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.

With integrated, market focused portfolio, the FBS solution and support team can reply quickly and efficiently to the costumers' demand for cutting-edge FTTH solutions. It can actively participate in the integration of these products into end-users' homes, businesses and experiences, all while driving continuous innovation.

One Furukawa
Global Presence

Japan

As a truly global company, Furukawa Electric Group understands how vital it is to identify and develop products and solutions, replying quickly and efficiently to customers' demands. Thus as a group, Furukawa knows there is much more to grow yet, and that there are still unknown needs to be addressed. In order to answer the oncoming need, all group companies are integrated and centered on markets and customers, through continuous technological innovation.

Research and Development

Technology in constant evolution.

Furukawa has invested heavily in 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.

USA
OFS Labs

OFS Laboratories 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

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
- Mechanical and climate testing
- Electrical and optical performance lab, including Component Level
- Hardware and embedded software of transmition equipment
- Test field for outdoor plant connectivity and application.

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 field.

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 Group shows its commitment to building an evolutionary and sustainable society.

Certifications

ISO 9001
ISO 9001 certificates that Quality Management System is present in Furukawa Electric's unit.

ISO 14001
Furukawa is committed to build an evolutionary and sustainable society through the ISO 14001 environmental certifications.

OHSAS 18001
Occupational Health and Safety Management. Operation in relation to the safety and health of employees.

Affiliation

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

Proven quality

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

Such awareness is confirmed by periodic updates regarding new standards and norms. An example 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.

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.

FURUKAWA ELECTRIC

Highlighted Technology

Rollable Ribbon Cable

Rollable Ribbon Cable Mini

Compact Sized & Light Weight Aerial Cables

Rollable Ribbon Cable, Rollable Ribbon Cable Mini (SSW structure cable)

Furukawa Electric's Compact Sized and Light Weight aerial cables are comprised of the newly developed Rollable Ribbon fiber. These cables allow for the installation of high fiber-count aerial cables in situations where placement of conventional types of cable is limited.

Local Central Office

Supporting wire

Joint

Cable part

Access

Indoor/Premises

SSW structure cable
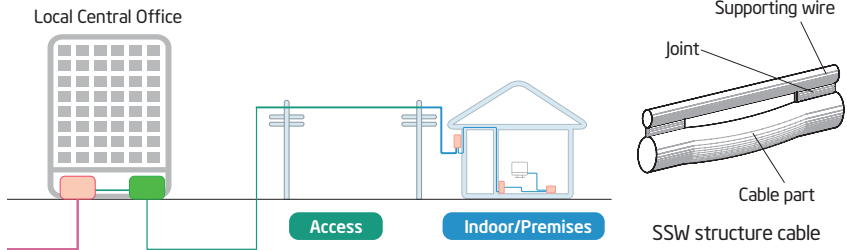
Rollable Ribbon

One of the most exciting developments in fiber optic technology in the past few years is the commercialization of cables with rollable ribbons. Rollable ribbons are fibers that are partially bonded to each other at intermittent points to form a ribbon. This enables 12 fibers to be spliced at one time, significantly reducing splicing time, and with the added benefit of easy individual fiber breakout for distribution applications. These ribbons can be rolled and routed similarly to individual fibers to facilitate use in smaller closures and splice trays, and provide fiber density similar to smaller microcables. The completely gel-free design also helps to reduce the time required for preparation for splicing. With its ability to maximize duct utilization, cables with rollable ribbons are an ideal choice for connecting data centers, and serving as distribution for dense FTTx or mobile networks.
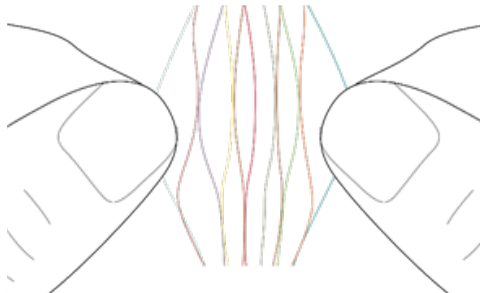
Meet our MDU!Click

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
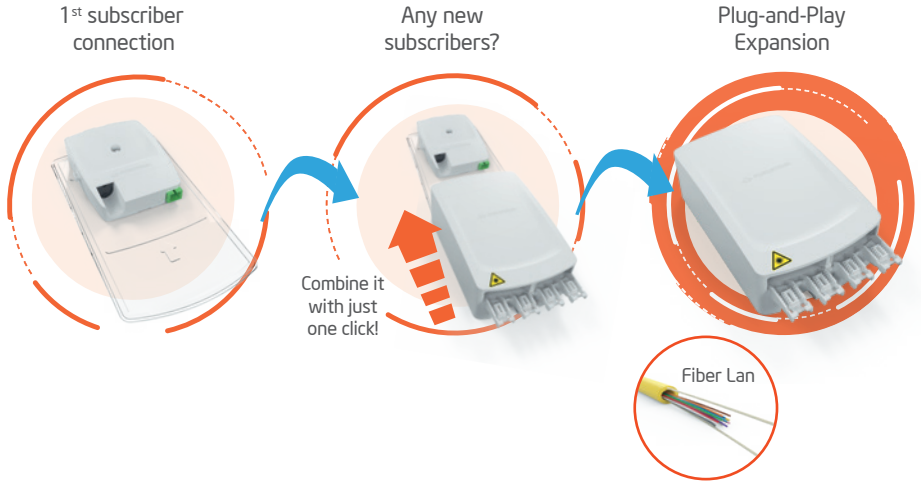
InvisiLight™ Optical Solutions
MDU and residential acess by fiber

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.

FBS
FURUKAWA BROADBAND SYSTEM
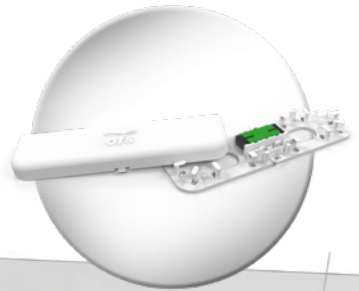
COMPLETE SOLUTION FOR OPTICAL COMMUNICATION NETWORKS.

The demand for broadband services is ever increasing. OFS and Furukawa develop 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 EPON (IEEE) and GPON (ITU-T) 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 optical solutions. These are completely Passive Optical Networks (PON) with elements that have no need of a power source in its outdoor network. The only elements that needs electrical power supply stand on Central Office, such as Optical Line Terminal (OLT) and at the subscriber's final position.

FTTx is a technology that allows to deliver optical fibers up to the subscriber's home (Fiber To The 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 by single-mode optical fibers, equipment at central offices and at subscriber's, and passive elements (splitters) for signal distribution through out the network.

The main active equipment at Central Offices, are the OLT, which allows signal sharing of a single port between 64 simultaneous users, up to 20 km away from central.

> Technology that takes optical fiber up to the subscriber's house or apartment.

At the user or subscriber level, we can find some active equipment: such as the ONT (Optical Network Terminal). These products receive an optical signal, convert it and provide RJ-45 Ethernet ports for connection to devices such as computers, routers or telephones.
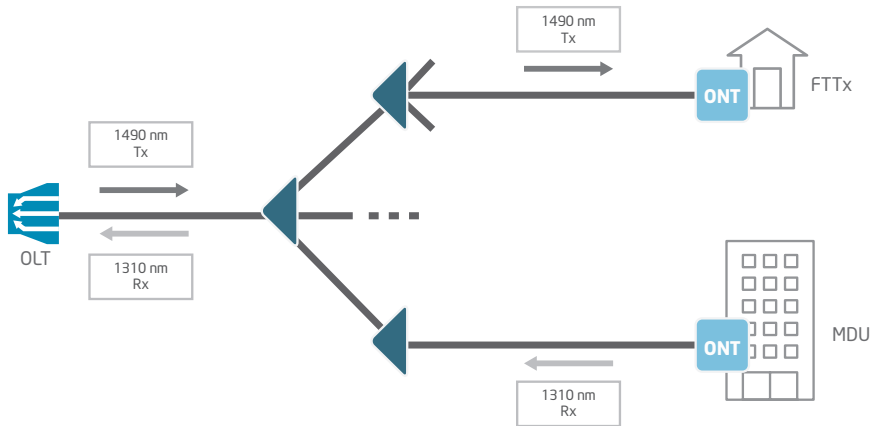
Splitters are optical passive dividers, inserted at strategic points at the network in a way to proportionally divide the optical signal to all branches and subscribers. Splitters in the external network, when properly used, optimizes network design even regarding installing costs.

The FBS product portfolio provides a complete solution for FTTx systems implementation, including active products, such as GPON and Video Overlay equipment, splice and termination closures, up to cables and accessories for indoor and in-home application for multiple markets.

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!Star

The EZ!STAR uses pre-terminated products in a great part of its network, from the distribution part of the network up to the customer's house. Due to this plug-n-play solution, the network's deployment is quicker and safer.

This solution requires operators to deploy its network only up to the first splitting level. And to deploy fiber access terminal closures only if there's any subscriber activation demand.

The first splitting level 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-L9), which holds the second splitting level, is installed on-demand with pre-terminated drop cables from the CTOP-16P. Subscribers are activated through pre-terminated drop cables with Slimconnector connected to the outputs of the CTOP-L9.

Due to the use of pre-terminated drop cables, this solution presents reduced labor time and training. Consequently, its deployment minimizes the need of infrastructure accessories, capex investment on network equipment and the network's complexity.

MDU!Click

The MDU!CLICK solution aims at solving the uncertainty of when and on which floors subscribers may require activation within a building. For this type network to become more effective, the MDU!CLICK solution uses modular plug-n-play elements associated with the concept of pay-as-you-grow. The solution separates 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-n-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

SDN: Software-Defined Networking decouples the network control plane and forwarding plane, enabling the network control plane to be directly programmable and the infrastructure to be abstracted for applications and network services. This brings simplification to networking devices, which can be realized with off the shelf hardware.

Key point:
- Gives network operators more flexible and responsive central control of network traffic through a programmable network

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.

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

FURUKAWA ELECTRIC

FTTx
Solutions

ITS

INDUSTRIAL

MDU

SMART CITY

FTTH

Smart/
Safe Cities

As metropolitan areas grow 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 existing operations (FTTH) and are used to interconnect services: schools, hospitals, traffic light systems, public security systems (civil defense, firefighters, police), etc. This interconnection is possible with passive optical network solutions which allow access of up to 10 Gb/s.

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

Smart City Concept
A holistic concept, which goes beyond technology

Society	Government	Product and Service Providers

STATE AUTHORITY

Top down approach
Vision, Development Strategy, Public Policies

Citizen Hospitals Universities

Business

Study of cases from different segments
Bottom up approach

Business

Financial

Industry

Associa barrel instituíons Models ICTs*

| 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/
Safe Cities

3 ACCESS NETWORK

2 DISTRIBUTION NETWORK

1 CENTRAL OFFICE

HOSPITAL

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 daily. Some attend to the needs of road services.

On-line services, such as call boxes, radars, cameras and tolls need to be interconnected fast, safely and reliably. 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, up to the standard industrial active equipment, at the final point of the network. Regarding the network administration, the OLTs – Optical Line Terminals equipment allows transmitting data from the central office whilst controlling the equipment situated at the network final points (ONUs – Optical Network Units). As for the passive optical elements, it consists of optical fiber cables and accessories, such as splitters, splice and access boxes and connectors, also present in our portfolio.

The main characteristic of a PON network is the use of optical fibers, which can be used for up to 64 points/users by means of optical splitters, thus, improving the use of the resources implemented in the network. The splitters are used in central office, in distribution or access network, 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 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.

PON [Passive 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 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 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.

MetroEthernet Network interconnected to the Tolls Booths

ITS

3 TERMINATION NETWORK

2 DISTRIBUTION NETWORK

DRIVE SAFELY
60KM/H

WELCOME TO
FURUKAWA CITY

1 **CENTRAL OFFICE**

FTTH
Fiber-To-The-Home

SlimBox™ Drop Terminal
Up to 16 drops
Splice
Field connector
SlimBox™ 4-Fiber Rosette
Field connector
Drop Cable
Field connector
Rosette

FBS has complete solutions for FTTH with high quality equipment and accessories to serve different customers' 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 the 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 the 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 network and increasing network capability; splice closures for network branching; and termination boxes to hold the "drop" cables that go to the customers' homes.

In the end-user's home, there are also optical termination points where the conversion from optical to electric signal happens.

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 the box with splitter, it is not necessary to open it 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 the residential users;
- Supports bandwidth growth from any application;
- Low loss allowing higher distance transmission between the head-end and subscriber;
- Easy installation of the network and activation of new customers;
- Reduced installation costs;
- Lower maintenance cost;
- Higher quality and stable data transmission;
- Optical fiber is immune to electromagnetic interference.

In a Few Words

As the optical infrastructure grows for long-haul, metro and access networks, FTTH is quickly becoming the choice for service providers to deploy fiber for the last mile. Optical fiber clearly future proofs the provider's network for bandwidth and subscriber growth as well as aggregating all services, which can include voice, video, data, WiFi, home security, smart meters and so on. Currently, the technology is at the point where optical fiber can even be taken inside the living unit.

A number of architectures based on the GPON and EPON 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

3 ACCESS NETWORK

4 TERMINATION NETWORK

MDU
Multiple Dwelling Unit

InvisiLight® MDU & ILU Solution

SlimBox™ 12-Fiber Internal Adapter Module

SlimBox™ 64-Fiber Internal Adapter Module

Access Network

As FTTx deployment accelerates globally to meet increasing bandwidth needs, service providers must install optical fiber both to and inside the 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.

Infrastructure to fit your building size

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 pre-terminated, 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.

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.

