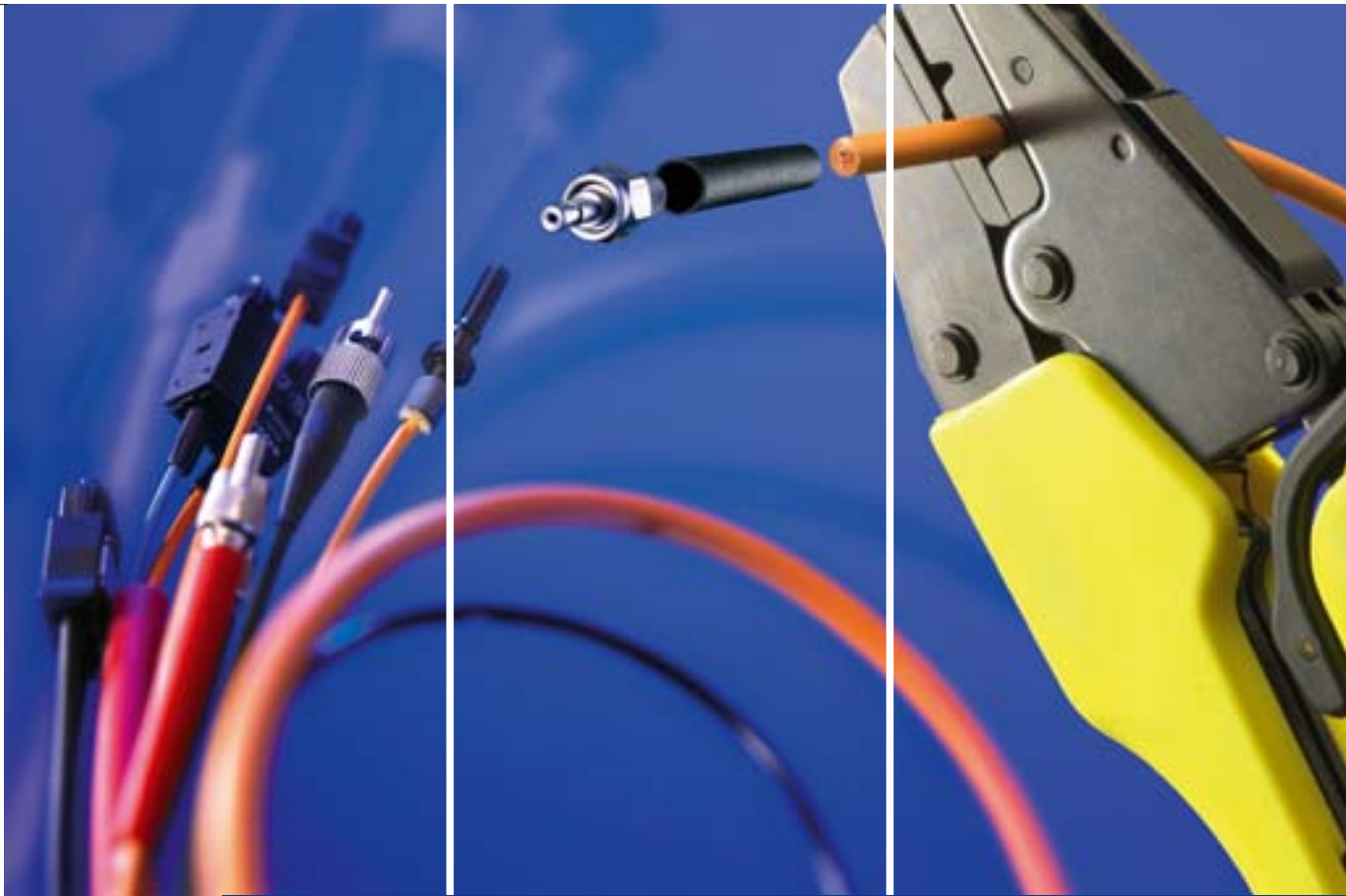


# **POF and PCF Fibre Optic Cables Assemblies, Connectors and Accessories**

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**Fibre optics for industrial applications**

**FO-Systems**

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Edition: July 2003  
Subject to change and error.





## Two partners that complement each other

LEONI has been involved in the development and production of plastic fibre optic cables for quite some time. The LEONI iQ-LINE product line was introduced primarily to provide an optimal solution for the industrial applications market.

FO-Systems has been one of our partners in this product space. Following a successful partnership, the LEONI Group took over a controlling interest in the company in 2002. Because the company has a sound, comprehensive knowledge of the plastic fibre optics market and associated products, we have granted FO-Systems GmbH and its experienced team exclusive distribution rights for this LEONI product group.

This gives us an excellent means of pooling the know-how that both companies possess, and you are the one who benefits. We can now offer you first-class advice and an applications-oriented product range. In addition to our line of standard products, which continue to deliver dependable performance in the field, we can also offer you tailored cable solutions to meet your exact requirements.

**This catalogue is intended to give you an initial look at what we have to offer in the field of fibre optics. We would be pleased to provide any advice you might need.**



THE QUALITY CONNECTION

**LEONI**

Wire • Cable • Wiring Systems

# POF & PCF

## Transmission media with a future

### FO-Systems – Systems advice service

FO-Systems is your specialist for the fibre optics you use in your industrial applications. Our product range includes POF (plastic) and PCF cables, ready-made cables, connectors and accessories. In addition to supplying these hardware items, we would also be pleased to advise you on any issues relating to active components that may arise during the development of your fibre optic system. You can tap into the more than 10 years of experience that we have accumulated in the development of fibre optic systems (and which is not limited to POF and PCF fibre optics). We also work very closely with the POF Applications Center at the University of Applied Sciences in Nuremberg.

