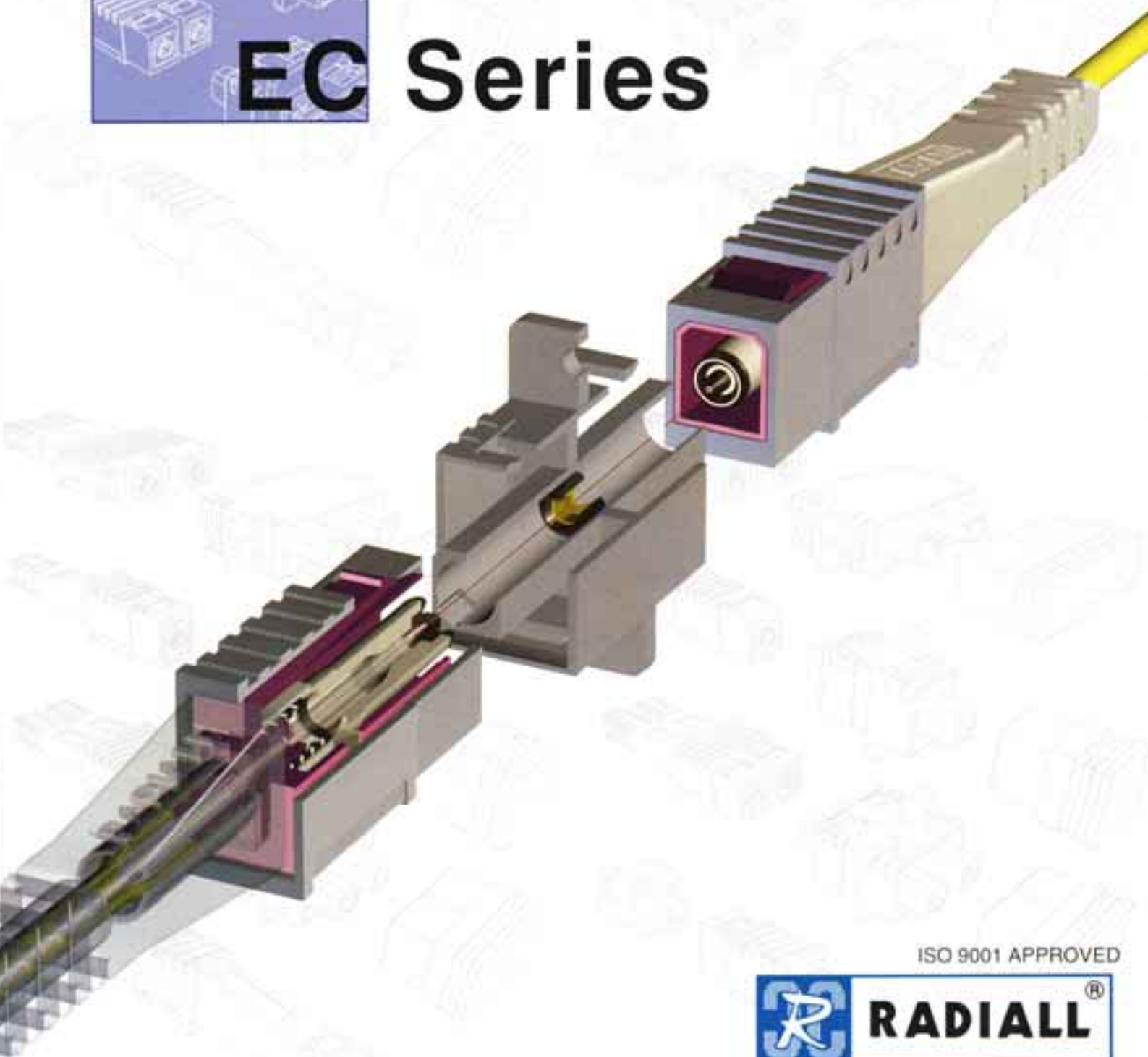




Fibre Optic Connectors
and Components

EC Series



ISO 9001 APPROVED





THE EC SYSTEM

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Its high performance, very low reflexion rate and its very economical design make the **EC connector** the most adapted to the requirements of the subscriber networks of the 21st century.

The EC connector is also the first link in a coherent and evolutionary system :

”THE EC SYSTEM”

This includes :

- connectorized active device housings (lasers and photodiodes),
- multi channel modules for type 41612 and metric back panel connectors,
- duplex versions adapted for ATM requirements,

and more generally, a whole range of functions and solutions adapted to the new requirements of the information super highway and subscriber networks.

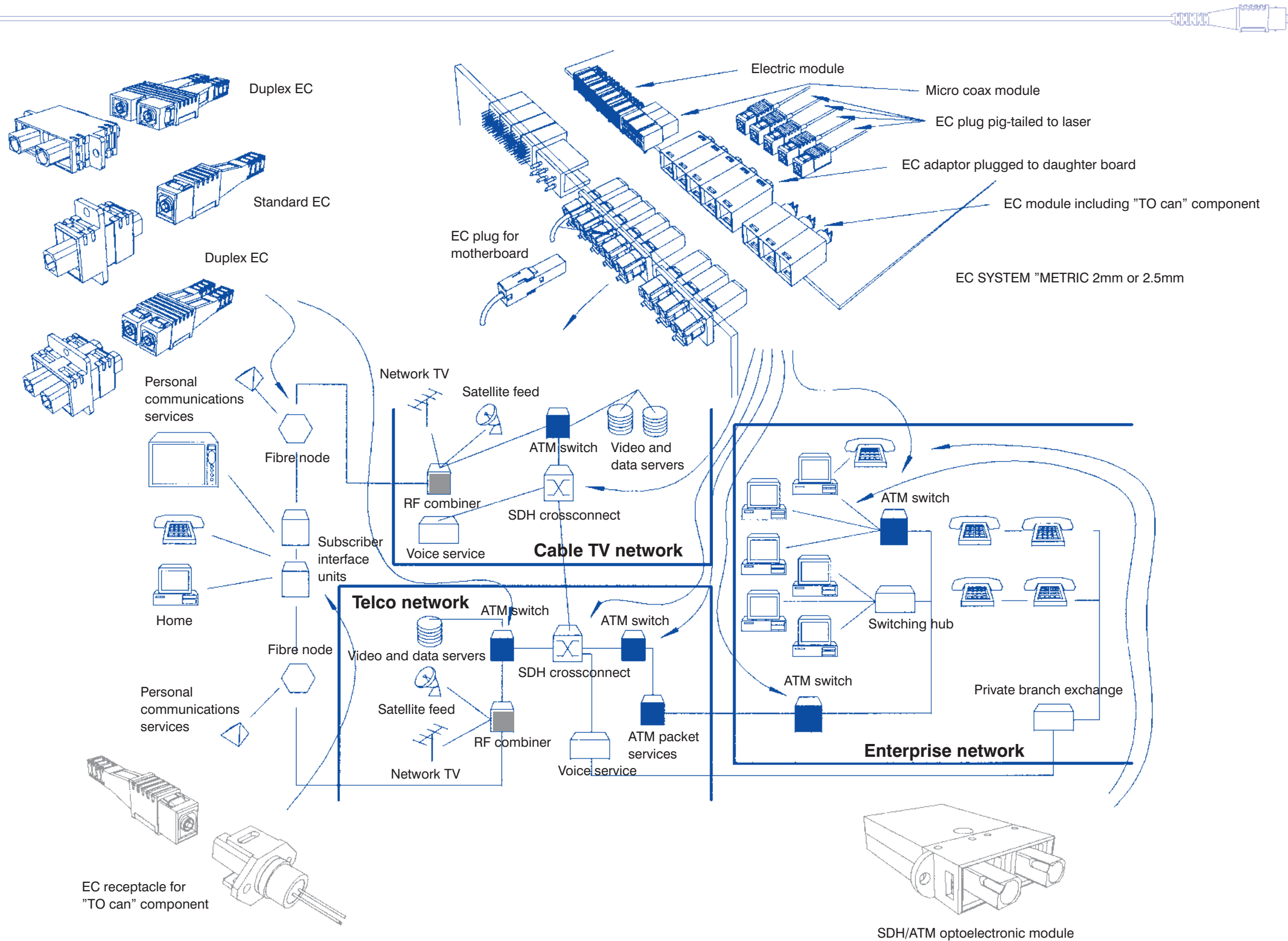
Characteristics :

