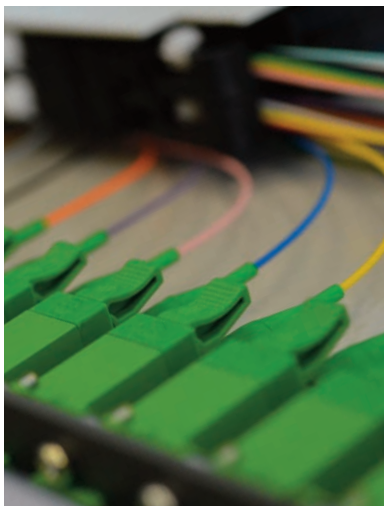
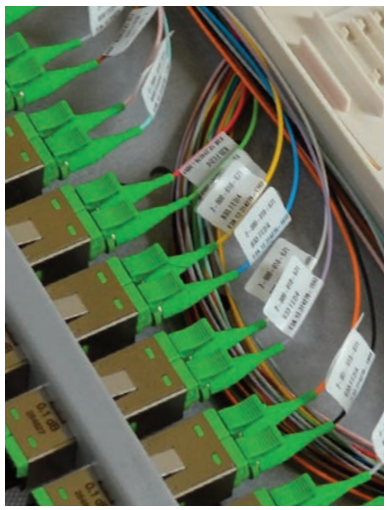
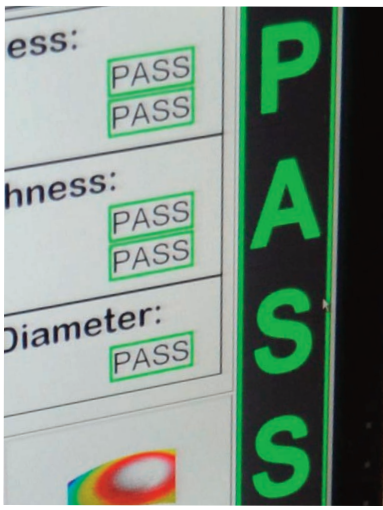
PENGG KABEL

# Fiber Optic Passive Components







PENGG KABEL



**PENGG KABEL GmbH** is an Austrian producer of high-tech telecom copper and fiber optic cables and their components with usage in a wide range of applications in the area of railway technology, telecommunication and infrastructure. We have two sites, one in Kapfenberg where we produce **copper cables** and the second in Wartberg where we are specialised on **fiber optic cables** and **components**.

In addition to a quality management system according to **EN ISO 9001** we set a high value on the fact that the loads of the environment are kept as small as possible. Therefore we have also implemented an environmental management system according to **EN ISO 14001**.


The rapid development of modern regional and supra-regional high-speed data networks makes steadily increasing demands on fiber optical cables and fiber optical cable plugs and components. We take this market request into consideration and produce fiber optic cables and pre-assembled connectors with singlemode, multimode and NZDS fibers for highest requirements.

The range of types covers all usual ground cable constructions in jelly-filled and dry-filled design as well as metallic and metal-free (PA) rodent protection. Beyond that also metal-free overhead cables (ADSS) in self-supporting design for spans up to 700m and for 20kV or high voltage systems will be manufactured. Also special cable designs can be manufactured in Wartberg according to customers requirements.

By means of most modern measuring equipment the fiber optic cables are submitted according to international standards and regulations by permanent tests and checks. These measurement results serves as a basis for the constant advancement of our fiber optic cables.

With a constant expansion of most modern finishing technique with integrated production logistics, we are in the position to supply fiber optic cables on drums with all fiber types available on the free fiber market safely and reliably for its customer.

Flexibility and customer proximity are the bases for a successful development on the market. New developments and product improvements are always necessary. Apart of the permanent search for improvements of our products, our efforts for the future run towards reduction of production time, increase of flexibility and constant improvement of quality, in order to be a reliable partner for our customers.

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# Fiber Optic Passive Components

## Index

# Pre-assembled Connectors / Adapters

# Connector mounting, Installation services

## Connector Mounting

All these processes of manufacturing and quality controlling are done by qualified and expert personnel at our new fiber optic facilities in Wartberg. These rooms meet all the requirements concerning climatisation and workspace for optimum working conditions.

Fiber- or cablepigtails, patchcables and fiber-optic cables are cut in required lengthes, accordingly to customers requests and then prepared for the connector assembling.

The following assembling process consists of several steps like uncovering and adhesive bonding the fiber into the ferrule and hardening, which is made with precise equipment and by expert personnel to meet specified loss values. After hardening the connector ferrules are polished in several steps on accordant machines to give the connector ferrules the final shape and surface quality. The finished and polished connectors are running through our quality control department. The connectors are tested for insertion loss, return loss by OTDR and for geometrical surface quality by interferometer.


## Installation services

In the field of passive fiber optic components technology, we also offer you installation services.


Numerous references attest to our diversified know-how - here is a selection:

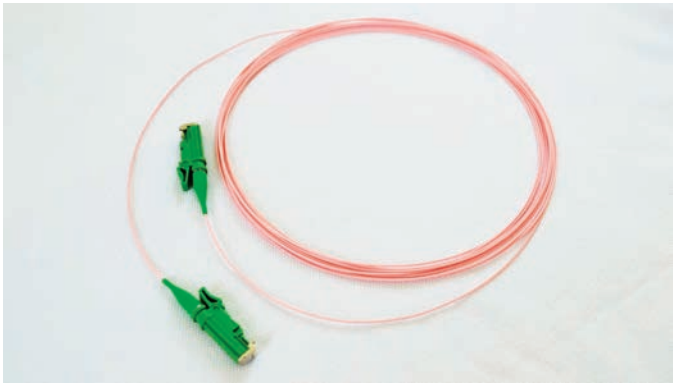
- highway A9 – project Tunnel Wald and Pretallerkogeltunnel (2016)
- highway A9 – project Gleinalmtunnel (2016)
- highway A10 – project Kroislerwandtunnel (2016)
- highway A1 – project Tunnel Liefering (2016)
- motorway B67a – project Ringstraße Südgürtel Graz (2016)
- highway A10 – project Oswaldibergtunnel (2016)
- highway A9 – project INS VAK TU Wartberg (2015)
- highway A44 – project Tunnel Birth D (2014 – 2015)
- highway S1 – project Tunnel Hennersdorf Ast Güterterminal (2014-2015)
- mediacenter Graz, MCG (2014)

# Fiber Pigtails, Patch Cable, Breakout Cable, Assembled Patch Panels

## Fiber Pigtail

Fiber pigtails, 900µm, pre-assembled with one or two connectors (connectors see page 8 - 14); only for installation in cabinets.

Fiber pigtails are not suitable for patch-connections or for the installation in conduits and cabinets.



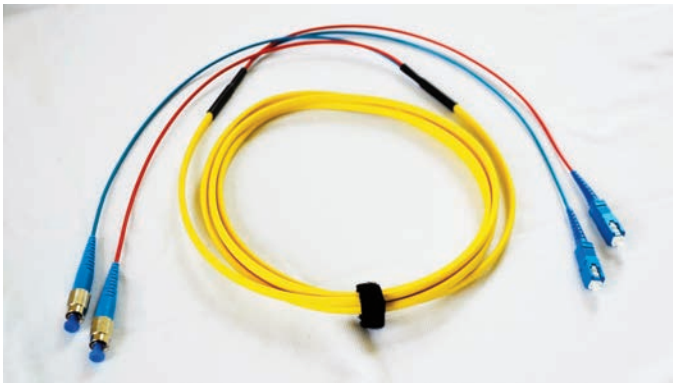
## Patch Cable

Indoor cable, 2-3 mm, pre-assembled connectors on both ends (connectors see page 8 - 14); for connection of terminals or patch panels / cabinets.

Because of their mechanical stability, patch cables can be used in cabinets, sleeves and with some restrictions in cable ducts. However, they may not be drawn in or injected.

**On request**

- Duplex-cables, Zip Cords
- with different connectors



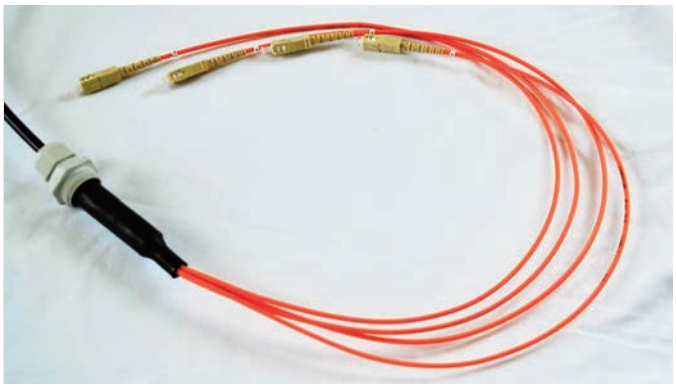
## Breakout Cable

Breakout cable, pre-assembled at one or both ends (connectors see page 8 - 14); cable length up to 1000 m.

For connection of terminals across greater distances.

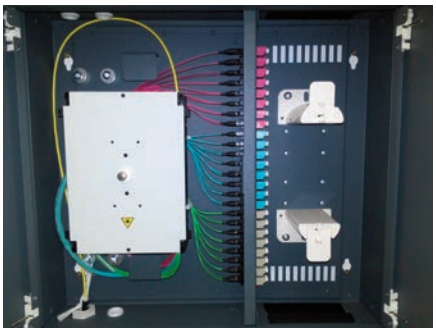
**On request**

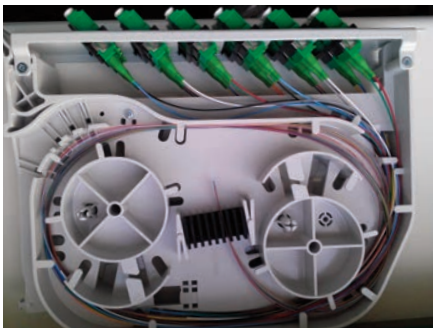
- length >1000 m
- with cable protective tube for safe laying (to be removed after laying)
- Center-unitubecable with distribution-adapter for splice-free mounting
- pre-assembled cables on drums



## Assembled Patch Panels

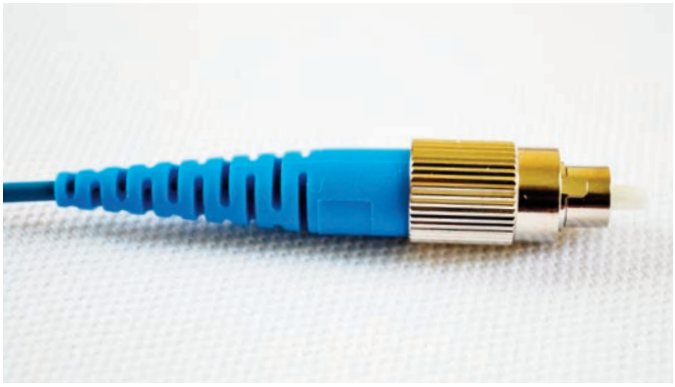
Patch panels and boxes pre-assembled with adapters and fiber pigtails. Due the preparing and stripping the pigtails in the correct length in the splice cassette they are ready for splicing.

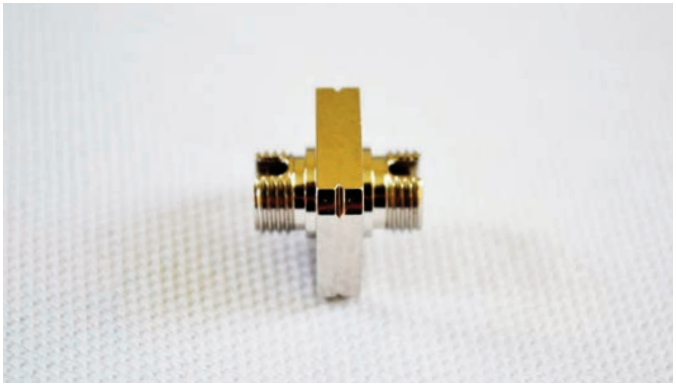




# FC/PC, FC/APC

## Connector / Adapter — FC/PC





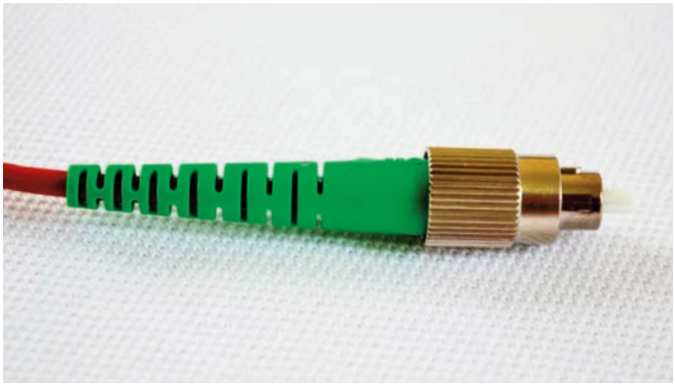
**Description**
- usable for SM and MM fibers
- each connector tuned for minimum insertion loss
- colour of boot: blue
- locks with coupling ring
- metal housing with zirconia ferrule
- 100% adjustment and testing on optical powermeter
- adapter with flange mount or D-hole

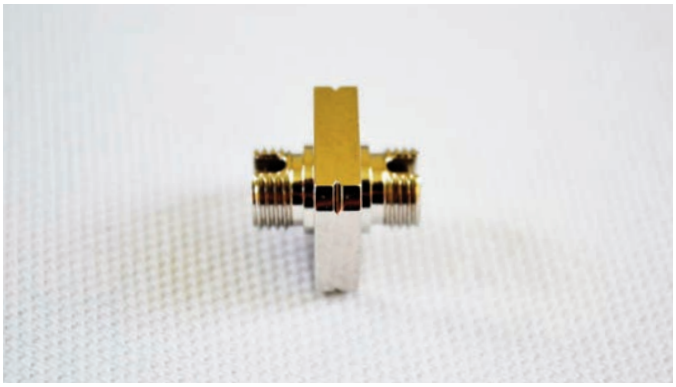
**On request**
- other attenuation values (IL & RL)
- other colours of boot
- other connector manufacturer

**Technical Data**

| | |
|---|---|
| standard | IEC 60874 |
| insertion loss (IL) for SM (typical) | |
| mean value | < 0.08 dB (to reference connector) |
| max. value | < 0.20 dB (to reference connector) |
| return loss (RL) | > 50 dB (SM) |
| UPC-polishing | |
| for Ø 0.9 mm and Ø 2.0-3.0 mm cables | |

## Connector / Adapter — FC/APC





**Description**
- typical usable for SM fibers
- colour of boot: green
- locks with coupling ring
- metal housing with zirconia ferrule
- adapter with flange mount or D-hole

**On request**
- other attenuation values (IL & RL)
- other connector manufacturer

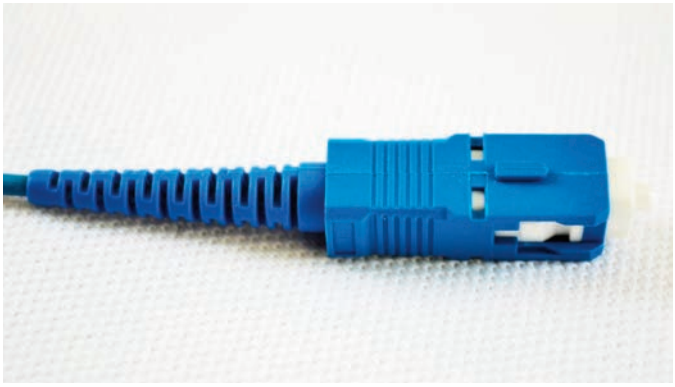
**Technical Data**

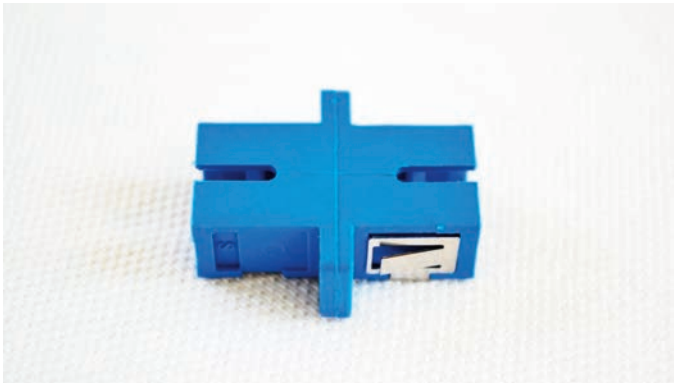
| | |
|---|---|
| standard | IEC 60874 |
| insertion loss (IL) (typical) | |
| mean value | < 0.20 dB (to reference connector) |
| max. value | < 0.30 dB (to reference connector) |
| return loss (RL) | > 65 dB |
| 8° polishing (APC-polishing) | |
| for Ø 0,9 mm and Ø 2.0-3.0 mm cables | |

## Pre-assembled Connectors / Adapters

# SC/PC, SC/APC

### Connector / Adapter — SC/PC





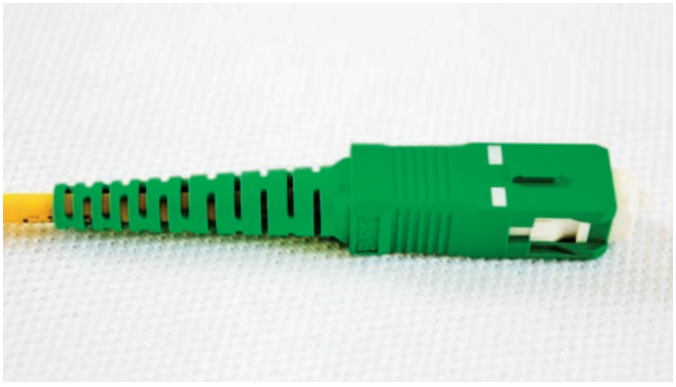
**Description**
- usable for SM and MM fibers
- colour of boot: blue (SM), beige (MM)
- automatic lock in adapter
- unlocks by pulling on housing („push-pull“)
- plastic housing with zirconia ferrule
- can be used as duplex connector with duplex clip
- adapter with flange mount or snap in mount

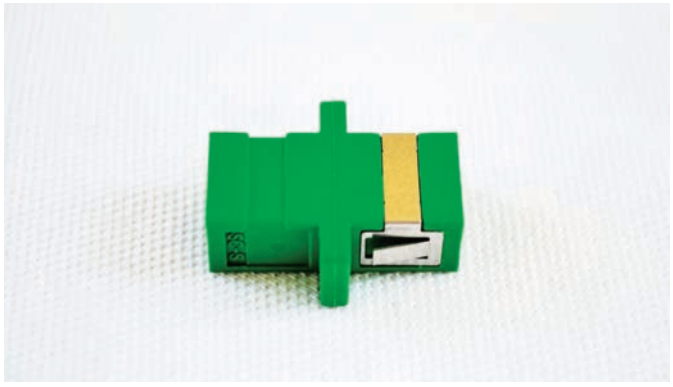
**On request**
- adapter versions with different shutters available
- other attenuation values (IL & RL)
- other colour of boot
- other connector manufacturer

**Technical Data**

| | |
|---|---|
| standard | IEC 60874 |
| Insertion loss (IL) for SM (typical) | |
| mean value | < 0.15 dB (to reference connector) |
| max. value | < 0.25 dB (to reference connector) |
| return loss (RL) | > 50 dB (SM) |
| UPC polishing | |
| for Ø 0.9 mm and Ø 2.0-3..0 mm cable | |

### Connector / Adapter — SC/APC





**Description**
- typical usable for SM fibers
- colour of boot: green
- automatic lock in adapter
- unlocks by pulling on housing („push-pull“)
- plastic housing with zirconia ferrule
- can be used as duplex connector with duplex clip
- adapter with flange mount or snap in mount

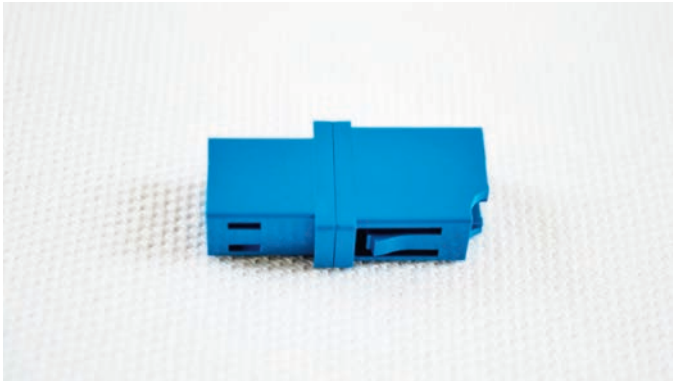
**On request**
- adapter versions with different shutters available
- other attenuation values (IL & RL)
- other connector manufacturer

**Technical Data**

| | |
|---|---|
| standard | IEC 60874 |
| insertion loss (IL) (typical) | |
| mean value | < 0.20 dB (to reference connector) |
| max. value | < 0.30 dB (to reference connector) |
| return loss (RL) | > 65 dB |
| 8° polishing (APC-polishing) | |
| for Ø 0.9 mm and Ø 2.0-3.0 mm cable | |

# LC/PC, LC/APC

## Connector / Adapter — LC/PC

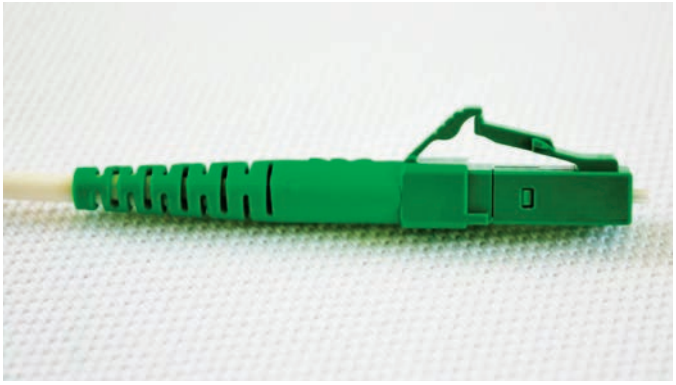
**Description**

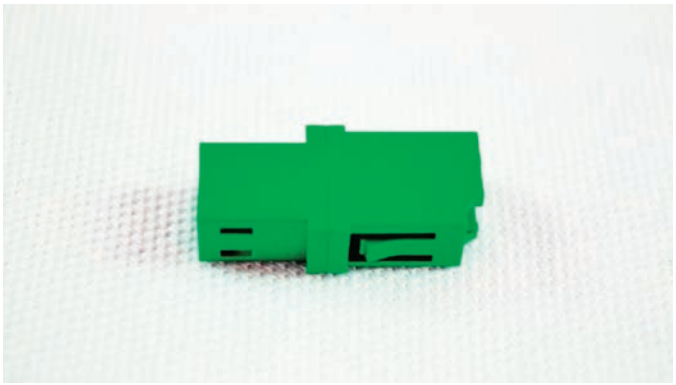
- one-half the size of current industry standards
- increases panel density - provides duplex connection in 50 % less space
- available in SM, MM versions (SM-blue / MM-beige)
- user-friendly audible latch to indicate proper mating
- simplex and duplex version available
- push-pull locking
- plastic housing with zirconia ferrule
- adapter with flange mount or snap in mount
- duplex adapter fits in one SC-simplex hole

**Technical Data**

| | |
|---|---|
| standard | IEC 61754-20 |
| insertion loss (IL) for SM (typical) | |
| mean value | < 0.15 dB (to reference connector) |
| max. value | < 0.25 dB (to reference connector) |
| return loss (RL) | > 50 dB (SM) |
| for Ø 0.9 mm and Ø 2.0-3.0 mm | |
| strain relief | 100N |

## Connector / Adapter — LC/APC





**Description**

- one-half the size of current industry standards
- increases panel density - provides duplex connection in 50 % less space
- green boot and housing
- SM-Angle (APC) polishing
- user-friendly audible latch to indicate proper mating
- simplex and duplex version available
- push-pull locking
- plastic housing with zirconia ferrule
- adapter with flange mount or snap in mount
- duplex adapter fits in one SC-simplex hole

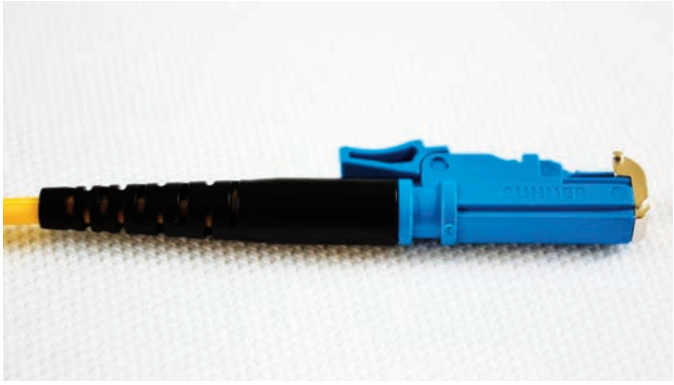
**Technical Data**

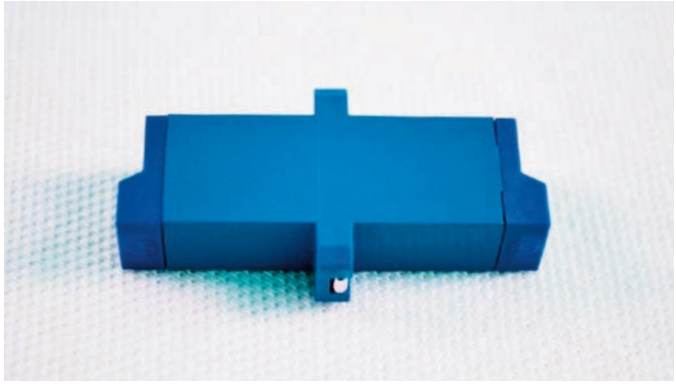
| | |
|---|---|
| standard | IEC 61754-20 |
| insertion loss (IL) for SM (typical) | |
| mean value | < 0.15 dB (to reference connector) |
| max. value | < 0.30 dB (to reference connector) |
| return loss (RL) | > 65 dB |
| for Ø 0.9 mm and Ø 2.0-3.0 mm | |
| strain relief | 100N |

## Pre-assembled Connectors / Adapters

# E2000/PC, E2000/APC

## Connector / Adapter — E2000/PC





**Description**

- usable for SM and MM fibers
- each connector tuned for minimum insertion loss
- colour of boot and housing: blue (SM), beige (MM)
- locks with locking lever
- plastic housing with zirconia ferrule
- automatic dust protection flap
- simplex and duplex versions available

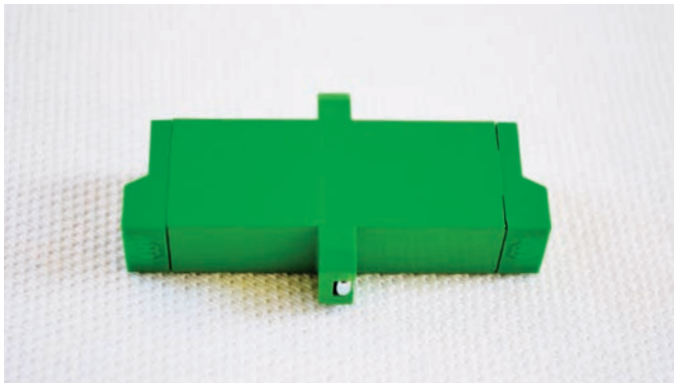
**On request**

- other attenuation values (IL & RL)
- other boot colours
- accessories

**Technical Data**

| | |
|---|---|
| standard | - |
| insertion loss (IL ) (typical) | |
| mean value | < 0.10 dB (to reference connector) |
| max. value | < 0.20 dB (to reference connector) |
| return loss (RL) | > 50 dB (SM) |
| PC polishing | |
| for Ø 0.9 mm and Ø 2.0-3.0 mm cables | |

## Connector / Adapter — E2000/APC

**Description**

- usable for SM fibers
- each connector tuned for minimum insertion loss
- colour of boot and housing: green
- locks with locking lever
- plastic housing with zirconia ferrule
- automatic dust protection flap
- simplex and duplex versions available

**On request**

- other attenuation values (IL & RL)
- other boot colours
- accessories

**Technical Data**

| | |
|---|---|
| standard | - |
| insertion loss (IL ): | |
| mean value | < 0,10 dB (to reference connector) |
| max. value | < 0.20 dB (to reference connector) |
| return loss (RL) | > 65 dB |
| 8° polishing (APC-polishing) | |
| for Ø 0,9 mm and Ø 2.0-3.0 mm cables | |

# ST/PC, FSMA

## Connector / Adapter — ST/PC

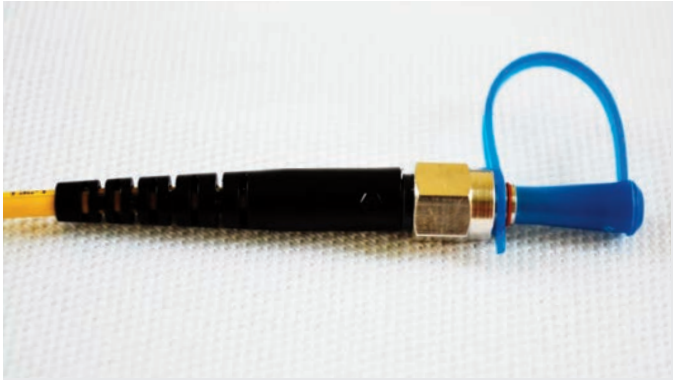
**Description**
- usable for SM and MM fibers
- colour of boot: yellow (SM), black (MM)
- bayonet lock
- metal housing with zirconia ferrule
- typical LAN-connector
- adapter with D-hole

**On request**
- other attenuation values (IL & RL)
- other colour of boot
- other connector manufacturer

**Technical Data**

| | |
|---|---|
| standard | IEC 60874 |
| insertion loss (IL) for SM (typical) | |
| mean value | < 0.20 dB (to reference connector) |
| max. value | < 0.30 dB (to reference connector) |
| return loss (RL) | > 45 dB (SM) |
| for Ø 0.9 mm and Ø 2.0-3.0 mm cables | |

## Connector / Adapter — FSMA



**Description**
- usable for MM fibers
- colour of boot: black
- locks with coupling ring
- metal housing with metal ferrule
- adapter with D-hole

**On request**
- other attenuation values (IL & RL)
- other colour of boot
- other connector manufacturer

**Technical Data**

| | |
|---|---|
| standard | similar to IEC 60874 |
| insertion loss (IL) (typical) | |
| mean value | < 0.40 dB (to reference connector) |
| max. value | < 0.80 dB (to reference connector) |
| for Ø 0.9 mm and Ø 2.0-3.0 mm cables | |
| ferrule | Ø 3.5 mm |

## Pre-assembled Connectors / Adapters

# MTRJ, DIN

### Connector / Adapter — MTRJ

**Description**
- usable for MM fibers
- colour of boot: black
- „snap in" - lock
- plastic housing
- adapter with flange mount

**Note**
- **please order with type of connector (female or male)**

**On request**
- other attenuation values (IL & RL)

**Technical Data**

| | |
|---|---|
| **Standard** | **-** |
| **insertion loss (IL ) (typical)** | |
| **mean value** | **< 0.50 dB (to reference connector)** |
| **max. value** | **< 0.70 dB (to reference connector)** |
| **return loss (RL)** | **> 30 dB** |
| **for Mini-Duplex cables** | |

### Connector / Adapter — DIN

**Description**
- usable for SM and MM fibers
- colour of boot: yellow (SM), black (MM)
- locks with coupling ring
- metal housing with zirconia ferrule
- adapter with D-hole

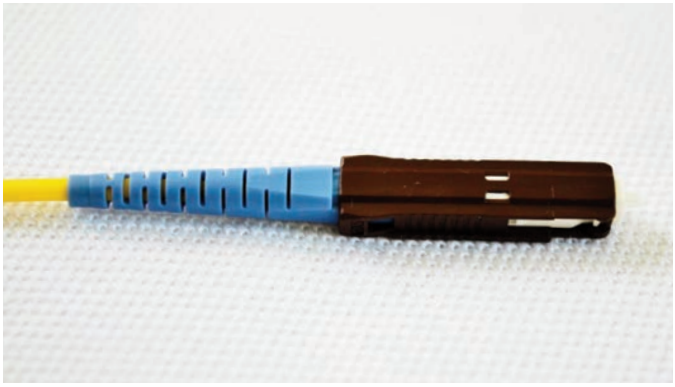
**On request**
- APC-polishing
- other attenuation values (IL & RL)
- other boot colour
- other connector manufacturer

**Technical Data**

| | |
|---|---|
| standard | DIN 47256 (LSA) |
| insertion loss (IL )for SM (typical) | |
| mean value | < 0.25 dB (to reference connector) |
| max. value | < 0.35 dB (to reference connector) |
| return loss (RL) | > 45 dB (SM) |
| PC-polishing | |
| for Ø 0.9 mm and Ø 2.0-3.0 mm cables | |

# MU/PC, Measuring launch fiber

## Connector / Adapter — MU/PC



**Description**

- usable for SM and MM fibers
- plastic housing with zirconia ferrule
- unlocks by pulling on housing („push-pull“)
- colour of boot: brown
- can be used as duplex connector with duplex clip
- usable for mini simplex / duplex cable
- adapter with „snap-in“ mount
- adapter available in Duplex-design

**On request**

- other attenuation values (IL & RL)
- other boot colours

**Technical Data**

| | |
|---|---|
| standard | IEC 60874 |
| insertion loss (IL) for SM (typical) | |
| mean value | < 0.20 dB (to reference connector) |
| max. value | < 0.30 dB (to reference connector) |
| return loss (RL) | > 40 dB (SM) |
| PC-polishing | |
| for Ø 0.9 mm and Ø 2.0-3.0 mm cables | |

## Measuring launch fiber

**Description**

- Both fibers are configurable with different: fiber types | fiber lengths | connectors
- The connection cables of both launch fibers are wound separately and thereby independently usable
- Water and dust-repellent
- 100% servicing - Measuring connector damaged or other than planned? No problem: Spare parts available at any time!
- Including interferometer protocol

**Technical Data**

| | |
|---|---|
| size | 235x195x105mm |
| fiber length | 500m, 1000m (max. 2 x 1000m) |
| weight | 1,6 kg |
| material | - plastic (shock proofed box)<br>- inside made of aluminium |
| connection length | 3m at dual fiber, 5m at single fiber |

# Optical Distribution System (OPDISYS®)

# OPDISYS® - Racks

## Field of Application

OPDISYS® is an optical fibre distribution/ patch system for Passive Optical Networks (PON). The main application of the system is fiber termination in Central Offices of FTTH networks. Our OPDISYS® combines all the advantages of the Central Office systems available on the market.

## Features

- Maximum fiber density for standard rack: 960/1920 (SC/LC)
- Comfortable patching with two-sided overlength patchcord storage
- 3 different rack heights: 32HU/1800mm, 40HU/2200mm, 48HU/2600mm
- 2 optional extensions (for cable guidance and gas blocker integration)
- Open and closed rack version
- Removable and rotatable splice/patch Fiber Module
- 0.5HU as well as 1HU Fiber Module available
- Fiber Module frontplate with two different cut-outs and adapter mounting through snap-in angled holder
- 45 degrees snap-in angled holders for all conventional adapter types: SCsx, LCdx, E2000, LX.5, FC, ST
- Possibility to blow fibers directly up to the fiber modules
- Integration of gas-blockers on incoming tubes possible

## Product description - OPDISYS®-Optical Distribution Frame

OPDISYS® is an Optical Distribution Frame (ODF) system specially designed for Fiber-To-The-Home (FTTH) applications. It is a modular system consisting of a basic rack, cable management, Mandrel Extension Racks and Gasblocker Extension Racks and Fiber Modules. Thanks to its design this system is very flexible. The extension racks can be ordered and combined individually according to the customer´s needs. Each Fiber Module has a front plate with two types of uniform cut-out patterns into which snap-in angled holders fitting into the required adapter type can be inserted. This snap-in angled holder also ensures a 45 degree angle of the adapter is maintained. Each fiber module can be used as a left-side as well as a right-side Fiber Module.

Two different types of fiber protection are supported, either high rigidity harness PBT tubes or microduct tubes. If microduct tubes are used in conjunction with gasblockers, the Gasblocker Extension Rack ensures an orderly cable guidance and mounting of the gasblockers. The OPDISYS®-System can be integrated into a 19” rack as well as into an outdoor street cabinet (see page 35 for additional information).

# OPDISYS® - Racks

## Product description - OPDISYS®-rack

The OPDISYS®-rack is the core component of every OPDISYS®-system. Both, an open version as well as a closed version, are available. An open version rack is turned into a closed version rack by installing side panels and doors. The rack accommodates the fiber module carrier, the cable entry plates, all types of extension modules and, if a closed version is required, the side panels as well as the front doors.

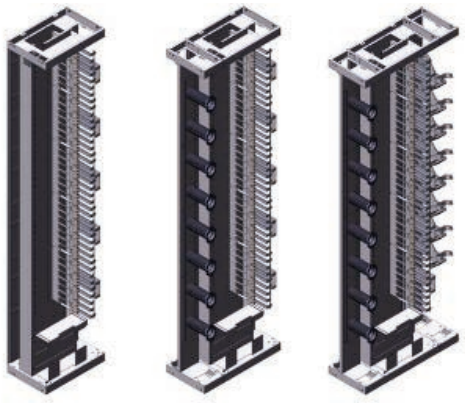
Rack features:
- Top or bottom cable entry possible.
- Top cover provides openings for cables (optionally with brushes)
- Easy expansion with side-by-side or back-to-back mounting of racks.
- Solutions for cross-connect and interconnect configurations.
- Backside vertical cable guidance for incoming cables.
- Bending radius protection of 30mm for fibers and patchcords.
- Intelligent patchcord management.
- Vertical patchcord cable guidance on left and right side.
- Mandrels on left and right side of the rack provide sufficient space for patchcord overlength storage.
- Integrated patchcord management to adjacent racks avoids the usage of external ducts.

## Technical specifications

| | |
|---|---|
| Colour | RAL 7035, light grey |
| Material | Powder coated steel |
| Flammability | UL 94V-0 |

## Single row racks

The Single row racks for the OPDISYS®-System are available in three different heights. The Single Row Rack can be equipped optionally with two extension racks as well as side panels and one single door. When adding extension racks, several combinations are possible:
- one Mandrel Extension Rack
- one Gasblocker Extension Rack
- a combination of one Gasblocker Extension Rack and one Mandrel Extension Rack



Various fixing sets (see information in the accessories section of this document) are available which allow you to mount the rack to either wall or ceiling or floor. It is possible to mount several racks next to each other back-to-back (requires only floor mounting) or next to each other (requires mounting both to floor and ceiling or wall for stability reasons). A stand-alone Single Row Rack should always be fixed to both floor and ceiling or wall.

# OPDISYS® - Racks

## Dimensions & Capacity - without extensions

| | FODR 450/32HU | FODR 450/40HU | FODR 450/48HU |
|---|---|---|---|
| Rack height | 1800mm | 2200mm | 2600mm |
| Rack width | 450mm | 450mm | 450mm |
| Rack weight (open / closed) | 50kg / 77kg | 62kg / 92kg | 74kg / 106kg |
| Max. amount of modules | 32 full size or 64 half size | 40 full size or 80 half size | 48 full size or 96 half size |
| Max. amount of fiber | 384 SC/E2000 | 480 SC/E2000 | 576 SC/E2000 |
| Terminations | 768 LC/LX.5 | 960 LC/LX.5 | 1152 LC/LX.5 |

## Dimensions & Capacity - with mandrels

| | FODR 600/32HU | FODR 600/40HU | FODR 600/48HU |
|---|---|---|---|
| Rack height | 1800mm | 2200mm | 2600mm |
| Rack width | 600mm | 600mm | 600mm |
| Rack weight (open / closed) | 60kg / 88kg | 72kg / 105kg | 84kg / 122kg |
| Max. amount of modules | 32 full size or 64 half size | 40 full size or 80 half size | 48 full size or 96 half size |
| Max. amount of fiber | 384 SC/E2000 | 480 SC/E2000 | 576 SC/E2000 |
| Terminations | 768 LC/LX.5 | 960 LC/LX.5 | 1152 LC/LX.5 |

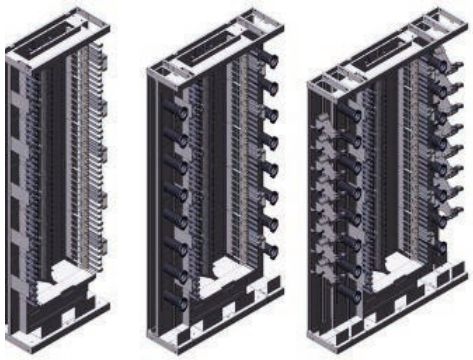
## Dimensions & Capacity - with mandrels and gasblocker integration

| | FODR 750/32HU | FODR 750/40HU | FODR 750/48HU |
|---|---|---|---|
| Rack height | 1800mm | 2200mm | 2600mm |
| Rack width | 750mm | 750mm | 750mm |
| Rack weight (open / closed) | 71kg / 99kg | 83kg / 116kg | 98kg / 132kg |
| Max. amount of modules | 32 full size or 64 half size | 40 full size or 80 half size | 48 full size or 96 half size |
| Max. amount of fiber | 384 SC/E2000 | 480 SC/E2000 | 576 SC/E2000 |
| Terminations | 768 LC/LX.5 | 960 LC/LX.5 | 1152 LC/LX.5 |

## Double row racks

The Double row racks are available in three different heights. The Double Row Rack can be equipped optionally with two extension racks as well as side panels and a pair of doors. For the Double Row Rack it is possible to add up to two extension racks on each side. It can be either a Mandrel Extension Rack or a Gasblocker Extension Rack.

