FBS

FURUKAWA BROADBAND SYSTEM

COMPLETE SOLUTIONS FOR OPTICAL COMMUNICATION NETWORKS

FURUKAWA
ELECTRIC GROUP

Index

FURUKAWA ELECTRIC GROUP

The history of Furukawa Electric Group began more than 130 years ago, in Japan. Since then, the group has transformed itself into a global corporation with diversified activities in metals, light metals, telecommunications, automotive systems, energy sector, among others, forming an international network of industries operating in Asia, North America, Europe, Africa and Latin America.

It underlines its values as a company of excellence, by providing products and technology that contribute to global development. Furukawa has more than 100 affiliates and modern research laboratories, prepared to generate new technologies and products.

● TELECOMMUNICATIONS

Optical fiber cables / Metalic communication cables / Semiconductor optical devices / Electronic appliance wires / Optical components / Network equipment / Optical fiber cable accessories and installations / CATV system / Radio products, etc.

● AUTOMOTIVE SYSTEMS AND ELECTRONICS

Automotive components and wiring harness / Magnet wires / Electronic component materials / Heat sinks / Hard disc drive (HDD) aluminum substrates / Battery products, etc.

● METALS ● LIGHT METALS

Copper and copper alloy products (plates, strips, pipes, rods, foils, and wires) / Functional surface products (plating)/ Electrodeposited copper foil / Processed products for electronic parts / Superconducting products / Special metal materials (Shape-memory and super-elastic alloys), etc.

● ENERGY & INDUSTRIALS

Copper wires and Aluminum wires / Power transmission cable / Insulated wires / Power transmission cable accessories and installations / Cable conduits / Water-feeding pipe materials / Foam products / UV tapes for semiconductor manufacturing / Electrical Insulation Tape / Electric material products, etc.

● SERVICES AND OTHERS

Logistics / Information processing service / Software development / Service business (real-estate leasing, hydraulic power generation and so on), etc.

A connected world requires innovation and technology.

Through integration of all companies in Furukawa Electric Group, each of them market and customer oriented, we can meet society needs in all five continents.

One Furukawa
Global Presence

As global company, Furukawa Electric Group understands how vital it is to identify and develop products and solutions, replying to customer´s demands in a quick, open and innovative way.

Despite that as a group we are well aware of future and unknown needs which must be faced not only as a market positioning, but must also aim at a safer, peaceful and more comfotable life to people through continuous technological innovation.

Japan
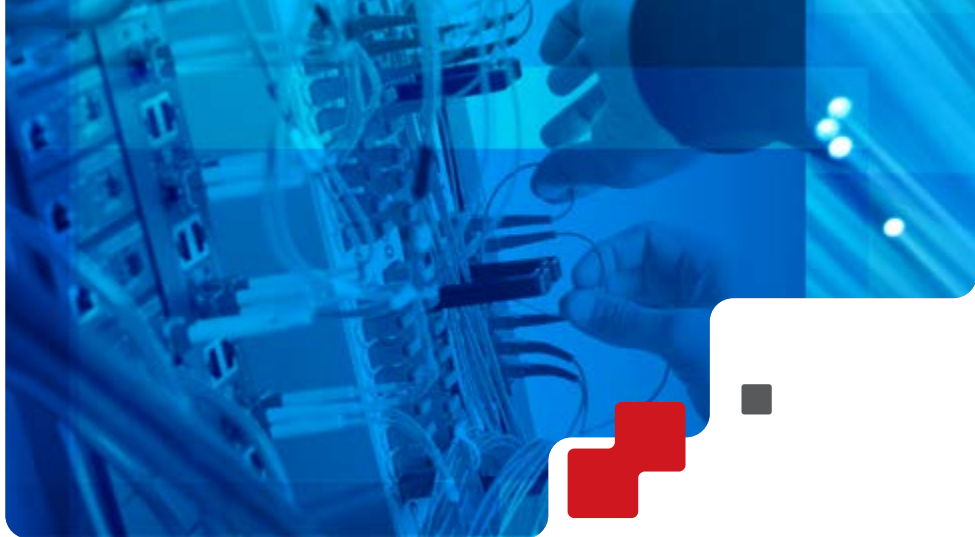
Research and Development

Technology in constant evolution.

Furukawa has invested heavily on its laboratories and in the research of broadband and networking applications. It is a center of excellence that offers complete solutions, adapted to the most diverse needs in its area of expertise: telecommunication network infrastructure and information technology.

LATIN AMERICA

Located in Curitiba, Brazil, our LatAm branch holds research and development tests equipped with high end equipment that supports high quality products in accordance with international standards. Which includes:

- Design and prototype lab: with 3D printers, allows machining for different materials;

- Mecanical and climate testing;

- Electrical and optical performance lab, including Component Level;

- Hardware and embedded software of transmition equipments;

- Test field for outdoor plant connectivity and application.

USA
OFS Labs

OFS Labs is one of the world's leading optical research institutions, and the research arm of OFS. Scientists at OFS Labs collaborate closely with the company's customers and product development teams to create solutions that help transform communications around the globe.

OFS Labs combines the rich legacy of Bell Labs with the experience of Furukawa research to form a world-class center of excellence for optical innovations. OFS Labs impacts daily life by creating technological advancements for communications, medicine, aviation, sensing, and industrial datacom. OFS Labs scientists are credited with inventing many innovative optical fiber technologies, now ubiquitous in the industry, including nonzero dispersion fiber, submarine optical fiber, polarization-maintaining fiber and bend insensitive fiber.

Initiatives for the Future

Our latest research includes a focus on:

- Optical fiber design and fabrication;
- Optical fiber manufacturing techniques;
- Fiber Bragg gratings;
- Fiber lasers and amplifiers;
- Raman amplification;
- Nonlinear optical fibers;
- Air-silica microstructure fiber;
- Signal conditioning;
- Optical monitoring;
- Theoretical modeling;
- Optical simulation OFS Laboratories.

JAPAN

Telecommunications & Energy Laboratories

This Furukawa Electric lab continues to develop optical fiber and optical communication parts/equipment to support the continuously evolving telecommunications field, and energy distribution/communication control technologies for the next-generation energy infrastructure fields.

High-capacity communications and smart infrastructure

- Optical fiber and related technologies;
- Riser cables/umbilical cables;
- Digital coherent optical communications;
- Next-generation passive/active optical components;
- Optical systems for next generation automated power distribution;
- Network protocol technologies.

Socio-Environmental Responsibility

The socio-environmental policies practiced by Furukawa Electric Group shows its commitment to building an evolutionary and sustainable society.

Certifications

ISO 9001

The ISO 9001 certificate of Quality Management System is present in Furukawa Electric's unit.

ISO 14001

Another representation is ISO 140001, regarding an environmental awareness of the Furukawa Electric Group.

OHSAS 18001

In relation to the safety and health of employees, we also comply with Occupational Health and Safety Management.

Affiliation

Furukawa Electric Group also has active participation and holds leadership position in global standards and organization that facilitate and promote the deployment of broadband technologies.

Such awareness is confirmed by periodic updates regarding new standards and norms. Example of it is our compliance with CENELEC (European Committee for Electrotechnical Standardization) standards and CPR (Construction Products Regulation) certificated cables, in accordance with Regulation (European Union) No 305/2011.

Proven quality

The Furukawa Electric Group is committed to quality in every stage of its production processes. This commitment is evidenced by important international certificates the company has earned.

Telecom Fiber by Application

Long Haul
AllWave® One Fiber
TeraWave® ULL Fiber

Long Haul networks carry huge loads of information between cities, countries and continents, creating challenges to keep the signal clear and minimize loss. Creating optimized fibers that combine the lowest dispersion and smallest dispersion slope is crucial for signals to travel over long distances with minimal need for costly dispersion compensation.

Metro Regional
AllWave® One Fiber
AllWave® *FLEX* 200 Fiber
TrueWave® Fiber

Implementing a modern metropolitan optical network is complex and challenging. Many times these networks have to be deployed through congested traffic areas, throughout fashionable, well-groomed commercial districts, or across cultural areas with invaluable artwork.

PREMISES

Central Office and Data Centers
AllWave® *FLEX+* Enhanced Fiber

Access (Outside Plant)
AllWave®+ Fiber
AllWave® *FLEX+* Fiber
EZ-Bend® Fiber

Access (Drop and in Building)
AllWave®+ Fiber
EZ-Bend® Fiber
AllWave® *FLEX+* Enhanced Fiber

Outside plant deployment for access networks poses both bending and splicing challenges. AllWave® fiber is the preferred choice for OSP Access networks as it offers a combination of fibers bend radius down to 10 mm, seamless splicing to conventional G.652D fibers, and full-spectrum zero water peak performance. AllWave+Fiber meets and exceeds both ITU-T G.652D and G.657A1 recommendations. AllWave FLEX 200 fiber offers a smaller outer diameter, and 7.5 mm bend radius performance, enabling it to support up to double the fiber count in OSP cables, compared to conventional 250 micron outer diameter fibers.

Installing fiber in buildings and homes often requires conforming the fiber around sharp corners. EZ-Bend® Single-mode Fiber offers outstanding bend performance to a 2.5 mm radius for the most challenging in-residence and MDU applications. The fiber, developed using patented groundbreaking EZ-Bend® Optical Technology, provides three times' lower loss at tight bends than comparable products. Compatible with the installed base of conventional G.652.D single-mode fibers, the fiber meets and exceeds ITU-T G.657.B3 recommendations.

Data Centers
LaserWave® *FLEX* Fiber
AllWave® *FLEX* + Fiber

Central Office and Data Center requirements for high bandwidth, high reliability networks are best supported by using components that are designed to support both today and tomorrow's applications, preserving the value of the physical infrastructure. As data centers migrate to fiber based networks, and as Central Offices migrate to all fiber IP based networks, our solutions can support you with fiber, cable, and optical assemblies.

LaserWave® *FLEX* multimode and Allwave® *FLEX*+Single-Mode Fibers are optimized to support the demanding needs of today's 10 and 40 Gb/s networks, as well as tomorrow's 100 Gb/s, 400 Gb/s and Terabit speeds.

New Slimbox™ In-Line

Meet our new slimbox in line. Aimed to face the restriction in aerial networks, our solution counts with:

• Grommets already mounted in box, compatible with input and derivation;
• Double sealing;
• Pivoting adapters. Work without impacting active costumers;
• Compatible with Round (3 mm) and Flat (3X2 mm) Drop Cable.

Fiber Ribbon for Easy Separation
Rollable Ribbon

Rollable Ribbon is an optical fiber ribbon with optical fibers bonded at intervals. Separating the optical fibers is easy since only release of the bonded portion is required. The ribbons can be rolled and the rolled ribbons can be stranded. This new technology helps realize extremely compact size and light weight, high fiber-count cables.
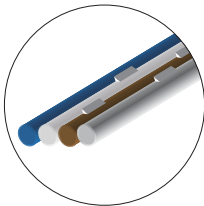
Rollable Ribbon
(schematic view)
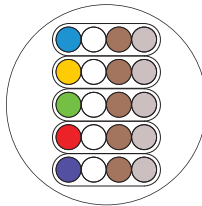
Stacked Ribbons
(conventional ribbon)
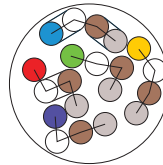
Rolled-up Ribbons
(rollable ribbon)

Meet our EZ!Lux

Aimed to support more efficient installations on MDU environments, this solutions counts with plug and play features to speed up and safe up your network. Easy to expand and supported by our Ez!Lux cable.

1st subscriber connection

Any new subscribers?

Plug-and-Play Expansion

Combine it with just one click!

Fiber Lan
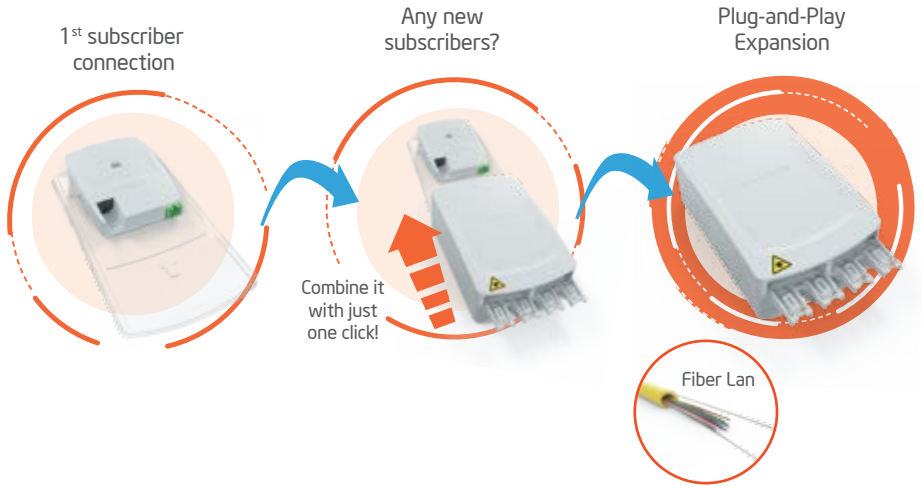
InvisiLight™ Optical Solutions
MDU and residential acess by fiber

InvisiLight™ Optical Solutions have been successful in deploying fiber in building hallways with a multifiber version and deep within the residential unit with a single fiber version. The solution leverages the EZ-Bend fiber technology to offer leading bend performance when routed around multiple corners.
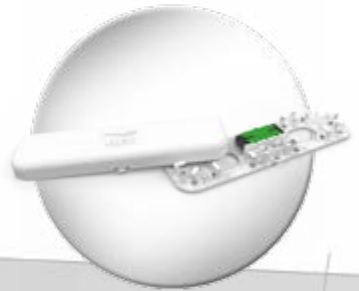
COMPLETE SOLUTION FOR OPTICAL COMMUNICATION NETWORKS.

The demand for broadband services is ever increasing. OFS as part of Furukawa Electric Group develops and provide optical fiber communication infrastructure solutions, for data, voice and video transmission.

The FBS product portfolio provides equipment, cables and accessories to implement services on Passive Optical Networks - PON.

The portfolio includes equipment for PON which enables triple play services (data, voice and video). It also offers a better cost-benefit ratio in Centralized, Convergent and Distributed network architectures that include splicing, field connectorization or pre-terminated assemblies.

The FBS product portfolio is designed for telecom carriers, ISPs (Internet Service Providers), contractors and high standard horizontal and vertical condominium operators. It meets the different needs of SFU (Single Family Unit) and MDU (Multi Dwelling Unit) applications.

FTTx (Fiber-To-The-Anywhere)

The term FTTx designates high performance network architectures based on an optical solution. These are Passive Optical Networks (PON) with elements that does not need to be connected to a power source.

FTTx is a technology that takes fiber up to the subscriber's house FTTH (Home), or plenty of other destinations, such as the building's entrance (FTTB – Building).

Regardless of FTTx modality, the main elements of this technology are composed of single-mode optical fibers, equipment at central offices and subscribers, and passive elements (splitters) in the network environment.

The main active equipments present in central offices, are the OLT (Opitcal Line Termination), which allows signal sharing up to 128 users.

At the user or subscriber level, we can find active equipments: ONU or ONT. These products receive an optical signal and provide RJ-45 ports for connection to devices such as computers or telephones.
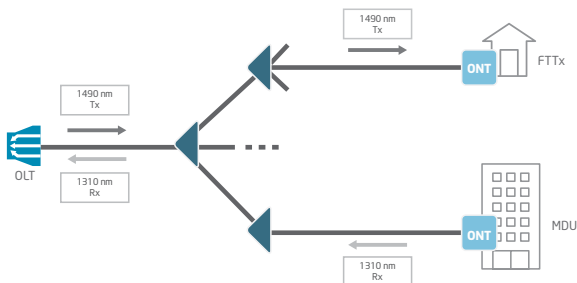
> Technology that takes optical fiber up to the subscriber's house or apartment.

PON FTTx network present multiple advantages face tradicional twisted pair and even hibrid networks, as it not only guarantee current and future bandwidth, but also eliminates the risk of damage by electrimagnetic interfearence and atmospheric discharge. Offering high availability and quality of service, reducing operating costs and increasing profit margins.

Splitters are passive dividers, which means they are not connected to a power supply and are completely optical. They are inserted at strategic points in the network in order to optimize and facilitate its expansion.

The FBS product portfolio provides a complete solution for implementation of FTTx systems ranging from equipment, splice and termination closures, to cables and accessories.

Pay-as-you Grow Solutions

Planning the network is a crucial part of the FTTx network deployment and predicting effectively the position and equipment' occupation is not easy. That's where the pay-as-you-grow concept comes from, it aims at optimizing the capex investment of the network by dispending only the necessary resources. Combining this concept with innovative products that help reduce labor costs investments, Furukawa Electric developed the EZ!Lux solution for both SFU and MDU segments of the networks. Learn more about these solutions below.

EZ!LUX SFU

The EZ!Lux SFU uses pre-terminated products from the distribution part of the network up to the customer's house. Due to this plug-an-play solution, all the network's deployment is much quicker and safer, as every product comes tested from factory.

This solution requires the operators to deploy the network only up to the first level splitter and, only if there's any demand to activate subscribers, it deploys the fiber access terminal closures.

The first level splitter is installed at the Pre-Terminated Slimbox Drop Terminal (CTOP-16P) that has Slimconnector IP68 outdoor outputs.

The Locked Pre-Terminated Slimbox Drop Terminal (CTOP-L8), which has the second level splitter, is installed on-demand with pre-terminated drop cables from the CTOP-16P. The subscribers will be activated through pre-terminated drop cables with Slimconnector connected to the outputs of the CTOP-L8.

Due to the use of only pre-terminated drop cables from the distribution closure up to the subscriber and sealed drop terminal closures, the deployment of this solution reduces labor time and training, complexity of the network and, capex investment on network equipment and infrastructure accessories.

EZ!Lux MDU

The EZ!Lux MDU solution looks to solve the uncertainty of when and on which floors the subscribers will require activation in the building. For this network to become more effective the EZ!Lux MDU solution uses modular plug-an-play elements associated with the pay-as-you-grow concept. The solution separates the deployment in three steps.

The first step is to install the distribution part of the network inside the building, deploying a closure at the base of the building, which is responsible for the transition between the outdoor cable and the indoor riser cable, and the Fiber-Lan EZ!Lux riser cable. With this step 100% of the building units can be considered homes passed (HP). All next deployments will be on-demand, when subscribers need to be activated, and don't require any splicing, it uses field connectors and sealed plug-an-play terminal boxes.

The second step only needs to be executed if the first subscriber of a floor requires activation. Therefore, the Flex Rosette is installed at shaft of the building over the Fiber-Lan EZ!Lux riser cable which has characteristics that facilitate the midspan access to the fiber. The connection to the drop cable deployed to the subscriber's unit is done with a field connector.

The third step is for when there's more than one subscriber requiring activation on the floor. It uses a sealed box (CEIP Flex) with the second level splitter inside that is simply attached to the Flex Rosette already installed. The CEIP Flex expand the number of connections to up to 8 subscribers.

Trends

Telecom companies around the globe are well aware of the change in which users are accessing content. Linear media is loosing space to more customized on-demand multiplatform services. However, while these changes are taking place at customer interface level, operators are also looking into ways of improving its own infrastructure using technologies such as SDN, NFV and network automation. All this effort aims at creating automated next-generation networks that are cheaper to run, more reliable and better-equipped to deliver a high-quality user experience. Get to know more about these technological trends below.

NFV:

Network Functions Virtualization is a network architecture concept that involves decoupling network services traditionally run on physical devices. It involves replacing dedicated appliances such as network address translation (NAT), domain name service (DNS) and firewalls with software running on industry standard servers. A key advantage of this approach is that network function software can be introduced without requiring the installation of new equipment.

Key points:

- Facilitates cost savings in CapEx and OpEx
- Allows operators to innovate faster, reducing the time it takes to deploy new services to market

Network Automation:

Network Automation is about getting to the point where a telecom's network can function with zero or minimal interference from humans, automating the configuration, management, testing, deployment and operations of physical and virtual devices within a network. It encompasses many themes such as NFV, SDN and data analytics, as well as emerging areas as AI, machine learning and robotics.

Key points:

- Improved reliability
- Reduced costs
- Better customer experience

5G:

5G technology promises to deliver faster speeds, lower latency, increased availability, improved reliability, innovative new use-cases and cost-effective mobile networks. Taking that into consideration, it will need to provide the foundation for comprehensive services that solve major challenges for applications such as self-driving vehicles, drones, public safety systems and smart grids. "It is expected to offer 100x faster speeds, 100x more devices, 10x lower latency and 1000x higher data volumes" by Your Role in 5G, Broadband World Forum 2018 Report.

> "It is expected to offer 100x faster speeds, 100x more devices, 10x lower latency and 1000x higher data volumes"

For the full potential to be realized, mobile technology must be backed by a fixed optical network. The high capacity and high speed that fiber delivers makes it the ideal foundation to deal with the unprecedented amount of data 5G is expected to generate providing fronthaul and backhaul.

"While 5G is usually thought of as a phenomenon in mobile broadband, it also presents a huge opportunity for fixed operators as the fixed network will need to be integrated seamlessly." – Robin Mersh, CEO, Broadband Forum.

Resources:
Your Role in 5G, Broadband World Forum 2018 Report
The Technology of Broadband, Part Three: Network Efficiency, Resiliency and Agility, Broadband World Forum 2018 Report
www.opennetworking.org/sdn-definition/
www.juniper.net/us/en/products-services/what-is/network-automation

FTTx Solutions

ITS

MDU

SMART CITY

FTTH

Smart
Cities

As metropolitan areas grows in size and complexity, the demand for intelligent systems increases. In order to facilitate public administration and improve citizens' quality of life, new and smarter solutions are necessary.

