packaging size: Drum
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
• EPIC® DATA RJ45 refer to page 173

For current information see: www.lappgroup.com
ETHERLINE® LAN 500 Cat.6
Ethernet cable for Category 6A / class E A verified up to 500 MHz

Benefits
- LAN cables for structured building cabling according to EN 50173 and ISO/IEC 11801

Application range
- Areas where the end device density is very high
- For office wiring, administration and development buildings in the tertiary sector (floor wiring).
- Cable length in tertiary area (horizontal area, floor) should not exceed a length of 100 m in accordance with the ISO/IEC 11801 and EN 50173 standards (90 m in cable duct + 10 m in working area)

Product features
- Transfer of digital and analogue data signals
- IEEE 802.3: 10/100/100Base-T, 10GBase-T IEEE 802.5: ISDN; FDDI; ATM; cable sharing
- Flame retardant acc. to IEC 60332-1-2

Norm references / Approvals
- LAN Cat.6 A cables from Lapp Kabel for „Structured Cabling Systems“ meet the requirements in accordance with EIA/TIA-568 and TSB36, as well as ISO/IEC 11801 or EN 50173 (Class E A - permanent link).

Product Make-up
- Solid conductor 4x2xAWG23/1
- S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
- F/UTP: Foil shielding as overall shielding, 2 cores stranded to pair, 4 pairs stranded to bundle with central cross
- F/FTP: aluminium compound foil as overall screening and pair screening
- Outer sheath either as PVC (grey RAL 7035) or LSZH (orange RAL 2003)

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable

Article number   Article designation  Number of pairs and AWG per conductor  Core diameter in mm  Outer diameter (mm)  Colour  Copper index (kg/km)  Weight (kg/km)

PVC
2170940  500 S/FTP Cat.6, 4 x 2 x AWG23/1  1.28  7.3  grey  24  52
2170961  500 F/UTP Cat.6, 4 x 2 x AWG23/1  1.09  7.4  grey  24  52

LSZH
2170982  500 F/FTP Cat.6, LSZH  4 x 2 x AWG23/1  1.28  7.3  orange  22  54
2170983  500 F/UTP Cat.6, LSZH  4 x 2 x AWG23/1  1.09  7.4  orange  24  56

Copper price basis: EUR 100/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

For current information see: www.lappgroup.com
Data communication systems for ETHERNET technology
Structured building cabling, Cat.7A • Cables for fixed installation

ETHERLINE® LAN 1000 Cat. 7a
Ethernet cable for Category 7a / class FA - verified up to 1000 MHz

ETHERLINE® LAN 1200 Cat.7a
Ethernet cable for Category 7a / class FA - verified up to 1200 MHz

Benefits
• LAN cables for structured building cabling according to EN 50173 and ISO/IEC 11801

Application range
• Areas where the end device density is very high
• For office wiring, administration and development buildings in the tertiary sector (floor wiring).
• Cable length in tertiary area (horizontal area, floor) should not exceed a length of 100 m in accordance with the ISO/IEC 50173 standards (90 m in cable duct + 10 m in working area)

Product features
• Transfer of digital and analogue data signals
• IEEE 802.3: 10/100/1000Base-T, 10GBase-T IEEE 802.5: ISDN; FDDI; ATM; cable sharing IEEE 802.3at: suitable for PoE, VoIP

Norm references / Approvals
• LAN Cat.7A cables from Lapp Kabel for Structured Cabling Systems“ meet the requirements in accordance with EIA/TIA-568 and TSB36 as well as ISO/IEC 11801 or EN 50173 (Class FA - permanent link).
• Flame-retardant according IEC 60332-1-2
• No flame-propagation according to IEC 60332-3-25 (Flame spread on vertical cable or wire bundle)

Product Make-up
• Solid conductor 4x2xAWG23/1, duplex 2x(4x2xAWG23/1)
• Core insulation: PE
• S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
• Outer sheath: halogen-free, flame-retardant compound
• Colour: yellow (RAL 1021)

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC000830
ETIM 5.0/6.0 Class-Description: Data cable

Minimum bending radius
during installation: 8 x outer diameter
Fixed installation: 4 x outer diameter

Characteristic impedance
ETHERLINE® LAN 1000 Cat. 7a

Temperature range
Fixed installation: -20°C to +60°C
During installation: 0 °C to +50 °C

Article number   Article designation  Number of pairs and AWG per conductor  Core diameter in mm  Outer diameter [mm]  Colour  Copper index (kg/km)  Weight (kg/km)
ETHERLINE® LAN 1000 S/FTP Cat.7a
2170971  1000 S/FTP Cat.7, LSZH  4 x 2 x AWG23/1  1.3  1.3  7.5  yellow  24  56
2170972  1000 S/FTP Cat.7, LSZH duplex  2x(4x2xAWG23/1)  1.3  1.3  15.2  yellow  48  113

ETHERLINE® LAN 1200 S/FTP Cat.7a
2170974  1200 S/FTP Cat.7, LSZH  4 x 2 x AWG23/1  1.3  1.3  7.5  yellow  26  58
2170975  1200 S/FTP Cat.7, LSZH duplex  2x(4x2xAWG23/1)  1.3  1.3  15.2  yellow  52  114

Copper price basis: EUR 100/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Drum
Photographs and graphics are not to scale and do not represent detailed images of the respective products.
ETHERLINE® LAN 1600 Cat.7
Data cable for Category 7A / class FA - verified up to 1600 MHz

**Benefits**
- LAN cables for structured building cabling according to EN 50173 and ISO/IEC 11801

**Application range**
- Mainly used where the terminal density is very high, e.g., for wiring offices, administration and development buildings in the tertiary area (floor wiring).
- 1500 MHz: Cable length in tertiary area (horizontal area, floor) should not exceed a length of 100 m in accordance with the ISO/IEC 11801 and EN 50173 standards (90 m in cable duct + 10 m in working area).
- 1600 MHz: at max. 30m length (typical in data centers)

**Product features**
- Transfer of digital and analogue data signals
- IEEE 802.3: 10/100/100Base-T, 10GBase-T IEEE 802.5: ISDN; FDDI; ATM; cable sharing IEEE 802.3at: suitable for PoE, VoIP

**Norm references / Approvals**
- LAN Cat.7A cables from Lapp Kabel for „Structured Cabling Systems“ meet the requirements in accordance with EIA/TIA-568 and TSB36 as well as ISO/IEC 11801 or EN 50173 (Class FA - permanent link).
- Exceeds the requirements of EN 50173 and ISO/IEC 11801 standards
- Flame-retardant according IEC 60332-1-2
- No flame-propagation according to IEC 60332-3-25 (Flame spread on vertical cable or wire bundle)

**Product Make-up**
- Solid conductor 4x2xAWG22/1
- Core insulation: cellular polyolefin
- S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
- Outer sheath: halogen-free, flame-retardant compound
- Colour: yellow (RAL 1021)

**Technical data**
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000830
  - ETIM 5.0/6.0 Class-Description: Data cable
- Minimum bending radius during installation: 8 x outer diameter
  - Fixed installation: 4 x outer diameter
- Characteristic impedance
  - nom. 100 Ω nach IEC 61156-5
- Temperature range
  - Fixed installation: -20°C to +60°C
  - During installation: 0 °C to +50 °C

**Article number**

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Copper price basis: EUR 100/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Drum
Photographs and graphics are not to scale and do not represent detailed images of the respective products.
ETHERLINE® LAN 1000 Cat.7 OUTDOOR
Ethernet cable for Category 7 / class F - verified up to 1000 MHz, for outdoor applications and direct burial

Benefits
• LAN cables for structured building cabling according to EN 50173 and ISO/IEC 11801
• Suitable for outdoor use and direct burial
• UV-resistant

Application range
• For outdoor use
• Suitable for direct burial
• Cable length in tertiary area (horizontal area, floor) should not exceed a length of 100 m in accordance with the ISO/IEC 11801 and EN 50173 standards (90 m in cable duct + 10 m in working area)

Product features
• Transfer of digital and analogue data signals
• IEEE 802.3: 10/100/1000Base-T, 10GBase-T IEEE 802.5: ISDN; FDDI; ATM; cable sharing
• Backward compatible

Norm references / Approvals
• LAN Cat.7 cables from Lapp Kabel for „Structured Cabling Systems“ meet the requirements in accordance with EIA/TIA-568 and TSB36, as well as ISO/IEC 11801 or EN 50173 (Class F - permanent link).

Product Make-up
• Solid conductor 4x2xAWG23/1
• Core insulation: PE
• S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
• Outer sheath: PE, black (L)PE additional with aluminum tape
• Farbe: schwarz (RAL 9005)

Technical data

- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000830
- ETIM 5.0/6.0 Class-Description: Data cable

- Minimum bending radius during installation: 8 x outer diameter
  Fixed installation: 4 x outer diameter

- Characteristic impedance nom. 100 Ω acc. to IEC 61156-5

- Temperature range
  Bei Verlegen/Flexing: -10°C to +50°C
  During laying: -30°C to +70°C

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<th>Article designation</th>
<th>Number of pairs and AWG per conductor</th>
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Copper price basis: EUR 100/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: Drum

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
UNITRONIC® LAN FLEX
Data cable for patchcable applications

**Benefits**
- For directly connecting two electric components
- Easy to assemble

**Application range**
- Indoor applications
- LAN connections
- Control cabinet wiring

**Product features**
- Good flexibility - easy installation with tight space requirements
- Flame retardant acc. to IEC 60332-1-2
- Flame retardant acc. to IEC 60332-1-2 and IEC 60332-3-24

**Technical data**
- Classification ETIM 5.5
- Classification ETIM 5.6
- Classification ETIM 5.0/6.0 Class-ID: EC000830
- Classification ETIM 5.0/6.0 Class-Description: Data cable
- Minimum bending radius during installation: 8 x outer diameter
- Fixed installation: 4 x outer diameter
- Mean characteristic Impedance nom. 100 /uni2126 nach IEC 61 156-5
- Temperature range
  - Operating temperature: -20°C to +60°C
  - During installation: 0 °C to +50 °C

**Article number**
- **PVC versions**
  - 2170127 200 F/UTP CAT.5e FLEX 4 x 2 x AWG26/7 5.6 13 28
  - 2170129 200 SF/UTP CAT.5e FLEX 4 x 2 x AWG26/7 6.0 22 36
  - 2170144 600 S/FTP CAT.7 Y FLEX 4 x 2 x AWG26/7 6.5 22 39

**Halogen-free versions**
- 2170172 200 F/UTP CAT.5e LSZH FLEX 4 x 2 x AWG26/7 5.6 13 28
- 2170139 200 SF/UTP CAT.5e LSZH FLEX 4 x 2 x AWG26/7 6.0 22 36
- 2170142 600 S/FTP CAT.7 LSZH FLEX 4 x 2 x AWG26/7 6.2 21 40

**Article number**
- **PVC versions**
  - 2170127 200 F/UTP CAT.5e FLEX 4 x 2 x AWG26/7 5.6 13 28
  - 2170129 200 SF/UTP CAT.5e FLEX 4 x 2 x AWG26/7 6.0 22 36
  - 2170144 600 S/FTP CAT.7 Y FLEX 4 x 2 x AWG26/7 6.5 22 39

**Halogen-free versions**
- 2170172 200 F/UTP CAT.5e LSZH FLEX 4 x 2 x AWG26/7 5.6 13 28
- 2170139 200 SF/UTP CAT.5e LSZH FLEX 4 x 2 x AWG26/7 6.0 22 36
- 2170142 600 S/FTP CAT.7 LSZH FLEX 4 x 2 x AWG26/7 6.2 21 40

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix 117 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: Coil 100 m; Drum (500; 1000) m

Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- Field-Terminable Connector RJ45 CAT.5e FM45 refer to main catalogue 2018/19
- EPIC® DATA RJ45 refer to page 173
- EPIC® DATA 90 RJ45 Cat.6, refer to main catalogue 2018/19

For current information see: www.lappgroup.com
Data communication systems for ETHERNET technology
Structured building cabling, Cat.6A • Patch cable RJ45

ETHERLINE® LAN RJ45 Cat.6A
Double shielded S/FTP office patchcords RJ45 Cat.6A

Benefits
• Improved bending and anti-kink protection for lower bending radii without damage
• Stable locking lugs
• Gold plated contacts
• High EMC protection
• Different colors for the assignment of different applications

Application range
• Connecting- and Patchcable for use in structured building cabling acc. to ISO/IEC 11801 and EN 50173 (2nd Version)
• For use in the workplace (tertiary area) to connect various devices within the scope of „Structured Cabling”
• Suited for all applications of classes D to F Multimedia (video, data, voice)> 10 GbE acc. to IEEE802.3 (cable sharing, VoIP)

Product features
• Backward compatible

Norm references / Approvals
• Halogen-free according to IEC 60754-1/2
• Flame retardant acc. to IEC 60332-1-2
• Connector acc. to IEC 60603-7-51

Product Make-up
• Braided conductor, 4x2x AWG27/7
• Core insulation: cellular-PE
• S/FTP: copper braid as overall screening and pair screening with aluminium compound foil
• Outer sheath made of flameretardant, halogenfree compound, 5.7mm in diameter

Technical data
Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC001262
ETIM 5.0/6.0 Class-Description: Patch cord copper (twisted pair)
Minimum bending radius
In operation: 5 x outer diameter
Protection rating
IP20
Temperature range
-20°C to +60°C

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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
Details of the clamping force are available upon request, halogen-free.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
**Data communication systems for ETHERNET technology**

**Structured building cabling, Cat.5e • RJ45 Connectors**

**Connector RJ45 CAT.6 Hirose TM21**

**Product features**
- Channel Class E up to 250 MHz (CAT.6)
- Fully screened
- Includes: bend protection and guide plate
- Anti-kink protection: beige

**Technical data**

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</table>

**Connector RJ45 Cat.6A Hirose TM31**

**Product features**
- Channel class E up to 500 MHz (CAT.6A)
- Includes: bend protection and guide plate
- Fully screened

**Technical data**

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<th>Article number</th>
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<th>Min. Core diameter in mm</th>
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**Crimping tool RJ45 Hirose**

**Product features**
- Crimping tool for RJ45 connector Hirose TM11 TM21 and TM31

**Technical data**

<table>
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<td>Crimping tool RJ45 Hirose</td>
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Fibre optic technology – General

The optical transmission of signals in fibre optic cables functions according to the principle of “total reflection”. The reflection is attained by surrounding a light-conducting core with a sheath that is optically thinner – the light is totally reflected by the boundary surface of the sheath, enabling it to be guided through the fibre optic cable.

