FTTX ACCESS NETWORKS

05

Modern access networks are aimed to enable the end user to benefit from nowadays telecommunication services (packet HD resolution TV, fast data transmission, voice communication). These requirements can be met only by networks based on optical fibre. Problems such as limited range and low throughput do not concern them in contrary to present copper networks.

Optical network can be based on traditional Ethernet or on a concept of a Passive Optical Network (PON). Ethernet is a point-to-point network, from telecommunication central office to a client signal is transmitted by one or two dedicated fibres. In case of PON, the signal is guided by one optical fibre and is divided by means of passive optical splitter on 32, 64 or 128 clients. The method employed in sharing transmission medium by multiple end-users in a large degree minimizes the required size of passive infrastructure and makes it the cheapest method of building optical access networks simultaneously preserving all the advantages of optical fibre.

The choice of components used for building optical networks depends on the chosen technology, type of buildings in the area as well as allready existing teletechnical infrastructure. The following chapter presents products and methods of building access networks in various types of building developments.

NETWORK INFRASTRUCTURE WITHIN MULTI-DWELLING BUILDINGS DEVELOPMENTS

At the network design stage, local conditions and location have to be taken into consideration and size of distribution point has to be defined

DISTRIBUTION POINT

In passive optical networks, the aim of a distribution point is to branch with the aid of optical splitters, fibres coming to a building from a Telecommunication Central Office and connect them to the vertical cabling system in the building. According to the needs the following products can be applied at the distribution point: PSMO, PSP, PSPE Indoor Distribution Cabinets with 32 to 288 clients capacity, PSH-2 Outdoor Cabinets with 12 to 144 clients capacity as well as PU Street Cabinets and PSS Splice Pillar with 20 to 1728 clients capacity.

VERTICAL CABLING

For vertical cabling, it is advised to use Easy Access Cables. These cables have mechanically durable external coating layer protecting loosely organised optical fibres. Such a construction allows for withdrawing single fibres through windows cut in the cable's coating.

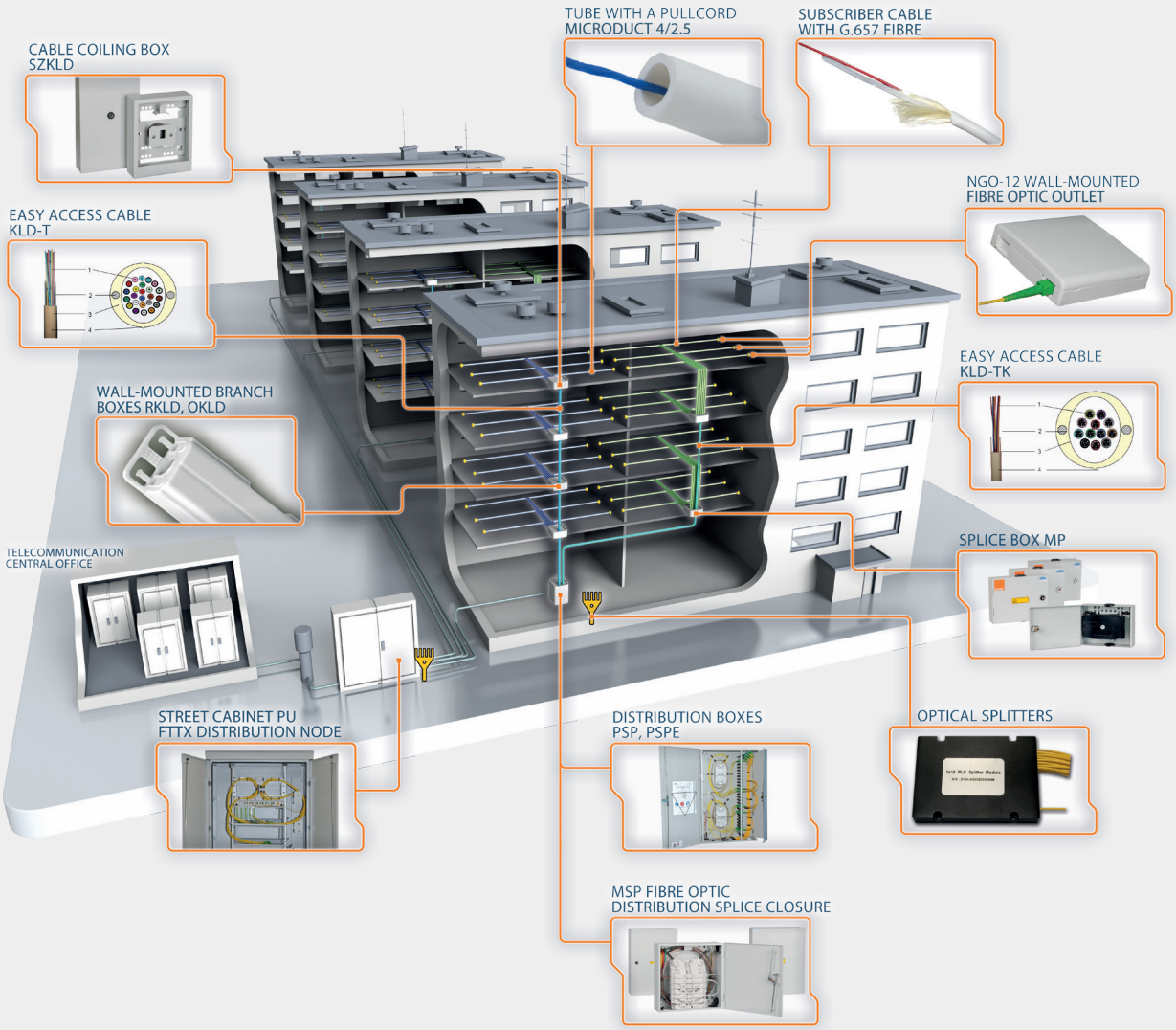
Easy Access Cables are offered in two versions: with 900 µm buffered fibres or with multifibre compact tubes. The window-cuts in the vertical cable are protected with a branch box or wall-mounted splice box. Using cables with 900 µm buffered fibres, to ensure the possibility of connecting clients on the highest level of a building, the coiling boxes with the capacity of 20 m of supplementary fibres are installed on the top floor.

HORIZONTAL CABLING

The method of connecing an end-user to a network is dependent on a version of employed cable. Connecting a subscriber with a single 900 µm buffered fibre is based on pulling a selected fibre out through a window-cut and inserting this fibre into a microtube going from the window in the cable to subscriber's outlet. In the outlet, the SC/APC pigtail is spliced to the selected fibre.

While using a multifibre cable with compact tubes, clients are connected by pigtails of increased mechanical durability. The pigtails are spliced with the fibres from the compact tube drawn out through a window cut in vertical cable, and later are distributed to subscribers' outlets. The window-cuts are covered with wall mounted splice boxes.

