



50 Ohm coaxial cable RG213 LSZH MIL Type



Store at: -0 to +60 °C

Install at: 0 to +50 °C, **Bend minimum:** 10xO.D. (unarmored) or 20xO.D. (armored)

Operate at: -20 to +70 °C, **Bend minimum:** 15xO.D. (unarmored) or 20xO.D. (armored)

Design

Conductor : bare copper 7×0.76mm

Dielectric : polyethylene nominal Ø 7.25mm

Screen : bare copper wire braid

Outer jacket : black LSZH material

Marking : APS Finland - ww/yy - RG 213 type MIL LSZH - 75 OHM - P/N - lot + meter

Armoured version is supplied with additional:

Armour : galvanized steel or tinned copper wire braid

Outer jacket : black LSZH material

Marking : APS Finland - ww/yy - ARMOURED RG 213 type MIL LSZH - 75 OHM - P/N - lot + meter

Environmental properties and Fire Performances

Degree of acidity of gases : IEC 60754-1, IEC 60754-2

Halogen acid gas corrosiveness : TS EN 50267-2-3

Smoke Emission : IEC 61034-2

Flame retardant : IEC 60332-1-1, IEC60332-2-1

Electrical characteristics

Impedance : $50 \pm 3 \Omega$

Capacitance : 101pF/m nominal

Velocity ratio : 66%

Insulation resistance : 10000 MΩ x Km

Spark tension of the sheath : 2.0 kV

Attenuation (typical)

MHz	100	200	400	600	800	1000
dB	7.2	11.0	15.5	21.0	25.0	29.0

Ordering and delivery information

Type	P/N	O.D [mm]	Weight [kg/km]	Packaging
RG213 Non-armoured	RG213MT	10.2	163	500m or 1000m (+/-5%)
RG213 armoured GSWB	RG213MTBH	14.5	250	500m (+/-5%)
RG213 armoured TCWB	RG213MTTH	14.5	235	500m (+/-5%)

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50 Ohm coaxial cable RG214 LSZH MIL Type



Store at: -0 to +60 °C

Install at: 0 to +50 °C, **Bend minimum:** 10xO.D. (unarmored) or 20xO.D. (armored)

Operate at: -20 to +70 °C, **Bend minimum:** 15xO.D. (unarmored) or 20xO.D. (armored)

Design

Conductor : bare copper 7×0.76mm

Dielectric : polyethylene nominal Ø 7.25mm

Screen 1 : silvered copper wire braid

Screen 2 : silvered copper wire braid

Outer jacket : black LSZH material

Marking : APS Finland - ww/yy - RG 214 type MIL LSZH - 75 OHM - P/N - lot + meter

Armoured version is supplied with additional:

Armour : galvanized steel or tinned copper wire braid

Outer jacket : black LSZH material

Marking : APS Finland - ww/yy - ARMOURED RG 214 type MIL LSZH - 75 OHM - P/N
- lot + meter

Environmental properties and Fire Performances

Degree of acidity of gases : IEC 60754-1, IEC 60754-2

Halogen acid gas corrosiveness : TS EN 50267-2-3

Smoke Emission : IEC 61034-2

Flame retardant : IEC 60332-1-1, IEC60332-2-1

Electrical characteristics

Impedance : $50 \pm 3 \Omega$

Capacitance : 101pF/m nominal

Velocity ratio : 66%

Insulation resistance : 10000 M Ω x Km

Spark tension of the sheath : 2.0 kV

Attenuation (typical)

MHz	100	200	400	600	800	1000
dB	7.0	10.5	15.0	20.0	23.5	28.5

Ordering and delivery information

Type	P/N	O.D [mm]	Weight [kg/km]	Packaging
RG214 Non-armoured	RG214MT	10.8	200	500m or 1000m (+/-5%)
RG214 armoured GSWB	RG214MTBH	15.2	290	500m (+/-5%)
RG214 armoured TCWB	RG214MTTH	15.2	275	500m (+/-5%)

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75 Ohm coaxial cable RG11 LSZH MIL Type



Store at: -0 to +60 °C

Install at: 0 to +50 °C, **Bend minimum:** 10xO.D. (unarmored) or 20xO.D. (armored)

Operate at: -20 to +70 °C, **Bend minimum:** 15xO.D. (unarmored) or 20xO.D. (armored)

Design

Conductor : tinned copper Ø 1.63mm nominal

Dielectric : polyethylene nominal Ø 7.20mm

Screen 1 : aluminium tape

Screen 2 : copper wire braid

Outer jacket : black LSZH material

Marking : APS Finland - ww/yy - RG 11 type MIL LSZH - 75 OHM - P/N - lot + meter

Armoured version is supplied with additional:

Armour : galvanized steel or tinned copper wire braid

Outer jacket : black LSZH material

Marking : APS Finland - ww/yy - ARMoured RG 11 type MIL LSZH - 75 OHM - P/N - lot + meter

Environmental properties and Fire Performances

Degree of acidity of gases : IEC 60754-1, IEC 60754-2

Halogen acid gas corrosiveness : TS EN 50267-2-3

Smoke Emission : IEC 61034-2

Flame retardant : IEC 60332-1-1, IEC60332-2-1

Electrical characteristics

Impedance : 75 ± 3 Ω

Capacitance : 53pF/m nominal

Velocity ratio : 82%

Insulation resistance : 10000 MΩ x Km

Spark tension of the sheath : 2.0 kV

Attenuation (typical)

MHz	100	200	400	600	800	1000
dB	4.7	6.5	9.5	12.3	14.0	16.2

Ordering and delivery information

Type	P/N	O.D [mm]	Weight [kg/km]	Packaging
RG11 Non-armoured	RG11MT	10.0	145	500m or 1000m (+/-5%)
RG11 armoured GSWB	RG11MTBH	14.2	232	500m (+/-5%)
RG11 armoured TCWB	RG11MTTH	14.2	218	500m (+/-5%)

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75 Ohm coaxial cable RG59 LSZH MIL Type



Store at: -0 to +60 °C

Install at: 0 to +50 °C, **Bend minimum:** 10xO.D. (unarmored) or 20xO.D. (armored)

Operate at: -10 to +70 °C, **Bend minimum:** 5xO.D. (unarmored) or 15xO.D. (armored)

Design

Conductor : copperweld Ø 0.58 ± 0.025 mm

Dielectric : low density polyethylene nominal Ø 3.70mm

Screen 1 : aluminium/poleysther/aluminium tape

Screen 2 : bare copper braid

Outer jacket : black LSZH material

Marking : APS Finland - ww/yy - RG 59 type MIL LSZH - 75 OHM - lot + meter

Armoured version is supplied with additional:

Armour : galvanized steel or tinned copper wire braid

Outer jacket : black LSZH material

Marking : APS Finland - ww/yy - ARMOURED RG 59 type MIL LSZH - 75 OHM - lot + meter

Environmental properties and Fire Performances

Degree of acidity of gases : IEC 60754-1, IEC 60754-2

Halogen acid gas : IEC 60754-1, IEC 60754-2

Smoke Emission : IEC 61034-2

Flame retardant : IEC 60332-1-1, IEC60332-2-1

Electrical characteristics

Impedance : 75Ω nominal

Capacitance : 67pF/m nominal

Inner conductor resistance @ 500V : 154Ω/km nominal

Spark tension of the sheath : 2.0 kV

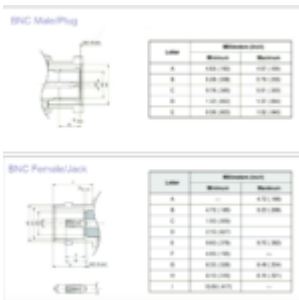
Attenuation (typical)

MHz	5	10	50	100	200	300	500	600	800	1000	1350	1500	1750	2150	2250	2500	2750	3000
dB	4.0	5.4	9.3	14.7	19.0	23.6	29.8	32.0	37.5	42.6	51.7	54.8	59.2	65.6	69.7	73.0	77.7	61.1

Ordering and delivery information

Type	P/N	O.D [mm]	Weight [kg/km]	Packaging
RG59 Non-armoured	RG59MT	6.2	57.2	500m or 1000m (+/-5%)
RG59 armoured GSWB	RG59MTBH	9.4	144.2	500m (+/-5%)
RG59 armoured TCWB	RG59MTTH	9.4	130.0	500m (+/-5%)

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50 Ohm connector BNC



Features

- Straight and right angle
- For flexible, semi-flex and semi-rigid cables
- PCB connectors (straight and right angle)

- Panel connectors in various flanges
- Adapters

Application

- Cable Assembly
- Antenna, CATV, Satcom
- Automotive
- Medical Equipment
- Radios, Telecommunications, Base Stations
- Instrumentation

Materials

Body, coupling nut Brass, Zinc alloy(diecast)

Insulator Teflon, Delrin

Center contact Brass for male / Beryllium copper or Phosphor bronze for female

Crimping sleeve Annealed Brass

Body plating Nickel (Ni)

Center contact plating Gold (Au)

Electrical Characteristics

Impedance 50 Ohm

Frequency range 0-4 GHz

VSWR Straight type ≤ 1.3 max

Dielectric withstanding voltage 1500 V rms
Working voltage 500 V rms
Center contact resistance ≤ 1.5 mΩ (Milliohms max.)
Outer contact resistance ≤ 2.0 mΩ (Milliohms max.)
Insulation resistance ≥ 5000 MΩ (Megohms min.)