In the Smart/Safe Cities concept, optical fiber networks expand its previous functions such as FTTH in order to interconnect services offered to citizens such as: schools, hospitals, traffic light systems, public security systems (civil defense, firefighters, police), etc. This interconnection is possible by the use of passive optical network solutions, which allows access of up to 10 Gb/s.

The FBS product portfolio offers the main necessary products to enable an optical network infrastructure for a Smart/Safe City based on PON (Passive Optical Network) technology.

Smart City Concept
A holistic concept, which goes beyond technology

Product and Service Providers

Society   **Government**

STATE AUTHORITY

Top down approach
Vision, Development Strategy, Public Policies

Citizen

Universities Hospitals

Business

ICTs*

BUsiness Models

Financial Institutions

Industry Associations

Bottom up approach
Study of cases from different segments

| Buildings | Energy | Transport | Residues | Water Sanitation | Communications | Public Security | Public Administration |

Intelligence coming from sensors, automations, solutions that exceed frontiers, but also from correct regulations, business models, financing and the engagement of the community.

*ICT = Information and Communication Technology

Scope:
- Urban mobility management;
- Intelligent traffic control;
- Intelligent parking lots;
- Efficient public lighting;
- Crisis management and disaster detection, sensing;
- Public health, education, transport and security services.
- Smart Metering
- Among others.

Smart Cities

3 ACCESS NETWORKS

2 DISTRIBUTION NETWORK

1 CENTRAL OFFICE

4 TERMINATION NETWORK

ITS
Intelligent Transportation Systems

Communication Optical Networks for Intelligent Road Automation Systems

We live in a world of constant technological evolution where new solutions are developed and implemented daily. Among those, some meets the needs of road services.

On-line services, such as call boxes, radars, cameras and tolls need to be interconnected in a fast, safe and reliable way. This interconnection allows for better control of vehicle traffic and improved customer satisfaction.

A PON (Passive Optical Network) can ensure the reliability as well as the future needs of the system. PON technology eliminates all active equipment in the network. From a management and operational point of view, this eliminates the need to set up and maintain active components and reduces the failure points on the network thereby making it safer and more reliable.

The FBS product portfolio offers a complete solution of products, from active equipment at the central office, passing through all passive elements, to the standard industrial active equipment, at the final point of the network. Regarding the network administration point, the OLTs – Optical Line Terminals equipment allows transmitting data from the central office while performs the whole control of the equipment situated at the network final points (ONUs –

Optical Line Units). As for the passive optical elements, it consists of optical fiber cables and accessories, such as splitters, splice/access boxes and connectors are inserted, also present at our portifolio.

The main caracteristic of a PON network is the use of optical fibers, which can be used in up to 128 points/users by means of optical splitters, thus, improving the use of the resources implemented in the network. The splitters are used in the administration center, in the distribution or access boxes, accordingly to the proposed topology.

The industrial ONU is located at the final point of the PON network, which was developed exclusively for applications in high temperature environments without abundant power supply. The resistance of the FBS ONUs to temperatures is higher through the "Power Saving Mode" or "Sleep Mode" feature. This function allows the ONU to switch off parts of its electric circuit temporarily to reduce the energy consumption.

The PON [Optical Network] solution and its advantages

- **Excellent cost-benefit ratio**: This system optimizes fiber utilization in the optical network, enabling lower investment through gradual release of fibers as the needs arise.
- **Open technology**: Applications and services do not require manufacturer-specific hardware or solutions. The topology of the passive optical network is based on diverse access technology such as IP protocol and Ethernet networks.
- **Easy expansion and integration**: The use of PON technology enables more reliable communication among the different applications connected to the network.
- **Energy efficiency**: Low energy consumption in specific applications such as emergency telephones / call boxes.
- **Monitoring**: Full integration with surveillance camera systems, speed radars, vehicle count, variable message panels, toll booths, etc.
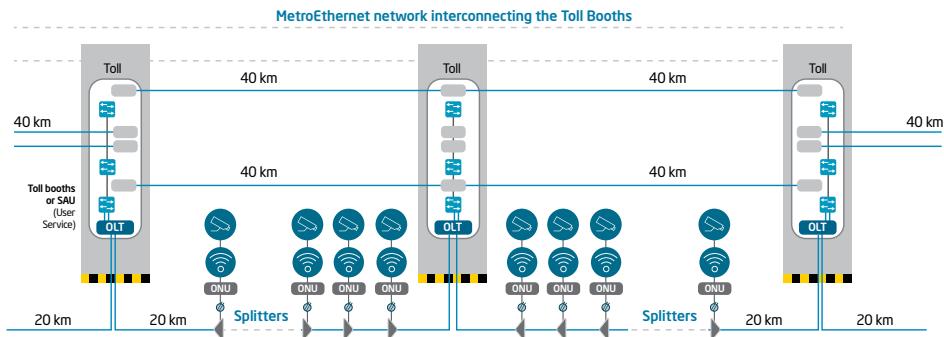
ITS

3 TERMINATION NETWORK

2 DISTRIBUTION NETWORK

1 CENTRAL OFFICE

FTTH
Fiber-To-The-Home

FBS has complete solutions for FTTH with high quality equipment and accessories to serve different customers' application and needs.

FTTH is a completely optical network connecting central offices to the subscriber's home. In this topology, an optical termination box provides the transition between distribution and termination cables or "drop cables", that reach the optical termination points within the end-user's environment. The last element of this network is the optical jumper that connects the final equipment (ONU) to the termination point.

In FTTH networks, the fiber goes all the way up to the subscriber's house, assuring the necessary bandwidth for an ever growing demand generated by data and voice traffic via Internet.

The FBS portfolio offers a variety of cables for different applications (aerial, self-supported, underground, etc.); ODFs (Optical Distribution Frames), which are concentration points within the Central Office; splitters, which enable dividing the PON signal and increase network capability; splice closures for network branching; and termination boxes to hold the "drop" cables that go to the customers' homes.

At the subscriber's home, there are also optical termination points where the conversion of termination network into a domestic network, or from optical into electrical signal is carried out.

Field connectorization offers many advantages in an FTTH network, specifically cost savings in installation time and avoiding the necessity of splicing machines.

The EZ!Lux Solution is designed for pre-terminated networks making it unnecessary to perform splices in the field; the termination boxes and the Drop cables are already provided with factory-installed connectors and adapters. After the installation of a box with splitter, it is not necessary to open it up for customer activation. The connectors are external and hardened, allowing their installation in outdoor environments.

Advantages of an Optical Network

- Meets increasing bandwidth demand by residential users;
- Supports bandwidth growth from any application;
- Reduced Insertion loss allows bigger distances transmission between the head-end and subscriber;
- Easy installation and activation of new customers;
- Higher quality and stable data transmission;
- Optical fiber is immune to electromagnetic interference.
- Reduced installation costs;
- Lower maintenance cost.

In a Few Words

As the optical infrastructure grows for long-haul, metro and access networks, FTTH is the choice for service providers to deploy fiber up to the last mile. Optical fiber ensures the provider's network for bandwidth and subscriber growth, even while aggregating multiple services, which can include voice, video, data, WiFi, home security, smart meters and so on.

A number of architectures based on international standards are used today to bring the benefits of optical fiber technology to communities all over the world.

FTTH
Fiber-To-The-Home

2 DISTRIBUTION NETWORK

1 CENTRAL OFFICE

ACCESS NETWORK 3

TERMINATION NETWORK 4

MDU
Multiple Dwelling Unit

As FTTX deployment accelerates globally to meet increasing bandwidth needs, service providers must install optical fiber both to and inside Multiple Dwelling Unit (MDU) for business and residential subscribers. To provide Gigabit services, providers must place optical cables in building risers and ducts, install optical fiber in hallways, and then take this fiber deep into the units, connecting to an indoor Optical Network Unit (ONU). How can providers accomplish this in buildings that can vary widely in design, materials and available pathways?

Buildings pose a challenge due to construction materials and styles including duplexes, garden style, low rise (less than 10 floors), mid rise (10 floors and above), high rise (15 to 40 floors) and skyscrapers (40 floors and above). However, while structures may vary, building owners, residents and service providers inevitably have certain common demands: they all want quick service turn-up and the fast, non-disruptive installation of solutions that blend into the existing décor.

To help meet these needs, the FBS portfolio features a broad range of solutions to meet the requirements of virtually any MDU deployment. For flexibility and regional preferences, these product offerings include a mix of preconnectorized, in-field fusion splicing and mechanical connector solutions to achieve a customized approach based on the specific building design.

These solutions include several building blocks composed of a wide range of terminals, splitters, point-of-entry modules, riser cables, hallway fiber and complete indoor living unit fiber kits. This portfolio allows service providers to pick and choose the best solution for their project.

By reducing time of installation and maintenance, our solutions also support increasing operational margins, by demanding a reduced investment at first and allowing later network increment according to new customers. In preterminated forms, this characteristic allows installation teams to be more efficient, as it can install and activate.

FBS Building Solutions help to revolutionize the speed of installing fiber; enhance the customer experience; minimize disruption; reduce labor costs; increase subscriber take rates; speed up time to revenue for service providers; and spread Gigabit speeds faster to subscribers.

Infrastructure adequate to the size of the building.
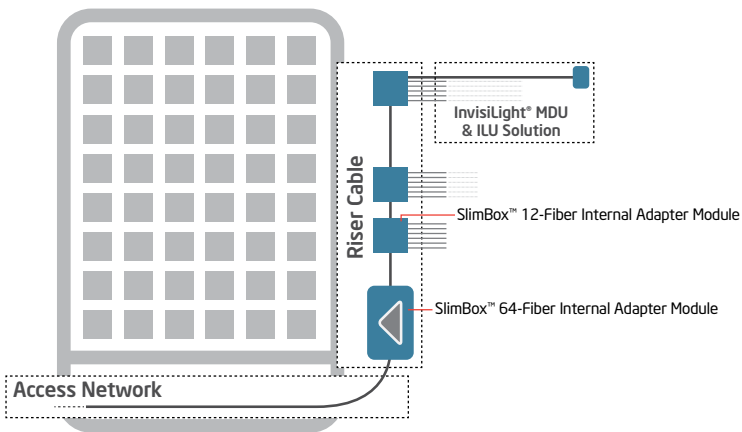
Riser Cable

InvisiLight® MDU & ILU Solution

SlimBox™ 12-Fiber Internal Adapter Module

SlimBox™ 64-Fiber Internal Adapter Module

Access Network

MDU
Multiple Dwelling Unit

4 TERMINATION NETWORK

3 ACCESS NETWORK

2 DISTRIBUTION NETWORK

CENTRAL

1 CENTRAL OFFICE

Central Office

COMPACT
MDF RACK
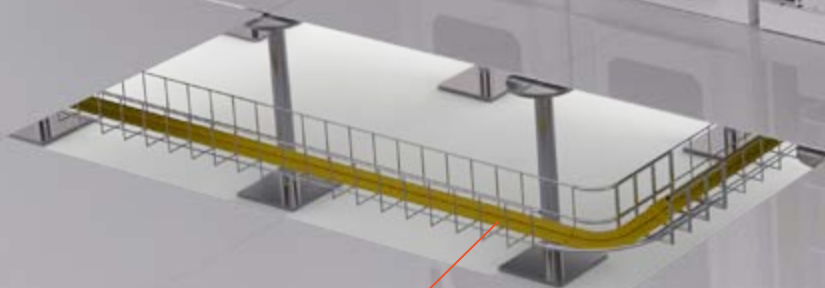
CFOI-UB-TS LSZH
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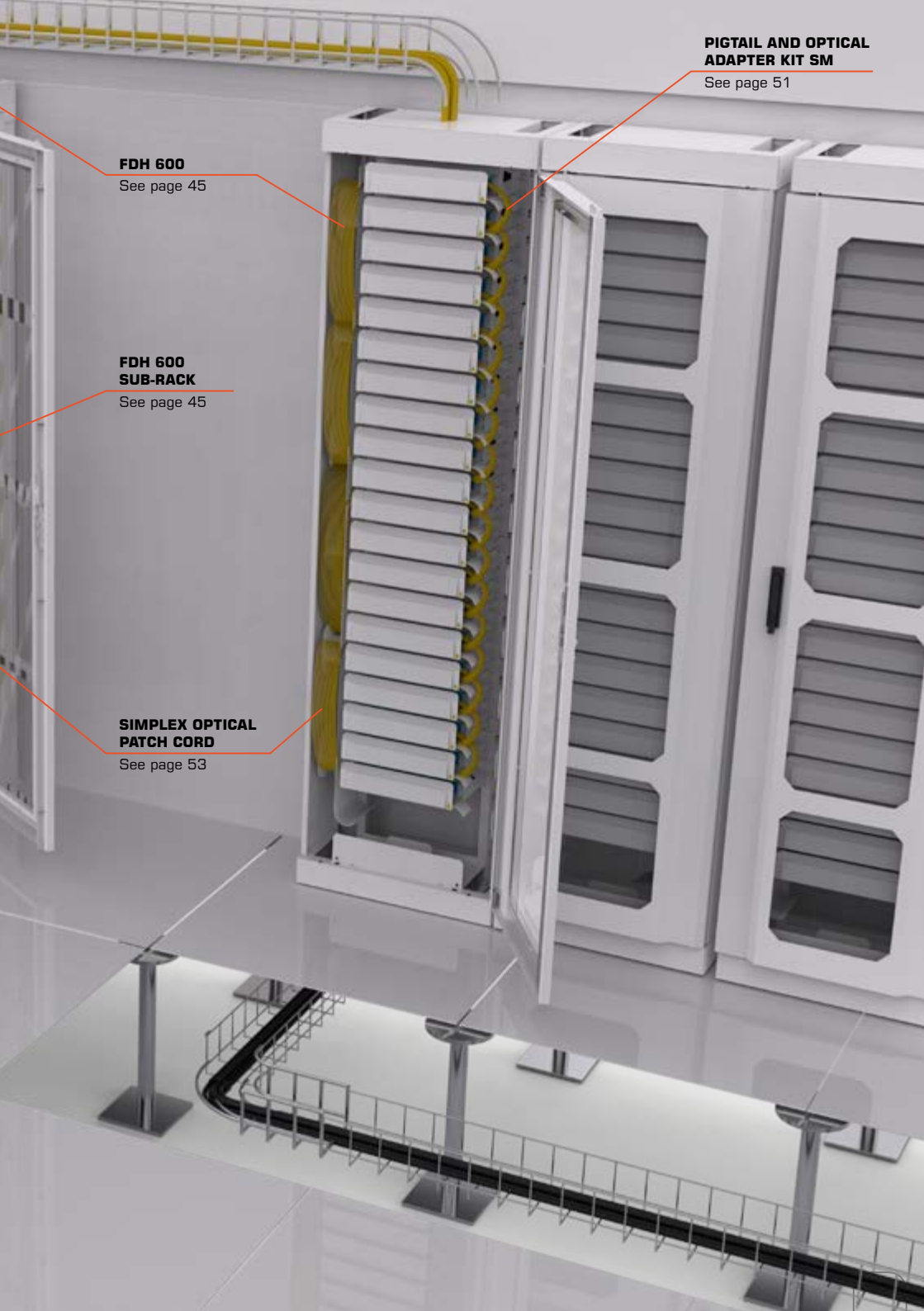
GPON

OPTICAL CONCENTRATOR CHASSIS LIGHTDRIVE GPON LD3032

The OLT (Optical Line Terminal) LD 3032 is an equipment used in FTTx networks (Fiber-To-The X) as subscriber hub.

Constructive Characteristics

Power Supply	2 DC sources with redundancy	
Operating temperature	-40º C ~ 80 ℃	
Dimension	Height	88 mm
	Width	443 mm
	Depth	290 mm

Technical Characteristics

Interfaces	2 slots for service modules	Total of 32 ports		
		16 GPON interfaces per module		
	2 slots for control and management module	4 uplink 10GE ports		
		1 MGMT port (RJ45)		
		1 alarm port (RJ45)		
		1 console port (RJ45)		
		1 microSD port		
GPON	Standard GPON ITU-T G.984	Layer 2	64K MAC addresses	
	128 ONTs per PON interface (Up to 4096 per chassis)		Support to 4K VLANs, 802.1q	
	2.5 Gbps downstream and 1.25 Gbps upstream		Spanning Tree (STP, RSTP, MSTP)	
	20 km reach (60 km maximum logical reach)		Link aggregation	
Layer 3	Static routing IPv4 e IPv6	Security	SSH v1/v2	
	Dynamic routing IPv4 e IPv6		802.1x with RADIUS e TACACS+	
	RIP v1/v2, OSPF v2, BGP v4			
	VRRP		Storm control	
QoS	Dynamic bandwidth allocation		Access control list for L2, L3 and L4	
	8 queues per port			
	Traffic scheduling (SP, WRR, DRR)			

Ordering Description

Optical Concentrator CHASSIS LIGHTDRIVE GPON LD3032
Power Supply DC for Optical Concentrator Chassis GPON 7U
Blank Panel - Power Supply DC for Optical Concentrator Chassis GPON 7U
Power Supply - 48VDC Netsure 211 C23 with 2X 1000 W Rectifier Units and SCU+ Supervision Unit
Management and Switch Module for FK-OLT-G2500
Blank Panel - Management and Switch Module for Optical Concentrator Chassis GPON 7U
Uplink Module with 2 10 GE Ports + 4 GE SFP Ports for Optical Concentrator Chassis GPON 7U
Blank Panel - Uplink Module for Optical Concentrator Chassis GPON 7U
Service Module with 4 SFP GPON Ports for Optical Concentrator Chassis GPON 7U
Service Module with 4 Redundant SFP GPON Ports for Optical Concentrator Chassis GPON 7U
Blank Panel - Service Module for Optical Concentrator Chassis GPON 7U
Transceiver SFP GPON OLT Class B+ for Optical Concentrator
Transceiver SFP GE SX 850 nm (550 m) for Optical Concentrator
Transceiver SFP GE LX10 1310 nm (10 km) for Optical Concentrator
Transceiver SFP GE LX20 1310 nm (20 km) for Optical Concentrator
Transceiver SFP GE LX40 1310 nm (40 km) for Optical Concentrator
Transceiver XFP 10 GE SR 850 nm (300 m) for Optical Concentrator
Transceiver XFP 10 GE LR 1310 nm (10 km) for Optical Concentrator
Transceiver XFP 10 GE ER 1550 nm (40 km) for Optical Concentrator

SERVICE MODULE SFP GPON 16 PORTS FOR CHASSIS

SWITCH AND MANAGEMENT MODULE FOR CHASSIS LIGHTDRIVE GPON LD3032

BLANK PANEL - SERVICE MODULE FOR CHASSIS LIGHTDRIVE GPON LD3032

Constructive Characteristics

Power Supply	2 DC sources with redundancy	
Operation Temperature	-40ºC to 80ºC	
Dimensões	Height	88 mm
	Width	443 mm
	Depth	290 mm

Technical Characteristics

Interfaces	2 slots for service modules	Total of 32 ports	Layer 2	64K MACs addresses
		16 GPON Interfaces per module		Support to 4K VLANs, 802.1q
	2 slots for control and management module	4 uplink 10GE ports		
		1 MGMT port (RJ45)		Spanning Tree (STP, RSTP, MSTP)
		1 alarm port (RJ45)		
		1 console port (RJ45)		Link aggregation
		1 micro SD port		
GPON	Standard GPON ITU-T G.984			
	128 ONTs per PON interface (Up to 4096 per chassis)			
	2.5 Gbps downstream and 1.25 Gbps upstream			
	20 km reach (60 km maximum logical reach)			
Layer 3	Static routing IPv4 e IPv6		Security	SSH v1/v2
	Dynamic routing IPv4 e IPv6			802.1x with RADIUS e TACACS+
	RIP v1/v2, OSPF v2, BGP v4			Storm control
	VRRP			Access control list for L2, L3 and L4
QoS	Dynamic bandwidth allocation			
	8 queues per port			
	Traffic scheduling (SP, WRR, DRR)			

Ordering Description

Service Module Sfp Gpon 16 Ports for Chassis
Switch and Management Module for Chassis Lightdrive Gpon LD3032
Blank Panel - Service Module for Chassis Lightdrive Gpon LD3032 / LD3096

POWER SUPPLY DC FOR CHASSIS LIGHTDRIVE GPON LD3032

BLANK PANEL - SWITCH AND MANAGEMENT MODULE FOR CHASSIS LIGHTDRIVE GPON LD3032

Constructive Characteristics

Power Supply	2 DC sources with redundancy	
Operation Temperature	-40ºC to 80ºC	
Dimensões	Height	88 mm
	Width	443 mm
	Depth	290 mm

Technical Characteristics

Interfaces	2 slots for service modules	Total of 32 ports		
		16 GPON Interfaces per module		
	2 slots for control and management module	4 uplink 10GE ports		
		1 MGMT port (RJ45)		
		1 alarm port (RJ45)		
		1 Console port (RJ45)		
		1 micro SD port		
GPON	Standard GPON ITU-T G.984	**Layer 2**	64K MACs addresses
	128 ONTs per PON interface (Up to 4096 per chassis		Support to 4K VLANs, 802.1q
	2.5 Gbps downstream and 1.25 Gbps upstream		Spanning Tree (STP, RSTP, MSTP)
	20 km reach (60 km maximum logical reach)		Link aggregation
Layer 3	Static routing IPv4 e IPv6	**Security**	SSH v1/v2
	Dynamic routing IPv4 e IPv6		802.1x with RADIUS e TACACS+
	RIP v1/v2, OSPF v2, BGP v4		Storm control
	VRRP		Access control list for L2, L3 and L4
QoS	Dynamic bandwidth allocation		
	8 queues per port		
	Traffic scheduling (SP, WRR, DRR)		

Ordering Description

Power Supply DC for Optical Concentrator Chassis GPON 7U

OPTICAL CONCENTRATOR STANDALONE LIGHTDRIVE GPON LD3016

The OLT (Optical Line Terminal is an equipment used on FTTx networks as subscriber hub. The OLT LD3016 is compatible with the GPON standard (ITU-T G.984.1).