NETWORK INFRASTRUCTURE WITHIN MULTI-DWELLING BUILDING DEVELOPMENTS



Passive Optical Network on multi-dwelling building developments

STREET CABINET PU - FTTX DISTRIBUTION NODE

FEATURES:

- outdoor cabinet, optimal for building distribution nodes of high capacities
- adapts 19 inch ODFs as well as MPPO and MS modules with passive optical components
- enables insertion of microducts and cable-duct tubes
- cabinet useful heights 20U, 30U, 33U, 66U
- patchcord cable storage space
- cable glands or foam cable entry stripes

EQUIPMENT:

- cable entries
- cable organizers
- cable fixing and fibre distribution plate
- concrete plinth

ADDITIONAL ACCESSORIES:

- fan
- DIN rail (width: 35mm)
- roof with hood
- microduct holders
- manifolds R-01A, R-01C and R-01F

Street Cabinet PU-10 with FTTX equipment

TECHNICAL SPECIFICATIONS:

	PU-4	PU-5	PU-7	PU-10	PU-20
dimensions: width/height/depth [mm]	750/1000/400	858/1170/465	858/1615/465	858/1752/465	1716/1752/465
usefull 19" frame installation height	17U	20U	30U	33U	2 x 33U
equipment for PON purposes - with splitter outputs cross-connect capability					
splitter modules 1x32 in PS-19/144/3U	9	14	24		54
19'' Fibre Optic Patch Panels PS-19/144 for terminating client's cables	2	3	6		12
19" Fibre Optic Patch Panels for termination of the cables routed from the OLT to PU cabinets equipped with PS-19/1U, PS-19/2U	1				
cable bracket plate TU-19	2		2	4	6
19" Excess Cable Tray SZ-19L	2	3	6		12
maximum number of PON clients with recommended equipment	288	432	768		1728
equipment for PON purposes - cross-connects with patchcords					
19'' frames PPO-19/3U for mounting optical splitters in MPPO-3 modules	2		4		8
splitter modules 1x32 in MPPO-3	8		14	16	32
19'' Fibre Optic Patch Panels PS-19/144 for terminating client's cables	2		3	4	8
19" Fibre Optic Patch Panels for termination of the cables routed from the OLT to PU cabinets equipped with PS-19/1U	1				
cable bracket plate TU-19	2		4		8
19" Excess Cable Tray SZ-19L	2		3	4	8
maximum number of PON clients with recommended equipment	256		432	512	1024

ORDERING:

PU-10 - Street Cabinet with 33U intallation useful height

FTTx PON

PSP FIBRE OPTIC DISTRIBUTION BOX

FEATURES:

- for use in FTTH networks in multi-dwelling buildings
- wall-mounted on the lowest level of a building
- terminates cables coming to the building from Telecommunication Central Office, vertical cables and enables installation of optical splitters
- possibility of mounting optical splitters
- connecting clients by cross-connecting optical splitter outputs

EQUIPMENT:

- case with a lock
- KSQ and KS-24 splice trays (set according to the table, applies to KS-24 tray)
- cable ties, description table
- wall installation kit
- installation and handling instruction

TECHNICAL SPECIFICATIONS:

	PSP-36	PSP-72	PSP-144
number of splices on client cable side	36	72	144
number of patching fields on client cable side	36	72	144
number of splices in a splice tray	3 x KSQ	3 x KS-24	6 x KS-24
number of splices on feeder cable side	12		24
number of patching fields on feeder cable side	4	12	24
number of splice trays on feeder cable side	1 x KSQ	1 x KS-24	
number of optical splitters	2	4	7
splitter pigtail length [m]	1		
connector standard	SC		
recommended customer distribution pigtail length [m]	2,5		
number of cable/duct entries	6	12	
maximum number of entering cables	18	36	
maximum diameter of cable/duct entries [mm]	ø37		
dimensions: width/height/depth [mm]	405/305/100	505/370/135	560/555/180
weight [kg]	6	8	10
colour	RAL 7035		
housing material	powder coated steel sheet		
mechanical IK protection	IK10		
environmental IP protection	IP50		

ORDERING:

PSP-36 - Wall-Mounted Distribution Box, for use in FTTH networks, pigtails, adapters and splitters to be ordered separately

FTTx PON

Fibre Optic Distribution Box PSP-36

PSPE FIBRE OPTIC DISTRIBUTION BOX

Distribution Box PSPE-72

Distribution Box PSPE-144

Distribution Box PSPE-576

FEATURES:

- for use in FTTH networks in multi-dwelling buildings
- wall-mounted on the lowest level of a building
- terminates cables coming to the building from Telecommunication Central Office, vertical cables and enables installation of optical splitters
- separated area for terminations of feeder cables incoming to the distribution box from telecommunication central office as well as vertical cables in the building
- separate access to a part of distribution box containing splices and patching fields
- connecting clients by cross-connecting optical splitter outputs
- possibility of mounting Easy Access Cable Coiling Box SZKL on the backside of PSPE-144 or above/under PSPE-72, PSPE-144, PSPE-288

EQUIPMENT:

- case with a lock
- splice trays KS-24
- cable ties, description table
- wall installation kit
- installation and handling instruction

TECHNICAL SPECIFICATIONS:

	PSPE-72	PSPE-144	PSPE-288	PSPE-576
splice/connector capacity of client cable side	72	144	288	576
number of splice trays on client cable side	3	6	12	24
splice/connector capacity on feeder cable side	12/6	12/6	12	24/12
number of splice trays on feeder cable side	1			
number of optical splitters	2	4	7	9
maximum splitter dimensions: width/height/depth [mm]	114/140/18			
splitter pigtail length [m]	1			
connector standard	E-2000, SC			
recommended customer distribution pigtail length [m]	2,5			3
number of cable/duct entries	2 round culverts on the left wall of the patchpanel	3 round culverts on the left wall of the patchpanel	8 round culverts: 2 on the top, 2 on the bottom and 4 on the left wall of the patchpanel	12 round culverts: 4 on the top, 4 on the bottom and 4 on the left wall of the patchpanel
maximum number of entering cables	8	16		36
maximum diameter of entering cables [mm]	18			
dimensions: width/height/depth [mm]	550/380/180	550/550/180	550/900/180	738/1005/284
weight [kg]	8	9	11	30
colour	RAL 7035			
housing material	powder coated steel sheet			
mechanical IK protection	IK10			
environmental IP protection	IP40			

ORDERING:

PSPE-72 - Wall-Mounted Distribution Box, for use in FTTH networks, pigtails, adapters and splitters to be ordered separately

FTTx PON

DISTRIBUTION SPLICE CLOSURE MSP

FEATURES:

- for use in FTTH networks in multi-dwelling buildings
- wall-mounted, inside the lowest level of the building
- terminates central office and riser cables, provides space for optical splitters
- connecting clients by splicing fibres from vertical cables with splitter

EQUIPMENT:

- case with a lock
- splice trays
- cable culverts
- cable ties
- installation and handling instruction
- wall-mounted installation kit

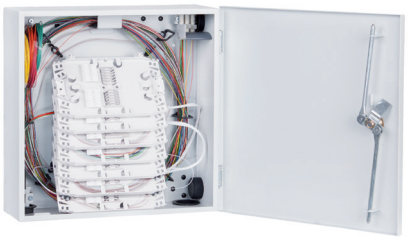
TECHNICAL SPECIFICATIONS:

	MSP-32	MSP -72	MSP -144
dimensions: height/width/depth [mm]	305/251/105	375/381/125	555/401/125
number of splice trays	3	7	13
number of optical splitters	max.3	max. 5	
number of connections on customer side	32	72	144
number of connections on feeder cable side	12		
number of entering cables	8	9	13
maximum diameter of entering cable [mm]	ø37		
housing material/equipment	steel/ABS		
mechanical IK protection	IK10		
environmental IP protection	IP44	IP54	

ORDERING:

MSP-32 - distribution splice clouse FTTH, designed for 32 clients

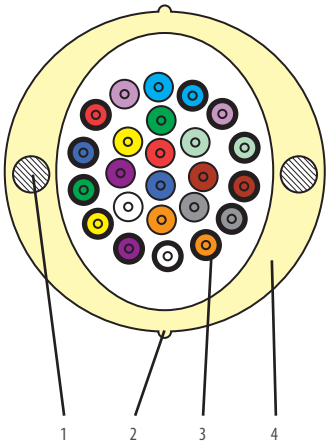
FTTx PON



Distribution splice closure MSP-72

KLD-T EASY ACCESS FIBRE

KLD-T cable construction



1. Fibre Reinforced Plastic (FRP) strength members
2. opening side location maker for proper window cutting
3. 900 µm easy strip buffer
4. halogen free coating (LSOH)