At a time when the demand for fast and secure communication networks is constantly growing, fibre optic cables are now an indispensable and irreplaceable communication medium.

### Benefits of using fibre optic cables
- Insensitivity to electromagnetic interference
- Electrical isolation of connected devices
- Low attenuation values
- Large transmission distances and high bandwidths
- Lightweight design
- Compact dimensions
- Can be installed in explosive environments
- High level of interception protection

#### Core
- 9, 50 or 62.5 µm

#### Cladding
- 125 µm

#### Buffer coating
- 250 µm

#### Core
- 980 µm

#### Cladding
- 1000 µm

#### Buffer coating
- 2200 µm

### GOF – Glass Optical Fibre

There are the following different types of fibres:
- Singlemode (SM) fibre, E9/125 OS2
- Multimode (MM) fibre, G62.5/125 OM1, G50/125 OM2 to OM4

### POF – Polymer Optical Fibre

- P980/1000

A distinction is made between the following application cases:
- SIMPLEX (one buffered fibre)
- DUPLEX (two buffered fibres)

### PCF – Plastic Cladded Fibre

- K200/230
- PCF – Plastic Cladded Fibre
- Also known as HCS (Hard Cladded Silica Optical Fibre)

### Fibre type / wavelength | max. attenuation [dB/km] | max. transmission length [m] | Colour
--- | --- | --- | ---
| 850 nm | 1300 nm | 1550 nm | 850 nm | 1300 nm | 1550 nm
POF 980 µm | 160 | 100 Mbit/s (PN): 50
PCF 200 µm | 10.0 | 8.0 | 100 Mbit/s (PN): 100
GOF MM 62.5 µm OM1 | 3.5 (3.0) | 1.5 (0.7) | 100 Mbit/s: 550
GOF MM 50 µm OM2 | 3.5 (2.5) | 1.5 (0.7) | 100 Mbit/s: 550
GOF MM 50 µm OM3 | 3.5 (2.5) | 1.5 (0.7) | 100 Mbit/s: 550
GOF MM 50 µm OM4 | 3.5 (2.5) | 1.5 (0.7) | 100 Mbit/s: 550
GOF SM 9 µm OS2 (G652.D) | 0.40 (0.35) | 0.40 (0.21) | 40 Gbit/s: 10,000

Photographs and graphics are not to scale and do not represent detailed images of the respective products. For specific cable parameters see product pages or technical data sheets.
FIBRE OPTIC CABLES

Colour-codes of fibres (loose tube) cabletypes

<table>
<thead>
<tr>
<th>LAPP Standard</th>
<th>TIA/EIA-598 (Bellcore)</th>
<th>IEC60304 and DIN EN60794-1-1 (VDE0888-..)</th>
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<tr>
<td>12 turquoise</td>
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<td>12 pink</td>
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</table>

If fibre 13 – 24 are used in a loose tube design, the color sequence is repeated for fibre 13 – 24, but fibres are ring marked.

In terms of connectors, a distinction is made with regard to the fibre type and the application

Connector for fibre type POF
• Very easy to handle. Configurable by means of crimp or clamp connection
• Connector with inner bore > 1 mm at a fibre diameter of 1000 µm and pin diameter (ferrule) of 2.5 mm
• Tailored tool set for straightforward field configuration

Connector for fibre type PCF
• Easy to handle. Configurable by means of crimp and cleave technology
• Connector with inner bore > 230 µm at a fibre diameter of 230 µm and pin diameter (ferrule) of 2.5 mm
• Tailored tool set for straightforward field configuration

Connector for fibre type GOF
• Handling requires existing knowledge. Assembly by means of bonding and polishing process
• Connector with inner bore > 125 µm at a fibre diameter of 125 µm and pin diameter (ferrule) of 2.5 mm or 1.25 mm (depending on connector type)
• Assembly by qualified staff
• The use of pre-assembled cables is recommended

Schematic size comparison of connector pin (2.5 mm) and hole (POF – PCF – GOF)

When comparing the different connector holes with regard to the fibre diameter, it becomes apparent that these are not interchangeable with one another. In other words, a PCF connector cannot be used for a POF cable. A PCF connector cannot be used for a POF cable as the fibre geometries and parameters are not compatible with one another.
Selection criteria

Basic information needed to select cable

1. Where is it used?
   - Indoor
   - Outdoor
   - Indoor/Outdoor (Universal)

2. Type of applications
   - Mining
   - Railway
   - Wind Turbines
   - Inside Machines
   - Production or Processing Plants
   - Telecommunications
   - Power chains
   - Vertical installation
   - Oil & gas platforms
   - On ships

3. Type of Fibres
   - GOF: Single-mode 9/125 µm OS2
   - Multimode 62.5/125 µm OM1
   - Multimode 50/125 µm OM2
   - Multimode 50/125 µm OM3
   - Multimode 50/125 µm OM4
   - PCF (200/230)
   - POF (980/1000)

4. No. of Fibres
   - GOF: 2, 4, 6, 8, 12, 24, ... n x 12 (depend on cable type)
   - POF: 1 (SIMPLEX), 2 (DUPLEX)
   - PCF: 1 (SIMPLEX), 2 (DUPLEX)

Cable designations for optical cables according to DIN VDE 0888

Example 1: A-DQ(ZN)(SR)2Y 12G 50/125 OM3 Outdoor cable with corrugated steel tape armour and PE sheath, central loose tube, non-metallic strain relief made of glass yarns, 12 fibres, 50/125 µm OM3 multimode fibres

Example 2: J-V2Y(ZN)1 1Y 2P 980/1000 Plastic fibre-optic cable, two-fibre (DUPLEX), indoor cable with PE inner sheath, non-metallic strain relief, PUR outer sheath

Article number coding for cables (not applicable to accessories)

Example 1: GOF outdoor cable, HQN1500 24G 50/125 OM3 27600324
Example 2: GOF armoured universal cable, HUW1500 8E 9/125 OS2 27500908
Example 3: POF cable, POF SIMPLEX PE 28000001
Example 4: POF cable, POF DUPLEX PE-PUR 28020002
Example 5: POF outdoor cable, PCF DUPLEX Outdoor 28600701
Example 6: POF indoor cable, PCF DUPLEX Indoor 28602072
LAPP is offering an integrated solution with ÖLFLEX® CONNECT – cables assembled exactly to your requirements. Everything is possible – from traditional cable assemblies to industry standard servo connections right up to highly complex drag chain systems. With ÖLFLEX® CONNECT LAPP offers as well customized fibre optic system assemblies (FO trunks).

Customers can choose the right cable from the wide range of HITRONIC® fibre optic cables which can be assembled exactly as per customer specification.

By using factory assembled fibre optic cable solutions the installation for industry, telecommunication and office applications are significantly simplified.

Depending on the planning approach, time consuming connector installation or splicing at site can be avoided. Just lay the trunk system and simply plug it in with the factory pre-assembled connectors. A plug & play solution from LAPP.

In a few steps to a customized FO-trunk-system:

1. Determination of the required fibre type
   - POF (980/1000)
   - PCF (200/230)
   - GOF (single-mode 9/125 OS2)
     (multimode 62,5/125 OM1)
     (multimode 50/125 OM2; OM3; OM4)

2. Selection of cable type and version
   See HITRONIC® cable range
   (POF, PCF and GOF and number of fibers)

3. Determination of the system length

4. Connector configuration
   Selection of connector type – side 1 and 2

5. Cable pulling device
   Selection cable pulling device
   side 1 and/or side 2

6. Specific requirements
   Regarding packaging and marking

7. LAPP in-house
   LAPP will check the technical feasibility and plausibility (fibre – cable – connector) and make a quotation

8. Easy ordering and fast shipping

For questions about customized packaging and special issues we are happy to assist you.

Selection example:

Short designation:
TRUNK GOF HUN1500-4E9 / 125-SC/LC-85m

Description:
- Customized pre-assembled fibre optic cable solution
- Based on cable version HITRONIC® HUN 4E9 / 125 OS2
- Assembled at both ends with connectors
  - side 1: 2 x SC-duplex connector
  - side 2: 2 x LC-duplex connector
- Cable splitter unit IP68:
  - up to 24 fibres
  - M20 through hole
  - Side 1 protected with a cable pulling device
    - outer diameter < 30 mm
  - System length 85 m
  - On disposable drum
  - With test protocol

Technical benefits

- No splice connections are necessary during installation. This saves time and costs for equipment and special tooling.
- Low attenuation values by factory preassembled plugs
- Trunk-system are easy to use without any further time consuming on-site processing

- Available with all major cable and connector types (LAPP HITRONIC® range)
- Ready to use fibre optic cabling system
- IP 68 metallic cable unit splitter for glass fibre (GOF) loose tube cables up to 48 fibres
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### Quickfinder

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<th>Cable type/standardisation (DIN VDE 0888)</th>
<th>Area of Installation</th>
<th>Cabling</th>
<th>Fibre Specification</th>
<th>No. of fibres</th>
<th>Outer sheath material</th>
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| **PCF – Polymer Cladded Fibre** | | static | POF 980/1000 µm | 1 (SIMPLEX) | PUR |
| | A-V(ZN)11Y1 1K200/230 | Outdoor | | POF 980/1000 µm | 2 (DUPLEX) | PE |
| | AT-VQ(ZN)1H202 Y2K200/230 | | | POF 980/1000 µm | 2 (DUPLEX) | PUR |
| | J-V(ZN)11Y1 1K200/230 | Indoor | | POF 980/1000 µm | 2 (DUPLEX) | PUR |
| | A-V1(V(ZN)11Y1 1K200/230 flex | Universal | highly flexible | POF 980/1000 µm | 2 (DUPLEX) | PUR |
| | AT-V(ZN)YY 2K200/230 | | static, Type B | POF 980/1000 µm | 2 (DUPLEX) | PVC |
| | AT-V(ZN)YY 2K200/230 (with UL-listing) | | static, Type B | POF 980/1000 µm | 2 (DUPLEX) | PVC |
| | AT-V(ZN)YY 2K200/230 | Industry and automation PROFINET® | highly flexible, Type C | POF 980/1000 µm | 2 (DUPLEX) | PUR |

Please see detailed technical information on the data sheet (www.lappgroup.com/products). Multimode OM4 fibres are also available upon request for all GOF cables.
## FIBRE OPTIC CABLES

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Please see detailed technical information on the data sheet (www.lappgroup.com/products). Multimode OM4 fibres are also available upon request for all GOF cables.
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<th>Cabling</th>
<th>Fibre Specification</th>
<th>No. of fibres</th>
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Please see detailed technical information on the data sheet (www.lappgroup.com/products).
Multimode OM4 fibres are also available upon request for all GOF cables.
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<td>Reelable Mini Breakout Cable A/J-V(ZN)11Y flexible (tight buffer, 4, 6, 8 fibres)</td>
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<td>flexible (for frequent reeling)</td>
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Please see detailed technical information on the data sheet (www.lappgroup.com/products). Multimode OM4 fibres are also available upon request for all GOF cables.
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<td>Fibre optical cables for wind applications with defined movement, torsion with robust PUR sheath, breakout cable construction, SIMPLEX sheath diameter: 2.5 mm</td>
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<td>Reelable fibre optical cable for events and plant engineering, tactical applications, with robust PUR outer sheath, mini-Breakout cable construction, tight buffer fibre diameter: 900µm</td>
<td>HITRONIC® HDM600 4G50/125 OM4</td>
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# POF selection table [Connector – Cable – Tools – Accessories]

## Connector types

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## (Compatible) Cables

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## Tools

| Assembly Set POF Connector FSMA | 29500001 X X X X |
| Assembly Set POF Connector ST(BFOC) | 29500002 X X X X |
| Assembly Set POF Connector SC/SC-RJ | 29500004 X X X X |
| POF Adapter FSMA /4PC | 29430099 X X X X |
| POF Adapter FSMA Hex /4PC | 29430099 X X X X |
| POF Adapter ST (BFOC) /4PC | 29500001 X X X X |
| POF Adapter FGS SIMPLEX /4PC | 29450099 X X X X |
| POF Adapter HFBR4505 GY SIMPLEX /4PC | 29440099 X X X X |

## Cable

| POF Cable Stripper 3.6/6.0 mm | 29500012 X X X X |
| POF Cable Stripper PA 2.2 mm | 29500013 X X X X |
| POF Crimp Tool 2.5/3.0/4.5/5.95 mm | 29500010 X X X X |
| Strain relief element scissors | 29500017 X X X X |
| Polishing film graining size 0.3 µm (Wh) | 29500018 X X X X |
| Polishing film graining size 1 µm (Gn) | 29500023 X X X X |
| Polishing film graining size 5 µm (Br) | 29500023 X X X X |
| Polishing glass plate 150x230 mm | 29500020 X X X X |
| Polishing Disc POF ST(BFOC) Connector | 29500032 X X X X |
| Polishing Disc POF HFBR4501/451 SIMPLEX | 29500033 X X X X |
| Polishing Disc POF SIMPLEX 2.2 mm | 29500036 X X X X |
| Polishing Disc POF FSMA Connector | 29500031 X X X X |
| Polishing Disc POF FS SIMPLEX Connector | 29500035 X X X X |
| Polishing Disc POF HFBR4516 DUPLEX | 29500034 X X X X |
| Polishing Disc POF SC Connector | 29500037 X X X X |
| POF Cutter 2.2 /1.0 mm Guillotine | 29500014 X X X X |
| POF BufferedFibreCutter 2.2 mm manual | 29500015 X X X X |
| POF BufferedFibreCutter 2.2 mm automatic | 29500016 X X X X |

## Optical accessories, tools, supplies

| POF Optical Transmitter (TMR) | 29500070 X X X X |
| POF Optical TMR Adapter HFBR, 650 nm | 29500071 X X X X |
| POF Optical TMR Adapter FSMA, 650 nm | 29500072 X X X X |
| POF Optical TMR Adapter ST(BFOC), 650 nm | 29500073 X X X X |
| POF Optical TMR Adapter FS, 660 nm | 29500074 X X |
| POF Optical TMR Adapter HFBR, 660 nm | 29500075 X X X X |
| POF Optical TMR Adapter FSMA, 660 nm | 29500076 X X X X |
| POF Optical TMR Adapter ST(BFOC), 660 nm | 29500077 X X X X |
| POF Optical Power Meter 660/850 nm | 29500080 X X X X |
| POF Optical Power Meter Adapter HFBR4501/4521 | 29500081 X X X X |
| POF Power Meter Adapter FSMA | 29500082 X X X X |
| POF Power Meter Adapter ST(BFOC) | 29500083 X X X X |
| POF Power Meter Adapter FS | 29500084 X X X X |