- High performances, low cost
- Easily implemented (no convex polishing)
- High density
- Very easy to use (push-pull and “click” type locking)
- Adaptable (operates independently of the wavelength)
- Safe and reliable

Applications :

- ◆ High-speed, long distance transmission
- ◆ Subscriber networks, distribution
- ◆ Local networks
- ◆ Medical
- ◆ Video transmission
- ◆ Industry

The EC system for multimedia and subscriber networks



The technology



THE MECHANICAL DESIGN OF THE HOUSING

The housing is simply **clicked into place**, which means it is easy to use even in configurations which are difficult to access.

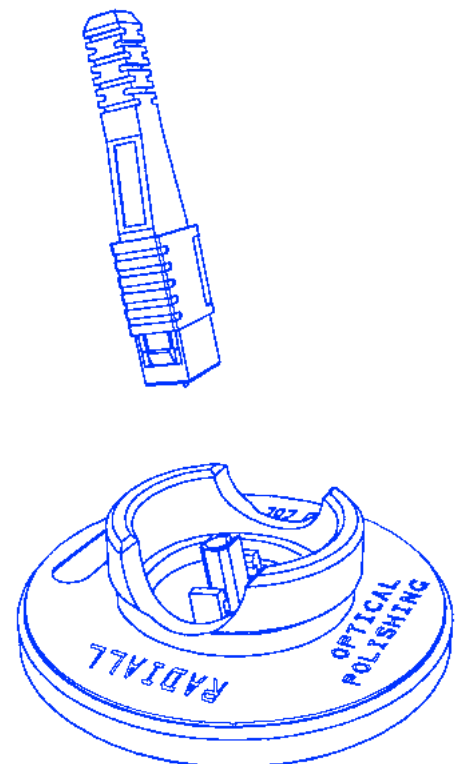
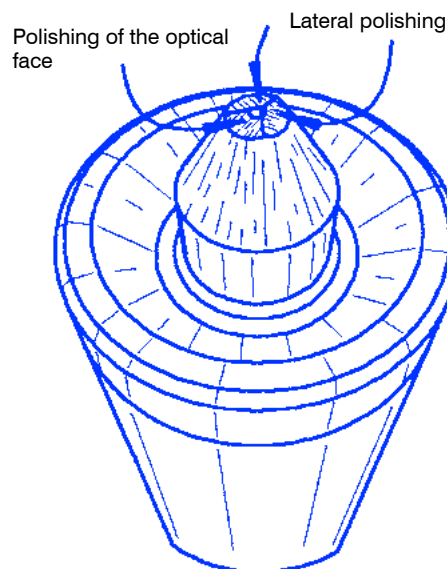
Its **rectangular form** allows the connectors to be placed side by side.

A **floating ferrule** allows it to act independently of traction on the cable.

ATTENUATION AND REFLEXION PERFORMANCES

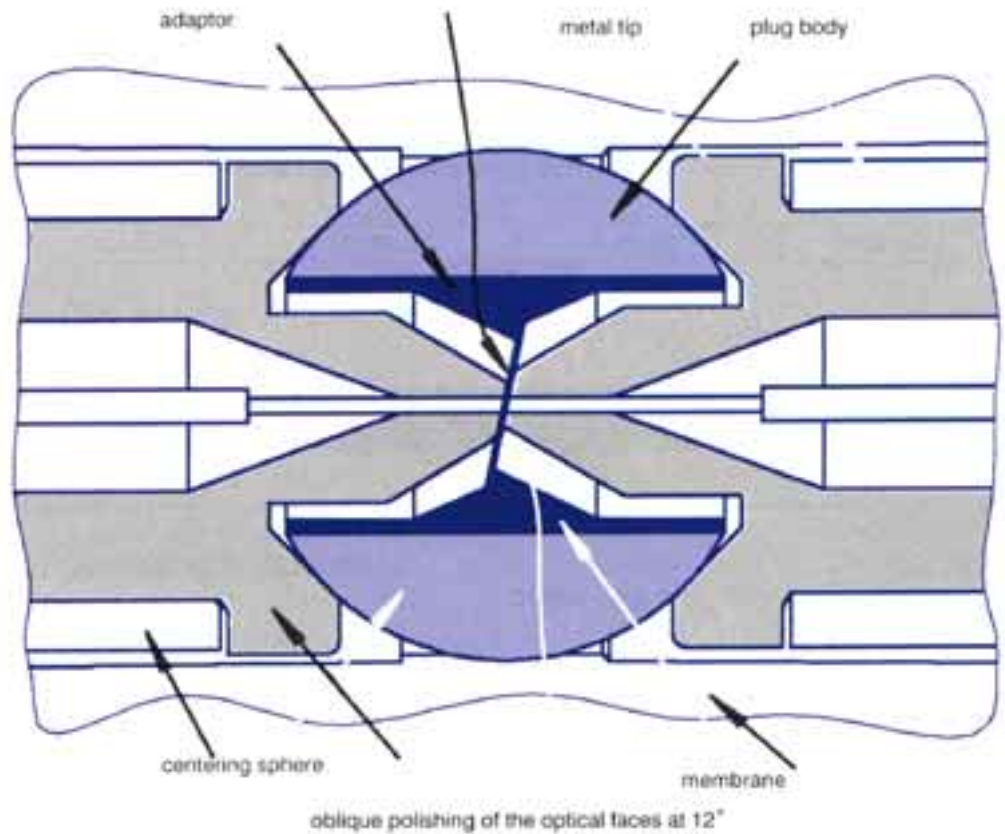
Low losses. A silicone membrane ensures optical continuity between the parallel and oblique fibre surfaces, over a wide range of dimensional tolerances. Before connection, the membrane is 30 μm thick. Following connection, the central area only is compressed to 20 μm (see diagram page 7). Estimated losses are identical at 1310 and 1550 nm.