Mechanical Characteristics

Coupling 2-stud bayonet
Contact Retention 100 lbs. min.
Vibration MIL-STD-202 Meth. 204
Corrosion resistance MIL-STD-202 Meth. 101

Environmental Characteristics

Temperature Range Teflon -65°C ~ +85 °C
Coupling nut retention 100 lbs. min.
Vibration MIL-STD-202 Meth. 204
Corrosion resistance MIL-STD-202 Meth. 101

Note : all characteristics and values are typical.

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75 Ohm Coaxial cable RG6 CCS double screen PVC



Installation Features

Store at -10 to +50 °C

Install at -10 to +50 °C, **Bend minimum** : 20 times O.D.

Operate at : -0 to +60 °C, **Bend minimum** : 20 times O.D.

Pull maximum : 100N

Design

Conductor : solid CCS 1.02mm

Dielectric : foam PE nominal Ø 4.60mm

Screen 1 : bonded AL/P nominal Ø 4.75mm

Screen 2 : Aluminium wire braid nominal coverage 60%

Jacket : black PVC material nominal Ø 6.86mm

Marking : APS Finland - ww/yy - 75 Ohm CATV RG6 CCS - P/N CCS6AB6VKB3 - lot - meter

Environmental properties and Fire Performances

Flame retardant : IEC60332-1-2

Electrical Characteristics

Characteristic impedance (Ohm)	75+/-3
Capacitance (pF/m)	52+/-2
Velocity of Propagation (%)	85.0
Return Loss (dB) 5-1000MHz	≥22

Frequency	Attenuation db/100ft	Attenuation dB/100 meter
55	1.6	5.2
187	2.8	9.3

211	3.1	10
400	4.1	13.5
500	4.6	15.0
750	5.6	18.5
860	6.1	20.0
1000	6.6	21.5

Recommended connectivity

BNC connectors : APS BNC75

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75 Ohm connector BNC



Features

- Straight and right angle
- For flexible, semi-flex and semi-rigid cables
- PCB connectors (straight and right angle)
- Panel connectors in various flanges
- Adapters

Application

- Cable Assembly
- Antenna, CATV, Satcom
- Automotive
- Medical Equipment
- Radios, Telecommunications, Base Stations
- Instrumentation

Materials

Body, coupling nut Brass, Zinc alloy(diecast)

Insulator Teflon, Delrin

Center contact Brass for male / Beryllium copper or Phosphor bronze for female

Crimping sleeve Annealed Brass

Body plating Nickel (Ni)

Center contact plating Gold (Au)

Electrical Characteristics

Impedance 75 Ohm

Frequency range 0-1 GHz

VSWR Straight type ≤ 1.3 max

Dielectric withstanding voltage 1500 V rms

Working voltage 500 V rms

Center contact resistance ≤ 1.5 m Ω (Milliohms max.)

Outer contact resistance ≤ 2.0 m Ω (Milliohms max.)

Insulation resistance ≥ 5000 M Ω (Megohms min.)

Mechanical Characteristics

Coupling 2-stud bayonet

Contact Retention 100 lbs. min.

Vibration MIL-STD-202 Meth. 204

Corrosion resistance MIL-STD-202 Meth. 101

Environmental Characteristics

Temperature Range Teflon $-65^{\circ}\text{C} \sim +85^{\circ}\text{C}$

Coupling nut retention 100 lbs. min.

Vibration MIL-STD-202 Meth. 204

Corrosion resistance MIL-STD-202 Meth. 101

Note : all characteristics and values are typical.

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75 Ohm coaxial cable RG6 LSZH MIL Type



Store at: -0 to +60 °C

Install at: 0 to +50 °C, **Bend minimum:** 10xO.D. (unarmored) or 20xO.D. (armored)

Operate at: -20 to +70 °C, **Bend minimum:** 5xO.D. (unarmored) or 15xO.D. (armored)

Design

Conductor : bare copper Ø 1.02mm nominal

Dielectric : low density polyethylene nominal Ø 4.60mm

Screen 1 : aluminium tape

Screen 2 : aluminium wire braid

Outer jacket : black LSZH material

Marking : APS Finland - ww/yy - RG 6 type MIL LSZH - 75 OHM - lot + meter

Armoured version is supplied with additional:

Armour : galvanized steel or tinned copper wire braid

Outer jacket : black LSZH material

Marking : APS Finland - ww/yy - ARMOURED RG 6 type MIL LSZH - 75 OHM - lot + meter

Environmental properties and Fire Performances

Degree of acidity of gases : IEC 60754-1, IEC 60754-2

Halogen acid gas corrosiveness : TS EN 50267-2-3

Smoke Emission : IEC 61034-2

Flame retardant : IEC 60332-1-1, IEC60332-2-1

Electrical characteristics

Impedance : $75 \pm 3 \Omega$

Capacitance : 53pF/m nominal

Insulation resistance : 10000 M Ω x Km

Spark tension of the sheath : 2.0 kV

Attenuation (typical)

MHz	100	200	300	400	600	800	1000
dB	7.0	10.2	12.0	14.8	18.5	20.8	24.8

Ordering and delivery information

Type	P/N	O.D [mm]	Weight [kg/km]	Packaging

Type	P/N	O.D [mm]	Weight [kg/km]	Packaging
RG6 Non-armoured	RG6MT	7.0	110	500m or 1000m (+/-5%)
RG6 armoured GSWB	RG6MTBH	11.2	197	500m (+/-5%)
RG6 armoured TCWB	RG6MTTH	11.2	183	500m (+/-5%)

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LIACC FO Access cable ADSS 2-72 cores, Mid Span.



*All images are indicative

Features

Aerial installation on HT power lines
All Dielectric Non-Metallic design
Waterproof
HDPE and UV-Resistant outer jacket

Standards of reference and applications

IEC 60793, IEC 60794-1, IEC60794-3-20, ANSI/ICEA S-104-696, EN 187105, Telcordia GR-20 | Telcordia GR-409

Intrabuilding Voice and Data/LAN Communication Networks

Telecommunication

Building access in FTTx networks

Installation Features

Store at -40 to +70 °C

Install at -10 to +60 °C, **Bend minimum** 20 times O.D.

Operate at -40 to +70 °C, **Bend minimum** 15 times O.D.

Design

Optical fiber : 125/250µm Single Mode or Multi Mode

Buffer : PBTP loose tube filled with jelly (nominal dial. $2.5 \pm 0.1\text{mm}$)

Central member : FRP (nominal diameter 2.0mm).

Assembling : tubes and fillers assembled together according to "Colour Code" table

Wrapping : water blocking tape.

inner jacket : Black MDPE material

Peripheral element : aramide yarns with ripcord.

Outer jacket : Black HDPE material, UV resistant

Marking : APS Finland - ww/yy - Fiber Optic Cable ADSS MT80 fiber count x fiber type - P/N - lot + meter

Environmental properties

UV resistant : UL1581, IEC11801

Mechanical properties

Pulling tension : 8000 N ($\Delta\alpha$ reversible, IEC 60794-1-2-E1)

Nominal span : 160m

Maximumspan : 280m

Crush : 3000N/100mm ($\Delta\alpha$ reversible, IEC 60794-1-2-E3)

Impact : 15J ($\Delta\alpha$ reversible, IEC 60794-1-2-E4)

Water penetration : 3m cable, 1m water, 24 hours (IEC 60794-1-2-F5)

Colour code of tubes and fibers

	1	2	3	4	5	6	7	8	9	10	11	12
Tube Colours	Blue	Orange	Green	Brown	Grey	White (natural)						
Fiber Colours	Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Aqua
Fillers	Black											

Fiber Optic characteristics

See detailed specification of optical fibers.

Ordering and delivery information

Fiber Count	Part Number	No. of tubes	Fibers per tube	Fillers	Nominal O.D. (mm)	Weight (kg/km)	Packaging
2	MT8002xxMSPoo	1	2	5	14.0	145	Drum (2 or 4km)
4	MT8004xxMSPoo	1	4	5	14.0	145	Drum (2 or 4km)
8	MT8008xxMSPoo	1	8	5	14.0	145	Drum (2 or 4km)
12	MT80121xxMSPoo	1	12	5	14.0	145	Drum (2 or 4km)
12	MT80122xxMSPoo	2	6	4	14.0	145	Drum (2 or 4km)
24	MT8024xxMSPoo	2	12	4	14.0	145	Drum (2 or 4km)
48	MT8048xxMSPoo	4	12	2	14.0	145	Drum (2 or 4km)
72	MT8072xxMSPoo	6	12	0	14.0	145	Drum (2 or 4km)

xx = fiber type

ex. OS2=S2, OM1=M1, OM2=M2, OM3=M3, OM4=M4

oo = delivery length

ex. 2000m=D2, 4000m=D4

Recommended connectivity

Pigtails : APS LIIN-25 series

Patch cords : APS LIIN-25 series

Adapters : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

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LIACC FO Access cable ADSS 2-72 cores, Short Span



*All images are indicative

Features

Aerial installation on HT power lines
All Dielectric Non-Metallic design
Waterproof
HDPE and UV-Resistant outer jacket

Standards of reference and applications

IEC 60793, IEC 60794-1, IEC60794-3-20, ANSI/ICEA S-104-696, EN 187105, Telcordia GR-20 | Telcordia GR-409

Intrabuilding Voice and Data/LAN Communication Networks

Telecommunication

Building access in FTTx networks

Installation Features

Store at -40 to +70 °C

Install at -10 to +60 °C, **Bend minimum** 20 times O.D.