Here are our experts and their contact information:

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**a.weinert@fosystems.de**

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We actively and regularly participate at conferences in this specialist area, and we remain in close contact with other companies in the industry. This network gives us access to a wealth of knowledge and experience, which is an advantage that our customers value very highly.



Plastics are attracting increasing attention as a means to transmit information. Pure fibre optics (POF – polymer optical fibre) and plastic-coated glass fibre optics with step index profile have been on the market for years.

They have been used primarily in high-range digital audio systems, the automotive industry, some segments of lighting technology, medical technology, and on bus systems in industrial applications. Bus system applications are found primarily where there are significant EMC issues and the transmission path is relatively short.

Compared to conventional glass fibre optics, plastic fibre optics have the advantage of greater flexibility (high alternate bending stress with small bend radii), and they are also a low-cost connection and transmission solution. These factors are particularly important in mechanical engineering and automation applications. Plastic fibre optics also have all the essential properties – including low EMC susceptibility, perfect galvanic isolation, low susceptibility to electronic surveillance, no cross talk, low weight, etc. – that are generally associated with fibre optics.

Compared to common single-mode and multi-mode fibre optics, plastic fibre optics have higher attenuation, which reduces their range, and they have smaller bandwidth. The latest developments (e.g. gradient index POF), which are currently in the market introduction phase, show that there is still significant potential for improved performance.

With the introduction of Ethernet technology and LAN networking in industrial applications, designers and planners have been taking a closer look at POF and PCF.

The distances that can now be bridged are 70m for POF fibres and 500m for PCF fibres, and this is regarded as sufficient for industrial applications. If you consider that the average length from the floor distribution board to a workstation in a local network is 45m, then it would appear that using POF/PCF is not so unrealistic. Solutions are already available for small office and home networks.

Once the necessary hardware is available in sufficient quantities and at an affordable price, POF/PCF will certainly become an attractive option in many office networks. Despite the drive towards higher and higher bandwidths, 100 Mbit/sec Ethernet connections will be adequate for most applications in the near future, especially if the user focuses on the cost-benefit aspect.

The “LEONI iQ LINE” offers you various cable designs using plastic or PCF fibre optics to enhance our existing broad range of fibre optic cables and to allow you to select the best transmission medium for your application.





## Quality and environmental management

### Quality Management

We must consistently maintain the high quality level of our products. To accomplish this, we permanently monitor the entire process, from planning right through to the final production step of a product. Our quality management system has been certified to DIN/ISO 9001 and QS 9000/VDA 6.1.

#### LEONI iQ-LINE – Innovative Quality Surveillance

All cables that leave our factory are tested to ensure that they comply with attenuation specifications. We are one of the few manufacturers worldwide who use a method which enables us to measure attenuation over a length of 500m. This reduces measurement error, and it allows us to produce longer cables.

Information printed on the cable includes a combination of production order and drum number that provides complete traceability for the production process, starting from incoming inspection of the fibres right through shipment of the cable. Years later we will still be able to recall, for example, the parametric measurement data for a particular cable.

### LEONI Environment Management

We see no conflict between business success and responsibility for the environment. As a corporation with production facilities around the globe, we recognize our responsibility to make our contribution to preserving the natural basis for life. We attempt to strike a balance between what is good for the environment and what is good for the company. This makes environmental protection a compulsory element of our corporate activities.

We encourage our business partners to act according to the same environmental guidelines that we use, and we provide advice to our customers about how to use and dispose of our products in a way that is gentle on the environment.

Our environment management system, which has been certified to DIN EN ISO 14001, ensures that our environmental policy is effectively implemented.



Current certificates:  
ISO TS 16949,  
DIN EN ISO 9001:2000,  
DIN EN ISO 14001

## Balancing application and fire protection criteria

The core and sheath material are designed to protect the fibre(s) from mechanical, thermal or chemical effects and prevent the penetration of moisture. On the other hand, in case of fire the materials should not spread the fire, and there should be no build up of toxic and corrosive fumes. Halogen-free and flame retardant materials should be used to protect equipment, buildings and above all people. PUR and PVC are the solution of choice for use in hard industrial environments because of their high resistance to oil and their abrasion resistance. PE is commonly used as a sheath material in outdoor applications.

It is difficult to fulfill all the requirements with one sheath material. To find the best solution given the conditions on site, LEONI offers a choice of standard materials.

If your application criteria cannot be met with the cable designs and materials that appear in this catalogue, please contact us. It is often possible to meet additional requirements by making specific changes to the sheath design (for example, aluminum tape or special material mixtures).

