NAFICON

Splitters, GPON and

XGS-PON

NAFICON

Naficon was established in 1994 and is specialized in products for Passive Optic Networks (PON). Naficon is located in Nauvo, in the archipelago of Turku. Over the past three decades we have established ourselves as one of the leading operators on the field of end-products for optical fiber networks in Finland. Quality, flexibility and understanding are the three words that describe best the way we operate. Using high-class materials, the newest production equipment and continuous development of skills are the reasons for maintaining good quality year in and year out.

In July 2015 we founded subsidiary in Dubai, United Arab Emirates. The name of the company is NFOM (Naficon Fiber Optic Manufacturing) LLC. NFOM manufactures similar products as we do in Finland using the same materials and production equipment. Certain products, like trunk cables for mobile masts and other cell sites, are still made from start to finish in Nauvo. The production in NFOM started in February 2016. In April 2017 NFOM quality management system got ISO 9001 quality certification.

As said our manufacturing plant in Finland is in Nauvo. We manufacture pigtails, patch cords and multifiber cables with connectors ready-made. Used cables are for indoor and outdoor applications according to customer needs. Beside those products we manufacture pre-terminated fiber panels for different purposes.

We manufacture products with all the most common connectors: SC, LC, FC and ST. All of them can be polished with UPC (no angle) and SC, LC and FC connectors are available as APC connectors. APC connectors feature fiber end face that is polished at an 8-degree angle. Other ready-made connectors, such as MTP/MPO and E2000, can be supplied via our partners.

Besides comprehensive stock of our own products, we have all the essential PON products in stock. Adapters, splice protector sleeves, attenuators, splitters, CWDM etc. We have thousands of products in stock so even bigger deliveries within a day can be made.

Flexibility, quality and understanding

- three words that describe Naficon's products and operations

Principles of PON techniques

PON technology stands for Passive Optical Network. The principled structure of the PON network is illustrated in Figure 1. The logical topology of the network is point-to-multipoint, the abbreviation of which is P2MP. In practice, this means that one central terminal in the equipment room feeds several network terminals located on the client side. The central terminal is abbreviated OLT (Optical Line Terminal) and customers' network terminals are referred to as ONU (Optical Network Unit).
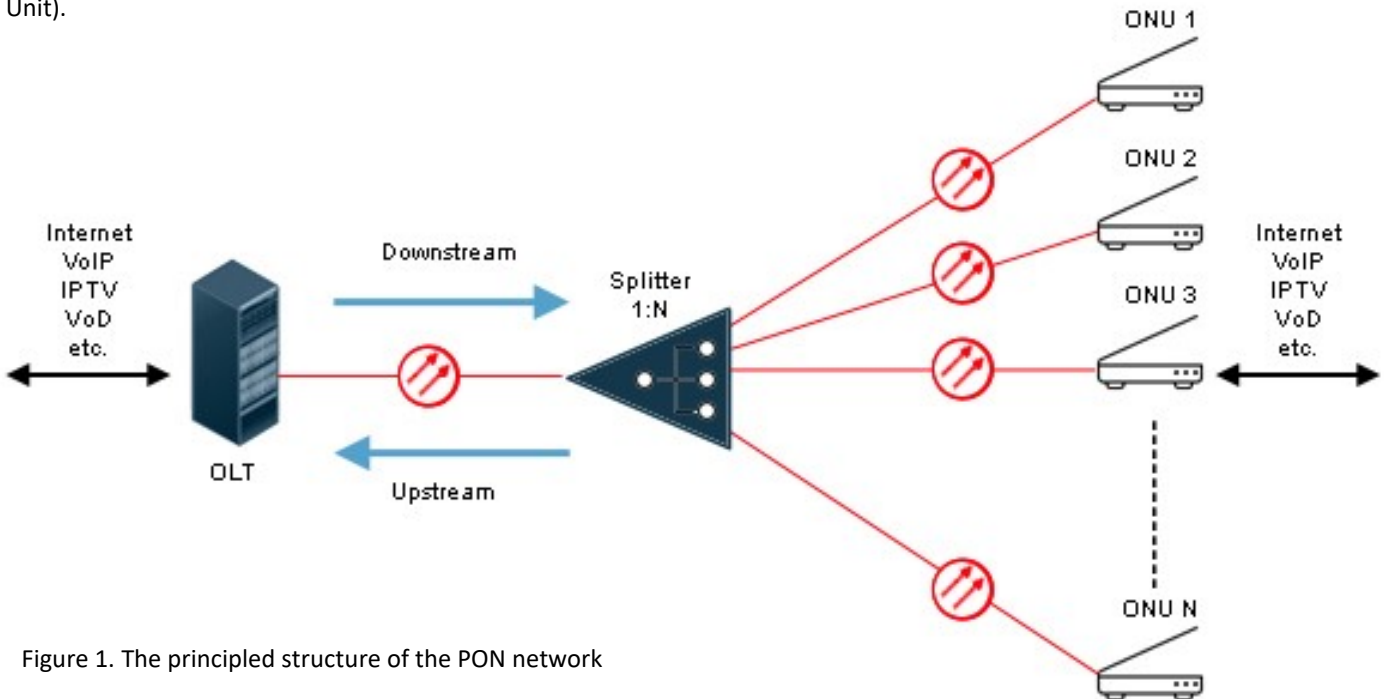

