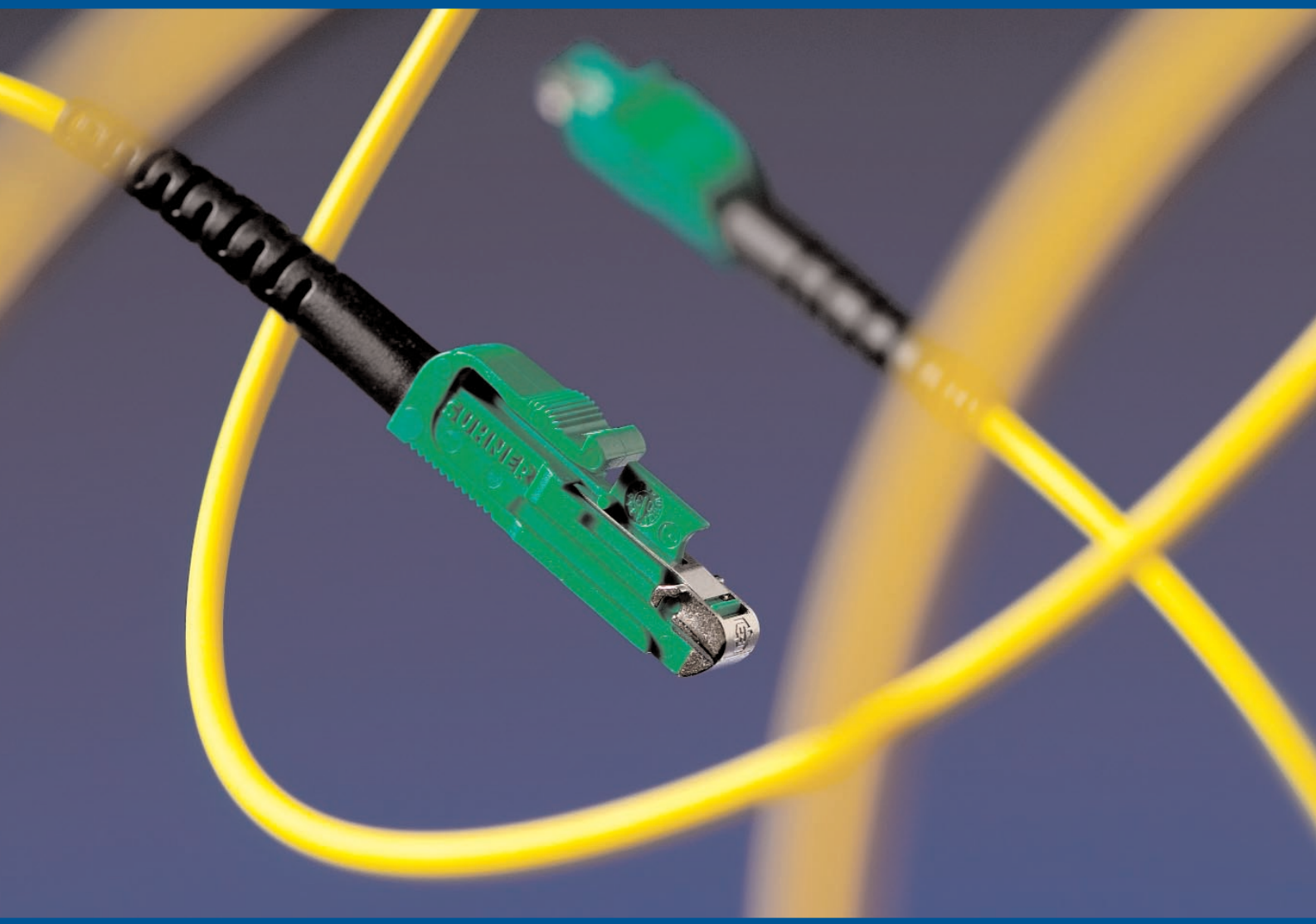
FIBEROPTIC COMPONENTS GENERAL CATALOGUE

Edition 2004



HUBER+SUHNER

Excellence in Connectivity Solutions

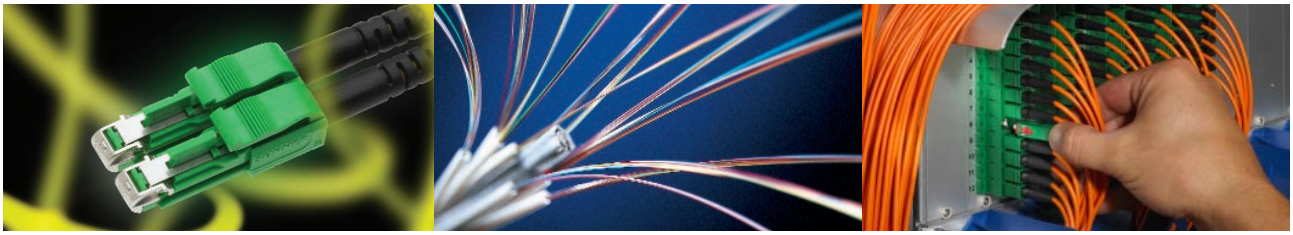
HUBER+SUHNER AG

Plant in Herisau

The HUBER+SUHNER Group is a leading international supplier of components and systems for electrical and optical interconnection applications in the fields of Telecommunications, Industry and Transport. HUBER+SUHNER have core competencies in the areas of radio frequency engineering, fiberoptics and polymer materials. With their global presence, HUBER+SUHNER develops and manufactures top-quality, world-class products in close collaboration with its customers.
In the fiscal year 2002, the HUBER+SUHNER Group achieved a turnover of 589.5 million Swiss francs with 2865 employees.
You will find more details about our Group in our annual report, various information bulletins and on our website under www.hubersuhner.com.

Fiber Optics Division
HUBER+SUHNER Fiber Optics produces a complete range of standard fiberoptic connectors and cables and assemblies (e.g. patchcables).We also provide components for Private and Public Networks and industrial applications. In this catalogue you can find short descriptions, technical data and ordering information of the fiberoptic product range. In 2004 a new range of distribution products for the Public and Private Networks markets, branded LISA, has been included.

Please contact your local HUBER+SUHNER Fiber Optics supplier for technical documentation or get more information from www.hubersuhner.com. We are happy to provide you with specific data sheets for special products not covered in our general catalogue.



HUBER+SUHNER AG

Quality philosophy

The prime principle governing all of the company's activities is a clear orientation towards the market and its needs. The term "Quality" as we understand it denotes the degree of fulfilment of market requirements; consequently, quality assurance refers to the optimization of our market-oriented activities. Our quality system covers all of the company's activities. It has been certified by the Swiss Association of Quality Assurance Certificates SQS in accordance with the ISO 9001 ISO 14001 standard.

You can always find the lastest version of the ISO certificate on http://www.hubersuhner.com/u-cert.htm

SQS

The Swiss Association for Quality and Management Systems

SQS herewith certifies that the company named below has a management system which meets the requirements of the normative bases specified below and issues the company

HUBER+SUHNER AG

CH-9100 Herisau

Certified area

Entire Company in Herisau AR and Pfäffikon ZH

Field of activity

Components and systems for electrical and optical interconnection applications, and polymer materials for Telecommunication, Industry and Transportation

on the basis of the audit result the

SQS Certificate

ISO 9001:2000 / ISO 14001:1996

CH-3052 Zollikofen, November 15, 2003
This SQS Certificate is valid up to and including November 14, 2006
Scope numbers 19, 14, 21
Registration number 15683-08

President SQS — X. Edelmann

Managing Director SQS — T. Zahner

SCES 002, 023

IQNet

OVERVIEW

CONNECTOR OVERVIEW

Connector type		FLX.5	FLC	FMU	FLSH	FSC
Compliance		IEC 61754-23 TIA 604-13	IEC 61754-20 TIA 604-10-A	IEC 61754-6	IEC 61754-15 TIA 604-16	IEC 61754-4 TIA 604-3
Technology						
Full ceramic ferrule + sleeve		•	•	•	•	•
Tuning						
in steps		45°	45°	90°	60°	60°
Mechanical resistance						
tensile load [N]		100	100	70	100	100
Thermal resistance						
stock temp. range		-40° to + 85° C	-40° to + 85° C	-40° to + 85° C	-40° to + 85° C	-40° to + 85° C
Flammability						
UL 94-V0		•	•	•	•	•
Durability						
Min. mating cycles		1000	1000	1000	1000	1000
Color of housing						
SM PC		blue	blue	brown	blue	blue
SM APC		green	green		green	green
MM		beige	beige		beige	beige
Brass nickel-plated						
Fiber type						
E9/125		•	•	•	•	•
G50/125		•	•	•	•	•
G50/125 OM3		•	•	•	•	•
G62.5/125		•	•	•	•	•
HCS200/230		–	–	–	•	•
Features						
One piece design		•	•	–	•	•
Automatic metal shutter		•	–	–	•	–
SFF connector		•	•	•	–	–
Color coding		•	•	–	•	–
For High Power application		•	•	–	•	•
For cable diameter [mm]		0.6 to 2.4	0.6 to 2.4	0.6 to 1.7	0.6 to 3.5	0.6 to 3.5
Insertion loss [dB]						
Each-to-each						
Multimode	mean ≤	0.20	0.20	0.20	0.20	0.20
	97 % ≤	0.50	0.50	0.50	0.50	0.50
SM 0.1 dB	mean ≤	0.06	0.06	n/a	0.06	0.06
	97 % ≤	0.15	0.15	n/a	0.15	0.15
SM High-End	mean ≤	0.12	0.12	0.12	0.12	0.12
	97 % ≤	0.25	0.25	0.25	0.25	0.25
SM LAN-Eco	mean ≤	0.25	0.25	0.25	0.25	0.25
	97 % ≤	0.70	0.70	0.70	0.70	0.70
Return loss [dB]						
Singlemode	PC >	45	45	45	45	45
	UPC >	50	50	50	50	50
	APC >	85	85	–	85	85

CONNECTOR OVERVIEW

FCPC	FLSA (DIN)	FST-LEAN	FST- HQ	FST-SEC	MT-RJ	FSMA
IEC 61754-13 TIA 604-4-A	IEC 61754-3 DIN 47256	IEC 61754-2 TIA 604-2	IEC 61754-2 TIA 604-2	IEC 61754-2 TIA 604-2	IEC 61754-18 TIA 604-12	
•	•	•	•	•	-	metal
PC infinitely APC 60°	60°					
100	100	100	100	100	70	100
-40° to + 85° C	-40° to + 85° C	-40° to + 85° C	-40° to + 85° C	-40° to + 85° C	-25° to + 70° C	-40° to + 85° C
1000	1000	1000	1000	1000	500	1000
					black	
					black	
•	•	•	•	•		•
•	•	–	•	•	•	–
•	•	•	•	•	•	•
•	•	•	•	•	•	•
•	•	•	•	•	•	•
•	–	–	•	–	–	•
•	•	•	•	•	–	•
–	–	–	–	–	–	–
–	–	–	–	–	•	–
–	–	–	–	–	–	–
–	–	–	–	–	–	–
0.6 to 3.5	0.6 to 3.5	0.6 to 3.5	0.6 to 3.5	0.6 to 3.5	0.6 and 1.7	0.6 to 4.5
0.20	0.20	0.25	0.20	0.20	0.25	1.00
0.50	0.50	0.70	0.50	0.50	0.70	1.50
0.06	n/a	n/a	n/a	n/a	n/a	n/a
0.15	n/a	n/a	n/a	n/a	n/a	n/a
0.12	0.12	n/a	n/a	n/a	n/a	n/a
0.25	0.25	n/a	n/a	n/a	n/a	n/a
0.25	0.25	n/a	0.25	0.25	0.25	n/a
0.70	0.70	n/a	0.70	0.70	0.70	n/a
45	45	–	45	45	35	–
50	50	–	–	–	–	–
85	85	–	–	–	–	–

HUBER+SUHNER CONNECTOR CODE

Connector type	Ferrule type	Division	Number of connections	Description
FLX5-				LX.5 connector
FLC-				LC connector
FMU-				MU connector
FLSH-				LSH (E-2000™) connector
FSC-				SC connector
FCPC-				FCPC connector
FLSA-				LSA connector
FST-				ST connector
FMTJ-				MT-RJ connector
FSMA-				SMA connector
FGAT-				FiberGate connector
SPEC-				Special connector
CMAX-				for SC
LEAN-				Lean
SEC-				Security
M/M-				Metal ferrule / metal body
Z/M-				Zirconia ferrule / metal body
Z/K-				Zirconia ferrule / plastic body
2000-				for E-2000™
	A-			Singlemode 9/125
	B-			Multimode 50;62.5/125
	D-			HCS 200/230
	E-			PCS 200/300
	H-			Premium
		001 to 599		PC version
		600 to 999		APC version
			-XX	If more than one connection (with one connection, nothing stated)

HUBER+SUHNER ADAPTER CODE / HYBRID ADAPTERS

Connection side 1	Connection side 2	Flange type	Division	Number of connections	Description
FCPC-					FCPC
FLSA-					LSA
FLSH-					LSH (E-2000™)
FSC-					SC
FSMA-					SMA
FMTJ-					MT-RJ
FLC-					LC
FMU-					MU
FGAT-					FiberGate
FLX5-					LX.5
	FCPC-				FCPC
	FLSA-				LSA
	FLSH-				LSH (E-2000™)
	FSC-				SC
	FSMA-				SMA
	FMTJ-				MT-RJ
	FLC-				LC
	FMU-				MU
	FGAT-				FiberGate
	FLX5-				LX.5
	REC-				Receptacle
		A-			without flange
		B-			2 loose nuts as flange
		C-			1 loose, 1 fixed nut
		D-			2-hole flange, fixed
		E-			4-hole flange, fixed
		F-			1 loose nut as flange
			0xx		without sleeve
			1xx		zirconia sleeve
			2xx		phosphor-bronze sleeve
			6xx		APC, zirconia sleeve
				-XX	If more than one connection (with one connection, nothing stated)

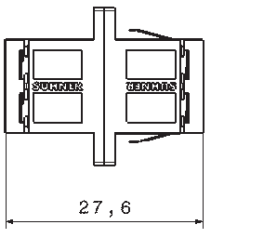
LX.5 (SFOC 1.25)

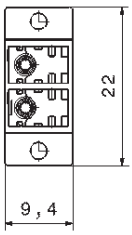
Specifications

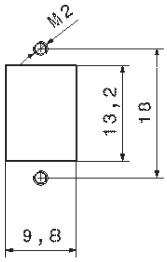
Compliance	IEC 61754-23, TIA 604-13	
Technology	Full ceramic ferrule and sleeve	
Tuning	in 45° steps	
Mechanical resistance	100 N tensile load	
Thermal resistance	–40° C to +85° C, stock temperature range	
Flammability	UL 94-V0	
Durability	Min. 1000 mating cycles	
Color of housing	Singlemode PC	blue
	Singlemode APC	green
	Multimode	beige

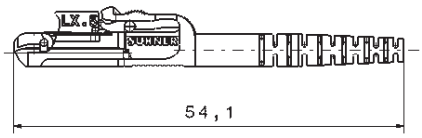
Features

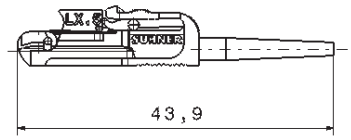
- Latched push-pull connector
- Automatic metal shutter in connector and adapter as dust and laser beam protection
- Small Form Factor connector for high packing density. 2 connections in SC shape adapter
- One-piece design for easy and quick termination
- Short rigid length of pigtail-connector
- Color coding of connector and adapter
- High-Power type with integrated locking mechanism
- High mechanical and thermal resistance according to Telcordia GR-326-CORE
- Easy duplexing of simplex connectors

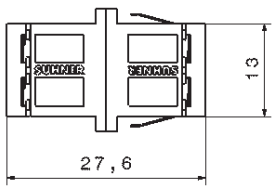


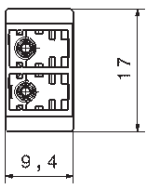


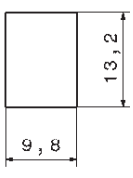












LX.5

Ordering information: LX.5 Connector, Simplex

Connector type	Polishing	Insertion loss[1] [dB] (mean/97%)	Cable Ø	Type
SM	PC/UPC	0.12/0.25	≤ 1.0 mm	FLX5-Z/K-A002
SM	PC/UPC	0.12/0.25	≤ 2.4 mm	FLX5-Z/K-A003
SM	APC	0.12/0.25	≤ 1.0 mm	FLX5-Z/K-A601
SM	APC	0.12/0.25	≤ 2.4 mm	FLX5-Z/K-A602
SM Premium	PC/UPC	0.06/0.15	≤ 1.0 mm	FLX5-Z/K-H002
SM Premium	PC/UPC	0.06/0.15	≤ 2.4 mm	FLX5-Z/K-H003
SM Premium	APC	0.06/0.15	≤ 1.0 mm	FLX5-Z/K-H601
SM Premium	APC	0.06/0.15	≤ 2.4 mm	FLX5-Z/K-H602
G50/125, G62.5/125	PC	0.2 / 0.5	≤ 1.0 mm	FLX5-Z/K-B002
G50/125, G62.5/125	PC	0.2 / 0.5	≤ 2.4 mm	FLX5-Z/K-B003

[1] Each-to-each IEC 61300-3-34 method 2

Ordering information: Crimpsets

Description	
Crimpsets	please see page 40

Ordering information: Adapters

Adapter type	Mounting	Sleeve material	Color	Type
SM Duplex	Flange with spring clip	ceramic	blue	FLX5-FLX5-A101-02
SM Duplex HighPower	Flange with spring clip	ceramic	blue	FLX5-FLX5-A102-02
SM APC Duplex	Flange with spring clip	ceramic	green	FLX5-FLX5-A601-02
SM APC Duplex HighPower	Flange with spring clip	ceramic	green	FLX5-FLX5-A602-02
MM Duplex	Flange with spring clip	phosphor-bronze	beige	FLX5-FLX5-A201-02
SM Duplex	with 2-hole flange	ceramic	blue	FLX5-FLX5-D101-02
SM Duplex HighPower	with 2-hole flange	ceramic	blue	FLX5-FLX5-D102-02
SM APC Duplex	with 2-hole flange	ceramic	green	FLX5-FLX5-D601-02
SM APC Duplex HighPower	with 2-hole flange	ceramic	green	FLX5-FLX5-D602-02
MM Duplex	with 2-hole flange	phosphor-bronze	beige	FLX5-FLX5-D201-02

Ordering information: Accessories

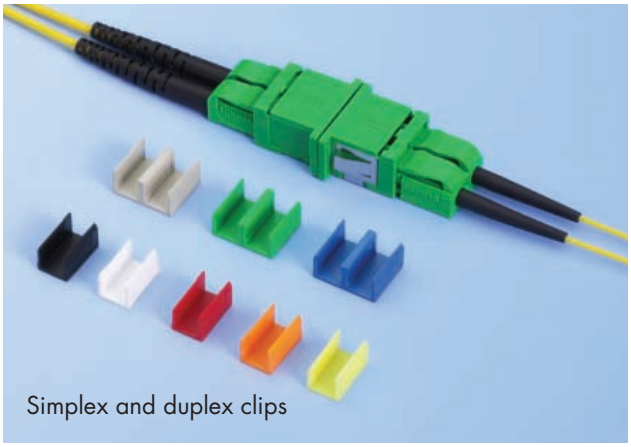
Description	
Accessories	please see next page
Duplex clips	please see next page
Color coding	please see next page
Angled boot	please see section “Accessories and Crimpsets”
Hybridadapters	please see second part of section “Hybrid adapters”

Ordering information: Accessories

Description	Color	Type
Duplex clip	blue	FLX5-DUP-BL2
Duplex clip	green	FLX5-DUP-GN2
Duplex clip	beige	FLX5-DUP-BG2
Tool to unlock LX.5 HighPower disconnection lock		9801.40.D

Color coding system

The new color coding system allows fast and secure installation of the connector and the adapter. It ensures mating without risk of confusion. Simplex clips can be used to mark connectors and color labels to mark adapters.



Simplex and duplex clips

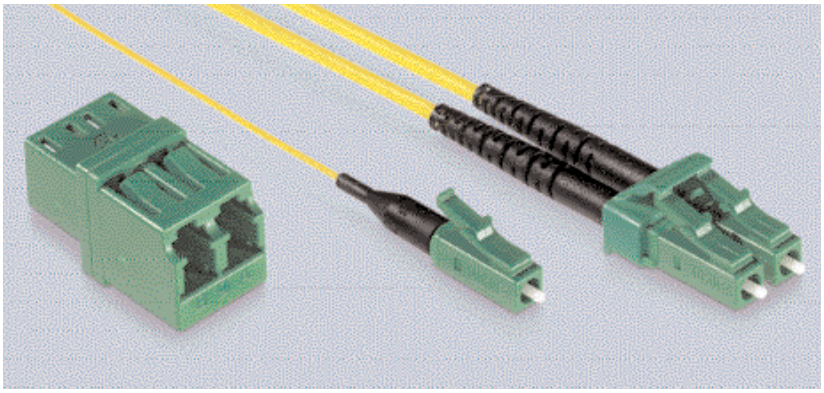
Color labels

Ordering information: Color coding

Description	Color	Type
Simplex clip	black	FLX5-CLP-BK1
Simplex clip	blue	FLX5-CLP-BL1
Simplex clip	brown	FLX5-CLP-BN1
Simplex clip	green	FLX5-CLP-GN1
Simplex clip	grey	FLX5-CLP-GR1
Simplex clip	orange	FLX5-CLP-OR1
Simplex clip	pink	FLX5-CLP-PK1
Simplex clip	purple	FLX5-CLP-PU1
Simplex clip	red	FLX5-CLP-RD1
Simplex clip	turquoise	FLX5-CLP-TU1
Simplex clip	white	FLX5-CLP-WT1
Simplex clip	yellow	FLX5-CLP-YE1

Description	Type
Color label pad including 24 stickers per color	ACC-LAB-001

FLC

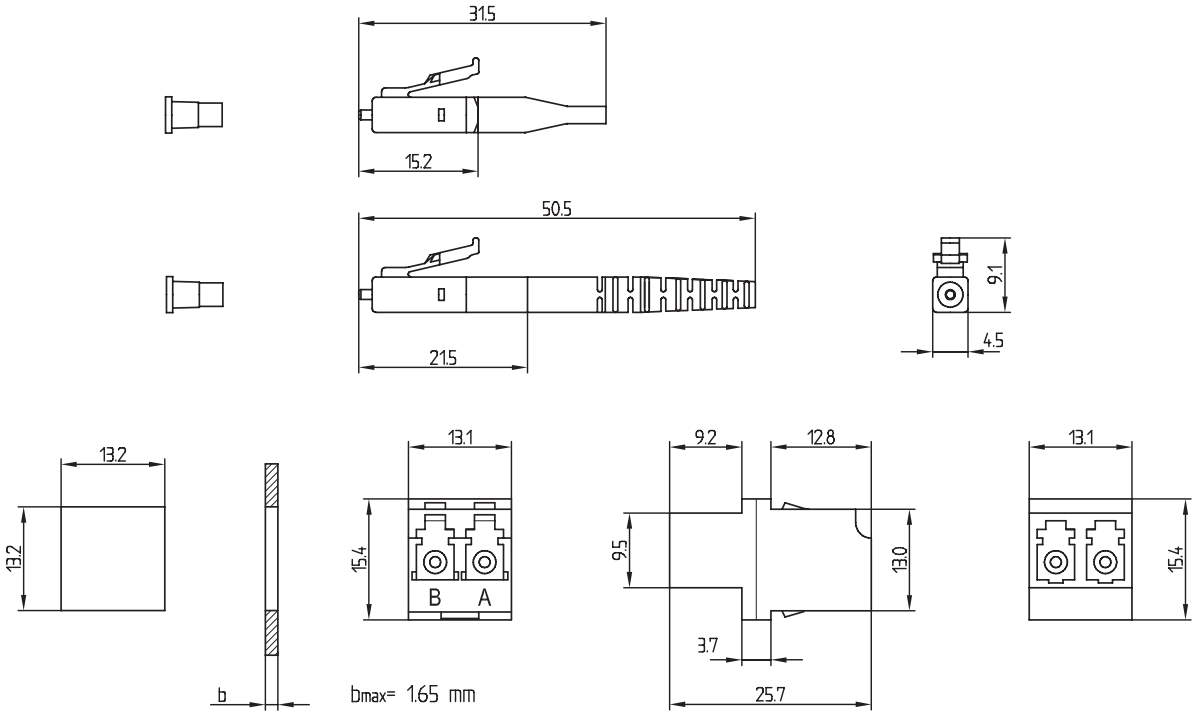


Features

- Latched push-pull connector
- Small Form Factor connector for high packing density. 2 connections in SC shape adapter
- One-piece design for easy and quick termination
- Short rigid length of pigtail-connector
- Color coding of connector
- Easy duplexing of simplex connectors

Specifications

Compliance	IEC 61754-20, TIA 604-10-A	
Technology	Full ceramic ferrule and sleeve	
Tuning	in 45° steps	
Mechanical resistance	100 N tensile load	
Thermal resistance	–40 °C to +85 °C, stock temperature range	
Flammability	UL 94-V0	
Durability	Min. 1000 mating cycles	
Color of housing	Singlemode PC	blue
	Singlemode APC	green
	Multimode	beige



FLC

Ordering information: FLC Connectors

Connector type	Polishing	Insertion loss[1] [dB] (mean/97%)	Cable Ø	Type
SM	PC/UPC	0.12/0.25	≤ 1.0 mm	FLC-Z/K-A005
SM	PC/UPC	0.12/0.25	≤ 2.4 mm	FLC-Z/K-A006
SM	APC	0.12/0.25	≤ 1.0 mm	FLC-Z/K-A600
SM	APC	0.12/0.25	≤ 2.4 mm	FLC-Z/K-A601
SM Premium	PC/UPC	0.06/0.15	≤ 1.0 mm	FLC-Z/K-H001
SM Premium	PC/UPC	0.06/0.15	≤ 2.4 mm	FLC-Z/K-H002
SM Premium	APC	0.06/0.15	≤ 1.0 mm	FLC-Z/K-H600
SM Premium	APC	0.06/0.15	≤ 2.4 mm	FLC-Z/K-H601
G50/125, G62.5/125	PC	0.2 / 0.5	≤ 1.0 mm	FLC-Z/K-B004
G50/125, G62.5/125	PC	0.2 / 0.5	≤ 2.4 mm	FLC-Z/K-B005

[1] IEC 61300-3-34 method 2

Ordering information: Crimpsets

Description	
Crimpsets	please see page 40

Ordering information: FLC Adapters

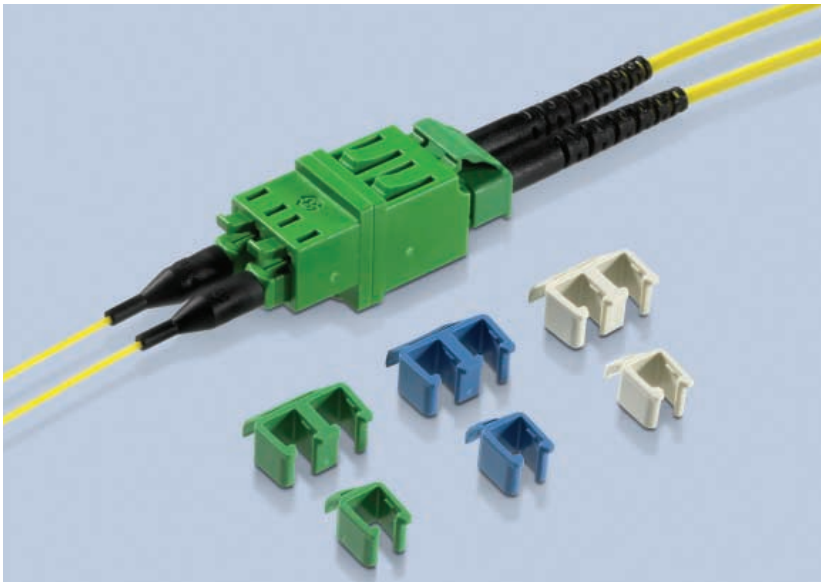
Adapter type		Mounting	Sleeve out of	Color	Type
SM	Duplex	integrated fixing springs	zirconia ceramic	blue	FLC-FLC-A100-02
SM APC	Duplex	integrated fixing springs	zirconia ceramic	green	FLC-FLC-A600-02
MM	Duplex	integrated fixing springs	phosphor-bronze	beige	FLC-FLC-A200-02
SM	SC footprint	integrated fixing springs	zirconia ceramic	blue	FLC-FLC-A101-02
SM APC	SC footprint	integrated fixing springs	zirconia ceramic	green	FLC-FLC-A601-02
MM	SC footprint	integrated fixing springs	phosphor-bronze	beige	FLC-FLC-A201-02
SM	Simplex	integrated fixing springs	zirconia ceramic	blue	FLC-FLC-A100
SM APC	Simplex	integrated fixing springs	zirconia ceramic	green	FLC-FLC-A600
MM	Simplex	integrated fixing springs	phosphor-bronze	beige	FLC-FLC-A200

Ordering information: Accessories

Description		Color	Type
Duplex clip		blue	FLC-DUP-BL2
Duplex clip		green	FLC-DUP-GN2
Duplex clip		beige	FLC-DUP-BG2
Coding	please see next page		
Angled boot	please see section “Accessories and Crimpsets”		
Hybridadapters	please see second part of section “Hybrid adapters”		

FLC

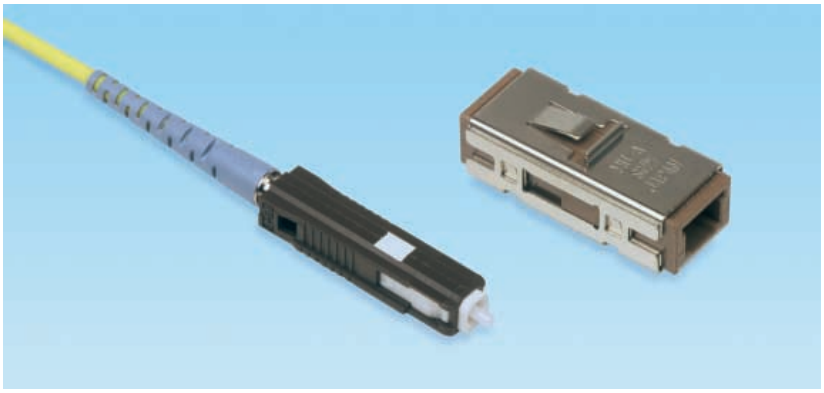
Color coding system
The color coding system helps to distinguish channels for secure handling. Simplex clips, which are used to mark connectors, can easily be mounted in the field and even after connectors have been terminated.



Ordering information: Accessories

Description	Color	Type
Simplex clip	black	FLC-CLP-BK1
Simplex clip	blue	FLC-CLP-BL1
Simplex clip	brown	FLC-CLP-BN1
Simplex clip	green	FLC-CLP-GN1
Simplex clip	grey	FLC-CLP-GR1
Simplex clip	orange	FLC-CLP-OR1
Simplex clip	pink	FLC-CLP-PK1
Simplex clip	purple	FLC-CLP-PU1
Simplex clip	red	FLC-CLP-RD1
Simplex clip	turquoise	FLC-CLP-TU1
Simplex clip	white	FLC-CLP-WT1
Simplex clip	yellow	FLC-CLP-YE1

FMU

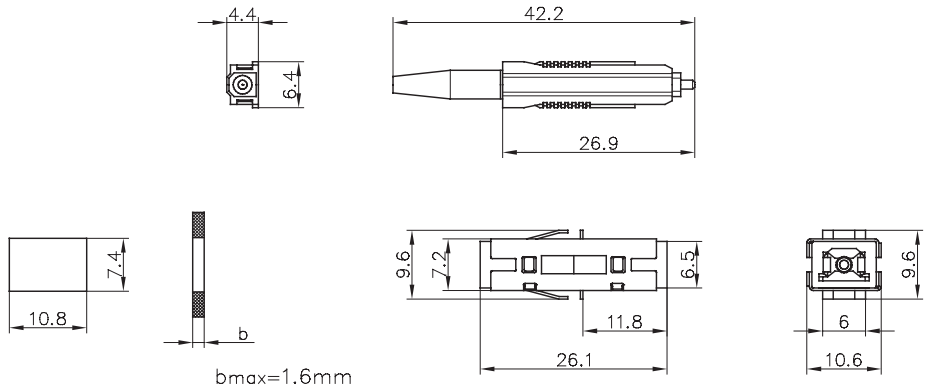


Features

- Push-pull connector
- Small Form Factor connector for high packing density. 2 connections in SC shape adapter

Specifications

Compliance	IEC 61754-6	
Technology	Full ceramic ferrule and sleeve	
Tuning	in 90° steps	
Mechanical resistance	70 N tensile load	
Thermal resistance	–40 °C to +85 °C, stock temperature range	
Flammability	UL 94-V0	
Durability	Min. 1000 mating cycles	
Color of housing	SM PC	brown
	MM	brown



Ordering information: FMU connector including Crimpset

Connector type	Polishing	Insertion loss [dB] [dB] (mean/97%)	Cable Ø	Type
E9/125	PC	0.12/0.25[1)]	< 1.0 mm	FMU-Z/K-A001[2)]
E9/125	PC	0.12/0.25[1)]	1.7 mm	FMU-Z/K-A002[2)]

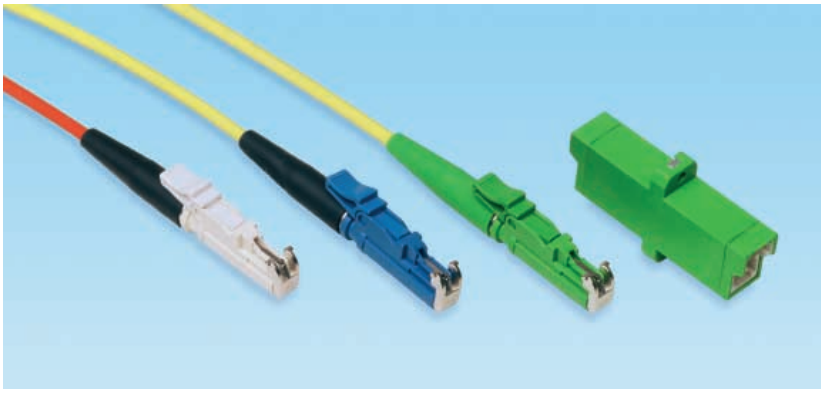
[1)] IEC 61300-3-34 method 2

[2)] including crimpset

Ordering information: Adapter

Adapter type	Mounting	Sleeve material	Type
SM	with integrated latch mechanism	ceramic	FMU-FMU-A001-01

FLSH (E-2000™)

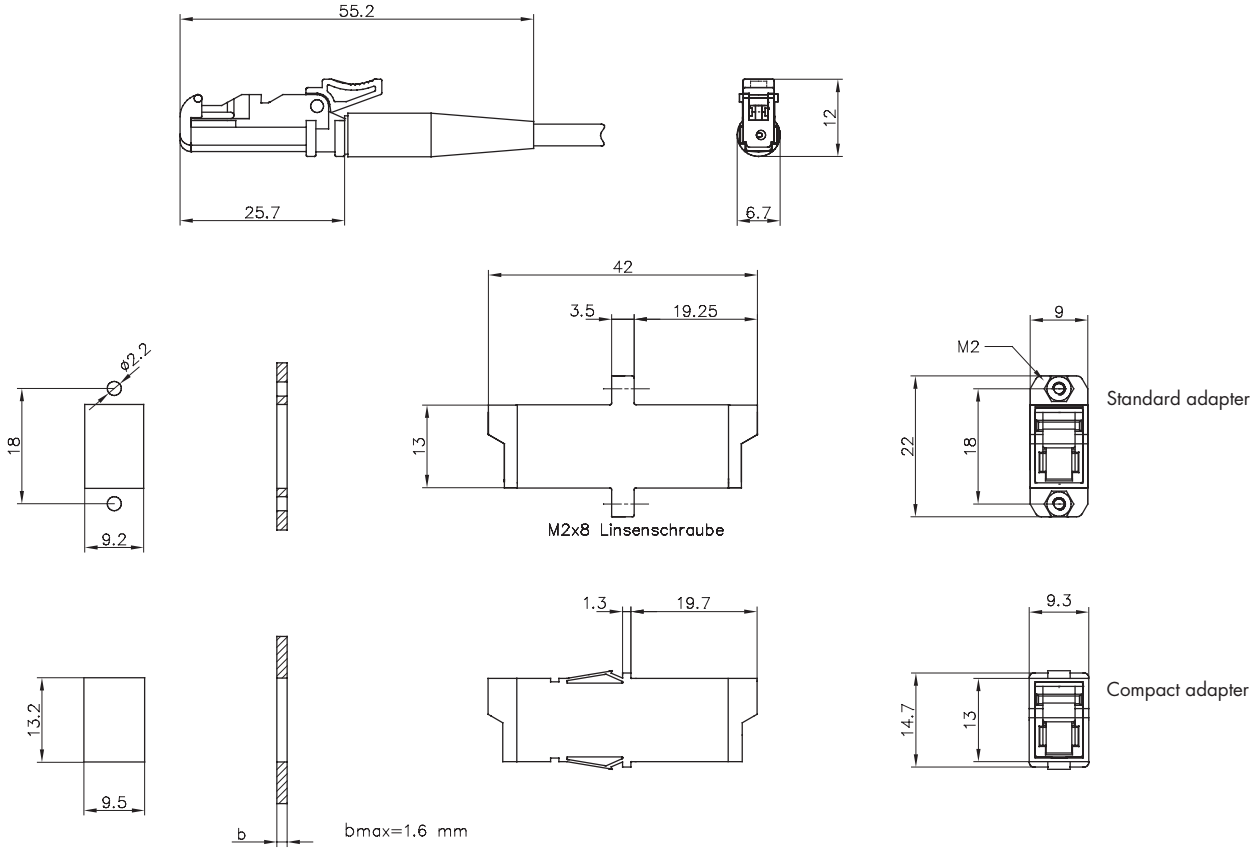


Features

- Latched push-pull connector
- Automatic metal shutter in connector and adapter as dust and laser beam protection
- One-piece design for easy and quick termination
- Color coding of connector and adapter
- Mechanical coding of connector and adapter
- High safety in HighPower applications

Specifications

Compliance	IEC 61754-15, TIA 604-16	
Technology	Full ceramic ferrule and sleeve	
Tuning	in 60° steps	
Mechanical resistance	100N tensile load	
Thermal resistance	–40 °C to +85 °C, stock temperature range	
Flammability	UL 94-V0	
Durability	Min. 1000 mating cycles	
Color of housing	Singlemode	blue
	SM (APC 8°)	green
	Multimode	beige



FLSH (E-2000™)

Ordering information: FLSH Connector, uncoded

Connector type	Polishing	Insertion loss[1] [dB] (mean/97%)	Cable Ø	Type
SM	PC/UPC	0.12/0.25	≤ 3.5	FLSH-2000-A005
SM	APC	0.12/0.25	≤ 3.5	FLSH-2000-A608
SM Premium	PC/UPC	0.06/0.15	≤ 3.5	FLSH-2000-H001
SM Premium	APC	0.06/0.15	≤ 3.5	FLSH-2000-H600
G50/125, G62.5/125	PC	0.2 / 0.5	≤ 3.5	FLSH-2000-B003
HCS200/230	PC	0.3 / 0.75	≤ 3.5	FLSH-2000-D001

[1] IEC 61300-3-34 method 2

Ordering information: Crimpsets

Description	
Crimpsets	please see page 40

Ordering information: Adapter

Adapter type	Mounting	Sleeve material	Color	Type
SM	with 2-hole flange	zirconia ceramic	blue	FLSH-FLSH-D100
SM APC	with 2-hole flange	zirconia ceramic	green	FLSH-FLSH-D600
SM HighPower	with 2-hole flange	zirconia ceramic	blue	FLSH-FLSH-D110
SM APC HighPower	with 2-hole flange	zirconia ceramic	green	FLSH-FLSH-D610
MM	with 2-hole flange	zirconia ceramic	beige	FLSH-FLSH-D102
Compact SM	integrated fixing springs	zirconia ceramic	blue	FLSH-FLSH-A100
Compact APC	integrated fixing springs	zirconia ceramic	green	FLSH-FLSH-A600
Compact SM HighPower	integrated fixing springs	zirconia ceramic	blue	FLSH-FLSH-A110
Compact SM APC HighPower	integrated fixing springs	zirconia ceramic	green	FLSH-FLSH-A610
Compact MM	integrated fixing springs	zirconia ceramic	beige	FLSH-FLSH-A101

Ordering information: Accessories

Description		Color	Type
Quick-mounting spring	metal (25 pieces)		9801.93.A
Angled boot 90°	plastic (100 pieces)	green	9890.95.P
Coding	please see next page		
Easyfit	please see section “Field termination”		
Hybridadapters	please see second part of section “Connectors”		

FLSH (E-2000™)

Mechanical coding system
The mechanical and color coding system allows fast and secure installation of the connector and the adapter. It ensures mating without risk of confusion. Connectors and adapters without coding are still available and fit on any coded piece.