MDU
Multiple Dwelling Unit

4 TERMINATION NETWORK

3 ACCESS NETWORK

2 DISTRIBUTION NETWORK

CENTRAL

1 CENTRAL OFFICE

Central Office

COMPACT
MDF RACK

INDOOR OPTICAL CABLE

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PIGTAIL AND OPTICAL ADAPTER KIT SM
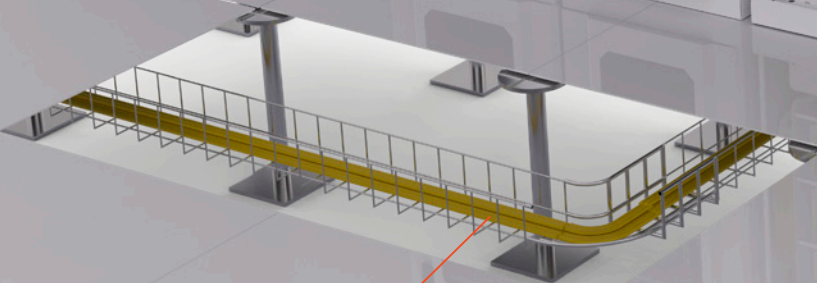
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FDH 600

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FDH 600 SUB-RACK

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FDH 600 SUB-RACK NETWORK

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SIMPLEX OPTICAL PATCH CORD

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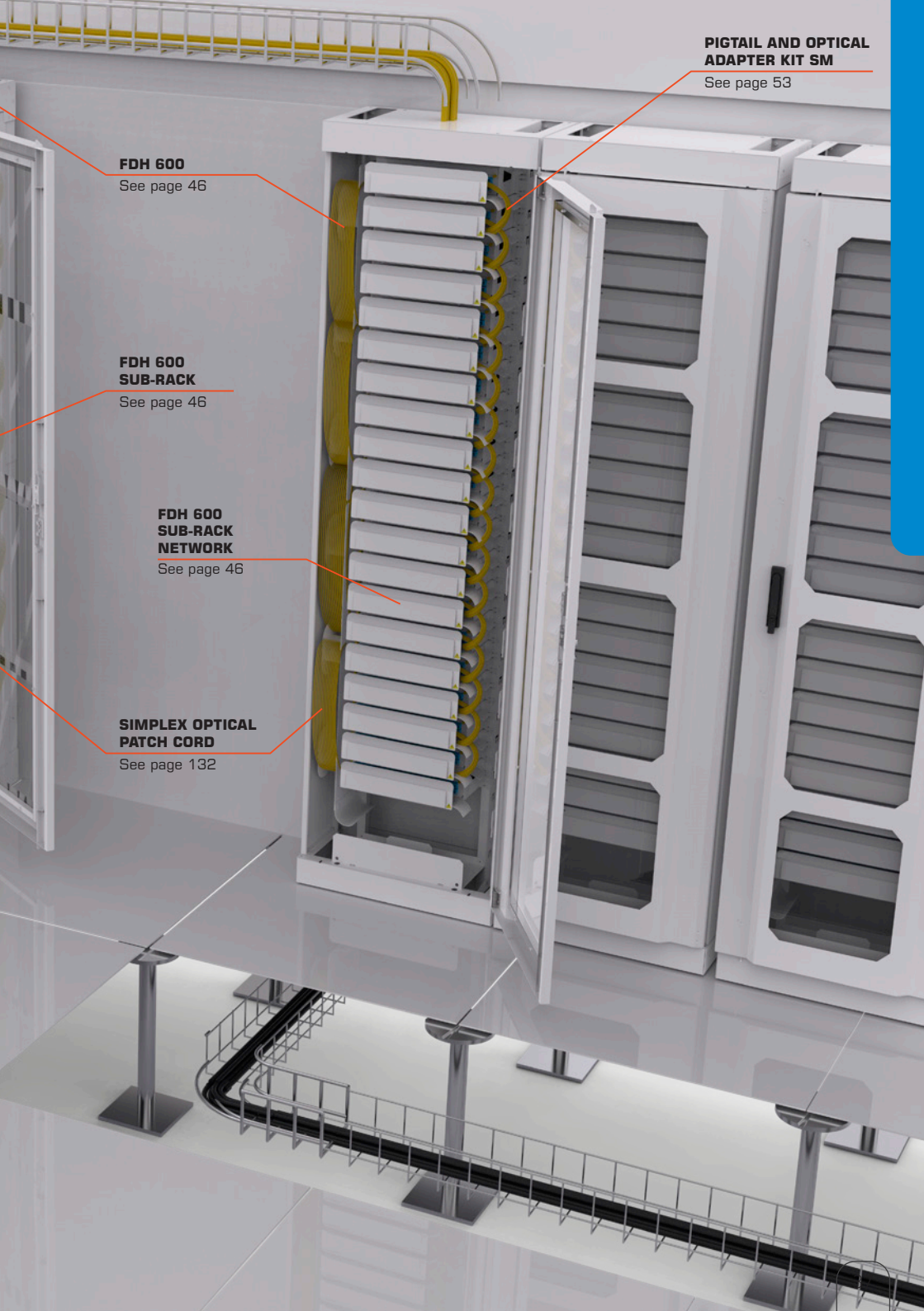
GPON

OPTICAL CONCENTRATOR CHASSIS GPON LD3032

The OLT (Optical Line Terminal) LD3032 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 ºC	
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 GPON LD3032
Service Module Sfp Gpon 16 Ports for Chassis
Switch and Management Module for Chassis Gpon LD3032
DC POWER SUPPLY FOR LD3032 - (48 VDC / 8 A)
UPLINK TRANSCEIVER SFP+ 10GE SR 850 NM LC-UPC (MM 300M)
UPLINK TRANSCEIVER SFP+ 10GE LR 1 310 NM LC-UPC (SM 10KM)
UPLINK TRANSCEIVER SFP+ 10GE ER 1 550 NM LC-UPC (SM 40KM)
TRANSCEIVER SFP GPON 2.5GBPS C+ LR 1 490 NM SC-UPC (SM 20KM)
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

SERVICE MODULE SFP GPON 16 PORTS FOR CHASSIS

SWITCH AND MANAGEMENT MODULE FOR CHASSIS 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

Service Module Sfp Gpon 16 Ports for Chassis
Switch and Management Module for Chassis Gpon LD3032

POWER SUPPLY DC
FOR CHASSIS GPON LD3032
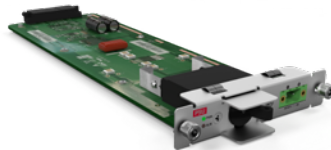
BLANK PANEL - SWITCH

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

DC Power Supply for LD3032 - (48 VDC / 8 A)

OPTICAL CONCENTRATOR STANDALONE 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

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

OPTICAL CONCENTRATOR STANDALONE 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

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

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+ 10 GE SX 1310 nm (10 km)	10 GE Uplink Interface for GPON Optical Concentrator	LC-UPC Duplex	10 km
Transceiver SFP 1 GE LX 1310 nm (10 km)	1 GE Uplink Interface for GPON Optical Concentrator	LC-UPC Duplex	10 km
Transceiver SFP 1 GE LX 1310 nm (20 km)	1 GE Uplink Interface for GPON Optical Concentrator	LC-UPC Duplex	20 km
Transceiver SFP 1 GE LX 1310 nm (40 km)	1 GE Uplink Interface for GPON Optical Concentrator	LC-UPC Duplex	40 km
Transceiver SFP+ 10 GE SR 850 nm (300m)	10 GE Uplink Interface for GPON Optical Concentrator	LC-UPC Duplex	300 m
Transceiver SFP+ 10 GE LR 1310 nm (10Km)	10 GE Uplink Interface for GPON Optical Concentrator	LC-UPC Duplex	10 km
Transceiver SFP+ 10 GE ER 1310 nm (40Km)	10 GE Uplink Interface for GPON Optical Concentrator	LC-UPC Duplex	40 km
Transceiver SFP Classe C+ 2.5 Gbps LR 1490 nm SC-UPC (20 km)	GPON Service Interface	SC-UPC	20 km

GPON MONITORING SOFTWARE

GPON Furukawa Monitoring Software that enables the visualization of the current state of the network and equipment in order to facilitate asset management and reduce the reaction time of the support team if intervention is required.

Features

OLT Management	Editing, removal and Inventory.
ONT Management	• Table view: filter, comparison and removal Slot / Port, ID, status, Rx • Power, distance, temperature, Serial Number (SN) GPON, MAC • Address, model, description; • Links to dashboards, services and IP Host / WEB of ONTs.
Dashboard - OLT	• Health of OLT • Band of interfaces • Status of interfaces • Quantitative of ONT's • OLT redundancy • Status of interfaces • Transceiver Temperature • Distance • Band of interfaces • Discovery Equipment

Characteristics

Software Requirements	• Linux O.S, Debian 7+ or Ubuntu 14+ indicated; • Quad-core processor; • 8 GB RAM memory; • 4 GB swap; • 300 GB HD on the root "/" partition	
OLT/ ONT Management	FK-OLT-G4S FK-OLT-G8S FK-OLT-G2500 FK-OLT-G1040 LD2502F LD2504 LD3032 LD3008 LD3016	FK-ONT-G400R FK-ONT-G400B/PoE FK-ONT-G400B/PoE S2 FK-ONT-G420R FK-ONT-G420W FK-ONT-G421W

Ordering Description

Laserway monitoring - 1 OLT - 1 year license
Laserway monitoring - 1 OLT - 3 year license
Laserway monitoring - 1 OLT - lifetime license

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	
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

FDH 600 - Fiber Distribution Hub - Basic Module

FDH 600 SUB-RACK

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 accommodate up to 10 sub-racks.

Constructive Characteristics

Dimensions	Height	177 mm (4U)
	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
Output card orientation	Left	Left	Right

Ordering Description

FDH 600 Sub-Rack Network

FDH 600 Sub-Rack GPON

FDH 600 Sub-Rack Customer

ODF BX24

ODF BX24 is an optical distributor for rack, with capacity of up to 24 splices in 1U. 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	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 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 grey (RAL 7035)	
Number of positions	Up to 48 fibers	
Product body material	Steel SAE1020	
Connector type	SC	
Polishing type	APC or UPC	
Cable type	Loose tube optical cable	
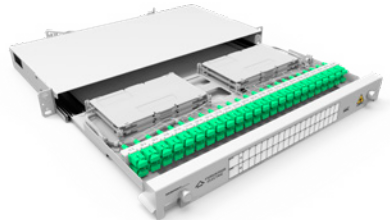
Ordering Description

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 configurations 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 grey (RAL 7035)	
Number of positions	Up to 72 fibers	
Product body material	Steel SAE1020	
Connector type	SC	
Polishing type	APC or PC (UPC or SPC)	
Cable type	Loose tube optical cable	
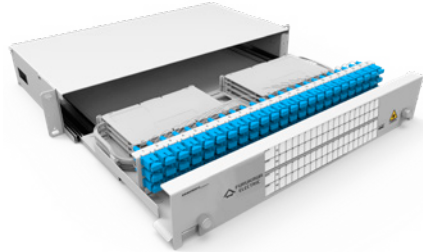
Ordering Description

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

Other configurations 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

LGX MODULAR PATCH PANEL

The LGX Modular 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 (1U)
	Width	442 mm
	Depth	169 mm
Color	Black	
Type of material	Steel SAE1020	

Total fiber	Connector type	Cable type
48 fibers	LC-Duplex	
36 fibers	SC	Pre-terminated
24 fibers	ST, FC	
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, or closing panel.

Constructive Characteristics

Dimensions	Height	29.2 mm	
	Width	129.6 mm	
Color	Black		
Material type	Steel		
Painting type	Steel plate	Powder epoxy painting with high resistance to scratch	
Connector	LC or SC		
Number of positions	08 or 12		

Ordering Description

3X LGX Plates Set - 08P LC/SC
3X LGX Plates Set - 12P LC/SC

LGX MODULAR 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	129.6 mm
	Depth	101.5 mm
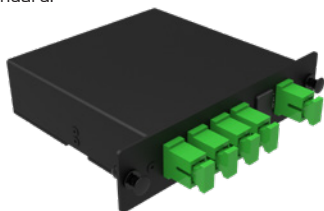
Performance

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

LGX Modular Optical Splitter 1X2 50/50 G.657A SC-APC/SC-APC
LGX Modular Optical Splitter 1X4 G.657A SC-APC/SC-APC
LGX Modular Optical Splitter 1X8 G.657A SC-APC/SC-APC
LGX Modular Optical Splitter 1X2 50/50 G.657A SC-UPC/SC-UPC
LGX Modular Optical Splitter 1X4 G.657A SC-UPC/SC-UPC
LGX Modular Optical Splitter 1X8 G.657A SC-UPC/SC-UPC
LGX Modular Optical Splitter 1X2 01/99 G.657A SC-APC/SC-APC
LGX Modular Optical Splitter 1X2 02/98 G.657A SC-APC/SC-APC
LGX Modular Optical Splitter 1X2 05/95 G.657A SC-APC/SC-APC
LGX Modular Optical Splitter 1X2 10/90 G.657A SC-APC/SC-APC
LGX Modular Optical Splitter 1X2 15/85 G.657A SC-APC/SC-APC
LGX Modular Optical Splitter 1X2 20/80 G.657A SC-APC/SC-APC
LGX Modular Optical Splitter 1X2 25/75 G.657A SC-APC/SC-APC
LGX Modular Optical Splitter 1X2 30/70 G.657A SC-APC/SC-APC
LGX Modular Optical Splitter 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	2x32
Maximum insertion loss (dB)	14.1	20.5	17.7
Uniformity (dB)	1.5	0.5	2.1
Maximum polarization dependent loss (PDL) (dB)	0.4	0.5	0.4
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 1310/1490/1550 nm SC-APC/SC-APC/SC-APC (C/D/V)
PON WDM Filter 1310/1490/1550 nm 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.
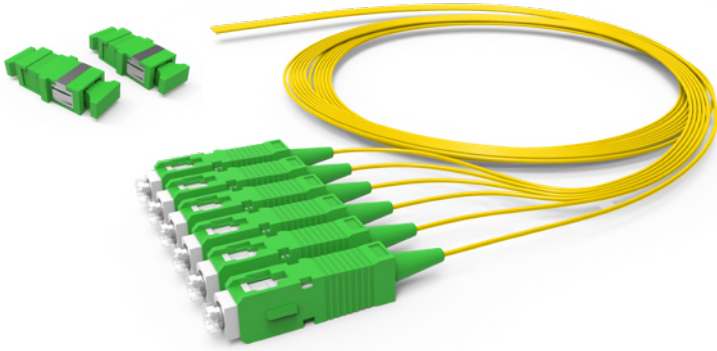
Constructive Characteristics

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" Plastic body Ceramic ferrule (zirconia)	SM	APC	Green
		MM	PC, SPC and UPC	Blue
			PC, SPC and UPC	Beige
SC	Type "push-pull" Plastic body Ceramic ferrule (zirconia)	SM	APC	Green
		MM	PC, SPC and UPC	Blue
			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.
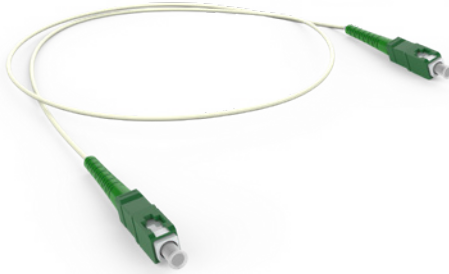
Performance

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 °C to 40 °C	
	Operation: -40 °C to 70 °C	
	Storage: -40 °C to 70 °C	
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

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

Flame-retardant outer jacket
900 μm buffered fiber
Aramid yarn
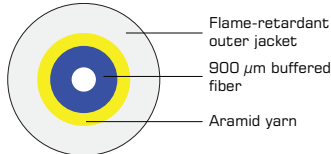
Optical Cables

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-retardantouter jacket
Rip cord
Buffered fibers (900 μm)
Dielectric strength members
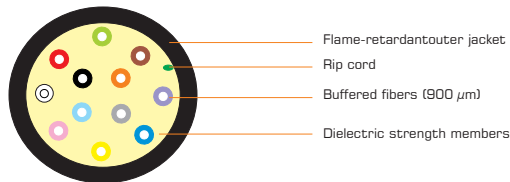
12 FIBERS

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 armour 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	
Armour material	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-retardantouter jacket
- Flame-retardantinner jacket
- Buffered fibers (900 μm)
- Rip cord
- Dielectric strength members
- Fiberglass yarns

12 FIBERS
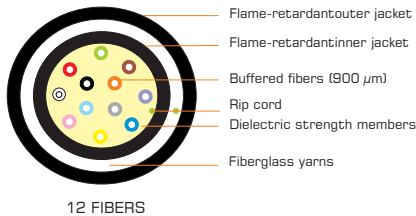
FIBER-LAN-AR INDOOR/OUTDOOR

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 armour 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	
Armour material	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

12 FIBERS

OPTIC-LAN

Description	Loose tube cable design, composed by a single tube (central) surrounded by dielectric strength members and covered by a flame-retardant outer jacket with UV protection.
Application	Installation environment: indoor/outdoor.
	Operation environment: installed 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
Flammability rating	LSZH	

Nominal outer diameter (mm)	Nominal weight (kg/km)	Maximum load during installation (N)	Minimum bending radius (mm)	
			During installation	After installation
6.2	30	600	124	62