## Power Meter

| POF Measuring Equipment Set 660/850 nm | 29500089 X X X X |

* Includes tools that can be used on the clamp version.
### FIBRE OPTIC CABLES

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### Accessories

- **Adapters**
- **Cables**
- **Tool**
- **Optional test accessories**
- **Sets**
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**Cables**

- HITRONIC® PCF SIMPLEX PUR, 2.9 mm 28600701
- HITRONIC® PCF DUPLEX FRNC-PUR, 2.9 mm 28020702
- HITRONIC® PCF DUPLEX FRNC-PE, 2.9 mm 28620702
- HITRONIC® PCF DUPLEX PNB PVC-PVC A, 2.2 mm 28055702
- HITRONIC® PCF DUPLEX PNB PVC-PVC, 2.2 mm 28052702
- HITRONIC® PCF DUPLEX FD FRNC-PUR, 2.2 mm 28320702
- HITRONIC® PCF DUPLEX FD PNC PVC-PUR, 2.2 mm 28351702
- HITRONIC® PCF DUPLEX FD PNC PVC-PVC, 2.2 mm 28352702

**Tool sets**

- Assembly Set PCF Connector FSMA 29500701
- Assembly Set PCF Connector ST (BFOC) 29500702
- Assembly Set PCF Connector SC/SC-RJ 29500704
- Assembly Set PCF Connector HFBR4521 29500703

**Adapters**

- POF Adapter FSMA/4PC 29430099
- POF Adapter FSMA Hex/4PC 29430089
- POF Adapter ST (BFOC)/4PC 29420099
- POF Adapter F05 SIMPLEX/4PC 29450099
- POF Adapter HFBR4505 GY SIMPLEX/4PC 29440099
- POF Adapter HFBR4515 BL SIMPLEX/4PC 29441099

**Individual accessories, tools, supplies**

- PCF Buffered Fibre Stripper 0.5 mm (K200/230) 2950071
- POF Cable Stripper 3.6/6.0 mm 29500012
- POF Cable Stripper PA 2.2 mm 29500013
- POF Crimp Tool 2.5/3.0/4.5/4.95 mm 29500010
- PCF Cleaving Tool FSMA Connector 29500712
- PCF Cleaving Tool ST (BFOC) Connector 29500713
- PCF Cleaving Tool HFBR4521 Connector 29500714
- PCF Cleaving Tool SC Connector 29500715
- Strain relief element scissors 29500017
- PCF Microscope Adapter FSMA SIMPLEX 29500771
- PCF Microscope Adapter ST (BFOC) SIMPLEX 29500772
- PCF Microscope Adapter HFBR SIMPLEX 29500773
- PCF Inspection Microscope (100x) 29500770
- Polishing film graining size 1000 (BL) 29500021
- Polishing film graining size 0.3 µm (WH) 29500022
- Polishing film graining size 1 µm (GN) 29500023
- Polishing film graining size 5 µm (BR) 29500024
- Polishing glass plate 150x230 mm 29500020
- Polishing Disc POF ST (BFOC) Connector 29500032
- Polishing Disc POF HFBR4501/4521 SIMPLEX 29500033
- Polishing Disc POF SIMPLEX 2.2 mm 29500036
- Polishing Disc POF FSMA Connector 29500031
- Polishing Disc POF F05 Connector 29500035
- Polishing Disc POF HFBR4516 DUPLEX 29500034
- Polishing Disc PCF HFBR4521 Connector 29500733
- Polishing Disc POF SC Connector 29500037

**Optional test accessories**

- POF Optical Transmitter (TMR) 29500070
- POF Optical TMR Adapter HFBR, 650 nm 29500071
- POF Optical TMR Adapter FSMA, 650 nm 29500072
- POF Optical TMR Adapter ST (BFOC), 650 nm 29500073
- POF Optical TMR Adapter F05, 660 nm 29500074
- POF Optical TMR Adapter HFBR, 660 nm 29500075
- POF Optical TMR Adapter FSMA, 660 nm 29500076
- POF Optical TMR Adapter ST (BFOC), 660 nm 29500077
- POF Optical Power Meter 660/850 nm 29500080
- POF Power Meter Adapter HFBR4501/4521 29500081
- POF Power Meter Adapter FSMA 29500082
- POF Power Meter Adapter ST (BFOC) 29500083
- POF Power Meter Adapter F05 29500084
- POF Measuring Equipment Set 660/850 nm 29500089

**FIBRE OPTIC CABLES**
### Quickfinder [GOF DUPLEX Patchcord]

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**Legend**

Standard catalog article

Also longer variants possible upon request!

*A*Upon request.
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HITRONIC® POF SIMPLEX BUFFERED FIBRE
Polymer optical fibre as simplex buffered fibre version with PE sheath

Benefits
• Transmission lengths up to 70 m
• Suitable for direct connector assembly
• Easy to handle
• No crosstalk
• EMC protection

Application range
• For optical signal transmission in industrial applications
• Very suitable for fixed installation in control cabinets, cable ducts, or pipes with low mechanical stress

Product features
• Lightweight
• High flexibility
• Halogen-free buffer tube

Product Make-up
• Polymer Optical Fibre (POF)
• PE buffer tube
• Without outer sheath
• Colour: black

Technical data

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<td>ETIM 5.0/6.0 Class-Description: Fibre optic cable</td>
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Dimensions
Buffered fibre: 2.2 mm
Fibre type
POF - P980/1000
Standard designation
J-V2Y

Optical fibre type
Core material: PMMA
Cladding material: fluoropolymers

Permissible bending radius
≥ 10 x outer diameter

Permissible tensile force
Fixed installation: 5 N
Short-term: 15 N

Temperature range
Operation: -55°C to +85°C
Installation: -10°C to +50°C

Article number   Article designation  Fibre type  Number of fibres  Outer diameter [mm]  Weight (kg/km)
HITRONIC® POF SIMPLEX PE
28000001  HITRONIC® POF SIMPLEX PE  P980/1000 POF  1  2.2  3.8

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Similar products
• HITRONIC® POF SIMPLEX CABLE refer to page 209

Accessories
• POF Connector and Adapter HFBR refer to page 213
• POF Cutting Tools refer to page 216
• POF Connector F05 Simplex refer to page 214
• UNIVERSAL STRIP stripping tool refer to main catalogue 2018/19
• Ty-Grip® F0L / F0 Cable tie refer to main catalogue 2018/19
**HITRONIC® POF SIMPLEX CABLE**

Polymer optical fibre as simplex fibre cable version with PUR sheath for fixed or flexible application

### Info

- Suitable for direct connector assembly

### Benefits

- Optical data transmission up to 70m
- Easy to handle
- No interference by external fields
- No grounding problems
- Suitable for direct connector assembly

### Application range

- For optical signal transmission in industrial applications
- As a link between moving parts
- FD cable version: for flexible applications (power chains)

### Product features

- Resistant to abrasion, oil, microbes and hydrolysis
- Adhesion-free
- Outer sheath flame-retardant and halogen-free
- FD cable version: 5,000,000 bending cycles

### Product Make-up

- Polymer Optical Fibre (POF)
- PE buffer tube
- Aramid yarns as strain relief
- PUR outer sheath
- Colour: orange (RAL 2003)

### Technical data

**Classification ETIM 5/6**

- ETIM 5.0/6.0 Class-ID: EC000034
- ETIM 5.0/6.0 Class-Description: Fibre optic cable

**Dimensions**

- Buffered fibre: 2.2 mm
- Cable: see table

**Fibre type**

- POF - P980/1000

**Standard designation**

- J-V2Y(ZN)1 1Y

**Optical fibre type**

- Core material: PMMA
- Cladding material: fluoropolymers

**Permissible bending radius**

- ≥ 10 x outer diameter

**Permissible tensile force**

- Fixed installation: 100 N
- Short-term: 600 N

**Temperature range**

- Operation: -20 °C to +70 °C
- Installation: -10°C to +50°C

### Article number | Article designation | Fibre type | Number of fibres | Outer diameter [mm] | Weight (kg/km)
---|---|---|---|---|---
HITRONIC® POF SIMPLEX PE-PUR | 28020001 | HITRONIC® POF SIMPLEX PE-PUR | 980/1000 POF | 1 | 5.5 | 25
HITRONIC® POF SIMPLEX FD PE-PUR for draig chain application | 28320001 | HITRONIC® POF SIMPLEX FD PE-PUR | 980/1000 POF | 1 | 6 | 30

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths Photographs and graphics are not to scale and do not represent detailed images of the respective products.

### Accessories

- POF Assembly Sets refer to page 216
- POF Cutting Tools refer to page 216
- POF Connector F-SMA and ST(BFOC) refer to page 214
- UNIVERSAL STRIP stripping tool refer to main catalogue 2018/19
- STAR STRIP stripping tool refer to main catalogue 2018/19
Optical transmission systems
POF - Polymer Optical Fibre Cable • Two buffered fibres applications (DUPLEX)

HITRONIC® POF DUPLEX BUFFERED FIBRES
Polymer optical fibre as duplex buffered fibres version with PE sheath

Benefits
• Transmission lengths up to 70 m
• Suitable for direct connector assembly
• Easy to handle
• No crosstalk
• EMC protection

Product features
• Halogen-free
• Lightweight
• High flexibility

Product Make-up
• Polymer Optical Fibre (POF)
• Twin cable
• PE buffer tube
• Without outer sheath
• Colour: black

Application range
• For optical signal transmission in industrial applications
• Very suitable for fixed installation in control cabinets, cable ducts, or pipes with low mechanical stress
• Light mechanical stress
• Identification by white dots

Technical data

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Dimensions

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Core identification code

| Black/black with white dots |

Fibre type

| POF - P980/1000 |

Standard designation

| J-V2Y |

Optical fibre type

| Core material: PMMA |
| Cladding material: fluoropolymers |

Permissible bending radius

| ≥ 10 x outer diameter |

Permissible tensile force

| Fixed installation: 10 N |
| Short-term: 30 N |

Temperature range

| Operation: -55°C to +85°C |
| Installation: -10°C to +50°C |

Article number | Article designation | Fibre type | Number of fibres | Outer diameter [mm] | Weight (kg/km) |
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Similar products
• HITRONIC® POF SIMPLEX BUFFERED FIBRE refer to page 208
• HITRONIC® POF DUPLEX CABLE refer to page 211
• HITRONIC® POF cables for PROFINET Applications refer to page 212

Accessories
• POF Connector and Adapter HFBR refer to page 213
• POF Cutting Tools refer to page 216
• POF Connector F-SMA and ST(BFOC) refer to page 214
• UNIVERSAL STRIP stripping tool refer to main catalogue 2018/19
• Ty-Grip® FOL / FO Cable tie refer to main catalogue 2018/19

For current information see: www.lappgroup.com
HITRONIC® POF DUPLEX CABLE
Polymer optical fibre as duplex fibre cable version with PUR sheath for fixed or flexible application

Benefits
• Optical data transmission up to 70m
• Easy to handle
• No interference by external fields
• No grounding problems
• Suitable for direct connector assembly

Application range
• For optical signal transmission in industrial applications
• FD cable version: for flexible applications (power chains)

Product features
• Outer sheath flame-retardant and halogen-free
• Resistant to abrasion, oil, microbes and hydrolysis
• Adhesion-free
• FD cable version: 5,000,000 bending cycles

Product Make-up
• Polymer Optical Fibre (POF)
• PE buffer tube
• Fibre colour coding: black, orange
• Aramid yarns as strain relief
• PUR outer sheath, orange (RAL 2003)

Technical data

<table>
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Dimensions
• Buffered fibre: 2.2 mm

Cable: see table

Core identification code
Black, orange

Fibre type
2x POF - P980/1000

Standard designation
J-V2Y(ZN)1 1Y

Optical fibre type
Core material: PMMA
Cladding material: fluoropolymers

Permissible bending radius
≥ 10 x outer diameter

Permissible tensile force
Fixed installation: 100 N (PE-PUR), 130 N (Heavy PE-PUR)
Short-term: 400 N

Temperature range
Operation: -40°C to +70°C (FD: -20°C to +70°C)
Installation: -10°C to +50°C

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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Similar products
• HITRONIC® POF SIMPLEX CABLE refer to page 209
• HITRONIC® POF cables for PROFINET Applications refer to page 212

Accessories
• POF Assembly Sets refer to page 216
• POF Cutting Tools refer to page 216
• POF Connector F-SMA and ST(BFOC) refer to page 214
• POF Connector SC-RJ refer to page 215
• UNIVERSAL STRIP stripping tool refer to main catalogue 2018/19
• STAR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
HITRONIC® POF cables for PROFINET Applications

Polymer optical fibre as duplex fibre cable version with PUR sheath for PROFINET applications type B or C

**Benefits**
- Optical data transmission up to 70m
- Easy to handle
- No interference by external fields
- No grounding problems
- Suitable for direct connector assembly

**Application range**
- For optical signal transmission in industrial applications
- PROFINET / Industrial Ethernet
- At 100 Mbit/s: max 50 m cable length
- PROFINET type B: for fixed laying
- PROFINET type C: for flexible applications (power chains)

**Product features**
- Cable version with PVC outer sheath: for standard applications in industrial environments
- Cable version with PUR outer sheath: for high mechanical or chemical stress in industrial environments and resistant to oil
- PNB - PROFINET-Type B
- PNC - PROFINET-Type C
- FD - Highly flexible (power chains)

**Product Make-up**
- Polymer Optical Fibre (POF)
- PA buffer tube
- Fibre colour coding: black, orange (with arrow printing)
- Aramid yarns as strain relief
- Outer sheath material PUR or PVC (see article description)
- Outer sheath colour: green (RAL 6018)

**Technical data**
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000034
  ETIM 5.0/6.0 Class-Description: Fibre optic cable
- Dimensions
  Buffered fibre: 2.2 mm
  Cable: see table
- Core identification code
  Black, orange (with arrow printing)
- Standard designation
  J-V4Y(ZN)1 1Y 2P980/1000
  J-V4Y(ZN)Y 2P980/1000
  J-V4Y(ZN)1 1Y 2P980/1000 flex
- Optical fibre type
  Core material: PMMA
  Cladding material: fluoropolymers
- Permissible bending radius
  ≥ 10 x outer diameter
- Permissible tensile force
  see data sheet
- Temperature range
  Operation: -20 °C to +70 °C
  Installation: -10°C to +50°C