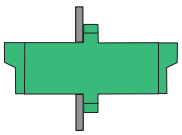
Ordering information

Type				
FLSH-FLSH-XXXX		Adapter code		
–A0	0	uncoded	color of adapter	
–A1	1	Key 1	red	coded "
–A2	2	Key 2	brown	"
–A3	3	Key 3	yellow	"
–A4	4	Key 4	orange	"
–A5	5	Key 5	violet	"
–A6	6	Key 6	white	"
–AA	A	Key 7	red	uncoded
–AB	B	Key 8	brown	"
–AC	C	Key 9	yellow	"
–AD	D	Key 10	orange	"
–AE	E	Key 11	violet	"
–AF	F	Key 12	white	"
–AG	G	Key 13	green	"
–AH	H	Key 14	blue	"
–AI	I	Key 15	black	"
–AJ	J	Key 16	grey	"
–AK	K	Key 17	pink	"
–AL	L	Key 18	turquoise	"
		→ coding frame at back		
		→ coding frame at front		

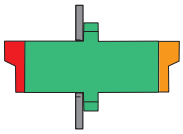
Type			
FLSH-2000-XXXX		connector code	
–C1	Key 1	red	coded
–C2	Key 2	brown	"
–C3	Key 3	yellow	"
–C4	Key 4	orange	"
–C5	Key 5	violet	"
–C6	Key 6	white	"
–CA	Key 7	red	uncoded
–CB	Key 8	brown	"
–CC	Key 9	yellow	"
–CD	Key 10	orange	"
–CE	Key 11	violet	"
–CF	Key 12	white	"
–CG	Key 13	green	"
–CH	Key 14	blue	"
–CI	Key 15	black	"
–CJ	Key 16	grey	"
–CK	Key 17	pink	"
–CL	Key 18	turquoise	"
	→ coding on the connector		

Examples:

FLSH-FLSH-D600
green adapter without coding



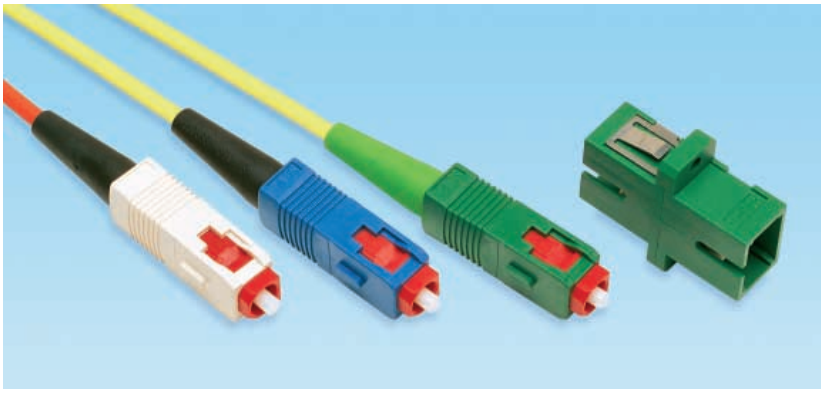
FLSH-FLSH-D600-A14
green adapter + 1 red coding frame on frontside,
1 orange coding frame on backside



FLSH-2000-A001
blue connector without coding

FLSH-2000-A001-C1
blue connector + red coding

FSC

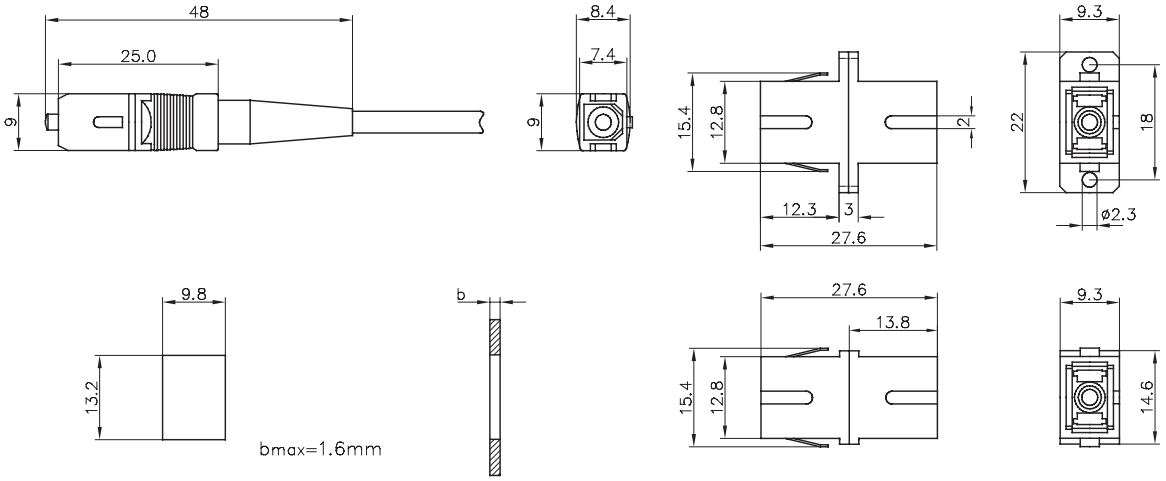


Features

- Push-pull connector
- One-piece design for easy and quick termination
- High mechanical and thermal resistance according to Telcordia GR-326-CORE

Specifications

Compliance	IEC 61754-4, TIA 604-3	
Technology	Full ceramic ferrule and sleeve (SM)	
Tuning	in 60° steps	
Mechanical resistance	100N tensile load	
Thermal resistance	–40 °C to +85 °C, stock temperature range	
Flammability	UL 94-V0	
Durability	Min. 1000 mating cycles	
Color of housing	Singlemode PC	blue
	SM (APC 8°/9°)	green
	Multimode	beige



FSC

Ordering information: FSC Connector

Connector type	Polishing	Insertion loss[1] [dB] (mean/97%)	Cable Ø	Type
SM High-End	PC/UPC	0.12/0.25	≤ 3.5	FSC-CMAX-A001
SM High-End	APC	0.12/0.25	≤ 3.5	FSC-CMAX-A600
SM Premium	PC/UPC	0.06/0.15	≤ 3.5	FSC-CMAX-H001
SM Premium	APC	0.06/0.15	≤ 3.5	FSC-CMAX-H600
G50/125, G62.5/125	PC	0.2/ 0.5	≤ 3.5	FSC-CMAX-B001
HCS200/230	PC	0.3/ 0.75	≤ 3.5	FSC-CMAX-D001

[1] Each-to-each IEC 61300-3-34 method 2

Ordering information: Crimpsets

Description	
Crimpsets	please see page 40

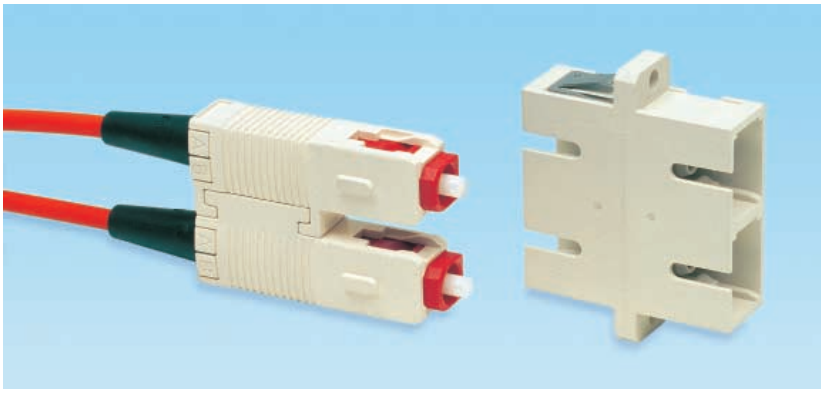
Ordering information: Adapter

Adapter type	Mounting	Sleeve material	Color	Type
SM	with 2-hole flange	zirconia ceramic	blue	FSC-FSC-D100
SM HighPower	with 2-hole flange	zirconia ceramic	blue	FSC-FSC-D110
SM (APC 8°/9°)	with 2-hole flange	zirconia ceramic	green	FSC-FSC-D600
SM (APC 8°/9°) HighPower)	with 2-hole flange	zirconia ceramic	green	FSC-FSC-D610
MM	with 2-hole flange	phosphor-bronze	beige	FSC-FSC-D200
Flangeless SM	fixing spring	zirconia ceramic	blue	FSC-FSC-A100
Flangeless SM HighPower	fixing spring	zirconia ceramic	blue	FSC-FSC-A110
Flangeless APC	fixing spring	zirconia ceramic	green	FSC-FSC-A600
Flangeless APC HighPower	fixing spring	zirconia ceramic	green	FSC-FSC-A610
Flangeless MM	fixing spring	phosphor-bronze	beige	FSC-FSC-A200

Ordering information: Accessories

Description		Color	Type
Angled boot 90°	plastic (100 pieces)	green	9890.95.P
Quick Assembly	please see section “Field termination”		
Easyfit	please see section “Field termination”		
Hybridadapters	please see second part of section “Connectors”		

FSC DUPLEX

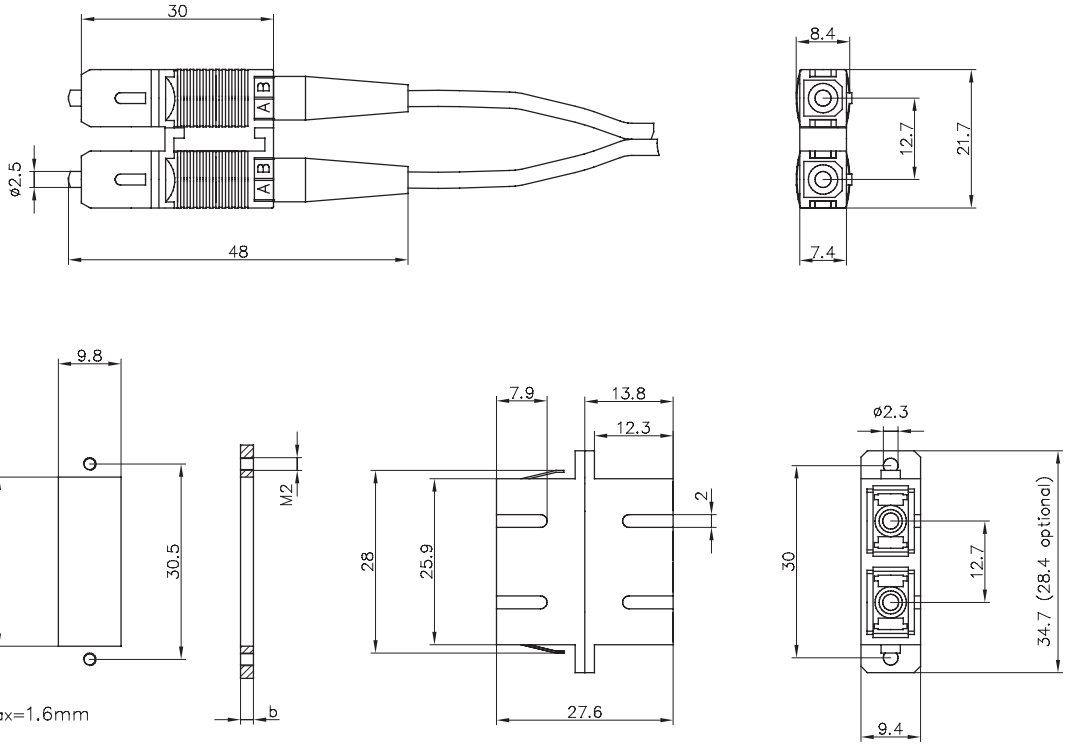


Features

- Push-pull connector
- One-piece design for easy and quick termination
- High mechanical and thermal resistance according to Telcordia GR-326-CORE
- Channel identification (A-B)

Specifications

Compliance	IEC 61754-4, TIA 604-3	
Technology	Full ceramic ferrule and sleeve	
Tuning	in 60° steps	
Mechanical resistance	100 N tensile load	
Thermal resistance	–40 °C to +85 °C, stock temperature range	
Flammability	UL 94-V0	
Durability	Min. 1000 mating cycles	
Color of housing	Singlemode PC	blue
	Singlemode APC	green
	Multimode	beige



FSC DUPLEX

Ordering information: FSC Duplex Connector

Connector type	Polishing	Insertion loss[1] [dB] (mean/97%)	Cable Ø	Type
SM	PC/UPC	0.12/0.25	≤ 3.5	FSC-CMAX-A001-02
SM	APC	0.12/0.25	≤ 3.5	FSC-CMAX-A600-02
G50/125, G62.5/12	PC	0.2/ 0.5	≤ 3.5	FSC-CMAX-B001-02

[1] IEC 61300-3-34 method 2

Ordering information: Crimpsets

Description	
Crimpsets	please see page 40

Ordering information: Adapter

Adapter type	Mounting	Sleeve material	Color	Type
Duplex SM	with 2-hole flange	zirconia	blue	FSC-FSC-D100-02
Duplex SM APC	with 2-hole flange	zirconia	green	FSC-FSC-D600-02
Duplex MM	with 2-hole flange	phosphor-bronze	beige	FSC-FSC-D200-02
Duplex SM flangeless	fixing spring	zirconia	blue	FSC-FSC-D102-02
Duplex MM flangeless	fixing spring	phosphor-bronze	beige	FSC-FSC-D202-02

Ordering information: Accessories

Description		Color	Type
Angled boot 90°	plastic (100 pieces)	green	9890.95.P
Quick Assembly	please see section “Field termination”		
Easyfit	please see section “Field termination”		

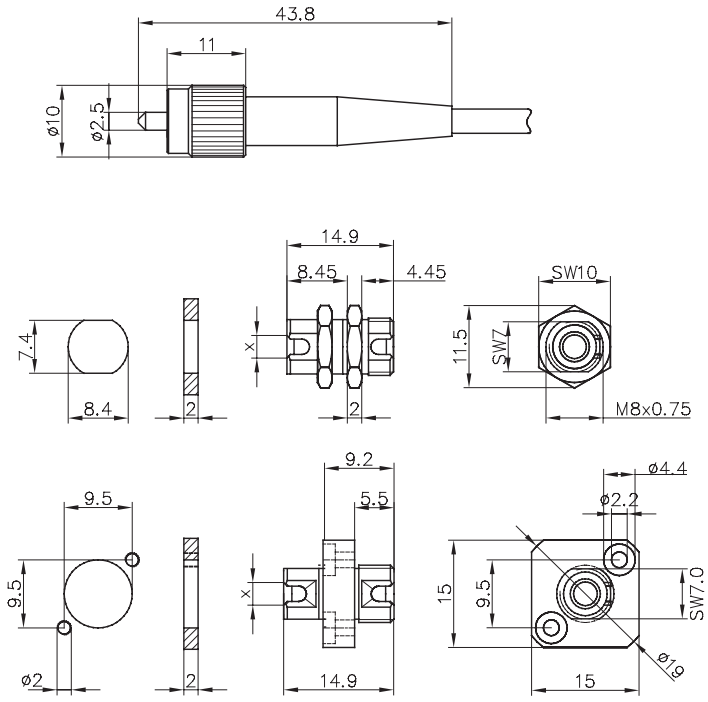
FCPC

Features

- Threaded nut connector
- One-piece design for easy and quick termination
- Very short rigid length
- High mechanical and thermal resistance according to Telcordia GR-326-CORE

Specifications

Compliance	IEC 61754-13, TIA 604-4-A
Technology	Full ceramic ferrule
Tuning	PC infinitely
	APC in 60° steps
Mechanical resistance	100 N tensile load
Thermal resistance	–40 °C to +85 °C, stock temperature range
Durability	Min. 1000 mating cycles
Adapter and connector material	Brass nickel-plated



FCPC

Ordering information: FCPC Connector

Connector type	Polishing	Insertion loss[1] [dB] (mean/97%)	Cable Ø	Type
SM wide key	PC/UPC	0.12/0.25	≤ 3.5	FCPC-Z/M-A001
SM small key	APC	0.12/0.25	≤ 3.5	FCPC-Z/M-A601
SM wide key	APC	0.12/0.25	≤ 3.5	FCPC-Z/M-A602
SM small key Premium	PC/UPC	0.06/0.15	≤ 3.5	FCPC-Z/M-H001
SM small key Premium	APC	0.06/0.15	≤ 3.5	FCPC-Z/M-H600
G50/125, G62.5/125 wide key	PC	0.2 /0.5	≤ 3.5	FCPC-Z/M-B001
HCS200/230	PC	0.3/0.75	≤ 3.5	FCPC-Z/M-D001

[1] IEC 61300-3-34 method 2

Ordering information: Crimpsets

Description	
Crimpsets	please see page 40

Ordering information: Adapter

Adapter type	Mounting	Sleeve material	Type
Standard	with 1 loose, 1 fixed nut for D-hole mounting key width: 2.15 mm	zirconia ceramic	FCPC-FCPC-C100
	with 2-hole flange, 4 mm thick key width: 2.15 mm	zirconia ceramic	FCPC-FCPC-D100
APC	with1 loose, 1 fixed nut for D-hole mounting key width: 2.03 mm	zirconia ceramic	FCPC-FCPC-C600
	with 2-hole flange, 4 mm thick key width: 2.03 mm	zirconia ceramic	FCPC-FCPC-D600

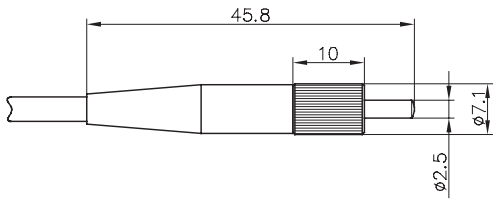
FLSA (DIN)

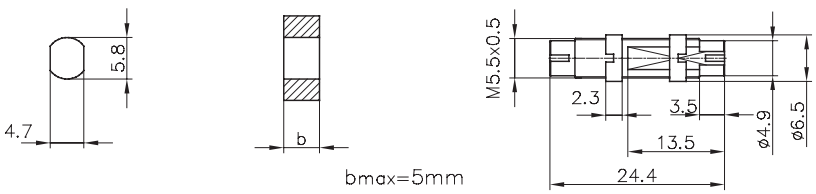
Features

- Threaded nut connector
- One-piece design for easy and quick termination
- Long ferrule according to DIN

Specifications

Compliance	IEC 61754-3, DIN 47256
Technology	Full ceramic ferrule
Tuning	in 60° steps
Mechanical resistance	100 N tensile load
Thermal resistance	–40 °C to +85 °C, stock temperature range
Durability	Min. 1000 mating cycles
Adapter and connector material	Brass nickel-plated





FLSA (DIN)

Ordering information: FLSA Connector

For fiber type	Polishing	Insertion loss[1] [dB] (mean/97%)	Cable Ø	Type
SM	PC	0.12/0.25	≤ 3.5	FLSA-Z/M-A001
SM	APC 8°	0.12/0.25	≤ 3.5	FLSA-Z/M-A600
G50/125, G62.5/125	PC	0.2 /0.5	≤ 3.5	FLSA-Z/M-B001

[1] IEC 61300-3-34 method 2

Ordering information: Crimpsets

Description	
Crimpsets	please see page 40

Ordering information: Adapter

Adapter type	Mounting	Sleeve material	Type
Standard	with 2 loose nuts for D-hole mounting	zirconia ceramic	FLSA-FLSA-B100

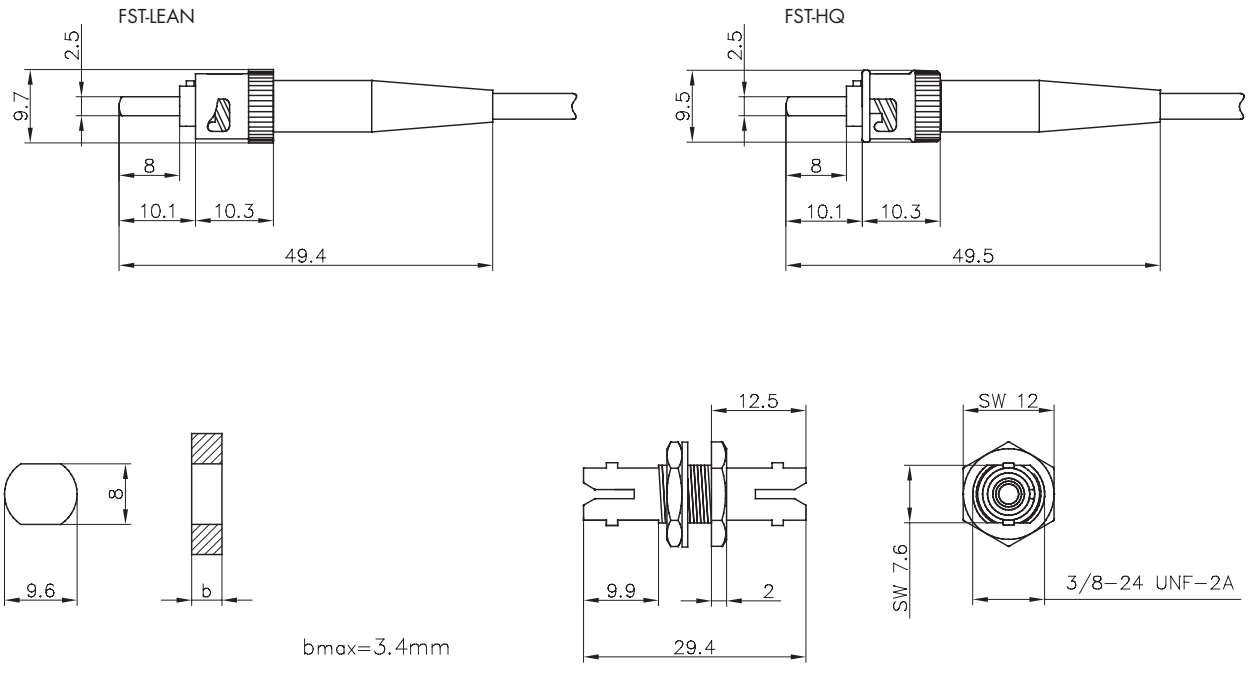
FST-LEAN, FST-HQ (BFOC)

Features

- Bayonet nut connector
- One-piece design for easy and quick termination

Specifications

Compliance	IEC 61754-2, TIA 604-2
Technology	Full ceramic ferrule
Mechanical resistance	100 N tensile load
Thermal resistance	–40 °C to +85 °C, stock temperature range
Durability	Min. 1000 mating cycles
Adapter and connector material	Brass nickel-plated



FST-LEAN, FST-HQ

Ordering information: FST-LEAN und FST-HQ Connector

Connector type		Ferrule	Bayonet	Insertion loss[1] [dB] (mean/97%)	Type
G50/125, G62.5/125	LEAN	zirconia	Plastic, black	0.25/0.70	FST-LEAN-B003
G50/125, G62.5/125	LEAN	zirconia	metal	0.25/0.70	FST-LEAN-B006
SM	HQ	zirconia	metal	0.25/0.70	FST-Z/M-A001
G50/125, G62.5/125	HQ	zirconia	metal	0.2 /0.5	FST-Z/M-B001
HCS200/230	HQ	zirconia	metal	0.4 /0.75	FST-Z/M-D001

[2] IEC 61300-3-34

Ordering information: Crimpsets

Description	
Crimpsets	please see page 40

Ordering information: Adapter

Adapter type	Mounting	Sleeve material	Type
SM	with 1 loose, 1 fixed nut 1 washer for D-hole mounting	zirconia ceramic	FST-FST-C100
MM	with 1 loose, 1 fixed nut 1 washer for D-hole mounting	phosphor-bronze	FST-FST-C200
MM for Panduit outlets	with special nut for round hole assembly	phosphor-bronze	FST-FST-C201

Ordering information: Accessories

Description		Type
Mounting tool	for Panduit adapter	9801.30.X
Quick Assembly	please see section “Field termination”	
Easyfit	please see section “Field termination”	
Hybrid adapters	please see second part of section “Hybrid adapters”	

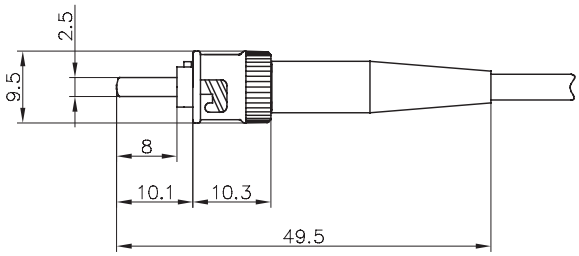
FST-SECURITY

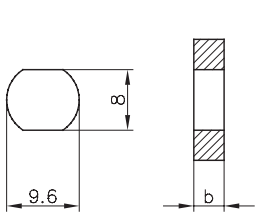
Features

- Bayonet nut connector
- One-piece design for easy and quick termination
- With integrated strain relief (ST2 version)

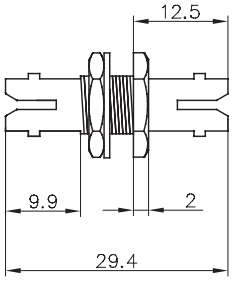
Specifications

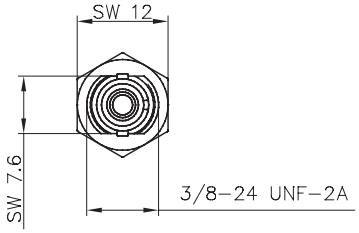
Compliance	IEC 61754-2, TIA 604-2
Technology	Full ceramic ferrule
Mechanical resistance	100 N tensile load
Thermal resistance	–40 °C to +85 °C, stock temperature range
Durability	Min. 1000 mating cycles
Adapter and connector material	Brass nickel-plated





bmax=3.4mm





FST-SECURITY

Ordering information: FST-Security Connector

For fiber type	Polishing	Insertion loss[1] [dB] (mean/97%)	Type
SM	PC	0.2 / 0.5	FST-SEC-A001
G50/125, G62.5/125	PC	0.25/0.70	FST-SEC-B001

[2] IEC 61300-3-34

Ordering information: Crimpset black

Description	
Crimpsets	please see page 40

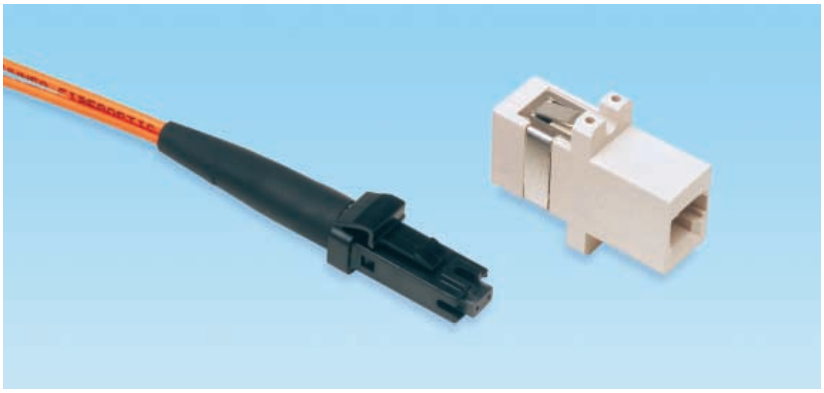
Ordering information: Adapter

Adapter type	Mounting	Sleeve material	Type
SM	with 1 loose, 1 fixed nut 1 washer for D-hole mounting	zirconia ceramic	FST-FST-C100
MM	with 1 loose, 1 fixed nut 1 washer for D-hole mounting	phosphor-bronze	FST-FST-C200

Ordering information: Accessories

Description		Color	Type
Angled boot 90°	plastic (100 pieces)	green	9890.95.P

MT-RJ

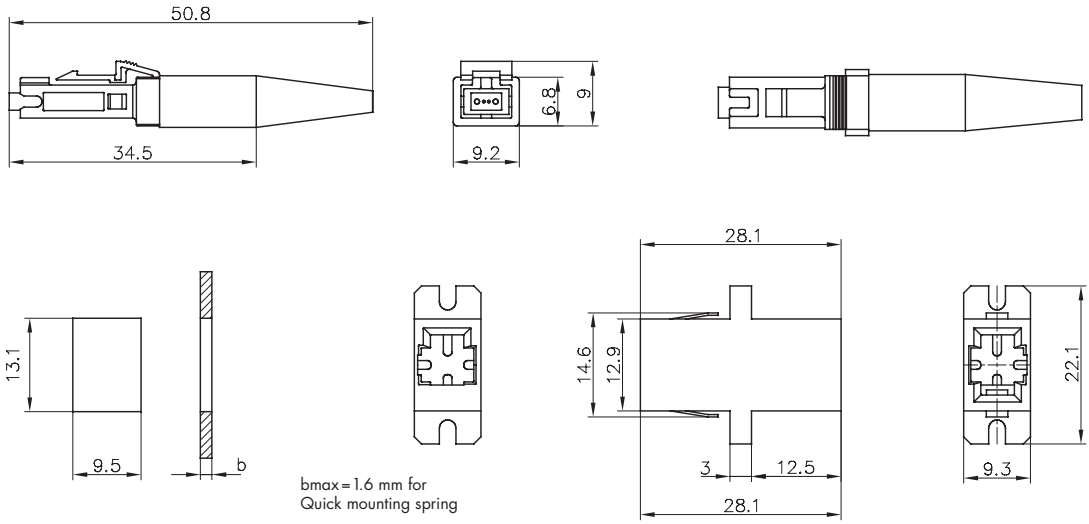


Features

- Latched push-pull connector
- Small Form Factor connector for high packing density. 2 connections in SC shape adapter
- Two fibers in one ferrule

Specifications

Compliance	IEC 61754-18, TIA 604-12		
Technology	Plastic ferrule		
Mechanical resistance	70 N tensile load		
Thermal resistance	-25 °C to +70 °C, stock temperature range		
Durability	Min. 500 mating cycles		
Adapter and connector material	Plastic		
Color of housing	Connector	black	(SM and MM)
	Adapter	beige	



Ordering information: Adapter

Adapter type	Mounting	Color	Type
MT-RJ adapter	with 2-hole flange	beige	FMTJ-FMTJ-D100

Please note: MT-RJ connectors are only available as patchcord or pigtail cables.

