# Structured Cabling Solutions

**HUBER+SUHNER**

Excellence in Connectivity Solutions

# Building next generation data centers

HUBER+SUHNER

Excellence in Connectivity Solutions

Connecting The World

# Connecting a Wide Range of Market Segments

HUBER+SUHNER provides high performance and innovative products and services for the rapidly evolving structured cabling solutions (SCS) market. We leverage over 25 years of experience in creating tailored connectivity solutions which deliver business-critical services safely and reliably. Our solutions are relevant regardless of the environment or application, and whenever there is a demand for quality, you can rely on us.

Colocation companies around the world rely on our high density fiber management systems to connect incoming carriers to their valued customers. Our excellent cost per port and structured cabling density make us the number one choice for regional and global colocation companies.

## Colocation

Our high performance cable systems provide financial companies with the reliability they depend on to maintain their business-critical connections. Our exceptional cable management supporting high density SAN switches reduces cable clutter and virtually eliminates network latency .

## Finance

Flexibility is key in the broadcast market and at HUBER+SUHNER, we pride ourselves in delivering customizable solutions that fit the specific needs of our customers. We are working with many of the world's largest broadcast companies who require the perfect combination of density, flexibility and speed.

## Broadcast

HUBER+SUHNER has been supplying the telecom market since our inception. Our technologies are used in all areas of the network and we are the ideal supplier for companies moving towards a converged all IP infrastructure. We support the requirements from the legacy network and we understand the challenging needs of the future.

## Telecom

The government sector requires reliability and traceability in every aspect of their business. Our products are designed in such a way as to negate installation errors and avoid costly or embarrassing issues during the lifetime of the network.

## Government

Our combination of high-end copper and fiber optics solutions match perfectly to the demanding needs of hotels and casinos where signal availability is everything. Users can enjoy seamless signal quality from the moment they enter the property.

## Hospitality

# Global Presence, Local Support
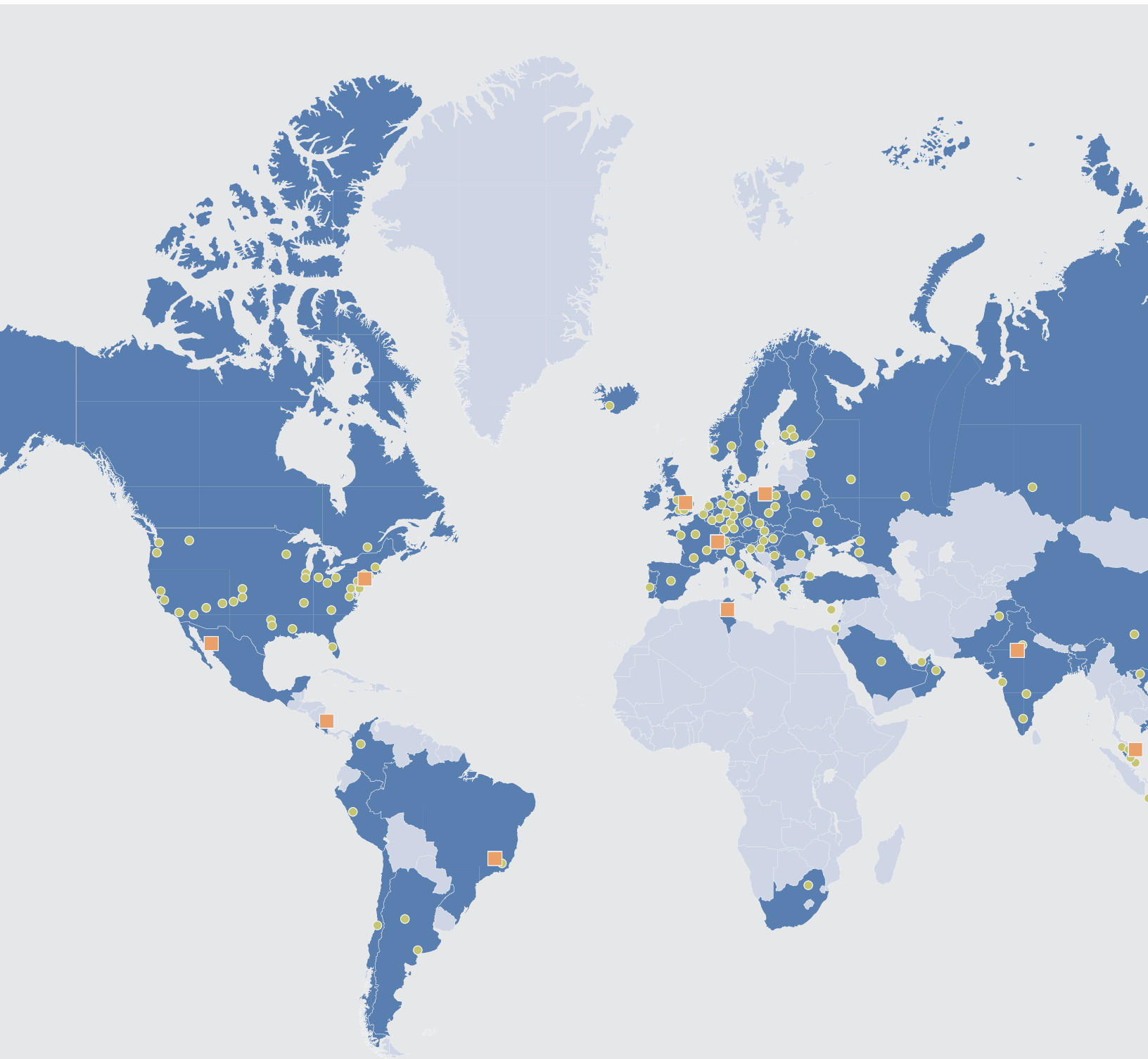
## Swiss precision delivered worldwide

HUBER+SUHNER is a Swiss company which prides itself in honesty, fairness and social responsibility. Furthermore, HUBER+SUHNER embodies the values traditionally associated with Swiss engineering excellence – those of quality, precision, reliability and high-performance. Even though the needs of a global market cannot be fulfilled from a single location, those values best associated with Switzerland are embedded globally.

## Worldwide manufacturing and assembly

HUBER+SUHNER operates manufacturing plants around the world which guarantees that regionalized requirements are met. On top of that, HUBER+SUHNER cooperates extensively with numerous third-party fiber optic assembly shops to extend the capacity and coverage of the HUBER+SUHNER brand. All of our assembly shops follow the same stringent processes and quality controls as our own group companies.

## Worldwide distribution and support

Customers can rely on HUBER+SUHNER's worldwide sales and support network. Market proximity is the advantage of our global presence with 14 subsidiaries and representatives in over 60 countries. Our customers benefit from our strength to deliver local solutions and services tailored to their requirements and our global presence guaranteed best in class support in all regions.

# Structured Cabling Solutions for Next Generation Data Centers

## IANOS high-density fiber management system

Modular and scalable fiber management system to facilitate 10G, 40G and 100G data rates.

› page 72

## LISA high density centralized cross-connects
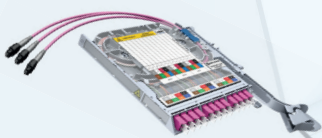
Front accessible fiber management system allowing highest density and fast moves, adds and changes.

› page 10

## Copper Solutions

High performance pre-terminated copper cabling system and components.

› page 146

## Fiber Pathways
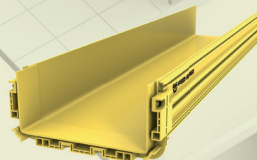
Modular containment system for optimized installation, routing and protection of fiber optic cables.

› page 138
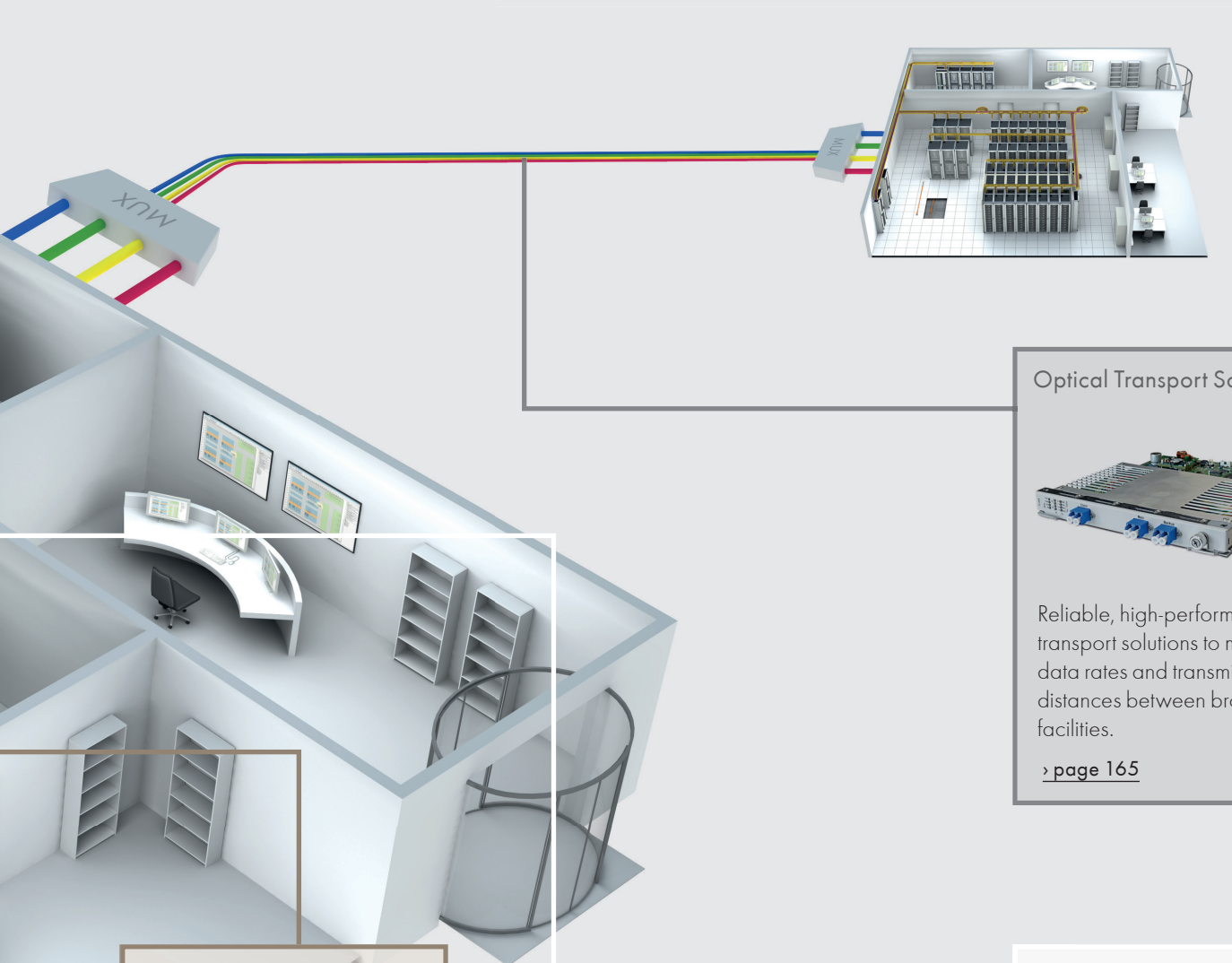
## Optical Transport Solutions
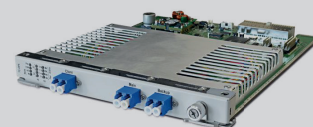
Reliable, high-performance transport solutions to maximize data rates and transmission distances between broadcast facilities.
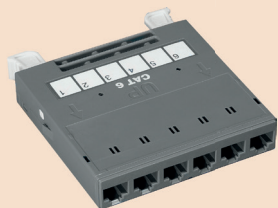
## Customized Cable Assemblies
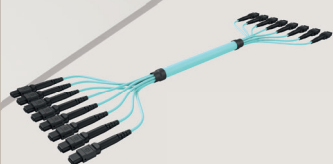
Compact and user-friendly cable systems which maximize link performance and transmission distances.

## Polatis Optical Switches

Industry's highest performance, line of all-optical switches and modules with rich software functionality for simple network integration.

# Fiber Optic Solutions
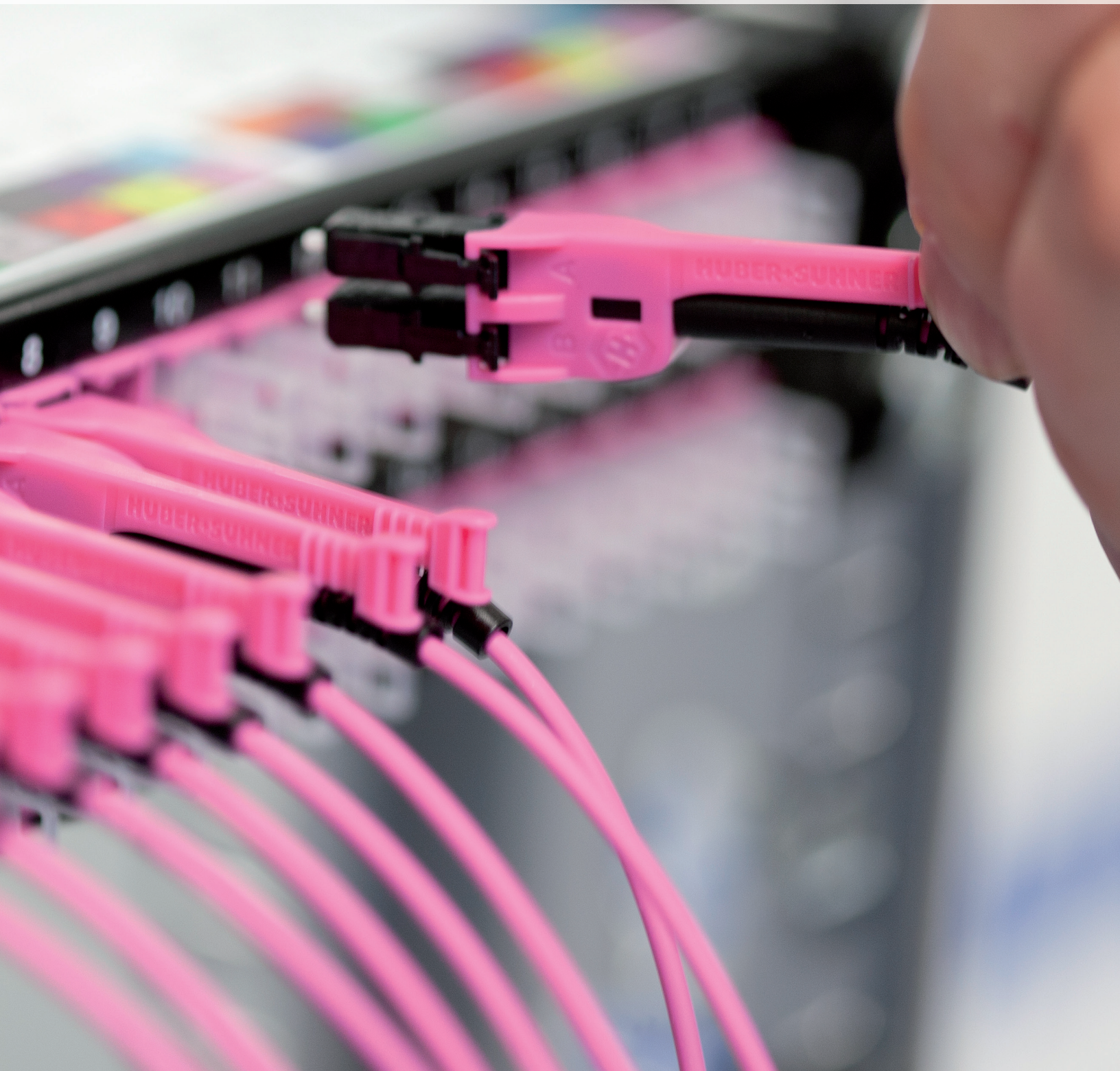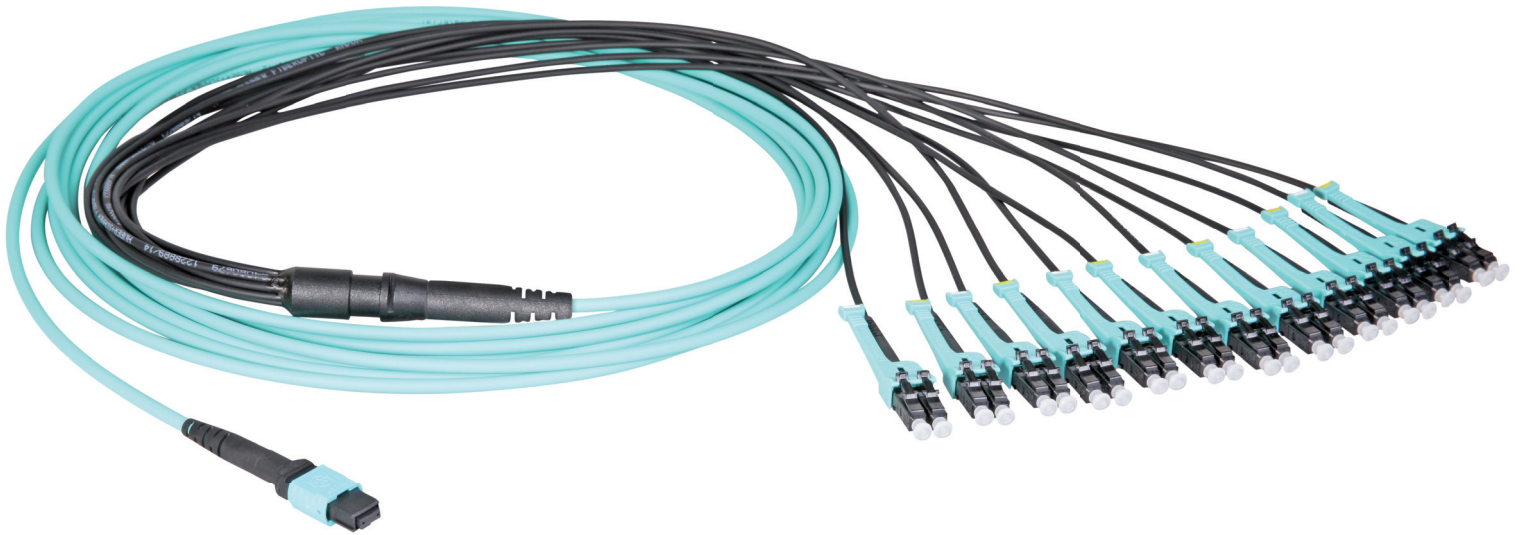
# Fiber Optic Solutions

HUBER+SUHNER designs and manufactures industry leading cost effective fiber solutions supporting today's most advanced networks. Our solutions include all the fiber components needed to design and build a state of the art network. From field terminated connectors and modular cassettes to fiber pathways and factory terminated custom assemblies, this wide range of interchangeable solutions makes HUBER+SUHNER the best partner to help design your network.

Each network component is designed to meet or exceed all relevant standards. We have a full range of singlemode as well as multimode (OM3/OM4) solutions ready to help take your network into the future. Contact your local HUBER+SUHNER representative for more details on the products and solutions featured in this catalog.

# LISA Cable Distribution Rack (CDR)

## Highest density for evolving structured cabling solution markets

The LISA CDR (Leading Interconnect System Approach Cable Distribution Rack) is a high density fiber manage-ment rack which serves as a central cross-connect for network services. With a footprint depth of only 12 in, the LISA CDR is fully modular and scalable up to 1,620 ports (3,240 fibers) using LC connectivity and 1,080 ports (25,920 fibers) using MTP24 connectivity. Users can benefit from the C-shaped construction where all internal sub-elements are completely installable and accessible from the front. This important feature means that LISA CDRs can be placed back-to-back on a single floor tile or alternatively against a wall for minimal space consumption.

## Configured to suit your needs

The LISA CDRs is 47U high, 12 in deep and comes in two standard width dimensions of 36 in and 48 in. The 36 in version is designed for splicing and MTP-LC transition trays and the 48 in version is intended for patching trays, whether it is LC or MTP cable system.

# Key Features LISA CDR

## C-shape design for easy patching and improved access

The rigid C-shape design of the LISA CDR dramatically improves the access to connectivity when making moves, adds and changes. LISA CDR racks can be positioned side-by-side, and cables can be routed from one rack to the other without the need to feed patch cords behind vertical posts.
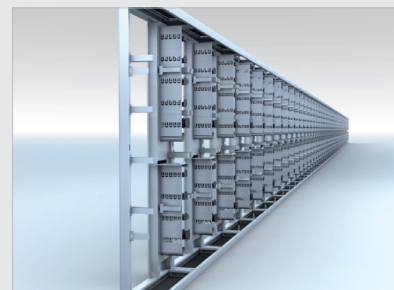
## Integrated slack management of patch cords

Managing thousands of fibers in a single rack is virtually impossible without dedicated patch cord management. The LISA CDR rack is supplied with this feature, fully integrated from the start so that installers can safely route and manage patch cord slack every time they make a patch. Furthermore, the integrated management reduces the quantity of different length patch cords required to make connections. Only two different length cords are required to connect any of the ports within the same rack.
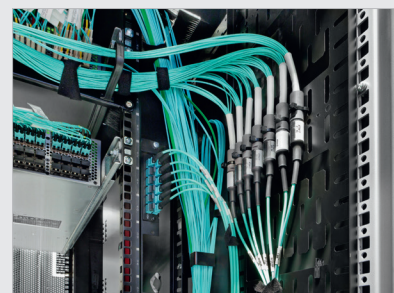
## Clear identification and traceability

The second you walk up to a LISA rack you know that a great deal of time and investment has been spent on making this system visible. Fiber trays inside the rack are colored for immediate identification and clear labeling on the front of the fiber tray allows users to locate connections in seconds. These features help to reduce installation and maintenance as well as have a significant impact on the operational costs of the network.
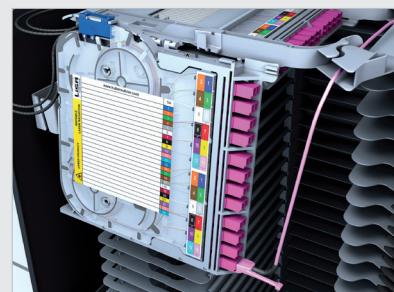
# LISA CDR Cable Distribution Rack

## Characteristics
• Enhanced visual appearance
• C-shape for front and side access
• Highly stable and rigid construction
• Door locking repeatability
• Lightweight
• Luxurious look and feel
• Easy fitment and removal of doors and side panels
• Better utilized internal space
• Industry leading density

## Technical data

| Attribute | | Value |
|---|---|---|
| Dimensions (W × L × H) | | 35.4 × 11.8 × 86.6 in / 47 U |
| Capacity | | 1,620 ports, 3,240 fibers using LC connectivity<br>1,080 ports, 25,920 fibers using MTP |
| Material | frame | aluminium extrusions, anodized colorless |
| | cover | metal sheet powder coated |
| Color | | black all cover metal sheets,<br>silver aluminium extrusions, internal metal parts |
| Ingress protection degree (EN60529) | | IP30 |
| Temperature resistance (short-term) | Celsius | −46 to +120 °C |
| | Fahrenheit | −50 to +250 °F |
| Temperature resistance (long-term) | Celsius | −46 to +81 °C |
| | Fahrenheit | −50 to +178 °F |
| Flammability rating | | UL 94V 0 |
| UV resistance | | resistant |
| Free of halogen | | yes |
| Chemical resistance | | good |
| RoHS requirements | | fully compliant |

# LISA CDR Side Access Base Racks

Suitable for splicing and MTP-LC transition

## Ordering information

| Description | Item no. |
|---|---|
| LISA CDR 36 rack black | |
| LISA CDR 36 in, with integrated patch cord management, perforated 24 in and 12 in wide doors, 47U, black | 85029082 |

| Description | Item no. |
|---|---|
| LISA CDR 36 rack gray | |
| LISA CDR 36 in, with integrated patch cord management, perforated 24 in and 12 in wide doors, 47U, gray | 85029085 |

Suitable for MTP-MTP and LC-LC patching

## Ordering information

| Description | Item no. |
|---|---|
| LISA CDR 48 rack black | |
| LISA CDR 36 in, with integrated patch cord management, perforated 24 in and 12 in wide doors, 47U, black | 85029082 |
| LISA CDR 12 in, with integrated patch cord management, perforated 12 in wide door, 47U, black | 85029083 |

| Description | Item no. |
|---|---|
| LISA CDR 48 rack gray | |
| LISA CDR 36 in, with integrated patch cord management, perforated 24 in and 12 in wide doors, 47U, gray | 85029085 |
| LISA CDR 12 in, with integrated patch cord management, perforated 12 in wide door, 47U, gray | 85029089 |

# LISA Tray Units for MTP Transition Solution

### Characteristics

- 19" rear-mounting for improved access to front
- Horizontal fiber tray mounting maximizes available height in rack
- Universal fixing plate for 2 conduits (splicing) or 3 MTP adapters (plug and play)
- Integral service loop for patch cords
- Horizontal and vertical patch cord guides
- Integrated patch cord mandrels for bend-radius protection
- Patch cord retaining ring ensures safe strain relief of patch cords exiting the unit

## Technical data

| Attribute | Value |
|---|---|
| Dimension (W × H × D) | 2U: 20 × 10 × 3 in<br>6U: 20 × 10 × 10 in<br>7U: 20 × 10 × 12 in |
| Capacity | 2 fiber trays per rack unit |
| Compatibility | LISA CDRs and LISA NGRs or to any rear mounted 19 in rail (e.g. street cabinet) |
| Material and Color | tray unit body: aluminum/steel – powder coated, black or gray<br>mandrels at the front: ABS, black<br>mandrels on the side: HDPE/PC, blue |
| Weight | 2U: 5.5 lb<br>6U:16.7 lb<br>7U: 20.0 lb |
| Ingress protection degree (EN60529) | IP20 |
| Resistance to impact (EN62262) | IK03 |
| Bending radius | 1.4 in |
| Temperature resistance (long term) | −40 to +70 °C (−40 to +158 °F) |

# LISA Tray Units for MTP Transition Solution

### Ordering information

| Description | Item no. |
| --- | --- |
| gray | |
| 2U tray unit for connecting up to 4 MTP transition fiber trays | 85013618 |
| 6U tray unit for connecting up to 12 MTP transition fiber trays | 85013616 |



### Ordering information

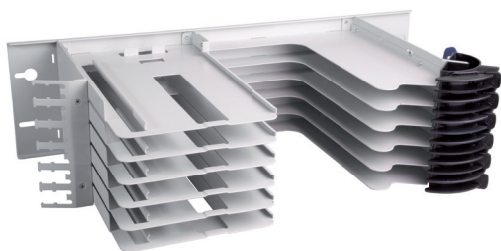| Description | Item no. |
| --- | --- |
| black | |
| 2U tray unit for connecting up to 4 MTP transition fiber trays | 84143144 |
| 7U tray unit for connecting up to 15 MTP transition fiber trays | 85013562 |

# LISA Tray Units for Patching Solution

## Characteristics
- 19" rear-mounting for improved access to front
- Horizontal patching tray mounting maximizes available height in rack
- Allows instant access to patching tray and its connectivity due to sliding mechanism
- Integral service loop for patch cords
- Horizontal and vertical patch cord guides
- Integrated patch cord mandrels for bend-radius protection
- Patch cord retaining ring ensures safe strain relief of patch cords exiting the unit
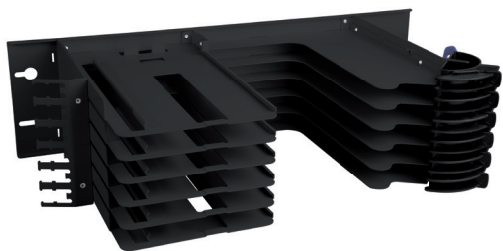
## Technical data

| Attribute | Value |
|---|---|
| Dimension (W × H × D) | 2U: 20 × 10 × 3 in<br>7U: 20 × 10 × 12 in |
| Capacitiy | 2 patching trays per rack unit |
| Compatibility | LISA CDRs and LISA NGRs or to any rear mounted 19 in rail (e.g. street cabinet) |
| Material and Color | tray unit body: aluminum/steel – powder coated, black or gray<br>mandrels at the front: ABS, black<br>mandrels on the side: PC, blue |
| RoHS requirements | fully compliant |
| Weight | 2U: 7.0 lb<br>7U: 25.3 lb |
| Ingress protection degree (EN60529) | IP20 |
| Resistance to impact (EN62262) | IK03 |
| Bend radius limitation | 1.4 in |
| Temperature resistance (long term) | −40 to +70 °C (−40 to +158 °F) |

# LISA Tray Units for Patching Solution

## Ordering information

| Description | Item no. |
| --- | --- |
| gray | |
| 2U tray unit for connecting up to 4 patching fiber trays | 85017844 |
| 7U tray unit for connecting up to 15 patching fiber trays | 85017846 |

## Ordering information

| Description | Item no. |
| --- | --- |
| black | |
| 2U tray unit for connecting up to 4 patching fiber trays | 85015635 |
| 7U tray unit for connecting up to 15 patching fiber trays | 85017847 |

# LISA CDR Accessories

LISA CDR accessories enable simple, fast and secure installations. The accessory portfolio includes protection conduits for a bend-free guiding of loose tubes within a LISA CDR, but also components for easy documentation and identification of individual fiber trays. The assortment is completed with splice protectors and fixing hardware for controlled patch cord management.

# LISA CDR Accessories

## Bend limitation conduits "solid"

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Black conduit, outer diameter 4.0 mm, inner diameter 2.6 mm, PBT-V0 | 100 m | 100 m | 84152202 | |
| Black conduit, outer diameter 5.0 mm, inner diameter 3.3 mm, PBT-V0 | 100 m | 100 m | 84014502 | |
| White conduit, outer diameter 5.0 mm, inner diameter 3.3 mm, PBT-V0 | 100 m | 100 m | 84147024 | |

## Bend limitation conduits "slitted"

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Black conduit, outer diameter 4.0 mm, inner diameter 2.6 mm, PBT-V0 | 100 m | 100 m | 84088286 | |
| Black conduit, outer diameter 5.0 mm, inner diameter 3.3 mm, PBT-V0 | 100 m | 100 m | 85017566 | |
| White conduit, outer diameter 5.0 mm, inner diameter 3.3 mm, PBT-V0 | 100 m | 100 m | 85017565 | |

**Calculation scheme for calculating single lengths of conduits within a LISA CDR**
If the cable breakout area is located at the top of the rack, then read the schematic drawing from top to bottom. The total conduit length required for a LISA CDR36 side access is 150 m [1].

No. of fiber trays

61 - 80

41 - 60

21 - 40

1 - 20

Calculate 2.5 m
Calculate 2.1 m
Calculate 1.6 m
Calculate 1.3 m
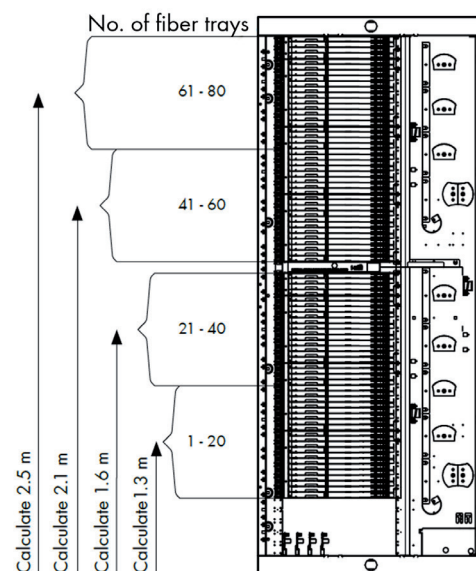
[1] One conduit to each fiber tray. By using two conduits to each fiber tray, double conduit length is required

# LISA CDR Accessories

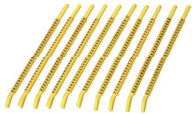## Conduit marking clip

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Clips for conduit labeling,  5 mm | 300 | 1 | 84088287 | |

## Tools

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Zipping tool for slitted conduits,  4 mm | 1 | 1 | 85017225 | |
| Zipping tool for slitted conduits,  5 mm | 1 | 1 | 84025983 | |

## Fastening material
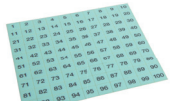
### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Patch cord retaining ring, grips and strain relieves patch cords safely to tray units | 100 | 100 | 84014507 | |
| Velcro® strap, dimension (W × L) 0.6 × 1.0 in | 82 ft | 82 ft | 84005451 | |
| Velcro® tie with retaining slot, dimension (W × L) 0.3 × 7.9 in | 100 | 100 | 84005803 | |
| Black rapstrap – flexible, strong, reusable and moulded cable strap, dimension (W × L) 10 × 12 in | 48 | 48 | 85004339 | |

# LISA CDR Accessories

## Number labels – for numbering individual fiber trays

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Yellow label sheet, imprinted numbers from 1 to 100 | 1 | 1 | 84105982 | |
| Aqua label sheet, imprinted numbers from 1 to 100 | 1 | 1 | 85015607 | |
| Heather violet label sheet, imprinted numbers from 1 to 100 | 1 | 1 | 85015611 | |

## Documentation

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Document holder 1U, gray | 1 | 1 | 84018388 | |
| Document holder 1U, black | 1 | 1 | 84102916 | |

# LISA CDR Accessories
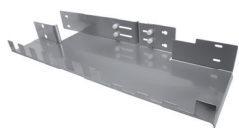
### Ordering information

| Description | Item no. |
|---|---|
| LISA CDR, 36 in wide 2U routing channel, silver | 85029682 |
| LISA CDR, 12 in wide 2U routing channel, silver | 85029837 |
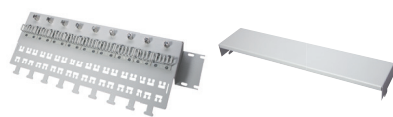
### Ordering information

| Description | Item no. |
|---|---|
| LISA CDR, 19 in breakout fixation plate for loose tube cables and conduits, gray | 84085928 |
| LISA CDR, protective cover for 19 in breakout plate, gray | 84069169 |

### Ordering information

| Description | Item no. |
|---|---|
| LISA CDR, 19 in breakout fixation plate for loose tube cables and conduits, black | 84088572 |
| LISA CDR, protective cover for 19 in breakout plate, black | 84076533 |
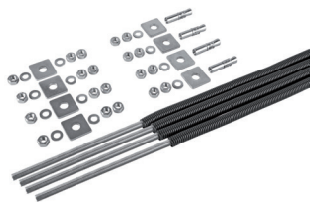
### Ordering information

| Description | Item no. |
|---|---|
| LISA CDR, fastening kit for raised computer floors incl. anchors, threaded-rod, nuts and washers | 85029106 |
| LISA CDR, fastening kit for solid concrete floors incl. anchor, nuts and washers | 84091849 |

# LISA CDR Accessories

## Ordering information

| Description | Item no. |
|---|---|
| LISA CDR, front mountable mandrel assembly incl. 2 divider plates and end cap, 5 piece set | 85029681 |



## Ordering information

| Description | Item no. |
|---|---|
| LISA CDR, patch cord guiding brackets for vertical divide plate, silver | 85029918 |



## Ordering information

| Description | Item no. |
|---|---|
| LISA CDR, patch cord guiding bracket for patch cord management plate, silver | 85029919 |
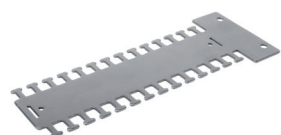


## Ordering information

| Description | Item no. |
|---|---|
| LISA CDR, conduit tie plate for extrusion, silver | 85021672 |
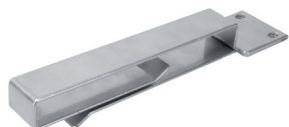


## Ordering information

| Description | Item no. |
|---|---|
| LISA CDR, vertical cable bracket for extrusion, silver | 85021673 |

# LISA Next Generation Rack (NGR)

Designed in collaboration with installers and operators, the LISA NGR incorporates many features not possible when using conventional 19" cabinets and splicing panels. For example, the NGR is only 12 in deep and its C-shape design allows unrestricted access to all internal elements from the front. This not only reduces installation and servicing time, but offers customers the opportunity to position LISA NGRs back-to-back for double density within a 24 in standard footprint. In addition, the C-shape design also allows cables to be patched from the LISA NGR directly to adjacent switch equipment without the need to enter the raised floor space or overhead pathway system. This reduces CAPEX and OPEX especially in smaller installations.

The LISA NGR is configured using modular and scalable LISA tray units. This building block approach offers maximum flexibility and scalability enabling the customer to add additional fiber capacity within the same rack as they grow. Termination modules support all connectivity types and offer a wide array of applications in a single generic footprint so that one product covers all existing and future customer requirements.

# LISA NGR – Base Rack

## Characteristics
• C-shape base rack with rear-mounted rails for excellent front access
• Patch cord routing without external ducts to adjoining racks
• Lateral and backside mounting of further racks
• Cable mounting plates and cable brackets for fixing cables or loose-tubes
• Fast and easy installation or removal of side walls, back walls and doors with spring bolts
• Robust steel construction
• Convenient patch cord management with generous storage possibilities
• Leveling with height adjustable feet
• Vertical rear fixing hole standard 19"
• Grounding and bonding of all parts to the base rack
• Termination of up to 1920 fibers
• Intelligent variants for storing, routing and cross-connecting fiber optic patch cords
• Integrated bend radius limiter: 1.4 in for fibers and patch cords, 1.8 in for loose-tubes

The LISA NGR was designed as an open C-shaped frame for managing passive optical components. With a standard height of 90 in, the LISA NGR has a capacity of 1920 fibers using telescopic fiber tray units. Specific installations such as the break-out termination unit (BTU900) or the customer termination shelf (CTS) allows optimal expansion to all known network conditions. An integrated, easy-access patch cord management facilitates patch cord over length within the LISA NGR.

Due to its compact dimensions of 12 x 35 x 90 in, this distribution frame excels in applications where small to medium-sized fiber density is required, such as FTTH POP stations. Because of its flexible C-shape design, scaling up the NGR to higher densities can be achieved by side-by-side mounting.