FEATURES:

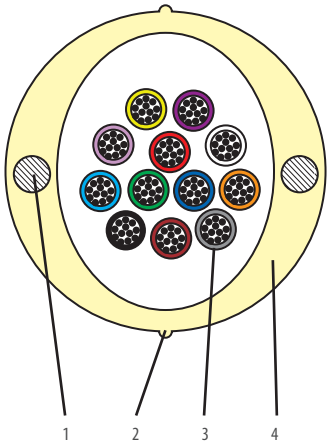
- capacity up to 48, G.657 A2, 900 µm buffered fibres
- applied in vertical installations in multi-dwelling buildings
- easy access to fibres through a window-cut
- possibility to draw up to 20 m of fibre out of a cable through a window-cut
- branching achieved by leading a drawn fibre to client's apartment
- non-flammable external coating, halogen free LSOH, in accordance with international fire safety requirements
- possibility of cable termination with optical connectors

TECHNICAL SPECIFICATIONS:

fibre count		1-8J	1-12J	24J	36-48J
temperature range [°C]:	transport and storage	-40 do +70			
	installation	-5 do +50			
	operation	-15 do +60			
maximum pulling force [N]		300	500		600
crush resistance [N/cm]		100	200		
minimum bending radius [mm]		65	90	100	130
standard packaging		cylinders of 2 or 4 km			
storage		indoor			
flame retardancy		IEC60332-1 i IEC60332-3C			
nominal diameter [mm]		6,6	8,5	10,5	13,5
nominal weight [kg/km]		32 do 38	55 do 64	87 do 97	122 do 143
marking of outer sheath		manufacturing year and week - ACOME - fibre count and type - product code + metre marks			

KLD-TK EASY ACCESS FIBREK

KLD-TK cable construction



1. Fibre Reinforced Plastic (FRP) strength members
2. opening side location maker for proper window cutting
3. compact tube with 2, 4, 6, 8 or 12 singlemode fibres
4. halogen free coating (LSOH)

FEATURES:

- up to 288 fibres organised in compact tubes
- 2, 4, 6, 8 or 12 fibres per tube
- applied in vertical installations in multi-dwelling buildings
- easy access to fibres through a window-cut
- possibility to draw out up to 6 m of compact tube through a window-cut
- branching achieved by splicing in a shaft splice box
- halogen free coating LSOH, in accordance with international fire safety requirements

TECHNICAL SPECIFICATIONS:

fibre count		2-48J	2-72J	26-144J	50-288J
configuration of cable tubes		max. 13 tubes each of 2 SMF or 4 tubes of 12 SMF each	max. 18 tubes each of 2 SMF or 6 tubes of 12 SMF each	max. 34 tubes each of 2 SMF or 12 tubes of 12 SMF each	max. 64 tubes each of 2 SMF or 24 tubes of 12 SMF each
temperature range [°C]:	transport and storage	-40 do +70			
	installation	-5 do +50			
	operation	-15 do +60			
maximum usage length		100 m			
maximum pulling force [N]		300	500		600
crush resistance [N/cm]		100	200		
minimum bending radius [mm]		60	90	100	130
standard packaging		cylinders of 2 or 4 km			
storage		indoor			
flame retardancy		IEC60332-1 i IEC60332-3C			
nominal diameter [mm]		6,6	8,5	10,5	13,5
nominal weight [kg/km]		32 do 38	55 do 64	81 do 95	112 do 140
marking of outer sheath		manufacturing year and week - ACOME - fibre count and type - product code + metre marks			

COLOURS OF FIBERS AND TUBES IN EASY ACCESS CABLE

FIBRE/TUBE COLOUR SEQUENCE IN EASY ACCESS CABLES

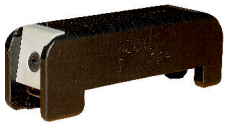
number of fiber/ tube	colour
1	red
2	blue
3	white
4	green
5	purple
6	orange
7	grey
8	yellow
9	brown
10	pink
11	black
12	aqua

COLOURING OF THE CABLES WITH MORE THAN 12 FIBRESTUB:

Fibre/tube number	Fibre/tube colour	Fibre/tube number	Fibre/tube colour	Fibre/tube number	Fibre/tube colour	Fibre/tube number	Fibre/tube colour	Fibre/tube colour
1	red + 1 black stripe	13	red + 2 black stripes	25	red + 3 black stripes	37	red + 4 black stripes	
2	blue + 1 black stripe	14	blue + 2 black stripes	26	blue + 3 black stripes	38	blue + 4 black stripes	
3	white + 1 black stripe	15	white + 2 black stripes	27	white + 3 black stripes	39	white + 4 black stripes	
4	green + 1 black stripe	16	green + 2 black stripes	28	green + 3 black stripes	40	green + 4 black stripes	
5	purple + 1 black stripe	17	purple + 2 black stripes	29	purple + 3 black stripes	41	purple + 4 black stripes	
6	orange + 1 black stripe	18	orange + 2 black stripes	30	orange + 3 black stripes	42	orange + 4 black stripes	
7	grey + 1 black stripe	19	grey + 2 black stripes	31	grey + 3 black stripes	43	grey + 4 black stripes	
8	yellow + 1 black stripe	20	yellow + 2 black stripes	32	yellow + 3 black stripes	44	yellow + 4 black stripes	
9	brown + 1 black stripe	21	brown + 2 black stripes	33	brown + 3 black stripes	45	brown + 4 black stripes	
10	pink + 1 black stripe	22	pink + 2 black stripes	34	pink + 3 black stripes	46	pink + 4 black stripes	
11	light green + 1 black stripe	23	light green + 2 black stripes	35	light green + 3 black stripes	47	light green + 4 black stripes	
12	aqua + 1 black stripe	24	aqua + 2 black stripes	36	aqua + 3 black stripes	48	aqua + 4 black stripes	

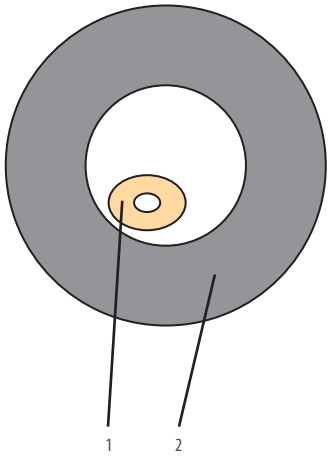
ACCESSORIES FOR EASY ACCESS CABLES

NKLDO Knife



NKLDA Knife

Tube with a pullcord



1. *pullcord*
2. *external coating*

NKLDO KNIFE

FEATURES:

- enables precise window cutting in an easy access cable
- cutting depth adjustment
- intended for cutting windows in cable's coating inside branch boxes of small sizes

ADDITIONAL ACCESSORIES:

- spare blades available upon request

ORDERING:

NKLDO - Knife For Easy Acces Cable

NKLDA KNIFE

FEATURES:

- enables precise window cutting in an easy access cable
- cutting depth adjustment
- intended for cutting windows in cable's coating inside branch boxes of small sizes

ORDERING:

NKLDA - Knife For Easy Acces Cable

TUBE WITH A PULLCORD EMT-MICRODUCT 4/2,5, 5/3,5

FEATURES:

- shielding of fibre laid from a window-cut in a cable to subscriber's outlet
- diameter 4/2.5 mm or 5/3.5 mm
- non-flammable material, does not emit halogen compounds