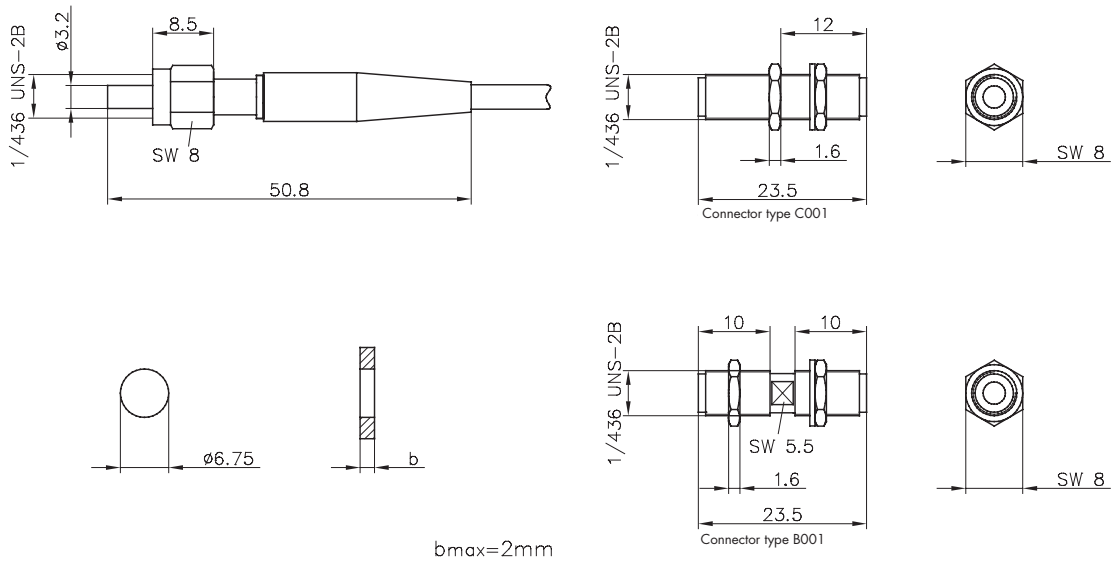
FSMA

Features

- Threaded nut connector
- One-piece design for easy and quick termination
- O-ring seal
- Connector without PC (physical contact)

Specifications

Technology	Metal ferrule and sleeve
Mechanical resistance	100 N tensile load
Thermal resistance	–40° to +85°C, stock temperature range
Durability	Min. 1000 mating cycles
Adapter and connector material	Brass nickel-plated



FSMA

Ordering information: FSMA Connector (Type 905)

For fiber type	Ferrule material	Insertion loss [dB] (mean/97%)	Type
G50/125, G62.5/125	metal	<1.0/<1.5	FSMA-M/M-B001
HCS200/230	metal	<1.0/<1.5	FSMA-M/M-D001

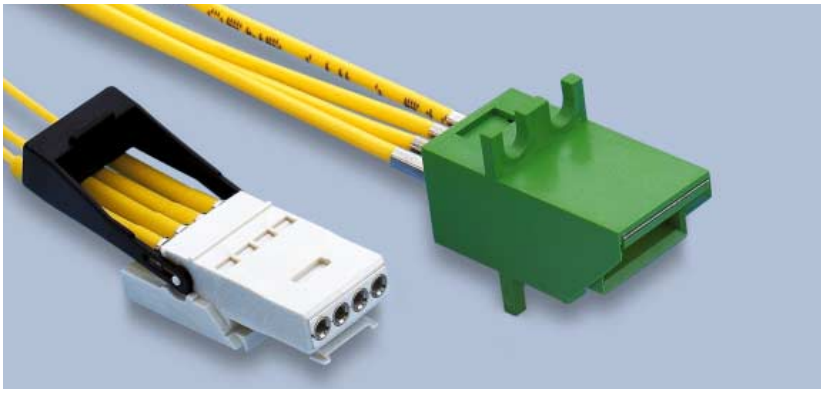
Ordering information: Crimpsets

Description	
Crimpsets	please see page 40

Ordering information: Adapter

Adapter type	Mounting	Type
Standard	continuous thread with 2 loose nuts and 1 washer	FSMA-FSMA-B001
	with 1 loose, 1 fixed nut and 1 washer	FSMA-FSMA-C001

FIBERGATE BACKPLANE CONNECTOR

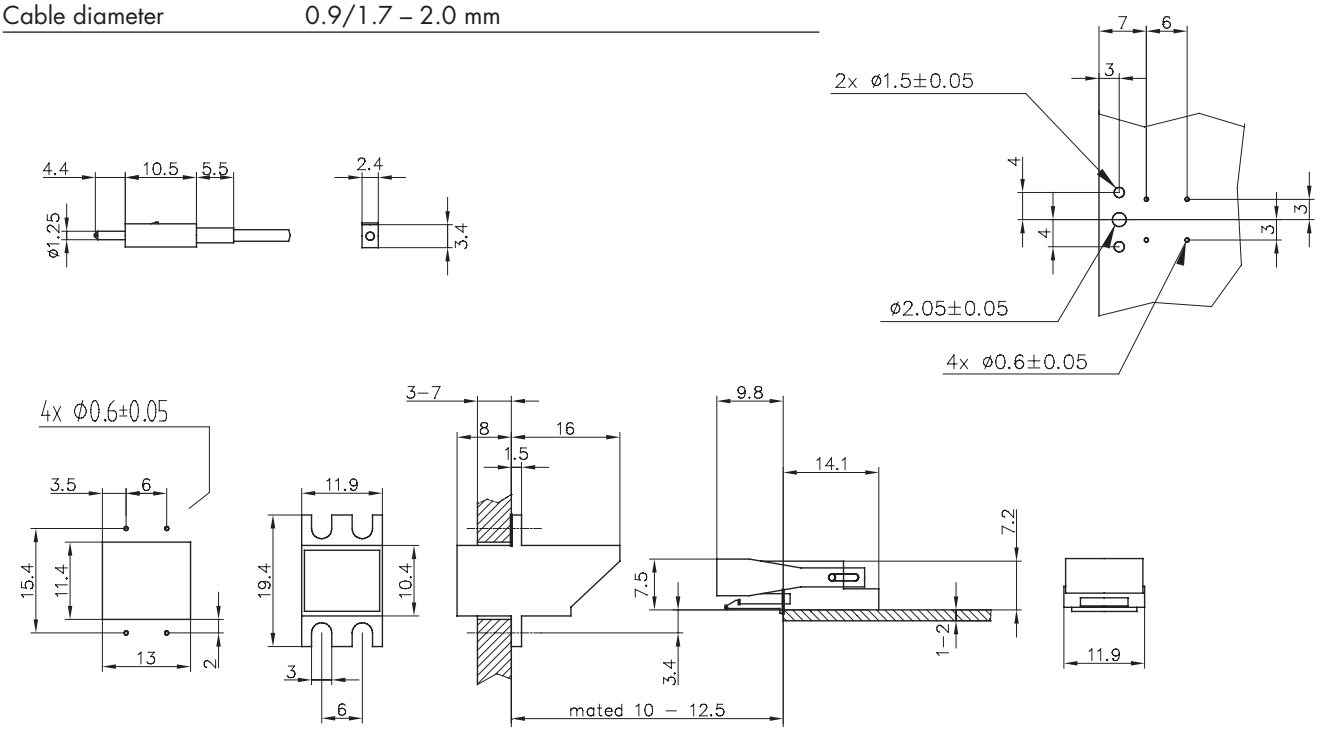


Specifications

Mechanical resistance	30 N tensile load
Thermal resistance	–25° to +70°C
Durability	Min. 500 mating cycles
Insertion loss Singlemode (E9/125)	< 0.4 dB, typical 0.09 dB (each-to-each)
Return loss	PC > 45 dB, APC 85 dB (typical)
Force on PC board after connection	force-free, length compensation
Longitudinal float lateral float	2.5 mm 0.5 mm
Connection/Disconnection force	Typical 15 N for all 4 connections
Highest packing density	4 pieces on 12 mm
Protection of fiber end face	Dust cap
Durability	> 10 years
Cable diameter	0.9/1.7 – 2.0 mm

Features

- FO connector with integrated adapter
- Compact design with highest packing density
- Full-ceramic ferrule inserts with individual configuration
- Guaranteed transmission safety
- SDH system compatibility
- Lateral floating compensation
- Dust protection for connector and adapter
- Populated with 1 to 4 Ø 1.25 mm ferrules
- Snap-on mounting
- HighPower approved

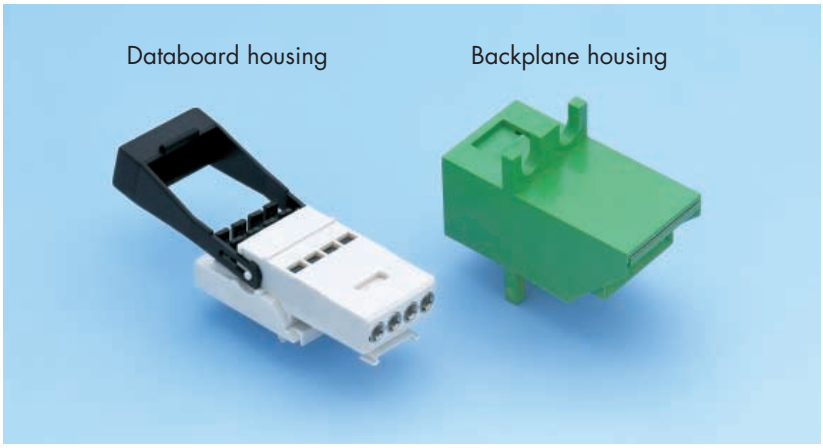


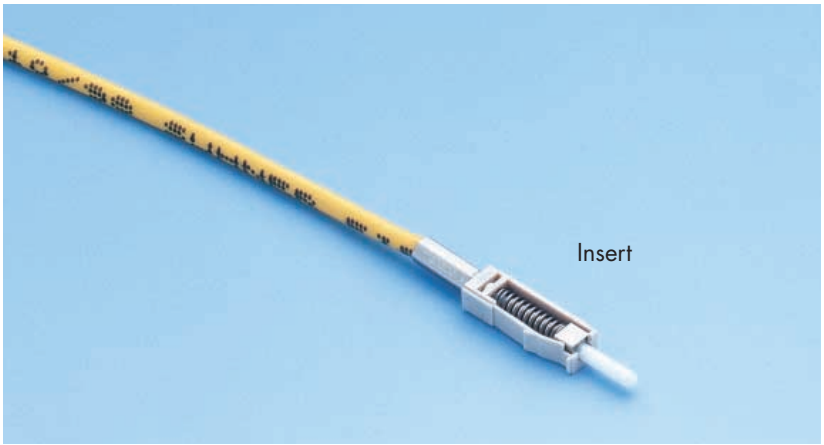
FIBERGATE BACKPLANE CONNECTOR

Ordering information: Backplane-System

Description		Type
Backplane housing without inserts		FGAT-BP-A001-4
Backplane housing fixing		FGAT-FIX-A001
Databoard housing without inserts		FGAT-BP-A002-4
Databoard housing fixing		FGAT-FIX-A002
Insert (1.25 mm ferrule)	PC	FGAT-INS-A001
Insert (1.25 mm ferrule)	APC	FGAT-INS-A601
Crimpset 0.9 mm	PC	009-YE-I001
Crimpset 0.9 mm	APC	009-GN-I001
Crimpset 1.7 mm	PC and APC	017-XX-I001
Key for insert disassembly		FGAT-KEY-A001
Inspection device adapter for backplane connector[1)]		FGAT-TIP-A001
Inspection device adapter for databoard connector[1)]		FGAT-TIP-A002
Cleaning devices		FGAT-CLN-A001
Cleaning stripes for FGAT-CLN-A001 (Set of 10 pieces)		FGAT-WPS-A001

[1)] Video inspection device from NOYES



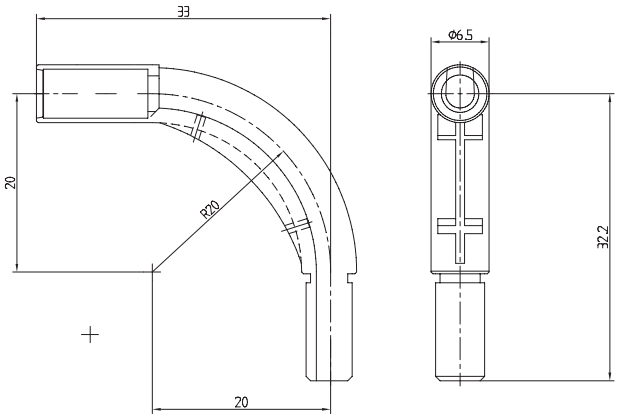


ANGLED BOOT FOR E-2000™, FSC, FCPC, FLSA, FST, FSMA

Designed for the installation of E-2000™, FSC, FCPC, FLSA, FST and FSMA connectors into racks with tight space conditions. The 90° boot is used in addition to a standard crimp-set and guarantees the minimal bending radius.

Ordering information

Description	Color	Type
Angled boot 90°	green	9890-95-P



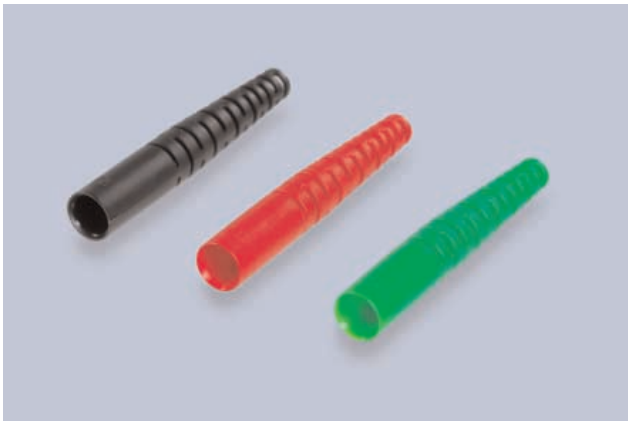
ANGLED BOOTS FOR LX.5 AND FLC

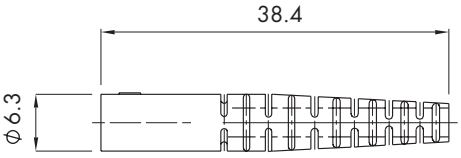
These angled boots are designed to install LX.5 and FLC connectors into racks with tight space conditions.

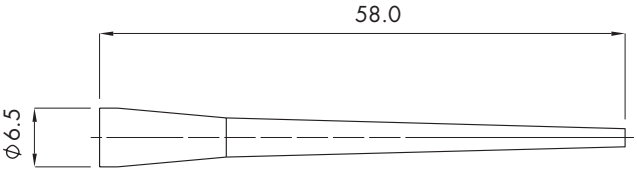
Ordering information

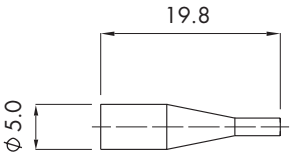
Description		Color	Type
Crimpset	45°	black	017-BK-H500
Crimpset	90° short	black	017-BK-H501
Crimpset	90° long	black	017-BK-H502
Crimpset	45°	black	021-BK-H500
Crimpset	90° short	black	021-BK-H501
Crimpset	90° long	black	021-BK-H502
Crimpset	45°	black	024-BK-H500
Crimpset	90° short	black	024-BK-H501
Crimpset	90° long	black	024-BK-H502

HUBER+SUHNER CRIMPSETS







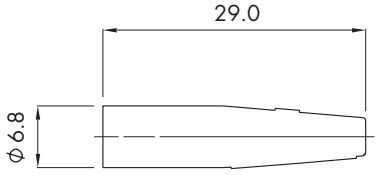


Crimpsets for FLSH, FCPC, FSC, FLSA, FSMA, FST (except FST security) connectors

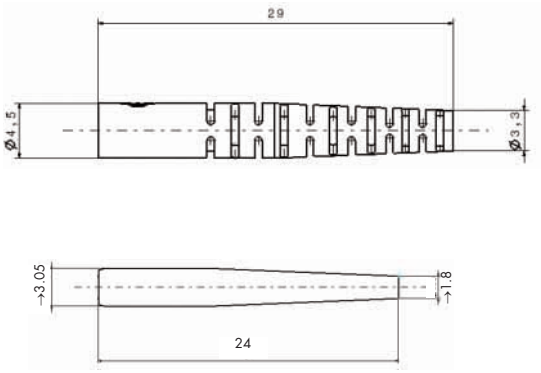
Type Max. cable Ø	Sleeve	Boot black	green	red	yellow	blue
<1.0 mm short	–	23003203	23017894	84005612	84005611	84005610
<1.0 mm long	–	23221231	23227472	23229087	84005609	84005608
1.6 – 1.9 mm	23308161	84005334	84005336	84005337	84005341	84005390
2.0 – 2.2 mm	23231091	84005334	84005336	84005337	84005341	84005390
2.3 – 2.6 mm	23231090	23023582	23023581	23023583	84005607	84005606
2.7 – 2.9 mm	23231089	23014820	84005353	23022846	84005354	84005355
3.0 – 3.2 mm	23233549	23014820	84005353	23022846	84005354	84005355

Type Max. cable Ø	Sleeve	Boot black	green
3.3 - 3.5 mm[1)]	23231087	23227238	23227244

[1)] old style



HUBER+SUHNER CRIMPSETS

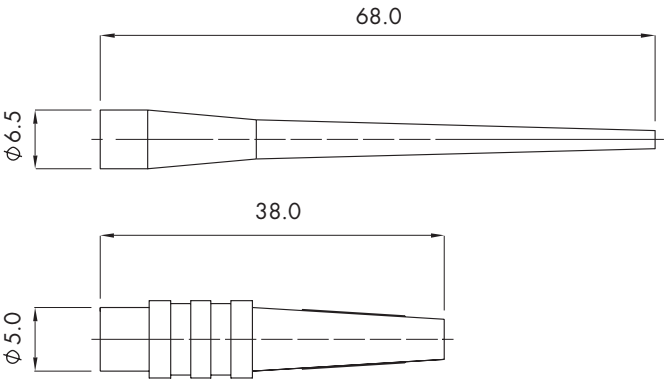


Crimpsets for FLX5 and FLC connectors

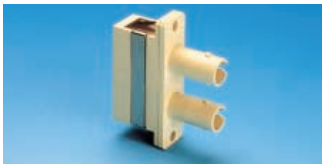
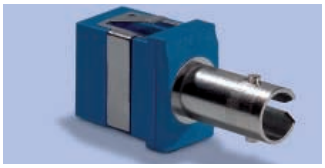
Type Max. cable Ø	Sleeve	Boot black	green	red	yellow	blue
<1.0 mm FLC	–	23026770	23026771	84005618	84005617	84005616
<1.0 mm FLX5	–	23034533	23034534	84005615	84005614	84005613
1.6 – 1.8 mm	23026713	23026769	84005356	84005357	84005358	84005359
1.9 – 2.2 mm	23028203	23026769	84005356	84005357	84005358	84005359
2.3 – 2.5 mm	23028204	23026769	84005356	84005357	84005358	84005359

Crimpsets for FST security connector

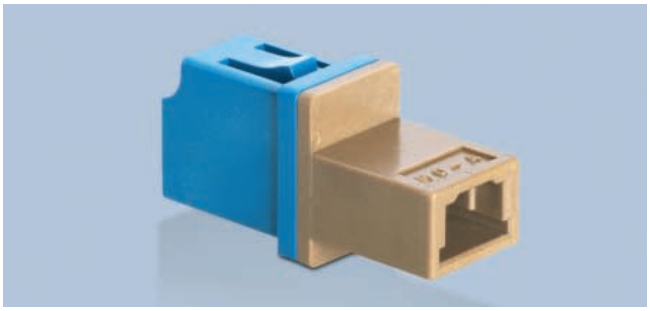
Type Max. cable Ø	Sleeve	Boot black
<1.0 mm long	–	23227063
2.0 – 2.3 mm	23232995	23221232
2.4 – 2.8 mm	23231084	23221232
2.9 – 3.5 mm	23231085	23219331
3.6 – 4.5 mm	23231086	23219332



OVERVIEW HYBRID ADAPTERS

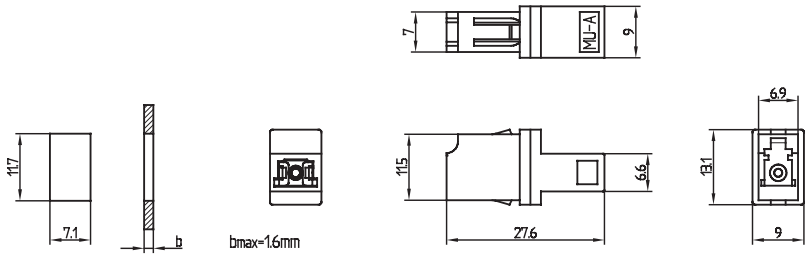
FLC-FMU page 44		**FLX5-FLC** page 44	
FLSH-FCPC page 45		**FLSH -FSC** page 45	
FST-FCPC page 46		**FSC-FCPC** page 46	
FSC-FST page 47		**FSC Duplex-FST** page 47	
FSC-FCPC page 48		**FSC-FST** page 48	

HYBRID ADAPTERS

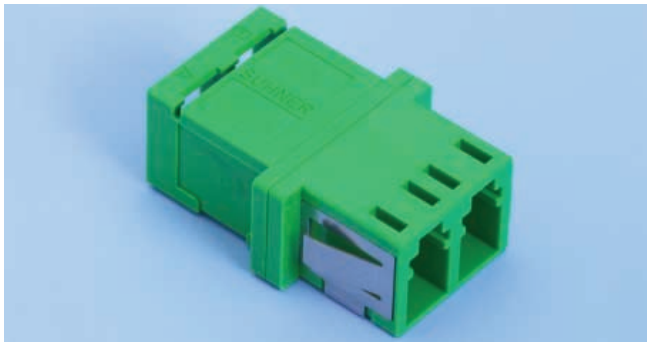


FLC-FMU

- Slotted zirconia ceramic sleeve
- Operating temperature: –40° to +75°C
- Min. mating cycles: 500
- For SM connectors
- For PC and APC applications
- UL94-V0
- FLC connection according to IEC 61754-20

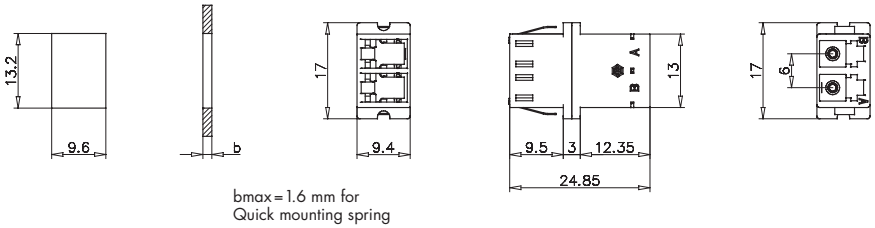


Adapter type	Features	Type
FLC-FMU	Hybrid adapter with zirconia ceramic sleeve, blue/brown	FLC-FMU-A100



FLX5-FLC

- Slotted zirconia ceramic sleeve
- Operating temperature: –40° to +85°C
- Min. mating cycles: 1000
- For SM and MM connectors
- For APC applications

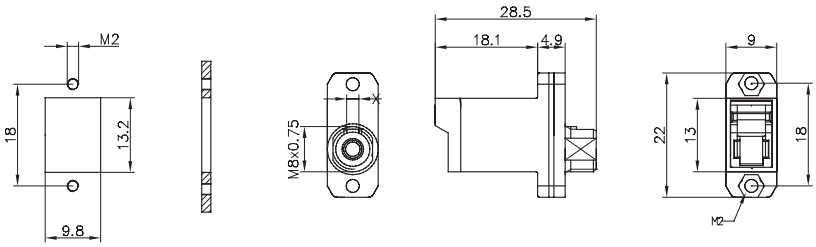


Adapter type	Features	Type
FLX5-FLC (SM)	Hybrid adapter with zirconia ceramic sleeve, Duplex, blue	FLX5-FLC-A100-02
FLX5-FLC (APC)	Hybrid adapter with zirconia ceramic sleeve, Duplex, green	FLX5-FLC-A600-02
FLX5-FLC (MM)	Hybrid adapter with phosphor-bronze sleeve, Duplex, beige	FLX5-FLC-A200-02

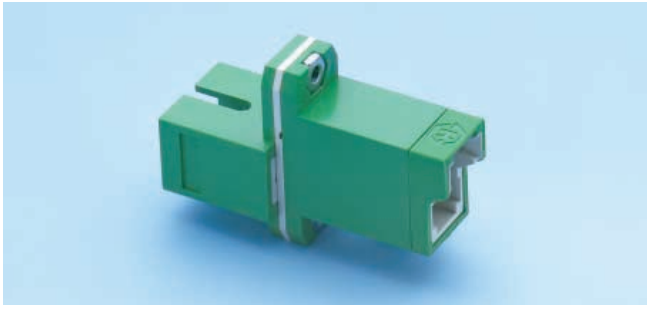
HYBRID ADAPTERS

FLSH (E-2000™)-FCPC

- Slotted zirconia ceramic sleeve; standard coding
- Operating temperature: – 40 °C to +85 °C
- Min. mating cycles: 1000
- For SM, MM and APC connectors (APC 8°)
- Key width: x = 2.15 mm; upon request 2 mm

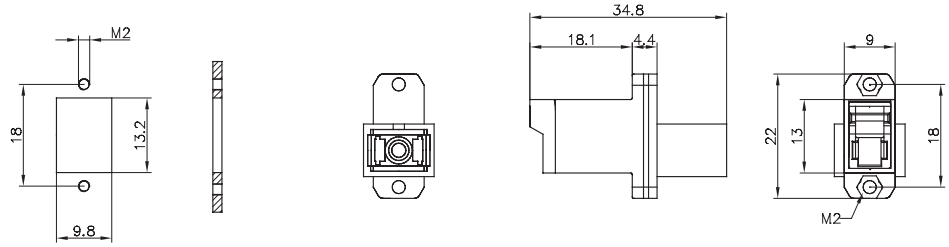


Adapter type	Features	Type
FLSH-FCPC (PC)	Hybrid adapter with zirconia ceramic sleeve, wide key, blue	FLSH-FCPC-D101
FLSH-FCPC (APC)	Hybrid adapter with zirconia ceramic sleeve, wide key, green	FLSH-FCPC-D601
FLSH-FCPC (APC)	Hybrid adapter with zirconia ceramic sleeve, small key, green	FLSH-FCPC-D602



FLSH (E-2000™)-FSC

- Slotted zirconia ceramic sleeve; standard coding
- Operating temperature: – 40 °C to +85 °C
- Min. mating cycles: 1000
- For SM, MM and APC connectors (APC 8°)

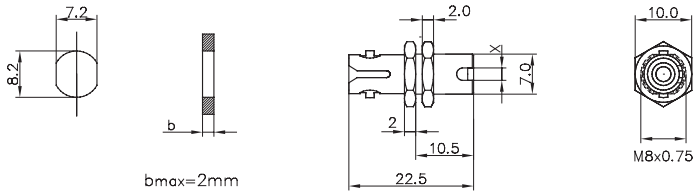


Adapter type	Features	Type
FLSH-FSC (PC)	Hybrid adapter with zirconia ceramic sleeve, blue	FLSH-FSC-D101
FLSH-FSC (APC)	Hybrid adapter with zirconia ceramic sleeve, green	FLSH-FSC-D601

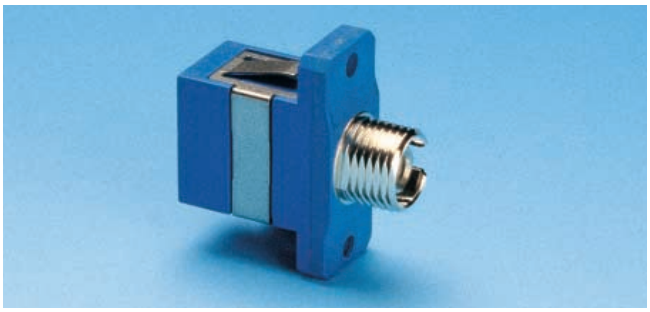
HYBRID ADAPTERS

FST-FCPC

- Slotted zirconia ceramic sleeve
- Operating temperature: – 40°C to +85°C
- Min. mating cycles: 1000
- For SM and MM connectors
- FST connection according to IEC 61754-2
- FCPC connection according to IEC 61754-13

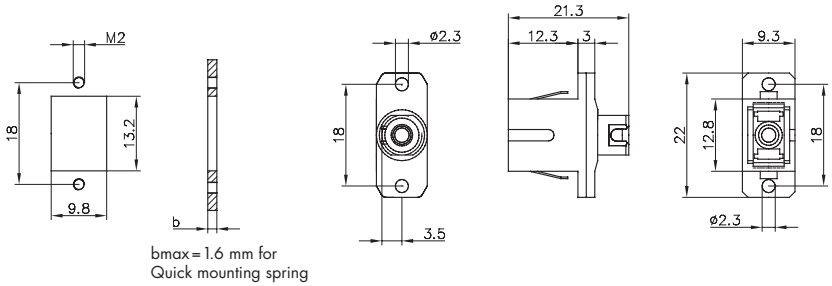


Adapter type	Features	Type
FST-FCPC	Hybrid adapter with zirconia ceramic sleeve, PC and APC, wide key	FST-FCPC-C100



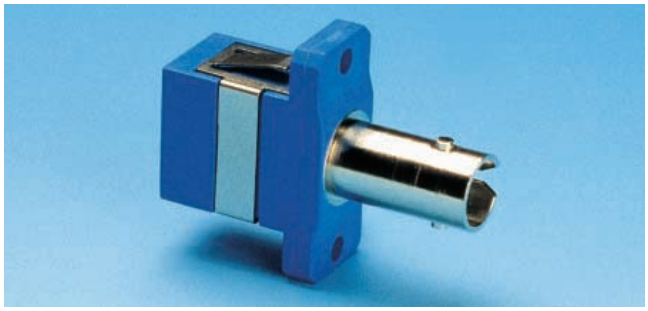
FSC-FCPC

- Slotted zirconia ceramic sleeve
- Operating temperature: – 40°C to +85°C
- Min. mating cycles: 1000
- For SM and MM connectors
- For APC (APC 8°) applications
- FSC connection according to IEC 61754-4
- FCPC connection according to IEC 61754-13



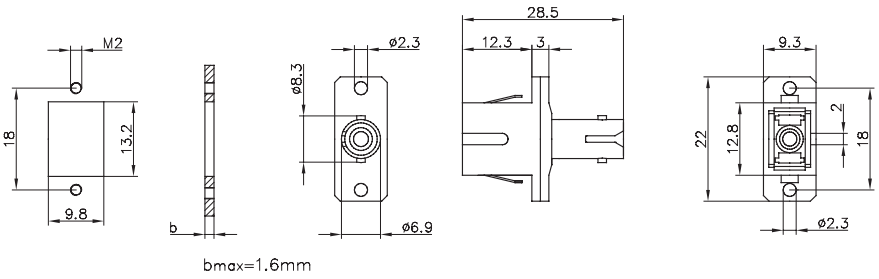
Adapter type	Features	Type
FSC-FCPC	Hybrid adapter with zirconia ceramic sleeve, PC and APC, wide key	FSC-FCPC-D101

HYBRID ADAPTERS

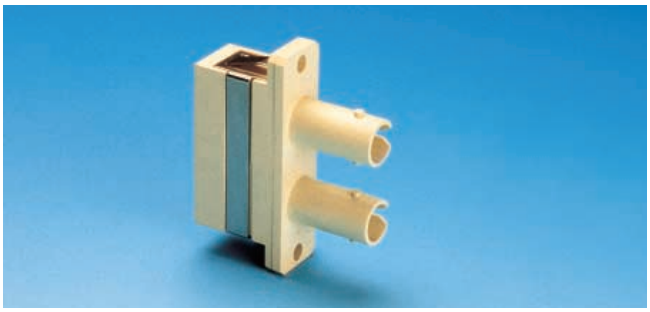


FSC-FST

- Slotted zirconia ceramic sleeve
- Operating temperature: – 40°C to +85°C
- Min. mating cycles: 1000
- For SM and MM connectors
- FSC connection according to IEC 61754-4
- FST connection according to IEC 61754-2

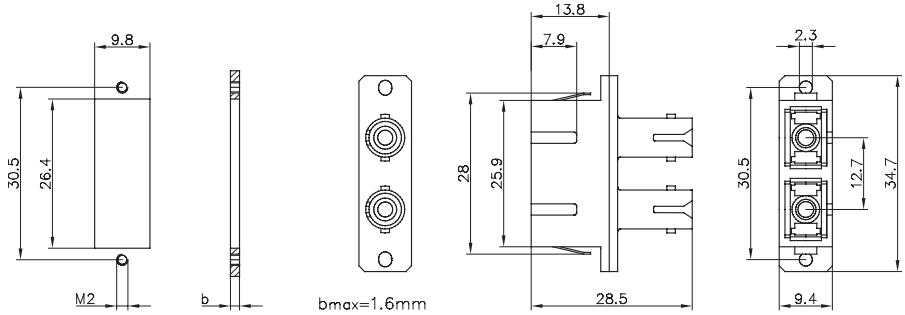


Adapter type	Features	Type
FSC-FST	Hybrid adapter with zirconia ceramic sleeve	FSC-FST-D100



FSC Duplex-FST

- Phosphor-bronze sleeve for Multimode
- Zirconia ceramic sleeve for Singlemode
- Operating temperature: – 40°C to +85°C
- Min. mating cycles: 500
- For Single and Multimode connectors
- FST connection according to IEC 61754-2
- FSC connection according to IEC 61754-4

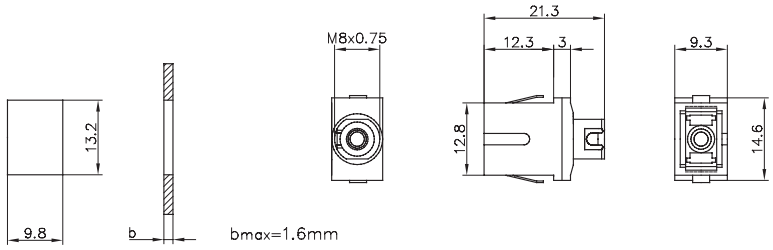


Adapter type	Features	Type
FSC Duplex-FST	Hybrid adapter with phosphor-bronze sleeve	FSC-FST-D200-02
FSC Duplex-FST	Hybrid adapter with zirconia ceramic sleeve	FSC-FST-D100-02
FSC Duplex-FST	Hybrid adapter with phosphor-bronze sleeve for Panduit outlet	FSC-FST-D201-01

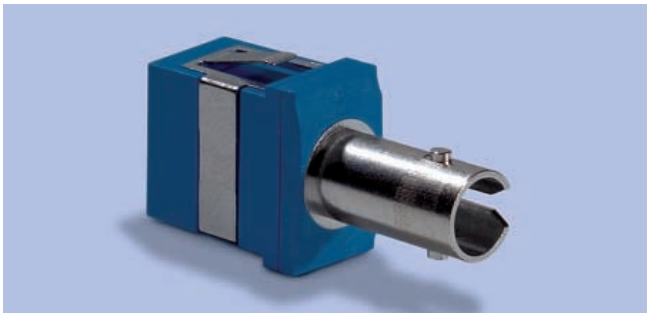
HYBRID ADAPTERS

FSC-FCPC

- Flangeless adapter
- Slotted zirconia ceramic sleeve
- Operating temperature: – 40°C to +85°C
- Min. mating cycles: 1000
- For SM and MM connectors
- For APC (APC 8°) applications
- FSC connection according to IEC 61754-4
- FCPC connection according to IEC 61754-13

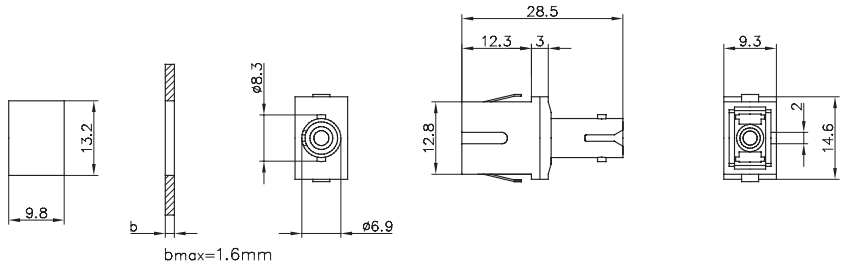


Adapter type	Features	Type
FSC-FCPC	Hybrid adapter with zirconia ceramic sleeve, blue	FSC-FCPC-A100
FSC-FCPC	Hybrid adapter with zirconia ceramic sleeve, black	FSC-FCPC-A101



FSC-FST

- Flangeless adapters
- Slotted zirconia ceramic sleeve
- Operating temperature: – 40°C to +85°C
- Min. mating cycles: 1000
- For SM and MM connectors
- FSC connection according to IEC 61754-4
- FST connection according to IEC 61754-2



Adapter type	Features	Type
FSC-FST	Hybrid adapter with zirconia ceramic sleeve, blue	FSC-FST-A100

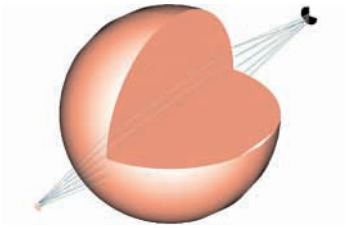
RECEPTACLES

Introduction
Optical connectivity to active components is one of the main problems in the realization of low-cost, high-performance electro-optical modules.

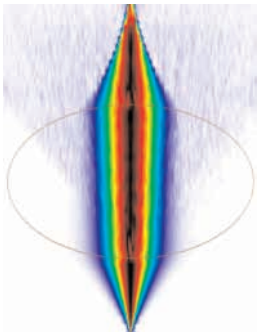
HUBER+SUHNER receptacles provide optical interconnection between a wide variety of active components to most standardized optical connector family. With a long tradition in optical component and engineering services in the field of signal transmission, we are able to supply economical and excellent fiber to chip connectivity solutions, ensuring the service, support and delivery critical in today's markets.

Capabilities
For many years HUBER+SUHNER FIBER OPTICS has increased their capabilities to provide optical connectivity solutions for passive and active components. Our resources include design and analysis software, extensive product development expertise, rapid prototyping possibilities, a tooling shop with molding facility, a large flexible manufacturing and assembly facility as well as environmental testing of fiber optic products.

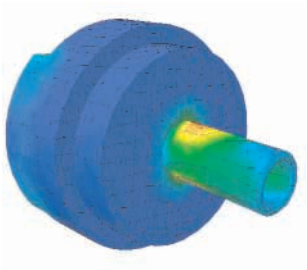
Design and analysis
To provide the best possible performance with the highest tolerances and the best reliability different optical and mechanical simulation tools help to optimize any optical system.



Ray optics to simulate optical lens system



Beam propagation tools to calculate coupling losses



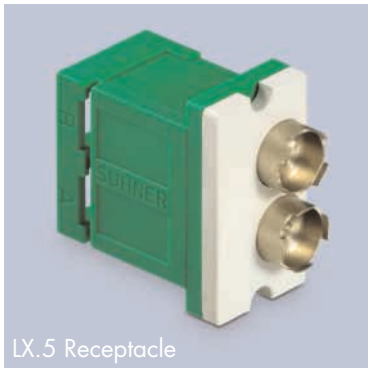
FEM to calculate dimensional stability

Prototyping
The HUBER+SUHNER in-house prototyping and tooling shop makes the realization of high-precision parts within the shortest time possible. Semi-automatic modular exchangeable assembly lines for alignment and attachment procedures further assure performance and quality, even for small and medium volume manufacturing.