## Jacketing material

	Core sheath (POF only)			Cable sheath material			
	PE	PA	PVC	TPE-O (FRNC)	TPE-U (PUR)	PVC	PE
<b>material properties</b>							
non-aging	+	+	+	+	+	+	+
halogen-free	+	+	--	+	+	--	+
non-flammability	--/●	-	+	+	+	+	--/●
elasticity	-	+	●	-	+	●	-
abrasion resistance	+/-	+	+	-	++	+	+/-
low fume generation	--/●	+	-	++	●	-	--/●
low emission of corrosive gases	+/-●	++	--	++	●	--	+/-●
low fume toxicity	+/-●	++	--	++	●	--	+/-●
no toxicological risk	+/-●	++	-	++	●	-	+/-●
<b>general resistance to</b>							
UV light	1)	+	+	1)	1)	1)	1)
water absorption	+	--	+	-	-	+	+
gas diffusion	●			-	2)		●
fuels	+/-	+	+	-	+	+/-	+
petroleum/lubricants	+	+	●	-	++	●	+
organic solvents	+ 4)	+ 5)	-	-	+ 3)	-	+ 4)
alcohol	+	+	+	-	-	+	+
oxidants	-	-	+	-	-	+	-
acids	++	-	+	+	--	+	++
alkaline solutions	+	+	+	+	--	+	+
saline solutions	+	-	+		-	+	+

**Note.:** instead of FRNC (flame retardant non corrosive) the expression LSOH or LSZH (low smoke zero halogens) is often used.

++ excellent

+ good

● depends on recipe

- weak

-- inadequate

1) increase in UV resistance by addition of black color pigments or UV stabilizers

2) permeation depends on type of gas, e.g.. Ar, CH<sub>4</sub>, N<sub>2</sub>, O<sub>2</sub> low gas permeation,  
CO<sub>2</sub>, H<sub>2</sub>, He higher gas permeation

3) low swelling in saturated hydrocarbons; significant swelling in aromatic hydrocarbons and aliphatic esters cause swelling, highly polar organic solvents dissolve causing extreme swelling

4) swelling in aliphatic and aromatic hydrocarbons and in chlorinated hydrocarbons

5) not resistant to chlorinated hydrocarbons, resistant to hydrocarbons and aliphatic and aromatic solvents

Short type identifiers for POF  
and PCF cables according to  
DIN VDE 0888 Parts 3 to 6 (3/96)

## Labelling code for LEONI iQ-LINE POF and PCF cables

1 2 3 4 5 6 7 8 9 10 11 12 13

### POF cable

												Supplemental company-specific information (for example hybrid cables)
												<b>Bandwidth</b> (MHz x 100 m)
												<b>Wavelength</b> (A = 650 nm)
												<b>Attenuation</b> (dB/km)
												<b>Cladding diameter</b> (1000 µm)
												<b>Core diameter</b> (980 µm)
												<b>P</b> PMMA-Fibre with step index profile
												<b>Number of fibres</b>
												<b>Material of the outer jacket</b> 11Y PUR   2Y PE   Y PVC   H Halogen-free and flame retardant
												<b>(ZN)</b> Non-metallic pull elements (can also be at position 2, if pull element is in center)
												<b>Material of the inner jacket</b> 4Y PA   2Y PE   Y PVC
												<b>V</b> Tight-buffered construction
												<b>Product code</b> A- Outdoor-cable   AT- Breakout-cabel   I- Indoor-cable

1 2 3 4 5 6 7 8 9 10 11 12

### PCF cable

												Supplemental company-specific information (for example hybrid cables)
												<b>Bandwidth</b> (MHz x km)
												<b>Wavelength</b> (A = 650 nm/B=850 nm)
												<b>Attenuation</b> (dB/km)
												<b>Cladding diameter</b> (230 µm)
												<b>Core diameter</b> (200 µm)
												<b>K</b> Plastic cladde fibres with step index profile
												<b>Number of fibres</b> resp. <b>number of tubes</b> x <b>Number of fibres</b> per tube (n x m)
												<b>Material of the outer jacket</b> 11Y PUR   2Y PE   Y PVC   H Halogen-free and flame retardant
												<b>(ZN)</b> Non-metallic pull elements (can also be at position 2, if pull element is in center)
												<b>V</b> Tigth-buffered   <b>D</b> Loose tube construction
												<b>Product code</b> A- Outdoor-cable   AT- Breakout-cabel   I- Indoor-cable





## Part number codes for ordering ready-made fibre-optic cables

### Shipping packaging







up to 100 m as a ring  
> 100 m on a disposable drum

### Quality Assurance

This is used to determine optical attenuation. The result is shown on the label.

### Identification

We use cable markers to identify the fibre optic cables according to your instructions.

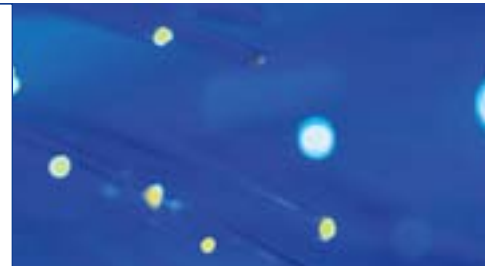
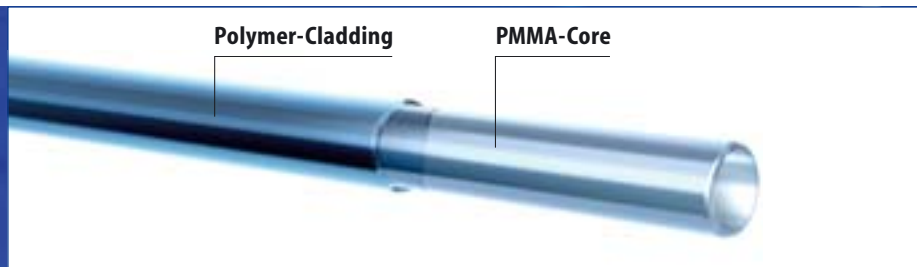
<b>K</b>	<input type="text"/>	-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>connector type side A</b> (see page 16 f)								
<b>connector type side B</b> (see page 16 f)	<div> <div>✖</div> <div> <div>XST</div> <div>SMA</div> <div>HPS</div> <div>HPD</div> <div>F05</div> <div>F07</div> </div> <div>       </div> </div>							
e.g. BFOC (ST®)								
FSMA								
HP, simplex								
HP, duplex								
F05, TOSLINK kompatibel								
F07, TOSLINK kompatibel								
<b>POF/PCF cable types</b> (see page 12 f)								
e.g. I-V(ZN)Y 1K200/230	72							
A-V(ZN)11Y 1K200/230	74							
<b>3-digit length</b>	e.g. 128, 010, ...							
<b>unit of measurement</b>	mm, cm, m							