Performance

In accordance with ET 2289

Package

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

12 FIBERS
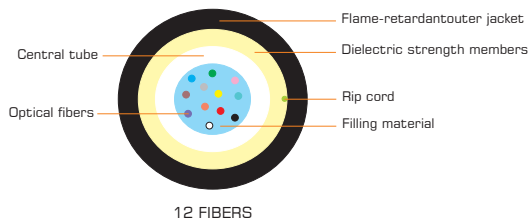
OPTIC-LAN-AR (PFV)

Description	Loose tube cable design, composed by a single tube (central) surrounded by dielectric strength members and involved by an inner jacket. A fiberglass armour and over this is applied a flame-retardant outer jacket with UV protection.
Application	Installation environment: indoor/outdoor.
	Operation environment: installed 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	
Armour material	Fiberglass yarns (PFV)	
Flammability rating	OFN or LSZH	
Nominal outer diameter	12 mm	
Nominal weight	170 kg/km	

Maximum installation load (N)	Minimum bending radius (mm)	
	During installation	After installation
3000	240	120

Performance

In accordance with ET 2168

Package

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

Central tube
Optical fibers
Dielectric strength members

Flame-retardant outer jacket
Fiberglass yarns
Flame-retardant inner jacket
Rip cord
Filling material
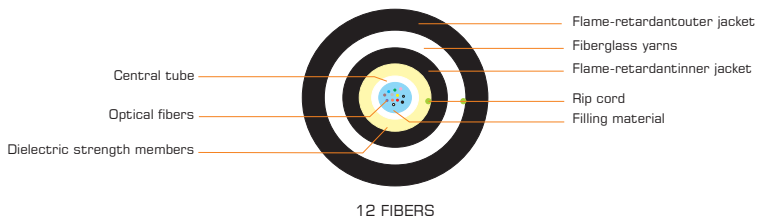
12 FIBERS

TERMINATION OPTICAL CABLE

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
Optical fibers
Filling material
Water blocking yarns
Rip cord

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	5 to 17 mm	
Derivation cable diameter	8 to 17.5 mm	
Number of oval port	01	
Number of derivation ports	04	
Number of splice trays	06 (24F/each)	
Maximum capacity	144F	
Installation	Aerial or underground	
Ingress Protection (IP)	68	
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 - Basic Module
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	5 to 25 mm	
Derivation cable diameter	10 to 17.5 mm	
Number of oval port	1	
Number of derivation ports	6	
Number of splice trays	10 (24F/each)	
Maximum capacity	240F	
Installation	Aerial or Underground	
Ingress Protection (IP)	68	
Sealing type	Mechanical	

Ordering Description

Aerial/Underground Optical Splice Closure FK-CEO-6M-240F
Splice Tray 24F for FK-CEO
FK-CEO 6M/6T Mounting Kit for Pole and Wall

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

POWERGUIDE® TTH CABLE
See page 77

FK-CEO MOUNTING
KIT FOR WIRE ROPE
See page 65

FK-CEO-4T 144F
See page 65

SPLITTER PLC
NON-CONNECTORIZED
See page 66

SPLICE TRAY 24F
FOR FK-CEO
See page 65

ALL-DIELECTRIC
SELF-SUPPORTED
OPTICAL CABLE
See page 73

HEAT-SHRINK DERIVATION KIT
See page 65
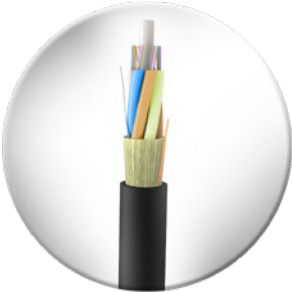
AERIAL/UNDERGROUND OPTICAL SPLICE CLOSURE FK-CEO-4T-144F

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	
Number of splice trays	06 (24F/each)	
Maximum capacity	144F	
Installation	Aerial or Underground	
Ingress Protection (IP)	68	
Sealing type	Heat-shrink	

Ordering Description

Aerial/Underground 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
Thermal isolator
Sheets
Sandpaper

Ordering Description

FK-CEO-4T Heat-Shrink Derivation Kit

OPTICAL SPLITTER 1XN

Passive Optical Splitter with split ratio 1xN and G.657A fiber.

Constructive Characteristics

Splitter type		1x2	1x4	1x8	1x16	1x32	1x64
Manufacturing technology		PLC	PLC				
Length	Non-connectorized	50 mm	40 mm			50 mm	60 mm
	Connectorized	55 mm	55 mm		60 mm	80 mm	–
Width	Non-connectorized	4 mm	4 mm			7 m	12 mm
	Connectorized	7 mm	7 mm		12 mm	20 mm	–
Height	Non-connectorized	4 mm	4 mm				
	Connectorized	4 mm	4 mm			6 mm	–
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					
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	PLC	Non-connectorized	1x2	2 m / 2 m
			1x4	
			1x8	
			1x16	
			1x32	
			1x64	
	PLC	SC-APC / SC-APC	1x2	60 cm / 60 cm
			1x4	
			1x8	
			1x16	
			1x32	
	PLC	SC-UPC / SC-UPC	1x2	
			1x4	
			1x8	
			1x16	
			1x32	
	PLC	NC/SC-APC	1x2	1.5 m / 60 cm
			1x4	
			1x8	
			1x16	
			1x32	
	PLC	NC/SC-UPC	1x2	
			1x4	
			1x8	
			1x16	
			1x32	

OPTICAL SPLITTER 1X2 UNBALANCED

Passive optical splitter with one input and two outputs with different optical power. Manufactured 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 and G.657A fiber.

Constructive Characteristics

Splitter type	2x2	2x4	2x8	2x16	2x32	2x64
Length	50 mm	45 mm		55 mm		
Width	5 mm	5 mm		7 mm		12 mm
Height	4 mm	4 mm				
Manufacturing technology	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

FBT	Optical Splitter FBT 2X2 50/50 G.657A NC/NC 2M/ 2M
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

OPTICAL PEDESTAL 192F

See page 70

SIMPLEX OPTICAL PATCH CORD SM

See page 132

LGX MODULAR OPTICAL SPLITTER

See page 50

STANDART AMOUR CABLE

See page 86

OPTIC LAN

See page 58
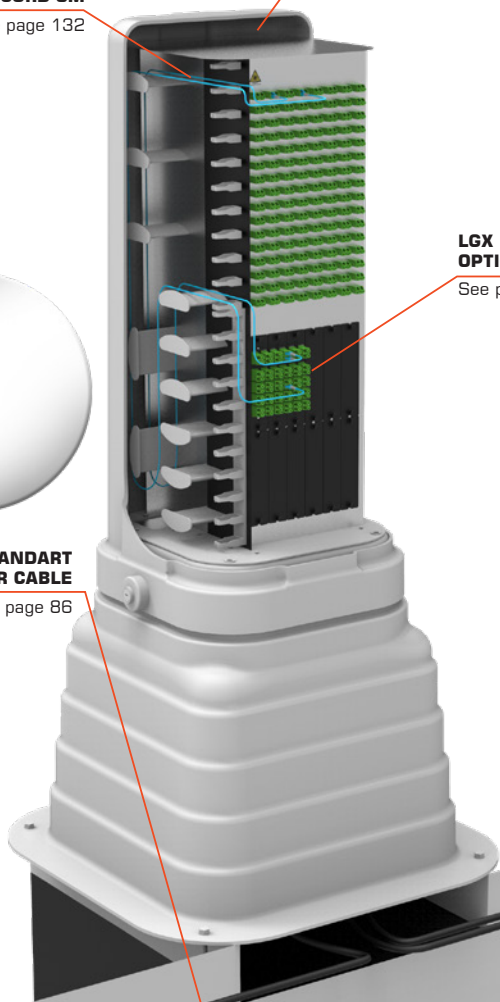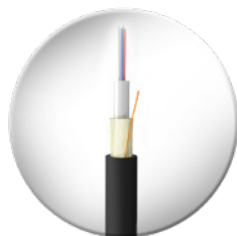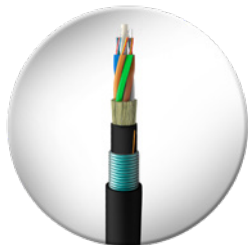
CONNECTORIZED OPTICAL PEDESTAL

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	Grey	
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
See page 71

SPLITTER
See page 72

FIBER DISTRIBUTION CABINET - DIRECT CONNECT 432

Designed to serve up to 432 homes in existing neighborhoods, this high density Fiber Distribution Cabinet (FDC) combines simplified 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.
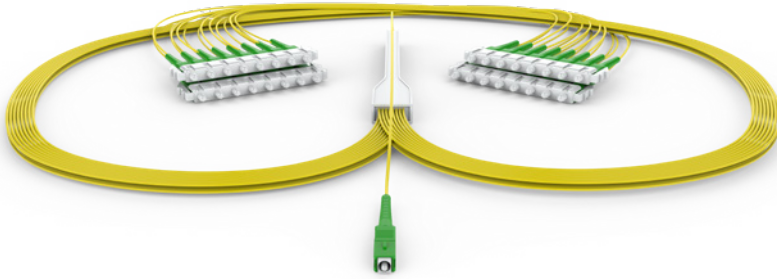
Constructive Characteristics

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 °C to 75 °C		

Ordering Description

D1-1x08-COMPLETE-UNC/SCA-N-BAL-29/29
D1-1X32-COMPLETE-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
	Single-mode NZD (9/125)	G.655 and G.656
	Multimode (50/125)	OM4, OM3 and OM2
	Multimode (62.5/125)	OM1
Central element	All-dielectric material	
Core type	Dry (S) or totally gel-free (TS)	
External jacket	Black polyethylene flame-retardantor not (RC or NR)	

Fiber count	Fiber count per basic unit (loose tube)	Core type	80m Span			120m Span			200m 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)	Nominal outer diameter (mm) ±0.2	Nominal weight (kg/km)	Maximum rated cable load (N)
6 to 36	6	S	11.5	95	2050	11.5	96	2850	11.9	102	5000
		TS	10.0	71	1065	10.0	72	1440	10.4	75	2250
48	12	S	11.9	117	2500	11.9	120	3400	12.3	125	5900
		TS	11.2	92	1380	11.2	93	1860	11.6	98	2940
60 to72		S	12.9	119	2500	12.9	122	3400	13.3	127	5900
		TS	11.2	92	1380	11.2	93	1860	11.6	98	2940
96		S	14.0	139	3000	14.2	141	3800	14.6	147	6300
		TS	13.0	120	1800	13.0	121	2420	13.4	130	3900
144		S	18.2	230	3650	18.2	232	5150	18.8	242	9000
		TS	16.6	190	2850	16.6	192	3840	17.0	199	5970
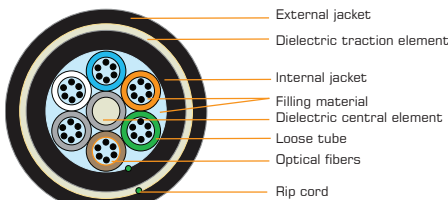
36 FIBERS
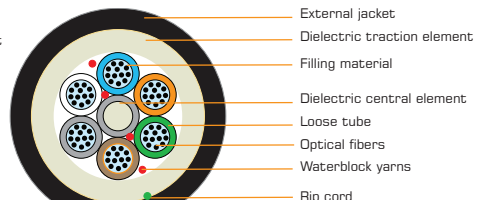
72 FIBERS

Performance

In accordance with ET 1105 (dry) and ET 3189 (totally gel-free)

Package

Wood reel	Standard length 4000 m

Recommendation for accessories

Use only pre-formed accessories to anchor the cables. Furukawa does not recommend other types of accessories for this purpose. For further information, please, contact the FBS Office closest to you.

ALL-DIELECTRIC SELF-SUPPORTED OPTICAL CABLE FOR LONG SPANS

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 in long spans.

Constructive Characteristics

Fiber types	Single-mode (9/125)	G.652D
Core type	Dry	
External jacket	Black polyethylene not flame-retardant(NR) or flame-retardant(RC) or tracking resistant (RT).	
Resistance to electric tracking	For installation in places with electric field ≤ 12 KV, NR and RC jacket.	
	For installation in places with electric field >12 KV/m and ≤ 25 kV/m, RT jacket.	

Maximum rated cable load	Fiber count	Fiber count per basic unit (loose tube)	Nominal outer diameter (mm) ±0.2	Nominal weight (kg/km)		Compression load (N/10 cm)	Minimum bending radius (mm)	
				NR and RT	RC		During installation	After installed
5 kN	6 to 36	6	13.6	120	132	2200	20 x outer cable diameter	10 x outer cable diameter
	48 to 72	12	14.8	146	158			
10 kN	6 to 36	6	13.6	130	142			
	48 to 72	12	14.8	158	170			
15 kN	6 to 36	6	14.6	145	157			
	48 to 72	12	15.6	171	185			
20 kN	6 to 36	6	15.0	160	162			
	48 to 72	12	16.4	187	201			

External jacket
Dielectric traction element
Waterblock yarns
Internal jacket
Filling material
Dielectric central element
Loose tube
Optical fibers
Rip cord
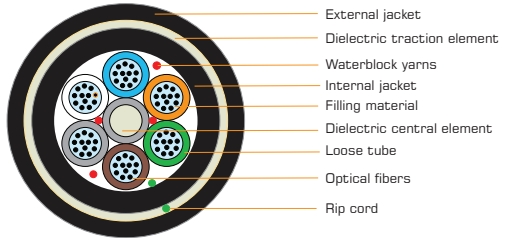
36 FIBERS

Recommendation for accessories

Use only pre-formed accessories to anchor the cables. Furukawa does not recommend other types of accessories for this purpose. For further information, please, contact the FBS Office closest to you.

Performance

In accordance with ET 1204 (dry core)

Package

Wood reel	Standard length 4000 m

POWERGUIDE® SKYLIGHT CABLE

Description	Up to 12 colour coded optical fibers (250 micron) are placed into each water-blocked buffer tube which are also colour coded for easy identification. Dry waterblocking material is applied to the cable core along with a layer of non-metallic strength elements. The cables are also available with up to 24 colour coded optical fibers (200 micron) in our PowerGuide®200 SkyLight Cable range.
Application	Installation environment: outdoor.
	Operation environment: aerial self-supporting in long spans.
	Excellent, cost effective alternative for short span aerial cable spans ranging from 60 to 150 metres depending on NESC loading*(Light/Medium/Heavy). Lightweight and easy to handle and install for duct and aerial use. durability and field reliability in fibercounts ranging from 12 to 288f.

Constructive Characteristics

Fiber types	Available with 250 micron G. 652, G. 654 and G.657 (12-144F) and 200 micron G. 652 and G.657 (96-288f) Singlemode fibers											
Elements	6						8		10		12	
Fiber per tube	12 with 250 micron fibers (or 24 with 200 micron fibers)											
Fiber count	12	24	36	48 (96)	60 (120)	72 (144)	84 (168)	96 (192)	108 (216)	120 (240)	132 (264)	144 (288)
Core design	1+6 (5 Fillers)	1+6 (4 Fillers)	1+6 (3 Fillers)	1+6 (2 Filler)	1+6 (1 Filler)	1+6	1+8 (1 Filler)	1+8	1+10 (1 Filler)	1+10	1+12 (1 Filler)	1+12
Outer diameter (mm)	10,4						11,9		13,4		15	
Cable weight (kg/km)	90						120		145		180	

- PE-Jacket
- Waterblocked cable core (with dry "water swellable" technology)
- Optical Fibers (200 micron x 24)
- Non-metallic Central Member
- Gel Filled Buffer Tubes
- Non-metallic Strength Elements
- Rip cords

72 fibers

Recommendation for accessories

Recommended Hardware for spans up to 150 m

Dead End Assembly: PLP FIBERLIGN® Dielectric Dead-end for ADSS	2872001C1E1 Max. Tension: 1135Kg	2872003C1E1 Max. Tension: 1135Kg	2872005C1E1 Max. Tension: 1135Kg	2872007C1E1 Max. Tension: 1135Kg
Fixed Tangent Support: PLP FIBERLIGN® Aluminium Support for ADSS	4450098	4450099	4450101	4450102
Suspended Support: PLP FIBERLIGN® Aluminium Suspension for ADSS	4450198	4450199	4450201	4450202
Black Storage Devices: FIBERLIGN® in-Span Storage System	FIS12A			
Download Cushion: FIBERLIGN® Downlead Cushion for ADSS	8003041			8003043
Vibration Dampers: FIBERLIGN® Dielectric Damper for ADSS Cable	50502272			50509862

Consult with your nearest FBS office on your application, fiber type, attenuation, span lenghts and loading conditions to complete the custom design and cable print.