Manufacturing and automation
In-depth knowledge of automatization enables us to offer the best cost performance relation for volume production.

RECEPTACLES


FLSH (E-2000™) Receptacle


LX.5 Receptacle


SC Receptacle


LC Receptacle

HUBER+SUHNER
standard optical interfaces to
- PIN photodiodes
- LED
- VCSEL
- Lasers
- Optical switches
- Wavelength demultiplexers

Datacom applications
- Optical backplanes
- Transceivers
- Optical subassemblies TOSA/ROSA
- Active devices in TO cans
- Active devices on substrates/boards

Telecom Equipment
- Optical cross-connects
- Access nodes
- High-performance devices

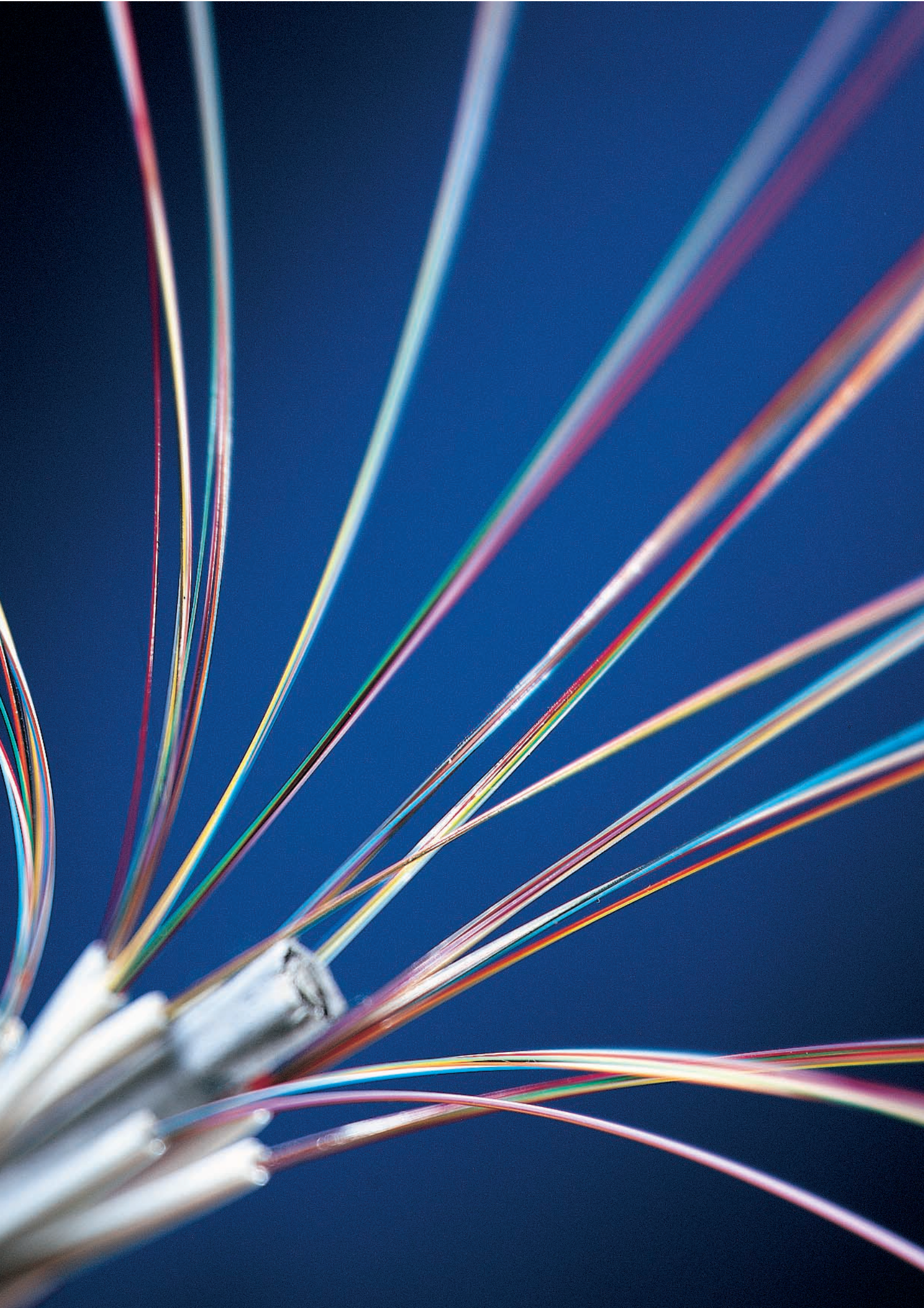
Industrial Applications
- Harsh environment transmission
- Switching

Life cycle testing and quality control
HUBER+SUHNER is committed to quality leadership, continuous improvement of products and services that offer the best value and meet our customers' requirements with on-time delivery.

Examples
HUBER+SUHNER FIBER OPTICS offers optical connectivity solutions to active components for a diverse range of applications. Thereby, we work with our customers to assure interconnection solutions meet exactly the specifications of their application requirements.
In particular, HUBER+SUHNER can offer a variety of standard and customized optical interfaces to PIN photodiodes, LED, VCSEL, lasers, optical switches, wavelength demultiplexers, chips in TO cans or other optical subassemblies etc. usable for optical backplanes, for optical cross-connects, for optical subassemblies and for active modules.

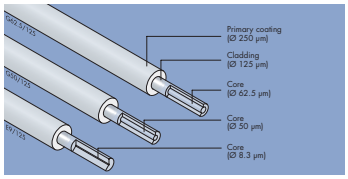
Ordering Information
Design, fabrication, alignment and manufacturing knowledge offered by HUBER+SUHNER FIBER OPTICS helps to find innovative and appropriate solutions for any interconnections problem. Our receptacles are individually designed and manufactured according to the customers' specifications and requirements. Receptacles to any other HUBER+SUHNER connector families are available upon request.


High precision interfaces enable excellent connecting performance to active components

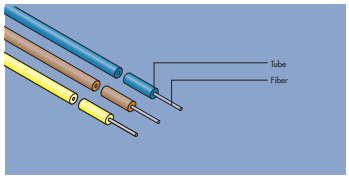


OVERVIEW FO CABLES

Fiber Types
Page 58



Tight and Semi-Tight Tubes
Page 61



Simplex Cables
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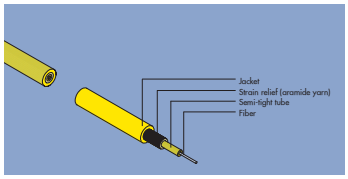
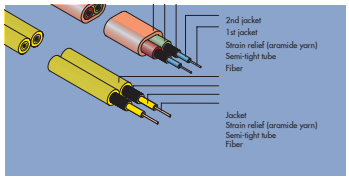


Duplex Cables
Page 67



Breakout Cables
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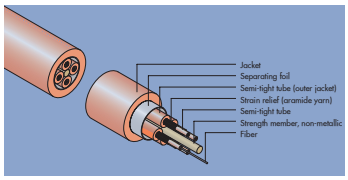
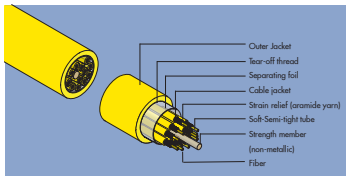
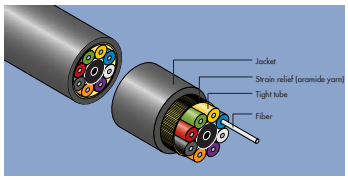


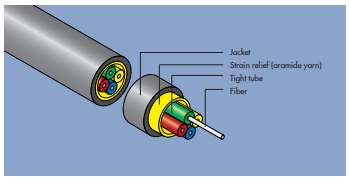
Minicord Breakout Cables
Page 75



Riser Cables (Distribution Cables)
Page 77



Mini Riser Cables
Page 79



JELLYFREE
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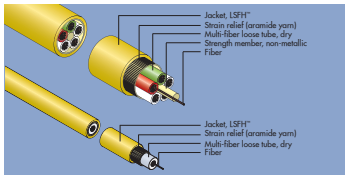

Non-armoured Multi-Fiber Loose Tube Cables
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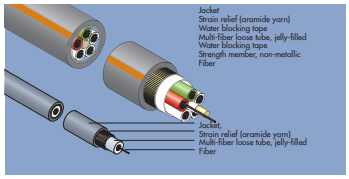
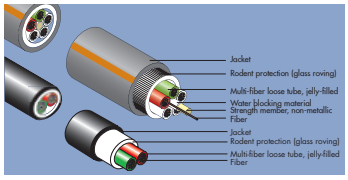


Rodent-Protected Multi-Fiber Loose Tube Cables (glass-armoured)
Page 88



Rodent-Protected Multi-Fiber Loose Tube Cables (steel-armoured)
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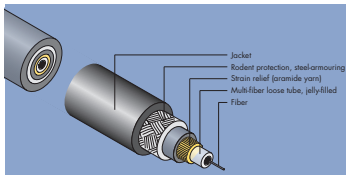

Secufire Cables
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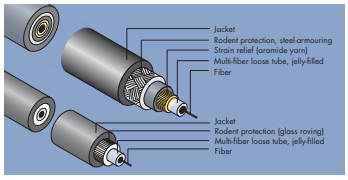

Minicord Breakout Cables (ruggedised)
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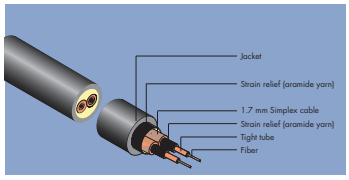

Field Cables
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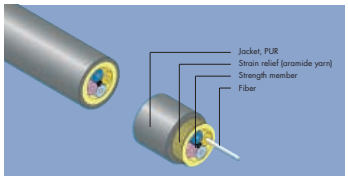
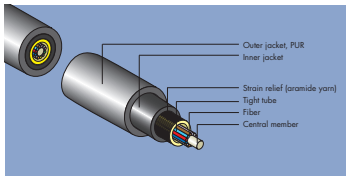


Drag Chain Cables
Page 100



Hybrid Cables
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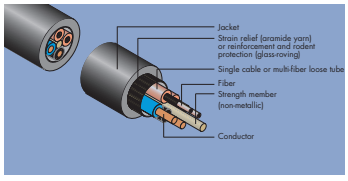

Testing methods
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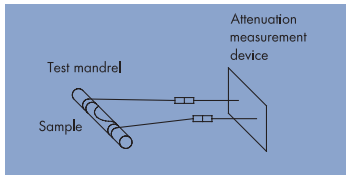


HUBER+SUHNER CABLE CODE

XXX-	Total number of optical fibers in cable, always indicated with two or three digits	
1-12	1 to 12 optical fibers per multi-fiber loose tube	
E9/	Step index fiber 9/125/250	
LEAF/	LEAF fiber	
TW/	TrueWave RS fiber	
G50/	Graded-index fiber 50/125/250	
G62/	Graded-index fiber 62.5/125/250	
H200/	Step-index fiber HCS 200/230/500	
F	Tight tube up to 0.9 mm	(tight tube)
V	Tight tube up to 0.6 mm	(tight tube)
CW	Compact tube 0.9 mm, jelly-filled	(semi-tight tube)
CH	Compact tube 0.9 mm, dry	(semi-tight tube)
SW	Soft compact tube 0.9 mm, jelly-filled	(semi-tight tube)
SH	Soft compact tube 0.9 mm, dry	(semi-tight tube)
W	Multi-fiber loose tube, with jelly (jelly-filled)	
H	Multi-fiber loose tube, without jelly (dry)	
J	Strain relief for each separate optical fiber	
SN	Central strength member, non-metallic	
DN	De-centralized strength member, non-metallic	
(ZN)	Strain-relief, non-metallic	
(ZNG)	Glass roving for strain relief/rodent protection	
A-	Steel wire armouring	
H-	Outer jacket of LSFH™	
N-	Outer jacket of PA/PBT	
T-	Outer jacket of PVC	
Y-	Outer jacket of PE	
Z-	Outer jacket of PUR	
A	Outer jacket figure 0"	
Δ	Color of outer jacket please refer to cable color chart	
XX	Outer diameter of the cable [1/10 mm] 1)	

1st option: fiber class or bandwidth length-product [MHz*km], 850/1300 nm

without indication (Standard)	G50: OM2	G62: OM1
-B	G50: 500/800	G62: 250/800
-C	G50: -	G62: 250/1200
-E	G50: 600/1200	G62: OM2
-F	G50: OM3	G62: -

2nd option: fiber color

-FΔ	Fiber colors please refer to fiber color chart

3rd option: special information

-SF	SECUFIRE cable for higest safety requirements
-UN	UL-listed OFN: General purpose UL1685
-UR	UL-listed OFNR: Riser cable UL1666
-UP	UL-listed OFNP: Plenum cable UL910

4th option: electrical elements

+XX-	Amount of conductors respectively units
C	Electrical conductor, copper cords
XX	Conductor cross section [1/10 mm^2]

OM classes please see under section „Fiber types"

HUBER+SUHNER CABLE CODE

Fiber and cable colors Δ	
A	red
B	green
C	blue 1 (dark blue / light blue)
D	orange
E	yellow
F	white
G	black
H	grey
I	brown
K	violet (blue-purple)
L	pink
M	turquoise
N	blue 2 (light blue)
O	ochre-brown
P	purple
Q	yellow-green
R	olive-green
T	transparent
U	nature (milky or beige)
Z	black with orange stripes

Rules:

1) For cables where each 0.6 or 0.9 mm tube (strain relief = J) is individually strain relieved, the termination diameter is specified.
   For cables where all tubes have a common strain relief (strain relief = ZN) the cable diameter is specified.
   If both are true, the termination diameter is specified.
2) The fiber color is only indicated if not standard
3) All options follow the basic code : basic key - 1st option - 2nd option - 3rd option - 4th option
4) The cable code has no spaces
5) Items not used are left out

Example:

02-G50/CWJSN(ZN)H-D27+2-C15

Breakout cable with 2 fiber optic simplex cables 50 µm fiber, individually strain-reliefed, non-metallic common strain-relief, outer jacket orange LSFH, single fiber cable Ø 2.7 mm, 2 electrical conductors with 1.5 mm^2

CABLE MATERIAL

Material designation		Polymer (Low Smoke Free of Halogen)	Polyvinyl-chloride	Poly-ethylene	Poly-urethane	Poly-butylen-tere-phthalate	Polyamide	Thermo-plastic elastomer
Abbreviation		LSFH™	PVC	PE	PUR	PBT	PA	TPE
Code		H	T	Y	Z	N	N	–
Application tempe–rature range [°C]		–20 to +70	–20 to +50	–40 to +70	–50 to +80	–40 to +90	–40 to +90	–50 to+115
Halogen free		yes	no	yes	yes	yes	yes	yes
Fire behaviour		self-extinguishing	self-extinguishing	combustible	self-extinguishing	combustible	combustible	combustible
Con-stancy	to UV-radiation[4]	fair – good	fair	good	fair – good	fair	good	good
	to oil[1]	fair	fair	fair	fair/good[2]	good	good	excellent
	with hydrolysis	fair	good	excellent	fair/good[3]	fair – good	fair	good
Abrasion resistance		good	fair	good	excellent	good	good	good
Mechanical resistance		good	fair	good	good	excellent	good	good

[1] In case of permanent contact with oil, the condition and the oil type have to be known
[2] Depending on plastic basis: fair for polyether/good for polyesther
[3] Depending on plastic basis: good for polyether/fair for polyesther
[4] Smallest aging effect with black colored material, moderate aging with brighter colors. Usually the change of mechanical characteristics and color change are tested for UV radiation resistance.

Rating for indoor applications:
The values refer to standard types of the particular plastic concerned.

excellent	excellently suitable
good	suitable
fair	may pose problems, depending on type or conditions
poor	unsuitable

LSFH™ polymers
LSFH™ materials are as a rule highly filled olefin copolymers (hydrocarbon-based plastic mix).
LSFH™ cables are predominantly applied in enclosed areas (tunnels, hospitals, safety environments, computer rooms), where they mainly replace PVC-jacketed cables.
LSFH™ cables from HUBER+SUHNER FIBER OPTICS are **self-extinguishing in the event of a fire, low smoke and 100% halogen free.** One material fulfills UL 94V-0. LSFH™ is also used for the coating of strength members.

Polyurethane PUR, (TPU)
PUR is the most suitable material when high flexibility and abrasion resistance are demanded. HUBER+SUHNER FIBER OPTICS uses flame-retardant, halogen free PUR versions on polyether basis (LSFH™ materials), with a matt surface.
PUR is oil-resistant and **100% halogen free.**
PUR is offered as a jacketing material for many cable types and as a coating for strength members.

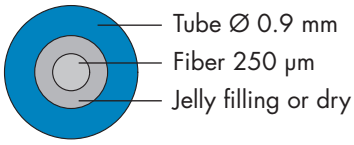
Polyethylene PE
PE is the most suitable cable material for single-fiber and multi-fiber loose tube cables exposed to the influence of the weather. PE is weather-resistant, transverse watertight and has a high aging resistance.
PE is applied as a jacketing material for multi-fiber loose tube cables and as a coating for dummies and strength members.
PE is halogen free. HUBER+SUHNER FIBER OPTICS also offers PE in accordance with DIN/VDE standards.

Polyamide PA/Polyester PBT/ Thermoplastic elastomer TPE
PA/PBT/TPE are used for single-sheathed tubes and as plastic armourings for single-fiber and multi-fiber loose tube cables.

Polyvinylchloride PVC
PVC is still the most widely used jacketing material for indoor cables. However, PVC contains halogen and has disadvantages as regards to the environmental compatibility and the safety of human life.
PVC is being increasingly replaced by LSFH™ materials.

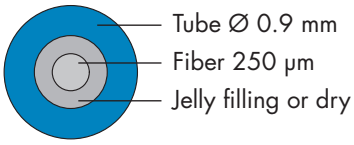
TERMS AND DEFINITIONS

Tube types
0.9 mm-tube



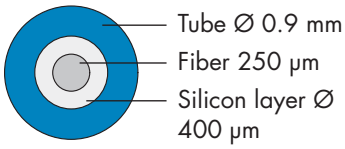
CW-tube
(semi-tight loose tube)

Features:
- standard tube
- easiest stripping > 2 m
- option dry: CH



SW-tube
(soft semi-tight loose tube)

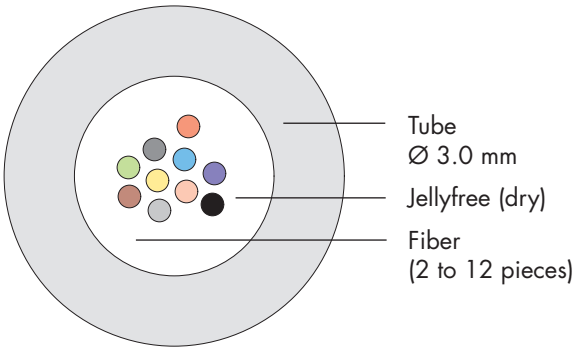
Features:
- very flexible
- stripping > 1 m
- non buckling
- option dry: SH
- wide temperature range



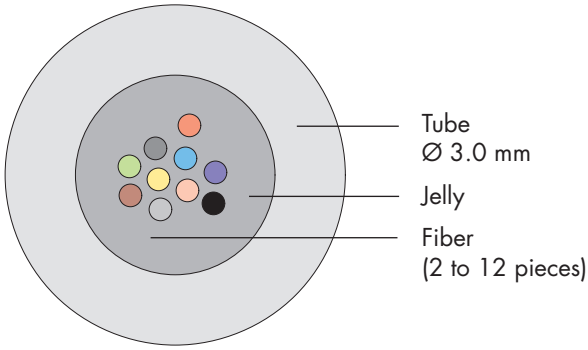
F-tube
(tight buffered tube)

Features:
- mechanically rugged (crush pressure)
- stripping approx. 5 cm
- non-buckling
- very wide temperature range

3.0 mm-tube



Multi-fiber loose tube, dry



Multi-fiber loose tube, jelly-filled

Standard color code (according to Swisscom)

The fibers inside the multi-fiber loose tubes are colored

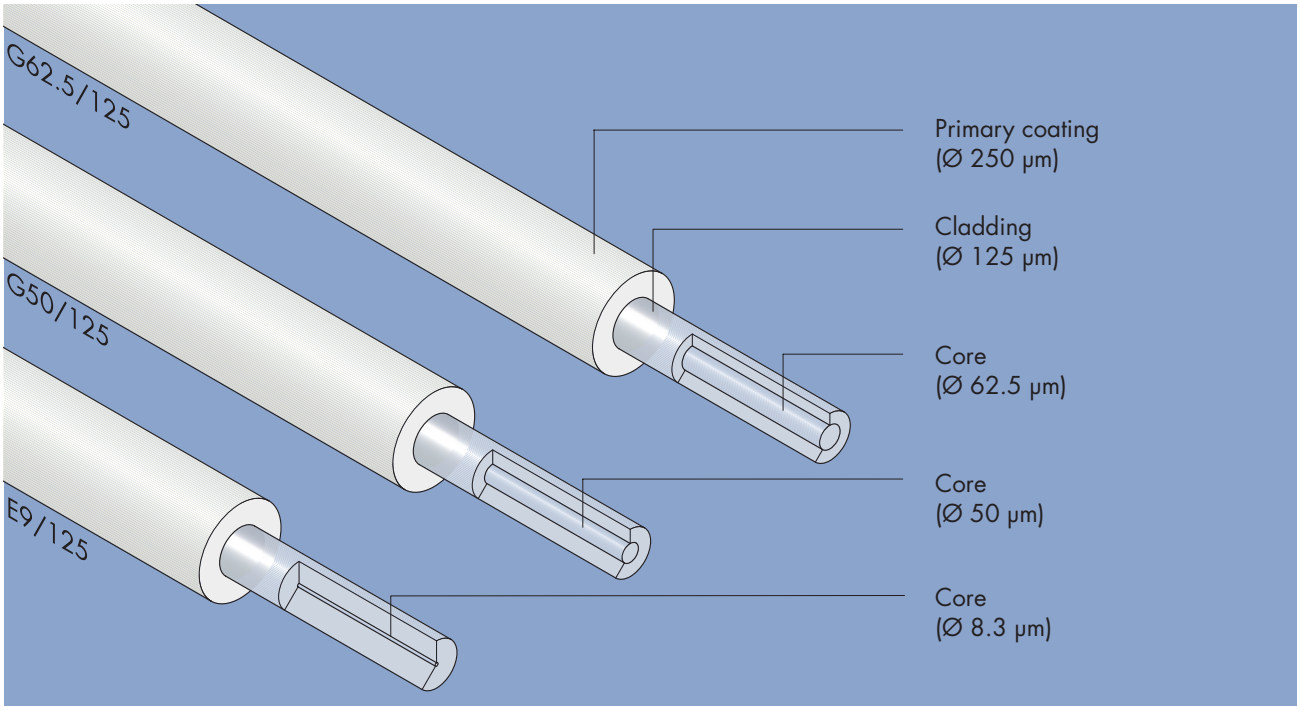
Fiber No	1	2	3	4	5	6	7	8	9	10	11	12
Fiber color	red	green	yellow	blue	natural/ white	violet	orange	black	grey	brown	pink	turquoise

Other color sequences upon request (i.e. according to DIN VDE 0888 part 3)

Fiber No	1	2	3	4	5	6	7	8	9	10	11	12
Fiber color	red	green	blue	yellow	white	grey	brown	violet	turquoise	black	orange	pink

Note: Concerns orders of fiber optic cables with different fiber types (combination SM/MM): if not specified, the first colors of the color code are assigned to the smaller fibers.
Example: Cable with 4xE9, 8xG50 red/green/yellow/blue = E9 fiber, rest to G50 fiber.

FIBER TYPES



Fiber data for transmission wavelength [nm]	Fiber E9/125		LEAF-Fiber		Fiber G50/125		Fiber G62.5/125		Fiber H200/230
	1310	1550	1550	1625	850	1300	850	1300	850
Optical data									
Attenuation [dB/km] (typical)	0.36	0.22	0.20	0.22	2.30	0.55	2.7	0.6	3.6
Attenuation [dB/km] (max.)	0.40	0.25	0.22	0.24	2.50	0.8	3.2	0.9	6.0
Fiber class or Minimum bandwidth [MHz * km]					Standard OM2 B 500/800 E 600/1200 F OM3		Standard OM1 B 250/800 C 250/1200 E OM2		17
Chromatic dispersion [ps/nm*km]	≤ 3.5	≤ 18.0	2.0 bis 11.2						
Mode field [µm]	9.2±0.5	10.5±1	9.6±0.4						
Cutoff wavelength [nm]	1100 – 1330								
PMD specification on demand [ps/$\sqrt{km}$]	typical ≤ 0.2		max. 0.08						
Geometric data									
Core Ø [µm]					50±3.0		62.5±3.0		200±5
Cladding Ø [µm]	125±1		125±0.7		125±2		125±2		230+0/-10
Coating Ø [µm]	245±10		245±5		245±10		245±10		500±50
Non-circularity, cladding [%]	≤ 2.0		≤ 1.0		≤ 2.0		≤ 2.0		
Non-circularity, core [%]	≤ 6.0		n.a.		≤ 6.0		≤ 6.0		
Concentricity error core / cladding [µm]	≤ 0.6		≤ 0.5		≤ 3.0		≤ 3.0		≤ 5.0
Mechanical data									
Strain resistance	8.8 N (100 Kpsi)		8.8 N (100 Kpsi)		8.8 N (100 Kpsi)		8.8 N (100 Kpsi)		8.8 N (100 Kpsi)
Approvals									
Standards	• ITU G.652 • IEC 60793-2-50 Type B1.1 • DIN VDE 0888, part 3		• ITU G.655 • IEC 60793-2-50 Type B4		• ITU G.651 • IEC 60793-2-10 Type A1a + A1a.2 • DIN VDE 0888, part 3		• IEC 60793-2-10 Type A1b		IEC 60793-2-30 Type A3c

Other fibers upon request

FIBER TYPES

Multimode fiber types

Multimode fiber type definition according to standard ISO/IEC 11801 - 2nd edition

Fiber type	Wavelength	OM1	OM2	OM3
Core diameter		50 or 62.5	50 or 62.5	50
Minimal modal bandwidth overfilled launch bandwidth [MHz * km]	850 nm 1300 nm	200 500	500 500	1500 500
Minimal modal bandwidth effective laser launch bandwidth[1] [MHz * km]	850 nm	not specified	not specified	2000

[1] Effective laser launch bandwidth is assured using DMD as specified in IEC/PAS 60793-1-49

Supported applications

With the required channel length and the specified application, the minimal fiber type can be taken from the table below. The order of the minimal to the maximal required fiber type is OM1, OM2, OM3 and OS1. OS1 is a conventional single-mode fiber.

Application IEEE 802.3		Maximal channel length		
		300 m	500 m	2000 m
10MbE	10BASE-	OM1	OM1	OM1
100MbE	100BASE-	OM1	OM1	OM1[3]/OM2
1GbE	1000BASE-	OM1[4]	OM1[3][4]/OM2[4]	OS1
10GbE	10GBASE-	OM3[5]	OS1	OS1

3) OM1 only with large wavelength (1300 nm)
4) Mode offset launch patchcord recommended
5) Only with small wavelength (850 nm)

Channel length

The optical fiber channel definition according to standard ISO/IEC 11801 - 2nd edition

Channel	OF-300	OF-500	OF-2000
Maximum channel length	300 m	500 m	2000 m
Origin	collapsed backbone[2]	building backbone	horizontal cabling + building + campus backbone

[2] actually 600 m (100 + 500 m), but 300 m are sufficient in most applications

INDOOR CABLES

General
Indoor cables are mainly used for building installations. The design of this cable group respects therefore the following special requirements:
- bending capacity
- strippability
- easy termination
- crush resistance capacity
- cable diameter
- temperature capacity

There is also an increasing requirement concerning fire behaviour.

The HUBER+SUHNER LSFH™-type cables excel by:
- self-extinguishing characteristics (i.e. IEC 60332-1 or IEC 60332-3)
- halogen free
- low smoke development
- low fire load (MJ/m)

The following cable families are part of the Indoor cable group:

0.9mm tubes
Semi-tight tube (Cx and Sx design) or tight tube design (F and V tubes) are used as:
- Cx and Sx tube as splice pigtails in cable termination boxes or distribution boxes. SW tubes with multimode fibers are not available.
- F tubes for the internal cabling of closed devices.
- V tubes for termination of MT-RJ connectors and all others

Simplex cables
0.9mm tubes with aramide yarn strain relief and additional outer jacket, used as:
- splicing cable
- jumper cable
- patch cables

Duplex cables fig. 0
Two simplex cables with additional outer jacket, used as:
- point-to-point connections
- patch cables
- jumper cables
- floor cabling (horizontal cablings)

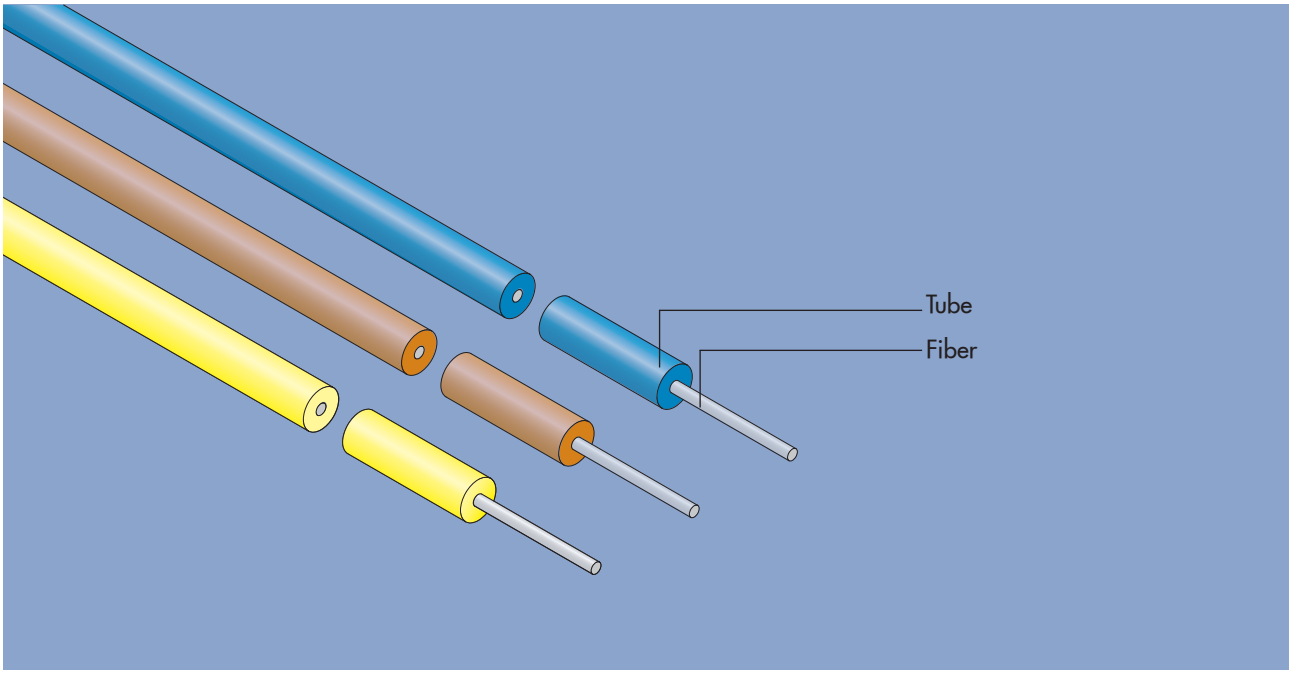
Duplex cables fig. 8
Two simplex cables with connection gate, used as:
- patch cables
- jumper cable

Breakout cables
4 to 12 simplex cables, stranded around a central strength member, with a common round outer jacket, used as:
- unit cablings
- riser zone cablings
- floor distribution (Horizontal zone)
- connections in telecom distribution centers

Riser cables
4 to 16 tight tubes, non stranded or stranded around a central strength member, with common strain releif, used as:
- riser zone cablings
- floor cablings (horizontal zone)
- collapsed backbone
- unit cablings

Jellyfree cables
Cable design: 1 to 12 dry multi-fiber loose tubes, strain releived with aramide and jacketed with LSFH™ material. The cable types of this cable family are absolutely free of cable-filling compounds. Therefore, they are especially suitable for the use in riser zones.
The low fire load and the time-saving cable end preparation for the purpose of a termination or splicing are further arguments for the use of these cables.

TIGHT AND SEMI-TIGHT TUBE CABLES



The 0.9 mm buffer tubing is made from either PA for semi-tight tube or TPE for soft semi-tight tube and tight tube. At least 1 m of the semi-tight tube can be stripped in one piece, and approx. 5 cm of the tight tube. The cavity between the fiber and the inner wall of the semi-tight tube is either dry or jelly-filled, the tight tube contains a silicon layer.
The tubes are available with three different fiber types. The fiber type is identified by the tube colors.

Properties:

- High buckling resistance
- Tight bending radius
- Halogen free

Semi-tight tube:

- > 2.0 m can be stripped in one piece
- Semi-tight tube and soft semi-tight tube

Tight tube:

- Broad temperature range
- Up to about 5 cm can be stripped in one piece

Field of application:
Semi-tight tube:

- As pigtail assemblies for fusion or mechanical splicing within distribution frames and termination boxes
- As mini patch cables within protected enclosures

Tight tube:

- As patch cable within distribution frames and termination boxes
- In thermally critical environments

Standard tubes:

- CH (dry) for tubes
- CW (jellyfilled) for cables
- SW (jellyfilled) for cables
- F, V for tubes and cables

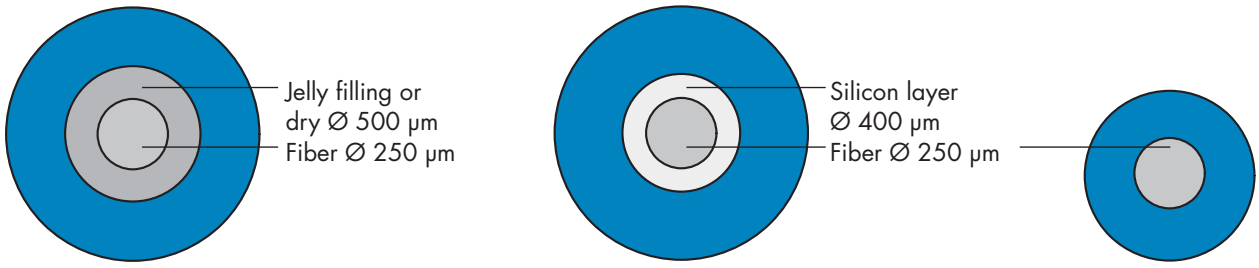
TIGHT AND SEMI-TIGHT TUBE CABLES

Specification:

		Semi-tight tube (Cx)	Tight tube (F)	Soft semi-tight tube (Sx)*	
Tube Ø [mm]		0.9	0.9	0.9	with 1 fiber
Approx. weight [kg/km]		0.7	0.74	0.7	
Max. allowable tensile load [N]	during install.	20	10	20	IEC 60794-1-2 E1
Min. bending radius [mm]		25	25	25	IEC 60794-1-2 E11
Crush resistance [N/cm]	short-term	100	100	100	IEC 60794-1-2 E3
	long term	50	50	50	
Temperature range [°C]	during install.	–10 to +50	–10 to +60	–10 to +60	IEC 61300-2-22
	in service	–20 to +70	–40 to +80	–40 to +80	
	in storage	–25 to +60	–40 to +80	–40 to +80	

Technical data valid for 0.9 mm tubes; for other types values might vary.

* Jelly-filled tube (SW) only with singlemode, dry tube (SH) with all fiber types available.