Operate at -40 to +70 °C, **Bend minimum** 15 times O.D.

Design

Optical fiber : 125/250µm Single Mode or Multi Mode

Buffer : PBTP loose tube filled with jelly (nominal dial. 2.5 ± 0.1 mm)

Central member : FRP (nominal diameter 2.0mm).

Assembling : tubes and fillers assembled together according to "Colour Code" table

Wrapping : water blocking tape.

Peripheral element : aramide yarns with ripcord.

Outer jacket : Black HDPE material, UV resistant

Marking : APS Finland - ww/yy - Fiber Optic Cable ADSS MT30 fiber count x fiber type - P/N - lot + meter

Environmental properties

UV resistant : UL1581, IEC11801

Mechanical properties

Pulling tension : 3000 N ($\Delta\alpha$ reversible, IEC 60794-1-2-E1)

Nominal span : 80m

Maximumspan : 120m

Crush : 2000N/100mm ($\Delta\alpha$ reversible, IEC 60794-1-2-E3)

Impact : 10J ($\Delta\alpha$ reversible, IEC 60794-1-2-E4)

Water penetration : 3m cable, 1m water, 24 hours (IEC 60794-1-2-F5)

Colour code of tubes and fibers

	1	2	3	4	5	6	7	8	9	10	11	12
Tube Colours	Blue	Orange	Green	Brown	Grey	White (natural)						
Fiber Colours	Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Aqua
Fillers	Black											

Fiber Optic characteristics

See detailed specification of optical fibers.

Ordering and delivery information

Fiber Count	Part Number	No. of tubes	Fibers per tube	Fillers	Nominal O.D. (mm)	Weight (kg/km)	Packaging
2	MT3002xxASPoo	1	2	5	11.0	110	Drum
4	MT3004xxASPoo	1	4	5	11.0	110	Drum

Fiber Count	Part Number	No. of tubes	Fibers per tube	Fillers	Nominal O.D. (mm)	Weight (kg/km)	Packaging
8	MT3008xxASPoo	1	8	5	11.0	110	Drum
12	MT30121xxASPoo	1	12	5	11.0	110	Drum
12	MT30122xxASPoo	2	6	4	11.0	110	Drum
24	MT3024xxASPoo	2	12	4	11.0	110	Drum
48	MT3048xxASPoo	4	12	2	11.0	110	Drum
72	MT3072xxASPoo	6	12	0	11.0	110	Drum

xx = fiber type

ex. OS2=S2, OM1=M1, OM2=M2, OM3=M3, OM4=M4

oo = delivery length

ex. 2000m=D2, 4000m=D4

Recommended connectivity

Pigtails : APS LIIN-25 series

Patch cords : APS LIIN-25 series

Adapters : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

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LIACC FO Access cable MTE 2-48 cores, Outdoor, 1500N



*All images are indicative

Features

Outdoor and duct installation
All Dielectric Non-Metallic design
Light weight

Standards of reference and applications

IEC 60793, IEC 60794
Intrabuilding Voice and Data/LAN Communication Networks
Installation in Ducts & Conduits
Building access in FTTx networks

Installation Features

Store at -40 to +70 °C

Install at -5 to +50 °C

Operate at -40 to +60 °C

Bend minimum 20 times O.D. (installation)

Bend minimum 15 times O.D. (static)

Design

Optical fiber : 125/250µm Single Mode or Multi Mode

Buffer : PBTP loose tube filled with jelly (nominal diameter 2.3mm).

Central member : FRP (nominal diameter 2.0mm).

Assembling : tubes and fillers assembled together according to “Colour Code” table

Wrapping : water blocking tape.

Protection : anti-rodent glass yarns.

Outer jacket : Black HDPE material, UV resistant (nominal thickness 1.5mm)

Marking : APS Finland - ww/yy - Fiber Optic Cable MTE fiber count x fiber type - P/N
- lot + meter

Environmental properties

UV resistant : UL1581, IEC11801

Mechanical properties

Pulling tension : 1500 N ($\Delta\alpha$ reversible, IEC 60794-1-2-E1)

Crush : 2000N/100mm ($\Delta\alpha$ reversible, IEC 60794-1-2-E3)

Impact : 10J ($\Delta\alpha$ reversible, IEC 60794-1-2-E4)

Water penetration : 3m cable, 1m water, 24 hours (IEC 60794-1-2-F5)

Colour code of tubes and fibers

	1	2	3	4	5	6	7	8	9	10	11	12
Tube Colours	Blue	Orange	Green	Brown	Grey	White (natural)						
Fiber Colours	Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Aqua
Fillers	Black											

Fiber Optic characteristics

See detailed specification of optical fibers.

Ordering and delivery information

Fiber Count	Part Number	No. of tubes	Fibers per tube	Fillers	O.D. (mm)	Weight (kg/km)	Packaging						
2	MTE1502xxoo	1	2	5	11.5	60	Drum						
4	MTE1504xxoo	1	4	5	11.5	60	Drum						
8	MTE1508xxoo	1	8	5	11.5	60	Drum						
12	MTE1512xxoo	1	12	5	11.5	60	Drum						
24	MTE15243xxoo	3	8	3	11.5	60	Drum						
24	MTE15242xxoo	2	12	4	11.5	60	Drum						
48	MTE1548xxoo	4	12	2	11.5	60	Drum						

xx = fiber type

ex. OS2=S2, OM1=M1, OM2=M2, OM3=M3, OM4=M4

oo = delivery length

ex. 2000m=D2, 4000m=D4

Recommended connectivity

Pigtails : APS LIIN-25 series

Patch cords : APS LIIN-25 series

Adapters : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

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LIACC FO Access cable UT9H 2-24 cores, Outdoor, 1500N



*All images are indicative

Features

- Outdoor and duct installation
- Metallic armour and moisture barrier
- Compact and light weight

Standards of reference and applications

IEC 60793, IEC 60794

Intrabuilding Voice and Data/LAN Communication Networks

Installation in Ducts & Conduits

Building access in FTTx networks

Installation Features

Store at -30 to +70 °C

Install at -5 to +50 °C, **Bend minimum** 20 times O.D. (installation)

Operate at -45 to +60 °C, **Bend minimum** 15 times O.D. (static)

Design

Optical fiber : 125/250µm Single Mode or Multi Mode

Buffer : PBTP loose tube filled with jelly (nominal diameter 2.3mm).

Protection : anti-rodent glass yarns.

Armour: corrugated steel tape.

Outer jacket : Black LSZH material, UV resistant

Marking : APS Finland - ww/yy - Armoured Fiber Optic Cable UT9H fiber count x fiber type - P/N - lot + meter

Environmental properties

Degree of acidity of gases : IEC 60754-1, IEC 60754-2

Halogen acid gas : IEC 60754-1, IEC 60754-2

Smoke Emission : IEC 61034-2, EN 50268-2

Toxicity of evolved gas : EN 50305 9.2

Flame retardant : IEC 60332-1-2

Fire retardant : IEC 60332-3-24 Cat.C

UV resistant : UL1581, IEC11801

Mechanical properties

Pulling tension : 1500 N ($\Delta\alpha$ reversible, IEC 60794-1-2-E1)

Crush : 1000N/100mm ($\Delta\alpha$ reversible, IEC 60794-1-2-E3)

Impact : 10J ($\Delta\alpha$ reversible, IEC 60794-1-2-E4)

Water penetration : 3m cable, 1m water, 24 hours (IEC 60794-1-2-F5)

Colour code of fibers

	1	2	3	4	5	6	7	8	9	10	11	12
Bundle A	Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Aqua
	13	14	15	16	17	18	19	20	21	22	23	24
Bundle B	Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Aqua

Fiber Optic characteristics

See detailed specification of optical fibers.

Ordering and delivery information

Fiber Count	Part Number	No. of tubes	Fibers per tube	Nominal O.D. (mm)	Weight (kg/km)	Packaging
2	UT9H02xxoo	1	2	8.5	85	Drum
4	UT9H04xxoo	1	4	8.5	85	Drum
8	UT9H08xxoo	1	8	8.5	85	Drum
12	UT9H12xxoo	1	12	8.5	85	Drum
24	UT9H24xxoo	1	24	8.5	85	Drum

xx = fiber type

oo = delivery length

OS2=S2, OM1=M1, OM2=M2, OM3=M3, OM4=M4

2000m=D2

Recommended connectivity

Pigtails : APS LIIN-25 series

Patch cords : APS LIIN-25 series

Adapters : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

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LIACC FO Access cable UTAE 2-24 cores, Direct Burial, SWA Armoured



*All images are indicative

Features

Outdoor, duct and direct burial installation

Metallic armour and moisture barrier

Compact and light weight

Standards of reference and applications

IEC 60793, IEC 60794

Telecommunication backbones

Intrabuilding Voice and Data/LAN Communication Networks

Installation in Ducts & Conduits or Directly Buried

Building access in FTTx networks

Installation Features

Store at -40 to +70 °C

Install at -10 to +60 °C, **Bend minimum** 20 times O.D. (installation)

Operate at -40 to +70 °C, **Bend minimum** 10 times O.D. (static)

Design

Optical fiber : 125/250µm Single Mode or Multi Mode

Buffer : PBTP loose tube filled with jelly (nominal diameter 3.0mm).