ORDERING:

EMT-MICRODUCT 4/2.5 - primary microtube LFH, white, diameter 4 mm with a pullcord (pack size 4 km)

FTTx PON

BRANCH BOXES

FEATURES:

- intended for branching from vertical cable in multi-dwelling buildings
- mounted on previously installed vertical cable
- available in versions for performing splices or as protective cover of branching
- possibility of mounting in places of limited space - small dimensions

EQUIPMENT:

- cable ties and brackets
- installation and handling instruction
- installation kit

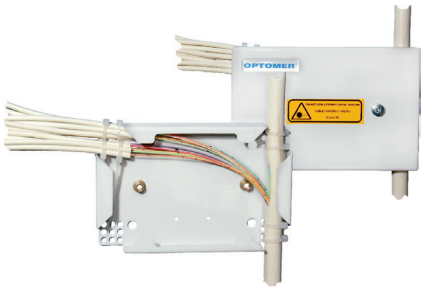
TECHNICAL SPECIFICATIONS:

	OKLD	OKLDS	RKLD-2	RKLD-6	RKLD-12
number of splices	-	12	-	-	12
number of splice trays			-		1
number of input/output vertical cables	1/1				
maximum number of client's cables or microtubes	12xΦ5 mm	12xΦ5 mm	2xφ5 mm	6xΦ5 mm	12xΦ5 mm
maximum diameter of cable/duct entering a splice/branch box [mm]	13,5				
dimensions: width/height/depth [mm]	147/97/27	147/97/27	116/25/22	36,5/140/27	64/215/40
weight [kg]	0,2	0,2	0,016	0,033	0,066
colour	RAL 7035		RAL 9010		
housing material	powder coated steel sheet		ABS		
mechanical IK protection	IK10	IK08			
environmental IP protection	IP20	IP30	IP40	IP41	

ORDERING:

Be-Box 12 - Easy Access Cable Branch Splice Box, capacity up to 12 splices, material - plastic

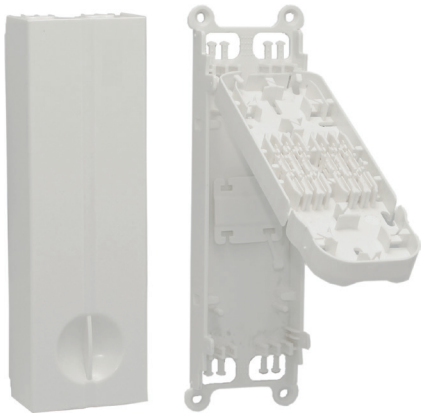
FTTx PON



Branch Box OKLD

Branch Box OKLDS

Branch Box By-Box 6



Branch Box Be-Box 12

SZKLD EASY ACCESS CABLE COILING BOXES

Easy Access Cable Coiling Boxes SZKLD-1, SZKLD-2

FEATURES:

- designed for storing spare lengths of easy access cable to be used for connection of customers on top floors of multi-dwelling buildings
- recommended for use with HPC1628 cable
- wall-mounted, detachable lockable cover
- possibility of installation within existing vertical ducting infrastructure in a building

EQUIPMENT:

- cable ties and brackets
- installation and handling instruction
- installation kit

TECHNICAL SPECIFICATIONS:

	SZKLD-1	SZKLD-2
maximum spare length of 900 µm buffered fibre [m]	400	1000
number of cable/duct entries in the bottom wall	2	
diameter of cable/duct entries in the botoom wall of the box [mm]	2 x 28	
number of cable/duct entries in the side wall	2 on each of the sides	
diameter of cable/duct entries in the side walls of the box [mm]	2x (ø17 + 25 x 15)	
dimensions: width/height/depth [mm]	220/280/125	220/400/125
weight [kg]	2	2,5
colour	RAL 7035	
housing material	powder coated steel sheet	
mechanical IK protection	IK10	
environmental IP protection	IP41	

FIBRE OPTIC DISTRIBUTION BOX - PSZ-24

PSZ-24 Fibre Optic Distribution Box

FEATURES:

- dediacated for FTTH networks
- serves as a fibre distribution box in multi dwelling buildings
- connectivity node to connect subscriber pigtail fibres with vertical cable fibres
- accepts 32 mm vertical ducts
- capacity: 24 splices, 24 cross connects
- key locked

EQUIPMENT:

- 24 fibre splice tray
- adapter plate
- cable ties large
- cable ties small
- 0.9 mm buffered fibre protective band
- DP36 cable gland
- wall installation kit

TECHNICAL SPECIFICATIONS:

	PSZ-24
number of splices	24/24
number of splice trays	1
total spare length of 0.9 mm buffered fibre or compact tube [m]	3
number of entries for vertical 32 mm ducts	4
number of entries for horizontal cabling (65 mm x 25 mm oval entries to be punched out)	2
maximum vertical cable diameter entering the distribution box in protective conduit or duct [mm]	23
dimensions: width/height/depth [mm]	180/307/70
weight [kg]	2
colour	RAL 7035
housing material	powder coated steel sheet
mechanical IK protection	IK08
environmental IP protection	IP40

MP SHAFT SPLICE BOX

FEATURES:

- intended for branching fibres from vertical cable in multi-dwelling buildings
- equipped with cable entries enabling for mounting the splice box on previously installed vertical cable
- possibility of installation within 26 mm diameter ducting system
- enables up to 12 optical fibre splices
- two cable entries for customer cables on each side of the box
- lockable

EQUIPMENT:

- splice tray for 12 splices
- cable entries
- cable ties and brackets
- installation and handling instruction
- installation kit

TECHNICAL SPECIFICATIONS:

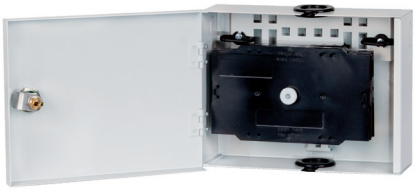
	MP-16/12	MP-16D	MP-24	MP-36
number of splices	12	12	24	36
number of splice trays KSQ	1	1	2	3
total spare length of 0.9 mm buffered fibre or compact tube [m]	3	20	36	54
number of vertical cable/ducts entries for ø26 mm tubes	6	1 on top and bottom wall each		
number of horizontal cable/ducts entries for ø16 mm tubes	4	2 on each of side walls		
maximum diameter of vertical cable entering splice box [mm]	12	18		
dimensions: width/height/depth [mm]	200/150/50	200/150/50	200/150/58	200/150/70
weight [kg]	1			
colour	RAL 7035			
housing material	powder coated steel sheet			
mechanical IK protection	IK10			
environmental IP protection	IP41			

ORDERING:

MP-16D - FTTH Wall-Mounted Splice Box of 12 optical fibre splices capacity

FTTx PON

Shaft Splice Box MP-16D



MP SHAFT SPLICE BOX-24

NETWORK INFRASTRUCTURE WITHIN HOUSING DEVELOPMENTS WITH DETACHED HOUSES

The method of building a network on a detached housing development depends, inter alia, on, local environment and the available infrastructure. In order to minimise the costs, previously built technical infrastructure is employed, being: dark fibres, cable ducts, existing aerial network supports. Depending on the infrastructure used to build distribution network, distribution point and subscriber's terminal, different solutions are employed.

DISTRIBUTION NETWORK

Building underground distribution network in existing cable ducts or in the area not equipped with ducts, the microduct system can be applied. This allows quick and easy installation of fibre units and minicables. Microducts enable easy and convenient network expansion in the future as well as, in comparison with a traditional network, in a large degree limits the number of spliced connections, lowers the amount of necessary cable spare lengths and number of telecom manholes. The advantage of aerial network infrastructure is low network deployment costs since no digging in ground is involved. However, the disadvantage is the direct influence of environmental conditions on the whole network infrastructure which results in higher failure rate. Deploying aerial networks is advised in rural and rocky or marshy areas.