Constructive Characteristics

Power Supply	AC full range (100-240V, 50/60Hz) or DC 48/60V Redundant
Modules	Hot swappable
Power Consumption	50W
Operation Temperature	-20ºC to 60ºC
Dimensões	Altura	440 mm
	Largura	300 mm
	Profundidade	44 mm

Technical Characteristics

Interfaces	16 GPON ports compatible with ITU-T G.984 (SFP)	**GPON**	Standart GPON ITU-T G984.4
	4 ports of uplink 10 GE (SFP+)		128 ONTs per PON interface (Up to 1024 per chassis)
	4 ports of uplink 1 GE (RJ45)		
	2 Slots to fonts AC/DC (Redundancy)		2.5 Gbps downstream and 1.25 Gbps upstream
			20 km reach (60 km logical reach)
	188 Gbps switching capacity and 1255 Mpps throughput	**Layer 3**	Static routing
			IPv4 (Dual Stack)
Layer 2	16K MAC addresses		IPV6 (Dual Stack)
	Support to VLANs	**Security**	SSH
	Spanning Tree (PVRSTP, MSTP, STP/PVSTP+)		802.1x
	Link aggregation		Storm control
			DoS Protection
QoS	Traffic scheduling (SP, WRR e DRR)		
	8 rows per door		
	Support for CoS with priority WRE, WRR e DSCP/802.1p		

Ordering Description

Lightdrive Standalone GPON Optical Concentrator LD3016
Power Supply AC for GPON Standalone Optical Concentrator LD3008/LW3008C/LD3016
Power Supply DC for GPON Standalone Optical Concentrator LD3008/LW3008C/LD3016

OPTICAL CONCENTRATOR STANDALONE LIGHTDRIVE GPON LD3008

The OLT (Optical Line Terminal is an equipment used on FTTx networks as subscriber hub. The OLT LD3008 is compatible with the GPON standard (ITU-T G.984.1).

Constructive Characteristics

Power Supply	AC full range (100-240V, 50/60hZ) or DC 48/60V Redundant	
Modules	Hot swappable	
Power Consumption	50W	
Operating Temperature	-20ºC to 60ºC	
Dimensões	Height	400 mm
	Width	300 mm
	Depth	44 mm

Technical Characteristics

Interfaces	8 GPON ports compatible with ITU-T G.984 (SFP)	**GPON**	Standart GPON ITU-T G984.4
	4 ports of uplink 10 GE (SFP+)		128 ONTs per PON interface (Up to 1024 per chassis)
	4 ports of uplink 1 GE (RJ45)		
	2 Slots to fonts AC/DC (Redundancy)		2.5 Gbps downstream and 1.25 Gbps upstream
			20 km reach (60 km logical reach)
	128 Gbps switching capacity and 95 Mpps throughput	**Layer 3**	Static routing
			IPv4 (Dual Stack)
Layer 2	16K MAC addresses		IPV6 (Dual Stack)
	Support to VLANs	**Security**	SSH
	Spanning Tree (PVRSTP, MSTP, STP/PVSTP+)		802.1x
	Link aggregation		Storm control
			DoS Protection
QoS	Traffic scheduling (SP, WRR e DRR)		
	8 rows per door		
	Support for CoS with priority WRE, WRR e DSCP/802.1p		

Ordering Description

Lightdrive Standalone GPON Optical Concentrator LD3008
Power Supply AC for GPON Standalone Optical Concentrator LD3008/LW3008C/LD3016
Power Supply DC for GPON Standalone Optical Concentrator LD3008/LW3008C/LD3016

GPON AND UPLINK TRANSCEIVERS

Transceivers to be used in GPON service modules, as well as for Uplink interfaces (SFP, SFP+ and XFP).

Constructive Characteristics

	Minimum	Typical	Maximum
Tension	3.135	3.3	3.465
Current (mA)	-	-	600
Operating relative humidity (%)	0	-	85
Storage relative humidity (%)	0	-	95

Ordering Description

Description	Application	Connector type	Maximum distance
Transceiver SFP Class C+ 2.5Gbps LR 1490 nm SC-UPC W/DDM (20 km)	GPON Service Interface	SC-UPC	20 km
Transceiver SFP+ 10GE SX 1310 nm (10 km)	10GE Uplink Interface for GPON Optical Concentrator	LC-UPC Duplex	10 km
Transceiver SFP 1GE LX 1310 nm (10 km)			
Transceiver SFP 1GE LX 1310 nm (20 km)			
Transceiver SFP 1GE LX 1310 nm (40 km)			

FDH 600

The FDH is a Rack, which accommodates up to 10 sub-racks for connection or splicing. It is provided with cable and optical cords (including pre-terminated) storage and management functionality.

Constructive Characteristics

Dimensions	Height	2200 mm
	Width	600 mm
	Depth	300 mm
Model	**Network type**	**Subscriber type**
Components	Frame	Frame
	Accommodator	Accommodator
	-	Organizer
Application	High density distributor for central offices	
Number of Fibers	Up to 720 connections	
Number of Sub-racks	Up to 10 sub-racks with 72 Fibers each	

Ordering Description

FDH 600 - Fiber Distribution Hub - Complete with Pigtails and Adapters

FDH 600 - Fiber Distribution Hub - Basic Module

FDH 600 SUB-RACKS

The FDH 600 Sub-racks are compatible with 15.5" racks, are 4U height, and have 8 positions for connections and/or splice modules, or connection modules only. The FDH 600 Rack can accomodate up to 10 sub-racks.

Constructive Characteristics

Dimensions	Height	177 mm
	Width	347 mm
	Depth	296.5 mm
Weight	2.8 kg	
Installation Kit Included	Screws, miniflex tubes, plastic clamps and velcro tapes.	

Performance

Model	Sub-unit Network	Sub-unit Gpon	Sub-unit Customer
Number of fibers	72 Fibers	64 Fibers	72 Fibers
Modules	6	8	6
SC Adapters	12	8	12
Maximum Fusion Splicing	72	0	72

Ordering Description

FDH 600 Sub Unit GPON

FDH 600 Sub Unit Customer

ODF BX24

ODF BX24 is an optical distributor for rack, with capacity accordingly to type of connector up to 48 F. Its function is to store and manage cables, including pre-connectorized as well as optical cords. It has removable relays for easier instalation and maintenace.

Constructive Characteristics

Dimensions	Height	1U
	Width	484 mm
	Depth	280 mm
Color	Black	
Number of positions	Up to 24 fibers	
Product body material	ABS+PC	
Connector type	LC/SC	
Polishing Type	APC or UPC (under consult)	
Cable Type	Loose Type or Tight	

Ordering Description

ODF BX 24 24F SM SC-APC - Telcordia

ODF BT48

The ODF BT48, Optical Distribution Frame, is an optical distribution frame for racks with capacity of up to 48 splices in 1U. It is provided with cable and optical cords (including pre-terminated) storage and management functionality.

Constructive Characteristics

Dimensions	Height	44.45 mm (1U)
	Width	484 mm
	Depth	290 mm
Color	Light gray (RAL 7035)	
Number of positions	Up to 48 fibers	
Product body material	Carbon Steel	
Connector type	SC	
Polishing type	APC or PC (UPC or SPC)	
Cable type	Loose tube optical cable	

Ordering Description

ODF BT48 12F SM SC-APC - TELCORDIA
ODF BT48 24F SM SC-APC - TELCORDIA
ODF BT48 36F SM SC-APC - TELCORDIA
ODF BT48 48F SM SC-APC - TELCORDIA
ODF BT48 12F SM SC-UPC - TELCORDIA
ODF BT48 24F SM SC-UPC - TELCORDIA
ODF BT48 36F SM SC-UPC - TELCORDIA
ODF BT48 48F SM SC-UPC - TELCORDIA

Other configuration available upon request.

ODF BT72

The ODF BT72 is an optical distribution frame for racks with capacity of up to 72 splices in 2U. It is provided with cable and optical cords (including pre-terminated) storage and management functionality.

Constructive Characteristics

Dimensions	Height	88.9 mm (2U)
	Width	484 mm
	Depth	255 mm
Color	Light gray (RAL 7035)	
Number of positions	Up to 72 fibers	
Product body material	Carbon Steel	
Connector type	SC	
Polishing type	APC or PC (UPC or SPC)	
Cable type	Loose tube optical cable	

Ordering Description

ODF BT72 - Basic module
ODF BT72 72F SM SC-APC TELCORDIA - Full
ODF BT72 72F SM SC-UPC TELCORDIA - Full

Other configuration available upon request.

ODF B144

The ODF B144 is an optical distribution frame for racks with capacity of up to 144 splices in 4U. It is provided with cable and optical cords (including pre-terminated) storage and management functionality.

Constructive Characteristics

Dimensions	Height	177.8 mm (4U)
	Width	496 mm
	Depth	465 mm
Painting type	Powder epoxy painting with high resistance to scratch	
Color	Black	
Number of positions	144 positions (36 positions per U)	
Number of fibers	Up to 144 fibers	

Ordering Description

ODF B144 - Basic module
ODF B144 144F SM SC-APC D0.9 - Complete

MODULAR LGX PATCH PANEL

The Modular LGX Patch Panel has the capacity for accommodating up to 3 LGX standard modules for optic patch cord handling.

Constructive Characteristics

Dimensions	Height	44.45 mm
	Width	442 mm
	Depth	169 mm
Color	Black	
Type of material	Carbon Steel	

Total fiber	Connector type	Cable type
72 fibers	LC Front / MPO Rear	
48 fibers	LC-Duplex	
36 fibers	SC	Pre-terminated
24 fibers	ST, FC, E2000	
18 positions	RJ-45	-

Size	Number of modules	Compatibility
1U / 19"	3	LGX Cassettes or LGX Plates

Ordering Description

LGX Modular Patch Panel

LGX OPTICAL ADAPTERS PLATE SET

Kits containing 3 LGX model plates, compatible with SC or LC, FC or ST, MPO connectors, or closing panel.

Constructive Characteristics

Dimensions	Height	29.2 mm
	Width	129.6 mm
Color	Black	
Material type	Steel or plastic	
Painting type	Steel plate	Powder epoxy painting with high resistance to scratch
	Plastic	Not applicable

Connector	MPO	LC or SC	FC or ST
Number of positions	06	06, 08 or 12	08

Ordering Description

3X LGX Plates Set - 06P LC/SC - Plastic
3X LGX Plates Set - 06P MPO
3X LGX Plates Set - 06P MPO Plastic
3X LGX Plates Set - 08P LC/SC - Plastic
3X LGX Plates Set - 08P LC/SC
3X LGX Plates Set - 08P ST/FC
3X LGX Plates Set - 08P Angled LC/SC
3X LGX Plates Set - 12P LC/SC
3X LGX Plates Set - 12P LC/SC - Plastic
3X LGX Plates Set - Blank Panel - Plastic

MODULAR LGX OPTICAL SPLITTER

Pre-terminated splitter with dimensions suitable to the LGX standard.

Constructive Characteristics

Optical adapter	SC	
Polishing type	APC or UPC	
Dimensions	Height	29.5 mm
	Width	101.5 mm
	Depth	129.6 mm

Performance

Splitter type	1x2	1x4	1x8	1x16	1x32
Maximum insertion loss (dB)	3.7	7.1	10.5	13.7	17.1
Uniformity (dB)	0.5	0.6	1.0	1.3	1.5
Maximum polarization dependent loss (PDL) (dB)	0.2	0.2	0.25	0.3	0.4
Operating wavelength	PLC: 1260-1650 nm				
	FBT: 1260-1360 nm and 1480-1580 nm				
Directivity	> 55 dB				
Return loss	> 55 dB				

Ordering Description

Optical Splitter Modular LGX 1X2 50/50 G.657A SC-APC/SC-APC
Optical Splitter Modular LGX 1X4 G.657A SC-APC/SC-APC
Optical Splitter Modular LGX 1X8 G.657A SC-APC/SC-APC
Optical Splitter Modular LGX 1X2 50/50 G.657A SC-UPC/SC-UPC
Optical Splitter Modular LGX 1X4 G.657A SC-UPC/SC-UPC
Optical Splitter Modular LGX 1X8 G.657A SC-UPC/SC-UPC
Optical Splitter Modular LGX 4 X 1X4 G.657A LC-APC/LC-APC
Optical Splitter Modular LGX 1X2 01/99 G.657A SC-APC/SC-APC
Optical Splitter Modular LGX 1X2 02/98 G.657A SC-APC/SC-APC
Optical Splitter Modular LGX 1X2 05/95 G.657A SC-APC/SC-APC
Optical Splitter Modular LGX 1X2 10/90 G.657A SC-APC/SC-APC
Optical Splitter Modular LGX 1X2 15/85 G.657A SC-APC/SC-APC
Optical Splitter Modular LGX 1X2 20/80 G.657A SC-APC/SC-APC
Optical Splitter Modular LGX 1X2 25/75 G.657A SC-APC/SC-APC
Optical Splitter Modular LGX 1X2 30/70 G.657A SC-APC/SC-APC
Optical Splitter Modular LGX 1X2 45/55 G.657A SC-APC/SC-APC

MODULAR 19" SPLITTER

Pre-terminated product, adequate for fixing on 19" racks. It is equipped with optical adapters with shutter, and a guide for cord routing.

Constructive Characteristics

Dimensions	Height	43.5 mm
	Width	494 mm
	Depth	341.3 mm
Manufacturing technology	PLC	
Connector type	SC-APC	

Performance

Splitter type	1x32	1x64
Maximum insertion loss (dB)	14.1	20.5
Uniformity (dB)	1.5	0.5
Maximum polarization dependent loss (PDL) (dB)	0.4	0.5
Operating wavelength	1260-1650 nm	
Directivity	>55 dB	
Return loss	>55 dB	
Maximum return loss per connection	>60 dB	
Optical attenuation per connection (dB)	0.15 (typical)	0.3 (maximum)

Ordering Description

Modular 19" Optical Splitter 1x32 G-657A SC-APC/SC-APC
Modular 19" Optical Splitter 1x64 G-657A SC-APC/SC-APC
Modular 19" Optical Splitter 2x32 G-657A SC-APC/SC-APC
Modular 19" Optical Splitter with 2 1x32 G-657A SC-APC/SC-APC

WDM

The WDM filter is responsible for multiplexing different wavelengths in a single fiber.

Constructive Characteristics

Connector type	SC
Polishing type	APC
Optical attenuation	0.15 dB (typical)
	0.3 dB (maximum)
Maximum return loss	> 60 dB

Performance

Operating wavelength	Reflected	1310 ± 50, 1490 ± 10
	Passing	1550 ± 10
Insertion loss	0.7 dB (typical)	
	1 dB (maximum)	
Directivity	> 50 dB	
Return loss	≥ 45 dB	

Ordering Description

PON WDM Filter 1310/1490/1550NM SC-APC/SC-APC/SC-APC (C/D/V)
PON WDM Filter 1310/1490/1550NM NC/NC/NC (C/D/V)
Modular WDM Filter LGX 1 Circuit SC-APC/SC-APC/SC-APC (C/D/V)
Modular WDM Filter LGX 2 Circuits SC-APC/SC-APC/SC-APC (C/D/V)

PIGTAIL AND OPTICAL ADAPTER KIT SM

Set of pigtail and optical adapter.
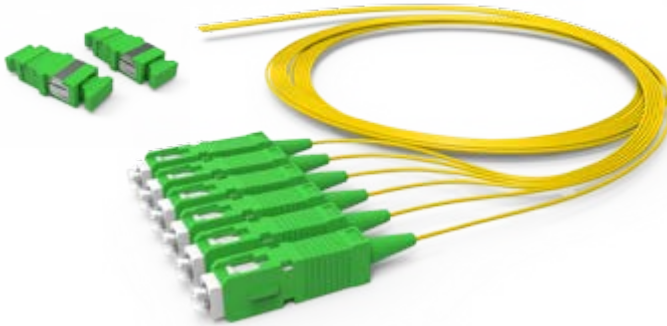
Constructive Characteristics

Rated diameter	0.9 and 2 mm	
Length	1.5 m	
Quantity	Simplex optical pigtail	01, 02 or 06 fibers

Connector		Fiber Type	Polishing type	Color
LC	• Type SFF "push-pull" and "shutter" • Plastic body • Ceramic ferrule (zirconia)	SM	APC	Green
			PC, SPC and UPC	Blue
		MM	PC, SPC and UPC	Beige
SC	• Type "push-pull" and "shutter" • Plastic body • Ceramic ferrule (zirconia)	SM	APC	Green
			PC, SPC and UPC	Blue
		MM	PC, SPC and UPC	Beige

Performance

Insertion Loss and Return Loss	Performance parameters are in conformance with IEC 61754 standard. All losses can be optimized according to connector and polishing type on request.
Number of cycles	> 500 insertions (per connector)

Cable type	Fiber type	Color
COA-DP ou COA-MF / optical element	Single-Mode G.652B, G.652D, G.655, G.657A and G.657B	Yellow
	Multimode OM1 and OM2	Orange
	Multimode OM3 and OM4	Aqua

OPTICAL PATCH CORDS

EZ-Bend cable assemblies are offered in indoor/outdoor, riser, plenum, and dual-rated low-smoke zero-halogen (LSZH) constructions, and can be routed around corners, stapled using traditional fast, and easy copper wire installation practices, with negligible signal loss. Offered in 3.0 mm and 4.8 mm cord diameter.
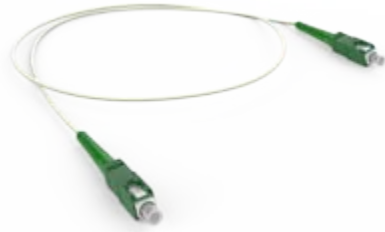
Performance

Flame Performance	Riser: UL 166 compliant	
	Dual Rated: IEC-3C and UL 1666	
	Non-Halogen: IEC60332-2 and IEC 61034-2 compliant	
Mechanical and Environmental performance	Telcordia GR-409	
	ICEA S-83-596 compliant	
Temperature range	Installation: 0 ℃ to 40 ℃	
	Operation: -40 ℃ to 70 ℃	
	Storage: -40 ℃ to 70 ℃	
Maximum Tensile Rating - All Cables	440 N	
Attenuation @	1310 nm	1550 nm
Maximum	0.4 dB/km	0.3 dB/km
Typical	0.35 dB/km	0.25 dB/km

Flame-retardant outer jacket

900 μm buffered fiber

Aramid yarn
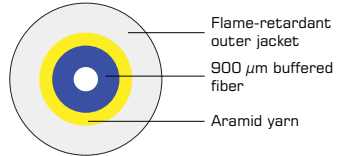
Ordering Description

EZ-Bend Indoor-Outdoor 4.8 mm Drop IO48-001C-DRK-4-PVC
EZ-Bend Indoor-Outdoor 3.0 mm Drop IR30-001C-DRK-4-PVC

OPTICAL ADAPTERS

Kit containing simplex or duplex optical adapters.

Constructive Characteristics

Number of fibers	02 fibers (1 piece for duplex adapters or 2 for simplex adapters)
	06 fibers (3 pieces for duplex adapters or 6 for simplex adapters)
	12 fibers (1 piece, only for MPO adapters)
	72 fibers (6 pieces, only for MPO adapters)

Adapter	Fiber type	Polishing type	Color
SC	SM	PC	Blue
		APC	Green
	MM	PC	Beige
LC-Duplex	SM	PC	Blue
		APC	Green
	MM	PC	Beige
MPO	SM / MM	PC and APC	Black (A Standard)
		APC	Gray (B Standard)

SIMPLEX OPTICAL PATCH CORD

Dielectrical optical cord made of one single-mode bending loss insensitive optical fiber. Suitable for indoor connections in FTTx networks.

Constructive Features

Rated diameter	Single-fiber	2 and 3 mm
	Duplex	4.5 and 5.9 mm
Fiber	G-652B/G-652D/G-657A	
Length	From 1.5 to 20 m	

Ordering Description

LC-SPC	LC-SPC	OM1 (62.5)	2.5 m	Duplex
ST-SPC	ST-SPC			
SC-SPC	ST-SPC	OM2 (50)		
LC-SPC	ST-SPC			
	LC-SPC			
	SC-SPC			
SC-SPC	SC-SPC			
ST-SPC	ST-SPC			
SC-SPC	SC-SPC		1.5 m	
LC-SPC	LC-SPC			
	SC-SPC			
LC-UPC	LC-UPC	OM3	2.5 m	
	SC-UPC			
	LC-UPC		1.5 m	
	SC-UPC			
FC-SPC	FC-SPC	SM	5 m	
LC-SPC	SC-SPC		2 m	
SC-SPC	SC-SPC		2.5 m	

Optical Cables

CFOI UB

Denomination	CFOI-UB
Description	Loose tube optical cable design, available with dry core and totally gel-free in which fibers are organized into multi-tubes and covered by a flame retardant outer jacket.
Application	Installation environment: indoor
	Operation environment: intrabuilding backbone and horizontal application.