Low reflexion whether the connector is coupled or uncoupled. This is ensured by the optical faces and the membrane being inclined at 12°.





CONE AND SPHERE ALIGNMENT OF THE EC CONNECTOR



The conical face of the plugs supports the sphere of the adaptor and acts as a **mechanical reference**.

Once clicked onto the adaptor, **the plugs position themselves on the sphere** and allow the two fibres to be aligned.

MATERIALS

Plug body	Polysulfone
Stripping device	PBT
Optical ferrule	Copper/nickel alloy
Protective sleeve	TEFABLOC
Adaptor body	Polysulfone
Panel attachment	Stainless steel
Membrane	Silicone



Designation of EC connectors according to IEC and CECC standards : **CF 08**

APPLICABLE STANDARDS

EN (intermediate specification)	:	EN 86210 published in December 1992
IEC (intermediate specification)	:	IEC 874-13 published in 1993
IEC (interfaces)	:	IEC 1754-8 IEC86B/609/DIS

SPECIFIC SPECIFICATIONS

CECC	:	CECC 86211-001 published in May 1993 CECC approval given 23/07/93
CECC	:	CECC 86215-001 published in July 1994 CECC approval renewed 10/95
CECC	:	CECC 86215-801
IEC	:	IEC 874-13-1 - EC Plug IEC86B/714/NP
IEC	:	IEC 874-13-3 - EC Adaptor IEC86B/716/NP



Typical insertion loss

Multimode (850 nm) and singlemode (1310 and 1550 nm) using a standard plug according to *specification IEC 874-1 § 4-4-7 method 7.*

singlemode	multimode		
9,5/125	50/125	62.5/125	100/140
0,25 dB	0,15 dB	0,15 dB	0,15 dB

Standard deviation

0.10 dB	0.09 dB	0.09 dB	0.09 dB
----------------	----------------	----------------	----------------

Return loss

IEC 874-1

singlemode	multimode	
9,5/125	50/125	62.5/125
≥ 60 dB	≥ 50 dB	≥ 50 dB

Operating temperature

CECC 86000 § 4-5-22 : **-25°C to +70°C**

Storage temperature

: **-40°C to +85°C**

Salt spray

CECC 86000 § 4-5-26 : **96 hours**

Cable traction

CECC 86000 § 4-5-4 : **100 N**

Vibrations

CECC 86000 § 4-5-1 : **10/500 Hz - 10g max.**

Shocks

: **100g - 10 mS**

Mechanical endurance

CECC 86000 § 4-5-32 : **1000 cycles**

Free falls

CECC 86000 § 4-5-14 : **8 falls - 1.5 metres**



PLUG HOUSINGS

For greater flexibility, several types of coatings, tubes or cables can be connected with the same plug. Use the table below to check the different diameters admissible for each part number.

PART NUMBERS for 9.5/125 fibres	Ø of coating, tube and cable						
	Bare fibre 250 µm	Coated fibre 500 or 900 µm tight structure	Fibre 250 µm + tube 0.6/1 mm	Fibre 250 µm + tube 0.8/1.6 mm	Cable Ø 2.2 to 3.2 mm		Cable Ø 3.5
					Coated fibre 900 µm tight structure	Coated fibre 250 µm loose structure	Coated fibre 900 µm tight structure
F 715 050 000	○	○			○	○	
F 715 051 000	○						○
F 715 052 000				○			
F 715 055 000	○	○					
F 715 058 000					○	○	
F 715 059 000			○				
F 715 060 000 high density	○						○
F 715 061 000 high density	○	○			○	○	
F 715 062 000 high density			○				

OPTICAL FERRULES

EC **singlemode** plug housings are to be equipped with an **optical ferrule**. These come in 6 different sizes and are ordered separately. Selecting the right ferrule allows optimal performances.



124 µm (+1/0) 125 µm (+0.5/0) 125 µm+ (+1/+0.5) 126 µm (+1/0) 127 µm (+1/0) 128 µm (+1/0)

F 715 001 704 F 715 001 705 F 715 001 703 F 715 001 706 F 715 001 707 F 715 001 708

PLUG HOUSINGS + OPTICAL FERRULES

For users who are entirely familiar with their fibre (tolerance virtually constant in relation to the nominal value), and who therefore wish to forego selecting a ferrule, there are several complete part numbers comprising a plug housing + optical ferrule in the most standard dimensions.

PART NUMBERS for 9.5/125 fibres	Ø of coating, tube and cable						
	Bare fibre 250 µm	Coated fibre 500 or 900 µm tight structure	Fibre 250 µm + tube 0.6/1 mm	Fibre 250 µm + tube 0.8/1.6 mm	Cable Ø 2.2 to 3.2 mm		Cable Ø 3.5
					Coated fibre 900 µm tight structure	Coated fibre 250 µm loose structure	Coated fibre 900 µm tight structure
F 715 010 703 125 µm+ (+1/+0,5)	○	○			○	○	
F 715 010 706 126 µm (+1/0)	○	○			○	○	



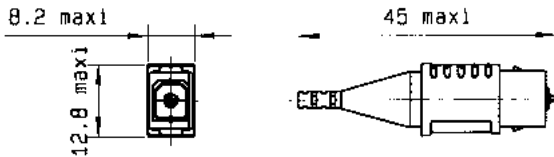
For greater flexibility, several types of coatings, tubes or cables can be connected with the same plug. Use the table below to check the different diameters admissible for each part number.