Figure 1. The principled structure of the PON network

Most PON networks run on a single fiber per connection. The feed/backbone fiber from the connection node is shared between several customers using an optical splitter. The split ratio can be e.g., 32, with one OLT and one backbone fiber serving 32 ONU devices. ONU devices, on the other hand, can serve one or more customers. Communication is possible in the same fiber in both directions when different wavelengths are used in different directions. The direction of transmission from the central terminal (OLT) to the network terminal (ONU) is called the downstream, and the opposite direction of transmission is called the upstream.

The figure below shows wavelengths used by different PON technologies. It shows that GPON and XGS-PON use different wavelengths. XGS-PON uses a longer wavelength (1577 nm) downstream compared to GPON (1490 nm). This means that traditional PON-WDMs (1310/1490 + 1550 nm) used in GPON networks do not work in XGS-PON networks. XGS-PON networks require a wider wavelength range for use. If you want RF video (1550 nm) on the same fiber in XGS-PON networks, OADM (Optical Add/Drop multiplexer) is used instead of the traditional PON-WDM. More on that later. The following pages contain passive devices provided by Naficon for the use of various PON networks.
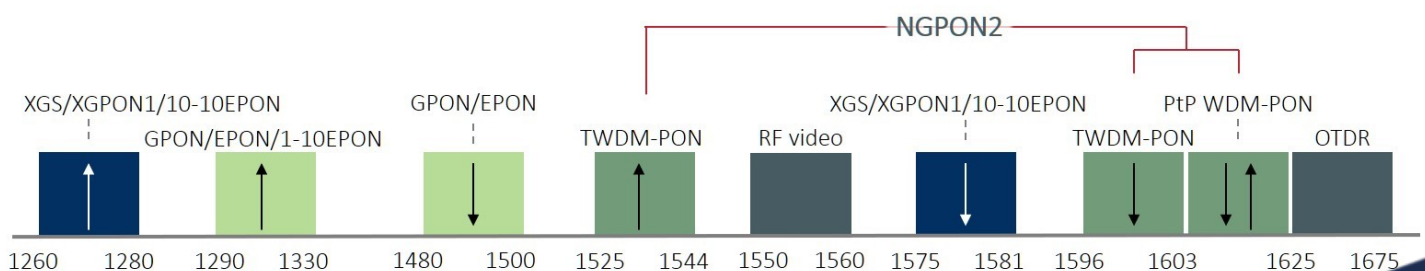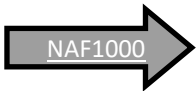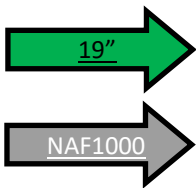
Splitters

We have PLC splitters in stock both with connectors (SCA and LCA) and without connectors. Uninstalled splitters without connectors have 250 µm tails and their length is 1.5m. Splitters with connectors are generally with 900 µm fibers. The ratios are from 1x2 to 1x64 and from 2x2 to 2x32. The specs can be found here. Via us you can also purchase splitters with two inputs. Our 19" panel is designed with this option in mind.

Beneath are the identification codes for the splitters in stock. For more information on preinstalled splitters, you can find on the pages dedicated for different types of casings.

19"

NAF1000

Splitters, CWDM, GPON...