Semi-tight tube
soft semi-tight tube

Tight tube

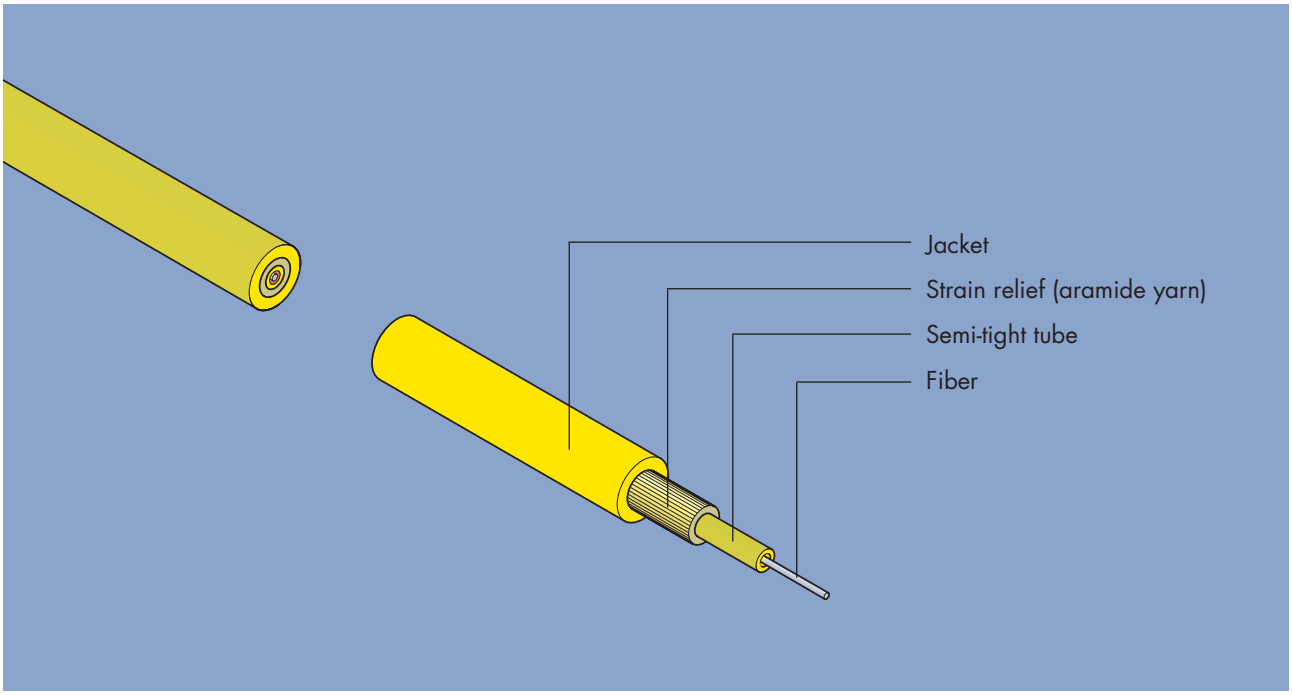
Small tight tube

Ordering information:

Tube type	Fiber type	Color	Type	Part no.
Semi-tight tube	**E9/125**	**yellow**	**01-E9/CH-E9-FE**	**22521983**
(Ø 0.9 mm)	**G50/125**	**orange**	**01-G50/CH-D9-FC**	**22520626**
	G50/125-OM3	**turquoise/aqua**	**01-G50/CH-M9-F-FM**	**84005132**
	G62.5/125	**blue**	**01-G62/CH-C9-FC**	**22520967**
Tight tube	**E9/125**	**yellow**	**01-E9/F-E9**	**22521478**
(Ø 0.9 mm)	E9/125	green	01-E9/F-B9	22521477
	G50/125	**orange**	**01-G50/F-D9**	**22521479**
	G62.5/125	**blue**	**01-G62/F-C9**	**22523050**
Tight tube	G50/125	orange	01-G50/V-D6	23025920
(Ø 0.6 mm)	G62.5/125	blue	01-G62/V-C6	23025921

Types printed in bold are stock items

SIMPLEX CABLES WITH SEMI-TIGHT TUBE



These Simplex cables with an outer diameter of 2.0 mm, 2.7 mm or 3.0 mm contain semi-tight tubes, are strain-relieved and jacketed with LSFH™ or PVC material.

Properties:
- Tight bending radius
- Rugged construction
- Can be assembled with spring-loaded connectors
- LSFH™ variants are self-extinguishing and low smoke
- non-toxic and halogen free

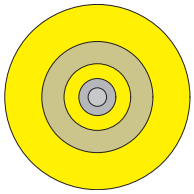
Field of application:
- Installation in indoor area
- As measurement cable withstanding mechanical loading
- As patch cable in distribution centres
- As data cable in distribution networks
- As strain-relieved pigtail
- LSFH™ variant ideal for applications involving high safety requirements in case of a fire

SIMPLEX CABLES WITH SEMI-TIGHT TUBE

Specification:

		Simplex	
Jacket Ø [mm]		2.7/3.0	
Tube Ø [mm]		0.9	with 1 fiber
Weight approx. [kg/km]		6.4/8.0	
Max. allowable tensile load [N]	during installation	200	IEC 60794-1-2 E1
	in service	100	
Min. Bending radius [mm]	during installation	50	IEC 60794-1-2 E11
	in service	30	
Crush resistance [N/cm]	short-term	500	IEC 60794-1-2 E3
	long-term	100	
Impact resistance [impacts]	Wp = 0.74 Nm/ r = 25 mm	20	IEC 60794-1-2 E4
Temperature range [°C] PVC	during installation	–10 to +50	IEC 60794-1-2 F1
	in service	–20 to +50	
	in storage	–25 to +50	
Temperature range [°C] LSFH™	during installation	–10 to +50	IEC 61300-2-22
	in service	–20 to +70	
	in storage	–25 to +60	
Fire load [MJ/m] LSFH™		0.13/0.18	
Fire propagation LSFH™		passed	IEC 60332-1
		passed	IEC 60332-3 Cat.C

Technical data for cable types with diameter 2.0 mm or H200 fiber might vary



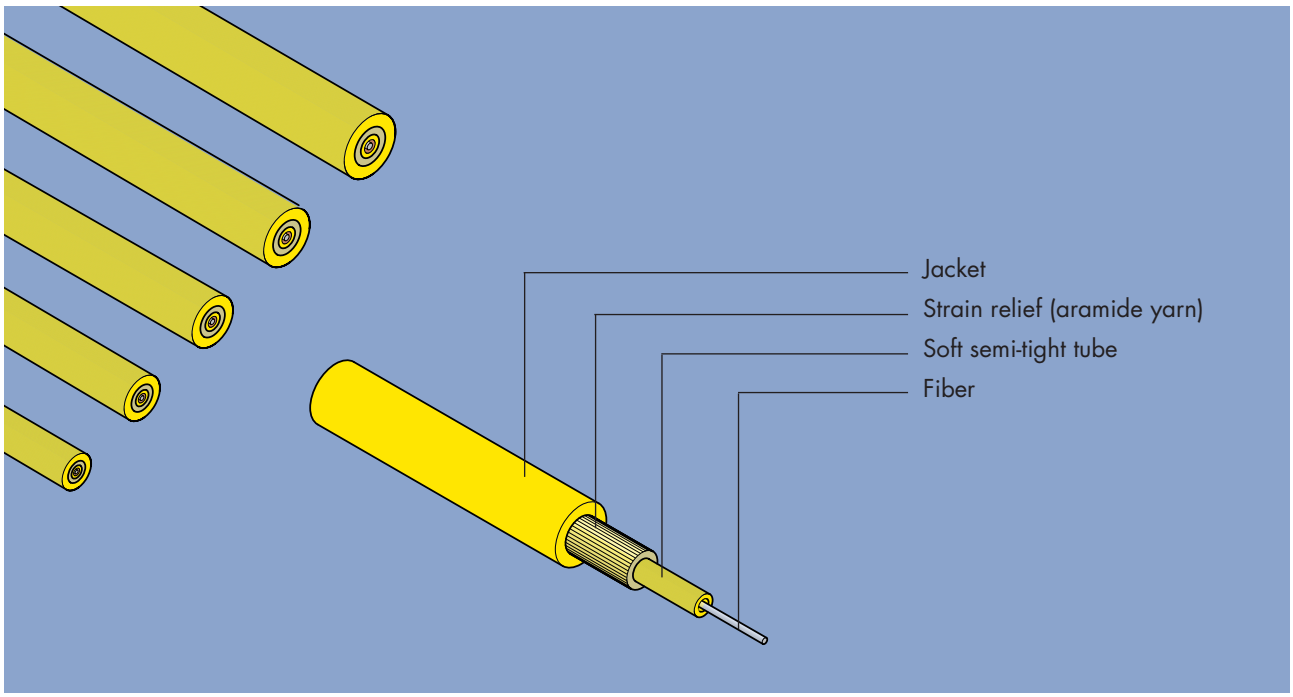
Simplex cable cross-section

Ordering information:

Number of fibers	Fiber type	Color	Type	Part no.
1 LSFH™	**G50/125**	**orange**	**01-G50/CWJH-D20**	**84000564**
1 LSFH™	**G62.5/125**	**orange**	**01-G62/CWJH-D20**	**84000565**
1 LSFH™	**E9/125**	**yellow**	**01-E9/CWJH-E27**	**22523125**
1 LSFH™	**G50/125**	**orange**	**01-G50/CWJH-D27**	**22523126**
1 LSFH™	**G62.5/125**	**orange**	**01-G62/CWJH-D27**	**22523127**
1 LSFH™	**H200/230**	**orange**	**01-H200/FJH-D27**	**23031085**
1 LSFH™	**E9/125**	**yellow**	**01-E9/CWJH-E30**	**22523128**
1 PVC	**E9/125**	**orange**	**01-E9/CWJT-D27**	**22521459**
1 PVC	**G50/125**	**orange**	**01-G50/CWJT-D27**	**22521460**
1 PVC	**G62.5/125**	**orange**	**01-G62/CWJT-D27**	**22521461**

Types printed in bold are stock items

SIMPLEX CABLES WITH SOFT SEMI-TIGHT TUBE



These cables with an outer diameter of 1.7 to 3.0 mm contain soft semi-tight tubes, are strain-relieved and jacketed with LSFH™.
With a small diameter of 1.7 mm this cable is ideal to terminate small form factor connectors.
Cables and cable assemblies allow the use in a wide temperature range as well as at high wavelengths (1550 and 1625 nm) and are therefore especially suitable telecom applications.

Properties:
- Tight bending radius
- Rugged construction
- Can be assembled with spring-loaded connectors
- self-extinguishing and low smoke
- non-toxic and halogen free

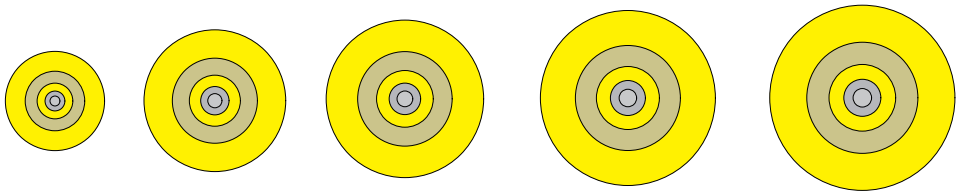
Field of application:
- Installation in indoor area
- As measurement cable withstanding mechanical loading
- As patch cable in distribution centres
- As data cable in distribution networks
- Ideal for applications involving high safety requirements in case of a fire

Cable with approvals:
Cable Ø 2.4 mm for assemblies approved as patch cable by the Deutsche Telekom AG (DTAG).

SIMPLEX CABLES WITH SOFT SEMI-TIGHT TUBE

Specification:

		Simplex					
Jacket Ø [mm]		1.7	2.1	2.4	2.7	3.0	
Tube Ø [mm]		0.9	0.9	0.9	0.9	0.9	with 1 fiber
Approx. weight [kg/km]		2.8	4.0	5.4	7.0	8.9	
Max. allowable tensile load [N]	during install.	100	200	300	400	500	IEC 60794-1-2 E1
	in service	50	100	150	200	250	
Min. Bending radius [mm]	during install.	50	50	50	50	50	IEC 60794-1-2 E11
	in service	25	25	25	25	25	
Crush resistance [N/cm]	short-term	500	500	700	500	500	IEC 60794-1-2 E3
	long-term	300	300	500	300	300	
Impact resistance [impacts]	Wp = 0.74 Nm/r = 25 mm	10	10	10	20	20	IEC 60794-1-2 E4
Temperature range [°C]	during install.	–10/+50	–10/+50	–10/+50	–10/+50	–10/+50	IEC 61300-2-22
	in service	–40/+70	–25/+70	–25/+70	–25/+70	–20/+70	
	in storage	–40/+60	–40/+60	–40/+60	–40/+60	–40/+60	
Fire load [MJ/m]		0.06	0.07	0.1	0.15	0.18	
Fire propagation		–	–	–	passed	passed	IEC 60332-1
		–	–	–	passed	passed	IEC 60332-3 Cat.C



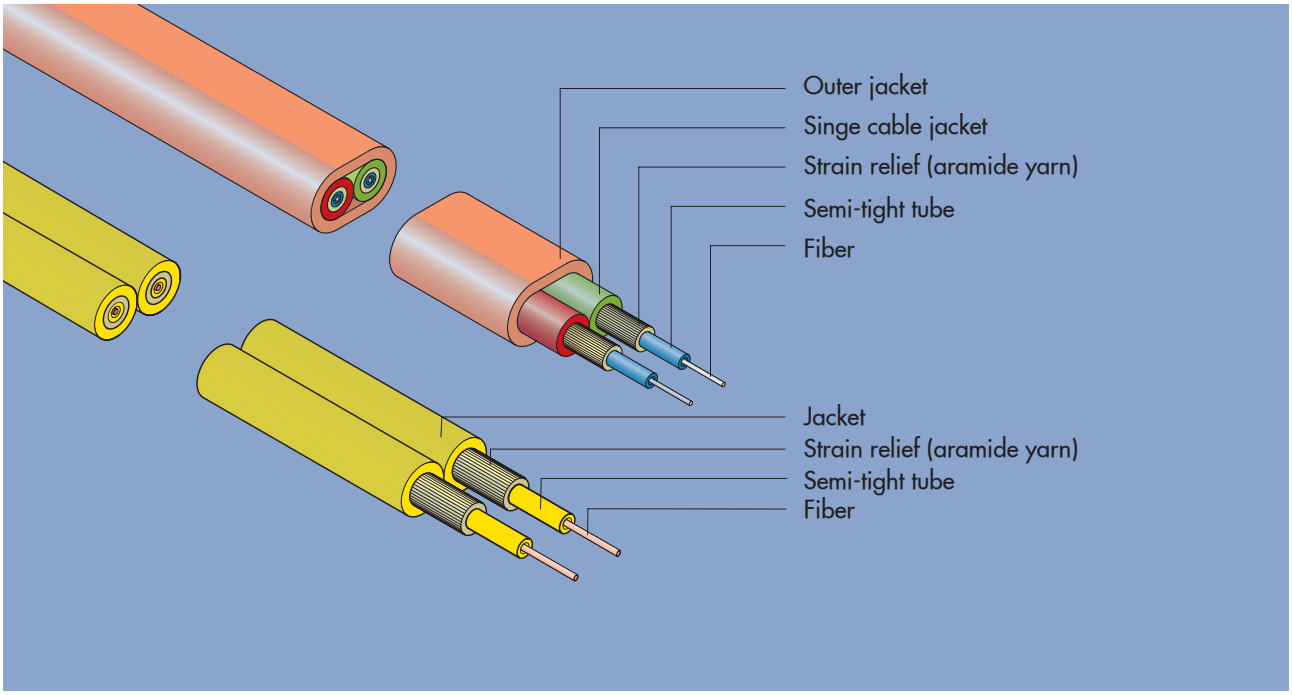
Simplex cable cross-section

Ordering information:

Number of fibers	Fiber type	Color	Type	Part no.
1	E9/125	yellow	**01-E9/SWJH-E17**	**22523105**
1	E9/125	yellow	**01-E9/SWJH-E21**	**23014851**
1	E9/125	yellow	**01-E9/SWJH-E24**	**23013083**
1	E9/125	yellow	01-E9/SWJH-E27	23014852
1	E9/125	yellow	**01-E9/SWJH-E30**	**23014853**

Types printed in bold are stock items

DUPLEX CABLES



Duplex cables consist of 2 single-fiber cables (semi-tight tube with strain relief and jacket). The "figure 0" duplex cable has a common second flat jacket.

LSFH™ and PVC cable types are available.

Properties:

- Tight bending radius (flat side)
- Rugged construction
- Can be assembled with spring-loaded connectors
- LSFH™ variants are self-extinguishing, low smoke, non-toxic and halogen free
- "figure 8": easy to divide

Field of application:

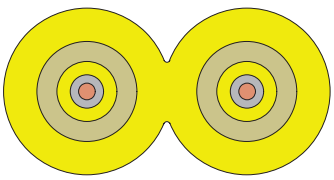
- Installation in indoor area
- As patch cable in distribution centres
- As data cable in distribution networks
- LSFH™ variant ideal for applications involving high safety requirements in case of a fire

DUPLEX CABLES

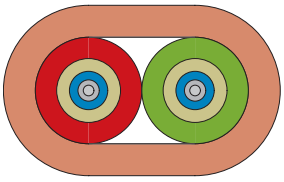
Specification:

		Figure 8	Figure 0	
Jacket Ø [mm]	PVC	2.7 x 5.4	3.9 x 6.6	
	LSFH™	2.7 x 5.4	3.5 x 6.2	
Single-fiber cable Ø [mm]		2.7	2.7	with 1 tube each
Semi-tight tube Ø [mm]		0.9	0.9	with 1 tube each
Approx. weight [kg/km]		14	27	
Max. allowable tensile load [N]	during installation	2 x 200	2 x 200	IEC 60794-1-2 E1
	in service	2 x 100	2 x 100	
Min. Bending radius	during installation	50	50	IEC 60794-1-2 E11
(flat side) [mm]	in service	30	30	
Crush resistance [N/cm]	short-term	1000	1000	IEC 60794-1-2 E3
	long-term	100	100	
Impact resistance [impacts]	Wp = 0.74 Nm/ r = 25 mm	20	50	IEC 60794-1-2 E4
Temperature range [°C] PVC	during installation	–10 to +50		IEC 60794-1-2 F1
	in service	–20 to +50		
	in storage	–25 to +50		
Temperature range [°C] LSFH™	during installation	–10 to +50		IEC 61300-2-22
	in service	–20 to +70		
	in storage	–25 to +60		
Fire load [MJ/m] LSFH™		0.30	0.45	
Fire propagation LSFH™		passed passed	passed passed	IEC 60332-1 IEC 60332-3 Cat. C

Technical data for cable types with H200 fiber might vary.



Cable cross-section „figure 8“



Cable cross-section „figure 0“

Ordering information
please see next page

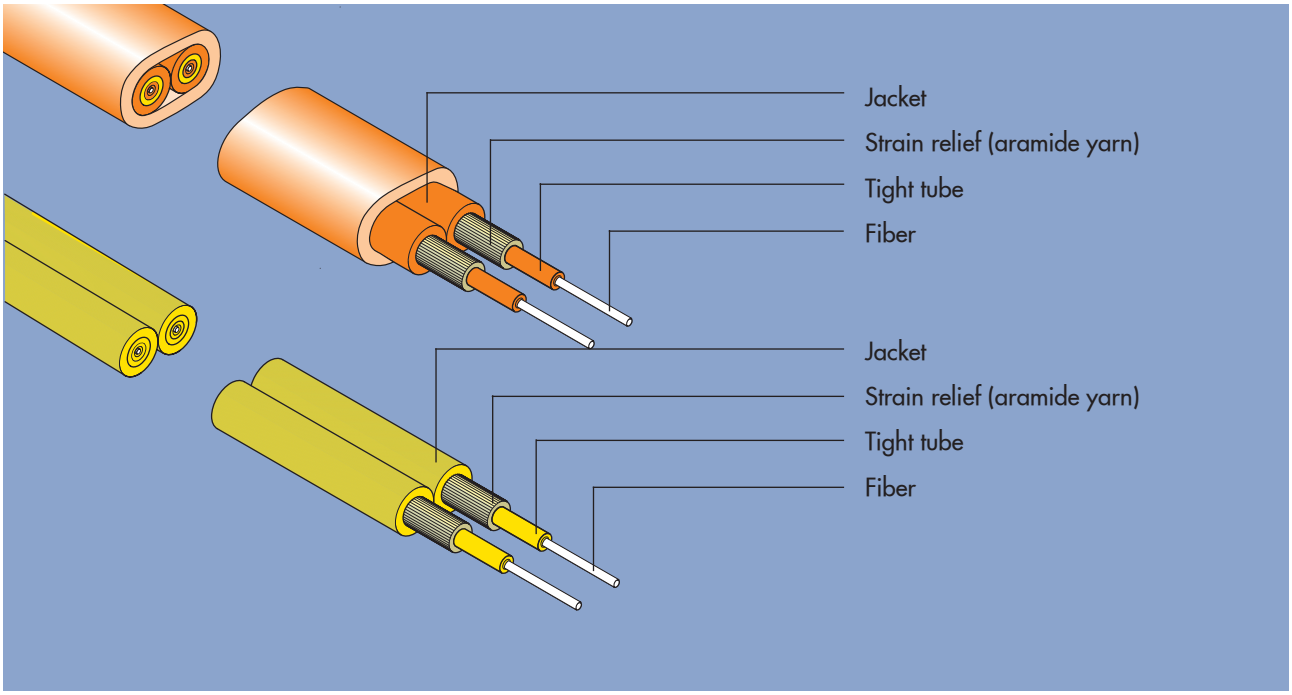
DUPLEX CABLES

Ordering information:

Number of fibers			Fiber type	Color	Type	Part no.
2	fig. 8	LSFH™	E9/125	yellow	**02-E9/CWJH-E27**	**22523202**
2	fig. 8	LSFH™	G50/125	orange	**02-G50/CWJH-D27**	**22523203**
2	fig. 8	LSFH™	G50/125-OM3	turquoise/aqua	02-G50/CWJH-M27-F	84005133
2	fig. 8	LSFH™	G62.5/125	orange	**02-G62/CWJH-D27**	**22523204**
2	fig. 0	LSFH™	E9/125	yellow	**02-E9/CWJH-AE27**	**22523252**
2	fig. 0	LSFH™	G50/125	orange	**02-G50/CWJH-AD27**	**22523253**
2	fig. 0	LSFH™	G50/125-OM3	turquoise/aqua	02-G50/CWJH-AD27-F	84005135
2	fig. 0	LSFH™	G62.5/125	orange	**02-G62/CWJH-AD27**	**22523254**
2	fig. 0	LSFH™	H200/230	orange	**02-H200/FJH-AD27**	**23031087**
2	fig. 8	PVC	E9/125	orange	**02-E9/CWJT-D27**	**22521465**
2	fig. 8	PVC	G50/125	orange	**02-G50/CWJT-D27**	**22521466**
2	fig. 8	PVC	G62.5/125	orange	**02-G62/CWJT-D27**	**22521467**
2	fig. 0	PVC	E9/125	orange	**02-E9/CWJT-AD27**	**22521470**
2	fig. 0	PVC	G50/125	orange	**02-G50/CWJT-AD27**	**22521469**
2	fig. 0	PVC	G62.5/125	orange	**02-G62/CWJT-AD27**	**22521468**

Types printed in bold are stock items

MINI DUPLEX CABLES



Mini Duplex Figure 8

Figure 8 cables are made of two single-fiber cables which integrate small tight tubes. Cables and cable assemblies with singlemode fibers allow the use in a wide temperature range as well as at high wavelengths (1550 nm) and therefore are especially suitable for telecom applications.

Properties:
- Self-extinguishing, low smoke, non-toxic and halogen free
- Low fire load
- Rugged construction
- Easy stripping of jacket
- Can be assembled with spring-loaded connectors, including MT-RJ
- Two step stripping of full-tight tube
- Easy to divide the channels
- Wide temperature range

Field of application:
- Installation in indoor areas
- As patch cable in distribution centres
- data cable in distribution networks
- Applications with high safety requirements in case of fire

Mini Duplex Figure 0

Figure 0 cables contain two single-fiber cables (semit-tight tubes with strain-relief and jacket) and an oval second coating.

Properties:
- Self-extinguishing, low smoke, non-toxic and halogen free
- Low fire load
- Rugged construction
- Easy stripping of jacket and tube
- Can be assembled with spring-loaded connectors

Field of application:
- Installation in indoor areas
- As patch cable in distribution centres
- data cable in distribution networks
- Applications with high safety requirements in case of fire

MINI DUPLEX CABLES

Specification:

		Figure 8	Figure 0	
Jacket Ø [mm]	LSFH™	1.7 x 3.5	3.1 x 5.2	
Single-fiber cable Ø [mm]		1.7	2.0[1]	
Channel marking on single-fiber cable		text on 1 side	numbered	
Tube Ø [mm]		0.6[2]	0.9	
Tube type		Full-tight[3]	Semi-tight	
Approx. weight [kg/km]		5.6	15.2	
Max. allowable tensile load [N]	during installation	2 x 100	2 x 200	IEC 60794-1-2 E1
	in service	2 x 50	2 x 100	
Min. Bending radius [mm]	during installation	50	50	IEC 60794-1-2 E11
	in service	25	25	
Crush resistance [N/cm]	short-term	100	500	IEC 60794-1-2 E1
	long-term	50	100	
Impact resistance [impacts]	Wp=2.8Nm, r=25mm	3	-	IEC 60794-1-2 E4
Temperature range [°C]	during installation	–10 to +60	–10 to +60	IEC 61300-2-22
	in service	–40 to +70	–20 to +70	
	in storage	–40 to +60	–25 to +60	
Fire load [MJ/m]		0.12	0.3	
Fire propagation		passed	passed	IEC 60332-1

1) Usually single-fiber cables are manufactured in average slightly over 2.0 mm in order to get a better jacket strength. Therefore these cables might also be declared and sold as 2.1 mm duplex cables
2) Cables contain small tight tubes with a diameter of 600 µm, suitable for MT-RJ connector termination
3) Stripping of full-tight tubes 0.6 mm in two steps:
Step 1: Strip secondary coating (600 µm) with small T-stripper (9801.22.A) and hole AWG26, resp. AWG 28 over a length of approx. 2 cm. As the primary coating is stripped off in a second step there is no problem if the 250 µm coating is already partially removed
Step 2: Remove the primary coating (250 µm) with the coating stripper (9801.10.E) or with a similar tool

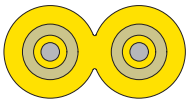


Figure 8

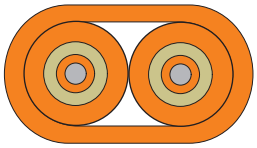


Figure 0

Ordering information: Mini Duplex Figure 8

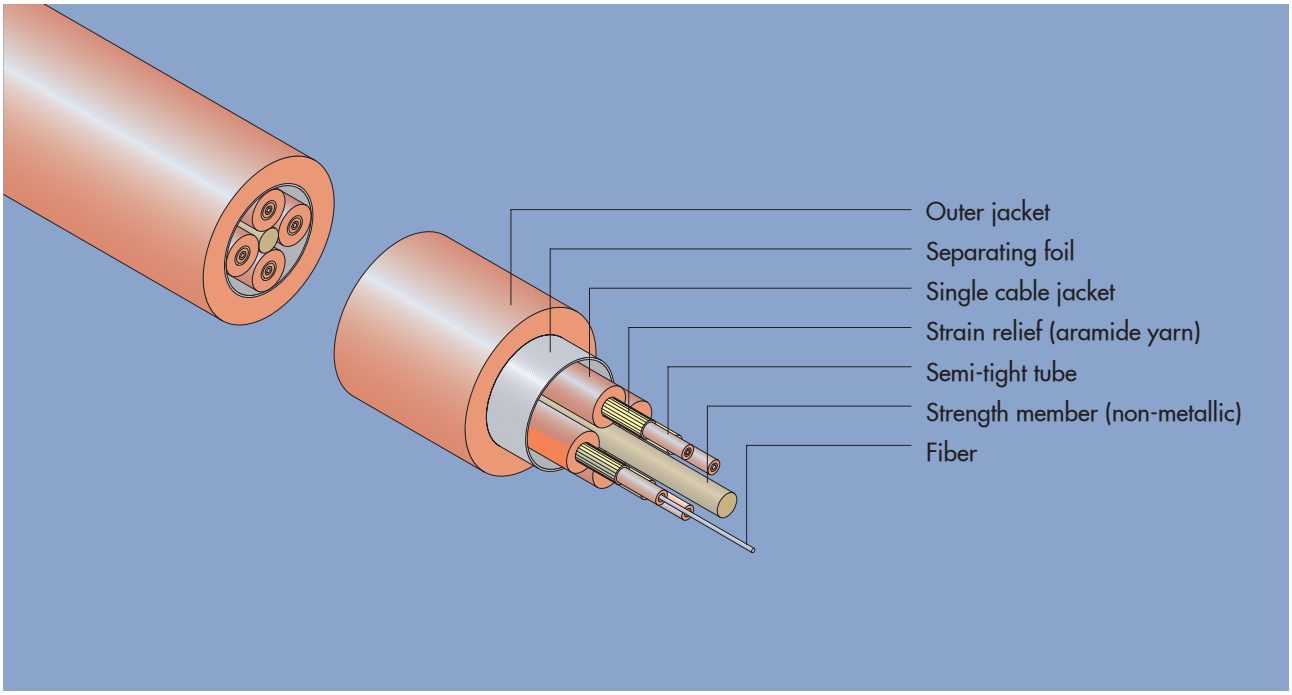
No. of fibers	Fiber type	Color	Type	Part no.
2 figure 8	E9/125	yellow	**02-E9/VJH-E17**	**23040758**
2 figure 8	G50/125	orange	**02-G50/VJH-D17**	**23040759**
2 figure 8	G50/125-OM3	turquoise/aqua	**02-G50/VJH-M17-F**	**84005418**
2 figure 8	G62.5/125	orange	**02-G62/VJH-D17**	**23040760**

Ordering information: Mini Duplex Figure 0

No. of fibers	Fiber type	Color	Type	Part no.
2 figure 0	E9/125	yellow	**02-E9/CWJH-AE20**	**23039888**
2 figure 0	G50/125	orange	**02-G50/CWJH-AD20**	**23039889**
2 figure 0	G50/125-OM3	turquoise/aqua	**02-G50/CWJH-AM20-F**	**84005553**
2 figure 0	G62.6/125	orange	**02-G62/CWJH-AD20**	**23039891**

Types printed in bold are stock items

BREAKOUT CABLES



This cable consists of 4 to 12 simplex cables which are SZ-stranded around a central strength member and unified in a single cable by a second outer jacket.

Properties:

- Rugged construction
- Can be assembled with spring-loaded connectors
- LSFH™ and PUR variants are self-extinguishing, low smoke, non-toxic and halogen free
- Each tube strain-relieved

Field of application:

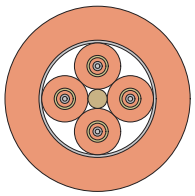
- Installation in indoor areas
- As a data cable in distribution networks
- For installation in cable ducts
- LSFH™ and PUR variants ideal for applications involving high safety requirements in case of a fire
- For horizontal and Collapsed Backbone cabling

BREAKOUT CABLES

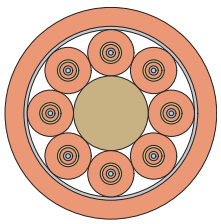
Specification:

		Stranding 4-way	8-way	12-way	
Jacket Ø [mm]		10	13	16	
Single cable Ø [mm]		2.7	2.7	2.7	with 1 tube each
Semi-tight tube Ø [mm]		0.9	0.9	0.9	with 1 fiber each
Approx. weight [kg/km]		90	160	225	
Max. allowable tensile load [N]	during installation	4 x 300	8 x 300	12 x 300	IEC 60794-1-2 E1
	in service	4 x 200	8 x 200	12 x 200	
Min. Bending radius [mm]	during installation	150	150	200	IEC 60794-1-2 E11
	in service	100	150	120	
Crush resistance [N/cm]	during installation	1000	1000	1000	IEC 60794-1-2 E3
	in service	200	200	200	
Impact resistance [Impacts]	Wp = 2.21 Nm/r = 25 mm	30	50	50	IEC 60794-1-2 E4
Temperature range [°C] PVC	during installation		–10 to +50		IEC 60794-1-2 F1
	in service		–20 to +50		
	in storage		–25 to +50		
Temperature range [°C] LSFH	during installation		–10 to +50		IEC 61300-2-22
	in service		–20 to +70		
	in storage		–25 to +60		
Fire load	LSFH	1.9	3.4	5.5	
Fire propagation	LSFH	passed	passed	passed	IEC 60332-1

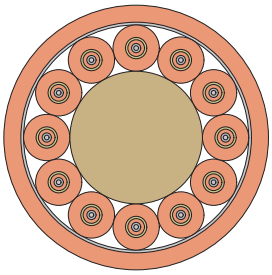
Technical data valid for PVC and LSFH jacketed cable types, other types might vary



4-way stranding



8-way stranding



12-way stranding

Ordering information
please see next page

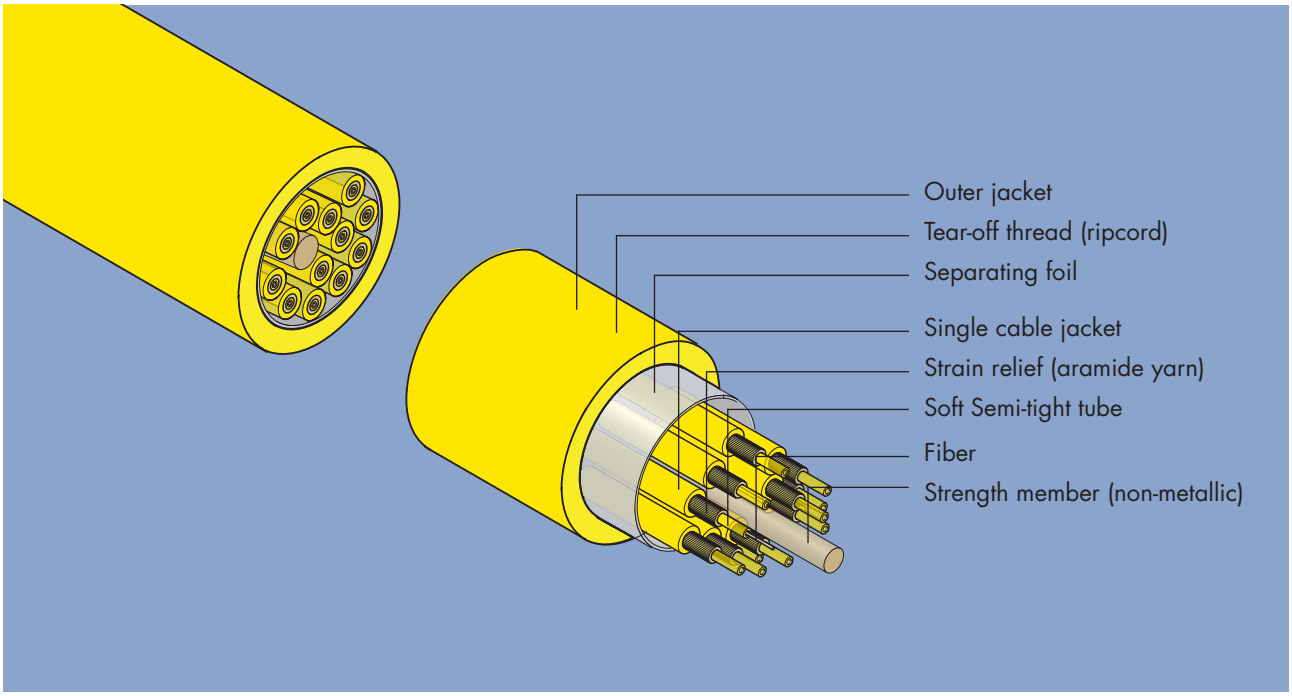
BREAKOUT CABLES

Ordering information:

No of fibers	Fiber type	Color	Coding of individual cables	Type	Part. No
4	LSFH™ G50/125	orange	orange/numbered	04-G50/CWJSNH-D27	22523300
4	LSFH™ G62.5/125	orange	orange/numbered	04-G62/CWJSNH-D27	23026402
12	LSFH™ G50/125	orange	orange/numbered	12-G50/CWJSNH-D27	23026403
12	LSFH™ G62.5/125	orange	orange/numbered	12-G62/CWJSNH-D27	23026404
4	PVC E9/125	orange	orange/numbered	04-E9/CWJSNT-D27	
4	PVC G50/125	orange	orange/numbered	04-G50/CWJSNT-D27	22521464
4	PVC G62.5/125	orange	orange/numbered	04-G62/CWJSNT-D27	22521462
8	PVC E9/125	orange	orange/numbered	08-E9/CWJSNT-D27	
8	PVC G50/125	orange	orange/numbered	08-G50/CWJSNT-D27	22521737
8	PVC G62.5/125	orange	orange/numbered	08-G62/CWJSNT-D27	22521736
12	PVC E9/125	orange	orange/numbered	12-E9/CWJSNT-D27	22523302
12	PVC G50/125	orange	orange/numbered	12-G50/CWJSNT-D27	22521734
12	PVC G62.5/125	orange	orange/numbered	12-G62/CWJSNT-D27	22521735
5	PUR H200/230	black	orange/numbered	05-H200/VJSN(ZN)Z-G26	22521540
9	PUR H200/230	black	orange/numbered	09-H200/VJSN(ZN)Z-G26	22521541

Types printed in bold are stock items

MINICORD BREAKOUT CABLES



Minicord Breakout Cables consists of 12 simplex cables (soft semi-tight tubes with strain relief and outer jacket), which are bundled around a central strength member and integrated into one cable by a second outer jacket of 10 mm diameter.

The small outer diameter of the cable allows a connection of 12 fibers using little space. The small diameter of the simplex cables enables the utilization of Small-Form-Factor connectors. The cable resp. the cable assembly allows applications with a big temperature range and with high wavelengths (1550 and 1625 nm). Therefore the cable is an excellent product for Telecom applications.