## Ordering information

| Description | Item no. |
| --- | --- |
| LISA NGR 36 in, patch cord management, back wall, solid 24 in and 12 in wide doors, 46U, gray | 85088557 |
| LISA NGR 36 in, patch cord management, back wall, no doors, 46U, gray | 85088555 |
| LISA NGR 36 in, patch cord management, back wall, solid 24 in and 12 in wide doors, 46U, black | 85093290 |
| LISA NGR 36 in, patch cord management, back wall, no doors, 46U, black | 85093289 |

# LISA NGR – Microduct Management

## Characteristics

- Robust steel construction
- High microduct density per footprint without compromising performance, reliability and ease of maintenance
- For termination of up to 216 microducts
- C-shape base rack with rear-mounted microduct fixing device for excellent front access
- Fast and easy installation or removal of side walls, back walls and doors with spring bolts
- Front-mounted microduct management
- Leveling with height adjustable feet
- Grounding and bonding of all parts to the base rack
- Extensive microduct management
- Microduct entry from top or bottom
- Secure strain-relief with an easy adaptive fixing device
- Water and gas blocker devices available

## Ordering information

| Description | Item no. |
|---|---|
| LISA NGR 12 in, no side panel, microduct management, solid 12 in wide door, 46U, gray | 85032247 |
| LISA NGR 12 in, microduct management, back wall, no doors, 46U, gray | 85032248 |
| LISA NGR 12 in, microduct management, back wall, no doors, 46U, black | 85093284 |
| LISA NGR 12 in, no side panel, microduct management, solid 12 in wide door, 46U, black | 85093287 |

# Tray Units for MTP Transition Solution

## Characteristics

- 19" rear-mounting for improved access to front
- Horizontal fiber tray mounting maximizes available height in rack
- Universal fixing plate for 2 conduits (splicing) or 3 MTP adapters (plug and play)
- Integral service loop for patch cords
- Horizontal and vertical patch cord guides
- Integrated patch cord mandrels for bend-radius protection
- Patch cord retaining ring ensures safe strain relief of patch cords exiting the unit

## Technical data

| Attribute | Value |
|---|---|
| Dimension (W × H × D) | 2U: 20 × 10 × 3 in<br>6U: 20 × 10 × 10 in<br>7U: 20 × 10 × 12 in |
| Capacity | 2 fiber trays per rack unit |
| Compatibility | LISA NGRs and LISA CDRs or to any rear mounted 19 in  rail (e.g. street cabinet) |
| Material and Color | tray unit body: aluminum/steel – powder coated, black or gray<br>mandrels at the front: ABS, black<br>mandrels on the side: HDPE/PC, blue |
| Weight | 2U: 5.5 lb<br>6U: 16.7 lb<br>7U: 20.0 lb |
| Ingress protection degree (EN60529) | IP20 |
| Resistance to impact (EN62262) | IK03 |
| Bending radius | 1.4 in |
| Temperature resistance (long term) | −40 to +70 °C (−40 to +158 °F) |

# LISA Tray Units for MTP Transition Solution

## Ordering information

| Description | Item no. |
|---|---|
| black | |
| 2U tray unit for connecting up to 4 MTP transition fiber trays | 84143144 |
| 7U tray unit for connecting up to 15 MTP transition fiber trays | 85013562 |

## Ordering information

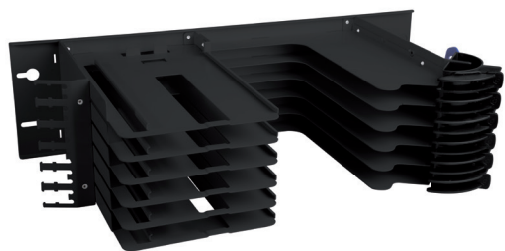| Description | Item no. |
|---|---|
| gray | |
| 2U tray unit for connecting up to 4 MTP transition fiber trays | 85013618 |
| 6U tray unit for connecting up to 12 MTP transition fiber trays | 85013616 |

# LISA Tray Units for Patching Solution

### Characteristics
• 19" rear-mounting for improved access to front
• Horizontal patching tray mounting maximizes available height in rack
• Allows instant access to patching tray and its connectivity due to runner mechanism
• Integral service loop for patch cords
• Horizontal and vertical patch cord guides
• Integrated patch cord mandrels for bend-radius protection
• Patch cord retaining ring ensures safe strain relief of patch cords exiting the unit
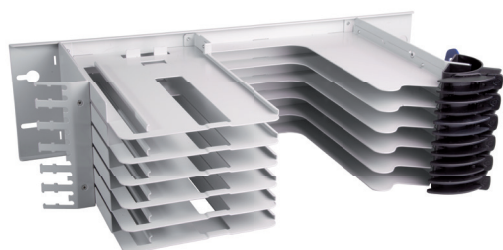
### Technical data

| Attribute | Value |
|---|---|
| Dimension (W × H × D) | 2U: 20 × 10 × 3 in<br>7U: 20 × 10 × 12 in |
| Capacitiy | 2 patching trays per rack unit |
| Compatibility | LISA NGRs, LISA CDRS and any rear mounted 19 in rail (e.g. street cabinet) |
| Material and Color | tray unit body: aluminum/steel – powder coated, black or gray<br>mandrels at the front: ABS, black<br>mandrels on the side: PC, blue |
| RoHS requirements | fully compliant |
| Weight | 2U: 7.0 lb<br>7U: 25.3 lb |
| Ingress protection degree (EN60529) | IP20 |
| Resistance to impact (EN62262) | IK03 |
| Bend radius limitation | 1.4 in |
| Temperature resistance (long term) | −40 to +70 °C (−40 to +158 °F) |

# LISA Tray Units for Patching Solution

## Patching tray unit



### Ordering information

| Description | Item no. |
|---|---|
| gray | |
| 2U tray unit for connecting up to 4 patching fiber trays | 85017844 |
| 7U tray unit for connecting up to 15 patching fiber trays | 85017846 |



### Ordering information

| Description | Item no. |
|---|---|
| black | |
| 2U tray unit for connecting up to 4 patching fiber trays | 85015635 |
| 7U tray unit for connecting up to 15 patching fiber trays | 85017847 |

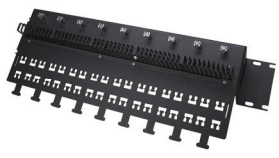# LISA NGR Accessories

LISA NGR accessories enable simple, fast and secure installations. The accessory portfolio includes protection conduits for a bend-free guiding of loose tubes within a LISA NGR, but also components for easy documentation and identification of individual fiber trays. The assortment is completed with splice protectors and fixing hardware for controlled patch cord management.
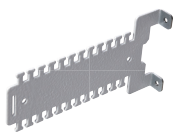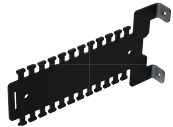
# LISA NGR Accessories

| Description | PU | Item no. | Picture |
|---|---|---|---|
| LISA NGR door 12 in with handle, hinged right, without lock, installation material and packaging included, gray | 1 | 85003858 | |
| LISA NGR door 12 in with handle, hinged left, without lock, installation material and packaging included, gray | 1 | 85003866 | |
| LISA NGR door 12 in with handle, hinged right, without lock, installation material and packaging included, black | 1 | 85003859 | |
| LISA NGR door 12 in with handle, hinged left, without lock, installation material and packaging included, black | 1 | 85003867 | |
| LISA NGR door 24 in with handle, hinged right, without lock, installation material and packaging included, gray | 1 | 85003854 | |
| LISA NGR door 24 in with handle, hinged left, without lock, installation material and packaging included, gray | 1 | 85003862 | |
| LISA NGR door 24 in with handle, hinged right, without lock, installation material and packaging included, black | 1 | 85003855 | |
| LISA NGR door 24 in with handle, hinged left, without lock, installation material and packaging included, black | 1 | 85003863 | |
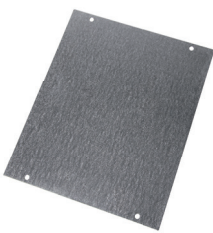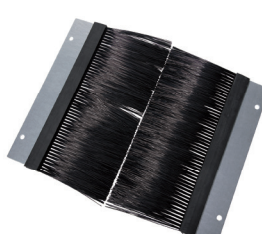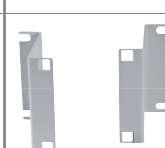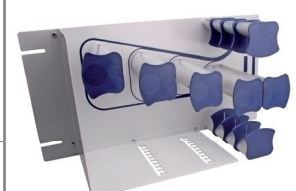
# LISA NGR Accessories

| | | | |
|---|---|---|---|
| LISA NGR side wall, 86.6 in, installation material and packaging included, gray | 1 | 84068179 | |
| LISA NGR side wall, 86.6 in, installation material and packaging included, black | 1 | 84076464 | |
| LISA NGR, 19 in breakout fixation plate for loose tube cables and conduits, gray | 1 | 84085928 | |
| LISA NGR, protective cover for 19 in breakout plate, gray | 1 | 84069169 | |
| LISA NGR, 19 in breakout fixation plate for loose tube cables and conduits, black | 1 | 84088572 | |
| LISA NGR, protective cover for 19 in breakout plate, black | 1 | 84076533 | |
| LISA NGR patch cord routing channel 12 in, 5U, mounting material included, gray | 1 | 84077066 | |
| LISA NGR patch cord routing channel 12 in, 5U, mounting material included, black | 1 | 84077067 | |

# LISA NGR Accessories

| Description | PU | Item no. | Picture |
|---|---|---|---|
| LISA NGR cable retainer, small, mounting material included, gray | 1 | 84068200 | |
| LISA NGR cable retainer, small, mounting material included, black | 1 | 84076535 | |
| LISA NGR cable bracket, mounting material included, gray | 1 | 84068201 | |
| LISA NGR cable bracket, mounting material included, black | 1 | 84076534 | |
| Cable guide 1U, mounting material included, gray and blue | 1 | 84093679 | |
| Cable guide 1U, mounting material included, black and blue | 1 | 84093678 | |
| LISA NGR door looking upgrade with 1 key, black | 1 | 84085188 | |
| LISA NGR door looking key, black | 1 | 84085514 | |

# LISA NGR Accessories

| | | | |
|---|---|---|---|
| LISA NGR 12 in top cover, installation material and packaging included, gray | 1 | 84076429 | |
| NGR 24 in top cover, installation material and packaging included, gray | 1 | 84076430 | |
| LISA NGR 36 in top cover, installation material and packaging included, gray | 1 | 84076431 | |
| LISA NGR 12 in brush stripes, installation material and packaging included, gray | 1 | 84068214 | |
| LISA NGR 24 in brush stripes, installation material and packaging included, gray | 1 | 84068211 | |
| LISA NGR 36 in brush stripes, installation material and packaging included, gray | 1 | 84068022 | |
| Rack distance to mount cable mounting 2-end plate, installation material and packaging included, gray | 2 | 84021461 | |
| LISA NGR baying kit, positioned side-by-side or back-to-back | 1 | 84076448 | |
| LISA NGR wall fixing kit | 1 | 84071885 | |
| Cross connect unit 6U high gray | 1 | 84004196 | |
| Cross connect unit 6U high black | 1 | 84087997 | |

# Structured Cabling Solutions for 19" Equipment Cabinets

Structured Cabling Solutions (SCS) are critical to the operations of today's networks. HUBER+SUHNER offers a comprehensive portfolio of SCS solutions for 19″ cabinets. This portfolio includes first-class cross-connect solutions (LISA), a modular top of rack solution (IANOS) and high density multi-technology panels (ZDPHD). These solutions enable network operators the ability to execute quick move, adds and changes (MACs) as well as provides network flexibilty which also reduces operational costs (OPEX).

LISA – a leading side access cross-connect solution guarantees a smooth implementation of structured cabling solutions to your network. The different colors and the extremely visible port identification ensures that MACs are made quickly and accurately every time.

IANOS – a new top of rack solution that allows mixed data rates and applications in one modular panel. This high degree of flexibility provides you a better return of investment (RoI) and higher utilization of your assets. Upgrades to higher data rates are made simple and safe reducing the time of MACs which can contribute to a lower total cost of ownership (TCO).

# Structured Cabling Solutions for 19" Equipment Cabinets

## Optimized Distribution Unit (ODU)

The optimized distribution unit (ODU) allows the integration of any LISA fiber tray into a standard 19" equipment cabinet. The ODU has a lockable steel door which provides security to the internal connections.

## IANOS

IANOS chassis are high density scalable sub-racks designed to accommodate the next generation of data transmissions in rapidly evolving structured cabling systems. Available in 1U or 4U increments, the IANOS chassis delivers industry leading density and best in class handling across almost every application be it splicing, pre-terminated cables or direct patching.
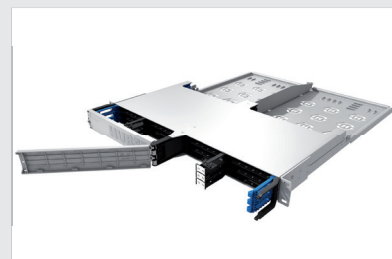
## IANOS lite

The IANOS lite chassis is designed to provide easy handling and a fast and complete access to the connectors. The unique design also allows installers easy access from the back and the front of the IANOS lite chassis when installing fibers.
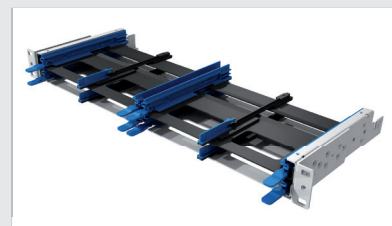
## Fiberframe / Fiberframe lite

Both Fiberframe and Fiberframe Lite, are 19" panels which allow the user to splice or patch various cable systems in a standard 1U 19" frame. The Fiberframe is a lightweight aluminium construction, while Fiberframe Lite is a solid steel construction.

## High Density Zone Distribution Panel (ZDPHD)

The high density zone distribution panel can accommodate up to four high density MTP modules (MTHDM), four high density universal adapter plates (HDUAP) or two RJ-45 modules in a single 1U space (unused spaces can be fitted with blanking plates) and is normally positioned at the top of server or switch cabinets.
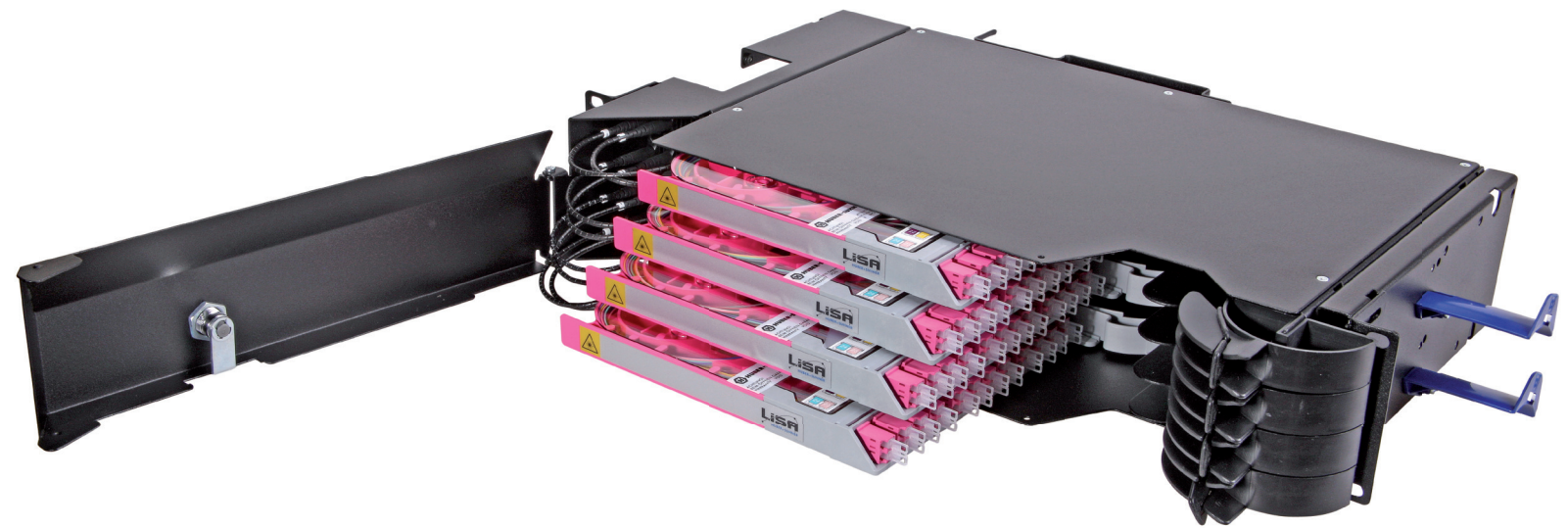
# Optimized Distribution Unit (ODU)

Within the LISA side access portfolio, HUBER+SUHNER offers a sub-rack which allows the integration of any LISA fiber tray into a standard 19" equipment cabinet. Flexible mounting options at the rear of the optimized distribution unit (ODU) make cable fixation quick and easy. Bend-limiting conduits give ultimate protection to the incoming fibers. Patch cords are routed to the front of the ODU and can either be guided to the rear of the cabinet (around the vertical rail) or vertically (along the front of the rail if sufficient side space is available within the cabinet).

The ODU has a lockable steel door which provides security to the internal connections. This feature is particularly beneficial in collocation areas where multiple subscribers occupy the same rack space.

# ODU – Optimized Distribution Unit

## Characteristics

- Integration of LISA fiber trays supporting splicing solution or LISA MTP transition solution
- Front mounting allows the use in standard 19" equipment cabinets
- Each rack unit accommodates 2 LISA fiber trays
- Allows instant access to fiber trays and its connectivity
- Integral service loop for patch cords
- Horizontal and vertical patch cord guides
- Integrated patch cord mandrels for bend-radius protection
- Patch cord retaining ring ensures safe strain relief of patch cords exiting the unit
- Lockable front door offer complete access security

## Technical data

| Attribute | Value |
|---|---|
| Dimension (W × H × D) | 1U: 20.3 × 12.2 × 1.7 in<br>2U: 20.3 × 12.2 × 3.5 in<br>3U: 20.3 × 12.2 × 5.2 in |
| Capacity | 2 fiber trays per rack unit |
| Compatibility | to any front mounted 19 in rail (e.g. network equipment racks) |
| Material | tray unit body: aluminum/steel – powder coated, black or gray<br>mandrels at the front: ABS, black<br>mandrels on the side: HDPE, blue |
| RoHS requirements | fully compliant |
| Weight | 1U: 6.6 lb<br>2U: 9.9 lb<br>3U: 13.2 lb |
| Ingress protection degree (EN60529) | IP20 |
| Resistance to impact (EN62262) | IK03 |
| Bending radius | 1.4 in |
| Temperature resistance (long term) | −40 to +70 °C (−40 to +158 °F) |

# ODU – for Splicing or Splitting Fiber Trays

### Characteristics
• Up to 4 conduits per fiber tray
• With conduit spaces on the rear
• Gray Color

## Ordering information

| Description | Item no. |
|---|---|
| 1U ODU for splicing up to 2 fiber trays | 84076616 |
| 2U ODU for splicing up to 4 fiber trays | 84076597 |
| 3U ODU for splicing up to 6 fiber trays | 84076598 |

# ODU – for MTP Transition Fiber Trays

### Characteristics
• Universal fixing plate for up to 3 MTP adapters (plug and play)
  or 2 conduits (splicing) per fiber tray
• Black Color

## Ordering information

| Description | Item no. |
|---|---|
| 1U ODU for connecting up to 2 MTP transition fiber trays | 84138128 |
| 2U ODU for connecting up to 4 MTP transition fiber trays | 84138122 |
| 3U ODU for connecting up to 6 MTP transition fiber trays | 84138119 |

# ODU Accessories
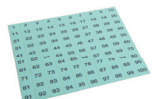
## Fastening material

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Patch cord retaining ring, grips and strain relieves patch cords safely to tray units | 100 | 100 | 84014507 | |
| Velcro® strap, dimension (W × L) 0.6 × 1.0 in | 25 | 25 | 84005451 | |
| Velcro® tie with retaining slot, dimension (W × L) 0.3 × 7.9 in | 100 | 100 | 84005803 | |
| Black rapstrap – flexible, strong, reusable and moulded cable strap, dimension (W × L) 10 × 12 in | 48 | 48 | 85004339 | |

## Number labels – for numbering individual fiber trays

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Yellow label sheet, imprinted numbers from 1 to 100 | 1 | 1 | 84105982 | |
| Aqua label sheet, imprinted numbers from 1 to 100 | 1 | 1 | 85015607 | |
| Heather violet label sheet, imprinted numbers from 1 to 100 | 1 | 1 | 85015611 | |

## Extension brackets

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| 3U sized bracket to mount 19" tray units into a 21" rack, gray | 1 | 1 | 84091367 | |

# ODU Accessories
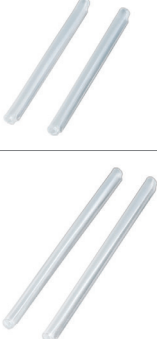
## ODU wall-mount kit

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Gray fastening kit to mount a 3U sized ODU onto a wall | 1 | 1 | 85002364 | |

## Splice protectors

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Heat shrink splice protector, dimension:  1.5 × 40 mm | 100 | 100 | 84059763 | |
| Heat shrink splice protector, dimension:  2.4 × 45 mm | 100 | 100 | 84005214 | |
| Heat shrink splice protector, dimension:  2.4 × 60 mm | 100 | 100 | 84005215 | |
| Sandwich splice protector, dimension: 1.2 × 3.2 × 30 mm | 150 | 150 | 23218558 | |

## Bend-limitation conduits

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| White conduit, outer diameter  5.0 mm, inner  diameter 3.3 mm, PBT-V0, solid | 100 m | 100 m | 84147024 | |
| Black conduit, outer diameter  5.0 mm, inner diameter  3.3 mm, PBT-V0, solid | 100 m | 100 m | 84014502 | |
| White conduit, outer  diameter 5.0 mm, inner diameter 3.3 mm, PBT-V0, slitted | 100 m | 100 m | 85017565 | |
| Black conduit, outer  diameter 5.0 mm, inner  diameter 3.3 mm, PBT-V0, slitted | 100 m | 100 m | 85017566 | |

# ODU Accessories

## Tools

### Ordering information

| Description | Packing unit | Order unit (mutiple of) | Item no. | Picture |
|---|---|---|---|---|
| Zipping tool for slitted conduits,  5 mm | 1 | 1 | 84025983 | |

## Patch cord routing

### Ordering information

| Description | Item no. | Picture |
|---|---|---|
| Patch cord routing element mounted on BTUs or front access sub-racks, guiding patch cords to the right side with an angle of 45° | 84072036 | |
| Patch cord routing element mounted on BTUs or front access sub-racks, guiding patch cords to the left side with an angle of 45° | 84072037 | |

# Leading Interconnect System Approach (LISA) Fiber Trays

LISA fiber trays are the side-facing connectivity blocks that are inserted into tray units within the high density LISA CDR, NGR, or ODU systems. Designed for speed of installation and improved accessibility, LISA fiber trays can be installed and removed in under 10 seconds.

Fiber trays are available to cover a wide range of applications including splicing , patching, and fiber connector transitions. Within the network services, the majority of splicing applications are singlemode LC because this combination provides a future-proofed infrastructure.

MTP-LC transitions on the other hand are generally multimode OM3 or OM4, allowing the operator to reuse the MTP backbone and upgrade it later to parallel optics including 40G and 100G.

In addition to the splicing and transition fiber trays, HUBER+SUHNER also offer a patching fiber tray which is designed to serve the increasing trend towards MTP parallel optic applications. The patching tray is also suitable for singlemode LC patching in applications where fast, factory tested links are required.

# Key Features Fiber Trays

## 100 % accessibility from front

The LISA tray unit allows incoming cables and outgoing patch cords to be fully installed and serviced from the front or side without the need to access the rear of the cabinet. Integrated slack storage areas allow fiber trays to be slid in and out of the tray unit in just a few seconds without disrupting pre-installed fibers.
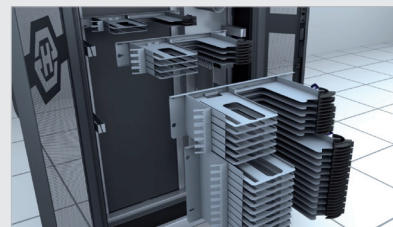
## Mix and match in the same rack

Splicing fiber trays and transition trays can be mixed together in the same centralized cross-connect rack due to the universal fixing plate on the side of the tray unit. This is a great feature for operators who have pre-installed spliced fibers but want to move to a more flexible MTP backbone. Multimode and singlemode trays can also be mixed and matched giving even more flexibility and scalability.

## Installation in under 10 seconds

The LISA fiber tray can be installed in under 10 seconds without any tools. The integrated sliding feature and self-locking system makes the installation simple, fast and repeatable. This core feature contributes to faster deployment times.

## Excellent fiber routing with bend-radius protection

The LISA fiber tray is designed to manage fibers safely and neatly without compromising user handling or optical performance. The internal guiding elements of the tray maintain the minimum bend-radius of fibers and also provide clear separation between incoming fibers and pre-loaded pigtails. Out-going patch cords are safely guided away from the tray with an integrated guiding arm. This guiding arm maintains a horizontal guidance of the cables and provides a consistent service loop for regular moves, adds and changes.
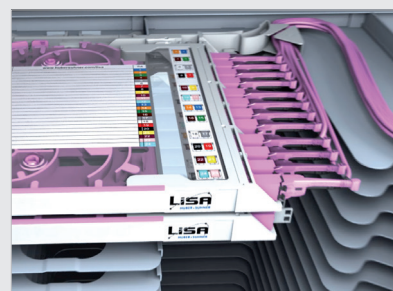
# LISA MTP Transition Solution

The LISA MTP fiber tray incorporates transition assemblies from MTP connectors on one side and standard connectors such as LC on the other side. The MTP connector offers a high degree of flexibility and speed because it only takes a few seconds to slide the fiber tray into the LISA CDR, NGR, and ODU system and connect the MTPs to pre-installed backbone cables.

The other benefit of LISA MTP fiber trays is the fact that you can easily change the fiber tray at any time without disrupting the pre-installed backbone cabling infrastructure. This means that you can easily change connectivity types without a great deal of complexity and cost.

The flexibility of LISA MTP fiber trays has an important bearing on the future of our structured cabling industry. With the migration from 10G to 40G and 100G, it is necessary that you have a suitable migration path from lower data rates to higher data rates. In simple terms, this means that although LC connectors are the popular choice now for 10G, the future will see a change to MTP connectors as recommended by various standardization bodies.

In summary, if you choose to implement LISA MTP/LC fiber trays today, you will have a platform capable of achieving your immediate 1G or 10G needs and additionally, the ability to easily migrate to 40G or 100G links in the future.

# LISA MTP Transition Module
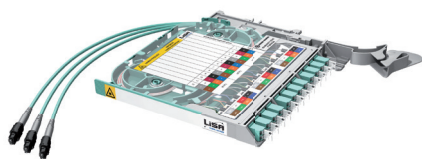
## Characteristics
- Pre-terminated MTP transition module for instant plug and play connectivity
- MTP elite connectivity
- Super low-loss multimode OM4
- Module access completely from the front side
- Side-facing adapter alignment for higher laser safety
- Patch cords horizontally supported
- For up to 36 LC duplex or 18 SC simplex connections per tray
- Upgrade path from 10G to 40G and 100G
- Easy traceability by color and label
- Fast installation without tools
- Clear label platforms for fast traceability

## Technical data

| Attribute | | Value |
|---|---|---|
| Dimension (W × H × D) | | 11.3 × 0.7 × 10.3 in (with hinge and patch cord arm) |
| Rack unit | | 0.5 U |
| Capacitiy (maximum) | overall per module | up to 18 channels (36 fibers) |
| | overall per rack unit | 2 modules, up to 36 channels (72 fibers) <br> **Note**: for certain adapter types the maximum fiber count is limited |
| RoHS requirements | | fully compliant |
| Ingress protection degree (EN60529) | | IP20 |
| Resistance to impact (EN62262) | | IK03 |
| Bend radius limitation | | 1.2 in |
| Temperature resistance (long term) | | −40 to +70 °C (−40 to +158 °F) |

## Optical performance

| Performance classes patch field | Attenuation "reference measuring" | | | |
|---|---|---|---|---|
| | IEC 61300-3-4, method B | | IEC 61300-3-6 | |
| | IL max | IL mean | RL UPC | RL APC |
| Singlemode standard class | 0.30 dB | 0.20 dB | > 50 dB | > 85 dB [1] |
| Multimode standard class | 0.25 dB [2] | n/a | > 35 dB | n/a |
| Multimode low-loss class | 0.15 dB [2] | n/a | > 35 dB | n/a |
| **Performance classes MT** | | | | |
| Singlemode standard class | 0.75 dB | 0.30 dB | > 50 dB | > 85 dB [1] |
| Singlemode elite class | 0.35 dB | 0.15 dB | > 50 dB | > 85 dB [1] |
| Multimode standard class | 0.60 dB [2] | n/a | > 35 dB | n/a |
| Multimode elite class | 0.35 dB [2] | n/a | > 35 dB | n/a |

[1] Measurement method 3 (OLCR)
[2] Measured with Encircled Flux (EF)

# LISA MTP Transition Module

## Multimode OM3
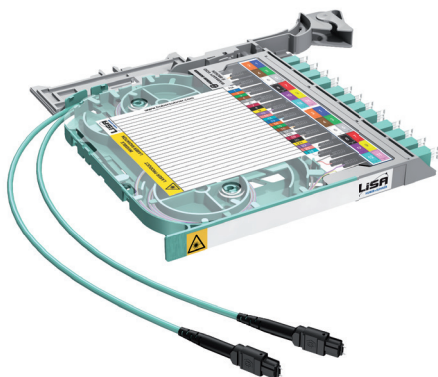


## Ordering information

| Description | Item no. |
|---|---|
| **LC ports** | |
| 1-way MTP tray, 24 fiber MTP24 female – OM3 elite class, 12 LC duplex ports – standard class, aqua, TIA code, polarity R1 | 85072992 |
| 2-way MTP tray, 24 fiber MTP12 male – OM3 elite class, 12 LC duplex ports – standard class, aqua, TIA code, polarity AS | 84132645 |
| 2-way MTP tray, 24 fiber MTP12 male – OM3 elite class, 12 LC duplex ports – standard class, heather violet, TIA code, polarity AS | 85027487 |
| 2-way MTP tray, 24 fiber MTP12 male – OM3 elite class, 12 LC duplex ports – standard class, red, TIA code, polarity AS | 85027485 |
| 2-way MTP tray, 24 fiber MTP12 male – OM3 elite class, 12 LC duplex ports – standard class, yellow, TIA code, polarity AS | 84145478 |
| 3-way MTP tray, 24 fiber MTP8 female – OM3 elite class, 12 LC duplex ports – standard class, aqua, TIA code, polarity NS | 85072991 |
| 3-way MTP tray, 36 fiber MTP12 male – OM3 elite class, 18 LC duplex ports – standard class, aqua, TIA code, polarity AS | 85011331 |
| 3-way MTP tray, 36 fiber MTP12 male – OM3 elite class, 18 LC duplex ports – standard class, blue, TIA code, polarity AS | 85065000 |
| 3-way MTP tray, 36 fiber MTP12 male – OM3 elite class, 18 LC duplex ports – standard class, green, TIA code, polarity AS | 85027482 |
| 3-way MTP tray, 36 fiber MTP12 male – OM3 elite class, 18 LC duplex ports – standard class, orange, TIA code, polarity AS | 85064989 |
| 3-way MTP tray, 36 fiber MTP12 male – OM3 elite class, 18 LC duplex ports – standard class, red, TIA code, polarity AS | 85027484 |
| **SC ports** | |
| 1-way MTP tray, 12 fiber MTP12 male – elite class, 12 SC simplex ports – standard class, aqua , TIA code, polarity AS | 84114518 |

# LISA MTP Transition Module

## Multimode OM4
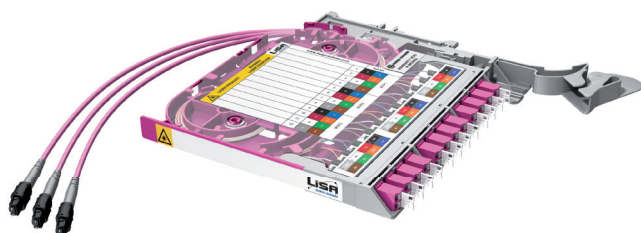
### Ordering information

| Description | Item no. |
|---|---|
| **LC ports** | |
| 1-way MTP tray, 12 fiber MTP12 male – OM4 elite class, 6 LC duplex ports – low-loss class, aqua, TIA code, polarity AS | 85024170 |
| 1-way MTP tray, 12 fiber MTP12 male – OM4 elite class, 6 LC duplex ports – low-loss class, heather violet, TIA code, polarity AS | 85069461 |
| 1-way MTP tray, 24 fiber MTP24 female – OM4 elite class, 12 LC duplex ports – low-loss class, heather violet, TIA code, polarity R1 | 85072994 |
| 2-way MTP tray, 24 fiber MTP12 male – OM4 elite class, 12 LC duplex ports – low-loss class, aqua, TIA code, polarity AS | 84116094 |
| 2-way MTP tray, 24 fiber MTP12 male – OM4 elite class, 12 LC duplex ports – low-loss class, green, TIA code, polarity AS | 84127814 |
| 2-way MTP tray, 24 fiber MTP12 male – OM4 elite class, 12 LC duplex ports – low-loss class, heather violet, TIA code, polarity AS | 84132648 |
| 2-way MTP tray, 24 fiber MTP12 male – OM4 elite class, 12 LC duplex ports – low-loss class, orange, TIA code, polarity AS | 84127800 |
| 3-way MTP tray, 24 fiber MTP8 female – OM4 elite class, 12 LC duplex ports – low-loss class, heather violet, TIA code, polarity NS | 85072993 |
| 3-way MTP tray, 36 fiber MTP12 male – OM4 elite class, 18 LC duplex ports – low-loss class, aqua, TIA code, polarity AS | 85017723 |
| 3-way MTP tray, 36 fiber MTP12 male – OM4 elite class, 18 LC duplex ports – low-loss class, heather violet, TIA code, polarity AS | 85017721 |
| 3-way MTP tray, 36 fiber MTP12 male – OM4 elite class, 18 LC duplex ports – low-loss class, orange, TIA code, polarity AS | 85017724 |
| **SC ports** | |
| 1-way MTP tray, 12 fiber MTP12 male – OM4 elite class, 12 SC simplex ports – low-loss class, heather violet, TIA code, polarity AS | 84132649 |
| 1-way MTP tray, 12 fiber MTP12 male – OM4 elite class, 12 SC simplex ports – low-loss class, gray , TIA code, polarity AS | 85032250 |

# LISA MTP Transition Module

## Singlemode
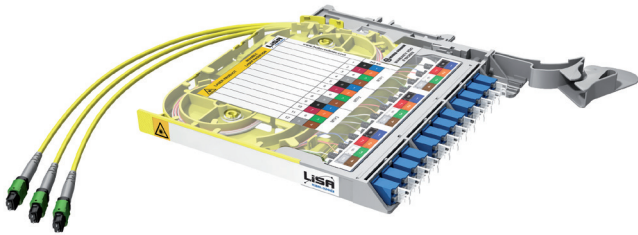


### Ordering information

| Description | Item no. |
|---|---|
| **LC-UPC ports** | |
| 1-way MTP tray, 12 fiber MTP12 male – OS2 standard class, 6 LC duplex ports – SM standard class, yellow, TIA code, polarity AS | 85067545 |
| 1-way MTP tray, 24 fiber MTP24 male – OS2 elite class, 12 LC duplex ports – SM standard class, yellow, TIA code, polarity AS | 85019035 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 elite class, 12 LC duplex ports – SM standard class, blue, TIA code, polarity AS | 84145386 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 elite class, 12 LC duplex ports – SM standard class, gray , TIA code, polarity AS | 84145407 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 elite class, 12 LC duplex ports – SM standard class, heather violet, TIA code, polarity AS | 85027490 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 elite class, 12 LC duplex ports – SM standard class, orange, TIA code, polarity AS | 85028772 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 elite class, 12 LC duplex ports – SM standard class, red, TIA code, polarity AS | 85027489 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 elite class, 12 LC duplex ports – SM standard class, yellow, TIA code, polarity AS | 84116087 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 standard class, 12 LC duplex ports – SM standard class, blue, TIA code, polarity AS | 84099155 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 standard class, 12 LC duplex ports – SM standard class, green, TIA code, polarity AS | 84099361 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 standard class, 12 LC duplex ports – SM standard class, red, TIA code, polarity AS | 84099360 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 standard class, 12 LC duplex ports – SM standard class, yellow, TIA code, polarity AS | 84088536 |
| 3-way MTP tray, 36 fiber MTP12 male – OS2 elite class, 18 LC duplex ports – SM standard class, blue, TIA code, polarity AS | 85026880 |
| 3-way MTP tray, 36 fiber MTP12 male – OS2 elite class, 18 LC duplex ports – SM standard class, green, TIA code, polarity AS | 85028452 |
| 3-way MTP tray, 36 fiber MTP12 male – OS2 elite class, 18 LC duplex ports – SM standard class, heather violet, TIA code, polarity AS | 85026828 |
| 3-way MTP tray, 36 fiber MTP12 male – OS2 elite class, 18 LC duplex ports – SM standard class, orange, TIA code, polarity AS | 85021550 |
| 3-way MTP tray, 36 fiber MTP12 male – OS2 elite class, 18 LC duplex ports – SM standard class, red, TIA code, polarity AS | 85027491 |
| 3-way MTP tray, 36 fiber MTP12 male – OS2 elite class, 18 LC duplex ports – SM standard class, yellow, TIA code, polarity AS | 85019037 |
| 3-way MTP tray, 36 fiber MTP12 male – OS2 standard class, 18 LC duplex ports – SM standard class, yellow, TIA code, polarity AS | 85019870 |

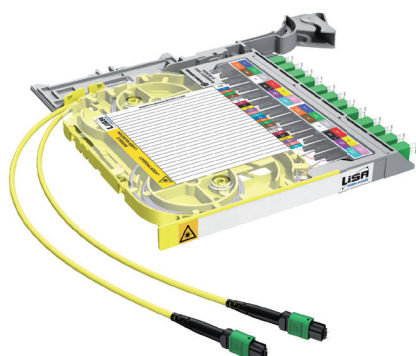| Description | Item no. |
|---|---|
| **SC-UPC ports** | |
| 1-way MTP tray, 12 fiber MTP12 male – OS2 elite class, 12 SC simplex ports – SM standard class, blue, TIA code, polarity AS | 84149634 |
| 1-way MTP tray, 12 fiber MTP12 male – OS2 standard class, 12 SC simplex ports – SM standard class, blue, TIA code, polarity AS | 84099845 |
| 1-way MTP tray, 12 fiber MTP12 male – OS2 elite class, 12 SC simplex ports – SM standard class, orange, TIA code, polarity AS | 84112258 |
| 1-way MTP tray, 12 fiber MTP12 male – OS2 standard class, 12 SC simplex ports – SM standard class, red, TIA code, polarity AS | 85032251 |
| 1-way MTP tray, 12 fiber MTP12 male – OS2 elite class, 12 SC simplex ports – SM standard class, yellow, TIA code, polarity AS | 84110256 |

# LISA MTP Transition Module

## Ordering information

| LC-APC ports | |
|---|---|
| 1-way MTP tray, 24 fiber MTP24 female – OS2 elite class, 12 LC duplex ports – SM standard class, yellow, TIA code, polarity R1 | 85072967 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 elite class, 12 LC duplex ports – SM standard class, green, TIA code, polarity AS | 84204698 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 elite class, 12 LC duplex ports – SM standard class, yellow, TIA code, polarity AS | 84205262 |
| 2-way MTP tray, 24 fiber MTP12 male – OS2 standard class, 12 LC duplex ports – SM standard class, yellow, TIA code, polarity AS | 85015521 |
| 3-way MTP tray, 24 fiber MTP8 female – OS2 elite class, 12 LC duplex ports – SM standard class, yellow, TIA code, polarity NS | 85072990 |
| SC-APC ports | |
| 1-way MTP tray, 12 fiber MTP12 male – OS2 elite class, 12 SC simplex ports – SM standard class, yellow, TIA code, polarity AS | 84148344 |

# LISA Splicing Solution

The LISA side access system is focused on speed of installation and overall access. The LISA fiber tray can be installed safely and quickly. Access can be made at any time without the need for tooling and without disrupting pre-installed fibers. Reliability and performance are key to the success of your network. Therefore, we have ensured that the highest level of fiber protection and bend-radius limitation are standard across our side access system.

The centerpiece of the LISA side access system is a flexible fiber tray that can be used for almost any application or termination method. For example, the LISA fiber tray can be utilized for pigtail-splicing or pre-connectorized passive components such as splitters, CWDMs or FTTH combiners. The main function of the LISA fiber tray is a telescopic, 90° turned fiber termination module. The fibers of the main cable are either spliced onto pre-stripped fiber pigtails or spliced directly to an outgoing cable. The LISA fiber tray is supplied with up to 36 pre-connectorized fiber pigtails which have been pre-stripped and neatly stored ready for connection. Because the pigtails are pre-stripped, we are able to store longer pigtail lengths inside the tray and the process of fusion splicing is more consistent and repeatable. The LISA fiber tray has two distinct areas for storing fibers. One side is dedicated to the storage of pigtails and the other area is reserved for incoming cables. This separation of fibers simplifies and speeds up the splicing process as well as improves the identification and access to individual fibers.

# LISA Splice Tray
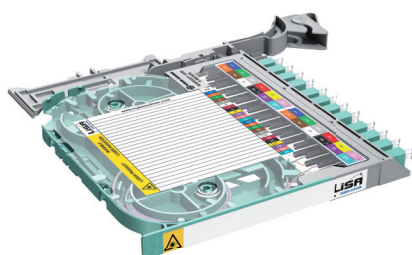
## Characteristics

- Quick installation and easy handling because of a double staged pull-out mechanism
- Module access completely from the front
- Hinge-down fiber tray offers immediate access to internal fibers
- Side-facing adapter alignment for higher laser safety
- Pull-out feature with service loop offers immediate access to adapters
- Patch cords horizontally supported for various connector types:
  up to 36 small form factor (SFF) or 18 big form factor (BFF) connectors
- Incoming fibers and pigtail fibers are stored in separate areas
- Pigtails pre-stripped to 250 µm for faster splicing
- Both fiber storage areas provide storage space of 1.5 m each
- Central splice bridge for heat shrink and sandwich splice protectors
- Retaining tabs on different height levels for faster insertion of fibers
- Bend radius limitation throughout
- Easy traceability by color and label

## Technical data

| Attribute | | Value |
|---|---|---|
| Dimension (W × H × D) | | 11.3 × 0.7 × 10.3 in (with hinge and patch cord arm) |
| Rack unit | | 0.5 U |
| Capacitiy (maximum) | overall per module | up to 36 splices/fibers |
| | overall per rack unit | 2 modules, up to 72 splices/fibers<br>**Note**: for certain adapter types the maximum fiber count is limited |
| Conduit fastening ( 5 mm) | | up to 4 conduits |
| RoHS requirements | | fully compliant |
| Weight | | module incl. packaging: 540 gr (without packaging: 350 gr) |
| Ingress protection degree (EN60529) | | IP20 |
| Resistance to impact (EN62262) | | IK03 |
| Bend radius limitation | | 1.2 in |
| Temperature resistance (long term) | | −40 to +70 °C (−40 to +158 °F) |

## Optical performance

| Pigtail performance class | Attenuation "each-to-each measuring" | | | |
|---|---|---|---|---|
| | IEC 61300-3-34 | | IEC 61300-3-6 | |
| | IL 97 % | IL mean | RL UPC | RL APC |
| Singlemode standard class | 0.45 dB | 0.20 dB | > 50 dB | > 85 dB [1] |
| Singlemode standard class, BTW Pigtails | 0.25 dB | 0.12 dB | > 50 dB | > 85 dB [1] |
| Singlemode grade B [2] | 0.25 dB | 0.12 dB | > 50 dB | > 85 dB [1] |
| Multimode standard class | max. 0.25 dB [3] | n/a | > 35 dB | n/a |

[1] Measurement method 3 (OLCR)
[2] All connectors are tuned acc. to IEC 61755-3-1/2, grade B
[3] Measured at 850 nm, launch conditions acc. IEC 61300-1

# LISA Splice to Patch Module

## LC connectivity
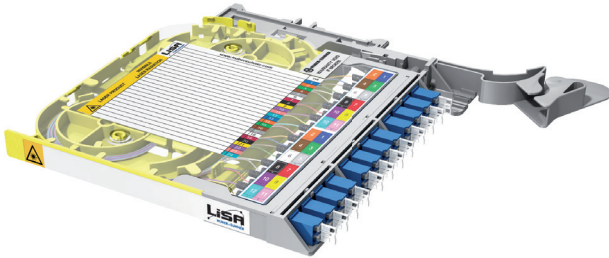


## Ordering information

| Description | Item no. |
|---|---|
| **Singlemode G.652 D fiber, UPC polishing, standard performance** | |
| Blue tray, 12 duplex adapters, 24 pigtails, no Color code, heat shrink comb with protectors 1.5 × 40 mm | 84022862 |
| Green tray, 12 duplex adapters, 24 pigtails, no Color code, heat shrink comb with protectors 1.5 × 40 mm | 84015509 |
| Orange tray, 12 duplex adapters, 24 pigtails, no Color code, heat shrink comb with protectors 1.5 × 40 mm | 84247374 |
| Yellow tray, 12 duplex adapters, 24 pigtails, no Color code, heat shrink comb with protectors 1.5 × 40 mm | 85071865 |
| Yellow tray, 12 duplex adapters, 24 pigtails, no Color code, sandwich comb without protectors | 84007519 |
| Yellow tray, 12 duplex adapters, 24 pigtails, TIA Color code, heat shrink comb with protectors 1.5 × 40 mm | 85019039 |
| **Singlemode G.652 D fiber, APC polishing, standard performance** | |
| Green tray, 12 duplex adapters, 24 pigtails, no Color code, heat shrink comb with protectors 1.5 × 40 mm | 84026537 |
| Blue tray, 12 duplex adapters, 24 pigtails, no Color code, heat shrink comb with protectors 1.5 × 40 mm | 84045870 |
| **Multimode OM3 fiber, UPC polishing, standard performance** | |
| Aqua tray, 12 duplex adapters, 24 pigtails, no Color code, sandwich comb with protectors | 85002836 |
| Aqua tray, 12 duplex adapters, 24 pigtails, TIA Color code, heat shrink comb with protectors 1.5 × 40 mm | 85018939 |
| **Multimode OM4 fiber, UPC polishing, standard and low-loss performance** | |
| Heather violet tray, 12 duplex adapters, 24 pigtails, no Color code, sandwich comb with protectors, standard performance | 85002837 |
| Heather violet tray, 12 duplex adapters, 24 pigtails, TIA Color code, heat shrink comb with protectors 1.5 × 40 mm, low-loss performance | 85019038 |

# LISA Splice to Patch Module

## SC connectivity
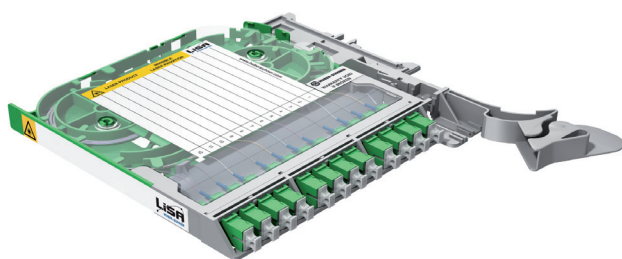
### Ordering information

| Description | Item no. |
| --- | --- |
| **Singlemode G.652 D fiber, UPC polishing, grade B performance** | |
| Orange tray, 12 simplex adapters, 12 pigtails, no Color code, heat shrink comb with protectors 1.5 × 40 mm | 84022860 |
| Yellow tray, 12 simplex adapters, 12 pigtails, no Color code, sandwich comb without protectors | 85002841 |
| | |
| **Singlemode G.657 D fiber, APC polishing, grade B performance** | |
| Green tray, 12 simplex adapters, 12 pigtails, no Color code, heat shrink comb with protectors 1.5 × 40 mm | 84132729 |
| | |
| **Multimode OM4 fiber, UPC polishing, low-loss performance** | |
| Heather violet tray, 12 simplex adapters, 12 pigtails, no Color code, heat shrink comb with protectors 1.5 × 40 mm | 85013398 |

# LISA Splice to Splice Module

## Ruggedized cable splicing

The ruggedized splicing solution with strain relief cable pigtails allows for direct fiber splicing. This reduces the amount of optical connections and line attenuation.