PLC Splitters	
1xN	
Product code	**Product**
Without connectors	
7262635	PLC Splitter 1x2
7262298	PLC Splitter 1x4
7262299	PLC Splitter 1x8
7269026	PLC Splitter 1x8 3.5m
7262392	PLC Splitter 1x16
7269027	PLC Splitter 1x16 3.5m
7262393	PLC Splitter 1x32
7262394	PLC Splitter 1x64
7269316	Jatkoslevykotelo 1:16
7269317	Jatkoslevykotelo 1:32
SC-APC	
7262643	PLC Splitter 1x2 SCA
7264098	PLC Splitter 1x4 SCA
7264099	PLC Splitter 1x8 SCA
7264294	PLC Splitter 1x16 SCA
7264295	PLC Splitter 1x32 SCA
7262634	PLC Splitter 1x64 SCA
LC-APC	
7262632	PLC Splitter 1x2 LCA
7262139	PLC Splitter 1x4 LCA
7262198	PLC Splitter 1x8 LCA
7262199	PLC Splitter 1x16 LCA
7262799	PLC Splitter 1x32 LCA
7262633	PLC Splitter 1x64 LCA
7269462	Splitter module 1:4 LCA 2mm
7269472	Splitter module 1:8 LCA 2mm
7269464	Splitter module 1:16 LCA 2mm

PLC Splitters	
2xN	
Product code	**Product**
Without connectors	
7268423	PLC Splitter 2x2
7262636	PLC Splitter 2x4
7262637	PLC Splitter 2x8
7262638	PLC Splitter 2x16
7262639	PLC Splitter 2x32
SC-APC	
7262640	PLC Splitter 2x4 SCA
7262641	PLC Splitter 2x8 SCA
7262642	PLC Splitter 2x16 SCA
7268304	PLC Splitter 2x32 SCA
LC-APC	
7268305	PLC Splitter 2x4 LCA
7268306	PLC Splitter 2x8 LCA
7268307	PLC Splitter 2x16 LCA
7268308	PLC Splitter 2x32 LCA

PLC 1x16 LC/APC

PLC 2x32 SC/APC

19" splitter panels, GPON and XGS-PON

Our range of panels includes 19" panels specially designed for splitters. 1x2, 1x4, 1x8, 1x16 , 1x32 and 1x64 splitters with SC-APC and LC-APC connectors are held in stock. The panels and splitters with 2 inputs are also part of the range we hold in stock. The height of the panel is 1U and is usually delivered without the impact protector. If wanted the impact protector will be attached. Installing several splitters with few connectors is possible inside the same panel, but we also have several custom made panels for these purposes. Panels with PON-WDMs are used in GPON networks and panels with OADMs are used in GPON and XGS-PON networks to separate pretermined wavelengths from each other.

7262137

7263114

19" mechanics

SC-APC	
Product code	Product
7269290	1x2 SCA SPLITTER PANEL 19"
7268309	1x4 SCA SPLITTER PANEL 19"
7264438	1x8 SCA SPLITTER PANEL 19"
7264439	1x16 SCA SPLITTER PANEL 19"
7262137	1x32 SCA SPLITTER PANEL 19"
7263400	Jakajapaneeli 1x32 SCA+ kuituohjain vedonpoistolla
7262138	1x64 SCA SPLITTER PANEL 19"
7263401	Jakajapaneeli 1x64 SCA+ kuituohjain vedonpoistolla
7263114	SPLITTER PANEL 19" 16kpl 1x2 SCA
7269334	Paneeli 19" 16 x 1:2 SCA
7263115	PAN 19" 6kpl 1x2 SCA+6KPL 1x4 SCA
7264475	SCA 3kpl 1x2 4kpl 1x4 4kpl 1X8
7269312	Paneeli 19" 8 x 1:4 SCA
7263116	JAKAJAPANEELI 16 PON-WDM SCA
7269313	Paneeli 19" 16xPON-WDM SCA
7263405	JAKAJAPANEELI 16x OADM SCA