PART NUMBERS for 50/125 and 62.5/125 fibres	PART NUMBERS for 100/140 fibres	Ø of coating, tube and cable					
		Bare fibre 250 µm	Coated fibre 500 or 900 µm tight structure	Fibre 250 µm + tube 0.6/1 mm	Fibre 250 µm + tube 0.8/1.6 mm	Cable Ø 2.2 to 3.2 mm	
						Coated fibre 900 µm tight structure	Coated fibre 250 µm loose structure
F 715 100 000	F 715 102 000	○	○			○	○
F 715 105 000	F 715 106 000				○		
F 715 109 000	F 715 112 000			○			
F 715 150 000 high density	F 715 151 000 high density	○	○			○	○

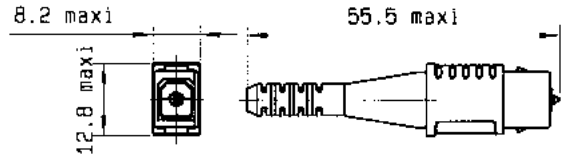
EC **Multimode** plugs are delivered equipped with an **optical ferrule**.

Note : Plug versions are also available for connecting **HCS 200, 400 and 600 µm type** multimode fibres. Consult us about part numbers and how to implement them.

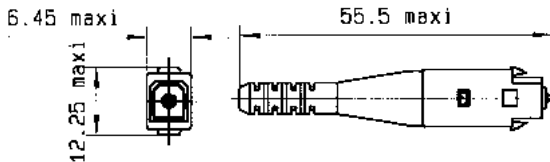
Dimensions of singlemode and multimode plugs



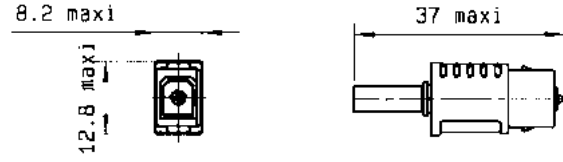
F 715 055 000



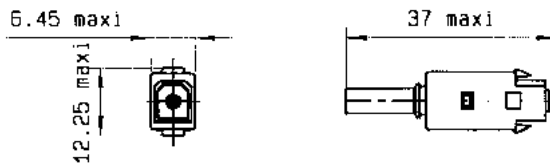
F 715 010 703 F 715 051 000 F 715 100 000
F 715 010 706 F 715 058 000 F 715 102 000
F 715 050 000



F 715 060 000 F 715 150 000
F 715 061 000 F 715 151 000



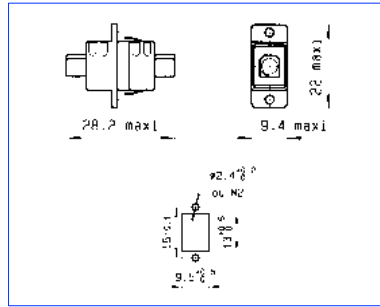
F 715 052 000 F 715 105 000 F 715 109 000
F 715 059 000 F 715 106 000 F 715 112 000



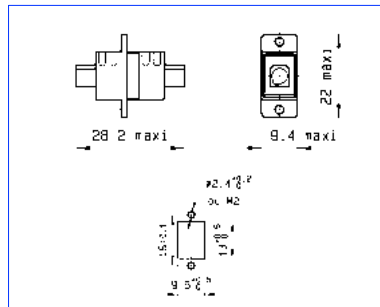
F 715 062 000



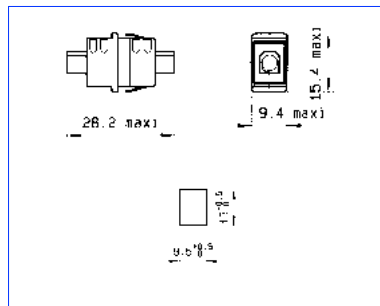
STANDARD ADAPTORS (with a silicone membrane)



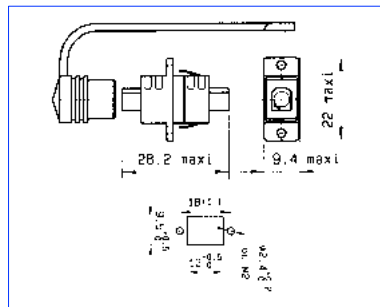
Adaptor with mounting holes and panel clip
F 715 700 000



Adaptor with mounting holes
F 715 704 000



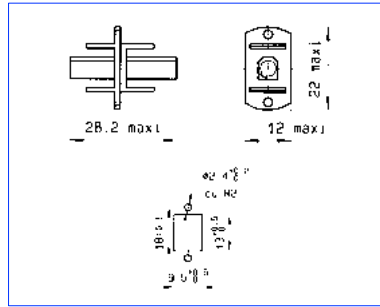
Adaptor with panel clip
F 715 705 000



Adaptor with mounting holes, panel clip and safety cap
F 715 706 000



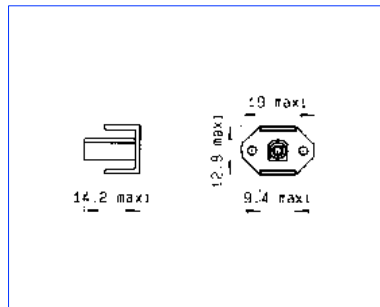
EMI SHIELDED METAL ADAPTOR



F 715 702 000

- Body : Nickel-plated brass
- Mating : 500 cycles
- Shielding : F < 500 Mhz, EB < -95 dB
F < 2 Ghz, EB < -80 dB
F < 6 Ghz, EB < -50 dB

MATING BODY



With narrow flange

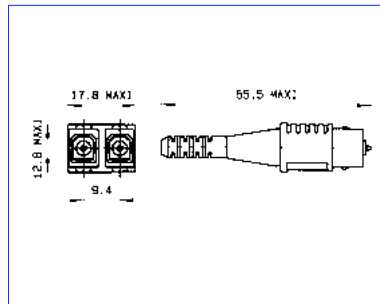
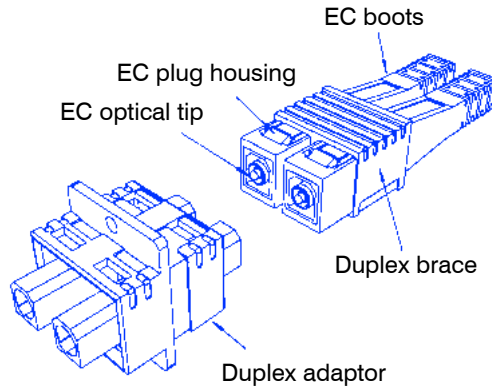
Allows an EC plug to be attached to a piece of equipment (measuring instrument etc..) already equipped with a reception diode. Mounted with 2 screws.