Performance

		5 elements			6 elements			8 elements			12 elements		
Tensile performance	Maximum Rated Cable Load (MRCL)	4000 N			4800 N			5550 N			6600 N		
	NESC Loading (Light/Medium/Heavy)	L	M	H	L	M	H	L	M	H	L	M	H
	Long Term Load (N)	1600	1050	600	2150	1450	900	2650	1900	1190	3300	2450	1550
Maximum Span*	Meters (m)	150	100	60	150	100	60	150	100	60	150	100	60
Cable Modulus	Kg/mm²	1046,5			882,3			831,9			794,8		
CTE (C-1)		1.06E- 05			1.46E- 05			1.53E- 05			1.57E- 05		
Bending performance	Bending Radius - fixed/installed	160 mm			120 mm			140 mm			150 mm		
	Bend Radius - during installation	320 mm			240 mm			270 mm			300 mm		
Temperatures	Operation	-40 to +70°C											
	Installation	-15 to +60°C											
	Storage/Shipping	-40 to +70°C											
Standard length (m)		2000, 4000, 6000, 8000											

Packaging

Wooden reel	Standard length 4000 m

POWERGUIDE® TTH (TO THE HOME) CABLE

Description	One to 6 optical fibers are placed within colour-coded, gel-filled buffer tubes to protect the fibers from mechanical and environmental forces. The buffer tubes are then stranded around a dielectric central member using the reverse oscillating lay (ROL) stranding method to enable fast, mid-span entry. DryBlock®waterblocking material and dielectric strength elements are applied to the cable core, followed by a durable polyethylene (PE) outer jacket.

Constructive Characteristics

Fiber types	Available with G. 652, G.654, G.655 and G.657 Singlemode fiber and also Multimode fibers
Elements	5
Fiber per tube	2 / 4 / 6
Fiber count	2-30
Outer diameter (mm)	9
Cable weight (kg/km)	58

Gel-Filled Buffer Tube

Optical Fibers

Central Member

Dielectric Strenght Members

DryBlock® Water Blocking Material

Outer PE Jacket

Rip cord
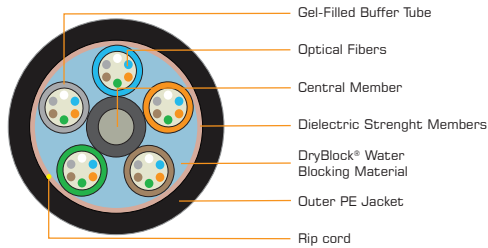
Performance

Tensile performance	Maximum Rated Cable Load (MRCL)	Variable
	Maximum Long Term Load (N)	Variable
Bending performance	Minimum Bend Radius - with load	15 x cable diameter
	Minimum Bending Radius - no load	10 x cable diameter
	Minimum Bending Radius - Storage	10 x cable diameter
Temperatures	Operation	-40℃ to +70℃
	Installation	-30℃ to +60℃
	Storage/Shipping	-40℃ to +75℃

Tested per Applicable Requirements of ANSI/ICEA S-87-640 and Telcordia GR-20 CORE Issue 4.

*Exact span lengths depend on loading conditions, fiber counts and clearance requirements.

Consult with your nearest FBS office on your application, fiber type, attenuation, span lengths and loading conditions to complete the custom design and cable print.

Tests according to IEC 60794-1-2.

MIDIA® CABLE

Description	Optical cable optimized for air-blown installation. They feature small tubes for a reduced outer diameter. The Dry Core Design allows quicker, cleaner cable preparation for jointing. There are description variations on cable design allowing protection against rodent attacks (metallic and non-metallic), chemical resistance, light armour and armoured. Also available with 200 μm fiber enabling double the fiber count stated below. These are the MiDia®200 range of cables with 24F/tube.

Constructive Characteristics

Fiber types	Available with G.652, G.654, G.655, G.656 and G.657 Singlemode fiber and also Multimode fiber up to 6F/ tube.								
Elements	6						8	12	
Fiber per tube	12								
Fiber count	12	24	36	48	60	72	96	120	144
Core design	1+6	1+6	1 + 6	1+6	1+6	1+6	1+8	1+12	1+12
	(5 Fillers)	(4 Fillers)	(3 Fillers)	(2 Fillers)	(1 Filler)			(2 Fillers)	
Outer diameter (mm)	7.5	7.5	7.5	7.5	7.5	7.5	8.8	11.1	11.1
Cable weight (kg/km)	45	45	45	45	45	45	70	105	105
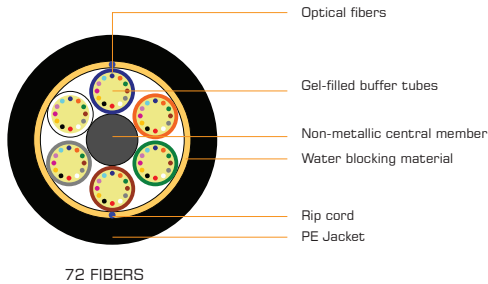
Optical fibers
Gel-filled buffer tubes
Non-metallic central member
Water blocking material
Rip cord
PE Jacket

72 FIBERS

Performance

		6 elements	8 elements	12 elements
Tensile performance	Long Term Load	500 N	500 N	500 N
	Short Term Load, during installation	650 N	1030 N	1550 N
Crush performance	Long Term Load	500 N	500 N	500 N
	Short Term Load	750 N	1000 N	1000 N
Bending performance	Bending Radius - fixed/installed	90 mm	90 mm	90 mm
	Bend Radius - during installation	180 mm	180 mm	180 mm
Temperatures	Operation	-30 to +70°C		
	Installation	-15 to +40°C		
	Storage/Shipping	-40 to +70°C		
Standard length (m)		2000, 4000, 6000, 8000		

In accordance with DataSheet MiDia® Cable - AUG
Tests according to IEC 60794-1-2

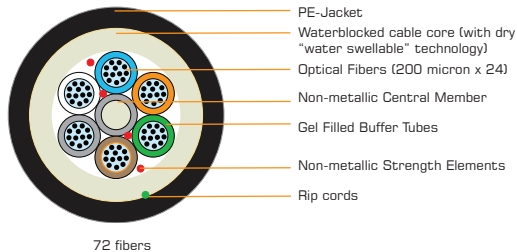# STANDARD DUCT CABLE

Description	Up to 12 colour coded optical fibers are placed into each water-blocked buffer tube which are also colour coded for easy identification. The buffer tubes are then stranded around a dielectric central member using the reverse oscillating lay (ROL) stranding technique. Dry waterblocking material is applied to the cable core along with a layer of non-metallic strength elements (if required). To complete the construction, two ripcords are placed beneath a durable, outer polyethylene (PE) jacket.
Application	Outdoor all dielectric cable mainly used in duct installation (HD-PE Tubes) and installed by cable blowing or pulling. The dry core design (using dry "water swellable" technology) allows for quicker, cleaner cable preparation for jointing.

Constructive Characteristics

Fiber types	Available with G.652, G.655, G.656 and G.657 Singlemode fiber and also Multimode fiber.																
Elements	5					6						8		12			
Fiber per tube	12																
Fiber count	12	24	36	48	60	12	24	36	48	60	72	84	96	108	120	132	144
Core design	1+5 (4 Fillers)	1+5 (3 Fillers)	1+5 (2 Fillers)	1+5 (1 Filler)	1+5	1+6 (5 Fillers)	1+6 (4 Fillers)	1+6 (3 Fillers)	1+6 (2 Fillers)	1+6 (1 Filler)	1+6	1+8 (1 Filler)	1+8	1+12 (3 Fillers)	1+12 (2 Fillers)	1+12 (1 Filler)	1+12
Outer diameter (mm)	9,2					9,5						11		14			
Cable weight (kg/km)	65					75						100		155			

Optical fibers
Gel-filled buffer tubes
Non-metallic central member
Waterblocked cable core (with dry "water swellable" technology)
Non-metallic Strength Elements
Rip cord
PE Jacket

60 FIBERS

Performance

		5 elements	6 elements	8 elements	12 elements
Tensile performance	Long Term Load	1000 N	1000 N	1000 N	1000 N
	Short Term Load, during installation	2700 N	2700 N	2700 N	2700 N
Crush performance	Long Term Load	500 N	500 N	500 N	500 N
	Short Term Load	2000 N	2000 N	2000 N	2000 N
Bending performance	Bending Radius - fixed/installed	10 x cable diameter			
	Bend Radius - during installation	20 x cable diameter			
Temperatures	Operation	-40 to +70°C			
	Installation	-15 to +60°C			
	Storage/Shipping	-40 to +70°C			
Standard length (m)		2000, 4000, 6000, 8000			

In accordance with DataSheet Standard Duct Cable - AUG
Tests according to IEC 60794-1-2

STANDARD DIELECTRIC ROBUST CABLE

Description	Up to 12 colour coded optical fibers are placed into each water-blocked buffer tube which are also colour coded for easy identification. The buffer tubes are then stranded around a dielectric central member using the reverse oscillating lay (ROL) stranding technique. Dry waterblocking material is applied to the cable core followed by two ripcords and an inner sheath of polyethylene. Layers of non-metallic glass elements together with two ripcords are placed beneath a durable, outer polyethylene (PE) jacket to complete the construction.
Application	Mainly used in Duct installation (HD-PE Tubes) and installed by cable blowing or pulling as well as suitable for direct burial into sand beds. The PGP (Polyethylene - Glass- Polyethylene) sheath construction offers extra mechanical , environmental and rodent protection. The dry core design (using dry "water swellable" technology) allows for quicker, cleaner cable preparation for jointing.

Constructive Characteristics

Fiber types	Available with G.652, G.655, G.656 and G.657 Singlemode fiber and also Multimode fiber.															
Elements	5					6						8		12		
Fiber per tube	12															
Fiber count	12	24	36	48	60	12	24	36	48	60	72	84	96	108	120	132	144
Core design	1+5 (4 Fillers)	1+5 (3 Fillers)	1+5 (2 Fillers)	1+5 (1 Filler)	1+5	1+6 (5 Fillers)	1+6 (4 Fillers)	1+6 (3 Fillers)	1+6 (2 Fillers)	1+6 (1 Filler)	1+6	1+8 (1 Filler)	1+8	1+12 (3 Fillers)	1+12 (2 Fillers)	1+12 (1 Filler)	1+12
Outer diameter (mm)	12.5					12.9						14.2		17.2		
Cable weight (kg/km)	90					135						170		235		

- Optical fibers
- Gel-filled buffer tubes
- Non-metallic central member
- Waterblocked cable core (with dry "water swellable" technology)
- Double layer of Glass Elements
- Rip cord
- PE Jacket

72 FIBERS

Performance

		5 elements	6 elements	8 elements	12 elements
Tensile performance	Long Term Load	1000 N	1000 N	1000 N	1000 N
	Short Term Load, during installation	2700 N	2700 N	2700 N	2700 N
Crush performance	Long Term Load	500 N	500 N	500 N	500 N
	Short Term Load	3000 N	3000 N	3000 N	3000 N
Bending performance	Bending Radius - fixed/installed	10 x cable diameter			
	Bend Radius - during installation	20 x cable diameter			
Temperatures	Operation	-40 to +70°C			
	Installation	-15 to +60°C			
	Storage/Shipping	-40 to +70°C			
Standard length (m)		2000, 4000, 6000, 8000			2000, 4000, 6000

In accordance with DataSheet Standard Dielectric Robust Cable - AUG
Tests according to IEC 60794-1-2

STANDARD LIGHT ARMOUR CABLE

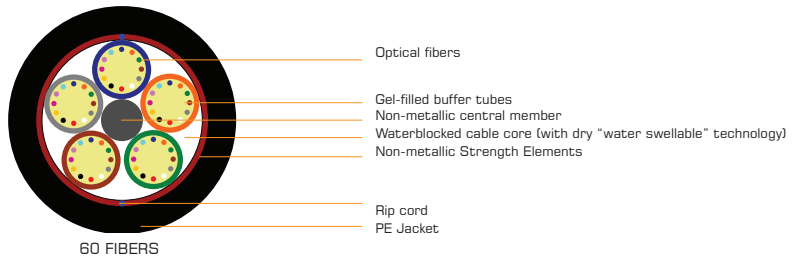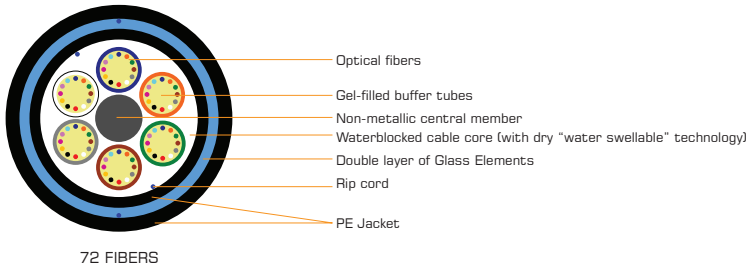|	
Description	Up to 12 colour coded optical fibers are placed into each water-blocked buffer tube which are also colour coded for easy identification. The buffer tubes are then stranded around a dielectric central member using the reverse oscillating lay (ROL) stranding technique. Dry waterblocking material is applied to the cable core along with a layer of non-metallic strength elements. To complete the construction, a corrugated steel tape is applied longitudinally together with two ripcords beneath a durable, outer polyethylene (PE) jacket.
Application	Outdoor metallic cable mainly used for direct burial and for duct installation by cable pulling. The corrugated steel tape provides ideal protection against rodents. The dry core design (using dry "water swellable" technology) allows for quicker, cleaner cable preparation for jointing.

Constructive Characteristics

Fiber types	Available with G.652, G.655, G.656 and G.657 Singlemode fiber and also Multimode fiber.															
Elements	5					6						8		12		
Fiber per tube	12															
Fiber count	12	24	36	48	60	12	24	36	48	60	72	84	96	108	120	132	144
Core design	1+5 (4 Fillers)	1+5 (3 Fillers)	1+5 (2 Fillers)	1+5 (1 Filler)	1+5	1+6 5 Fillers)	1+6 (4 Fillers)	1+6 (3 Fillers)	1+6 (2 Fillers)	1+6 (1 Filler)	1+6	1+8 (1 Filler)	1+8	1+12 (3 Fillers)	1+12 (2 Fillers)	1+12 (1 Filler)	1+12
Outer diameter (mm)	12.2					13						14.3		17.3		
Cable weight (kg/km)	145					165						200		270		

- Optical fibers
- Gel-filled buffer tubes
- Non-metallic central member
- Waterblocked cable core (with dry "water swellable" technology)
- Corrugated Steel Tape
- Rip cord
- PE Jacket

48 FIBERS

Performance

		5 elements	6 elements	8 elements	12 elements
Tensile performance	Long Term Load	1000 N	1000 N	1000 N	1000 N
	Short Term Load, during installation	2700 N	2700 N	2700 N	2700 N
Crush performance	Long Term Load	500 N	500 N	500 N	500 N
	Short Term Load	3000 N	3000 N	3000 N	3000 N
Bending performance	Bending Radius - fixed/installed	15 x cable diameter			
	Bend Radius - during installation	20 x cable diameter			
Temperatures	Operation	-40 to +70°C			
	Installation	-15 to +60°C			
	Storage/Shipping	-40 to +70°C			
Standard length (m)		2000, 4000, 6000, 8000			2000, 4000, 6000

In accordance with DataSheet Standard Light Armour Cable - AUG
Tests according to IEC 60794-1-2

DIELECTRIC OPTICAL CABLE FOR 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 (ants and termites) and external jacket made of UV and weather resistant thermoplastic material.
Application	Installation environment: outdoor.
	Operation environment: underground directly buried.