LC-APC	
Product code	Product
7269285	1x8 LCA SPLITTER PANEL 19"
7269286	1x16 LCA SPLITTER PANEL 19"
7269287	1x32 LCA SPLITTER PANEL 19"
7269288	1x64 LCA SPLITTER PANEL 19"
7269305	SPLITTER PANEL 19" 3 x 1:32 LCA
	SPLITTER PANEL 19" 6 x 1:8 LCA
	SPLITTER PANEL 19" 3 x 1:16 LCA
7269410	SPLITTER PANEL 19" 1x4+1x8 LCA
7269411	SPLITTER PANEL 19" 8 x 1:2 LCA
7269466	SPLITTER PANEL 19" 4x1:2 LCA TS
7269467	SPLITTER PANEL 19" 8x1:2 LCA TS
7269468	SPLITTER PANEL 19" 16x1:2 LCA TS
7263456	SPLITTER PANEL 19" 4x1:8 LCA
7263457	SPLITTER PANEL 19" 8x1:4 LCA
7263221	Päätemoduuli 1x32 LCA
7269321	Päätemoduuli 1x16 LCA
7269322	Päätemoduuli 1x8 LCA
7269323	Päätemoduuli 1x4 LCA
7269324	Päätekehikko 1U 19" (Splitter)

Päätemoduuli 1x32 LCA is a splitter module, which fits into a frame (päätekehikko), which can hold two of them side by side. The height of the frame is 1U. The frame fits directly into 19" rack. In the other picture below is a splitter panel, which fits 6 pcs of 1:8 LC/APC splitters or alternatively 6 pcs of 1:4 SC/APC splitters. The other splitter panel is for 3 pcs of 1:16 LC/APC splitters.
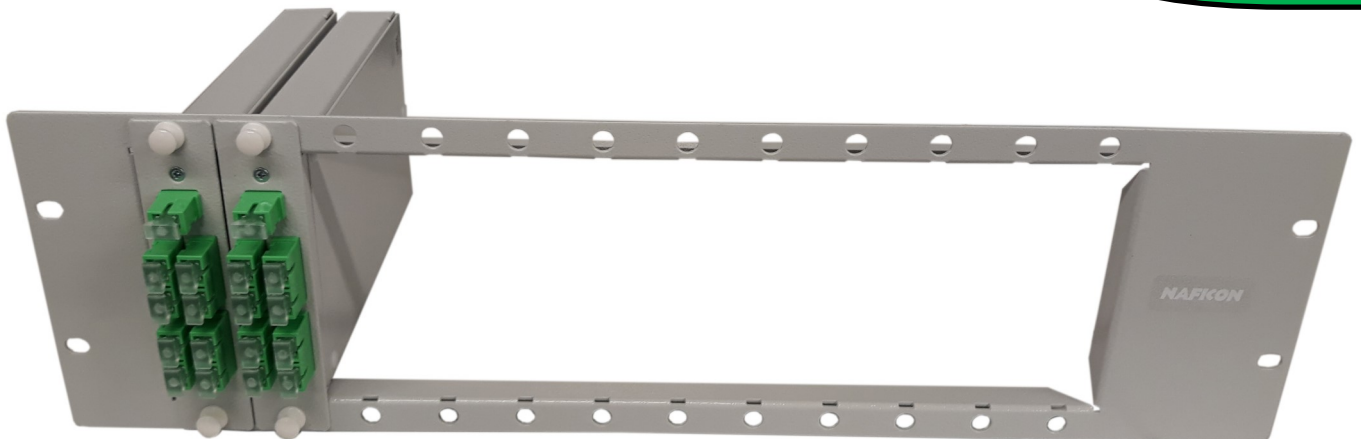
LGX-modules and frames

We provide LGX-modules with three different split ratios, (1:2, 1:4 ja 1:8), with SC/APC connectors installed in all of them. In addition, we provide a LGX-module with two 1310/1550 WDMs installed inside. All the modules can be installed into a 1U or 3U frames. 1U frame can hold three modules and the 3U frame can hold 12.

19" mechanics

| LGX-modules and frames	
Product code	Product
7269390	LGX frame 1U
7269391	LGX frame 3U
7269392	LGX 1:2 SCA
7269393	LGX 1:4 SCA
7269394	LGX 1:8 SCA
7269395	LGX 2xWDM 1310/1550

NAF1000 splitter modules

Splitter modules are also available for NAF1000 system, with preinstalled SC-APC or LC-APC splitters. Also GPON and XGS-PON modules are available within the NAF1000 frame.

Below are the identification codes for the splitter modules in stock.