F 715 200 000

Duplex plugs and adaptors



Vertical 9.4 mm version



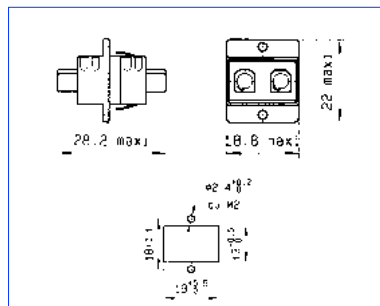
Singlemode plug (optical ferrule to be ordered separately – see page 10).

F 715 090 000

Multimode plug (optical ferrule already mounted)

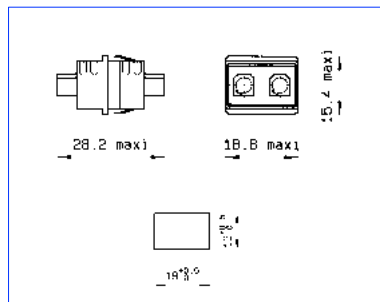
F 715 140 000

Ø of coating, tube and cable			
Bare fibre		Cable Ø 2.2 to 3.2 mm	
250 µm	Coated fibre 500 or 900 µm tight structure	Coated fibre 900 µm tight structure	Coated fibre 250 µm loose structure



Adaptor with flange and mounting holes

F 715 710 000



Adaptor with panel clip

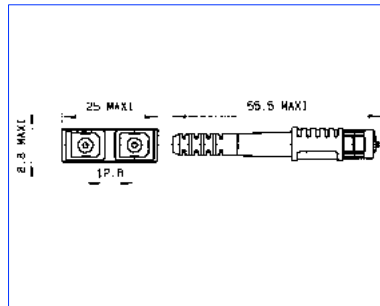
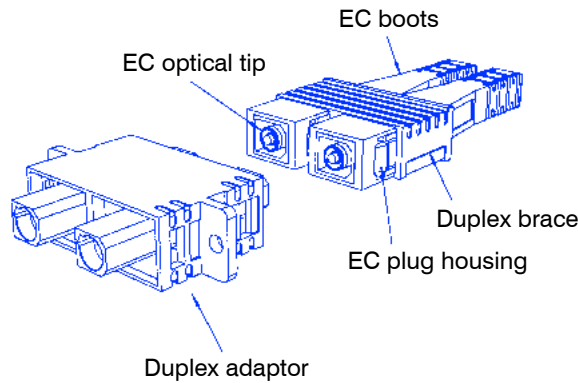
F 715 711 000

Note : duplex adaptor can also be used to connect simplex EC plugs

Duplex plugs and adaptors



Horizontal 12.8 mm version



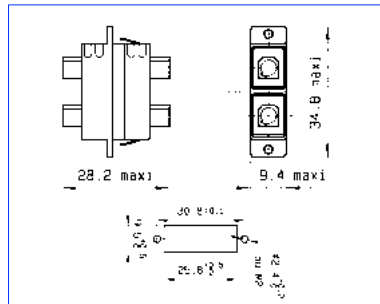
Singlemode plug (optical ferrule to be ordered separately – see page 10)

F 715 091 000

Multimode plug (optical ferrule already mounted)

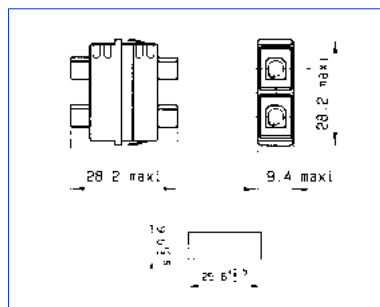
F 715 141 000

Ø of coating, tube and cable			
Bare fibre 250 µm	Coated fibre 500 or 900 µm tight structure	Câble Ø 2,2 à 3,2 mm	
		Coated fibre 900 µm tight structure	Coated fibre 250 µm loose structure



Adaptor with flange and mounting holes

F 715 708 000



Adaptor with panel clip

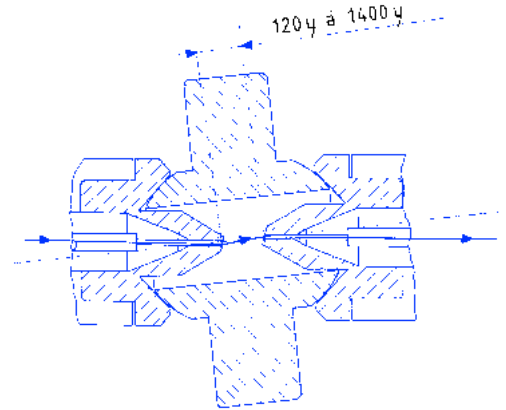
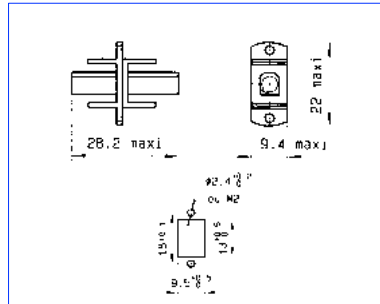
F 715 709 000

Note : duplex adaptor can also be used to connect simplex EC plugs

Attenuator adaptors



Principle : attenuation is achieved by distancing the optical surfaces and realigning the beams at an angle.



Range available for monoband or broadband applications.
Singlemode fibre. Return loss > 60 dB.

Part numbers

attenuation *	wavelength		
	1310 nm	1550 nm	1310-1550 broadband
2 dB	-	-	F 751 005 100
3 dB	-	-	F 751 005 200
4 dB	-	-	F 751 005 300
5 dB	F 751 003 400	F 751 004 400	F 751 005 400
10 dB	F 751 003 600	F 751 004 600	F 751 005 600
15 dB	F 751 003 700	F 751 004 700	F 751 005 700
20 dB	F 751 003 800	F 751 004 800	F 751 005 800

Attenuation tolerances

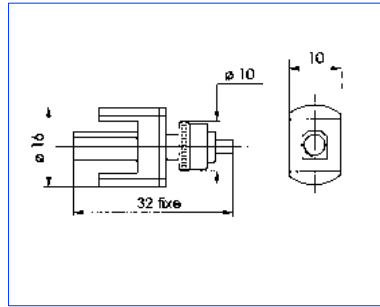
attenuation	wavelength		
	1310 nm	1550 nm	1310-1550 broadband
2 dB	-	-	± 0,75 dB
3 dB	-	-	± 0,75 dB
4 dB	-	-	± 0,75 dB
5 dB	± 1 dB	± 0,5 dB	± 1,5 dB
10 dB	± 1 dB	± 0,5 dB	± 1,5 dB
15 dB	± 1 dB	± 0,5 dB	± 1,5 dB
20 dB	± 1 dB	± 0,5 dB	± 1,5 dB

Attenuation of a $2 \text{ wo} = 9.2 \mu\text{m}$ singlemode fibre.