### Article number | Article designation | Fibre type | Number of fibres | Outer diameter [mm] | Weight (kg/km)
--- | --- | --- | --- | --- | ---
POF DUPLEX - PROFINET TYPE B
28051002 | HITRONIC® POF DUPLEX PNB PA-PUR | 980/1000 POF | 2 | 8 | 56
28052002 | HITRONIC® POF DUPLEX PNB PA-PVC | 980/1000 POF | 2 | 7.8 | 59
POF DUPLEX - PROFINET TYPE C
28351002 | HITRONIC® POF DUPLEX FD PNC PA-PUR | 980/1000 POF | 2 | 8 | 55

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Lapp Kabel is a member of the PROFIBUS user organisation (PNO)

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- POF Assembly Sets refer to page 216
- POF Cutting Tools refer to page 216
- POF Connector F-SMA and ST(BFOC) refer to page 214
- POF Connector SC-RJ refer to page 215
- EPIC® DATA PB Sub-D FO refer to page 71
- UNIVERSAL STRIP stripping tool refer to main catalogue 2018/19
- STAR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
POF Connector and Adapter HFBR

Connectors for polymer optical fibre cables, connectors and adapters type HFBR family
(HFBR4501/4503/4506/4511/4513/4516/4531/4532/4533)

Benefits
- Compatible with HP Versatile Link Connectors and Components series
- Different colours for channel coding

Application range
- Factory automation
- Medical equipment
- Telecommunications Switching Systems
- Automotive Networks
- Printed Circuit Board

Product features
- HFBR connector series for 2.2 mm POF
- For crimping or clamping
- Simplex or Duplex variations

Technical data

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Pieces / PU</th>
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<tbody>
<tr>
<td>Connector HFBR-4501, Simplex, with Crimp Sleve</td>
<td>POF Connector HFBR4501 GY Simplex /4PC</td>
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<td>Latching Connector HFBR-4503, Simplex, with Crimp Sleve</td>
<td>POF Connector HFBR4503 GY Simplex /50PC</td>
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<td>Connector HFBR-4511, Simplex, with Crimp Sleve</td>
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<td>HFBR4505 Adapters</td>
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<tr>
<td>HFBR4515 Adapters</td>
<td>POF Adapter HFBR4515 BL Simplex /4PC</td>
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For current information see: www.lappgroup.com
Optical transmission systems
POF - Polymer optical fibre accessories • Connectors and adapters

POF Connector F05 Simplex
Connectors for polymer optical fibre cables, connector and adapter type F05, compatible with TOCP155K

Benefits
- Easy to assemble

Application range
- Digital audio
- Factory automation
- Office Automation (Smart House)

Product features
- F-05 (TOCP) SIMPLEX clamp connector for connecting to polymer optical fibre without crimping or gluing
- Snap-In Connector
- Suitable for 2.2 mm POF

Info
- Compatible with TOCP155K

Technical data

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<th>Classification ETIM 5/6</th>
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<tr>
<td>ETIM 5.0/6.0 Class-Description: Fibre optic connector</td>
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Accessories
- POF Cutting Tools refer to page 216
- POF Polishing tools and accessories refer to page 217

POF Connector F-SMA and ST(BFOC)
Connectors for polymer optical fibre cables, connector type FSMA and ST(BFOC)

Benefits
- As crimp or clamp version for easy assembling

Product features
- FSMA and ST(BFOC) connector with knurled nut or hexagonal nut for crimping, gluing or easy clamping
- Suitable for 2.2 mm POF
- Available for different cable diameters (2.2 mm and 6.0 mm)
- Connector including bend protection boot and dust cap

Info
- FSMA and ST(BFOC) connectors for POF cable assembly

Technical data

<table>
<thead>
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<th>Classification ETIM 5/6</th>
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</table>

Accessories
- POF Assembly Sets refer to page 216
- POF Polishing tools and accessories refer to page 217
- POF Measurement Equipment refer to page 218
POF Connector SC-RJ
Connector for polymer optical fibre cables, connector type SC-RJ

Benefits
• Connectors for PROFINET Data Cabling
• As crimp version for easy assembling

Product features
• Connector set included two SC connectors, SC-RJ housing, two bending protection boots, dust caps
• Suitable for 2.2 mm POF
• Bend protection boot colour: black and red

Info
• SC-RJ connectors for POF cable assembly
• Connectors for PROFINET Data Cabling

Technical data

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<td>ETIM 5.0/6.0 Class-Description: Fibre optic connector</td>
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Certifications
SC-RJ complies with IEC61754-24

Article number | Article designation | Pieces / PU |
--- | --- | --- |
29161097 | POF Connector SC-RJ Crimp 2.2 | 1 |

POF Adapter F-SMA
Adapter for connector type FSMA

Product features
• POF Adapter FSMA: version with two fixing nuts and lock washer
• POF Adapter FSMA hexa: version with hexagonal flange, fixing nuts and lock washer

Info
• Can be used for POF and PCF connector types

Technical data

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<tr>
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Article number | Article designation | Pieces / PU |
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29430099 | POF Adapter FSMA /4PC | 4 |
29430089 | POF Adapter FSMA Hex /4PC | 4 |

POF Adapter ST (BFOC)
Adapter for connector type ST(BFOC)

Product features
• ST(BFOC) adapter with flange, fixing nuts and lock washer

Norm references / Approvals
• ST comply with IEC standard 61754-2

Info
• Can be used for POF and PCF connector types

Technical data

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<th>Classification ETIM 5/6</th>
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Article number | Article designation | Pieces / PU |
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29420099 | POF Adapter ST (BFOC) /4PC | 4 |

For current information see: www.lappgroup.com
Optical transmission systems
POF - Polymer optical fibre accessories • Connectors and adapters

POF Assembly Sets
Assembly set for connector assembly of POF crimp connector versions: FSMA; ST(BFOC); SC/SC-RJ

Benefits
• Easy to handle
• Set includes all the necessary tools for connector assembly
• Suitable for on-site assembly

Product features
• Sets available for POF connector types FSMA and ST (BFOC) and SC / SC-RJ
• Contents: crimp tool, buffered fibre stripper, polishing disc FSMA, polishing film, cutter

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<th>Article number</th>
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<td>Assembly Set POF Connector ST(BFOC)</td>
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<td>Assembly Set for POF Connector SC</td>
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Optical transmission systems
POF - Polymer optical fibre accessories • Tools and Accessories

POF Cutting Tools
Cutting, stripping and crimping tools for different jacket materials and cable diameter of POF cable and connectors

Benefits
• Cutting tools for the POF cable and connector product range

Application range
• Cable stripper for different jacket materials and cable diameter

Product features
• Various tools for cutting buffered fibres (2.2mm) from very simple to version with automatic blade advance
• 29500001 - fibre stripper for PE buffer tube 2.2mm
• 29500003 - fibre stripper for PA buffer tube 2.2mm-2.3mm
• 29500012 - jacket stripper for cable diameter 3.6mm and 6.0mm
• Crimping tool suitable for the POF(PCF) connector program

<table>
<thead>
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<th>Article number</th>
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<td>29500014</td>
<td>PDF Cutter 2.2/1.0mm Guillotine</td>
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<td>29500015</td>
<td>POF BufferedFibreCutter 2.2mm manuel</td>
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<td>29500016</td>
<td>POF BufferedFibreCutter 2.2mm automatic</td>
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<td>29500011</td>
<td>POF Buffered Fibre Stripper 2.2 mm (P980/1000)</td>
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<td>29500013</td>
<td>POF Cable Stripper PA 2.2mm</td>
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<td>POF Cable Stripper 3.6/6.0mm</td>
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<td>29500017</td>
<td>Strain relief element scissors</td>
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<td>29500010</td>
<td>POF Crimp Tool 2.5/3.0/4.5/4.95mm</td>
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Similar products
• POF Assembly Sets refer to page 216

For current information see: www.lappgroup.com
POF Polishing tools and accessories

Polishing discs for different connector designs; polishing sheets; accessories

Benefits
- Easy to handle
- Suitable to POF Connector Assembly Sets

Product features
- Accessories for POF Assembly
- Polishing disc for various POF connector types
- Other versions are available upon request
- Polishing film with different grain size types for fibre end face treatment
- Polishing process:
  - POF - Polishing Film 1000 (BU)
  - Polishing Film 5 µm (BN)
  - Polishing Film 1 µm (BN)
  - PCF - Polishing Film 5 µm (BN)
  - Polishing Film 1 µm (GN)
  - Polishing Film 0.3 µm (WH)

Technical data

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<td>Polishing Disc POF HFBR4501/4511 SIMPLEX</td>
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<td>Polishing Disc POF HFBR4516 DUPLEX</td>
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<td>Polishing Disc POF FS5 Connector</td>
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<td>Polishing glass plate 150x230mm</td>
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Similar products
- POF Assembly Sets refer to page 216
POF Measurement Equipment

Measuring equipment set for wavelength range 660 nm and 850 nm; suitable for measuring assembled POF and PCF systems

Benefits
- Measuring Equipment Set for wavelengths 660/850nm
- Suitable for the measurement of assembled POF and PCF systems

Product features
- The measurement device is supplied without adapters. Please order separately
- Optical Transmitter (TMR): wavelength dependent on interchangeable adapter
  - 650nm
  - 660nm
  - 850nm (on request)
- Optical Power Meter: for attenuation measurement of an assembled POF (PCF) system adapted to Optical Transmitter (TMR)

Product Make-up
- Optical Transmitter with digital display, wavelength dependent on adapter, active interchangeable adapters are not included, please order separately
- Optical Power Meter with digital display, wavelength meter 660/850 nm, interchangeable adapters (receiver side) are not included, please order separately
- Measuring Set (29500089): Optical Transmitter and Power Meter as set in a black suitcase, interchangeable adapters are not included

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<td>POF Optical TMR Adapter FSMA, 650nm</td>
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Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC002609
- ETIM 5.0/6.0 Class-Description: Accessories for optic fibre technique

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
HITRONIC® PCF SIMPLEX Cable

Polymer Cladded Fibre as simplex fibre cable version for indoor or outdoor use, pur outer sheath; halogen-free

Benefits
- Transmission lengths up to 500 m
- Suitable for direct connector assembly
- High mechanical strength
- UV-resistant
- EMC protection

Application range
- For data transmission in field bus systems, such as PROFIBUS, INTERBUS etc.
- Industrial environments

Product features
- Possible transmission wavelengths: 650 nm and 850 nm
- Outer sheath flame-retardant and halogen-free

Product Make-up
- Tight-buffered fibres
- Aramid yarns as strain relief
- PUR outer sheath
- Colour: black (RAL 9005)

Technical data

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<th>Dimensions</th>
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<td>PCF - K200/230</td>
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<td>PCF - Polymer Cladded Fibre</td>
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<th>Minimum bending radius</th>
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<tbody>
<tr>
<td>Core material: glass</td>
</tr>
<tr>
<td>Cladding material: fluoropolymers</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Permissible tensile force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed installation: 200 N</td>
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<table>
<thead>
<tr>
<th>Temperature range</th>
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<tbody>
<tr>
<td>Operation: -10°C to +60°C</td>
</tr>
<tr>
<td>Installation: -10°C to +50°C</td>
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<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Fibre type</th>
<th>Number of fibres</th>
<th>Outer diameter [mm]</th>
<th>Weight (kg/km)</th>
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<tr>
<td>286000701</td>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

The cables can also be supplied as pre-terminated fibre optic trunks.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- PCF Assembly Sets refer to main catalogue 2018/19
- PCF Connector HFBR refer to page 223
- PCF Connector F-SMA and ST(BFOC) refer to page 223
- PCF Cutting Tools refer to page 225

For current information see: www.lappgroup.com
HITRONIC® PCF DUPLEX Cable
Polymer Cladded Fibre as duplex fibre cable version for indoor or outdoor use

Benefits
- Transmission lengths up to 500 m
- Suitable for direct connector assembly
- Good resistance to oil, petrol, acids and alkalis
- High mechanical strength
- EMC protection

Application range
- For data transmission in field bus systems, such as PROFIBUS, INTERBUS etc.
- Industrial environments

Product features
- Possible transmission wavelengths: 650 nm and 850 nm
- Complies with requirements for all BUS systems
- Halogen-free outer sheath

Product Make-up
- Colour-coded, tight-buffered PCF sub-cable with FRNC sheath (2.9mm)
- Aramid yarns as strain relief
- PUR outer sheath (indoor); PE outer sheath (outdoor)
- Colour: orange (indoor); black (outdoor)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000034
  ETIM 5.0/6.0 Class-Description: Fibre optic cable
- Dimensions
  Buffered fibre: 0.5mm
  Single cable: 2.9 mm
  Cable: see table
- Core identification code
  red, green
- Fibre type
  PCF - K200/230
  PCF - Polymer Cladded Fibre
- Minimum bending radius
  Static: ≥ 15 x outer diameter
  Dynamic: ≥ 20 x outer diameter
- Standard designation
  PCF DUPLEX Indoor: J-V(ZN)H1 1Y 2K200/230
  PCF DUPLEX Outdoor: A-VQ(ZN)HB2Y 2K200/230
- Optical values
  see data sheet
- Optical fibre type
  Core material: glass
  Cladding material: fluoropolymers
- Permissible tensile force
  Fixed installation: 400 N (indoor); 500 N (outdoor)
  Short-term: 1200 N (indoor); 1500 N (outdoor)
- Temperature range
  Operation: -20 °C to +70 °C
  Installation: -10°C to +50°C

Article number | Article designation | Fibre type | Number of fibres | Outer diameter [mm] | Weight (kg/km)
--- | --- | --- | --- | --- | ---
Indoor
28020702 | HITRONIC® PCF DUPLEX FRNC-PUR Indoor | 200/230 PCF | 2 | 8 | 53
Outdoor
28620702 | HITRONIC® PCF DUPLEX FRNC-PE Outdoor | 200/230 PCF | 2 | 10.5 | 89

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

The cables can also be supplied as pre-terminated fibre optic trunks. Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Similar products
- HITRONIC® PCF DUPLEX FD cables refer to page 221
- HITRONIC® PCF cables for PROFINET Applications refer to page 222

Accessories
- PCF Assembly Sets refer to main catalogue 2018/ 19
- PCF Connector HFBR refer to page 223
- PCF Connector F-SMA and ST(BFOC) refer to page 223
- PCF Connector SC-R) refer to page 224
- STAR STRIP stripping tool refer to main catalogue 2018/ 19
HITRONIC® PCF DUPLEX FD cables
Polymer Cladded Fibre as duplex fibre cable version for flexible applications, PUR outer sheath, halogen-free

Benefits
- Designed for use in power chains
- Transmission lengths up to 500 m
- Suitable for direct connector assembly
- Good resistance to oil, petrol, acids and alkalis
- EMC protection