Various fixing sets (see information in the accessories section of this document) are available which allow you to mount the rack to either wall or ceiling or floor. It is possible to mount several racks next to each other back-to-back (requires only floor mounting) or next to each other (requires mounting both to floor and ceiling or wall for stability reasons). A stand-alone Double Row Rack should always be fixed to both floor and ceiling or wall.



# OPDISYS® - Racks



## Dimensions & Capacity - without extensions

| | FODR 700/32HU | FODR 700/40HU | FODR 700/48HU |
|---|---|---|---|
| Rack height | 1800mm | 2200mm | 2600mm |
| Rack width | 700mm (750mm closed rack) | 700mm (750mm closed rack) | 700mm (750mm closed rack) |
| Rack weight (open / closed) | 83kg / 112kg | 98kg / 133kg | 115kg / 162kg |
| Max. amount of modules | 64 full size or 128 half size | 80 full size or 160 half size | 96 full size or 192 half size |
| Max. amount of fiber | 768 SC/E2000 | 960 SC/E2000 | 1152 SC/E2000 |
| Terminations | 1536 LC/LX.5 | 1920 LC/LX.5 | 2304 LC/LX.5 |

## Dimensions & Capacity - with mandrels

| | FODR 1000/32HU | FODR 1000/40HU | FODR 1000/48HU |
|---|---|---|---|
| Rack height | 1800mm | 2200mm | 2600mm |
| Rack width | 1000mm | 1000mm | 1000mm |
| Rack weight (open / closed) | 98kg / 142kg | 118kg / 170kg | 138kg / 197kg |
| Max. amount of modules | 64 full size or 128 half size | 80 full size or 160 half size | 96 full size or 192 half size |
| Max. amount of fiber | 768 SC/E2000 | 960 SC/E2000 | 1152 SC/E2000 |
| Terminations | 1536 LC/LX.5 | 1920 LC/LX.5 | 2304 LC/LX.5 |

## Dimensions & Capacity - with mandrels and gasblocker integration

| | FODR 1300/32HU | FODR 1300/40HU | FODR 1300/48HU |
|---|---|---|---|
| Rack height | 1800mm | 2200mm | 2600mm |
| Rack width | 1300mm | 1300mm | 1300mm |
| Rack weight (open / closed) | 123kg / 171kg | 148kg / 205kg | 174kg / 233kg |
| Max. amount of modules | 64 full size or 128 half size | 80 full size or 160 half size | 96 full size or 192 half size |
| Max. amount of fiber | 768 SC/E2000 | 960 SC/E2000 | 1152 SC/E2000 |
| Terminations | 1536 LC/LX.5 | 1920 LC/LX.5 | 2304 LC/LX.5 |

## Extension racks and additional components

**Mandrel Extension Rack**

The mandrels are used for cable guidance of the jumper patchcords. An optionally available back panel for the Mandrel Extension Rack must be installed when a closed version is needed.

**Gasblocker Extension Rack**

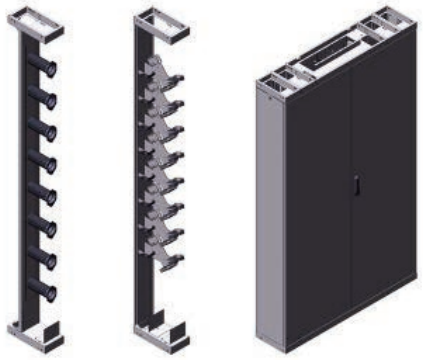
When using blow-in systems, gasblockers are essential in order to protect the installation against gas and/or water entry. The Gasblocker Extension Rack can accommodate the gasblockers. The Gasblocker Extension Rack has a built-in back panel, so no extra back panel is needed in order to turn it into a closed version.

**Rack doors**

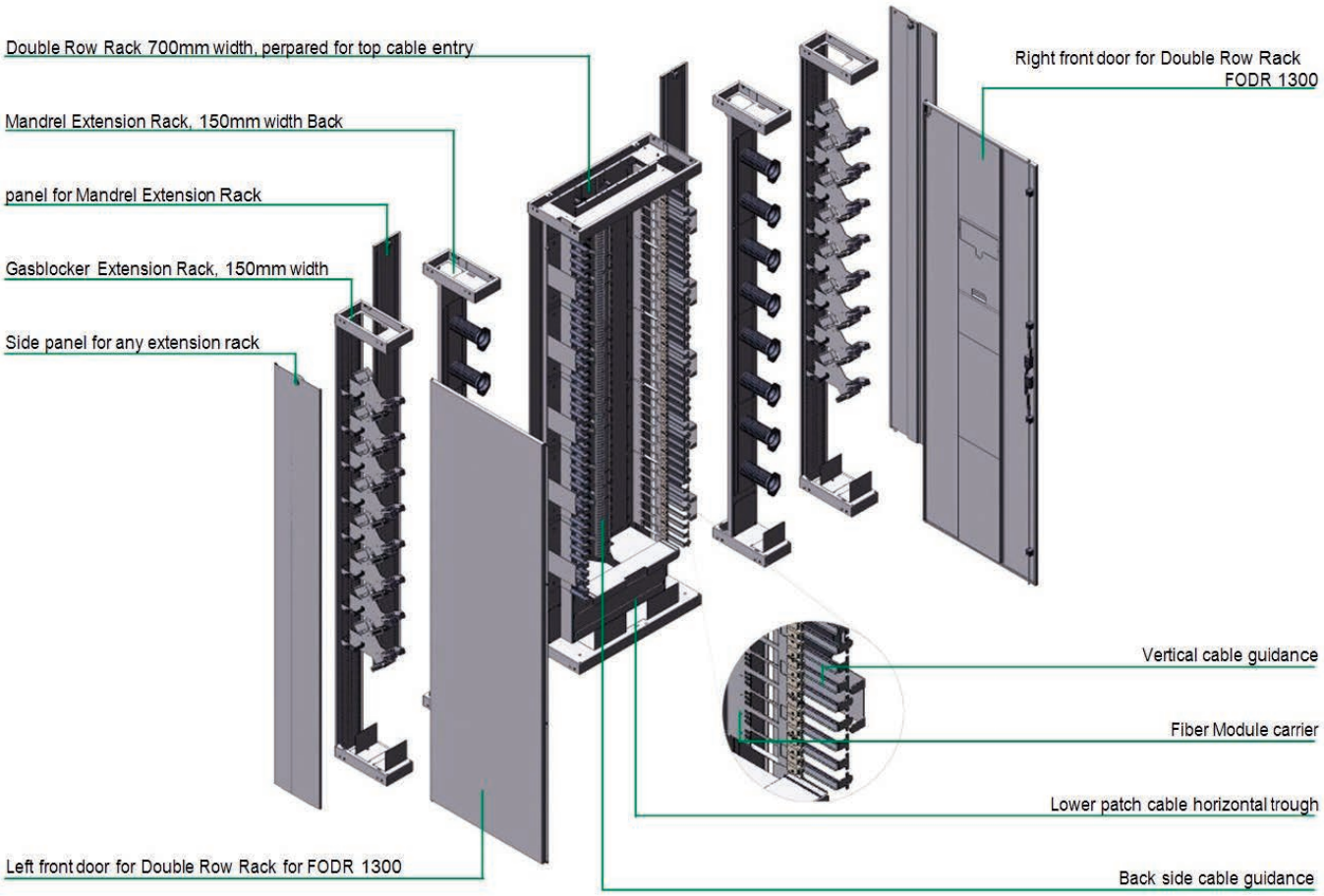
If a closed rack version is required, doors can be attached to the single or double row rack. Each door has an opening angle of 180°. The doors are equipped with an integrated lever and lock and have an A4 document holder on their inner side.

**Side and back panels**

Side and back panels must be mounted with screws to achieve a closed rack version. The side panel for the Single/Double Row Rack is different to the side panel for an Extension Rack. Each side panel is useable for right as well as for left side mounting.



# OPDISYS® - Racks




## Scope of supply

Additionally to your ordered rack and extension parts and to the side and back panels the basis rack is preassembled as follows:
- Assembled vertical cable guidance
- Assembled patchcord guidance (on both sides for Single row racks)
- Assembled cable trough
- Assembled 8HU carrier units
- Assembled back side cable guidance

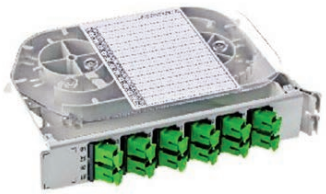
All fiber modules have to be ordered separately.
Required rack accessories, fiber protection type and length will be determined according to the OPDISYS® configuration process and have to be ordered separately.

# OPDISYS® - Fiber modules

## Product description - Fiber modules

The multi-circuit management fiber modules are used as combined splice & patch modules. They offer highest fiber density along with best maintainability. Maximum flexibility is guaranteed by metal frontplates and 45° angled adapter holders for all conventional adapter types.

The fiber modules are available in 2 sizes:
- as half-size fiber modules with a height of 0,5HU
- as full-size fiber modules with a height of 1HU



Fiber modules can be equipped with different adapter types or with a closed frontplate without adapters for a splice-through version (in this case, a loop- back connection of fibers can be done via splices).

The material of the LSZH fiber modules is a Polycarbonate / ABS blend. The symmetrical design of the multi-circuit management fiber modules allows you to use the same module for left- and right-side mounting. A uniform module colour optimizes stock keeping, while individual threefold colour code labelling (on front, side and cover) provides fast and clear module and fiber identification.

Features:
- Fiber Modules can be rotated by 90° and are removable from the rack
- Incoming fibers and pigtails are stored in separate areas
- Easy to snap in adapter holders allow comfortable cleaning of pigtail-connector ferrules by taking off the adapter holders.
- Identical splice protection holder for both shrink and crimp splice protection
- Two-sided, easy to remove transparent covers per fiber module - bending radius protection for all fibers and pigtails
- Overlength storage of incoming cable subtube is possible on the bottom side of the module
- Integration of splitters up to 1x64 possible


## Technical specifications

| | |
|---|---|
| Colour | RAL 7035, light grey |
| Material | Powder coated steel |
| Flammability | UL 94V-0 |
| Weight (half size module) | 105 grams (without adapters and pigtails) |
| Weight (full size module) | 145 grams (without adapters and pigtails) |

## Max. amount of adapters

| | SCsx | LCdx | E2000sx | E2000dx | LX.5 | ST | FC |
|---|---|---|---|---|---|---|---|
| Half Size Fiber Module | 6 | 6 | 6 | - | 6 | 6 | 6 |
| Full Size Fiber Module | 12/16 | 12 | 12/16 | 12 | 12 | 12/16 | 12/16 |

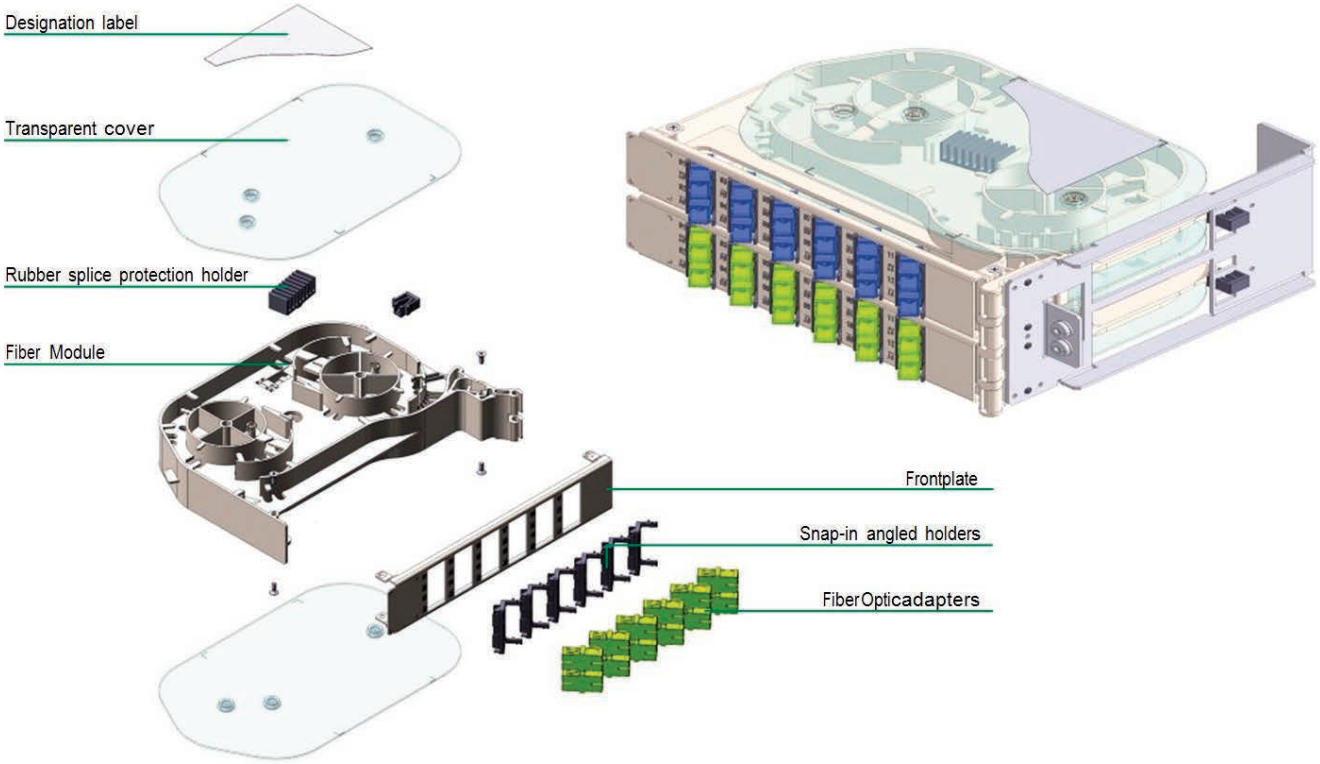
## Max. amount of pigtails

| | SCsx | LCdx | E2000sx | E2000dx | LX.5 | ST | FC |
|---|---|---|---|---|---|---|---|
| Half Size Fiber Module | 6 | 12 | 6 | - | 12 | 6 | 6 |
| Full Size Fiber Module | 12/16 | 24 | 12/16 | 24 | 24 | 12/16 | 12/16 |

## Max. amount of splices

| | Heat shrink splice protection | Crimp splice protection |
|---|---|---|
| Half Size Fiber Module | 16 | 16 |
| Full Size Fiber Module | 32 | 48 |

# OPDISYS® - Fiber modules




## Scope of supply

Each Fiber Module is equipped with:
- Frontplate
- Snap-in angled holders
- Rubber shrink/crimp splice protection holder
- Fiber protection pipe holder
- Two transparent covers.
- Designation label
- Door latch
- Inserted adapters and pigtails

A shrink or crimp splice protection is not included in the fiber module and has to be ordered separately.

# OPDISYS® - Fiber modules

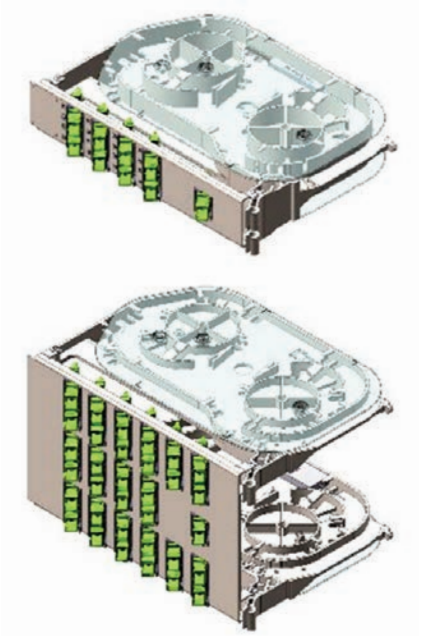
## Product description - Splitter Fiber modules

There are different types of Splitter Fiber Modules available in order to integrate a PLC splitter into the Fiber Module. It is possible to integrate all types of splitters starting from 1:4 up to 1:128.

The Splitter Fiber Module consists of either two Half Size Fiber Modules or one or two Full Size Fiber Modules (depending on the splitter ratio needed). Special frontplates designed for splitter usage ensure clearly arranged cable guidance for both incoming signal patchcable and outgoing signal patchcables. We offer various pre configured adapter configurations with integrated splitters, ready to use. Other adapter combinations are available upon request.

The Splitter Fiber Modules are available as 1:8, 1:16, 1:32 and 1:64 versions. The ratio indicates the amout of SC simplex ports, the actual ratio can be higher when using higher denisty adapter systems such as LC (see „Splitter Fiber Modules - Technical Specification“-table below).

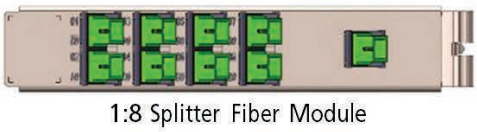
All other technical parameters for the Splitter Fiber Modules are equivalent to those of the standard Fiber Modules. For PLC splitter technical details please see separate datasheet.



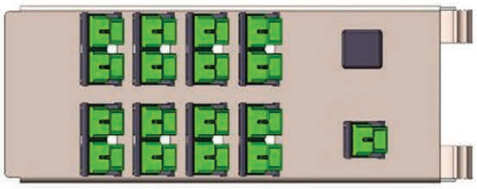
## Max. amount of splices

| | Max. amount of imputs | Max. amount of outputs | Amount of modules | Space in module carrier needed |
|---|---|---|---|---|
| 1:8 Splitter Fiber Module | 1 | 8[1] / 16[2] | 1 Full Size | 1HU |
| 1:16 Splitter Fiber Module | 2 | 16[1] / 32[2] | 2 Half Size | 2HU |
| 1:32 Splitter Fiber Module | 1 | 32[1] / 64[2] | 2 Half Size | 3HU |
| 1:64 Splitter Fiber Module | 1 | 64[1] / 128[2] | 2 Full Size | 4HU |

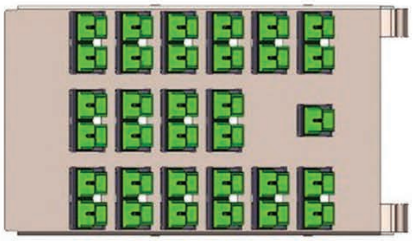
[1] When using SCsx, FCsx, STsx, LX.5sx, E2000sx adapters
[2] When using LCdx, E2000dx adapters



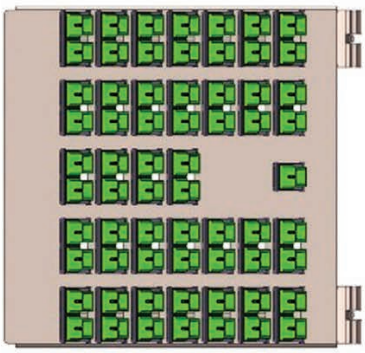
1:8 Splitter Fiber Module



1:16 Splitter Fiber Module



1:32 Splitter Fiber Module



1:64 Splitter Fiber Module

## Scope of supply

Each Splitter Fiber Module is equipped with:
- Frontplate
- Snap-in angled holders
- Two transparent covers
- Designation label
- Door latch
- Inserted adapters and pigtails and PLC splitter (if ordered as assembled version)

# OPDISYS® - Fiber modules

## Product description - MPO/MTB®

**MPO/MTP® integration into OPDISYS®**

We also offers MPO/MTP® ready Fiber Modules. In general, there are two possibilities to integrate the MPO/MTP® system into a OPDISYS® rack. You can use either MPO/MTP®-ready Fiber Modules or you can use separate MPO/MTP® patch fields at the top of the fiber module area or at the extension bars.

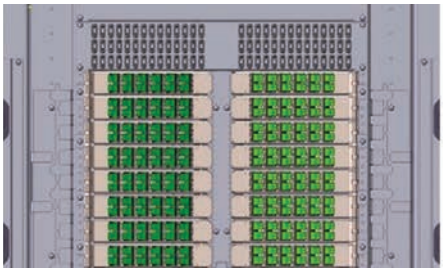
**MPO/MTP®-ready Fiber Modules**

The MPO/MTP®-ready Fiber Module contains a MPO/MTP® adapter holder inside the module. To connect the adapters at the frontplate with the MPO/MTP® adapter inside the module, a MTP® direct split cable is used. The MPO/MTP®-ready Fiber Module is based on the standard Fiber Module, containing an MPO/MTP® adapter holder instead of the fiber protection sleeve holder.


The MPO/MTP®-ready Fiber Module can be ordered preassembled as shown above with mounted adapters and a MTP® direct split cable already installed. This ensures a quick installation as the Fiber Module comes ready for use. Just connect your incoming MPO/MTP® cable to the MPO/MTP® adapter located inside the Fiber Module and the Fiber Module is integrated into your network. The MPO/MTP®-ready Fiber Module is available only as a Full Size Fiber Module (1HU).

**MPO/MTP® patching areas**

If the OPDISYS®-rack is equipped with MPO/MTP® patching areas which can either be located on top of the Fiber Module rows or at the extension racks, a MTP® fanout cable is used to connect the front plate adapters to the MPO/MTP® patch field. The Fiber Module needed can be ordered preassembled as well, equipped with adapters and the MPO/MTP® cable. The divider for the fanout cable is located inside the Fiber Module. The cable leads from the Fiber Module directly to the MPO/MTP® patching area, therefore its length must be specified upon ordering.



**Top patching area**

MPO/MTP® patching area above the Fiber Module mounting area. Available for Single row racks as well as for Double row racks.

**Side patching area**

MPO/MTP® patching area is integrated into the Gasblocker Extension Rack.

**MPO fanout for patching areas**

If the MPO/MTP® patching is installed on top of the rack or at the extension bar, a MTP® fanout cable, which leads to the MPO/MTP® patching area, must be installed into the Fiber Module.

## Scope of supply

Each MPO/MTP®-ready Fiber Module is equipped with:
- Frontplate
- Snap-in angled holders
- Two transparent covers.
- Designation label
- Door latch
- MPO/MTP® adapter holder
- Inserted adapters and MTP® direct split cable (if ordered as assembled version).

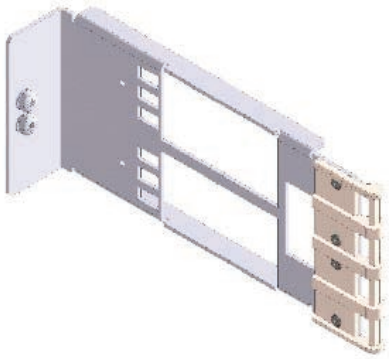
# OPDISYS® - Accessories

## Product description - Accessories

We offer various accessories in order to install a OPDISYS® system on location and to ensure a proper cable guidance and feeding. Each fiber module must be mounted to the basis rack by using a module carrier unit. Two different fiber protection systems are supported by OPDISYS®.

## Module carrier unit

The OPDISYS®-module carrier unit accommodates the Fiber Module and allows the rotation of the Fiber Module in the rack and the removal of Fiber Modules from the rack. A flexible mix of Half Size Fiber Modules and Full Size Fiber Modules is possible by using four different sizes of module carrier units (2HU, 4HU, 6HU and 8HU versions are available). The 8HU version is the standard module carrier unit.



## Technical specifications

| | |
|---|---|
| Colour | RAL 7035, light grey |
| Material | Powder coated steel |

## Fiber protection

**Fiber protection tubes**

Fiber protections tubes are necessary to protect the loose tubes of an incoming cable from the terminal point of the incoming cable to the Fiber Modules. Two different types of protection tubes are available. We offers these fiber protection tubes per meter as well as in a set. A set for fiber protection contains the necessary quantity of tubes for each rack height, including labelling of each tube, cutting to its proper length and packed in a separate cardboard packing. Alternatively a set including pre-installation can be ordered either for the pre-installation into the base rack or into the extension rack. All fiber protection tubes are made of LSZH material.

**High rigidity harness PBT tube**

This kink-resistant tube-slit version ensures that a maximum bending radius of incoming cables is maintained.

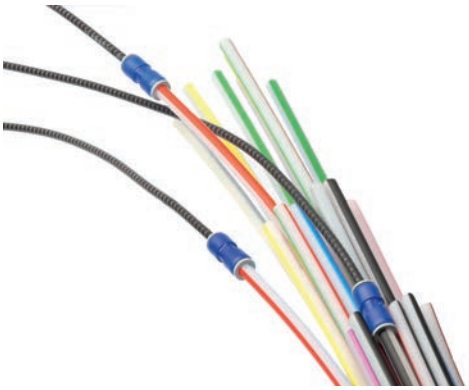
**Microduct/Primary tube**

The microduct protection tubes offer the possibility to blow in fibers directly up to the Fiber Modules. When using Microduct/Primary protection tubes, a pre-installation is possible by using our cable feeding tool. When ordering sets of microduct/primary tube, each tube is pre-printed with fiber module level indication.

## Technical specifications

**High rigidity harness tube**

| | |
|---|---|
| Colour | Black |
| Material | polyethylene terephthalate (PBT) |
| Flammability | UL 94V-0 |
| Inner diameter | 3.3mm |
| Outer diameter | 5.0mm |



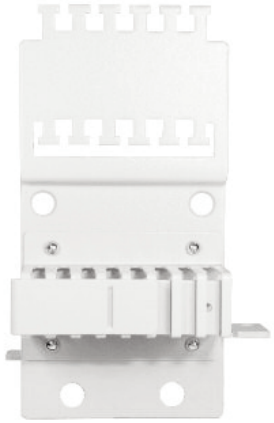
**Microduct**

| | |
|---|---|
| Colour | transparent and numbered |
| Material | LSZH material |
| Flammability | UL 94V-0 |
| Inner diameter | 3.5mm |
| Outer diameter | 5.0mm |

# OPDISYS® - Accessories

## Cable clamp set

The cable clamp sets are mounted either on the top or on the bottom side of the cabinet and secures the strain relief element of incoming cables. They also serve as holding point for the cable conduits. Optionally the central strength member of the incoming cable can also be fixed. A cable clamp set includes the cable clamp, mounting rail, protection bar and screws.



## Technical specifications

| | |
|---|---|
| Colour | RAL 7035, light grey |
| Material | Powder coated steel |
| Dimensions | 140mm x 90mm x 51.7mm (HxWxD) |
| Weight | 250 grams |

## Tools, Fixing material & Pre-Installation services

Fixing sets
Several fixing sets are available to mount the rack to the wall, on the floor or to mount multiple racks side by side or back to back to each other. Each individual fixing set contains all necessary screws, mounting brackets, washers and anchor pins.

Adapter holder pincer
The adapter holder pincer is designed to easily remove the snap-in angled holder from the frontplate cutout of the OPDISYS® fiber module. Thanks to its small and compact design it ensures the smooth removal of a snap-in angled holder without interfering with other connections.

Torx socket wrench
The torx socket wrench is necessary to mount various accessories into the base rack or the extension rack, e.g. spools in the mandrel extension rack. This tool is required to install an OPDISYS®-System.

Draw wire or element
The draw wire or element tool is necessary to insert the incoming fiber cable into the fiber protection tube which is fed up to the fiber optic module. This tool is required to install a OPDISYS®-System.

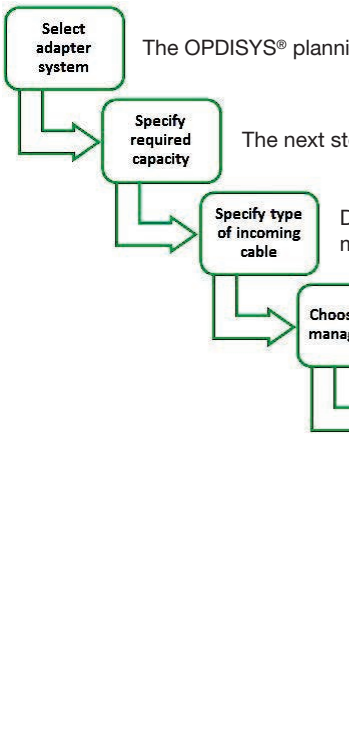
Micro duct cutting tool
A cutting tool with integrated knife to help cut microduct tubes easily to the correct length. The tool has a plastic housing and a metal knife.

Pre-Installation of fiber protection tubes
We offer to install the sets of selected fiber protection tubes into the rack.

Customized labelling
We can deliver each fiber module with a customized labelling of the top cover (index of all ports with description) as well as a labelling of the side of each Fiber Module (indication of the street and the building this module is assigned to) according to the customer's request. Also the labelling of the fiber module numbering can be done by us.

# OPDISYS® - Planning process, Ordering checklist

## Planning process




The OPDISYS® planning process usually starts with the selection of the adapter system.

The next step is to specify how many terminations (splices) are necessary on site.

Depending on the type and the method how the cable is fed into the system, the proper cable clamp set must be chosen.

Within this step you must specify what kind of fiber protection tube is needed and if gasblokkers are required.

The next step is to assign the fiber terminations to fiber modules.

Based on the termination assignment you can choose which Fiber Modules are needed (0.5HU or 1HU) and which quantity is necessary.

With the given limitations for the rack types (dimensions, open/closed versions) the type and amount of required racks can be calculated.

With this figure, a floor plan can be created.

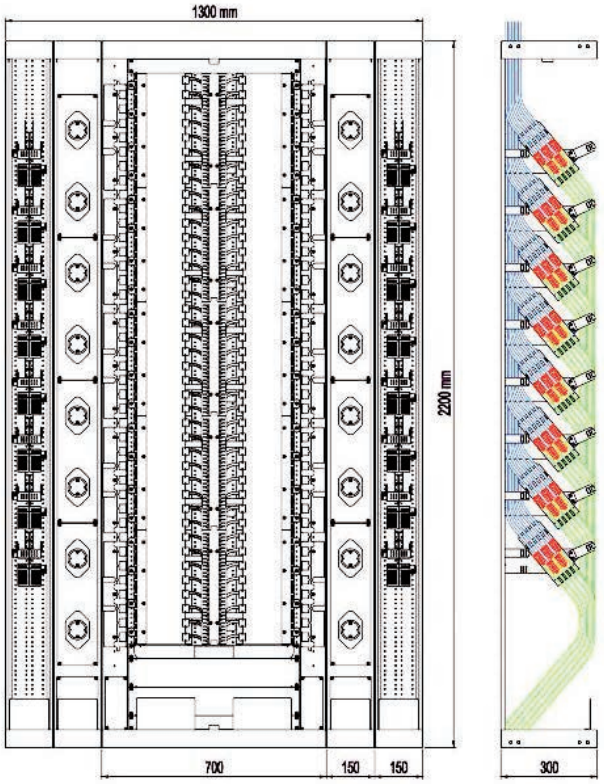
## Ordering checklist

The following checklist helps you make sure that you have ordered all parts which are required to build up OPDISYS®.

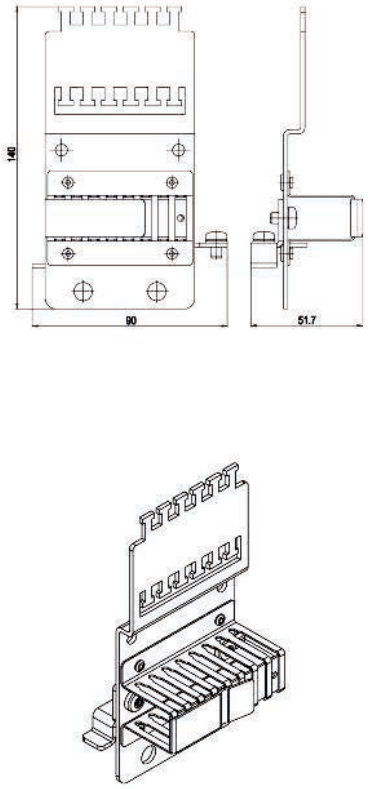
| | |
|---|---|
| **Base rack**<br>Base rack (single row or double row version) | mandatory |
| **Extension racks, doors & side panels**<br>Mandrel or gasblocker extension racks, doors & side panels to achieve closed rack | optional |
| **Fiber Modules**<br>Fiber modules according to your needs (0.5HU/1.0HU), with specified adapter system | mandatory |
| **Module carrier unit**<br>The quantity depends on the quantity of Fiber Modules needed | mandatory |
| **Fiber protection tube**<br>Either high rigidity harness PBT tube or microduct | mandatory |
| **Fiber protection tube set**<br>Fiber protection tube cut to correct length with or without pre-installation | optional |
| **Cable clamp set**<br>The quantity depends on the type of the incoming cable | mandatory |
| **Fixing sets**<br>Fixing sets to mount a rack to the floor, to the wall or two racks side by side | **mandatory** |
| **Tools**<br>Various tools to install a OPDISYS®-rack | recommended |

# OPDISYS® - Dimensions

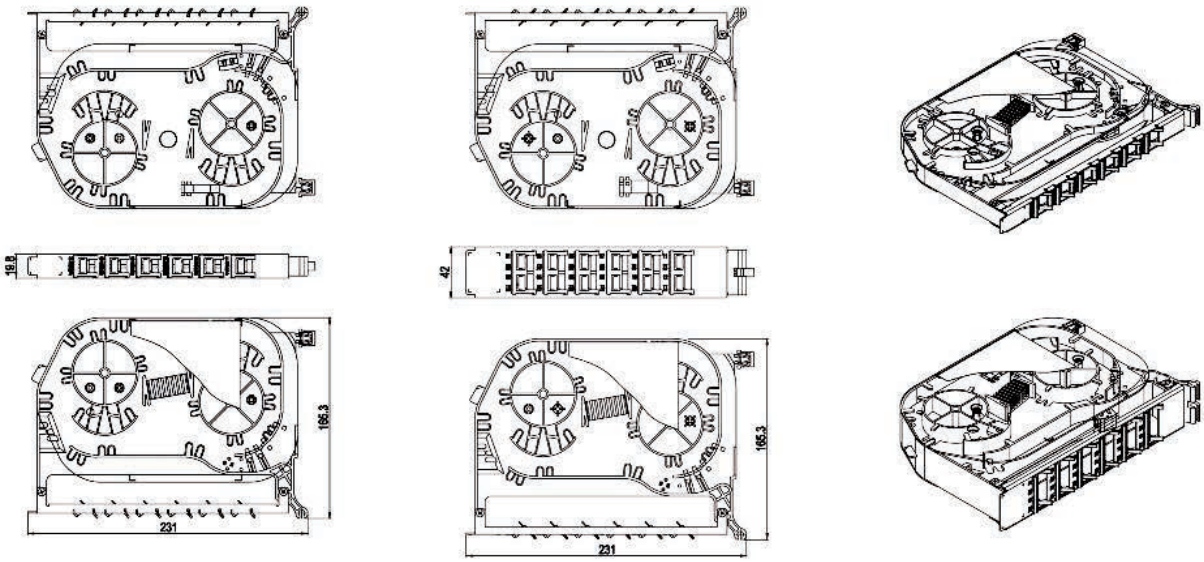
## Dimensions of the OPDISYS®-Components




**OPDISYS®-Rack**
Dimensions of OPDISYS®-Rack with Mandrel Extension Rack and Gasblocker Extension Rack. Front view of the rack, side view and guidance of Gasblocker Extension Rack.




**OPDISYS®-cable clamp**
Dimensions of the cable clamp for fixing and strain relief of incoming cables.




**Fiber Modules**
Outer Dimensions of Half Size Fiber Modules and Full Size Fiber Modules. All kind of Fiber Modules have equivalent outer dimensions (except some types of Splitter Fiber Modules).

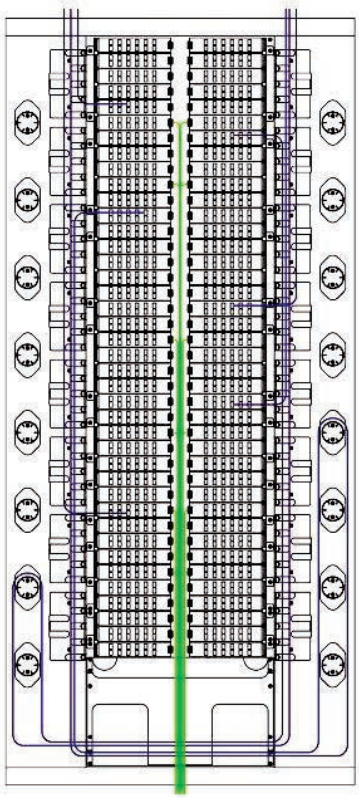
# OPDISYS® - Configuration examples



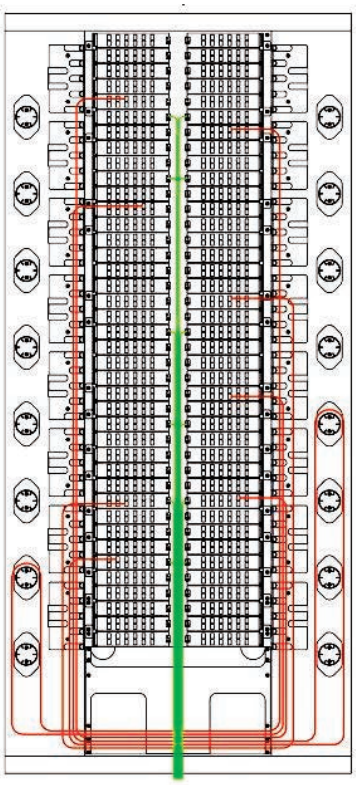
## Connecting your subscribers to the network

The main application of OPDISYS® is fiber termination in central offices of FTTH networks. This distribution/patch system can be placed as distribution node within the passive distribution network or between active components and the passive distribution network. The following sketches of connections and cabling show different approaches how to connect the subscribers to the active equipment respectively to the network backbone using one or more OPDISYS®-racks.

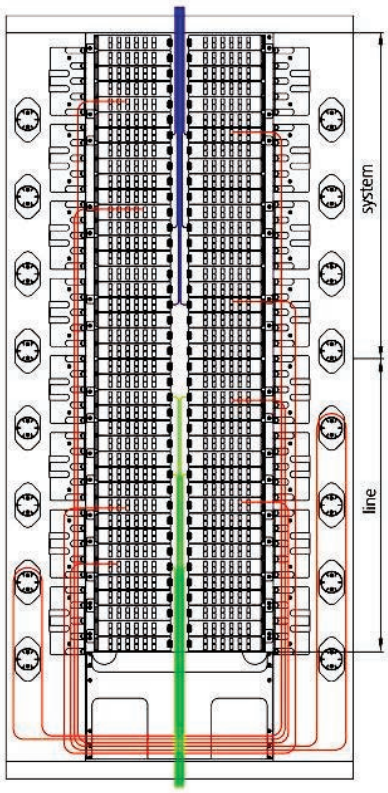
## Configurations with one OPDISYS®-Rack



ext. patchcord conn. (interconnection)
incoming/outgoing cable (line)



int. patchcord conn. (crossconnection)
incoming/outgoing cable (line)




int. patchcord conn. (crossconnection)
incoming/outgoing cable (system)
incoming/outgoing cable (line)

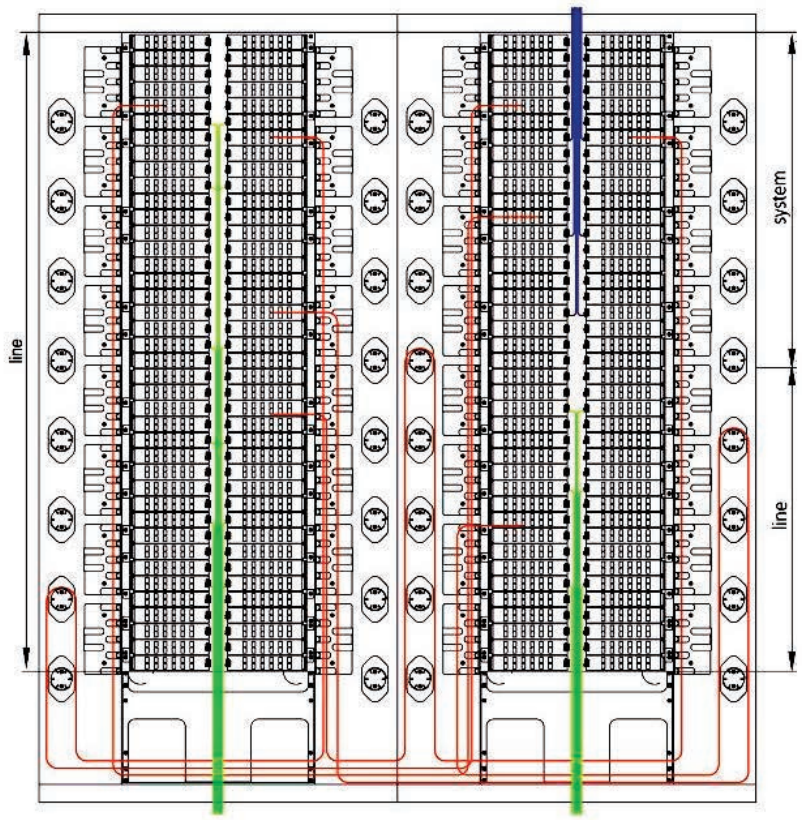
**Interconnect configuration**
The line cable, which establishes the connection to the passive optical distribution network, comes from the bottom. The external patchcord connection establishes the connection to the active optical equipment such as transmitters and receivers.