## CTS assemblies

CTS assemblies have a factory made strain relief element on one side and a connector on the other side. Installers simply have to splice the fibers in the fiber tray followed by patching to the equipment.

- Direct splicing to incoming fibers
- Up to 36 fibers (18 duplex assemblies) per module
- Strain relief element factory mounted
- Slotted fixing method on the module
- One side terminated cable pigtail
- Cable types:
  - Simplex cable 1.7 or 2.0 mm
  - Duplex cable figure 8 (zip cord) 1.7 x 3.5 mm

### Ordering information

| Description | Item no. |
| --- | --- |
| Blue fiber tray for assembling CTS assemblies, sandwich comb without protectors | 84136247 |

## Ruggedized pigtails

With the use of a fiber boot, standard patch cords can be directly spliced to network fibers. Slotted fiber tray front plates accommodate up to 16 fiber boots.
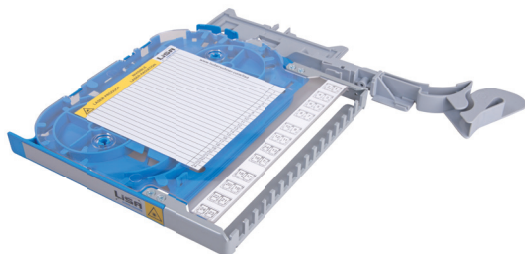
- Slotted fixing method for fast installation
- Compact design allows 16 glands per fiber tray
- No threaded nut required
- Two sizes of aramide cap
- Protective boot for cable sizes 1.4 to 2.6 mm and 2.7 to 3.2 mm
- Larger boot size is also suitable for 1.7 mm duplex cable

### Ordering information

| Description | Item no. |
| --- | --- |
| Blue fiber tray for assembling 12 ruggedized pigtails 2.6 mm, heat shrink comb with 24 protectors 1.5 × 40 mm | 84045875 |

# LISA Splice to Splice Module

## Splice through – direct cable to cable splicing

The LISA direct cable to cable splice tray is a single tray where the fibers are internally spliced. There are no external connectors.

- Fast splicing and reduced coiling time
- Lid with fiber identification
- Quick access to fibers (telescopic hinge)
- High density, up to 36 fibers on small footprint
- Bend radius control throughout
- Fiber overlength storage with integral heat shrink or sandwich splice comb

### Ordering information

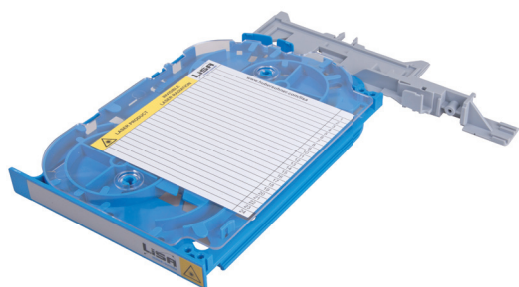| Description | Item no. |
| --- | --- |
| Blue splice through fiber tray, up to 24 splices, sandwich comb without protectors | 84045874 |
| Aqua splice through fiber tray, up to 24 splices, heat shrink comb 1.5 × 40 mm without protectors | 84086644 |
| Gray splice through fiber tray, up to 24 splices, sandwich comb without protectors | 84144605 |

## IFC cable splicing

The LISA fiber tray for IFC cables (inter-facility cables) allows splicing of up to 2 x 24 fibers of different cable types. The IFC cable will enter the tray from the right hand side by using a specific bracket and thus will be routed within our LISA CDR/NGR in the same manner as patch cords.
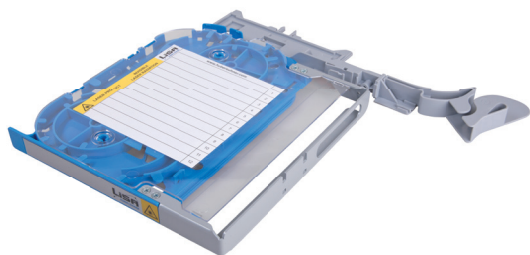
- IFC cable fixed to the LISA fiber tray to provide an effective connection
- Standard glanding of incoming loose tubes
- Each 12/24 fiber bundle is routed in different areas
- Fast splicing and reduced coiling time
- Easy fiber identification and labeling

### Ordering information

| Description | Item no. |
| --- | --- |
| Blue fiber tray for splicing IFC cables, heat shrink comb with 12 protectors 1.5 × 40 mm | 84071899 |
| Yellow fiber tray for splicing IFC cables, heat shrink comb with 12 protectors 1.5 × 40 mm | 84071905 |
| Green fiber tray for splicing IFC cables, heat shrink comb with 24 protectors 1.5 × 40 mm | 84127028 |

# LISA Next Generation Fiber Trays

LISA fiber trays are the side-facing connectivity blocks that are inserted into the tray units within high density CDR racks. Designed for speed of installation and improved accessibility, LISA fiber trays can be installed and removed in under 10 seconds.

Fiber trays are available to cover a wide range of applications including pigtail splicing and MTP-LC transitions. Within the data center the majority of splicing applications are singlemode LC because this combination provides a future-proofed infrastructure which is low-loss and precise in terms of cable slack management.

MTP-LC transitions on the other hand are generally multimode OM3 or OM4, allowing the operator to reuse the MTP backbone and upgrade it later to parallel optics up to 40G and 100G.

In addition to the pigtail splicing and transition fiber trays, HUBER+SUHNER also offer a patching fiber tray which is designed to serve the increasing trend towards MTP parallel optic applications. The patching tray is also suitable for singlemode LC patching in applications where fast, factory tested links are required.

# LISA Next Generation Fiber Trays

## Single color approach

- Gray colored tray with two labeling windows on front side
- Simple and individual adaptable color coding
- Easier inventory management

## New fixation cover

- Increased operational security
- Available in all base types 8 / 12 / 24 fiber
- No changes on the performance or polarities
- Increased enviromental effectness
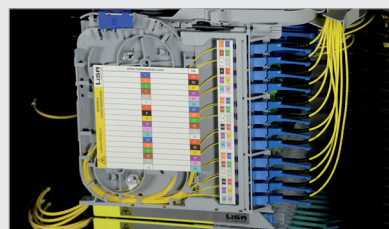
## Improved cable management

- Better slack cable management
- Improved bend radius tolerances
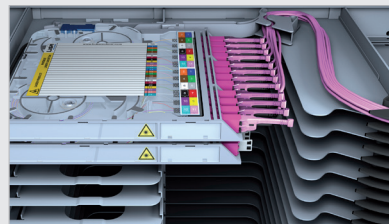
## Compatible and interchangeable

LISA current generation and Next Generation are compatible and interchangeable with standard LISA components.

# LISA Next Generation MTP Transition Modules
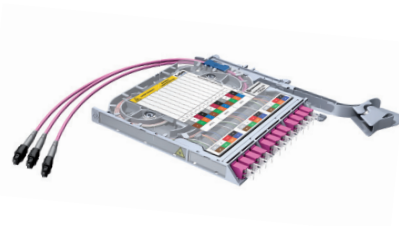
## Characteristics
- Pre-terminated MTP transition module for instant plug and play connectivity
- 8, 12 (single row) or 24 fiber (double row) MTP transition module
- Module access from the front with side-facing adapters
- MTP Elite® connectivity
- Super low-loss multimode OM4
- Patch cords horizontally supported and managed
- Highly protected fibers
- Upgrade path from 10G to 40G and 100G
- Easy traceability by color and label
- Fast installation and easy handling without tools
- Service position for immediate access to adapters

## Technical data

| Attribute | | Value |
|---|---|---|
| Dimension (W × H × D) | | 10.33 × 11.54 × 0.73 in |
| Rack unit | | 0.5 U |
| Capacitiy (maximum) | overall per module | up to 18 ports (36 fibers) |
| | overall per rack unit | 2 modules, up to 36 ports (72 fibers)<br>**Note**: for certain adapter types the maximum fiber count is limited |
| (without packaging: 350g / 12.35oz) | | yes |
| Ingress protection degree (EN60529) | | IP 20 |
| Resistance to impact (EN62262) | | IK 03 |
| Bending radius | | 1.2 in |
| Temperature resistance (long term) | | −40°C to +70°C (−40°F to +158°F) |
| UV resistance | | resistant |
| RoHS requirements | | fully compliant |

## Optical performance

| Performance classes patch field | Attenuation "reference measuring" | | | |
|---|---|---|---|---|
| | IEC 61300-3-4, method B | | IEC 61300-3-6 | |
| | IL max | IL mean | RL UPC | RL APC |
| Singlemode standard class | 0.30 dB | 0.20 dB | > 50 dB | > 85 dB [1] |
| Multimode standard class | 0.25 dB | n/a | > 35 dB | n/a |
| Multimode low-loss class | 0.15 dB | n/a | > 35 dB | n/a |
| **Performance classes MT** | | | | |
| Singlemode elite class | 0.35 dB | 0.10 dB | n/a | > 60 dB [1] |
| Multimode elite class | 0.35 dB [2] | 0.10 dB | > 30 dB | n/a |

[1] Measurement method 3 (OLCR)
[2] All connectors are tuned acc. to IEC 61755-3-1/2, grade B

# LISA Next Generation MTP Transition Modules

## Multimode OM3
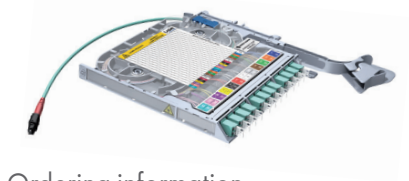
### Ordering information

| Description | Item no. |
|---|---|
| LC ports | |
| 1-way MTP tray, 24 fiber MTP24 female – elite class, 12 LC duplex ports – standard class, TIA code, polarity R1 | 85088664 |
| 2-way MTP tray, 24 fiber MTP12 male – elite class, 12 LC duplex ports – standard class, TIA code, polarity AS | 85088661 |
| 3-way MTP tray, 24 fiber MTP8 female – elite class, 12 LC duplex ports – standard class , TIA code, polarity NS | 85088658 |

## Multimode OM4

### Ordering information

| Description | Item no. |
|---|---|
| LC ports | |
| 1-way MTP tray, 24 fiber MTP24 female – elite class, 12 LC duplex ports – standard class, TIA code, polarity R1 | 85088671 |
| 2-way MTP tray, 24 fiber MTP12 male – elite class, 12 LC duplex ports – standard class, TIA code, polarity AS | 85088662 |
| 3-way MTP tray, 24 fiber MTP8 female – elite class, 12 LC duplex ports – standard class , TIA code, polarity NS | 85088659 |

## Singlemode

### Ordering information

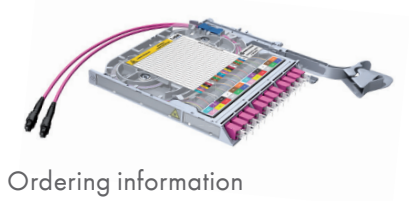| Description | Item no. |
|---|---|
| LC-UPC ports | |
| 2-way MTP tray, 24 fiber MTP12 male – standard class, 12 LC duplex ports – standard class, TIA code, polarity AS | 85086075 |
| 3-way MTP tray, 36 fiber MTP12 male – elite class, 18 LC duplex ports – standard class , TIA code, polarity AS | 85092876 |
| LC-APC ports | |
| 1-way MTP tray, 24 fiber MTP24 female – elite class, 12 LC duplex ports – standard class, TIA code, polarity R1 | 85088663 |
| 2-way MTP tray, 24 fiber MTP12 male – elite class, 12 LC duplex ports – standard class, TIA code, polarity AS | 85088660 |
| 3-way MTP tray, 24 fiber MTP8 female – elite class, 12 LC duplex ports – standard class , TIA code, polarity NS | 85088657 |
| 3-way MTP tray, 36 fiber MTP12 male – elite class, 18 LC duplex ports – standard class , TIA code, polarity AS | 85088080 |

# LISA Next Generation Splice to Patch Fiber Trays
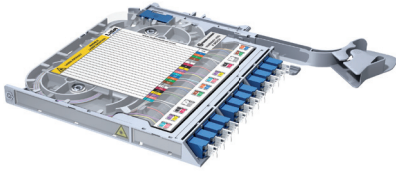
## Characteristics
- Quick installation and easy handling without tools
- Module access from the front with side-facing adapters
- Pull-out and hinge-down function for service - offers immediate access to internal fibers
- Side-facing adapter alignment for added laser safety
- Pull-out feature with service loop offers immediate access to adapters
- Patch cords horizontally supported and managed
- Incoming fibers and pigtail fibers are stored in separate areas
- Pigtails pre-stripped to 250 µm for faster splicing
- Both fiber storage areas provide storage space for 1.5 m of 250 µm fiber
- Central splice bridge fitted to secure heat shrink and sandwich splice protectors
- Retaining tabs on different height levels for faster insertion of fibers
- Designed with bend radius limiting geometry of 1.2 in minimum
- Easy to understand labeling and highly visible color coding

## Technical data

| Attribute | | Value |
|---|---|---|
| Dimension (W × H × D) | | 10.33 × 11.54 × 0.73 in |
| Rack unit | | 0.5 U |
| Capacitiy (maximum) | overall per module | up to 36 splices/fibers |
| | overall per rack unit | 2 modules, up to 72 splices/fibers<br>**Note**: for certain adapter types the maximum fiber count is limited |
| Conduit fastening ( 5 mm) | | up to 4 conduits |
| (without packaging: 350g / 12.35oz) | | yes |
| Ingress protection degree (EN60529) | | IP 20 |
| Resistance to impact (EN62262) | | IK 03 |
| Bending radius | | 1.2 in |
| Temperature resistance (long term) | | −40°C to +70°C (-40°F to +158°F) |
| RoHS requirements | | fully compliant |

## Optical performance

| Type | Measurement method (IL/RL) | IL (dB) | RL (dB) |
|---|---|---|---|
| SM UPC | IL: IEC 61300-3-4 method B | ≤ 0.30 | ≥ 50 |
| SM APC | RL: IEC 61300-3-6 | ≤ 0.30 | ≥ 65 |
| MM OM3 | IL: IEC 61300-3-34 method B | ≤ 0.25 | ≥ 35 |
| MM OM4 | RL: IEC 61300-3-6 | ≤ 0.15 | ≥ 35 |

# LISA Next Generation Splice to Patch Fiber Trays

## LC connectivity
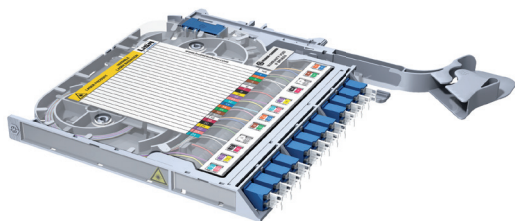


### Ordering information

| Description | Item no. |
|---|---|
| **Singlemode G.652 D fiber, UPC/APC polishing, standard performance** | |
| 12 LC duplex adapters PC, 24 pigtails, no Color code, sandwich comb without protectors 1.5 × 40 mm | 85088674 |
| 12 LC duplex adapters PC, 24 pigtails, no Color code, heat shrink comb with protectors 1.5 × 40 mm | 85088090 |
| **Singlemode G.652 D fiber, APC polishing, standard performance** | |
| 12 duplex adapters, 24 pigtails, no color code, heat shrink comb with protectors 1.5 × 40 mm | 85088093 |
| **Multimode OM3 fiber, UPC polishing, standard performance** | |
| 12 duplex adapters, 24 pigtails, TIA color code, heat shrink comb with protectors 1.5 × 40 mm | 85088675 |
| **Multimode OM4 fiber, UPC polishing, standard performance** | |
| 12 duplex adapters, 24 pigtails, TIA color code, heat shrink comb with protectors 1.5 × 40 mm | 85088676 |

## SC connectivity
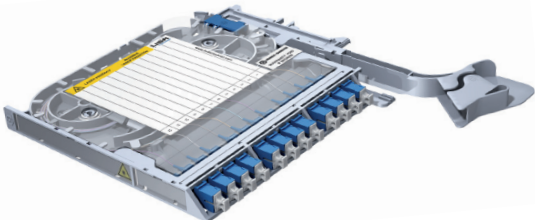


### Ordering information

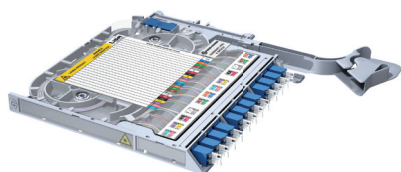| Description | Item no. |
|---|---|
| **Singlemode G.652 D fiber, UPC polishing, grade B performance** | |
| 12 simplex adapters, 12 pigtails, no color code, heat shrink comb with protectors 1.5 × 40 mm | 85088494 |

# LISA Next Generation Fiber Tray – Splitter / PLC module

## Characteristics
- Quick installation and easy handling without tools
- Module access from the front with side-facing adapters
- Pull-out and hinge-down function for service – offers immediate access to internal fibers even during service
- Side-facing adapter alignment for added laser safety
- Pull-out feature with service loop offers immediate access to adaptors
- Patch cords horizontally supported & managed
- Incoming fibers and pigtail fibers are stored in separate areas
- Both fiber storage areas provide storage space for 1.5 m of 250 µm fiber
- Central splitter bridge
- Designed with bend radius limiting geometry of 30mm minimum
- Easy to understand labeling and highly visible port coding
- Service position for immediate access to adaptors

## Technical data

| Attribute | Value |
| --- | --- |
| Dimension (W × H × D) | 10.33 × 11.54 × 0.73 in |
| Rack unit | 0.5 U |
| Capacitiy (maximum)   overall per module | 1 pcs     1 x 32 broadband PLC splitter<br>2 pcs     1 x 8 broadband PLC splitter<br>12 pcs    2 x 2 broadband PLC splitter<br>4 pcs     1 x 8 broadband PLC splitter<br>**Note**: for certain adapter types the maximum fiber count is limited |
| Ingress protection degree (EN60529) | IP 20 |
| Resistance to impact (EN62262) | IK 03 |
| Bending radius | 1.2 in |
| Temperature resistance (long term) | −40°C to +70°C (−40°F to +158°F) |
| RoHS requirements | fully compliant |

# LISA Next Generation Fiber Tray – Splitter / PLC module
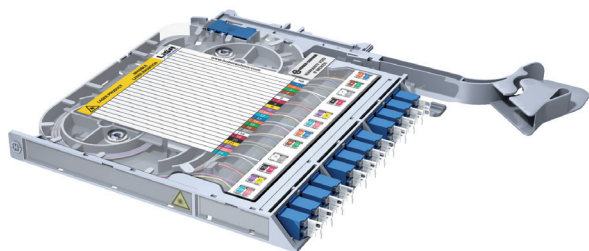
## Ordering information

| Description | Item no. |
|---|---|
| Splitter integration module: LC connectivity | |
| 1 pcs 1 × 32 broadband PLC splitters, input and output on LC/APC, polished within standard performance class | 85088499 |
| 2 pcs 1 × 8 broadband PLC splitters, input and output on LC/APC, polished within standard performance class | 85088498 |
| 12 pc 2 x  2 broadband PLC splitter, input and output on LC/APC, polished within grade B performance class | 85088099 |
| 4 pcs 1 × 8 broadband PLC splitter, input and output on LC/APC, polished within grade B performance class | 85088500 |

# LISA Patching Solution

LISA patching trays are generally used to build a cross-connect configuration either within the same LISA rack or between adjacent racks with the highest flexibility when using pre-terminated, factory tested cable systems.

Cable systems can be patched easily thanks to a sliding and pivoting design.  Cables enter the trays from the left or right side, and are horizontally managed before entering the patching tray. This unique system differs from other patching trays because the tray is side facing and not forward facing. This means that cables connected to both sides of the LISA patching tray can be accessed simply by sliding the tray out. All cables that enter/exit the LISA patching tray have an integrated service loop so that removal and insertion of one cable can be made with minimal disruption to the remaining cables.

In today's networks, the LISA patching trays provide a simple upgrade path from LC-based 10G systems to MTP-based 40/100G systems. This is possible because each tray (and connection) can be upgraded individually.

# LISA Patch to Patch Module
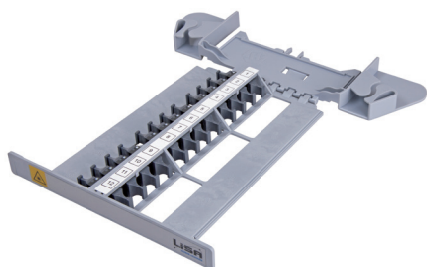
## Characteristics
- MTP, LC or SC connectivity
- Up to 12 adapters per tray
- Fast installation without tools
- Module access completely from the front
- Side facing adapter alignment for higher laser safety
- Patch cords horizontally supported
- Full 1.2 in bend-radius limitation throughout
- Upgrade path from 10G to 40G and 100G
- Clear labeling for quick identification and traceability

## Technical data

| Attribute | | Value |
|---|---|---|
| Dimension (W × H × D) | | 9.5 x 0.7 x 10.1 in |
| Rack unit | | 0.5 U |
| Capacitiy (maximum) | overall per module | up to 12 channels |
| | overall per rack unit | 2 modules, up to 24 channels |
| RoHS requirements | | fully compliant |
| Ingress protection degree (EN60529) | | IP20 |
| Resistance to impact (EN62262) | | IK03 |
| Bend radius limitation | | 1.2 in |
| Temperature resistance (long term) | | −40 to +70 °C (−40 to +158 °F) |

# LISA Patch to Patch Module

## MTP connectivity
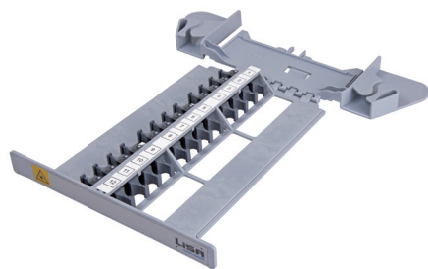
### Ordering information

| Description | Item no. |
| --- | --- |
| Patching tray, 12 MTP adapter, key-up/key-down | 85015429 |

## LC connectivity
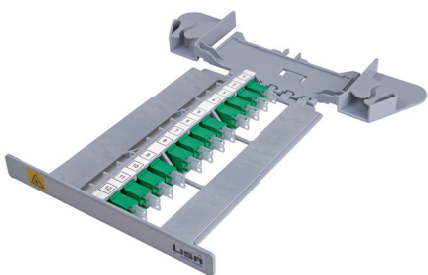
### Ordering information

| Description | Item no. |
| --- | --- |
| Patching tray, 12 LC APC duplex adapters green | 85024771 |
| Patching tray, 6 LC UPC duplex adapters blue | 85065139 |
| Patching tray, 12 LC UPC duplex adapters blue | 85074415 |

## SC connectivity
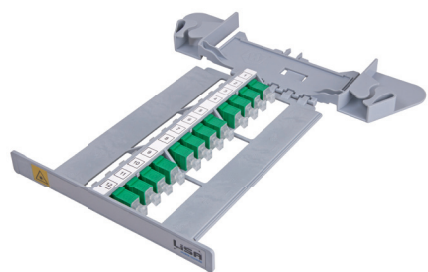
### Ordering information

| Description | Item no. |
| --- | --- |
| Patching tray, 12 SC APC simplex adapters | 85024769 |
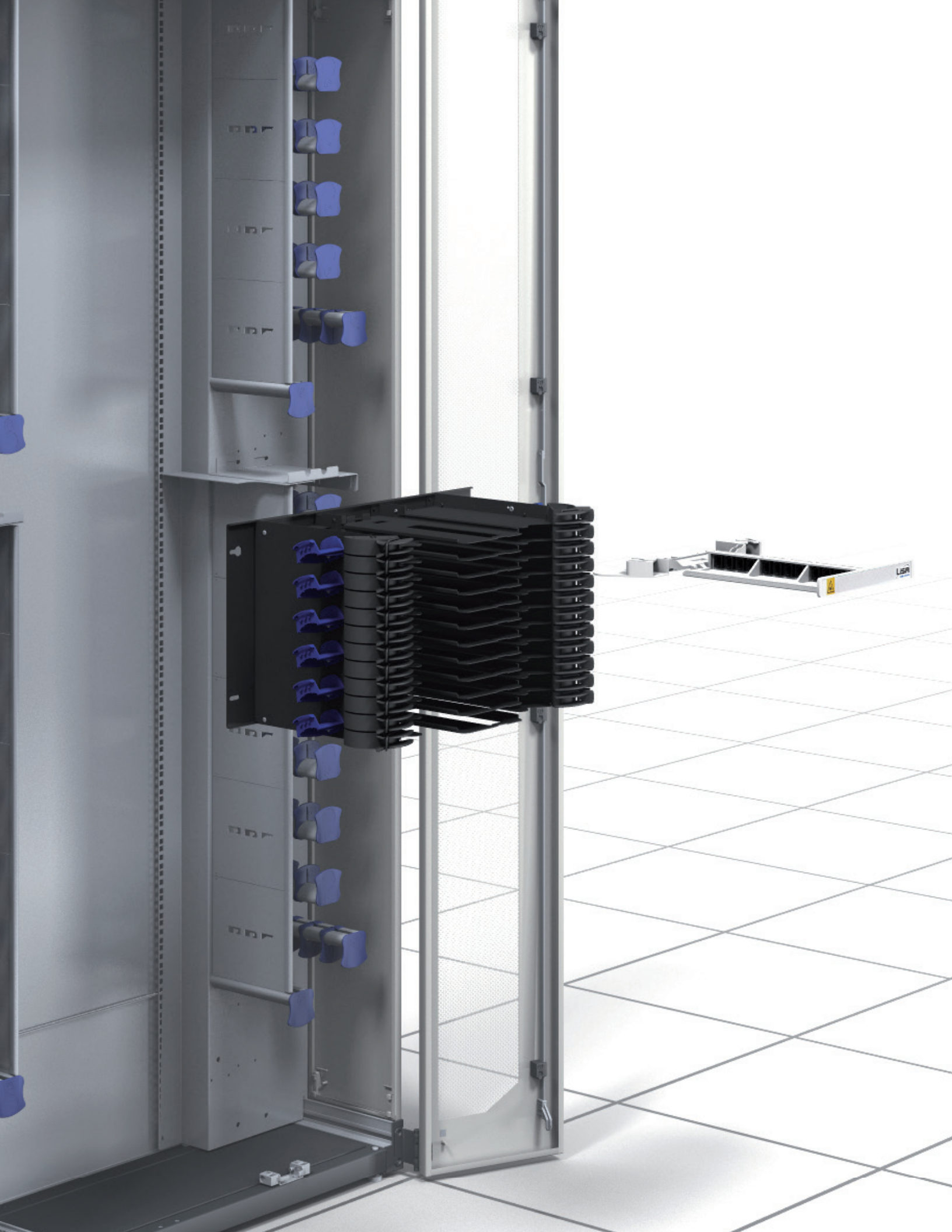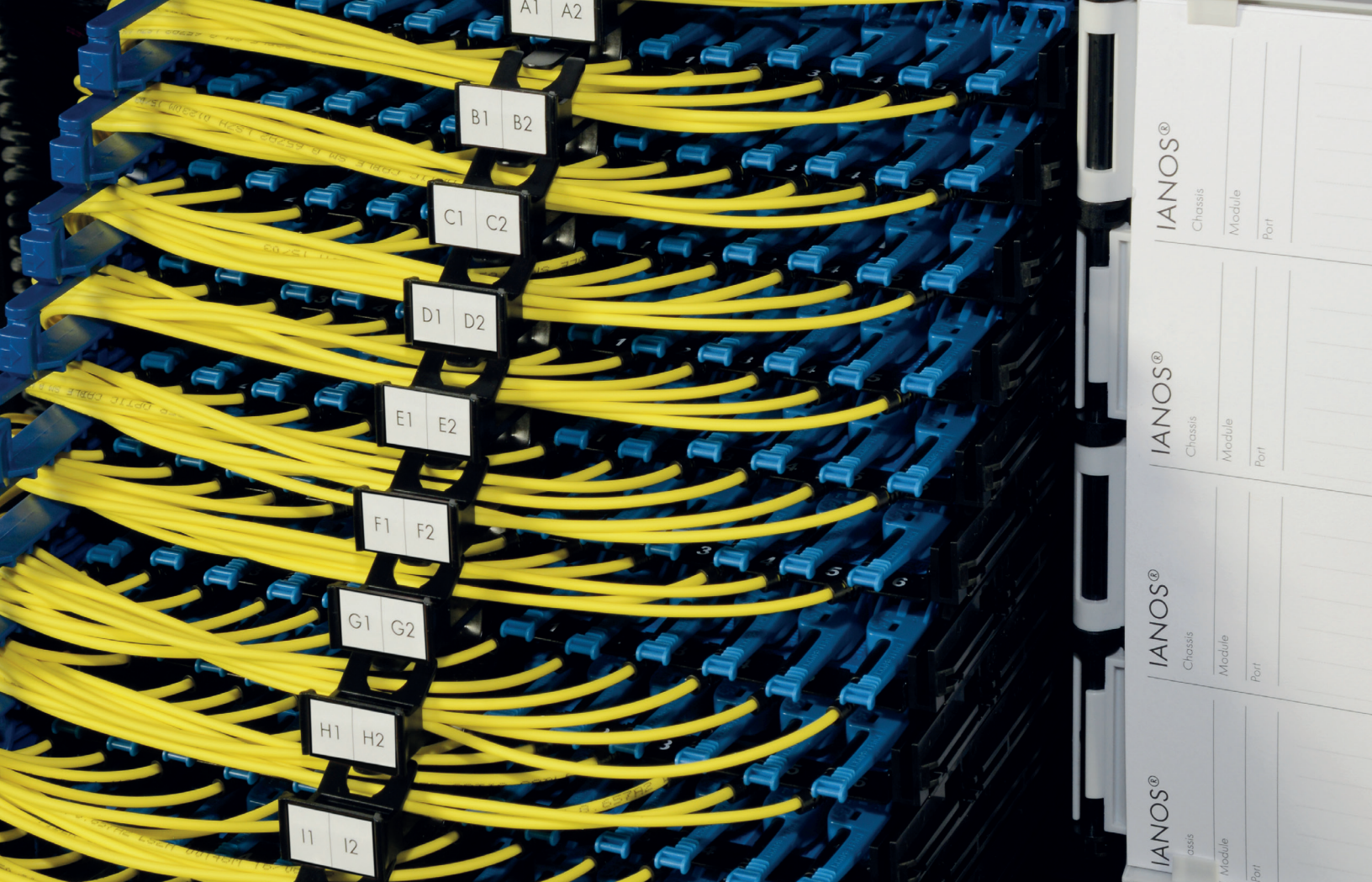
# IANOS

The IANOS family of high density fiber management from HUBER+SUHNER is a state of the art fiber optic management system which facilitates fast, flexible and future-proofed connectivity in the structured cabling market. As its name suggests, "IANOS" (as in Roman mythology) looks to the past as well as to the future. This means that IANOS is a combination of previous experience and valuable insight into the future.

Networks are constantly adapting to reflect the demands placed on them, and today's fiber management systems need to accommodate these changes with the minimum amount of cost, time and disruption. As networks evolve, we see a broad mixture of applications and data rates depending on the location, the business model and of course the data demand. IANOS accommodates these changes by offering the widest range of connectivity scenarios in a single generic platform.

# IANOS 4U chassis

The IANOS 4U chassis is designed for high density applications where connections to high density blade servers and switches are required in the same or adjacent racks. Generally mounted above or below switches, the IANOS 4U chassis supports up to 576 fibers (288 ports) in LC duplex. The split design of the IANOS chassis allows users to separate redundant cable feeds down different sides of the equipment cabinet so that there is less risk of disruption to live traffic.

# IANOS 1U chassis

The IANOS 1U chassis is designed for medium to high density applications where connections to servers and switches are required in the same or adjacent racks. Generally mounted at the top of equipment cabinets, the IANOS 1U chassis supports up to 144 fibers (72 ports) in LC duplex or the IANOS lite chassis supports up to 96 fibers (48 ports). The split design of the IANOS chassis allows users to separate redundant cable feeds down different sides of the equipment cabinet so that there is less risk of disruption to live traffic.

# IANOS 19" Chassis 1U and 4U

### Characteristics
- Up to 12 modules/72 ports (LC duplex/MTP) per 1U space
- Insertion and removal of drawers and modules with one hand
- Horizontal opening front-door, separate redundant paths
- Labeling within front-door or as a slide-out system from within the chassis central dividing element
- Single-handed handling of drawers and modules
- Same modules for all IANOS applications
- Optional rear cable manager with divider plate (left/right)

IANOS chassis are high density scalable sub-racks designed to accommodate the next generation of data rates and transceivers in rapidly evolving network services. Available in 1U or 4U increments, the IANOS chassis delivers industry leading density and best in class handling across almost every application be it splicing, pre-terminated cables or direct patching.

IANOS modules can be inserted from the front or the rear of the chassis and it is possible to mix and match any of the IANOS single or double modules in the same individual chassis. Unlike other fiber panels on the market, the IANOS chassis has a split design separating the left hand side of the chassis from the right hand side. This means that users are able to access just one half of the connectivity row without disrupting pre-installed business-critical fibers. The unique central door system of the IANOS chassis further acts as a clear separation element between the two sides of the panel, and users are deliberately prevented from crossing fibers from one side of the chassis to the other. This split-panel principle also helps to maintain redundant cable paths and reduces the risk of possible downtime.

## Technical data

| Attribute | Value |
| --- | --- |
| Rack unit | 1U and 4U |
| Mounting type | standard 19 in rails |
| Dimensions (W × D × H) | 1U: 19 × 12.9 × 1.7 in<br>4U: 19 × 12.9 × 6.97 in |
| Weight | 1U: 8.0 lb<br>4U: 27.3 lb |
| Material | chassis and drawers: stainless steel powder coated<br>other components: UPC/ABS |
| Color | gray housing (RAL 7047) with blue control elements |
| Capacity | 1U: up to 12 × IANOS modules<br>4U: up to 48 × IANOS modules |
| Density | 1U: up to 72 ports (LC duplex/MTP)<br>4U: up to 288 ports (LC duplex/MTP) |

## Environmental data for all chassis and modules

| Attribute | Value |
| --- | --- |
| Free of halogen | yes |
| 2011/65/EC (RoHS) | fully compliant |

# Key Features IANOS Chassis

## Clearer and faster identification

The IANOS chassis is fully loaded with numerous identification areas for clearer and faster traceability. Doors can be labelled for identification or to show redundant feeds. Patching rows, module positions and of course port positions are all clearly marked on the product itself. There is even a slide out label in the center of the chassis for additional information.

## Quick and easy access to patch cords

Because the IANOS chassis is constructed with three sliding trays on the left and right side of the chassis, access to connectors is fast and easy. Each tray can be slid out independently so that there is minimum disruption to pre-installed cords.

## Split design for improved cable separation

Standardisation bodies such as TIA and IEC recommend that redundant cable paths are created in the data center. The IANOS system facilitates this by completely separating cables entering or exiting the chassis. The benefit of this is zero disruption to redundant paths and much clearer identification of live/redundant traffic.
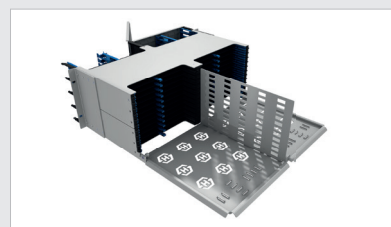
## IANOS chassis 1U, 4U and zero-space

### Ordering information

| Description | Item no. |
| --- | --- |
| IANOS 1U chassis, gray, for up to 12 × IANOS modules * | 85069469 |
| IANOS 4U chassis, gray, for up to 48 × IANOS modules * | 85069470 |
| IANOS 1U rear cable manager, gray | 85069473 |
| IANOS 4U rear cable manager, gray | 85069474 |
| IANOS zero space chassis, gray, for up to 6 IANOS modules | 85069471 |

* Chassis supplied with standard white label and front doors. Rear cable manager needs to be ordered separately.

# IANOS Lite 19" Chassis 1U



Standard version
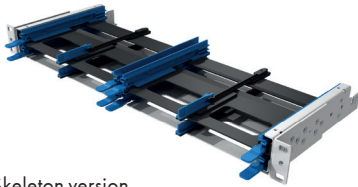


Skeleton version

## Characteristics
- High density sub-rack for up to 8 modules 48 x ports (LC-duplex/MTP) per 1U space
- Quick and simple installation of sub-rack, modules and cables
- Insertion of single and double modules from the rear and front
- Easy access and protection of ports through horizontal opening front door (Optional)
- Fixed tray design
- Labeling within front-door or as a slide-out system
- Compatible to all double or single IANOS modules

IANOS Lite chassis are high density scalable sub-racks designed to accommodate the next generation of data rates and transceivers in the rapidly evolving structured cabling market. Available in 1U increments, the IANOS lite chassis delivers industry leading density and best-in-class handling across almost every application be it splicing, pre-terminated cables or direct patching.

IANOS modules can be inserted from the front or the rear of the chassis and can be mixed and matched with any of the IANOS single or double modules in the same individual chassis. Unlike other fiber panels on the market, the IANOS lite chassis has a non-moving tray design. This means that end-users are able to access connectivity rows without disrupting pre-installed business-critical fibers by sliding modules out of the chassis. The unique central door system of the IANOS chassis further acts as a clear separation element between the two sides of the panel assuring that users are deliberately prevented from crossing fibers from one side of the chassis to the other. This split-panel principle also helps to maintain redundant cable paths and reduces the risk of possible downtime.

## Technical data

| Attribute | | Value |
|---|---|---|
| Rack unit | | 1U |
| Mounting type | | standard 19 in  rails |
| Dimensions (W × D × H) | Skeleton version:<br>Standard version: | 19 × 11.9 × 1.7 in<br>19 ×  8.6 × 1.7 in |
| Weight | Skeleton version:<br>Standard version: | 1.6 lb<br>2.3 lb |
| Material | | Chassis and drawers: stainless steel powder coated<br>Other components: UPC/ABS |
| Color | | gray housing (RAL 7047) with blue control elements |
| Capacity | | 1U: up to 8 × IANOS modules |
| Density | | 1U: up to 48 ports (LC duplex/MTP) |

## Environmental data for all chassis and modules

| Attribute | Value |
|---|---|
| Free of halogen | yes |
| 2011/65/EC (RoHS) | fully compliant |

# Key Features IANOS Lite 19" Chassis

## Quick and easy access to patch cords

The IANOS lite chassis is designed to provide easy handling as wall as fast and complete access to the connectors. The unique design also allows installers easy access from the back and the front of the IANOS lite chassis when installing fibers. Cable guides allow for safe handling and routing of the patch cords on both sides.
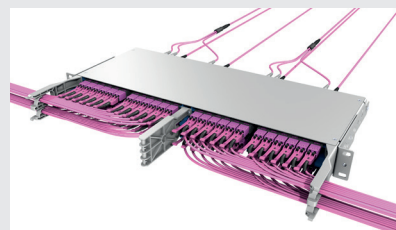
## No disruping of live patch cords

The fixed tray design provides highly secure connections with no disruption to pre-installed patch cords and modules. The simple design of the chassis and extra space between the modules allows the addition or removal of patch cords even when other connections are live. This in turn reduces the risk of downtime and damage to the patch cords.

## Fast MAC's

Because the modules do not need to be moved during patching, a fast and straight forward approach is possible. The integrated cable management system enables easy, quick and scalable cabling throughout the lifecycle of your network.
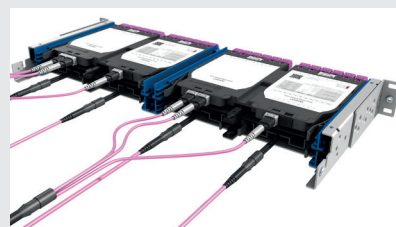
# IANOS Lite Chassis 1U, Standard and Skeleton

## Chassis
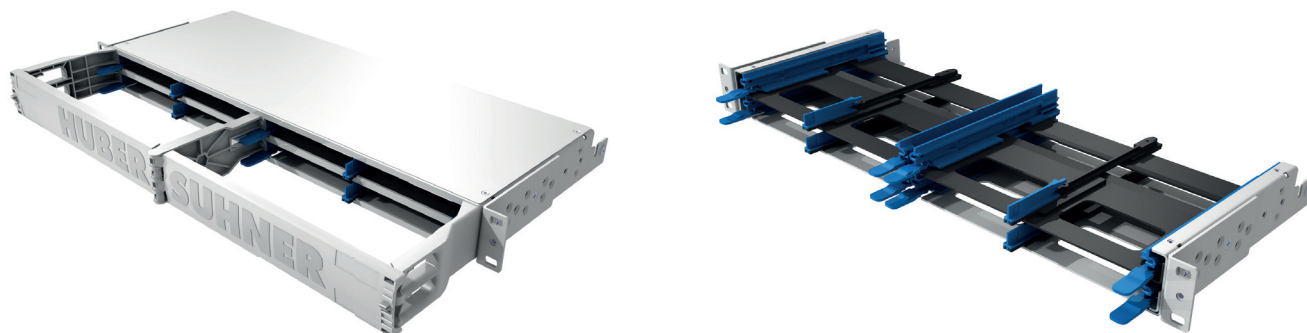
## Ordering information

| Description | Item no. |
|---|---|
| IANOS lite standard 1U chassis, gray for up to 8 x IANOS modules | 85086220 |
| IANOS lite skeleton 1U chassis, gray for up to 8 x IANOS modules | 85089215 |

## Chassis accessories

## Ordering information

| Description | Item no. |
|---|---|
| IANOS-LITE-SIDE-CABLE-MGT-T4 | 85089277 |
| IANOS-LITE-CENT-CABLE-MGT-T4 | 85089214 |
| IANOS 1U rear cable manager, gray | 85069473 |
| IANOS blanking plate | 85086306 |
| IANOS mandrel set | 85085974 |

# HUBER+SUHNER Fiber Base Types

A wide variance of different backbone types allows you to satisfy your immediate requirements but also offers you the scalability and upgradability required for the future.  HUBER+SUHNER offers a wide range of backbone solutions (Base-2, Base-8, Base-12 and Base-24).  This broad range of solutions allows for an easy upgrade from today's 10G links to future 40G or 100G links.