Application range
- For highly flexible applications
- For data transmission in field bus systems, such as PROFIBUS, INTERBUS etc.
- As a link between moving parts
- Industrial environments

Product features
- Possible transmission wavelengths: 650 nm and 850 nm
- Complies with requirements for all BUS systems
- Outer sheath flame-retardant and halogen-free

Product Make-up
- Colour-coded, tight-buffered PCF sub-cable with FRNC sheath
- Sub cable outer diameter: 2.2mm
- Aramid yarns as strain relief
- PUR outer sheath
- Colour: orange (RAL 2003)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000034
  ETIM 5.0/6.0 Class-Description: Fibre optic cable
- Dimensions
  Buffered fibre: 0.5mm
  Single cable: 2.2 mm
  Cable: 8.8mm
- Core identification code
  red, green
- Fibre type
  PCF - K200/230
  PCF - Polymer Cladded Fibre
- Minimum bending radius
  Static: ≥ 15 x outer diameter
  Dynamic: ≥ 20 x outer diameter
- Standard designation
  A/-J-V(ZN)H11Y
- Optical fibre type
  Core material: glass
  Cladding material: fluoropolymers
- Permissible tensile force
  Fixed installation: 800 N
  Short-term: 2000 N
- Temperature range
  Operation: -20 °C to +70 °C
  Installation: -10°C to +50°C

Table: HITRONIC® PCF DUPLEX FD cables

<table>
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<tr>
<th>Article number</th>
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<th>Number of fibres</th>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.
The cables can also be supplied as pre-terminated fibre optic trunks.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- PCF Assembly Sets refer to main catalogue 2018/19
- PCF Connector HF8R refer to page 223
- PCF Connector F-SMA and ST(BFOC) refer to page 223
- PCF Cutting Tools refer to page 225
- PCF Connector SC-RJ refer to page 224
- STAR STRIP stripping tool refer to main catalogue 2018/19
HITRONIC® PCF cables for PROFINET Applications

Polymer optical fibre as duplex fibre cable version with PCV or PUR sheath for PROFINET applications type B or C

Benefits
- Optical data transmission up to 500m
- Easy to handle
- No interference by external fields
- No grounding problems
- Suitable for direct connector assembly

Application range
- PCF DUPLEX cables for optical signal transmission in industrial applications
- PROFINET / Industrial Ethernet
- At 100 Mbit/s: max 100 m cable length
- PROFINET type B: for fixed laying
- PROFINET type C: for flexible applications (power chains)

Product features
- Cable version with PVC outer sheath: for standard applications in industrial environments
- Cable version with PUR outer sheath: for high mechanical or chemical stress in industrial environments and resistant to oil
- PN8 - PROFINET-Type B
- PNC - PROFINET-Type C
- FD - Highly flexible (power chains)

Norm references / Approvals
- 28055702: with c(UL) us certification (OFNG 75°C)

Product Make-up
- Colour-coded, tight-buffered PCF sub-cable with PVC sheath
- Sub cable outer diameter: 2.2mm
- Aramid yarns as strain relief
- Outer sheath material PUR or PVC (see article description)
- Outer sheath colour: green (RAL 6018)

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000034
- ETIM 5.0/6.0 Class-Description: Fibre optic cable
- Dimensions
  - Buffered fibre: 0.5mm
  - Single cable: 2.2 mm
- Core identification code
  - Black, orange (with arrow printing)
- Fibre type
  - PCF - K200/230
- Minimum bending radius
  - see data sheet
- Standard designation
  - J-V(ZN)YY 2K200/230
  - J-V(ZN)YY(ZN)11Y 2K200/230 flex
  - J-V(ZN)YY(ZN)Y 2K200/230 flex
- Optical fibre type
  - Core material: glass
  - Cladding material: fluoropolymers
- Permissible tensile force
  - see data sheet
- Temperature range
  - See data sheet

Article number | Article designation | Fibre type | Number of fibres | Outer diameter [mm] | Weight (kg/km) |
--- | --- | --- | --- | --- | --- |
28055702 | HITRONIC® PCF DUPLEX PNB PVC-PVC A | 200/230 PCF | 2 | 7.5 | 59 |
28052702 | HITRONIC® PCF DUPLEX PNB PVC-PVC | 200/230 PCF | 2 | 7.2 | 55 |
28351702 | HITRONIC® PCF DUPLEX FD PNC PVC-PUR | 200/230 PCF | 2 | 8.8 | 71 |
28352702 | HITRONIC® PCF DUPLEX FD PNC PVC-PVC | 200/230 PCF | 2 | 8.8 | 76 |

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Lapp Kabel is a member of the PROFIBUS user organisation (PNO)
The cables can also be supplied as pre-terminated fibre optic trunks.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- PCF Assembly Sets refer to main catalogue 2018/19
- PCF Connector F-SMA and ST(BFOC) refer to page 223
- PCF Cutting Tools refer to page 225
- PCF Connector SC-RJ refer to page 224
- EPIC® DATA PB Sub-D FO refer to page 71
- STAR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
PCF Connector HFBR
Connectors for polymer cladded optical fibre cables, connectors type HFBR4521

Benefits
- Compatible with HP Versatile Link Connectors and Components series

Application range
- Factory automation
- Medical equipment
- Telecommunications Switching Systems

Product features
- HFBR4521 connector for 2.2 mm PCF cable diameter as crimp version
- HFBR4521 connector for 3.0 mm PCF cable diameter as clamp version
- HFBR4521 clamp connector compatible with Assembly Set PCF Connector HFBR4521

<table>
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<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Pieces / PU</th>
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<td>PCF Connector HFBR4521 Clamp 3.0 /4PC</td>
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<td>PCF Connector HFBR4521 Clamp 3.0 /50PC</td>
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</table>

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

PCF Connector F-SMA and ST(BFOC)
Connectors for Polymer Cladded Fibre cables, connector type FSMA and ST(BFOC)

Benefits
- Easy to assemble
- Designed for field assembly
- Reusable as it can be removed

Product features
- Connectors for clamp and cleave assembly
- Available for different cable diameters (2.2mm and 3.0mm)
- Adapters available on request
- Bend protection boot colour: black and red

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Pieces / PU</th>
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<tbody>
<tr>
<td>29136799</td>
<td>PCF Connector FSMA Clamp 3.0 /4PC</td>
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<td>29125798</td>
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Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Similar products
- POF Adapter F-SMA refer to page 215
- POF Adapter ST (BFOC) refer to page 215

For current information see: www.lappgroup.com
PCF Connector SC-RJ

Connectors for PCF cables, connector type SC-RJ for clamp and cleave assembly, PROFINET

Benefits
• Easy to assemble
• Designed for field assembly
• Reusable as it can be removed

Product features
• Connector set included two SC connectors, SC-RJ housing, two bending protection boots, dust caps
• Connectors for clamp and cleave assembly
• Available for different cable diameters (2.2mm and 3.0mm)
• Bend protection boot colour: black and red

Info
• Connectors for PROFINET Data Cabling

Technical data
• Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC00122
  ETIM 5.0/6.0 Class-Description: Fibre optic connector
• Certifications
  SC-RJ complies with IEC61754-24

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Accessories
• PCF Cutting Tools refer to page 225

PCF Assembly Sets

Assembly sets for connector assembly of PCF connector versions: FSMA, ST(BFOC), SC/SC-RJ, HFBR4521

Benefits
• Easy to handle
• Set includes all the necessary tools for connector assembly from clamp connector versions
• Suitable for on-site assembly

Product features
• Sets available for PCF clamp connector types FSMA, ST (BFOC), SC and HFBR4521
• Contents: stripper, cleave tool, kevlar scissor, cutter, microscope

<table>
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<th>Article number</th>
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Accessories
• PCF Connector F-SMA and ST (BFOC) refer to page 223
• PCF Cutting Tools refer to page 225

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Optical transmission systems

PCF - Plastic Cladded Fibre Accessories • Tools and Accessories

**Benefits**
- Optimally coordinated tools for the PCF cable and connector product range
- For the processing of PCF fibres

**Product features**
- PCF cleaving tool for connector types:
  - FSMA
  - ST(BFOC)
  - HFBR4521
  - SC

---

**PCF Cutting Tools**
Accessories for Polymer Claddes Fibre cables

**Benefits**
- Inspection Microscope with 200x magnification for connector inspection
- Easy to handle

**Product features**
- Interchangeable adapter for PCF connector types FSMA, ST(BFOC), HFBR
- Interchangeable adapters are not included in microscope, please order separately
- Other adapters available on request

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**PCF Cutting Tools**

**Benefits**
- Optimally coordinated tools for the PCF cable and connector product range
- For the processing of PCF fibres

**Product features**
- PCF cleaving tool for connector types:
  - FSMA
  - ST(BFOC)
  - HFBR4521
  - SC

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**PCF Measurement Equipment**

Inspection microscope for PCF connector types: FSMA; ST(BFOC); HFBR

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For current information see: www.lappgroup.com
HITRONIC® FIRE

Safety cable with central loose tube, LSZH inner and outer sheath, corrugated steel tape; halogen-free

Benefits
- Ensures that the fibres can still transmit data during and after a fire (according to IEC 60331-25)
- Suitable for installation in underground tunnels where fire safety is critical
- Additional sheath protects the fibres for use in harsh environments
- Armouring provides excellent protection against high mechanical stress and rodents
- UV-resistant longitudinally and laterally watertight

Application range
- In industrial areas that use fire as a tool
- Highly combustible or fire-prone areas
- For indoor and outdoor use
- Methods of Deployment: empty plastic pipes, ducts and trays

Product features
- Fire behaviour:
  - Halogen-free (IEC 60754-1)
  - Flame-retardant (IEC 60332-3)
  - Low smoke density (IEC 61034-1/2)
  - Circuit integrity (IEC 60331-25);
  - Optical fibre cables
- Central loose tube with up to 24 fibres
- Colour-coded fibres
- Longitudinal watertight
- Outer sheath flame-retardant and halogen-free

Product Make-up
- Gel-filled loose tube
- Water-blocking reinforced glass yarn strain relief
- Corrugated steel tape armour
- LSZH inner and outer sheaths
- Colour: black (RAL 9005)

Technical data

<table>
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<tr>
<th>Classification</th>
<th>ETIM 5/6</th>
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<td>ETIM 5.0/6.0 Class-ID:</td>
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<td>ETIM 5.0/6.0 Class-Description:</td>
<td>Fibre optic cable</td>
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Dimensions
- Primary coated fibre: 250µm
- Cable: see table

Fibre type
- GOF - Glass Optical Fibre

Standard designation
- A/•-DQ(ZN)BH(SR)H

Optical values
- see data sheet

Optical fibre type
- Core material: glass
- Cladding material: glass

Permissible bending radius
- Static: ≥ 15 x outer diameter
- Dynamic: ≥ 20 x outer diameter

Permissible tensile force
- Fixed installation: 1500 N
- Short-term: 2200 N

Temperature range
- Fixed installation: -30°C to +70°C

Article number | Article designation | Fibre type | Number of fibres | Outer diameter [mm] | Weight (kg/km) |
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

The cables can also be supplied as pre-terminated fibre optic trunks.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Available on request with Multimode OM4 fibres.

Accessories
- GOF DUPLEX Patchcord refer to page 242
- GOF SIMPLEX Pigtail refer to page 243
- STAR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
INFO

• Torsion-resistant and very flexible

Benefits
• Designed to withstand high torsion in the windmill drip loop
• Suitable for field assembly
• Easy to install due to the compact design, high flexibility, robust sheath and small bending radii
• Zero electromagnetic interference as the cable contains no metal (totally dielectric)

Application range
• For fixed and flexible installations, as well as for applications with torsional movements (e.g. machinery, wind turbines)
• Industrial environments
• In vertical installations
• As a link between moving parts
• For indoor and outdoor use

Product features
• Based on military norm MIL-C-85045
• Torsion-resistant and very flexible
• Outer sheath flame-retardant and halogen-free
• Mechanically robust

Product Make-up
• 2.5 mm tight-buffered sub-cable with LSZH sheath
• Aramid yarns as strain relief
• Central element
• PUR outer sheath
• Colour: black (RAL 9005)

Technical data

Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC000034
ETIM 5.0/6.0 Class-Description: Fibre optic cable

Dimensions
sub-cable: 2.5mm
Cable: see table

Core identification code
Details see datasheet

Fibre type
GOF - Glass Optical Fibre

Standard designation
A/J-V(ZN)H1 1Y

Optical values
see data sheet

Optical fibre type
Core material: glass
Cladding material: glass

Permissible bending radius
Static: ≥ 15 x outer diameter
Dynamic: ≥ 20 x outer diameter

Temperature range
Fixed installation: -40°C to +70°C
Occasional flexing: -30°C to +70°C

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Available on request with Multimode OM4 fibres.