NAF1000 splitter modules	
SC-APC	
Product code	Product
7268310	1x4 SCA SPLITTER MODULE/NAF1000
7264440	1x8 SCA SPLITTER MODULE/NAF1000
7264441	1x16 SCA SPLITTER MODULE/NAF1000
7262135	1x32 SCA SPLITTER MODULE/NAF1000
7262136	1x64 SCA SPLITTER MODULE/NAF1000
7269314	NAF1000 8 x 1:4 SCA
7269315	NAF1000 16 x PON-WDM SCA
7263473	NAF1000 16 x OADM SCA
7269335	NAF1000 16 x 1:2 SCA
LC-APC	
7263406	1x32 LCA SPLITTER PANEL/NAF1000
7263221	Päätemoduuli 1x32 LCA
7269321	Päätemoduuli 1x16 LCA
7269322	Päätemoduuli 1x8 LCA
7269323	Päätemoduuli 1x4 LCA
7269325	Päätekehikko NAF1000 Splitter

NAF1000
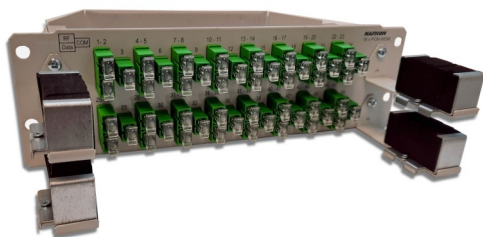
NAF1000-mechanics have identification codes for terminal modules (päätemoduuli) with LC/APC connectors. The module fits into a frame (Päätekehikko NAF1000 Splitter) which can be directly installed into a NAF1000 cross-

PLC-Splitters

| Parameter	Unit	1:2	1:4	1:8	1:16	1:32	1:64
Operating wavelength	nm	1260~1650					
Insertion Loss	dB	≤4.20	≤7.60	≤10.90	≤13.90	≤17.90	≤21.20
Loss Uniformity	dB	≤0.5	≤0.5	≤0.7	≤1.3	≤1.5	≤1.5
PDL	dB	≤0.2	≤0.3	≤0.35	≤0.4	≤0.45	≤0.5
Return Loss	dB	≥55.0	≥55.0	≥55.0	≥55.0	≥55.0	≥55.0
Directivity	dB	≥55.0	≥55.0	≥55.0	≥55.0	≥55.0	≥55.0
Operating temperature	°C	-40 ~ +70					
Maximum Power Handling	mW	500					
Size (HxWxL)	mm	4x7x60	4x7x60	4x7x60	4x12x60	6x20x80	6x40x100

PON-WDM and OADM

We keep also PON-WDMs in stock, which are needed to build GPON-networks. Those can be installed into NAF1000 casings, 19" panels and into other casings as well. The 1550 OADM (Optical Add/Drop Multiplexer), on the other hand, is suitable for GPON, XGS-PON and NG-PON2 networks to separate the wavelength of cable TV from other data traffic. The OADM has a narrow 1550nm (±7.5nm) window, which allows to add or remove the wavelength in question. GPON and XGS-PON use different wavelengths. XGS-PON uses a longer wavelength (1577 nm) in the downstream direction compared to GPON (1490 nm). In the upstream direction, XGS-PON, on the other hand, uses a shorter wavelength (1270 nm) compared to GPON (1310 nm). It means that the traditional PON-WDMs used in GPON networks (1310/1490 + 1550 nm) do not work in XGS-PON networks .

PON-WDM	
Product code	Product
7269291	PON SCA PANEELI 19"
7263116	JAKAJAPANEELI 16 PON-WDM SCA
7269313	Paneeli 19" 16 x PON-WDM SCA
7269315	NAF1000 16xPON-WDM SCA
7269020	PON-WDM SCA

OADM	
Product code	Product
7263405	JAKAJAPANEELI 16x OADM SCA
7269021	1550 OADM SCA
7263473	NAF1000 16x OADM SCA

Splitters, CWDM, GPON…
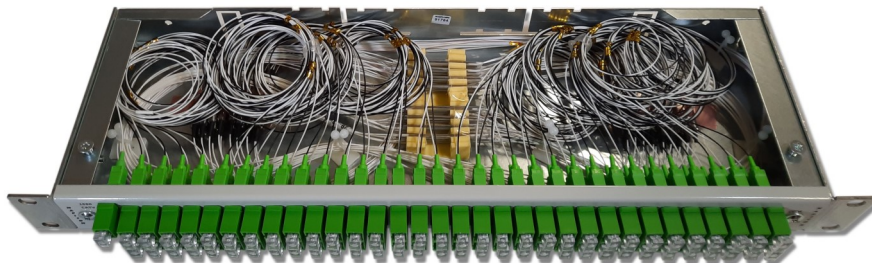
The picture above shows a 19" panel with 32 PON-WDMs with 1550 nm port sspliced on a 1:32 splitter. The connectors are SC/APC. Technical information about PON-WDM and OADM can be found in the Specs section of the product catalog.