**Crossconnect configuration**
The line cable, which establishes the connection to the passive optical distribution network, comes from the bottom. It is for incoming as well as for outgoing signals. The rack is used for patching in the distribution part of the optical network.

**Crossconnect configuration**
In this configuration example the rack is split into a system's part and a line's part. The line cable, which establishes the connection to the passive optical distribution network, comes from the bottom while the external connection cable comes from the top. Both line and external cable are terminated by Fiber Modules. An internal patchcord is used to connect the system part with the line part of the network.

# OPDISYS® - Configuration examples

## Configuration with two OPDISYS®-Racks



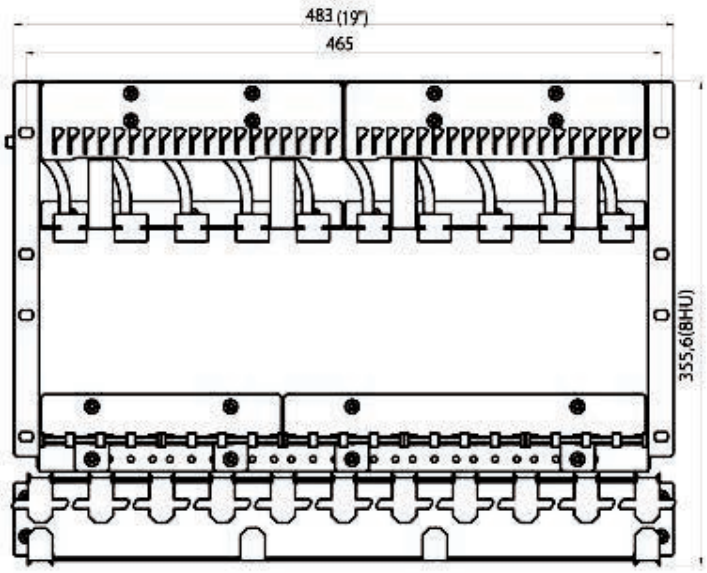

**Crossconnect configuration with two racks**

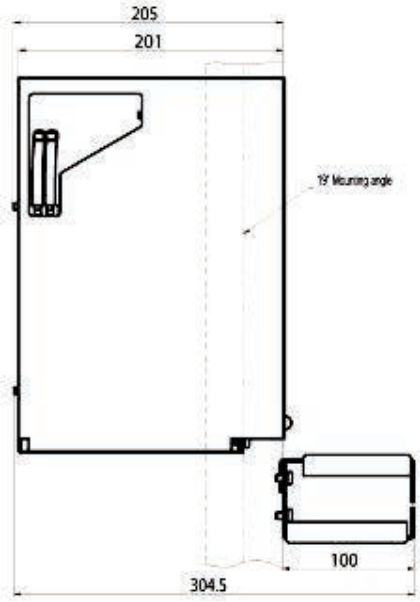
In this configuration example there is one rack for the line part of the system, the second rack is split into a system part and a line part. The line cables, which establish the connection to the passive optical distribution network, is comes from the bottom while the external connection cable is coming from the top. Both, line and external cable are terminated by Fiber Modules. An internal patchcord is used to connect the system part with the line part of the network. The internal patchcord is also used to cross connections between the two Racks.

# OPDISYS® - Integration into other systems

## Carrier for 19” system

OPDISYS® can also be used in a 19“ system by using a 19“ carrier. This carrier with a horizontal patch cable guiding can accommodate up to 10 pcs. of Full Size Fiber Modules or 20 pcs. of Half Size Fiber Modules at a height of 8HU.

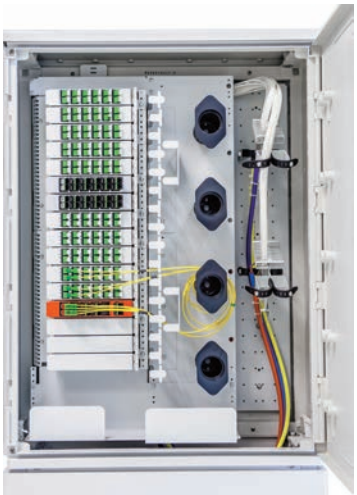


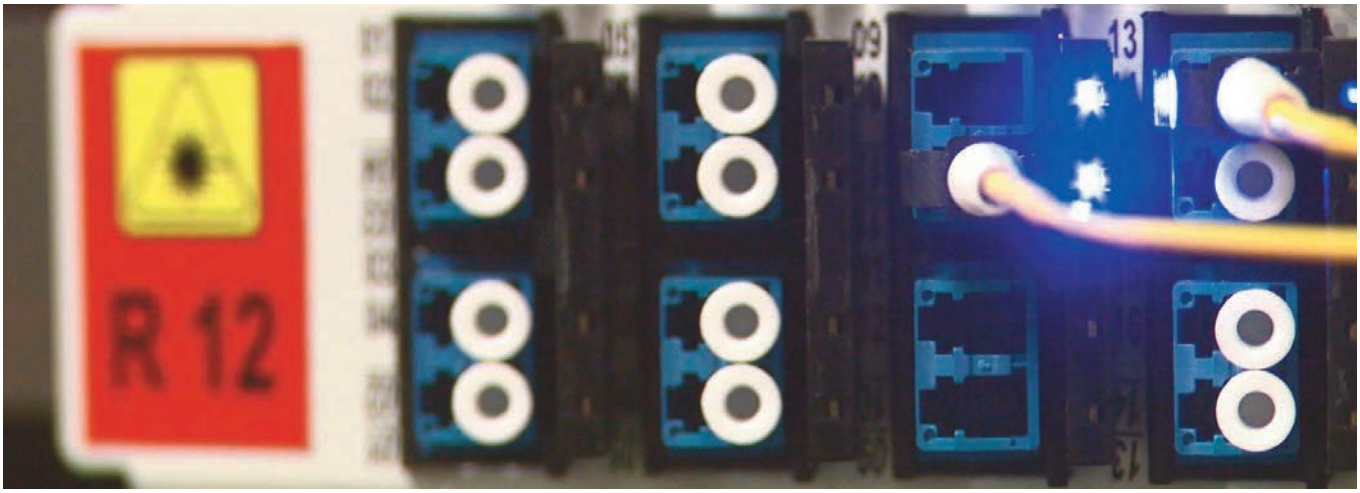

## Street cabinet

OPDISYS® can be integrated into an outdoor street cabinet. Different types of carriers ensure that the OPDISYS®-System is compatible to the most common types of outdoor street cabinets.

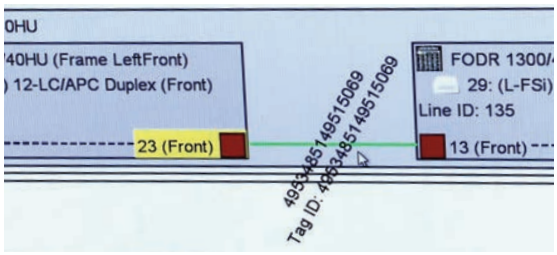
The figure shows a street carbinet with an integrated OPDISYS® system on the right side with space for active components on the left side.
The OPDISYS® support space for 21 full-size or 42 half-size fiber modules. The maximum capacity of a fully-equipped distribution box would here be 252 fibers.



# OPDISYS® Intelligent (Patch Management System)



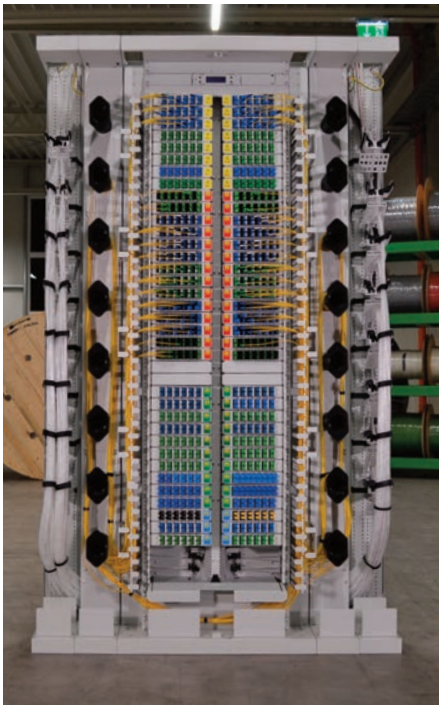

If you want to fully meet the requirements set by modern network administration, it is necessary to maintain process safety from the planning stage right up to the physical setup of a connection.

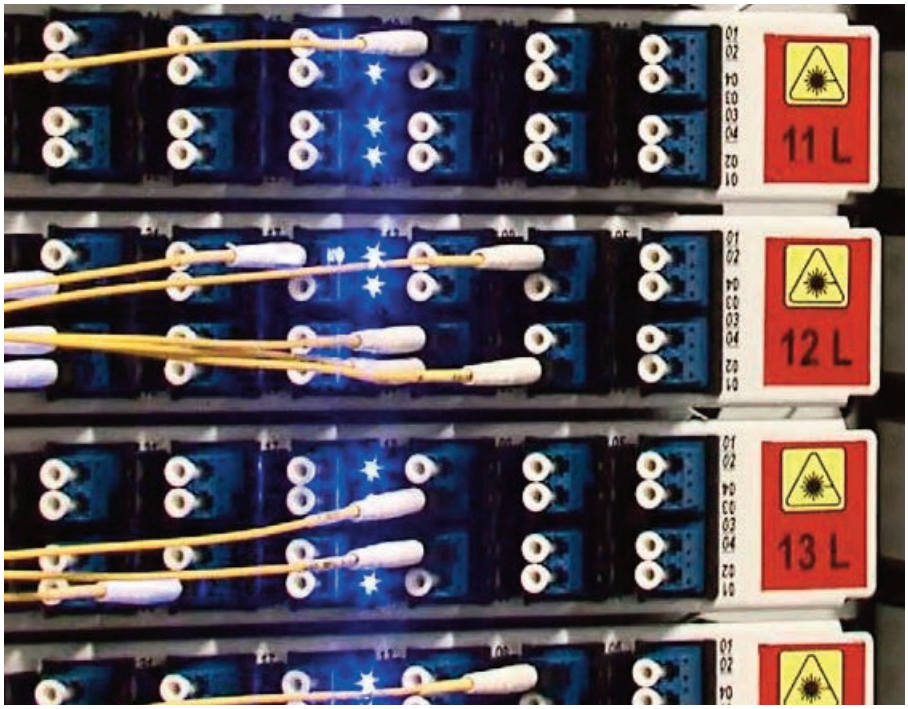



OPDISYS®-Intelligent is our intelligent system solution. It is capable to detect plugged connections inside cable distributors such as patch panels, distribution cabinets for fiber-to-the-home applications or street-side distributors and to transmit this information to a network management software.

In other words, the system is capable to identify connecting paths, connector and coupling types and to store this information in a documentation data base. This makes sure that faulty patchings are automatically detected and that an alarm is triggered in case of unauthorized changes to your connections.

This picture shows you our OPDISYS®-Intelligent system, using the OPDISYS® distribution cabinet for FTTH-networks as an example. Thanks to its flexible construction scheme, our Patch Management System can also be used in any other cable distribution system such as patch panels or street-side distributors.



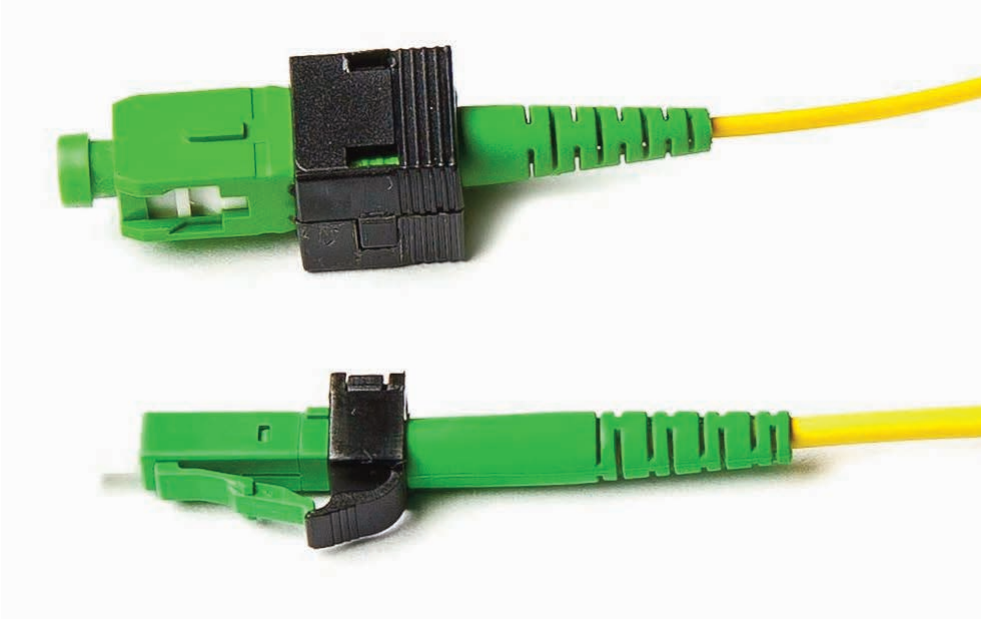


# OPDISYS® Intelligent (Patch Management System)

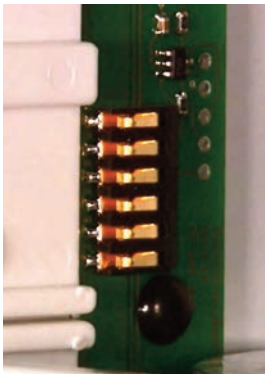
The basis for our intelligent system solution is a technology based on the well-known “Radio-Frequency-Identification (RFID)“ technology.

This system helps you determine plugged connections within a patch field and to correlate them with specific mechanical conditions.

RFID-transponders are clipped onto both connectors of the patch cable. They are compatible with all current connector systems and can be easily fitted onto existing patch cables.



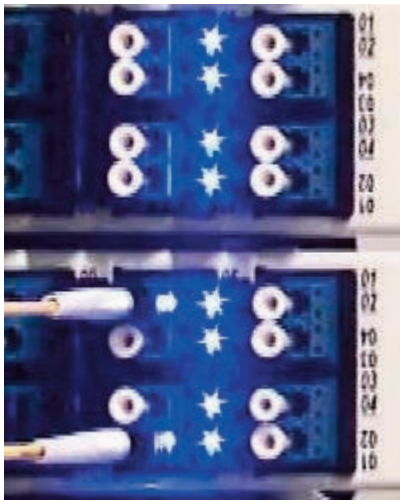
The fiber module is fitted with an electronic unit with integrated RFID antenna which recognizes an inserted patch cable and reads the information contained in the transponder.



All data collected by the fiber modules are transmitted - to the analyzer - via a bus system. The analyzer couples the bus to an Ethernet network via which information from the fiber modules is transmitted to a network management software.

# OPDISYS® Intelligent (Patch Management System)

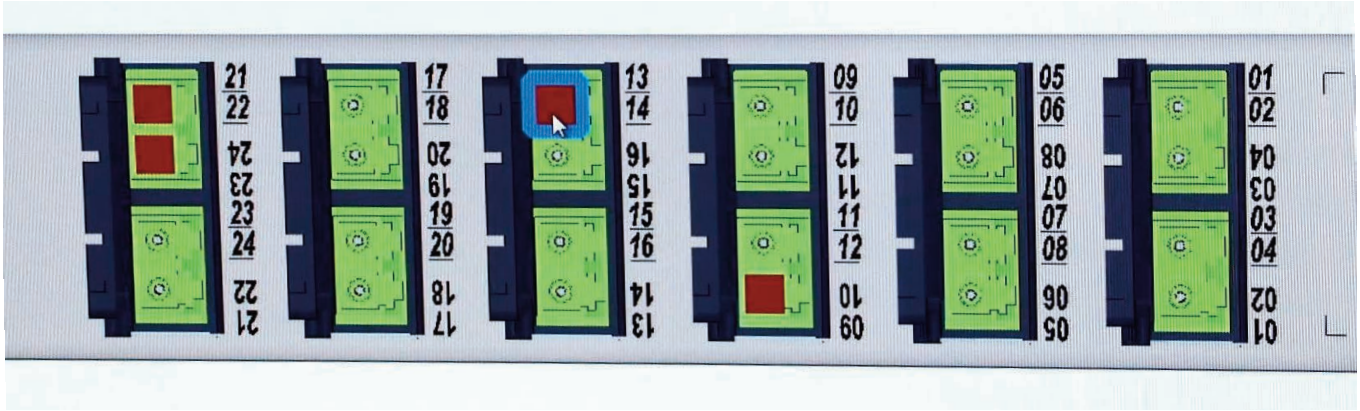
Each RFID-transponder has a unique number identifying each patch cable. This number allows you also to retrieve specific information related to the patch cable, such as measured values, manufacturer's information, batch numbers or the number of connecting cycles.



Additionally, it is possible to transmit other information about the fiber module to the documentation software, i.e. coupling type used, number of ports or product type.

Integrated LEDs visualize the current port status or ongoing work processes.

The Network Operation Center gathers the entire information flow in the central network management software. Our OPDISYS®-Intelligent is a manufacturer-independent solution and allows you to work with various software solutions as it meets current international standards.



# OPDISYS® Intelligent (Patch Management System)



## Return of investment

The installation of a patch management system is indisputably associated with significant installation costs. Consequently, the cost of such a solution must be demonstrated - "nice to have" is not a tenable basis for argumentation. Such calculations cannot get generalized - due to the different structures of companys. Also the level of detail is mostly different so here is only the basis of such a calculation.

| ANNUAL SAVINGS | |
|---|---|
| Port utilization | - EUR 1,50 |
| Database synchronization | - EUR 3,00 |
| Moves, adds, changes | - EUR 6,00 |
| Total savings | - EUR 10,50 |

The build-up costs of active components in a POP (point of presence) are about 150 EUR per port (In addition to highly integrated switching technology also security components, such as VPN-concentrators and firewalls added). An optimization of the port utilization, i.e. the avoidance of unused connections by 1% brings the saving of: 1,50 EUR / port. Gets patching not or not properly documented, documentation database must regularly be reconciled with the real wiring - each port on average every 2 years. The port adjustment costs the equivalent of 6 EUR, this means 3 EUR per year.

## Comparison of the required time with and without Patch Management System

| Action | Instrumental entity | Without PMS | With PMS |
|---|---|---|---|
| Planning | Network administrator | 6 min | 3 min |
| Create workorder | Network administrator | 5 min | 0 min |
| Patching | Technician | 5 min | 1 min |
| Update database | Network administrator | 5 min | 0 min |

## Advantage through the system

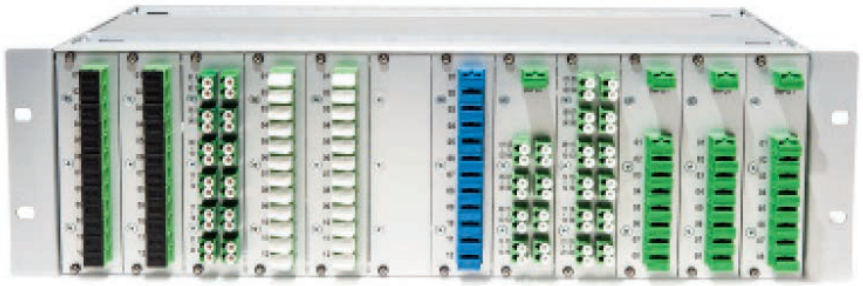
With using the patch management system the operations of the network administrators and their technicians can be re-defined and structured efficiently. This makes it possible to support larger networks with less effort. Valuable time is saved and can be used elsewhere. The times in which the administrator is searching for wrong patches and were errors in the documentation and the system can be done are counted. A very simple automatic recording of the actual state and the comparison with the target state are also part of the benefits, such as returning to the state of a secured system with very little effort. Not least, the automatic documentation of activities in a system an unbiased, accurate and also expense less characteristic of the system. The obtained information contributes to a large extent to the security of a network. The schedules of the planed patches can be done very detailed in advance. A predictable timing of resource work is thus easy and possible.

The current hardware technical features of the system already offers the possibility of already planned future developments, such as the mentioned local control element to integrate into the system without installation work only with software and interface customization.

# OPDISYS® compact

## Field of Application

OPDISYS® compact is a convenient and flexible fiber patching system. It can be used for fiber splicing only or to terminate an incoming loose tube or tight buffered cable. As OPDISYS® compact can handle a high density of fiber cores and offers flexible cross and interconnect capabilities with an convenient cable guidance, it is the ideal choice for datacenter and LAN installations.



## Features

- Eurocard Fiber Modules
- 1HU, 3HU and 4HU subracks available
- Support for all common types of adapters
- Open and closed version available

## Product description - OPDISYS® compact - Eurocard Module System

OPDISYS® compact is a new cable management system for datacenter. Intelligent cable guidance and the easy installation and maintenance make it a convenient solution for your network. Interoperability is ensured through the eurocard standard. The system consists of different kinds of subracks and various OPDISYS® compact Fiber Modules. A OPDISYS® compact Module is an Eurocard module consists of a front plate and body based on a PC/ABS blend. It can accommodate a splice cassette and is designed either for patching or as a splice through module.

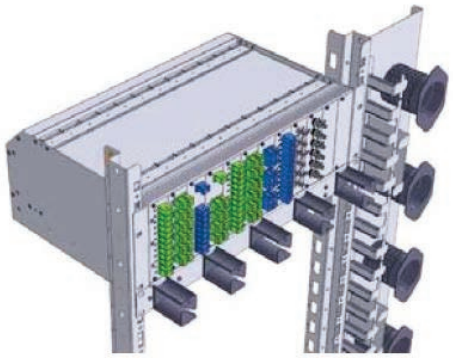
# OPDISYS® compact - Carrier

## Product description - OPDISYS® compact - Carrier

The OPDISYS® compact Carrier is a subrack for all OPDISYS® compact Modules. It is made of Aluminum and Aluzinc mild sheet. Plastic guidance rails ensure an accurate positioning of the compact Module inside the OPDISYS® compact Carrier. The plastic guidance rails are easy to install and uninstall as they simply click into the body of the OPDISYS® compact Carrier. Thus their position can be changed quickly as it is needed when using different widths of OPDISYS® compact Modules.

## Technical specifications

| | |
|---|---|
| Material | Anodized oxide brushed aluminum and Aluzinc mild steel |
| Flammability | UL 94V-0 |

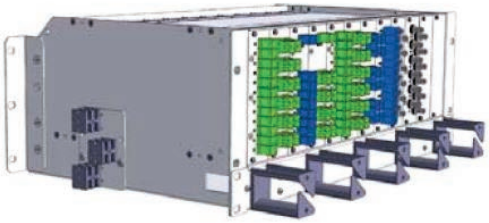


**Intelligent Cable Guidance**

We offer various kinds of installation kit for horizontal cable guiding and professional vertical overlength storage to enhance any installation of a OPDISYS® compact inside a rack (independently of the rack manufacturer).

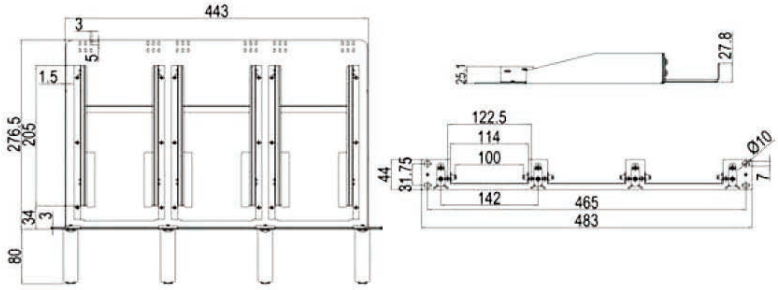
**Wall Mounting**

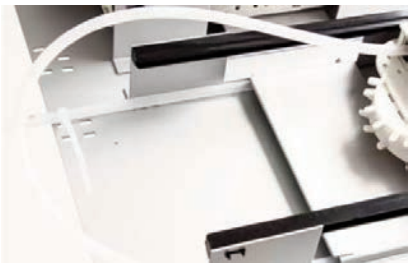
An optional wall mounting kit is available for the OPDISYS® compact system which allows you to mount a 4HU OPDISYS® compact Carrier on a wall. Two brackets will fix the 4HU OPDISYS® compact Carrier to the wall. The protection tube of a trunk cable's sub tube can be fixed by allotted holders which are mounted to the side of the 4HU OPDISYS® compact Carrier. A side hole is dedicated for inserting subcable protection tubes into the OPDISYS® compact Carrier to feed the cable into the OPDISYS® compact extension drawer.



## 1HU OPDISYS® compact - Carrier

The 1HU OPDISYS® compact carrier can accommodate three OPDISYS® compact Modules in a horizontal direction. It comes with screw mounted horizontal cable guidance. The 1HU OPDISYS® compact carrier is available as open version only. The protection tube is fed from the Multi Tube Cable divider (MTCD) directly to each OPDISYS® compact Module, mounted to the compact carrier. An additional space for a service loop is available.

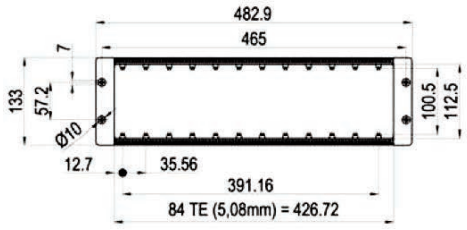


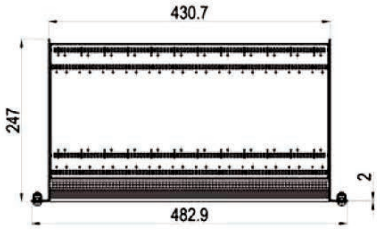



# OPDISYS® compact - Carrier

## 3HU OPDISYS® compact - Carrier

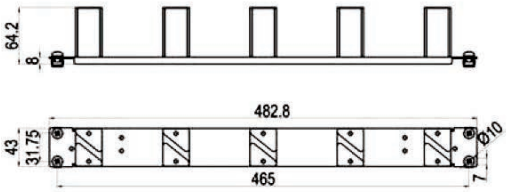
The 3HU OPDISYS® compact Carrier is available as an open version. It is covered on top and open on the back side. The cable protection tube can be fed form the Multi Tube Cable Divider (MTCD) directly to the OPDISYS® compact Module.

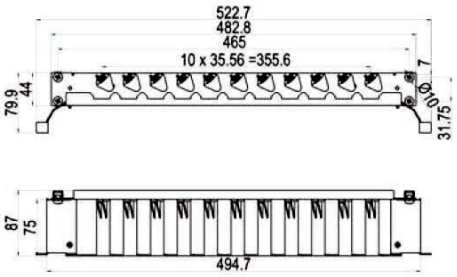



## OPDISYS® compact - Management Bar

The OPDISYS® compact Management Bar can be ordered separately as an accessory for horizontal cable guidance at the OPDISYS® compact's front. It is available in two different executions: The simple Management Bar with five plastic hooks and the advanced Management Bar with up to eleven bending radius limitators.




## 4HU OPDISYS® compact - Carrier

The 4 HU OPDISYS® compact Carrier consists of two key parts, the subrack and the integrated extension drawer with horizontal cable management at the front. Furthermore it is available in different executions of cable/subcable management:

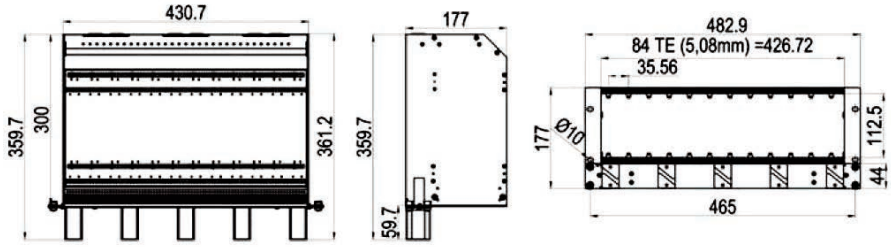
- for cable fixation and subtubes splitting in external Multi Tube Cable Divider(MTCD), is recommended to use open rack with extension drawer by their additional protection pipes.
- for direct cable fixation to backside of 4HU subrack (on drawer back plate), we recommend to use closed rack with universal drawer. Universal drawer is designed for cable fixation by cable glands or simply with cable ties. 4HU subrack is closed, because subtubes have no additionally protection inside.

A OPDISYS® compact Carrier in an open version can be easily upgraded to a closed version simply by mounting the additional cover plates to the OPDISYS® compact Carrier.

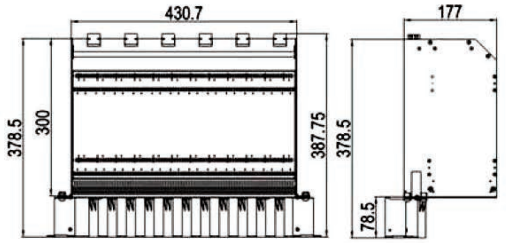
We offers also two different types of Management Bar:
- 4 HU OPDISYS® compact carrier with simple Management Bar - consists from five plastic hooks and the advanced.
- 4 HU OPDISYS® compact carrier with advanced Management Bar - consists from up to eleven bending radius limitators.

# OPDISYS® compact - Carrier

## 4 HU OPDISYS® compact - Carrier with simple Management Bar

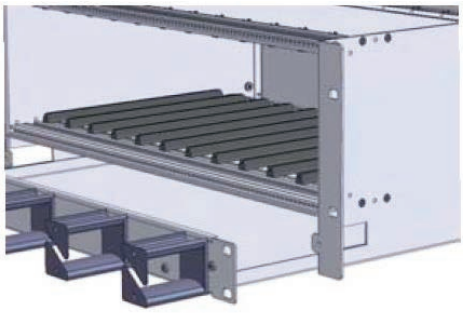



## 4 HU OPDISYS® compact - Carrier with advanced Management Bar




## OPDISYS® compact - Extension/Universal drawer

The OPDISYS® compact Extension/Universal drawer is an integrated part, only available for the 4HU OPDISYS® compact Carrier. It provides an additional space for the service loop of the cable which is a necessary overlength to pull out the OPDISYS® compact Module from the Carrier. Furthermore, it accommodates the OPDISYS® compact Management Bar.

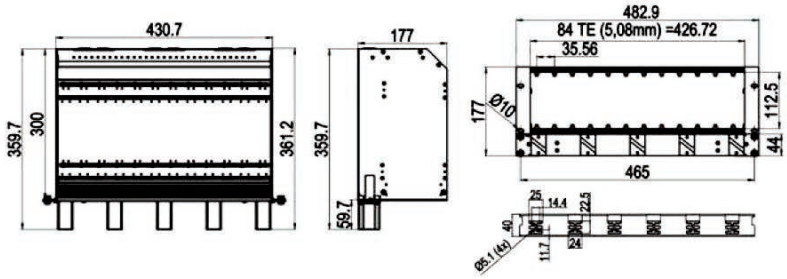


We offers these modification:

- OPDISYS® compact Extension Drawer with simple Management Bar
- OPDISYS® compact Extension Drawer with advanced Management Bar
- OPDISYS® compact Universal Drawer with simple Management Bar
- OPDISYS® compact Universal Drawer with advanced Management Bar

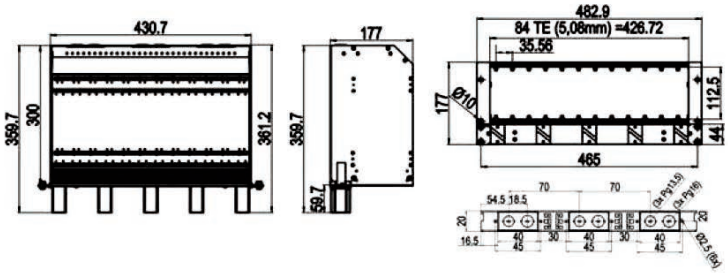
Universal Drawer modul support fixation of incomming cables by cable glands.
Extension Drawer support fixation of incomming tubes by fixing of protection tubes.

## 4 HU OPDISYS® compact - Carrier with simple Management Bar and Extension Drawer

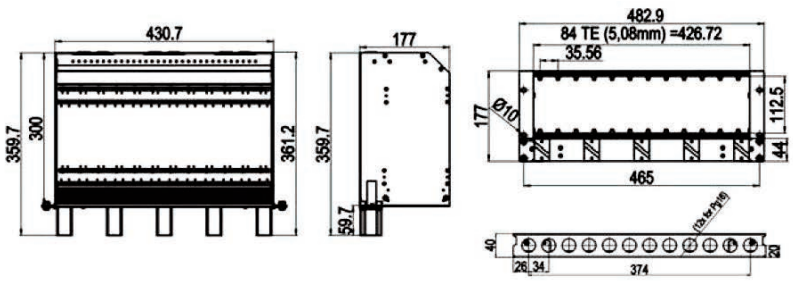


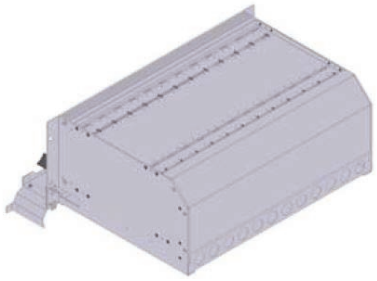

# OPDISYS® compact - Carrier

## 4 HU OPDISYS® compact - Carrier with simple Management Bar and Universal Drawer




## 4 HU OPDISYS® compact - Carrier with simple Management Bar and 12 x PG16 Drawer

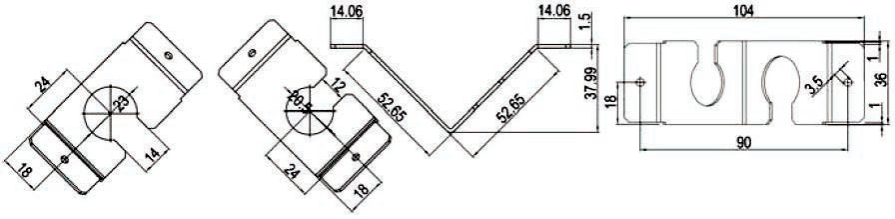


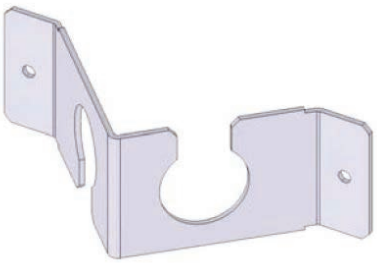



## OPDISYS® compact Carrier - Accessories

**Angled Cable Entry Plate PG16/M20:**

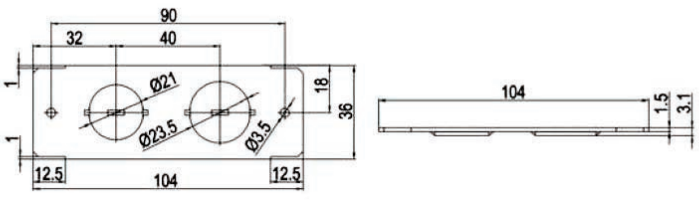
Angled cable entry plates allow to bring the cable to drawer by 45 degrees angle. This part is mounting by 2 screws on back side of drawer.

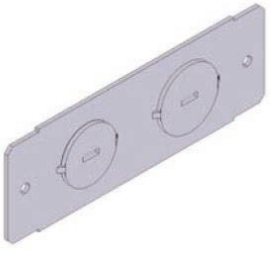


**Straight Cable Entry Plate PG13,5/PG16:**

Straight cable entry plates allow to bring the cable to drawer by 90 degrees angle. This part is mounting by 2 screws on back side of drawer.

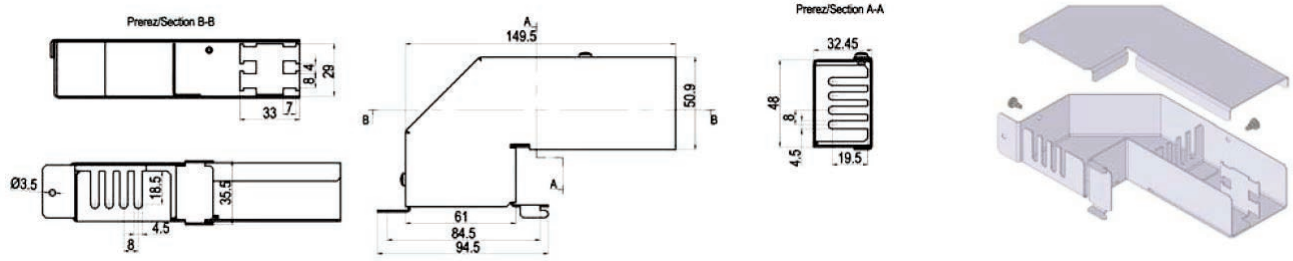


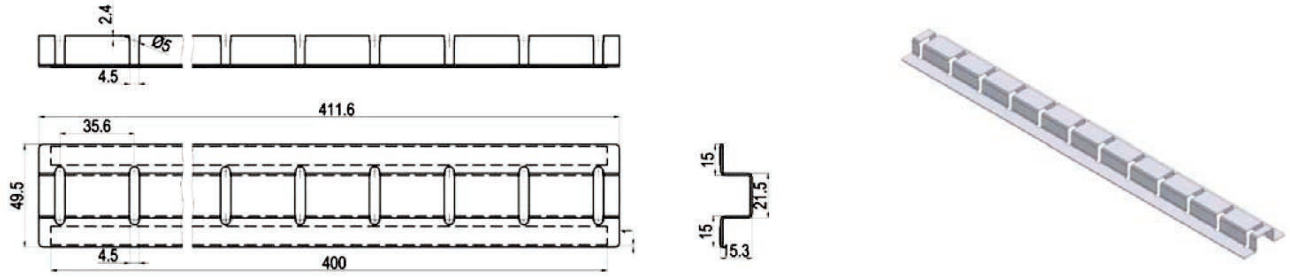
## Optical Distribution System (OPDISYS®)

# OPDISYS® compact - Fiber modules

**Loose tube divider:**
Loose tube divider is one of the cable management oportunities inside drawer. Devider being mounted in drawer by doublesided tape.




**Protection tube organizer:**
Protection tube organizer is very useful for manage protection tubes of fibers inside of drawers. Organizer being mounted in drawer by double-sided tape. Protection tubes going to inside of drawer, where are fixing in protection tube organizer.