Constructive Characteristics

Fiber types	Single-mode (9/125)	G.652D
Fiber count	02 to 144	
Core type	Jelly (G)	
Internal jacket resistant to termites	Polyamide (Nylon)	
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/10cm)	Minimum bending radius (mm)	
						During installation	After installed
6 to 36	6	11.8	102	1000	2200	20 x outer cable diameter	10 x outer cable diameter
48 to 60	12	12.4	115				
72		13.2	130				
96		15.0	170				
144		18.4	255				

External jacket
Internal jacket made of Polyamide (nylon)
Internal jacket
Loose tube
Optical fibers
Dielectric central element
Filling material
Rip cord

36 FIBERS

Performance

In accordance with ET 1249

Package

Wood 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

36 FIBERS

Performance

In accordance with ET 1202 (jelly core)

Package

Wood reel	Standard length 4000 m

OPTIC-LAN-AR

Description	Optical cable formed by a single central loose tube, protected against moisture penetration and with metal armour. With external jacket made of black UV and weather resistant thermoplastic material.
Application	Installation environment: outdoor.
	Operation environment: underground directly buried, in ducts or aerial lashed in a steel messenger. Environment subject to rodents' and insects' (ants and termites) action.

Constructive Characteristics

Fiber types	Multimode (50/125)	OM4, OM3 and OM2
	Multimode (62.5/125)	OM1
	Single-mode (9/125)	G.652D
Fiber count	02 to 12	
Armour material	Corrugated steel tape	

Nominal outer diameter (mm)	Nominal weight (kg/km)	Maximum load during installation (N)	Minimum bending radius (mm)	
			During Installation	After Installed
11.5	110	1000	20 x outer diameter	10 x outer diameter
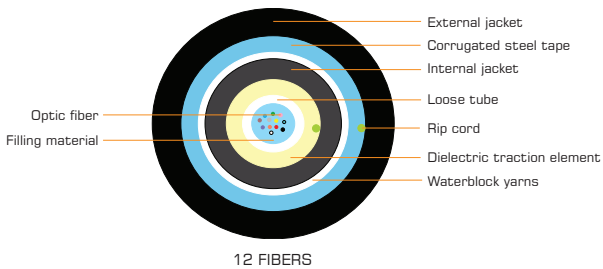
12 FIBERS

External jacket
Corrugated steel tape
Internal jacket
Loose tube
Rip cord
Dielectric traction element
Waterblock yarns
Optic fiber
Filling material

Recommendation for accessories

Use only pre-formed accessories to anchor the cables. Furukawa does not recommend other types of accessories for this purpose. For further information, please, contact the FBS Office closest to you.
Hardware preformed dead-end: OPDE-1008-L
Hardware preformed suspension: OPDE-1004-L

Performance

In accordance with ET 1484

Package

Wood reel	Standard length 2100 m for Multimode or 2000 m for Single-mode

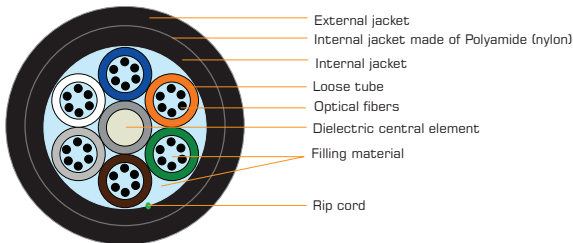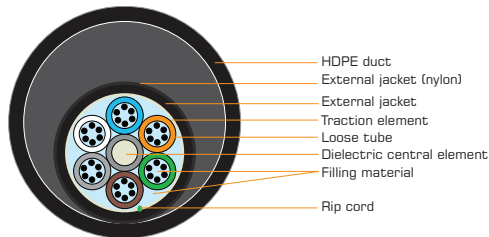# OPTICAL CABLE WITH DIELECTRIC ARMOUR FOR DIRECT BURIED INSTALLATION

Description	Dielectric optical cable with optic fibers grouped in basic units (loose tube). Core protected against moisture penetration, internal jacket resistant to insect attacks, armoured dielectric material and external jacket made of UV and weather resistant thermoplastic material.
Application	Installation environment: outdoor.
	Operation environment: underground directly buried. Environment subject to rodents' and insects' (ants and termites) action.

Constructive Characteristics

Fiber types	Single-mode (9/125)	G.652D
Core type	Jelly (G)	
Internal jacket resistant to termites	Polyamide (Nylon)	
Armour material	Fiberglass yarns (PFV)	
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/10cm)	Minimum bending radius (mm)	
		G	S	TS	G	S	TS			During Installation	After installed
6 to 36	6	14.6	14.6	14.6	190	190	190	2700	4400	20 x outer cable diameter	10 x outer cable diameter
48 to 60	12	16.2	16.2	16.2	235	235	235				
72		16.2	16.2	16.2	235	235	235				
96		18.0	18.0	18.0	290	290	290				
144		22.0	22.0	22.0	410	410	410				

External jacket
Armour material (PFV)
Nylon jacket
Internal jacket
Loose tube
Dielectric central element
Optical fibers
Filling material
Rip cord
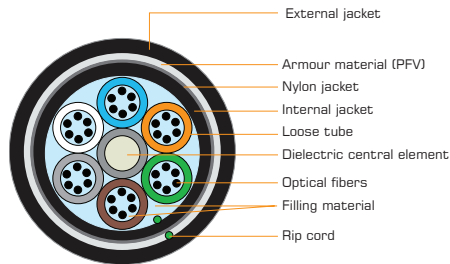
36 FIBERS

Performance

In accordance with ET 1203 (jelly core)

Package

Wood reel	Standard length 4000 m

STANDARD ARMOUR CABLE

Description	Up to 12 colour coded optical fibers are placed into each water-blocked buffer tube which are also colour coded for easy identification. The buffer tubes are then stranded around a dielectric central member using the reverse oscillating lay (ROL) stranding technique. Dry waterblocking material is applied to the cable core along with a layer of non-metallic strength elements followed by an inner polyethylene jacket. To complete the construction, a corrugated steel tape is applied longitudinally together with two ripcords beneath a durable, outer polyethylene (PE) jacket.
Application	Outdoor metallic cable mainly used for direct burial and for duct installation by cable pulling. The armoured cable provides high mechanical protection with the corrugated steel tape providing an effective barrier against rodents and lightning. The dry core design (using dry "water swellable" technology) allows for quicker, cleaner cable preparation for jointing.

Constructive Characteristics

Fiber types	Available with G.652, G.655, G.656 and G.657 Singlemode fiber and also Multimode fiber.										
Elements	5						6	8		12	
Fiber per tube	6	12									
Fiber count	12	12	24	36	48	60	36	72	84	96	144
Core design	1+5 (3 Fillers)	1+5 (4 Fillers)	1+5 (3 Fillers)	1+5 (2 Fillers)	1+5 (1 Filler)	1+5	1+6 (3 Fillers)	1+6	1+8 (1 Filler)	1+8	1+12
Outer diameter (mm)	15.2						15.8		16.2		20.3
Cable weight (kg/km)	215						230		255		370

Optical fibers
Gel-filled buffer tubes
Non-metallic central member
Waterblocked cable core (with dry "water swellable" technology)
Non-metallic Strength Elements
Corrugated Steel Tape
PE Jacket
Rip cord

72 FIBERS

Performance

		5 elements	**6 elements**	**8 elements**	**12 elements**
Tensile performance	Long Term Load	1000 N	1000 N	1000 N	1000 N
	Short Term Load, during installation	2700 N	2700 N	2700 N	2700 N
Crush performance	Long Term Load	1000 N	1000 N	1000 N	1000 N
	Short Term Load	3000 N	3000 N	3000 N	3000 N
Bending performance	Bending Radius - fixed/installed	15 x cable diameter			
	Bend Radius - during installation	20 x cable diameter			
Temperatures	Operation	-40 to +70°C			
	Installation	-15 to +60°C			
	Storage/Shipping	-40 to +70°C			
Standard length (m)		2000, 4000, 6000, 8000	2000, 4000, 6000		2000, 4000

In accordance with DataSheet Standard Armour Cable - AUG
Tests according to IEC 60794-1-2

OPTICAL CABLE ADSS MINI-RA

Description	Self-supported dielectric optical cables, loose type, suitable to spans up to 80 meters for urban transport networks or access networks.
Application	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 span	80 m	
Core type	Dry	
External jacket	Black polyethylene	

Span	Number of optical fibers	Nominal outer diameter	Nominal weight (kg/km)	Maximum weight 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 outer diameter

- External Jack
- Tensile Strength Yarns
- Rip cord
- Optical Fibers
- Protection Tube
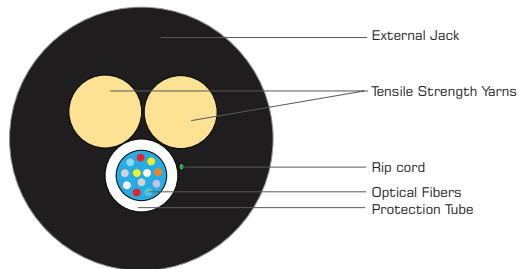
12 FIBERS

Recommendation for accessories

Use only pre-formed accessories to anchor the cables. Furukawa does not recommend other types of accessories for this purpose. For further information, please, contact the FBS Office closest to you.

Hardware pre-formed dead-end: OPDE-1008-L
Hardware pre-formed suspension: OPDE-1004-L

Performance

In accordance with ET 2116

Package

Wood reel	Standard length 2000 or 3000 m

STANDARD MONOTUBE CABLE

Description	Up to 12 colour coded optical fibers are placed into a natural coloured central water-blocked buffer tube. A layer of non-metallic strength elements and a ripcord are placed beneath a durable, outer polyethylene (PE) jacket.
Application	Outdoor all dielectric cable mainly used in duct installation (HD-PE Tubes) and installed by cable pulling.

Constructive Characteristics

Fiber types	Available with G.652 and G.657 Singlemode fiber (up to 12F max.) and also Multimode fiber types (up to 8F max.).
Elements	1
Fiber per tube	12 Maximum
Fiber count	2, 4, 6, 8, 10, 12
Outer diameter (mm)	6.5
Cable weight (kg/km)	35

Optical fibers
Gel-filled buffer tubes
Non-metallic Strength Elements

PE Jacket
Rip cord

12 FIBERS

Performance
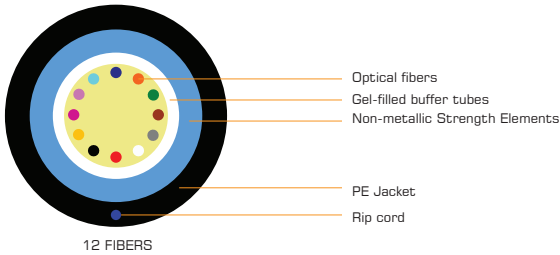
		Single-mode Fiber	Multi-mode Fiber
Tensile performance	Long Term Load	400 N	
	Short Term Load, during installation	1000 N	
Crush performance	Long Term Load	500 N	
	Short Term Load	1500 N	
Bending performance	Bending Radius - fixed/installed	10 x cable diameter	
	Bend Radius - during installation	15 x cable diameter	
Temperatures	Fiber type	Single-mode Fiber	Multi-mode Fiber
	Operation	-30 to +60°C	-20 to +60°C
	Installation	-5 to +50°C	-5 to +50°C
	Storage/Shipping	-30 to +60°C	-20 to +60°C
Standard length (m)		2000, 4000, 6000, 8000	

In accordance with DataSheet Standard Monotube Cable - AUG
Tests according to IEC 60794-1-2

STANDARD DIELECTRIC RODENT PROTECTED CABLE

Description	Up to 12 colour coded optical fibers are placed into each water-blocked buffer tube which are also colour coded for easy identification. The buffer tubes are then stranded around a dielectric central member using the reverse oscillating lay (ROL) stranding technique. Dry waterblocking material is applied to the cable core along with a double layer of glass elements. To complete the construction, two ripcords are placed beneath a durable, outer polyethylene (PE) jacket.
Application	Outdoor all dielectric cable mainly used in duct and trough installation by cable pulling. The double layer of glass elements provide protection against rodents. The dry core design (using dry "water swellable" technology) allows for quicker, cleaner cable preparation for jointing.

Constructive Characteristics

Fiber types	Available with G.652, G.655, G.656 and G.657 Singlemode fiber and also Multimode fiber.															
Elements	5					6						8		12		
Fiber per tube	12															
Fiber count	12	24	36	48	60	12	24	36	48	60	72	84	96	108	120	132	144
Core design	1+5 (4 Fillers)	1+5 (3 Fillers)	1+5 (2 Fillers)	1+5 (1 Filler)	1+5	1+6 (5 Fillers)	1+6 (4 Fillers)	1+6 (3 Fillers)	1+6 (2 Fillers)	1+6 (1 Filler)	1+6	1+8 (1 Filler)	1+8	1+12 (3 Fillers)	1+12 (2 Fillers)	1+12 (1 Filler)	1+12
Outer diameter (mm)	10.3					10.9						12.4		15.4		
Cable weight (kg/km)	85					100						130		195		

- Optical fibers
- Gel-filled buffer tubes
- Non-metallic central member
- Waterblocked cable core (with dry "water swellable" technology)
- Double layer of Glass Elements
- Rip cord
- PE Jacket

60 FIBERS

Performance

		5 elements	6 elements	8 elements	12 elements
Tensile performance	Long Term Load	1000 N	1000 N	1000 N	1000 N
	Short Term Load, during installation	2700 N	2700 N	2700 N	2700 N
Crush performance	Long Term Load	500 N	500 N	500 N	500 N
	Short Term Load	2000 N	2000 N	2000 N	2000 N
Bending performance	Bending Radius - fixed/installed	10 x cable diameter			
	Bend Radius - during installation	20 x cable diameter			
Temperatures	Operation	-40 to +70°C			
	Installation	-15 to +60°C			
	Storage/Shipping	-40 to +70°C			
Standard length (m)		2000, 4000, 6000, 8000			2000, 4000, 6000

In accordance with DataSheet Standard Dielectric Rodent Protected Cable - AUG
Tests according to IEC 60794-1-2

MIDIA® ARMOUR CABLE

Description	Up to 12 colour coded optical fibers are placed into each water-blocked buffer tube which are also colour coded for easy identification. The buffer tubes are then stranded around a dielectric central member using the reverse oscillating lay (ROL) stranding technique. Dry waterblocking material is applied to the cable core along with a layer of non-metallic strength elements followed by an inner polyethylene jacket. To complete the construction, a corrugated steel tape is applied longitudinally together with two ripcords beneath a durable, outer polyethylene (PE) jacket.
Application	Outdoor metallic cable mainly used for direct burial and for duct installation by cable pulling. The armoured cable provides high mechanical protection with the corrugated steel tape providing an effective barrier against rodents and lightning. The dry core design (using dry "water swellable" technology) allows for quicker, cleaner cable preparation for jointing and small tubes give a reduced outer diameter.