## Base-2

The Base-2 system is based on LC trunks in the backbone. The Base-2 system is generally used in single mode applications where the ability to upgrade to higher data rates is guaranteed by the optical performance of the fiber.

## Base-8

The Base-8 system is based on pinned MTP trunks in the backbone. The Base-8 system is SR4 ready which means that the backbone connectivity has the same fiber count as the SR4 transceiver. This matched connectivity means that customers can patch directly to SR4 transceivers without having to convert connectors with different fiber counts or waste excess fibers in the backbone.

## Base-12

The Base-12 system is based on un-pinned trunks in the backbone. The Base-12 system is partially SR4 ready because unlike the Base-8 system, Base-12 does not utilize all of the fibers in the backbone when patched directly with SR4 transceivers. Multiple Base-12 connectors can be combined and then converted so that full fiber utilization can still be achieved.

## Base-24

Base-24 is generally deployed for 100G parallel links running over SR10 transceivers. Normally these links are between two high data-rate switches as opposed to switch to server.

# IANOS Modules

IANOS modules are interchangeable connectivity blocks that can be inserted into the IANOS chassis from the front and rear side. A wide range of different modules are available to cover many different applications such as patching, splicing, transition and conversion. Single and double modules are available to give users a higher degree of flexibility and choice as to how they want to build their fiber optic infrastructure.

IANOS modules are extremely compact as well as lightweight and can easily be inserted and removed as the infrastructure evolves. Operators who upgrade their infrastructure to higher data rates can remove their legacy 10G modules, then replace them with modules more suitable for 40G and 100G for example. This building block approach is what makes the IANOS system so scalable and adaptive.

All of the IANOS modules contain high-performance optical fibers and components so that the total hardware loss is reduced to an absolute minimum. This is important in higher data rate environments because allowable optical budgets are significantly lower at 40G and 100G than they are for legacy 1G and 10G systems. This enhanced performance helps operators to maintain flexibility whilst achieving performance.

# Key Features IANOS Modules

## Color-coded MTP adapters

A unique feature of the IANOS patching module is color coded adapters by Base-type. Colored frames are added to the outer face of the adapter so that users can quickly identify MTP types. This color scheme is also continued through the cable system portfolio so that users can visually check that the correct trunks or cords are connected together.
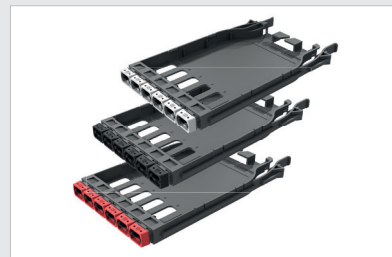
## Polarity flippable adapters

The MTP adapter fitted to all IANOS modules can be removed and rotated so that the polarity can be adjusted in the field. This allows users to convert a type A adapter (key-up to key-down) to a type B adapter (key-up to key-up). A clear marking is provided on the top of the adapter to show the type being deployed.

## Supported by high performance HUBER+SUHNER harnesses

The IANOS patching modules can either be fed from the rear with a trunk cable or alternatively harnesses can be connected to the front of the module. The HUBER+SUHNER cable harnesses are extremely compact both in terms of cable diameter and furcation body. These two products compliment each other superbly and offer the customer a total solution that is compact as well as optimized for performance and handling.
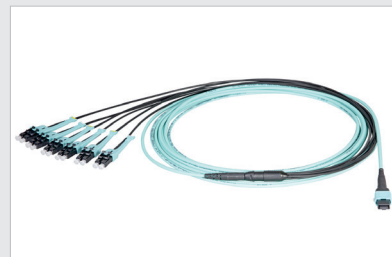
# IANOS Patching Modules
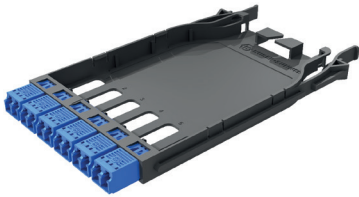
## Characteristics

- 6 x adapters per module (LC duplex/MTP/SC simplex)
- Fast and tool-less installation
- Cable guide at rear
- Facilitates patching to transceiver
- Available in Singlemode and Multimode OM3/OM4 performance
- Compatible with IANOS 1U/4U and zero space chassis
- Color coded LC adapters by performance
- Color coded MTP adapter shrouds by Base-type

The IANOS patching module is a straight through MTP or LC patching field which allows trunk cables to be connected directly to patch cords or harnesses. In Base-2 singlemode applications, the IANOS patching module provides a fast plug and play alternative to fusion splicing. For MTP multimode applications, the patching module is designed to facilitate end-to-end parallel optics using Base-8, Base-12 or Base-24 connectivity.

## Technical data

| Attribute | | Value |
|---|---|---|
| Product family | | IANOS |
| Suitable for | | Chassis<br>Zero space chassis |
| Dimensions (W × D × H) | | 3.81 × 6.77 × 0.47 in |
| Material | | PC/ABS |
| Color | | black (RAL 9005) |
| Number of adapters | front | 6 × LC duplex adapter/6 × MTP adapters/ 6x SC simplex |
| | rear | n/a |
| Adapter types | front | LC duplex/MTP key-up/key-down (reversible to key-up/key-up if needed) |
| | rear | n/a |
| Adapter Colors | LC | blue (SM/UPC)<br>aqua (MM/OM3/OM4) |
| | MTP MM | black body/gray shroud (8 fiber)<br>black body/black shroud (12 fiber)<br>black body/red shroud (24 fiber) |
| | MTP SM | green body/gray shroud (8 fiber)<br>green body/black shroud (12 fiber)<br>green body/red shroud (24 fiber) |
| | SC | black (SM/MM) |

# Key Features Patching Modules

## Simpler upgrades with MTP patch and LC harness

As networks migrate to higher data rates, the LC connector is being replaced by the MTP connector. MTP is generally used to aggregate 10G server connections to 40G and 100G switch ports. Because the majority of LC-MTP upgrades are at the switch end, it makes sense to deploy a MTP patch module in the switch rack and then run harnesses to the server.
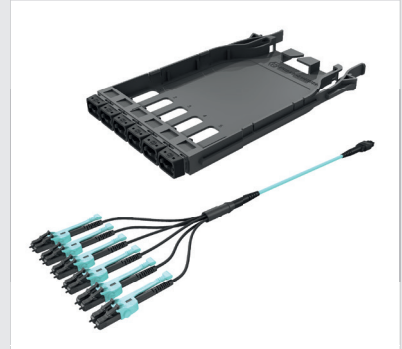


## Quick feed-through functionality to pre-installed modules

The IANOS patching module incorporates a cable guiding system at the rear of the module which facilitates fast and simple installation of trunk cables. Trunk cables are terminated on the back of the adapter while patch cords are terminated on the front of the adapter.
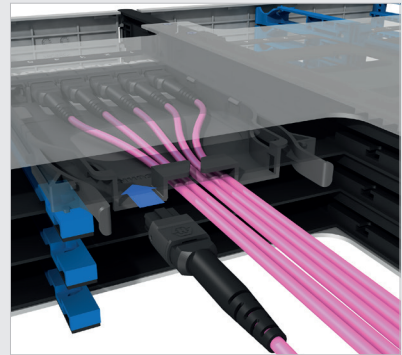
# IANOS Patching Modules

## Ordering information
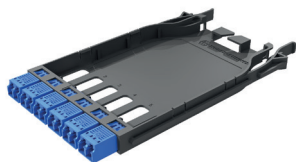
| Description | Item no. |
|---|---|
| Patching module, single size, Base-2, 6 × LCD adapter blue, Singlemode UPC | 85072924 |
| Patching module, single size, Base-2, 6 x LCD adapter green, Singlemode APC | 85073353 |
| Patching module, single size, Base-2, 6 × LCD adapter aqua, Multimode UPC (OM3/OM4) | 85073354 |
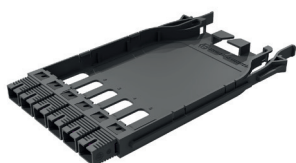
## Ordering information

| Description | Item no. |
|---|---|
| Patching module, single size, Base-1, 6x SC simplex adapter black, Singlemode and Multimode (OM3/OM4) | 85083805 |

## Ordering information

| Description | Item no. |
|---|---|
| Patching module, single size, Base-8, 6 × MTP8 adapter body black, shroud gray, key-up/key-down | 85072925 |
| Patching module, single size, Base-8, 6 x MTP8 adapter body black, shroud gray, key-up/key-up | 85072926 |
| Patching module, single size, Base-8, 6 x MTP8 adapter body green, shroud gray, key-up/key-down | 85072928 |

# IANOS Patching Modules

## Ordering information

| Description | Item no. |
|---|---|
| Patching module, single size, Base-12, 6 × MTP12 adapter body black, shroud black, key-up/key-down | 85072929 |
| Patching module, single size, Base-12, 6 × MTP12 adapter body black, shroud black, key-up/key-up | 85072930 |
| Patching module, single size, Base-12, 6 × MTP12 adapter body green, shroud black, key-up/key-down | 85072927 |

## Ordering information

| Description | Item no. |
|---|---|
| Patching module, single size, Base-24, 6 × MTP24 adapter body black, shroud red, key-up/key-down | 85072931 |
| Patching module, single size Base-24, 6 x MTP24 adapter body black, shroud red, key-up/key-up | 85072932 |

# IANOS MTP-LC Transition Modules

### Characteristics
- MTP to LC transition
- Single and double modules available
- Fast and tool-less installation
- Facilitates patching to transceiver
- Available for Base-8, 12 and 24
- Available in Multimode OM3/OM4 and Singlemode performance
- Compatible with IANOS 1U/4U and zero space chassis
- Color coded LC adapters by performance
- Color coded MTP adapter shrouds by Base-type

IANOS transition modules convert MTP backbone cables to LC connectivity at the front of the module so that LC patch cords can be connected to nearby active equipment. Generally used for lower data rates such as 1G, 10G or 16G. IANOS transition modules offer users the possibility to upgrade their LC based links in the future simply by replacing the transition module with an MTP based conversion module, patching module or conversion harness. Transition modules are available in single or double versions and are suitable for Base-8, Base-12 or Base-24 MTP backbones.

## Technical data

| Attribute | | Value |
|---|---|---|
| Product family | | IANOS |
| Suitable for | | chassis/zero space chassis |
| Dimensions (W × D × H) | | single module 3.8 × 6.8 × 0.5 in<br>double module 7.7 × 6.8 × 0.5 in |
| Material | | UPC/ABS |
| Color | | black (RAL 9005) |
| Adapter types | front | LC duplex |
| | rear | MTP 8, 12 or 24 (key-up/key-down) |
| Adapter Colors | LC | aqua (MM/OM3), heather violet (MM/OM4), blue (SM/OS2) |
| | MTP MM | black body/gray shroud (8 fiber)<br>black body/black shroud (12 fiber)<br>black body/red shroud (24 fiber) |
| | MTP SM | green body/gray shroud (8 fiber)<br>green body/black shroud (12 fiber)<br>green body/red shroud (24 fiber) |
| Ferrule | LC | zirconia ceramic |
| | MTP | composite |

## Optical data

| Attribute | Value |
|---|---|
| Fiber count | single module 8 or 12, double module 24 |
| Fiber type | Multimode 50/125 µm OM3<br>Multimode 50/125 µm OM4<br>Singlemode 9/125 µm OS2 |
| Module insertion loss | MM OM3: ≤0.45 dB<br>MM OM4: ≤0.35 dB<br>SM OS2: ≤0.50 dB |
| Module return loss | MM OM3: ≥30 dB<br>MM OM4: ≥30 dB<br>SM OS2 UPC: ≥50 dB<br>SM OS2 APC: ≥60 dB |

# Key Features Transition Modules

## MTP 10G systems that are upgradeable in the future

Transition modules using MTP connectivity at the rear of the module allows users to build an upgradeable backbone suitable for 40G or 100G in the future. Deploying MTP in the backbone also offers users a high degree of flexibility when connecting different types of interfaces and equipment.

**40G/100G**

**1G/10G**

## Single and double modules for increased flexibility

Having the flexibility of a single or double module in the IANOS portfolio is crucial for many applications. The double module offers improved routing space and handling when splicing cables. It also allows high fiber-count trunk cables to be better utilized in the chassis. A Base-8 double module supports a trunk cable that has 24 fibers and splits to 3 x 8 fiber MTPs at the rear of the module. This reduces the size and installation time of the cable and also provides 100 % port density in the chassis.

## Low-loss performance 0.35 dB

As data rates increase in a network, the distance over which you can transmit data is reduced significantly. Furthermore, the total optical loss budget is also lowered at higher data rates. To compensate this effect, you need to deploy super low-loss components in all areas of the link so that flexibility can be maintained without compromising performance.

# IANOS MTP-LC Transition Modules

## Ordering information

| Description | Item no. |
| --- | --- |
| Transition module, single size, Base-8, front 4 × LCD adapter aqua, rear 1 × MTP8, non-pinned, adapter body black, shroud gray, key-up/key-down, MM OM3, polarity NS | 85072938 |
| Transition module, double size, Base-8, front 12 × LCD adapter aqua, rear 3 × MTP8, non-pinned, adapter body black, shroud gray, key-up/key-down, MM OM3, polarity NS | 85072954 |
| Transition module, single size, Base-8, front 4 × LCD adapter heather violet, rear 1 × MTP8, non-pinned, adapter body black, shroud gray, key-up/key-down, MM OM4, polarity NS | 85072939 |
| Transition module, double size, Base-8, front 12 × LCD adapter heather violet, rear 3 × MTP8, non-pinned, adapter body black, shroud gray, key-up/key-down, MM OM4, polarity NS | 85072955 |
| Transition module, single size, Base-8, front 4 × LCD adapter blue, rear 1 × MTP8, non-pinned, adapter body green, shroud gray, key-up/key-down, SM OS2 UPC, polarity NS | 85072940 |
| Transition module, double size, Base-8, front 12 × LCD adapter blue, rear 3 × MTP8, non-pinned, adapter body green, shroud gray, key-up/key-down, SM OS2 UPC, polarity NS | 85072956 |

## Ordering information

| Description | Item no. |
| --- | --- |
| Transition module, single size, Base-12, front 6 × LCD adapter aqua, rear 1 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, MM OM3, polarity AS | 85072942 |
| Transition module, single size, Base-12, front 6 × LCD adapter aqua, rear 1 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, MM OM3, polarity AP | 85072943 |
| Transition module, double size, Base-12, front 12 × LCD adapter aqua, rear 2 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, MM OM3, polarity AS | 85072957 |
| Transition module, double size, Base-12, front 12 × LCD adapter aqua, rear 2 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, MM OM3, polarity AP | 85072958 |
| Transition module, single size, Base-12, front 6 × LCD adapter heather violet, rear 1 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, MM OM4, polarity AS | 85072944 |
| Transition module, single size, Base-12, front 6 × LCD adapter heather violet, rear 1 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, MM OM4, polarity AP | 85072945 |
| Transition module, double size, Base-12, front 12 × LCD adapter heather violet, rear 2 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, MM OM4, polarity AS | 85072959 |
| Transition module, double size, Base-12, front 12 × LCD adapter heather violet, rear 2 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, MM OM4, polarity AP | 85072960 |

# IANOS MTP-LC Transition Modules

## Ordering information

| Description | Item no. |
| --- | --- |
| Transition module, single size, Base-12, front 6 × LCD adapter blue, rear 1 × MTP12, pinned, adapter body green, shroud black, key-up/key-down, SM OS2 UPC, polarity AS | 85072946 |
| Transition module, single size, Base-12, front 6 × LCD adapter blue, rear 1 × MTP12, pinned, adapter body green, shroud black, key-up/key-down, SM OS2 UPC, polarity AP | 85073356 |
| Transition module, single size, Base-12, front 6 × LCD adapter green, rear 1 × MTP12, pinned, adapter body green, shroud black, key-up/key-down, SM OS2 APC, polarity AS | 85073357 |
| Transition module, double size, Base-12, front 12 × LCD adapter blue, rear 2 × MTP12, pinned, adapter body green, shroud black, key-up/key-down, SM OS2 UPC, polarity AP | 85073364 |
| Transition module, double size, Base-12, front 12 × LCD adapter blue, rear 2 × MTP12, pinned, adapter body green, shroud black, key-up/key-down, SM OS2 UPC, polarity AS | 85072961 |
| Transition module, double size, Base-12, front 12 × LCD adapter green, rear 2 × MTP12, pinned, adapter body green, shroud black, key-up/key-down, SM OS2 APC, polarity AS | 85073365 |
| Transition module, double size, Base-12, front 12 × LCD adapter green, rear 2 × MTP12, pinned, adapter body green, shroud black, key-up/key-down, SM OS2 APC, polarity AP | 85072962 |

## Ordering information

| Description | Item no. |
| --- | --- |
| Transition module, double size, Base-24, front 12 × LCD adapter aqua, rear 1 × MTP24, non-pinned, adapter body black, shroud red, key-up/key-down, MM OM3, polarity R1 split fibers per row | 85072963 |
| Transition module, double size, Base-24, front 12 × LCD adapter heather violet, rear 1 × MTP24, non-pinned, adapter body black, shroud red, key-up/key-down, MM OM4, polarity R1 split fibers per row | 85072964 |

# IANOS Base-12 MTP-SC Transition Module

## Characteristics
- Transition double module – 1 x MTP12 to 12 x SC simplex
- Fast and tool-less installation
- Facilitates patching to transceiver
- Compact and robust plastic construction
- Low insertion loss design
- Available in Singlemode APC and Multimode OM4 performance
- Compatible with all IANOS chassis
- Color coded MTP adapters

## Technical data

| Attribute | | Value |
|---|---|---|
| Product family | | IANOS |
| Suitable for | | All IANOS chassis |
| Dimensions (W × D × H) | | Double module  7.71 × 6.77 × 0.46 in |
| Material | | PC/ABS |
| Color | | black (RAL 9005) |
| Number of adapters | front | 12 x SC simplex |
| | rear | 1 x MTP12 |
| Adapter types | front | SC simplex |
| | rear | MTP12 Type A (Key Up / Key Down) |
| Adapter colors | front | Black (SM/APC)/ (MM/OM4/UPC) |
| | rear | Green adapter with black shroud (MTP12) |
| Ferrule | SC | zirconia ceramic |
| | MTP | composite / male gender |

## Optical data

| Attribute | Value |
|---|---|
| Fiber count | Double module: 12 |
| Fiber type | Singlemode 9/125 µm APC<br>Multimode 50/125 µm OM4 |
| Module insertion loss | SM APC: ≤0.50 dB<br>MM OM4: ≤0.35 dB |
| Module return loss | SM OS2 APC: ≥60 dB<br>MM OM4: ≥30 dB |
| Free of halogen | yes |
| 2011/65/EC (RoHS) | fully compliant |

# IANOS Base-12 MTP-SC Transition Module

## Ordering information

| Description | Item no. |
|---|---|
| Base-12 MTP-SC transition double module, SM APC, 1 x MTP12 pinned (rear) - 12 x SC simplex, polarity AS | 85083804 |
| Base-12 MTP-SC transition double module, SM APC, 1 x MTP12 pinned (rear) - 12 x SC simplex, polarity AP | 85085506 |
| Base-12 MTP-SC transition double module, OM4 UPC, 1 x MTP12 pinned (rear) - 12 x SC simplex, polarity AS | 85083808 |
| Base-12 MTP-SC transition double module, OM4 UPC, 1 x MTP12 pinned (rear) - 12 x SC simplex, polarity AP | 85085505 |

# IANOS MTP Conversion Modules

### Characteristics
- Converts Base-8, 12 and 24 backbones
- Fast and tool-less installation
- Facilitates patching to transceiver
- Available as single module only
- Available in Multimode OM3/OM4 performance
- Compatible with IANOS 1U/ 4U and zero space chassis
- Color coded MTP adapter shrouds by Base-type

IANOS conversion modules provide an easy upgrade path for users who want to convert their pre-installed MTP backbone cables to match new transceiver requirements. This process allows users to get full fiber utilization from their existing backbones. For example, two Base-12 backbone trunks can be converted to three Base-8 MTP connectors (40G SR4) or alternatively they can be converted to a single Base-24 MTP connector (100G SR10).

## Technical data

| Attribute | | Value |
|---|---|---|
| Suitable for | | all IANOS chassis |
| Dimensions (W × D × H) | | 3.8 × 6.5 × 0.5 in |
| Material | | PC/ABS |
| Color | | black (RAL 9005) |
| Adapter types | front | MTP 8, 12 or 24 (key-up/key-down) |
| | rear | MTP 8, 12 or 24 (key-up/key-down) |
| Adapter Colors | front/rear | black adapter with gray shroud (MTP8) |
| | front/rear | black adapter with black shroud (MTP12) |
| | front/rear | black adapter with red shroud (MTP24) |
| Ferrule | MTP | composite (male/female) |

## Optical data

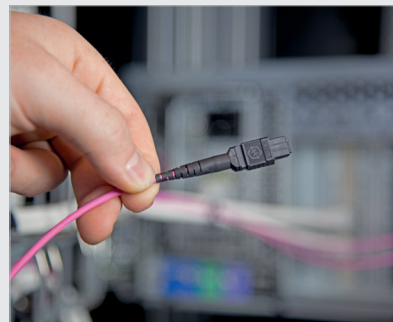| Attribute | Value |
|---|---|
| Fiber type | Multimode 50/125 µm OM3<br>Multimode 50/125 µm OM4 |
| Module insertion loss | MM OM3: ≤ 0.50 dB<br>MM OM4: ≤ 0.50 dB |
| Module return loss | MM OM3: ≥ 30 dB<br>MM OM4: ≥ 30 dB |

# Key Features Conversion Modules

## 100 % utilization of existing backbone

Conversion modules allow users to reuse their existing backbone cables even though the MTP connectivity does not match their new equipment. Therefore Base-12 backbone cables can be converted to Base-8 or Base-24 depending on the required data rate.
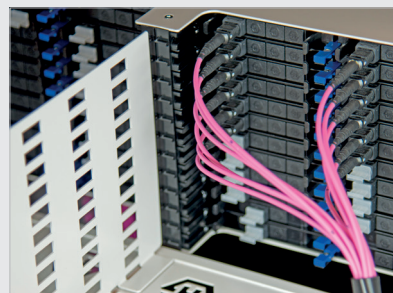
## Patch directly to nearby equipment

IANOS conversion modules are the preferred conversion method for many operators because MTP jumpers can be used to connect directly from the module to nearby equipment. Generally the conversion module will have a male connector at the front which allows for female to female patch cords. This makes the management of patch cords easier and prevents any risk of damaging the transceiver with a pinned connector.

# IANOS MTP Conversion Modules



## Ordering information

| Description | Item no. |
| --- | --- |
| Conversion module, single size, Base-8, front 1 × MTP24 pinned, adapter body black, shroud red, key-up/key-down, rear 3 × MTP8, non-pinned, adapter body black, shroud gray, key-up/key-down, OM3, polarity S0 split fibers per row | 85073360 |
| Conversion module, single size, Base-8, front 1 × MTP24 pinned, adapter body black, shroud red, key-up/key-down, rear 3 × MTP8, non-pinned, adapter body black, shroud gray, key-up/key-down, OM4, polarity S0 split fibers per row | 85073361 |



## Ordering information

| Description | Item no. |
| --- | --- |
| Conversion module, single size, Base-12, front 6 × MTP8 pinned, adapter body black, shroud gray, key-up/key-down, rear 4 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, OM3, polarity S2 split fibers per row | 85072948 |
| Conversion module, single size, Base-12, front 6 × MTP8 pinned, adapter body black, shroud gray, key-up/key-down, rear 4 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, OM4, polarity S2 split fibers per row | 85072951 |
| Conversion module, single size, Base-12, front 2 × MTP24 pinned, adapter body black, shroud red, key-up/key-down, rear 4 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, OM4, polarity S1 split fibers per row | 85072949 |
| Conversion module, single size, Base-12, front 2 × MTP24 pinned, adapter body black, shroud red, key-up/key-down, rear 4 × MTP12, pinned, adapter body black, shroud black, key-up/key-down, OM3, polarity S1 split fibers per row | 85073362 |



## Ordering information

| Description | Item no. |
| --- | --- |
| Conversion module, single size, Base-24, front 6 × MTP8 pinned, adapter body black, shroud gray, key-up/key-down, rear 2 × MTP24, non-pinned, adapter body black, shroud red, key-up/key-down, OM3, polarity S4 split fibers per row | 85072950 |
| Conversion module, single size, Base-24, front 6 × MTP8 pinned, adapter body black, shroud gray, key-up/key-down, rear 2 × MTP24, non-pinned, adapter body black, shroud red, key-up/key-down, OM4, polarity S4 split fibers per row | 85072953 |

# IANOS Splicing Modules

### Characteristics
- 24 LC splicing /12 SC splicing
- Fast splicing and reduced coiling time
- Cover with fiber identification
- Quick access to fiber
- Fast cable attachement for incoming cables (2, 3 and 5 mm)
- Suitable for 5 mm conduit
- Bend radius control throughout (min. 1.2 in)
- Fiber over-length storage with integral heat shrink or optional sandwich splice comb
- Available in Singlemode OS2 and Multimode OM3/OM4 performance
- Compatible with IANOS 1U/4U and zero space chassis
- Color coded LC adapters by performance
- 24 individual or 4 ribbon heat shrink splices

## Technical data

| Attribute | | Value |
|---|---|---|
| Suitable for | | chassis/zero space chassis |
| Dimensions (W × D × H) | | 5.1 × 5.4 × 1.9 in |
| Material | | PC/ABS |
| Color | | black (RAL 9005) |
| Adapter types | front | LC duplex<br>SC simplex |
| | rear | cable fixation |
| Adapter Colors | front | blue (SM/UPC)<br>green (SM/APC)<br>aqua (MM/OM3)<br>heather violet (MM/OM4) |
| | rear | n/a |
| Ferrule | LC/SC | zirconia ceramic |

## Optical performance

| Type | Measurement method (IL/RL) | IL (dB) | RL (dB) |
|---|---|---|---|
| SM UPC | IL: IEC 61300-3-4 method B | ≤ 0.30 | ≥ 50 |
| SM APC | RL: IEC 61300-3-6 | ≤ 0.30 | ≥ 65 |
| MM OM3 | IL: IEC 61300-3-34 method B | ≤ 0.25 | ≥ 35 |
| MM OM4 | RL: IEC 61300-3-6 | ≤ 0.15 | ≥ 35 |

# Key Features Splicing Modules

## Clear routing and separation of incoming and outgoing fibers

The IANOS splicing module incorporates two independent storage areas which keep incoming and outgoing fibers separate from each other. This feature simplifies the splicing process and reduces the time required for installation and maintenance.
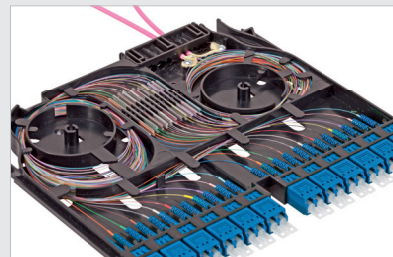


## Fast cable attachement

The IANOS splicing module allows users to attach cables simply by clamping the outer jacket of the cable. This innovative feature eliminates the need for cable ties or other wrap-around ties that can cause damage to the cable. Additional kevlar fixation is available inside the module to provide additional strain relief and security. The IANOS module is designed for HUBER+SUHNER cable systems with a diameter of 2 mm, 3 mm and 5 mm. Protective conduit can also be fixed to the rear of the module if required.



## Up to 24 heat-shrink splices per module

The IANOS splicing module is a double module which facilitates the fusion splicing of 24 individual heat or 4 ribbon heat shrink splices. The splicing module is suitable for all HUBER+SUHNER 8, 12 and 24 strand cables.

# IANOS Splicing Modules

## Ordering information

| Description | Item no. |
| --- | --- |
| Splice module, double size, Base-2, front 12 × LC duplex adapter blue (SM/UPC) | 85072934 |
| Splice module, double size, Base-2, front 12 × LC duplex adapter green (SM/APC) | 85072935 |
| Splice module, double size, Base-2, front 12 × LC duplex adapter aqua (MM/OM3) | 85072936 |
| Splice module, double size, Base-2, front 12 × LC duplex adapter heather violet (MM/OM4) | 85072937 |
| Splice module, double size, Base-1, front 12x SC simplex adapter black (SM/APC) | 85083807 |
| Splice module, double size, Base-1, front 12x SC simplex adapter black (SM/UPC) | 85083806 |
| Splice module, double size, Base-1, front 12x SC simplex adapter black (MM/OM4) | 85083803 |

# 19" Fiber Panels

Both Fiberframe and Fiberframe Lite are 19" fiber panels which allow the user to splice or patch various cables in a standard 1U 19" frame. The Fiberframe is a lightweight aluminium construction, while Fiberframe Lite is a solid steel construction. Both can accommodate up to 24 adapters such as LC and SC. In addition, maximum flexibility for the Fiberframe is ensured thanks to exchangeable front plates for a wide range of supplementary adapter types.

The panels have a density of up to 48 fibers and allow the user to bring various different cables into the back of the panel – Fiberframe Lite with a multifunctional back plate and Fiberframe with exchangeable back plates. Both panels have a telescopic drawer, which ensures access to the back of the connectors and to the splice cassettes. The Fiberframe has an additional loose tube storage area which is separated from the splicing and patching area inside the panel.

For splice applications, the well-known ACS splice cassette accommodates up to 24 fibers per cassette using either heat shrink or sandwich splice protectors. The cassette allows the user to store fiber overlength neatly and securely within the cassette and the hinge mechanism ensures the access to any cassette without tools.

# Fiberframe

## Characteristics
- Standard 19" 1U size
- Lightweight aluminium construction
- Telescopic drawer with tilt of 25°
- Up to 48 fibers per 1U
- Separate storage area for loose tubes and pigtails inside the panel
- 2 perforated plates integrated in the rear of the panel
- Additional exchangeable adapter plates for different cable systems available
- Moveable brackets for either even, reset or salient mounting
- ACS splice cassette technology accepting up to 24 fibers per cassette
- Color coded pigtails are standard
- Optional zero space cable management bar

## Patching and splicing within a lightweight aluminium patch panel

Each panel is delivered with a mounting kit (M5), designation strip, Velcro straps and cable ties.

### Technical data

| Attribute | Value |
| --- | --- |
| Dimensions (W × D × H) | 17.3 × 7.9 (9.1) × 1.7 in |
| Drawer tilt (pulled out) | 25° |
| Mounting positions | −2.0 to +3.0 in (1.0 in steps) |
| Rack height unit | 1U |
| Adapter types | LC, LX.5, SC |
| Capacity | 48 fibers with LC/LX.5 connectivity<br>24 fibers with SC connectivity |
| ACS splice cassette capacity | 24 splices with heat shrink or sandwich splice protection technology, with storage area for bare fibers |
| Loose tube storage area | yes, in bottom of drawer |
| Material | anodized aluminium |
| Weight (empty) | 3.20 lb |
| Color | aluminium silver |
| Free of halogen | yes |
| 2011/65/EC (RoHS) | fully compliant |

# Fiberframe

## Fiberframe – unpopulated

### Ordering information

| Description | Item no. |
|---|---|
| For 24 × LC duplex or LX.5 duplex (1 to 48 numbering) | 85063207 |
| For 24 × LC duplex, LX.5 duplex or SC simplex (1 to 24 numbering) | 85063208 |

## Fiberframe, patch variant – including flangeless adapters

### Ordering information

| Description | Item no. |
|---|---|
| 24 × LC duplex adapters, blue | 85063212 |
| 24 × LC duplex adapters, green | 85063213 |
| 24 × LC duplex adapters, beige | 85063214 |
| 24 × SC simplex adapters, blue | 85063215 |
| 24 × SC simplex adapters, green | 85063216 |

## Fiberframe, splice variant – including flangeless adapters, pigtails, splice cassettes and splice protector holders (sandwich/heat shrink)

### Ordering information

| Description | Item no. |
|---|---|
| 24 × LC duplex adapters, blue, with 48 × LC/UPC SM standard pigtails, DIN color code | 85063219 |
| 24 × LC duplex adapters, green, with 48 × LC/APC SM standard pigtails, DIN color code | 85063220 |
| 24 × SC simplex adapters, blue, with 24 × SC/UPC SM standard pigtails, DIN color code | 85063222 |
| 24 × SC simplex adapters, green, with 24 × SC/APC SM standard pigtails, DIN color code | 85063223 |

# Fiberframe – Accessories
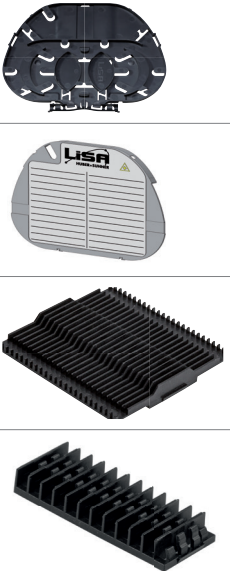
## Back plates and cable glands

### Ordering information

| Description | Packing unit | Order unit (multiple of) | Item no. | Picture |
|---|---|---|---|---|
| Entry plate<br>suitable for 1 × M25 cable gland | 1 | 1 | 85033023 | |
| Entry plate<br>suitable for 1 × M20 cable gland and<br>2 × SC shaped connectors | 1 | 1 | 85033024 | |
| M20 × 1.5 cable gland<br>for cables with diameter 7.0 to 13.0 mm | 1 | 1 | 84118394 | |
| M20 locknut | 1 | 1 | 85068092 | |
| M25 × 1.5 cable gland<br>for cables with diameter 9.0 to 17.0 mm | 1 | 1 | 84039078 | |
| M25 locknut | 1 | 1 | 85064421 | |

## Splice accessories

### Ordering information

| Description | Packing unit | Order unit (multiple of) | Item no. | Picture |
|---|---|---|---|---|
| ACS splice cassette accepting<br>up to 24 splices | 1 | 1 | 84123330 | |
| ACS splice cassette cover | 1 | 1 | 84123617 | |
| Sandwich splice protector holder, 24 way | 1 | 1 | 84103969 | |
| Shrink splice protector holder, 24 way | 1 | 1 | 84123618 | |

# Fiberframe – Accessories

## Splice accessories (continuing)

### Ordering information

| Description | Packing unit | Order unit (multiple of) | Item no. | Picture |
|---|---|---|---|---|
| Heat shrink splice protector, dimension: diameter 1.5 × 40 mm | 100 | 100 | 84059763 | |
| Sandwich splice protector, dimension: 1.2 × 3.2 × 30 mm | 150 | 150 | 23218558 | |

## Cable management

### Ordering information

| Description | Packing unit | Order unit (multiple of) | Item no. | Picture |
|---|---|---|---|---|
| Patch cord management bar and front door | 1 | 1 | 85063160 | |
| Patch cord management bracket, gray /blue | 1 | 1 | 84093679 | |

# Fiberframe Lite

### Characteristics
- Standard 19" 1U size
- Robust steel construction
- Telescopic drawer with tilt of 15°
- Multifunctional back plate
- Up to 48 fibers per 1U
- ACS splice cassette technology accepting up to 24 fibers per cassette
- Optional zero space cable management bar

## Flexible fiber management

Each panel is delivered with a mounting kit (M5), Velcro straps and cable ties.

## Technical data

| Attribute | Value |
| --- | --- |
| Dimensions (W × D × H) | 17.6 x 7.9 x 1.7 in |
| Drawer tilt (pulled out) | 15° |
| Rack height unit | 1U |
| Adapter types | LC, SC, LX.5 |
| Capacity | 48 fibers with LC/LX.5 connectivity<br>24 fibers with SC connectivity<br>2 ACS splice cassettes including pigtail management |
| ACS splice cassette capacity | 24 splices with heat shrink or sandwich splice protection technology, with storage area for bare fibers |
| Material | steel powder coated |
| Weight (empty) | 5.29 lb |
| Color | gray (RAL 7035) |
| Free of halogen | yes |
| 2011/65/EC (RoHS) | fully compliant |

# Fiberframe Lite – Unpopulated
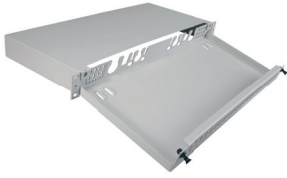
## Ordering information

| Description | Item no. |
|---|---|
| For 24 × LC duplex, or SC simplex | 85063206 |

## Fiberframe Lite, patch variant – including flangeless adapters

## Ordering information

| Description | Item no. |
|---|---|
| 24 × LC duplex adapters, blue | 85063226 |
| 24 × LC duplex adapters, green | 85063227 |
| 24 × LC duplex adapters, beige | 85063228 |
| 24 × SC simplex adapters, blue | 85063229 |
| 24 × SC simplex adapters, green | 85063231 |

## Fiberframe Lite, splice variant – including flangeless adapters, pigtails, splice cassettes and splice protector holders (sandwich/heat shrink)
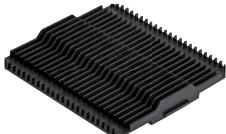
## Ordering information

| Description | Item no. |
|---|---|
| 24 × LC duplex adapters, blue, with 48 × LC/UPC SM standard pigtails, no color coding | 85063232 |
| 24 × LC duplex adapters, green, with 48 × LC/APC SM standard pigtails, no color coding | 85063236 |
| 24 × SC simplex adapters, blue, with 24 × SC/UPC SM standard pigtails, no color coding | 85064745 |
| 24 × SC simplex adapters, green, with 24 × SC/APC SM standard pigtails, no color coding | 85064746 |

# Fiberframe Lite – Accessories

## Splice accessories

### Ordering information

| Description | Packing unit | Order unit (multiple of) | Item no. | Picture |
|---|---|---|---|---|
| ACS splice cassette accepting up to 24 splices | 1 | 1 | 84123330 | |
| ACS splice cassette cover | 1 | 1 | 84123617 | |
| Sandwich splice protector holder, 24 way | 1 | 1 | 84103969 | |
| Shrink splice protector holder, 24 way | 1 | 1 | 84123618 | |
| Heat shrink splice protector, dimension: diameter 1.5 × 40 mm | 100 | 100 | 84059763 | |
| Sandwich splice protector, dimension: 1.2 × 3.2 × 30 mm | 150 | 150 | 23218558 | |

## Cable management

### Ordering information

| Description | Packing unit | Order unit (multiple of) | Item no. | Picture |
|---|---|---|---|---|
| Patch cord management bar | 1 | 1 | 85063160 | |
| Patch cord management bracket, gray /blue | 1 | 1 | 84093679 | |
| M20 × 1.5 cable gland for cables with diameter 7.0 to 13.0 mm | 1 | 1 | 84118394 | |
| M20 locknut | 1 | 1 | 85068092 | |
| M25 × 1.5 cable gland for cables with diameter 9.0 to 17.0 mm | 1 | 1 | 84039078 | |
| M25 locknut | 1 | 1 | 85064421 | |

# Zone Distribution Panel for High Density Modules (ZDPHD)

## Characteristics
- Offers high density of 144 fibers or 24 Keystone type RJ-45 jacks in 1U space
- Up to 4 × high density MTP modules or high density universal adapter plates
- Up to 2 × RJ-45 modules
- Mix and match fiber and copper technology in the same panel
- Optional rear cable manager for cable overlength storage
- Access and installation of modules/plates from the front side
- Optional radius guides for patch cord support and bend radius protection
- Designed for maximum flexibility

## Unrivalled density in 1U of space

The high density zone panel can accommodate up to four high density MTP modules (MTHDM), four high density universal adapter plates (HDUAP) or two RJ-45 modules in a single 1U rack space (unused spaces can be fitted with blanking plates) and is normally positioned at the top of server or switch cabinets. The HD panel provides unrivalled patching density and requires no complex pivoting mechanism to gain access to the connectors. This is possible because the HD module utilizes HUBER+SUHNER's revolutionary LC-XD connector which improves access to the connections even when the panel is in a static position. Both fiber and copper technologies can also be interchanged within the same panel to ensure maximum flexibility in a 1U space.

## Easy access pivoting cable manager

An additional cable manager can be fitted to the rear of the panel which allows excess cable to be stored and routed safely away to the sides of the equipment cabinet. The cable manager can be retrofitted if required and a pivoting function makes installation and access faster and easier.

## Technical data

| Attribute | Value |
|---|---|
| Dimensions (W × D × H) | 17.4 × 5.7 × 1.7 in |
| Capacity | 4 × MTHDM modules, HDUAP or blanking plates<br>2 × RJ-45 modules |
| Material | steel and aluminium powder coated |
| Weight | 2.16 lb |
| Color | black (RAL 9005) |
| Free of halogen | yes |
| 2011/65/EC (RoHS) | fully compliant |

## Ordering information

| Description | Item no. |
|---|---|
| Zone distribution panel for high density modules, black | 84146158 |

# MTP® Modules High Density

### Characteristics
- Robust metal construction
- Capacity of 12 or 18 ports
- Available in all performances: singlemode and multimode (OM3/OM4)
- Produced with low-bend fiber
- Port identification front and top
- Available with LC duplex
- Up to 144 fibers per 1U HD panel
- Fast tool-less installation
- Factory tested plug and play system
- Compatible with the HD zone distribution panel (ZDP) and zero space brackets

## Highest density presentation for in-rack distribution

The MTP HD module is the highest density module currently available on the market. This compact unit acts as a termination point inside or close to equipment racks. MTP connectors on the rear side fan out to 12 or 18 LC duplex/SC simplex adapters on the front side. This means that patch cords can be connected from the front of the module to equipment ports in the same or adjacent racks.