✖ The connectors shown are available for POF and PCF  
– see page 16 f

### Sample order: K SMA-F05 22 325 cm

3.25 meters, simplex connecting cable  
(cable type: I-V2Y(ZN)11Y 1P980/1000, PMMA fibre with PE coating,  
aramide strain relief and PUR outer jacket)  
pre-assembled with FSMA connector and F05 connector

# POF P980/1000



**LEONARDO LINE**

## Description

Polymer Optical Fibre (POF)P980/1000

## Geometry

Core diameter (µm)	980
Cladding diameter (µm)	1000

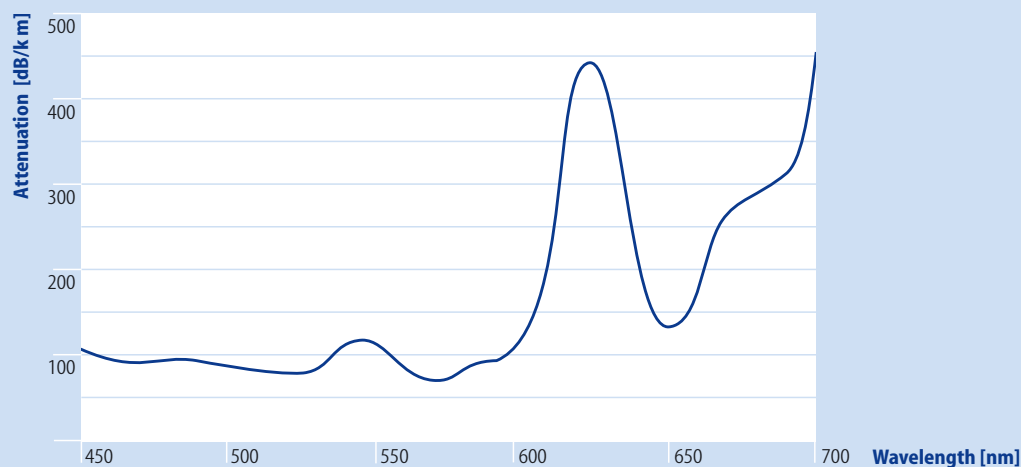
## Transmission properties

Wavelength (nm)	650
Attenuation max. (dB/km)	160
Bandwidth min. (MHz x 100 m)	10
Numerical aperture	0,50

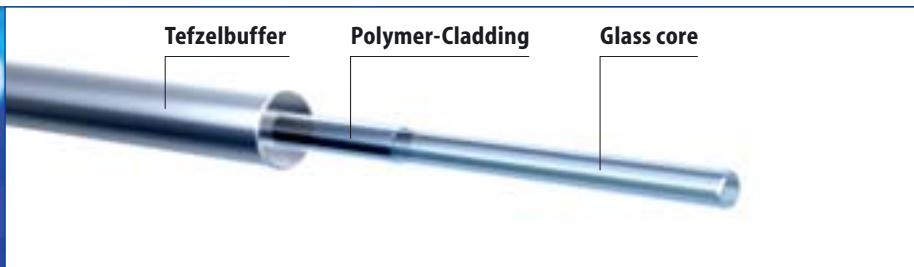
POF is made of a super pure polymethylmethacrylate (PMMA) fibre core, which is cladded with a sheath of fluoropolymer. The large fibre core facilitates coupling to transmitter and receiver elements and allows the use of low-cost connector systems, some of which have been specially developed for plastic fibre optics.

LEDs in the wavelength range  $\lambda = 650 \dots 670$  nm are used as transmitter elements. POF has a relative attenuation minimum of 160 dB/km in this range. The attenuation can increase slightly (up to 200 dB/km for example) depending on the cable design. PIN diodes are used as receivers at the other end of the transmission path.

Because of the attenuation, the link length is typically limited to  $< 100$  m.



# PCF K200/230



LEONI **FC** LINE

## Description

Polymer Cladded Fibre (PCF)K200/230

PCF has a glass core and a plastic sheath. There is an additional Tefzel layer to improve mechanical and thermal properties.