Constructive Characteristics

Fiber types	Available with G.652, G.655, G.656 and G.657 Singlemode fiber and also Multimode fiber up to 6F/tube.									
Elements	6					8			12	
Fiber per tube	12					12	6	12	12	
Fiber count	12	24	36	48	72	84	48	96	120	144
Core design	1+6 (5 Fillers)	1+6 (4 Fillers)	1+6 (3 Fillers)	1+6 (2 Fillers)	1+6	1+8 (3 Fillers)	1+8	1+8	1+12 (2 Fillers)	1+12
Outer diameter (mm)	12					14.2			16.1	
Cable weight (kg/km)	150					205			250	

Optical fibers
Gel-filled buffer tubes
Non-metallic central member
Waterblocked cable core (with dry "water swellable" technology)
Non-metallic Strength Elements
Corrugated Steel Tape
Rip cord
PE Jacket

72 FIBERS

Performance

		6 elements	**8 elements**	**12 elements**
Tensile performance	Long Term Load	1000 N	1000 N	1000 N
	Short Term Load, during installation	1470 N	2000 N	2450 N
Crush performance	Long Term Load	1000 N	1000 N	1000 N
	Short Term Load	3000 N	3000 N	3000 N
Bending performance	Bending Radius - fixed/installed	15 x cable diameter		
	Bend Radius - during installation	20 x cable diameter		
Temperatures	Operation	-30 to +70°C		
	Installation	-15 to +60°C		
	Storage/Shipping	-40 to +70°C		
Standard length (m)		2000, 4000, 6000, 8000		2000, 4000, 600

In accordance with DataSheet MiDia® Armour Cable - AUG
Tests according to IEC 60794-1-2

MIDIA® LIGHT ARMOUR CABLE

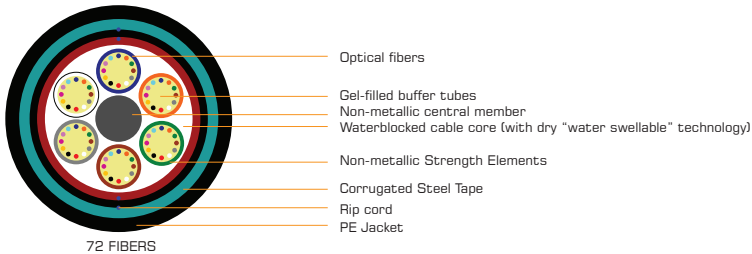|	
Description	Up to 12 colour coded optical fibers are placed into each water-blocked buffer tube which are also colour coded for easy identification. The buffer tubes are then stranded around a dielectric central member using the reverse oscillating lay (ROL) stranding technique. Dry waterblocking material is applied to the cable core along with a layer of non-metallic strength elements. To complete the construction, a corrugated steel tape is applied longitudinally together with two ripcords beneath a durable, outer polyethylene (PE) jacket.
Application	Outdoor metallic cable mainly used for direct burial and for duct installation by cable pulling. The corrugated steel tape provides ideal protection against rodents and the small tubes give a reduced outer diameter. The dry core design (using dry "water swellable" technology) allows for quicker, cleaner cable preparation for jointing.

Constructive Characteristics

Fiber types	Available with G.652, G.655, G.656 and G.657 Singlemode fiber and also Multimode fiber up to 6F/tube.							
Elements	6					8		12
Fiber per tube	12							
Fiber count	12	24	48	60	72	84	96	144
Core design	1+6	1+6	1+6	1+6	1+6	1+8	1+8	1+12
	(5 Fillers)	(4 Fillers)	(2 Fillers)	(1 Filler)		(1 Filler)		
Outer diameter (mm)	11.2					11.9		14.4
Cable weight (kg/km)	125					150		200

- Optical fibers
- Gel-filled buffer tubes
- Non-metallic central member
- Waterblocked cable core (with dry "water swellable" technology)
- Corrugated Steel Tape
- Rip cord
- PE Jacket

72 FIBERS

Performance

		6 elements	8 elements	12 elements
Tensile performance	Long Term Load	1000 N	1000 N	1000 N
	Short Term Load, during installation	2450 N	2940 N	3920 N
Crush performance	Long Term Load	1000 N	1000 N	1000 N
	Short Term Load	3000 N	3000 N	3000 N
Bending performance	Bending Radius - fixed/installed	15 x cable diameter		10 x cable diameter
	Bend Radius - during installation	20 x cable diameter		
Temperatures	Operation	-30 to +70°C		
	Installation	-15 to +60°C		-15 to +40°C
	Storage/Shipping	-40 to +70°C		
Standard length (m)		2000, 4000, 6000, 8000		

In accordance with DataSheet MiDia® Light Armour Cable - AUG
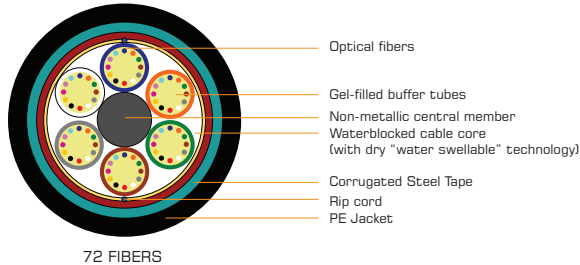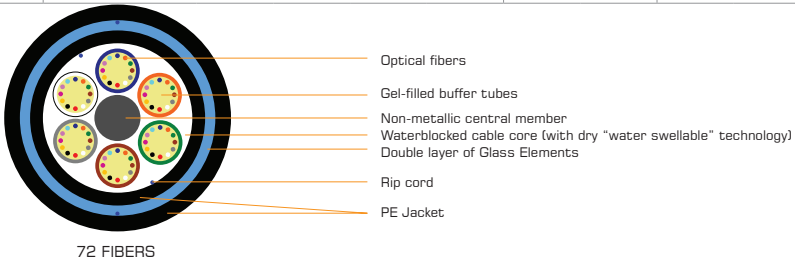Tests according to IEC 60794-1-2

MIDIA® DIELECTRIC ROBUST CABLE

Description	Up to 12 colour coded optical fibers are placed into each water-blocked buffer tube which are also colour coded for easy identification. The buffer tubes are then stranded around a dielectric central member using the reverse oscillating lay (ROL) stranding technique. Dry waterblocking material is applied to the cable core followed by two ripcords and an inner sheath of polyethylene. Layers of non-metallic glass elements together with two ripcords are placed beneath a durable, outer polyethylene (PE) jacket to complete the construction.
Application	Mainly used in Duct installation (HD-PE Tubes) and installed by cable blowing or pulling as well as suitable for direct burial into sand beds. The PGP (Polyethylene - Glass- Polyethylene) sheath construction offers extra mechanical, environmental and rodent protection. The dry core design (using dry "water swellable" technology) allows for quicker, cleaner cable preparation for jointing and small tubes give a reduced outer diameter.

Constructive Characteristics

Fiber types	Available with G.652, G.655, G.656 and G.657 Singlemode fiber and also Multimode fiber up to 6F/tube.									
Elements	6						8		12	
Fiber per tube	12									
Fiber count	12	24	36	48	60	72	84	96	120	144
Core design	1+6 (5 Fillers)	1+6 (4 Fillers)	1+6 (3 Fillers)	1+6 (2 Fillers)	1+6 (1 Filler)	1+6	1+8 (1 Filler)	1+8	1+12 (2 Fillers)	1+12
Outer diameter (mm)	10.7						12		14.4	
Cable weight (kg/km)	100						125		170	

- Optical fibers
- Gel-filled buffer tubes
- Non-metallic central member
- Waterblocked cable core (with dry "water swellable" technology)
- Double layer of Glass Elements
- Rip cord
- PE Jacket

72 FIBERS

Performance

		6 elements	**8 elements**	**12 elements**
Tensile performance	Long Term Load	750 N	800 N	800 N
	Short Term Load, during installation	1470 N	1840 N	2500 N
Crush performance	Long Term Load	500 N	500 N	500 N
	Short Term Load	1500 N	2000 N	2000 N
Bending performance	Bending Radius - fixed/installed	10 x cable diameter		
	Bend Radius - during installation	20 x cable diameter		
Temperatures	Operation	-30 to +70°C		
	Installation	-15 to +60°C		
	Storage/Shipping	-40 to +70°C		
Standard length (m)		2000, 4000, 6000, 8000		

In accordance with DataSheet MiDia® Dielectric Robust Cable - AUG
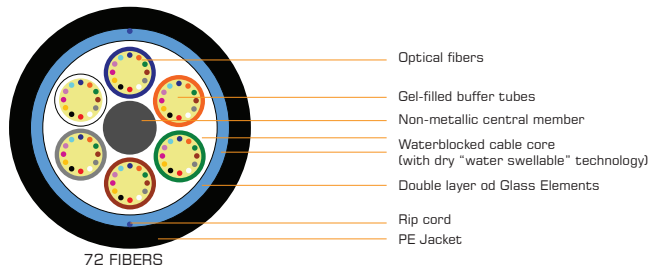Tests according to IEC 60794-1-2

MIDIA® DIELECTRIC RODENT PROTECTED CABLE

Description	Up to 12 colour coded optical fibers are placed into each water-blocked buffer tube which are also colour coded for easy identification. The buffer tubes are then stranded around a dielectric central member using the reverse oscillating lay (ROL) stranding technique. Dry waterblocking material is applied to the cable core along with a double layer of glass elements. To complete the construction, two ripcords are placed beneath a durable, outer polyethylene (PE) jacket.
Application	Outdoor all dielectric cable optimised for air-blown installation. The double layer of glass elements provide protection against rodents. The dry core design (using dry "water swellable" technology) allows for quicker, cleaner cable prep for jointing and small tubes give a reduced outer diameter.

Constructive Characteristics

Fiber types	Available with G.652, G.655, G.656 and G.657 Singlemode fiber and also Multimode fiber up to 6F/tube.										
Elements	6					8		12			
Fiber per tube	12										
Fiber count	12	24	36	48	60	72	96	108	120	132	144
Core design	1+6 (5 Fillers)	1+6 (4 Fillers)	1+6 (3 Fillers)	1+6 (2 Fillers)	1+6 (1 Filler)	1+6	1+8	1+12 (3 Fillers)	1+12 (2 Fillers)	1+12 (1 Filler)	1+12
Outer diameter (mm)	8.3						9.2	11.7			
Cable weight (kg/km)	60						80	125			

- Optical fibers
- Gel-filled buffer tubes
- Non-metallic central member
- Waterblocked cable core (with dry "water swellable" technology)
- Double layer od Glass Elements
- Rip cord
- PE Jacket

72 FIBERS

Performance

		6 elements	8 elements	12 elements
Tensile performance	Long Term Load	400 N	800 N	800 N
	Short Term Load, during installation	880 N	1170 N	1840 N
Crush performance	Long Term Load	500 N	500 N	500 N
	Short Term Load	1500 N	2000 N	2000 N
Bending performance	Bending Radius - fixed/installed	15 x cable diameter	160 mm	15 x cable diameter
	Bend Radius - during installation	25 x cable diameter	320 mm	20 x cable diameter
Temperatures	Operation	-30 to +70°C		
	Installation	-15 to +40°C		
	Storage/Shipping	-40 to +70°C		
Standard length (m)		2000, 4000, 6000, 8000		

In accordance with DataSheet MiDia® Dielectric Rodent Protected Cable - AUG
Tests according to IEC 60794-1-2

Microduct Cables

To implement or upgrade a modern metropolitan optical network, especially through urban areas, service providers can face challenges such as space limitations to excavation disruption to upgradability. To help make these intricate networks simpler and less costly, OFS developed the MiDia® Micro cable product line.

An ideal solution for congested metro networks, the MiDia® Micro cables can help dramatically lower the cost of fiber optic deployment while increasing and enhancing capacity and fiber density in limited spaces. Whether your application involves overriding cables installed in existing ducts, deployment into unused inner ducts or greenfield "grow-as-you go" deployments, the MiDia® Micro cables are an excellent solution.

By reducing or eliminating the need for expensive and disruptive excavation along with procuring costly rights-of-way, the MiDia® Micro cables offer a more cost-effective solution that requires fewer deployment resources. With the ability to deploy fiber only as needed, these micro cables can help to defer initial investment costs while also allowing the flexibility to add newer fiber types or technologies as they become available.

Selecting the right microduct is critical to the success of any micro cable deployment. The formulation and surface finish of a microduct's low-friction layers are vitally important to achieving long, continuous blowing distances. In the same way, a micro cable's optimized outer diameter, weight, stiffness and low- friction jacket also play a critical role in installation performance. When the most appropriate micro cable for an application is used with the right microduct, these critical features combine, in a synergistic way, to deliver smooth, air-blown deployment with maximum, continuous blowing distances.

Microduct cables are optimized for air-blown installation applications and, as such, are less robust than traditional cables.

Microduct cables are NOT designed for aggressive handling scenarios including, as an example, shared and undersized hand-holes. In these situations, cables are often exposed to excessive crush forces and are routinely accessed and removed (with coiling and recoiling).

Recommended microduct sizes are based on application and micro cable outer diameter. For example, direct buried applications of bundled microducts, thick-walled products or the next larger-size microduct are recommended to account for deformation that may occur in the microduct in a direct buried environment.

Please consult with your OFS representative on selecting the right microduct for your application and for installation guidance.

Access
Network

NAP CLOSURE

CONNECTORS TRAY WITH 16 SC-APC ADAPTER
See page 97

OPTICAL SPLITTER NC/SC-APC 1X16
See page 66

SLIMBOX™ DROP TERMINAL FK-CTO-16MC
See page 97

DROP CABLE GROMMETS AND SUPPORT KIT
See page 97

EZ!CONNECTOR
See page 101

ALL DIELETRIC SELF-SUPPORTED OPTICAL CABLE
See page 73

LOW FRICTION DROP CABLE
See page 106

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	
Ingress Protection (IP)	56	

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 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.