Constructive Characteristics

Fiber types	Multimode (50/125)	OM4, OM3 and OM2
	Multimode (62.5/125)	OM1
	Single-mode (9/125)	G.652.D
Fiber count	06 to 144	
Core type	Dry and totally gel-free	
Flammability rating	OFN or LSZH	

	Dry Core						Totally Gel Free					
Fiber count	06 to 36	48 to 60	72	96	120	144	06 to 36	48 to 60	72	96	120	144
Nominal outer diameter (mm)	9.2	10.2	10.9	12.4	14.1	16.0	10.2	10.2	10.9	12.4	14.1	16.0
Nominal weight (kg/km)	87	103	119	150	185	223	86	101.6	117.6	148.6	183.6	221.6
Maximum load during installation (kgf)	Up to 12F: 66											
	More than12F: 132											
Minimum bending radius (mm)	During installation	15 x cable diameter										
	After installation	10 x cable diameter										

- Flame-retardant outer jacket
- Loose tube
- Central strength member
- Optical fibers
- Filling material

CFOI-UB 36 FIBERS

Performance

In accordance to ET 1195 (dry core) and ET 2706 (totally gel-free).

Package

Wood reel	
Cable length	2100 m for Multimode fiber and 2000 m for Single-Mode fiber

FIBER-LAN INDOOR/OUTDOOR

Description	Tight-buffered cable, composed by optical fibers with secondary coating (900 μm), surrounded by dielectric strength members and covered by a flame retardant jacket with UV protection.
Application	Installation environment: indoor/outdoor.
	Operation environment: In ducts or underground manhole susceptible to temporary inundation.

Constructive Characteristics

Fiber types	Multimode (50/125)	OM4, OM3 and OM2
	Multimode (62.5/125)	OM1
	Single-Mode (9/125)	G.652.D and G.657 (BLI)
Fiber count	02 to 12	
Flammability rating	OFN/OFNR* or LSZH	

Fiber count	Nominal outer diameter (mm)	Nominal weight (kg/km)	Maximum load during installation (N)	Minimum bending radius (mm)	
				During installation	After installation
2	4.8	19	1850	15 x cable diameter	10 x cable diameter
4	5.2	21			
6	5.6	24			
8	6	34			
12	6.5	40			

Performance

In accordance with ET 1183.

Package

Wood reel	
Cable length	2100 m for Multimode fiber and 2000 m for Single-Mode fiber

*Applicable to cables with PVC jacket and to 12 fibers.

- Flame-retardant outer jacket
- Rip cord
- Buffered fibers (900 μm)
- Dielectric strength members

FIBER-LAN INDOOR/OUTDOOR

FIBER-LAN-AR (PFV) INDOOR/OUTDOOR

Description	Tight-buffered cable, totally dielectric, composed by optical fibers with secondary coating (900 μm), surrounded by dielectric strength members and involved by an inner jacket. A fiberglass layer protects against rodents and over this is applied a flame retardant outer jacket with UV protection.
Application	Installation environment: indoor/outdoor
	Operation environment: in ducts or underground manhole susceptible to temporary inundation. Environment subject to rodents' action.

Constructive Characteristics

Fiber types	Multimode (50/125)	OM4, OM3 and OM2
	Multimode (62.5/125)	OM1
	Single-mode (9/125)	G.652.D
Fiber count	02 to 12	
Protection against rodents	Fiberglass yarns (PFV)	
Flammability rating	OFN or LSZH	

Fiber count	Nominal outer diameter (mm)	Nominal weight (kg/km)	Maximum load during installation (N)	Minimum bending radius (mm)	
				During installation	After installation
2 to 6 fibers	11.8	195	1850	15 x cable diameter	10 x cable diameter
8 to 12 fibers	12.8	205			

Performance

In accordance with ET 2206

Package

Wood reel	
Cable length	2100 m for Multimode fiber and 2000 m for Single-Mode fiber

- Flame-retardant outer jacket
- Flame-retardant inner jacket
- Buffered fibers (900 μm)
- Rip cord
- Dielectric strength members
- Fiberglass yarns
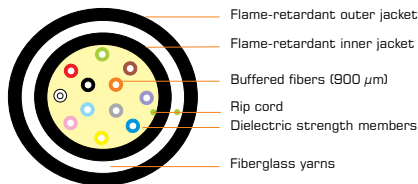
FIBER-LAN AR (PFV) 12 FIBERS

FIBER-LAN-AR INDOOR/OUTDOOR

Description	Tight-buffered cable, composed by optical fibers with secondary coating (900 μm), surrounded by dielectric strength members and involved by an inner jacket. A corrugated steel tape protects against rodents and over this is applied a flame retardant outer jacket with UV protection.
Application	Installation environment: indoor/outdoor.
	Operation environment: in ducts or underground manhole susceptible to temporary inundation. Environment subject to rodents' action.

Constructive Characteristics

Fiber types	Multimode (50/125)	OM4, OM3 and OM2
	Multimode (62.5/125)	OM1
	Single-mode (9/125)	G.652.D
Fiber count	02 to 12	
Protection against rodents	Corrugated steel tape	
Flammability rating	OFN or LSZH	

Fiber count	Nominal outer diameter (mm)	Nominal weight (kg/km)	Maximum load during installation (N)	Minimum bending radius (mm)	
				During installation	After installation
2 to 6 fibers	11.5	175	1850	15 x cable outer diameter	10 x cable outer diameter
8 to 12 fibers	12.5	185			

Performance

In accordance with ET 1480

Package

Wood reel	
Cable length	2100 m for Multimode fiber and 2000 m for Single-Mode fiber

- Flame-retardant outer jacket
- Corrugated steel tape
- Rip cord
- Buffered fibers (900 μm)
- Dielectric strength members
- Water blocking tape
- Flame-retardant inner jacket
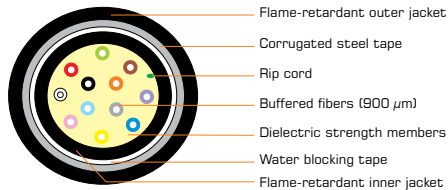
FIBER-LAN AR 12 FIBERS

TERMINATION OPTICAL CABLE - CFOT-UB
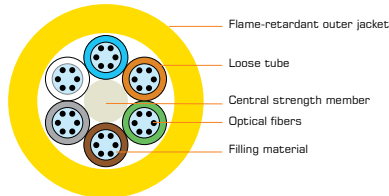
Description	Loose tube cable design, available with dry core or totally gel-free in which fibers are organized into multi-tubes arranged around a dielectric central member and covered by a flame retardant outer jacket with UV protection.
Application	Installation environment: indoor/outdoor.
	Operation environment: Installed in ducts or aerial lashed in a steel messenger.

Constructive Characteristics

Fiber types	Multimode (50/125)	OM4, OM3 and OM2
	Multimode (62.5/125)	OM1
	Single-mode (9/125)	G.652.D
Fiber count	02 to 144	
Core type	Dry or Totally Gel-Free	
Flammability rating	OFN or LSZH	

Cable type	Fiber count	Fiber count per basic unit (loose tube)	Dry core	
			Nominal outer diameter (mm)	Nominal weight (kg/km)
CFOT-UB	2 to 12	2	8.9	82
	18 to 36	6	9.5	92
	48 to 60	12	9.6	107
	72		10.9	117
	96		12.4	150
	120		14.1	183
	144		16	225

Maximum load during installation (N)	Minimum bending radius (mm)	
	During installation	After installation
Up to 12F: 1330	20 x cable diameter	10 x cable diameter
More than 12F: 2670		

Flame-retardant outer jacket
Loose tube
Dielectric central member
Water blocking yarns
Optical fibers
Filling material
Rip cord

CFOT-UB 36 FIBERS
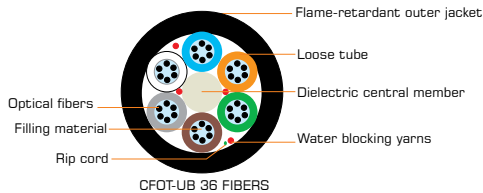
Performance

In accordance with ET 1252 (dry core) and ET 3095 (totally gel-free)

Package

Wood reel	
Cable length	2100 m for Multimode fiber and 2000 m for Single-Mode fiber

Distribution Network

FK-CEO-4M
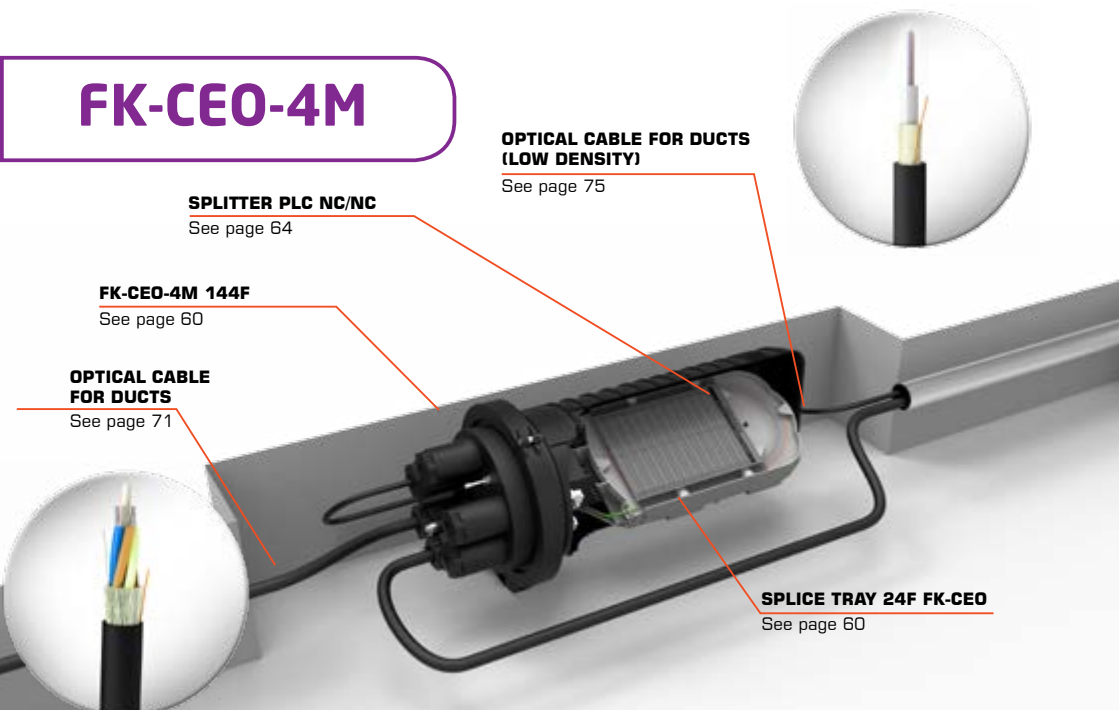
AERIAL/UNDERGROUND OPTICAL SPLICE CLOSURE FK-CEO-4M-144F

Optical Splice Closure with mechanical sealing system for up to 144 splices. Application: optical telecommunications networks. Suitable for aerial and underground networks.

Constructive Characteristics

Dimensions	Height	450 mm
	Diameter	230 mm
Color	Black	
Input cable diameter	10 to 17 mm	
Derivation cable diameter	5 to 17.5 mm	
Number of oval ports	01	
Number of derivation ports	04	
Installation	Aerial or underground	
Sealing type	Mechanical	
Number of grommets	For the main port	01 for cable with diameters from 10 to 13 mm
		01 for cable with diameters from 14 to 17 mm
	For the derivation ports	04 with 4 holes for cable with diameters from 5 to 7 mm
		04 with 1 hole for cable with diameters from 8 to 12 mm
		04 with 1 hole for cable with diameters from 12 to 17.5 mm

Ordering Description

Aerial/Underground Optical Splice Closure FK-CEO-4M-144F
Splice Tray 24F for FK-CEO
FK-CEO Mounting Kit for Pole and Wall
FK-CEO Mounting Kit for Wire Rope

AERIAL/UNDERGROUND OPTICAL SPLICE CLOSURE FK-CEO-6M-240F

Optical Splice Closure with mechanical sealing system for up to 240 splices. Application: optical telecommunications networks. Suitable for aerial and underground networks.

Constructive Characteristics

Dimensions	Height	480 mm
	Diameter	245 mm
Color	Black	
Input cable diameter	10 to 25 mm	
Derivation cable diameter	10 to 17.5 mm	
Number of oval ports	1	
Number of derivation ports	6	
Number of splice trays	10	
Installation	Aerial/Underground	
Sealing type	Mechanical	

Ordering Description

Aerial/Underground Optical Splice Closure FK-CEO-6M-240F
Splice Tray 24F for FK-CEO

DERIVATION KIT FOR MECHANICAL OPTICAL SPLICE CLOSURE FK-CEO-4M/6M

Derivation kit for mechanical optical splice closures. Application: FK-CEO-4M and FK-CEO-6M.

Components

Grommet 10 to 17.5 mm
Grommet 7 to 17.5 mm
Cable anchorage clip
Fixing screw

Ordering Description

Mechanical Derivation Kit for FK-CEO

FK-CEO-4T

**SELF-SUPPORTED OPTICAL
CABLE (LOW DENSITY)**
See page 70

MOUNTING KIT FOR WIRE ROPE
See page 63

FK-CEO-4T 144F
See page 63

SPLITTER PLC NC/NC
See page 64

SPLICE TRAY 24F FK-CEO
See page 63

**SELF-SUPPORTED
OPTICAL CABLE**
See page 70

HEAT-SHRINK DERIVATION KIT
See page 63

AERIAL OPTICAL SPLICE CLOSURE FK-CEO-4T-144F

Optical splice closure with heat-shrink sealing system and capacity for up to 144 splices in 6 trays. Application: optical telecommunications networks. Suitable for aerial networks.

Constructive Characteristics

Dimensions	Height	450 mm
	Diameter	230 mm
Color	Black	
Input cable diameter	10 to 17 mm	
Derivation cable diameter	8 to 17.5 mm	
Number of oval ports	01	
Number of derivation ports	04	
Installation	Aerial	
Type of sealing	Heat-shrink	

Ordering Description

Aerial Optical Splice Closure FK-CEO-4T-144F
Splice Tray 24F for FK-CEO
FK-CEO Mounting Kit for Pole and Wall
FK-CEO Mounting Kit for Wire Rope

HEAT-SHRINK DERIVATION KIT FOR FK-CEO-4T

Heat-Shrink derivation kit for FK-CEO-4T optical splice closure. Application: FK-CEO-4T.

Components

Heat-shrink
Sand paper
Aluminium adhesive
Transportation tube

Ordering Description

Heat-Shrink Derivation Kit for FK-CEO-4T and FK-CEO-6T

OPTICAL SPLITTER 1XN

Passive Optical Splitter with split ratio 1xN, PLC technology with G.657A fiber.

Constructive Characteristics

Splitter type		1x2	1x4	1x8	1x16	1x32	1x64
Manufacturing technology		FBT	PLC				
Length	Non-connectorized	50 mm	40 mm			50 mm	60 mm
	Connectorized		55 mm		60 mm	80 mm	–
Width	Non-connectorized	N/A	4 mm			7 m	12 mm
	Connectorized		7 mm		12 mm	20 mm	–
Height	Non-connectorized	N/A	4 mm				
	Connectorized		4 mm			6 mm	–
Rated diameter		3 mm	N/A				
Bare fiber diameter		0.25 mm					
Pigtail diameter		0.9 mm					

Performance

Splitter type	1x2	1x4	1x8	1x16	1x32	1x64
Maximum insertion loss (dB)	3.7	7.1	10.5	13.7	17.1	20.5
Uniformity (dB)	0.5	0.6	1.0	1.3	1.5	1.7
Maximum polarization dependent loss (PDL) (dB)	0.2	0.2	0.25	0.3	0.4	0.5
Operating Wavelength	PLC: 1260~1650 nm					
	FBT: 1260~1360 nm and 1480~1650 nm					
Connector type	SC-APC			SC-UPC		
Optical attenuation per connection (dB)	0.15 (typical)		0.3 (maximum)	0.15 (typical)		0.3 (maximum)
Maximum return loss per connection	>60			>50		

Ordering Description

Optical Splitter	FBT	Non-connectorized	1x2		2 m / 2 m
	PLC		1x2		
			1x4		
			1x8		
			1x16		
			1x32		
			1x64		
	FBT	Connectorized	1x2	SC-APC / SC-APC	60 cm / 60 cm
	PLC		1x2		
			1x4		
			1x8		
			1x16		
			1x32		
	FBT		1x2	SC-UPC / SC-UPC	
	PLC		1x2		
			1x4		
			1x8		
			1x16		
			1x32		
	FBT		1x2	NC/SC-APC	1.5 m / 60 cm
	PLC		1x2		
			1x4		
			1x8		
			1x16		
			1x32		
	FBT		1x2	NC/SC-UPC	
	PLC		1x2		
			1x4		
			1x8		
			1x16		
			1x32		

OPTICAL SPLITTER 1X2 UNBALANCED

Passive optical splitter with one input and two outputs with different optical power. Manufactured with FBT technology without connectors, with G.657A standard fiber.

Constructive Characteristics

Length	Connectorized	66 mm
	Non-connectorized	50 mm
Rated diameter	Connectorized	3.8 mm
	Non-connectorized	3 mm
Pigtail length	Connectorized	60 cm
	Non-connectorized	2 m
Bare fiber diameter	Connectorized	0.9 mm
	Non-connectorized	0.25 mm
Manufacturing technology	FBT	

Performance

Splitter type	1/99	2/98	5/95	10/90	15/85	20/80	25/75	30/70	35/65	40/60	45/55
Maximum insertion loss (dB)	21.6	18.7	14.6	11	9.6	7.9	6.95	6	5.35	4.7	4.15
	0.3	0.4	0.5	0.7	1	1.4	1.7	1.9	2.3	2.7	3.15
Maximum polarization dependent loss (PDL)	0.2 dB										
Passing optical band	1260~1360 nm and 1480~1580 nm										
Directivity	> 55 dB										
Return loss	> 55 dB										

Ordering Description

Optical splitter	Non-connectorized	1/99	2 m / 2 m
		2/98	
		5/95	
		10/90	
		15/85	
		20/80	
		25/75	
		30/70	
		35/65	
		40/60	
		45/55	
	SC-APC/SC-APC	1/99	60 cm / 60 cm
		2/98	
		5/95	
		10/90	
		15/85	
		20/80	
		25/75	
		30/70	
		35/65	
		40/60	
		45/55	

OPTICAL SPLITTER 2XN

Passive optical splitter with split ratio 2xN, PLC technology with G.657A fiber.

Constructive Characteristics

Splitter type	2x2	2x4	2x8	2x16	2x32	2x64
Length	50 mm	45 mm		55 mm		
Rated diameter	3 mm	N/A				
Width	N/A	5 mm		7 mm		12 mm
Height	N/A	4 mm				
Manufacturing technology	FBT or PLC	PLC				
Pigtail length	2 meters					
Bare fiber diameter	0.25 mm					

Performance

Splitter type	2x2	2x4	2x8	2x16	2x32	2x64
Maximum insertion loss (dB)	4.0	7.3	10.8	14	17.7	21.3
Uniformity (dB)	0.6	0.8	1.3	1.5	2.1	2.5
Maximum dependent polarization loss (PDL)	0.2	0.2	0.25	0.3	0.4	0.5
Passing optical band	1260~1360 nm and 1480~1580 nm					
Directivity	> 55 dB					

Ordering Description

PLC	Optical Splitter PLC 2X2 G.657A NC/NC 2M/2M
	Optical Splitter PLC 2X4 G.657A NC/NC 2M/2M
	Optical Splitter PLC 2X8 G.657A NC/NC 2M/2M
	Optical Splitter PLC 2X16 G.657A NC/NC 2M/2M
	Optical Splitter PLC 2X32 G.657A NC/NC 2M/2M
	Optical Splitter PLC 2X64 G.657A NC/NC 2M/2M

PEDESTAL

PEDESTAL 192F
See page 68

LGX MODULAR SPLITTER LC-APC
See page 68

SIMPLEX OPTICAL CORD SM
See page 115

OPTICAL CABLE FOR DUCT
See page 71

DIRECTLY BURIED OPTICAL CABLE WITH METALLIC PROTECTION
See page 72

CONNECTORIZED OPTICAL PEDESTAL

Optical distribution cabinet (pedestal type) for external network with capacity for up to 192 subscribers.
Application: external.

Constructive Characteristics

Dimensions	Height	1140 mm
	Width	570 mm
	Depth	570 mm
Material	FRP + Aluminum	
Color	Gray	
Number of ports	From 64F to 192F (using expansion kits)	
Splitters	Up to 12 splitters 4 x 1 x 4 LC-APC	
Fiber type	SM	
Connector type	LC-APC	
Cables	Main Cable: 16 – 21 mm Derivation Cable: 9 – 13 mm	
Installation environment	Outdoor/Indoor	

Ordering Description

Optical Pedestal 192F
64F Expansion Kit for Optical Pedestal
LGX Modular Splitter 4x1x4 G.657A LC-APC/LC-APC

DIRECT CONNECT 432

FIBER DISTRIBUTION CABINET - DIRECT CONNECT 432

Designed to serve up to 432 homes in existing neighborhoods, this high density Fiber Distribution Cabinet (FDC) combines fiber routing management with Direct Connect splitter's excellent optical performance and reliability.