## Geometry

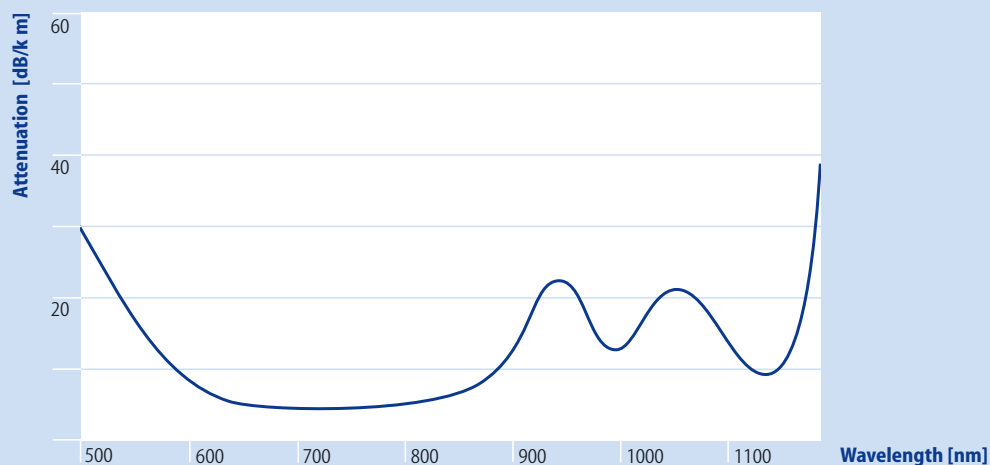
Core diameter (µm)	200
Cladding diameter (µm)	230
Tefzel buffer (µm)	500

The same transmitting and receiving elements are used for PCF and POF. Because attenuation is lower, distances up to 500 m can be bridged.

## Transmission properties

Wavelength (nm)	650	850
Attenuation max. (dB/km)	10	8
Bandwidth min. (MHz x km)	17	20
Numerical aperture	0,37	0,37






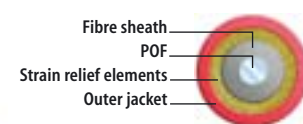

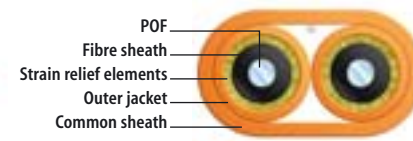

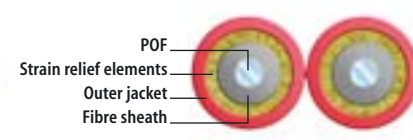

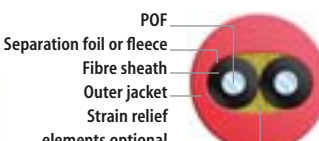



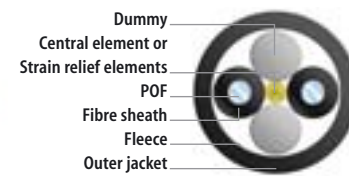

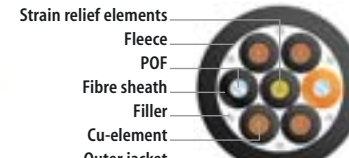
You can also use at a wavelength of  $\lambda = 850$  nm.



# POF

## Polymer Optical Fiber

LEONLINE

		✖	Order-No.	cable type (see page 8)	
			11	84A00100S000	V-2Y 1P980/1000
			14	84A00200S777	V-Y 1P980/1000
			12	84A00300S000	V-4Y 1P980/1000
			15	84A00300S262	V-4Y 1P980/1000
			13	84B00100S000	V-2Y 2x1P980/1000
			21	84C00100S333	I-V4Y(ZN)11Y 1P980/1000 HEAVY
			26	84C00200S333	I-VY(ZN)Y 1P980/1000
			23	84C00800S333	I-V2Y(ZN)11Y 1P980/1000
			22	84C01000S333	I-V2Y(ZN)11Y 1P980/1000
			32	84D00900S222	I-V2Y(ZN)HH 2x 1P980/1000
			31	84D03000S222	I-V2Y(ZN)H 2x1P980/1000
			24	84D01100S333	I-V4Y(ZN)11Y 2P980/1000 HEAVY
			33	84D01600S333	I-V2Y(ZN)Y 2P980/1000
			34	84D02000S333	I-V2Y(ZN)11Y 2P980/1000
		1)	25	84D00500S333	I-V2Y(ZN)11Y 2P980/1000 FLEX
			36	84D00300S333	I-V4Y(ZN)11Y 2P980/1000 FLEX
		2)	29	84D00600S333	I-(ZN)V2Y11Y 2P980/1000 + 2x1.0 mm <sup>2</sup>
			37	84D02500S000	AT-(ZN)V2Y2Y 2P980/1000
			38	84D02800S333	I-(ZN)V4Y11Y 2P980/1000 + 2x1.0 mm <sup>2</sup>
			39	84E00200S333	I-V4Y11Y 4P980/1000
		3)	41	84D01400S444	I-V(ZN)4Y11Y 2P980/1000 + 4x1.5 mm <sup>2</sup>
			42	84D01800S707	I-V(ZN)4YY 2P980/1000 + 3x1.5 mm <sup>2</sup>

✖ Assembly code (see page 9).

1) The dummy elements can be replaced with Cu elements.

2) Instead of the dummy elements, additional POF or Cu elements can be stranded.

3) The number of PMMA, Cu or possible dummy elements can vary.