For a $2 \text{ wo} = 8.2 \mu\text{m}$, the adaptors have a nominal attenuation of 10% higher, $\Delta\alpha$ during temperature test (-25°C $+70^\circ\text{C}$) at less than ± 0.5 dB.



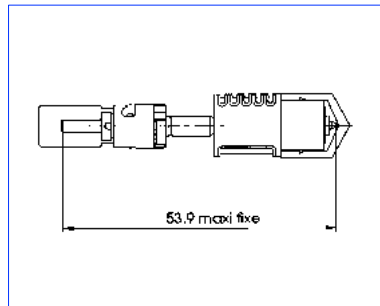
METAL SINGLEMODE ADAPTOR



Female EC / male FCPC

Typical attenuation : < 0.45 dB
(standard deviation < 0.15 dB)
Return loss : > 30 dB

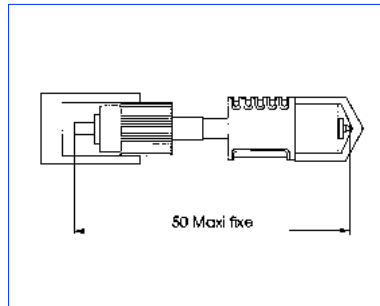
F 719 007 000



Male EC / male ST®

Typical attenuation : < 0.55 dB
(standard deviation < 0.15 dB)
Return loss : > 30 dB

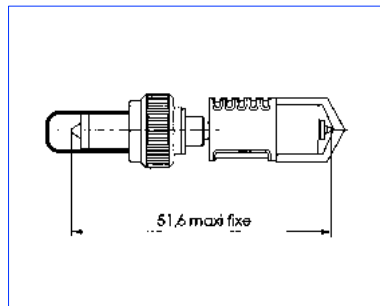
F 719 001 000



Male EC / Male FCPC

Typical attenuation : < 0.45 dB
(standard deviation < 0.15 dB)
Return loss : > 30 dB

F 719 002 000



Male EC / Male "FR" VFO

Typical attenuation : < 0.5 dB
(standard deviation < 0.15 dB)
Return loss : > 60 dB

F 719 003 000

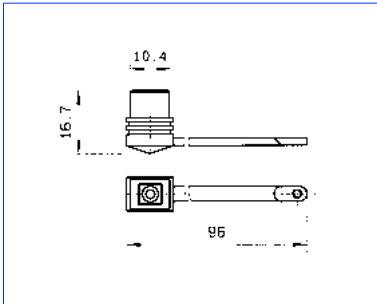
MULTIMODE METAL ADAPTOR EC male / ST® male

Typical attenuation : < 0.35 dB (standard deviation < 0.13 dB)

50/125 fibre	62.5/125 fibre	100/140 fibre
F 719 004 000	F 719 005 000	F 719 006 000



CAPS



Safety caps (grey) for plugs (Bag of 20)

F 715 750 000

Safety caps (grey) for adaptors (Bag of 20)

F 715 762 000

Caps (red) for plugs (Bag of 100)

F 715 751 000

PROTECTIVE BOOTS

	Ø of coating, tube and cable	Colour				
		Grey	Red	Green	Yellow	Blue
	Ø 1.2 mm max	F 718 029 000	F 718 030 000	F 718 031 000	F 718 032 000	F 718 033 000
	Ø 2.9 mm max	-	F 718 034 000	F 718 035 000	F 718 036 000	F 718 037 000
	Ø 3.3 mm max	-	F 718 038 000	F 718 039 000	F 718 040 000	F 718 041 000



COUPLERS AND FIBRE DIVIDERS

RADIALL **CATV** splitters are tailored to meet the high performance requirements of the **CATV** industry.

The high return loss **EC connector** (standard*) has been matched with dual wave-length, low reflectance fibre splitters to yield consistent, "high spec" technical performance across a wide frequency band.

These components are integrated in several package options designed to offer maximum flexibility to simplify customer installation and conform to any cable management style.

Splitting Way Options	Splitting Ratio Options
1 x 2	(50:50) or (60:40) (70:30) (80:20) (90:10)
1 x 3	(33:33:33) or according to specification
1 x 4	(25:25:25:25) or according to specification

Others available upon request.

Package options :

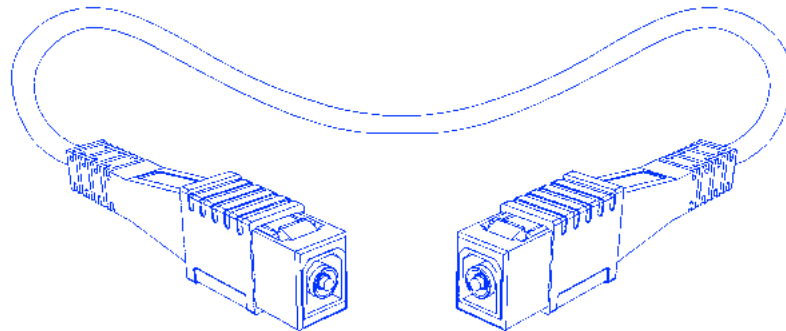
- 3 'U' / 8H modules for vertical mounting in sub-rack (standard),
- 1 'U' modules for mounting horizontally in 19" rack.

Input / Output options :

- Front or rear face adaptor ports,
- Connectorized or bare fibre input and / or output leads from front or rear face.

Please consult us for any further information about this product.

*Other connector options are available upon request.



Characteristics

Attenuation : 0.5 dB max

Delivered with a measurement sheet (attenuation at 850 nm for multimode cable assemblies, attenuation at 1310 nm for singlemode cable assemblies).