## OPDISYS® compact - Dimensions & Capacity

| | 1HU Carrier | 3HU Carrier | 4HU Carrier (open) | 4HU Carrier (closed) |
|---|---|---|---|---|
| Carrier depth | 275mm | 300mm | 300mm | 300mm |
| Carrier width | 483mm (19“) | 483mm (19“) | 483mm (19“) | 483mm (19“) |
| Carrier height | 1HU | 3HU | 4HU | 4HU |
| Max. amount of modules | 3 | 12 | 12 | 12 |
| Max. amount of ports | 36 | 288 | 288 | 288 |

## Scope of supply

Each OPDISYS® compact 1HU Carrier consists of:
1 pc. OPDISYS® compact Carrier body
6 pcs. Plastic guidance rails (pre-assembled to the body)
1 set Fixation screws M6
4 pcs. Front patch cable support clamps (for horizontal patchocord guidance)

Each OPDISYS® compact 3HU Carrier consists of:
1 pc. OPDISYS® compact Carrier body
24 pcs. Plastic guidance rails (pre-assembled to the body)
1 set Fixation screws M6
1 pc. Back cover (in case of closed version)

Each OPDISYS® compact 4HU Carrier consists of:
1 pc. OPDISYS® compact Carrier body with integrated OPDISYS® compact Extension/Universal Drawer
1 pc. Simple or advanced Management Bar (upon order, preassembled to the OPDISYS® compact Extension/Universal Drawer)
24 pcs. Plastic guidance rails (pre-assembled to the body)
1 set Fixation screws M6
1 pc. Back cover (in case of closed version)

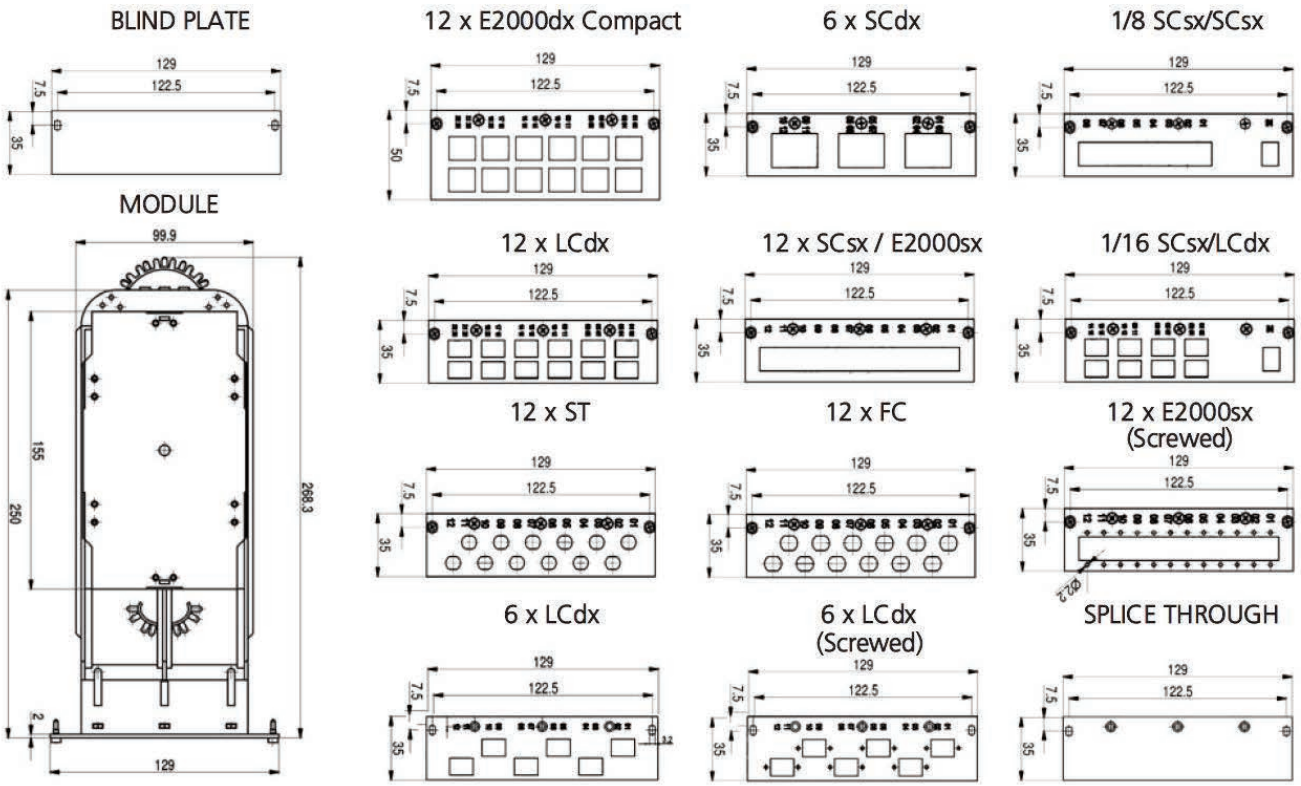
# OPDISYS® compact - Fiber modules

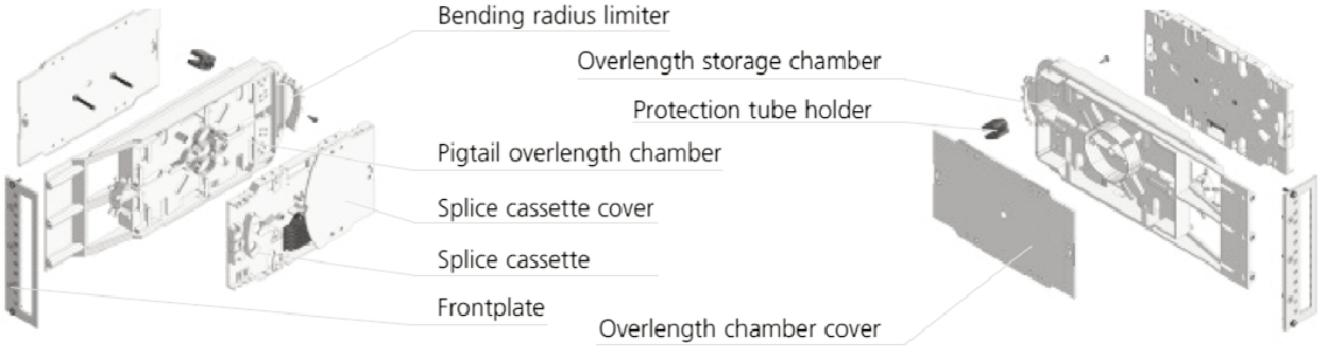
## Product description - OPDISYS® compact - Module

The OPDISYS® compact Module is the key component of a OPDISYS® compact system. A compact module has a height of 100mm which is defined by the eurocard standard. We offer various types of compact Modules, preassembled with all common types of adapters such as SC, LC, ST, FC and E2000 including appropriate pigtails. Furthermore, it allows you to install an MTP® fanout kit and mount a MTP adapter on the backside of the compact Module. A OPDISYS® compact Module consists of a exchangeable frontplate, made of brushed aluminium, the plastic body and an splice cassette. One side the OPDISYS® compact Module body has an integrated incoming cable subtube overlength storage chamber with protection tube fixation element and on the other side it has an overlength storage chamber for pigtails below. On front side there is an integrated bending radius limiter which ensures a proper guidance of pigtails from Pigtails overlength storage chamber to a splice cassette and on the back side there is an integrated banding radius limiter which ensures a proper guidance of a cable's subtube from the overlength storage chamber to a splice cassette.

## Technical specifications

| | |
|---|---|
| Frontplate material | Anodize oxide brushed aluminium |
| Body colour | RAL 9001 (Cream white) |
| Body material | PC/ABS blend |
| Flammability | UL 94V-0 |



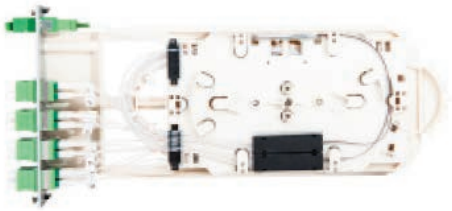
# OPDISYS® compact - Fiber modules

## OPDISYS® compact - Splitter and MPO® integration

**OPDISYS® compact Splitter Module**

Different types of Splitter compact Modules are available in order to integrate a PLC splitter into a OPDISYS® compact Module. It is possible to integrate all types of splitters starting from 1:4 up to 1:16.

The Splitter compact Module consists of a conventional OPDISYS® compact Module with a special front plate designed for splitter usage. We offer various preconfigured adapter configurations with integrated splitters, ready to use.

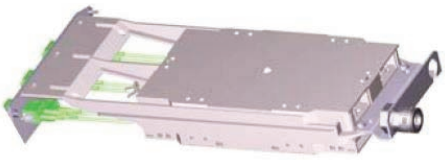


**OPDISYS® compact MPO® Module**

We offer also MPO/MTP® ready compact Modules. The MPO/MTP® ready compact Module consists of a conventional OPDISYS® compact Module with a special lid for MPO adapter accommodation on the backside of the compact Module body.

**Metal cable glands holder for 2xPG7 or 2xPG9**

Additional metal plate for 2xPG7 or 2xPG9 glands fixation on module.
Metal cable glands holder can be offered with mouting on OPDISYS® compact Module or we offer only separately item without mounting.



**Designation paper holder set for frontplates**

We offer simply additionally labelling solutions. The main advantage of this set is possible to marked with own identification values. This set can be offered with mounting on OPDISYS® compact Module or we offer only separately item without mounting.

## Scope of supply

Each OPDISYS® compact Module is equipped with:
- Frontplate
- Splice cassette
- Splice protection holder (for shrink or crimp splice protection sleeve - upon customer's request)
- Cover for splice cassette and cable overlength chamber
- Fixation screws
- Inserted adapters and pigtails
- Protection tube holder

# OPDISYS® compact - Multi tube cable divider

## Field of Application

The Multi Tube Cable Divider is used to divide each core of a multi core cable into separate protection tubes. Originally designed as Cable Divider for the OPDISYS® compact system, it can actually be used for any patching system requiring a separate cable outlet for each loose tube of tight buffered fiber.

## Features

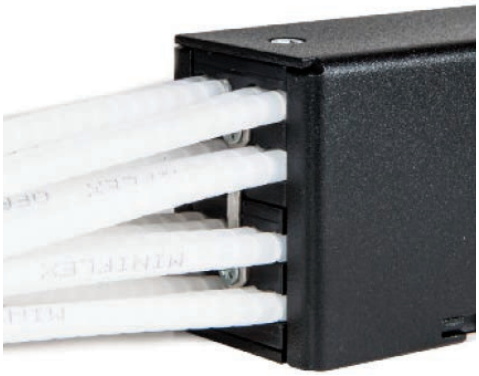
- Robust steel housing
- Easy installation
- Cable entry with or without cable gland
- Strength member anchoring point
- Integrated 2xM6 nuts
- Output capacity: 8 to 72 protection tubes

## Product description - OPDISYS® compact - Multi Tube Cable Divider

The Multi Tube Cable Divider is designed for indoor use. It is made of powder coated steel and consists of a body, a protection tube fixation element, a cable entry hole for PG cable glands and a cover. Assembly is done with screws. A cable strength member clamp allows you to fix both, a strain relief element (e.g. Aramid yarn) and a central strength member (if integrated) of the incoming fiber cable. The incoming fiber cable can be fixed with a cable gland or simply with cable ties. The Multi Tube Cable Divider disposes of two integrated M6 fixation nuts for mounting the Multi Tube Divider into a rack. Different types of Multi Tube Cable Dividers are available, starting from a minimum output of 8 protection tubes up to a maximum output of 72 protection tubes and a range of cable glands form PG13.5 to PG72.

## Technical specifications

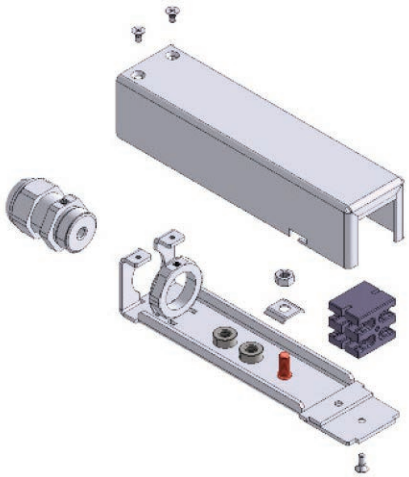
| | |
|---|---|
| Material | Powder coated steel |
| Colour | Black (RAL 9005) |
| Flammability | UL 94V-0 |

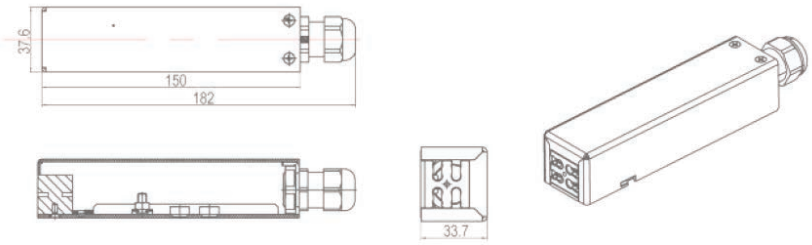


# OPDISYS® compact - Multi tube cable divider

## 1 to 8 divider with PG13.5 cable gland

The Multi Tube Cable Divider 1/8-13 is a small and compact cable divider for fiber optic cables. It accommodates one PG13.5 cable gland for the incoming multi tube cable. One protection tube fixing element is used to attach the fiber protection tubes for the outgoing cables. The maximum capacity of the 1 to 8 divider is 8 outgoing fiber protection tubes.



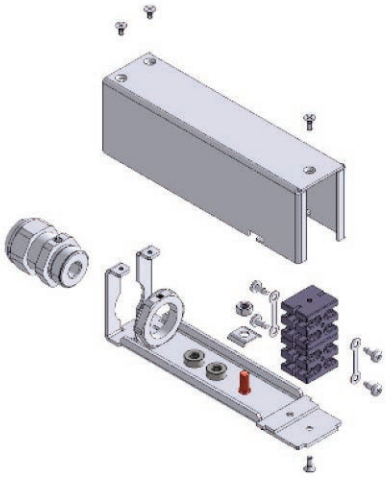


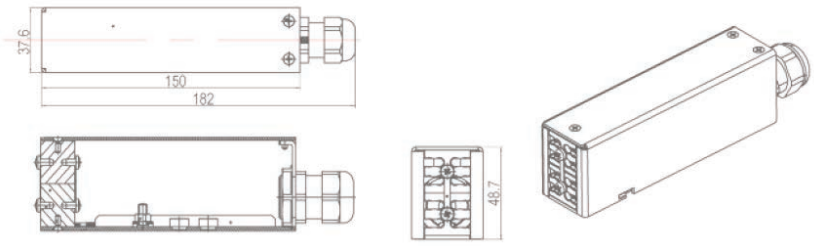

### Technical specifications

| | |
|---|---|
| Cable entry | PG13.5 cable gland (ø 6.5 mm - ø 12.0 mm) |
| No. of outgoing tubes | 8 |
| Dimensions | 38x34x150 mm / 38x34x182 mm (WxHxL) |
| Weight | 0.34 kgs (with cable gland) |

## 1 to 16 divider with PG16 cable gland

The Multi Tube Cable Divider 1/16-16 is a small and compact cable divider for fiber optic cables. It accommodates one PG16 cable gland for the incoming multi tube cable. Two protection tube fixing elements are used to attach the fiber protection tubes for the outgoing cables. The maximum capacity of the 1 to 16 divider is 16 outgoing fiber protection tubes.





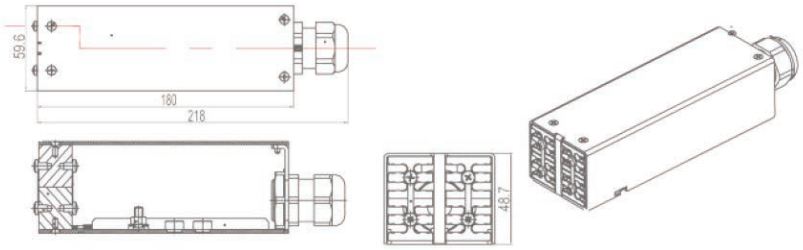

### Technical specifications

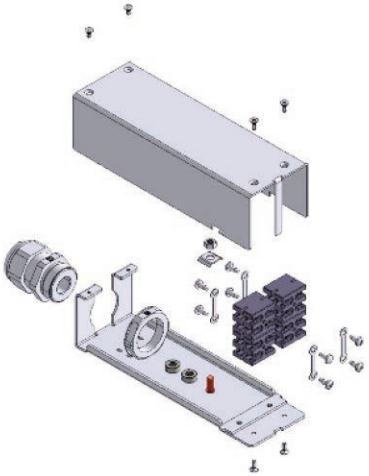
| | |
|---|---|
| Cable entry | PG16 cable gland (ø 9.0 mm - ø 14.0 mm) |
| No. of outgoing tubes | 16 |
| Dimensions | 38x49x150 mm / 38x49x184 mm (WxHxL) |
| Weight | 0.40 kgs (with cable gland) |

# OPDISYS® compact - Multi tube cable divider

## 1 to 32 divider with PG21 cable gland

The Multi Tube Cable Divider 1/32-21 is a compact cable divider for fiber optic cables. It accommodates one PG21 cable gland for the incoming multi tube cable. Four protection tube fixing elements (two of each are fixed one above in two columns) are used to attach the fiber protection tubes for the outgoing cables. The maximum capacity of the 1 to 32 divider is 32 outgoing fiber protection tubes.



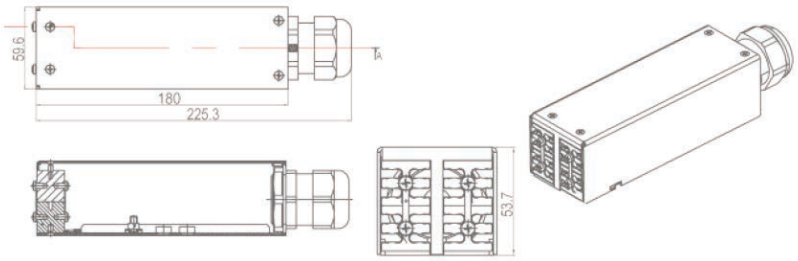



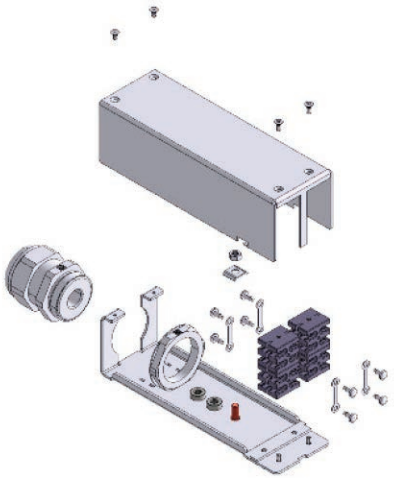
## Technical specifications

| | |
|---|---|
| Cable entry | PG21 cable gland (ø 13.0 mm - ø 18.0 mm) |
| No. of outgoing tubes | 32 |
| Dimensions | 60x49x180 mm / 60x49x218 mm (WxHxL) |
| Weight | 0.60 kgs (with cable gland) |

## 1 to 32 divider with PG29 cable gland

The Multi Tube Cable Divider 1/32-29 is a compact cable divider for fiber optic cables. It accommodates one PG29 cable gland for the incoming multi tube cable. Four protection tube fixing elements (two of each are fixed one above in two columns) are used to attach the fiber protection tubes for the outgoing cables. The maximum capacity of the 1 to 32 divider is 32 outgoing fiber protection tubes.



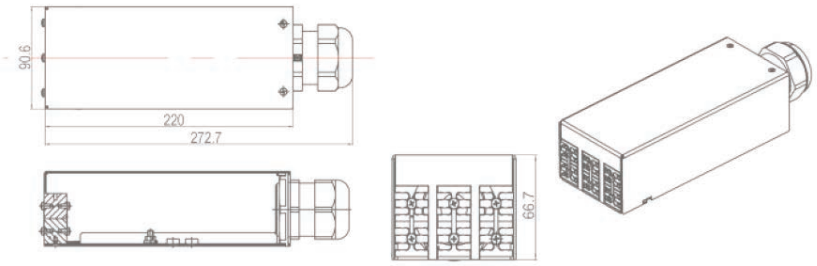
## Technical specifications

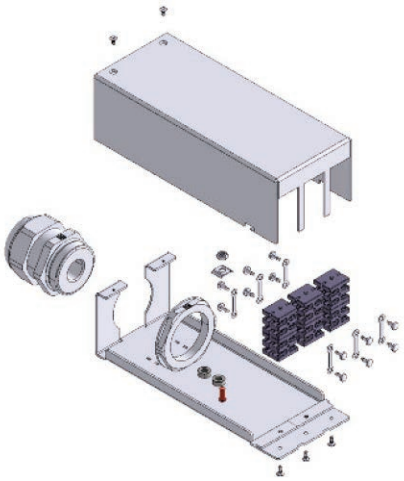
| | |
|---|---|
| Cable entry | PG29 cable gland (ø 14.0 mm - ø 25.0 mm) |
| No. of outgoing tubes | 32 |
| Dimensions | 60x54x180 mm / 60x54x225 mm (WxHxL) |
| Weight | 0.66 kgs (with cable gland) |

# OPDISYS® compact - Multi tube cable divider

## 1 to 48 divider with PG36 cable gland

The Multi Tube Cable Divider 1/48-36 is a high capacity cable divider for fiber optic cables. It accommodates one PG36 cable gland for the incoming multi tube cable. Six protection tube fixing elements (two of each are fixed one above in three columns) are used to attach the fiber protection tubes for the outgoing cables. The maximum capacity of the 1 to 48 divider is 48 outgoing fiber protection tubes.



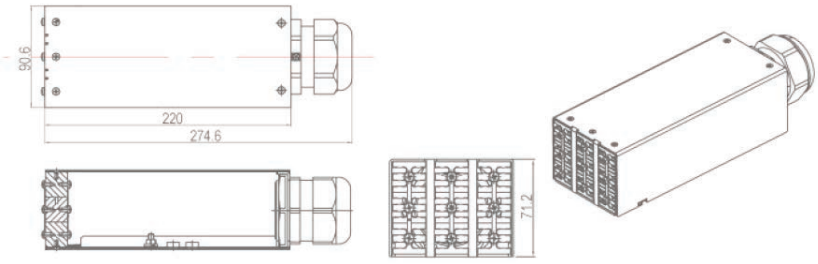



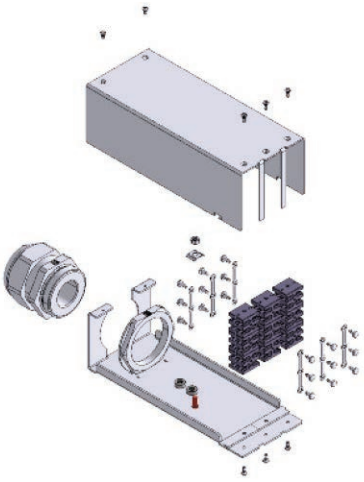
### Technical specifications

| | |
|---|---|
| Cable entry | PG36 cable gland (ø 24 mm - ø 32.0 mm) |
| No. of outgoing tubes | 48 |
| Dimensions | 91x67x220 mm / 91x67x273 mm (WxHxL) |
| Weight | 1.35 kgs (with cable gland) |

## 1 to 72 divider with PG42 cable gland

The Multi Tube Cable Divider 1/72-42 is a high capacity cable divider for fiber optic cables. It accommodates one PG42 cable gland for the incoming multi tube cable. Nine protection tube fixing elements (three of each are fixed one above in three columns) are used to attach the fiber protection tubes for the outgoing cables. The maximum capacity of the 1 to 72 divider is 72 outgoing fiber protection tubes.



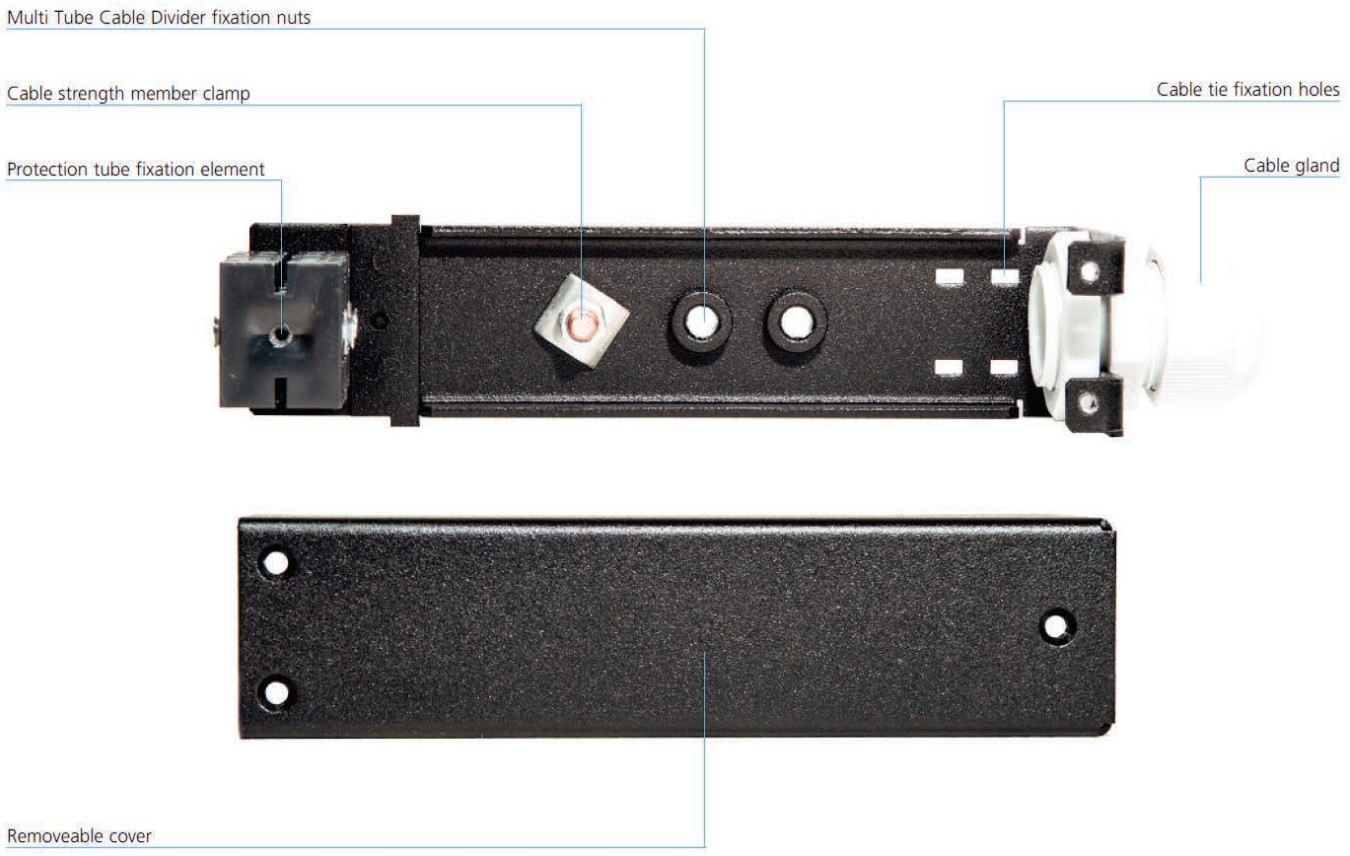



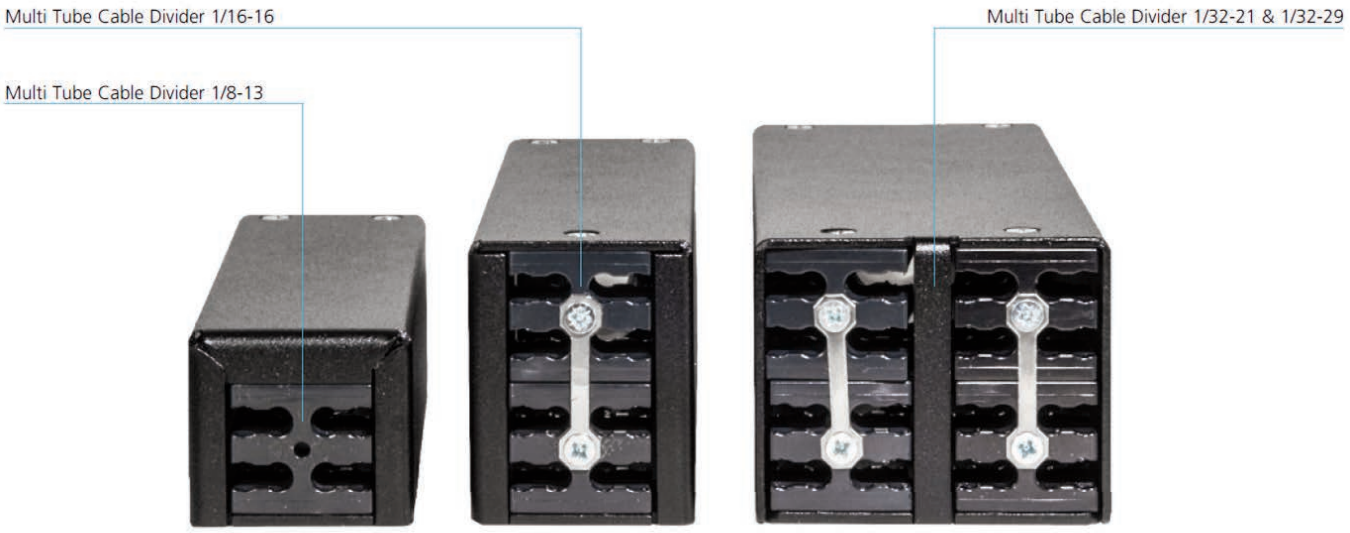
### Technical specifications

| | |
|---|---|
| Cable entry | PG42 cable gland (ø 32.0mm - ø 37.0mm) |
| No. of outgoing tubes | 72 |
| Dimensions | 91x72x220 mm / 91x72x275 mm (WxHxL) |
| Weight | 1.50 kgs (with cable gland) |

# OPDISYS® compact - Multi tube cable divider

## Multi Tube Cable Divider - Parts & components



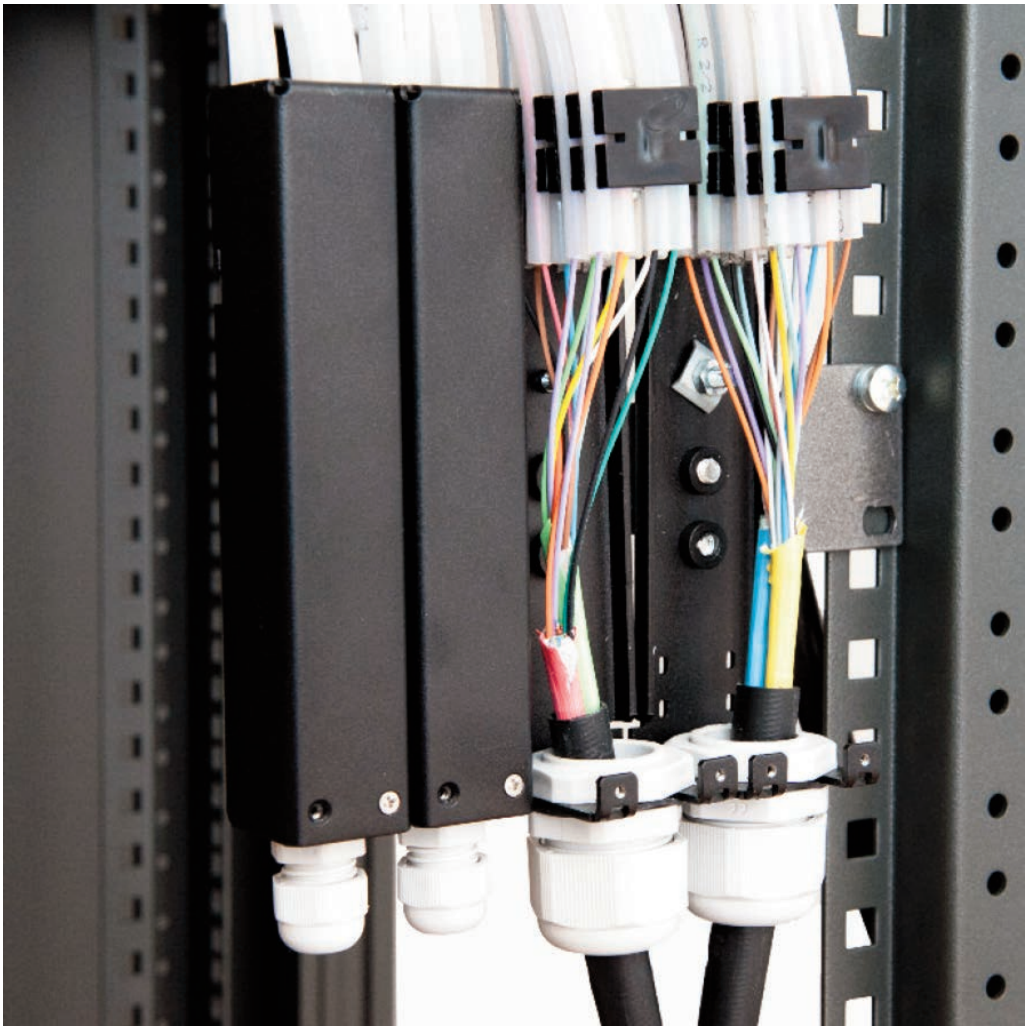




## Scope of Delivery

Each OPDISYS® compact Multi Tube Cable Divider gets delivered with:
- 1pc. Multi Tube Cable Divider body with anchoring point and 2xM6 fixation nuts
- 1pc. Removable cover
- 1-9pcs. Fiber protection tube fixation element
- 1set Fixation material

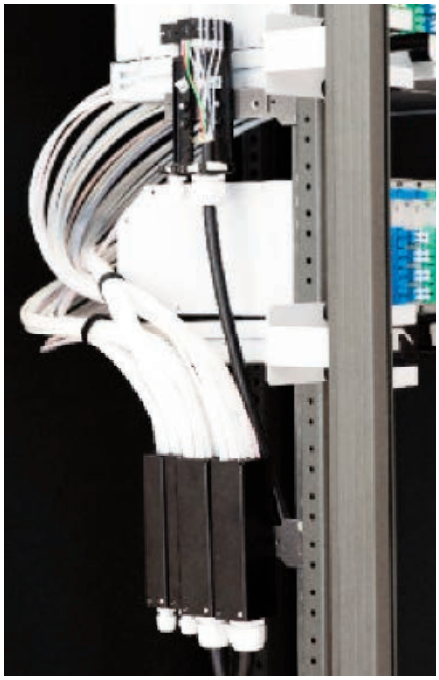
# OPDISYS® compact - Examples of installation

## OPDISYS® compact - Multi Tube Cable Divider - Examples of installation



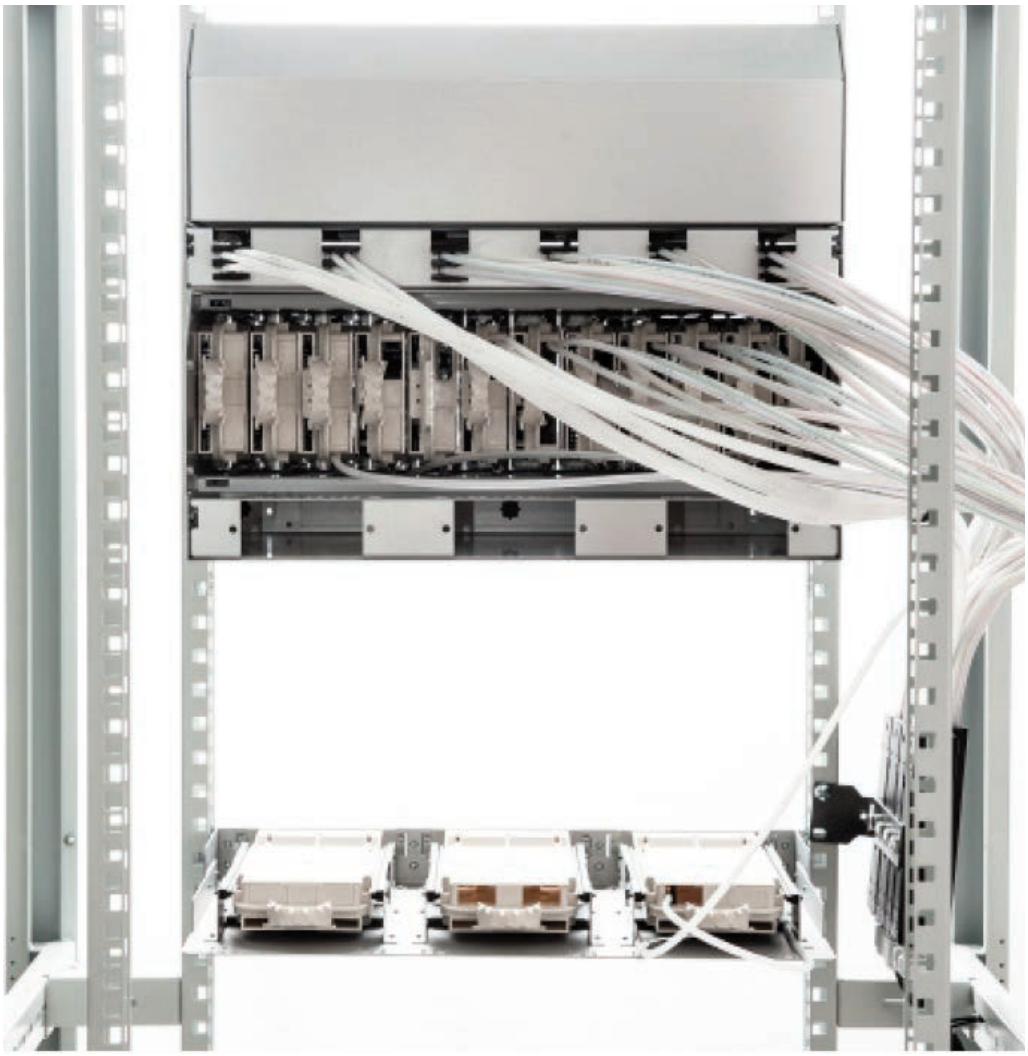
**Multi Tube Cable Divider (MTCD)**

The Multi Tube Cable Divider can be installed into the rack and provides a splitting of the subcables of an incoming cable. Furthermore, it provides a fixation point for the subcable protection tubes which lead to the OPDISYS® compact Carrier.



# OPDISYS® compact - Examples of installation

## OPDISYS® compact - Examples of installation



**OPDISYS® compact - Rack-mounting (rear side)**
The picture shows a OPDISYS® compact system with a 4HU rack (with integrated drawer) and an underlying open 3HU OPDISYS® compact management system with bar and a 1HU OPDISYS® compact unit at the bottom.

**OPDISYS® compact with drawer**
The 4HU OPDISYS® compact carrier has an integrated drawer which cannot be detached. In this example it is equipped with a simple Management Bar for horizontal patchcord guidance.

# Termination System for 19“ Technology

# Fiber Optic Splice Box - PENGG solution

## Fiber Optic Splice Box - PENGG solution

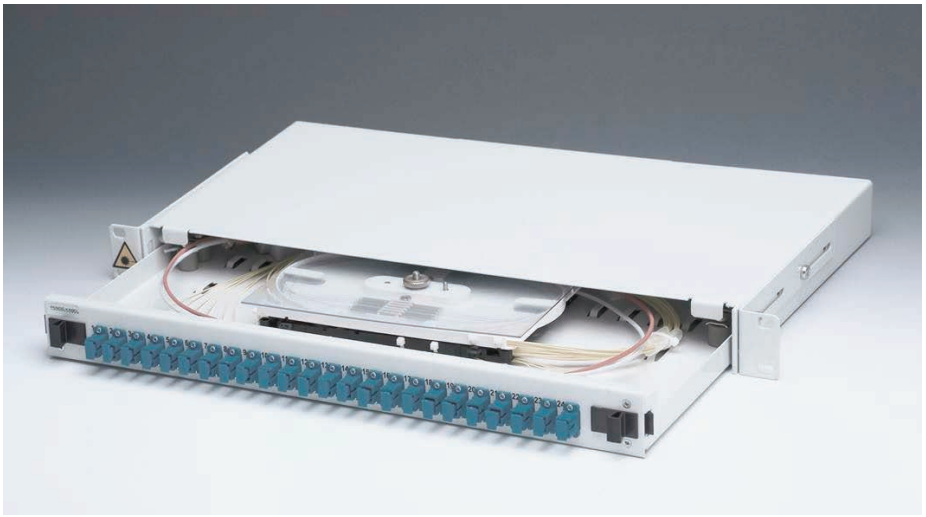
**Description**

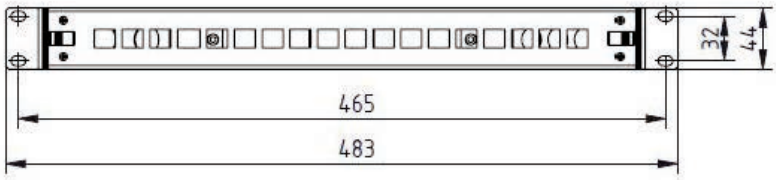
- Designed to storage fiber optic cables and splicing cassettes
- Functional and easy to install, featured by highest flexibility
- Intended for installing in 19” rack system
- Enable fiber optic termination and distribution

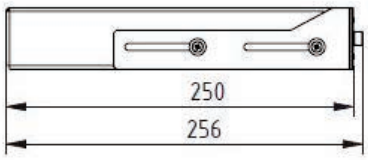
This Fiber Optic Splice Box can be equipped according your requirements - mounted only with adapters and also fully equipped with adapters and pigtails.