Properties:
- Rugged construction
- Can be assembled with spring-loaded connectors
- self-extinguishing, low smoke, non-toxic and halogen free

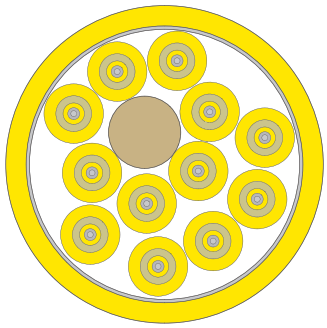
Field of application:
- Indoor applications
- Connection between system rack and optical distributor
- Connection between distributors
- Applications with high safety requirements
- with tear-off thread
- SMARTLINE

SMARTLINE the pre-terminated cabling system is shown in the chapter "Systems".

MINICORD BREAKOUT CABLES

Specification:

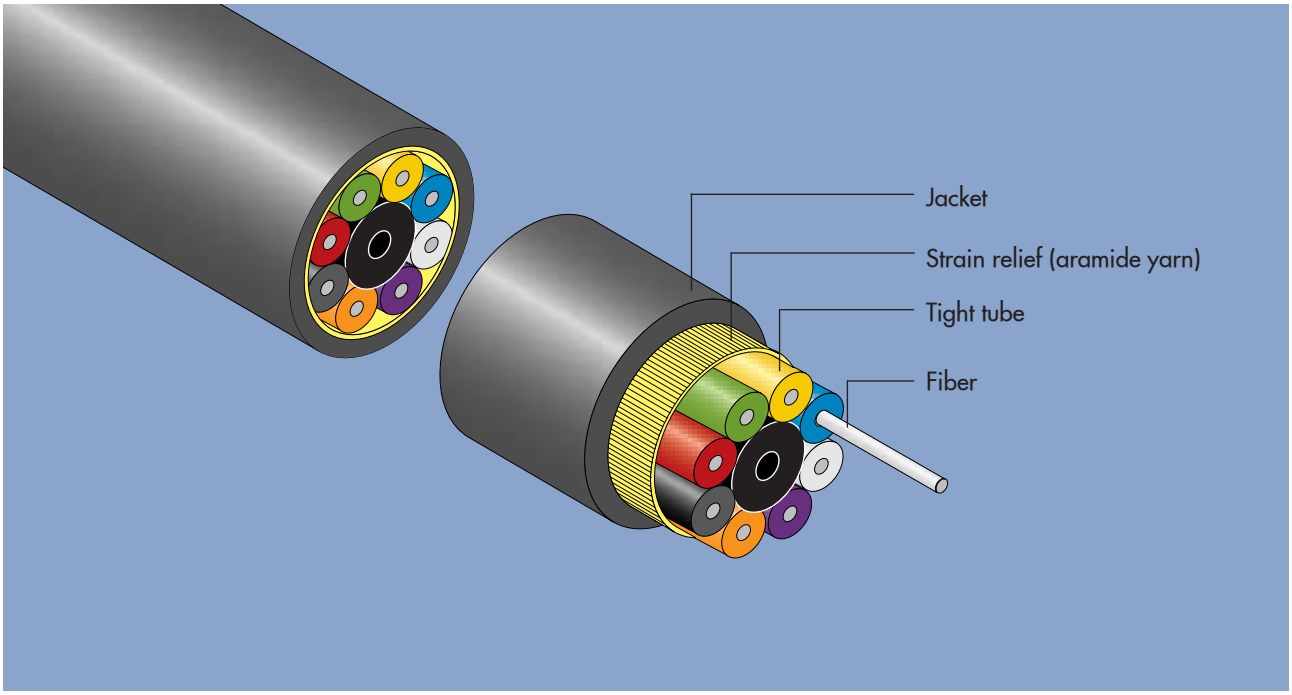
		Breakout	
Jacket Ø [mm]	LSFH™	10.0	
Single cable Ø [mm]	LSFH™	1.7	with 1 tube each
Soft-Semi-tight tube		0.9	with 1 fiber each
Approx. weight [kg/km]		70	
Max. allowable tensile load [N]	during installation	12 x 100	IEC 60794-1-2 E1
	in service	12 x 50	
Min. Bending radius [mm]	in service	75	IEC 60794-1-2 E11
Crush resistance [N/cm]	short-term	600	IEC 60794-1-2 E3
	long-term	200	
Impact resistance [Impacts]	Wp=2.21 Nm, R=25 mm	15	IEC 60794-1-2 E4
Repeated bending [cycles]	r=100mm, force=25N	2500	IEC 60794-1-2 E6
Temperature range [°C]	during installation	–10 to +50	IEC 61300-2-22
	in service	–25 to +70	
	in storage	–25 to +60	
Fire load [MJ/m]		1.41	
Fire propagation		passed	IEC 60332-1
		passed	IEC 60332-3- Cat.C



Number of fibers	Fiber type	Color outer jacket	Type	Part no.
12	E9/125	yellow	**12-E9/SWJSNH-E17**	**23020148**

The yellow simplex cables are numbered individually.

RISER CABLES (DISTRIBUTION CABLES)



Riser cables contain 4 to 16 individually coloured tight tube fibers, it is highly flexible and easy to prepare. Once the outer jacket is removed, the individual fibers are ready for fast and easy termination with connectors.

Properties:
- For direct, spliceless connector assembling
- High compactness/small dimensions
- High mechanical and thermal resistance
- Cost effective
- self-extinguishing, low smoke, non-toxic and halogen free
- Longitudinal and transversal watertight construction
- Tear-off thread

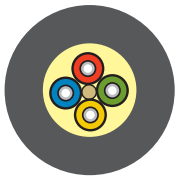
Field of application:
- Internal building distribution
- LAN
- For installation in cable ducts
- FTTD (fiber-to-the-desk)
- Application with high safety requirements
- For horizontal and Collapsed Backbone cabling

Special riser cables:
4 or 8 fiber field cable with PUR jacket for highest mechanical and thermal requirements.

RISER CABLES (DISTRIBUTION CABLES)

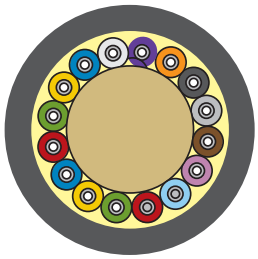
Specification:

Stranding		Standard types 4	6	8	12	16 way	
Jacket Ø [mm]		5.0	5.5	6.0	7.0	8.5	
Tight tube Ø [mm]		0.9	0.9	0.9	0.9	0.9	with 1 fiber each
Approx. weight [kg/km]		28	30	33	52	65	
Max. allowable tensile load [N]	during installation	1200	1600	2400	3000	4200	IEC 60794-1-2 E1
	in service	400	550	800	1000	1400	
Min. Bending radius [mm]	during installation	100	100	120	130	130	IEC 60794-1-2 E11
	in service	50	50	60	70	85	
Crush resistance [N/cm]	during installation	1800	1800	1800	1800	1800	IEC 60794-1-2 E3
	in service	300	300	300	300	300	
Impact resistance [Impacts]	Wp = 2.21 Nm/ r = 25 mm	100	100	100	100	100	IEC 60794-1-2 E4
Temperature range [°C]	during installation	–10 to +50					IEC 60794-1-2 F1
	in service	–20 to +70					
	in storage	–25 to +70					
Fire load [MJ/m]		0.4	0.6	0.8	1.1	1.9	
Fire propagation		passed	passed	passed	passed	passed	IEC 60332-1



4-way Stranding

up to



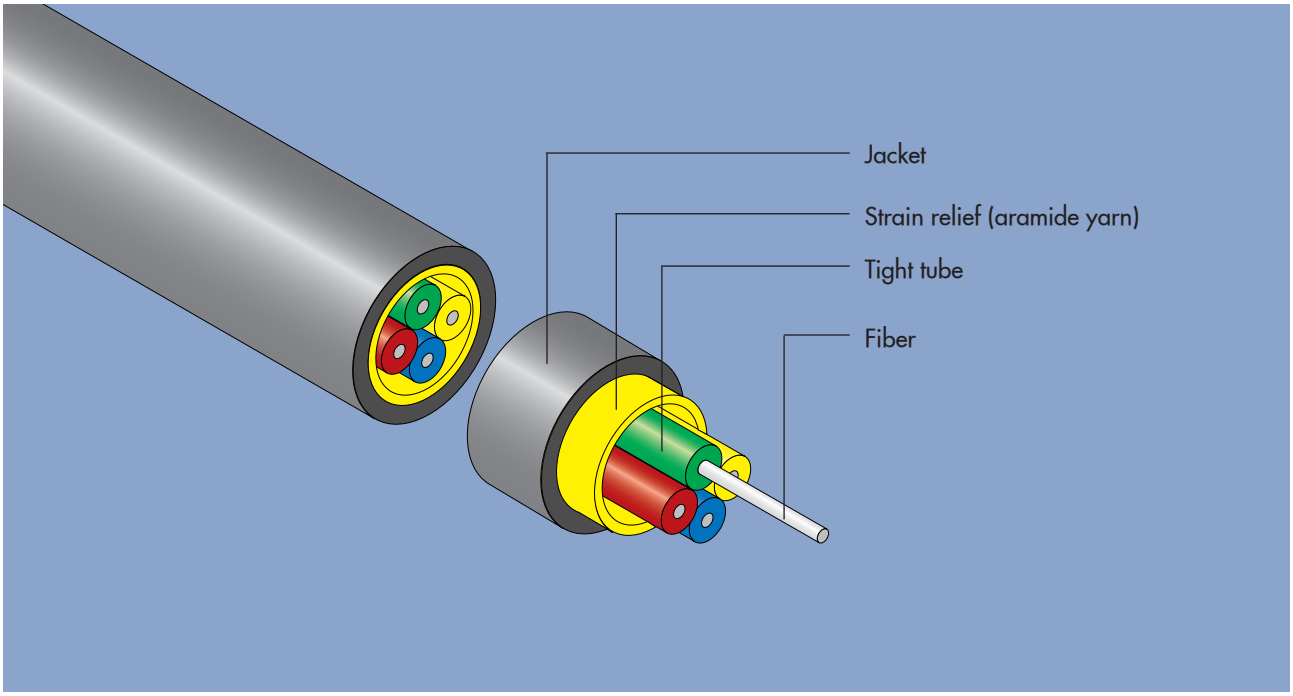
16-way Stranding

Ordering information:

Number of fibers	Fiber type	Color	Type (outer jacket: LSFH™)	Part no.
4	E9/125	black	04-E9/FSN(ZN)H-G50	22523404
4	G50/125	black	**04-G50/FSN(ZN)H-G50**	**22521830**
4	G62.5/125	black	**04-G62/FSN(ZN)H-G50**	**22521829**
6	E9/125	black	06-E9/FSN(ZN)H-G55	22523405
6	G50/125	black	06-G50/FSN(ZN)H-G55	22521833
6	G62.5/125	black	06-G62/FSN(ZN)H-G55	22521834
8	E9/125	black	08-E9/FSN(ZN)H-G60	22523406
8	G50/125	black	08-G50/FSN(ZN)H-G60	22521836
8	G62.5/125	black	08-G62/FSN(ZN)H-G60	22521837
12	E9/125	black	12-E9/FSN(ZN)H-G70	22523407
12	G50/125	black	**12-G50/FSN(ZN)H-G70**	**22521838**
12	G62.5/125	black	**12-G62/FSN(ZN)H-G70**	**22521839**
16	E9/125	black	16-E9/FSN(ZN)H-G85	
16	G50/125	black	16-G50/FSN(ZN)H-G85	
16	G62.5/125	black	16-G62/FSN(ZN)H-G85	

Types printed in bold are stock items

MINI RISER CABLES



MINI Riser cables consist of 4 single buffered fibers, these so called full-tight tubes have a small outer diameter of 0.6mm. Aramide yarn and an LSFH™ jacket surround the tubes.
Mini Riser cable assemblies with singlemode fibers can be used in a wide temperature range and at high wavelength (1550 and 1625nm) and are therefore especially suitable for telecom applications.

Properties:
- Self-extinguishing, low smoke, non-toxic and halogen free
- Very low fire load for highest safety
- Easy stripping of jacket
- Two-step stripping of full-tight tubes
- Can be assembled with all spring-loaded connectors including MT-RJ
- Wide temperature range

Field of application:
- Telecom applications
- Indoor installations
- Distribution cabling (FttD or Ftt0)
- Everywhere where four fibers are needed and only little space is available
- Where smallest fire load is required

MINI RISER CABLES

Specification:

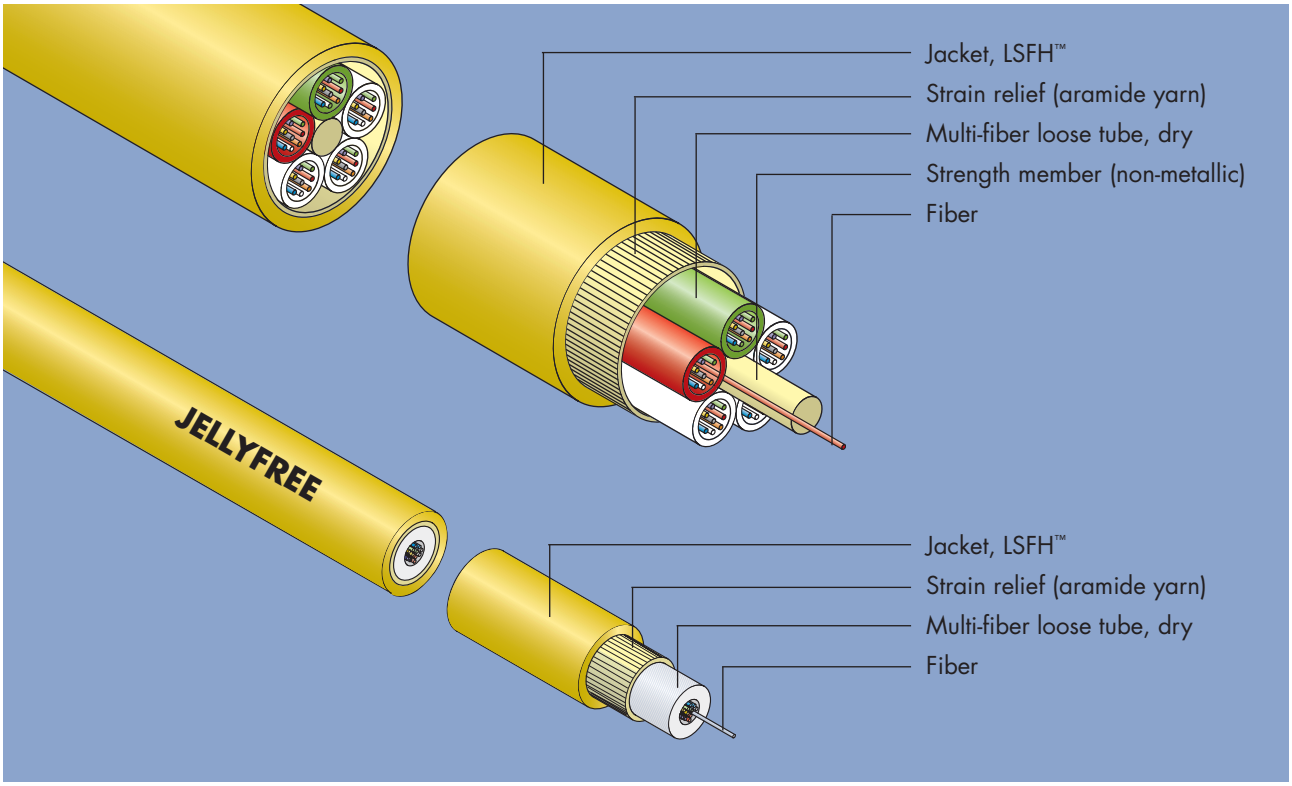
		Mini Riser	
Number of fibers		4	
Jacket Ø [mm]		3.0	
Tight tube Ø [mm]		0.6	color coded
Approx. weight [kg/km]		7	
Max. allowable tensile load [N]	during installation	400	IEC 60794-1-2 E1
	in service	200	
Min. Bending radius [mm]	during installation	50	IEC 60794-1-2 E11
	in service	25	
Crush resistance [N/cm]	short-term	75	IEC 60794-1-2 E3
	long-term	50	
Impact resistance [Impacts]	Wp = 2.21 Nm/r = 25 mm	25	IEC 60794-1-2 E4
Repeated bending [Cycles]	R=60mm, F=10N	1000	IEC 60794-1-2 E6
Temperature range [°C]	during installation	–10 to +60	IEC 60794-1-2 F1
	in service	–40 to +70	
	in storage	–40 to +60	
Fire load [MJ/m]		0.14	
Fire propagation		passed	IEC 60332-1

Note:
- Cables contain small tight tubes with a diameter of 600 mm, suitable for MT-RJ connector termination
- Stripping of full-tight tubes 0.6 mm in two steps:
  - Step 1: Strip secondary coating (600 mm) with small T-stripper (9801.22.A) and hole AWG26, rsp. AWG 28 over a length of approx. 2 cm. As the primary coating is stripped off in a second step there is no problem if the 250 mm coating is already partially removed
  - Step 2: Remove the primary coating (250 mm) with the coating stripper (9801.10.E) or with a similar tool

Ordering information:

Number of fibers	Fiber type	Color	Type (outer jacket: LSFH™)	Part no.
4	E9/125	yellow	**04-E9/V(ZN)H-E30**	**84001652**
4	G50/125	orange	**04-G50/V(ZN)H-D30**	**84001655**
4	G62.5/125	orange	04-G62/V(ZN)H-D30	84001656

JELLYFREE



Jellyfree cables consist of dry multi-fiber loose tubes, each of which contains up to 12 fibers and is strain-relieved and LSFH™ jacketed. The tubes are also color-coded:

Simplex:	white	
Stranded:	red	(counting tube)
	green	(direction of counting)
	white	(others)
	black	(dummies)

Field of application:

- Installation in indoor areas
- As a data cable in distribution networks
- For vertical applications up to 500 m
- For installation in cable ducts
- Ideal for applications involving high safety requirements in case of a fire

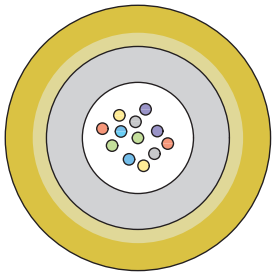
Properties:

- No need for cleaning the fibers
- Self-extinguishing, halogen free, non-toxic, low smoke
- Very low fire load for high safety requirements
- Rugged construction
- No contamination of the installation materials by jelly
- easy stripping

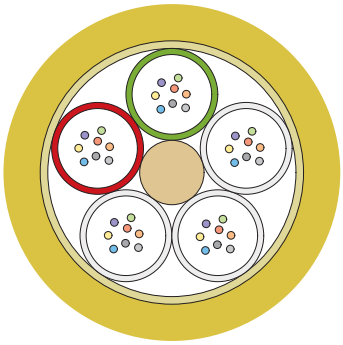
JELLYFREE

Specification:

		Simplex	Stranding 5-way	
Jacket Ø [mm]		5.0	11	
Multi-fiber loose tube Ø [mm]		3.0	3.0	with 4 to 12 fibers per multi-fiber loose
Approx. weight [kg/km]		25	95	
Max. allowable tensile load [N]	during installation	600	2500	IEC 60794-1-2 E1
	in service	400	1000	
Min. Bending radius [mm]	during installation	80	170	IEC 60794-1-2 E11
	in service	50	120	
Crush resistance [N/cm]	during installation	300	500	IEC 60794-1-2 E3
	in service	150	200	
Impact resistance [Impacts]	Wp = 2.21 Nm/ r = 25 mm	50	100	IEC 60794-1-2 E4
Temperature range [°C]	during installation	–5 to +50	–10 to +60	IEC 60794-1-2 F1
	in service	–5 to +60	–25 to +70	
	in storage	–20 to +50	–40 to +70	
Fire load [MJ/m]		0.6	2.2	
Fire propagation		passed	passed	IEC 60332-1



Simplex (up to 12 fibers)



Stranding >12–144 fibers

Ordering information
please see next page

JELLYFREE

Loose tubes x fibers	Fiber type	Type	Part no.
SIMPLEX-TYPE			
1 x 4	E9/125	04-4E9/H(ZN)H-E50	
1 x 4	G50/125	04-4G50/H(ZN)H-D50	22521820
1 x 4	G62.5/125	04-4G62/H(ZN)H-D50	22521821
1 x 6	E9/125	06-6E9/H(ZN)H-E50	
1 x 6	G50/125	06-6G50/H(ZN)H-D50	22521822
1 x 6	G62.5/125	06-6G62/H(ZN)H-D50	22521823
1x 8	E9/125	08-8E9/H(ZN)H-E50	
1 x 8	G50/125	08-8G50/H(ZN)H-D50	22521595
1 x 8	G62.5/125	08-8G62/H(ZN)H-D50	22521596
1 x 12	E9/125	**12-12E9/H(ZN)H-E50**	**22523600**
1 x 12	G50/125	12-12G50/H(ZN)H-D50	22521597
1 x 12	G62.5/125	12-12G62/H(ZN)H-D50	22521598
5-way stranding			
2 x 8	E9/125	16-8E9/HSN(ZN)H-E110	
2 x 8	G50/125	16-8G50/HSN(ZN)H-D110	
2 x 8	G62.5/125	16-8G62/HSN(ZN)H-D110	
3 x 8	E9/125	24-8E9/HSN(ZN)H-E110	
3 x 8	G50/125	24-8G50/HSN(ZN)H-D110	
3 x 8	G62.5/125	24-8G62/HSN(ZN)H-D110	
3 x 12	E9/125	36-12E9/HSN(ZN)H-E110	
3 x 12	G50/125	36-12G50/HSN(ZN)H-D110	
3 x 12	G62.5/125	36-12G62/HSN(ZN)H-D110	
4 x 12	E9/125	48-12E9/HSN(ZN)H-E110	
4 x 12	G50/125	48-12G50/HSN(ZN)H-D110	
4 x 12	G62.5/125	48-12G62/HSN(ZN)H-D110	
5 x 12	E9/125	60-12E9/HSN(ZN)H-E110	
5 x 12	G50/125	60-12G50/HSN(ZN)H-D110	
5 x 12	G62.5/125	60-12G62/HSN(ZN)H-D110	

Types printed in bold are stock items.

OUTDOOR CABLES

General
Outdoor cables are mainly designed for metropolitan area networks (MAN) and access networks.
Non-stranded cable types and especially jellyfree cables are also often used for indoor installations because of their characteristics.
The most important requirements on outdoor cables are:
- Tensile load
- Crush resistance
- Longitudinal water-tightness
- Weathering resistance
- Temperature resistance

Concerning indoor use, the following criteria are important when choosing a cable type:

- Flectional resistance
- Stripping ability
- Fire behaviour (LSFH™ types) i.e. circuit integrity in case of fire

Non- and glass armoured multi-fiber loose tube designs of SUHNER FIBEROPTIC are available up to 144 fibers.

PMD value
The PMD value plays a major role when installing single-mode fibers, as it influences the transmission rate.
SUHNER FIBEROPTIC guarantees a very low PMD value of the processed fibers by the selection of high-quality fiber suppliers and by a stress-free and careful fiber manufacturing procedure.

Logitudinal and transverse water-thightness
The cables are protected against permeation (transverse water-tightness) and propagation (longitudinal water-tightness).

The transverse water-tightness describes the permeation of humidity into the core of the cable.
PE material guarantees best protection against water and humidity. For outdoor applications with frequent or permanently wet environments we recommend cable with PE or PUR material. If the cable is exposed to a humid environment occasionally LSFH cable from SUHNER FIBEROPTIC can also be used.

The longitudinal water-tightness of cables is accomplished by using swelling materials. SUHNER cables comply with tests according to IEC60794-1-2 F5A/B. In addition the glass roving and aramide have an absorbent respectively swellable coating material.

Further protection layers like the tube around the mulit-fiber loose tube und the primary coating of the fiber keep water away from the fiber.
SUHNER FIBEROPTIC cables are free from petrolates (oils) in the space between the multi-fiber loose tube and the outer coating. So there is no need for time-consuming cleaning.

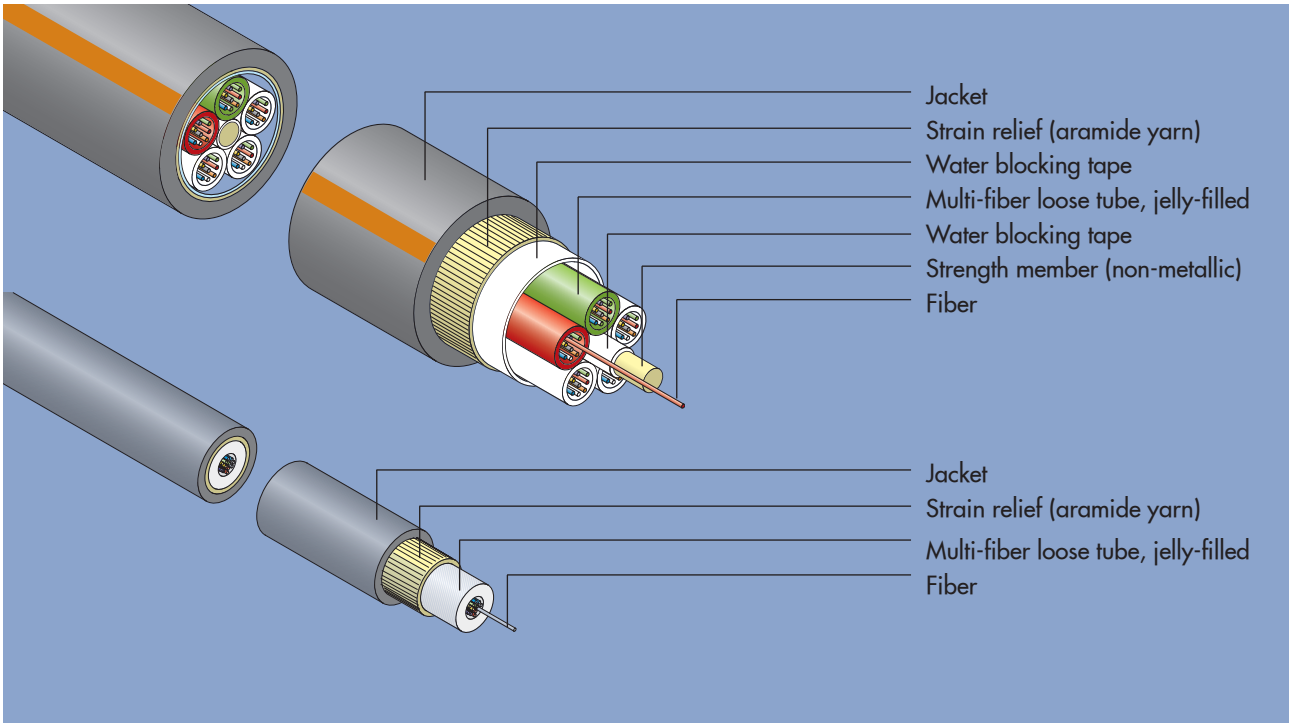
Non-armoured multi-fiber loose tube cables
The products of this cable family are available with 1 to 12 jelly-filled multi-fiber loose tubes, aramide strain relief and jackets made of PE or LSFH™.
Non-armoured multi-fiber loose tube cables are also used for indoor applications (non-stranded cable types) as well as for outdoor applications.

Glass-armoured multi-fiber loose tube cables
The products of this cable family are available with 1 to 12 jelly-filled multi-fiber loose tubes, glass-roving strain relief and jackets made of PE and LSFH™ material. The glass-roving layer around the multi-fiber loose tubes fulfills the following four functions:
- strain relief
- high crush resistance
- high resistance to biting
- longitudinal water tightness

Glassroving-armoured multi-fiber loose tube cables allow a wide range of applications because of their specific characteristics. The applications reach from indoor cablings to direct outdoor burial.

Steel-armoured multi-fiber loose tube cables
The products of this cable family feature one jelly-filled multi-fiber loose tube, they are strain-relieved with aramide and have two PE or LSFH™ layer jackets with a braided steel wire armouring. Steel-armouring provides an excellent protection against rodents.

NON-ARMOURED MULTI-FIBER LOOSE TUBE CABLES



These cable types contain 2 to 12 fibers per loose tube. The tubes are also color-coded:

Simplex:	white	
Stranded:	red	(counting tube)
	green	(direction of counting)
	white	(others)
	black	(dummies)

Properties:

- Rugged construction
- Halogen free, non-toxic
- Wide temperature range
- LSFH™ variant self-extinguishing and low smoke
- Tight bending radius
- Longitudinal/transverse watertight

Field of application:

- As a data cable in distribution networks
- Installation indoor areas
- Installation outdoors, in moist, wet cable ducts
- Ideal as distributor-to-distributor patch cable
- As LSFH™ variant ideal for applications involving high safety requirements in case of a fire
- Maximum 12 loose tubes with maximum 12 fibers = 144 fibers

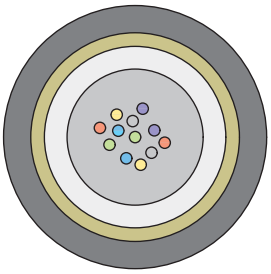
Cables with approbation
Also available approved by Swisscom acc. to specification 6PHETOP_1069_00E_1

NON-ARMOURED MULTI-FIBER LOOSE TUBE CABLES

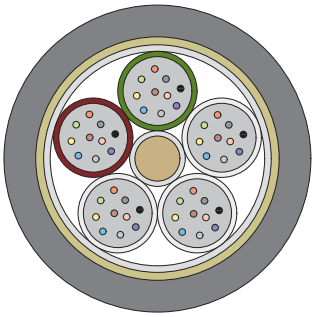
Specification:

		Simplex	Stranding 5-way	
Jacket Ø [mm]		5.0	11.5	
Multi-fiber loose tube Ø [mm]		3.0	3.0	with 2 to 12 fibers per loose tube
Approx. weight [kg/km]		20	100	
Max. allowable tensile load [N]	during installation	600	2000	IEC 60794-1-2 E1
	in service	400	1000	
Min. Bending radius [mm]	during installation	80	170	IEC 60794-1-2 E11
	in service	50	120	
Crush resistance [N/cm]	during installation	300	500	IEC 60794-1-2 E3
	in service	150	200	
Impact resistance [Impacts]	Wp=2.21Nm/ r=25 mm	50	100	IEC 60794-1-2 E4
Temperature range [°C]	during installation	–10 to +50	–10 to +60	IEC 60794-1-2 F1
	in service	–20 to +70	–25 to +70	
	in storage	–40 to +70	–40 to +70	
Fire load [MJ/m]	PE	0.72	2.8	
	LSFH™	0.6	2.6	
Fire propagation	LSFH™	passed	passed	IEC 60332-1

Technical data for cable types with LSFH™ jacket might vary slightly.



Simplex (up to 12 fibers)



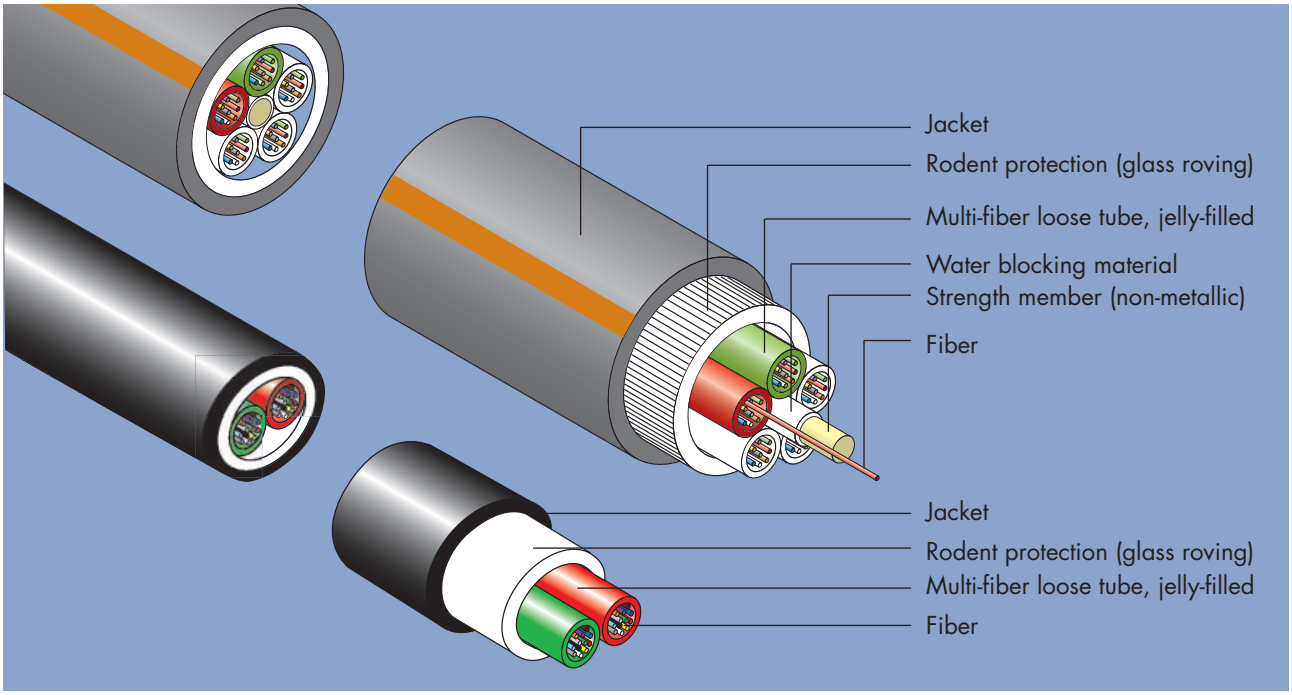
Stranding >12–144 fibers

Ordering information
please see next page

NON-ARMOURED MULTI-FIBER LOOSE TUBE CABLES

Loose tubes x fibers	Fiber type	Type	Part no.
SIMPLEX-TYPE			
1 x 4	E9/125	04-4E9/W(ZN)Y-G50	
1 x 4	G50/125	04-4G50/W(ZN)Y-G50	22520723
1 x 4	G62.5/125	04-4G62/W(ZN)Y-G50	22520687
1 x 6	E9/125	06-6E9/W(ZN)Y-G50	
1 x 6	G50/125	06-6G50/W(ZN)Y-G50	22520678
1 x 6	G62.5/125	06-6G62/W(ZN)Y-G50	22520707
1 x 8	E9/125	08-8E9/W(ZN)Y-G50	
1 x 8	G50/125	08-8G50/W(ZN)Y-G50	22520688
1 x 8	G62.5/125	08-8G62/W(ZN)Y-G50	22520740
1 x 12	E9/125	12-12E9/W(ZN)Y-G50	
1 x 12	G50/125	12-12G50/W(ZN)Y-G50	22521250
1 x 12	G62.5/125	12-12G62/W(ZN)Y-G50	22521251
5-way stranding			
2 x 8	E9/125	16-8E9/WSN(ZN)Y-Z115	
2 x 8	G50/125	16-8G50/WSN(ZN)Y-Z115	
2 x 8	G62.5/125	16-8G62/WSN(ZN)Y-Z115	
2 x 12	E9/125	24-12E9/WSN(ZN)Y-Z115	22523700
2 x 12	G50/125	24-12G50/WSN(ZN)Y-Z115	22521813
2 x 12	G62.5/125	24-12G62/WSN(ZN)Y-Z115	22521814
3 x 12	E9/125	36-12E9/WSN(ZN)Y-Z115	
3 x 12	G50/125	36-12G50/WSN(ZN)Y-Z115	
3 x 12	G62.5/125	36-12G62/WSN(ZN)Y-Z115	
4 x 12	E9/125	48-12E9/WSN(ZN)Y-Z115	
4 x 12	G50/125	48-12G50/WSN(ZN)Y-Z115	
4 x 12	G62.5/125	48-12G62/WSN(ZN)Y-Z115	
5 x 12	E9/125	60-12E9/WSN(ZN)Y-Z115	
5 x 12	G50/125	60-12G50/WSN(ZN)Y-Z115	
5 x 12	G62.5/125	60-12G62/WSN(ZN)Y-Z115	

RODENT-PROTECTED MULTI-FIBER LOOSE TUBE CABLES (GLASS-ARMOURED)



Glass-armoured cable types excel in an increased biting consistency and contain 2 to 12 fibers per loose tube.