Also available in white

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 x 3 mm	

Ordering Description

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

SLIMBOX™ UNDERGROUND TERMINAL - FK-CTOS-16P

Underground network access point, with 1 splice tray, for underground access and termination networks.
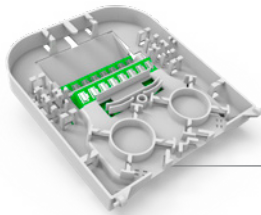
CONNECTOR TRAY

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 4 mm	
Maximum number of splices	Up to 64 splices (without adapters) or 48 splices (with adapter trays)	
Application	Aerial / Underground	
Ingress Protection (IP)	68	

Ordering Description

SlimBox™ Uderground Terminal (FK-CTOS-16P - Basic Module)

Splice Tray for Optical Termination Box FK-CTOS-16P

Connectors Tray with 16 SC-APC Adapters without Shutter (FK-CTOS-16P)

Connectors Tray with 8 SC-APC Adapters without Shutter (FK-CTOS-16P)

Optical Splitter PLC 1X8 BLI A/B G-657A NC/SC-APC 1.5D0.9/0.6D0.9

Optical Splitter PLC 1X16 BLI A/B G-657A NC/SC-APC 1.5D0.9/0.6D0.9

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 CABLE

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	-25 °C up to 75 °C	
Storage temperature		
Traction load (compact cable)	20 N	
Supports cable's diameter	3x2 mm and 2x1.6 mm	
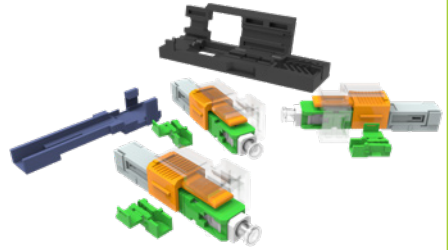
Connector type	Polishing type	Insertion Loss	Return loss	
SC	APC/UPC	< 0.3 dB (typical) < 0.6 dB (maximum)	≥ 50 dB	≥ 60 dB

Ordering Description

Kit of 50 Field Optical Connectors SM SC-APC EZ!Connector for Flat Cables 1.6 x 2mm and 3 x 2mm
Kit of 10 Field Optical Connectors SM SC-APC EZ!Connector for Flat Cables 1.6 x 2mm and 3 x 2mm
Kit of 50 Field Optical Connectors SM SC-UPC EZ!Connector for Flat Cables 1.6 x 2mm and 3 x 2mm
Kit of 10 Field Optical Connectors SM SC-UPC EZ!Connector for Flat Cables 1.6 x 2mm and 3 x 2mm

EZ!CONNECTOR FOR ROUND CABLE

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

Constructive Characteristics

Dimensions	Height	8 mm
	Width	9.2 mm
	Length	64 mm
Operation temperature	-25 °C to 75 °C	
Storage temperature		
Traction load (compact cable)	20 N	

Connector type	Polishing type	Insertion Loss	Return loss
SC	APC	< 0.3 dB (typical) < 0.5 dB (maximum)	≥ 50 dB

Ordering Description

Kit of 10 Field Optical Connectors SM SC-APC EZ!Connector for 3mm Circular Cable

EZ!FUSE™ SPLICE ON CONNECTOR

The new Splice On Connector termination system allows for easy termination and flexibility in the field. 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)
Operation temperature		- 40 °C 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 (MM) (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 mm 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 mm 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 mm 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 mm cordage

PRE-TERMINATED NAP CLOSURE

SPLITTER NC/SC-APC 1X16
See page 66

SPLICE TRAY FOR FK-CTOP-16P
See page 104

PRE-TERMINATED SLIMBOX DROP TERMINAL FK-CTOP-16P
See page 104

ALL-DIELECTRIC SELF-SUPPORTED OPTICAL CABLE
See page 73

SLIMCONNECTOR
See page 104

LOW FRICTION DROP CABLE
See page 109

PRE-TERMINATED SLIMBOX DROP TERMINAL FK-CTOP-16P

Pre-terminated network access point, for access and termination networks, to used with slimconnector adapters.

Constructive Characteristics

Dimensions	Height	375 mm
	Width	240 mm
	Depth	120 mm
Body material	Reinforced thermoplastic	
Color	Black	
Input cable diameter	6.5 to 16 mm	
Derivation diameter	5.0 mm up to 8.2 mm	
Maximum number of drop cables	16 Slimconnector drop cables	
Maximum number of splices	Up to 96 Splices (Up to 6 Splice Trays)	
Application	Aerial	
Ingress Protection (IP)	56	

Ordering Description

Pre-terminated Slimbox™ Drop Terminal FK-CTOP-16P
Splice Tray for Pre-terminated Slimbox™ Drop Terminal FK-CTOP-16P
Branching kit for Pre-terminated Slimbox™ Drop Terminal FK-CTOP-16P

SLIMCONNECTOR DROP

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
Ingress Protection (IP)	68
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

LOCKED PRE-TERMINATED SLIMBOX DROP TERMINAL - 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	Pre-terminated SlimConnector Drop Cable (for some Ordering Descriptions)	
Maximum number of drop cables	8 Slimconnector drop cables	
Ingress Protection (IP)	68	

Ordering Description

Locked Pre-terminated Slimbox™ Drop Terminal FK-CTOP-L

Optical Cables

LOW FRICTION DROP CABLE (CM)

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

Constructive Characteristics

Fiber type	Single-mode (9/125)	G.657 (BLI)
Fiber count	01 or 02	
Messenger	Steel wire: ø1.2 mm	
Strength member	Steel wire: ø0.4 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
5.1±0.1 x 2.0±0.1	20	80	660	148	30	15

Messenger = 1.2 mm

Strength member = 0.4 mm
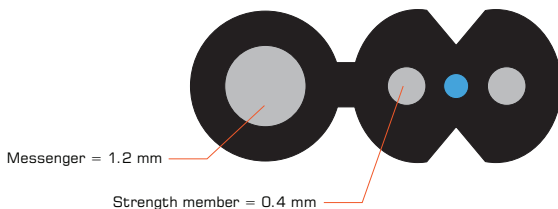
Performance

In according with ET 3312.

Package

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

COMPACT DIELECTRIC FAST DROP FIG.8 CABLE

Description	Figure 8 type cable, it presents compact dimensions and LSZH external sheath. Specially developed for last mile applications (drop) in FTTH and MDU networks that does not require low friction characteristics. FRP wires as strength members allow it to be pushed or pulled through ducts, without a wire guide and making the product optical element dielectric.
Application	Installation environment: indoor/outdoor.
	Operation environment: Self-supported and ducts

Constructive Characteristics

Types of fibers	Single-mode (9/125)	G.657 (BLI)
Fiber count	01 or 02	
Messenger	Steel wire: ø1.0 mm	
Strength member	FRP: ø0.5 mm	
Flammability rating	LSZH	
Color	Black or gray	

Cable dimension (mm)	Nominal weight (kg/km)	Maximum load during installation		Minimum bend radius (mm)	
		Only messenger (N)	**Only optical unit (N)**	**During installation**	**After installation**
5.1±0.1 x 2.0±0.1	20	660	75	30	15

Messenger = 1.0 mm
Strength member = 0.5 mm

Performance

In according with ET 4061.

Package

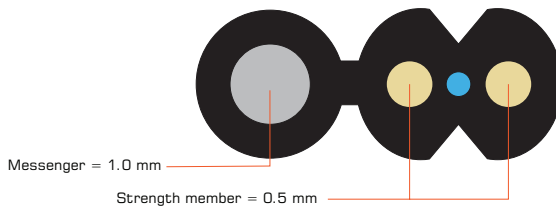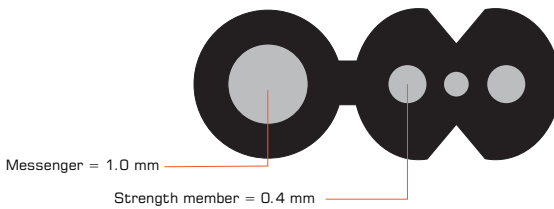| Wood reel	1000 m

COMPACT METALLIC FAST DROP FIG.8 CABLE

Description	Figure 8 type cable, it presents compact dimensions and LSZH external sheath. Specially developed for last mile applications (drop) in FTTH and MDU networks that does not require low friction characteristics. Steel wires as strength members allow it to be pushed or pulled thru ducts, without a wire guide.
Application	Installation environment: indoor/outdoor.
	Operation environment: Self-supported and ducts

Constructive Characteristics

Types of fibers	Single-mode (9/125)	G.657 (BLI)
Fiber count	01 or 02	
Messenger	Steel wire: ø1.0 mm	
Strength member	Steel wire: ø0.4 mm	
Flammability rating	LSZH	
Color	Black or gray	

Cable dimension (mm)	Nominal weight (kg/km)	Maximum load during installation		Minimum bend radius (mm)	
		Only messenger (N)	Only optical unit (N)	During installation	After installation
2.0 ± 0.1 x 5.1 ± 0.1	20	660	148	30	15

Messenger = 1.0 mm

Strength member = 0.4 mm

Performance

In according with ET 3697.

Package

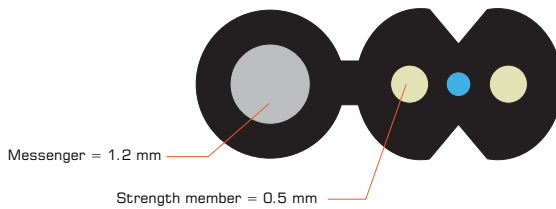| Wood reel	1000 m

LOW FRICTION 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 to be pushed into congested ducts with existing cables.
Application	Installation environment: indoor/outdoor.
	Operation environment: Self-supporting aerial or in underground duct application, enabling the cable to 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
5.1±0.1 x 2.0±0.1	20	80	660	75	30	15

Messenger = 1.2 mm

Strength member = 0.5 mm

Performance

In according with ET 3295.

Package

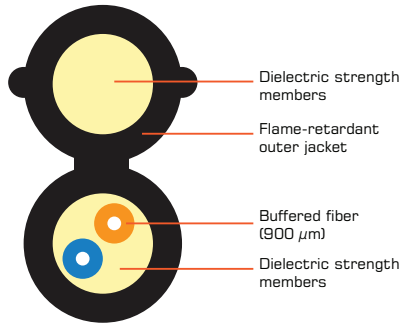| Wood reel	1000 m
Roll	500 m (to be used with a specific metallic support)
RIB (Reel-in-a-Box)	500 m

FIG. 8 TB DROP CABLE

Description	Totally dielectric 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 (900 μm), 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. Recommended for continuous installation of up to 400 meters.

Constructive Characteristics

Fiber type	Single-mode (9/125)	G.657 (BLI)
Fiber count	01 or 02	
Strength member	Aramid yarns	
Flammability rating	OFN or LSZH	
Color	Black	

Cable dimension (mm)	Nominal weight (kg/km)	Maximum span (Installation SAG 1%) (m)	Maximum load during installation (N)	Everyday Stress (EDS) (N)	Minimum bend radius (mm)	
					During installation	After installation
3.1 x 7.0	22	50	500	350	30	15

- Dielectric strength members
- Flame-retardant outer jacket
- Buffered fiber (900 μm)
- Dielectric strength members

Performance

In according with ET 2341.

Package

Wood reel	1000 m

Termination Network

INVISILIGHT® SYSTEM

Multifiber cable

InvisiLight®
POE MODULE
See page 114

SlimBox™
12-FIBER
INNER
ADAPTER
MODULE
See page 121
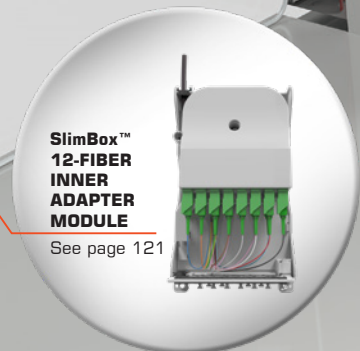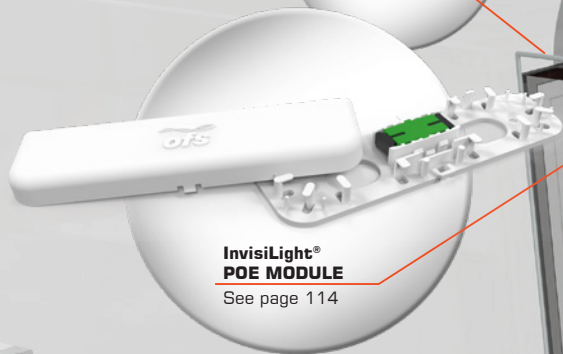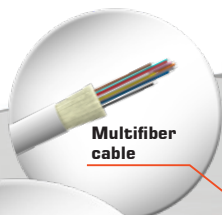
Fiber cable

Under consult

INVISILIGHT® COMPACT POE MODULE

The Compact Point-of-Entry (POE) Module serves as the transition point between the building hallway and the customer living unit.

Constructive Characteristics

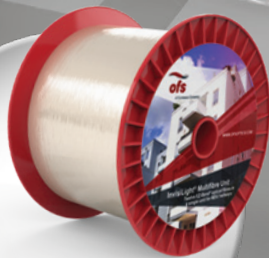|	
Product specification	Invisilight® Compact POE Module
Size	04,08 and 12 250 μm EZ-Bend Optical Fibers in a 2 mm unit
Application	Building or MDU hallways; risers if in OFNR duct
Install process	Fiber adhered to wall or ceiling by an adhesive
Install materials	Adhesive (in tubes) with precision pre-cut tip (fits in applicator tool)
	Inside and outside corner protectors, wall plugs and caps
	Pigtail, Mechanical or Slice on connector
	POE wall module outside tenant unit
Connectors	Factory-terminated connectors for closet. Mechanical or Fusion spliced connectors or splice pigtails for point of entry module
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 decór
	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 lengths and fiber counts
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

NVSLGHTHI-D-SCAUNC-Module Kit-12-100M-EA	SC-APC connectorized (one end) 12-fiber InvisiLight® Multifiber Unit, 100 meters, 12 compact point-of-entry (POE) compact 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) compact 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) compact 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) compact modules and components

Ordering Description

NVSLGHTH-Compact-Module W/ LCA adapter	Additional compact point-of-entry (POE) module with LC-APC adapter
NVSLGHTH-Compact-Module W/ SCA adapter	Additional compact 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-Tube, 30ML adhesive (in tubes)	25-pack of adhesive (in tubes)

Additional configuration available upon request.

SLIMBOX™ WALL PLATE

The SlimBox™ Wall Plate serves as a termination point or a demarcation point for optical fiber in an indoor environment. An EZ-Bend® jumper would connect the SlimBox™ Wall Plate to a desktop ONT and the InvisiLight® 80 x 80 Adapter Module may be used in case of a distant ONT.

Constructive Characteristics

Dimensions	Height	121.92 mm
	Width	58.42 mm
	Depth	18.80 mm
Capacity	2 Adapters	
	2 Splices	
Color	White	
Connector type	SC	
Number of positions	02 SC ports	
Product body material	Plastic (PC+ABS)	

Ordering Description

SlimBox™-V, INDOOR WALL PLATE-SC	SlimBox™ Wall Plate without adapter
SlimBox™-V, INDOOR WALL PLATE-1F-SM-SCA	SlimBox™ Wall Plate, 1SC-APC adapter
SlimBox™-V, INDOOR WALL PLATE-2F-SM-SCA	SlimBox™ Wall Plate, 2SC-APC adapters

INVISILIGHT® EZ-CONNECT MODULE

The InvisiLight® EZ-Connect Module is provided with an integrated jumper to connect to the ONT. This jumper is available in two different versions. The module has an internal parking space for the inside SC connector end. The internal spool allows slack management of the tight buffer and jumper, and the bottom layer of the spool supports up to 40 meters of InvisiLight® tight buffer optical fiber.
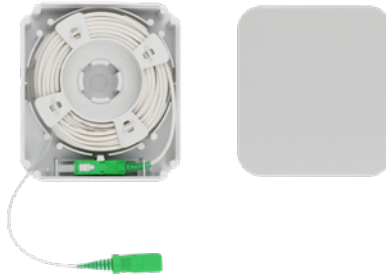
Constructive Characteristics

Kit includes	Connectorized Spool, Module, Wall Through Tool, Bend Limiters (6 ea. Inside and Outside), and Wall Plugs (4 ea. Cap and Plug)	
Dimensions	Height	87.68 mm
	Width	79.56 mm
	Depth	35.74 mm
Fiber type	BLI-A/B - G.657.B3	
Color	White	
Operation 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

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 grey	
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 grey	
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