## Technical data

| Attribute | | Value |
|---|---|---|
| Dimensions (W × D × H) | | 8.4 × 5.0 × 0.8 in |
| Adapter types (front) | | LC duplex, SC simplex |
| Capacity | front of module | 12 or 18 LC duplex or SC simplex adapters |
| | back of module | 2 or 3 MTP connectors |
| Material | | aluminium powder coated |
| Color | | black (RAL 9005) |
| Free of halogen | | yes |
| 2011/65/EC (RoHS) | | fully compliant |

## Ordering information

| Description | Performance | Item no. |
|---|---|---|
| High density MTP module, black, 24 fiber 2 × MTP12 male, standard ferrule, 12 LC duplex ports, polarity A | SM | 85014130 |
| High density MTP module, black, 24 fiber 2 × MTP12 male, elite ferrule, 12 LC duplex ports, polarity A | SM | 84150020 |
| High density MTP module, black, 36 fiber 3 × MTP12 male, standard ferrule, 18 LC duplex ports, polarity A | SM | 85014129 |
| High density MTP module, black, 36 fiber 3 × MTP12 male, elite ferrule, 18 LC duplex ports, polarity A | SM | 84148469 |
| High density MTP module, black, 24 fiber 2 × MTP12 male, elite ferrule, 12 LC duplex port, polarity A | OM3 | 84150022 |
| High density MTP module, black, 36 fiber 3 × MTP12 male, elite ferrule, 18 LC duplex ports, polarity A | OM3 | 84150024 |
| High density MTP module, black, 24 fiber 2 × MTP12 male, elite ferrule, 12 LC duplex ports, polarity A | OM4 | 84150025 |
| High density MTP module, black, 36 fiber 3 × MTP12 male, elite ferrule, 18 LC duplex ports, polarity A | OM4 | 84148468 |

# HDUAP Universal Adapter Plates

### Characteristics
- Capacity 12 or 18 SC-shaped adapters (MTP/LC duplex/SC simplex)
- Compact and robust
- Fast installation with snap-fixation
- Port numbering for easy identification
- Compatible with the HD zone distribution panel (ZDPHD) and zero space brackets

## High density patching panels

High density universal adapter plates are supplied pre-loaded with adapters and can be fitted to any panel that accepts the high density MTP modules. This allows adapter plates, modules and blanking plates to be interchanged in the same panel if desired. Adapter plates are generally used in combination with ruggedized fan-outs where the fan-out connects to the rear side of the plate and patch cords connect to equipment ports on the front side. Blank versions of the plate are also available in situations where panel positions are to be reserved for later use.

When building an MTP link, HDUAP plates are pre-loaded with MTP adapters so that incoming link assemblies can be connected with fan-outs directly to equipment ports. In 40G and 100G applications, the pre-loaded HDUAP will act as a patching area where MTP patch cords can be connected directly to multi-fiber transceivers.

## Technical data

| Attribute | Value |
|---|---|
| Dimensions (W × D × H) | 8 × 1 × 0.83 in |
| Adapter types | LC duplex, SC simplex, MTP |
| Capacity | 12 or 18 LC duplex/SC simplex/MTP adapters |
| Material | aluminium powder coated |
| Color | black (RAL 9005) |
| Free of halogen | yes |
| 2011/65/EC (RoHS) | fully compliant |

## Ordering information

| Description | Performance | Item no. |
|---|---|---|
| HDUAP, black, fitted with 18 LC duplex adapters (blue) | SM/UPC | 85009702 |
| HDUAP, black, fitted with 18 LC duplex adapters (aqua) | OM3/OM4 | 85018189 |
| HDUAP, black, fitted with 18 MTP adapters (blue) | SM/UPC | 85018176 |
| HDUAP, black, fitted with 18 MTP adapters (black) | OM3/ OM4 | 85014434 |

# Blanking Panels

### Characteristics
- Fit to any space where MTHDM modules or HDUAP plates are used
- Aluminium construction
- Fast installation with snap-fixation
- Prevent cold and hot airflow mixing

## Airflow Management

The blanking panels can be used as placeholders and will fit into any empty space where HDUAP panels fit. The blanking panels also block airflow leakage, supporting the hot aisle/cold aisle infrastructure. The blanking panels can be replaced with connectivity modules/panels quickly and easily.

### Technical data

| Attribute | Value |
|---|---|
| Dimensions (W × D × H) | for MTHDM/HDUAP spaces: 8 × 0.39 × 0.83 in |
| Compatibility | with all spaces for MTHDM modules and HDUAP plates |
| Material | aluminium powder coated |
| Color | black (RAL 9005) |
| Free of halogen | yes |
| 2011/65/EC (RoHS) | fully compliant |

### Ordering information

| Description | Item no. |
|---|---|
| Universal high density blanking plate, black, suitable with ZDPHD | 84148846 |

# Rear Cable Manager for ZDPHD



### Characteristics
• Retrofittable
• Suitable for ZDPHD
• Pivoting for easy access to MTP connectors
• 1.4 in minimum bend radius
• 1U
• Robust steel and aluminium construction

## Easy access pivoting cable manager

An additional cable manager can be fitted to the rear of the panel which allows excess cable to be stored and routed safely away to the sides of the equipment cabinet. The cable manager can be retrofitted if required and a pivoting function makes installation as well as access faster and easier.

## Technical data

| Attribute | Value |
|---|---|
| Dimensions (W × D × H) | 17.52 × 8.36 × 1.54 in |
| Suitable for | ZDPHD |
| Material | steel and aluminium powder coated |
| Weight | 1.98 lb |
| Color | black (RAL 9005) |
| Free of halogen | yes |
| 2011/65/EC (RoHS) | fully compliant |

## Ordering information

| Description | Item no. |
|---|---|
| Rear cable manager, black, retrofittable, suitable for ZDPHD | 84146157 |

# Front Door for all ZDPHD Panels

Characteristics
- Compatible for all ZDPHD panels
- Locking mechanism
- Retrofittable

Ordering information

| Description | Item no. |
|---|---|
| Front door with locking mechanism, black, retrofittable, for all ZDPHD panels | 85030404 |

# Patch Cord Retainer
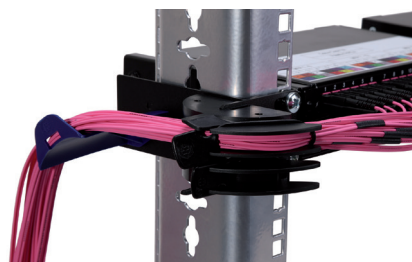
Characteristics
- Guides patch cords around 19 in vertical rails
- Suitable for standard 19 in fixing holes
- Provides lateral support and strain relief for patch cords
- 1U
- Left and right mountable (1.6 in side space required)
- 1.2 in bend radius

Ordering information

| Description | Item no. |
|---|---|
| Patch cord management brackets, black (w/o lateral support), set of 2 pcs | 84146159 |
| Patch cord retainer, black/blue | 84088889 |

# Patch Cord Guide
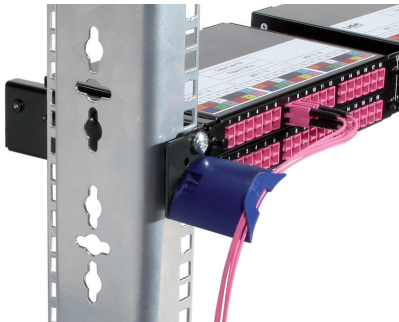
## Characteristics
- Guides patch cords to the side of the rack
- Suitable for standard 19 in fixing holes
- 1U
- Rapstrap tie can be added
- Left and right mountable
- 1.2 in bend radius

## Ordering information

| Description | Item no. |
| --- | --- |
| Patch cord guide, black/blue | 84093678 |

# Rapstrap

## Characteristics
- Flexible and extremely strong
- Moulded plastic creates no debris
- Reduces chance of cable jacket damage or fiber micro/macro-bending
- Re-useable (simply cut with scissors)
- Suitable for fiber cables and patch cords
- Color black

## Ordering information

| Description | Item no. |
| --- | --- |
| Rapstrap cable tie, 48 pcs. | 85004339 |

# Connectors and Cable Assemblies
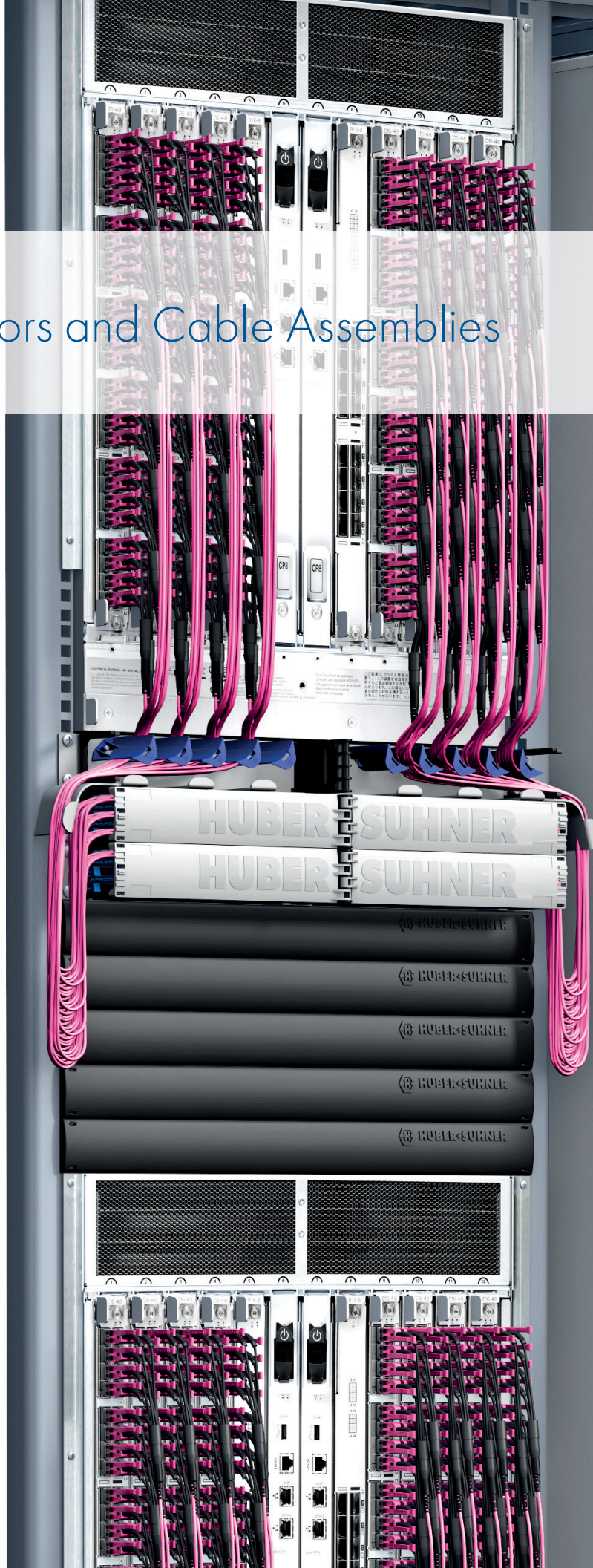
# Connectors and Cable Assemblies

## MTP forming the backbone of structured cabling solutions

High density fiber management systems and the increased use of MTP connectivity has led to the need for smaller more flexible backbone cables. Available in fiber counts up to 144 fibers, HUBER+SUHNER's MTP trunks reduce the installation time by consolidating multiple sub-units into a single cable. This approach significantly reduces the overall diameter of the cable and provides much better space utilization of cable routing channels.

## SC patch cords/pigtails

The SC connector is one of the most common solutions for reliable networks. With the big form ferrule, this connector ensures a reliable optical connection with good mechanical stability. Its push-pull design prevents rotational misalignment. A clip is available for duplex setup, and polarity flipping is accomplished without a tool.
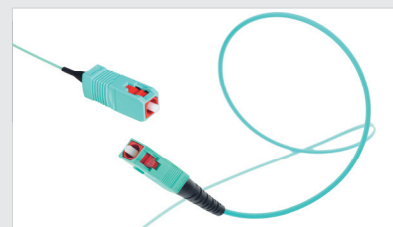
## LC-XD for unrivalled density and fast moves, adds and changes

HUBER+SUHNER developed the world's first push-pull LC connector to provide faster moves, adds and changes and unrivalled density. The LC-XD uniboot connector has an extraction pin at the rear of the shroud that can be accessed by installers quickly and easily even in the most congested of patching fields. Many of our competitors recommend tools to remove connectors from high density cross-connects or SAN switches but at HUBER+SUHNER, we believe that connector innovation lies at the heart of usability.

## ST connector and cable assemblies

HUBER+SUHNER is pleased to offer ST connector based custom cable assemblies. The one piece design for quick and easy termination, based on the bayonet nut connector, provides ST-security coupled with integrated strain relief.

# Field Terminated Connectors

## LC Connector, 250µm/900µm

### Characteristics
- Mechanical splice using index matching gel
- Perfect stability and reliability
- High performance
- RoHs compliant
- UL94-V0 flammability rated
- Compliant to TIA/EIA 568-C.3, IEC-61754-20

### Technical data

| Description | Connector Type | Polishing | Values |
|---|---|---|---|
| Insertion Loss | Single mode | UPC | Typical: 0.2dB (UPC) |
| | Single mode | APC | Typical: 0.3dB (APC) |
| Return Loss | Single mode | UPC | Typical: 55dB (UPC) |
| | Single mode | APC | Typical: 60dB (APC) |

### Mechanical data

| Description | Values |
|---|---|
| Operating temperature | -40°C up to +75°C |
| Durability | <0.1dB change, 500 matings |
| Tensile load | 250µm fiber = 3N |
| Intermateability | IEC 61754-4 |
| Qualification | TIE/EIA 568-C.3 |

### Ordering information

| Description | Item number |
|---|---|
| LC Connector UPC, 250µm/900µm | 85067428 |

Termination tools are available on request.

# Field Terminated Connectors

## SC Connector, 2mm/3mm

### Characteristics
- Mechanical splice using index matching gel
- Highly stable and reliable
- Perfect performance
- Compact package
- RoHs compliant
- Finished connector meet UL94-V0 flammability rate
- TIA/EIA 568-C.3 compliant

### Technical data

| Description | Connector Type | Polishing | Values |
|---|---|---|---|
| Insertion Loss | Single mode | UPC | Typical: 0.2dB (UPC) |
| | Single mode | APC | Typical: 0.3dB (APC) |
| Return Loss | Single mode | UPC | Typical: 55dB (UPC) |
| | Single mode | APC | Typical: 60dB (APC) |

### Mechanical data

| Description | Values |
|---|---|
| Operating temperature | −40°C up to +75°C |
| Durability | <0.1dB change, 500 matings |
| Intermateability | IEC 61754-4 |
| Tensile | TIE/EIA 568-C.3 |

### Ordering information

| Description | Item number |
|---|---|
| SC Connector UPC, 2mm/3mm | 85067430 |
| SC Connector APC, 2mm/3mm | 85067432 |

Termination tools are available on request.

# Customized Cable Assemblies

# Customized Cable Assemblies

Custom Cable assemblies from HUBER+SUHNER are available in a variety of different configurations designed and manufactured to meet your specific needs. Whether it is MTP, SC, LC or LX.5 or any combination of these, HUBER+SUHNER can configure and manufactures customer specific cable assemblies solutions.

# MTP Trunk Assemblies

### Characteristics
- Available with 8, 12 and 24 fiber strand sub-units
- Small outer-diameter cable for space saving
- Terminated with MTP® connectors for 10G, 40G and 100G applications
- Lightweight construction suitable for easy installation
- Customer specific cable and fan-out lengths available
- Bend-optimized fiber as standard
- Braided sock as connector protection/pulling aid
- Color coded MTP boots for easy and fast identification (MTP-8, -12, -24)
- Available in plenum, riser, and general purpose rating

HUBER+SUHNER trunk cables are high density multi-stranded cables which form the backbone of your network. Available in fiber counts up to 144 fibers, the HUBER+SUHNER trunks reduce the installation time by consolidating multiple sub-units into a single cable. This approach significantly reduces the overall diameter of the cable and provides much better space utilization of cable routing channels.

HUBER+SUHNER trunk cables are available with 8, 12 and 24 fiber sub-units so that users can deploy Base-8, Base-12 or Base-24 infrastructures to suit their MTP connectivity requirements.

### Base-8 HUBER+SUHNER trunk cables
Base-8 HUBER+SUHNER trunks allows users to build 10G links today which can easily be upgraded to 40G links tomorrow using 8 fiber MTP connectivity.

### Base-12 HUBER+SUHNER trunk cables
Base-12 HUBER+SUHNER trunks allows users to build 10G links today which can easily be upgraded to 40G or 100G links tomorrow using conversion modules, harnesses or patch cables.

### Base-24 HUBER+SUHNER trunk cables
Base-24 HUBER+SUHNER trunks allows users to build 10G links today which can easily be upgraded to 40G or 100G links tomorrow by using conversion modules, conversion harnesses or patch cables.

## Technical data

| General specification | | |
|---|---|---|
| Application | | backbone trunk connections |
| Fiber type | OS2 | E9/125 |
| | OM3 | G50/125 – OM3 |
| | OM4 | G50/125 – OM4 |
| Cable jacket color | OS2 | yellow |
| | OM3 | aqua |
| | OM4 | aqua |

| Construction | | |
|---|---|---|
| Connectors | Side A | MTP 8/12/24 fibers (male/female) |
| | Side B | MTP 8/12/24 fibers (male/female) |

# MTP Trunk Assemblies

## Technical data

| Optical performance | Tested acc. to | Condition | Values |
|---|---|---|---|
| Connector insertion loss | IEC 6111.8-3-4 | | < 0.35 dB |
| Return loss | IEC 6111.8-3-6 | SM | > 60 dB |
| | | OM3 | > 30 dB |
| | | OM4 | > 30 dB |

| General specification | Condition | 8 fiber | 12 fiber | 24 fiber | 48 fiber | 72 fiber | 96 fiber | 144 fiber |
|---|---|---|---|---|---|---|---|---|
| Cable diameter (mm) | Base-8 | 2.0/3.0 | n/a | 3.0 | 6.5 | n/a | 9.9 | n/a |
| | Base-12 | n/a | 3.0 | 3.0 | 6.5 | 6.5 | n/a | 9.9 |
| | Base-24 | n/a | n/a | 3.0 | n/a | n/a | n/a | n/a |

| Environmental data | Tested acc. to | Condition | Values |
|---|---|---|---|
| Temperature range | IEC 6111.8-2-22 | during installation | 0 to +60°C |
| | | in service | 0 to +70°C |
| | | storage conditions | −40 to +70°C |

# HUBER+SUHNER MTP Trunk Cable Assemblies – Order Code

| 0 | 1 | 2 | 3 | 4 | – | 5 | 6 | 7 | 8 | 9 | – | 10 | 11 | 12 | 13 | – | 14 | 15 | 16 | 17 |

## 0 System type

| O | T | All lengths in order code specified in metric units |
|---|---|---|
| U | T | All lengths in order code specified in imperial units |

## 1 Number of fibers

| 0 | 8 | Base-8 |
|---|---|---|
| 1 | 2 | Base-12 |
| 2 | 4 | Base-24 |

## 2 Number of connectors per side

| 2 | 2x MTP connector per side |
|---|---|
| 3 | 3x MTP connector per side |
| 4 | 4x MTP connector per side |
| 6 | 6x MTP connector per side |
| 8 | 8x MTP connector per side |
| C | 12x MTP connector per side |
| D | Other number of MTP connector per side |

## 3 Fiber allocation

| A | Type A polarity |
|---|---|
| B | Type B polarity |

## 4 Optical performance

| L | Low loss (same performance classes for SM and MM) |
|---|---|
| S | Standard (same performance classes for SM and MM) |
| X | Non-functional sample |

## 5 Cable jacket rating

| P | NFPA Plenum |
|---|---|
| R | NFPA Riser |
| G | NFPA General Purpose |
| B | CPR B2ca rated LSFH (low smoke free of halogen) and self-extinguishing cable |

## 6 Cable type

| A | CPR rated cable with optimized diameter (8/12 fibers: 2mm subunits, 24 fibers: 3mm subunits) |
|---|---|
| F | Indoor multi-unit small and lightweight cable, 12-144 fiber |
| G | Indoor armored micro distribution cable, 24-144 fiber |

## 7 Fiber type

| 0 | SM E9/125 |
|---|---|
| 3 | MM G50/125 OM3 |
| 4 | MM G50/125 OM4 |

## 8 Cable length (divider to divider)

| n n n | - product code starting with OT: unit in meters |
|---|---|
|  | - product code starting with UT: unit in feet |

## 9 Packaging option

| D | Standard packing (cardboard) |
|---|---|
| F | Particle-free packing (plastic) |
| Z | Custom packaging |

## 10 Fan-out A-Side

| 5 | Type 5 fan-out (equal length) |
|---|---|
| Z | Custom fan-out |

## 11 Fan-out side A, length (divider to connector)

| n n n | Longest fan-out side A |
|---|---|
|  | - product code starting with OT: unit in cm |
|  | - product code starting with UT: unit in inch |

## 12 Fan-out side A, connector

| M | MTP connector |
|---|---|

## 13 Fan-out side A, connector type

| M | MTP male connector (pinned) |
|---|---|
| F | MTP female connector (non-pinned) |

## 14 Fan-out side B

| 0 | No fan-out (for splice version) |
|---|---|
| 5 | Type 5 fan-out (equal length) |
| Z | Custom fan-out |

## 15 Fan-out side B, length (divider to connector)

| n n n | Longest fan-out side B |
|---|---|
|  | - product code starting with OT: unit in cm |
|  | - product code starting with UT: unit in inch |

## 16 Fan-out side B, connector

| 0 | No connector (for splice version) |
|---|---|
| M | MTP connector |

## 17 Fan-out side B, connector type

| 0 | No connector (for splice version) |
|---|---|
| M | MTP male connector (pinned) |
| F | MTP female connector (non-pinned) |

# Order Code Example MTP-MTP Trunk Cable Assemblies

Side A
Specify longest leg length in cm/in
(Standard is 60 cm/24 in)

Specify cable length in meters/feets

Side A
Specify longest leg length in cm/in
(Standard is 60 cm/24 in)
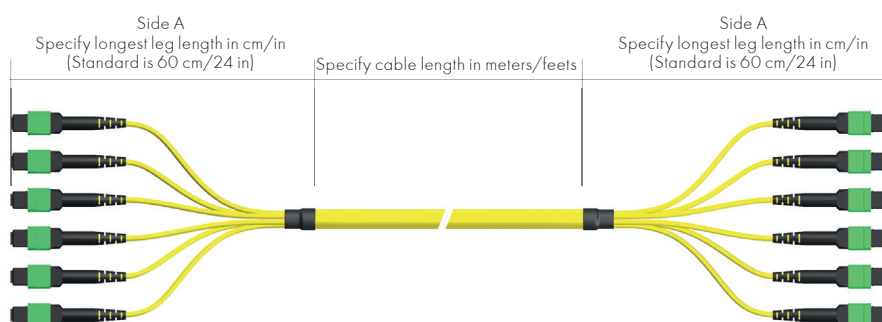
| Example | UT126AL-GF-0025D-5024MF-5024MF |
|---|---|
| Harness type | Trunk Base-12, 6X12f, Type A fiber allocation, std. packaging |
| Cable | SM, 25 ft length, indoor multi-unit small and lightweight cable, general purpose (NFPA) |
| Fan-out side A | Type 5, equal length fan-out, 24 in, MTP female |
| Fan-out side B | Type 5, equal length fan-out, 24 in, MTP female |

# MTP-LC Harness

## Characteristics
• Ready to use plug and play cable system
• Low space consumption in pathways and racks
• Easy handling and routing
• Highest performance singlemode and multimode elite connectivity
• Scalable for regular MACs
• Protective pulling sock supplied
• Available in plenum, riser, and general purpose rating

HUBER+SUHNER plug and play harnesses provide a transition from MTP connectivity in the backbone to LC duplex connectivity at the switches and servers. Instead of using LC patch panels and cords, the harness provides a fast and compact alternative that plugs directly into equipment transceivers.

Many networks today are designed with multimode MTP backbones because this is the most flexible and future-proofed way of adapting from one type of connector to another.

Although LC connectivity is still used for 1G and 10G Ethernet applications and 4G, 8G, 16G and 32G fiber channel applications, in the future this will change to MTP connectors that deliver higher data rates over parallel fiber lanes.

## Technical data

| General specification | | |
|---|---|---|
| Application | | network equipment connections |
| Fiber type | OS2 | E9/125 |
| | OM3 | G50/125 – OM3 |
| | OM4 | G50/125 – OM4 |
| Cable type | | Indoor cable – strain relieved aramid yarn |
| Cable jacket color | OS2 | yellow |
| | OM3 | aqua |
| | OM4 | aqua |

# MTP-LC Harness

| Construction | | |
|---|---|---|
| Connectors | A-Side | MTP (female/male) |
| | B-Side | LC-XD (Uniboot) |
| Furcation/fan-out shortest/longest length | A-Side | no furcation |
| | B-Side | furcation fan-out LC-XD |
| Fiber allocation | HUBER+SUHNER specific | neutral straight/neutral pair-flip |

| Optical performance | | Tested acc. to | Option | Values |
|---|---|---|---|---|
| Insertion loss | MTP | IEC 61300-3-4 B * | | < 0.35 dB |
| | LC | IEC 61300-3-4 B | SM | < 0.30 dB |
| | | | OM3 | < 0.25 dB |
| | | | OM4 | < 0.15 dB |
| Return loss | MTP | IEC 61300-3-6 | SM | > 60 dB |
| | | | OM3 | > 30 dB |
| | | | OM4 | > 30 dB |
| | LC | IEC 61300-3-6 | SM APC | > 65 dB |
| | | | SM UPC | > 50 dB |
| | | | OM3 UPC | > 35 dB |
| | | | OM4 UPC | > 35 dB |

\* Multimode MT elite ferrule as tested with proposed encircled flux launch condition on 50 µm fiber and 850 nm per IEC 61280-4-1.
  Singlemode MT elite ferrule compliant with IEC 61755-3-31/grade B.

# MTP-LC and LC-LC Harness

## Fan-outs to match your equipment

HUBER+SUHNER offer harnesses with different staggered lengths so that you can match your harness to the blade orientation and port allocations of the switch. Some blades are vertically orientated and others are horizontal. This change in orientation has an impact on the numbering scheme of the ports and can result in a mismatch between the harness tail length and the port position.

Furthermore, a switch is often fed from two different sides of the rack. In this case fan-out leg 1 may need to be shortest leg on the left side of the switch but the longest leg on the right hand side.

If you are unsure which fan-out configuration is right for your switch, you should choose fan-outs with equal leg lengths or consult your local HUBER+SUHNER representative for further assistance.

| Type 1 fan-out | Type 2 fan-out | Type 3 fan-out |
|---|---|---|
| 1–2–3–4–5–6 | 1–2–3–4–5–6 | 6–5–4–3–2–1 |



| Type 1 fan-out | Type 2 fan-out | Type 3 fan-out |
|---|---|---|
| • 15 mm staggering<br>• Individual leg lengths<br>• No. 1 on shortest leg | • 15 mm staggering<br>• Pairwise leg lengths<br>• No. 1 on shortest leg | • 15 mm staggering<br>• Individual leg lengths<br>• No. 1 on longest leg |

| Type 4 fan-out | Type 5 fan-out |
|---|---|
| 6–5–4–3–2–1 | 1–2–3–4–5–6 |



| Type 4 fan-out | Type 5 fan-out |
|---|---|
| • 15 mm staggering<br>• Pairwise leg lengths<br>• No. 1 on longest leg | • Equal leg lengths (max. 100 cm)<br>• Used as generic harness for all patching modules (rear patching) |

# HUBER+SUHNER Harness – Order Code

| 0 | 1 | 2 | 3 | – | 4 | 5 | 6 | 7 | 8 | – | 9 | 10 | 11 | 12 | – | 13 | 14 | 15 | 16 |

| **0** | | **System type** |
|---|---|---|
| O | H | All lengths in order code specified in metric units |
| U | H | All lengths in order code specified in imperial units |

| **1** | | **Number of fibers** |
|---|---|---|
| O | 8 | Base-8 (or 4 x Base-2 LC-LC) |
| 1 | 2 | Base-12 (or 6 x Base-2 LC-LC) |
| 2 | 4 | Base-24 (or 12 x Base-2 LC-LC) |

| **2** | | **Fiber allocation** |
|---|---|---|
| N | S | Type N - straight (for Base-8) |
| N | P | Type N - pair-flipped (for Base-8) |
| A | S | Type A- straight (for Base-2 & Base-12) |
| A | P | Type A - pair-flipped (for Base-2 & Base-12) |
| R | 1 | Type R1 (for Base-24) |

| **3** | **Optical performance** |
|---|---|
| L | Low loss (same performance classes for SM and MM) |
| S | Standard ECO (same performance classes for SM and MM) |
| X | Non-functional sample |

| **4** | **Cable jacket rating** |
|---|---|
| P | NFPA Plenum |
| R | NFPA Riser |
| G | NFPA General Purpose |
| L | CPR Dca rated LSFH (low smoke free of halogen) and self-extinguishing cable |

| **5** | **Cable type** |
|---|---|
| A | CPR rated cable with optimized diameter (8/12 fibers: 2mm subunits, 24 fibers: 3mm subunits) |
| B | CPR rated cable with regular diameter (12 fibers: 3mm subunits, 24 fibers: 3.6mm subunits) |
| F | Indoor multi-unit small and lightweight cable, 12-144 fiber |
| G | Indoor armored micro distribution cable, 24-144 fiber |

| **6** | **Fiber type** |
|---|---|
| 0 | SM E9/125 |
| 3 | MM G50/125 OM3 |
| 4 | MM G50/125 OM4 |

| **7** | **Cable length (divider to divider - LC / connector to divider - MTP)** |
|---|---|
| n n n | - product code starting with OH: unit in meters <br> - product code starting with UH: unit in feet |

| **8** | **Packaging option** |
|---|---|
| D | Standard packing (cardboard) |
| F | Particle-free packing (plastic) |
| Z | Custom packaging |

| **9** | **Fan-out A-Side** |
|---|---|
| 0 | No fan-out (MTP side in case of MTP-LC harness) |
| 1 | Type 1 fan-out LC (15mm staggering, shortest leg on #1) |
| 2 | Type 2 fan-out LC (15mm pairwise staggering, shortest leg on #1) |
| 3 | Type 3 fan-out LC (15mm staggering, longest leg on #1) |
| 4 | Type 4 fan-out LC (15mm pairwise staggering, longest leg on #1) |
| 5 | Type 5 fan-out LC (equal length) |
| Z | Custom fan-out |

| **10** | **Fan-out side A, longest fan-out length (divider to connector)** |
|---|---|
| n n n | - product code starting with OH: unit in cm <br> - product code starting with UH: unit in inch |

| **11** | **Fan-out side A, connector** |
|---|---|
| M | MTP connector |
| L | LC duplex connector (LC-XD) |
| S | SC simplex connector |

| **12** | **Fan-out side A, connector type** |
|---|---|
| F | MTP female connecor (non-pinned) |
| M | MTP male connector (pinned) |
| P | UPC polish (only applicable for LC) |
| A | APC polish (only applicable for LC) |

| **13** | **Fan-out B-Side** |
|---|---|
| 0 | No fan-out (for splice version) |
| 1 | Type 1 fan-out LC (15mm staggering, shortest leg on #1) |
| 2 | Type 2 fan-out LC (15mm pairwise staggering, shortest leg on #1) |
| 3 | Type 3 fan-out LC (15mm staggering, longest leg on #1) |
| 4 | Type 4 fan-out LC (15mm pairwise staggering, longest leg on #1) |
| 5 | Type 5 fan-out LC (equal length) |
| Z | Custom fan-out |

| **14** | **Fan-out side B, longest fan-out length (divider to connector)** |
|---|---|
| n n n | - product code starting with OH: unit in cm <br> - product code starting with UH: unit in inch |

| **15** | **Fan-out side B, connector** |
|---|---|
| 0 | No connector (LC to splice harness) |
| M | MTP connector |
| L | LC duplex connector (LC-XD) |
| S | SC simplex connector |

| **16** | **Fan-out side B, connector type** |
|---|---|
| 0 | No connector (LC to splice harness) |
| F | MTP female connecor (non-pinned) |
| M | MTP male connector (pinned) |
| P | UPC polish (only applicable for LC) |
| A | APC polish (only applicable for LC) |

# Order Code Example Harness LC to LC

Specify cable length in meters/feets

Side B
Specify longest leg length in cm/in
(Standard is 22 cm/9 in)

Choose preferred staggering type for side B
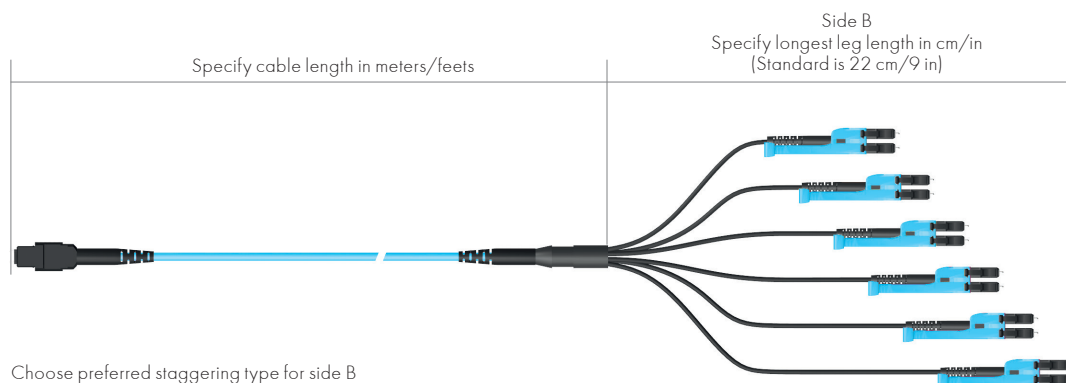
| Example | OH12ASL-PF3005F-0000MF-3022LP |
|---|---|
| Harness type | Harness Base-12, fiber allocation type A-straight, low loss class |
| Cable | OM3, 5m length, Indoor multi-unit small and lightweight cable, NFPA plenum, particel free packaging |
| Fan-out side A | No fan-out length, MTP female |
| Fan-out side B | Type 3, 15cm staggered leg #6, longest leg #1, 22cm length, LC duplex connector (LC-XD) |

Side A
Specify longest leg length in cm/in
(Standard is 70 cm/28 in)

Specify cable length in meters/feets

Side A
Specify longest leg length in cm/in
(Standard is 70 cm/28 in)

Choose preferred staggering type for side B
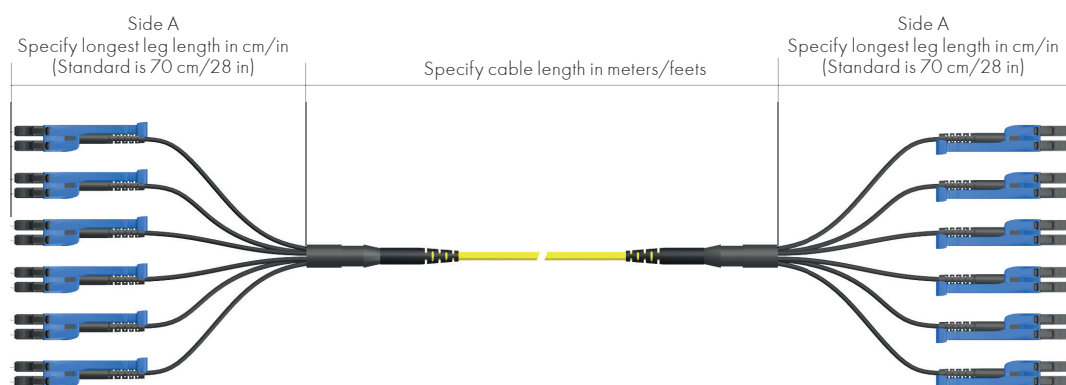
| Example | OH12ASL–DB0020F–5070LP–5070LP |
|---|---|
| Harness type | Optipack harness Base-2 (6x LC duplex), fiber allocation AS, low loss class |
| Cable | CPR rated optipack cable Dca with optimised diameter, SM, 20meter length, particle-free packing |
| Fan-out side A | Type 5 fan-out, 70cm lenght (equal), LC duplex connector (LC-XD), PC polish |
| Fan-out side B | Type 5 fan-out, 70cm lenght (equal), LC duplex connector (LC-XD), PC polish |

# MTP Patch Cables
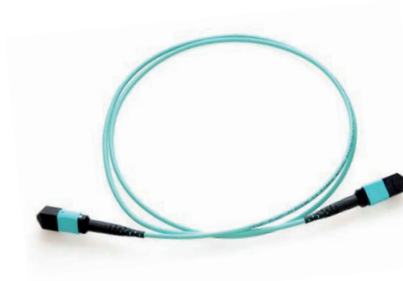
### Characteristics
• Color coded connector boots by fiber count
• Ultra compact cable diameter
• Bend optimized fiber and flexible construction
• Available as Base-8, -12 or Base-24 types
• Robust construction
• Available in plenum, riser, and general purpose rating

## Base-8 MTP patch cables cables
Base-8 MTP patch cables are used to connect fiber optic patch panels with servers and switches in 4-lane parallel architectures. They can also be used to connect two independent trays or modules within centralized cross-connects. Base-8 is the most common interface for 10G data rates and new developments in transceiver technology means that Base-8 could also satisfy 40G, 200G and 400G in the future.

Base-8 patch cables are identified by a gray boot at the rear of the connector so that users do not mistake it for a Base-12 assembly with black boot. Base-8 patch cables are fully compatible with Base-12 patch backbone cables and patch panels, however users should note that 33 % of backbone fibers will be wasted in such a case.

## Base-12 MTP patch cables
Base-12 MTP patch cables are used to connect fiber optic patch panels with servers and switches in 4-lane parallel architectures. They can also be used to connect two independent trays or modules within centralized cross-connects. Base-12 patch cables are compatible with Base-8 transceivers, but usage will result in a 33 % fiber wastage because SR4 deployments of 40G only require 8 fibers (4 x lanes).

Base-12 patch cables are identified by a black boot at the rear of the connector so that users do not mistake it for a Base-8 assembly with gray boot. Base-12 patch cables are fully compatible with Base-8 backbone cables and patch panels, however users should note that 33 % of jumper fibers will be wasted in such a case.

## Base-24 MTP patch cables
Base-24 MTP patch cables are used to connect fiber optic patch panels with servers and switches in 10-lane parallel architectures. They can also be used to connect two independent trays or modules within centralized cross-connects. Base-24 patch cables are typically used for 100G data rates over SR10 transceivers and can be identified by a red boot at the rear of the connector.

# MTP Patch Cables

## Technical data

| Attribute | Value |
|---|---|
| Cable diameter | 3.0 mm, 8 fibers<br>3.0 mm, 12 fibers<br>3.0 mm, 24 fibers |
| Design acc. to IEC 61754-7 and TIA 604-5 Type MPO | compliant |
| Tensile load | 50N |
| Operating temperature | −10 to +60 °C |
| Material | flame retardant acc. to UL 94 V-0 |
| RoHS guidelines 2011/65/EU | compliant |

## Optical values

| Type | Measurement method (IL/RL) | IL (dB) | RL (dB) |
|---|---|---|---|
| SM MT elite (8, 12 and 24 fiber) | IL tested per IEC 6111.8-3-4 method B | 0.10/0.35 | >60 |
| | RL tested per IEC 6111.8-3-6 method B | | |
| MM MT elite (8, 12 and 24 fiber) | IL tested per IEC 6111.8-3-4 method B | 0.10/0.35 | >30 |
| | RL tested per IEC 6111.8-3-6 method B | | |

# LC-XD Patch Cables
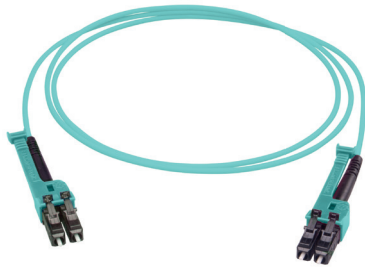
## Characteristics
- Patented push-pull mechanism for best handling and highest density
- Stable lever with easy-grip design and marking possibility
- Short connector body length
- Two connections in one LC-shaped adapter
- Polarity flipping without tool
- Compatible to standard (6.25 mm) and mini LC (5.25 mm) adapters and transceivers
- Available in plenum, riser, and general purpose rating

Base-2 LC patch cables connect fiber optic patch panels to servers and switches in duplex serial architectures. They can also be used to connect two independent trays or modules within centralized cross-connects.

Depending on the application, HUBER+SUHNER has a range of LC patch cables to match your particular need. The LC-XD patch cable incorporates the world's first push-pull LC connector and facilitates simple insertion as well as removal simply by pushing or pulling the extraction finger at the rear of the connector. This innovative step means that even in the highest density environments, users can still carry out moves, adds and changes with minimal disruption.