**Features**

- Model offered: Resetable and sliding
- Available heights: 1U and 2U
- Installation depth: 250 mm
- Material: steel
- Powder coated
- Colour: RAL 7024 (Graphite Grey) or RAL 7035 (Light Grey) - other colours optionally on request
- No. of Connectors / Openings: 2, 12, 24, 36, 48, 72 or 96
- Universal splice cassette holding system: fixed & booklet mounting option
- Equipped with removable splice cassette holder and anti-twist system

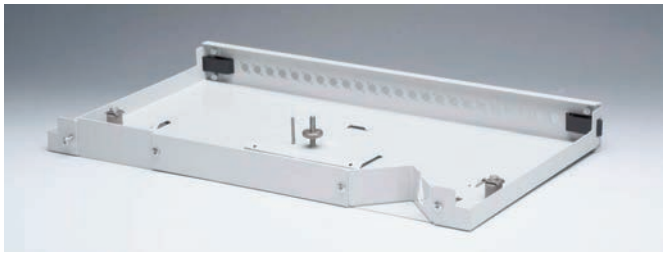





**Front View**

**Rear View**



**Rechangeable Front Plates**

- SC/E-2000, SC Duplex, ST, FC, FC-ST and LC
- 45°-version for 24xSC/E-2000 and 24xLC
- 2x latches snap in

**Rechangeable Cable Entry Plates**

Straight (PG), angular (PG), without, blind closed

**19” and ETSI**

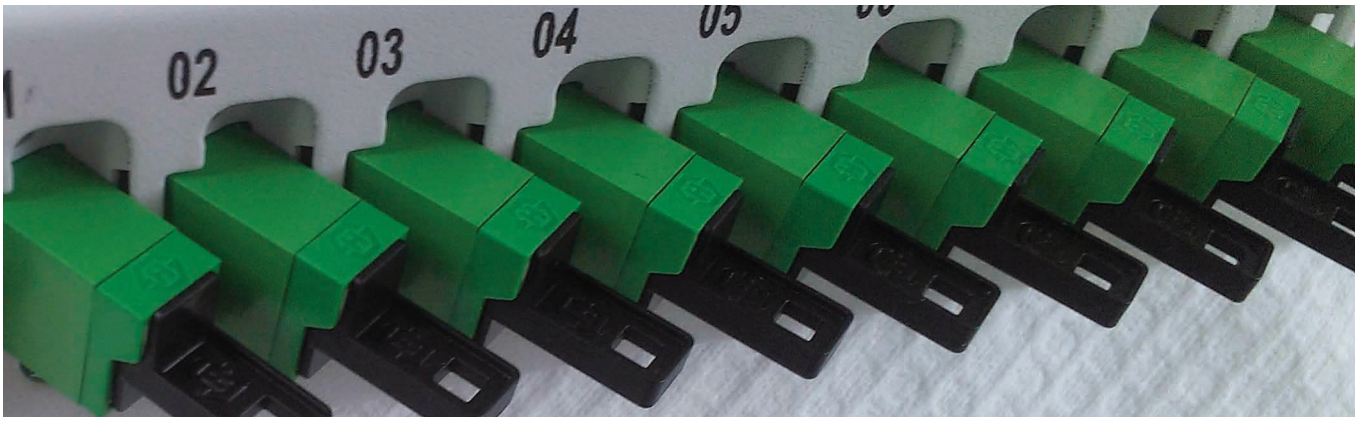
for depth adjustment (stepless)

# Fiber Optic Splice Box - PENGG solution

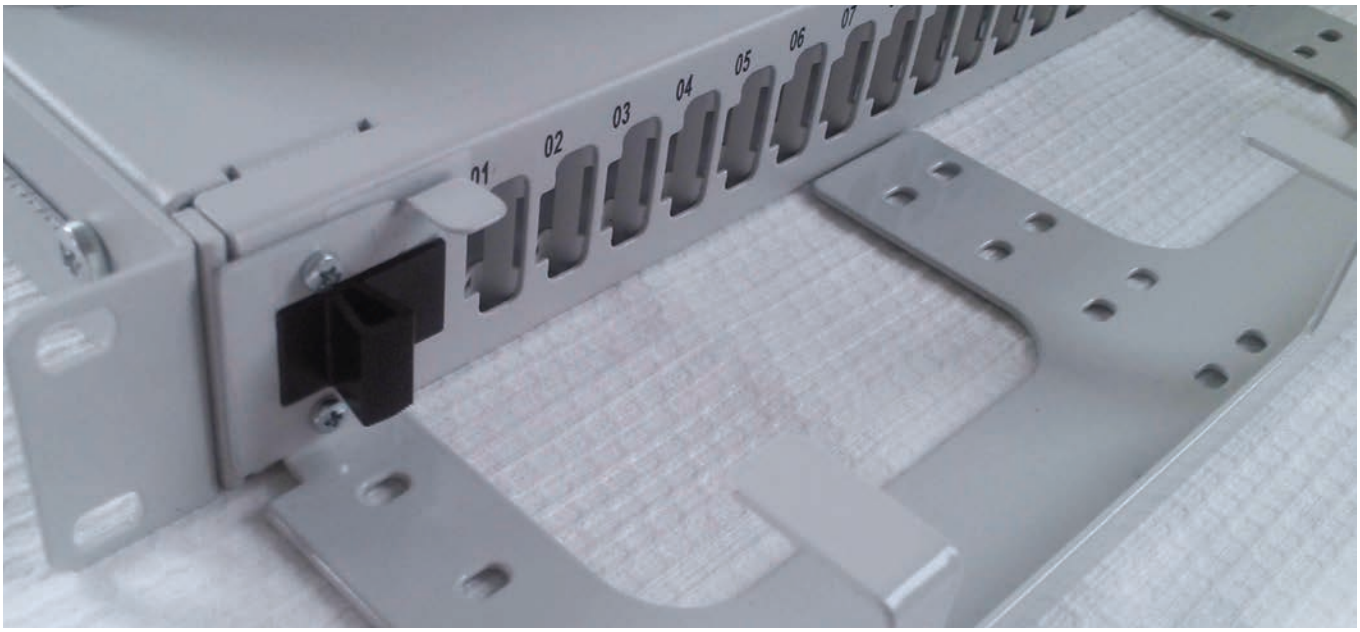


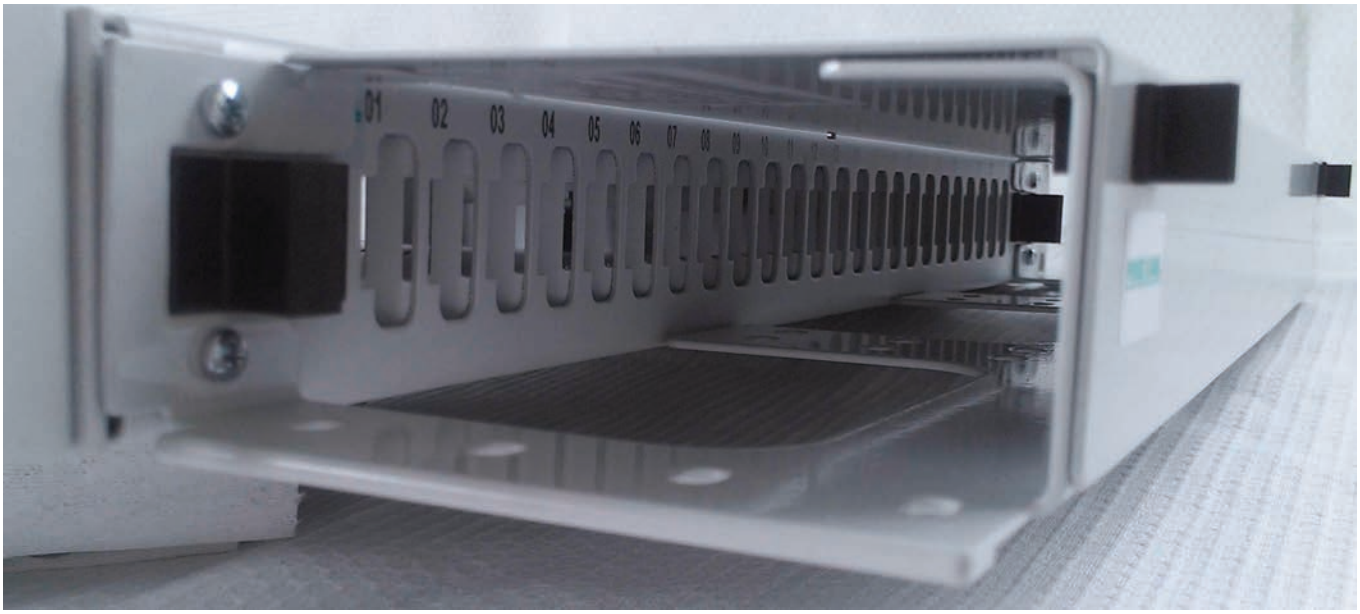
## Fiber Optic Splice Box - PENGG solution

**Assembled Front Pate in 45°-version**



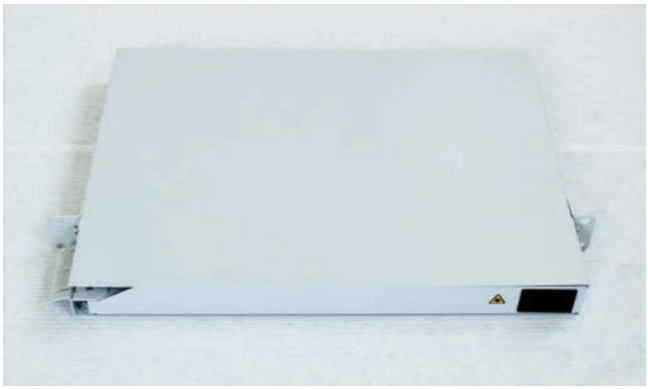

**Front Cable Management System (in open or closed version)**

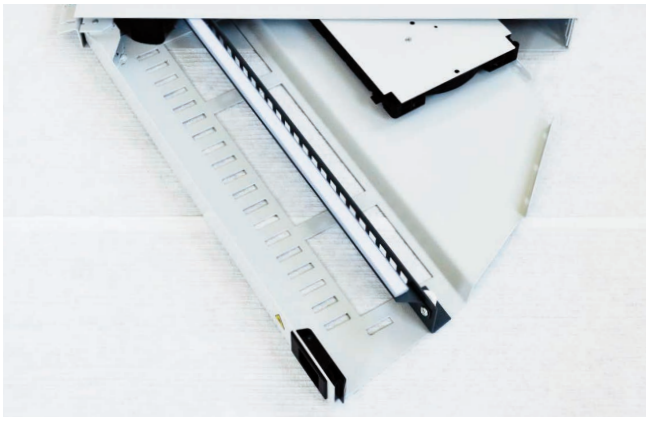


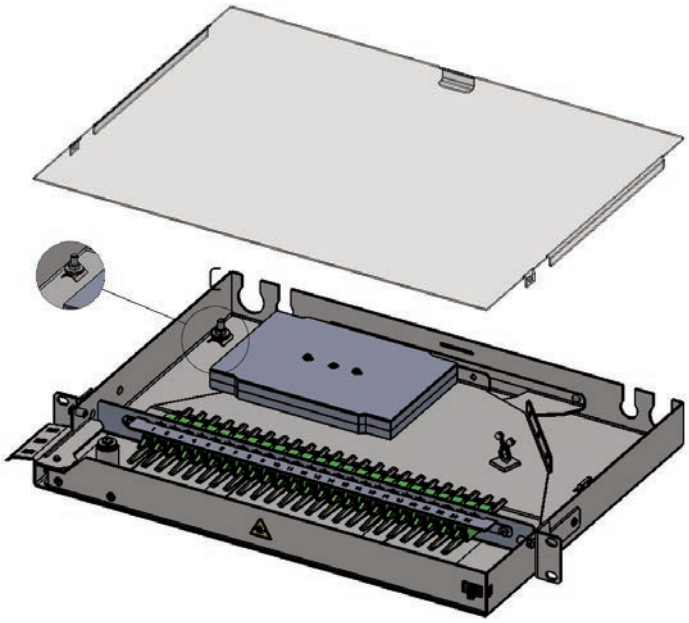



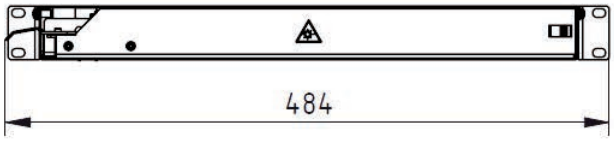
# Fiber Optic Splice Box - traversable

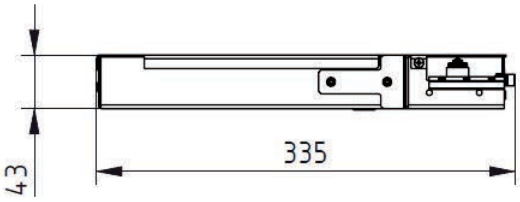
## Fiber Optic Splice Box - traversable










**Description**

- Designed to storage fiber optic cables and splicing cassettes
- Functional and easy to install, featured by highest flexibility
- Intended for installing in 19” rack system
- Enable fiber optic termination and distribution

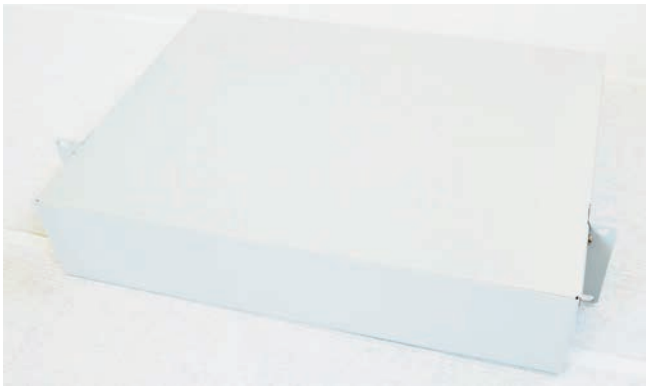
This Fiber Optic Splice Box can be equipped according your requirements - mounted only with adapters and also fully equipped with adapters and pigtails.

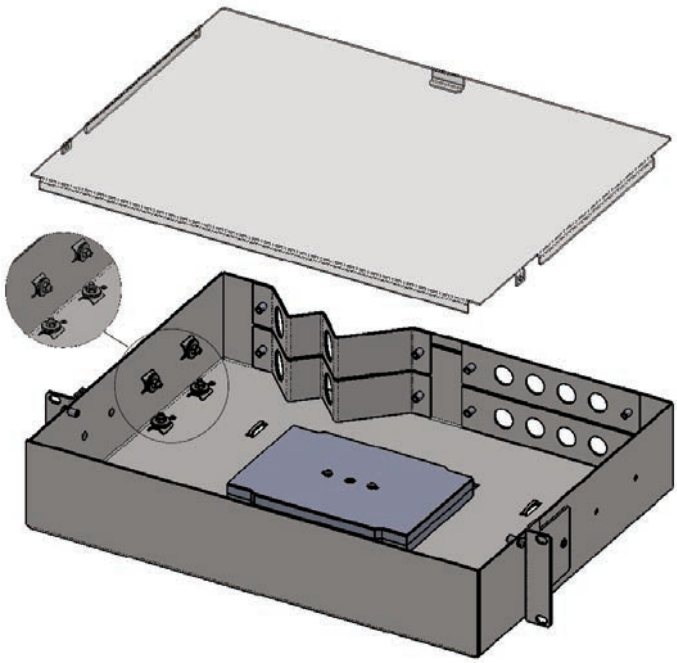
**Features**

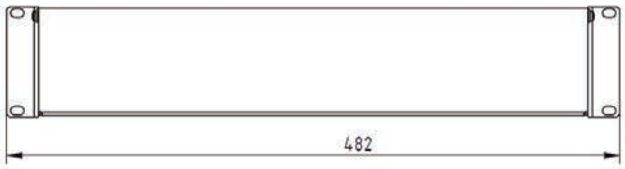
- High mechanical protection of the patch area inside thanks to the traversable adapter plate with closed front design.
- Suitable for cables with large number of fibers, in combination with the management box and connection tubes, only the loose tube of the cable is inserted into the splice box. For direct cable insertion a slanted cable entry and a installation point for cable strain relief is delivered.
- Available heights: 1HU
- Material: steel, powder coated or V2A on request
- Powder coated
- Colour: RAL 7035 (Light Grey) - other colours optionally on request
- No. of connectors: 24 (48 LC)
- No. of splice cassettes: 2 (removable)

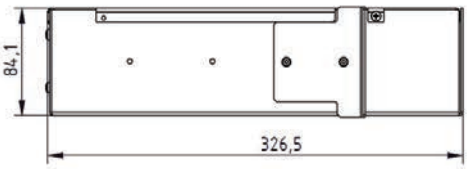
# Fiber Optic Management Box

## Fiber Optic Management Box








**Description**

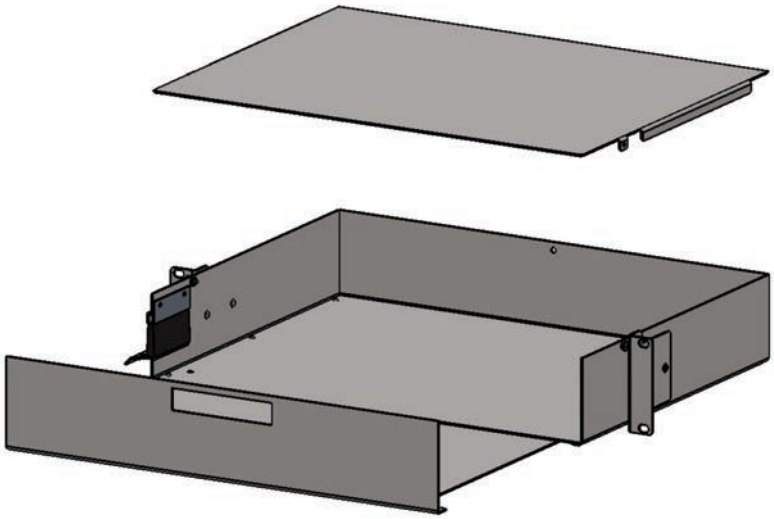
- Designed to storage fiber optic cables and splicing cassettes
- Functional and easy to install, featured by highest flexibility
- Intended for installing in 19” rack system

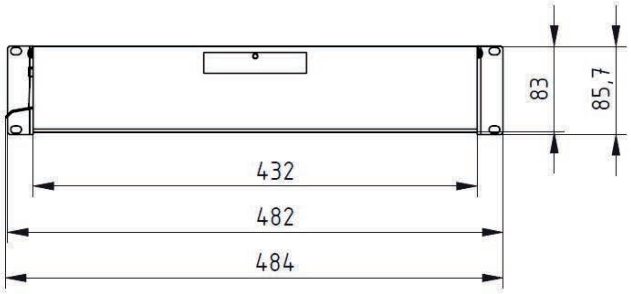
**Features**

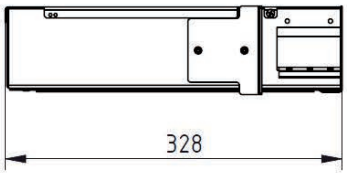
- The Fiber Optic Management Box is designed for distributing and storing multi-fiber loose tubes of a fiber optic cable with a large number of fibers to several patch panels.
- To cover the possibility for several fiber management structures, slice cassettes can be integrated in the management box for jointing cable fibers together.
- Connection tubes are used for mechanical protection of the loose tubes which are routed to the patch panels.
- Slanted cable entries and installation points for cable strain relief
- Available heights: 1HU, 2HU
- Capacity: 1HU - 2 cables, 2HU - 4 cables
- Material: steel, powder coated or V2A on request

# Fiber Optic Patch Cable Storage Box - drawer design

## Fiber Optic Patch Cable Storage Box - drawer design




**Description**

- Designed to storage and protect reserve + excess length of fiber optic cables
- Functional and easy to install, featured by highest flexibility
- Intended for installing in 19” rack system

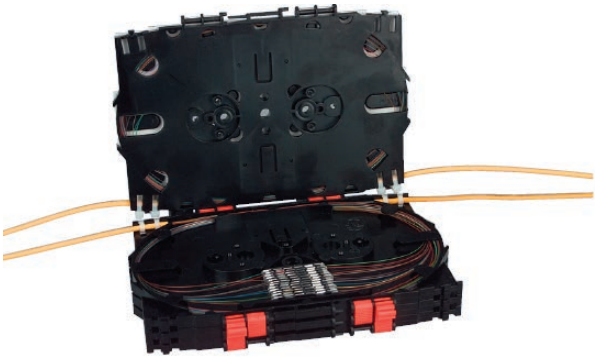
**Features**

- High mechanical protection through the closed design
- Easy access by drawer system
- Patch cable entry with dust-protection brush strip
- Available heights: 1HU, 2HU
- Material: steel, powder coated or V2A on request

# Splice Cassettes

# Splice Cassettes ...-SK/120.. and ...-SK/121..

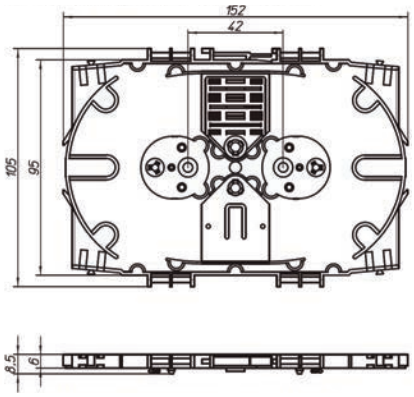
## Splice Cassette ...-SK/120..



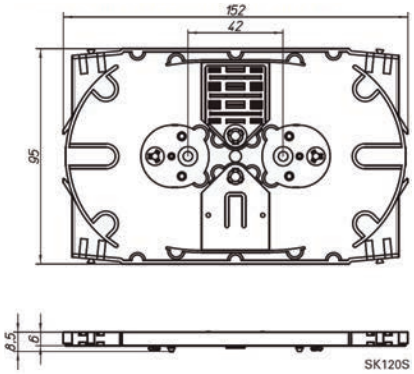
Stripping dimensions (cm):

| Windings | Min. | Max. |
|---|---|---|
| 1.5 | 59 | 68 |
| 2 | 76 | 86 |
| 2.5 | 89 | 105 |
| 3 | 108 | 125 |
| 3.5 | 124 | 144 |

With the possibility for mounting the hinge:




Without the possibility for mounting the hinge:



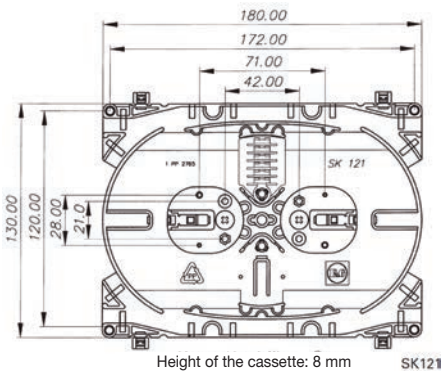

- Splice storage for all kinds of optical fibres
- Splice cassettes can be piled one on top of the other
- With or without the possibility for mounting the hinge
- Installation of different splice protection holders is possible through the snap-on system
- Laying in an 8-shaped loop is possible
- Bending radius: >30 mm
- Capacity
  - Splices: 16 splice protection tubes Ø 2.5 mm (heat-shrinkable); 24 sandwich splice protectors (sandwich)
  - Splice protection holders: 2x ...-SRH8 or 2x ...-SWH12
- Reserve fibre length approx. 40 m
- Material: Polystyrene
- Weight: 36 g
- Scope of delivery: 1 Splice cassette (excl. splice protection holder, excl. hinge)

Note: Is not suitable for splice protection holder with 12 splice protection tubes (heat-shrink).

## Splice Cassette ...-SK/121..

Stripping dimensions (cm):

| Windings | Min. | Max. |
|---|---|---|
| 1 | 37 | 49 |
| 1.5 | 54 | 73 |
| 2 | 69 | 95 |
| 2.5 | 86 | 118 |
| 3 | 104 | 144 |
| 3.5 | 116 | 164 |



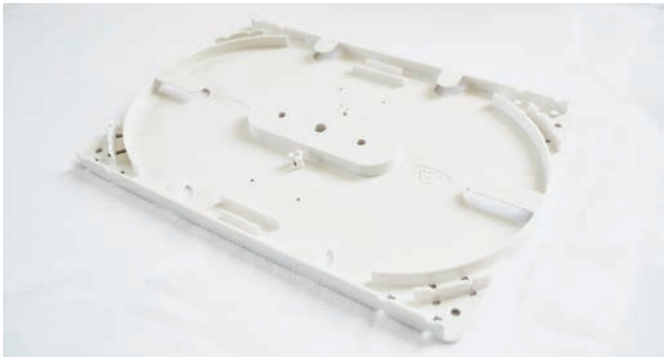

Height of the cassette: 8 mm

SK121

- Splice storage for all kinds of optical fibres
- Splice cassettes can be piled one on top of the other, so they can be “leafed through” like a book
- Mounting of different splice protection holders is possible through the snap-on system
- Laying in an 8-shaped loop is possible
- Bending radius: >35 mm
- Capacity
  - Splices: 16 splice protection tubes Ø 2.5 mm (heat-shrinkable); 24 sandwich splice protectors (sandwich)
  - Splice protection holders: 2x ...-SRH8, 2x ...SRH12 or 2x ...-SWH12
- Reserve fibre length approx. 80 m
- Material: Polypropylene
- Weight: 62 g
- Scope of delivery: 1 Splice cassette (excl. splice protection holder)

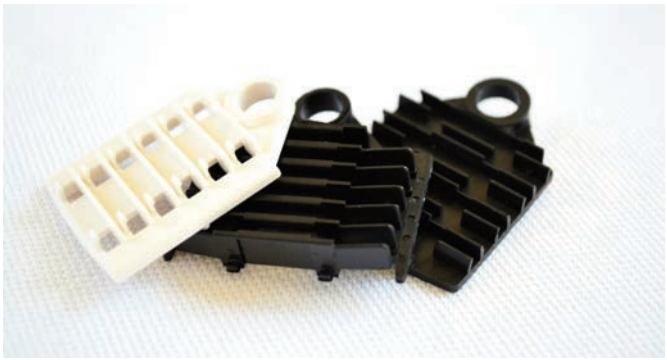
# Splice Cassette PENGG 2000, Accessories

## Splice Cassette PENGG 2000



- Splice storage for all kinds of optical fibres
- Mounting of different splice protection holders is possible through the snap-on system
- Bending radius: >35 mm
- Capacity splices: 24 max.
- Accessory: transparent cover

## Splice Protection Holder



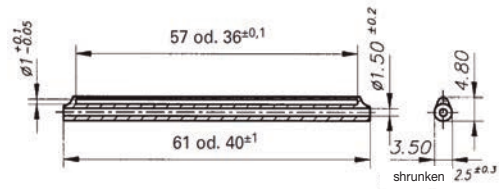
- The splice protection holder is designed to hold the splice protectors in the splice cassette.
- Splice protection holder
  ...-SRH6: for 6 splice protection tubes Ø 2,5 - 3,6
  ...-SRH8: for 8 splice protection tubes Ø 2,5
  ...-SRH12: for 12 splice protection tubes Ø 2,5
  ...-SRW12: for 12 sandwich splice protectors
- Pressing the holder snaps it into the splice cassette

## Splice Protection Tube Ø 2.5mm, DNW-SR61/2,5/00 or LWL-SR40/2,5/00

- A splice protection tube protects the splicing point (bare fibre) against mechanical damage and moisture
- Design: Transparent heat-shrinkable sleeve with metal pin inside and hot-melt adhesive
- Installation in splice protection holder DNW-SRH8, LWL-SRH8/M or LWL-SK223/SR..
- Technical specifications:

| | |
|---|---|
| Shrinking temp. of sleeve | approx. 115°C to 125°C |
| Melting point of adhesive | approx. 75°C to 85°C |
| Hardness of the metal pin | > 400 HV |
| Dimensions after shrinking | Ø 2.5 x 61 mm,<br>Ø 2.5 x 40 mm |

- Scope of delivery: 1 Splice protection tube



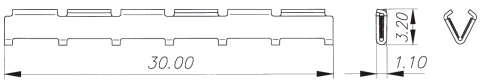

## Sandwich Splice Protector, DNW-SW32

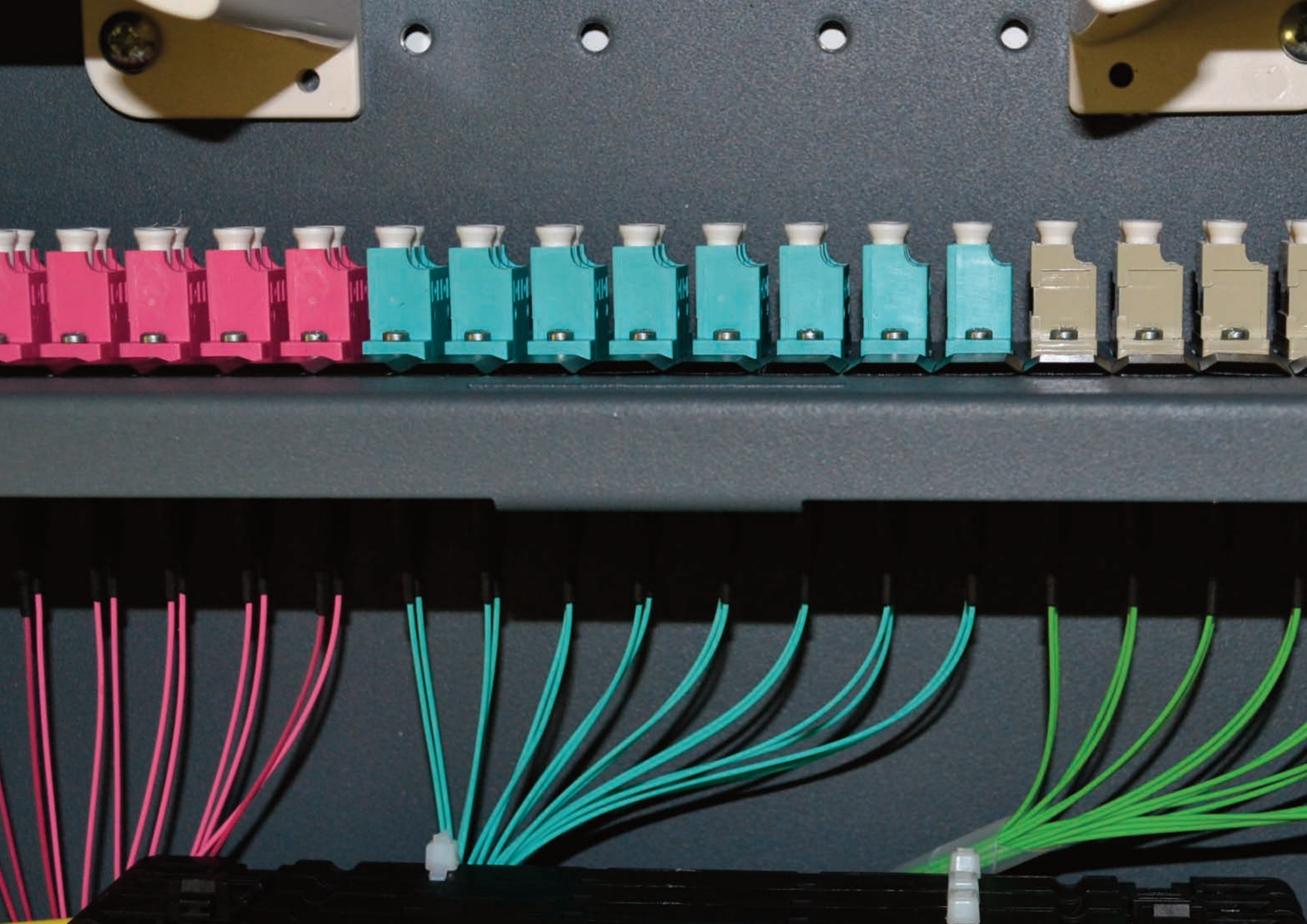
- A sandwich splice protector protects the splicing point (bare fibre) from mechanical damage and moisture
- Design: V-shaped metal support with permanently elastic sealing
- Installation in splice protection holder DNW-SWH12, LWL-SWH12/M or LWL-SK223/SW..
- Technical specifications:

| | |
|---|---|
| Max. diameter of the fibre with a primary coating: | 250 µm |
| Storage temperature | -30°C to +60°C |
| Processing temperature | -5°C to +45°C |

- Scope of delivery: 1 Sandwich splice protector

Shown open

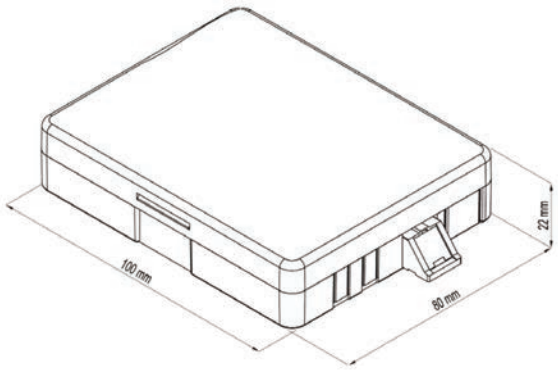




# Termination Boxes and Wall Outlets

# Wall outlet mini and standard

## Wall outlet mini

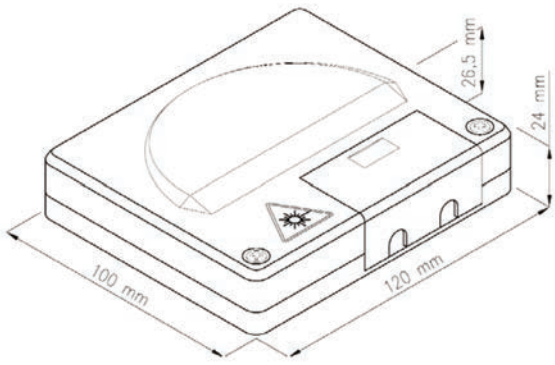



- Small termination box, especially suitable where space is limited
- Suitable for indoor wall-mounting in living rooms
- Traversable splice storage frame with splice protection holders

| | |
|---|---|
| • Entries | for one FTTH mini cable |
| • Splice protection holder | integrated |
| • Adapters | 2x SC, SC/APC, E2000, LC duplex, LC/APC duplex |
| • Number of fibres terminated | 2 (4 with LC-adapters) |
| • Material | High heat and high impact resistance Polystyrene (PS454C), RAL 9010 |
| • Flammability | UL94 HB |
| • Weight | Approx. 60 g |

- Scope of delivery
  1 wall outlet box, 1 splice storage frame, 1 copy of Instructions for Installation, 2 cable tie wraps, screws

## Wall outlet standard




- Small termination box, especially suitable where space is limited
- Suitable for indoor wall-mounting in living rooms
- Traversable splice storage frame with splice protection holders
- Connectors are protected in the housing

| | |
|---|---|
| • Entries | for one FTTH mini cable |
| • Splice protection holder | integrated |
| • Adapters | 2x SC, SC/APC, E2000, LC duplex, LC/APC duplex |
| • Number of fibres terminated | 2 (4 with LC-adapters) |
| • Material | High heat and high impact resistance Polystyrene (PS454C), RAL 9010 |
| • Flammability | UL94 HB |
| • Weight | Approx. 95 g |

- Scope of delivery
  1 wall outlet box, 1 splice storage frame, 1 copy of Instructions for Installation, 2 cable tie wraps, screws

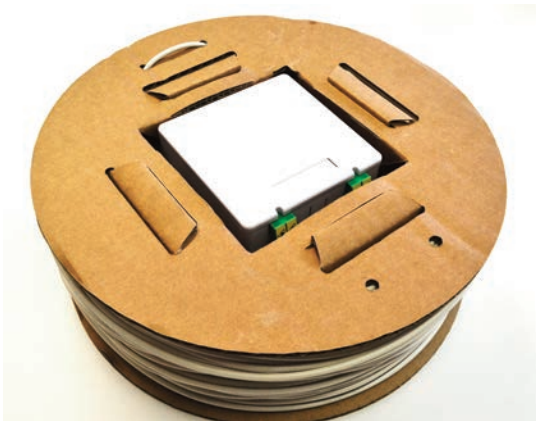
# FTTH Installation Box and Enclosure OM10-4..

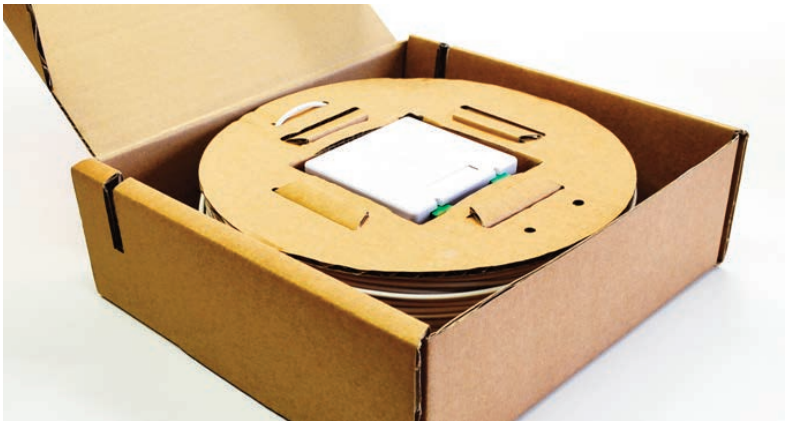
## FTTH Installation box

Our convenient FTTH installation box gives you everything you need for a quick installation:

- Installation cable rolled up on an inside moving cardboard reel (customized length)
- Wall outlet - pre-assembled according to your needs

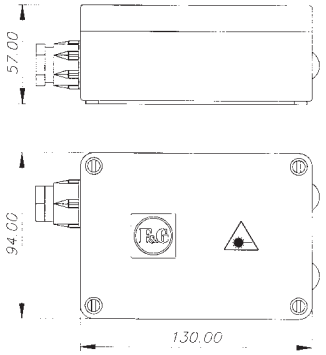
For example:
• I-VQ(ZN)H 4E9/125 FTTH in house cable preassembled with 2 LC/APC 8° connectors





## Distribution Enclosure OM10-4..






- The distribution enclosure serves as a terminal for fibre optic cables routed to connectors and for storing splices
- Small termination box, especially suitable where space is limited
- Suitable for indoor wall-mounting and installation in moist rooms
- Pull-out splice storage frame with splice protection holders
- Installation point for strain relief element (Kevlar)
- Provides sufficient space for multi-fibre loose tube reserves under the splice storage frame

| | |
|---|---|
| • Entries | 1 PG13 cable ø 6-12 mm |
| • Splice protection holder | 1 SRH8 or 1 SWH12 |
| • Adapters | 4x FC/PC, ST, SC simplex, E2000 or LC duplex |
| • Degree of protection of the empty enclosure | IP64 |
| • Material | |
| Enclosure | Polystyrene, similar to RAL 7035 |
| Splice storage frame | Powder-coated aluminium, RAL 7035 |
| PG Cable entry gland | Plastic |
| • Weight | Approx. 0.7 kg |
| • Scope of delivery | 1 Enclosure, 1 splice storage frame, 1 copy of Instructions for Installation, 1 PG13 cable gland, 2 cable tie wraps, 2 PC121 pigtail clips, 1 SRH8/SWH12 splice protection holder |

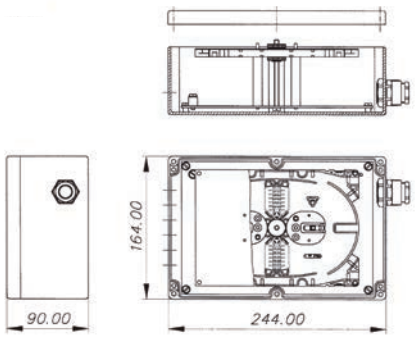
# Distribution Enclosures OM

## Distribution Enclosures OM, Individual Assembly, LWL-...

**Description of OM2 and OM3 Distribution Enclosures**

- These distribution enclosures serve as a terminal for a fibre optic cable routed to a connector and for storing splices
- Small termination boxes, particularly suitable where space is limited
- Suitable for indoor wall-mounting and installation in moist rooms
- For easy mounting, the base plate with splice cassette is removable
- Installation point for strain relief element (Kevlar)
- Provides sufficient space for storing multi-fibre loose tube reserves under the splice cassette
- A wall mounting set is available as accessory for easy wall mounting
- Degree of protection of the empty enclosure: IP64
- Material
  Enclosure: ABS similar to RAL 7035
  Base plates: Powder-coated aluminium, RAL 7035
- Weight
  OM2: Approx.1 kg
  OM3: Approx.1.2 kg
- Scope of delivery
  Basic enclosure: 1 Enclosure, 1 base plate, 1 copy of Instructions for Installation
  Adapter holes: 1 Hole in the basic enclosure
  Cable entry: 1 Hole in the basic enclosure, 1 PG cable gland, 1 PG counternut

## OM 2 Basic Enclosure LWL-OM2/GG/M

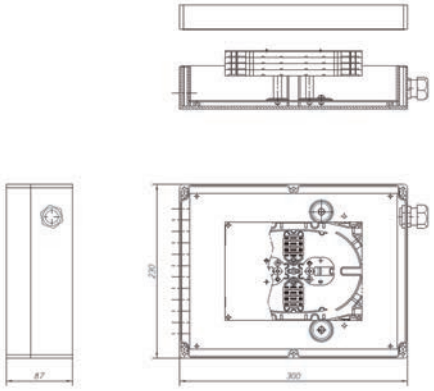



| | |
|---|---|
| • Cable entries | 1 or 2 cables<br>PG11 cable ø 5-10 mm<br>PG13 cable ø 6-12 mm<br>PG16 cable ø 8-14 mm<br>PG21 cable ø 10-18 mm |
| • Splice cassettes | 1 x SK121 |
| • Adapters | 4 or 8 fibres FC/PC, ST; 12 fibres SC simplex, SC duplex or E2000; 24 fibres LC duplex |

# Distribution Enclosures OM

## Distribution Enclosures OM, Individual Assembly, LWL-...

### OM 3 Basic Enclosure LWL-OM3/GG/M



- Cable entries: 1, 2, 3 or 4 cables
  PG11 cable ø 5-10 mm
  PG13 cable ø 6-12 mm
  PG16 cable ø 8-14 mm
  PG21 cable ø 10-18 mm
- Splice cassettes: Max. 4 x SK121
- Adapters: 12 or 16 fibres FC/PC, ST; 12 fibres SC simplex/E2000; 24 fibres SC simplex/E2000 or LC duplex; 48 fibres LC duplex

## Accessories for OM2 and OM3 Distribution Enclosures

**PG Cable Entry LWL-KDF/D..**

- For sealing cables with a PG cable gland
- Cable diameters

| | |
|---|---|
| LWL-KDF/D/PG11.. | 5 to 10 mm |
| LWL-KDF/D/PG13.. | 6 to 12 mm |
| LWL-KDF/D/PG16.. | 8 to 14 mm |
| LWL-KDF/D/PG21.. | 10 to 18 mm |

- Degree of protection: IP68
- Material: Polyamide
- Weight: Approx. 15g
- Scope of delivery: 1 PG cable gland, 1 counternut

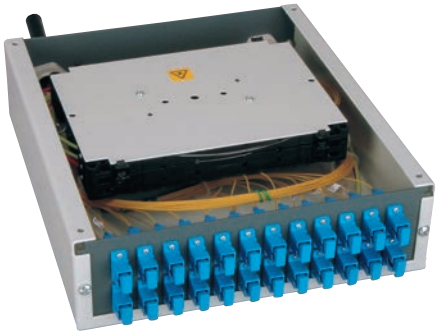
# Distribution Enclosure IML

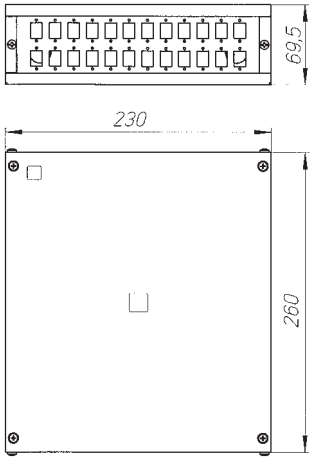
## Distribution Enclosure IML, Individual Assembly, LWL-...