Inner strength member : aramide yarns.

Inner jacket : PE black, nominal thickness 1.0mm.

Armour: steel wire, one layer, coverage ≥80%.

Outer jacket : PE black, UV resistant, nominal thickness 1.5mm.

Marking : APS Finland - ww/yy - Armoured Fiber Optic Cable UTAE fiber count x fiber type - P/N - lot + meter

Environmental properties

UV resistant : UL1581, IEC11801

Mechanical properties

Pulling tension : max 5000 N ($\Delta\alpha$ reversible, IEC 60794-1-2-E1)

Crush : 3000N/100mm ($\Delta\alpha$ reversible, IEC 60794-1-2-E3)

Impact : 15J ($\Delta\alpha$ reversible, IEC 60794-1-2-E4)

Water penetration : 3m cable, 1m water, 24 hours (IEC 60794-1-2-F5)

Colour code of fibers

1	2	3	4	5	6	7	8	9	10	11	12
Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Aqua
13	14	15	16	17	18	19	20	21	22	23	24
Blue/black	Orange/black	Green/black	Brown/black	Grey/black	White/black	Red/black	Natural	Yellow/black	Violet/black	Pink/black	Aqua/black

Fiber Optic characteristics

See detailed specification of optical fibers.

Ordering and delivery information

Fiber Count	Part Number	No. of tubes	Fibers per tube	Nominal O.D. (mm)	Weight (kg/km)	Packaging (*)
2	UTAE02xxoo	1	2	10.3	178	Drum
4	UTAE04xxoo	1	4	10.3	178	Drum

Fiber Count	Part Number	No. of tubes	Fibers per tube	Nominal O.D. (mm)	Weight (kg/km)	Packaging (*)
8	UTAE08xxoo	1	8	10.3	178	Drum
12	UTAE12xxoo	1	12	10.3	178	Drum
24	UTAE24xxoo	1	24	10.3	178	Drum

xx = fiber type

OS2=S2, OM1=M1, OM2=M2, OM3=M3, OM4=M4,

OM5=M5

oo = delivery length 2000m=D2

(*) a tolerance of $\pm 5\%$ applies to the delivery length.

Recommended connectivity

Pigtails : APS LIIN-25 series

Patch cords : APS LIIN-25 series

Adapters : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

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LIACC FO Access DROP cable BOWA 1-4 cores, self-supporting



*All images are indicative

Features

- Aerial installation (F8 type)**
- All Dielectric Non-Metallic design**
- LSZH Fire Retardant**
- Suitable for both indoor and outdoor**
- UV-Resistant outer jacket**
- Small size**
- 100% dry design**
- Low installation cost**
- Easy to strip**
- Direct Connection to Terminal Equipments**

Standards of reference and applications

EN 50173-1, IEC 60754-2, IEC 60794-1&2, IEC 60793-1&2, IEC 60332-1 & 2

FTTH Applications

Aerial (F8 Type with Steel Messenger Wire)

Drop Cabling

Intrabuilding Voice or Data Communication Networks

Outdoor Interconnect and Patchcord Applications

Interconnection of Distribution Boxes, Distribution Frames and Customer Equipment and between the buildings

WAN

Aerial (Lashed)

Installation Features

Store at -40 to +70 °C

Install at -10 to +60 °C

Operate at -40 to +70 °C

Design

Optical fiber : 1 to 4 cores 125/250µm, Single Mode or Multi Mode

Outer jacket : Black LSZH-HFFR material

Self supporting element : FRP rod 1.0mm

Peripheral pulling elements : FRP rod 0.5mm

Marking : APS Finland - ww/yy - DROP Fiber Optic Cable BOWA fiber count x fiber type - P/N - lot + meter

Environmental properties

Degree of acidity of gases : IEC 60754-1, IEC 60754-2

Halogen acid gas corrosiveness : TS EN 50267-2-3

Smoke Emission : IEC 61034-2

Flame retardant : IEC 60332-1-1, IEC60332-2-1

UV resistant : UL1581, IEC11801

Mechanical properties

Bending radius : 15 x O.D. (OS2 and MM), 10 x O.D. (G657A1/2)

Pulling tension, during installation : 600 N

Pulling tension, permanent : 400 N

Crush : 600N/100mm (IEC 60794-1-2 E3)

Impact : 5J ($\Delta\alpha$ reversible, IEC 60794-1-2-E4)

Colour code of fibers

	1	2	3	4
Fiber Colours	Blue	Orange	Green	Brown

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LIOVH OPGW Optical Ground Wire up to 24 cores type B1-63



*All images are indicative

Features

SUS AL tube

AA wire

Right Hand Z-stranding

Standards of reference and applications

IEC, IEEE, DL/T 832-2003, GB/T 7424.4-2003 standards

Installation Features

Store at -40 to +60 °C

Install at -10 to +50 °C, **Bend minimum** 262 mm

Operate at -40 to +80 °C, **Bend minimum** 157 mm

Design

Optical fiber : 125/250µm Single Mode G652.D or G.655

Fiber Buffer : Central SUS Tube / AL-Tube diameter 3.0/5.2 mm

Layer 1 : 9 wires AS/AA diameter 2.65 mm

Mechanical properties

Supporting Cross Section : 63.8 mm²

Section of AS Wire : 49.6 mm²

Section of AL tube : 14.2 mm²

Ultimate Tensile Strength (UTS) : 56.8 kN

Rate Tensile Strength (RTS) : 51.6 kN

Modulus of Elasticity (E-Modulus) : 121.3 kN/mm²

Thermal Elongation Coefficient : 14.4 Å~10⁻⁶ /°C

Permissible Maximum Working Stress (40% RTS) : 323.7 N/mm²

Everyday Stress □ EDS) (18%~25% RTS) : 145.7 ~202.3 N/mm²

Ultimate Exceptional Stress (70% RTS) : 566.5 N/mm²

DC Resistance : 0.789 Ω/km

Short Time Current (0.5s, 40°C ~200°C) : 7.7 kA

Short Time Current Capacity I²t : 29.3 kA²s

Ratio between Pull and Weight : 14.8 km

Colour code of fibers

1	2	3	4	5	6	7	8	9	10	11	12
Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Rose	Aqua
13	14	15	16	17	18	19	20	21	22	23	24
Blue/Black	Orange/Black	Green/Black	Brown/Black	Grey/Black	White/Black	Red/Black	Natural	Yellow/Black	Violet/Black	Rose/Black	Aqua/Black

Fiber Optic characteristics

See detailed specification of optical fibers.

Ordering and delivery information

Fiber Count	Part Number	Central tube	Fibers per tube	1st layer (no of tubes)	O.D. (mm)	Weight (kg/km)	Packaging
2	OPGWB16302xx	1	2	9	10.5	357	2-4km
4	OPGWB16304xx	1	4	9	10.5	357	2-4km
8	OPGWB16308xx	1	8	9	10.5	357	2-4km

Fiber Count	Part Number	Central tube	Fibers per tube	1st layer (no of tubes)	O.D. (mm)	Weight (kg/km)	Packaging
12	OPGWB16312xx	1	12	9	10.5	357	2-4km
24	OPGWB16324xx	1	24	9	10.5	357	2-4km

xx = fiber type

ex. G652D=S2, G655=S5

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LIIN-25 24 Way SC Duplex / LC Quad Fibre Optic Panel - Empty



Standards of reference and applications

EIA19"

Data centers

LAN/SAN

CATV networks

Fiber-to-the-home (FTTH) applications

Installation Features

Store at -0 to +70 °C

Install at -0 to +50 °C

Operate at : -20 to +60 °C

Fitting : designed for 24 adapters (SC Simplex or LC Duplex)

Design

Material : powder painted steel

Colour : black

Features : built-in splice management

Number of adaptors: 24

Type of adaptors: SC Duplex or LC Quad

Number of cores: up to 48 with SC DX or up to 96 with LC QD

Size : 19", 1 Unit / Width: 483mm x Height 44mm x Depth 205mm

Ordering and delivery information

P/N	Weight (kg/km)	Packaging
ODF124SCD	2.1	1 pc / ctn

Recommended connectivity

Adaptors : all LIIN-25 adaptors SC and LC, SM and MM

Pigtails : all LIIN-25 pigtails SC and LC, SM and MM

Patchcords : all LIIN-25 patchcords SC and LC, SM and MM

Extended System Warranty

The APS System Warranty assures the compliance of the system performance to the applicable class of cabling for a period of 25 years. The warranty may be applied for by an accredited APS Partner who has designed and/or installed the entire system.