Constructive Characteristics

Dimensions	Height	914.4 mm
	Width	609.6 mm
	Depth	457.2 mm
Mounting	Pole and pad mountable	
Capacity	Up to 432 homes	
Splitters	Compatible with 1x32 Direct Connect Splitters	
Optical Fiber	AllWave® Flex Zero Water Peak	
Connector type	SC-APC or LC-APC	
Protection Rating	NEMA4	

Ordering Description

FDC432-SCA-02-01-12YT-2/288/144-0100F - Direct Connect 432

SPLITTER - DIRECT CONNECT 432

Direct Connect splitters offer superior optical performance in a flexible, yet easy to-manage package.

Constructive Characteristics

PLC configuration	1x8, 1x16 and 1x32
Connector type	SC-APC, LC-APC or non-connectorized

Performance

PLC Configuration	1x8	1x16	1x32
Operating Wavelength	1260 - 1650 nm		
Maximum Insertion Loss (dB)	10.8	14.2	18.2
Maximum Insertion Loss Uniformity (dB)	1.0	1.3	1.6
Maximum Polarization Dependent Loss (dB)	0.3	0.3	0.3
Minimum Return Loss (dB)	50	50	50
Minimum Directivity (dB)	50	50	50
Operating Temperature	-40 ℃ to 75 ℃		

Ordering Description

D1-1x08-FULL-UNC/SCA-N-BAL-29/29

D1-1X32-FULL-LCA/LCA-N-BAL-52/52

Optical Cables

ALL-DIELECTRIC SELF-SUPPORTED OPTICAL CABLE

Description	Dielectric optical cable with optic fibers grouped in basic units (loose tube). Core protected against moisture penetration and external jacket made of UV and weather resistant thermoplastic material.
Application	Installation environment: outdoor
	Operation environment: aerial self-supporting

Constructive Characteristics

Fiber types	Single-mode (9/125)	G.652D
Central element	All-dielectric material	
Core type	Dry (S) or totally gel-free (TS)	
External jacket	Black polyethylene	

Fiber count	Fiber count per basic unit (loose tube)	Core type	40m Span			100m Span		
			Nominal outer diameter (mm) ±0.2	Nominal weight (kg/km)	Maximum Rated Cable Load (N)	Nominal outer diameter (mm) ±0.2	Nominal weight (kg/km)	Maximum Rated Cable Load (N)
6 to 30	6	S	10.0	75	1200	10.0	75	1800
		TS	10.0	65	1200	10.5	70	1800
36 to 60	12	S	11.0	85	1200	11.0	85	1800
		TS	11.0	75	1200	11.0	75	1800
72		S	11.5	100	1500	11.5	100	2500
		TS	11.5	85	1500	11.5	90	2500
96		S	13.5	130	1500	13.5	130	2500
		TS	13.5	110	1500	13.5	115	2500
144		S	16.5	210	2500	16.5	210	3500
		TS	16.5	180	2500	16.5	180	3500
216		S	16.5	200	2500	16.5	200	3500
		TS	16.5	160	2500	16.5	160	3500

External jacket
Dielectric traction element
Filling compound (S) or water blocking thread (TS)
Dielectric central element
Loose tube
Optical fibers
Waterblock yarns
Rip cord

Cross-section view: all-dielectrical self-supporting (ADSS) 72 fibers

Performance

In accordance with TFS-7481 & TFS-7483 (dry core) and TFS-7482 & TFS-7484 (totally gel-free)

Packaging

Wooden reel	Standard length 4000 m

DIELECTRIC OPTICAL CABLE FOR DUCT INSTALLATION

Description	Dielectric optical cable with optic fibers grouped in basic units (loose tube). Core protected against moisture penetration and external jacket made of UV and weather resistant thermoplastic material.
Application	Installation environment: outdoor
	Operation environment: underground in ducts or aerial lashed in a steel messenger

Constructive Characteristics

Fiber types	Single-mode (9/125)	G.652D
Core type	Dry (S) or totally gel-free (TS)	
External jacket	Polyethylene, black	

Fiber count	Fiber count per basic unit (loose tube)	Nominal outer diameter (mm) ±0.2		Nominal weight (kg/km)		Maximum installation load (N)	Compression load (N/10 cm)	Minimum bending radius (mm)	
		S	TS	S	TS			During installation	After installed
6 to 30	6	11.0	11.0	85	75	2000	2200	15 x Outer Cable Diameter	10 x Outer Cable Diameter
36 to 60	12	11.0	11.0	90	80				
72		11.5	11.5	100	85				
96		13.5	13.5	130	110				
144		16.5	16.5	210	180				
216		16.5	16.5	200	160				

- External jacket
- Traction element
- Loose tube
- Optical fibers
- Dielectric central element
- Filling compound (S) or water blocking thread (TS)
- Waterblock yarns
- Rip cord

Cross-section view: single-jacket loose tube 72 fibers for duct application

Performance

In accordance with TFS-8127 (dry core) and TFS-8128 (totally gel-free)

Packaging

Wooden reel	Standard length 4000 m

OPTICAL CABLE WITH CORRUGATED STEEL TAPE FOR DUCT INSTALLATION

Description	Metallic optical cable with optic fibers grouped in basic units (loose tube). Core protected against moisture penetration, internal cover, layer for protection against rodents made of corrugated steel tape and external jacket made of UV and weather resistant thermoplastic material.
Application	Installation environment: outdoor
	Operation environment: in ducts or aerial lashed in a steel messenger. Environment subject to rodents' action.

Constructive Characteristics

Fiber types	Single-mode (9/125)	G.652D
Core type	Dry (S) or totally gel-free (TS)	
Protection against rodents	Corrugated steel armor tape	
External jacket	Black polyethylene	

Fiber Count	Fiber count per basic unit (loose tube)	Nominal outer diameter (mm) ±0.2		Nominal weight (kg/km)		Maximum installation load (N)	Compression Load (N/10 cm)	Minimum bending radius (mm)	
		S	TS	S	TS			During installation	After installed
6 to 30	6	12.0	12.0	125	115	2000	2200	15 x Outer Cable Diameter	10 x Outer Cable Diameter
36 to 60	12	12.5	12.5	140	125				
72		13.0	13.0	155	135				
96		15.0	15.0	190	165				
144		18.5	18.5	285	250				
216		18.0	18.0	270	220				

External jacket
Rip cord
Loose tube
Optical fibers
Dielectric central element
Strenght elements
Filling compound (S) or water blocking thread (TS)
Waterblock yarns
Corrugated steel armor tape

Cross-section view: single-jacket lightarmor
loose tube 72 fibers for duct application

Performance

In accordance with TFS-7210 (dry core) and TFS-7211 (totally gel-free)

Packaging

Wooden reel	Standard length 4000 m

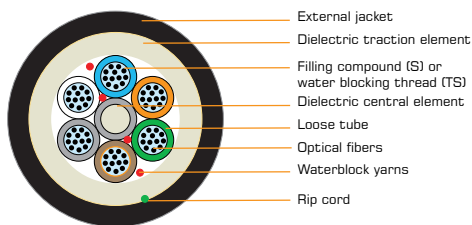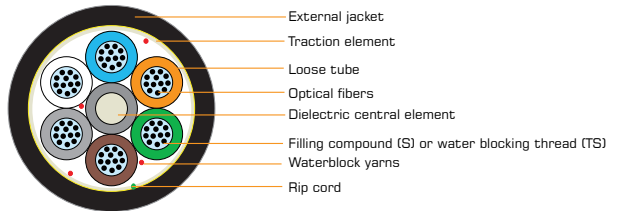# DIELECTRIC OPTICAL CABLE PROTECTED BY HDPE OUTER DUCT FOR DIRECT BURIED INSTALLATION

Description	Dielectric optical cable with optic fibers grouped in basic units (loose tube). Core protected against moisture penetration, internal jacket resistant to insect attacks. The optical cable is placed loose inside a protection duct made of UV and weather resistant polyethylene (HDPE).
Application	Installation environment: outdoor
	Operation environment: underground directly buried

Constructive Characteristics

Fiber Types	Single-mode (9/125)	G.652D
	Single-mode NZD (9/125)	G.655 and G.656
Core type	Jelly (G)	
Internal jacket resistant to termites	Polyamide (Nylon)	
External jacket	Black high density polyethylene (HDPE)	

Fiber count	Fiber count per basic unit (loose tube)	Nominal outer diameter (mm) ±0.2		Nominal weight (kg/km)		Maximum installation load (N)	Compression Load (N/10cm)		Minimum bending radius (mm)	
									During installation	After installed
		Cable	Duct	Cable	Duct		Cable	Duct		
6 to 36	6	10.6	27.5	100	214	2700	2300	5000	20 x Outer Cable Diameter	10 x Outer Cable Diameter
48 to 60	12	11.6	29.3	108	230					
72		12.1	29.3	122	230					
96		14.4	35.0	158	288					
144		17.5	40.0	245	338					

- HDPE duct
- External jacket (nylon)
- External jacket
- Traction element
- Loose tube
- Dielectric central element
- Filling material
- Rip cord
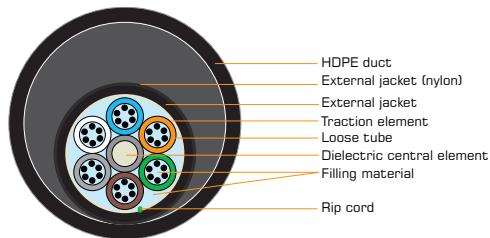
CFOA-X-DPE-G 36 FIBERS

Performance

In accordance with ET 1202 (jelly core)

Packaging

Wooden reel	Standard length 4000 m

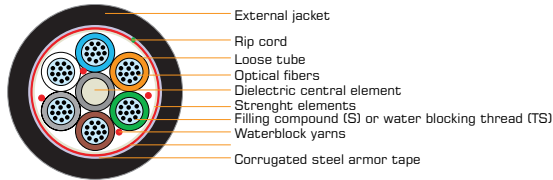# OPTICAL CABLE WITH CORRUGATED STEEL TAPE PROTECTION AGAINST RODENTS FOR DIRECT BURIED INSTALLATION

Description	Metallic optical cable with optic fibers grouped in basic units (loose tube). Core protected against moisture penetration, an inner thermoplastic jacket, layer for protection against the attacks of rodents made of corrugated steel tape and external jacket made of UV and weather resistant thermoplastic material.
Application	Installation environment: outdoor
	Operation environment: undergrounds directly buried. Environment subject to rodents action.

Constructive Characteristics

Fiber type	Single-mode (9/125)	G.652D
Core type	Dry (S) or Totally gel-free (TS)	
Protection against rodents	Corrugated steel armor tape	
External jacket	Black polyethylene (inner and outer jacket)	

Fiber count	Fiber count per basic unit (loose tube)	Nominal outer diameter (mm) ±0.2		Nominal weight (kg/km)		Maximum installation load (N)	Compression Load (N/10cm)	Minimum bending radius (mm)	
		S	TS	S	TS			During Installation	After installed
6 to 30	6	13.5	13.5	165	155	2000	4400	15 x Outer Cable Diameter	10 x Outer Cable Diameter
36 to 60	12	14.0	14.0	180	170				
72		15.0	15.0	200	185				
96		16.5	16.5	245	225				
144		20.0	20.0	245	320				
216		20.0	20.0	340	295				
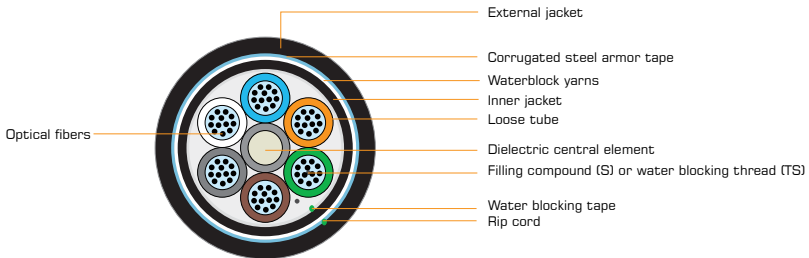
Cross-section view: double jacket, single armor loose tube 72 fibers for direct buried application

Performance

In accordance with TFS-7208 (jelly and dry core) and TFS-7209 (totally gel-free)

Packaging

Wooden reel	Standard length 4000 m

OPTICAL CABLE ADSS MINI-RA

Description	Self-supported dielectric optical cables, loose type, suitable to spans up to 120 meters for urban transport networks or access networks.
Applications	Installation environment: Outdoor
	Operation environment: Self-supported (aerial) or in ducts

Constructive Characteristics

Fiber types	Singlemode (9/125)	G.652D and G.657 (BLI)
Maximum Spam	80 or 120 m	
Core Type	Dry	
External Jacket	Black polyethylene	

Span	Number of optical fibers	Nominal outer diameter	Nominal Weight (kg/km)	Maximum Rated Cable Load (N)	Minimal bending radius	
					During installation	After installation
80 m	02 up to 12	6.8	42	1.5 x weight/km	20 x outer diameter	10 x cable diameter
120 m		7.2	47	2.0 x weight/km		
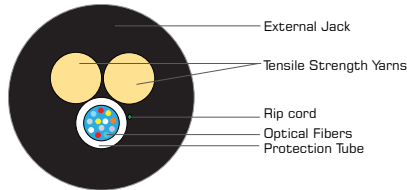
CFOA-X-AS80-MINI-RA 12 fibers

Accessories Recomendations

We strongly recommend the use of outdoor wire anchor accessories solely. Furukawa does not recommend any other type of accessories for this end. For further information, please contact us.

Performance

In accordance with ET 2116

Packing

Wooden reel

Standard length 2000 or 3000 m

COMPACT SIZED & LIGHT WEIGHT AERIAL CABLES

These cables specially developed for aerial usage allows high density optical cables application trhough out the network. The rollable Ribbon Cables mini reduced 50% height and 80% weight compared to loose tube cables.

Local Central Office

Access

Indoor/Premises

Rollable Ribbon Cable
Rollable Ribbon mini
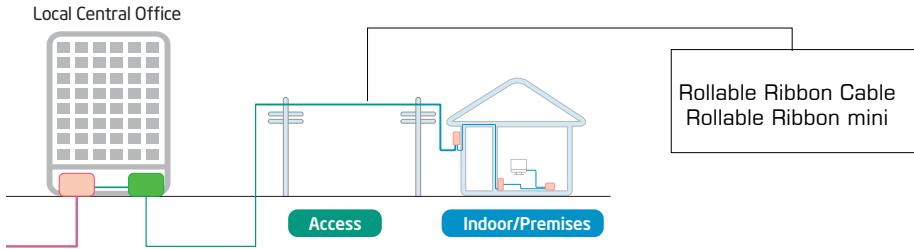
ROLLABLE RIBBON SSW CABLE

Smaller diameter and lighter weight due to using Rollable Ribbon and not using slot spacer. It was developed with the concept of easy handling and enabling mid-span branching. Rollable Ribbon structure is based on ITU-T L.10, L26, L43 and L59.

Denomination	Rollable Ribbon Cable SSW Structure
Description	Rollable Ribbon Cable combines good features of ribbon fiber and single fiber. It is 30% smaller and 50% lighter than conventional aerial cable.
Application	Non slotted rod structure, and the use of rollable ribbon fibers make the cable size smaller. It has slack between the cable and the supporting wire to reduce wind pressure.

Constructive Characteristics

Fiber Ribbon Type		4-fiber Rollable Ribbon				
Fiber Count		24	40	60	100	200
Core Cable Construction		4-fiber ribbon x 6	4-fiber ribbon x 10	20-fiber unit x3	20-fiber unit x 5	20-fiber unit x 10
Supporting wire	Count	7	7	7	7	7
	Wire Diameter (mm)	1.4	1.4	1.4	1.4	1.4
Strength Member		0.7 mm steel wire x 2				
Diameter of cable part (mm)		8	8	8.5	9.5	10.5
Height of overall cable (mm)		16.5	16.5	17	18	19
Weight (kg/km)		155	155	160	170	190
Maximum Pulling Tension (N)	Cable Part	392	392	392	392	392
	Supporting Wire	1960	1960	1960	1960	1960
Minimum Bending Radius (mm)	Dynamic	250	250	250	250	250
	Static	300	300	300	300	300
Fiber types		G.657A1				

Ordering Description

Rollable Ribbon Cable (SSW Structure) 24-fiber
Rollable Ribbon Cable (SSW Structure) 40-fiber
Rollable Ribbon Cable (SSW Structure) 60-fiber
Rollable Ribbon Cable (SSW Structure) 100-fiber
Rollable Ribbon Cable (SSW Structure) 200-fiber

Other configuration available upon request.

ROLLABLE RIBBON MINI SSW CABLE

Rollable Ribbon Cable mini is a cable with reduced dimensions and weight for easy handling. Rollable Ribbon structure is based on ITU-T L.10, L26, L43 and L59.

Denomination	Rollable Ribbon Mini Cable SSW Structure
Description	24 fibers, aerial cable. Six 4-fiber rollable ribbon accomodated inside a protector. The cable has a supporting wire and two strength members. Suitable for reaching remote areas.
Application	Small fiber count rollable ribbon cable, suitable for aerial application.

Constructive Characteristics

Fiber Ribbon Type		4-fiber Rollable Ribbon
Fiber Count		24
Core Cable Construction		4-fiber ribbon x 6
Supporting wire diameter (mm)		Steel wire: 2.6
Strength member diameter (mm)		Steel wire: 0.5 x 2
Cable dimension	Height	10.5 mm
	Width	3.3 mm
Weight (kg/km)		66.5
Maximum Pulling Tension (N)	Cable Part	390
	Supporting Wire	700
Fiber types		G.657A1

- Supporting wire
- Strength member
- Rollable Ribbon
- Protector
- Sheath
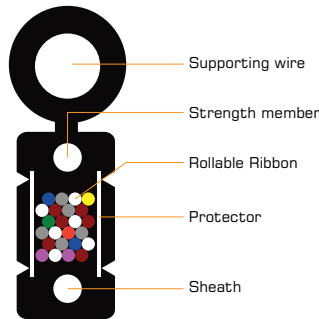
Ordering Description

Rollable Ribbon Cable Mini (SSW Structure) 24-fiber

Other configuration available upon request.

Access
Network

NAP CLOSURE

TRAY FOR 16 SC-APC ADAPTER
See page 80

SPLITTER NC/SC-APC 1X16
See page 64

SlimBox™ DROP TERMINAL - FK-CTO-16MC
See page 80

GROMMETS AND SUPPORTS KIT FOR DROP FLAT
See page 80

EZ!CONNECTOR
See page 84

SELF-SUPPORTED (ADSS) OPTICAL CABLE
See page 70

LOW FRICTION DROP CABLE
See page 83

SlimBox™ DROP TERMINAL - FK-CTO-16MC

Network access point, with 1 splice tray, for access and termination networks.

CONNECTOR TRAY

GROMMETS KIT

Constructive Characteristics

Dimensions	Height	300 mm
	Width	220 mm
	Depth	100 mm
Body material	Reinforced thermoplastic	
Color	Black	
Input cable diameter	5~15 mm	
Output cable diameter	Circular: 16 cables 4.5~5.3 mm	
	Flat: 16 cables 2~3 mm	

Ordering Description

SlimBox™ Drop Terminal (FK-CTO-16MC - Basic Module)
SlimBox™ Drop Terminal (FK-CTO-16MC - with 1 Splice Tray, 1 Tray with 8 Adapters SC-APC and 1 Splitter 1X8 NC/SC-APC)
SlimBox™ Drop Terminal (FK-CTO-16MC - with 1 Splice Tray, 1 Tray with 16 Adapters SC-APC and 1 Splitter 1X16 NC/SC-APC)
Splice Tray for Optical Termination Box FK-CTO-16-MC
Connectors Tray with 16 SC-APC Adapters Without Shutter (FK-CTO-16MC)
Connectors Tray with 8 SC-APC Adapters Without Shutter (FK-CTO-16MC)
Drop Cable Grommets and Supports Kit for Network Access Point FK-CTO-16MC
Round Cable Grommet Kit (FK-CTO-16MC)
Strand Installation Kit (FK-CTO-16MC)

SlimBox™ DROP TERMINAL - FK-CTO-8MC

The Slimbox Drop Terminal FK-CTO-8MC aims at accommodating and protecting fusion splices between optical distribution cable and drop cables of a network. It also allows the storage of optical adapters for connectorized outputs with low friction flat drop cables and field connectors.

Constructive Characteristics

Dimensions	Height	280 mm
	Width	198 mm
	Depth	65 mm
Body material	Reinforced thermoplastic	
Color	Black or White	
Input cable diameter	6~12 mm	
Output cable diameter	Circular: 8 cables 4.5~5.3 mm	
	Flat: 8 cables 2~3 mm	

Ordering Description

SlimBox™ Drop Terminal (FK-CTO-8MC - Basic Module)

SlimBox™ UNDERGROUND TERMINAL - FK-CTOS-16P

Underground network access point for underground access and termination networks.
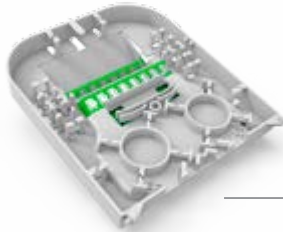
CONNECTOR TRAY

Constructive Characteristics

Dimensions	Height	380 mm
	Width	245 mm
	Depth	130 mm
Body material	Reinforced thermoplastic	
Color	Black	
Input cable diameter	10 to 17.5 mm	
Derivation cable diameter	8 to 17.5 mm	
Drop cable diameters	Flat Cable: 16 cables with 2.0 x 3.0 mm / Round Cable: 16 cables up to 6mm	
Maximum number of splices	Up to 64 splices (without adapters) or 48 splices (with adapter trays)	
Application	Aerial / Underground	

Ordering Description

SlimBox™ Uderground Terminal (FK-CTOS-16P - Basic Module)
Splice Tray for Optical Termination Box FK-CTO-16-MC
Connectors Tray with 16 SC-APC Adapters without Shutter
Connectors Tray with 8 SC-APC Adapters without Shutter

SlimBox™ FK-CTO-16MI

The Slimbox Drop Terminal (FK-CTO-16MI) aims at accommodating and protecting fusion splices between optical distribution cable and drop cables of an access network. It has 2 main ports with fiber tapping possibility and 4 branching ports, all compatible with cables up to 15 mm of diameter using grommets (6-9 mm / 9-12 mm / 12-15 mm). It supports up to 16 output drop cables that may be round with diameter of 3 mm or flat with dimensions 3.0 and 2.0 mm.