**Description of IML**

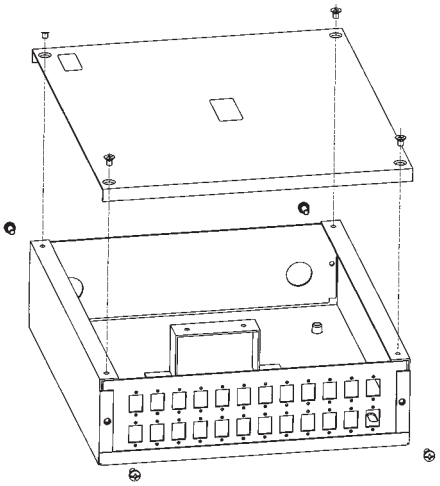
- The distribution enclosures serves as a terminal for a fibre optic cable routed to a connector and for storing splices
- Small termination boxes, particularly suitable where space is limited
- Suitable for indoor wall-mounting
- Robust metal enclosure
- Installation point for strain relief element (Kevlar)
- Provides sufficient space for storing multi-fibre loose tube reserves under the splice cassette
- Degree of protection of the enclosure: IP30
- Material
  Enclosure: Powder-coated sheet steel, RAL 7035
  Plates: Powder-coated sheet steel, RAL 7011
- Weight: approx. 2.3 kg
- Dimensions WxHxD: approx. 230x70x260 mm
- Scope of delivery
  Basic enclosure: 1 Enclosure consisting of trough and cover
  Adapter plate: 1 Front plate with holes (adapters not included)
  Cable entry plate: 1 Entry plate for 2 cables, 2 PG-cable glands, 1 blind plug, incl. counternuts

## IML Basic Enclosure LWL-IML/GG/M






- Cable entries
  2 cable glands of the same type
  PG11 cable ø 8-10 mm
  PG13 cable ø 10-12 mm
  PG16 cable ø 12-14 mm
- Splice cassettes
  4 small splice cassettes (SK120S) or
  3 large splice cassettes (SK121)
- Adapters
  12 or 24 fibres FC, ST, SC simplex, SC duplex, E2000
  24 or 48 fibres LC duplex



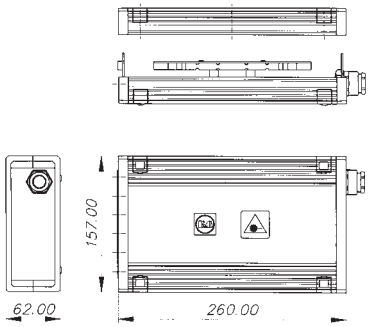
# Distribution Enclosure IM

## Distribution Enclosure IM, Individual Assembly, LWL-...

**Description of IM2, IM3 and IM3/1 Distribution Enclosures**

- These distribution enclosures serve as a terminal for a fibre optic cable routed to a connector and for storing splices
- Small termination boxes, particularly suitable where space is limited
- Suitable for indoor wall-mounting
- For easy mounting, the base plate with splice cassette is removable
- Installation point for strain relief element (Kevlar)
- Provides sufficient space for storing multi-fibre loose tube reserves under the splice cassette
- A set of wall brackets is available as accessory for easy wall mounting
- Degree of protection of the empty enclosure: IP40
- Material
  Enclosure: ABS similar to RAL 7035
  Base plate: Powder-coated aluminium, RAL 7035
  Adapter-, Cable entry plate: ABS similar to RAL 7035
- Weight
  IM2: Approx. 0.9 kg
  IM3: Approx.1.4 kg
  IM3/1: Approx. 2 kg
- Scope of delivery
  Basic enclosure: 1 Enclosure, 1 base plate, 1 copy of Instructions for Installation
  Adapter plate: 1 Front plate with holes (without adapters)
  Cable entry plate: 1 Cable entry plate, PG cable glands, PG counternuts

## IM2 Basic Enclosure LWL-IM2/GG/M

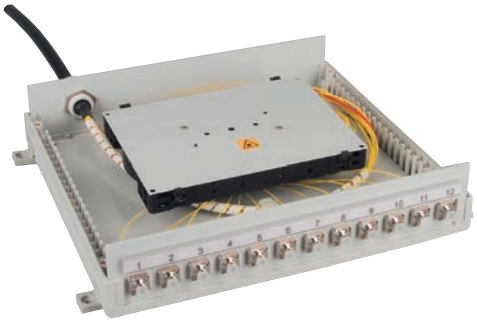


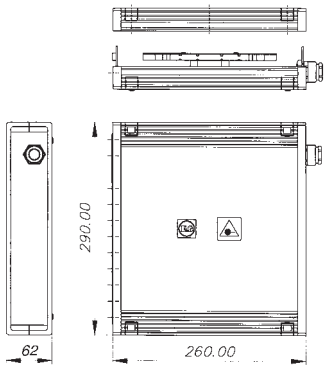

| | |
|---|---|
| • Cable entries | 1 or 2 cables |
| | PG11 cable ø 8-10 mm |
| | PG13 cable ø 10-12 mm |
| | PG16 cable ø 12-14 mm |
| • Splice cassettes | 1 x SK121 |
| • Adapters | 4 or 8 fibres FC/PC, ST, SC simplex, SC duplex, E2000 |
| | 8 or 16 fibres LC duplex |

# Distribution Enclosure IM

## Distribution Enclosure IM, Individual Assembly, LWL-...

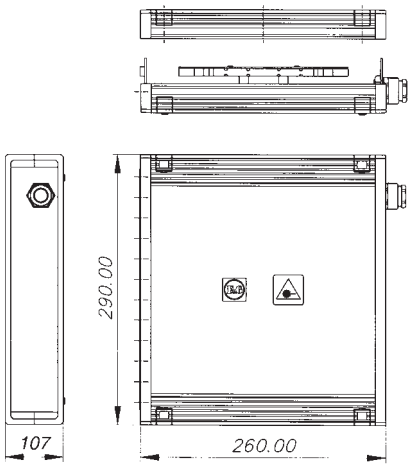
### IM3 Basic Enclosure LWL-IM3/GG/M






- Cable entries — 1 or 2 cables
  PG11 cable ø 8-10 mm
  PG13 cable ø 10-12 mm
  PG16 cable ø 12-14 mm
- Splice cassettes — Max. 2 x SK121
- Adapters — 8, 12 or 16 fibres FC/PC, ST, SC simplex, SC duplex, E2000
  16, 24 or 32 fibres LC duplex

### IM3/1 Basic Enclosure LWL-IM3/1/GG/M




- Cable entries — 1, 2 or 3 cables
  PG11 cable ø 8-10 mm
  PG13 cable ø 10-12 mm
  PG16 cable ø 12-14 mm
- Splice cassettes — Max. 4 x SK121
- Adapters — 24 or 36 fibres FC/PC, ST, SC simplex, SC duplex, E2000
  48 or 72 fibres LC duplex

# Distribution Enclosure VK5

## Distribution Enclosure VK5, Individual Assembly, LWL-...

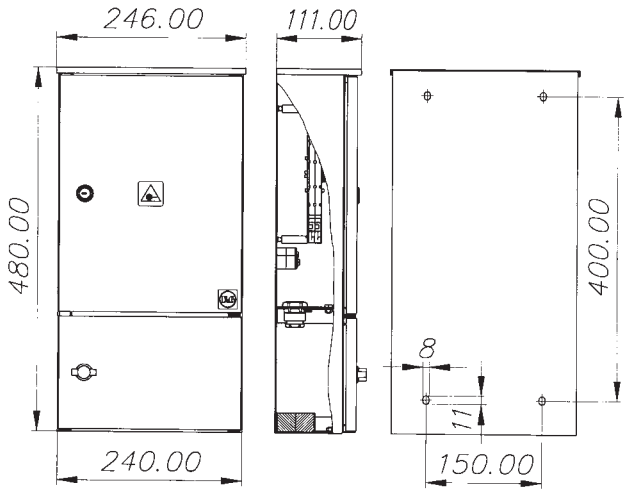
**Description**

- The VK5 distribution enclosure serves as a terminal for a fibre optic cable routed to a connector and for storing splices
- Small termination box, particularly suitable where space is limited
- Suitable for indoor wall-mounting, in particular for robust industrial applications
- Separate access to splice and plug connections

## VK5 Basic Enclosure LWL-VK5/.T/GG/M

- Split cabinet available with 1 or 2 doors
- Doors are right-hinged, optionally either with lock or latch
- 2 Areas
  top area for splicing
  bottom area for patching
- Split foamed material entry strip for sealing the patch cords
- Strain relief and sealing of the cables on an intermediate plate with PG cable glands
- For easy mounting, the base plate with splice cassette is removable
- Installation points for central strength member and strain relief element (Kevlar)
- Provides sufficient space for storing multi-fibre loose tube reserves under the splice cassette

| | |
|---|---|
| • Degree of protection | IP53 |
| • Cable entries | 1 or 2 cables<br>PG11 cable ø 8-10 mm<br>PG13 cable ø 10-12 mm<br>PG16 cable ø 12-14 mm |
| • Splice cassettes | Max. 2 x SK121 |
| • Adapters | 12 fibres FC/PC, ST, SC simplex, E2000<br>24 fibres LC duplex |
| • Material | |
| Basic enclosure | Powder-coated sheet steel, RAL 7035 |
| Base plate | Powder-coated aluminium, RAL 7035 |
| • Weight | Approx. 6 kg |
| • Scope of delivery | |
| Basic enclosure: | 1 Cabinet, 1 base plate, 3 plastic twisting clamps, 1 or 2 doors |
| Closure: | 1 Lock or latch, fixing material, 1 key |
| Intermediate plate: | 1 Intermediate plate with holes, fastening screws |



# House Distribution Enclosure HEV10

## House Distribution Enclosure HEV10, Individual Assembly, LWL-...

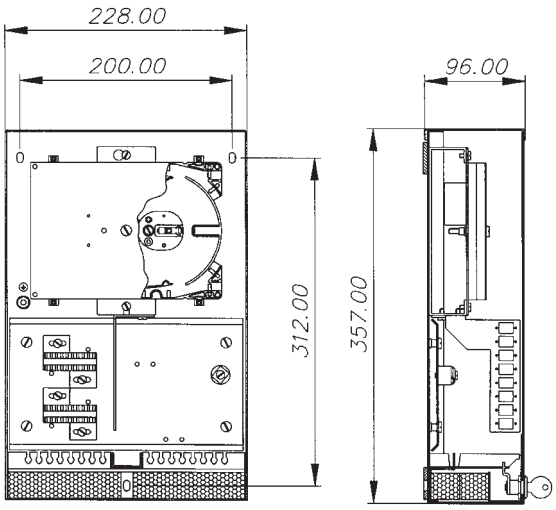
**Description**

- The house distribution enclosure serves as a terminal for a fibre optic cable routed to a connector, for storing splices and connecting copper data cables
- Especially designed for hybrid cables
- Suitable for indoor wall mounting
- Suitable for uncut cables

## Basic Enclosure HEV10, LWL-HEV10/GG/M

- Lockable hood (lock)
- Cable entry through a split foamed material strip
- Cable strain relief through tie wraps
- Installation point for strain relief element (Kevlar)
- For ease of installation, the base plate with the splice cassette can be removed
- Provides sufficient space to store multi-fibre loose tube reserves under the splice cassette
- Mounting plate for fastening LSA PLUS terminal rails

| | |
|---|---|
| • Tightness | Dust-proof |
| • Cable entries | 2 Cables of up to ø 16 mm, uncut |
| • Splice cassettes | Max. 4 x SK121 |
| • Adapters | 8 or 12 fibres FC/PC, ST, SC simplex, E2000<br>16 or 24 fibres LC duplex |
| • LSA PLUS terminal rails | Max. 20 dual wires (4x 5 dual wires) |
| • Material | Powder-coated aluminium, RAL 7035 |
| • Weight | Approx. 2 kg |
| • Scope of delivery | |
| Basic enclosure: | 1 Base plate, 1 hood, 1 mounting plate, 1 split foamed material cable entry, 1 copy of Instructions for Installation |
| Adapter angle: | 1 Angle, fastening screws |
| LSA PLUS terminal rail: | 1 LSA PLUS terminal rail - 5 dual wires, fastening screws |




Shown without cover

# Wall-mounted Splice Box WSB10

## Wall-mounted Splice Box WSB10, Individual Assembly, LWL-...

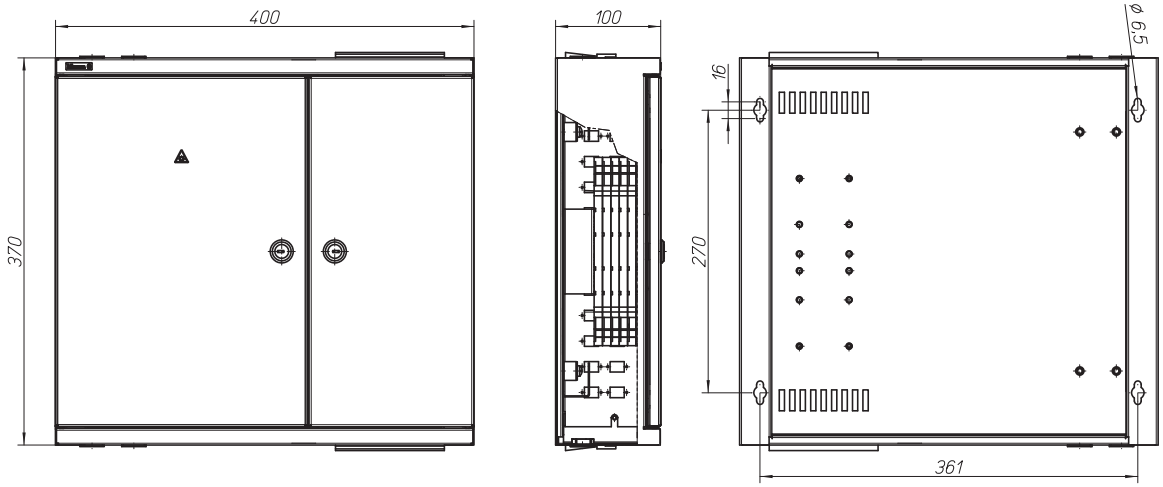
**Description**

- The wall-mounted splice box serves as a terminal for a fibre optic cable routed to a connector and for storing splices
- Enclosure for in-line connections and branch-offs
- Compact enclosure which provides a space-saving facility and an optimal protection of the fibres
- Suitable for indoor wall-mounting, in particular as a floor distributor
- Separate access to splice and plug connections

## Basic Enclosure, LWL-WSB10/.S/GG/M

- Enclosure optionally with 1 or 2 locks (single-door locking)
- 2 Areas
  left area for splicing
  right area for patching
- Patch cord entry/exit covered by a brush strip
- Patch cord guides for routing the patch cords properly
- Strain relief points for central strength member and Kevlar reinforcement
- Provides sufficient space for storing multi-fibre loose tube reserves under the splice cassette
- Cable entries

| | |
|---|---|
| Splicing area: | 1 or 2 cables with cable gland (on top and bottom)<br>M16 cable Ø 5-10 mm<br>M20 cable Ø 8-13 mm<br>M25 cable Ø 11-15 mm |
| Patching area: | Rectangular opening 100 x 30 mm with brush strip (on top and bottom) |
| • Splice cassettes | Max. 6 x SK121 |
| • Adapters | 24 or 48 fibres FC/PC, ST, SC simplex, SC duplex, E2000<br>48 or 96 fibres LC duplex |
| • Material | |
| Basic enclosure, Adapter plate | Powder-coated sheet steel, RAL 7011 |
| • Weight | Approx. 3.9 kg |
| • Scope of delivery | |
| Basic enclosure: | 1 Enclosure incl. doors, 1 or 2 locks with keys, 2 patch cord guides, 2 brush strips, 4 blind plugs |
| Adapter plate: | 1 Adapter plate with holes, fixing material |

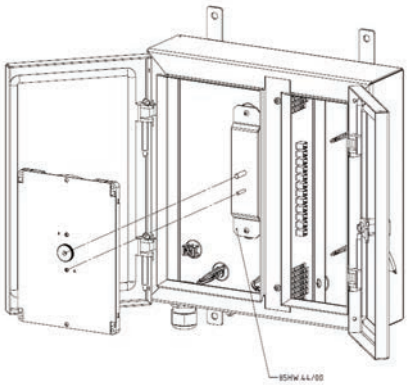


# Wall-mounted Splice Box PKG

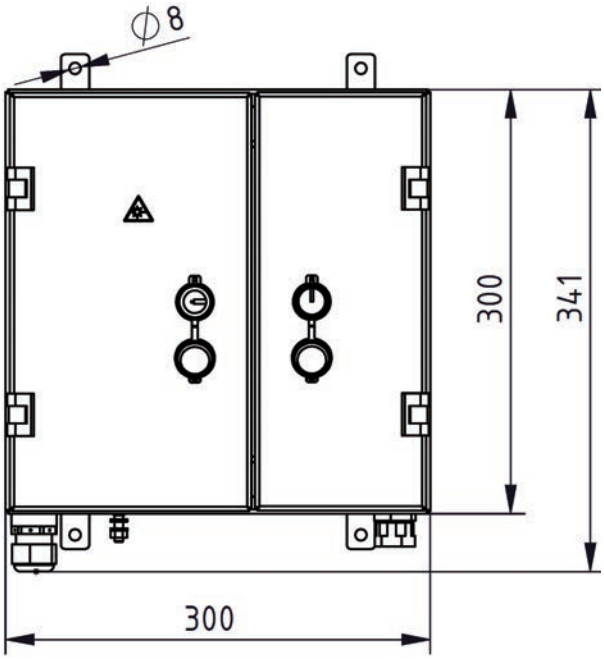
## Wall-mounted Splice Box PKG

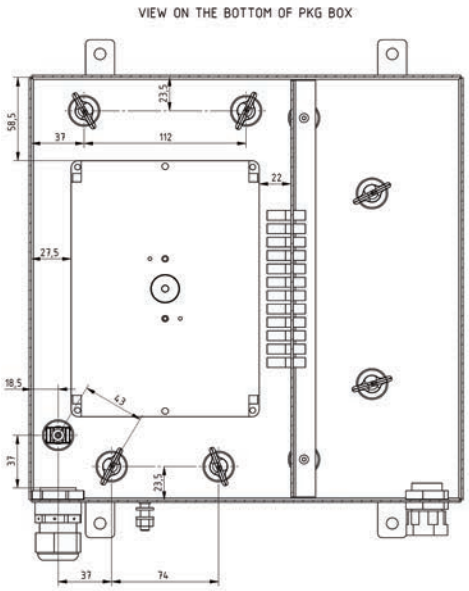
**Description**

- The wall-mounted splice box serves as a terminal for a fibre optic cable routed to connectors and for storing splices
- Enclosure for in-line connections and branch-offs
- Compact enclosure which provides a space-saving facility and an optimal protection of the fibres
- Suitable for indoor wall-mounting, in particular as a floor distributor
- Separate access to splice and plug connections



- Enclosure optionally with 1 or 2 locks (single-door locking)
- 2 Areas
  - left area for splicing
  - right area for patching
- Patch cord entry/exit with cable gland
- Patch cord guides for routing the patch cords properly
- Strain relief points for central strength member and Kevlar reinforcement
- Provides sufficient space for storing multi-fibre loose tube reserves under the splice cassette
- degree of protection: IP53
- Cable entries
  - Splicing area: 1 or 2 cables with cable gland (on top and bottom)
    - M16 cable Ø 5-10 mm
    - M20 cable Ø 8-13 mm
    - M25 cable Ø 11-15 mm
  - Patching area: M25 cable gland
- Splice cassettes: Max. 4 x SK120
- Adapters: 24 fibres FC/PC, ST, SC simplex, SC duplex, E2000
  - 48 fibres LC duplex
- Material
  - Basic enclosure, Adapter plate: Powder-coated sheet steel, RAL 7011
- Weight: Approx. 3.9 kg
- Scope of delivery
  - Basic enclosure: 1 Enclosure incl. doors, 1 or 2 locks with keys, 2 patch cord guides, 4 blind plugs
  - Adapter plate: 1 Adapter plate with holes, fixing material



# Interconnect Cases and Distribution Cabinets

# Interconnect Case RGV20

## Interconnect Case RGV20, Individual Assembly, LWL-RGV20...

**Description**

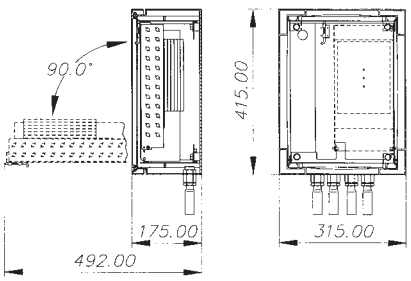
- The interconnect case serves for storing splices and for interconnecting fibre optic cables
- Enclosure for in-line connections and branch-offs
- Suitable for wall mounting
- Suitable for indoor and outdoor applications
- Suitable for uncut cables

## Basic Enclosure LWL-RGV20/GG/M

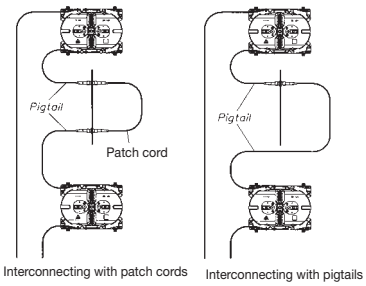
- Door is right-hinged and easy to remove
- Cylinder lock
- Door sealing inside
- Degree of protection IP66 acc. to EN 60529 with heat-shrinkable entry, IP54 with PG cable entry
- Strain relief points for central strength member and Kevlar reinforcement
- Storage for cut/uncut multi-fibre loose tubes
- Swing-type false floor for mounting splice cassettes and patch drawers
- Protected against unintended swing-out through a locking pin
- Cable entries

| | |
|---|---|
| Heat-shrink cable entries | 2 cables Ø 10-25mm, oval entry port, uncut |
| | 1 cable Ø 3-16mm |
| | 1 cable Ø 6-22mm |
| PG cable entries | Ø 8-10mm (PG11) |
| | Ø 10-12mm (PG13) |
| | Ø 12-14mm (PG16) |
| | Ø 14-17mm (PG21) |
| | 24x Ø 3mm (PG29) for patch cords |
| • Splice cassettes | 6 x SK/121 |
| • Adapters | 24 FC/PC, ST, SC, E2000 or LC duplex |
| • Permanent temperature | Max. 150°C |
| • Colour | RAL 7035 |
| • Material | |
| Enclosure | Thermoformed, self-extinguishing, halogen-free, glass fibre reinforced polyester |
| Inside components | Powder-coated sheet steel RAL 7035 |
| • Weight | Approx. 7.8 kg |
| • Scope of delivery | Enclosure with door, cylinder lock, sealing, false floor, spiral tapes |

Dimensions (mm)




Options for Interconnecting




Interconnecting with patch cords

Interconnecting with pigtails

# Interconnect Case RGV20 TL

## Interconnect Case RGV20 TL (Tubeless System), Individual Assembly, LWL-RGV20...

**Description**

- The interconnect case serves for storing splices and interconnecting fibre optic cables
- The tubeless version is particularly suitable for Single Circuit (SC) and Single Element (SE)
  Single Circuit: Distribution of the fibres from one multi-fibre loose tube to several splice cassettes through fibre guiding channels
  Single Element: For multi-fibre loose tube management (multi-fibre loose tube upon multi-fibre loose tube)
- Tubeless laying of fibres from the entry to the splice cassette
- Up to 24 individual splice cassettes thanks to the “cassette in a cassette” system
- Enclosure for in-line connections and branch-offs
- Suitable for wall, pole and tower mounting
- Suitable for indoor and outdoor applications
- Suitable for uncut cables

## Basic Enclosure LWL-RGV20/GG/M

- Door is right-hinged and easy to remove
- Clip-down handle
- Door sealing inside
- Degree of protection IP66 according to EN 60529 with heat-shrinkable entries,
  IP 54 with PG cable entry
- Strain relief points for central strength member and Kevlar reinforcement
- Storage area for cut/uncut multi-fibre loose tubes
- The removable cassette-ground plate is used for fastening the multi-fibre loose tubes and also to assembly the splice cassette set LWL-SEC23/TL/6SK... onto the mounting plate
- The entry module permits fibre routing to any cassette entry
- Cable entries

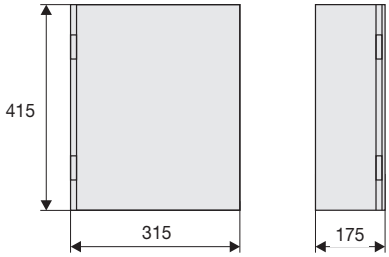
| | |
|---|---|
| Heat-shrink cable entries | 2 cables Ø 10-25mm, oval entry port, uncut |
| | 1 cable Ø 3-16mm |
| | 1 cable Ø 6-22mm |
| PG cable entries | Ø 8-10mm (PG11) |
| | Ø 10-12mm (PG13) |
| | Ø 12-14mm (PG16) |
| | Ø 14-17mm (PG21) |
| | 24x Ø 3mm (PG29) for patch cords |

- Splice cassettes — 24 x SK123 or SK223
  Available as sets of 6 splice cassettes each => max. 2 sets
  Splice cassettes are engaged in a slanted position
  Swing-type splice cassettes (90°) provide easy access to each splice
- Adapters — 12 FC/PC, ST, SC, E2000 or LC duplex
  24 SC, E2000 or LC duplex
- Permanent temperature — Max. 150°C
- Material

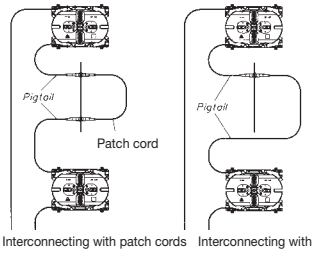
| | |
|---|---|
| Enclosure | Thermoformed, self-extinguishing, halogen-free, glass-fibre reinforced polyester, colour RAL 7035 |
| Mounting-, Base plate | Powder-coated sheet steel, RAL 7035 |
| Patch-, Fastening angle | Powder-coated sheet steel, RAL 7011 |

- Weight — Approx. 5.1 kg
- Scope of delivery
  Basic enclosure: 1 Cabinet incl. door, clip-down handle and sealing, 1 mounting plate, 1 base plate, 1 entry module with cover, 1 fastening angle
  Patch angle: 1 Angle with holes, fastening screws

Dimensions (mm)




Options for Interconnecting



# Interconnect Case RGV30

## Interconnect Case RGV30, Individual Assembly, LWL-RGV30...

**Description**

- The interconnect case serves for splice storage and connecting fibre optic cables
- Enclosure for in-line connections and branch-offs
- Suitable for wall, pole and tower mounting
- Suitable for indoor and outdoor applications
- Suitable for uncut cables

## Basic Enclosure, LWL-RGV30/GG/M

- Door is hinged on the right side and easy to remove
- 3-Point-lock through clip-down handle and bar lock
- Suitable for installation of a semi-cylinder
  Length 40mm with an up to 2.5mm protruding cylinder head
- Door sealing inside
- Degree of protection IP66 according to EN 60529 with heat-shrinkable entries,
  IP54 with PG cable entry
- Separate strain relief points for central strength member and Kevlar reinforcement
- Storage for cut/uncut multi-fibre loose tubes
- Removable and pivoting false floor for mounting the splice cassettes,
  patch drawers and for reserve lengths storage
- Protected against unintended swing-out through a locking pin
- Storage of reserve lengths for compensating differences in the length of pigtails
  and patch cords
- Single Circuit (SC) management possible through further accessories LWL-ES/UFM/6455..
- Cable entries

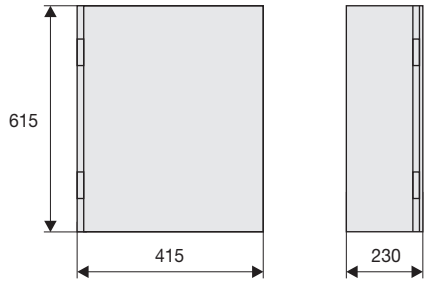
| | |
|---|---|
| Heat-shrink cable entries | 2 cables Ø 10-25mm, oval entry port, uncut |
| | 1 cable Ø 3-16mm |
| | 1 cable Ø 6-22mm |
| PG cable entries | Ø 8-10mm (PG11) |
| | Ø 10-12mm (PG13) |
| | Ø 12-14mm (PG16) |
| | Ø 14-17mm (PG21) |
| | 24x Ø 3mm (PG29) for patch cords |

- Splice cassettes — 36 x SK/120/S or 14 x SK/121
  Splice cassette SK120S engaged in a slanted position
  Pivoting splice cassette (90°) to provide easy access to each splice
- Adapters — 72 FC/PC, ST, SC, E2000 or LC duplex
- Permanent temperature — Max. 150°C
- Colour — RAL 7035
- Material

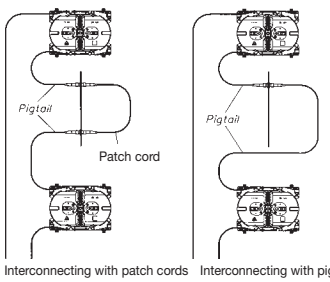
| | |
|---|---|
| Enclosure | Thermoformed, self-extinguishing, halogen-free, glass-fibre reinforced polyester |
| Inside components | Powder-coated aluminium and steel sheet, RAL 7035 |

- Weight — Approx. 10.75 kg
- Scope of delivery — Enclosure with door, clip-down handle and bar lock, sealing and false floor

Dimensions (mm)




Types of interconnecting



# Interconnect Case RGV30 TL

## Interconnect Case RGV30 TL (Tubeless System), Individual Assembly, LWL-RGV30...

**Description**

- The interconnect case serves for storing splices and interconnecting fibre optic cables
- The tubeless version is particularly suitable for Single Circuit (SC) and Single Element (SE)
  Single Circuit: Distribution of the fibres from one multi-fibre loose tube to several splice cassettes through fibre guiding channels
  Single Element: For multi-fibre loose tube management (multi-fibre loose tube upon multi-fibre loose tube)
- Tubeless laying of fibres from the entry to the splice cassette
- Up to 48 individual splice cassettes thanks to the “cassette in a cassette” system
- Enclosure for in-line connections and branch-offs
- Suitable for wall, pole and tower mounting
- Suitable for indoor and outdoor applications
- Suitable for uncut cables

## Basic Enclosure LWL-RGV30/GG/M

- Door is right-hinged and easy to remove
- 3-Point-lock through clip-down handle and bar lock
- Suitable for installation of a semi-cylinder
  40mm long, with an up to 2.5mm protruding cylinder head
- Door sealing inside
- Degree of protection IP66 according to EN 60529 with heat-shrinkable entries,
  IP 54 with PG cable entry
- Separate strain relief points for central strength member and Kevlar reinforcement
- Storage area for cut/uncut multi-fibre loose tubes
- Removable and swing-type false floor for mounting the splice cassettes,
  patch drawers and for storing excess lengths
- Protected against unintended swing-out through a rotary bolt latch
- Storage area for reserve lengths to compensate differences in the length of pigtails and patch cords
- Cable entries

| | |
|---|---|
| Heat-shrink cable entries | 2 cables Ø 10-25mm, oval entry port, uncut |
| | 1 cable Ø 3-16mm |
| | 1 cable Ø 6-22mm |
| PG cable entries | Ø 8-10mm (PG11) |
| | Ø 10-12mm (PG13) |
| | Ø 12-14mm (PG16) |
| | Ø 14-17mm (PG21) |
| | 24x Ø 3mm (PG29) for patch cords |

- Splice cassettes — 24 x SK123 or SK223
  Available as sets of 6 splice cassettes each => max. 4 sets
  Splice cassettes are engaged in a slanted position
  Swing-type splice cassettes (90°) provide easy access to each splice
- Adapters — 72 FC/PC, ST, SC, E2000 or LC duplex
- Permanent temperature — Max. 150°C
- Colour — RAL 7035
- Material

| | |
|---|---|
| Enclosure | Thermoformed, self-extinguishing, halogen-free, glass-fibre reinforced polyester |
| Inside components | Powder-coated aluminium and sheet steel, RAL 7035 |

- Weight — Approx. 10.75 kg
- Scope of delivery — Enclosure with door, clip-down handle and bar lock, sealing, false floor

Dimensions (mm)

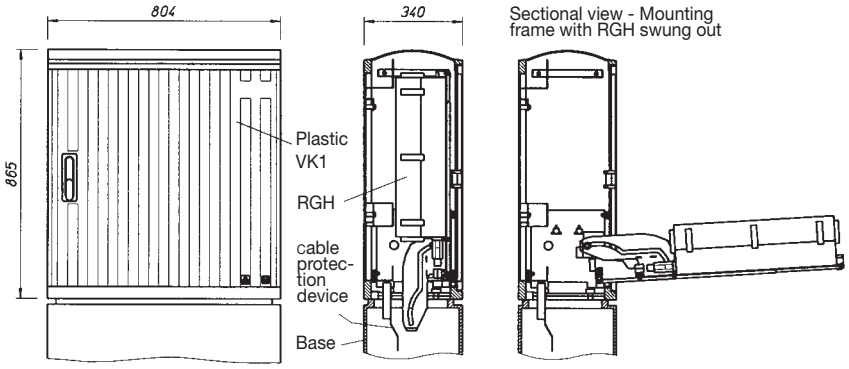
See previous page

Types of interconnecting

# Plastic Distribution Cabinet, VK1-SO-K-SH/00

## Plastic Distribution Cabinet VK1-SO-K-SH/00

- Distribution cabinet for outdoor base mounting (Austrian standard ÖNORM E 4382 size S5 or DIN 43629 size 1)
- Junction for several fibre optic cables
- 90° swing-type mounting frame for mounting an RGH6455 interconnect enclosure
- Additional adapter rails and a mounting plate for wall mounting allow the installation of OM1 and KM3 sleeves
- Cable insertion at the bottom, through the base
- Cable protection plate for orderly insertion and laying of the cables
- Support frame for approx.15 m cable reserve at the rear
- Door with clip-down handle for semi-cylinder, 40 mm long and up to 2.5 mm protruding cylinder head
- Degree of protection: IP43
- Material
  - Cabinet and door: Glass-fibre reinforced polyester, RAL 7035
  - Inside elements: Sheet steel, galvanized or powder-coated, RAL 7035
- Weight: Approx. 36 kg
- Scope of delivery: 1 Cabinet, 1 door (pre-assembled), 1 mounting frame, 1 strain relief rail, 1 cable protection plate, 1 clip-down handle



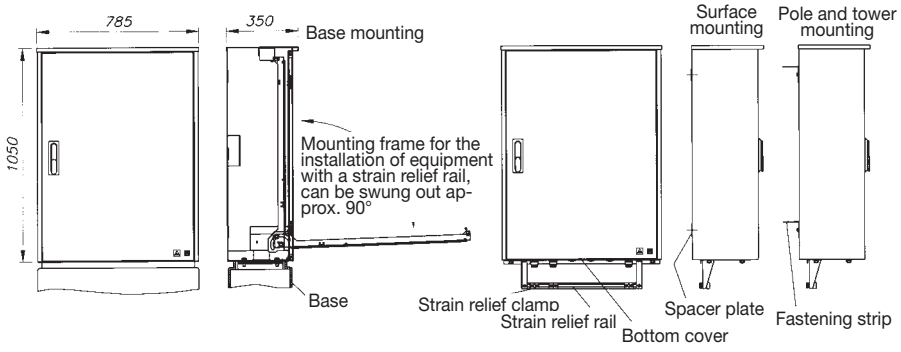

## Base for VK1-SO

- Base for mounting the distribution cabinet VK1-SO-K-SH/00
- Fastening dimensions according to Austrian standard ÖNORM E4382 size S5 or DIN 43629 size 1
- Height 900 mm
- C-profile rail for strain relief of fibre optic tubes with cable clips
- Sealing of the fibre optic tubes with UF1 universal fitting or RAS tube end closure
- Material: Glass-fibre reinforced polyester, RAL 7035
- Weight: Approx. 18 kg
- Scope of delivery: 1 Base, 1 C-profile rail, 4 M12 x 30mm screws

# Universal Distribution Cabinet, VK1-SO/AP/M-SH/00

## Universal Distribution Cabinet VK1-SO/AP/M-SH/00

- Distribution cabinet for outdoor base mounting (Austrian standard ÖNORM E 4382 size S5 or DIN 43629 size 1), surface mounting and pole/tower mounting
- Junction for several fibre optic cables
- 90° swing-type mounting frame for mounting an RGH6455 interconnect enclosure
- Additional mounting rails and a mounting plate for wall mounting allow the installation of OM1 and KM3 sleeves
- Insertion of cables at the bottom, through the base, in case of wall or pole/tower mounting insertion through bottom plates
- Different bottom plates for surface mounting and pole/tower mounting
- Support for approx. 15 m cable reserve at the rear
- Door with clip-down handle for semi-cylinder, 40 mm long and up to 2.5 mm protruding cylinder head
- Degree of protection: IP43
- Material
  - Cabinet and door: Powder-coated aluminium, RAL 7035
  - Inside elements: Sheet steel, galvanized or powder-coated, RAL 7035
- Weight: Approx. 45 kg
- Scope of delivery: 1 Cabinet, 1 door (pre-assembled), 1 mounting frame, 1 strain relief rail, 1 clip-down handle




## Base for VK1-SO/AP/M

- Base for mounting the VK1-SO/AP/M-SH/00 distribution cabinet
- Fastening dimensions according to Austrian standard ÖNORM E4382 size S5 or DIN 43629 size 1
- Height 950 mm, ground excavation depth 600 mm
- C-profile rail for strain relief of fibre optic tubes with cable clips
- Sealing of the fibre optic tubes with UF1 universal fitting or RAS tube end closure
- Material: Polyester, RAL 7032
- Weight: Approx. 20 kg
- Scope of delivery: 1 Base, 1 C-profile rail, 4 M12 x 30mm screws

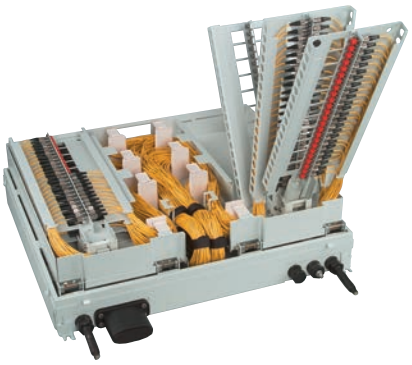
## Bottom Plates

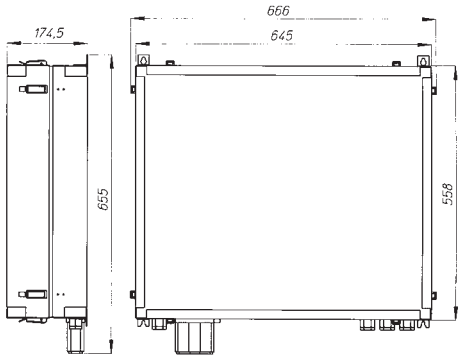
- Bottom plates for insertion of cables in case of surface mounting or pole/tower mounting
- Different versions for surface mounting and pole/tower mounting with the suitable fixing devices and external strain relief (aluminium or plastic clamps)
- Versions:

| | |
|---|---|
| Bottom plate - blank | Cable entries to be drilled at site as required |
| Bottom plate 3P213B21 | 3x PG21 (cable ø 10-18 mm), 3x PG21 blank |
| Bottom plate, split | Split entry for uncut cables of max. 25 mm |
| Bottom plate, split, 1P212B21 | Split entry for uncut cables of max. 25 mm, 1x PG21 (cable ø 10-18 mm), 2x PG21 blank |

# Interconnect Enclosures, RGH6455 144..

## Interconnect Enclosures RGH6455 144…





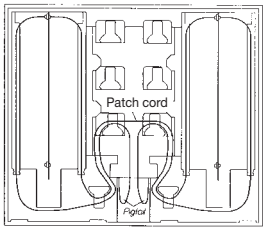

- The interconnect enclosure serves for storing splices and for interconnecting fibre optic cables
- Enclosure allowing easy access to connections and branch-offs
- Suitable for wall and duct mounting as well as for installation in the cabinet (VK1-...)
- Swing-type false floor with storage frame for patch cord excess lengths and 6 x 24 swing-type adapter drawers
- False floor and adapter drawers are secured through snap-in closures
- Lower level for cable entries, storage of excess lengths of multi-fibre loose tubes, 2 tiers of splice cassettes
- Delivered with cable entries closed through removable blanks
- For cable insertion use either an oval cable entry set (included in the scope of delivery) and/or heatshrinkable LWL-KDF/S/3/16 cable entries

| | |
|---|---|
| • Entries | 2 Cables 10-25 mm, uncut |
| | 4 Cables 3-16mm |
| • Splice cassettes | 56x SK/120/S |
| • Adapters | 144x FC/PC, SC or E2000 |
| • Degree of protection | IP66 |
| • Material | |
| Enclosure | Powder-coated aluminium, RAL 7035 |
| Adapter strip | Powder-coated aluminium, RAL 7011 |
| Sealing | EPDM |
| • Weight | Approx.16.5 kg |

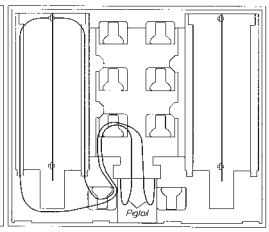
• Scope of delivery

1 Enclosure with cover, 4 16-mm heat-shrinkable blanking plugs, 1 oval cable entry, 1 oval cable entry set, 24 SK120S splice cassettes, 48 SRH8 splice protection holders, 8 patchcord guides, 250g drying agent, 4 velcro straps, 1 copy of Instructions for Installation

Options for Interconnecting




Interconnecting with patch cords




Interconnecting with pigtails

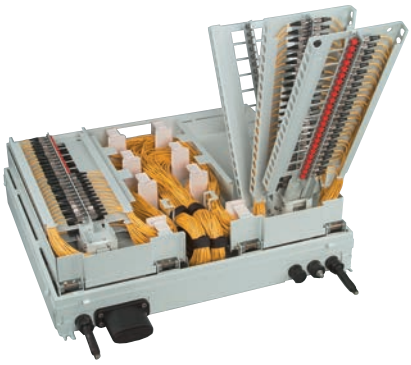
# Interconnect Case, RGH6455 TL

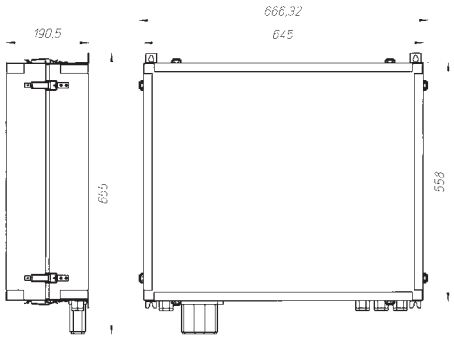
## Interconnect Case RGH6455 TL (Tubeless System), Individual Assembly, LWL-RGH6455...