PON-WDM specs:

OPTIC SPECIFICATION

Parameter		Unit	SPC
Channel Number		CH	1
Port Number		-	3
Operating Wavelength		nm	1260~1620
Channel Wavelength		nm	T1535~1620nm R1260~1360&1480~1500nm
Insertion Loss	Transmission1535~1620	dB	0.8
	Reflection1260~1360	dB	0.6
	Reflection1480~1500	dB	0.6
Isolation	Transmission Channel （1310）	dB	≥30
	Transmission Channel （1490）	dB	≥30
	Reflection　Channel （1550）	dB	≥15
Channel Ripple		dB	0.5
Return Loss		dB	≥50
Directivity		dB	≥55
Polarization Dependent Loss		dB	＜0.1
Polarization Mode Dispersion		ps	＜0.1
Power Handling		mW	500
Package (exclude boots)		mm	Φ5.5*38mm

*Note: IL include connector.

OADM specs:

Parameters		Specification
Pass Channel Wavelength Range (nm)		1550±7.5
Reflect Channel Wavelength range (nm)		1260 ~ 1537.5 & 1562.5 ~ 1620
Insertion Loss (dB)	Pass Channel	≤ 0.8
	Reflect Channel	≤ 0.6
Isolation (dB)	Pass Channel	≥ 30
	Reflect Channel	≥ 15
PDL (dB)	Pass Channel	≤ 0.1
	Reflect Channel	≤ 0.1
Directivity (dB)		≥ 50
Return Loss (dB)		≥ 50
Operating Temperature (⁰C)		-40 ~ +70
Storage Temperature (⁰C)		-40 ~ +85

Specs

NAF K0 and NAF multi-cabinet

- NAF multi-cabinet 7268711

- To be placed inside K0 or K1 distribution cabinet

- Supplied either separately or pre-installed into K0 or K1 distribution cabinet

- NAF multi-cabinet and K0/850 distribution cabinet with stand 7269473

- Suitable for various direct buried cables and duct cables as well as microduct cables

- Microducts can be brought directly inside the splice cabinet

- Includes slots for 48-fiber splice trays and for 96-fiber splice trays

- The door can be removed during installation

- Dimensions 600 x 450 x 250 mm (HxWxD), weight 19,5 kg

- Material: hot-dip galvanized steel sheet

- Capacity:

  * 17 pcs 48-fiber splice trays

  * 12 pcs 96-fiber splice trays

  * 98 pcs 7/3,5 mm microducts

  * 16 pcs 14/10 mm microducts

NAF K0 and splice cabinets

Mini panels with hook brackets for splice cabinets
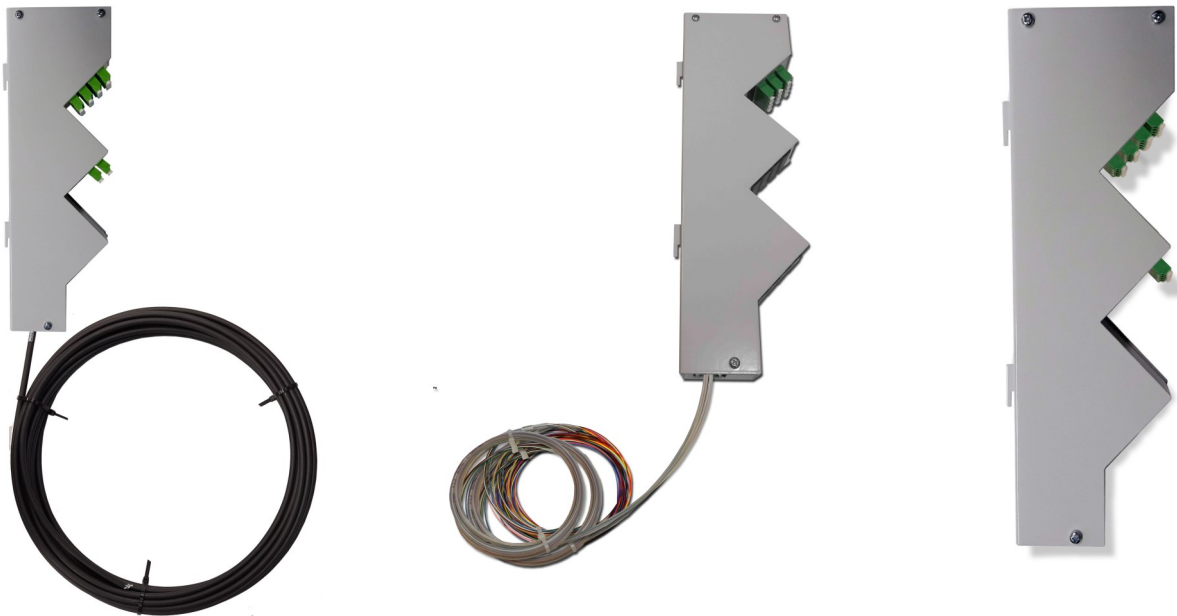
- Terminal or splitter module which is installed to a splice tray stand using hook brackets