DISTRIBUTION POINT

Optimal choice of capacity and location of a distribution point in a high degree influences financial requirements linked with the access infrastructure. In this case, building a network based on cascaded splitters is optimal. In such a configuration, on the housing development outskirts there is a distribution cabinet with the first splitter (e.g. 1x8) of the splitter cascade. This way, preliminary OLT port division is obtained. In the vicinity of clients group, another distribution box is installed, being the next stage of the cascade. Applying this scheme enables minimizing individual subscribers' cable lengths. In case of underground networks, it is advantageous to employ single distribution box/pillar of small capacity e.g. PSS-2, PSS-3; and with aerial networks splice box with a patching field.

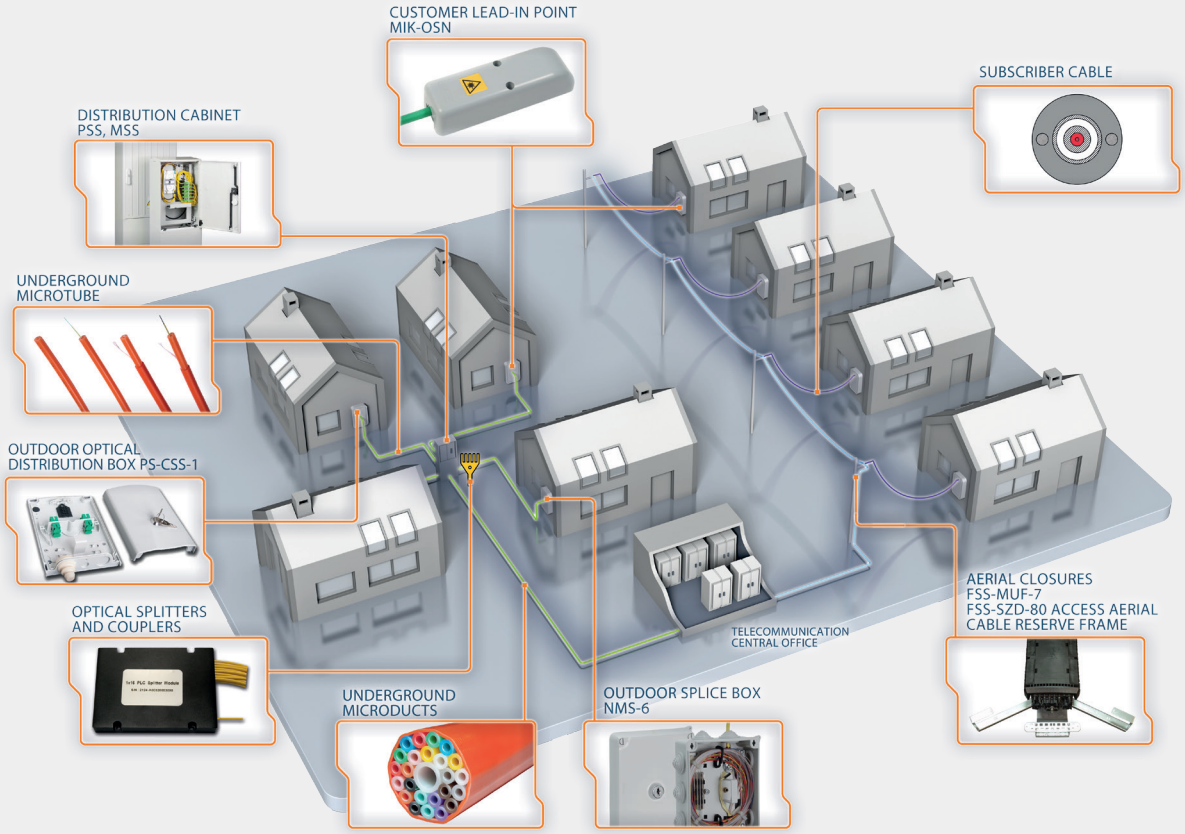
The aim of distribution/splice box is to ensure proper organization and protection of terminations of fibres coming to a housing development from telecommunication central office, division with an optical splitter and connection with fibres deployed to optical outlet in clients' apartments.

SUBSCRIBER TERMINAL

In an underground network, subscriber's terminal can be realized with a thick-walled microtube, conducted from a distribution pillar to client's house. The price of such a terminal is close to the price of a terminal made with an underground cable, moreover a swift fibre units replacement deployed from the distribution pillar to client is possible.

In an aerial and underground networks, it is advised to minimise the number of spliced and detachable connections, by installing prefabricated, specially dimensioned subscriber pigtails. These pigtails are blown or pulled into microtube, from optical outlet mounted in client's home to distribution pillar where fibres are spliced with fibres from distribution network.

NETWORK INFRASTRUCTURE WITHIN HOUSING DEVELOPMENTS WITH DETACHED HOUSES



Passive Optical Network on a development of single family houses

PSS-1, PSS-2 FIBRE OPTIC DISTRIBUTION/SPLICE PILLAR

Distribution/Splice Pillar PSS-1

Distribution/Splice Pillar PSS-2

FEATURES:

- for use in FTTH networks on single family houses developments
- enables termination of cables coming to the pillar from Telecommunication Central Office side, termination of cables coming to single family houses and installation of optical splitters
- provides space for accumulating supply of operating fibres terminated in the pillar, which enables for convenient cabling the product in a service car
- a possibility of mounting nest for LSA connectors - additional feature for PSS-2

EQUIPMENT:

- adapter plate
- KS-24, KSQ (PSS-1) splice trays
- cable ties and brackets
- installation and handling instruction
- installation kit

OPTIONAL EQUIPMENT:

- concrete plinth
- nest for LSA Plus connectors (PSS-2)

TECHNICAL SPECIFICATIONS:

	PSS-1	PSS-2
number of splices on client cable side	12 - one space for splicing of client and feeder fibres	24
number of splices on feeder cable side		12
number of splice trays	1 for client side + 1 for feeder side	
number of patching fields	12	24
number of splitters	0	2
maximum splitter dimensions: width/height/depth [mm]	-	80/100/10
connector standard	SC or E-2000	
recommended customer distribution pigtail length [m]	1,5	
maximum number of cables entering the pillar	3	26
maximum diameter of cable/duct entries [mm]	14	16
dimensions: diameter/height [mm]	ø160/1300	ø200/1500
height after burrying [m]	0,8	0,8
weight [kg]	5	7
colour	RAL 9017	
housing material	HDPE	
mechanical IK protection	IK10	
environmental IP protection	IP44	

ORDERING:

PSS-2 - Outdoor Distribution/Splice Pillar intended for connecting 22 PON clients

FTTx PON

PSS-3, PSS-4 FIBRE OPTIC DISTRIBUTION/SPLICE PILLAR

FEATURES:

- for use in FTTH networks on single family house developments
- terminates cables coming to the building from Telecommunication Central Office, vertical cables and enables
- installation of optical splitters
- provides space for accumulating supply of operating fibres terminated in the pillar, which enables for convinient cabling the product in a service car
- a possibility of mounting nest for LSA connectors - additional feature

EQUIPMENT:

- adapter plate
- KS-24 splice trays
- cable ties and brackets
- installation and handling instruction
- installation kit

OPTIONAL EQUIPMENT:

- nest for LSA Plus connectors
- nest with suport for LSA Plus connectors (PSS-4/288)