**Description**

- The interconnect enclosure serves for storing splices and interconnecting fibre optic cables
- The tubeless version is particularly suitable for Single Circuit (SC) and Single Element (SE)
  Single Element: For multi-fibre loose tube management (multi-fibre loose tube upon multi-fibre loose tube)
  Single Circuit: Distribution of the fibres from one multi-fibre loose tube to several splice cassettes through fibre guiding channels
- Tubeless laying of fibres from the entry to the splice cassette
- Up to 96 individual splice cassettes thanks to the “cassette in a cassette” system
- Enclosure offers easy access to in-line connections and branch-offs
- Suitable for wall and duct mounting as well as for installation in an additional outer cabinet (VK1-...)
- Suitable for uncut cables

## Basic Enclosure LWL-RGH6455/TL/GG/M






- Swing-type false floor with storage area for patch cord excess lengths, can accommodate 2 patch drawer sets
- False floor and patch drawers are secured through quick opening devices
- Lower level for cable entries, storage of excess lengths of multi-fibre loos tubes, 2 tiers of splice cassettes
- The entry module permits fibre routing to any cassette entry
- Delivered with cable entries closed through removable blanks
- For cable insertion use either an oval cable entry set (included in scope of delivery) and/or LWL-KDF/S/3/16 heat shrinkable cable entries

| | |
|---|---|
| • Cable entries | 2 Cables 10-25 mm, uncut<br>4 Cables 3-16mm |
| • Splice cassettes<br>Available as sets of 6 splice cassettes each => max. 8 sets<br>Splice cassettes are engaged in a slanted position<br>Swing-type splice cassettes (90°) provide easy access to each splice | 48x SK123 or SK223 |
| • Adapters | 144x FC/PC, ST, SC or E2000 |
| • Degree of protection | IP66 |
| • Material | |
| Enclosure | Powder-coated aluminium, RAL 7035 |
| Adapter strip | Powder-coated aluminium, RAL 7011 |
| Sealing | EPDM |
| • Weight | Approx. 17 kg |

- Scope of delivery
  1 Enclosure with cover, 4 16mm heat-shrinkable blanking plugs, 1 oval cable entry, 1 oval cable entry set, 2 entry modules with cover, 8 patchcord guides, 250g drying agent, 4 velcro straps, 1 copy of Instructions for Installation

Options for Interconnecting

See previous page

# Fiber Optic Enclosures

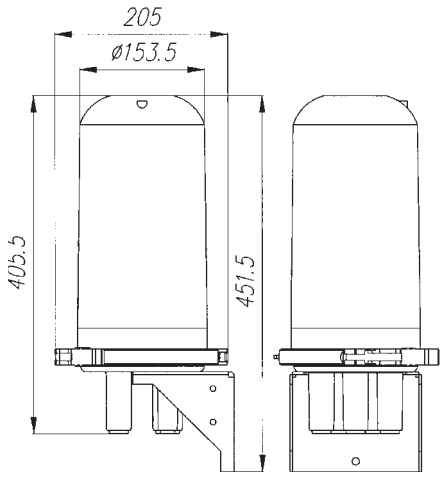
# Dome Enclosure SEC15

## SEC15 Dome Enclosure, Individual Assembly, LWL-S...

**Description**

- The SEC15 Dome Enclosure is particularly suitable for connecting fibre optic cables featuring a small number of fibres
- Enclosure for in-line connections and branch-offs
- Suitable for underground, duct, wall and pole/tower mounting
- Suitable for uncut cables

## Basic Enclosure LWL-SEC15/GM/M




- Assembly/disassembly of the dome without any tools
- Sealings can be used again
- Separate strain relief points for central strength member and Kevlar reinforcement
- Storage of cut/uncut multi-fibre loose tubes

| | |
|---|---|
| • Cable entries | 2 Cables 10-25 mm, uncut<br>3 Cables, 10-20 mm |
| • Splice cassettes | 8 x SK120S |
| • Degree of protection | >IP68 |
| • Max. splice capacity | |
| Splice protection tube | 128 |
| Sandwich splice protector | 192 |
| • Tests | According to DIN 47624 Draft 4/97 |
| Mechanical strength | |
| Load (15 min) | 1000 N at the centre of the enclosure, contact area 5 $cm^2$ |
| Impact (once) | 1 kg Steel ball, 2 m fall, at the centre of the enclosure |
| Pressure resistance | |
| Permanent pressure | 0.4 bar above atmospheric |
| Tight from | -40°C to +70C° |
| Tightness with cable | |
| Strain (15 min) | 1000 N |
| Shearing/bending (twice) | Deflection 45° or a max. of 500 N bending force, Point of application 250 mm from cable entry |
| Torsion (twice) | ±90° rotation angle or a max. torque of 50 Nm, Point of application 500 mm from cable entry |
| Vibration | 168 hours; both cable ends fastened, Amplitude ±3 mm, frequency 10 Hz |
| Temperature changes | -40°C to +70°C, 10 times |
| Immersion in wetting agent | 168 hours |
| External pressure resistance | 4 m water column |
| Water vapour permeation | < 240 µg/h at 10°C |
| • Material | |
| Base plate, dome, locking ring and snap-in lock | Environmentally friendly, UV-resistant polypropylene |
| Strain relief angle | Stainless steel |
| Cassette support | Powder-coated aluminium sheet, RAL 7035 |
| • Weight | Approx. 2 kg |
| • Scope of delivery | Base plate, dome, locking ring incl. snap-in lock, securing pin, sealing ring, cassette support, drying agent, 1 copy of Instructions for Installation |

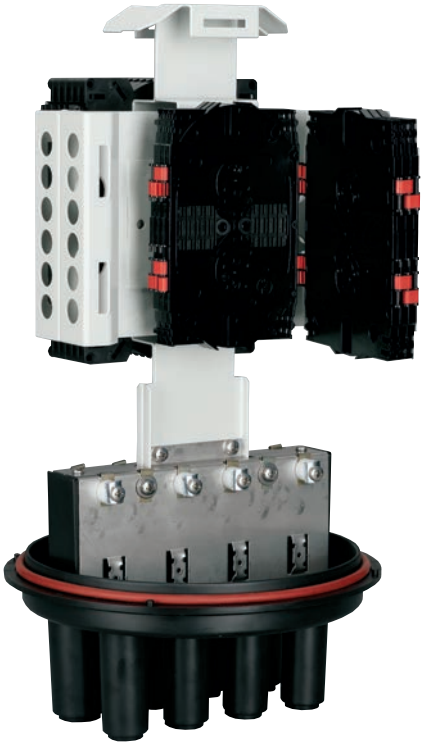
# Dome Enclosure SEC23 Classic

## SEC23 Classic Dome Enclosure, Individual Assembly, LWL-S...

**Description**

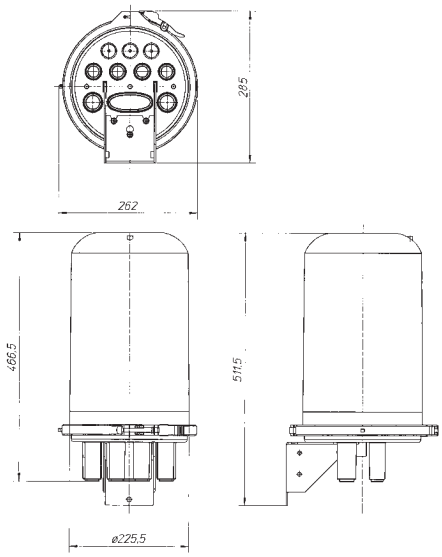
- The SEC 23 Classic Dome Enclosure is particularly suitable for connecting fibre optic cables featuring a large number of fibres
- Enclosure for in-line connections and branch-offs
- Suitable for underground, duct, wall and pole/tower mounting
- Suitable for uncut cables

## Basic Enclosure LWL-SEC23/S/C/GM/M



- Assembly/disassembly of the dome without any tools
- Sealings can be used again
- Separate strain relief points for central strength member and Kevlar reinforcement
- Storage of cut/uncut multi-fibre loose tubes

| | |
|---|---|
| • Cable entries | 2 Cables 10-25 mm, uncut<br>2 Cables 10-25 mm, 4 cables 10-20 mm<br>3 Cable entries with cable glands with heat-shrinkable sleeves (3-16 mm) optional |
| • Splice cassettes | 20 x SK120S or 12 x SK121 |
| • Degree of protection | >IP68 |
| • Max. splice capacity | |
| Splice protection tube | 320 (SK120S), 192 (SK121) |
| Sandwich splice protector | 480 (SK120S), 288 (SK121) |
| • Tests | According to DIN 47624 Draft 4/97 |
| Mechanical strength | |
| Load (15 min) | 1000 N at the centre of the enclosure, contact area 5 $cm^2$ |
| Impact (once) | 1 kg Steel ball, 2 m fall, at the centre of the enclosure |
| Pressure resistance | |
| Permanent pressure | 0.4 bar above atmospheric |
| Tight from | -40°C to +70C° |
| Tightness with cable | |
| Strain (15 min) | 1000 N |
| Shearing/bending (twice) | Deflection 45° or a max. of 500 N bending force, Point of application 250 mm from cable entry |
| Torsion (twice) | ±90° rotation angle or a max. torque of 50 Nm, Point of application 500 mm from cable entry |
| Vibration | 168 hours; both cable ends fastened, Amplitude ±3 mm, frequency 10 Hz |
| Temperature changes | -40°C to +70°C, 10 times |
| Immersion in wetting agent | 168 hours |
| External pressure resistance | 4 m water column |
| Water vapour permeation | < 600 µg/h at 10°C |
| • Material | |
| Base plate, dome, locking ring and snap-in lock | Environmentally friendly, UV-resistant polypropylene |
| Strain relief angle | Stainless steel |
| Cassette support | Powder-coated aluminium sheet, RAL 7035 |
| • Weight | Approx. 4 kg |
| • Scope of delivery | Base plate, dome, locking ring incl. snap-in lock, securing pin, sealing ring, cassette support, drying agent, 1 copy of Instructions for Installation |



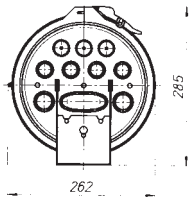
# Dome Enclosure SEC23 Single Element II

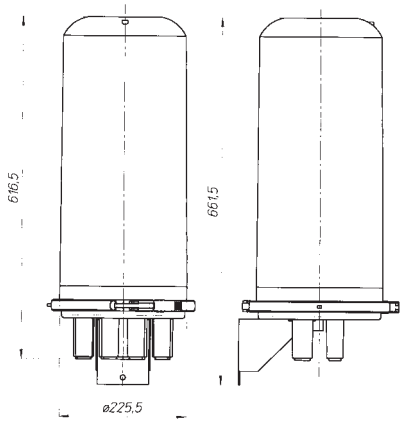
## SEC23 Single Element II, Individual Assembly, LWL-S...

**Description**

- Single Element (SE) version, especially for multi-fibre loose tube management (multi-fibre loose tube upon multi-fibre loose tube)
- In-line connection and branch-off enclosure
- Suitable for ground, duct, wall, pole and tower mounting
- Suitable for uncut cables

## Base Enclosure, LWL-SEC23/SEII/GM/M




- Assembly/disassembly of the dome without any tools
- Sealings can be used again
- Separate strain relief points for central strength member and Kevlar reinforcement
- Pivoting storage frame for cut/uncut multi-fibre loose tubes
- Cable entries: 2 cables of 10-25 mm, uncut; 2 cables of 10-25 mm, 4 cables of 10-20 mm; 3 cable entries with cable glands with heat-shrinkable sleeves (3-16 mm) optional
- Splice cassettes: 38 x SK123 or SK223

  Splice cassettes engaged in a slanted position

  Pivoting splice cassettes (90°) to provide easy access to each splice
- Degree of protection: >IP68
- Max. splice capacity
  - Splice protection tube: 608
  - Sandwich splice protector: 912
- Tests: According to DIN 47624 Draft 4/97

  Mechanical strength
  - Load (15 min): 1000 N at centre of the enclosure, contact area 5 $cm^2$
  - Impact (once): 1 kg steel ball, 2 m fall, centre of the enclosure

  Pressure resistance
  - Permanent pressure: 0.4 bar above atmospheric
  - Tight from: -40°C to +70C°

  Tightness with cable
  - Strain (15 min): 1000 N
  - Shearing/Bending (twice): Deflection 45° or a max. of 500 N bending force, Point of application 250 mm from cable entry
  - Torsion (twice): ±90° rotation angle or a max. torque of 50 Nm, Point of application 500 mm from cable entry
  - Vibration: 168 hours; both cable ends fastened, Amplitude ±3 mm, frequency 10 Hz

  Temperature changes: -40°C to +70°C, 10 times

  Immersion in wetting agent: 168 hours

  External pressure resistance: 4 m water column

  Water vapour permeation: < 600 µg/h at 10°C
- Material

  Base plate, dome, locking ring and snap-in lock: Environmentally friendly, UV-resistant polypropylene

  Strain relief angle: Stainless steel

  Cassette support: Powder-coated aluminium sheet, RAL 7035
- Weight: Approx. 4 kg
- Scope of delivery: Base plate, dome, locking ring with snap-in lock, securing pin, sealing ring, cassette support, drying agent, instructions for installation, 2 fastening ledges for multi-fibre loose tubes

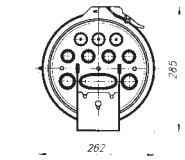
# Dome Enclosure SEC23 Management II

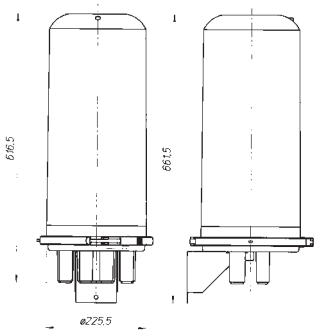
## SEC23 Management II, Individual Assembly, LWL-S...

**Description**

- Management version, suitable especially for Single Circuit (SC) and Single Element (SE).
  Single Circuit: Distribution of the fibres from one multi-fibre loose tube to several splice cassettes through fibre protection tubes
- In-line connection and branch-off enclosure
- Suitable for ground, duct, wall, pole and tower mounting
- Suitable for uncut cables

## Base Enclosure, LWL-SEC23/MII/GM/M




- Assembly/disassembly of the dome without any tools
- Sealings can be used again
- Separate strain relief points for central strength member and Kevlar reinforcement
- Pivoting storage frame for cut/uncut multi-fibre loose tubes
- Cable entries — 2 cables of 10-25 mm, uncut; 2 cables of 10-25 mm, 4 cables of 10-20 mm; 3 cable entries with cable glands with heat-shrinkable sleeves (3-16 mm) optional
- Splice cassettes — 38 x SK123 or SK223
  Splice cassettes engaged in a slanted position
  Pivoting splice cassettes (90°) to provide easy access to each splice
- Degree of protection — >IP68
- Max. splice capacity
  - Splice protection tube — SE: 608
  - Sandwich splice protector — SE: 912
  - 2 splices per cassette — SC: 152
- Tests — According to DIN 47624 Draft 4/97

| | |
|---|---|
| Mechanical strength | |
| Load (15 min) | 1000 N at centre of the enclosure, contact area 5 $cm^2$ |
| Impact (once) | 1 kg steel ball, 2 m fall, centre of the enclosure |
| Pressure resistance | |
| Permanent pressure | 0.4 bar above atmospheric |
| Tight from | -40°C to +70C° |
| Tightness with cable | |
| Strain (15 min) | 1000 N |
| Shearing/Bending (twice) | Deflection 45° or a max. of 500 N bending force, Point of application 250 mm from cable entry |
| Torsion (twice) | ±90° rotation angle or a max. torque of 50 Nm, Point of application 500 mm from cable entry |
| Vibration | 168 hours; both cable ends fastened, Amplitude ±3 mm, frequency 10 Hz |
| Temperature changes | -40°C to +70°C, 10 times |
| Immersion in wetting agent | 168 hours |
| External pressure resistance | 4 m water column |
| Water vapour permeation | < 600 µg/h at 10°C |

- Material

| | |
|---|---|
| Base plate, dome, locking ring and snap-in lock | Environmentally friendly, UV-resistant polypropylene |
| Strain relief angle | Stainless steel |
| Cassette support | Powder-coated aluminium sheet, RAL 7035 |

- Weight — Approx. 3.85 kg
- Scope of delivery — Base plate, dome, locking ring with snap-in lock, securing pin, sealing ring, cassette support, drying agent, instructions for installation

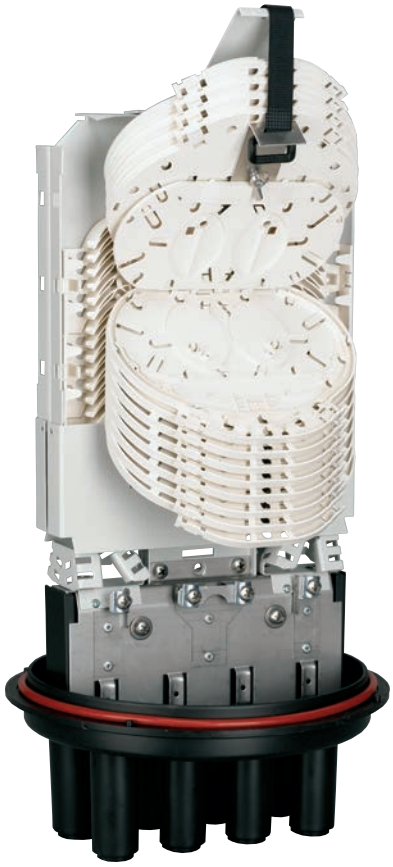
# Dome Enclosure SEC23 Tubeless Short

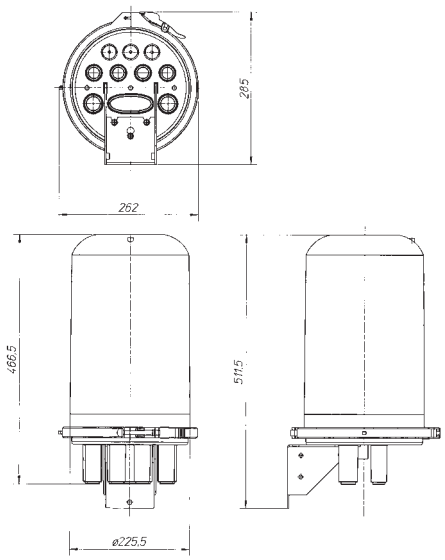
## SEC23 Tubeless Short, Individual Assembly, LWL-S...

**Description**

- Tubeless version suitable especially for Single Circuit (SC) and Single Element (SE).
  Single Circuit: Distribution of the fibres from one multi-fibre loose tube to several splice cassettes through fibre guiding channels
- Tubeless laying of the fibres from entry to splice cassette
- Up to 72 individual splice cassettes thanks to the “cassette in a cassette” system
- In-line connection and branch-off enclosure
- Suitable for ground, duct, wall, pole and tower mounting
- “Short” version especially for manholes or cable ducts
- Suitable for uncut cables

## Base Enclosure, LWL-SEC23/S/TL/GM/M






- Assembly/disassembly of the dome without any tools
- Sealings can be used again
- Separate strain relief points for central strength member and Kevlar reinforcement
- An entry module permits fibre guidance to any desired cassette entry
- Cable entries — 2 cables 10-25 mm, uncut; 2 cables 10-25 mm, 4 cables 10-20 mm
- Splice cassettes — 36 x SK123 or SK223
  Available in cassette sets of 6 splice cassettes each ⇒ max. 6 sets (3 units on either side).
  Splice cassettes engaged in a slanted position
  Pivoting splice cassettes (90°) to provide easy access to each splice
- Degree of protection — >IP68
- Max. splice capacity
  - Splice protection tube — SE: 576
  - Sandwich splice protector — SE: 864
  - 2 splices per cassette — SC: 144
- Tests — According to DIN 47624 Draft 4/97
  - Mechanical strength
    - Load (15 min) — 1000 N at centre of the enclosure, contact area 5 $cm^2$
    - Impact (once) — 1 kg steel ball, 2 m fall, centre of the enclosure
  - Pressure resistance
    - Permanent pressure — 0.4 bar above atmospheric
    - Tight from — -40°C to +70C°
  - Tightness with cable
    - Strain (15 min) — 1000 N
    - Shearing/bending (twice) — Deflection 45° or a max. of 500 N bending force, Point of application 250 mm from cable entry
    - Torsion (twice) — ±90° rotation angle or a max. torque of 50 Nm, Point of application 500 mm from cable entry
    - Vibration — 168 hours; both cable ends fastened, Amplitude ±3 mm, frequency 10 Hz
  - Temperature changes — -40°C to +70°C, 10 times
  - Immersion in wetting agent — 168 hours
  - External pressure resistance — 4 m water column
  - Water vapour permeation — < 600 µg/h at 10°C
- Material
  - Base plate, dome, locking ring and snap-in lock — Environmentally friendly, UV-resistant polypropylene
  - Strain relief angle — Stainless steel
  - Cassette support — Powder-coated aluminium sheet, RAL 7035
- Weight — Approx. 3.5 kg
- Scope of delivery — Base plate, dome, locking ring with snap-in lock, securing pin, sealing ring, cassette support, drying agent, instructions for installation, 2 entry modules incl. cover

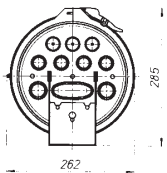
# Dome Enclosure SEC23 Tubeless

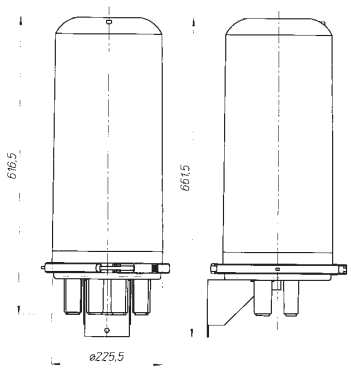
## SEC23 Tubeless, Individual Assembly, LWL-S...

**Description**

- Tubeless version suitable especially for Single Circuit (SC) and Single Element (SE).
  Single Circuit: Distribution of the fibres from one multi-fibre loose tube to several splice cassettes through fibre guiding channels
- Tubeless laying of the fibres from entry to splice cassette
- Up to 144 individual splice cassettes thanks to the “cassette in a cassette” system
- In-line connection and branch-off enclosure
- Suitable for ground, duct, wall, pole and tower mounting
- Suitable for uncut cables

## Base Enclosure, LWL-SEC23/TL/GM/M




- Assembly/disassembly of the dome without any tools
- Sealings can be used again
- Separate strain relief points for central strength member and Kevlar reinforcement
- An entry module permits fibre guidance to any desired cassette entry
- Cable entries — 2 cables 10-25 mm, uncut; 2 cables 10-25 mm, 4 cables 10-20 mm
- Splice cassettes — 72 x SK123 or SK223
  Available in cassette sets of 6 splice cassettes each ½ max. 12 sets (6 units on either side).
  Splice cassettes engaged in a slanted position
  Pivoting splice cassettes (90°) to provide easy access to each splice
- Degree of protection — >IP68
- Max. splice capacity
  - Splice protection tube — SE: 1152
  - Sandwich splice protector — SE: 1728
  - 2 splices per cassette — SC: 288
- Tests — According to DIN 47624 Draft 4/97
  - Mechanical strength
    - Load (15 min) — 1000 N at centre of the enclosure, contact area 5 $cm^2$
    - Impact (once) — 1 kg steel ball, 2 m fall, centre of the enclosure
  - Pressure resistance
    - Permanent pressure — 0.4 bar above atmospheric
    - Tight from — -40°C to +70C°
  - Tightness with cable
    - Strain (15 min) — 1000 N
    - Shearing/bending (twice) — Deflection 45° or a max. of 500 N bending force, Point of application 250 mm from cable entry
    - Torsion (twice) — ±90° rotation angle or a max. torque of 50 Nm, Point of application 500 mm from cable entry
    - Vibration — 168 hours; both cable ends fastened, Amplitude ±3 mm, frequency 10 Hz
  - Temperature changes — -40°C to +70°C, 10 times
  - Immersion in wetting agent — 168 hours
  - External pressure resistance — 4 m water column
  - Water vapour permeation — < 600 µg/h at 10°C
- Material
  - Base plate, dome, locking ring and snap-in lock — Environmentally friendly, UV-resistant polypropylene
  - Strain relief angle — Stainless steel
  - Cassette support — Powder-coated aluminium sheet, RAL 7035
- Weight — Approx. 4 kg
- Scope of delivery — Base plate, dome, locking ring with snap-in lock, securing pin, sealing ring, cassette support, drying agent, instructions for installation, 2 entry modules incl. cover

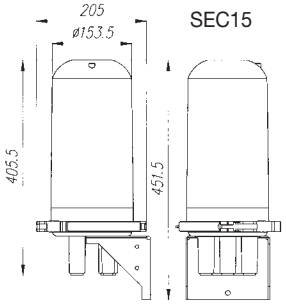
# Accessories for Dome Enclosures Type SEC...

## Accessories for Dome Enclosures Type SEC...

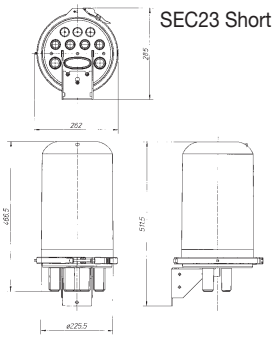
### Wall-mounting Set, LWL-SEC../WM

- Fastening angle for convenient wall-mounting
- Material: Powder-coated 3-mm aluminium sheet, RAL 7035
- Scope of delivery: Wall-mounting set

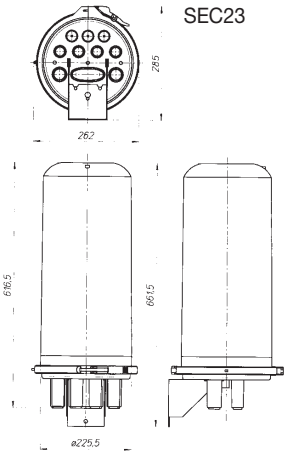
SEC15




SEC23 Short

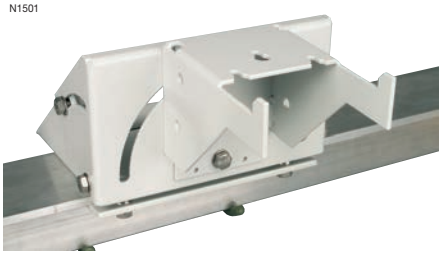



SEC23



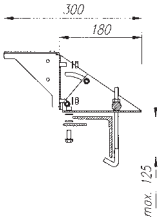

### Steel Tower Mounting Set, LWL-SEC../SM

N1501

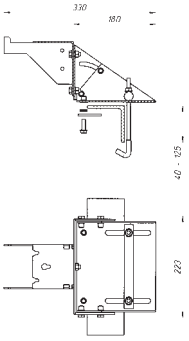


- Clamping support for steel lattice towers
- For angle sections with a leg length of 40 - 125 mm
- Section angle 60°-90°
- No drilling required
- Vertical adjustment of the enclosure along 2 axes
- Enclosure can be engaged
- Material: Powder-coated 3-mm aluminium sheet, RAL 7035
- Scope of delivery: Steel tower mounting set, installation material

SEC15



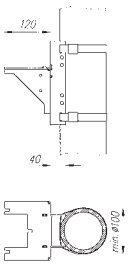

SEC23




### Round Pole Mounting Set, LWL-SEC../RM...

- Fastening set for securing the enclosure to a round pole
- U-shaped support plate is secured to the pole by means of steel strips
- No drilling required
- Independent of pole diameter (min.: 100mm)
- Enclosure can be engaged
- Material: Powder-coated 3-mm aluminium sheet, RAL 7035
- Steel strip and closing buckles not included
- Scope of delivery: Round pole mounting set, installation material

SEC15

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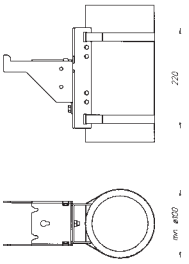
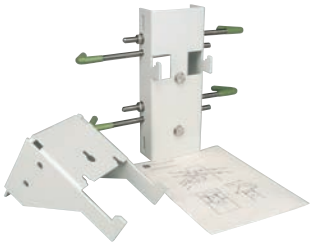


# Accessories for Dome Enclosures Type SEC...

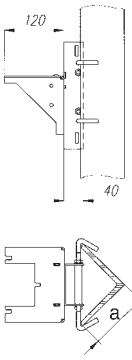
## Accessories for Dome Enclosures Type SEC...

### Corner Post Mounting Set - Small and Large, LWL-SEC../EK/0...

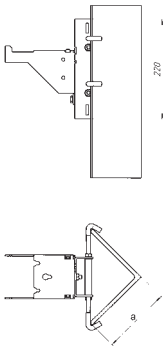


- Clamping support for corner sections of steel lattice towers
- No drilling required
- For angle sections with a leg length of a = 100-200 mm (version 01) or up to 320 mm (version 02)
- Enclosure can be engaged
- Material: Powder-coated 3-mm aluminium sheet, RAL 7035
- Scope of delivery: Corner post mounting set, installation material

SEC15




SEC23




### External Strain Relief Set, LWL-SEC../KZX

- Especially for cables resistant to bending and torsion (e.g. optical ground wires)
- External clamping by means of aluminium clamps
- In case of round connection bushes, double clamping with aluminium clamps up to size 2 is possible
- Suitable for installation on any mounting set
- Enclosure can still be engaged on any mounting set
- Material: Powder-coated 3-mm aluminium sheet, RAL 7035
- Clamps and mounting set not included
- Scope of delivery: Strain relief angle, 4 strain relief rails, installation material

# Dome Enclosure PLP - FibreGuard

## PLP - FibreGuard Closure

**Versatility**

- Accepts a wide range of fibre management systems
- Ready access (10 second entry)
- Re-usable
- Mechanical cable and closure sealing system
- No flame required
- Wide opening express cable ports
- Extensive size of cable ranges accepted
- Expandable split grommets
- Multi drop ability from one port
- Split cable sealing system
- Proven “O”-ring sealing system from dome to end plate
- Security locking device
- Splice I.D. plate
- Sizes to accommodate most fibre counts
- OPGW/ADSS compatible

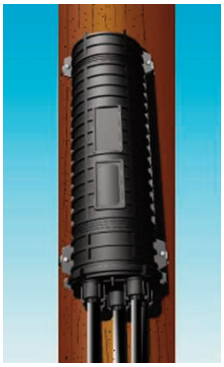
**Technical & commercial benefits**

- No special tools required
- Easy future drop cable installation
- No gas equipment cost
- Re-usable, no re-entry kits required
- Flash testing to prove closure integrity
- Minimal cable preparation required
- Cost effective

| FibreGuard Closure Information | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Closure Designation | Express Port Sizes | Drop Port Sizes | Closure Length | Closure Diameter | Max. No. of Splice Trays | Splice Capacity | | |
| | | | | | | 12 per tray | 24 per tray | 36 per tray |
| FibreGuard 500 | 2 x 10 - 25 | 2 x 10 - 25 | 515 | 130 | 4 | 48 | 96 | - |
| FibreGuard 650 | 2 x 10 - 25 | 3 x 10 - 25 | 600 | 165 | 5 | 60 | 120 | 180 |
| FibreGuard 800 | 2 x 10 - 25 | 5 x 10 - 25 | 700 | 203 | 9 | 108 | 216 | 324 |
| FibreGuard 800S | 2 x 10 - 25 | 5 x 10 - 25 | 480 | 203 | 9 | 108 | 216 | 324 |

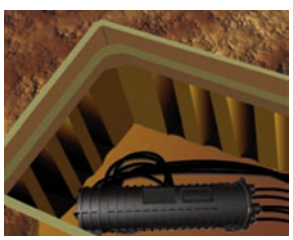
Measurements are in mm

| Grommet Drop Port Combinations | | |
|---|---|---|
| Grommet Designation | Cable Range | Number of Entries |
| A | 10 - 15 mm | 1 |
| B | 15 - 21 mm | 1 |
| C | 21 - 25 mm | 1 |
| 2-H | 7 - 11 mm | 2 |
| 4-H | 3 - 7 mm | 4 |
| 8-H | 3 - 7 mm | 8 |
| 8-H | 4 - 8 mm | 8 |
| 12-H | 3.5 - 4.5 mm | 12 |
| 24-H | 1.8 - 2.5 mm | 24 |

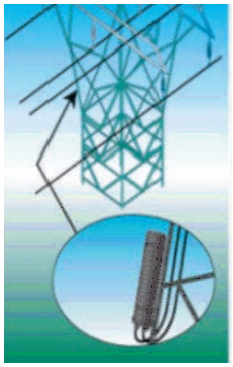


Pole wall mount application

Strand mount



Underground hand hole application



Tower mount application

Pedestal application

# Dome Enclosure PLP - FibreGuard

## PLP - FibreGuard Closure

Security Locking Facility

Flash Test Air-Valve

Identification Name Plate

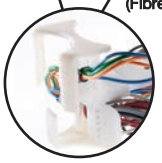
"O"-Ring Cover/End Plate Sealing System

Grommet Driver and Cap

Strength Member and Cable Fastening System

Express Ports with Grommet Sealing System

(FibreGuard 500 only)

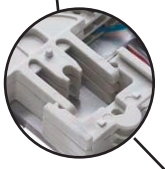


"FANG" Buffer Tube Guide (FibreGuard 800 & 650 only)

Various Grounding Facilities Available

Effort Saving Cap Tightening Tool

Loose Buffer Tube Storage System



COYOTE Stacked Fibre Tray System and Transition Tray Compatable (FibreGuard 800 & 650 only)

SLIDE-N-LOCK Fibre Tray Access Technology

Drop Cable Grommets for Single Port, Multi-Cable Entry

Factory Sealed Drop Ports with clean "Knock-out" Facility

Simple Finger Locking Cover to End Plate Sealing System

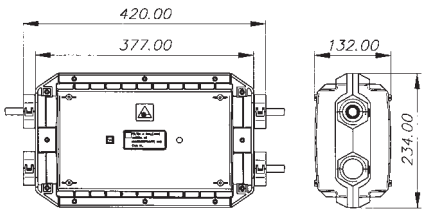
# Universal Plastic Sleeve KM3

## Universal Plastic Sleeve KM3, Individual Assembly, LWL-...

**Description**

- The KM3 Universal Plastic Sleeve is particularly suitable for connecting fibre optic cables featuring a small number of fibres
- Sleeve for in-line connections and branch-offs
- Suitable for underground, duct and wall mounting as well as for installation in a protective sleeve
- Suitable for uncut cables

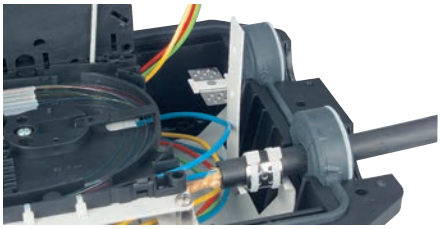
## Basic Sleeve LWL-KM3/GM/M




- Sealings can be used again
- Separate strain relief points for central strength member and Kevlar reinforcement
- Removable mounting insert for storing cut/uncut multi-fibre loose tubes
- Cable sealing with a special cable gland, which can be divided, and with an onion ring sealing

| | |
|---|---|
| • Cable entries | 4 Cables 9-25 mm |
| • Splice cassettes | 6 x SK121 |
| • Tests | |
| Mechanical strength | |
| Load (15 min) | 1000 N at the centre of the sleeve, contact area 5 $cm^2$ |
| Impact (once) | 1 kg Steel ball, 2 m fall, at the centre of the sleeve |
| Pressure resistance | |
| Permanent pressure | 0.4 bar above atmospheric |
| Tight from | -30°C to +60C° |
| Tightness with cable | |
| Strain (15 min) | 1000 N |
| Push (15 min) | 1000 N |
| Shearing/bending (twice) | Deflection 45° or a max. of 500 N bending force, Point of application 250 mm from cable entry |
| Torsion (twice) | 90° rotation angle or a max. torque of 50 Nm, Point of application 400 mm from cable entry |
| Vibration | 168 hours; both cable ends fixed off the vibration desk (500 mm from cable entry) |
| Temperature changes | -30°C to +60°C, 10 times |
| Immersion in wetting agent | 168 hours |
| External pressure resistance | 4 m water column |
| Water vapour permeation | < 160 µg/h at 10°C |
| • Material | |
| Top and bottom, cable gland | Environmentally friendly, UV-resistant polypropylene |
| External components | Stainless steel |
| Internal components | Powder-coated aluminium, RAL 7035 |
| Sealings | Special rubber compound |
| • Weight | Approx. 3.5 kg |
| • Scope of delivery | 1 Basic enclosure, 4 cable glands, 1 mounting insert, 1 cassette base plate, 1 cable cleaning cloth, 1 copy of Instructions for Installation, 1 lubricant for sealings, 1 wrench, drying agent, fastening screws |