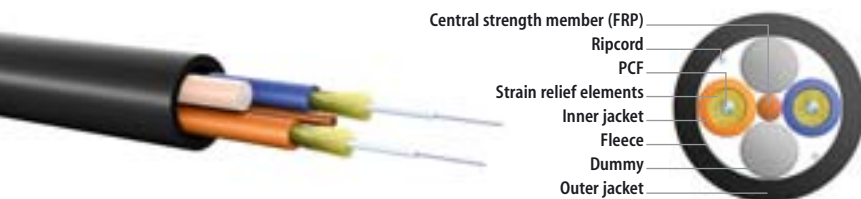
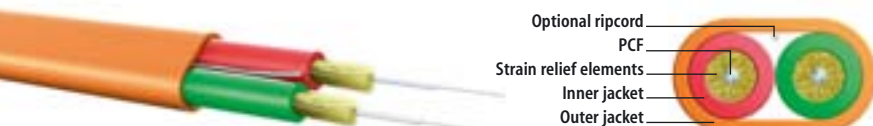
	fibre sheath material	outer jacket material	number of POF elements	number of Cu elements	outer diameter (in mm)	sheath color	attenuation (dB/km) at 650 nm **	attenuation (dB/km) at 660 nm ***	bending radius (in mm) during installation	bending radius (in mm) during operation	tensile strength during installation (in N)	weight (in kg/km)	ambient temperature during operation (in °C)	suitable for drag chain	use in harsh industrial environment	direct connector pre-assembly
	PE		1	0	2.2	black	< 160	< 230	25	25	15	3.8	-55/+85			X
	PVC		1	0	2.2	grey	< 160	< 230	25	25	15	3.8	-40/+85			X
	PA		1	0	2.2	black	< 160	< 230	20	20	60	3.8	-55/+85			X
	PA		1	0	2.2	orange	< 160	< 230	20	20	60	3.8	-55/+85			X
	PE		2	0	2.2x4.4	black	< 160	< 230	25 *	25 *	15	7.6	-55/+85			X
	PA	PUR	1	0	6.0	red	< 160	< 230	50	30	500	32.0	-20/+70	X	X	X
	PVC	PVC	1	0	3.6	red	< 190	< 290	70	50	250	12.0	-20/+70			X
	PE	PUR	1	0	3.6	red	< 160	< 230	70	50	250	11.0	-20/+70			X
	PE	PUR	1	0	6.0	red	< 160	< 230	70	50	400	32.0	-20/+70	X	X	X
	PE	FRNC	2	0	4.7x8.2	orange	< 190	< 290	70 *	50 *	400	43.0	-20/+70			X
	PE	FRNC	2	0	3.6x7.5	orange	< 190	< 270	70 *	50 *	400	26.0	-20/+70			X
	PA	PUR	2	0	6.0	red	< 160	< 230	60	40	500	33.0	-20/+70		X	X
	PE	PVC	2	0	6.0	red	< 200	< 290	90	60	400	54.0	-20/+70			X
	PE	PUR	2	0	5.6	red	< 200	< 290	90	60	400	28.0	-20/+70		X	X
	PE	PUR	2	0	6.4	red	< 220	< 310	90	60	200	30.0	-20/+70	X	X	X
	PA	PUR	2	0	8.0	red	< 190	< 290	60	40	400	55.0	-20/+70	X	X	X
	PE	PUR	2	2	7.5	red	< 220	< 310	90	60	200	62.0	-20/+70	X	X	X
	PE	PE	2	0	7.0	black	< 220	< 310	90	60	200	33.0	-25/+80			X
	PA	PUR	2	2	7.5	red	< 190	< 290	70	50	400	42.0	-20/+70	X	X	X
	PA	PUR	4	0	7.5	red	< 190	< 290	70	50	500	42.0	-20/+70		X	X
	PA	PUR	2	4	10.6	purple	< 230	< 330	110	70	400	146.0	-20/+70	X	X	X
	PA	PVC	2	3	10.7	grey	< 230	< 330	110	70	200	132.0	-20/+70			X

\* bending radius over flat side

\*\* monochromatic attenuation measurement, using laser

\*\*\* attenuation measurement using LED (FWHM 30 nm)





	✖ Order-No.	cable type	inner sheath material	outer jacket material
72	<b>84P00300T222</b>	I-V(ZN)Y 1K200/230	–	PVC
	<b>84P00600T000</b>	A-V(ZN)11Y 1K200/230	–	PUR
74	<b>84Q00300T222</b>	I-V(ZN)Y 2X 1K200/230	–	PVC
66	<b>84Q01000T222</b>	I-V(ZN)H 2X 1K200/230	–	FRNC
71	<b>84P00900T333</b>	I-V(ZN)YY 1K200/230	PVC	PVC
64	<b>84Q00700T222</b>	I-V(ZN)HH 2X 1K200/230	FRNC	FRNC
63	<b>84Q00400T000</b>	I-V(ZN)H2Y 2K200/230	FRNC	PE
75	<b>84Q00200T000</b>	AT-VQ(ZN)HB2Y 2K200/230	FRNC	PE
67	<b>84Q01500T333</b>	I-V(ZN)H11Y 2K200/230	FRNC	PUR
62	<b>84Q01600T333</b>	I-V(ZN)H11Y 2K200/230 + 2x1 mm <sup>2</sup>	FRNC	PUR
65	<b>84Q01800T333</b>	I-V(ZN)Y11Y 2K200/230	PVC	PUR
79	<b>84S00200T000</b>	A-DQ(ZN)BH 12K200/230	–	FRNC
76	<b>84S00400T000</b>	A-DQ(ZN)B2Y 2K200/230	–	PE

✖ Assembly code (see page 9).