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LIIN-25 24 Way SC Simplex / LC Duplex Fibre Optic Panel - Empty



Standards of reference and applications

EIA19"

Data centers

LAN/SAN

CATV networks

Fiber-to-the-home (FTTH) applications

Installation Features

Store at -0 to +70 °C

Install at -0 to +50 °C

Operate at : -20 to +60 °C

Fitting : designed for 24 adapters (SC Simplex or LC Duplex)

Design

Material : powder painted steel

Colour : black

Features : built-in splice management

Number of adaptors: 24

Type of adaptors: SC Simplex or LC Duplex

Number of cores: up to 24 with SC SX or up to 48 with LC DX

Size : 19", 1 Unit / Width: 483mm x Height 44mm x Depth 205mm

Ordering and delivery information

P/N	Weight (kg/km)	Packaging
ODF124SCS	2.1	1 pc / ctn

Recommended connectivity

Adaptors : all LIIN-25 adaptors SC and LC, SM and MM

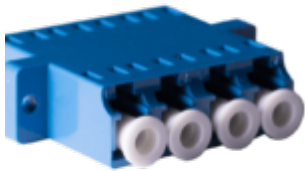
Pigtails : all LIIN-25 pigtails SC and LC, SM and MM

Patchcords : all LIIN-25 patchcords SC and LC, SM and MM

Extended System Warranty

The APS System Warranty assures the compliance of the system performance to the applicable class of cabling for a period of 25 years. The warranty may be applied for by an accredited APS Partner who has designed and/or installed the entire system.

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LIIN-25 Adaptor LC Duplex and Quad



Features

- Single Mode and Multi Mode
- Test Certificate on each package
- ISO9001, RoHS Compliant
- Batch number tracking
- Dust cover

- 25 years system warranty

Standards of reference and applications

ITU.T G652.D, ISO/IEC 11801, EIA/TIA 568 B.3, IEC60874, IEC EN 61754-4, EN 61754-20, EN 61755-3-2, EN 61755-2-2/B, EN 61755-2-2/1, EN-50173-1
Telecommunication, LAN, FTTx Cabling, CCTV

Installation Features

Store at +10 to +50 °C

Install at 0 to +50 °C

Operate at : -10 to +70 °C

Design

Material : plastic

Connection A : LC

Connection B : LC

Fastening : clip

SM UPC colour : blue

SM APC colour : green

MM UPC colour : OM1 and OM2 = beige, OM3 = turquoise, OM4 = purple.

Fiber Optic characteristics

	MM	SM PC	SM UPC	SM APC
Insertion Loss dB (typical)	≤ 0,2	≤ 0,2	≤ 0,2	≤ 0,2
Return Loss dB (typical)	≥ 35	≥ 45	≥ 45	≥ 55
Repeatability dB (typical)	≤ 0,2	≤ 0,2	≤ 0,2	≤ 0,2
Changeability dB (typical)	≤ 0,2	≤ 0,2	≤ 0,2	≤ 0,2

Ordering and delivery information

Fiber count	P/N	Packaging
Duplex UPC	AD xxx LC U DX	25 pcs / box
Duplex APC	AD xxx LC A DX	25 pcs / box
Quad UPC	AD xxx LC U QD	25 pcs / box
Quad APC	AD xxx LC A QD	25 pcs / box

xxx = fiber type = OS2, OM1, OM2, OM3, OM4.

Recommended connectivity

Cables : APS LIIN-25 series

Patch cords : APS LIIN-25 series

Pigtails : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

Extended System Warranty

The APS System Warranty assures the compliance of the system performance to the applicable class of cabling for a period of 25 years. The warranty may be applied for by an accredited APS Partner who has designed and/or installed the entire system.

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LIIN-25 Adaptor SC Simplex and Duplex



Features

- Single Mode and Multi Mode
- Test Certificate on each package
- ISO9001, RoHS Compliant
- Batch number tracking
- Dust cover
- 25 years system warranty

Standards of reference and applications

ITU.T G652.D, ISO/IEC 11801, EIA/TIA 568 B.3, IEC60874, IEC EN 61754-4, EN 61754-20, EN 61755-3-2, EN 61755-2-2/B, EN 61755-2-2/1, EN-50173-1
Telecommunication, LAN, FTTx Cabling, CCTV

Installation Features

Store at +10 to +50 °C

Install at 0 to +50 °C

Operate at : -10 to +70 °C

Design

Material : plastic

Connection A : SC

Connection B : SC

Fastening : clip and screw

SM UPC colour : blue

SM APC colour : green

MM UPC colour : beige

Fiber Optic characteristics

	MM	SM PC	SM UPC	SM APC
Insertion Loss dB (typical)	≤ 0,2	≤ 0,2	≤ 0,2	≤ 0,2
Return Loss dB (typical)	≥ 35	≥ 45	≥ 45	≥ 55
Repeatability dB (typical)	≤ 0,2	≤ 0,2	≤ 0,2	≤ 0,2
Changeability dB (typical)	≤ 0,2	≤ 0,2	≤ 0,2	≤ 0,2

Ordering and delivery information

Fiber count	P/N	Packaging
Simplex UPC	AD xxx SC U SX	25 pcs / box
Simplex APC	AD xxx SC A SX	25 pcs / box
Duplex UPC	AD xxx SC U DX	25 pcs / box
Duplex APC	AD xxx SC A DX	25 pcs / box

xxx = fiber type = OS2, OM1, OM2, OM3, OM4.

oo = connector type = SC, LC, FC, ST.

a = U for UPC, A for APC

bb = SX, DX or QU (for QUAD)

Recommended connectivity

Cables : APS LIIN-25 series

Patch cords : APS LIIN-25 series

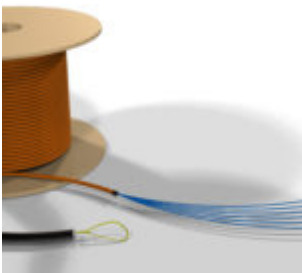
Pigtails : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

Extended System Warranty

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LIIN-25 Fiber Optic Preterminated cables



Features

70% faster to install

Very Low Installation Cost

No termination failures.

No waste of cables and connectors and termination materials.

Better attenuation values.

Pre-tested and test reports available for each single fiber.

Made after the customer's requirements, tailored to the specific case.

Pulling socks, strength elements and protection tubes available.

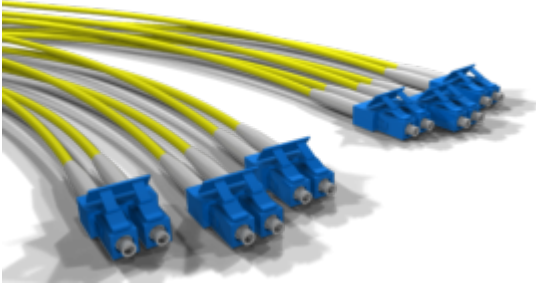
Different cables design available

SC, LC, MU, ST, FC, MT-RJ, and MTP connectors available.

Halogen Free Fire Retardant / Low Smoke Zero Halogen available.

Maximise your project with the APS failure-free, installation-ready preterminated fiber optic cables.

APS designs and delivers factory terminated fiber optic cables for various projects, from the biggest data center to the smaller LAN or industrial networks, with no minimum quantity required. Cables are made from high quality components, according the latest editions of the applicable standards or customer's requirements, with each single terminated fiber tested. The use of APS factory terminated cables minimizes the risks of the installation failures that might happen when terminating cables on site, due to the often non-optimal conditions at the site. Our pre terminated cables are available with both modular connectors than with MTP connectors and they are always done in accordance to the customer's specification or requirements, to answer fully to the needs of each specific installation.



Prime quality and long lasting reliability

The high standards of our manufacturing and testing processes ensure the installation will benefit from products of the highest quality. At APS we are very strict with the quality of our polishing process and with the compliance of each single terminated fiber with our own internal as well as with the applicable standards. In fact, we pay a lot of attention that the mechanical connections, the reflection coefficient, the attenuation values and the geometry of the connector's head are up to the standards and requirements.

Tests are done in accordance with ISO standards. The geometry of the fiber is tested with interferometer.

The largest scope, tailored to you

APS is offering a range of options that are virtually covering all requirements and applications.

Our scope of supply includes both silica fiber SM (G652, G657, G655) and MM (50 and 62,5 OM1, OM2, OM3, OM4, OM5) than Plastic Fibers (POF) while the cable used are as much as possible tailored to the customers' or project requirements, be for

indoor, indoor/outdoor or outdoor applications.

Product configurator : for a faster response please download APS “Preterm Configurator”, fill it in with your requirements and email it to your sales representative.

Optical cables innovation

Always up to date with the latest trends and technologies, APS keeps designing optical fiber cables to meet the new challenges of the telecommunication and data industries. Being space and growing data traffic being these days the main issue others, we have designed cables like MCHF and MIFFE for the installation of high fiber counts in packed indoor environments like datacenters. These cables are available in range from 4 to 288 cores. These cables save significant amount of the space that cables are taking in the group of typical sisä- ulkocables. These valmiskaapelit can be used also for the teollisuus standard MPO (MTP®). This way we are making sure of the highest kuitutiheyden and joustavimman runkoverkon liitettävyyden ratkaisut datakeskuksiin ja lähiverkon asennuksiin.

Fiber Optic characteristics

See detailed specification of optical fibers.