TECHNICAL SPECIFICATIONS:

	PSS-3/36	PSS-3/72	PSS-4/144	PSS-4/288*
number of splices	48	72	144	288
number of splice trays	2	3	6	12
number of patching fields	36	72	144+12**	288+24**
number of optical splitters	4	8	16	24
maximum splitter dimensions: width/height/depth [mm]	80/100/10	114/140/18	114/140/18	114/140/18
splitter pigtail length [m]	1			
connector standard	SC or E-2000			
recommended customer distribution pigtail length [m]	2			
dimensions: width/height/depth [mm] cabinet/pillar	400/1500/245	530/1750/320	500/600/230 465/1000/200	600/800/300 500/1000/300
height after burrying [m]	0,9	1,1		1,3
weight [kg]	20	30	18	25
colour	RAL 7035			
housing material	glass fibre reinforced polyester			
mechanical IK protection	IK10			
environmental IP protection	IP54		IP66	

* for SC Duplex conenctors
** separate plate with splitter's adapters

ORDERING:

PSS-4/288 - Distribution/Splice Pillar, intended for connecting up to 288 PON clients

FTTx PON

Distribution/Splice Pillars PSS-3/36, PSS-3/72

Distribution/Splice Pillars PSS-4/288

MSS-2, MSS-3 PILLAR SPLICING POINT

MSS-2 pillar splicing point

FEATURES

- fibre optic distribution point
- feeder and customer drop cable terminal point
- adapts fibre optic splitters
- feedr cable loop through capability
- 4 m cable reserve to enable all cabling operations to be done in a service car

EQUIPMENT:

- locable housing
- splice trays
- cable ties
- corrugated tube
- foam cable entry (MSS-3)

TECHNICAL SPECIFICATIONS:

	MSS-2	MSS-3/48	MSS-3/72
number of optical splices	24	48	72
number of splices on feeder cable side	12	24	
dimensions with plinth width/height/depth [mm]	ø200/1500	265/1500/250	400/1700/250
plinth dimensions width/height/depth [mm]	-	265/870/250	400/870/250
spare fiber lenght [m]	4		6
number of entering cables	1	2	2
number of entering cables/microducts	24	48	72
housing material	HDPE	glass fibre reinforced polyester	
mechanical IK protection	IK10		
environmental IP protection	IP44	IP54	

ORDERING:

MSS-3/48 – pillar splicing point, designed for up to 48 PON subscribers

FTTx PON

MSS-3/32, MSS-3/48 pole splicing point

PS-CCS-1 SPLICE CLOSURE/CROSS-CONNECT SPLICE BOX

FEATURES:

- distribution/splice box, advised for using in FTTH networks
- enables transition from an outdoor cable to an indoor one
- designed to be installed on the facades of single-family houses
- available in version with or without a patching field
- latch locked lid

EQUIPMENT:

- 12 fibre capacity
- adapter plate for 4 adapters
- cable ties and brackets
- installation and handling instruction
- installation kit

TECHNICAL SPECIFICATIONS:

	PS-CCS-1
maximum number of splices	12
number of patching fields	typically 4, maximum 6
recommended pigtail length [m] 0.9 mm	2,5
number of bottom cable/duct entries	2 pcs for cables of up to 16 mm diameter
number of rear cable/duct entries	2 pcs for cables of up to 5 mm diameter
dimensions: width/height/depth [mm]	130/190/45
weight [kg]	0,5
colour	RAL 7035
housing material	polycarbonate
mechanical IK protection	IK08
environmental IP protection	IP54

Outdoor Splice Closure/Cross-Connect Splice Box

NMS-6 OUTDOOR SPLICE CLOSURE/OPTICAL CROSS - CONNECT SPLICE BOX

Outdoor Splice Closure/Optical Cross-Connect Splice Box NMS-6 BOX

FEATURES:

- distribution/splice box, advised for using in FTTH networks
- enables transition from an outdoor cable to an indoor one
- designed to be mounted on the facades of single-family houses
- capacity for up to 6 fibre splices
- cable entries in the back wall (option)

EQUIPMENT:

- case with a lock
- cable ties and brackets
- installation and handling instruction
- installation kit

	NMS-6
maximum number of splices	6
number of cable entries	10 pcs for cables of up to 11 mm diameter
number of rear cable/duct entries	2 pcs for cables of up to 5 mm diameter
dimensions: width/height/depth [mm]	120/170/70
colour	RAL 7035
weight [kg]	0,3
housing material	polycarbonate
mechanical IK protection	IK08
environmental IP protection	IP54

DIRECT BURY SUBSCRIBER CABLE

FEATURES:

- designed for connecting FTTH client with the closest central point
- designed for direct burying or aerial network installation
- available with G.652D or G.657A1 fibres
- high mechanical durability
- black HDPE outer sheath
- RFP strength members

TECHNICAL SPECIFICATIONS:

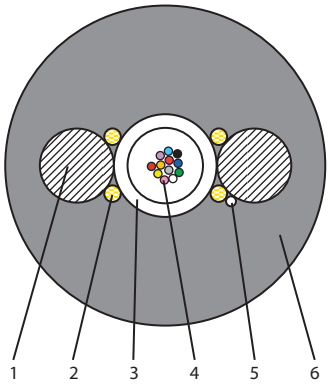
number of optical fibres		2-12J
temperature range [°C]:	transport and storage	-20 do +60
	installation	-10 do +40
	operation	-20 do +70
outer diameter of the central tube [mm]		2,3
minimum bending radius [mm]		with tension: 20 x cable diameter no tension: 15 x cable diameter
minimal thickness of outer coating [mm]		0,6
outer diameter of the cable [mm]		5,8
weight [kg/km]		30
tensile strength, static, according to IEC 60794-1-E1		300N, 5 min
wytrzymałość na rozciąganie, dynamiczna, zgodnie z IEC 60794-1-E1		900N, 5 min
crush resistance, acording to IEC 60794-1-2-E3		3000N/100mm, max. 5min
crush resistance, acording to IEC 60794-1-2-E4		10J, 3 hits, R=300mm

ORDERING:

KSD-2J-G 652 - direct bury subscriber cable 2J, G.652D fibres

FTTx PON

Cable design



1. *RFP strength member*
2. *kevlar yarn*
3. *central tube*
4. *250 µm primary coated fibres*
5. *ripcord*
6. *outer sheath*

CABLING WITHIN CUSTOMER APARTMENT

An optical fibre is an element, which until recently, has not been present in subscriber's apartment. Lack of users' proper knowledge concerning the operation and usage of optical fibres, makes this part of a network the most prone for damages and simultaneously enforces requirements for equipment.

The choice of deploying cabling in subscriber's house or apartment, in a significant way is reflected in parameters and reliability of a network. Many opertators and producers of optical equipment recommend to connect clients with the aid of connectors and mechanical splices. Apart from precise optical fibre cutter, no special tools are required to mount such elements, which should simplify procedure of cabling and decrease its costs. The drawbacks of such a solution are higher insertion loss, worse return loss and decreasing with time network parameters. Because of that, it is advised to deploy cables in subscriber's apartment with the aid of factory made pigtails and patchcords, connected with the distribution infrastructure by traditional splices.