	number of PCF elements	number of Cu elements	inner sheath diameter (in mm)	outer diameter (in mm)	outer sheath color	attenuation (dB/km) at 650 nm	attenuation (dB/km) at 850 nm	bending radius (in mm) during installation	bending radius (in mm) during operation	tensile strength during installation (in N)	weight (in kg/km)	suitable for drag chain	use in harsh industrial environment	direct connector pre-assembly	longitudinal waterproof	outer cable
	1	0	–	2.2	orange	10	8	60	30	300	5.0			X		
	1	0	–	3.0	black	10	8	60	30	800	6.5		X	X		
	2	0	–	2.2x4.5	orange	10	8	60 *	30 *	300	10.0			X		
	2	0	–	2.2x4.5	orange	10	8	60 *	30 *	300	11.0			X		
	1	0	2.2	5.0	red	10	8	60	40	300				X		
	2	0	2.9	3.9x6.8	orange	10	8	50 *	30 *	800	31.0			X		
	2	0	2.2	7.0	black	10	8	70	50	800	38.0			X		X
	2	0	2.9	10.5	black	10	8	200	150	1500	97.0			X	X	X
	2	0	2.2	7.4	red	10	8	70	50	800	45.0	X	X	X		
	2	2	2.2	7.4	red	10	8	70	50	800	65.0	X	X	X		
	2	0	2.2	7.0	red	10	8	70	50	300	43.0	X	X	X		
	12	0	–	8.5	black	10	8	170	130	1500	85				X	(X)
	2	0	–	7.5	black	10	8	150	110	1500	50				X	X

\* bending radius over the flat side of the cable

The Tefzel buffer of the PCF optical fibre is not halogen-free.

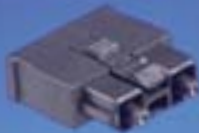
**Thermal properties:**

transport and storage –25/+70 °C

installation –5/+50 °C

operating –20/+70 °C

## Connectors POF



Order-No.	Description	Polishing tool	Crimp tool	Stripping tool	meter
<b>SHP-DS0</b>	HP Duplex connector POF crimpversion HFBR 4506	L or H + Q + R	J	B or C	T – W
<b>SHP-SS0</b>	HP Simplex connector POF HFBR 4531	L or H + Q + R	not required	B or C	T – W
<b>SF05-SS2</b>	F05 Simplex connector POF for grinding and polishing (unit 100)	G + Q + R	not required	B or C	T – W
<b>SF05-SH3</b>	F05 Simplex connector POF for Hot Plate (unit 500)	S	not required	B or C	T – W
<b>SF07-DH0</b>	F07 Simplex connector POF for Hot Plate	S	not required	B or C	T – W
<b>SSMA-SS0-2,2</b>	FSMA connector POF * for grinding and polishing for cables with 2.2 mm Ø	F + Q + R	J	B or C	T – W
<b>SSMA-SS0-3,6</b>	FSMA Stecker POF * for grinding and polishing for cables with 3.6 mm Ø	F + Q + R	J	B or C + A	T – W
<b>SSMA-SS0-6,0</b>	FSMA connector POF * for grinding and polishing for cables with 6.0 mm Ø	F + Q + R	J	B or C + A	T – W
<b>SSMA-SV0-2,2</b>	FSMA connector POF for grinding and polishing crimpless version	F + Q + R	not required	B or C	T – W

\* can be supplied as hotplate version



Order-No.	Description	Polishing tool	Crimp tool	Stripping tool	meter
<b>SXST-SS0-2,2</b>	BFOC (ST®) connector POF for grinding and polishing for cables with 2.2–3.6 mm Ø	I + Q + R	K	B or C A possible	T – W
<b>SJack-SS0</b>	3.5 mm plug	Q + R	not required	B or C	T – W

## Connectors PCF



Order-No.	Description	Polishing tool	Crimp tool	Stripping tool	meter
<b>SHP-SC0</b>	HP Simplex connector PCF HFBR 4521 for cables with 2.2 mm Ø	O	O	O	T – W
<b>SF07-DC0</b>	F07 Duplex connector PCF for cables with 2.2 mm Ø	P	P	P	T – W
<b>SF05-SC0</b>	F05 Simplex connector PCF for cables with 2.2 mm Ø	P	P	P	T – W
<b>SXST-SW0-2,2</b>	BFOC (ST®) connector Clamp/Cleave PCF for cables with 2.2 mm Ø	N	not required	B + D	T – W
<b>SSMA-SW0-2,2</b>	FSMA connector PCF Clamp/Cleave PCF for cables with 2.2 mm Ø	M	not required	B + D	T – W

## Accessories POF/PCF



A



B



C



D



E



F



G



H



I

Order-No.	Description
<b>Z012-SA0-6,0</b>	Stripper for Ø 6.0 and Ø 3.6 mm Simplex cable
<b>Z010-SA0-2,2</b>	Stripper for Ø 2.2 mm cable (specially for PCF and PA jacketed POF)
<b>Z011-SA0-2,2</b>	Stripper for Ø 2.2 mm PE-jacketed fibre (POF)
<b>Z004-TA0-0,5</b>	Buffer stripper für 230 µm PCF-Faser
<b>ZXXX-TD0</b>	Cutter for jacketed fibres and fibres (up to Ø 2.3 mm)
<b>ZSMA-SP0</b>	FSMA Polish Disc
<b>ZF05-SP0-L</b>	F05 Polish Disc
<b>ZHP-TPO</b>	HFBR Polish Disc
<b>ZXST-SP0</b>	BFOC (ST®) Polish Disc