Constructive Characteristics

Dimensions	Height	340 mm
	Width	230 mm
	Depth	120 mm
Body material	Reinforced thermoplastic	
Color	Black (RAL 9005)	
Input cable diameter	6,0 to 12,0 mm	
Derivation cable diameter	6,0 to 12,0 mm	
Drop cable diameters	Flat Cable: 16 cables with 2.0 x 3.0 mm / Round Cable: 16 cables up to 6 mm	
Maximum number of splices	Up to 50 splices (48 for the cables and 2 for the splitter splices) Installation for up to 2 optical splitters and up to 18 SC adapters (2 for the inputs of 2 optical splitters SC/SC + 16 for outputs with drop).	
Application	Aerial	

Ordering Description

SlimBox™ Uderground Terminal (FK-CTOS-16MI - Basic Module)
Kit 2 Grommets for 6-9 mm CABLES
Optical Adapter Kit 01F SM SC – APC – Green (KIT 08 PCS)

EZ!CONNECTOR FOR FLAT CABLES

Connector for field assembly, not requiring splicing, polishing or epoxy machine.

Constructive Characteristics

Dimensions	Height	8 mm
	Width	9.2 mm
	Length	51.5 mm (for flat compact cables)
Operation temperature	-40 ℃ up to 75 ℃	
Storage temperature	-40 ℃ up to 75 ℃	
Traction load (compact cable)	10 N (<0.2 dB change)	

Connector type	Polishing type	Insertion Loss	Return loss
SC	APC	≤0,3 dB (typical.) / ≤0,5 dB (maximum)	≥ 50 dB
SC	UPC	≤0,3 dB (typical) / ≤0,5 dB (maximum)	≥ 40 dB

Ordering Description

Kit of 50 Field Optical Connectors SM SC-APC EZ! Connector for Flat Cables 1.6 x 2 mm and 3 x 2 mm

EZ!CONNECTOR FOR ROUND CABLE

Field assembly connector for compact circular 3 mm tight cables (not requiring fusion splicer, polishing or epoxy machine).

Constructive Characteristics

Dimensions	Height	8 mm
	Width	9.2 mm
	Length	64 mm
Operating temperature	-40 ℃ up to 75 ℃	
Storage temperature	-40 ℃ up to 75 ℃	
Supports axial load	10 N (<0,2 dB)	

Connector type	Polishing type	Insertion Loss	Return loss
SC	APC	≤0,3 dB (typical.) / ≤0,5 dB (maximum)	≥ 50 dB
SC	UPC	≤0,3 dB (typical) / ≤0,5 dB (maximum)	≥ 40 dB

Ordering Description

Kit of 10 Field Optical Connectors SM SC-APC EZ! Connector for Circular Cable

Kit of 50 Field Optical Connectors SM SC-APC EZ! Connector for Circular Cable

EZ!FUSE™ SPLICE ON CONNECTOR

The new Splice On Connector termination system allows for easy termination and flexibility in the filed. This new "splice-on" connector (SOC) eliminates the need for field polishing and significantly improves the quality of the termination and installation time required. The connector is easily assembled by using a process that requires minimal skill or training. These connectors are optimal for use in FTTx application.

Constructive Characteristics

Dimensions	Height	7,4 mm
	Width	9 mm
	Length	67 mm (for 250/900 μm fiber) 68 mm (for 2/3 mm cordage)
Operating temperature	-40 °C up to 75 °C	
Applicable fiber type	250 μm, 900 μm, 2 mm, 3 mm	

Connector type	Polishing type	Insertion Loss		Return loss	
SC	UPC	0,3 dB (SM) (typical)	0,5 dB (maximum)	> 50 dB (SM/UPC)	> 50 dB
	APC (SM)	0,3 dB (SM) (typical)	0,6 dB (maximum)	> 60 dB (SM/APC)	> 60 dB
	PC (MM)	0,1 dB (SM) (typical))	0,3 dB (maximum)	> 30 dB (MM/PC)	> 30 dB

Ordering Description

FSOC-SC09-SM-U	SC connector, SM UPC polishing for 250/900 μm fiber
FSOC-SC23-SM-U	SC connector, SM UPC polishing for 2/3 m cordage
FSOC-SC09-SM-A	SC connector, SM APC polishing for 250/900 μm fiber
FSOC-SC23-SM-A	SC connector, SM APC polishing for 2/3 m cordage
FSOC-SC09-M3-P	SC connector, OM3 PC polishing for 250/900 μm fiber
FSOC-SC23-M3-P	SC connector, OM3 PC polishing for 2/3 m cordage
FSOC-SC09-M1-P	SC connector, OM1 PC polishing for 250/900 μm fiber
FSOC-SC23-M1-P	SC connector, OM1 PC polishing for 2/3 m cordage

CTOP

DIELECTRIC SELF-SUPPORTED OPTICAL CABLE
See page 70

FK-CTOP-L
See page 89

PRE-TERMINATED NAP CLOSURE

PRE-TERMINATED NETWORK ACCESS POINT CFK-CTOP-16P

The pre terminated Network Access Point FK-CTOP connects the cables from the distribution network to the access/termination network cables. The drop cables connection and disconnection are made exclusively outside the box, without affecting any previous connection.

Constructive Characteristics

Dimensions	Height	380 mm
	Width	240 mm
	Depth	140 mm
Product body material	Polypropylene	
Color	Black	
Input cable diameter	6.5 to 16 mm	
Derivation cable diameter	Up to 16 mm	
Maximum Number of Drop Cables	Up to 16 Reinforced Adapters (Drop SlimConnector)	
Maximum number of splices	Up to 96 Splices (Up to 6 Splice Trays)	
Application	Aerial	

Ordering Description

Pre-Terminated Network Access Point FK-CTOP-16P
Splice Tray for Network Access Point FK-CTOP-16P

LOCKED PRE-TERMINATED NETWORK ACCESS POINT - REINFORCED CONNECTOR FK-CTOP-L

Locked Pre-Terminated Network Access Point, is a splicing access point for connection of up to 8 Slimconnector and drop cables to customer's activation. Its main function is to be the connection between the distribution and terminal network.

Constructive Characteristics

Dimensions	Height	117 mm
	Width	146 mm
	Depth	64 mm
Color	Black	
Installation	Aerial or underground	
Input cable	Included (for some Ordering Descriptions)	
Number of exits	8 adapters for Slimconnector	
IP classification	IP67	

Ordering Description

FK-CTOP-L8S (Locked Pre-Terminated Network Access Point + Slimconnector + 10.0 M Cable Mini-RA 08F)
FK-CTOP-L8S (Locked Pre-Terminated Network Access Point + Slimconnector + 30.0 M Cable Mini-RA 08F)
FK-CTOP-L8S (Locked Pre-Terminated Network Access Point + Slimconnector + 50.0 M Cable Mini-RA 08F)

NEW
★
PRODUCT

SLIMCONNECTOR

The hardened optical connector was developed for connection in pre-terminated network access points. This module is easily connected with no need to open the box to activate the customer.

Constructive Characteristics

Diameter	19 mm
Length	120 mm
Operation temperature	-30 °C to 70 °C
Storage temperature	-30 °C to 70 °C
Traction load	Axial traction 45.4 kg
	Axial traction in the adaptor 22.7 kg
Protection Class	IP67
Type of Connector	SC
Type of Polishing	APC
Type of Cable	Compact Drop Fig. 8
Cover Protection	LSZH
Type of Fiber	G657 BLI
Insertion Loss	≤0.15 dB - Typical / ≤0.30 dB - Maximum
Return loss	≥ 60 dB

Ordering Description

Slimconnector Optic Drop Cable Fig.8 Low Friction 01F CZ - 50 m Roll

Slimconnector Optic Drop Cable Fig.8 Low Friction 01F CZ - 100 m Roll

Slimconnector Optic Drop Cable Fig.8 Low Friction 01F CZ - 150 m Roll

Slimconnector Optic Drop Cable Fig.8 Low Friction 01F CZ - 220 m Roll

Slimconnector Optic Drop Cable Fig.8 Low Friction 01F CZ - 300 m Roll

Slimconnector Compact Optic Drop CAble Fig.8 Low Friction 01F CZ - 300 m Roll

SlimBox™ 2-FIBER OUTDOOR ENCLOSURE

The SlimBox™ 2-Fiber Outdoor Enclosure is an external demarcation closure, featuring dual functionality as either a splice or connector housing. Featuring dual functionality as either a splice or connector housing and designed to resemble other typical wall outlets in a home, the SlimBox™ 2-Fiber Outdoor Enclosure is compact, while protecting the valuable network splice sleeves and/or connectors inside. It can be used for a wide variety of optical fiber applications.

Constructive Characteristics

Dimensions	Height	167 mm
	Width	102 mm
	Depth	31 mm
Color	Light gray	
Connector type	SC or LC	
Number of positions	02 SC ports	
Product body material	Plastic (PC+ABS)	
Ingress Protection (IP)	65	

Ordering Description

WSE1S-002-SS21-GRY-SCAUNC-F	SlimBox™ outdoor wall mount unit with 2 internal SCA adapters
WSE1W-002-SS21-GRY-SCAUNC-F-PT	SlimBox™ outdoor wall mount unit with 2 internal SCA adapters and 2 SM pigtails
WSE1S-002-SS21-GRY-SCUUNC-F	SlimBox™ outdoor wall mount unit with 2 internal SCU adapters
WSE1W-002-SS21-GRY-SCUUNC-F-PT	SlimBox™ outdoor wall mount unit with 2 internal SCU adapters and 2 SM pigtails

SlimBox™ 4-FIBER OUTDOOR ENCLOSURE

The SlimBox™ 4-Fiber Outdoor Enclosure is an external demarcation closure, featuring dual functionality as either splice or connector housing for 4 fibers. Featuring dual functionality as either splice or connector housing, designed to resemble typical wall outlets in a home, the SlimBox™ 4-Fiber Outdoor Enclosure is compact, while protecting the valuable network splice sleeves and/or connectors inside. It can be used for a wide variety of outdoor or indoor applications.

Constructive Characteristics

Dimensions	Height	186 mm
	Width	116 mm
	Depth	40 mm
Color	Light gray	
Connector type	SC or LC	
Number of positions	04 SC ports	
Product body material	Plastic (PC+ABS)	
Ingress Protection (IP)	65	

Ordering Description

WSE1S-004-SS21-GRYSCAUNC-F	SlimBox™ outdoor wall mountnunit with 4 internal SCA adapters
WSE1W-004-SS21-GRYSCAUNC-F-PT	SlimBox™ outdoor wall mountnunit with 4 internal SCA adapters and 4 SM pigtails
WSE1S-004-SS21-GRYSCUUNC-F	SlimBox™ outdoor wall mount unit with 4 internal SCU adapters
WSE1W-004-SS21-GRYSCUUNC-F-PT	SlimBox™ outdoor wall mount unit with 4 internal SCU adapters and 4 SM pigtails

Optical Cables

LOW FRICTION METALIC CORE DROP CABLE (CM)

Description	Flat drop cable type figure-8 with compact dimensions and covered by a flame retardant polyethylene. Especially designed for last-one-mile in FTTx networks, the metallic strength members enable the cable be installed into congested ducts with existing cables.
Application	Installation environment: indoor/outdoor
	Operation environment: Self-supporting aerial or in underground duct application, enabling be pushed or pulled directly into congested ducts.

Constructive Characteristics

Fiber type	Single-mode (9/125)	G.657 (BLI)
Fiber count	01	
Messenger	Steel wire: ø1.2 mm	
Strength member	Steel wire: ø0.4 mm	
Sheath	LSZH	
Color	Black or gray	

Cable dimension (mm)	Nominal weight (kg/km)	Maximum span (Installation SAG 1%) (m)	Maximum load during installation		Minimum bend radius (mm)	
			Only messenger (N)	Only optical unit (N)	During installation	After installation
5.0±0.1 x 2.0±0.1	20	80	660	148	30	15

Messenger = 1.2 mm

Steel wire = 0.4 mm

Performance

In according with ET 3312.

Packaging

Wooden reel	1000 m
Roll	500 m (to be used with a specific metallic support)
RIB (Reel-in-a-Box)	500 m

LOW FRICTION DIELECTRIC CORE DROP CABLE (CD)

Denomination	CFOAC-BLI-A/B-CD-AR-LSZH
Description	Flat drop cable type figure-8 with compact dimensions and covered by a low friction jacket. Especially designed for last-one-mile in FITx networks, the dielectric (FRP) strength members enable the cable be installed into congested ducts with existing cables.
Application	Installation environment: indoor/outdoor
	Operation environment: Self-supporting aerial or in underground duct application, enabling be pushed or pulled directly into congested ducts. Recommended for continuous installation of up to 400 meters.

Constructive Characteristics

Types of fibers	Single-mode (9/125)	G.657 (BLI)
Fiber count	01 or 02	
Messenger	Steel wire: ø1.2 mm	
Strength member	FRP: ø0.5 mm	
Flammability rating	LSZH	
Color	Black or gray	

Cable dimension (mm)	Nominal weight (kg/km)	Maximum span (Installation SAG 1%) (m)	Maximum load during installation		Minimum bend radius (mm)	
			Only messenger (N)	Only optical unit (N)	During installation	After installation
5.0±0.1 x 2.0±0.1	20	80	660	75	30	15

Messenger = 1.2 mm

FRP = 0.5 mm
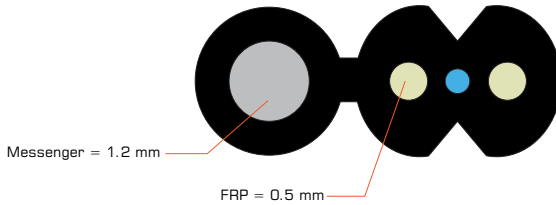
Performance

In according with ET 3295.

Packaging

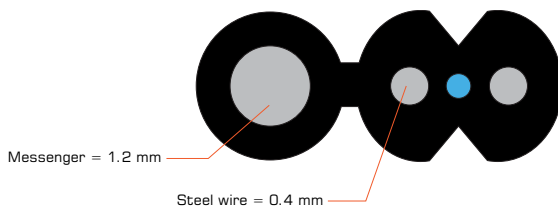|	
Wooden reel	1000 m
Roll	500 m (to be used with a specific metallic support)
RIB (Reel-in-a-Box)	500 m

DROP CABLE (CD)

Description	Flat drop cable type figure-8 with compact dimensions and covered by a flame retardant polyethylene. Especially designed for last-one-mile in FTTx networks, the metallic strength members enable the cable be installed into congested ducts with existing cables.
Application	Installation environment: indoor/outdoor
	Operation environment: Self-supporting aerial or in underground duct application, enabling be pushed or pulled directly into congested ducts.

Constructive Characteristics

Types of fibers	Single-mode (9/125)	G.657.A1
Fiber count	01 or 02	
Messenger	Standard wire: ø1.2 mm (7 x 0.4 mm)	
Strength member	Steel wire: ø0.5 mm	
Flammability rating	Flame retardant polyethylene	
Color	Black or gray	
Temperature range	Storage	-10 to +70 ºC
	Installation	0 to +70 ºC
	Operation	-10 to +70 ºC

Cable dimension (mm)	Nominal weight (kg/km)	Maximum pulling tension	Minimum bend radius (mm)	
			with suspension member	without suspension member
H1: 6.0 mm H2: 3.3 mm w: 2.2 mm	20	660	120	15

Support standard wire ø1.2 mm (7 x 0.4 mm)

Strength member

Optical fiber

Strength member

Sheath

1 Fiber   2 Fibers
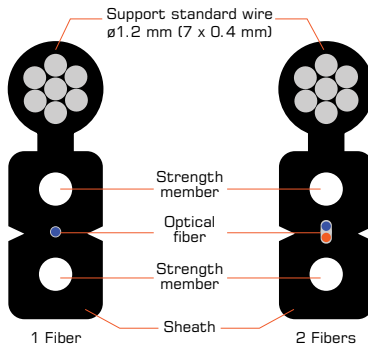
Performance

In according with TFS-6495.

Packaging

Wooden reel	1000 m
Roll	500 m (to be used with a specific metallic support)

FIG.8 TB DROP CABLE

Description	Tight-buffered drop cable type figure-8, especially designed for last-one-mile in FTTx networks, it is composed by optical fibers with secondary coating, surrounded by dielectric strength members and covered by a flame retardant outer jacket with UV protection.
Application	Installation environment: indoor/outdoor
	Operation environment: Self-supporting aerial application.

Constructive Characteristics

Fiber type	Single-mode (9/125)	G.657.A1
Fiber count	01 or 02	
Buffered fiber diameter	900 μm (1 fiber) or 600 μm (2 fibers)	
Messenger	Stranded wire ø1.2 mm (7 x 0.4 mm)	
Strength member	Aramid yarns	
Sheath	Flame retardant polyethylene	
Color	Black	

Cable dimension (mm)	Nominal weight (kg/km)	Maximum span (sag 0.5%) (m)	Maximum pulling tension (N)	Minimum bend radius (mm)	
				with suspension unit	without suspension unit
2.7 x 5.8	22	50	800	130	35

Suspension unit

Tight buffer tube

Optical fiber

Strength member

Sheath
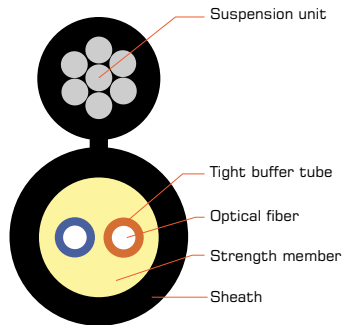
Performance

In according with TFS-7441.

Packaging

Wooden reel	1000 m

Termination Network

**ROSETTE 1P
OVERLAY W/ 1 ADAP**
See page 110

MDU
DISTRIBUTION
SOLUTION

SLIMBOX™ FLEX
See page 99

DO9 CONNECTOR
See page 99

FLEX ROSETTE
See page 111

OPTICAL FIELD EZ!CONNECTOR
See page 89

MICRO INDOOR LOW FRICTION
See page 113

FIBER-LAN EZ!LUX
See page 104

SLIMBOX™ 12
See page 105

OPTICAL SPLITTER 1X8
See page 64

OPTICAL CABLE OUTDOOR
See page 70

General Distribution Boxes

SlimBox Flex™ INDOOR SPLITTER MODULE (CEIP FLEX)

The Slimbox™ Indoor Splitter Module (CEIP FLEX) is an optical distribution box supplementing the Slimbox™ Indoor Rosette (FLEX ROSETTE) in its application distribution in floor buildings. Its reduced dimensions allows its indoor installation with a pre-connectorized splitter works in modularidades of 1x4 and 1x8, allows expansion than was initially for only 1 to 8 possible activation.

Constructive Characteristics

Dimensions	Height	184 mm
	Width	105 mm
	Depth	53 mm
Color	Light gray (RAL 7035)	
Protection Index	IP 30	
Product body material	High-impact - Thermoplastic	

Ordering Description

SlimBox™ 8 FLEX INDOOR - 1x4 Splitter Module (Fiber Internal Adapter Module with Splitter 1x4 and 4 SC/APC Adapters - CEIP FLEX)

SlimBox™ 8 FLEX INDOOR Splitter Module - (Fiber Internal Adapter Module With Splitter 1x8 and 8 SC/APC Adapters - CEIP FLEX) (10302570048)(B)

FIELD ASSEMBLY EZ!CONNECTOR APC 900 µM

The Field Assembly Optical Connector D0.9 was developed for 0.9 mm diameter single-mode fibers quick and easy connection . Available in SC type and APC polished connector. Easy installation - there is no need for special tools neither epoxy or polishing in the field.

Constructive Characteristics

Dimensions	Height	7.3 mm
	Width	9 mm
	Depth	55.6 mm
Operating temperature	-25 °C up to 75 °C	
Storage temperature	-25 °C up to 75 °C	
Supports axial load	3 N	

Connector type	Polishing type	Insertion Loss	Return loss
SC	APC	≤0,3 dB (typical) / ≤0,5 dB (maximum)	≥ 50 dB

Ordering Description

Kit with 10 optical field connectors SM SC-APC EZ!Connetor for 0.9 mm tight buffered fiber

SlimBox™ 120-FIBER DISTRIBUTION MODULE

SlimBox™ 120-Fiber is an indoor optical distributor frame fixed to the wall applied in the infrastructure of FTTx optical networks. The product is responsible to accommodate and protect optical splices between input cables and internal distribution cables inside the buildings.
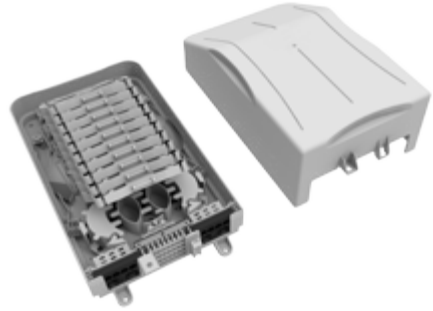
Constructive Characteristics

Dimensions	Height	305 mm
	Width	185 mm
	Depth	90 mm
Color	Light gray	
Number of positions	120 direct optical splices (without splitters)	
	96 optical splices (with splitters - 2 trays dedicated to accommodate them)	
Product body material	Thermoplastic	

Ordering Description

SlimBox™ 120-Fiber Distribution Module (CEIP 120 - Wall Mount - 120 Splices)

SlimBox™ 24 -FIBER INDOOR SPLICE MODULE (CEIP 24F)

This SlimBox™ is used as a distribution central point for optical fiber in an indoor environment. Capable of performing the distribution of optical cables using fusion splices. It has two trays for splice accommodation up to 12 splices each one.