Breakdown of part numbers

Type	Connector 1	Fibre/cable	Connector 2	Length
<p>Type : _____</p> <p>P : Pigtail M : Single channel ☞ B : <i>Bi-channel</i></p> <p>Connector 1 : _____</p> <p>EC : Simplex connector ☞ ECV : <i>Duplex connector - vertical</i> ☞ ECH : <i>Duplex connector - horizontal</i></p> <p>Fibre and cable : _____</p> <p>60 : 9.5/125 singlemode 900 µm 67 : 9.5/125 singlemode Ø 3 mm loose structure cable 63 : 9.5/125 singlemode Ø 3 mm tight structure cable 68 : 9.5/125 singlemode dispersion shifted fiber, Ø 3 mm cable, tight structure ☞ 65 : 9.5/125 singlemode "zipcord" duplex 2.8x8.5 20 : 50/125 multimode Ø 3 mm tight structure cable 21 : 62.5/125 multimode Ø 3 mm tight structure cable ☞ 35 : 50/125 "zipcord" duplex 2.8x6.5 multimode ☞ 36 : 62.5/125 "zipcord" duplex 2.8x6.5 multimode</p> <p>Connector 2 : _____</p> <p>EC : Simplex connector ☞ ECV : <i>Duplex connector - vertical</i> ☞ ECH : <i>Duplex connector - horizontal</i></p> <p>Length : _____ L.... in cm</p>				

Note 1 : use the letter "P" to designate a single way or a two way pigtail.

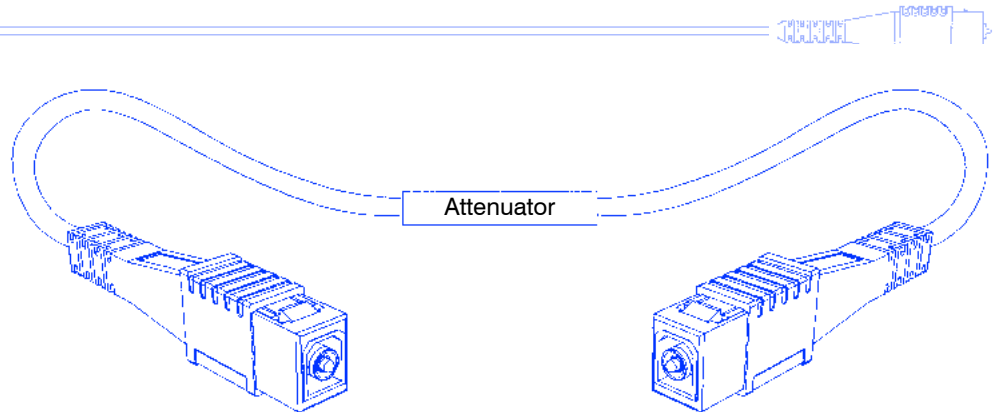
Note 2 : "☞" designate the elements which can be associated to make up a part number for a two way patchcord.

Example of part number

B ECV 35 ECV L100 – M EC 63 EC L150 – P EC 60 L100 – P ECH 65 L200

For any other type of fibre or cable, please consult us.

Attenuator cable assemblies



In simplex version only.
Singlemode fibre, Ø 3mm tight structure cable.

AT	EC	Wavelength	EC	Attenuation	Length
<p>Wavelength : _____</p> <p>13 : 1310 nm</p> <p>15 : 1550 nm</p> <p>16 : broadband</p> <p>Attenuation : _____</p> <p>between 2 and 20 dB</p> <p>Length : _____</p> <p>L.... in cm</p>					

Attenuation tolerances

Attenuation	1310 nm	1550 nm	Broadband
2 to 4 dB	± 0,5	± 0,5	± 1
5 to 9 dB	± 1	± 1	± 1,5
10 to 14 dB	± 1,5	± 1,5	± 2
15 to 20 dB	± 2	± 2	± 2,5

Example of part number
AT EC 16 EC 15dB L100



ASSEMBLY KIT

220 Volts	F 780 550 000
110 Volts	F 780 551 000

This kit contains all the necessary tools and accessories for assembling an EC connector. It is durable and easy to use, allowing it to be used either in the factory or on site. There are enough polishing disks, resin, capillaries and plungers for injecting the resin, for cabling approximately 100 plugs. Comes with assembly instructions.

Contents :

"Miller" stripping tool	F 780 025 000
"No Nik" stripping tool	F 780 029 000
"T Stripper" stripping tool	F 780 033 000
"Xcellite" stripping tool	F 780 037 000
Ceramic scissors	F 780 039 000
Crimping tool	F 780 051 000
☞ 9µm polishing disks (10)	F 780 127 000
☞ 0,3µm polishing disks (2 x 10)	F 780 129 000
Ceramic cutting tool	F 780 136 000
☞ 6 bags of 353ND resin + 6 cruscibles	F 780 242 000
Optical polishing gauge	F 780 262 000
Lateral polishing gauge	F 780 264 000
Optical ferrule insertion tool	F 780 502 000
Resin injector	F 780 503 000
☞ Resin injector accessories	F 780 504 000*
Polishing support	F 780 505 000
☞ 10µm polishing strips (10)	F 780 508 000
x10 microscope	F 780 522 000
☞ Cleaning tips (50)	F 780 525 000
x100 microscope	F 780 526 000
110V fibre deburring tool	F 780 535 000
220V fibre deburring tool	F 780 536 000 or
☞ 10 abrasive patches for fibre deburring tool	F 780 537 000
☞ Cleaning paper	F 780 552 000
220V AC/12V DC curing oven	F 780 553 000 or
110V curing oven	F 780 554 000

All these part numbers may be ordered separately.

"☞" Signifies consummable products which can be re-ordered.
* F 780 504 000 : contains 100 accessories for injecting resin.

Other accessories :

1 roll of adhesive tape, assorted caps for plugs and adaptors, 3 F 715 700 000 adaptors, 2 microscope batteries, 1 water bottle, 1 alcohol dispenser, 1 measuring tape, 1 flat headed screwdriver, 1 pair tweezers, 20 cruscibles for resin.



MAINTENANCE KIT

F 780 531 000

This kit contains cleaning and inspection accessories (microscopes) and is designed more for those responsible for maintaining installations. Comes with cleaning procedure.

Contents :

Cleaning paper	F 780 552 000
Cleaning tips (50)	F 780 525 000
x100 microscope	F 780 526 000
x10 microscope	F 780 522 000

Other accessories :

1 roll of adhesive tap, assorted caps for plugs and adaptors, 3 F 715 700 000 adaptors, 2 microscope batteries, 1 water bottle, 1 alcohol dispenser, 1 flat-headed screwdriver. A place is reserved for an air can (not supplied).



CLEANING KIT

F 780 532 000

Designed for cable assembly and adaptor users. Comes with cleaning procedure.

Contents : 50 cleaning tips, cleaning paper, 1 roll of adhesive tape, water bottle, alcohol bottle.

VIDEO CASSETTES

available for EC cabling procedure.