J



K



L



M



O



Q



R

Order-No.	Description
<b>ZSMA-CC0</b>	Crimp tool for FSMA connectors POF (Ø 2.2 / 3.6 / 6.0 mm)
<b>ZXST-CC0</b>	Crimp tool for ST connectors POF
<b>ZHP-PS0</b>	Polishing kit HFBR-4593
<b>ZSMA-TW0</b>	Cleave tool for FSMA connectors PCF (clamp version)
<b>ZXST-TW0</b>	Cleave tool for ST connectors PCF (clamp version)
<b>ZXHP-KW0</b>	Fibre optic assembly kit for HP connectors PCF
<b>ZF0507-KC0</b>	Fibre optic assembly kit for F05/F07 connectors PCF
<b>Z001-PS1</b>	Lapping film 3µm 10 sheets, size approx. 210x300 mm
<b>Z002-PS1</b>	Lapping film 600 10 sheets, size approx. 210x300 mm

## Accessories POF/PCF



Order-No.	Description
<b>ZSMA-TH0</b>	<p><b>Hotplate incl. power supply</b> for FSMA and F05/F07</p> <p>The hotplate method is an alternative to grinding and polishing equipment for preparing the end surface of POF fibres. Its principal advantages are good reproducibility and ease of use. With this method, the fibre end surfaces are melted at a temperature of about 160°C and put into their final form. Nearly all POF connectors can be used with this special assembly method.</p>
<b>ZXST-TH0</b>	<p><b>Hotplate incl. power supply</b> for ST (BFOC) connector</p>
<b>ZXXX-TM0</b>	<p><b>Optical power meter with digital display</b></p> <p>Use this meter to determine the power of a light source (LED or Laser) or to measure the attenuation of a fibre optic cable when used in conjunction with a stabilized light source. Micro-processor technology allows you to measure two wave lengths and display results in µW or dBm. Automatic zero adjustment during power-on sequence. Includes adapter system which accommodates all standard fibre optic connectors.</p> <p><b>opt. detector</b>                      silicon PIN diode  <b>detector surface</b>                2.65 x 2.65 mm  <b>opt. connector</b>                  removable adapter, screw-on  <b>display</b>                              –50.0 to +3 dBm  (LCD 13,5mm)</p> <p>Adapter for optical power meter</p>
<b>ZXST-TX0</b> <b>ZSMA-TX0</b> <b>ZF05-TX0</b> <b>ZHP-TX0</b>	<p><b>ST (BFOC)</b> (connector type)  <b>FSMA</b> (connector type)  <b>F05</b> (connector type)  <b>HP</b> (connector type)</p>
<b>ZXXX-TS0</b>	<p><b>Optical transmitter</b></p> <p>Basic device with BNC adapter for connection of various fibre optic plug adapters. Plug adapters with wave lengths of 650 nm, 660 nm and 850 nm can be supplied. The part numbers below show adapters for a wave length of 660 nm as an example.</p> <p>Active adapter for optical basic transmitter device</p>
<b>ZXST-TS0-660</b> <b>ZSMA-TS0-660</b> <b>ZF05-TS0-660</b> <b>ZHP-TS0-650</b>	<p><b>ST (BFOC)</b> (connector type)  <b>FSMA</b> (connector type)  <b>F05</b> (connector type)  <b>HP</b> (connector type)</p>

The method described below gives you a simple and quick way to determine the attenuation of a ready-made cable.

## Measuring attenuation – an uncomplicated method for use in practical applications

### 1. Reference measurement

Measure the light power after the reference cable -  $P_S$  in [-dBm]



### 2. Measurement of the cable under test

Measure light power at the remote end of the cable under test -  $P_L$  in [-dBm]



### 3. Analysis

**3.1 Attenuation**  $A = P_L - P_S$

**3.2 Attenuation coefficient**  $\alpha = \frac{A}{L}$  dB/km  
(L stands for length of the cable under test in km)

### 4. Comparison with allowable threshold

#### 4.1 Attenuation

Find the maximum allowable attenuation in the description of the system you are using. This value must always be greater than attenuation A which you measured. You should leave a reserve of 3 dB.

#### 4.2 Attenuation coefficient

$\alpha_{\max}$  for POF typ. 230 dB/km at 660 nm

$\alpha_{\max}$  for PCF typ. 10 dB/km at 660 nm

typ. 8 dB/km at 850 nm

#### Tip

If you use PCF fibre optics in systems for POF, in other words 660 nm and your system is not explicitly specified for PCF fibres, proceed as follows:

- use a POF cable instead of a PCF cable as a reference cable
- attenuation:  $A = P_L$  (PCF cable) –  $P_S$  (POF reference)

In our analysis (4.1), the maximum allowable attenuation must be greater than the attenuation you have measured.

Experience shows that this method is one of the most reliable, but you cannot determine the attenuation coefficient (3.2) in this way. It is better to use the transmitter that is built into the system (and not the transmitter described above).

### Reference cable for attenuation measurement

Order No.	Connector type	Fibre type
KXST-XST 11001m	ST (BFOC)	POF
KSMA-SMA 11001m	FSMA	POF
KF05-F0511001m	F05	POF
KHPS-HPS11001m	HP	POF
KXST-XST72001m	ST (BFOC)	PCF
KSMA-SMA72001m	FSMA	PCF
KF05-F0572001m	F05	PCF
KHPS-HPS72001m	HP	PCF



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### Here is our insider tip on books about POF

Author: **Weinert, Andreas**

Title: **Plastic Optical Fibers**

Fundamentals, Components, Installation

The book guides you through the basic physics of this new technology, describing materials, the plastic fibre manufacturing process and the structure of plastic fibre optics.

It gives you an insight into various types of cables as well as transmitting and receiving components on a transmission path, and it gives you tips on working with and installing plastic fibre optics. It also presents important national and international regulations. The book is targeted at anyone who is involved in the development, planning or installation of plastic fibre optic systems.



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