Constructive Characteristics

Dimensions	Height	220 mm
	Width	130 mm
	Depth	70 mm
Operation Temperature	-25°C to 75°C	
Color	Light gray	
Number of positions	24 direct optical splices (without splitters)	
Product body material	Thermoplastic	

Ordering Description

SlimBox™ 24 - Fiber Internal Adapter Module

SlimBox™ 64-FIBER INTERNAL ADAPTER MODULE

SlimBox™ 64-Fiber is used in Fiber-to-the-Apartment networks, where the building's base is a point of division from the drop cable to the vertical cabling. This box is compatible with connectorized splitters and is provided with a panel of up to 64 adapters, where it is possible to connect the splitters outputs to the vertical cable fibers. The splitters, pigtails and adapters shall be added to the basic module according to the application.
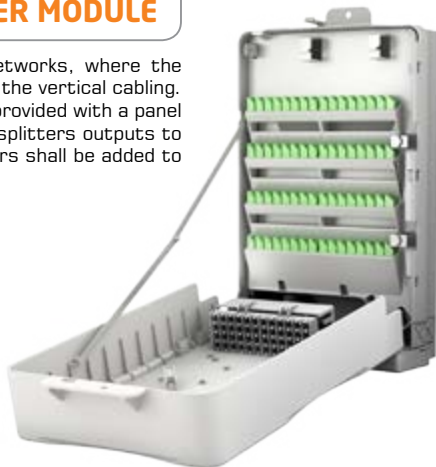
Constructive Characteristics

Dimensions	Height	360 mm	
	Width	220 mm	
	Depth	100 mm	
Capacity	HP (home passed) / adapters SC-APC	64	
	HC (home connected) / splitter outputs	48	
	Compact modular splitters 1x8 SC-APC	6	

Ordering Description

SlimBox™ 64-Fiber Internal Adapter Module (DGOI-C 64 - Basic Modu
SlimBox™ 64-Fiber Internal Adapter Module (DGOI-C 64 - with 64 Ad
SlimBox™ 64-Fiber Internal Adapter Module (DGOI-C 64 - with 8 Adapters and 1 Splitter 1X8)
SlimBox™ 64-Fiber Internal Adapter Module (DGOI-C 64 - with 24 Adapters and 1 Splitter 1X8)
SlimBox™ 64-Fiber Internal Adapter Module (DGOI-C 64 - with 48 Adapters and 1 Splitter 1X8)
SlimBox™ 64-Fiber Internal Adapter Module (DGOI-C 64 - with 64 Adapters and 1 Splitter 1X8)

COMPACT OPTICAL SPLITTER

Modular splitter for utilization with Slimbox 64-fiber. Manufactured with PLC semiconductor technology with SC/APC connectors in the output, standard fiber G.657A.
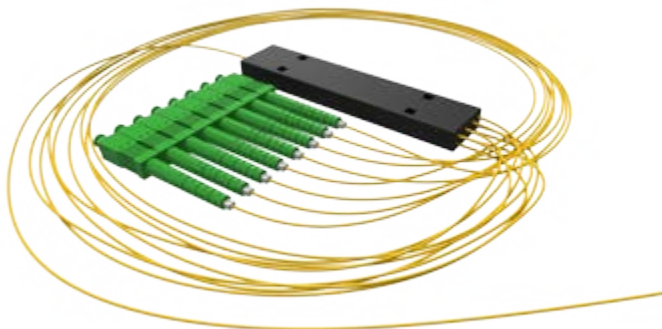
Constructive Characteristics

Dimensions	Height	10 mm
	Width	20 mm
	Depth	90 mm
Capacity	Insertion loss	10.5 dB
	Cord diameter	2 mm
	Input cord length	2 m
	Output cord length	90 cm

Ordering Description

PLC Optical Splitter 90X20X10 Compact 1x8 G.657A NC/SC-APC 2.0D2.0/0.9D2.0

Optical Cables

SIMPLUSLAN MDU CABLE

Description	Optimized optical cable for vertical installation in MDU (Multi-Dwelling) networks. The optical fibers are placed in basic units type micro-modules which presents reduced dimension, greater flexibility and easy removal without the use of special tools and over this is applied a flame retardant jacket.
Application	Installation environment: indoor
	Operation environment: vertical installation in duct or shaft.

Constructive Characteristics

Fiber type	Single-mode (9/125)	G.657 (BLI)
Flammability rating	LSZH	

Fiber count	Nominal diameter (mm)	Nominal weight (kg/km)	Maximum load during installation (N)	Minimum bend radius (mm)	
				During installation	After installation
24	7.6 ± 0,4	56	1000	15 x cable diameter	10 x cable diameter
32					
48		60			
64	8.6 ± 0,4	65			

- Flame-retardant jacket
- Micro-module
- Optical fiber
- Filling compound
- Dielectric yarns
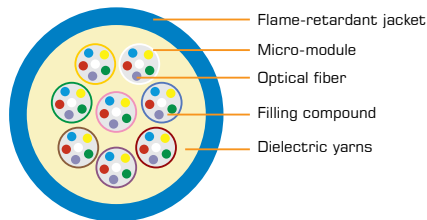
SIMPLUSLAN 48 FIBERS

Performance

In accordance with ET 2115.

Packaging

Wooden reel	1000 m

FIBER-LAN INDOOR

Denomination	CFOI-EO
Description	Tight-buffered cable composed by optical fibers with secondary coating (900 μm), surrounded by dielectric strength members and covered by a flame retardant outer jacket.
Application	Installation environment: indoor
	Operation environment: Intrabuilding backbone and horizontal application.

Constructive Characteristics

Fiber types	Multimode (50/125)	OM4, OM3 and OM2
	Multimode (62.5/125)	OM1
	Single-mode (9/125)	G.652.D and G.657 (BLI)
Fiber count	02 to 72	
Flammability rating	OFN, OFNR, OFNP and LSZH	

Fiber count	2	4	6	8	10	12	16	24	36	48	72
Nominal outer diameter (mm)	4.8	5.2	5.4	6	6.4	6.6	15	15	18	18.6	21.6
Nominal weight (kg/km)	19	21	24	34	38	40	192	192	231	254	372
Maximum load during installation (kgf)	Up to 12F: 66										
	More than 12F: 132										
Minimum bending radius (mm)	During installation				15 x cable diameter						
	After installation				10 x cable diameter						

Flame-retardant outer jacket

Rip cord

Buffered fibers (900 μm)

Dielectric strength members
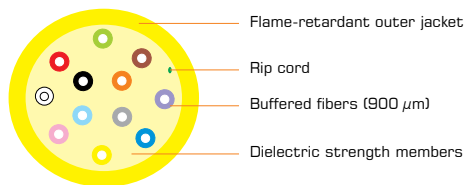
FIBER-LAN INDOOR 12 FIBERS

Performance

In accordance with ET 2070.

Package

Wood reel	
Cable length	2100, 900 or 500 m

FIBER-LAN EZ!LUX

Description	Tight Buffer Optical cable with acrylate primary coating and thermoplastic secondary coating. The core of the cable is coated in flame retardant thermoplastic material reinforced by two FRPs. Installation environment: Indoor.		
Application	Operation environment: Vertical Duct Installation.		

Constructive Characteristics

Fiber types	Singlemode BLI (9/125)		G.657.A1
Fiber count	Up to 12		
Flammability rating	LSZH		
	6 fibers	**8 fibers**	**12 fibers**
Nominal outer diameter	8.3 ± 0.3 mm	8.3 ± 0.3 mm	9.3 ± 0.3 mm
Nominal weight	53 kg/km	53 kg/km	62 kg/km

Maximum installation load (N)	Minimum bending radius (mm)	
	During installation	**After installation**
0.2 x cable weight	15 x cable diameter	10 x cable diameter

Buffered fiber (900 μm)
Dielectric strength members
Outer Jacket
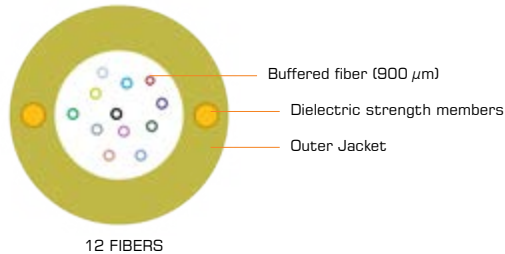
12 FIBERS

Performance

In accordance with ET 3700	

Package

Wood reel	
Cable length	300 or 500 m

Floor Boxes

SlimBox™ 12-FIBER INNER ADAPTER MODULE

It is used as an internal optical distribution box in typical building networks (MDU). Due to its hybrid aspect, it can be used either as a transition box at the building entrance, or as a floor box. It has 2 setups: with 12 pigtails and with 1x8 splitter. Capacity for up to 12 SC-APC adapters.

Constructive Characteristics

Dimensions	Height	220 mm	
	Width	130 mm	
	Depth	70 mm	
Capacity	SC-APC Adapters	12	
	Fusion Splices	12	
	PLC Splitters	1X8	1
		1X4	2

Ordering Description

SlimBox™ 12-Fiber Inner Adapter Module (CEIP 12 - Basic Module)
SlimBox™ 12-Fiber Inner Adapter Module (CEIP 12 - with 12 Pigtails)
SlimBox™ 12-Fiber Inner Adapter Module (CEIP 12 - with 1 Splitter 1X8)

OPTICAL ADAPTERS KIT

Package with multiple SC-APC single-fiber optical adapters with angular shape and articulate shutter towards the inside, avoiding the need of opening for connector insertion.

Constructive Characteristics

Number of fibers	02 fibers (1 piece for duplex adapters or 2 for single-fiber adapters)
	06 fibers (3 pieces for duplex adapters or 6 for single-fiber adapters)
	12 fibers (1 piece, only for MPO adapters)
	72 fibers (6 pieces, only for MPO adapters)

Adapter	Fiber type	Polishing type	Color
SC	SM	PC	Blue
		APC	Green
	MM	PC	Beige

Ordering Description

PC	02 Fibers	Multimode (MM)
		Single-mode (SM)
	06 Fibers	Multimode (MM)
		Single-mode (SM)
APC	02 Fibers	Single-mode (SM)
	04 Fibers	
	06 Fibers	
	08 Fibers	

PIGTAIL AND OPTICAL ADAPTER KIT SM

12 isolated individually colored fibers according to TELCORDIA color standard, connectorized at one end and accompanied by optical adapters.
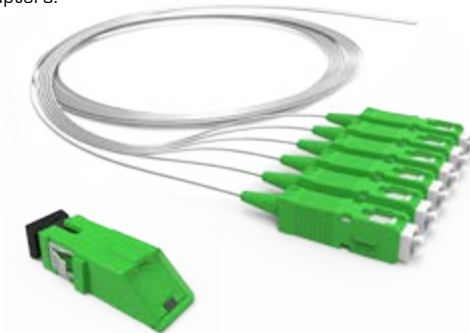
Constructive Characteristics

Length	1.5 m
Rated diameter	0.9 mm
Depth	49 mm
Color	TELCORDIA Standard
Fiber type	Single-mode LWP G.652.D

Ordering Description

Pigtail and Optical Adapter Kit 12F BLI A/B G-657A SC-APC D0.9 TELCORDIA
12F Kit Connectorized BLI A/B G-657A SC-APC SM Simplex Pigtail with Angular Adapter
Pigtail and Optical Adapter Kit 12F SM SC-UPC D0.9 TELCORDIA

Other configurations upon request.

SlimBox™ 12-FIBER DISTRIBUTION MODULE

Optical distribution box used for indoor derivation of optical cables. With capacity of 12 fibers per box in 1 articulated tray, it can be used in building optical networks (MDU) as a point of fiber distribution of vertical riser cables to the horizontal drop cables, which reach the apartments. Another application is as optical blockage. It is compatible for derivation of flat cables or optical pigtail.

Constructive Characteristics

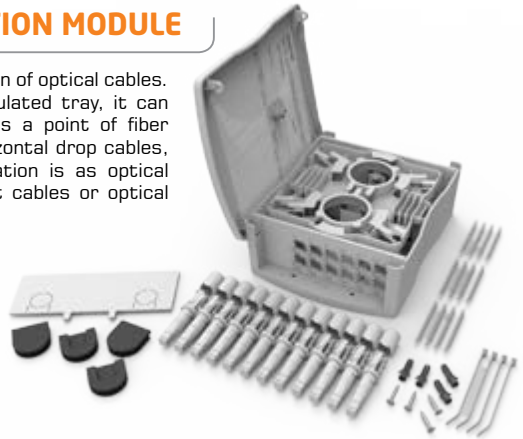|		
Dimensions	Height	149 mm
	Width	123 mm
	Depth	49 mm
Color	Light gray	
Cable type	Tight buffer, loose tube and micro-module	
Fiber type	Single-mode G-652B, G-652D or G-657A pigtail	
Number of positions	12 positions: for any type of optical pigtail (2, 3 or 5.3 mm)	
Product body material	Highly resistant plastic	

Ordering Description

SlimBox™ 12-Fiber Distribution Module (CDOI 12 - Basic Module)

SlimBox™ 12-FIBER OUTER ADAPTER MODULE

Optical distribution box used for indoor derivation of optical cables. With capacity of 12 fibers per box in 1 articulated tray, it can be used in building optical networks (MDU) as a point of fiber distribution of vertical riser cables to the horizontal drop cables, which reach the living units. Another application is as optical blockage. It is compatible for derivation of flat cables or optical pigtails.
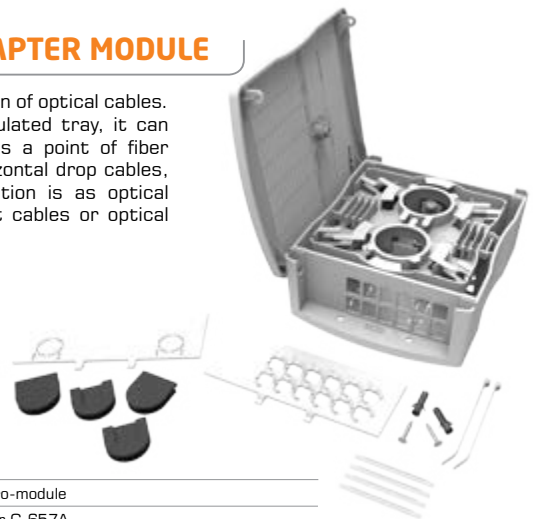
Constructive Characteristics

Dimensions	Height	155 mm
	Width	130 mm
	Depth	53 mm
Color	Light gray	
Connector type	SC	
Cable type	Tight buffer, loose tube and micro-module	
Fiber type	Single-mode G-652B, G-652D or G-657A	
Number of positions	12 positions	
Product body material	Highly resistant plastic	

Ordering Description

SlimBox™ 12-Fiber Outer Adapter Module (BW 12 - Basic Module)

SPLITTER MODULE

Splitter modules for Indoor or Outdoor use. Both type of modules are suitable for MDU application. SC connector interface of the modules allows quick installation. Outdoor type is applicable on external wall of small buildings.

Constructive Characteristics

Product Name		Splitter Module - 4	Splitter Module - 8	Splitter Module WM - 4	Splitter Module WM - 8
Dimensions (mm)	Height	29	29	151	
	Width	94	102	156	
	Depth	57	77	69	
Weight (kg)		0.2		0.5	
Flammability Class		UL94, V-0			
Mount Condition		Indoor wall mount type		Indoor/outdoor wall mount type	
Protection degree		-		IPx3	
Insertion Loss		≤ 8.9 dB	≤ 12.4 dB	≤ 8.9 dB	≤ 12.4 dB
Connector Type		SC			

Ordering Description

Splitter Module 4
Splitter Module 8
Splitter Module WM-4
Splitter Module WM-8

HORIZONTAL SOLUTION

SIMPLEX OPTICAL PATCH CORD - D3

OPTICAL ROSETTE 2P

OPTICAL FIELD CONNECTOR SM SC-APC EZ! CONNECTOR FOR FLAT CABLES

LD 421-21WV

OPTICAL CABLE CFOI-BLI-A/B-UB 48F LSZH AZ (SIMPLUSLAN)

Termination Point

SlimBox™ 2-FIBER OPTICAL ROSETTE

Optical network termination point (4x2 inches) used to make the transition between the outdoor optical fiber cable and the optical patch cord, which will take the signal to the final equipment used indoors. Termination capacity of up to 4 fibers and compatible with field connector. Made of highly resistant plastic.

Constructive Characteristics

Dimensions	Height	114.9 mm
	Width	79.8 mm
	Depth	22.5 mm
Color	Beige (RAL 1015)	
Connector type	SC	
Polishing type	APC or PC (UPC or SPC)	
Cable type	Tight buffer, loose tube and micro-module	
Fiber type	Single-mode G-652B, G-652D or G-657A	
Number of positions	2 positions for optical fusion or mechanical splices	
	2 positions for optical adapter SC simplex or LC duplex	
Product body material	ABS Plastic	

Ordering Description

SlimBox™ 4-Fiber Optical Rosette 2P 4x2 - White
SlimBox™ 4-Fiber Optical Rosette 2IN with 1 Shutter SC/APC Adapter - White
SlimBox™ 4-Fiber Optical Rosette 2IN with 2 Shutter SC/APC Adapters - White

SlimBox™ FLEX INDOOR ROSETTE

The SlimBox™ Flex Indoor Rosette is a very versatil product, it can be used as: Optical termination point (PTO): connected to an equipment via a cord; Floorbox (MDU): can be used as a connection with first subscriber or expand for more activations with Slim Box Flex Indoor Splitter Module (CEIP FLEX). It can be supplied with or without the plastic limiter.

Constructive Characteristics

Dimensions	Height	96 mm
	Width	82 mm
	Depth	22 mm
Color	White or Light gray	
Protection Index	IP 30	
Product body material	Thermoplastic	
Included Accessories	Basic Setup: 2 screws for wall mounting; 2 wall mounting bushings; 1 screw to seal; 4 plastic clamps; 1 splice protector; 1 SC/APC adapter.	

Ordering Description

SlimBox™ Flex Indoor Rosette E 1P OverlayY W/ 1 Pigt
SlimBox™ Flex Indoor Rosette 1P Overlay W/ 1 Adap SC-APC and W/ Plastic Limiter
SlimBox™ Flex Indoor Rosette 1P Overlay W/ 1 Pigtail G-657, 1 Adap SC-APC and Plastic Limiter
SlimBox™ Flex Indoor Rosette 1P Overlay W/ 1 Adap SC-APC
SlimBox™ Flex Indoor Rosette 1P Overlay W/ 1 Adap SC-APC and W/ Plastic Limiter

OPTICAL ROSETTE J428N

J428N rosette is designed for termination of drop or indoor cable with EZ! Connector SC - Field Installable Connector.
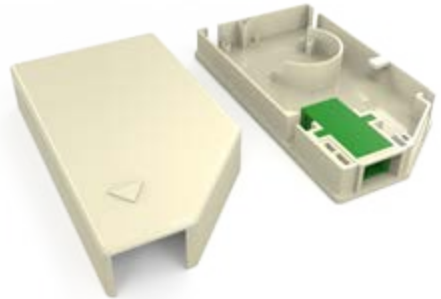
Constructive Characteristics

Dimensions	Height	100 mm	
	Width	50 mm	
	Depth	17 mm	
Weight	0.1 kg		
Flammability Class	UL94, V-0		
Mount Condition	Indoor wall mount type		
Cable entry position	Top		
Maximum cable count	Drop cable or indoor cable	1	
Maximum SC connector joint	1		

Ordering Description

J428N Optical Rosette

INLINE ROSETTE

The Optical Inline Rosette presents as main characteristics the ability to perform compact optical cables termination through field connectorization as well as cable anchorage with versatile retention system, which enables compatibility with drop cables. Adjusted to fit your indoor environment.

Constructive Characteristics

Dimensions	Height	18.8 mm
	Width	24.5 mm
	Depth	94.1 mm
Color	White	
Protection Index	IP 30	
Product body material	Thermoplastic	
Maximum cable Input diameter	3 mm	
Included accessories	SC-APC optical adapters	
Operational Temperature	-25ºC to 75ºC	

Ordering Description

Slimbox™ Inline Indoor Rosette 1P

Optical Cables

LOW FRICTION INDOOR CABLE

Description	Compact dimension optical cable with cover made of low friction material. Especially developed for indoor installations in FTTH and MDU networks. The traction elements made of steel wires enables the cable to be pushed through the ducts, avoiding the use of a wire guide during installation.
Application	Installation environment: Indoor.
	Operation environment: Vertical or horizontal installation in ducts.