Recommended connectivity

Pigtails : APS LIIN-25 series

Patch cords : APS LIIN-25 series

Adapters : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

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LIIN-25 FO Distribution cable TB FTMS 2-24 Universal



Features

Easy to Strip, Direct Termination
Non-Metallic Strength Members
Dry, All Dielectric Non-Metallic design
Halogen Free Fire Retardant / Low Smoke Zero Halogen
Flexible
Low Installation Cost

Standards of reference and applications

DIN VDE 0888 Part 6; IEC 61034; IEC 60332-1&2; IEC 60754-2; IEC 60794-1&2
Inter Building and Intrabuilding Voice and Data/LAN Communication Networks
Interconnection of Distribution Boxes, Distribution Frames and Customer Equipment
and between the floors
Direct Connection to Terminal Equipments
Installation in Ducts & Conduits
Vertical Riser and General Horizontal Applications
FTTx Cabling

Installation Features

Store at -5 to +50 °C

Install at -0 to +50 °C

Operate at : -10 to +70 °C

Bend minimum : 10 times O.D.

Bend minimum : 10 times O.D.

Design

Optical fiber : 125/250µm Single Mode or Multi Mode

Buffer : 900µm tight, colour coded (see table 1)

Cable core : 2 to 24 optical fibers

Protection : glass or aramide yarns

Outer jacket : fire retardant LSZH material, UV resistant

Marking : APS Finland - ww/yy - Fiber Optic Cable TB FTMS fiber count x fiber type - LSZH-FR UVR IEC60332-3-24 - /lot + meter

Environmental properties and Fire Performances

Degree of acidity of gases : IEC 60754-1, IEC 60754-2 (pH arvo $\geq 4,3$ ja sähkönjohtavuus $\leq 10\mu\text{S}/\text{mm}$)

Halogen acid gas : IEC 60754-1, IEC 60754-2 ($\leq 0.3\%$)

Smoke Emission : IEC 61034-2, EN 50268-2 ($\geq 60\%$)

Toxicity of evolved gas : NES 713, CEI 20-37/7

Flame retardant : IEC 60332-1-2

Fire retardant : IEC 60332-3-24 Cat.C

UV resistant : UL1581, IEC11801

Fiber Optic characteristics

See detailed specification of optical fibers.

Colour code of fibers

1	2	3	4	5	6	7	8	9	10	11	12
Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Aqua
13	14	15	16	17	18	19	20	21	22	23	24
Blue/Black	Orange/Black	Green/Black	Brown/Black	Grey/Black	White/Black	Red/Black	Natural	Yellow/Black	Violet/Black	Pink/Black	Aqua/Black

Ordering and delivery information

Fiber count	P/N	O.D [mm]	Pulling tension (perm/inst)	Crush (N)	Impact	Weight (kg/km)	Packaging
2	FTMS02xxc	4.5	400/600	1000	3J	26	2000m / 6561ft
4	FTMS04xxc	5.5	400/600	1000	3J	31	2000m / 6561ft

Fiber count	P/N	O.D [mm]	Pulling tension (perm/inst)	Crush (N)	Impact	Weight (kg/km)	Packaging
6	FTMS06xxc	6.0	600/1000	1000	5J	42	2000m / 6561ft
8	FTMS08xxc	6.8	600/1000	1000	5J	48	2000m / 6561ft
12	FTMS12xxc	7.2	800/1200	1000	5J	54	2000m / 6561ft
16	FTMS16xxc	8.0	1000/1600	1000	5J	67	2000m / 6561ft
24	FTMS24xxc	8.6	1200/2000	1000	5J	85	2000m / 6561ft

xx = fiber type ex. OS2=S2, OM1=M1, OM2=M2, OM3=M3, OM4=M4
 c = colour ex. White=W, Yellow=Y, Orange=O, Grey=G, Turquoise=T, Purple=P

Recommended connectivity

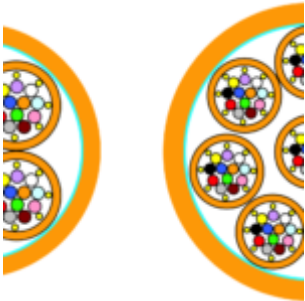
Pigtails : APS LIIN-25 series

Patch cords : APS LIIN-25 series

Adapters : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

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LIIN-25 FO Distribution cable TB FTMS 48-96 cores Universal



Features

- Easy to Strip, Direct Termination
- Non-Metallic Strength Members
- Dry, All Dielectric Non-Metallic design
- Halogen Free Fire Retardant / Low Smoke Zero Halogen
- Flexible
- Low Installation Cost

Standards of reference and applications

DIN VDE 0888 Part 6; IEC 61034; IEC 60332-1&2; IEC 60754-2; IEC 60794-1&2, EN 187000

Inter Building and Intrabuilding Voice and Data/LAN Communication Networks

Interconnection of Distribution Boxes, Distribution Frames and Customer Equipment and between the floors

Direct Connection to Terminal Equipments

Installation in Ducts & Conduits

Vertical Riser and General Horizontal Applications

FTTx Cabling

Installation Features

Store at -5 to +50 °C

Install at -0 to +50 °C, **Bend minimum** : 15 times O.D.

Operate at : -10 to +70 °C, **Bend minimum** : 12 times O.D.

Design

Optical fiber : 125/250µm Single Mode or Multi Mode

Buffer : 900µm tight, colour coded (see table 1)

Cable core : 12 or 24 optical fibers

Protection : glass or aramide yarns

Sub-unit jacket : fire retardant LSZH material, UV resistant

Marking : numbering 1 to 8

Assembling: from 4 up to 8 sub-units assembled together into a compact core

Wrapping: polyester tape

Outer jacket : fire retardant LSZH material, UV resistant (nominal thickness 1.2mm)

Marking : APS Finland - ww/yy - Fiber Optic Cable TB FTMS "fiber count and type" - LSZH IEC60332-3-24 Cat.C - lot no - meter

Environmental properties and Fire Performances

Degree of acidity of gases : IEC 60754-1, IEC 60754-2 (pH arvo $\geq 4,3$ ja sähkönjohtavuus $\leq 10\mu\text{S}/\text{mm}$)

Halogen acid gas : IEC 60754-1, IEC 60754-2 ($\leq 0.5\%$)

Smoke Emission : IEC 61034-2, EN 50268-2 ($\geq 60\%$)

Toxicity of evolved gas : NES 713, CEI 20-37/7

Flame retardant : IEC 60332-1-2

Fire retardant : IEC 60332-3-24 Cat.C

UV resistant : UL1581, IEC11801

Fiber Optic characteristics

See detailed specification of optical fibers.

Colour code of fibers

1	2	3	4	5	6	7	8	9	10	11	12
Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Aqua
13	14	15	16	17	18	19	20	21	22	23	24
Blue/Black	Orange/Black	Green/Black	Brown/Black	Grey/Black	White/Black	Red/Black	Natural	Yellow/Black	Violet/Black	Pink/Black	Aqua/Black

Ordering and delivery information

Fiber count	P/N	O.D [mm] Subcable	O.D [mm]	Pulling tension (perm/inst)	Crush (N)	Impact	Weight (kg/km)	Packaging
48	FTMS48xxc	6.5	18.0	1500	1500	4J	350	500m / 1640ft
72	FTMS72xxc	6.5	22.0	1500	1500	4J	450	500m / 1640ft
96 (8x12)	FTMS968xxc	6.5	22.0	1500	1500	4J	550	500m / 1640ft
96 (4x24)	FTMS964xxc	8.6	21.0	1500	1500	4J	550	500m / 1640ft

xx = fiber type ex. OS2=S2, OM1=M1, OM2=M2, OM3=M3, OM4=M4

c = colour ex. White=W, Yellow=Y, Orange=O, Grey=G, Turquoise=T, Purple=P

Recommended connectivity

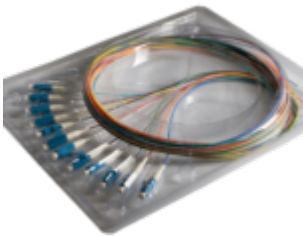
Pigtails : APS LIIN-25 series

Patch cords : APS LIIN-25 series

Adapters : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

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LIIN-25 FO Pigtail LC



Features

- G.652.D OS2 Single and Multi Mode

- Simplex and duplex
- ISO9001, RoHS Compliant
- Test Certificate for each item
- Batch number tracking

Standards of reference and applications

ITU.T G652.D, ISO/IEC 11801, EIA/TIA 568 B.3, IEC60874, IEC EN 61754-20, EN 61755-3-2, EN 61755-2-2/B, EN 61755-2-2/1
Telecommunication, LAN, FTTx Cabling, CCTV

Installation Features

Store at +10 to +50 °C

Install at 0 to +50 °C and **bend minimum** : 20 times O.D.

Operate at : -10 to +70 °C and **bend minimum** : 10 times O.D.