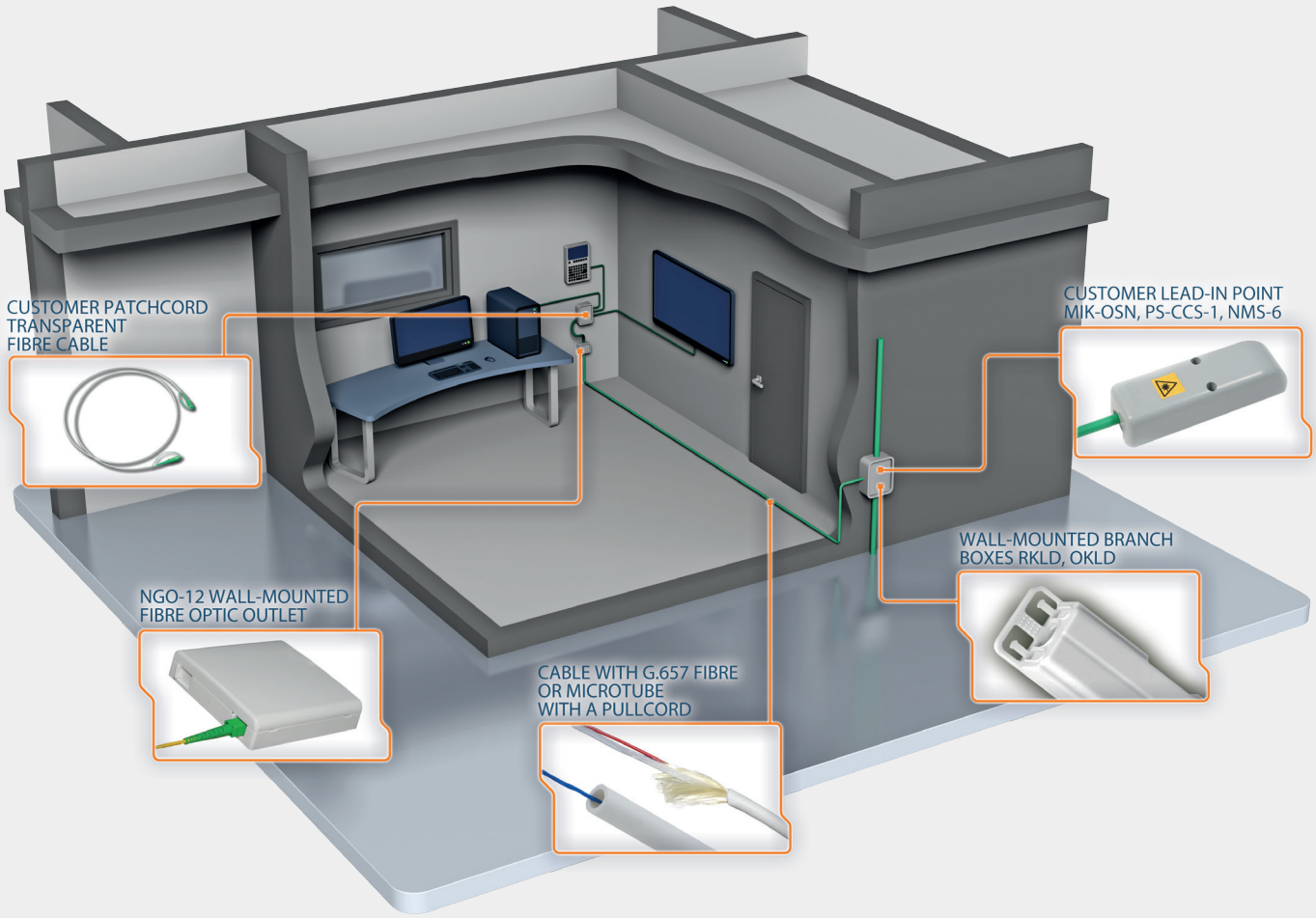
Inside buildings, it is advised to employ cables with G.657 bend insensitive fibre, non-flammable, Low Smoke Zero Halogen. In contrast to the standard optical fibres, G.657 fibres enable convenient deployment of optical cable and low bending radii in apartment corners, edges etc. without significant signal loss.

The critical point of an optical network is a fibre optic outlet in subscriber's apartment. In order to protect the user against harmful laser radiation and secure detachable connections from possible contamination, which may lead to significant increase of transmission loss, it is advised to employ wall-mounted fibre optic outlet NGO-12. They are equipped with an integrated adapter shutter, automatically closing when a connector is removed from the outlet.

Fibre outlet NGO-12 features aesthetical appearance, small dimensions and is intended for mounting directly on a wall or on a recessed box of 60 mm diameter.

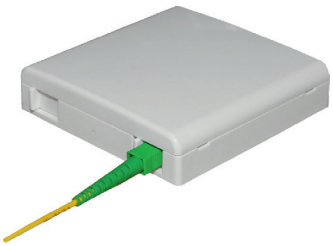
Minimization of workload and time necessary for performing installation in client's apartment while keeping the best parameters can be achieved by using OPTOMER connection kit. Such a kit consists of factory preinstalled SC/APC pigtail in NGO-12 outlet. Connecting a client is based on mounting the optical outlet on apartment's wall, uncoiling and deploying the cable coming out of it and performing spliced connection with distribution network.

CABLING WITHIN CUSTOMER APARTMENT



Passive Optical Network at client's apartment

NGO-12 WALL-MOUNTED FIBRE OPTIC OUTLET



Wall-Mounted Fibre Optic Outlet NGO-12

Wall-Mounted Fibre Optic Outlet NGO-12

FEATURES:

- network termination in customer's apartment
- installed directly on the wall or on flush-mounting box ø60 mm
- maximum capacity: 2 SC connectors or 4 LC connectors, 2 splice protectors
- access to adapters protected by automatically closing shutters

EQUIPMENT:

- installation and handling instruction
- installation kit
- optionally with an adapter and pigtail

TECHNICAL SPECIFICATIONS:

	NGO-12
maximum number of splices	4
number of patching fields	2 x E-2000/SC/LC Duplex
total pigtail spare length (0.9 mm buffered fibre) [m]	4
total cable spare length (2mm) [mm]	1
dimensions: width/height/depth [mm]	86/86/25
weight [kg]	0,08
housing material	ABS V0
colour	RAL 9016
mechanical IK protection	IK08
environmental IP protection	IP54

ORDERING:

NGO-12-1SCA- Wall-Mounted Fibre Optic Outlet, equipped with 1 pigtail and SC/APC adapter

FTTx PON

READY FOR INSTALLATION FTTH KIT

NEW

Ready for Installation Fully Populated FTTH Fibre Optic Wall Outlet Kit

Packed in a disposable cardboard box the kit contains the Fibre Optic Wall Outlet NGO-12 populated with a drop--cable terminated with two connectors SC/APC SM or SC/PC SM. The drop-cable is stored on the reel located in the box. The cable slots on two box sides allow to pull the cable out of the box during the installation. Pigtails are manufactured in accordance with ZN-13/TP S.A. -044.