## Technical data

| Specification | Value |
|---|---|
| Cable diameter | 2.1 mm |
| Design acc. to IEC 61754-20 and TIA 604-10-B | compliant |
| Thermal and mechanical tests acc. to IEC 61753-1 | fulfilled |
| Side load acc. to GR-326-CORE | fulfilled |
| Tensile load | 70 N |
| Operating temperature | −25 to +70 °C |
| Material | Compliant with plenum, riser and general purpose requirements |
| RoHS guidelines 2011/65/EU | compliant |

## Optical performance

| Type | Measurement method (IL/RL) | IL (dB) | RL (dB) |
|---|---|---|---|
| SM UPC | IL: IEC 6111.8-3-4 method B | ≤ 0.30 | ≥ 50 |
| SM APC | RL: IEC 6111.8-3-6 | ≤ 0.30 | ≥ 65 |
| MM OM3 | IL: IEC 6111.8-3-34 method B | ≤ 0.25 | ≥ 35 |
| MM OM4 | RL: IEC 6111.8-3-6 | ≤ 0.15 | ≥ 35 |

# LC-XD Patch Cables

## Ordering information

LC-XD uniboot duplex jumper cable, push-pull, polarity A-B/B-A and A-A/B-B, cable diameter 2.1 mm

## Ordering information

| Fiber Type Polarity | Description | Length (m) | Item Number |
|---|---|---|---|
| SM A-B/B-A | LC XD - LC XD duplex patch cable, ONFP OS2 1.5m A-B/B-A | 1.5 | 85090208 |
| | LC XD - LC XD duplex patch cable, ONFP OS2 3.5m A-B/B-A | 3.5 | 85090209 |
| | LC XD - LC XD duplex patch cable, ONFP OS2 5m A-B/B-A | 5 | 85080879 |
| | LC XD - LC XD duplex patch cable, ONFP OS2 7m A-B/B-A | 7 | 85090210 |
| | LC XD - LC XD duplex patch cable, ONFP OS2 10m A-B/B-A | 10 | 85088924 |
| SM A-A/B-B | LC XD - LC XD duplex patch cable, ONFP OS2 1.5m A-A/B-B | 1.5 | 85090211 |
| | LC XD - LC XD duplex patch cable, ONFP OS2 3.5m A-A/B-B | 3.5 | 85090212 |
| | LC XD - LC XD duplex patch cable, ONFP OS2 5m A-A/B-B | 5 | 85090213 |
| | LC XD - LC XD duplex patch cable, ONFP OS2 7m A-A/B-B | 7 | 85090214 |
| | LC XD - LC XD duplex patch cable, ONFP OS2 10m A-A/B-B | 10 | 85090215 |
| OM3 A-B/B-A | LC XD - LC XD duplex patch cable, ONFP OM3 1.5m A-B/B-A | 1.5 | 85090216 |
| | LC XD - LC XD duplex patch cable, ONFP OM3 3.5m A-B/B-A | 3.5 | 85090217 |
| | LC XD - LC XD duplex patch cable, ONFP OM3 5m A-B/B-A | 5 | 85090218 |
| | LC XD - LC XD duplex patch cable, ONFP OM3 7m A-B/B-A | 7 | 85090219 |
| | LC XD - LC XD duplex patch cable, ONFP OM3 10m A-B/B-A | 10 | 85090009 |
| OM3 A-A/B-B | LC XD - LC XD duplex patch cable, ONFP OM3 1.5m A-A/B-B | 1.5 | 85090220 |
| | LC XD - LC XD duplex patch cable, ONFP OM3 3.5m A-A/B-B | 3.5 | 85090221 |
| | LC XD - LC XD duplex patch cable, ONFP OM3 5m A-A/B-B | 5 | 85090222 |
| | LC XD - LC XD duplex patch cable, ONFP OM3 7m A-A/B-B | 7 | 85090223 |
| | LC XD - LC XD duplex patch cable, ONFP OM3 10m A-A/B-B | 10 | 85090224 |
| OM4 A-B/B-A | LC XD - LC XD duplex patch cable, ONFP OM4 1.5m A-B/B-A | 1.5 | 85090225 |
| | LC XD - LC XD duplex patch cable, ONFP OM4 3.5m A-B/B-A | 3.5 | 85090226 |
| | LC XD - LC XD duplex patch cable, ONFP OM4 5m A-B/B-A | 5 | 85090227 |
| | LC XD - LC XD duplex patch cable, ONFP OM4 7m A-B/B-A | 7 | 85090228 |
| | LC XD - LC XD duplex patch cable, ONFP OM4 10m A-B/B-A | 10 | 85090229 |
| OM4 A-A/B-B | LC XD - LC XD duplex patch cable, ONFP OM4 1.5m A-A/B-B | 1.5 | 85090230 |
| | LC XD - LC XD duplex patch cable, ONFP OM4 3.5m A-A/B-B | 3.5 | 85090231 |
| | LC XD - LC XD duplex patch cable, ONFP OM4 5m A-A/B-B | 5 | 85090232 |
| | LC XD - LC XD duplex patch cable, ONFP OM4 7m A-A/B-B | 7 | 85090233 |
| | LC XD - LC XD duplex patch cable, ONFP OM4 10m A-A/B-B | 10 | 85090234 |

# HUBER+SUHNER Cable Assembly – Order Code

| 1 | | 2 | | 3 | | 4 | | 5 | | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | – | | – | | – | | – | | – | | | |

| 1 | Assembly type | |
|---|---|---|
| PTxx | Pigtail (BTW) | xx: fiber count (e.g. 01) |
| PSxx | Pigtail set | Dx: for duplex zip cord |
| PCxx | Patch cord | Rx: for ruggedized/round duplex/duplex |
| MRxx | Multifiber riser | xS: straight polarity A-B/B-A (standard) |
| Moxx | Multifiber breakout | xF: flipped polarity A-A/B-B |
| Myxx | MTP based assembly | y: polarity |
| | | A: crossed |
| | | B: straight |
| | | C: pairwise crossed |
| | | D: level flip (MT24) |
| | | E: straight (MT24) |

| 2 | Connector, left side | |
|---|---|---|
| **3** | **Connector, right side** | |
| LCxy | LC | x: U: UPC/SM |
| SCxy | SC | A: APC 8o/SM |
| FCxy | FCPC | M: PC MM |
| LHxy | FLSH | y: S: simplex |
| LXxy | LX.5 | D: duplex |
| STxy | ST | E: simplex push-pull* |
| MTxy | MTP | P: duplex push-pull* |
| 0000 | w/o connector on the right side | H: duplex high density* |
| | | G: simplex high density* |
| | | U: Uniboot* |
| | | X: XD (extreme density)* |
| | | F: female (MTP) |
| | | M: male (MTP) |
| | | |
| | | *only applicable for LC |

| 4 | Cable type | |
|---|---|---|
| Smxxy | SM-standard, G652.D | xx: cable diameter (1/10mm) |
| A1xxy | SM-LowBend r10, G657.A1 | y: T: tight tube |
| A2xxy | SM-LowBend r7.5, G657.A2 | E: easy strip tube |
| O3xxy | MM, G50, OM3 | R: UL conform |
| O4xxy | MM, G50, OM4 | |

| 5 | Length (refer to section 8 for unit) | |
|---|---|---|
| xx.x | Length (ferrule tip to ferrule tip / 03.5 = 3.5) |
| xxxx | Length if > 99 (ferrule tip to ferrule tip / 1000 = 1000) |

| 6 | Assembly class, left side | |
|---|---|---|
| **7** | **Assembly class, right side** | |
| S | SM standard |
| B | SM grade B/SM elite for MTP |
| A | SM 0.1dB |
| H | SM 0.1dB High-Power |
| M | MM standard |
| L | MM low loss/MM elite for MTP |
| 0 | w/o connector on the right side |

| 8 | Unit of the length | |
|---|---|---|
| X | Choose this when length in section 5 is in meter. |
| | Leave it empty when length in section 5 is in ft. |

## Examples

PT01_LCUS_0000_SM09E_02.0_S0X
Pigtail one fiber, LC UPC simplex connector on the left, without connector on the right, SM G.652.D, 0.9 mm fiber, 2 m length, SM standard performance

PCDS_LCMD_LCMD_O420E_05.5_LLX
Patch cord duplex zip cord (fig. 8), LC MM standard duplex left and right, OM4 duplex zip cord 2.0 mm, 5.5 m length, MM low loss performance

# Fiber Pathways

The HUBER+SUHNER fiber pathways solution can be installed underfloor or overhead and provides a secure and stress-free routing channel for fiber cabling within a structured cabling solution. Curved fittings such as cross-pieces, tees and elbows are specifically designed to protect fibers so that a minimum bend radius of 1.2 in is maintained at all times.

Unlike conventional cable baskets and ladders, the HUBER+SUHNER fiber pathways solution offers lateral support along the complete fiber length. This reduces the risk of both macro and micro-bending of the individual cables.

In order to reduce installation times and simplify the complete assembly process, HUBER+SUHNER supplies all pathways components pre-assembled with end cap. This unique feature can reduce installation times by as much
as 50 % and reduces the complexity involved in connecting straight pathways of different lengths to other components. Because a straight pathway always requires at least one joiner, we assemble this in the factory so that full-length pathways can be connected in the fastest possible time. We also pre-fit the screws on the unmated side of the joiner to further improve handling and reduce installation times.

# Key Features Pathways

## CAD and visio stencils for easy planning

The pathway system from HUBER+SUHNER is supported with a comprehensive stencil package which allows planners to design accurate pathway drawings of their complete network infrastructure. Drag and drop functionality provides a fast and logical user experience.
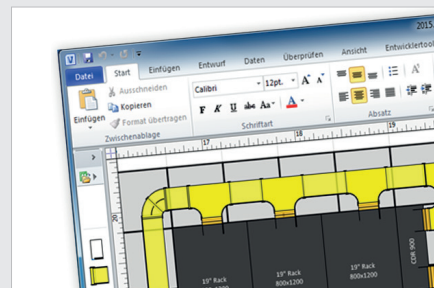
## Cable slack management

With the rising use of pre-terminated cable systems, network service operators are looking for new ways to manage excess cable slack between equipment cabinets and optical cross-connects. The pathway system can be configured with strategically placed storage loops that take up excess cable length. Storage loops can be in-line or off-line depending on the quantity, size and length of cables being managed.
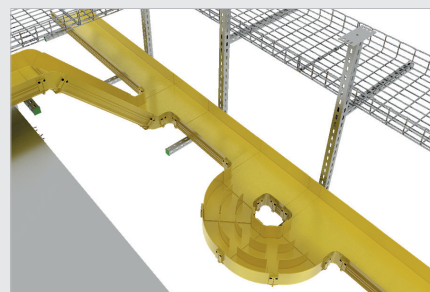
## Pre-installed joiners cut installation time by 50 %

All pathway components are delivered on site with pre-installed end cap at one end. This allows the user to cut the open end to length and then quickly fix the two components together. On larger projects, this feature contributes greatly to reduced installation times and rapid deployments.
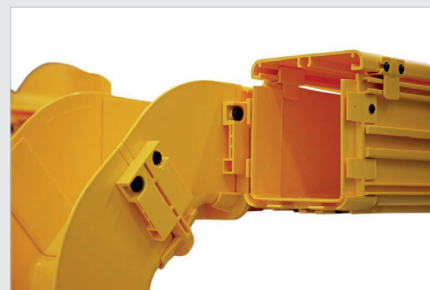
## Protected cable routing to equipment cabinets

Retrofittable top outlets can be added to straight sections of pathway so that cables can be protected between the main routes and the cabinet. Full radius protection is provided from the pathway to the cabinet and open sides facilitate fast and simple moves, adds and changes (MACs).

# Pathways
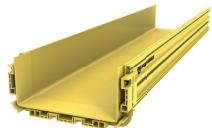
## Ordering information main pathways

| Description | Item no. |
|---|---|
| Main pathway (incl. 1 joiner and screws) 4 × 4 × 79 in | 85029745 |
| Main pathway (incl. 1 joiner and screws) 6 × 4 × 79 in | 85029747 |
| Main pathway (incl. 1 joiner and screws) 9 × 4 × 79 in | 85029748 |
| Main pathway (incl. 1 joiner and screws) 12 × 4 × 79 in | 85029749 |

## Ordering information covers

| Description | Item no. |
|---|---|
| Pathway cover (incl. clips) 4 × 79 in | 85029751 |
| Pathway cover (incl. clips) 6 × 79 in | 85029752 |
| Pathway cover (incl. clips) 9 × 79 in | 85029753 |
| Pathway cover (incl. clips) 12 × 79 in | 85029754 |
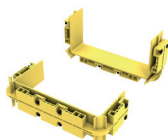
## Ordering information joiners

| Description | Item no. |
|---|---|
| Joiner (incl. screws) 4 × 4 in | 84107835 |
| Joiner (incl. screws) 6 × 4 in | 84107834 |
| Joiner (incl. screws) 9 × 4 in | 84107833 |
| Joiner (incl. screws) 12 × 4 in | 84107832 |

## Ordering information end cap

| Description | Item no. |
|---|---|
| End cap 4 × 4 in | 84107847 |
| End cap 6 × 4 in | 84107846 |
| End cap 9 × 4 in | 84107845 |
| End cap 12 × 4 in | 84107844 |

# Pathways
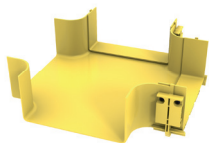
## Ordering information horizontal crosses

| Description | Item no. |
|---|---|
| Horizontal cross (incl. 2 end cap and screws) 4 × 4 in | 85029759 |
| Horizontal cross (incl. 2 end cap and screws) 6 × 4 in | 85029760 |
| Horizontal cross (incl. 2 end cap and screws) 9 × 4 in | 85029761 |
| Horizontal cross (incl. 2 end cap and screws) 12 × 4 in | 85029762 |

## Ordering information horizontal cross covers

| Description | Item no. |
|---|---|
| Horizontal cross cover 4 in | 84108097 |
| Horizontal cross cover 6 in | 84108096 |
| Horizontal cross cover 9 in | 84108095 |
| Horizontal cross cover 12 in | 84108094 |
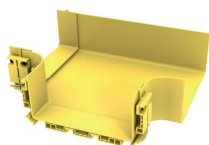
## Ordering information horizontal tees

| Description | Item no. |
|---|---|
| Horizontal tee (incl. 2 end cap and screws) 4 x 4 in | 85029764 |
| Horizontal tee (incl. 2 end cap and screws) 6 x 4 in | 85029765 |
| Horizontal tee (incl. 2 end cap and screws) 9 x 4 in | 85029766 |
| Horizontal tee (incl. 2 end cap and screws) 12 x 4 in | 85029767 |

## Ordering information horizontal tee covers

| Description | Item no. |
|---|---|
| Horizontal tee cover 4 in | 84117259 |
| Horizontal tee cover 6 in | 84117258 |
| Horizontal tee cover 9 in | 84117257 |
| Horizontal tee cover 12 in | 84117256 |

# Pathways
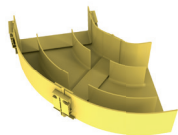


## Ordering information horizontal elbows 90°

| Description | Item no. |
|---|---|
| Horizontal elbow 90° (incl. 1 joiner and screws) 4 × 4 in | 85029769 |
| Horizontal elbow 90° (incl. 1 joiner and screws) 6 × 4 in | 85029770 |
| Horizontal elbow 90° (incl. 1 joiner and screws) 9 × 4 in | 85029771 |
| Horizontal elbow 90° (incl. 1 joiner and screws) 12 × 4 in | 85029772 |
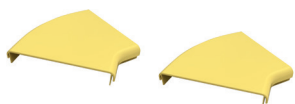


## Ordering information horizontal elbow covers 90°

| Description | Item no. |
|---|---|
| Horizontal elbow cover 90° 4 in | 84117268 |
| Horizontal elbow cover 90° 6 in | 84117265 |
| Horizontal elbow cover 90° 9 in | 84117263 |
| Horizontal elbow cover 90° 12 in | 84117261 |
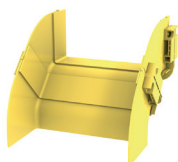


## Ordering information vertical down elbows 90°

| Description | Item no. |
|---|---|
| Vertical down elbow 90° (incl. 1 joiner and screws) 4 × 4 in | 85029789 |
| Vertical down elbow 90° (incl. 1 joiner and screws) 6 × 4 in | 85029790 |
| Vertical down elbow 90° (incl. 1 joiner and screws) 9 × 4 in | 85029791 |
| Vertical down elbow 90° (incl. 1 joiner and screws) 12 × 4 in | 85029792 |
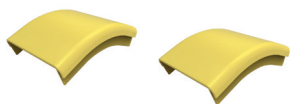


## Ordering information vertical down elbow covers 90°

| Description | Item no. |
|---|---|
| Vertical down elbow cover 90° 4 in | 84117298 |
| Vertical down elbow cover 90° 6 in | 84117297 |
| Vertical down elbow cover 90° 9 in | 84117296 |
| Vertical down elbow cover 90° 12 in | 84117295 |

# Pathways
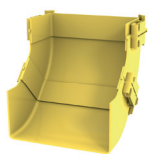
### Ordering information vertical up elbows 90°

| Description | Item no. |
|---|---|
| Vertical up elbow 90° (incl. 1 joiner and screws) 4 × 4 in | 85029794 |
| Vertical up elbow 90° (incl. 1 joiner and screws) 6 × 4 in | 85029795 |
| Vertical up elbow 90° (incl. 1 joiner and screws) 9 × 4 in | 85029796 |
| Vertical up elbow 90° (incl. 1 joiner and screws) 12 × 4 in | 85029797 |
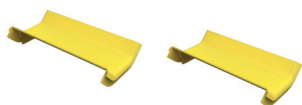
### Ordering information vertical up elbow covers 90°

| Description | Item no. |
|---|---|
| Vertical up elbow cover 90° 4 in | 84117308 |
| Vertical up elbow cover 90° 6 in | 84117307 |
| Vertical up elbow cover 90° 9 in | 84117306 |
| Vertical up elbow cover 90° 12 in | 84117305 |
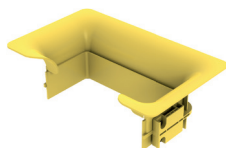
### Ordering information trumpet outlets

| Description | Item no. |
|---|---|
| Trumpet outlet (incl. 1 joiner and screws) 4 × 4 in | 85029784 |
| Trumpet outlet (incl. 1 joiner and screws) 6 × 4 in | 85029785 |
| Trumpet outlet (incl. 1 joiner and screws) 9 × 4 in | 85029786 |
| Trumpet outlet (incl. 1 joiner and screws) 12 × 4 in | 85029787 |

# Pathways
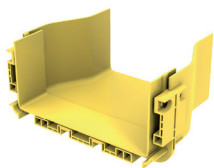
## Ordering information reducers

| Description | Item no. |
|---|---|
| Reducer (incl. 1 joiner and screws) 6 to 4 × 4 in | 85029801 |
| Reducer (incl. 1 joiner and screws) 9 to 6 × 4 in | 85029802 |
| Reducer (incl. 1 joiner and screws) 12 to 9 × 4 in | 85029803 |
| Reducer (incl. 1 joiner and screws) 12 to 4 × 4 in | 85073020 |
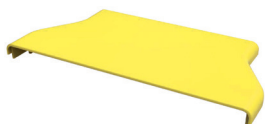
## Ordering information reducer covers

| Description | Item no. |
|---|---|
| Reducer cover 6 to 4 in | 84117319 |
| Reducer cover 9 to 6 in | 84117320 |
| Reducer cover 12 to 9 in | 84117322 |
| Reducer cover 12 to 4 in | 85073029 |
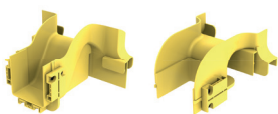
## Ordering information top outlet drop-offs

| Description | Item no. |
|---|---|
| Top outlet drop-off horizontal (incl. 1 joiner and screws) 4 × 4 in | 85029798 |
| Top outlet drop-off vertical (incl. 1 joiner and screws)  4 × 4 in | 85029799 |

# Pathways
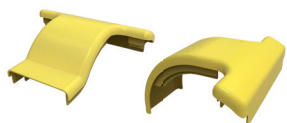
## Ordering information top outlet drop-off covers

| Description | Item no. |
|---|---|
| Top outlet drop-off cover horizontal 4 in | 84117315 |
| Top outlet drop-off cover vertical 4 in | 84117316 |

## Ordering information top outlet mounting brackets

| Description | Item no. |
|---|---|
| Top outlet mounting bracket, horizontal | 84107849 |
| Top outlet mounting bracket, vertical | 85005492 |

## Ordering information pathway fixing bolt

| Description | Item no. |
|---|---|
| Pathway fixing bolt | 84107837 |

# Copper and LAN Solutions

# Copper and LAN Solutions

HUBER+SUHNER designs and manufactures cost-effective high-performance copper products to support applications including 10GBase-T and remote powering (PoE+). Our tailored solutions offer proven and reliable performance characteristics which exceed all of the relevant cabling standards found on the international market.
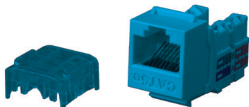
Our copper products allow you to utilize the full capacity and transmission distance of your copper infrastructure without compromising flexibility and handling. Built from high quality, proven components, the Category 5e, Category 6 and Category 6A solutions operate to 250 and 500 MHz respectively, with overcapacity built into selected components for enhanced longevity and upgradability.

Each component is compliant to the relevant component standards, and when installed in combination, provide link and channel performance which exceeds the ISO/IEC, EN and TIA link and channel standards.

# Data Communication Jacks
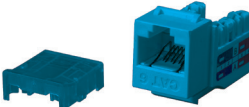
## Category 5e Premium Jacks

### Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| Category 5e premium jack, unshielded, punch down, keystone, blue | 85087747 | |
| Category 5e premium jack, unshielded, punch down, keystone, green | 85087748 | |
| Category 5e premium jack, unshielded, punch down, keystone, office white | 85087749 | |
| Category 5e premium jack, unshielded, punch down, keystone, yellow | 85087750 | |
| Category 5e premium jack, unshielded, punch down, keystone, gray | 85088277 | |
| Category 5e premium jack, unshielded, punch down, keystone, red | 85087751 | |
| Category 5e premium jack, unshielded, punch down, keystone, black | 85087752 | |
| Category 5e premium jack, unshielded, punch down, keystone, orange | 85092233 | |
| Category 5e premium jack, unshielded, punch down, keystone, ivory | 85092234 | |

## Category 6 Premium Jacks

### Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| Category 6 premium jack, unshielded, punch down, keystone, blue | 85087753 | |
| Category 6 premium jack, unshielded, punch down, keystone, green | 85087754 | |
| Category 6 premium jack, unshielded, punch down, keystone, office white | 85087755 | |
| Category 6 premium jack, unshielded, punch down, keystone, yellow | 85087756 | |
| Category 6 premium jack, unshielded, punch down, keystone, gray | 85088279 | |
| Category 6 premium jack, unshielded, punch down, keystone, red | 85087757 | |
| Category 6 premium jack, unshielded, punch down, keystone, black | 85087758 | |
| Category 6 premium jack, unshielded, punch down, keystone, orange | 85092235 | |
| Category 6 premium jack, unshielded, punch down, keystone, ivory | 85092236 | |

## Category 6 Premium Toolless Jacks

### Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| Category 6 premium jack, unshielded, toolless, keystone, black | 85067214 | |
| Category 6 premium jack, unshielded, toolless, keystone, office white | 85066494 | |
| Category 6 premium jack, unshielded, toolless, keystone, red | 85087838 | |
| Category 6 premium jack, unshielded, toolless, keystone, gray | 85087839 | |
| Category 6 premium jack, unshielded, toolless, keystone, yellow | 85080906 | |
| Category 6 premium jack, unshielded, toolless, keystone, blue | 85087840 | |
| Category 6 premium jack, unshielded, toolless, keystone, green | 85087841 | |
| Category 6 premium jack, unshielded, toolless, keystone, orange | 85087842 | |
| Category 6 premium jack, unshielded, toolless, keystone, ivory | 85087843 | |

Premium jack – tested to component level TIA specifications
Base jack – tested to permanent link TIA specifications

# Data Communication Jacks

## Category 6A Base Jacks

### Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| Category 6A base jack, unshielded, punch down, keystone, black | 85087858 | |
| Category 6A base jack, unshielded, punch down, keystone, office white | 85087860 | |
| Category 6A base jack, unshielded, punch down, keystone, red | 85087862 | |
| Category 6A base jack, unshielded, punch down, keystone, gray | 85087863 | |
| Category 6A base jack, unshielded, punch down, keystone, yellow | 85087864 | |
| Category 6A base jack, unshielded, punch down, keystone, blue | 85087865 | |
| Category 6A base jack, unshielded, punch down, keystone, green | 85087866 | |
| Category 6A base jack, unshielded, punch down, keystone, orange | 85087867 | |
| Category 6A base jack, unshielded, punch down, keystone, ivory | 85087868 | |
| Category 6A UTP angled jack, office white | 85090170 | |

## Category 6A Premium Jacks

### Ordering information
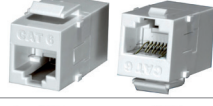
| Description | Item Number | Pictures |
|---|---|---|
| Category 6A premium jack, unshielded, punch down, keystone, black | 85087845 | |
| Category 6A premium jack, unshielded, punch down, keystone, office white | 85087847 | |
| Category 6A premium jack, unshielded, punch down, keystone, red | 85087849 | |
| Category 6A premium jack, unshielded, punch down, keystone, gray | 85087850 | |
| Category 6A premium jack, unshielded, punch down, keystone, yellow | 85087851 | |
| Category 6A premium jack, unshielded, punch down, keystone, blue | 85087852 | |
| Category 6A premium jack, unshielded, punch down, keystone, green | 85087853 | |
| Category 6A premium jack, unshielded, punch down, keystone, orange | 85087854 | |
| Category 6A premium jack, unshielded, punch down, keystone, ivory | 85087855 | |

Premium jack – tested to component level TIA specifications
Base jack – tested to permanent link TIA specifications

## Keystone In-line Coupler
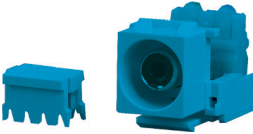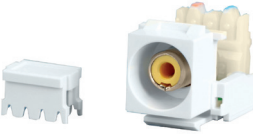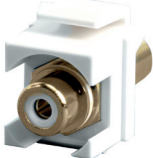
### Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| Category 6, unshielded, keystone in-line coupler, office white, compatible with HUBER+SUHNER snap-in face plates and patch panels | 84381114 | |
| Category 6A, unshielded, keystone in-line coupler, office white, compatible with HUBER+SUHNER snap-in face plates and patch panels | 84381116 | |
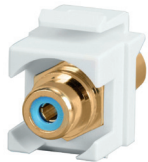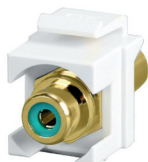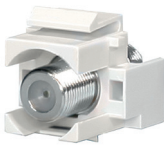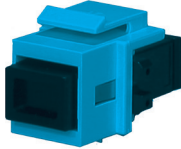
# Audio/Video Jacks

HUBER+SUHNER offers a wide range of audio and video connectivity to meet the interactive display needs of your environment. Please contact your local HUBER+SUHNER representative with any questions regarding our A/V connectivity.

## Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| RCA keystone connector module, IDC termination, for video/audio use, black | 85088365 | |
| RCA keystone connector module, IDC termination, for video/audio use, red | 85089772 | |
| RCA keystone connector module, IDC termination, for video/audio use, yellow | 85089773 | |
| RCA keystone connector module, IDC termination, for video/audio use, office white | 85089774 | |
| RCA connector, for RCA A/V line, 16.30mm in width, compatible with 24 port patch panel, white | 85089463 | |
| RCA connector, for RCA A/V line, 16.30mm in width, compatible with 24 port patch panel, yellow | 85089464 | |
| RCA connector, for RCA A/V line, 16.30mm in width, compatible with 24 port patch panel, black | 85089465 | |

# Audio/Video Jacks

| | | |
|---|---|---|
| RCA connector, for RCA A/V line, 16.30mm in width, compatible with 24 port patch panel, blue | 85089466 | |
| RCA connector, for RCA A/V line, 16.30mm in width, compatible with 24 port patch panel, green | 85089467 | |
| F-/F snap-in connector | 85089468 | |
| S-Video keystone connector module, IDC termination | 85089469 | |
| ST fiber keystone connector module | 85088364 | |
| MT-RJ SM/MM fiber keystone connector module | 85088363 | |
| LC duplex SM fiber keystone connector module | 85088361 | |

# Audio/Video Jacks

| | | |
|---|---|---|
| LC duplex MM fiber keystone connector module | 85088360 | |
| SC MM fiber keystone connector phosphor bronze module, black | 85088362 | |
| USB 2.0 coupler, female A to female A coupler module | 85089461 | |
| USB 2.0 coupler, female A to female B coupler module | 85088348 | |
| USB 2.0 coupler, female B to female B coupler module | 85089462 | |
| USB 3.0 coupler, female A to female A coupler module | 85088349 | |
| HDMI coupler, for transmitting audio and video signals | 85088347 | |
| Blank keystone, office white | 85088366 | |

# Face Plates

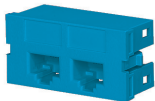| Description | Item Number | Pictures |
|---|---|---|
| 1-port, keystone mounting face plate, office white (4.87" x 3.11") | 85087760 | |
| 2-port, keystone mounting face plate, office white (4.87" x 3.11") | 85087761 | |
| 4-port, keystone mounting face plate, office white (4.87" x 3.11") | 85087762 | |
| 6-port, keystone mounting face plate, office white (4.87" x 3.11") | 85087763 | |
| 6-port, keystone mounting face plate, office white (4.53" x 4.56") | 85087764 | |
| 12-port, keystone mounting face plate, office white (4.53" x 4.56") | 85087765 | |
| Blank face plate, office white (4.53" x 2.75") | 85087652 | |
| 1-port, keystone mounting face plate, office white (4.53" x 2.75") | 85087653 | |
| 2-port, keystone mounting face plate, office white (4.53" x 2.75") | 85087654 | |

# Face Plates
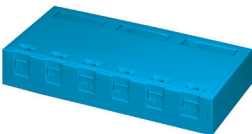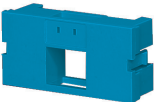
| | | |
|---|---|---|
| 4-port, keystone mounting face plate, office white (4.53" x 2.75") | 85087655 |  |
| 1-port, edges, keystone mounting face plate, office white (4.53" x 2.75") | 85087656 |  |
| 2-port, edges, keystone mounting face plate, office white (4.53" x 2.75") | 85087657 |  |
| 4-port, edges, keystone mounting face plate, office white (4.53" x 2.75") | 85087658 |  |
| 1-port, keystone mounting face plate, stainless steel brused (4.53" x 2.75") | 85087660 |  |
| 2-port, keystone mounting face plate, stainless steel brused (4.53" x 2.75") | 85087661 |  |
| 2-port horizontal, keystone mounting face plate, stainless steel brused (4.53" x 2.75") | 85087666 |  |
| 4-port, keystone mounting face plate, stainless steel brused (4.53" x 2.75") | 85087663 |  |
| 1-port, window label, keystone mounting face plate, stainless steel brused (4.53" x 2.75") | 85087668 |  |

# Face Plates

| | | |
|---|---|---|
| 2-port, window label, keystone mounting face plate, stainless steel brused (4.53" x 2.75") | 85087669 | |
| 2-port horizontal, window label, keystone mounting face plate, stainless steel brused (4.53"x2.75") | 85087670 | |
| 4-port, window label, keystone mounting face plate, stainless steel brused (4.53" x 2.75") | 85087671 | |
| 1-port, window label, keystone mounting face plate, office white (4.53" x 2.75") | 85087672 | |
| 2-port, window label, keystone mounting face plate, office white (4.53" x 2.75") | 85087673 | |
| 4-port, window label, keystone mounting face plate, office white (4.53" x 2.75") | 85087674 | |
| Window label, face plate frame module, office white (4.53"x2.75"x0.36") | 85087716 | |
| Window label, face plate frame module, office white (4.53"x2.75"x0.59") | 85087717 | |

# Surface Mount Boxes

## Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| 1-port surface mount box, office white | 85087766 | |
| 2-port surface mount box, office white | 85087768 | |
| 4-port surface mount box, office white | 85087769 | |
| 6-port surface mount box, office white | 85087770 | |
| 1-gauge surface mounting box for mounting modules, with snap-in fitting on wall or table, office white | 85087739 | |
| 3-gauge surface mounting box for mounting modules, with snap-in fitting on wall or table, office white | 85087742 | |
| Blank, 1-row bezel, office white | 85087718 | |
| Bezel 1 row, 1 port key stone, white | 85087719 | |
| Bezel 1 row, 2 port key stone, white | 85087720 | |
| Bezel 1 row, 1 Category 6 port, white | 85087721 | |
| Bezel 1 row, 2 Category 6 port, white | 85087722 | |

# Fiber Bezels

## Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| Bezel 1 row, 2 LC ports, white | 85087723 |  |
| Bezel 1 row, 4 LC ports, white | 85087724 |  |
| Bezel 1 row, 1 SC ports, white | 85087771 |  |
| Bezel 1 row, 2 SC ports, white | 85087772 |  |

# Universal Patch Panels

## Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| 1U, 24-port, snap-in patch panel, black | 85066808 |  |
| 1U, 24-port, snap-in patch panel, staggered, black | 85088271 |  |
| 1U, 24-port, angled snap-in patch panel, black | 85088264 |  |
| 1U, 48-port, snap-in patch panel, shielded, silver | 85066054 |  |
| 1U, 48-port snap-in patch panel, black | 84381106 |  |
| 2U, 48-port, snap-in patch panel, black | 85092068 |  |
| 1U, blank panel, black | 85088609 |  |

# Patch Panels

## Category 5e Patch Panels

### Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| 1U, 24-port, Category 5e, punch down patch panel, black | 85091493 |  |
| 2U, 48-port, Category 5e, punch down patch panel, black | 85091494 |  |
| 1U, 24-port, Category 5e, angled punch down premium patch panel, black | 85088275 |  |
| 2U, 48-port, Category 5e, angled punch down premium patch panel, black | 85088276 |  |

## Category 6 Patch Panels

### Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| 1U, 24-port, Category 6, punch down panel, with earthing kit and cable management bar, black stainless steel | 85066660 |  |
| 1U, 24-port, Category 6, punch down, PCB type patch panel, black | 85088267 |  |
| 1U, 24-port, Category 6, angled, punch down, PCB type patch panel, black | 85088265 |  |
| 2U, 48-port, Category 6, punch down, PCB type patch panel, black | 85088268 |  |
| 2U, 48-port, Category 6, angled, punch down, PCB type patch panel, black | 85088266 |  |
| 1U, 24-port, Category 6, angled, punch down, PCB type premium patch panel, black | 85088269 |  |
| 2U, 48-port, Category 6, angled, punch down, PCB type premium patch panel, black | 85088270 |  |

# Patch Panels

## Category 6A Patch Panels

### Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| 1U, 24-port, Category 6A, punch down, PCB type patch panel, black | 85088272 | |
| 2U, 48-port, Category 6A, punch down, PCB type patch panel, black | 85088273 | |

## Pre-terminated Copper Solutions

### Ordering information

| Description | Item Number | Pictures |
|---|---|---|
| Category 6 UTP cassette with 6 ports | 85087835 | |
| 1U, front metal panel, 24-port using 4 copper cassettes | 85066059 | |
| 1U, front metal panel, 48-port using 8 copper cassettes | 85066060 | |

# RJ45 Patch Cords
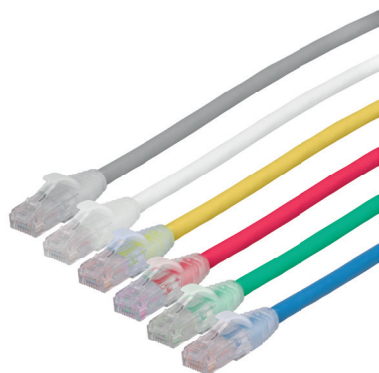
## Characteristics
• Independently tested and verified
• Component-rated for optimum channel performance
• 24, 26, 28-AWG stranded cable for maximum flexibility
• Standard plugs feature over-moulded boot to protect plug
• High density polyethylene insulation, polyvinylchloride jacket

## Ordering information

| Item Number | Description |
|---|---|
| 85087923 | Category 5e patch cord, 26 AWG F/UTP, 10ft, gray* |
| 85087925 | Category 5e patch cord, 24 AWG UTP, 10ft, gray* |
| 85087920 | Category 6 patch cord, 28 AWG UTP, 10ft, gray* |
| 85087922 | Category 6 patch cord, 24 AWG UTP, 10ft, gray* |
| 85087918 | Category 6A patch cord, 28 AWG F/UTP patch cord, 10ft, gray* |
| 85087919 | Category 6A patch cord, 26 AWG F/UTP patch cord, 10ft, gray* |

* Standard lengths includes: 1, 3, 5, 7, 10, 15ft
* Available colors: red, yellow, green, blue, gray, white, black

Contact Customer Services for additional product configurations

# Horizontal Cable Guides

### Characteristics
• 19 in basic management panel
• Robust steel construction
• Easy patch cord organisation
• Assembled with 5 support guiders

## Ordering information

| Description | Item no. |
|---|---|
| Cable guide, 1U, 5 guiders, black | 85005733 |
| Cable guide, 2U, 5 guiders, black | 85005734 |

# Horizontal Cable Channel Guides

### Characteristics
• 19 in basic management panel
• Robust steel baseplate, plastic tunnel and cover
• Easy patch cord organisation

## Ordering information

| Description | Item no. |
|---|---|
| Cable channel guide, 1U, slotted tunnel with cover, black | 85005737 |
| Cable channel guide, 2U, slotted tunnel with cover, black | 85005738 |

# Advanced Technologies
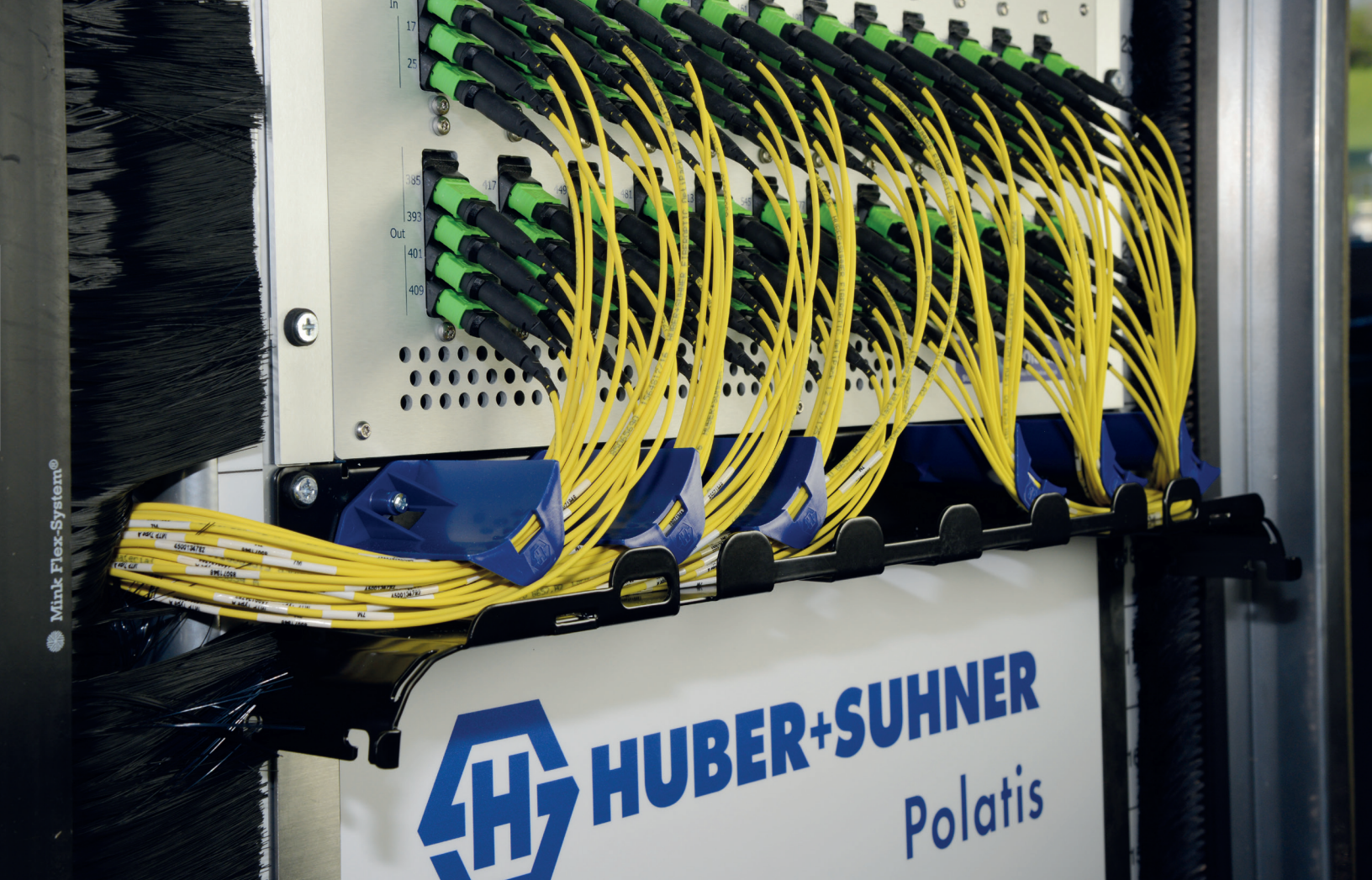
# Advanced Technologies

Communication technologies are ever evolving. To help customers understand these advancing technologies, HUBER+SUHNER has made significant investments in several of these new technologies – notably, WDM systems from Cube Optics and all optical switching from Polatis.

HUBER+SUHNER Cube Optics develops and produces wavelength-division multiplexing (WDM) solutions based on state of the art fiber optic technology. WDM systems provide a cost effective solution for boosting the data transmission rates across not only local networks but also long distances as well as multiple/branch locations.

HUBER+SUHNER Polatis is the most technologically advanced all optical switching platform on the market today. With an all optical switch (OOO), data transmissions are not converted from optical to electric to optical signals – introducing latency and insertion losses into transmissions – but kept as all optical signals, thus switching data streams much faster and more reliably with lower insertion loss. The Polatis solutions allow the efficient management of ever-increasing data volumes and are a key building block in the evolution towards software defined networks (SDN).

# Key Features Optical Transport Systems

## Smallest footprint on the market

Integrated into 19" racks or in the form of a IANOS module, HUBER+SUHNER is specializes in providing highest density multiplexers for different WDM grids in the smallest possible housings. These can be equipped with different connectors, where MTP offers the highest possible density connectivity per available rack space.

## Fully compliant to industry standards

All solutions comply with relevant industry standards and are designed for easy integration into existing standardized systems. Data transport solutions provided by HUBER+SUHNER are furthermore fully interoperable with all major active system providers in order to make future transition to higher speeds as simple as possible.

## Delivering what matters

While the major part of the data center market is still using 10G interconnections between data centers, HUBER+SUHNER already has a proven track record with major players in the market in installing 100G passive data transport connections in system critical links. Solutions cover not only single channel 100G, but also multichannel transmissions of 100G with co-propagating 10G to offer migration from 10G to 100G in easy and affordable steps.

## Integration of active elements

For demanding networks that require better reach, performance or resilience, HUBER+SUHNER has wide offerings of amplifiers, media converters, demarcation units and optical protection switches.
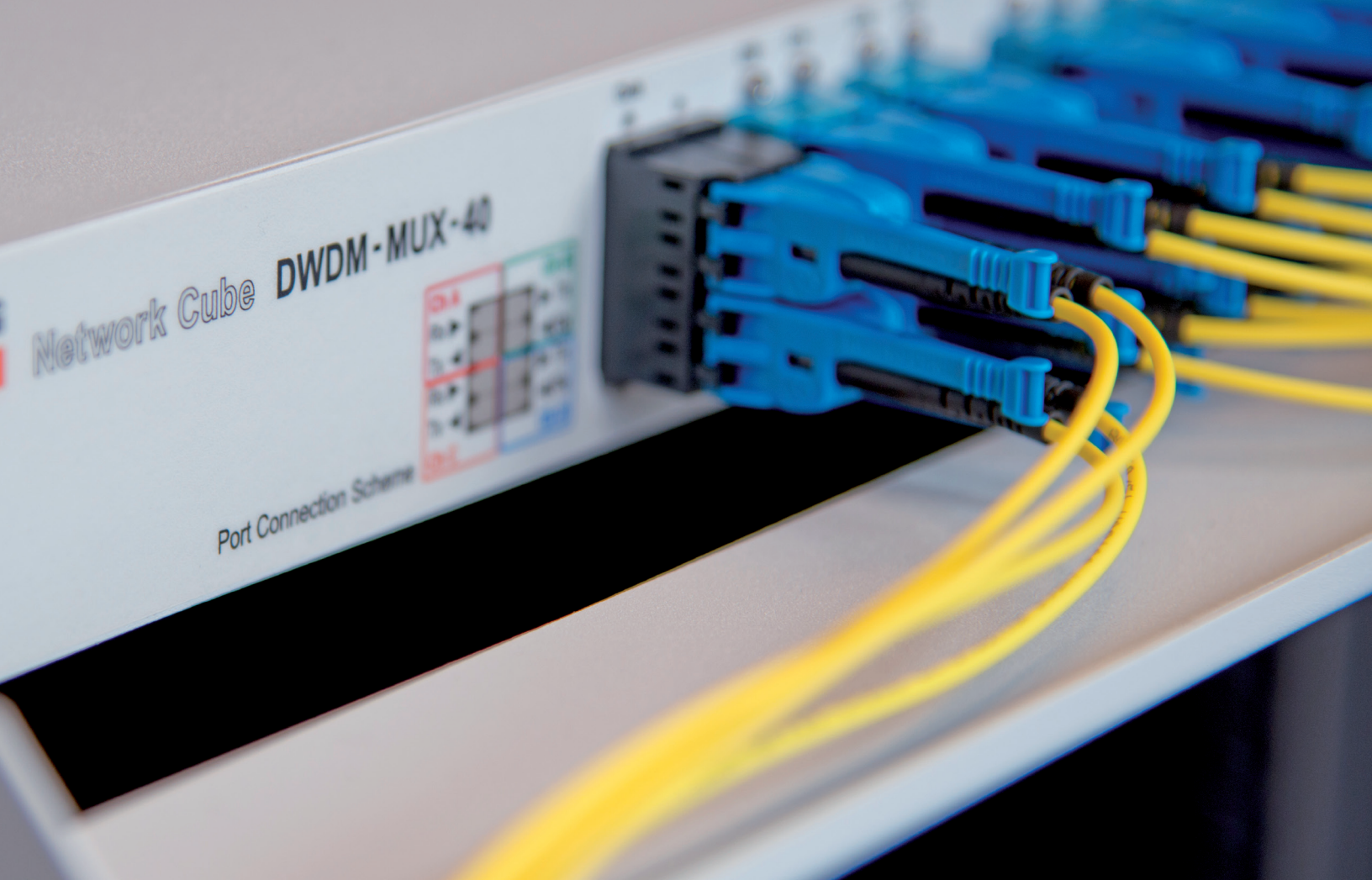
# HUBER+SUHNER Network Cube

HUBER+SUHNER offers all types of optical muxes, ranging from simple Wideband WDM over coarse WDM to dense WDM. We are able to combine the different WDM grids and/or cascade several muxes in order to create optimal solutions suitable to each customer's needs.