## Accessories for KM3 Universal Plastic Sleeves - Cable Entry Set



- For cable sealing (all types of jackets)
- Cable diameter 9-25 mm, adjustable on site through an onion ring sealing
- Non-flammable cable sealing
- Blank cable entry set for spare cable entries
- Material: Special rubber compound
- Scope of delivery
  1 Onion ring sealing, 2 tie wraps or 1 blanking plug

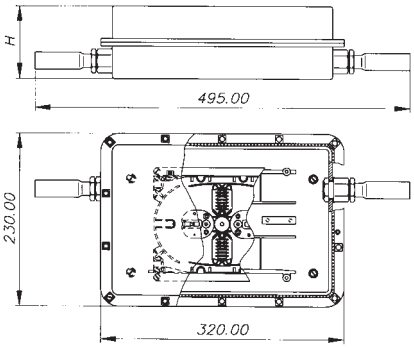
# Universal Plastic Sleeve OM1

## Universal Plastic Sleeve OM1, Individual Assembly, LWL-...

**Description**

- OM1 Universal Plastic Sleeves are particularly suitable for connecting fibre optic cables
- Sleeves for in-line connections and branch-offs
- Suitable for underground, duct and wall mounting as well as for installation in a protective sleeve
- With oval cable entry it is suitable for uncut cables

## Basic Sleeves LWL-OM1../GM/M




| Versions | H |
|---|---|
| OM1 | 97.0 |
| OM1/1 | 137.0 |
| OM1/2 | 177.0 |

- Sealings can be used again
- Strain relief point for central strength member and Kevlar reinforcement
- Storage of cut/uncut multi-fibre loose tubes
- For sealing of cables with heat-shrinkable cable entries or for preparing a cable insertion for a heat-shrinkable blanking plug
- With uncut cables, sealing is carried out with an oval cable entry and an oval cable entry set
- Cable entries: 4 Cables 10-25 mm uncut, or 8 Cables 3-16 mm or 6 Cables 6-22 mm
- Splice cassettes: 5 x SK121 with ...-OM1.. 8 x SK121 with ...-OM1/1.. 13 x SK121 with ...-OM1/2..
- Tests
  - Mechanical strength
    - Load (15 min): 1000 N at the centre of the sleeve, contact area 5 $cm^2$
    - Impact (once): 1 kg Steel ball, 2 m fall, at the centre of the sleeve
  - Pressure resistance
    - Permanent pressure: 0.4 bar above atmospheric
    - Tight from: -30°C to +60C°
  - Tightness with cable
    - Strain (15 min): 1000 N
    - Push (15 min): 500 N
    - Shearing/bending (twice): Deflection 45° or a max. of 500 N bending force, Point of application 250 mm from cable entry
    - Torsion (twice): 90° rotation angle or a max. torque of 50 Nm, Point of application 400 mm from cable entry
    - Cable vibration: 168 hours; both cable ends fixed off the vibration desk (500 mm from cable entry)
  - Temperature changes: -30°C to +60°C, 10 times
  - Immersion in wetting agent: 168 hours
  - External pressure resistance: 4 m water column
  - Water vapour permeation: < 120 µg/h at room temperature
- Material
  - Top and bottom: Environmentally friendly, UV-resistant polypropylene
  - External components: Stainless steel
  - Internal components: Powder-coated aluminium, RAL 7035
  - Sealings: Special rubber compound
- Weight: Approx. 1.5 kg
- Scope of delivery: 1 Basic enclosure, 1 cassette base plate, 1 cleaning cloth, 1 emery cloth, 1 copy of Instructions for Installation, drying agent, fastening screws

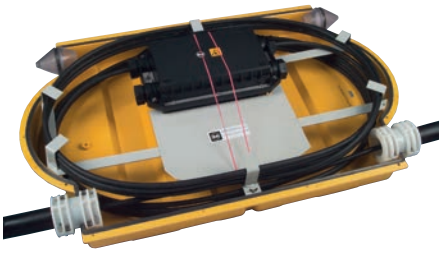
## Accessories for KM3 Universal Plastic Sleeves - Cable Entry Set

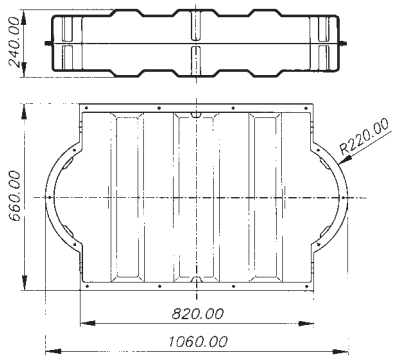
**Wall Mounting Set LWL-UKM/WM**

- For wall-mounting of Universal Plastic Sleeves KM3 and OM1 and of Distribution Enclosures OM2 and OM3
- Material: Powder-coated aluminium, RAL 7035
- Scope of delivery: 2 Rails, fastening screws

# Protective Sleeve SM/2F..+2B

## Protective Sleeve SM/2F..+2B






- The protective sleeve is an additional enclosure used for accommodating and protecting cable reserves and sleeves
- Especially designed for underground laying
- The split design makes it suitable for uncut cables
- Can also be used for the storage of reserve lengths
- 4 Entries for the installation of UF1 universal end fitting (cable entry) or double strain relief cone (blind plugs for spare entries)
- Integrated support frame for the installation of OM1, OM1/1, OM1/2 and KM3 sleeves
- Integrated support frame for the storage of 2 x 20m cable reserves
- Installation point for an Electronic Marker System (EMS)
- Entries — 4x Universal end fitting LWL-UF1/R./KU/00; Tube ø 40 or 50 mm; Cable ø 10-20 mm
- Tests
  - Mechanical strength
    - Load (5 min.) — 18 kN, contact surface over the entire sleeve
    - Impact (10 times) — 6 kg guillotine, 90 cm fall, at the centre of the sleeve
    - Impact (once) — 7 kg sharp impact device, 80 cm fall, penetration depth < 20 mm at the centre of the sleeve
  - Tightness with UF1 universal end fitting — mud-tight
- Material
  - Top and bottom — Glass-fibre reinforced polyester - yellow (similar to RAL 1018)
  - Universal end fitting — POM
  - Support frame — Powder-coated sheet steel, RAL 7035
  - Screws and washers — Stainless steel
- Weight — Approx. 27 kg
- Scope of delivery — 1 Basic enclosure, 1 support frame, 1 copy of Instructions for Installation, 2 universal end fittings, 2 double strain relief cones, fixing material

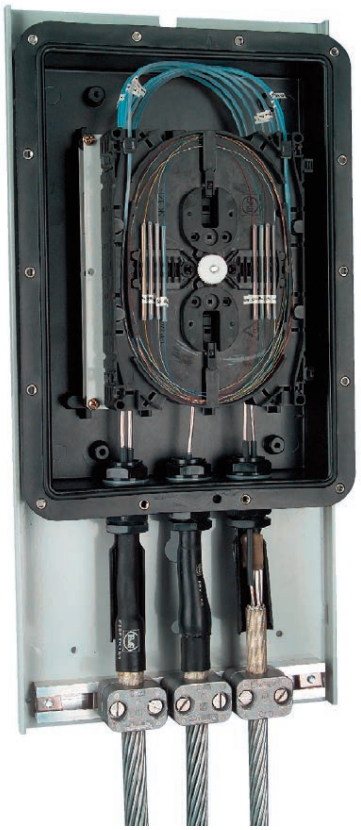
# Dome Enclosure OM-HM

## Dome Enclosure OM-HM, Individual Assembly, LWL-...

**Description**

- The OM-HM dome enclosure is especially designed for connecting optical ground wires to high-voltage towers
- Sleeves for in-line connections and branch-offs
- Suitable for wall, pole and tower mounting

## Basic Enclosure LWL-HM/OM1../.Z/GG/M

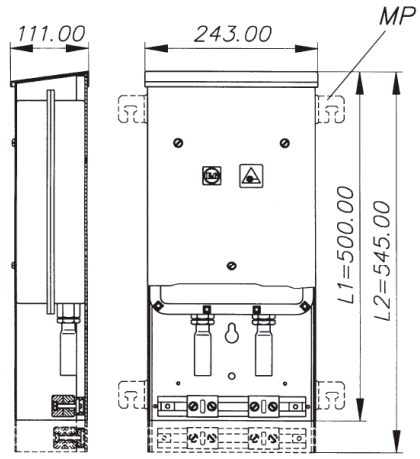


- The dome is both a protection against mechanical strain and UV rays
- Different basic enclosures for OM1 and OM1/1 sleeves
- Strain relief for wires and cables through strain relief rails and aluminium clamps

| | |
|---|---|
| • Basic enclosure | single with one strain relief rail<br>double with two strain relief rails |
| • Cable entries | 4 Optical ground wires 8-27 mm or<br>4 Cables 3-16 mm or 3 Cables 6-22 mm |
| • Splice cassettes | 5 x SK121 with OM1<br>8 x SK121 with OM1/1 |
| • Material | |
| Base plate, dome | Powder-coated aluminium, RAL 7035 |
| Strain relief plate | Aluminium |
| External components | Stainless steel |
| • Weight | Approx. 4 kg |
| • Scope of delivery | 1 Dome, 1 base plate, 1 or 2 strain relief rails, 1 copy of Instructions for installation, fastening screws |

## Accessories for OM-HM and HM-LASH Metal Dome Enclosures

**Wall Mounting Set LWL-HM/WM/M**

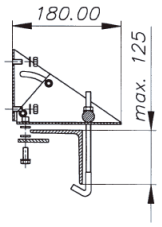



- For mounting the dome enclosure onto a wall
- The dome enclosure can be engaged in pre-mounted screws and then fastened since the wall brackets are open at the bottom.

# Accessories for Dome Enclosure OM-HM

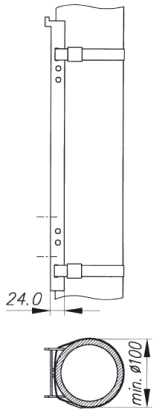
## Accessories for OM-HM and HM-LASH Metal Dome Enclosures

### SteelTower Mounting Set LWL-HM/SM/M



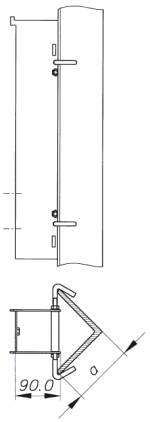

- Clamping support for steel lattice towers
- For angle sections with a leg length of 40-125 mm
- Section angle 60°-90°
- No drilling required
- Vertical adjustment of the enclosure is possible along two axes
- Enclosure can be engaged
- Material: Powder-coated 3 mm aluminium sheet, RAL 7035
- Scope of delivery: Steel tower mounting set, fixing material

### Round Pole Mounting Set LWL-HM/RM/M




- Fastening set for securing the enclosure to a round pole
- U-shaped support plate is secured to the pole by means of steel strips
- No drilling required
- Independent of pole diameter (min. 100mm)
- Enclosure can be engaged
- Material: Powder-coated 3-mm aluminium sheet, RAL 7035
- Steel strip and closing buckles not included in scope of delivery
- Scope of delivery: Round pole mounting set, installation material

### Corner Post Mounting Set LWL-HM/EK/O./M




- Clamping support for corner sections of steel lattice towers
- No drilling required
- For angle sections with a leg length of
  a = 100-200 mm (version 01) or
  up to 320 mm (version 02)
- Enclosure can be engaged
- Material: Powder-coated 3-mm aluminium sheet, RAL 7035
- Scope of delivery: Corner post mounting set, installation material

## Accessories for OM-HM Metal Dome Enclosures

### Entry Set for Optical Ground Wires LWL-HM/ES/LES..

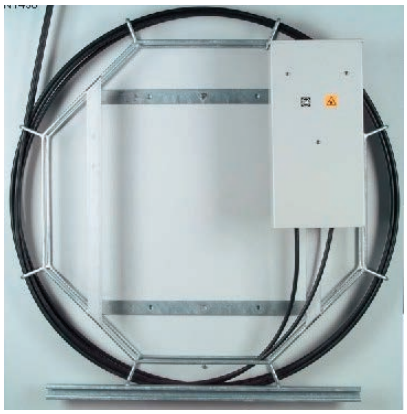
- For sealing optical ground wires with integrated fibre
- One set is required for each optical ground wire to be inserted
- Material: Cross-linked polyolefine, inside coated with thermoplastic adhesive
- Scope of delivery: Various heat-shrinkable sleeves

### Anti-Insect Seal

- Keeps insects out of the dome enclosure
- Material: Powder-coated aluminium, RAL 7035
- Scope of delivery: 2 Angles, foamed material strips

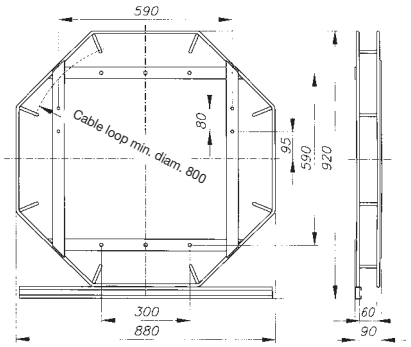
# Wire and Cable Storage Frames LWL-SSP

## Wire and Cable Storage Frames, LWL-SSP

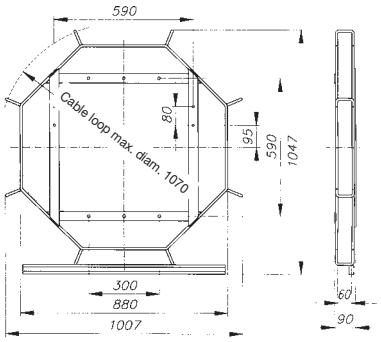


- For orderly storage of wire and cable reserves
- Suitable for indoor and outdoor applications, for wall, duct, pole and tower mounting
- C-Profile rail for strain relief of tubes or cables with cable clips
- Type ../OS comes without C-profile rail
- With type LWL-SSP/88 and LWL-SSP/88/OS cables are wound in loops from outside
- With type ../A cables are wound in loops from inside, particularly suitable for very rigid wires or cables
- Split version for installation in ducts with narrow manholes
- Mounting of the enclosure — 1x OM-HM; 1x SEC15 + Wall fastening; 1x SEC23 + Wall fastening
- Cable reserves with ø 12 mm — LWL-SSP/88, LWL-SSP/88/OS: 50 to 60 m; LWL-SSP/88/A, LWL-SSP/88/A/GET, LWL-SSP/88/A/OS: 50 m; LWL-SSP/113/A, LWL-SSP/113/A/OS: 60 m
- Bending radius — LWL-SSP/88, LWL-SSP/88/OS: 400 mm; LWL-SSP/88/A, LWL-SSP88/A/GET, LWL-SSP/88/A/OS: 535 mm; LWL-SSP/113/A, LWL-SSP/113/A/OS: 670 mm
- Material — Hot-dip galvanized steel
- Weight — Approx. 11.4 kg
- Scope of delivery — 1 Wire and cable storage frame

LWL-SSP/88




LWL-SSP/88/A




PENGO KABEL

# Equipment for laying cables near rails

# Rail foot clamps

## Rail foot clamps and branches

Laying cables at the rail foot is an economical alternative, and can supplement the cables laid on the ground, in a cable trough, or on masts.

With the optimal pressure they apply to the cables, the SFK rail foot clamps ensure reliable anchoring of the cable on the rail foot, without influencing the transmission characteristics and electrical parameters of the cable. They can be mounted without the need for any special tools.

SFK / ▯ - ▯▯ - ▯ / ▯ - ▯▯

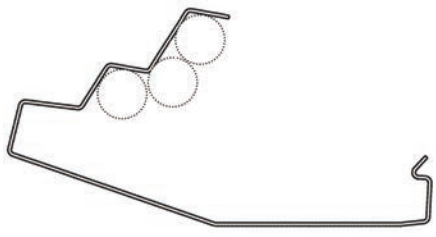
- identification of 2-part design
- second cable-diameter
- first cable-diameter
- rail foot width
- identification of the reinforced

The cable is fed out of the rail foot using SFA rail foot branches. These ensure that the permissible bending diameter of the cable at the rail foot is complied with, for installation and at the final position.

## Rail foot clamp SFK

• for 1 unreinforced rail foot cable

| type | for cable diameter [mm] | for railtype |
|---|---|---|
| SFK-125-18/0 | 15-21, PZB-signal cable | S49, S54 |
| SFK-125-25/0 | 22-29 | S49, S54 |
| SFK-150-18/0 | 15-21, PZB-signal cable | UIC60 |
| SFK-150-25/0 | 22-29 | UIC60 |



• for several PZB-signal cable

| type | number of PZB-signal cable | for railtype |
|---|---|---|
| SFK-125-18/18 | 2 | S49, S54 |
| SFK-125-3x18(PZB) | 3 | S49, S54 |
| SFK-150-18/18 | 2 | UIC60 |

# Rail foot clamps

## Rail foot clamp SFK-V

- for 1 unreinforced rail foot cable

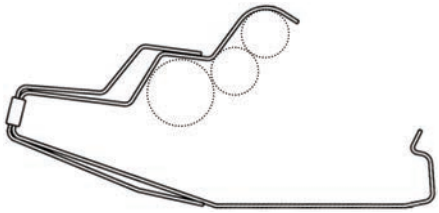
| type | for cable diameter [mm] | for railtype |
|---|---|---|
| SFK/V-125-18/0 | 15-21 | S49, S54 |
| SFK/V-125-25/0 | 22-29 | S49, S54 |
| SFK/V-150-18/0 | 15-21 | UIC60 |
| SFK/V-150-25/0 | 22-29 | UIC60 |

- for 1 unreinforced or 1 reinforced rail foot cable

| type | for cable diameter [mm] | for railtype |
|---|---|---|
| SFK/V-125-12/0 | 11-14 (copper) or 16 (fiber) | S49, S54 |
| SFK/V-125-30/0 | 29-34 | S49, S54 |
| SFK/V-150-12/0 | 11-14 (copper) or 16 (fiber) | UIC60 |
| SFK/V-150-30/0 | 29-34 | UIC60 |

- for 2 rail foot cable (copper or copper/fiber)

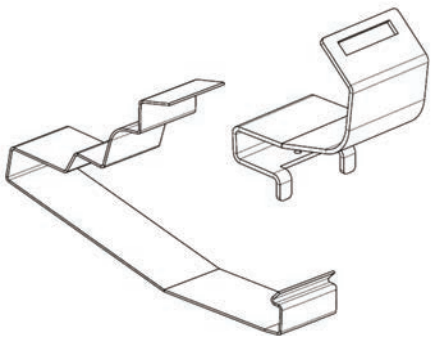
| type | for cable diameter [mm] | for railtype |
|---|---|---|
| SFK/V-125-17/15 | 1x 16-18 and 1x 15-18 | S49, S54 |
| SFK/V-125-22/16 | 1x 21-22 and 1x 16 | S49, S54 |
| SFK/V-125-24/21 | 1x 23-27 and 1x 21-22 | S49, S54 |
| SFK/V-125-27/16 | 1x 27 and 1x 16 | S49, S54 |
| SFK/V-125-27/21 | 1x 27 and 1x 21-22 | S49, S54 |
| SFK/V-125-29/29 | 1x 27-31 and 1x 28-31 | S49, S54 |
| SFK/V-150-17/15 | 1x 16-18 and 1x 15-18 | UIC60 |
| SFK/V-150-22/16 | 1x 21-22 and 1x 16 | UIC60 |
| SFK/V-150-24/21 | 1x 23-27 and 1x 21-22 | UIC60 |
| SFK/V-150-27/16 | 1x 27 and 1x 16 | UIC60 |
| SFK/V-150-27/21 | 1x 27 and 1x 21-22 | UIC60 |
| SFK/V-150-29/29 | 1x 27-31 and 1x 28-31 | UIC60 |



- for 3 rail foot cable (copper or copper/fiber)

| type | for cable diameter [mm] | for railtype |
|---|---|---|
| SFK/V-125-2x22/16 | 2x 21-22 and 1x 16 | S49, S54 |
| SFK/V-125-22/2x16 | 1x 21-22 and 2x 16 | S49, S54 |

## Rail foot clamp SFK-V, two-part

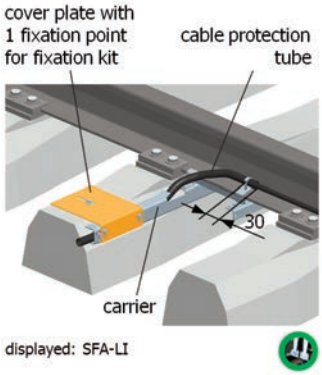


- for several rail foot cable (copper or copper/fiber)

| type | for cable diameter [mm] | for railtype |
|---|---|---|
| SFK/V-125-27/2x16-2tlg | 1x 27 and 2x 16 | S49, S54 |
| SFK/V-125-34/16-2tlg | 1x 34 and 1x 16 | S49, S54 |
| SFK/V-150-27/2x16-2tlg | 1x 27 and 2x 16 | UIC60 |
| SFK/V-150-34/16-2tlg | 1x 34 and 1x 16 | UIC60 |

# Rail foot branches

## Rail foot branch SFA and SFA-K

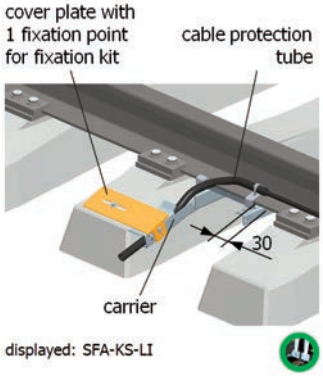



- for protected lead in or lead out of a rail foot cable with a cable diameter of up to 21 mm and a bending diameter of up to 400 mm
- for standard sleeper and short sleeper

| type | branch | length of sleeper | sleeper spacing | for rail type |
|---|---|---|---|---|
| SFA-LI | left | ≥ 2600 mm | not relevant | S49, S54, UIC60 |
| SFA-RE | right | ≥ 2600 mm | not relevant | S49, S54, UIC60 |
| SFA-K-LI | left | < 2600 mm | not relevant | S49, S54, UIC60 |
| SFA-K-RE | right | < 2600 mm | not relevant | S49, S54, UIC60 |

Delivery unit:
1 carrier, 1 cover plate, 2 tube clamps

## Rail foot branch SFA-KS

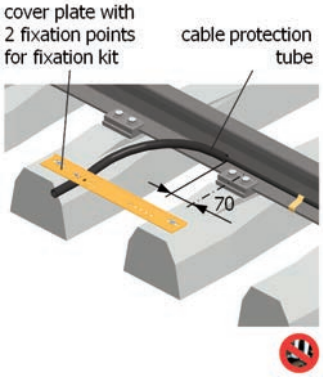



- for protected lead in or lead out of a rail foot cable with a cable diameter of up to 21 mm and a bending diameter of up to 400 mm
- pivoting for short concrete sleeper with slanted sleeper head

| type | branch | length of sleeper | sleeper spacing | for rail type |
|---|---|---|---|---|
| SFA-KS-LI | left | ≤ 2300 mm | not relevant | S49, S54, UIC60 |
| SFA-KS-RE | right | ≤ 2300 mm | not relevant | S49, S54, UIC60 |

Delivery unit:
1 carrier, 1 cover plate, 2 tube clamps

## Rail foot branch SFA-M

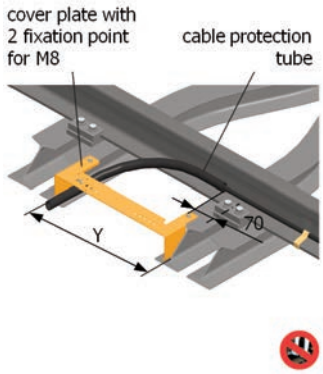



- for protected lead in and lead out of a rail foot cable with a cable diameter of 22-34 mm and a bending diameter of > 400 mm
- 1 set for 1 lead in and 1 lead out

| type | branch | length of sleeper | sleeper spacing | for rail type |
|---|---|---|---|---|
| SFA-M-600 | both sides | not relevant | 600±50 mm | not relevant |
| SFA-M-650 | both sides | not relevant | 650±40 mm | not relevant |
| SFA-M-725 | both sides | not relevant | 725±60 mm | not relevant |

Delivery unit:
2 cover plates, 2 tube clamps to fix the KSS

## Rail foot branch SFA-M-Y




- for protected lead in and lead out of a rail foot cable with a cable diameter up to 34 mm at Y-steel sleeper Y-No-600 or Y-No-650
- 1 set for 1 lead in and 1 lead out

| type | branch | length of sleeper | sleeper spacing | for rail type |
|---|---|---|---|---|
| SFA-M-Y-600 | both sides | not relevant | 600 mm | not relevant |
| SFA-M-Y-650 | both sides | not relevant | 650 mm | not relevant |

Delivery unit:
2 cover plates with fixation elements M8 to be installed at Y-steel sleeper,
2 tube clamps to fix the KSS

# Terms of delivery

## for cables, furnitures and insulated cords from Pengg Kabel GmbH, later named seller.

**1. Scope**

1.1. These General Terms shall govern legal transactions between business enterprises, namely the delivery of commodities and, mutatis mutandis, the rendering of services. Software transactions are with precedence governed by the Software Conditions issued by the Austrian Electrical and Electronics Industry Association, assembly work by the Terms and Conditions for Assembly Work issued by the Austrian Power Current and Light Current Engineering Industry and/or (where applicable) the Terms and Conditions for the Assembly of Electrical Equipment used in Medicine issued by the Austrian Electrical and Electronics Industry (the current versions are available at www.feei.at).

1.2. Any departure from the terms and conditions mentioned in 1.1 above shall be valid only if expressly accepted in writing by Seller.

**2. Submission of offers**

2.1. Seller's offers shall be deemed offers without engagement.

2.2. Tender documents and project documentation must not be duplicated nor made available to third parties without the permission of Seller. They may be claimed back at any time and shall be returned to Seller immediately if the order is placed elsewhere.

**3. Conclusion of contract**

3.1. The contract shall be deemed concluded upon written confirmation by Seller of an order received or upon dispatch of a delivery.

3.2. Particulars appearing in catalogues, folders etc. as well as any oral or written statements shall only be binding if Seller makes express reference to them in the confirmation of the order.

3.3. Subsequent amendments of or additions to the contract shall be subject to written confirmation.

**4. Prices**

4.1. Prices shall be quoted ex works or ex Seller's warehouse without VAT, packing and packaging, loading, disassembly, take-back and proper recycling and disposal of waste electrical and electronic equipment for commercial purposes as defined by the Ordinance Regulating the Handling of Waste Electrical Equipment. Buyer shall be liable for any and all charges, taxes or other duties levied in respect of delivery. If the terms of delivery include transport to a destination designated by Buyer, transport costs as well as the cost of any transport insurance desired by Buyer shall be borne by the latter. Delivery does not, however, include unloading and subsequent handling. Packaging materials will be taken back only by express agreement.

4.2. Seller reserves the right to modify prices if the order placed is not in accordance with the offer submitted.

4.3. Prices are based on costs obtaining at the time of the first quotation. In the event that the costs have increased by the time of delivery, Seller shall have the right to adjust prices accordingly.

4.4. In carrying out repair orders, Seller shall provide all services deemed expedient and shall charge Buyer for the same on the basis of the work input and/or expenditures required. The same holds for any services or additional services the expediency of which becomes apparent only as the repair order is executed. In such an event special notification of Buyer shall not be required.

4.5. Expenses for estimates of costs of repair and maintenance or for expert valuations shall be invoiced to Buyer.

**5. Delivery**

5.1. The period allowed for delivery shall commence at the latest of the following dates:

a) the date of order confirmation by Seller;

b) the date of fulfilment by Buyer of all the conditions, technical, commercial and other, for which he is responsible;

c) the date of receipt by Seller of a deposit or security due before delivery of the goods in question.

5.2. Buyer shall obtain whatever licences or approvals may be required from authorities or third parties for the construction of plant and equipment. If the granting of such licences or approvals is delayed for any reason the delivery period shall be extended accordingly.

5.3. Seller may carry out, and charge Buyer for, partial or advance deliveries. If delivery on call is agreed upon, the commodity shall be deemed called off at the latest one year after the order was placed.

5.4. In case of unforeseeable circumstances or circumstances beyond the parties control, such as all cases of force majeure, which impede compliance with the agreed period of delivery, the latter shall be extended in any case for the duration of such circumstances; these include in particular armed conflicts, official interventions and prohibitions, delays in transport or customs clearance, damages in transit, energy shortage and raw materials scarcity, labour disputes, and default on performance by a major component supplier who is difficult to replace. The aforesaid circumstances shall be deemed to prevail irrespective of whether they affect Seller or his subcontractor(s).

5.5. If a contractual penalty for default of delivery was agreed upon by contracting parties when the contract was concluded, it shall be executed as follows, and any deviations concerning individual items shall not affect the remaining provisions: Where delay in performance can be shown to have occurred solely through the fault of Seller, Buyer may claim for each completed week of delay an indemnity of at most one half of one per cent, a total of no more than 5 %, however, of the value of that part of the goods to be delivered which cannot be used on account of Seller's failure to deliver an essential part thereof, provided the Buyer has suffered a damage to the aforesaid extent. Assertion of rights of damages exceeding this extent is precluded.

**6. Passage of risk and place of performance**

6.1. Unless otherwise agreed, the delivery of goods is considered sold EXW in accordance with INCOTERMS® 2010.

6.2. For services, the place of performance shall be the place indicated in the written order confirmation, secondary to that at which the service is actually rendered by Seller. The risk in respect of such services or any part thereof shall pass to Buyer at the time the services have been rendered.

**7. Payment**

7.1. Unless otherwise agreed, one third of the purchase price shall fall due at the time of receipt by Buyer of the order confirmation of Seller, one third after half the delivery period has elapsed and the balance at the time of delivery. Irrespective thereof the turnover tax comprised in the amount of the invoice shall be paid within 30 days of the invoice date. If bankruptcy proceedings are instituted against the assets of Buyer or if an application for bankruptcy proceedings is not granted for insufficiency of assets, deliveries shall only be made against cash in advance.

7.2. In the case of part settlements the individual part payments shall fall due upon receipt of the respective invoices. The same shall apply to amounts invoiced for additional deliveries or resulting from additional agreements beyond the scope of the original contract, irrespective of the terms of payment agreed upon for the principal delivery.

7.3. Payment shall be made without any discount free Seller's domicile in the agreed currency. Drafts and checks shall be accepted on account of payment only, with all interest, fees and charges in connection therewith (such as collection and discounting charges) to be borne by Buyer.

7.4. Buyer shall not be entitled to withhold or offset payment on the grounds of any warranty claims or other counterclaims.

7.5. Payment shall be deemed to have been effected on the date at which the amount in question is at Seller's disposal.

7.6. If Buyer fails to meet the terms of payment or any other obligation arising from this or other legal transactions, Seller may without prejudice to his other rights

a) suspend performance of his own obligations until payments have been made or other obligations fulfilled, and exercise his right to extend the period of delivery to a reasonable extent,

b) call in debts arisen from this or any other legal transactions and charge default interest amounting to 1.25 % per month plus turnover tax for these amounts beginning with the due dates, unless Seller proves costs exceeding this.

c) only perform other legal transactions against cash in advance in the case of qualified insolvency, in other words, following two delays in payment.

In any case Seller has the right to invoice all expenses arising prior to a lawsuit, especially reminder charges and lawyer's fees.

7.7. Discounts or bonuses are subject to complete payment in due time.

7.8. Seller retains title to all goods delivered by him until receipt of all amounts invoiced including interests and charges.

Buyer herewith assigns his claim out of a resale of conditional commodities, even if they are processed, transformed or combined with other commodities, to Seller to secure the latter's purchase money claim. In the case of resale granting respite Buyer shall have the power of disposal of the product under retention of ownership only with the proviso that upon reselling Buyer notifies the secondary buyer of the assignment for security or enters the assignment in his account books. Upon request Buyer has to notify the assigned claim and the debtor thereof to Seller, and to make all information and material required for his debt collection available and to notify the assignment to the third-party debtor. If the goods are attached or otherwise levied upon, Buyer shall draw attention to Sellers title and immediately inform Seller of the attachment or levy.

**8. Warranty and acceptance of obligation to repair defects**

8.1. Once the agreed terms of payment have been complied with, Seller shall, subject to the conditions hereunder, remedy any defect existing at the time of acceptance of the article in question whether due to faulty design, material or manufacture, that impairs the functioning of said article. From particulars appearing in catalogues, folders, promotional literature as well as written or oral statements which have not been included in the agreement no warranty obligations may be deduced.

8.2. Unless special warranty periods operate for individual items the warranty period shall be 12 months. These conditions shall also apply to any goods supplied, or services rendered in respect of goods supplied, that are firmly attached to buildings or the ground. The warranty period begins at the point of passage of risk acc. to paragraph 6.

8.3. For improved or exchanged parts, the warranty period shall start again, but shall end in any case 6 months after the original warranty period has expired.

8.4. If delivery or the performance of services is delayed for reasons outside the control of Seller, the warranty period shall begin 2 weeks after Seller is ready to deliver or perform services.

8.5. The foregoing warranty obligations are conditional upon the Buyer giving within a reasonable period notice in writing of any defects that have occurred and such notice reaching the Seller. Buyer shall prove within a reasonable period the presence of a defect, in particular he shall make available within a reasonable period to Seller all material and data in his possession. Upon receipt of such notice Seller shall, in the case of a defect covered by the warranty under 8.1 above, have the option to replace the defective goods or defective parts thereof or else to repair them on Buyer's premises or have them returned for repair, or to grant a fair and reasonable price reduction.

8.6. Any expenses incurred in connection with rectifying defects (e. g. expenses for assembly and disassembly, transport, waste disposal, travel and site-to-quarters time) shall be borne by Buyer. For warranty work on Buyer's premises Buyer shall make available free of charge any assistance, hoisting gear, scaffolding and sundry supplies and incidentals that may he required. Replaced parts shall become the property of Seller.

8.7. If an article is manufactured by Seller on the basis of design data, design drawings, models or other specifications supplied by Buyer, Seller's warranty shall be restricted to non-compliance with Buyers specifications.

8.8. Seller's warranty obligation shall not extend to any defects due to assembly and installation work not undertaken by Seller, inadequate equipment, or due to non-compliance with installation requirements and operating conditions, overloading of parts in excess of the design values stipulated by Seller, negligent or faulty handling or the use of inappropriate materials, nor for defects attributable to material supplied by Buyer. Nor shall Seller be li- able for damage due to acts of third parties, atmospheric discharges. Excess voltage and chemical influences. The warranty does not cover the replacement of parts subject to natural wear and tear. Seller accepts no warranty for the sale of used goods.

8.9. The warranty shall lapse immediately if, without written consent of Seller, Buyer himself or a third party not expressly authorised undertakes modifications or repairs on any items delivered.

8.10. Claims acc. to § 933b ABGB are struck by the statute of limitation with lapse of the period mentioned under point 8.2.

8.11. The provisions of sub-paragraphs 8.1 to 8.10 shall apply, mutatis mutandis, to all cases where the obligation to repair defects has to be accepted for other reasons laid down by law.

**9. Withdrawal from contract**

9.1. Buyer may withdraw from the contract only in the event of delays caused by gross negligence on the part of Seller and only after a reasonable period of grace has elapsed. Withdrawal from contract shall be notified in writing by registered mail.

9.2. Irrespective of his other rights Seller shall be entitled to withdraw from the contract

a) if the execution of delivery or the inception or continuation of services to be rendered under the contract is made impossible for reasons within the responsibility of Buyer and if the delay is extended beyond a reasonable period of grace allowed;

b) if doubts have arisen as to Buyer's creditworthiness and if same fails, on Seller's request, to make an advance payment or to provide adequate security prior to delivery, or

c) if, for reasons mentioned in 5.4, the period allowed for delivery is extended by more than half of the period originally agreed or by at least 6 months, or

d) if Buyer does not or does not properly meet the obligations imposed as per paragraph 13.

9.3. For the reasons given above withdrawal from the contract shall also be possible in respect of any outstanding part of the delivery or service contracted for.

9.4. If bankruptcy proceedings are instituted against Buyer or an application for bankruptcy proceedings is not granted for insufficiency of assets, Seller may withdraw from the contract without allowing a period of grace. If this withdrawal is taken, it shall take effect immediately upon the decision that the business will not be continued. If the business will be continued, a withdrawal shall not take effect until 6 months after the institution of bankruptcy proceedings or after an application for bankruptcy proceedings has not been granted for insufficiency of assets. In any case, the contract shall be terminated immediately unless the bankruptcy law to which Buyer is subject conflicts with this or if termination of the contract is necessary to prevent significant damages to Seller.

9.5. Without prejudice to Seller's claim for damages including expenses arising prior to a lawsuit, upon withdrawal from contract any open accounts in respect of deliveries made or services rendered in whole or in part shall be settled according to contract This provision also covers deliveries or services not yet accepted by Buyer as well as any preparatory acts performed by Seller. Seller shall, however, have the option alternatively to require the restitution of articles already delivered.

9.6. Withdrawal from contract shall have no consequences other than those stipulated above.

9.7. The assertion of claims on the ground of laesio enormis, error, or lapse of purpose by the Buyer is excluded.

**10. Disposal of waste electrical and electronic equipment**

10.1. The Buyer of electrical/electronic equipment for commercial purposes, incorporated in Austria, is responsible for the financing of the collection and treatment of waste electrical and electronic equipment as defined by the Ordinance Regulating the Handling of Waste Electrical Equipment, if he is himself the user of the electrical/electronic equipment. If the Buyer is not the end user, he shall transfer the full financial commitment to his customer by agreement and furnish proof thereof to the Seller.

10.2. The Buyer incorporated in Austria shall ensure that the Seller is provided with all information necessary to meet the Seller's obligations as manufacturer/importer, particularly according to §§ 11 and 24 of the Ordinance Regulating the Handling of Waste Electrical Equipment and the Waste Management Act.

10.3. The Buyer incorporated in Austria is liable vis-à-vis the Seller for any dam- age and other financial disadvantages incurred by Seller due to Buyer's failure to meet or fully meet his financing commitment or any other obligations according to Article 10. The Buyer shall bear the burden of proof of performance of this obligation.

**11. Seller's liability**

11.1. Outside the scope of the Product Liability Act, Seller shall be liable only if the damage in question is proved to be due to intentional acts or acts of gross negligence, within the limits of statutory provisions. Seller's total liability in cases of gross negligence is limited to the net value of the order or EUR 500,000, depending on which amount is lower.

11.2. For each incident of damage, Seller shall be liable for 25% of the net value of the order or EUR 125,000, depending on which amount is lower.

11.3. Seller shall not be liable for damage due to acts of ordinary negligence nor for consequential damages or damages for pure economic loss, indirect damages, loss of production, financing costs, costs for replacement energy, loss of energy, data or information, loss of profits, loss of savings or interest, or damage resulting from third-party claims against buyer.

11.4. Seller shall not be liable for damages in case of non-compliance with instructions for assembly, commissioning and operation (such as are contained in instructions for use) or non-compliance with licensing requirements.

11.5. Claims that exceed the contractual penalties that were agreed on are excluded from the respective title. The provisions of paragraph 11 apply exclusively for all claims by Buyer against Seller, regardless of the legal basis or entitlement, and also apply to all employees, subcontractors and subsuppliers of Seller.

**12. Industrial property rights and copyrights**

12.1. Buyer shall indemnify Seller and hold him harmless against any claims for any infringement of industrial property rights raised against him if Seller manufactures an article pursuant to any design data, design drawings, models or other specifications made available to him by Buyer.

12.2. Design documents such as plans and drawings and other technical specifications as well as samples, catalogues, prospectuses, pictures and the like shall remain the intellectual property of Seller and are subject to the relevant statutory provisions governing reproduction, imitation, competition etc. The provisions of 2.2 above shall also cover design documents.

**13. Compliance with export provisions**

13.1. When passing on goods delivered by Seller to third parties (as well as any related documentation, regardless of the method of provision or the services performed by Seller [including technical support of any kind]), Buyer must comply with the applicable regulations of national and international (re-)export provisions. In any case, Buyer must observe the (re-)export provisions of Seller's country of residence, the European Union and the United States of America.

13.2. If necessary for export controls, Buyer must provide Seller with all necessary information immediately after being requested to do so, for example, information about the final recipient, final destination and purpose of the goods or services.

**14. General**

Should individual provisions of the contract or of these provisions be invalid the validity of the other provisions shall not be affected. The invalid provision shall be replaced by a valid one, which comes as close to the target goal as possible.

**15. Jurisdiction and applicable law**

Any litigations arising under the contract including litigations over the existence or non-existence thereof shall fall within the exclusive jurisdiction of the competent court at Sellers domicile; the competent court of the Bezirksgericht Innere Stadt, Vienna, shall have exclusive jurisdiction if Seller is domiciled in Vienna. The contract is subject to Austrian law excluding the referral rules. Application of the UN Convention on Contracts for the International Sale of Goods is renounced.

**16. Proviso**

The execution of the contract by Seller is subject to the condition that there are no obstacles standing in the way of execution due to national or international (re-)export provisions, and especially no embargos and/or other sanctions.

Last revised in September 2011

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