Tubes are color-coded as follows:

Simplex:	white	
Non-stranded:	red	
	green	
Stranded:	red	(counting tube)
	green	(direction of counting)
	white	(others)
	black	(dummies)

TWINTUBE cables have additional characteristics
- Small dimension and low weight for 24 fibers
- Low fire load
- As LSFH™ variant: high safety in case of fire with circuit integrity over 90 minutes
- Fast stripping and exposure of loose tubes
- No twisted loose tubes, as caused by stranding
- Time-saving as no need to heat twisted loose tubes to achieve a straight form
- Slightly oval, which helps to compensate the fiber lengths when bent

Properties:
- Rodent-protected
- Rugged construction
- Halogen free, non-toxic
- Wide temperature range
- LSFH™ variant self-extinguishing and low smoke
- Tight bending radius
- Longitudinal/transverse water tight

Field of application:
- For installation directly in the ground and in mechanically unprotected environments
- For installation in indoor areas
- As data cable in distribution networks
- For installation outdoors, in moist, wet cable ducts and in pipes
- As LSFH™ variant ideal for applications involving high safety requirements in case of a fire
- Maximum 12 loose tubes with maximum 12 fibers = 144 fibers

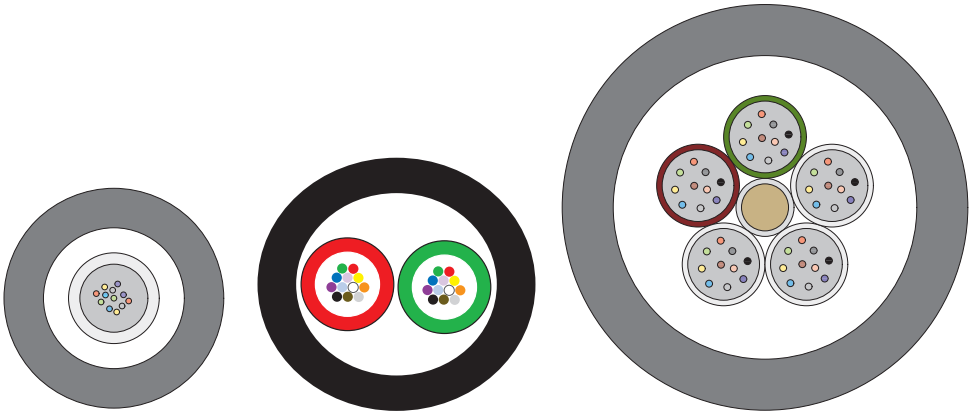
Cables with approbation
- Connector cables also available acc. to SBB requirements 3001.92.1000.
- Communication cables also available acc. to Swisscom requirements 6PHETOP_1069_00E_1

RODENT-PROTECTED MULTI-FIBER LOOSE TUBE CABLES (GLASS-ARMOURED)

Specification:

		Simplex	TWINTUBE	5-way Stranding	
Jacket Ø [mm]		8.5	9.4x8.8	15	
Multi-fiber loose tube Ø [mm]		3.0	3.0	3.0	with 2 to 12 fibers per loose tube
Approx. weight [kg/km]	PE	62	69	178	
	LSFH™	82	90	225	
Max. allowable tensile load [N]	during installation	3000	3000	9000	IEC 60794-1-2 E1
	in service	1500	1500	4500	
Min. Bending radius [mm]	during installation	130	150	225	IEC 60794-1-2 E11
	in service	80	100	150	
Crush resistance [N/cm]	during installation	400	800	800	IEC 60794-1-2 E3
	in service	200	400	300	
Impact resistance [Impacts]	Wp = 4.41 Nm/ r = 25 mm	30	–	100	IEC 60794-1-2 E4
Torsion resistance [rotations]	L=1m, 3 cycles, –40°C	±4	–	–	IEC 60794-1-2 E7
Temperature range [°C]	during installation	–10 to +50	–10 to +50	–10 to +60	IEC 60794-1-2 F1
	in service	–40 to +70	–20 to +70	–40 to +70	
	in storage	–40 to +70	–40 to +70	–40 to +70	
Fire load [MJ/m]	PE	1.7	1.8	5.0	
	LSFH™	1.5	1.7	4.4	
Fire propagation	LSFH™	passed	passed	passed	IEC 60332-1
Fire propagation with circuit integrity	LSFH™	30 minutes	90 minutes	30 minutes	IEC 60331

Technical data for LSFH™ cable types might vary slightly.



Simplex
up to 12 fibers

TWINTUBE
non-stranded
up to 24 fibers

Stranding
>12–144 fibers

Ordering information
please see next page

RODENT-PROTECTED MULTI-FIBER LOOSE TUBE CABLES (GLASS-ARMOURED)

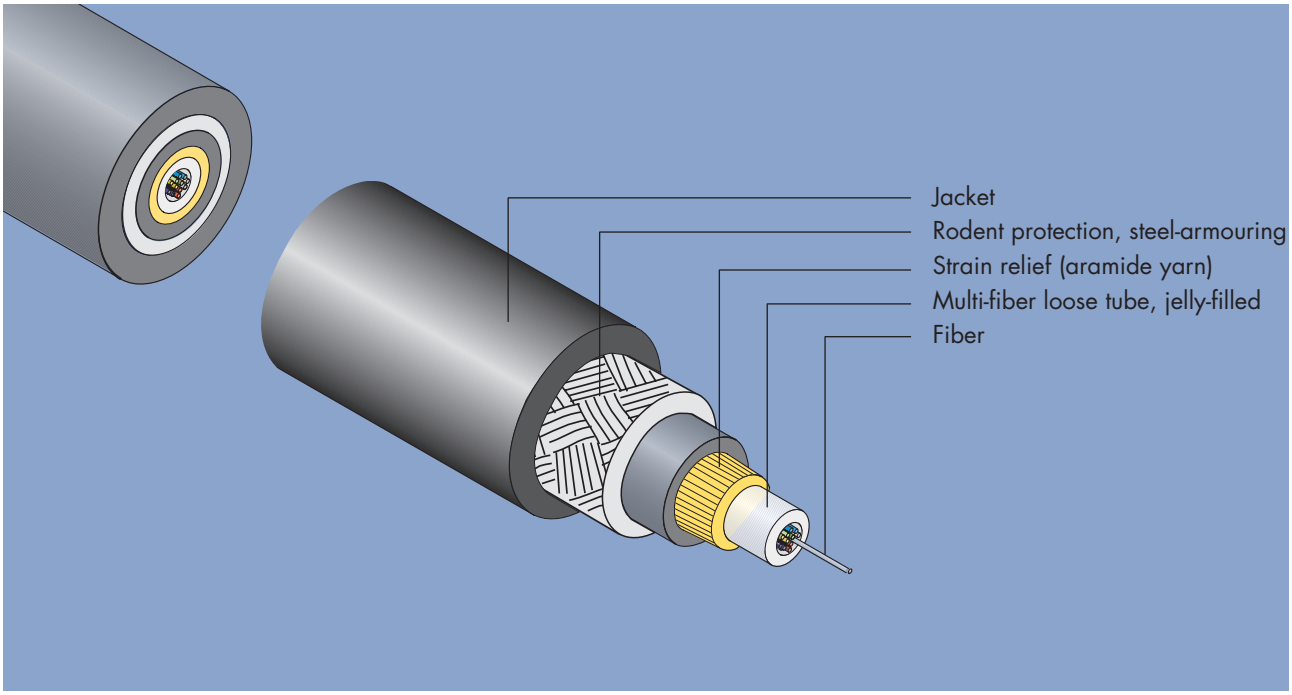
No. loose tubes x no. fibers	Fiber type	Type	Part no.
LSFH™-Types Simplex			
1 x 4	G50/125	**04-4G50/W(ZNG)H-G85**	**22523601**
1 x 4	G62.5/125	**04-4G62/W(ZNG)H-G85**	**22523603**
1 x 8	G50/125	**08-8G50/W(ZNG)H-G85**	**22523602**
1 x 8	G62.5/125	**08-8G62/W(ZNG)H-G85**	**22523604**
1 x 12	E9/125	**12-12E9/W(ZNG)H-G85**	**22523654**
1 x 12	G50/125	**12-12G50/W(ZNG)H-G85**	**22521943**
1 x 12	G50/125-OM3	**12-12G50/W(ZNG)H-M85-F**	**84005134**
1 x 12	G62.5/125	**12-12G62/W(ZNG)H-G85**	**22521884**
LSFH™-Types TWINTUBE non-stranded			
2 x 12	E9/125	24-12E9/W(ZNG)H-G94	23041032
2 x 12	G50/125	**24-12G50/W(ZNG)H-G94**	**23038139**
2 x 12	G50/125-OM3	**24-12G50/W(ZNG)H-M94-F**	**84003522**
2 x 12	G62/125	**24-12G62/W(ZNG)H-G94**	**23041033**
LSFH™-Types 5-way Stranding			
2 x 12	E9/125	**24-12E9/WSN(ZNG)H-G150**	**23011674**
2 x 12	G50/125	**24-12G50/WSN(ZNG)H-G150**	**22523750**
2 x 12	G62.5/125	24-12G62/WSN(ZNG)H-G150	22523751
4 x 12	G50/125	**48-12G50/WSN(ZNG)H-G150**	**22521908**
4 x 12	G62.5/125	48-12G62/WSN(ZNG)H-G150	22521885
PE types Simplex			
1 x 2	E9/125	02-2E9/W(ZNG)Y-G85	
1 x 2	G50/125	02-2G50/W(ZNG)Y-G85	22521811
1 x 2	G62.5/125	02-2G62/W(ZNG)Y-G85	22521749
1 x 2	H200/230	**02-2H200/W(ZNG)Y-G85**	**22523652**
1 x 4	E9/125	**04-4E9/W(ZNG)Y-G85**	**22523661**
1 x 4	G50/125	**04-4G50/W(ZNG)Y-G85**	**22521750**
1 x 4	G62.5/125	**04-4G62/W(ZNG)Y-G85**	**22521751**
1 x 4	H200/230	04-4H200/W(ZNG)Y-G85	22523653
1 x 6	E9/125	06-6E9/W(ZNG)Y-G85	
1 x 6	G50/125	**06-6G50/W(ZNG)Y-G85**	**22521752**
1 x 6	G62.5/125	06-6G62/W(ZNG)Y-G85	22521753
1 x 8	E9/125	**08-8E9/W(ZNG)Y-G85**	**23017688**
1 x 8	G50/125	**08-8G50/W(ZNG)Y-G85**	**22521754**
1 x 8	G62.5/125	**08-8G62/W(ZNG)Y-G85**	**22521755**
1 x 10	E9/125	10-10E9/W(ZNG)Y-G85	
1 x 10	G50/125	10-10G50/W(ZNG)Y-G85	22521817
1 x 10	G62.5/125	10-10G62/W(ZNG)Y-G85	22521819
1 x 12	E9/125	**12-12E9/W(ZNG)Y-G85**	**22521756**
1 x 12	G50/125	**12-12G50/W(ZNG)Y-G85**	**22521757**
1 x 12	G50/125-OM3	**12-12G50/W(ZNG)Y-G85-F**	**23027099**
1 x 12	G62.5/125	**12-12G62/W(ZNG)Y-G85**	**22521758**

RODENT-PROTECTED MULTI-FIBER LOOSE TUBE CABLES (GLASS-ARMOURED)

No. loose tubes x no. fibers	Fiber type	Type	Part no.
Glass-armoured cables with enhanced crush resistance			
1 x 12	E9/125	**12-12E9/W(ZNG)Y-Z120**	**22523657**
1 x 12	G50/125	**12-12G50/W(ZNG)Y-Z120**	**22523655**
1 x 12	G62/125	12-12G62/W(ZNG)Y-Z120	22523656
PE types, TWINTUBE non-stranded			
2 x 12	E9/125	**24-12E9/W(ZNG)Y-G94**	**23038137**
2 x 12	G50/125	**24-12G50/W(ZNG)YG94**	**23038138**
2 x 12	G50/125-OM3	24-12G50/W(ZNG)Y-G94-F	23041030
2 x 12	G62/125	**24-12G62/W(ZNG)Y-G94**	**23041031**
PE types, 5-way stranding			
2 x 12	E9/125	**24-12E9/WSN(ZNG)Y-Z150**	**22523758**
2 x 12	G50/125	**24-12G50/WSN(ZNG)Y-Z150**	**22521815**
2 x 12	G62.5/125	**24-12G62/WSN(ZNG)Y-Z150**	**22521816**
3 x 12	E9/125	36-12E9/WSN(ZNG)Y-Z150	
3 x 12	G50/125	36-12G50/WSN(ZNG)Y-Z150	
3 x 12	G62.5/125	36-12G62/WSN(ZNG)Y-Z150	
4 x 12	E9/125	**48-12E9/WSN(ZNG)Y-Z150**	**22523759**
4 x 12	G50/125	**48-12G50/WSN(ZNG)Y-Z150**	**22523761**
4 x 12	G62.5/125	48-12G62/WSN(ZNG)Y-Z150	22523762
5 x 12	E9/125	60-12E9/WSN(ZNG)Y-Z150	22523760
5 x 12	G50/125	60-12G50/WSN(ZNG)Y-Z150	
5 x 12	G62.5/125	60-12G62/WSN(ZNG)Y-Z150	
Enforced cable types acc. to customer specifications			
1 x 12	E9/125	E-1NDZ-GGT-12FS/A (SBB)	22523650
2 x 12	E9/125	**E-2DZ-GGT-24FS/A (Diax)**	**22521973**
5 x 12	E9/125	**E-5DZ-GGT-60FS/A (Diax)**	**22521987**

Types printed in bold are stock types.

RODENT-PROTECTED MULTI-FIBER LOOSE TUBE CABLES (STEEL-ARMOURED)



This cable type contains one multi-fiber loose tube up to max. 12 fibers. A first jacket includes the strain-relief and the multi-fiber loose tube. On this first jacket a steel wire armouring is applied, which offers excellent protection against rodent attacks. The outer jacket consists of the same material as the inner jacket.

Properties:

- Excellent rodent-protection
- Mechanically extremely robust
- Wide temperature range
- Halogen free, non-toxic
- Installation-friendly
- Tight bending radius
- LSFH™ variant self-extinguishing and low smoke

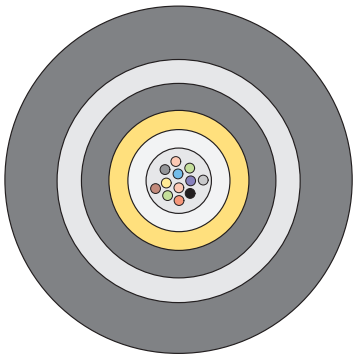
Field of application:

- For outdoor and indoor installations and in mechanically unprotected environments
- For installations directly in the ground
- For underwater applications up to 10 m (cable is 1.3 times heavier than water)
- LSFH™ variant is ideal for applications involving high safety requirements in case of fire

RODENT-PROTECTED MULTI-FIBER LOOSE TUBE CABLES (STEEL-ARMOURED)

Specification:

		Simplex	
Jacket Ø [mm]		8.0	
Multi-fiber loose tube Ø [mm]		3.0	with 2 to 12 Fibers
Approx. weight [kg/km]		65	
Max. allowable tensile load [N]	during installation (r > 130mm)	1000	IEC 60794-1-2 E1
	in service (r > 80mm)	500	
Min. Bending radius [mm]	during installation	130	IEC 60794-1-2 E11
	in service	80	
Crush resistance [N/cm]	during installation	400	IEC 60794-1-2 E3
	in service	200	
Impact resistance [Impacts]	Wp = 1.5 Nm/r = 25 mm	50	IEC 60794-1-2 E4
Repeated bending [Cycles]	r = 30 mm/Zug = 100 N	1000	IEC 60794-1-2 E6
Temperature range [°C]	during installation	–10 to +50	IEC 60794-1-2 F1
	in service	–25 to +70	
	in storage	–40 to +70	
Fire load [MJ/m]	LSFH™	1.45	
	PE	1.6	
Fire propagation	LSFH™	passed	IEC 60332-1

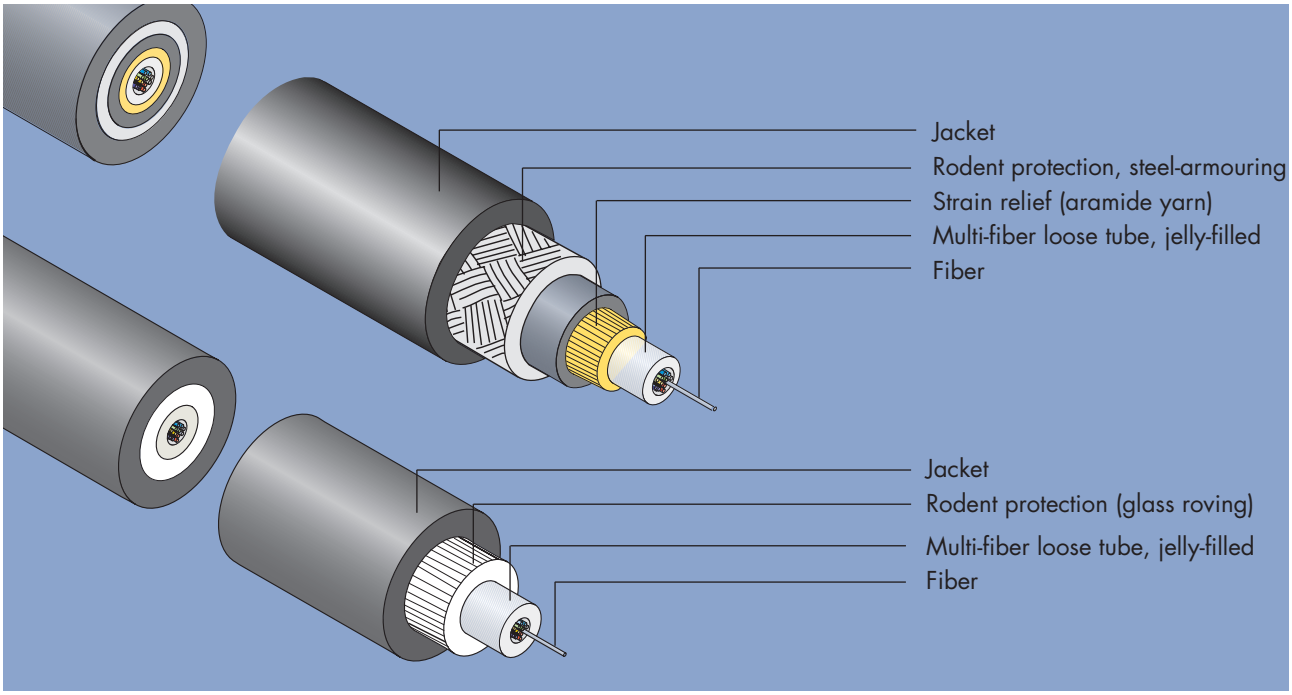


Ordering information:

Loose tubes x no. fibers	Fiber type	Color	Type	Part no.
1 x 12	E9/125	black	12-12E9/W(ZN)YAY-G80	22523660
1 x 12	G50/125	black	12-12G50/W(ZN)YAY-G80	22523658
1 x 12	G62/125	black	12-12G62/W(ZN)YAY-G80	22523659

Types printed in bold are stock items

SECUFIRE



SECUFIRE cables meet the highest safety requirements due to a jacket made of enhanced LSFH™ material. They contain 2 up to 12 fibers, have glass roving or braided steel wires for rodent protection. The construction guarantees a working data transmission in case of fire.
Fire damming due to strong self-extinguishing characteristics, low fire load and minimal fire propagation. High protection for humans and objects as only very little and non-toxic smoke is produced; therefore escape routes stay visible.

Properties:

- Halogen free, non-toxic
- Strong self-extinguishing characteristics
- Minimal fire propagation
- Low smoke emission
- Circuit integrity over 90 minutes
- Low fire load
- Rodent-protected
- Wide temperature range

Field of application:

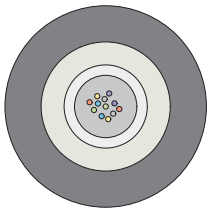
- Tunnels
- Underground railways
- Ships
- Premises cabling (e.g. airports, tower blocks, buildings)
- Other applications with highest safety requirements

SECUFIRE

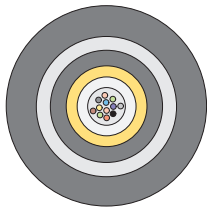
Specification:

		Glass-armoured	Steel-armoured	
Jacket Ø [mm]		8.0	8.0	
Multi-fiber loose tube Ø [mm]		3.0	3.0	
Approx. weight [kg/km]		82	82	
Max. allowable tensile load [N]	during installation	3000	1000	IEC 60794-1-2 E1
	in service	1000	500	
Min. bending radius [mm]	during installation	120	120	IEC 60794-1-2 E11
	in service	80	80	
Crush resistance [N/cm]	during installation	400	400	IEC 60794-1-2 E3
	in service	200	200	
Temperature range [°C]	during installation	–10 to +60		IEC 60794-1-2 F1
	in service	–40 to +70		
	in storage	–40 to +70		
Fire load [MJ/m]		1.2	1.3	
Fire propagation		passed	passed	IEC 60332-1
		passed*	passed*	IEC 60332-3 Cat. C
Fire test with circuit integrity		30 minutes	-	IEC 60331
Fire resistance for use in emergency circuits		90 minutes	-	EN 50200
Smoke emission		passed	passed	IEC 61034-2

* including optional circuit integrity during 20 minutes flame application and afterwards



Glass-armoured



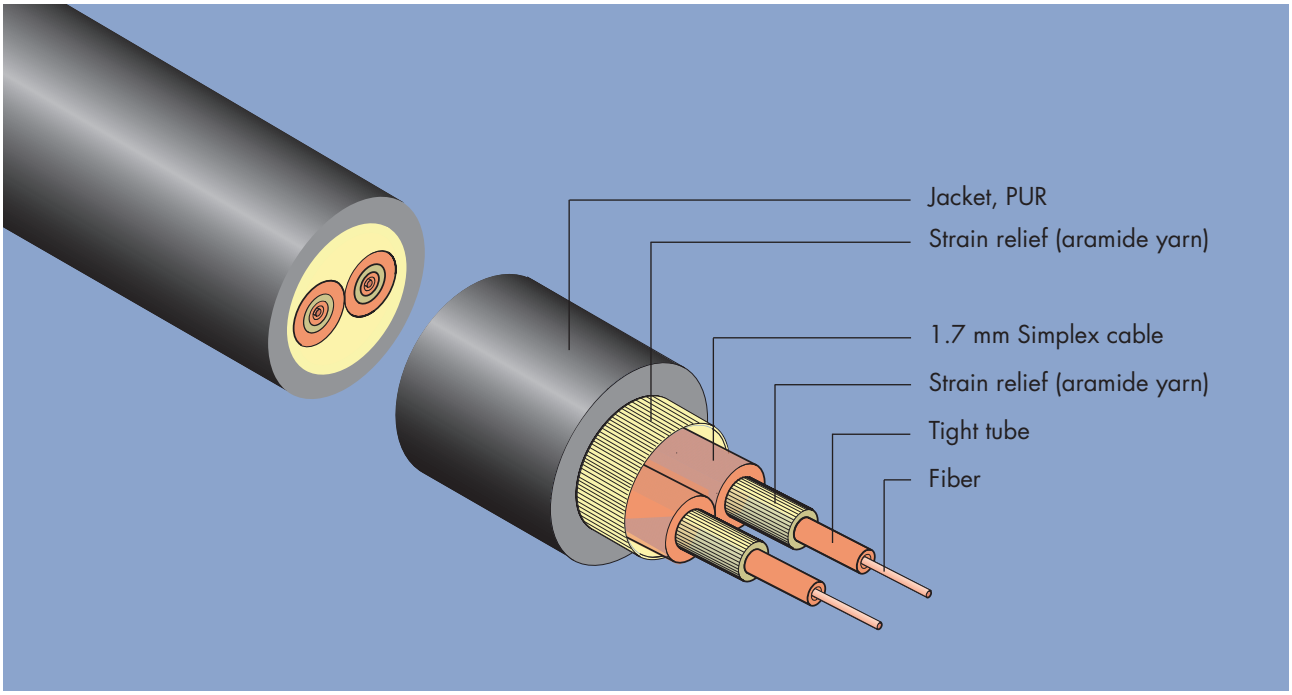
Steel-armoured

Ordering information:

No. of fibers	Armouring	Type	Part no.
Max. 12	glass-armoured	...-.../W(ZNG)H-...80-SF	
Max. 12	steel-armoured	...-.../W(ZN)HAH-...80-SF	

Example: 12-12G50/W(ZNG)H-G80-SF
Description: 12 x 50 micron multimode fiber, glass-armoured, LSFH black, Ø 8.0 mm, SECUFIRE

MINICORD BREAKOUT CABLES (RUGGEDISED)



This cable consists of 2 simplex cables which have additional strain relief yarn and a round outer jacket.
The small diameter of the 1.7 mm cables is suitable for terminations of Small-Form-Factor connectors.
The cable with its rugged construction features excellent mechanical, thermal and chemical resistance.

Properties:
- Rugged construction
- Single fiber strain relief for direct connector termination
- Suitable for repeated coiling and drag chain applications
- For spring-loaded connectors
- Very flexible
- Halogen free and low smoke

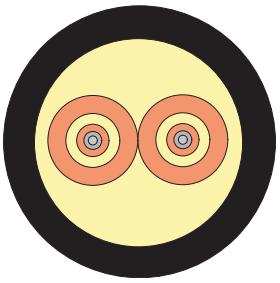
Field of application:
- Industry-LAN
- Machine cablings
- Mobile data cablings
- Connection of outdoor devices
- As data cable in distribution networks
- Drag chains

MINICORD BREAKOUT CABLES (RUGGEDISED)

Specification:

		2-way	
Jacket Ø [mm]		6.0	
Single fiber cable Ø [mm]		1.7	
Tight tube Ø [mm]		0.9	with 1 fiber
Approx. weight [kg/km]		28	
Max. allowable tensile load [N]	during installation (r > 90mm)	2000	IEC 60794-1-2 E1
	in service (r > 60mm)	1000	
Min. Bending radius [mm]		25	IEC 60794-1-2 E11
Crush resistance [N/cm]	short-term	600	IEC 60794-1-2 E3
	long-term	200	
Impact resistance [Impacts]	Wp = 1.5 Nm, r = 25 mm	200	IEC 60794-1-2 E4
Coiling capability [Cycles]	L=200m, reel d=240mm	5	HUBER+SUHNER
Torsion resistance [Rotations]	L=1m, 3 cycles, –40°C	±4	IEC 60794-1-2 E7
Drag chain capability [Cycles]	R=77mm, L=2.0m, v=2.2m/s	100000	HUBER+SUHNER
Temperature range [°C]	during installation	–20 to +60	IEC 61300-2-22
	in service	–40 to +70	
	in storage	–40 to +60	
Fire load [MJ/m]		0.6	

Technical data for cable with H200 fiber might vary slightly.



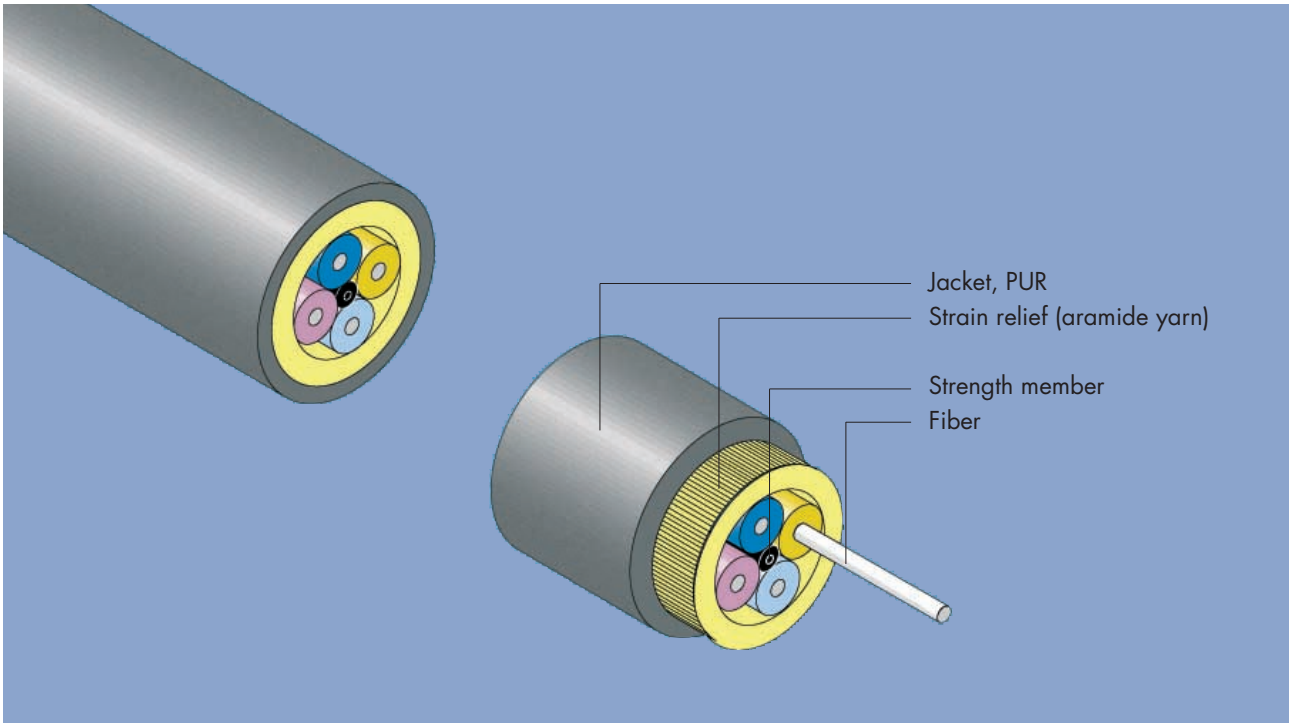
Ordering information:

Number of fibers	Fiber type	Color	Type	Part No.
2	G50/125	black	02-G50/FJ(ZN)Z-G17	23037747
2	G62/125	black	02-G62/FJ(ZN)Z-G17	23037748
2	H200/230	black	02-H200/FJ(ZN)Z-G17	23037749

Types printed in bold are stock items

Coding of single fiber cable: orange numbered
Material of single fiber cable: LSFH™

FIELD CABLES



Field cables excel by their high mechanical loading capacy and a good chemical constancy and are therefore ideal for rough industrial and military applications. Due to the rugged, but flexible construction this cable is suitable for drag chains or coiling applications.

Properties:
- Operational temperature: –40°C to +80°C
- Longitudinal and transversal watertight
- MIL- and DOD-proven
- halogen free
- very flexible

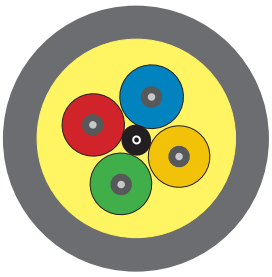
Field of application:
- Mobile data cablings
- Drag chains
- Riser zone cablings
- Machine cablings
- Military cablings

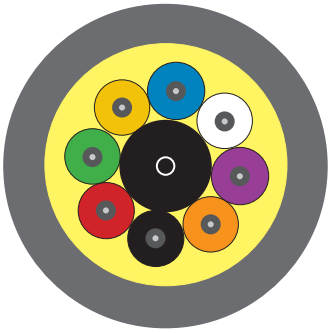
FIELD CABLES

Specification:

		Field cable 4-way	8-way	
Jacket Ø [mm]		6.0	7.0	
Tight tube Ø [mm]		0.9	0.9	with 1 fiber
Approx. weight [kg/km]		26	39	
Max. allowable tensile load [N]	during installation (r > 90/100mm)	4000		DOD-STD 1678, Meth. 3019
	in service (r > 60/75mm)	2000		
Min. Bending radius [mm]	during installation	90	100	IEC 60794-1-2 E11
	in service	60	75	
Crush resistance [N/cm]	during installation	4000	4000	DOD-STD 1678, Meth. 2040
	in service	1000	1000	
Impact resistance [Impacts]	Wp = 2.25 Nm/ r = 25 mm	200	-	DOD-STD 1678, Meth. 2030
Repeated bending [Cycles]	r = 30 mm/ Zug = 100 N	20000	-	DOD-STD 1678, Meth. 2010
Torsion resistance [rotations]	L=1m, 3 cycles, –40°C	±4	-	IEC 60794-1-2 E7
Coiling capability [Cycles]	L=200m, reel d=240mm	5	5	HUBER+SUHNER
Drag chain capability [Cycles]	r=77mm, L=2.0m, V=2.2m/s	100000		HUBER+SUHNER
Temperature range [°C]	during installation	–40 to +80		IEC 60794-1-2 F1/61300-2-22
	in service	–40 to +80		MIL-STD 810, Meth. 501
	in storage	–60 to +80		
Fire load [MJ/m]		0.5	0.78	

Technical data for cable with H200 fiber might vary slightly.



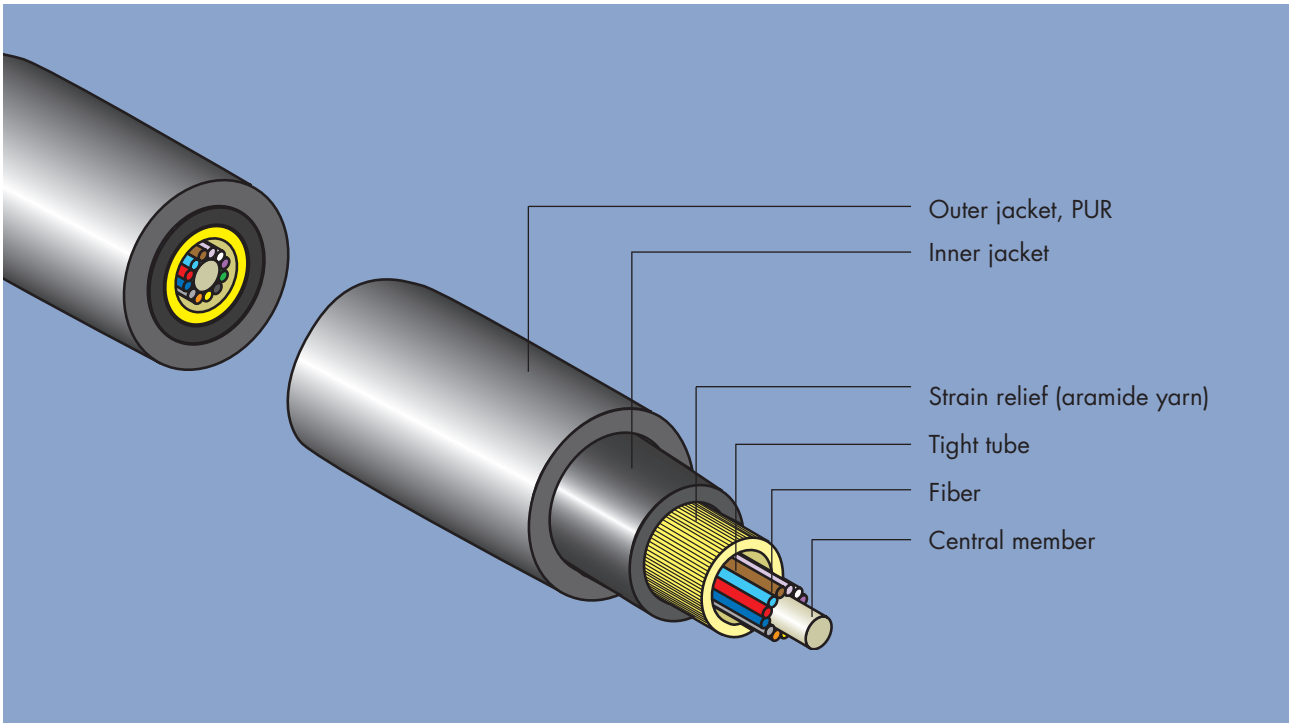


Ordering information:

No. of fibers	Fiber type	Color	Type	Part no.
4	E9/125	black	04-E9/FSN(ZN)Z-G60	23026401
4	**G50/125**	**black**	**04-G50/FSN(ZN)Z-G60**	**22523400**
4	**G62.5/125**	**black**	**04-G62/FSN(ZN)Z-G60**	**22523401**
4	H200/230	black	04-H200/FSN(ZN)Z-G60	23027971
8	G50/125	black	08-G50/FSN(ZN)Z-G70	23032139

Types printed in bold are stock items

DRAG CHAIN CABLES



Constructed with an optimized high mechanical flexibility and high kink resistance, this cable is designed for medium to big drag chains with lengths up to several hundred meters. The cable contains up to 12 tight buffered fibers, an aramide yarn for reinforcement and two thermoplastic jackets. The outer jacket is made out of polyurethan and excels with a high abrasion and good environmental resistance.