Short term max. pulling tension : 6.0N

Long term max. pulling tension : 3.0N

Design

Optical fiber : 125/250 Single and Multi Mode

Buffer : 900µm tight, colour coded

Fiber count : 1

Outer diameter : 0.9mm

UPC connector colour : blue

APC connector colour : green

Assembly : glue and polish

Connection : physical contact

Fiber Optic characteristics

	MM	SM PC	SM UPC	SM APC
Insertion Loss dB (typical)	0.15	0.15	0.15	0.15
Return Loss dB (typical)	≥ 35	≥ 45	> 50	> 60
Repeatability dB (typical)	≤0,2	≤0,2	≤0,2	≤0,2
Changeability dB (typical)	≤0,2	≤0,2	≤0,2	≤0,2

Colour code of fibers

1	2	3	4	5	6	7	8	9	10	11	12
Light Green	Pink	Purple	Yellow	Black	Red	White	Grey	Brown	Green	Orange	Blue

Ordering and delivery information

Fiber count	P/N	Weight (kg/km)	Length (m)	Packaging
1	PT xxx LC a 02	0.9	2.0	12 pcs / ctn

Fiber count	P/N	Weight (kg/km)	Length (m)	Packaging
1	PT xxx LC a 00	0.9	custom	custom

oo =connector type = SC, LC, FC, ST

a = U for UPC, A for APC

oo =connector type = SC, LC, FC,

ST 00 = length (standard 2.0mm)

Recommended connectivity

Cables : APS LIIN-25 series

Patch cords : APS LIIN-25 series

Adapters : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

Extended System Warranty

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LIIN-25 FO Pigtail SC



Features

- Single Mode and Multi Mode
- Easy to strip 900µm
- Easy unpack and identification with 12-colours blister bag
- Test Certificate on each blister bag
- ISO9001, RoHS Compliant
- Batch number tracking
- Dust cover
- Choice of connectors

Standards of reference and applications

ITU.T G652.D, ISO/IEC 11801, EIA/TIA 568 B.3, IEC60874, IEC EN 61754-4, EN 61754-20, EN 61755-3-2, EN 61755-2-2/B, EN 61755-2-2/1, EN-50173-1
Telecommunication, LAN, FTTx Cabling, CCTV

Installation Features

Store at +10 to +50 °C

Install at 0 to +50 °C and **bend minimum** : 10 times O.D.

Operate at : -10 to +70 °C and **bend minimum** : 10 times O.D.

Short term max. pulling tension : 6.0N

Long term max. pulling tension : 3.0N

Design

Optical fiber : 125/250 Single or Multi Mode

Buffer : 900µm tight, colour coded

Fiber count : 1

Outer diameter : 0.9mm

SM UPC connector colour : blue

SM APC connector colour : green

MM UPC connector colour : beige

Assembly : glue and polish

Connection : physical contact

Fiber Optic characteristics

	MM	SM PC	SM UPC	SM APC
Insertion Loss dB (typical)	0.2	0.2	0.15	0.15
Return Loss dB (typical)	≥ 35	≥ 45	> 55	> 60
Repeatability dB (typical)	≤0,2	≤0,2	≤0,2	≤0,2
Changeability dB (typical)	≤0,2	≤0,2	≤0,2	≤0,2

Colour code of fibers

1	2	3	4	5	6	7	8	9	10	11	12
Light Green	Pink	Purple	Yellow	Black	Red	White	Grey	Brown	Green	Orange	Blue

Ordering and delivery information

Fiber count	P/N	Weight (kg/km)	Length (m)	Packaging
1	PT xxx oo a 02	0.9	2.0	12 pcs / ctn

Fiber count	P/N	Weight (kg/km)	Length (m)	Packaging
1	PT xxx oo a 00	0.9	custom	custom

xxx = fiber type = OS2, OM1, OM2, OM3, OM4

oo = connector type = SC, LC, FC, ST

a = U for UPC, A for APC

00 = length (standard 2.0mm)

Recommended connectivity

Cables : APS LIIN-25 series

Patch cords : APS LIIN-25 series

Adapters : APS LIIN-25 series

Patch Panels : APS LIIN-25 series

Extended System Warranty

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LIIN-25 FO Universal cable LTH Loose Tube 2-24 cores



Features

Compact, Light Weight and Small Size, Robust
Waterproof, UV- Resistant
All Dielectric, Non-Metallic Armored, Rodent Resistant
Halogen Free Fire Retardant / Low Smoke Zero Halogen
Enforcement with Non-Metallic Strength Members

Applications

Inter Building and Intrabuilding Voice or Data Communication Networks General Purpose

Installed in Ducts & Conduits

Secondary Distribution

LAN

FTTB Cabling

Campus Cabling

Indoor and Outdoor (Universal Use)

Telecommunication Data Trunk Systems

Interconnection of Distribution Boxes, Distribution Frames and the Panels at Customer Side

Standards of reference

IEC 60754-1, IEC 61034-1&2, IEC 60332-1, IEC 60794-1&2

Installation Features

Store at -5 to +50 °C

Install at -0 to +50 °C, **Bend minimum** : 20 times O.D.

Operate at : -30 to +70 °C, **Bend minimum** : 20 times O.D.

Design

Optical fiber : 125/250µm Single Mode or Multi Mode

Buffer : PBTP loose tube diam. 3.0mm, filled with jelly

Fiber count : 2 to 24

Protection : waterblocking glass yarns

Outer jacket : fire retardant LSZH material, UV resistant

Marking : APS Finland - ww/yy - Fiber Optic Cable CTH fiber count x fiber type - LSZH-FR UVR - lot + meter

Environmental properties and Fire Performances

Degree of acidity of gases : IEC 60754-1, IEC 60754-2

Halogen acid gas : IEC 60754-1, IEC 60754-2

Smoke Emission : IEC 61034-2, EN 50268-2

Toxicity of evolved gas : NES 713, CEI 20-37/7

Flame retardant : IEC 60332-1-2

UV resistant : UL1581, IEC11801

Fiber Optic characteristics

See detailed specification of optical fibers.

Colour code of fibers

Bundle A	1	2	3	4	5	6	7	8	9	10	11	12
	Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Aqua
Bundle B	13	14	15	16	17	18	19	20	21	22	23	24
	Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Aqua

Ordering and delivery information

Fiber count	P/N	O.D [mm]	Pulling tension (perm/inst)	Crush (N)	Impact	Weight (kg/km)	Packaging
2	CTH02xxc	7.5	1000/2500	1500	3J	62	2000m / 6561ft
4	CTH04xxc	7.5	1000/2500	1500	3J	62	2000m / 6561ft
6	CTH06xxc	7.5	1000/2500	1500	5J	62	2000m / 6561ft
8	CTH08xxc	7.5	1000/2500	1500	5J	62	2000m / 6561ft
12	CTH12xxc	7.5	1000/2500	1500	5J	62	2000m / 6561ft
16	CTH16xxc	8.5	1000/2500	1500	5J	90	2000m / 6561ft

Fiber count	P/N	O.D [mm]	Pulling tension (perm/inst)	Crush (N)	Impact	Weight (kg/km)	Packaging
24	CTH24xxc	8.5	1000/2500	1500	5J	90	2000m / 6561ft

xx = fiber type ex. OS2=S2, OM1=M1, OM2=M2, OM3=M3, OM4=M4
 c = colour ex. Yellow=Y, Orange=O, Grey=G, Turquoise=T, Purple=P, Black=B

Recommended connectivity

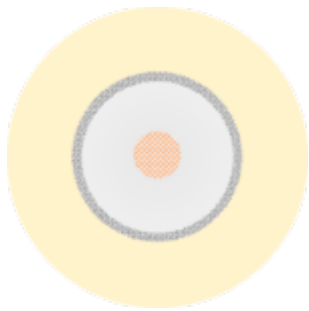
- Pigtails** : APS LIIN-25 series
- Patch cords** : APS LIIN-25 series
- Adapters** : APS LIIN-25 series
- Patch Panels** : APS LIIN-25 series

Extended System Warranty

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Coaxial cable 50 Ohm PLENUM RG58/U



Store at: -40 to +70 °C

Install at -10 to +50 °C, **Bend minimum** 15 times O.D.

Operate at -40 to +200°C, **Bend minimum** 10 times O.D.

Max recommended pulling tension 40 lbs

Design

Conductor : stranded barecopper AWG20 19×32

Dielectric : foam FEP 0.102"

Screen 1 : tinned copper braid coverage 95%

Outer jacket : Ivory FEP 0.158" nom.

Marking : APS Finland - ww/yy - RG58 PLENUM - 50 OHM - 200°C FT6 - lot + ft

Note : the Jacket is sequentially footmarked.