Accessories
• GOF DUPLEX Patchcord refer to page 242
• GOF Connector refer to page 244
• STAR STRIP stripping tool refer to main catalogue 2018/19
## HITRONIC® HDM Cable

Mini breakout/distribution cable designed for frequent reeling and unreeling, reaصلable

### Benefits
- Suitable for field application
- Reelable for mobile use
- Very easy to install due to small dimensions, high flexibility, and small bending radius
- Zero electromagnetic interference as the cable contains no metal (totally dielectric)

### Application range
- Light & sound technology
- For indoor and outdoor use
- Industrial environments
- TV broadcasts
  - Camera technology
  - Building monitoring
- Field application

### Technical data
- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC000034
  - ETIM 5.0/6.0 Class-Description: Fibre optic cable
- **Dimensions**
  - Tight-buffer (secondary coated fibre): 900µm
  - Cable: see table
- **Core identification code**
  - Buffered-fibre colour code see data sheet
- **Fibre type**
  - GOF - Glass Optical Fibre
- **Standard designation**
  - A/J-V(ZN)1 1Y
- **Optical values**
  - see data sheet
- **Optical fibre type**
  - Core material: glass
  - Cladding material: glass
- **Permissible bending radius**
  - Static: ≥ 15 x outer diameter
  - Dynamic: ≥ 20 x outer diameter
- **Temperature range**
  - Fixed installation: -40°C to +70°C
  - Flexible use: -20°C to +60°C

### Technical specifications

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<tr>
<th>Article number</th>
<th>Article designation</th>
<th>Fibre type</th>
<th>Number of fibres</th>
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The cables can also be supplied as pre-terminated fibre optic trunk.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

### Accessories
- **GOF DUPLEX Patchcord** refer to page 242
- **STAR STRIP stripping tool** refer to main catalogue 2018/19

For current information see: www.lappgroup.com
HITRONIC® HRM-FD Cable

flexible divisible breakout cable designed for use in power chains

**Benefits**
- Designed for use in power chains
- Suitable for field assembly
- Easy to install due to the compact design, high flexibility, robust sheath and small bending radii
- Zero electromagnetic interference as the cable contains no metal (totally dielectric)

**Application range**
- For highly flexible industrial applications
- As a link between moving parts
- In vertical installations
- Industrial environments
- For indoor and outdoor use

**Product features**
- Based on military norm MIL-C-85045
- For use in power chains and moving machinery parts in dry or damp rooms
- Outer sheath flame-retardant and halogen-free
- Mechanically robust

**Product Make-up**
- 2.0 mm tight-buffered sub-cable with LSZH sheath
- Aramid yarns as strain relief
- Central element
- PUR outer sheath
- Colour: black (RAL 9005)

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The cables can also be supplied as pre-terminated fibre optic trunks.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- GOF DUPEX Patchcord refer to page 242
- GOF Connector refer to page 244
- STAR STRIP stripping tool refer to main catalogue 2018/19
**HITRONIC® HVN-Mini Cable**

Mini outdoor cable designed for installation by air-blowing systems (Ducts)

### Benefits
- Suitable for blowing into ducts
- Compact dimensions
- UV-resistant longitudinally and laterally watertight
- Zero electromagnetic interference as the cable contains no metal (totally dielectric)

### Application range
- Backbone-Area, FTTH applications
- Telecommunications network
- WAN applications
- For installations by blowing
- Methods of deployment: for blowing or pulling into ducts

### Product features
- Stranded loose tubes with up to 144 fibres (12 loose tubes with each 12 fibres)
- Colour-coded fibres and loose tubes
- Reduced dimensions
- Halogen-free, low-friction outer sheath
- UV-resistant

### Product Make-up
- Up to 12 stranded gel-filled loose tubes
- Central GRP strength element
- Reinforced glass yarn strain relief
- PE outer sheath
- Colour: black (RAL 9005)

### Technical data
- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC000034
  - ETIM 5.0/6.0 Class-Description: Fibre optic cable
- **Fibre type**
  - GOF - Glass Optical Fibre
  - Single-mode
  - E9/125 OS2
- **Standard designation**
  - A-DQ(ZN)2Y
- **Optical fibre type**
  - Core material: glass
  - Cladding material: glass
- **Permissible bending radius**
  - Static: ≥ 15 x outer diameter
  - Dynamic: ≥ 20 x outer diameter
- **Temperature range**
  - Fixed installation: -40°C to +70°C

### Article numbers

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**Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Photographs and graphics are not to scale and do not represent detailed images of the respective products.**

### Accessories
- GOF DUPLEX Patchcord refer to page 242
- GOF SIMPLEX Pigtail refer to page 243
- DATA STRIP stripping tool refer to main catalogue 2018/19
**HITRONIC® HQN Outdoor Cable**

Outdoor cable with central loose tube and non-metallic strain relief

**Benefits**
- Suitable for direct burial
- Easy to install due to the compact design, high flexibility, robust sheath and small bending radii
- UV-resistant longitudinally and laterally watertight
- Zero electromagnetic interference as the cable contains no metal (totally dielectric)
- Suitable for blowing-in technics (low friction outer sheath)

**Application range**
- For outdoor use
- Campus backbone
- WAN applications
- Industrial environments
- Methods of Deployment: empty plastic pipes, ducts and trays
- Suitable for blowing-in technics

**Product features**
- Central loose tube with up to 24 fibres
- Colour-coded fibres
- Longitudinal watertight
- Rodent-protection
- Robust, halogen-free outer sheath

**Product Make-up**
- Glass fibres with primary coating
- Gel-filled loose tube
- Water-blocking reinforced glass yarn strain relief
- PE outer sheath
- Colour: black (RAL 9005)

**Technical data**
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000034
  - ETIM 5.0/6.0 Class-Description: Fibre optic cable
- Dimensions
  - Primary coated fibre: 250µm
  - Cable: see table
- Core identification code
  - Fibre colour code see data sheet
- Fibre type
  - GOF - Glass Optical Fibre
- Standard designation
  - A-DQ(ZN)B2Y
- Optical values
  - see data sheet
- Optical fibre type
  - Core material: glass
  - Cladding material: glass
- Permissible bending radius
  - Static: ≥ 15 x outer diameter
  - Dynamic: ≥ 20 x outer diameter
- Permissible tensile force
  - Fixed installation: 1500 N
  - Short-term: 3000 N
- Temperature range
  - Fixed installation: -40°C to +70°C
  - Fixed installation: -40°C to +70°C

**Article number**
- Article designation
- Fibre type
- Number of fibres
- Outer diameter [mm]
- Weight (kg/km)

- Multimode G 50 OM3
  - 27600304 HITRONIC® HQN1500 4G 50/125 OM3 50/125 OM3 4 7.3 40
  - 27600308 HITRONIC® HQN1500 8G 50/125 OM3 50/125 OM3 8 7.3 40
  - 27600312 HITRONIC® HQN1500 12G 50/125 OM3 50/125 OM3 12 7.3 40
  - 27600324 HITRONIC® HQN1500 24G 50/125 OM3 50/125 OM3 24 8.3 65

- Multimode G 50 OM2
  - 27600204 HITRONIC® HQN1500 4G 50/125 OM2 50/125 OM2 4 7.3 40
  - 27600208 HITRONIC® HQN1500 8G 50/125 OM2 50/125 OM2 8 7.3 40
  - 27600212 HITRONIC® HQN1500 12G 50/125 OM2 50/125 OM2 12 7.3 40
  - 27600224 HITRONIC® HQN1500 24G 50/125 OM2 50/125 OM2 24 8.3 65

- Multimode G 62.5 OM1
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  - 27600108 HITRONIC® HQN1500 8G 62.5/125 OM1 62.5/125 OM1 8 7.3 40
  - 27600112 HITRONIC® HQN1500 12G 62.5/125 OM1 62.5/125 OM1 12 7.3 40
  - 27600124 HITRONIC® HQN1500 24G 62.5/125 OM1 62.5/125 OM1 24 8.3 65

- Single-mode E 9 OS2
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  - 27600908 HITRONIC® HQN1500 6E 9/125 OS2 9/125 OS2 6 7.3 40
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The cables can also be supplied as pre-terminated fibre optic trunks.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Available on request with Multimode OM4 fibres.

**Similar products**
- HITRONIC® HUN Universal Cable refer to page 238
- HITRONIC® HVN Outdoor Cable refer to page 232
- HITRONIC® HQW Armoured Outdoor Cable refer to page 233

**Accessories**
- GOF SIMPLEX Pigtail refer to page 243
- DATA STRIP stripping tool refer to main catalogue 2018/19

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For current information see: www.lappgroup.com
HITRONIC® HVN Outdoor Cable
Outdoor cable with stranded loose tubes and non-metallic strain relief

Benefits
- Suitable for direct burial
- Easy to install due to the compact design, high flexibility, robust sheath and small bending radii
- UV-resistant longitudinally and laterally watertight
- Suitable for blowing-in technique (low friction outer sheath)
- Zero electromagnetic interference as the cable contains no metal (totally dielectric)

Product features
- Stranded loose tubes with up to 144 fibres (12 loose tubes with each 12 fibres)
- Colour-coded fibres and loose tubes
- Longitudinal watertight
- Rodent-protection
- Robust, halogen-free outer sheath

Product Make-up
- Up to 12 stranded gel-filled loose tubes
- Central GRP strength element
- Water-blocking reinforced glass yarn strain relief
- PE outer sheath
- Colour: black (RAL 9005)

Application range
- For outdoor use
- Campus backbone
- WAN applications
- Industrial environments
- Methods of Deployment: empty plastic pipes, ducts and trays

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000034
  ETIM 5.0/6.0 Class-Description: Fibre optic cable
- Dimensions
  Primary coated fibre: 250µm
  Cable: see table
- Core identification code
  Fibre colour code see data sheet
- Fibre type
  GOF - Glass Optical Fibre
- Standard designation
  A-DQ(ZN)B2Y
- Optical values
  see data sheet
- Permissible bending radius
  Static: ≥ 15 x outer diameter
  Dynamic: ≥ 20 x outer diameter
- Temperature range
  Fixed installation: -40°C to +70°C

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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Photographs and graphics are not to scale and do not represent detailed images of the respective products. Other models are available upon request.

Similar products
- HITRONIC® HVN-Mini Cable refer to page 230
- HITRONIC® HVW Armoured Outdoor Cable refer to page 234

Accessories
- GOF SIMPLEX Pigtail refer to page 243
- STAR STRIP stripping tool refer to main catalogue 2018/19
HITRONIC® HQW Armoured Outdoor Cable

Outdoor cable with corrugated steel tape, central loose tube, non-metallic strain relief

**Benefits**
- Armouring provides excellent protection against high mechanical stress and rodents
- Suitable for direct burial
- Easy to install due to the compact design, high flexibility, robust sheath and small bending radii
- UV-resistant
  - Longitudinally and laterally watertight

**Application range**
- For outdoor use
- Campus backbone
- WAN applications
- Industrial environments
- Methods of Deployment: empty plastic pipes, ducts and trays

**Product features**
- Central loose tube with up to 24 fibres
- Colour-coded fibres
- Longitudinal watertight
- Excellent rodent protection
- Robust, halogen-free outer sheath

**Product Make-up**
- Gel-filled loose tube
- Water-blocking reinforced glass yarn strain relief
- Corrugated steel tape armour
- PE outer sheath
- Colour: black (RAL 9005)

**Technical data**

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**Dimensions**
- Primary coated fibre: 250µm
- Cable: see table

**Core identification code**
- Fibre colour code see data sheet

**Fibre type**
- GOF - Glass Optical Fibre

**Standard designation**
- A-DQ(ZN)(SR)2Y

**Optical values**
- see data sheet

**Permissible bending radius**
- Static: ≥ 15 x outer diameter
- Dynamic: ≥ 20 x outer diameter

**Permissible tensile force**
- Fixed installation: 3000 N
- Short-term: 5000 N

**Temperature range**
- Fixed installation: -40°C to +70°C

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<tr>
<th>Article number</th>
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<th>Fibre type</th>
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**Accessories**
- GOF SIMPLEX Pigtail refer to page 243
- STAR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
HITRONIC® HVW Armoured Outdoor Cable

Outdoor cable with corrugated steel tape, stranded loose tubes and non-metallic strain relief

Benefits
- Armouring provides excellent protection against high mechanical stress and rodents
- Suitable for direct burial
- Easy to install due to the compact design, high flexibility, robust sheath and small bending radii
- UV-resistant longitudinally and laterally watertight

Product features
- Stranded loose tubes with up to 144 fibres (12 loose tubes with each 12 fibres)
- Colour-coded fibres and loose tubes
- Longitudinal watertight
- Excellent rodent protection
- Robust, halogen-free outer sheath

Product Make-up
- Up to 12 stranded gel-filled loose tubes
- Water-blocking reinforced glass yarn strain relief
- Corrugated steel tape armour
- PE outer sheath
- Colour: black (RAL 9005)

Application range
- Methods of Deployment: empty plastic pipes, ducts and trays
- For outdoor use
- Campus backbone
- WAN applications
- Industrial environments

Technical data

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<tr>
<th>Article number</th>
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<th>Fibre type</th>
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The cables can also be supplied as pre-terminated fibre optic trunks.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
- GOF SIMPLEX Pigtail refer to page 243
- STAR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
HITRONIC® HQW-Plus Armoured Outdoor Cable

Outdoor cable with corrugated steel tape, central loose tube, non-metallic strain relief and PE inner and outer sheath

Info

- Cable with corrugated steel tape (CST) for increased mechanical stress

Benefits

- Additional sheath protects the fibres for use in harsh environments
- Armouring provides excellent protection against high mechanical stress and rodents
- Suitable for direct burial
- UV-resistant longitudinally and laterally watertight

Application range

- For outdoor use
- Harsh industrial environment
- Campus backbone
- WAN applications
- Methods of Deployment: empty plastic pipes, ducts and trays

Product features

- Central loose tube with up to 24 fibres
- Colour-coded fibres
- Longitudinal watertight
- Excellent rodent protection
- Robust, halogen-free outer sheath

Product Make-up

- Gel-filled loose tube
- Water-blocking reinforced glass yarn strain relief
- Corrugated steel tape armour
- PE inner and outer sheaths
- Colour: black (RAL 9005)

Technical data

Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC000034
ETIM 5.0/6.0 Class-Description: Fibre optic cable

Dimensions

- Primary coated fibre: 250µm
- Cable: see table

Core identification code

Fibre type: GOF - Glass Optical Fibre

Standard designation

A-DQ(ZN)/B2Y(SR)2Y

Optical values

see data sheet

Optical fibre type

Core material: glass
Cladding material: glass

Permissible bending radius

Static: ≥ 15 x outer diameter
Dynamic: ≥ 20 x outer diameter

Permissible tensile force

- Fixed installation: 3000 N
- Short-term: 5000 N

Temperature range

- Fixed installation: -40°C to +70°C

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories

- GOF SIMPLEX Pigtail refer to page 243
- STAR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
HITRONIC® HQA Aerial Cable
Outdoor self-supporting aerial cable with stranded loose tubes and non-metallic strain relief; ADSS cable type

Benefits
- Suitable for mild weather conditions
- Easy to install due to the compact design, high flexibility, robust sheath and small bending radii
- UV-resistant longitudinally and laterally watertight
- Zero electromagnetic interference as the cable contains no metal (totally dielectric)

Application range
- For outdoor use
- Hanging on poles
- Laying on poles
- Installation on building columns

Product features
- Stranded loose tubes with up to 96 fibres
- Colour-coded fibres and loose tubes
- Mechanical support members (central filler and aramid yarns)
- Robust, halogen-free outer sheath
- Span width up to 90m

Product Make-up
- Up to 8 stranded gel-filled loose tubes
- Central GRP strength element
- Aramid yarns as strain relief
- PE outer sheath
- Colour: black (RAL 9005)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000034
  ETIM 5.0/6.0 Class-Description: Fibre optic cable
- Dimensions
  Primary coated fibre: 250µm
  Cable: see table
- Core identification code
  Fibre colour code see data sheet
- Fibre type
  GOF - Glass Optical Fibre
- Standard designation
  A-DQ(ZN)2Y - ADSS
  All-Dielectric Self-Supporting
- Optical values
  see data sheet
- Optical fibre type
  Core material: glass
  Cladding material: glass
- Permissible bending radius
  Static: ≥ 15 x outer diameter
  Dynamic: ≥ 20 x outer diameter
- Permissible tensile force
  MAT: 2000 N
  EDS: 800 N
- Temperature range
  Fixed installation: -40°C to +70°C
  Occasional flexing: -30°C to +70°C