- Mini panel 7269407
- Mini panel LCA/- HBBX 12SML 5m, 7269408
- Mini panel LCA/- HBBX 24SML 5m, 7269329
    A 24-fibre SM indoor/outdoor cable is installed in the terminal module, with 24 LC/APC connectors at one end and the other end is free for splicing. Cable length is 5m.

- Mini panel 1:8 LCA splitter module, 7269336
- Mini panel 2x 1:8 LCA splitter module, 7269337
- Mini panel 1:16 LCA splitter module, 7269338
- Mini panel package, 7269396
    The package includes:
    Mini panel LCA/- HBBX 24SML 5m, 7269329
    Mini panel 1:16 LCA splitter module, 7269338
    Splice tray 48, 2 pcs, 7264145
- Mini panel LCA/- 12SMT 3,5m, 7269465
- Mini panel LCA/- 24SMT 3,5m, 7269488
- Mini panel LCA/- 48SMT 3,5m, 7269489
- Mini panel 4SM+1:16 LCA, 7263455

NAF K0 and splice cabinets

Splitter cases with hook brackets

- Product code 7269316

  * A PLC splitter, with a split ratio of 1:16, is installed in a splitter case. The fibers are in protective tubes. Com in its own tube and other fibers 8 pcs/tube. In the case, there are hook fasteners suitable for the splice tray holders. The length of the fibers is 3 m.

- Product code 7269317

  * A PLC splitter, with a split ratio of 1:32, is installed in a splitter case. The fibers are in protective tubes. Com in its own tube and other fibers 8 pcs/tube. In the case, there are hook fasteners suitable for the splice tray holders. The length of the fibers is 3 m.

NAF K1 and NAF1000 XC outdoor cabinet

- Product code: 7269309

- Placed inside the K1 or K2 distribution cabinet.

- Delivered either separately or pre-installed in the distribution cabinet.

- The cabinet has been specially developed as a coupling cabinet for PON networks.

- Includes a rack for ODF1000 terminal and splitter panels, fiber guides, separate splice tray holder for 48 and 96-fiber splice trays, fastening and grounding rails for incoming cables underneath the splice trays and three wide cable glands with bristle at the bottom of the cabinet.

- The height of the rack is 16 U.

- Suitable for various direct buried cables and duct cables as well as microducts.

- Can be used for mid span access.

- Material: powder coated sheet steel

- Colour RAL 7035

- Dimensions 850 (H) x 740 (W) x 271 (D)

- Dustproof construction

Below are the different delivery options for the XC-cabinet:

NAF K1 and XC-cabinets

NAF 19" XC outdoor cabinet

- Product code: 7268712

- Placed inside the K1 or K2 distribution cabinet.

- Delivered either separately or pre-installed in the distribution cabinet.

- Includes a rack for 19" terminal and splitter panels, fiber guides, separate splice tray holder for 48 and 96-fiber splice trays, fastening and grounding rails for incoming cables underneath the splice trays and two wide cable glands with bristle at the bottom of the cabinet.

- The height of the rack is 10 U

- Suitable for various direct buried cables and duct cables as well as microducts.

- Material: powder coated sheet steel

- Colour RAL 7035

- Measures (HxWxD): 1025 x 766 x 273 mm

- Dustproof construction

NAF K1 and XC-cabinets

NAF K1 ja 19" RK-ulkokaappi

- Product code: 7268715
- NAF 19" XC outdoor cabinet installed inside K1/1200 distribution cabinet (7268712, 7268706)

NAF K1 and XC-cabinets