Constructive Characteristics

Fiber types	Single-mode (9/125)	G.657 (BLI)
Traction element and sustaining	2 galvanized steel wires with 0.5 mm rated diameter	
Flammability class	LSZH	
Color	White	

Number of optical fibers	Rated outer diameter (mm)	Rated net mass (kg/km)	Maximum load during installation (N)	Minimum curvature radius (mm)	
				During installation	After installation
01	1.6 x 2	7	200	30	15
02	2 X 3	11	200	30	15

Flame-retardant jacket (low friction)
Steel wire
Optical fiber
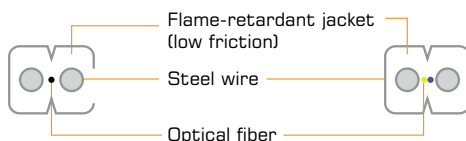
Performance

In accordance with ET 2365.

Packaging

Reelex® Box	Standard length 1000 m for 1-fiber, 500 m for 2-fiber
In RIB Box	Standard length 1000 m or 500 m

MDU OPTICAL CORD

Description	Dielectric optical cord constituted of one single-mode optical fiber (single-fiber cord) "bending loss insensitive" tpe. It presents higher mechanical performance due to its robust construction. It is indicated for internal interconnections in FTTx access networks.
Application	Installation environment: indoor.
	Operation environment: internal network interconnection.

Constructive Characteristics

Fiber types	Single-mode (9/125)	G.657 (BLI)
Number of fibers	01	
Flammability class	COG or LSZH	

Rated outer diameter (mm)	Rated mass (kg/km)	Maximum installation load (N)	Minimum curvature radius (mm)
2.9	10	300	15

Performance

In accordance with ET 2245.

Packaging

Wooden reel	Standard length 1000 m

ROUND INDOOR CABLE B3

Description	Dielectric internal optical cable for access to the subscriber with one single-mode optical fiber optimized for reduced curvatures (BLI), with secondary coating made of thermoplastic material (type "tight"). Traction elements made of aramid wires are placed over the isolated fiber, as well as external flame-retardant coating.
Application	Installation environment: indoor
	Operation environment: vertical or horizontal installation in ducts

Constructive Characteristics

Fiber types	Single-mode (9/125)	G.657 (BLI)
Flammability class	LSZH	
Color	White	

Number of optical fibers	Rated outer diameter (mm)	Rated net mass (kg/km)	Maximum load during installation (N)	Minimum curvature radius (mm)	
				During installation	After installation
01	3.8	15	800	15	5

Performance

In accordance with ET 2412.

Packaging

Carton box type RIB (reel in a box)	Standard length 500 m
Wooden reel	Standard length 500 m

SIMPLEX OPTICAL PATCH CORD

Dielectrical optical cord made of one single-mode bending loss insensitive optical fiber. Suitable for indoor connections in FTTx networks.
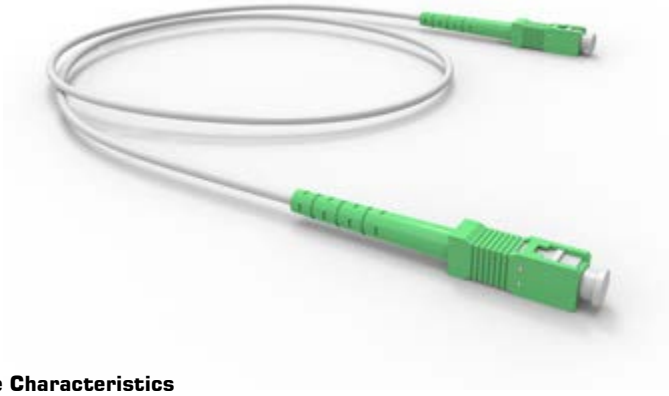
Constructive Characteristics

Rated diameter	Single-fiber	2 and 3 mm
	Duplex	4.5 and 5.9 mm
Fiber	G-657-A1 e G-657-A2	
Length	From 1.5 to 20 m	
Polishing	UPC or SPC	

Ordering Description

LC-UPC	LC-UPC	OM3
	SC-UPC	
	LC-UPC	
	SC-UPC	
LC-UPC	SC-UPC	OM4
	LC-UPC	
	SC-UPC	
	LC-UPC	
LC-SPC	SC-SPC	SM
SC-SPC	SC-SPC	

Other configuration available upon request.

InvisiLight® SYSTEM

InvisiLight®
MDU SOLUTION
See page 118

SlimBox™
12-FIBER
INTERNAL
ADAPTER
MODULE
See page 105

InvisiLight® EZ!CONNECT MODULE

InvisiLight® MDU SOLUTION

InvisiLight® MDU SOLUTION

The InvisiLight® Optical Solution is a revolutionary system that enables fast, easy-to-install and almost invisible fiber drop connections for the indoor living unit (ILU) or multi dwelling unit (MDU).

InvisiLight® MDU Kit

Constructive Characteristics

Product Specification	InvisiLight® MDU Solution
Size	From 4 to 16 optical fibers, 250 μm EZ-Bend in a 2 mm unit
Application	Building or MDU hallways; risers if in OFNR duct
Install Process	Fiber adhered to wall or ceiling by an adhesive
Install Materials	Adhesive (in tubes) with precision pre-cut tip (fits in applicator tool)
	Inside and outside corner protectors, wall plugs and caps
	Mechanical connector or pigtail
	Add options for 4F,8F,12F,16F
	PoE wall module outside tenant unit
Connectors	Factory-terminated connectors for closet. Mechanical Connectors or spliced pigtails for point of entry
Surface Mounting	Adheres to most common types of painted and unpainted indoor wall, molding and ceiling surfaces
Aesthetics	Minimum disruption to owner or tenants
	Virtually invisible and blends into the decor
	Can be caulked and painted with latex and oil-based indoor paint
	Can be repositioned or removed and reapplied if required without damage
	Easily installed around corners, obstacles and on textured surfaces
	Safe and naturally protected in crevices
Corners	Supports maximum 40 outside corners and no limit on inside corners
Spool Lenghts	Available in various spool lenghts
Slack Management	Point of Entry module has storage space for slack
Install Conditions	Temperature ≥10 °C for adhesive installation. No humidity restriction or preconditioning required.
Operating Conditions	5 °C to 43 °C
Standards	UL listed OFN-LS and OFN-FT1. For in-between floors, in risers or through fire walls, it must be placed inside OFNR-rated conduits or ducts.

Ordering Description

Item	Detail
NVSLGHTHI-D-SCAUNC-Module Kit-12-100M-EA	SC-APC connectorized (one end) 12-fiber InvisiLight® Multifiber Unit, 100 meters, 12 point-of-entry (PoE) modules and components
NVSLGHTHI-D-MTFUNC-Module Kit-12-100M-EA	MPO (Ribbon) connectorized (one end) 12-fiber InvisiLight® Multifiber Unit, 100 meters, includes 12 point-of-entry (PoE) modules and components
NVSLGHTHI-D-LCAUNC-Module Kit-12-100M-EA	LC-APC connectorized (one end) 12-fiber InvisiLight® Multifiber Unit, 100 meters, includes 12 point-of-entry (PoE) modules and components
NVSLGHTHI-D-UNCUNC-Module Kit-12-100M-EA	Unconnectorized 12-fiber InvisiLight® Multifiber Unit, 100 meters, includes 12 point-of-entry (POE) modules and components
NVSLGHTH-Module E/W LCA ADAPTER	Additional point-of-entry (PoE) module with LC-APC adapter
NVSLGHTH-Module E/W SCA ADAPTER	Additional point-of-entry (PoE) module with SC-APC adapter
NVSLGHTH-Module E/W SPLICE TRAY	Additional point-of-entry (PoE) module with splice tray
NVSLGHTH-MID Span Tool	12-fiber multifiber unit access tool
NVSLGHTC-MINI Dispensing Tool	Adhesive dispensing tool
NVSLGHTC-Tool Belt Kit	InvisiLight® tool belt kit
NVSLGHTC-Pole Extension Tool	InvisiLight® pole extension tool
NVSLGHTC-Tube, 30ML Adhesive 25 PK	25-pack of adhesive (in tubes)

Additional configuration available upon request.

InvisiLight® EZ-CONNECT MODULE

Pre-terminated FTTx Module for Easy Deployment in Living Unit.

Constructive Characteristics

Product Specification	InvisiLight® EZ-Connect	
Size	One 900 μm InvisiLight Optical Fiber	
Application	Indoor Living Unit (home or apartment)	
Dimensions	Height	87.68 mm
	Width	79.56 mm
	Depth	35.74 mm
Fiber type	BLI-A/B - G.657.B3	
Bottom Layer (Max. Length)	40 meters	
Splice Repair	Yes (2 splices)	
Top Layer (Max. Length) 5	5 meters of tight buffer fiber 2.5 meters of 2 mm cord 1.5 meters of 3 mm cord	
Color	White	
Operation temperature	-40 to +85 ºC	
Storage Temperature	-40 to +85 ºC	

Connector type	Polishing type	Insertion Loss	Return loss
SC connector on inside and outside end	APC	≤ 0.30 dB - maximum	≥ 60 dB

Ordering Description

NVSLGHTD-DSCASCA-1-NAMKIT 900-5.0M/40M	EZ-Connect module with 5.0 meters of 900 μm fiber on the top layer and 40 meters of 900 μm fiber on the bottom layer; pre connectorized both ends with SCA connectors
NVSLGHTDD-SCASCA-1- NAM-KIT 2MM2.5M/40M	EZ-Connect module with 2.5 meters of 2.0 mm fiber on the top layer and 40 meters of 900 μm fiber on the bottom layer; pre connectorized both ends with SCA connectors
NVSLGHTDD-SCASCA-1- NAM-KIT 3MM1.5M/40M	EZ-Connect module with 1.5 meters of 3.0 mm fiber on the top layer and 40 meters of 900 μm fiber on the bottom layer; pre connectorized both ends with SCA connectors

GPON FK-ONT-G420W/AC S2

GPON optical modem FK-ONT-G420W/AC (4 Gigabit Ethernet ports + 2 FxS ports + Wi-Fi).

Constructive Characteristics

Power Supply	12 VDC with AC/DC full-range adapter (not included)	
Operating Temperature	-5 ºC to 50 ºC	
Dimensions	Height	34 mm
	Width	160 mm
	Depth	220 mm

Technical Characteristics

Interfaces	1 optical interface GPON SC-APC	**Voice**	Support to IP telephone systems	
	4 copper interfaces Gigabit Ethernet RJ-45		Caller ID, Call Hood, Call Transfer, etc.	
	2 copper interfaces FxS RJ-11		Configuration of DHCP cliente or static IP	
	Dual-Band 802.11 a/b/g/n/ac Wifi with integrated antenna	**Multicast**	IGMP snooping	
GPON	Standard GPON ITU-T G.984	**WiFi**	Compatible with IEEE 802.11b/g/n	
	2.5 Gbps downstream and 1.25 Gbps upstream		Multiple SSIDs	
	20 km reach (60 km maximum logical reach)		Security: WEP, WPA and WPA2	
	Multiple T-CONTs and GEM Ports	**Management**	Management and provisioning through OLT	
Layer 2	Up to 128 MAC addresses		Auto discovery	
	Up to 16 VLAN groups		Provisioning via RADIUS	
	Marking/Remarking 802.1p		Remote firmware update	
Layer 3	Cliente PPPoE	**Transmission wavelength**	1310 nm	
	NAT and NAPT	**Reception wavelength**	1490 nm	
	DHCP Server	**Transmission optical power**	0.5 dBm~+5 dBm	
QoS	Bandwidth adjustable from OLT	**Reception optical power**	-8 dBm~-27 dBm	
	8 priority lines per port			

Ordering Description

GPON Optical Modem FK-ONT-G420W/AC S2
Power Supply for Optical Modem NEMA Standard
Power Supply Adapter Standard ABNT NBR 14136 for Optical Modem

GPON LD421-21WV

The LD421-21WV is an ONT (Optical Network Terminal) compliant with the ITU-T G.984 standard. The equipment supports rates up to 2.5 Gbps for downstream and 1.25 Gbps for upstream. ONT supports full Triple Play services, including voice, video and data, with built-in WiFi antenna.

Constructive Characteristics

Power Supply	AC / DC adapter 100-240V, 50 / 60Hz (Not included)	
Operating Temperature	0 ºC to 40 ºC	
Dimensions	Height	42 mm
	Width	130 mm
	Depth	203 mm

Technical Characteristics

Interfaces	1 optical interface GPON SC-APC	**RF Video**	Type F connector, 75 ohms
	1 metal interface RJ-45 10/100 Base-T (FastEthernet)		1550 nm dedicated analogue wavelength RF video; range from -8 to +2dBm
	1 metal interface RJ-45 10/100/1000 Base-T (GbE)		Supports AGC optical feedfoward
			RF operation range: 54 to 1002 MHz
	1 metal interface RJ-11 FxS (for analog telephony);	**Management**	Management and provisioning through OLT
			Auto discovery
	1 RF interface type F (for analog video)		Provisioning via RADIUS
	WIFI antena		Remote firmware update
GPON	Standard GPON ITU-T G.984x	**Transmission wavelength**	1310 nm
	2.5 Gbps downstream and 1.25 Gbps upstream		
	20 km reach (60 km maximum logical reach)		
	Multiple T-CONTs and GEM Ports	**Reception wavelength**	1490 nm
Layer 2	Up to 256 MAC addresses		
	Up to 4K VLAN ID		
	Double tagging, IEEE compliant 802.1		
Layer 3	RFC 2663, 3022, 3027, 3489	**Transmission optical power**	0.5 dBm~+5 dBm
	IPV4 & IPV6 dual stack		
	DHCP Server / Client and Static IP	**Reception optical power**	-8 dBm~-28 dBm
	NAT, NAPT, multi-NAT, NAT transparent		

Ordering Description

Optical Modem LIGHTDRIVE GPON LD421-21WV
Power Supply for Optical Modem NEMA Standard

GPON LD420-10R

The LD421-21WV is an ONT (Optical Network Terminal) compliant with the ITU-T G.984 standard. The equipment supports rates up to 2.5 Gbps for downstream and 1.25 Gbps for upstream. ONT supports full Triple Play services, including voice, video and data, with built-in WiFi antenna.

Constructive Characteristics

Power Supply	AC / DC adapter 100-240V, 50 / 60Hz (included)	
Operating Temperature	-5 ~ 45 ° C	
Dimensions	Height	38 mm
	Width	87 mm
	Depth	108 mm

Technical Characteristics

Interfaces	1 x 10/100/1000 Base-T Giga Ethernet Port (RJ-45);	Management	Supports OMCI, Web GUI, CLI
			Supports firmware upgrade with remote server
			It has 2 images of software
	1 x PON port with SC-APC connector.		Supports restoring factory settings
GPON	Standard GPON ITU-T G.984x	Transmission wavelength	1310 nm
	2.5 Gbps downstream and 1.25 Gbps upstream		
	20 km reach (60 km maximum logical reach)		
	Multiple T-CONTs and GEM Ports		
Layer 2	Data frame filter based on port, SA / DA	Reception wavelength	1490 nm
	Supports 1500 byte MTU, compliant with IEEE 802.3as		
	Forwarding between GEMPORT and TCONT		
	Supports dual tagging, compliant with IEEE 802.1ad		
Layer 3	WAN connection	Transmission optical power	0.5 dBm~+5 dBm
	PPPoE and DHCP mode to obtain from IP address		
	URL, MAC, IP filters, DNS, UPnP	Reception optical power	-8 dBm~-27 dBm
	Log and Network Diagnostics		

Ordering Description

Optical Modem LIGHTDRIVE GPON LD420-10R
Power Supply for Optical Modem NEMA Standard

Fusion Splicing Machines

Fusion Splicers

Besides the products for telecommunications network, Furukawa is a major provider of high quality optical fiber and fiber optic products. This includes a complete line of fusion splicers that produce highly accurate, reliable splices with minimal loss. FITEL fusion splicers are designed using state of the art technology, decades of manufacturing experience and feedback from countless customer installations. You will find that FITEL splicers are simple to use yet precise and reliable tools that can support your full range of splicing needs.

Hand-Held Core-Alignment Fusion Splicer

Description:

Furukawa Electric Co. Ltd is pleased to introduce the FITEL S179 hand-held, core alignment fusion splicer offering powerful performance, delivering fast and reliable optical fiber splicing even under harsh environmental conditions. While a substantially lower profile and lighter weight enhance portability, the splicer's ruggedized body provides resistance to shock, water and dust exposure.

This user-friendly S179 fusion splicing machine is suitable for rapid network and production assembly lines. The FITEL S179 Fusion Splicer is highly effective for use in data centers, long-haul operations, Metro, LAN and FTTx fiber, including ultra bend-insensitive fibers as well as large area effective fibers.

Key Features:

- Battery system helps save time by allowing 200 splicing cycles (splicing/heating) in one charge;
- 4.3-inch LCD touch screen offers easy and intuitive operation;
- 3 upper + 1 lower LED lights illuminate the entire splicing chamber;
- Exceptional performance for fast and consistent fiber splicing;
- Enhanced ease of use and portability;
- High-speed splicing and heating;
- Ruggedized body design;
- Easy, intuitive operation;
- Compatible with various type of Splice-On-Connectors (SOC).

Hand-Held Single Fiber Fusion Splicer

Description:

The NJ001 Hand-Held Single Fiber Fusion Splicer is suitable for all METRO, LAN and FTTx fibers including ultra bend-insensitive fibers. With its low-profile, compact and ruggedized body, the NJ001 offers reliable splicing under harsh environmental conditions. The large battery capacity makes it possible to perform 100 splicing and heating cycles. Combining portability, power, flexibility and field ruggedness, the NJ001 delivers fast and consistent splicing with outstanding mobility and optimal ease of use.

Key Features:

- 3 LED lamps;
- High Propulsion motor – guarantees stable splicing even for highly rigid cables including drop and indoor cables;
- Ruggedized design – Endure shocks, impact, water and dust;
- Internal battery charging;
- Compatibility with Splice-on-Connector (SOC);
- 100 cycles (Splicing and Heating) on a fully charged S946 Battery;
- Available for ALL METRO/LAN/FTTx fibers including ultra bend-insensitive fibers.

Hand-Held Ribbon Fiber Fusion Splicer

Description:

The S123M Series Hand-Held Ribbon Fiber Fusion Splicers have been enhanced and updated. The battery is automatically charged internally when connected to AC mains power even during operation.

With their low profile design and lightweight bodies, the S123M series offer not only ribbon fiber splicing but also single fiber splicing with outstanding mobility and extreme ease-of-use.

In addition, the rugged body is designed to endure harsh operating conditions by improving shock/impact resistance with rubber pads embedded on 4 corners of the splicer body. It achieves water resistance compliant IPX2 and dust resistance compliant IP5X.

The fast splice time and protection sleeve shrink time offers a highly efficient work environment. Large battery capacity makes it possible to perform 70 cycles of splicing and heating for S123M4 and 160 cycles for S123M8 and S123M12 (with two batteries), while it offers SOC solutions as well.

Features and Benefits:

- Internal battery charging;
- Illumination lamp lights up a wide area around V-grooves;
- IP-52 – Rugged and compact hand held design;
- Fast splice (15 secs) at low loss and Fast heating (36 sec) for ribbon fiber;
- Simple operation with Fixed V-groove;
- Easy maintenance – Toolless electrode replacement/ mirror free alignment system;
- Up-and-down fiber clamp system allows automatic fiber re-positioning;
- Easy software upgrade via the internet;
- Auto-start shrink sleeve oven feature;
- Available for ALL METRO/LAN/FTTx fibers including ultra bend-insensitive fibers.

Optical Fiber Identifier

Optical fiber identifiers are installation tools for contrasting the direction of optical communication inside an optical fiber core and the core being worked on. This tool identifies the core currently under use, so that it won't be cut mistakenly during construction work

and identifies the contrast light from the office side with certainty so that optical connection work can be carried out safely.

Furukawa Electric Group supplies optical fiber identifiers that allow identification work to be carried out simply and with certainty, based on the activities of workers on field.

ID-H/R v3 Optical Fiber Identifier

Advanced, compact and simple to operate the new FITEL Fiber Identifier offers enhanced fiber detection.
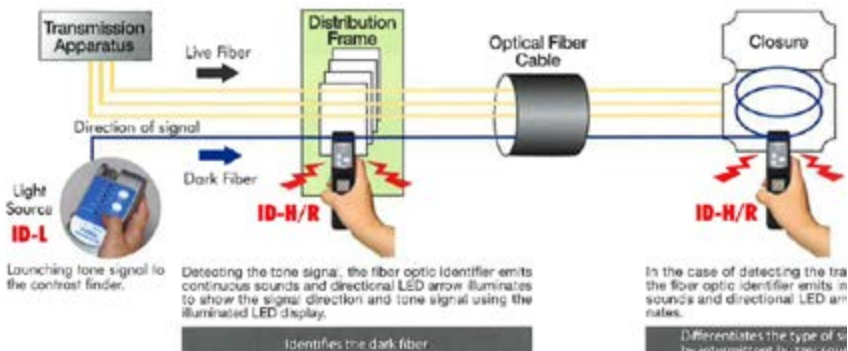
Features:

- Improved traffic direction recognition, even in brightly lit environments. 10 times increased sensitivity;
- Enhanced sensitivity using the light receiving adjustment function;
- The increased display functionality shows the communication light intensity in the optical fiber;
- G657 A2 optical fiber (ITU R7.5) can also be identified;
- The device does not require head changes or adjustments;
- Wide dynamic range;
- The brighter LED display provides improved clarity;
- Super low insertion loss.
- **Ordering description**:

Ordering code	Product name	Code	Package details
ID-H/R v3	Main unit	A121H	Includes battery, strap and instruction manual
	Carry case	A102H-001	With belt or tool case loop
	PD head for BIF	AI21H-017	For G.657 B3 (Optional)

- **Example of Application**:

Identifies the dark fiber

Differentiates the type of s...

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