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<th>Article designation</th>
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<th>Number of fibres</th>
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Accessories
- STAR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
HITRONIC® HQA-Plus Aerial Cable

Outdoor self-supporting aerial cable with stranded loose tubes, non-metallic strain relief and PE inner and outer sheath; ADSS cable type

Benefits
- Designed to withstand harsh weather conditions
- Easy to install due to the compact design, high flexibility, robust sheath and small bending radii
- UV-resistant
- Longitudinally and laterally watertight
- Zero electromagnetic interference as the cable contains no metal (totally dielectric)

Application range
- For long span widths
- Hanging on poles
- For outdoor use
- Laying on poles
- Installation on building columns

Product features
- Stranded loose tubes with up to 96 fibres
- Colour-coded fibres and loose tubes
- Mechanical support members (central filler and aramid yarns)
- Robust, halogen-free outer sheath
- Span width up to 250m

Product Make-up
- Up to 8 stranded gel-filled loose tubes
- Central GRP strength element
- Aramid yarns as strain relief
- PE inner and outer sheaths
- Colour: black (RAL 9005)

Technical data
- Classification ETIM 5/6
- ETIM 5.0/6.0 Class-ID: EC000034
- ETIM 5.0/6.0 Class-Description: Fibre optic cable
- Dimensions
  - Primary coated fibre: 250µm
  - Cable: see table
- Core identification code
  - Fibre colour code see data sheet
- Fibre type
  - GOF - Glass Optical Fibre
- Standard designation
  - A-DQ2Y(ZN)2Y ADSS
  - All-Dielectric Self-Supporting
- Optical values
  - see data sheet
- Optical fibre type
  - Core material: glass
  - Cladding material: glass
- Permissible bending radius
  - Static: ≥ 15 x outer diameter
  - Dynamic: ≥ 20 x outer diameter
- Permissible tensile force
  - MAT: 8000 N
  - EDS: 3200 N
- Temperature range
  - Fixed installation: -40°C to +70°C
  - Occasional flexing: -30°C to +70°C

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Accessories
- STAR STRIP stripping tool refer to main catalogue 2018/19

For current information see: www.lappgroup.com
Optical transmission systems
GOF - Glass Optical Fibre • Outdoor and indoor area

UNITRONIC® HUN Universal Cable
Universal cable with corrugated steel tape armour, central loose tube and non-metallic strain relief

Benefits
• Flame retardance makes it suitable for indoor and outdoor installations
• Easy to install due to the compact design, high flexibility, robust sheath and small bending radii
• UV-resistant longitudinally and laterally watertight
• Zero electromagnetic interference as the cable contains no metal (totally dielectric)

Application range
• For indoor and outdoor use
• Campus backbone
• Industrial environments
• Methods of Deployment: empty plastic pipes, ducts and trays

Product features
• Central loose tube with up to 24 fibres
• Colour-coded fibres
• Longitudinal watertight
• Outer sheath flame-retardant and halogen-free
• Rodent-protection

Product Make-up
• Glass fibres with primary coating
• Gel-filled loose tube
• Water-blocking reinforced glass yarn strain relief
• LSZH outer sheath
• Colour: dark grey

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000034
  ETIM 5.0/6.0 Class-Description: Fibre optic cable
- Dimensions
  Primary coated fibre: 250µm
  Cable: see table
- Core identification code
  Fibre colour code see data sheet
- Fibre type
  GOF - Glass Optical Fibre
- Standard designation
  A/J-DQ(ZN)BH
  U-DQ(ZN)BH
- Optical values
  see data sheet
- Optical fibre type
  Core material: glass
  Cladding material: glass
- Permissible bending radius
  Static: ≥ 15 x outer diameter
  Dynamic: ≥ 20 x outer diameter
- Permissible tensile force
  Fixed installation: 1500 N
  Short-term: 2000 N
- Temperature range
  Fixed installation: -30°C to +70°C

Table: Article number, Article designation, Fibre type, Number of fibres, Outer diameter [mm], Weight (kg/km)

Multimode G 50 OM4
- 27400404 HITRONIC® HUN1500 4G 50/125 OM4 50/125 OM4 4 7.3 53
- 27400408 HITRONIC® HUN1500 8G 50/125 OM4 50/125 OM4 8 7.3 53
- 27400412 HITRONIC® HUN1500 12G 50/125 OM4 50/125 OM4 12 7.3 53
- 27400424 HITRONIC® HUN1500 24G 50/125 OM4 50/125 OM4 24 8.3 60

Multimode G 50 OM3
- 27400304 HITRONIC® HUN1500 4G 50/125 OM3 50/125 OM3 4 7.3 53
- 27400308 HITRONIC® HUN1500 8G 50/125 OM3 50/125 OM3 8 7.3 53
- 27400312 HITRONIC® HUN1500 12G 50/125 OM3 50/125 OM3 12 7.3 53
- 27400324 HITRONIC® HUN1500 24G 50/125 OM3 50/125 OM3 24 8.3 60

Multimode G 62.5 OM1
- 27400104 HITRONIC® HUN1500 4G 62.5/125 OM1 62.5/125 OM1 4 7.3 53
- 27400108 HITRONIC® HUN1500 8G 62.5/125 OM1 62.5/125 OM1 8 7.3 53
- 27400112 HITRONIC® HUN1500 12G 62.5/125 OM1 62.5/125 OM1 12 7.3 53
- 27400124 HITRONIC® HUN1500 24G 62.5/125 OM1 62.5/125 OM1 24 8.3 60

Single-mode E 9 OS2
- 27400904 HITRONIC® HUN1500 4E 9/125 OS2 9/125 OS2 4 7.3 53
- 27400908 HITRONIC® HUN1500 8E 9/125 OS2 9/125 OS2 8 7.3 53
- 27400912 HITRONIC® HUN1500 12E 9/125 OS2 9/125 OS2 12 7.3 53
- 27400924 HITRONIC® HUN1500 24E 9/125 OS2 9/125 OS2 24 8.3 60

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

The cables can also be supplied as pre-terminated fibre optic trunks. Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Accessories
• GOF DUPLEX Patchcord refer to page 242
• GOF SIMPLEX Pigtail refer to page 243
• DATA STRIP stripping tool refer to main catalogue 2018/19
**HITRONIC® HUW Armoured Universal Cable**

Universal cable with central loose tube, corrugated steel tape and non-metallic strain relief for applications with extended mechanical stress.

**Benefits**
- Armouring provides excellent protection against high mechanical stress and rodents.
- Flame retardance makes it suitable for indoor and outdoor installations.
- Easy to install due to the compact design, high flexibility, robust sheath and small bending radii.
- Water-resistant.

**Application range**
- For indoor and outdoor use.
- Campus backbone.
- Industrial environments.
- Methods of Deployment: empty plastic pipes, ducts and trays.

**Product features**
- Outer sheath flame-retardant and halogen-free.
- Central loose tube with up to 24 fibres.
- Colour-coded fibres.
- Longitudinal water tight.
- Excellent rodent protection.

**Product Make-up**
- Gel-filled loose tube.
- Water-blocking reinforced glass yarn strain relief.
- Corrugated steel tape armour.
- LSZH outer sheath.
- Colour: green (based on RAL 6018).

**Technical data**
- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC000034
  - ETIM 5.0/6.0 Class-Description: Fibre optic cable.
- **Dimensions**
  - Primary coated fibre: 250µm
  - Cable: see table.
- **Core identification code**
  - Fibre colour code see data sheet.
- **Fibre type**
  - GOF - Glass Optical Fibre.
- **Standard designation**
  - A/J-DQ(ZN)(SR)H
  - U-DQ(ZN)(SR)H.
- **Optical values**
  - see data sheet.
- **Optical fibre type**
  - Core material: glass.
  - Cladding material: glass.
- **Permissible bending radius**
  - Static: ≥ 15 x outer diameter.
  - Dynamic: ≥ 20 x outer diameter.
- **Permissible tensile force**
  - Fixed installation: 1500 N.
  - Short-term: 2000 N.
- **Temperature range**
  - Fixed installation: -30°C to +70°C.

**Accessories**
- GOF SIMPLEX Pigtail refer to page 243.
- STAR STRIP stripping tool refer to main catalogue 2018/19.

**Article number**
- **Multimode G 50 OM3**
  - 27500304 HITRONIC® HUW1500 4G 50/125 OM3 50/125 OM3 4 9.6 88.
  - 27500308 HITRONIC® HUW1500 8G 50/125 OM3 50/125 OM3 8 9.6 88.
  - 27500324 HITRONIC® HUW1500 24G 50/125 OM3 50/125 OM3 24 9.6 88.
- **Multimode G 50 OM2**
  - 27500304 HITRONIC® HUW1500 4G 50/125 OM2 50/125 OM2 4 9.6 88.
  - 27500308 HITRONIC® HUW1500 8G 50/125 OM2 50/125 OM2 8 9.6 88.
  - 27500324 HITRONIC® HUW1500 24G 50/125 OM2 50/125 OM2 24 9.6 88.
- **Multimode G 62.5 OM1**
  - 27500104 HITRONIC® HUW1500 4G 62.5/125 OM1 62.5/125 OM1 4 9.6 88.
  - 27500108 HITRONIC® HUW1500 8G 62.5/125 OM1 62.5/125 OM1 8 9.6 88.
  - 27500112 HITRONIC® HUW1500 12G 62.5/125 OM1 62.5/125 OM1 12 9.6 88.
  - 27500124 HITRONIC® HUW1500 24G 62.5/125 OM1 62.5/125 OM1 24 9.6 88.
- **Single-mode E 9 OS2**
  - 27500908 HITRONIC® HUW1500 8E 9/125 OS2 9/125 OS2 8 9.6 88.

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. The cables can also be supplied as pre-terminated fibre optic trunks. Photographs and graphics are not to scale and do not represent detailed images of the respective products. Available on request with Multimode OM fibres.

For current information see: www.lappgroup.com.
HITRONIC® HRH Breakout Cable
Divisible breakout cable for direct connector assembly; J-V(ZN)HH

Benefits
• Suitable for field assembly
• Universal cable for cabling of buildings
• Very easy to install due to compact design, high flexibility, and small bending radii
• Zero electromagnetic interference as the cable contains no metal (totally dielectric)

Application range
• For indoor use
• Tertiary cabling
• Structured cabling - backbone
• Methods of Deployment: laying in trunking, ducts, trays, empty plastic pipes, building riser, raised floors and plenums

Product features
• Installation cable with up to 12 Simplex cables
• Outer sheath flame-retardant and halogen-free
• Mechanically robust

Product Make-up
• 2.1 mm tight-buffered sub-cable with LSZH sheath (identified by numbers)
• Central GRP strength element
• Aramid yarns as strain relief
• LSZH inner and outer sheaths
• Colour: aqua (RAL 6027) for OM3, orange (RAL 2003) for OM2 and OM1, yellow for Single-mode

Technical data

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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

The cables can also be supplied as pre-terminated fibre optic trunks.
Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Available on request with multi-mode OM4 fibres (outer sheath colour violet).

Accessories
• GOF DUPLEX Patchcord refer to page 242
• GOF Connector refer to page 244

• DATA STRIP stripping tool refer to main catalogue 2018/19
• Ty-Grip® FOL / FO Cable tie refer to main catalogue 2018/19

For current information see: www.lappgroup.com
HITRONIC® HDH Mini-Breakout Cable

Divisible indoor cable (distribution-style) with LSZH outer sheath, halogen-free; J-V(ZN)HH

**Benefits**
- Very easy to install due to small dimensions, high flexibility, and small bending radius
- Suitable for field assembly
- Universal cable for cabling of buildings
- Zero electromagnetic interference as the cable contains no metal (totally dielectric)

**Application range**
- For indoor use
- Tertiary cabling
- Structured cabling - backbone
- Methods of Deployment: laying in trunking, ducts, trays, empty plastic pipes, building riser, raised floors and plenums

**Product features**
- Up to 12 tight-buffered fibres (900µm)
- Colour-coded fibres
- Outer sheath flame-retardant and halogen-free
- Mechanically robust

**Product Make-up**
- Tight-buffered fibres
- Water-blocking reinforced glass yarn strain relief
- LSZH outer sheath
- Colour: aqua (RAL 6027) for OM3, orange (RAL 2003) for OM2 and OM1
- Available on request: single-mode OS2 (yellow) and multimode OM4 (violet)

**Technical data**
- Classification ETIM 5/6
  - ETIM 5.0/6.0 Class-ID: EC000034
  - ETIM 5.0/6.0 Class-Description: Fibre optic cable
- Dimensions
  - tight-buffer (secondary coated fibre): 900µm
    - Cable: see table
- Core identification code
  - Buffered-fibre colour code see data sheet
- Fibre type
  - GOF - Glass Optical Fibre
- Standard designation
  - J-V(2N)H
- Optical values
  - see data sheet
- Optical fibre type
  - Core material: glass
  - Cladding material: glass
- Permissible bending radius
  - Static: ≥ 15 x outer diameter
  - Dynamic: ≥ 20 x outer diameter
- Temperature range
  - Fixed installation: -20°C to +70°C

**Article number | Article designation | Fibre type | Number of fibres | Outer diameter [mm] | Weight (kg/km) | Multi mode G 50 OM3

26010302 | HITRONIC® HDH 2G 50/125 OM3 | 50/125 OM3 | 2 | 6 | 34 |
26010304 | HITRONIC® HDH 4G 50/125 OM3 | 50/125 OM3 | 4 | 6.3 | 37 |
26010308 | HITRONIC® HDH 8G 50/125 OM3 | 50/125 OM3 | 8 | 7.5 | 57 |
26010312 | HITRONIC® HDH 12G 50/125 OM3 | 50/125 OM3 | 12 | 8.3 | 69 |

**Multi mode G 50 OM2**

26010202 | HITRONIC® HDH 2G 50/125 OM2 | 50/125 OM2 | 2 | 6 | 34 |
26010204 | HITRONIC® HDH 4G 50/125 OM2 | 50/125 OM2 | 4 | 6.3 | 37 |
26010208 | HITRONIC® HDH 8G 50/125 OM2 | 50/125 OM2 | 8 | 7.5 | 57 |
26010212 | HITRONIC® HDH 12G 50/125 OM2 | 50/125 OM2 | 12 | 8.3 | 69 |