FLEX INDOOR ROSETTE

See page 125

LOW FRICTION INDOOR CABLE

See page 113

CEIP FLEX

See page 125

PIGTAIL AND OPTICAL ADAPTER KIT

See page 124

FLEX INDOOR ROSETTE

See page 125

EZ!CONNECTOR

See page 101

FIBER-LAN EZ!LUX

See page 130

CEIP 12

See page 121

OUTDOOR OPTICAL CABLE

See page 73
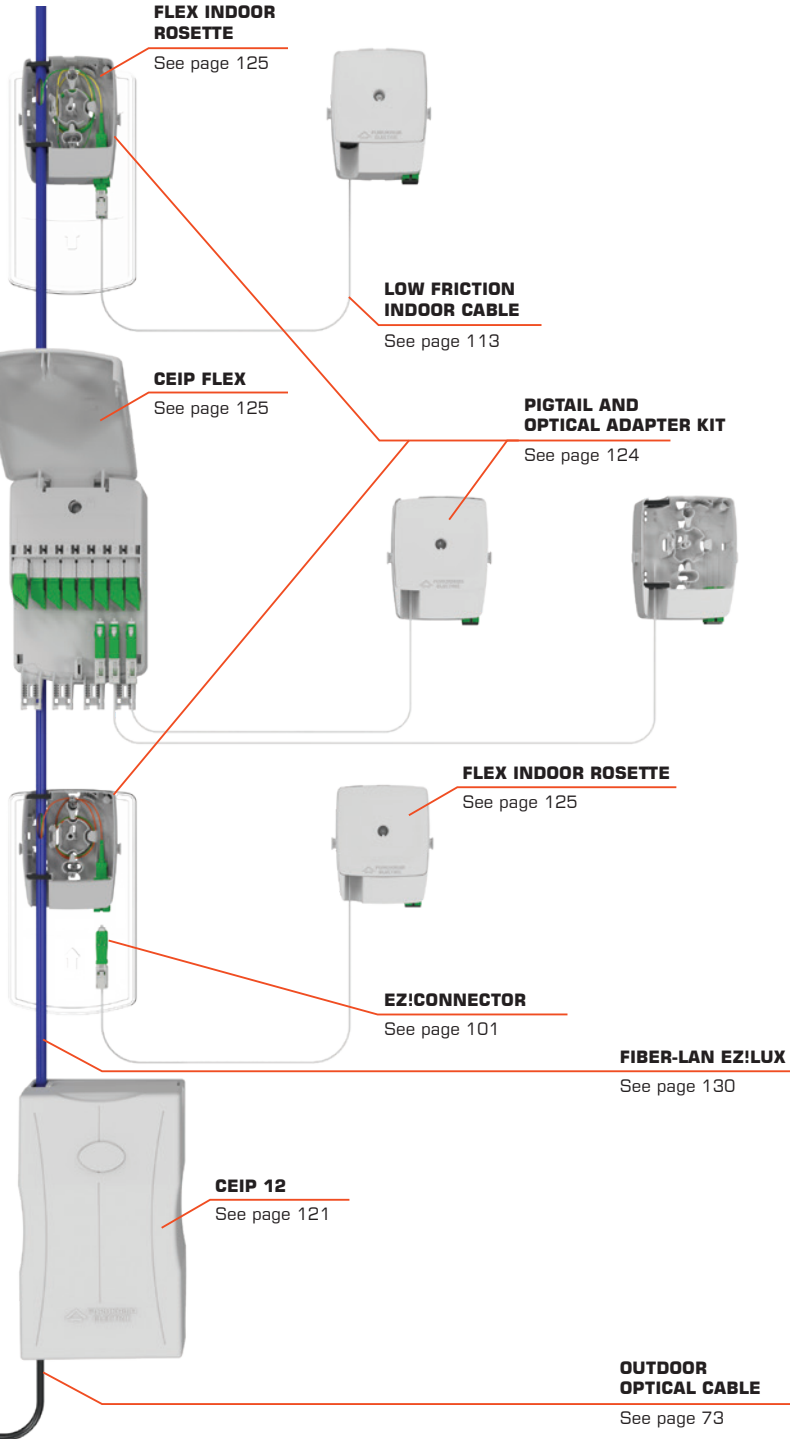
SLIMBOX™ 120-FIBER DISTRIBUTION MODULE

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.
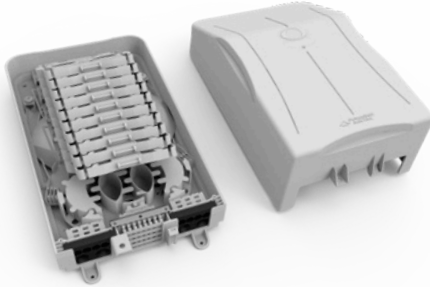
Constructive Characteristics

Dimensions	Height	305 mm
	Width	185 mm
	Depth	100 mm
Color	Light grey	
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™ 64-FIBER INTERNAL ADAPTER MODULE

SlimBox™ 64-Fiber is used in Multi Dwelling Units (MDU) 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 Module) |
| 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 DGOI-C. Manufactured with PLC semiconductor technology with SC/APC connectors in the output, standard fiber G.657A.
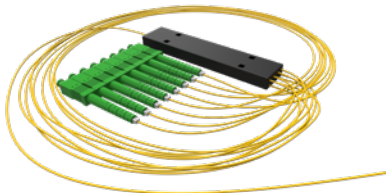
Constructive Characteristics

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

Compact Optical Splitter 90x20x10 1x8 G.657A 2D2/0.9D2 NC/SC-APC

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.
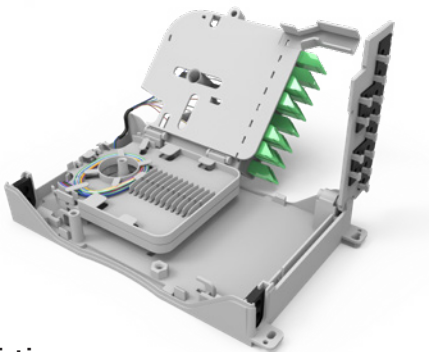
Constructive Characteristics

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)

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 apartments. Another application is as optical blockage. It is compatible for derivation of flat cables or optical pigtail.

Constructive Characteristics

Dimensions	Height	155 mm
	Width	130 mm
	Depth	53 mm
Color	Light grey	
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 External Adapter Module (BW 12 - Basic Module)

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	155 mm
	Width	130 mm
	Depth	53 mm
Color	Light grey	
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)

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.
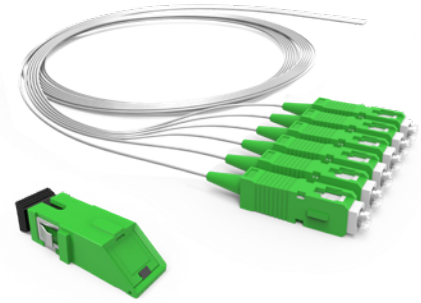
Constructive Characteristics

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.

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

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	185 mm
	Width	105 mm
	Depth	55 mm
Color	Light gray (RAL 7035)	
Protection Index	IP 30	
Product body material	PC+ABS, high resistance 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)

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 1P overlay w/ 1 pigtail G-657, 1 adap SC-APC and plastic limiter - Gray
SlimBox™ Flex Indoor Rosette 1P overlay w/ 1 adap SC-APC - White
SlimBox™ Flex Indoor Rosette 1P overlay w/ 1 adap SC-APC and w/ plastic limiter - Gray

SLIMBOX™ 2-FIBER OPTICAL ROSETTE

Optical network termination point (4x2 inches) used at the transition between outdoor optical fiber cable and optical patch cord, which delivers the signal to the final user's equipment used indoors. Termination capacity of up to 2 fibers and compatible with field connector. Made of highly resistant plastic.
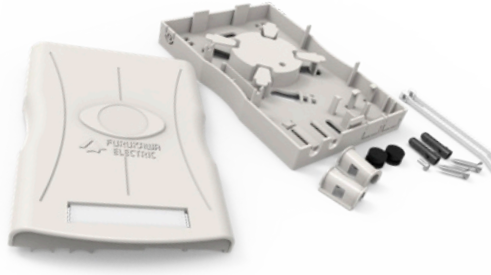
Constructive Characteristics

Dimensions	Height	120 mm
	Width	79.8 mm
	Depth	22.5 mm
Color	White	
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™ 2-Fiber Optical Rosette 2P 4x2 - White

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

SlimBox™ 2-Fiber Optical Rosette 2IN with 2 Shutter SC/APC Adapters - White

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 apartment.
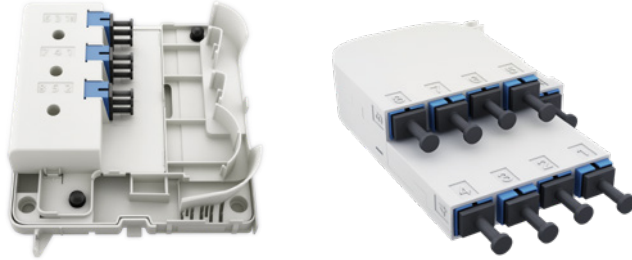
Constructive Characteristics

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

Optical Cables

SIMPLUSLAN MDU

Description	Optical Cable optimized for vertical installation in MDU. Optical fibers are grouped in basic units called micro-modules. They feature small tubes for a reduced diameter, greater flexibility and easier preparation for jointing. It's external jacket is made of thermoplastic flame-retardant material.
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	46	1000	15 x cable diameter	10 x cable diameter
32					
48		49			
64	8.6 ± 0.4	55			

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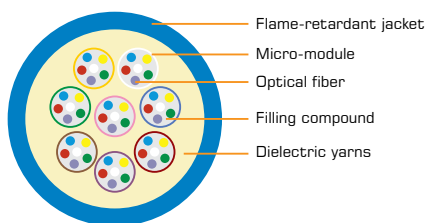
48 FIBERS

Performance

In accordance with ET 2115.

Package

Wood reel	1000 m

FIBER-LAN INDOOR

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-retardantouter jacket
Rip cord
Buffered fibers (900 μm)
Dielectric strength members

12 FIBERS
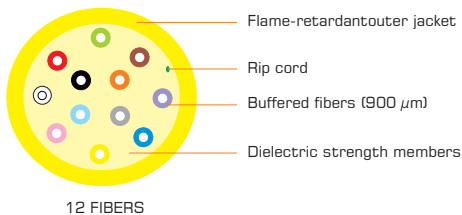
Performance

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
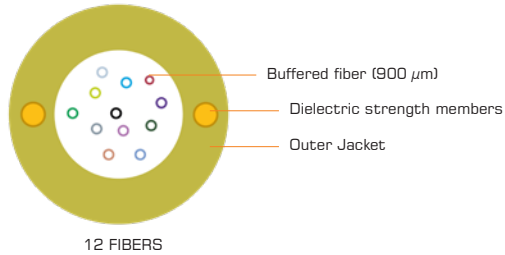
Performance

In accordance with ET 3700

Package

Wood reel	
Cable length	300 or 500 m

INDOOR LOW FRICTION

Description	Compact dimension optical cable with low friction external jacket 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 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)
Fiber count	01 or 02	
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	7.3	230	30	15
02	0.16 x 2.3	7.73	230	30	15

Flame-retardantjacket (low friction)

Steel wire

Optical fiber
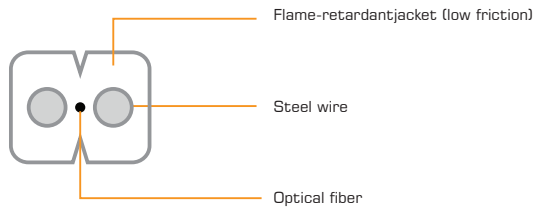
Performance

In accordance with ET 2365

Package

Reelex® Box	Standard length 1000 m, 500 m or 300 m
RIB Box	Standard length 1000 m or 500 m

SIMPLEX OPTICAL PATCH CORD

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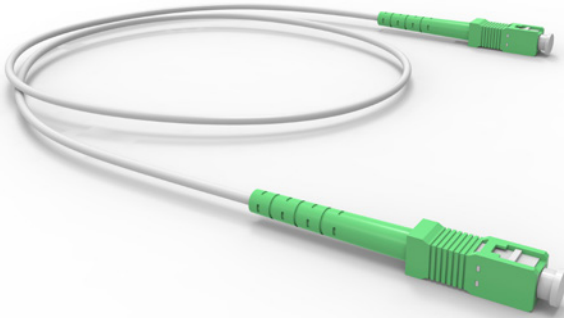
Constructive Characteristics

Rated diameter	Single-fiber	2 and 3 mm
	Duplex	4.5 and 5.9 mm
Fiber	G-652B/ G-652D/ G-657A	
Length	From 1 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	

Other configurations upon request.

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		
Layer 2	Up to 256 MAC addresses	**Reception wavelength**	1490 nm
	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 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 GPON LD420-10R
Power Supply for Optical Modem NEMA Standard

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

OPTICAL MODEM GPON LD421-21W

The OPTICAL MODEM GPON LD421-21W is a termination equipment ONT (Optical Network Terminal) compliant with the ITU-T G.984 standard.

Constructive Characteristics

Power Supply	48 VDC	
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	QoS	Bandwidth adjustable through OLT
	1 metal interface RJ-45 10/100 Base-T (FastEthernet)		8 priority lines per port
	1 metal interface RJ-45 10/100/1000 Base-T (GbE)	Management	Management and provisioning through OLT
	1 metal interface RJ-11 FxS (for analog telephony);		Auto discovery
	WIFI antena		Remote firmware update
GPON	Standard GPON ITU-T G.984	Multicast	IGMP snooping
	2.5 Gbps downstream and 1.25 Gbps upstream		256 Multicast groups
	Multiple T-CONTs and GEM Ports	Layer 3	IPV4 & IPV6 dual stack
Layer 2	Up to 256 MAC addresses		DHCP Server / Client and Static IP
	Supports 4K VLAN ID		DNS Server, DNS Relay, Dynamic DNS
	802.1d, 802.1q Bridge		

*one year warranty

Ordering Description

GPON Optical Modem LD421-21W

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)

NJ001M4

Hand-Held Single Fiber Fusion Splicer

Description:

The NJ001 Hand-Held Single Fiber Fusion Splicer and the NJ001M4 Hand-Held 4-Fiber Ribbon Fusion Splicer are suitable for all METRO, LAN and FTTx fibers including ultra bend-insensitive fibers. With its low-profile, compact and ruggedized body, the NJ001 series offers reliable splicing under harsh environmental conditions. The large battery capacity makes it possible to perform 10 splicing and heating cycles. Combining portability , power, flexibility and field ruggedness, the NJ001 series 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.
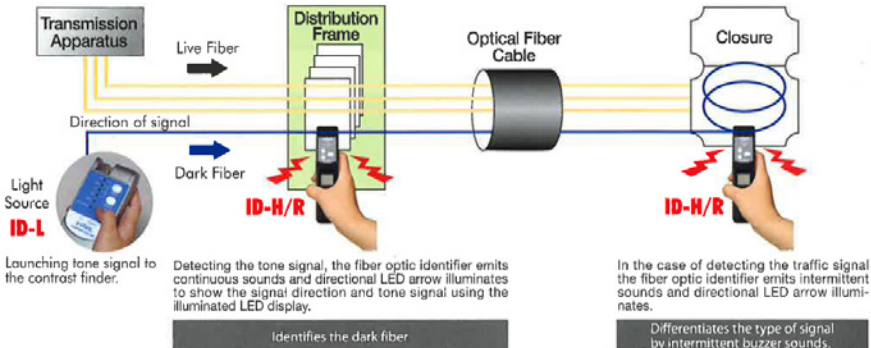
Features:

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

Example of Application:

Transmission Apparatus — Live Fiber — Distribution Frame — Optical Fiber Cable — Closure

Direction of signal — Dark Fiber

Light Source **ID-L**

ID-H/R

ID-H/R

Launching tone signal to the contrast finder.

Detecting the tone signal, the fiber optic identifier emits continuous sounds and directional LED arrow illuminates to show the signal direction and tone signal using the illuminated LED display.

Identifies the dark fiber

In the case of detecting the traffic signal the fiber optic identifier emits intermittent sounds and directional LED arrow illuminates.

Differentiates the type of signal by intermittent buzzer sounds.

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