VHS SECAM French	F 798 013 000
VHS PAL English	F 798 014 000
VHS NTSC English	F 798 016 000
VHS PAL German	F 798 015 000



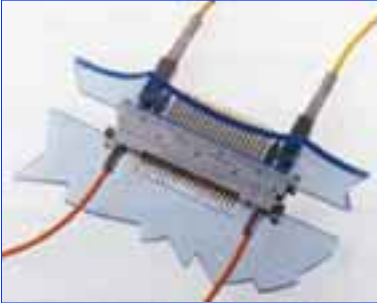
MASTER PATCHCORD singlemode fibre, 5 metre-long

F 793 804 200

This cable assembly is designed for inspecting an "X" plug during the production of EC cable assemblies.

Optical characteristics : 0.15 dB (CECC 86000 § 4-4-7, method 7).

The measuring procedure is described in the assembly instructions.



The new generation telecommunications and installations systems imply greater and greater information output rates and input/output channels. In order to meet these new requirements, RADIALL has developed a range of Back Panel connectors divided into two series :

- BPO**, optical contacts for standardized DIN 41612 connectors, either standard or reversed,
- OPTIPACK**, module with a **metre pitch of 2 or 2.5 mm** equipped with optical contacts. Compatible with electrical and **MICRO-COAX** modules.



Characteristics :

- Blind connection due to the technology of cone/sphere alignment,
- Floating optical ferrules,
- Connection is self-aligning and self-locking,
- Compatible with EC connectors..

For further information, consult our EC System catalogue under "BPO" and "OPTIPACK".

Connectors for severe environments



MILFO, series of miniature water-proof connectors for multimode or singlemode fibre.

Characteristics :

- Screw-type locking,
- Metal optical ferrule,
- Can be connected to a hermetic feed-thru adaptor,
- Wide temperature range (-55°C + 125°C) depending on design,
- Highly resistant to shocks and vibrations.

BOC, series of multichannel connectors for multimode and singlemode fibre. These products are characterized by the fact that they can be equipped using all optical or a mix of electrical/optical.

Characteristics :

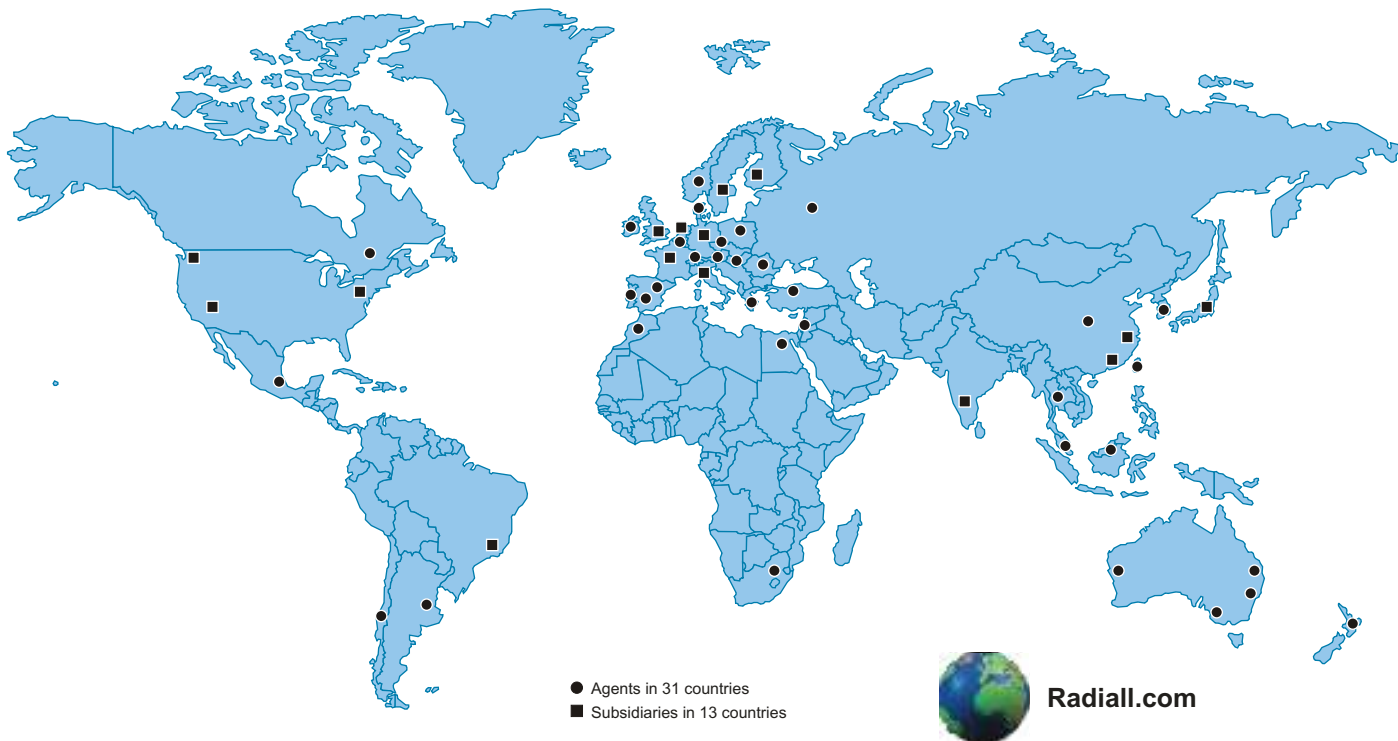
- Waterproof,
- Optical surfaces protected (contact set back),
- Very easy to maintain (contacts can be removed and replaced on site),
- Screw-type or push-pull locking.

Applications :

- ◆ Temporary field links for video,
- ◆ Temporary military communications links,
- ◆ High performance mobile transmission networks,
- ◆ Temporary high-speed data links, etc . . .

Consult RADIALL for any information regarding these products.





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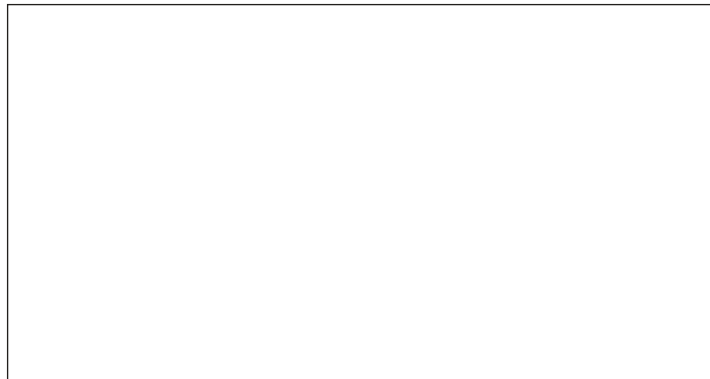
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