We are very much aware that you have a specific unique network architecture. In order to meet your individual network requirements, we have solutions that are designed for point to point or ring deployments (OADMs). With these solutions, we can mix and match specific lambdas of different grids or use band splitters, in order to allocate more than one wavelength to certain locations.

You will find products and solutions in the following pages covering most of your needs, however, we encourage you to contact your local HUBER+SUHNER representative for a customized analysis of your needs.

# WDM Network Cube

## Characteristics
- Smallest footprint on the market
- Highly flexible and scalable
- 1310/1550 wideband Mux and Demux for SDH/SONET/ATM
  - Mux and Demux, up to 48 channels, cascadable
  - Mux and Demux, 4 or 8 channels + Pass of SDH/ATM channel
  - OADM modules, 1, 2 or 4 channels
- Integration of taps, band splitters and WWDMs on demand
- Wide range of adapters: SC, LC, E2000, MU
- Private labeling and customization
- Available for line card and sub-rack mounting

The WDM network cube features a broad range of Wideband (SDH/SONET), coarse wavelength division multiplexing and dense wavelength division multiplexing configurations. HUBER+SUHNER offers enough scalability and flexibility to implement a wide range of network node functions such as Mux, Demux or OADMs. All network topologies can be accommodated by the cube including point to point, mesh or ring architectures.

A maximum of two WDM network cubes can be integrated inside a single 1U WDM-MODULAR-SHELL and if increased density is required, a sub-rack with up to eight modules is available. Further density is added, when we integrate WDM into IANOS modules.

WDM network cubes are fully compliant with the ITU G.694.2, NEBS level 3 and Telcordia GR1221 standard, guarantying interosperability and easy integration with all other compliant equipment.

## Ordering information

| Description | Insertion loss (dB) [1] | | | Product family |
|---|---|---|---|---|
| **CWDM modules** (for 1 slot of the WDM modular shell) | | | | |
| CWDM 8 channel mux and demux for bi-directional data transmission over two fibers.<br>• CWDM channels:<br>  1470, 1490, 1510, 1530, 1550,1570, 1590, 1610 nm | Max.:<br>Typ.: | **CWDM**<br>< 2.8<br>2.2 | | CWDM-MUX-8<br>C-1640_Rev.A |
| CWDM 8 channel mux and demux with 1310 band ports for bi-directional data transmission over two fibers.<br>• CWDM channels:<br>  1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm<br>• 1310/WWDM band:<br>  1260 to 1360 nm for "gray " 1310 nm transceivers | Max.:<br>Typ.: | **CWDM**<br>< 3.6<br>1.7 | **WWDM**<br>< 1.2<br>0.7 | CWDM-MUX-8+1310<br>C-1651_Rev.B |
| CWDM 8 channel mux and demux with UG band ports for bi-directional data transmission over two fibers.<br>• CWDM channels:<br>  1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm<br>• UG/upgrade band: 1260 to 1438 nm,<br>  for later upgrades or "gray " 1310 nm transceivers | Max.:<br>Typ.: | **CWDM**<br>< 3.6<br>2.5 | **UG**<br>< 1.2<br>1.2 | CWDM-MUX-8+UG<br>C-1678_Rev.C |

# WDM Network Cube

## Ordering information

| Description | Insertion loss (dB) [1] | | | Product family |
|---|---|---|---|---|
| **DWDM modules (fixed 1HU/19" rack-mountable),** all these units are also available as 200 GHz units | | | | |
| DWDM 16 channel (100 GHz grid) mux and demux for bi-directional data transmission over two fibers.<br>• DWDM channels:<br>  to be selected by customer out of the 100 GHz ITU grid | Max.:<br>Typ.: | **DWDM**<br>< 4.0<br>2.4 | | DWDM-MUX-8FS<br>C-2513_Rev.B |
| DWDM 8 channel (100 GHz grid) mux and demux for bi-directional data transmission over two fibers.<br>• DWDM channels:<br>  to be selected by customer out of the 100 GHz ITU grid | Max.:<br>Typ.: | **DWDM**<br>< 4.1<br>2.9 | **UG**<br>< 0.7<br>0.8 | DWDM-MUX-8+UG<br>C-2468_Rev.A |
| DWDM 16 channel (100GHz grid) mux and demux for bi-directional data transmission over two fibers.<br>• DWDM channels:<br>  to be selected by customer out of the 100 GHz ITU grid | Max.:<br>Typ.: | **DWDM**<br>< 4.1<br>2.7 | **WWDM**<br>< 1.2<br>0.9 | DWDM-MUX-8+1310<br>C-2401_Rev.A |
| DWDM 16 channel (100 GHz grid) mux and demux for bi-directional data transmission over two fibers.<br>• DWDM channels:<br>  to be selected by customer out of the 100 GHz ITU grid | Max.:<br>Typ.: | **DWDM**<br>< 4.0<br>2.5 | | DWDM-MUX-16<br>C-2402_Rev.A |
| DWDM 16 channel (100 GHz grid) mux and demux with UG band ports for bi-directional data transmission over two fibers.<br>• DWDM channels: ITU 100 GHz grid channel 21 to 36<br>• UG/upgrade band: supporting channel 43 to 59 | Max.:<br>Typ.: | **DWDM**<br>< 4.5<br>2.8 | **UG**<br>< 1.0<br>0.9 | DWDM-MUX-16+UG<br>C-2403_Rev.B |
| DWDM 40 channel (100 GHz grid) mux and demux for bi-directional data transmission over two fibers, based on athermal AWG technology with wideband passbands.<br>• DWDM channels:<br>  to be selected by customer out of the 100 GHz ITU grid | Max.:<br>Typ.: | **DWDM**<br>< 5.0<br>4.4 | | DWDM-MUX-40<br>C-2477_Rev.B |
| DWDM 48 channel (100 GHz grid) mux and demux for bi-directional data transmission over two fibers, based on athermal AWG technology with wideband passbands.<br>• DWDM channels:<br>  to be selected by customer out of the 100 GHz ITU grid | Max.:<br>Typ.: | **DWDM**<br>< 5.0<br>4.6 | | DWDM-MUX-48<br>C-2533_Rev.B |

**TRANSPORT CUBE  TC12-CH6U**
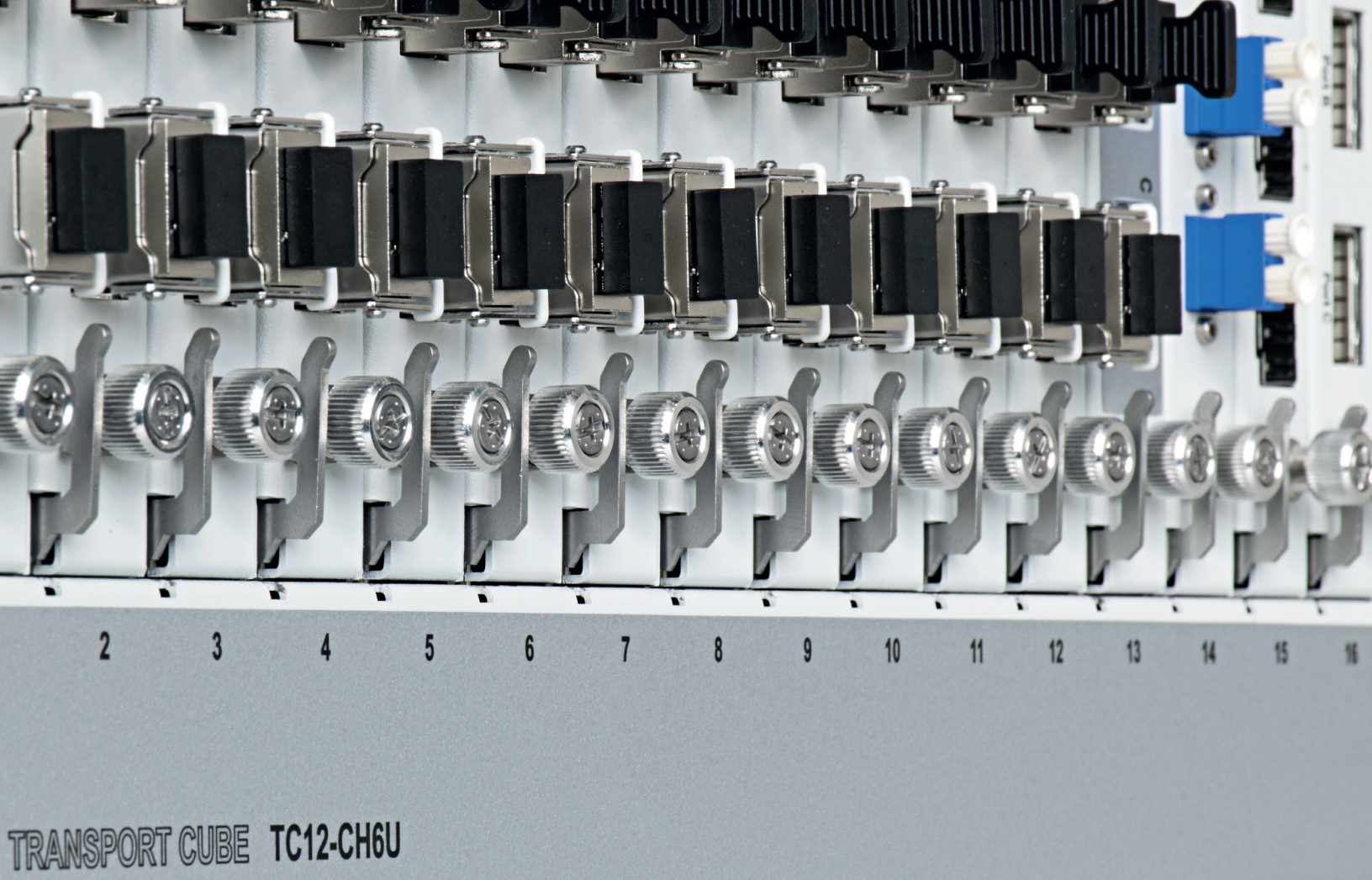
# HUBER+SUHNER Transport Cube

Due to the many existing network topologies and data transmission standards, interoperability is of utmost importance. Various devices have been developed to enable connection of different networks. The transport cube series is a carrier grade, cost effective and very flexible modular platform that combines a multi-protocol transport platform for metro applications with optionally built-in test and measurement equipment (OAM and performance monitoring). The transport cube enables network operators to implement a wide range of signal boosting, media conversions and information security with a comprehensive set of quality of service (QoS) features.

# Transport Cube – Multi-Rate Transponder Platform
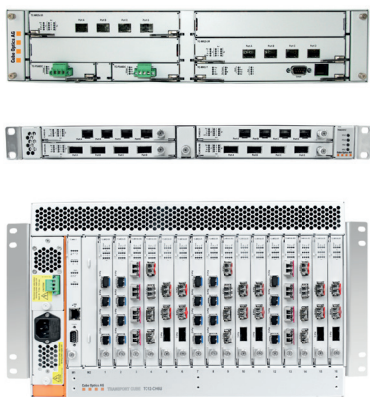
## Characteristics

- Multi-protocol transponders from 10 Gbps for Ethernet, DSH, fiber channel, OTN, digital video
- Configurable operation mode
- Performance monitoring. Statistics on quality of service according to G.826 (ES, SES, BBE, UAS)
- 3R regeneration with FEC (Reed-Solomon algorithms) for SDH, Ethernet and fiber channel
- Detection and processing of alarms (LOS, LOF, AIS, RDI, TIM)
- Multiple chassis versions (2U and 1U chassis with 4 slots and 6U chassis with 12 slots
- Compact chassis design (compliant with IEC 60297-2 and ETS 300119-2 (300 mm depth)
- Redundant and modular power supplies (AC and DC)
- Replaceable modular filter and fan unit
- System management via web terminal, EMS, NMS, SNMP v2 and MIBII

## General specifications

| Attribute | | Value |
|---|---|---|
| Dimensions | Chassis 1U | width: 19 in<br>depth: 18 in |
| | Chassis 2U | width: 19 in<br>depth: 9 in |
| | Chassis 6U | width: 19 in<br>depth: 10 in |
| Capacity | Chassis 1U | 4 slots for transponder cards<br>1 slot for management card<br>2 slots for power supply (AC), redundant |
| | Chassis 2U | 4 slots for transponder cards<br>1 slot for management card<br>2 slots for power supply (DC), redundant |
| | Chassis 6U | 12 slots for transponder cards<br>1 slot for management card<br>2 slots for power supply (DC and AC), redundant |

## Electrical specifications

| Attribute | Value |
|---|---|
| Power supply | −48 VDC<br>110/240 VAC |
| Power consumption | 80 to 100 W (chassis 2U/1U)<br>180 to 450 W (chassis 6U) |

# Transport Cube – Multi-Rate Transponder Platform

## Environmental conditions

| Attribute | Value |
| --- | --- |
| Operation | −5 to 50 °C (non-condensing) |
| Storage | −20 to 70 °C (non-condensing) |

## Functional specifications

| Attribute | Value |
| --- | --- |
| Interfaces | pluggable transceiver (line/client) |
| Operative wavelength | depending on transceivers |
| Transmission protocol | multi-rate<br>(10 Mbps to 10 Gbps) |
| Functional modes | loopback<br>protection<br>media conversion<br>regeneration<br>port configuration |
| Optical specifications | depending on transceiver |
| Management | modular management unit (linecard) |

## Environmental data

| Attribute | Value |
| --- | --- |
| Free of halogen | yes |
| 2011/65/EC (RoHS) | fully compliant |

# Transport Cube – Multi-Rate Transponder Platform

## Module overview

| Module name | | Description |
|---|---|---|
| TC04-CH1U | Chassis, 19" high density (HD) | 1U, 4 slots |
| TC04-CH2U | Chassis, 19", ETSI | 2U, 4 slots |
| TC12-CH6U | Chassis, 19", high density (HD) | 6U, 12 slots |
| TC-MR25-3R<br>TC-MR25-3R HD | Transponder linecard,<br>multirate 2.7 Gbps,<br>dual channel | SDH (STM-1/-4/-16), Gigabit Ethernet, Fast Ethernet, OTU-1, SDI, fiber channel (1/2GFC)<br>3R regeneration<br>Protection switching: triggered by optical signal degradation<br>Ports: 4 × SFP |
| TC-MR25-3RM<br>TC-MR25-3RM HD | Transponder linecard,<br>multirate 2.7 Gbps,<br>performance monitoring,<br>single channel | SDH (STM-1/-4/-16), Gigabit Ethernet, Fast Ethernet, OTU1, SDI, fiber channel (1/2GFC)<br>Monitoring parameters: SDH (B1, J0), Ethernet (CRC), alarms (AIS, LOS, RDI)<br>Protection switching: triggered by optical signal degradation, packet errors,<br>3R regeneration with FEC<br>Ports: 3 × SFP |
| TC-MR100-3R<br>TC-MR100-3R HD | Transponder linecard, multirate<br>11.3 Gbps, single channel | STM-64, 10 Gb Ethernet, OTU2, 10G FC<br>Protection switching: triggered by optical signal degradation<br>3R regeneration<br>Ports: 3 × XFP |
| TC-MR100-3RD<br>TC-MR100-3RD HD | Transponder linecard, multirate<br>11.3 Gbps, dual channel | STM-64, 10 Gb Ethernet, OTU-2/OTU-2 LAN, 10G FC<br>3R regeneration with FEC<br>Accepts tunable XFP<br>Ports: 4 × XFP |
| TC-MR100-3RM | Transponder linecard, multirate<br>11.3 Gbps, performance<br>monitoring, single channel | STM-64, 10Gb Ethernet, OTU-2, 10G FC<br>Monitoring parameters SDH (B1, J0, etc) and alarms (OOF, RDI, AIS, LOS, etc), Ethernet (CRC)<br>Protection switching: triggered by optical signal degradation, packet errors,<br>3R regeneration with FEC<br>Ports: 3 × XFP |
| TC-OPS HD | Optical protection switch linecard | 1+1 full optical line protection<br>Latching switch mode (switch retains its current state at el. power loss);<br>switching time < 10 ms; insertion loss < 2.4 dB (dual switch option)<br>Connector type: LC/PC |
| TC-MNG-T<br>TC-MNG-T HD | Management linecard | Configuration, control and monitoring of TC platform<br>SNMP agent for each unit inserted in the rack<br>Ports: 1 × RJ45 (Ethernet 10/100BASE-T), 1 × RS232 |
| TC-NMG-O HD | Management linecard | Configuration, control and monitoring of TC platform<br>SNMP agent for each unit inserted in the rack<br>Ports: 2 × SFP, 1 × RJ45 (Ethernet 10/100BASE-T/-X) |
| TC-PS48DC | Power supply DC | −48 VDC, modular, in-service replaceable |
| TC-PS240AC500-R | Power supply unit AC<br>(external, 1U) | 240 VAC, redundant PS modules, in-service replaceable |
| TC-PSAC300 | Power supply module AC | 240 VAC, 300 W module for TC04-CH1U, in-service replaceable |
| TC-PSAC600 | Power supply module AC | 240 VAC, 600 W module for TC12-CH6U, in-service replaceable |
| TC-PSDC600 | Power supply module DC | 48 VDC, 600 W module for TC12-CH6U and TC04-CH1U, in-service replaceable |
| TC04-FAN | Fan unit, modular | for TC04-CH2U, in-service replaceable |
| TC12-FAN | Fan unit, modular | for TC12-CH6U, in-service replaceable |
| TC04-FIL | Air flow filter unit, modular | for TC04-CH2U, in-service replaceable |

Advanced Technologies

# Transport Cube – SOA Pre-amplifier Linecard

### Characteristics
- Semiconductor optical amplifier (SOA) for pre-amplifier use (in front of receiver)
- One slot linecard for TRANSPORT CUBE TC04-CH1U and TC16-CH6U chassis installation
- Allows high density implementation (4 SOA/1U and 16 SOA/6U)
- Simple and easy WebGUI configuration and management via internet browser
- Remote firmware updates
- Alarm notification (power supply failure, SOA failure, LOS)
- Supports SNMPv2 with private MIB

## Optical data

| Attribute | Value |
| --- | --- |
| Operating wavelength | 1290 to 1330 nm |
| Signal Gain[1] | 13.5 dB |
| Saturated Output Power [2,3] | > 8 dBm |
| Noise figure | < 7.5 dB |
| Gain ripple | < 0.2 dB |
| Polarization dependent gain | < 1.5 dB |
| Fiber Type | SMF-28 compatible ø 9 / 125 / 250µm |
| Optical Adapters | To be selected via order code |

[1] Typical value for small optical input power.
[2] Typical value for option without monitoring. Monitoring options (E and I) induce 0.3 dB insertion loss per port.
[3] At 3 dB gain compression.

## Modules and accessories overview

| Unit | Function | Remarks |
| --- | --- | --- |
| TC-SOA2XX-Y-CC HD | SOA Linecard for one single 100G BASE LR4 line amplification | Linecard for one HD chassis slot. Detailed order code under "Ordering Information" |

## Logical Setup
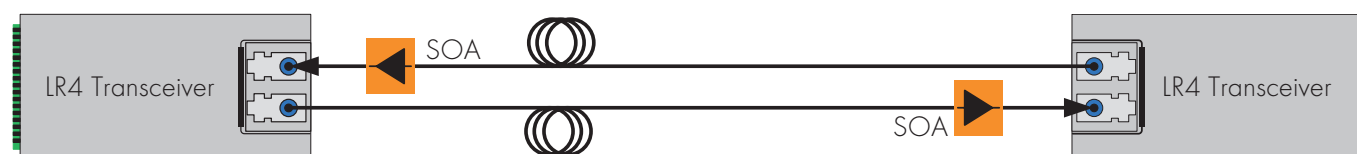
# Transport Cube – SOA Pre-amplifier Linecard

Customer-specific pre-amplifier line cards are available on request. For more details on customer-specific solutions contact your local sales representative or choose from our configurable options in the order code below.

| TC | – | SOA | 1 | – | 2 | – | 3 | HD |
|----|---|-----|---|---|---|---|---|----|

| 1 | Reach (Gain) |
|---|--------------|
| S | 40 km |
| L | 50 km |

| 2 | Monitoring Option |
|---|-------------------|
| E | External monitoring (passive IN/OUT power tapping) |
| I | Integrated monitoring (integrated power levels in WebGUI) |
| 0 | No monitoring option |

| 3 | Connector Type |
|---|----------------|
| 33 | SC/APC |
| BB | LC/APC |

| Order Code Example | TC-SOA2S-I-11 HD<br>for a SOA linecard with SC/UPC connectors on IN and OUT ports, reach 40 km, integrated power monitoring. |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Note | When external monitoring (option code E) is chosen, the monitoring ports will be terminated on LC/UPC connectors , regardless of the connector choice for IN and OUT (connector code option) |

# Transport Cube – SOA Pre-amplifier Unit

### Characteristics
- Semiconductor Amplifier (SOA) unit for 19" rack type installation (1U)
- For 40G/100G BASE applications at 1310 nm
- To be placed before the receiver of the 40G / 100G transceiver
- Extends the reach of 40G BASE / 100G BASE-LR optical transceivers
- Two hot pluggable redundant power supplies
- Remote accessible via Fast Ethernet (RJ-45 port).
- Manageable via web interface (local craft terminal)
- SOA current can be varied to adjust the optical gain
- Alarms sent via Fast Ethernet interface

## General Specifications

| Attribute | Value |
|---|---|
| Operating Temperature | +0°C to +50°C |
| Storage Temperature | −40°C to +85°C |
| Fiber Type | SMF-28 compatible Æ 9 / 125 / 250μm |
| Optical Adapters | To be selected by customer via order code |
| Electrical Power | Depending on oder code (100 to 240 VAC or -48 VDC) |

## Optical Performance

| Attribute | Value |
|---|---|
| Operating Wavelength | 1290 nm to 1330 nm |
| Signal Gain (Peak) 1 | Depending on order code |
| Saturated Output Power | > 8 dBm (@ 3 dB gain compression) |
| Noise Figure | < 7.5 dB |
| Gain Ripple | 0.2 dB |
| Polarization Dependent Gain | < 1.5 dB |

# Transport Cube – SOA Pre-amplifier Unit – Order Code

Customer-specific pre-amplifier units are available on request. For more details on customer-specific solutions contact your local sales representative or choose from our configurable options in the order code below.

| C | – | 2508 | [1] | – | [2] | – | [3] | – | Rev. C |

| 1 | Electrical power |
|---|---|
| A | 100 to 240 VAC |
| D | −48 VDC |

| 2 | Optical gain | |
|---|---|---|
| 1 | 5 | 15 dB |
| 1 | 7 | for 100 Gbase-LR4 up to 55 km |
| 1 | 8 | 18.5 dB |

| 3 | Connector type |
|---|---|
| 3 | SC/APC |
| 4 | FC/APC |
| B | LC/APC |

Product description: SOA pre-amplifier unit
Product code: C–2508

| Example | C – 2 5 0 8 – D – 1 5 – 3 3 – Rev.C |
|---|---|
| SOA with SC/APC connectors, 15 dB small signal gain and DC power supplies | |

Advanced Technologies

# Transport Cube – DWDM Optical Amplifier Unit

### Characteristics

- EDFA optical amplifier for DWDM applications
- Fixed unit for 19" rack type installation (1U)
- Output power up to 20 dBm
- Different units for booster and Pre-Amplification
- The system inter-operates with any router, switch, DSLAM, SFP and GBIC,
  which supports the DWDM ITU G.694.1 standard
- Remote management via WebGUI
- In-service replaceable redundant power supplies
- Higher density version available as double line card in the transport cube chassis

## Technical data

| Attribute | | Value |
|---|---|---|
| Dimensions (W × D × H) | | 482.6 × 387 × 44 mm |
| Operating temperature | | 0 to +50 °C |
| Storage temperature | | −40 to +70 °C |
| Relative humidity | | < 95 % non-condensing |
| Fiber type | | SMF-28 compatible Ø 9/125/250 μm |
| Optical adapters | | SC/APC |
| Electrical power | AD | 100 to 240 VAC |
| | DC | −48 VDC |
| Management interface | | RJ45 |

## Optical data

| Attribute | | Value |
|---|---|---|
| Operating wavelength | | 1530 to 1565 nm |
| Saturated output power | | 20 dBm |
| Optical power input | booster | −5 to +5 dBm |
| | pre-amp | −30 dBm to 0 dBm |
| Nominal optical input power | | + 3 dBm |
| Optical output power stability | | ≤ + 0.5 dB |
| Gain flatness | | ≤ 0.3 dB |
| Polarization sensitivity | | ≥ 0.3 dB |
| Polarization mode dispersion | | ≤ 0.5 ps |

## Environmental data

| Attribute | Value |
|---|---|
| Free of halogen | yes |
| 2011/65/EC (RoHS) | fully compliant |

# Transport Cube – DWDM Optical Amplifier Unit – Order Code

Customer-specific DWDM optical amplifier units are available on request. For more details on customer-specific solutions contact your local sales representative or choose from our configurable options in the order code below.

| C | – | 2 7 4 1 | [1] | – | [2] | – | [3] | – | Rev. A |
|---|---|---------|-----|---|-----|---|-----|---|--------|

| 1 | Application mode | |
|---|---|---|
| B | | Booster |
| E | | Pre-amp |

| 2 | Output power | |
|---|---|---|
| 2 | 0 | 20 |

| 3 | Electrical power | |
|---|---|---|
| A | | 100 to 240 VAC |
| D | | −48 VDC |

Product description: DWDM EDFA amplifier unit
Product code: C–2741

| Example | C – 2 7 4 1 – B – 2 0 – A – Rev. A |
|---|---|
| DWDM booster, max. 20 dB, output power, dual AC power supplies | |

Advanced Technologies

# Transceivers

## Services provided
- 155 Mbit to multi-100G OSNR testing
- Bit error rate testing
- Power budget testing (output, sensitivity, rise times, fall times, extinction ratios, swing times)
- Optical and electrical eye diagrams
- Dispersion behaviour

## Application tests provided
- OEM Transceiver Compatibility
- Protocol Testing
- Interoperability testing between manufacturers
- Standard and extended temperature environment conditions

## Optical transceivers – 10G, 40G, 100G and beyond

A vital element of any optical network is the transceiver, and with such a variety of media types, data rates and protocols, choosing the right transceiver can be a challenging task. Vendor specific form factors add to the complexity. As the transceiver becomes more complex, so too does the cabling infrastructure required to support it. Our expertise in both "core optical technologies" and well as "next generation cabling systems" means that you can enjoy continuity across the complete transmission link. HUBER+SUHNER offers transceivers to support all network applications and data rates – from 1G to 100G and beyond. With our extensive manufacturing and test laboratories, we can provide extended support to ensure that the application will delivery consistently every time.

## Ordering requirements

In order for us to recommend a transceiver solution, we will require the following system parameters:

| A | Transceiver type "form factor"/MSA type (example SFP/SFP+/XFP/CXP/CFP/CFP2/CFP4/QSFP/QSFP28) |
|---|---|

The transceiver must mechanically and electrically fit into a given piece of active equipment.
Transceiver MSAs define mechanical form factors including electric interface as well as power consumption and cable connector types.

| B | Protocol and data rate<br>(Ethernet: Gigabit Ethernet 10 Gb/s, 40 Gb/s, 100 Gb/s and fiber channel: 2 Gb/s, 4 Gb/s, 8 Gb/s, 16 Gb/s, 32 Gb/s) |
|---|---|

| C | Power budget (dB) |
|---|---|

The transceiver power budget is the difference between laser launch power and receiver sensitivity. For distances under 2 km, if the link loss cannot be measured it has to be calculated by adding up individual losses to give a Channel Insertion Loss (CIL). The CIL is made up from the transmission distance × unit loss per length (depends on fiber type), number of connections and number of splices.

| D | Transport media type/transceiver "color" (example: copper, single mode fiber (SMF), multimode fiber (MMF) |
|---|---|

If SMF is used what is the optical transmission spectrum: "gray " (1310/1550 nm) or "colored" (CWDM or DWDM).
If CWDM or DWDM are used, channels will need to be specified.

Available options: 850 nm MM/1310 nm gray /1550 nm gray /CWDM (1270 to 1610 nm)/DWDM (100 GHz ch 17 to 61)
Bi-Di (please specify wave-length pair), MM = Multimode/all others are singlemode.

| E | Equipment compatibility/"coding" |
|---|---|

In which switch or router is the transceiver required to work? Is the equipment "open for 3rd party transceivers" or "vendor locked"? In the 2nd case, the transceiver has to be coded to be accepted by the equipment, therefore switch or router brand and model must be defined (e.g. Cisco Catalyst 8500).

Available options: Uncoded/none, 3 Com/Alcatel/Arista/Brocade (pls. differ from Foundry)/Ciena/Cisco/Dell/Ericsson/Extreme/Force10/Juniper/HP/Huawei/Marconi/Nortel/Transmode.

| F | Other specifications |
|---|---|

Usually we provide digital diagnostics with all of our transceivers but in some cases transceivers will be supplied without DMI on request. Operating temperature range: In some cases an extended operating temperature range (−40 to +85 °C) is required, which can be supplied on request. Please specify if there are any other specific requirements that are outside of normal operating specifications and requirements.

Advanced Technologies
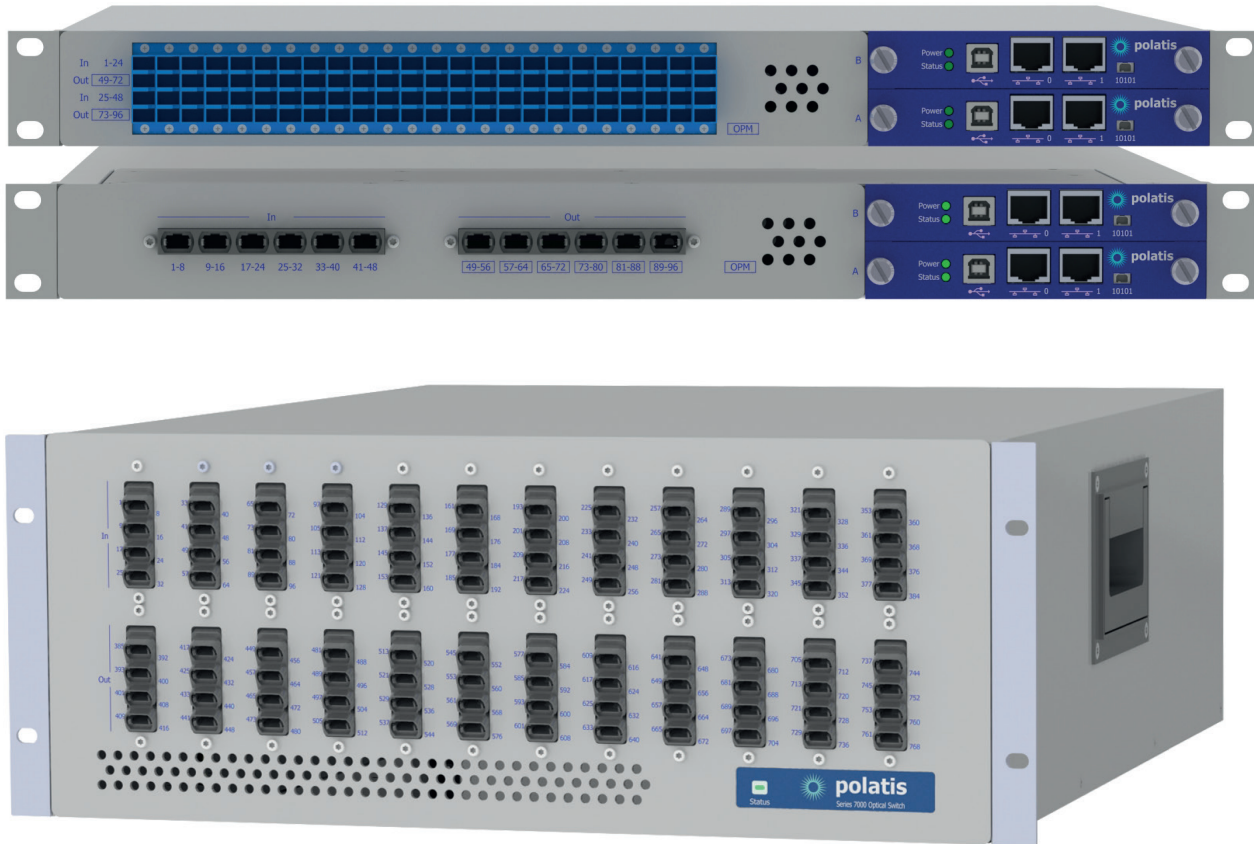
# Polatis Optical Switching Solutions

HUBER+SUHNER Polatis is the leading provider of all-optical switches, enabling low latency, fully transparent connections between optical fibers without requiring conversion between optical and electrical signals to offer much greater flexibility and energy efficiency. The patented DirectLight® optical switch technology connects fibers with the best possible optical performance. The modular, strictly non-blocking optical switch platform scales from 4x4 to 384x384 ports, applying class-leading performance to provide dynamic connectivity for today's network services.

Polatis all-optical switches are time proven in mission-critical network applications, with key features that enable operators and systems integrators to deliver secure, scalable, reliable, manageable and cost-effective optical cross-connect capabilities.

# Polatis Optical Switching Solutions

## SDN-enabled all-optical switch

Embedded OpenFlow and NETCONF interfaces enable a faster deployment of new software-defined network solutions.

## Industry leading port density

Broadest portfolio available on the market from 4x4 up to 384x384 fiber ports per switch, also available in asymmetric (MxN) and reconfigurable (M-fiber) configurations.
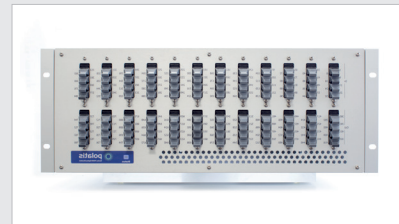
## Adds flexibility to today's network services

Automated fiber provisioning, protection, monitoring, reconfiguration and test applications.
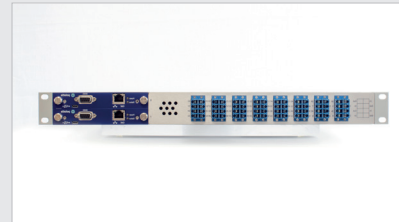
## Transparent connectivity and superior performance

Low optical loss and dark fiber switching enables dynamic, bandwidth-agnostic network architectures with minimal system impact and near-zero latency.
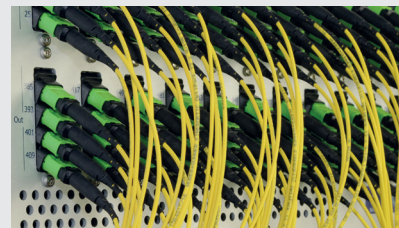
## Proven track record

The reliable, field-proven DirectLight™ optical switch technology powers more than 2000 systems worldwide.
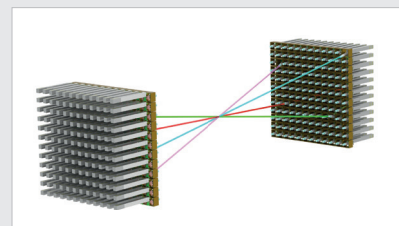
# The Potential of All-Optical Switching

Network operators are searching for bandwidth-on-demand capabilities that allow them to direct network capacity where and when it is needed, with performance guarantees to support latency, jitter and availability requirements for a range of diverse applications. Adoption of dynamic fiber cross-connects to bring the physical layer under software control allows rapid provisioning, protection and reconfiguration of network resources on-demand bringing additional benefits to operators, including:

• Eliminating manual patch errors and the potential for service interruption
• Maintaining current state of physical layer connectivity in a software database
• Creating optical demarcation points in multi-tenant/multi-service provider environments
• Facilitating bridge and roll during equipment commissioning, upgrade and replacement
• Providing physical isolation between virtualized network slices for enhanced security
• Enabling aggregation of optical taps for network monitoring
• Automated protection services for individual or groups of traffic lines

Since all-optical circuit switches do not require any optical-to-electrical conversions, they consume very little energy and add virtually no latency to the data path. Connections are fully transparent and format independent, which makes them ideal for use in network infrastructures where optical transmission rates continually advance.

While individual optical circuit switches can provide up to a few hundred ports of non-blocking connectivity, scaling beyond this level is only possible using multi-stage cross-connect fabrics. These multi-stage fabrics operate within the restricted power budgets of low-cost optical transceivers due to the very low loss characteristics of the Directlight® technology.
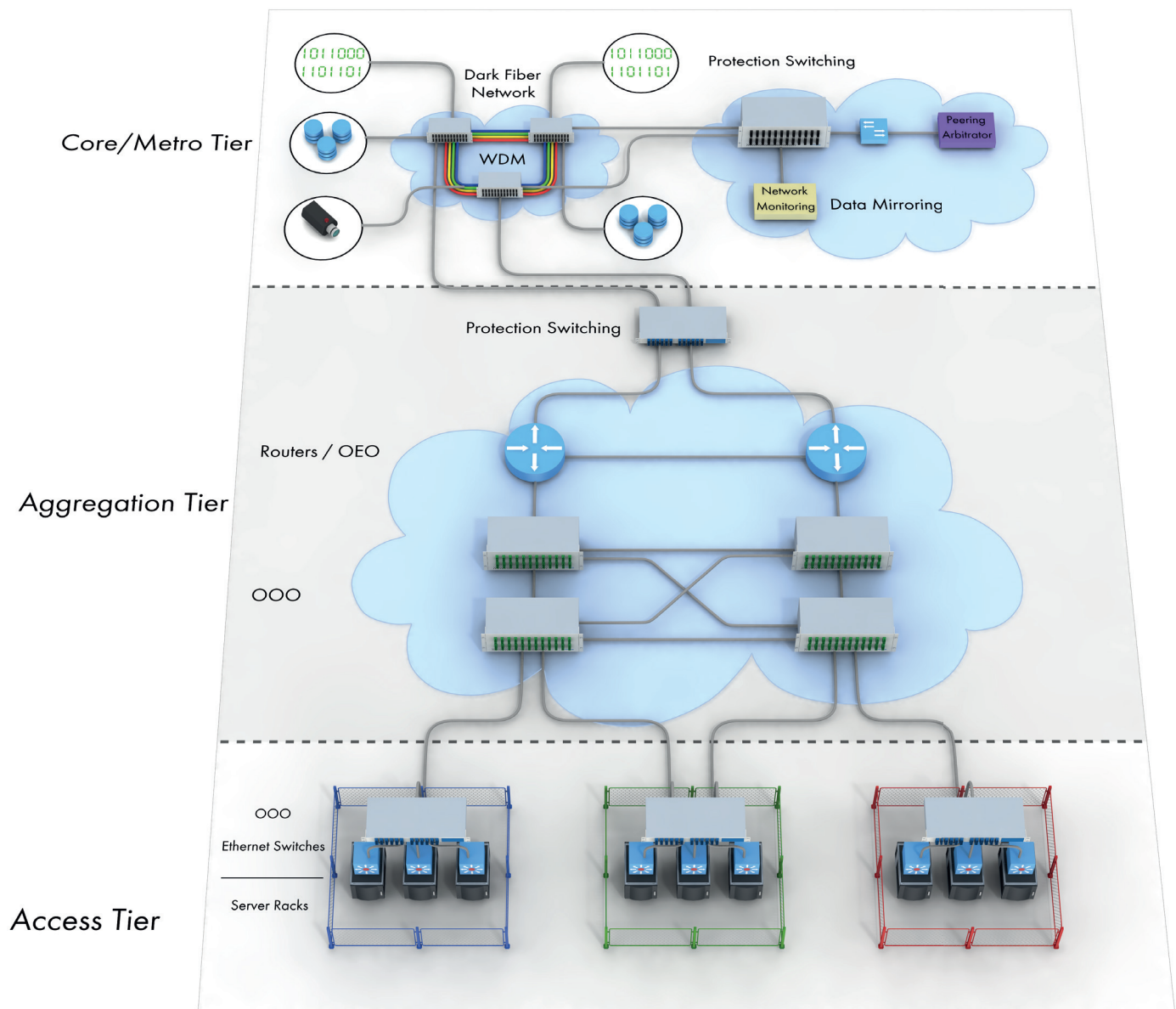
## SDN-ENABLED All-Optical Switching

### Today's Three-Tiered Network Architectures

SDN-enabled all-optical switching is being introduced at a number of levels to optimize network resources in today's network services, alongside existing packet routers and switches. In the application outlined below, all-optical switching is not a replacement for packet switching; it is added to the existing network to bring the capacity, flexibility and scalability needed at key congestion points to meet heavy and persistent traffic demands.