NGO-12 WALL-MOUNTED FIBRE OPTIC OUTLET:

- for install Network termination in customer's apartment
- wall or on flush mounted
- 2 SC or 4 LC connectors, 2 splice protectors
- adapter shutters
- 4 heatshrink splice protectors and 2 mechanical splices
- dimensions (Width/Height/Depth): (86/86/25) mm
- weight: 0.08 kg
- housing material: ABS V0
- colour: RAL 9016
- mechanical Protection: IK08
- environmental Protection: IP54

DIMENSIONS:

- cardboard box: 310 mm x 310 mm x 54 mm
- reel: diameter 295 mm, height 46 mm

REEL CAPACITY:

- up to 200m of 2mm cable
- up to 70m of 4mm cable

NGO-12F WALL–MOUNTED FIBRE OPTIC/COAXIAL CABLE OUTLET

FEATURES:

- fibre Optic Cable/Antenna Cable Outlet
- the outlet enables simultaneous connection of coaxial cable terminated with "F" type connector and fibre optic connector terminated with SC/APC connector
- can be flush-mounted on 60 mm deep in-wall mounting box

EQUIPMENT:

- installation and handling instruction
- installation kit
- SC/APC adapter and „F" type connector

FTTx PON

NGO-12F Wall–Mounted Fibre Optic/ Coaxial Cable Outlet

NGO-24 WALL-MOUNTED FIBRE OPTIC OUTLET

FEATURES:

- network termination in customer's apartment
- can be used as a splice point between two cables
- cable can enter the box from rear, bottom, top, right or left hand side
- installed directly on the wall or 35 mm DIN rail mounted
- maximum capacity: 4 SC connectors and 4 splice protectors
- removable cover for easy access

EQUIPMENT:

- installation and handling instruction
- installation kit
- 4 adapters
- optionally with pigtail

TECHNICAL SPECIFICATIONS:

	NGO-24
maximum number of splices	4
number of patching fields	4 SC*
dimensions: width/height/depth [mm]	83/100/30
housing material	ABS+PC
colour	polar white
number of cable entries	2 bottom, 1 rear, 1 top, 1 left, 1 right
environmental IP protection	IP31

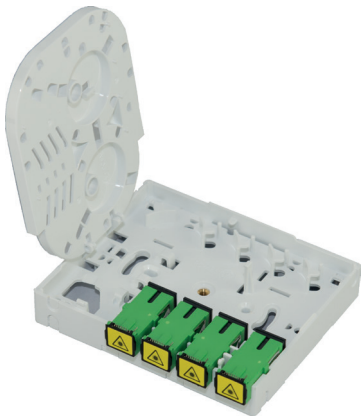
* both versions are available with standard adapters, with no shutters

ORDERING:

NGO-24 – Wall-Mounted Fibre Optic Outlet

FTTx PON

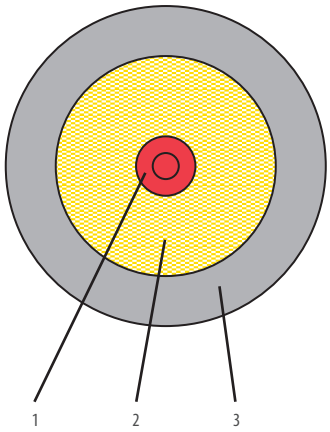
NGO-24 Wall-Mounted Fibre Optic Outlet



Otwarte naścienne gniazdko optyczne NGO-24

SUBSCRIBER PIGTAIL WITH G.657 A2, G657B3 FIBRE

Structure of the subscriber's cablel



1. *one or two 900 µm buffered G.657 bend insensitive fibres*
2. *waterproof reinforcement with aramid yarn*
3. *halogen free coating (LSOH)*

FEATURES:

- pigtail with G.657 A2, G.657 B3 bend insensitive fibre
- designed to match the requirements of FTTH network
- available in one or two fibre version, or as a patchcord
- perfect for direct connection of subscribers
- cab be pulled through walls and floors
- LSOH low smoke halogen free coating, in accordance with international fire safety requirements

TECHNICAL SPECIFICATIONS:

		1-fibre cable - 4,0mm	2-fibre cable 4,0mm	1-fibre cable 2,8mm	2-fibre cable 3,0mm
temperature range [°C]:	transport and storage	-40 do +70		-40 do +70	
	installation	-5 do +50		-5 do +50	
	operation	-30 do +70		-30 do +70	
maximum pulling force [N]		200		150	
crush resistance [N/cm]		100			
minimum bending radius [mm]		20			
standard packaging		coils of 250m, drum of 2km		drum of 2km	
nominal diameter [mm]		4		2,8	3,0
minimum coating thickness [mm]		0,8		0,5	0,5
flame retardancy		CEI60332-1 (C2)		CEI60332-1 (C2)	
nominal weight [kg/km]		16	18	8	9
marking of outer sheath		manufacturing year and week - ACOME - fibre count and type - product code + metre marks		manufacturing year and week - ACOME - fibre count and type - product code + metre marks	

ORDERING:

SCA/U/SM/SG657A2/1J/4,0/LFH – pigtail SM SC/APC 24 m, włókno G.657 A2, średnica zewnętrzna 4 mm, materiał LFH

FTTx PON

INVISIBLE OPTICAL FIBRE FOR INDOOR LIVING UNIT APPLICATIONS

Invisible optical fibre is a specially designed system of virtually invisible fibres dedicated for Multi Dwelling Unit and Living Unit applications. The fibre outer diameter is 0.9 mm and is made of all transparent materials. The fibre can be glued to all kinds of walls with the use of specially designed microclips. It can also be fixed directly to the wall using the dedicated glue. The G.657.B3 fibre enables worry-free bending around the many tight corners typically found inside buildings and rooms.

SYSTEM COMPONENTS:

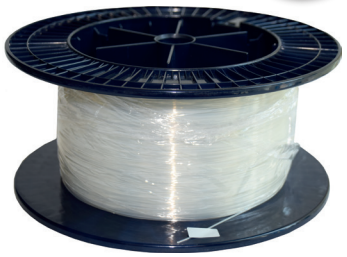
Transparent fibre:
- 0.9 mm outer diameter
- tight buffered
- G.657 B3 fibre
- mechanically durable outer sheath material
- virtually invisible
- paintable
- flame retardant material

Self-adhesive clips:
- stick to all kinds of walls
- easy to remove
- do not damage the wall surface
- transparent
- paintable
- flame retardant

Dedicated glue:
- used when fibre is glued directly to the wall without the use of clips or in case of multiple use of clips to get higher adherence
- easy to paint
- flame retardant

Optical Outlet:
- compact and aesthetic housing
- integrated automatic shutters, providing protection against laser radiation and connector contamination with dirt and dust
- 2 x SC/APC connectors, two mechanical splices or 2 heatshrink splice protectors
- flame retardant material

NEW



Virtually Invisible Fibre

Self - adhesive clip

Dedicated glue

ORDERING:

PRODUCT CODE	DESCRIPTION
NGO-12/K/KN/SCA/20/KNTG.657B3/1J/0,9/LFH	20m of invisible optical fibre for FTTH installation in clients apartment. Set includes: wall-mounted optical outlet NGO-12, pigtail SC/APC made with invisible fibre, L=20m, adapter SC/APC, outer clip, inner clip - 5 pcs of each, dedicated glue 20ml, installation kit for outlet
NGO-12/K/KN/SCA/35/KNTG.657B3/1J/0,9/LFH	35m of invisible optical fibre for FTTH installation in clients apartment. Set includes: wall-mounted optical outlet NGO-12, pigtail SC/APC made with invisible fibre, L=35m, adapter SC/APC, outer clip, inner clip - 5 pcs of each, dedicated glue 20ml, installation kit for outlet
NGO-12/K/KN/SCA/40/KNTG.657B3/1J/0,9/LFH	40m of invisible optical fibre for FTTH installation in clients apartment. Set includes: wall-mounted optical outlet NGO-12, pigtail SC/APC made with invisible fibre, L=40m, adapter SC/APC, outer clip, inner clip - 5 pcs of each, dedicated glue 20ml, installation kit for outlet

PRODUCT CODE	DESCRIPTION	UNIT
WN-KLEJ	Glue dedicated for invisible optical fibre, 1F0, 20ml	pcs
WN-KLIP ZEWN	invisible optical fibre - equipment - outer clip	pcs
WN-KLIP WEWN	invisible optical fibre - equipment - inner clip	pcs
WN-KLIP PROSTY	invisible optical fibre - equipment - go-through clip	pcs
WN-WŁÓKNO-1J	invisible optical fibre , SM, 1F0, G657B3	pcs