**Multi mode G 62.5 OM1**

26010102 | HITRONIC® HDH 2G 62.5/125 OM1 | 62.5/125 OM1 | 2 | 6 | 34 |
26010104 | HITRONIC® HDH 4G 62.5/125 OM1 | 62.5/125 OM1 | 4 | 6.3 | 37 |
26010108 | HITRONIC® HDH 8G 62.5/125 OM1 | 62.5/125 OM1 | 8 | 7.5 | 57 |
26010112 | HITRONIC® HDH 12G 62.5/125 OM1 | 62.5/125 OM1 | 12 | 8.3 | 69 |

**Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.**

**Photographs and graphics are not to scale and do not represent detailed images of the respective products. Available on request with Multimode OM4 fibres.**

**Accessories**
- DATA STRIP stripping tool refer to main catalogue 2018/19
- Ty-Grip® FOL / FO Cable tie refer to main catalogue 2018/19

For current information see: www.lappgroup.com
GOF DUPLEX Patchcord

Optical patch cords with various types of connectors available in single-mode or multi-mode fibre version

Benefits
- To connect optical transmitter, receiver and terminal box
- „Plug & Play“ connection between optical devices
- Non-permanent connections allow for easy change of equipment
- For direct connection between two active optical components

Product Make-up
- Tight-buffered duplex cable with LSZH outer sheath
- Connector: LC, SC or ST
- Cable colour: violet for multimode OM4, aqua for multimode OM3, orange for multimode OM2 and OM1, yellow for single-mode OS2
- Standard length: 2 m
- On request: 1 m, 3 m, 5 m and 10 m

Product features
- Outer sheath flame-retardant and halogen-free
- High flexibility
- Cable termination with durable ceramic ferrules
- Pre-assembled connectors:
  - Low insertion loss
  - High return loss

Norm references / Approvals
- LC comply with IEC standard 61754-20
- SC comply with IEC standard 61754-4
- ST comply with IEC standard 61754-2
- FC complies with IEC61754-13

Technical data
- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC001263
  - ETIM 5.0/6.0 Class-Description: Fibre optic patch cord
- **Dimensions**
  - Primary coated fibre: 250µm tight-buffer (secondary coated fibre): 900µm
  - sub-cable: 1.9mm
- **Fibre type**
  - GOF - Glass Optical Fibre
- **Standard designation**
  - J-VH 2x1G/E...
- **Optical fibre type**
  - Core material: glass
  - Cladding material: glass
- **Permissible bending radius**
  - Static: ≥ 30 mm
  - Dynamic: ≥ 40 mm
- **Permissible tensile force**
  - Fixed installation: 100 N
- **Temperature range**
  - Fixed installation: -20°C to +60°C
  - Occasional flexing: -5°C to +50°C

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Other lengths and types of connectors are available upon request. / Photographs and graphics are not to scale and do not represent detailed images of the respective products.
**GOF SIMPLEX Pigtail**

12x assorted colour coded pigtails with various types of connectors (LC, ST, LC) with Singlemode OS2 and Multimode OM1, OM2, OM3, OM4 fibres

- Pre-assembled simplex tight-buffered optical fibre with a durable ceramic ferrule connector

**Info**
- Ease of installation and assembly
- Create a direct plug connection for installation cables with splicing
- Zero electromagnetic interference as the cable contains no metal (totally dielectric)

**Application range**
- For indoor use
- Connection to an end optical device

**Product features**
- High flexibility
- Cable termination with durable ceramic ferrules
- Set consisting of 12 colour-coded pigtails (red, green, blue, yellow, white, gray, brown, violet, turquoise, black, orange, pink)

**Norm references / Approvals**
- LC comply with IEC standard 61754-20
- SC comply with IEC standard 61754-4
- ST comply with IEC standard 61754-2

**Product Make-up**
- Tight buffered simplex fibres
- Connector: LC, SC or ST
- Colour-coded primary and secondary coatings
- Standard length: 2 m

**Technical data**

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**Dimensions**
- Primary coated fibre: 250µm
- Secondary coated fibre: 900µm
- Fibre type: GOF - Glass Optical Fibre

**Standard designation**
- J-VH 1G/E...

**Fibre type**
- Core material: glass
- Cladding material: glass

**Permissible tensile force**
- Fixed installation: 100 N
- Occasional flexing: -5°C to +50°C

**Temperature range**
- Fixed installation: -20°C to +60°C
- Occasional flexing: -5°C to +50°C

**Article number** | **Article designation** | **Pieces / PU**
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29320402 | GOF Simplex Pigtail ST G50 OM4, 2m | 12
29330402 | GOF Simplex Pigtail LC G50 OM4, 2m | 12
Multimode G 50 OM3 29310302 | GOF Simplex Pigtail SC G50 OM3, 2m | 12
29320302 | GOF Simplex Pigtail ST G50 OM3, 2m | 12
29330302 | GOF Simplex Pigtail LC G50 OM3, 2m | 12
Multimode G 50 OM2 29310202 | GOF Simplex Pigtail SC G50 OM2, 2m | 12
29320202 | GOF Simplex Pigtail ST G50 OM2, 2m | 12
29330202 | GOF Simplex Pigtail LC G50 OM2, 2m | 12
Multimode G 62.5 OM1 29310102 | GOF Simplex Pigtail SC G62.5, 2m | 12
29320102 | GOF Simplex Pigtail ST G62.5, 2m | 12
29330102 | GOF Simplex Pigtail LC G62.5, 2m | 12
Single-mode E 9 OS2 29310902 | GOF Simplex Pigtail SC E9 OS2, 2m | 12
29320902 | GOF Simplex Pigtail ST E9 OS2, 2m | 12
29330902 | GOF Simplex Pigtail LC E9 OS2, 2m | 12

Other types of connectors (e.g. LC, MTRJ, E2000) are available upon request. Judy Lim: This will not apply to Hitronic anymore, as LC will become a standard product and MTRJ/E2000 will be removed.

Photographs and graphics are not to scale and do not represent detailed images of the respective products.
Optical transmission systems

GOF - Fiber optic accessories • Connectors and adapters

GOF Connector
Accessories for glass optical fibre cable, connector types LC, SC, ST and FC

Benefits
• Ideal for assembling
• For assembly process: cable preparation/glueing/crimping/polishing
• Assembly instructions can be found in the GOF assembly toolbox (not included in Lapp product range)
• Trained optical installers should be used in all connector assembly

Application range
• For connector assemblies in production or laboratory environment

Product features
• Connector sets include all needed parts for assembly

Norm references / Approvals
• LC comply with IEC standard 61754-20
• SC comply with IEC standard 61754-4
• ST comply with IEC standard 61754-2

Product Make-up
• Ferrule diameter:
  - LC: 1.25mm (zirconia)
  - SC, ST: 2.5mm (zirconia)
• Can be assembled with cables of 1.7mm-2.1mm diameter
• LC and SC connector sets available in green (single-mode APC), blue (single-mode PC) and grey (multimode)

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC001122
  ETIM 5.0/6.0 Class-Description: Fibre optic connector
- Permissible tensile force
  Tensile load 70N
  Tensile strength after assembly > 100N
- Temperature range
  Operating
  - LC: -40°C to 75°C
  - SC: -40°C to 75°C
  - ST: -40°C to 85°C
  Humidity 95%
  Flammability UL 94 V-0

<table>
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<tr>
<th>Article number</th>
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<th>Pieces / PU</th>
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<td>GOF Connector SC Single-mode Blue /4PC</td>
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GOF - Fiber optic accessories • Connectors and adapters

Optical transmission systems

Product features
- The couplings connect the glass fibre connectors with the same or different connector types.

Norm references / Approvals
- LC comply with IEC standard 61754-20
- SC comply with IEC standard 61754-4
- ST comply with IEC standard 61754-2
- Comply with IEC, EIA/TIA standards

GOF Adapters
Accessories for glass optical fibre cable, adapters for connector types LC, SC and ST

Product Make-up
- Zirconia sleeves
- LC and SC adapters available in green (single-mode APC), blue (single-mode PC) and grey (multimode)

Product features
- The couplings connect the glass fibre connectors with the same or different connector types.

Technical data
- Classification ETIM 5/6
  ETIM 5.0/6.0 Class-ID: EC000752
  ETIM 5.0/6.0 Class-Description: Fibre optic coupler

  Attenuation
  Attenuation (dB) < 0.2
  Repeatability
  1000 cycles (dB) < 0.2

  Temperature range
  Operating
  LC: -25°C to 70°C
  SC: -40°C to 75°C
  ST: -40°C to 85°C
  Humidity 95%

  Flammability UL 94 V-0

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For current information see: www.lappgroup.com
**Optical transmission systems**

**GOF - Fiber optic accessories • Housing and distribution boxes**

# 19“ Splice Box for ST

### Product features
- For up to 12 or 24 fibres
- Can be pulled out
- Unpopulated
- For a maximum of 4 splicing cartridges
- Height: 1 RU
- Dimensions (WxHxD):
  - 483 x 44.5 x 244 mm
- Material: steel plate, 1.5 mm
- Colour: light grey (RAL 7035)

### Technical data

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<td>ETIM 5.0/6.0 Class-Description: Patch panel fibre optic</td>
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<tr>
<td>19“ Splice Box for 24 ST</td>
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</table>

Splice boxes for more fibres with other types of connectors are available upon request. Also available in pre-assembled versions with couplings and pigtails. Photographs and graphics are not to scale and do not represent detailed images of the respective products.

### Accessories

- GOF DUPLEX Patchcord refer to page 242
- GOF Adapters refer to page 245
- GOF SIMPLEX Pigtail refer to page 243
- Accessories for splice boxes and wall-mounted rack refer to page 248

# 19“ Splice Box for SC

### Product features
- For up to 24 fibres
- Included: front panel with 12 SC-duplex holes
- Can be pulled out
- Unpopulated
- Height: 1 RU
- Material: steel plate, 1.5 mm
- Colour: light grey (RAL 7035)

### Technical data

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Splice boxes for more fibres with other types of connectors are available upon request. Also available in pre-assembled versions with couplings and pigtails. Photographs and graphics are not to scale and do not represent detailed images of the respective products.

### Accessories

- GOF DUPLEX Patchcord refer to page 242
- GOF Adapters refer to page 245
- GOF SIMPLEX Pigtail refer to page 243
- Accessories for splice boxes and wall-mounted rack refer to page 248
Splice Box Compact

**Product features**
- Panel mounting
- Lockable
- Max. capacity of 8 splicing cartridges or 4 splicing cartridges and one distribution plate
- Includes distributor plate for 8 ST couplings
- Includes distributor plate for 4 SC duplex couplings
- Dimensions (WxHxD): 265 x 150 x 55 mm
- Colour: light grey (RAL 7035)

**Technical data**

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**Article number** | **Article designation** | **Pieces / PU**
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CE9147 | Splice Box Compact | 1

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**Accessories**
- GOF DUPLEX Patchcord refer to page 242
- GOF Adapters refer to page 245
- GOF SIMPLEX Pigtail refer to page 243
- Accessories for splice boxes and wall-mounted rack refer to page 248

Mini wall-mounted rack

**Product features**
- Panel mounting
- Lockable
- Max. capacity of 8 splicing cartridges or 4 splicing cartridges and one distribution plate
- Accessories for Mini wall-mounted rack:
  - Distributor plate for 24 ST couplings
  - Distributor plate for 24 SC Simplex couplings
  - Distributor plate for 12 SC Duplex couplings
- Dimensions (W x H x D): 320 x 280 x 54 mm
- Colour: light grey (RAL 7035)

**Technical data**

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**Article number** | **Article designation** | **Pieces / PU**
--- | --- | ---
CE9150 | Mini wall-mounted rack | 1

**Accessories for Mini wall-mounted rack**
- Distributor plate for 24 x ST-Couplers
- Distributor plate for 24 x SC-simplex-Couplers
- Distributor plate for 12 x SC-duplex-Couplers

**Article number** | **Article designation** | **Pieces / PU**
--- | --- | ---
CE9151 | Distribution plate for 24 x ST-Couplers | 1
CE9152 | Distribution plate for 24 x SC-simplex-Couplers | 1
CE9153 | Distribution plate for 12 x SC-duplex-Couplers | 1

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

**Accessories**
- GOF DUPLEX Patchcord refer to page 242
- GOF Adapters refer to page 245
- GOF SIMPLEX Pigtail refer to page 243
- Accessories for splice boxes and wall-mounted rack refer to page 248

For current information see: www.lappgroup.com
Optical transmission systems

GOF - Fiber optic accessories • Housing and distribution boxes

Accessories for splice boxes and wall-mounted rack

**Product features**

- Splicing cassette for up to 2 splicing protection holders
- Cover for splicing cartridge
- 12-fold splicing protection holder
- Splicing protection sleeve for ANT splicing device
- Blind cap instead of E2000 coupling
- Blind cap instead of ST coupling
- Dummy cap instead of SC duplex coupling

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**Accessories**

- GOF DUPLEX Patchcord refer to page 242
- GOF Adapters refer to page 245
- GOF SIMPLEX Pigtail refer to page 243
- Ty-Grip® FOL / FO Cable tie refer to main catalogue 2018/19

**Technical data**

- **Classification ETIM 5/6**
  - ETIM 5.0/6.0 Class-ID: EC00123
  - ETIM 5.0/6.0 Class-Description: Splice protection
The following applies for the use of our products

The conformity of our products to the relevant European directives and compliance with the provisions contained therein shall be indicated by the CE marking.

The safety of our products is closely associated with how they are used. A knowledge of and adherence to the respective international/national standards of use (e.g. DIN VDE 0100, 0298) are mandatory. There are particular risks if installed improperly. This applies to all our products/items.

Processing is only to be done by an authorised electrician! Otherwise, there is the risk of an electric shock or a fire ignited by electric current!

Without exception, our products are tested for application safety in accordance with defined standards and our own regulations, which complement the standards. Relevant legal requirements and safety regulations are also observed. Provided due care and attention is paid, the possibility of product-specific danger to the user may thus reasonably be excluded. Where products are used carelessly or incorrectly, however, considerable danger to persons and the environment may arise. For this reason, our cables must only be processed and/or used responsibly by trained electricians or specialists. This catalogue contains general information for the application of each product. Independent of such information, the application standards DIN VDE 0298 and DIN VDE 0691 for cables will apply. Excerpts from these standards, as well as complementary selection and application tables, design and installation guidelines, are contained in the tables in the appendix to the current main catalogue. Our machines and installation tools are – where necessary – designed in accordance with the machine guidelines and display the CE identification mark. It must be noted, however, that our machines and installation tools must only be used by trained specialist personnel and for the purpose for which they were designed.

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