Environmental properties and Fire Performances

Flame retardant : NFPA 262 PLENUM, FT6

Electrical characteristics

Impedance : 52 Ω nominal

Capacitance : 25 pF/ft nominal (@ 1KHz)

Velocity ratio : 82%

DC resistance @ 20°C : 8.8 Ω /1m nominal

Attenuation

MHz	1	10	50	100	400	700	900	1000
dB/100FT	0.5	1.3	3.2	4.9	11.1	15.3	18.4	19.6

Ordering and delivery information

Type	P/N	O.D [in / mm]	Weight [lbs/m / kg/m]	Packaging (standard)
RG58/U PLENUM	C50R58P	0.158 / 4.0	0.17 / 7.72	1000ft or 305m (+/-5%)

Other standards of reference

-

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Multi Mode Optical Fiber Specification



Multi Mode Fibres	OM1 MM62.5	OM1 + MM62,5	OM2 MM50	OM3 MM50	OM4 MM50	OM5 MM50
Applicable standards	IEC60793-2-10 Type A1b	IEC60793-2-10 Type A1b	IEC60793-2-10 Type A1a.1	ISO/IEC 11801	ISO/IEC 11801 IEC60793-2-10 Type A1a.3	ISO/IEC 11801-OM5 IEC60793-2-10 Type A1a.4
	Telcordia GR20-CORE	Telcordia GR20-CORE	Telcordia GR20-CORE	IEC60793-2-10 Type A1a.2	Telcordia GR20-CORE	Telcordia GR 20-CORE/409-CORE
			ITU-T G651.1, Am.1	ITU-T G651.1, Am.1	ITU-T G651.1, Am.1	TIA/EIA-492AAAE

Multi Mode Fibres	OM1 MM62.5	OM1 + MM62,5	OM2 MM50	OM3 MM50	OM4 MM50	OM5 MM50
Core Diameter	62,5 ± 2 µm	62,5 ± 2.5 µm	50 ± 2 µm	50 ± 2 µm	50 ± 2 µm	50 ± 2.5 µm
Core non-circularity	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %
Cladding diameter	125 ± 1,0 µm	125 ± 1,0 µm	125 ± 1,0 µm	125 ± 1,0 µm	125 ± 1,0 µm	125 ± 1,0 µm
Coating diameter	242 ± 5 µm	242 ± 7 µm	242 ± 5 µm	242 ± 5 µm	242 ± 5 µm	242 ± 5 µm
Cladding non-circularity	≤ 0,7 %	≤ 1,0 %	≤ 0,7 %	≤ 0,7 %	≤ 0,7 %	≤ 1,0 %
Core/Cladding concentricity error	≤ 1,0 µm	≤ 1,0 µm	≤ 1,0 µm	≤ 1,0 µm	≤ 1,0 µm	≤ 1,5 µm
Coating/Cladding concentricity error	≤ 10 µm	≤ 12 µm	≤ 6 µm	≤ 6 µm	≤ 6 µm	≤ 10 µm
Numerical aperture	0,275 ± 0,015 µm	0,275 ± 0,015 µm	0,200 ± 0,015 µm	0,200 ± 0,015 µm	0,200 ± 0,015 µm	0,200 ± 0,015 µm
Attenuation @ 850 nm	≤ 3,50 dB/km	≤ 2.80 dB/km	≤ 2,80 dB/km	≤ 2,80 dB/km	≤ 2,60 dB/km	≤ 2,40 dB/km
Attenuation @ 1300 nm	≤ 1,00 dB/km	≤ 0,70 dB/km	≤ 0,80 dB/km	≤ 0,80 dB/km	≤ 0,60 dB/km	≤ 0,60 dB/km
Bandwith @ 850 nm	≥ 200 MHz*km	≥ 250 MHz*km	≥ 500 MHz*km	≥ 1500 MHz*km	≥ 3500 MHz*km	≥ 3500 MHz*km
Bandwith @ 1300 nm	≥ 500 MHz*km	≥ 1000 MHz*km	≥ 500 MHz*km	≥ 500 MHz*km	≥ 500 MHz*km	≥ 500 MHz*km
Proof test	≥ 100 kpsi	≥ 100 kpsi	≥ 100 kpsi	≥ 100 kpsi	≥ 100 kpsi	≥ 100 kpsi
Link lengths						
100BASE FX	2000m	2000m	2000m	2000m	2000m	2000m
1000BASE SX	275m	500m	550m	1000m	1100m	1100m
1000BASE LX	550m	1000m	550m	550m	550m	550m
10GBASE SW/SR	565m	33m	82m	300m	550m	550m
10GBASE LX4	-	-	300m	300m	300m	300m
40GBASE SR4	-	-	-	100m	150m	150m

Multi Mode Fibres	OM1 MM62.5	OM1 + MM62,5	OM2 MM50	OM3 MM50	OM4 MM50	OM5 MM50
100GBASE SR10	-	-	-	100m	150m	100m

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Patch panel, 24 ports RJ45,

unloaded



Standards of reference and applications

EIA19"

Installation Features

Store at -0 to +70 °C

Install at -0 to +50 °C

Operate at : -20 to +60 °C

Fitting : designed for unshielded and shielded LAN 1 unit EIA 19" rack mount.

Design

Material : black powder painted steel (front), galvanised steel (rear).

Features : built-in cable holder rack with cable shield termination.

Printing : Numbered 1-24

Size : 18.4 x 38.4 x 25.7 mm, 1 Unit

Ordering and delivery information

Ports	P/N	Size [mm]	Weight [kg/km]	Packaging
24	PPE24SU	18.4H x 38.4W x 25.7D	1.0	1 pc/box

Recommended connectivity

Keystone jack : all APS Keystone Jacks Category 5e, 6, 6A.

Patchcords : PCMJ6U_, PCMJ6F_, PCMJ6S_.

Extended System Warranty

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RA19 Cable Management, 5 hooks



Standards of reference and applications

EIA19"

Installation Features

Store at -0 to +70 °C

Install at -0 to +50 °C

Operate at : -20 to +60 °C

Fitting : designed for LAN 1 unit EIA 19" rack mount.

Design

Material : black powder painted steel.

Features : built-in 5 hooks.

Size : 18.4 x 25.7 mm, 1 Unit

Ordering and delivery information

Hooks	P/N	Size [mm]	Weight [kg/km]	Packaging
5	MCRPAS1	18.4H x 38.4W	0.8	1 pc/box

Recommended connectivity

Racks : all APS RA19 Series

Extended System Warranty

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RA19 Network Cabinets 19" Glass Door



Features

- 15U to 42U high
- 600, 800 or 1000 mm deep
- Glass door
- Grey White or Black colour
- Heavy duty lockable casters included
- Brush strip cable entry in roof and base
- Large cut out in base for cable entry
- Swing handle lock
- Full height front and rear adjustable 19" profiles
- 19" profiles marked with U height position
- Removable side panels
- Supplied as flat pack (or assembled upon request)

Standards of reference and applications

ANSI/EIA-310-E, IEC 60297-2, DIN 41494 Part 1 & 7.

Telecommunication, LAN, FTTx Cabling, CCTV.

Installation Features

Store at +10 to +50 °C

Install at 0 to +50 °C

Operate at : -10 to +70 °C

Design

Material : SPCC Cold Rolled Steel

Door : tempered glass (alternatively steel)

19" rails : 2.0mm thick

Frame : 2.0mm thick

Side panels : 1.0mm thick

Colour : standard Black RAL9004 (optional grey or white)

Front door lock : single point lock, swing handle

Rear door lock : single point barrel lock

Side door lock : single point barrel lock

Ordering and delivery information

Unit count	Width	Depth	Height	Weight (kg)	Code	Flat-Pack	Assembled
15U	600	600	780	44	RA196615GDB	Yes	Upon request
15U	600	800	780	50	RA196815GDB	Yes	Upon request
15U	800	600	780	50	RA198615gdb	Yes	Upon request

Unit count	Width	Depth	Height	Weight (kg)	Code	Flat-Pack	Assembled
15U	800	800	780	60	RA198815GDB	Yes	Upon request
18U	600	600	910	48	RA196618GDB	Yes	Upon request
18U	600	800	910	55	RA196818GDB	Yes	Upon request
18U	800	600	910	55	RA198618GDB	Yes	Upon request
18U	800	800	910	64	RA198818GDB	Yes	Upon request
22U	600	600	1090	52	RA196622GDB	Yes	Upon request
22U	600	800	1090	62	RA196822GDB	Yes	Upon request
22U	800	600	1090	62	RA198622GDB	Yes	Upon request
22U	800	800	1090	70	RA198822GDB	Yes	Upon request
24U	600	600	1200	80	RA196624GDB	Yes	Upon request
24U	600	800	1200	80	RA196824GDB	Yes	Upon request
24U	800	600	1200	80	RA198624GDB	Yes	Upon request

Unit count	Width	Depth	Height	Weight (kg)	Code	Flat-Pack	Assembled
24U	800	800	1200	80	RA198824GDB	Yes	Upon request
27U	600	600	1310	60	RA196627GDB	Yes	Upon request
27U	600	800	1310	70	RA196827GDB	Yes	Upon request
27U	800	600	1310	70	RA198627GDB	Yes	Upon request
27U	800	800	1310	80	RA198827GDB	Yes	Upon request
32U	600	600	1540	74	RA196632GDB	Yes	Upon request
32U	600	800	1540	85	RA196832GDB	Yes	Upon request
32U	800	600	1540	85	RA198632GDB	Yes	Upon request
32U	800	800	1540	90	RA198832GDB	Yes	Upon request
42U	600	600	1980	90	RA196642GDB	Yes	Upon request
42U	600	800	1980	105	RA196842GDB	Yes	Upon request
42U	800	600	1980	105	RA198642GDB	Yes	Upon request

Unit count	Width	Depth	Height	Weight (kg)	Code	Flat-Pack	Assembled
42U	800	800	1980	120	RA198842GDB	Yes	Upon request

Recommended connectivity

Patch panels for copper cabling : PPE24SU

Patch panels for fiber optic cabling : ODF124SCS, ODF124SCS and generally all LIIN-25 series

Cable management : MCRPAS1, MCRPAS2

Extended System Warranty

The APS System Warranty assures the compliance of the system performance to the applicable class of cabling for a period of 25 years. The warranty may be applied for by an accredited APS Partner who has designed and/or installed the entire system.



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