Large networks have clusters of tens of thousands of servers distributed across rooms, buildings and campuses. To provide reliable and scalable interconnections between all of these servers, networks are typically built in tiers using a combination of packet routers and circuit switches at the core/metro, aggregation and access levels. This hierarchy enables efficient sharing of data and provides services across internal networks while also connecting to the outside. All-optical switching can be added to each tier of the network to enhance performance and reduce costs. Graphic 1 shows the basic tiered approach including potential locations for all-optical switching in each tier.
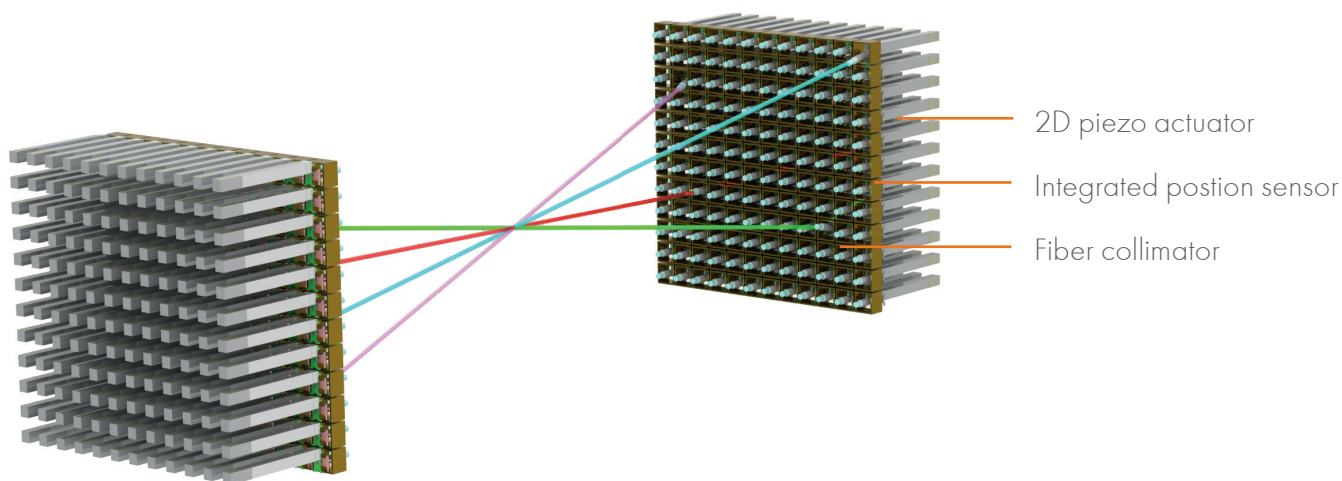
# The Potential of All-Optical Switching



**Core/Metro Tier**

Dark Fiber Network

Protection Switching

WDM

Peering Arbitrator

Network Monitoring

Data Mirroring

**Aggregation Tier**

Protection Switching

Routers / OEO

OOO

**Access Tier**

OOO

Ethernet Switches

Server Racks

Graphic 1

# Technology

- DirectLight® free-space optical switch technology connects fibers with the best possible optical performance
- Patented 2D piezo beam-steering with integrated position control
- Lowest loss all-optical cross-connect – typical 1dB IL
- Modular platform scales from 4x4 thru 384x384
- Available in dual-sided symmetrical (NxN), asymmetrical (MxN) and single-sided (M-fiber) variants
- True transparent dark-fiber switch connections are independent of protocol, bitrate, light color, direction or power level
- Optical power monitoring enables Variable Optical Attenuation (VOA) and Automatic Protection Switching (APS) functionality

2D piezo actuator

Integrated postion sensor

Fiber collimator

# Products

| Series | Matrix Size | Technology | Optional Functions | Key Features |
|---|---|---|---|---|
| 3000 | 4x4 to 16x16 | DirectLight™ Multimode | | • World's only multimode fiber matrix switch<br>• Supports OM1 and OM3/OM4 fibers<br>• Available in NxN, MxN configurations |
| 6000 | 4x4 to 192x192 | DirectLight™ Single mode | • OPM<br>• APS<br>• VOA | • Low insertion loss / superior optical specs<br>• Carrier class interfaces (SNMP, TL1, etc.)<br>• Available in NxN and MxN configurations<br>• Single sided N-fiber variants available<br>• SDN enabled with OpenFlow and NETCONF |
| 6000 PSS | 4, 8 or 16 Rx/Tx line pairs Protection Services | DirectLight™ Single mode | | • Compact 1+1 optical layer protection<br>• Up to 16 services in 1U, < 25 watts<br>• Pre-configured, drop in APS system<br>• Automatic LOS protection and restoration |
| 7000 | 208x208 to 384x384 | DirectLight™ Single mode | • OPM<br>• APS<br>• VOA | • Superior optical specs<br>• NxN and MxN configurations<br>• SDN enabled carrier-class interfaces<br>• Low power, resilient architecture |

OPM – optical power monitor
APS – automatic protection switching
VOA – variable optical attenuation

In

1

9

17

25

33

65

97

385

417

393

401

409

Out

# Technical Annex

# Standards

Standards governing the design, installation, commissioning and operation of structured cabling systems, and the particular environments they operate within can be complex and confusing. There are 3 main Standardization bodies across the world and depending on where the installation takes place; they have an order of precedence.

## International

The Joint Technical Committee 1 (JTC1) of the International Organisation for Standardization (ISO) and the International Electrotechnical Commission (IEC) is the main body for producing such standards. IEC provides the interface, performance and test standards for components.

ISO
IEC

## Europe

The European Committee for Electrotechnical Standardization (CENELEC) is the overall authority for the production of standards within Europe. Various national committees also exist in many of the European countries and may take their national standards from any of the larger standards bodies. National standards are not allowed, where European standards exits. The countries have to adopt the normative European standards (EN).

CENELEC
EN

## North America

In North America (including Canada), the Telecommunications Industry Association (TIA) is the relevant Standardization body, although the structure of its standards is slightly different (and in some cases deviating) to that of ISO, IEC and CENELEC. There is extensive harmonization between CENELEC, ISO and IEC bodies, some of the differences with TIA are in the exact wording, designation and structure used. However TIA harmonizes standards with ISO and IEC wherever possible.

TIA

HUBER+SUHNER is a global company, supplying a globally suitable products, which references international standards component compliance as a preference. However, the precedence of local standards is typically most relevant in the design and installation requirements rather than components and typically will reference the same international component standards.

If there is any doubt on the compliance to any local standard, please contact your local application engineer who will be happy to clarify the situation.

# Standards Listings

- ISO/IEC 11801:2002/Amd 2:2010/Cor 1:2010
  Information technology – Generic cabling for customer premises

- ISO/IEC 24764:2010/Amd 1:2014
  Information technology – Generic cabling systems for data centers

- ISO/IEC 14763-1:1999 + Amd 1:2004
  Information technology – Implementation and operation of customer premises cabling –
  Part 1: Administration

- ISO/IEC 14763-2:2012
  Information technology – Implementation and operation of customer premises cabling –
  Part 2: Planning and installation

- ISO/IEC 18010:2002/Amd 1:2005
  Multi-tenant Pathways and Spaces

- EN 50173-5:2007/A2:2012
  Information technology – Generic cabling systems – Part 5: Data Centers

- EN 50600-2-4: 2015
  Information technology – Data center facilities and infrastructures – Part 2 to 4: Telecom-
  munications cabling infrastructure

- EN 50174-2:2009/A2:2014
  Information technology – Cabling installation – Part 2: Installation planning and prac-
  tices inside buildings

- ANSI/TIA-568.0-D (September 2015)
  Generic Telecommunications Cabling for Customer Premises

- ANSI/TIA-942-A (August 2012)/A-1 (March 2013)
  Telecommunications Infrastructure Standard for Data Centers

- ISO/IEC 14763-3:2014/Cor 1:2015
  Information technology – Implementation and operation of customer premises cabling
  – Part 3: Testing of optical fiber cabling

- IEC 61280-4-1:2009
  Fiber optic communication subsystem test procedures – Part 4-1: Installed cable plant
  – Multimode attenuation measurement

- IEC 61935-1:2015
  Specification for the testing of balanced and coaxial information technology cabling –
  Part 1: Installed balanced cabling as specified in ISO/IEC 11801and related standards

- EN 50346:2002/A2:2009
  Information technology – Cabling installation – Testing of installed cabling

More standards exist than listed above. They are listed
on the websites of the standardization organisations.

# Ethernet (LAN)

| Application | Fiber type | Channel length, max., m | Wavelength, nm | No. of fibers | Optical loss budget for cabling, dB | Source | Physical interface |
|---|---|---|---|---|---|---|---|
| IEEE 802.3: 1000BASE-SX [1] | OM3 | 1000 [2] | 850 | 1 + 1 | 3.56 | * | serial |
| IEEE 802.3: 1000BASE-SX [1] | OM4 | 1100 [2] | 850 | 1 + 1 | 3.56 | * | serial |
| IEEE 802.3: 10GBASE-SR/SW [1] | OM3 | 300 | 850 | 1 + 1 | 2.6 | * | serial |
| IEEE 802.3: 10GBASE-SR/SW [1] | OM4 | 550 [2] | 850 | 1 + 1 | 2.6 | * | serial |
| IEEE 802.3: 40GBASE-SR4 [1] | OM3 | 100 | 850 | 4 + 4 | 1.9 | * | parallel MPO |
| IEEE 802.3: 40GBASE-SR4 [1] | OM4 | 150 | 850 | 4 + 4 | 1.53 | * | parallel MPO |
| IEEE 802.3: 100GBASE-SR4 [1] | OM3 | 70 | 850 | 4 + 4 | 1.9 | */** | parallel MPO |
| IEEE 802.3: 100GBASE-SR4 [1] | OM4 | 100 | 850 | 4 + 4 | 1.53 | */** | parallel MPO |
| IEEE 802.3: 100GBASE-SR10 [1] | OM3 | 100 | 850 | 10 + 10 | 1.9 | * | parallel MPO |
| IEEE 802.3: 100GBASE-SR10 [1] | OM4 | 150 | 850 | 10 + 10 | 1.53 | * | parallel MPO |
| IEEE 802.3:1000BASE-LX [1] | OM3 | 550 | 1300 | 1 + 1 | 2.35 | * | serial |
| IEEE 802.3:1000BASE-LX [1] | OM4 | 550 | 1300 | 1 + 1 | 2.35 | * | serial |
| IEEE 802.3:1000BASE-LX | OS2 | 5000 [2] | 1310 | 1 + 1 | 4.56 | * | serial |
| IEEE 802.3:10GBASE-LR/LW | OS2 | 10 000 [2] | 1310 | 1 + 1 | 6.2 | * | serial |
| IEEE 802.3:10GBASE-ER/EW | OS2 | 30 000 [2] | 1550 | 1 + 1 | 10.9 | * | serial |
| IEEE 802.3:40GBASE-LR4 (DWDM) | OS2 | 10 000 [2] | 1310 | 1 + 1 | 6.7 | * | serial |
| IEEE 802.3:100GBASE-LR4 (DWDM) | OS2 | 10 000 [2] | 1310 | 1 + 1 | 8.3 | * | serial |
| IEEE 802.3:100GBASE-ER4 (DWDM) | OS2 | 40 000 [2] | 1550 | 1 + 1 | 18 | * | serial |

# Fiber Channel (SAN)

| Application | Fiber type | Channel length, max., m | Wavelength, nm | No. of fibers | Optical loss budget for cabling, dB | Source | Physical interface |
|---|---|---|---|---|---|---|---|
| 1 Gb/s FC | OM3 | 500 | 850 | 1 + 1 | 2.62 | * | serial |
| 1 Gb/s FC | OM4 | 500 | 850 | 1 + 1 | 2.62 | * | serial |
| 2 Gb/s FC | OM3 | 150 [A], 300 [B] | 850 | 1 + 1 | 3.31 | * | serial |
| 2 Gb/s FC | OM4 | 150 [A], 300 [B] | 850 | 1 + 1 | 3.31 | * | serial |
| 4 Gb/s FC | OM3 | 150 [B], 300 [C] | 850 | 1 + 1 | 2.88 | * | serial |
| 4 Gb/s FC | OM4 | 420 [D] | 850 | 1 + 1 | 3.02 | * | serial |
| 8 Gb/s FC | OM3 | 50 [B], 150 [C] | 850 | 1 + 1 | 2.19 | * | serial |
| 8 Gb/s FC | OM4 | 190 [D] | 850 | 1 + 1 | 2.22 | * | serial |
| 16 Gb/s FC | OM3 | 35 [B], 100 [C] | 850 | 1 + 1 | 1.95 | * | serial |
| 16 Gb/s FC | OM4 | 125 [D] | 850 | 1 + 1 | 1.97 | * | serial |
| 32 Gb/s FC | OM3 | tbd | 850 | 1 + 1 | tbd | ** | serial |
| 32 Gb/s FC | OM4 | tbd | 850 | 1 + 1 | tbd | ** | serial |

\* included in published standard ISO/IEC 11801 ed2.2

\*\* conditionally; current in draft of ISO/IEC 11801 ed3.0

1) These applications are bandwidth limited at the channel lengths shown. The use of lower attenuation components to produce channels exceeding the values shown cannot be recommended.
2) Longer possible lenght is shown as it is specified in the referenced standard.

A) Minimum cabled optical fiber performance of category OM1 is specified.
B) Minimum cabled optical fiber performance of category OM2 is specified.
C) Minimum cabled optical fiber performance of category OM3 is specified.
D) Minimum cabled optical fiber performance of category OM4 is specified.

# Color Codes

Color codes for fiber identification according to standard

| Number | ANSI/TIA-598 |
|--------|--------------|
| 1 | blue |
| 2 | orange |
| 3 | green |
| 4 | brown |
| 5 | gray |
| 6 | white |
| 7 | red |
| 8 | black |
| 9 | yellow |
| 10 | violet |
| 11 | pink |
| 12 | aqua |

# Optical Performance

Unless specifically requested, HUBER+SUHNER supplies all multimode OM3 and OM4 assemblies terminated with MTP elite ferrules. This not only ensures that optimum performance is obtained across a mated pair connection but also allows more flexible, structured links to be constructed without exceeding the specified channel insertion loss (CIL) for the application(s) that the cabling is designed to support. It is important to note that HUBER+SUHNER supplies all singlemode MTP connectors with a green connector shroud to signify APC.

Optical performance

| Type | Measurement method (IL/RL) | IL (dB) | RL (dB) |
|------|----------------------------|---------|---------|
| SM UPC | IL: IEC 61300-3-4 method B | ≤ 0.30 | ≥ 50 |
| SM APC | RL: IEC 61300-3-6 | ≤ 0.30 | ≥ 65 |
| MM OM3 | IL: IEC 61300-3-34 method B | ≤ 0.25 | ≥ 35 |
| MM OM4 | RL: IEC 61300-3-6 | ≤ 0.15 | ≥ 35 |

Performance classes MTP connector

| Type | Measurement method (IL/RL) | IL (dB) typical all fibers/ max. single fiber | RL (dB) |
|------|----------------------------|----------------------------------------------|---------|
| SM MT elite (8, 12 and 24 fiber) | IL tested per IEC 61300-3-4 method B  RL tested per IEC 61300-3-6 method B | 0.10/0.35 | ≥ 60 |
| MM MT elite (8, 12 and 24 fiber) | IL tested per IEC 61300-3-4 method B  RL tested per IEC 61300-3-6 method B | 0.10/0.35 | ≥ 30 |

Multimode MT elite ferrule as tested with proposed encircled flux launch condition on 50 µm fiber and 850 nm per IEC 61280-4-1
Singlemode MT elite ferrule compliant with proposed IEC 61755-3-31/GRADE B

# MTP® Connectivity

MTP adapters supplied by HUBER+SUHNER are standard as TIA type "A", meaning a key-up to key-down arrangement. Uniquely, however, it is also possible to alter the configuration in the field, if and where necessary, to the TIA type "B", meaning key-up to key-up.

The type of adapter used is critical to the correct functioning of the cabling channel so caution must be used when making changes of this kind. Please contact your local HUBER+SUHNER applications engineer to advise on any changes.

The HUBER+SUHNER MTP adapter is suitable for singlemode and multimode, 8-fiber, 12-fiber and 24-fiber mated connections. The Type of interface and number of fibers contained within are identified by the shroud.

"A" Type 8 fiber adapter gray

"A" Type 12 fiber adapter black

"A" Type 24 fiber adapter red
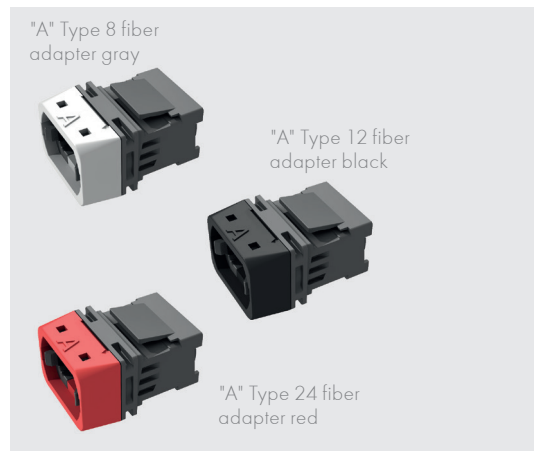
# Keyway Marking – Adapters

MTP adapters are fitted into the patch, transition and conversion modules types as an "A" type, with keyways up and down (key-up, key-down). The "A" indication will be visible on top of the colored shroud which indicates that this keyway is uppermost, so the plug being inserted should be aligned with its keyway upwards as shown below.

# MTP® Connector Type Identification

Due to the increased use of MTP connectors with different numbers of fibers terminated within, HUBER+SUHNER now use a color coding system to enable the user to easily distinguish between, using the same colors found on the MTP adapter shrouds.
Gray represents 8 fibers, black represents 12 fibers and red represents 24 fibers.
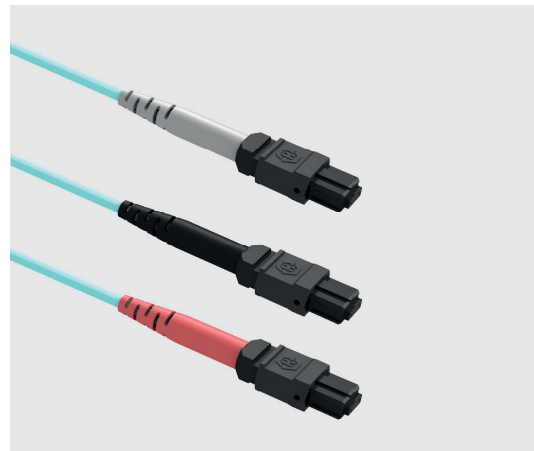
# MTP® Gender

MTP connectors are available as a male (with pins) and female (without pins). A male MTP connector must always be mated to a female MTP connector so that the ferrules are correctly aligned. Failure to adhere to this rule will result in a dark connection and potential permanent damage to the connector end-faces.

MTP transceivers of any form factor (QSFP, QSFP28, CFP, CFP2, CXP, etc) are typically supplied with a male interface, the final equipment connection shall be with a female connector. Transceiver damage can occur if this is not adhered to. If in doubt, please consult the relevant manufacturers' specification and/or visually inspect the interface before designing the cabling system.

- HUBER+SUHNER supplies 8F modules, fiber trays and short fan-outs (less than 5 m) with female connectors, and backbone cables such as link assemblies and trunk harnesses with a male connector.
- HUBER+SUHNER supplies 12F modules, fiber trays and short fan-outs (less than 5 m) with male connectors, and backbone cables such as link assemblies and trunk harnesses with a female connector.
- HUBER+SUHNER supplies 24F short fan-outs and equipment cords (less than 5 m) with female connectors, and backbone cables such as link assemblies and  trunk harnesses with a male connector.

Other options are available upon request – please contact your local HUBER+SUHNER applications engineer to advise on any changes of this kind.

Gender matching requires careful design and planning, particularly when a customized link is implemented. In some cases (such as links to SAN switches), it may be necessary to eliminate one mated pair of MTP connections and route long fan-outs directly from the switch back to the Main Distribution Area (MDA). In the case of an 8F system, a fan-out with a male connector should be used because it will be connected directly with a female connector at the fiber tray.

If you have any doubt about gender matching – please contact your local HUBER+SUHNER applications engineer.

# MTP® Cleaning Instructions

| IEC 62627 procedure for exposed connectors | | IEC 62627 procedure for in-port connectors | |
|---|---|---|---|



| 1. | Always inspect before cleaning. If the connector is already clean, there is no need to clean it. | 1. | Always inspect before cleaning. If the connector is already clean, there is no need to clean it. |
|---|---|---|---|
| 2. | Use a dry cleaning method. | 2. | Use a dry cleaning method. |
| a. | Remove connector dust cover | a. | Insert the IBC cleaner into the adapter where the connector is mated |
| b. | Select the appropriate cleaner for male/female | b. | Rotate the tape feeder wheel as indicated on the cleaner |
| c. | For female MTP connectors, use the cleaning brush and fluid to remove any debris from the pin holes | c. | Inspect the connector with a 200 × microscope |
| d. | Depress the green lever so that a fresh area of cleaning cloth is exposed | d. | If still contaminated repeat steps once more |
| e. | Position the ferrule against the cloth so that the fibers are in contact with the cleaning material. In the case of angled connectors, the ferrule will need to be adjusted accordingly. | 3. | Use a wet cleaning method. |
| f. | Wipe the connector in the direction shown on the cassette | a. | Insert the cleaning bud through the adapter and wipe the surface of the connector ferrule |
| g. | Release the grip to seal off the cleaning cloth | b. | Insert the IBC cleaner into the adapter where the connector is mated |
| h. | Let the ferrule air-dry before inspecting with a 200 × microscope | c. | Allow to dry and then inspect the connector with a 200 × microscope |
| i. | If still contaminated repeat all steps once again | d. | If still contaminated repeat steps once more |
| j. | Ensure that the connector does not touch any hard surfaces | | |
| 3. | If connector is still contaminated, use a wet cleaning method. | | |
| a. | Apply an approved cleaning fluid to a small area of lint-free cleaning cloth | | |
| b. | Wipe the connector over the damp area | | |
| c. | Wipe the connector over a dry area of cloth and allow it to dry | | |
| d. | Re-inspect the ferrule with a 200 × microscope | | |

# Pathway Capacity

60 % expansion

40 % capacity
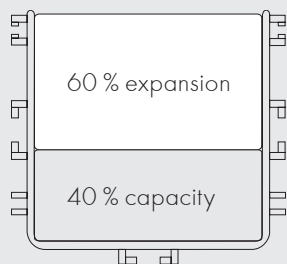
Cable pathway systems can be specified in a number of different sizes to accommodate varying quantities of cables. Cables vary significantly in the space they require in pathways, and pathway sizing is a significant element for consideration in the long term upgradability of a network area in ensuring that there is sufficient space for additional cables required during the lifetime of the facility.

The HUBER+SUHNER pathways system, described in the table below, shows the average capacity of different cable types. It is important to note that the higher quantity figures are based on full cross sections of the main bends and straight pathway elements that are connected with joiners – they do not represent the retrofitable top outlets. The first row (100 × 45 mm) accurately represents the useable space that a top outlet or horizontal outlet will produce.

The cable sizes reflect the various cables we use for backbone links such as MTP trunks. We have included data about patch cord sizes although we recommend that whenever possible, patch cords are not guided through a pathway system – only for use within the rack, not between racks.

Careful attention should also be given to the capacity of the top outlets because these represent the smallest cross-section when linking two cabinets in the network. To avoid bottlenecks, make sure that the quantity of cables per cabinet is clearly understood and planned in advance.

The cable quantity table below shows a 40 % and 60 % fill ratio. We recommend that all calculations are based on 40 % on day 1 to allow for future expansion and upgrades. Please contact your local HUBER+SUHNER applications engineer who will be able to assist you with a specific configuration.

| Pathways cross sectional area (mm$^2$) | Cable type and overall diameter (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2.0 mm | | 2.1 mm | | 3.0 mm | | 6.0 mm | |
| | simplex 8/12f 1 × 12f unit | | simplex 2f 1 × 2f unit | | simplex 24f 1 × 24f unit | | simplex 32/48f 4 × 8/12f units | |
| % fill | 40 % | 60 % | 40 % | 60 % | 40 % | 60 % | 40 % | 60 % |
| 4500 | 450 | 675 | 408 | 612 | 200 | 300 | 50 | 75 |
| 10 000 | 1000 | 1500 | 907 | 1361 | 444 | 667 | 111 | 167 |
| 16 000 | 1600 | 2400 | 1451 | 2177 | 711 | 1067 | 178 | 267 |
| 22 000 | 2200 | 3300 | 1995 | 2993 | 978 | 1467 | 244 | 367 |
| 30 000 | 3000 | 4500 | 2721 | 4082 | 1333 | 2000 | 333 | 500 |

| Pathways cross sectional area (mm$^2$) | Cable type and overall diameter (mm) | | | | | |
|---|---|---|---|---|---|---|
| | 7.4 mm | | 8.6 mm | | 9.9 mm | |
| | simplex 48/72f 6 × 8/12f units | | simplex 64/96f 8 × 8/12f units | | simplex 96/144f 12 − 8/12f units | |
| % fill | 40 % | 60 % | 40 % | 60 % | 40 % | 60 % |
| 4500 | 33 | 49 | 24 | 37 | 18 | 28 |
| 10 000 | 73 | 110 | 54 | 81 | 41 | 61 |
| 16 000 | 117 | 175 | 87 | 130 | 65 | 98 |
| 22 000 | 161 | 241 | 119 | 178 | 90 | 135 |
| 30 000 | 219 | 329 | 162 | 243 | 122 | 184 |

# Patch Cords

## Calculating patch cord lengths in HUBER+SUHNER racks

HUBER+SUHNER recommend that whenever possible, patch cords should only be used for in-rack connections. This simplifies Moves, Adds and Changes (MACs) and reduces the cable mass generated by thousands of cross-network connections.

In some cases, it will be necessary to position more than one rack together so that a higher density cross-connect can be achieved. In such cases, the patch cord lengths will need to be adjusted accordingly. The figure and table hereafter show how the various segments of the racks correspond to different patch cord lengths.
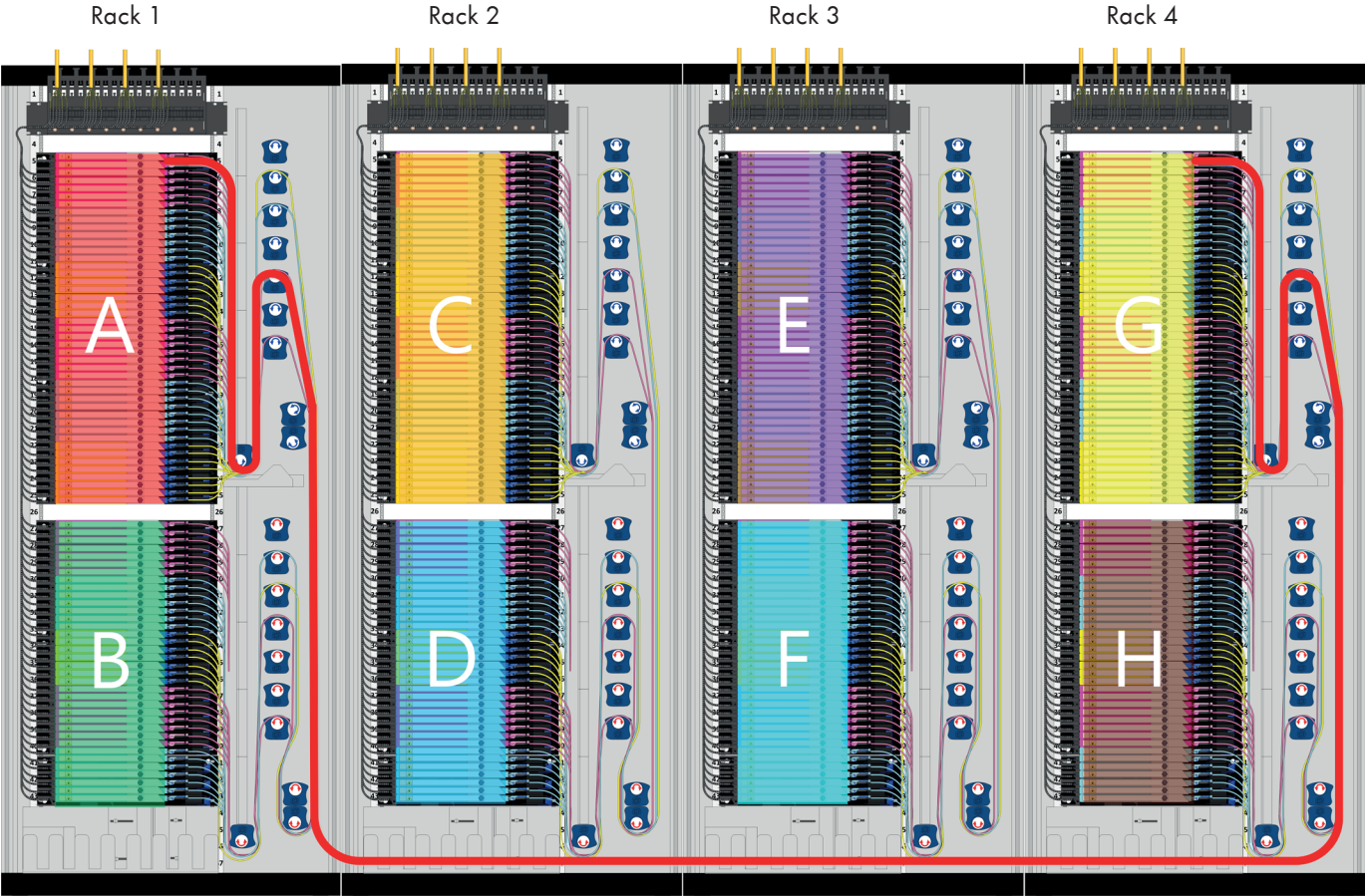


| | | Rack 1 | | Rack 2 | | Rack 3 | | Rack 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G | H |
| Rack 1 | A | 3.5 m | 5 m | 9 m | 8 m | 10 m | 9 m | 11 m | 10 m |
| | B | 5 m | 3.5 m | 8 m | 5 m | 9 m | 6 m | 10 m | 7 m |
| Rack 2 | C | 9 m | 9 m | 3.5 m | 5 m | 9 m | 8 m | 10 m | 9 m |
| | D | 8 m | 5 m | 5 m | 3.5 m | 8 m | 5 m | 9 m | 9 m |
| Rack 3 | E | 10 m | 9 m | 9 m | 8 m | 3.5 m | 5 m | 9 m | 8 m |
| | F | 9 m | 9 m | 9 m | 5 m | 5 m | 3.5 m | 8 m | 5 m |
| Rack 4 | G | 11 m | 10 m | 10 m | 9 m | 9 m | 8 m | 3.5 m | 5 m |
| | H | 10 m | 7 m | 9 m | 9 m | 8 m | 5 m | 5 m | 3.5 m |

# Copper – Channel Design

Copper cabling systems are well defined in national and international standards and follow a simple, modular design. These use 4 possible configurations which allow the cabling designs to be guaranteed to deliver the performance required in a layout that suits the user environment best.

| | |
|---|---|
| **Inter-connect EO** | This is the most simple and straightforward of the designs which provides a single fixed element of cabling (the zone distribution cable) and is attached to active equipment (EQP) using a patch cord at each end. |
| **Inter-connect LDP-EO** | This is the next stage of complexity which adds an LDP-EO link to the single fixed element of cabling (the zone distribution cable) and is attached to active equipment (EQP) using a patch cord at each end. This gives a more flexible cabling channel and allows the final connections to be supplied from "concentration points" and adapted locally without affecting the fixed cabling element. |
| **Cross-connect EO** | This adds a cross-connect into a conventional zone distribution cable, which allows the switch equipment to be located remotely from the zone cabling patching area. It means that all switch connections can be made by simply patching between patch panels within the cross-connect area to complete the connection. This is a simpler and lower risk method because the switch (which may have many hundreds of connections to it) is cabled once as it is initially installed and is then never disturbed by repeated patching changes and additions. It can also allow the switch ports to be distributed to different areas to increase resiliency of equipment and at a longer distance than a conventional equipment cord will allow. |
| **Cross-connect LDP-EO** | This has all of the benefits of the cross-connect and the LDP-EO – the designs are combined together to give the advantages of flexibility at both ends of the cabling system. This means that the destination cabling in the server rows can be simply reconfigured, plus the switch supplying this connection is pre-cabled, avoiding disruption. |

# Design Rules

Length limitations on specific elements of the cabling system are shown in the tables below. These should be used if the cabling design is outside of the baseline segment lengths and/or the ambient temperature of operation. Segments shown in the table below relate to the diagrams for each design on following pages.

Temperature: 20 °C is the baseline temperature at which the limits below apply.

| Segment | Minimum length (m) | Maximum length (m) |
|---|---|---|
| ZD-LDP | 15 | 85 |
| LDP-EO | 5 | – |
| ZD-EO (no LDP) | 15 | 90 |
| Equipment cord at EO | 2 [a] | 5 |
| Patch cord | 2 | – |
| Equipment cord at ZD | 2 [b] | 5 |
| All cords | – | 10 |

## Horizontal link length equations

| | Class E and EA channels |
|---|---|
| Interconnect – EO | $H=107-3a-FX$ |
| Interconnect – LDP-EO | $H=106-3a-FX-CY$ |
| Cross-connect -EO | $H=106-3a-FX$ |
| Cross-connect LDP-EO | $H=105-3a-FX-CY$ |

| | |
|---|---|
| H | Max. length of fixed horizontal cable (m) |
| F | Combined length of patch, equipment and work area cords (stranded) (m) |
| X | Ratio of cord cable insertion loss: fixed horizontal cable insertion loss = 1.5 |
| Y | Ratio of LDP cable insertion loss: fixed horizontal cable insertion loss = 1 (if solid cable is used in LDP) or 1.5 (if stranded cable is used in LDP) |
| C | Length of LDP cable (solid) (m) |

| | |
|---|---|
| Shielded cabling | For operating temperatures above 20 °C, H should be reduced by 0.2 % for every degree above 20 °C |
| Unshielded cabling | For operating temperatures between 20 and 40 °C H should be reduced by 0.2 % for every degree above 20 °C |
| Unshielded cabling | For operating temperatures between 20 and 40 °C H should be reduced by 0.6 % for every degree above 20 °C |

Stranded cable is used to manufacture cords (patch or equipment) and due to its construction has a greater attenuation than that of the equivalent solid conductor cable used in fixed horizontal (zone) cabling and LDP cables. The total length of stranded cable in the channel is limited to 10 m. If the design requires more than 10 m of stranded cable in the channel then the overall length limit of the channel must be reduced to compensate as per the calculations in the table above.

Additionally, if the temperature of operation is above 20 °C then the channel shall be de-rated to take into account the increase of attenuation with temperature as per the calculations in the above table.

[a] If there is no LDP, the minimum length of the equipment cord is 1 m.
[b] If there is no cross-connect, the minimum length of the equipment cord is 1 m.

# Glossary

| | |
|---|---|
| Balanced Cable | A cable construction technology used in copper structured cabling systems that generally utilizes 4 pairs of twisted conductors, which are "balanced" together to provide a suitable medium for data transmission when used in conjunction with suitable connectors (typically RJ45 type). Can be produced in shielded (screened) or unscreened form. The balancing ensures consistent performance on each pair. |
| CDR | Stands for "Cable Distribution Rack" which is the optical distribution rack built specifically to support high-density, high-managability data center cabling systems. |
| CENELEC | European Committee for Electrotechnical Standardization – the governing standards body within EU that covers structured cabling systems. Closely aligned to ISO standards in technical content. |
| Conversion Assembly/ Module | A cable assembly or a pre-terminated module that has 2 different types of MTP connector fitted. For example, a 24F MTP converted to 3 × 8F MTP connectors. It is different from a transition assembly/ module because it is MTP in and MTP out. |
| Data Center | A structure, or group of structures, dedicated to the centralized accommodation, interconnection and operation of information technology and network telecommunications equipment providing data storage, processing and transport services together with all the facilities and infrastructures for power distribution and environmental control together with the necessary levels of resilience and security required to provide the desired service availability. (Definition by ISO) |
| DCMS | Data Center Management Software |
| EDA | Equipment Distribution Area |
| EN | European Normative – a designation given to a standard written by the CENELEC organisation that has applicability throughout the EU. |
| EO | Equipment Outlet – fixed connecting device for terminating the zone distribution cabling and providing the interface to the equipment cabling. |
| FBH | Floor box high density |
| F/FTP | A term used to describe the detailed construction of a balanced cable – stands for foil overall shield, with each pair individually foil covered. |
| F/UTP | A term used to describe the detailed construction of a balanced cable – stands for foil overall shield, with each pair unshielded. |
| Front Access | Access to fibers and adapters from the front rack, where usually a door is located. |
| Fiber Tray (FT) | A splice or distribution cassette with telescopic hinged functionality holding fibers, splice connections and/or adapters. The FT has lateral fiber access to adapters called side access. |
| FOCIS | Fiber Optic Connector Intermateability Standard, referenced to TIA, generally used in North America. |
| IEC | IEC International Electrotechnical Commission – the standardization body that provides the interface, performance and test standards for components. |
| IEEE | Institute of Electrical and Electronics Engineers – the body that produces many of the applications standards, particularly those of the Ethernet type. |
| ISO | International organization for standardization |
| LC | Lucent connector, type of cylindrical ferrule Small Form Factor (SFF) optical fiber connector |
| LC Classic | Lucent connector classic |
| LCHD | Lucent connector high-definition |
| LCHQ | Lucent connector high-quality |
| LCXD | Lucent connector extreme-density |

# Glossary

| | |
|---|---|
| LDP | Local Distribution Point – connection point in the zone distribution cabling subsystem between a zone distributor and an equipment outlet |
| LFF | Large form factor (connector) – such as SC, ST type |
| Link Losses | The sum of all losses in a fiber cabling system and includes fiber attenuation factor, mated connector pairs and splices but excludes equipment cord cable attenuation and the equipment connection itself. |
| LISA | Leading Interconnect Systems Approach – HUBER+SUHNER is using this term for passive optical network solutions with different application specifications. |
| LSFH™ | An acronym used to describe the characteristics of the standard HUBER+SUHNER cable jacket material, which stands for "Low smoke and free of halogens". |
| MAC | Moves, Adds and Changes – the sometimes complex process by which users, equipment and services are altered and re-provisioned. |
| MDA | Main Distribution Area – the area that houses the distributor used to make connections between the main distribution cabling subsystem, network access cabling subsystem and cabling subsystems (as specified in ISO/IEC 11801) and active equipment. |
| MCM | Multi-circuit management – a type of splice tray design that allows multiple optical circuits (often 24 or 48 fibers) to be managed in a single splice tray. |
| MM | Multi Mode (or multimode) - an optical technology description which is generally used in short distance communications (sub 2 km) but basically describes the method by which the light passes along the glass – by multiple "modes" or paths. Requires a less precision of components to ensure alignment of the core (50 to 62.5 microns), but needs a more complex manufacturing method for the glass. |
| MTP | Mechanical Transfer Push-Pull – an enhanced version of the MPO connector offering higher optical perfomance, repeatability and reliability. |
| MTP Link Assemblies | Cable assemblies using 12 fiber cable with MTP connectors terminated at either end. |
| MPO | Multi-fiber push-on – an optical connector, standardized under IEC 61754-7:2008 which provides an interface for up to 24 fibers utilising individual rows of up to 12 fibers, in a polymeric ferrule. |
| ODR | Optical Distribution Rack – interconnects incoming and outgoing optical fiber in a controlled way. Each fiber can be connected to every other fiber within the rack by simple patching. |
| ODU | Optimized Distribution Unit – subrack that can be front mounted to any 19 in rack. |
| OM3 | Optical multimode class 3 – only available in the market with 50 µm diameter core and is now considered the minimum bandwidth suitable for LAN and data center applications. It is the first "laser optimized" multimode optical fiber and was developed to provide increaded bandwidth (and hence reach) for VCSEL 850 nm opto-electronnic devices, such as used in 10 GBASE-SR. |
| OM4 | Optical multimode class 4 – only available in the market with 50 µm diameter core and is now considered the most future-proofed class, suitable for LAN and data center applications. It is the second "laser optimized" multimode optical fiber, offering more than double the bandwidth of OM3 at the critical 850 nm wavelength. |
| OS2 | Optical singlemode class 2 – this is often described as "low water peak" singlemode, and offers both lower attenuation and a flatter attenuation curve in the wavelengths between the traditional 1310 and 1550 nm than OS1, to allow wave division multiplexing-based applications to utilise the previously unavailable zone found between those wavelengths. |
| Patch Cord | Strain-relieved cable assembly with connectors on both ends used to cross-connect individual links. Can also be used to connect links to transceivers and when added to a link, create a channel. |
| Pigtail | Cable assembly with connector on one end; typically cable diameter 0.9 mm |

# Glossary

| | |
|---|---|
| RJ 45 | Registered jack, Type 45 – a term generally used to describe a 8P (8 position), 8C (8 contact) RJ-style connector, and can be gendered male of female. Typically supplied in ethernet transceivers and then used in the structured cabling system within the LAN and data center. Cabling systems using this connector are typically limited to a channel length of 100 m with a maximum of 4 connections at 500 MHz and Category 6A/Class EA channels. |
| SAN | Storage Area Network: A network that is designed specifically for the needs of storage devices. Often a separate cabling system is used due to the frequent use of the FC (Fiber Channel) transmission protocol and specific FC transceivers. |
| SC | Subscriber connector, a type of optical fiber connector |
| SCM | Single-circuit management |
| SFF | Small Form Factor connector with a diameter 1.25 mm ferrule, this size allows a higher density. Available types: LX.5, LC, MU. |
| S/FTP | A term used to describe the detailed construction of a balanced cable – stands for braid overall shield, with each pair individually foil covered. |
| Side Access | Adapters and connectors are side facing |
| SM | Single Mode (or singlemode) - an optical technology description which is generally used in long distance communications but basically describes the method by which the light passes along the glass – by a single "mode" or path. It requires a greater precision of components to ensure alignment of the very small core (8 to 10 microns). |
| Splice | Permanent joint between 2 optical fibers, created by fusion (heat), clamping or gluing. |
| TIA | Telecommunications Industry Association – U.S standards creation body for structured cabling systems, components and test methods, also generally adopted by Canadian Standards Association. |
| Transition Assembly | An assembly of cabled optical fibers and connectors, with an array connector at one end and simplex or duplex connectors at the other end. Typically used within a transition module or as a ruggedized assembly to make the primary connections into a switch "blade". |
| U/FTP | A term used to describe the detailed construction of a balanced cable – stands for no overall shield, with each pair individually foil covered. |
| U/UTP | A term used to describe the detailed construction of a balanced cable – stands for no overall shield, with each pair unshielded. More commonly referred to as "UTP". |
| ZDA | Zone Distribution Area |
| ZDPHD | Zone Distribution Panel High Density |

# Index

# Index

# Index

# Index

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