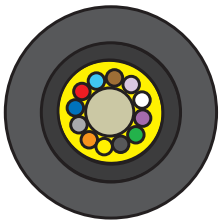
Properties:
- Rugged construction
- Excellent mechanical flexibility
- Small bending radius
- High tensile strength
- Wide temperature range
- Halogen free, non-toxic
- High kink resistance

Field of application:
- Medium to large drag chains
- Cabling in industrial applications

DRAG CHAIN CABLES

Specification:

		up to 12 fibers	
Jacket Ø [mm]		13.0	
Tight tubes Ø [mm]		0.9	color coded
Approx. weight [kg/km]		133	
Max. allowable tensile load [N]	during installation	4000	IEC 60794-1-2 E1
	in service	2000	
Min. Bending radius [mm]	during installation	200	IEC 60794-1-2 E11
	in service	100	
Crush resistance [N/cm]	short-term	400	IEC 60794-1-2 E3
	long-term	200	
Repeated bending [Cycles]	R = 100mm, F = 50N	5000	IEC 60794-1-2 E6
Drag chain capability [Cycles]	R=100mm, L=2.0m, v=2.0m/s	1 Mio.	HUBER+SUHNER
Temperature range [°C]	during installation	–10 to +50	IEC 60794-1-2 F1
	in service	–30 to +90	
	in storage	–40 to +90	
Fire propagation		passed	IEC 60332-1
Fire load [MJ/m]		3.5	



Ordering information:

No. of fibers	Fiber type	Color	Type	Part no.
Max. 12			.../FSN(ZN)YZ-..130	

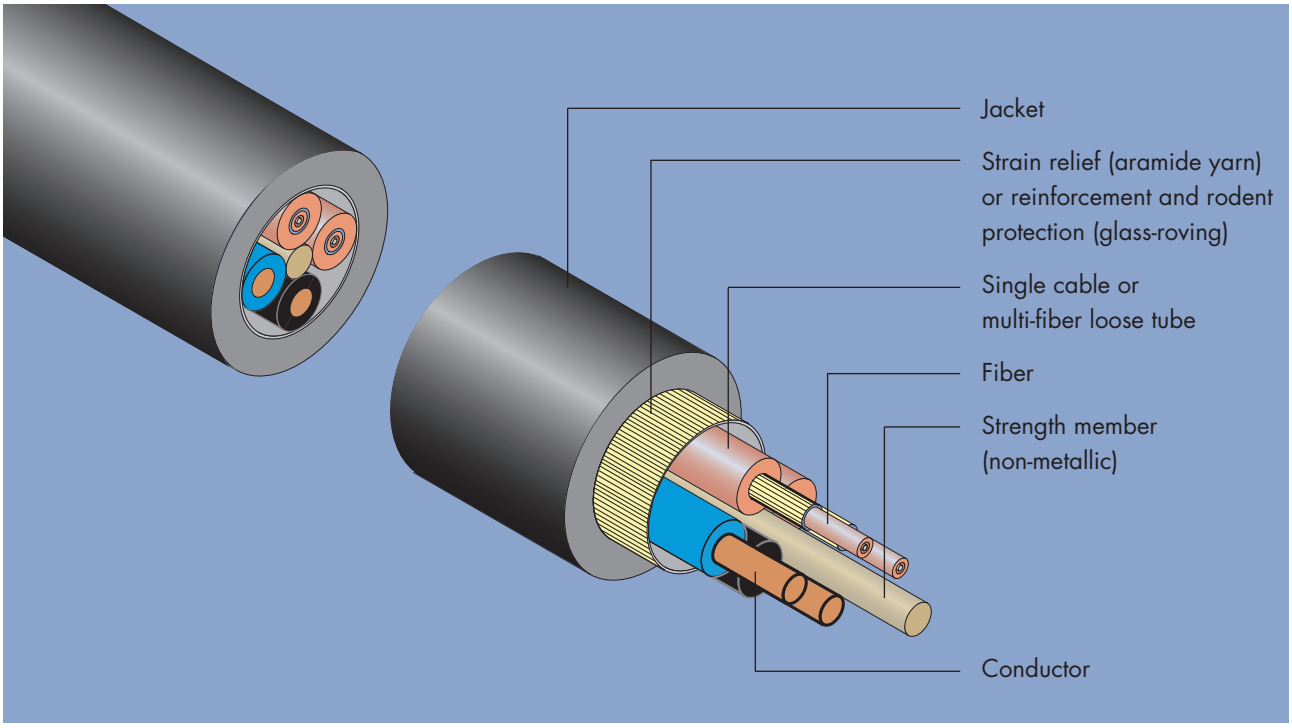
Example: 12-12G50/FSN(ZN)YZ-G130
Description: 12 x 50 micron multimode fiber, glass-armoured, PUR black, Ø 13 mm

Fiber configurations:

4 fibers	2 dummies	between 2 single buffered fibers
6 fibers	1 dummy	between 2 single buffered fibers
8 fibers	1 dummy	between 2 pairs of buffered fiber
12 fibers	no dummies	buffered fibers are side by side

Buffered fibers are color coded according to the standard color code, dummies are black

HYBRID CABLES



Copper and glass
Hybrid cables integrate fiber optic and electrical conductors in one jacket. High data quantities can be transmitted via optical fibers; the energy supply occurs through the electrical conductors. The installation of two cables is thus avoided. Four basic types of hybrid cables may be configured within the defined frame.

Properties:
- Combination of fiber-optic cables with Cu power cables
- Use of commercial connectors
- Jacket material selection same as with fiber-optic cables (e.g. flame-retardant, halogen free)
- Glass-armoured cables possible

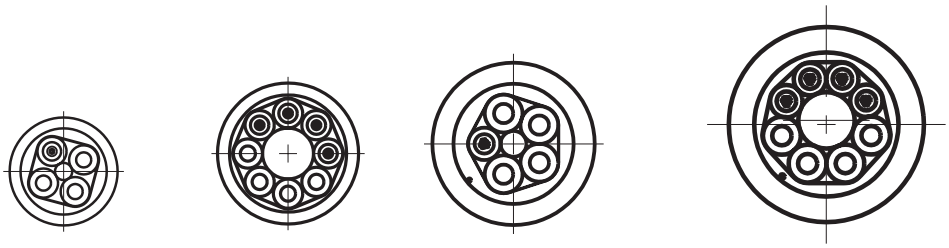
Field of application:
- As data and power cable for industry, LAN, video, telephone, customer-specific applications, etc.

Types:

Breakout cable:	…–…/CWJSN(ZN)H-D27+x-Cyy
Multi-fiber loose tube:	…–…/WSN(ZNG)…-G…+x-Cyy

yy:	Conductor diameter in 1/10mm²
C:	Conductors
x:	Number of copper conductors

HYBRID CABLES



Specification:

The configuration occurs according to the following specification:

	4-way Breakout	8-way Breakout	5-way Multi-fiber loose tube	8-way Multi-fiber loose tube
Amount of elements for the configuration	4	8	5	8
Fiber optic cable Ø2.7mm, numbered channels, orange	1 to 4 pieces	4 to 8 pieces	–	–
Multi-fiber loose tube Ø3.0mm	–	–	1 to 5 bundles à 2/4/6/8/10/12 fibers per bundle	1 to 8 bundles à 2/4/6/8/10/12 fibers per bundle
1.5mm² conductor[1)]	0 to 3 pieces	0 to 4 pieces	0 to 4 pieces	0 to 4 pieces
2.5mm² conductor[1)]	–	–	0 to 4 pieces	0 to 4 pieces
3.0mm empty elements	–	–	0 to 2 pieces	0 to 2 pieces
LWL-Fiber types	E9, G50 oder G62			
Jacket material for Ø2.7mm FO cable	LSFH™	LSFH™	–	–
Jacket material for outer jacket	LSFH™	LSFH™	PE or LSFH™	PE or LSFH™
Strain-relief/Armouring	Aramide	Aramide	Glasroving	Glasroving
Outer diameter	10 mm	13 mm	15 mm	18 mm
Jacket color	black	black	black	black
Inscription	H+S Standard	H+S Standard	H+S Standard	H+S Standard

[1)] Conductor in black, blue or yellow/green
Selection: 2 conductors – one in black and one in blue
3 conductors – one of each: black, blue and yellow/green
4 conductors – three black and one yellow/green

Please note:
Max. delivery length is 4000 m

HYBRID CABLES

Technical data breakout cables:

		4-way	8-way	
Weight [kg/km]		to 110	to 173	
Allowable tensile load [N]	during installation	2000	4000	IEC 60794-1-2 E1B
	in service	1000	2000	
Min. Bending radius [mm]	during installation	150	200	IEC 60794-1-2 E11B
	in service	100	130	
Crush resistance	during installation	1000	1000	IEC 60794-1-2 E3
[N/cm]	in service	200	200	
Impact resistance [Impacts]	Wp = 2.21 Nm/r = 25 mm	50	50	IEC 60794-1-2 E4
Temperature range [°C]	during installation	–10 to +50	–10 to +50	IEC 61300-2-22
LSFH™	in service	–20 to +70	–20 to +70	
	in storage	–25 to +70	–25 to +70	

Technical data multi-fiber loose cables:

		5-way	8-way	
Weight [kg/km]		to 300	to 385	
Allowable tensile load [N]	during installation	9000	13000	IEC 60794-1-2 E1B
	in service	4500	6500	
Min. Bending radius [mm]	during installation	225	270	IEC 60794-1-2 E11B
	in service	150	180	
Crush resistance	during installation	800	800	IEC 60794-1-2 E3
[N/cm]	in service	300	300	
Impact resistance [Impacts]	Wp = 4.41 Nm/r = 25 mm	100	100	IEC 60794-1-2 E4
Temperature range [°C]	during installation	–10 to +60	–10 to +60	IEC 60794-1-2 F1
PE	in service	–40 to +70	–40 to +70	
	in storage	–40 to +70	–40 to +70	
Temperature range [°C]	during installation	–10 to +60	–10 to +60	IEC 60794-1-2 F1
LSFH™	in service	–25 to +70	–25 to +70	
	in storage	–40 to +70	–40 to +70	

Specification of electrical conductors:

Conductor profile	**[mm²]**	**1.5**	**2.5**
Conductor type		Tinned copper cords	Tinned copper cords
Diameter conductor	[mm]	1.5	2.1
Diameter insulation	[mm]	2.7	3.5
Test voltage U_0/U	[V]	600/1000	600/1000
Electrical resistance	[Ω/km]	13.7	8.2
Jacket material		RADOX® 125, halogen free	RADOX® 125, halogen free

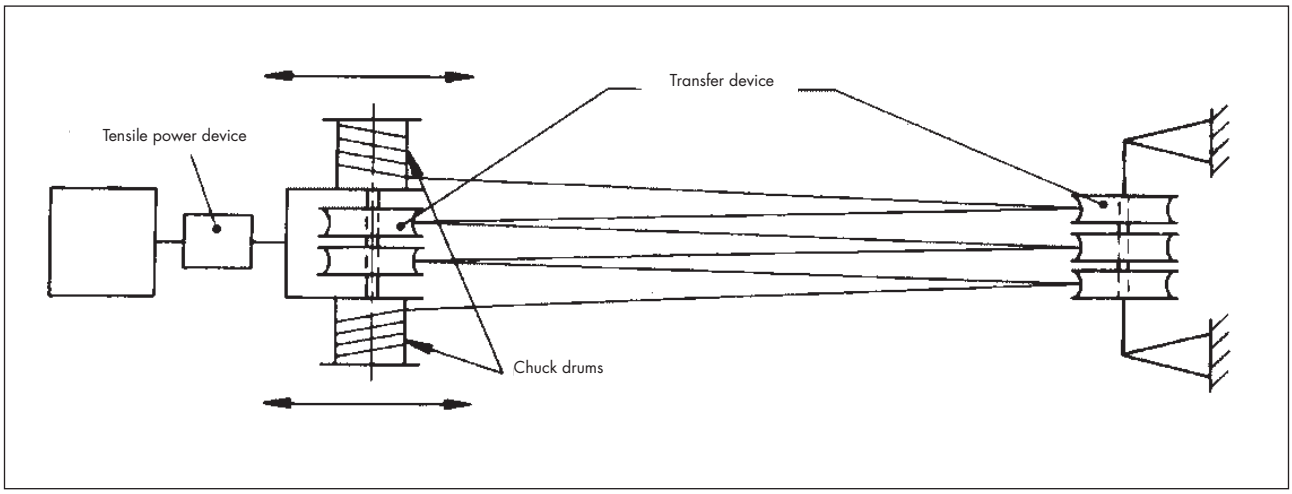
TESTING METHODS

SUHNER FIBEROPTIC test procedures: the guarantee for highest quality

SUHNER FIBEROPTIC cables are oriented towards the utility, the needs of the customer and the market: they fulfil highest safety and reliability requirements. To guarantee this standard on a long-term basis, each product has to undergo a complete standardized test procedure before delivery, so that the function is maintained also under the hardest conditions.

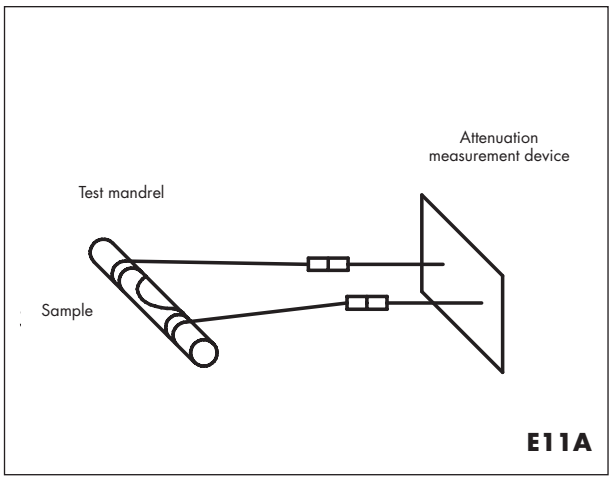
Tensile test acc. to IEC 60794-1-2 E1

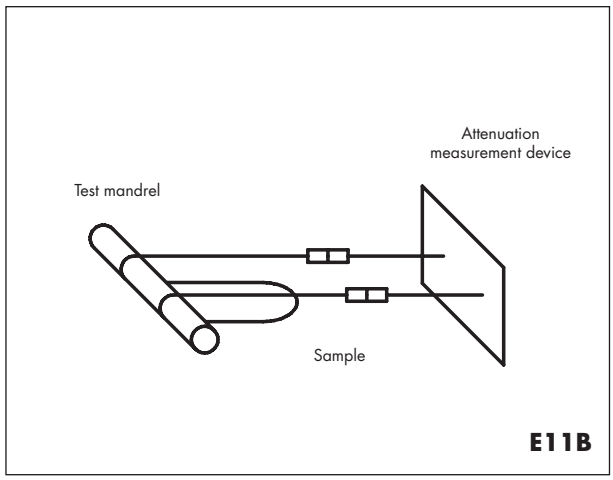
The tensile test determines the attenuation behaviour of the cable design under tensile load.



Bending behaviour acc. to IEC 60794-1-2 E11A/B

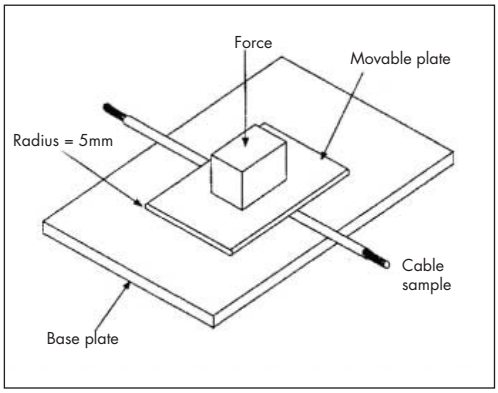
This test determines the resistance of a optical fibre cable under a bending load.



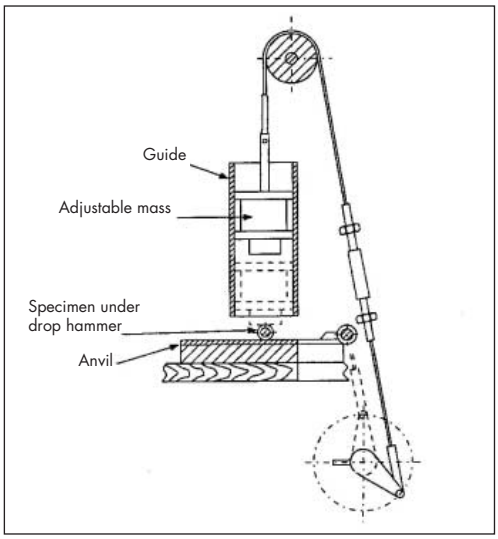


TESTING METHODS

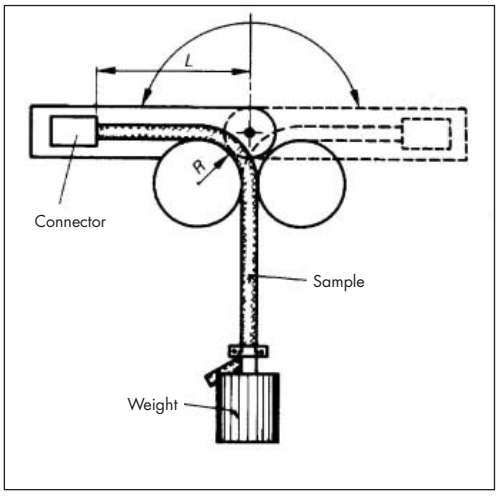
Compressive strength acc. to IEC 60794-1-2 E3
The purpose of this test if to determine the ability of an optical fibre cable to withstand crushing.



Impact strength acc. to IEC 60794-1-2 E4
To determine the resistance of an fibre optic cable towards imptacts, a weight is dropped vertically on a steel plate.
The cable jacket may not show any damage.



Repeated bending acc. to IEC 60794-1-2 E6
The purpose of this test is to determine the ability of an optical fibre cable to withstand repeated bending under tension. This occurs by bending the cable sample forwards and backwards by 180°.

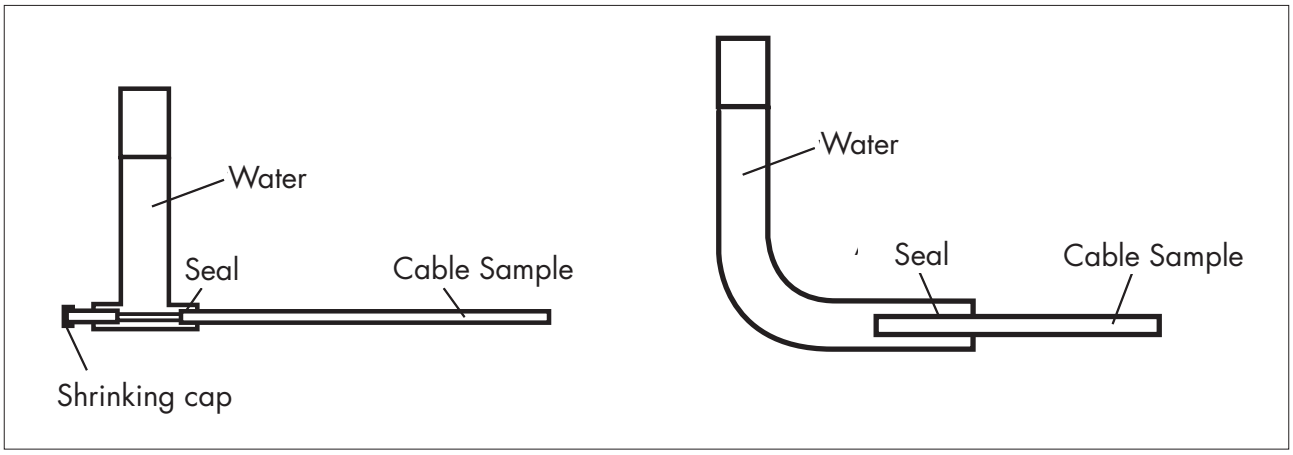


TESTING METHODS

Temperature stress acc. to IEC 60794-1-2 F1
The temperature test determines the cable's resistance respectively the attenuation stability at changing temperatures. The smaller the attenuation change the more suitable the cable design is for use at extreme temperatures.

Temperature stress acc. to IEC 61300-2-22
In this test, assemblies (patch cables) are exposed to changing temperatures in order to be able to measure the effect on the attenuation. The measurement values show the quality of the cable, of the connector and the combination of both components. The testing method represents the real application of the components as assembly.

Longitudinal water tightness acc. to IEC 60794-1-2 F5A/B
A damage of the cable jacket can cause the penetration of water or humidity into the cable core. This test determines the resistance of the cable towards water penetration.

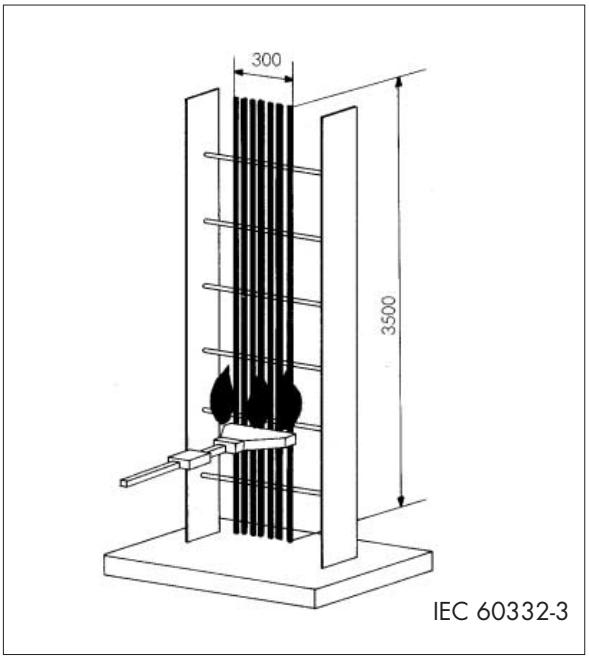


Fire behaviour acc. to IEC 60332-1/-3
The test arrangement checks the self-extinguishing characteristics of a cable mounted vertically under defined conditions.

IEC 60332-1: on a single cable
IEC 60332-3: on a cable bundle

Fire test with circuit integrity according to IEC 60331
The purpose of this test is to determine the circuit integrity in case of a fire on a horizontal single cable.

Fire test with circuit integrity acc. to EN 50200, method of tests for resistance to fire of unprotected small cables used in emergency circuits. During the test duration of 90 minutes every 5 minutes a hammer inpact is applied on the support plate holding the sample.



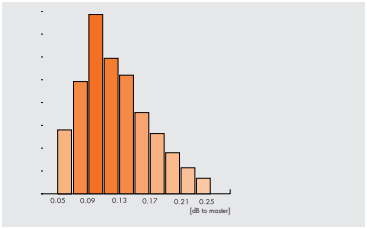
IEC 60332-3


SUHNER

OVERVIEW ASSEMBLIES

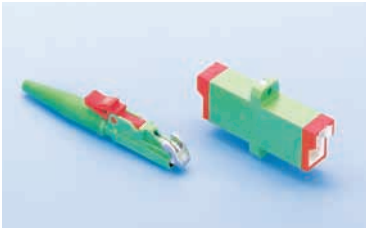
Assembly Classes
- 0.1 dB Class
- High-End Class
- LAN-ECO Class

page 110



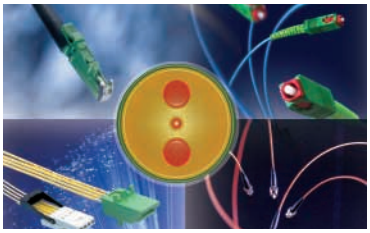
HighPower Assemblies

page 112



Polarisation-Maintaining Assemblies

page 113



Pigtails And Patch Cables

page 116

Ordering Code and Stock Assemblies

page 117

Mobile Systems

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Passive Network Components

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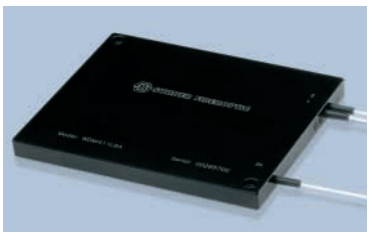


FIBEROPTIC ASSEMBLY CLASSES

HUBER+SUHNER Cable Assemblies stand for PERFORMANCE and RELIABILITY

Features

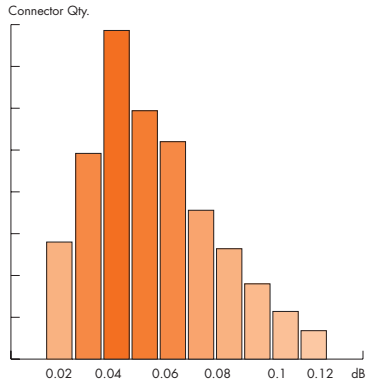
- Available in 3 attenuation classes to meet different customer requirements
- Full ceramic ferrules as a base for highest performance and reliability
- Optimized products and assembling processes due to HUBER+SUHNER in-house connector and cable development and manufacturing
- Outstanding mechanical and thermal strengths exceeding requirements of international standards

0.1 dB Class

Applications

- Long haul transmissions saving costs for signal amplification
- Low loss budget transmissions
- Transmissions where uniform channel losses are required
- Replacement of splices by keeping the same loss level

Attenuation



	each-to-each	against ref.
IL[1)]	IEC 61755-2-2 97% 0.15 dB mean 0.06 dB	max. 0.15 dB
RL	IEC 61300-3-6 >45 dB >50 dB >85 dB	 PC UPC APC

Compatibility

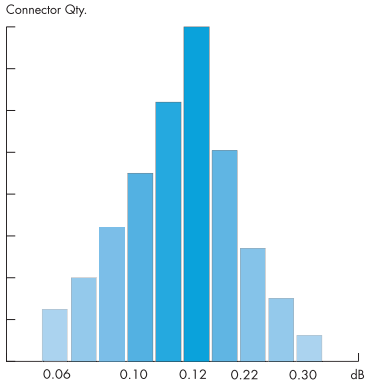
- all connectors are tuned
- Fiber according to ITU-T G.652
- Premium ferrule with low eccentricity

High-End Class

Applications

- CATV / Video
- Passive Optical Networks PON
- WDM /DWDM

Attenuation



	each-to-each	against ref.
IL[1)]	IEC 61300-3-34 97% 0.25 dB mean 0.12 dB	IEC 61300-3-4 max. 0.35 dB
RL	IEC 61300-3-6 > 45 dB > 50 dB > 85 dB	 PC UPC APC

Compatibility

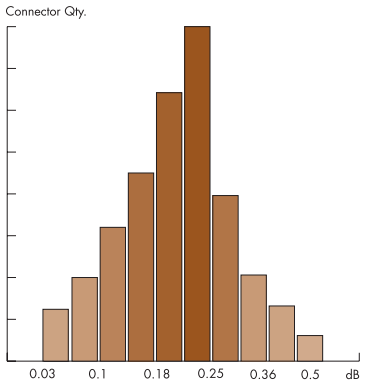
- all connectors are tuned
- Fiber according to ITU-T G.652

LAN-Eco Class

Applications

- Universal premises cabling according to EN 50173-1, EIA/TIA 568
- Cost effective connections in PON
- FTTD, FTTH, FTTB, FTTX

Attenuation



	each-to-each	against ref.
IL[1)]	IEC 61300-3-34 97% 0.70 dB mean 0.25 dB	IEC 61300-3-4 max. 0.50 dB
RL	IEC 61300-3-6 > 35 dB > 60 dB	 PC APC

Compatibility

- connectors are not tuned
- Fiber according to ITU-T G.652

Please note
0.1dB Assemblies have max. losses lower than the accuracy of todays field measurements: Measurement equipment (power meter /OTDR) and measurement set-up, reference cables and adapters, environmental conditions and dirt easily cause measurement uncertainities of >0.2dB. Reliable and reproducible measurements below 0.1dB are possible only in laboratory conditions.

[1)] at 1310 nm

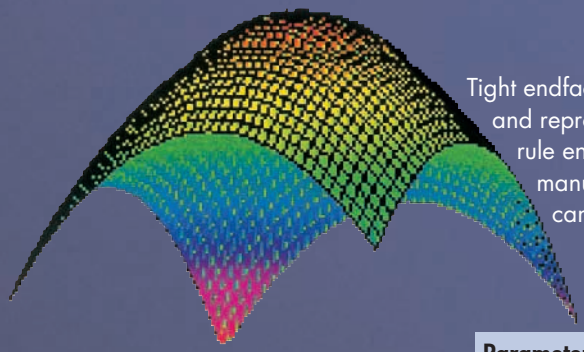
Zirconia Ferrule

HUBER+SUHNER connectors feature full ceramic ferrules!

Only high-precision full ceramic ferrules with tightest dimensional tolerances can ensure best possible optical performances as well as

- **Reliability**
- **Stability** (chemical, thermal, mechanical)
- **Reproducibilty**
- **Compatibility**

Endface Geometry



Tight endface geometry tolerances guarantee the customer a reliable and reproducible quality and long term behaviour. Interferometric ferrule endface inspection is mandatory for controlled and mastered manufacturing processes. Upon request a Quality Control Report can be issued for each assembled connector.

Parameters: Ferrule end face geometry [1]		
Fiber height	–125 nm to +50 nm (conditioned by radius)	PC
	±100 nm	APC
Apex offset	< 50 µm	
Radius	7 - 25 mm	PC
	5 - 12 mm	APC

[1] acc. to Telcordia GR 326-Core, issue 3

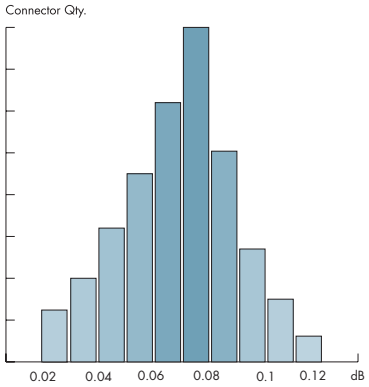
ASSEMBLY CLASSES

HighPower Assemblies

Applications

- DWDM / CWDM
- Raman, EDFA amplifications
- Long haul transmissions saving costs for signal amplification

Attenuation



	each-to-each	against ref.
	IEC 61755-2-2	
IL[1]	97% 0.15 dB	0.10 dB
	mean 0.06 dB	0.04 dB
	IEC 61300-3-6	
RL	>45 dB	PC
	>50 dB	UPC
	>85 dB	APC

Compatibility

- all connectors are tuned
- Fiber according to ITU-T G.652
- Premium ferrule with low eccentricity

The HighPower Concept

HighPower Assemblies are HUBER+SUHNER's answer to the ever-increasing transmission requirements of high-performance networks. Amplifiers used in DWDM applications easily reach power levels of 1 Watt and more. 1 Watt or 30 dBm of optical power concentrated in a fiber core of 10 µm correspond to 1.3 MW/cm^2 power density.

Such high values implicate rigorous demands on connector technology in terms of reliable operation and safety requirements, as high power creates the risk of eye damage and tissue burns.

List of hazard levels, the corresponding power for a singlemode fiber at 1.3 µm wavelength and the applicable safety hazards (IEC 60825-2):

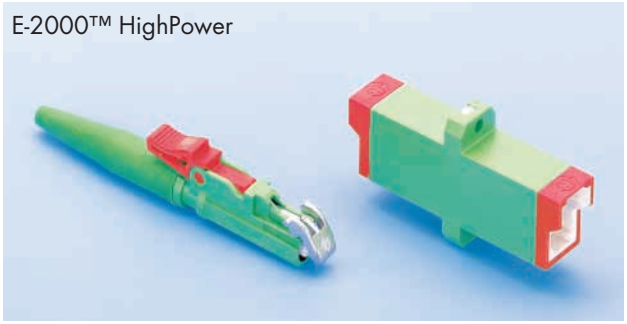
Level	Optical power	Hazard
1	15.6 mW 12 dBm	Safe under all foreseeable conditions
1M	42.8 mW 16 dBm	Safe, but might be hazardous if magnifying instrument is used
3R	80.0 mW 19 dBm	Low risk to eyes and to skin
3B	500 mW 27 dBm	Medium risk to eyes and low risk to skin
4	> 500 mW	High risk to eyes and skin, even for stray reflected light beams

HUBER+SUHNER FIBER OPTICS assemblies have a proven reliable long term performance at up to 2 W and withstand power peaks up to 5 W.

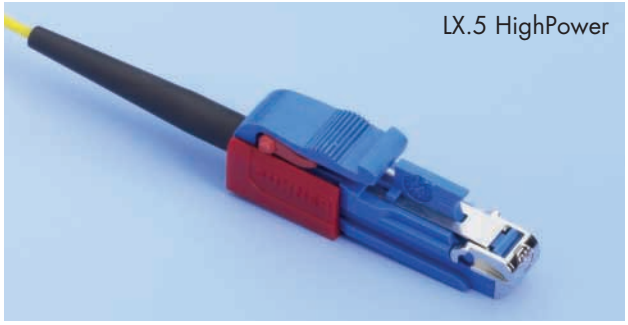
The high-performance FLSH (E-2000™) and FLX5 connector meet the most rigorous handling and functionality safety standards, especially where eye protection is required. With their full metal protection cap, special locking mechanism and adapter shutter, these two connectors fulfill all current requirements for hazard levels.

[1] at 1310 nm

E-2000™ HighPower

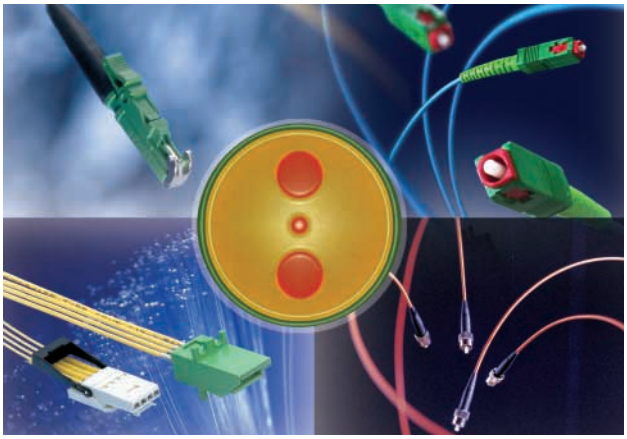


LX.5 HighPower



Upon request FSC-CMAX, FLC and FiberGate HighPower assemblies can be supplied. However these three connectors do not offer the same protection from laser light as they have no shutter.

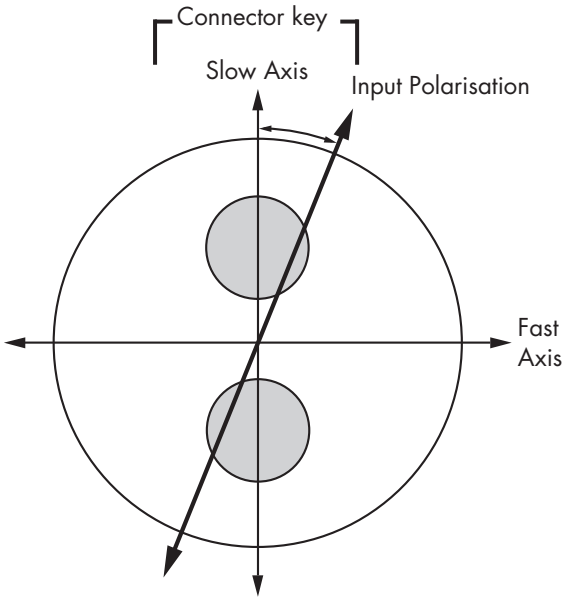
POLARISATION-MAINTAINING ASSEMBLIES



Application

HUBER+SUHNER high-speed optical links can be used in a range of applications including:

- Sensors
- fiber optic gyroscopes (FOG)
- Interferometry
- fiber lasers
- linking in-line optical components such as lasers, modulators and amplifiers
- Raman Gain Amplifier optical links, a key component in ultra-long-haul and 40 Gbps systems
- PM passive components such as splitters and couplers
- PM compensators



PM Fibers

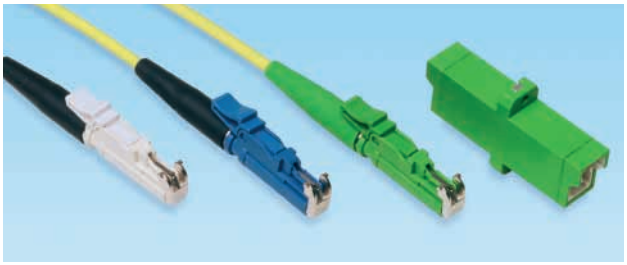
PM fibers are designed to maintain the state of polarisation of light as it travels through the fiber. To achieve this management of the state of polarisation, birefringence is induced into the fiber during the fabrication drawing process, and takes the form of a pre-defined stress structure within the core and cladding. Fiber birefringence defines two principal optical axes, the slow and fast axes, representing the differing propagational constants and subsequent optical transmission speeds.

Specification

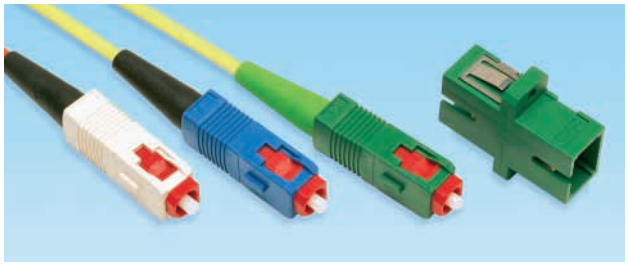
	PC	APC
Insertion loss **IL** [dB] typ.	0.2	0.2
Return loss **RL** [dB]	>45	>85
Extinction ratio **ER**	>23	>23
Temperature range [°C], depending on fiber and cable type	–40 to +85	–40 to +85
Min. mating cycles	1000	1000

POLARISATION-MAINTAINING ASSEMBLIES

The PM Connector Family



E-2000™ PM



FSC PM

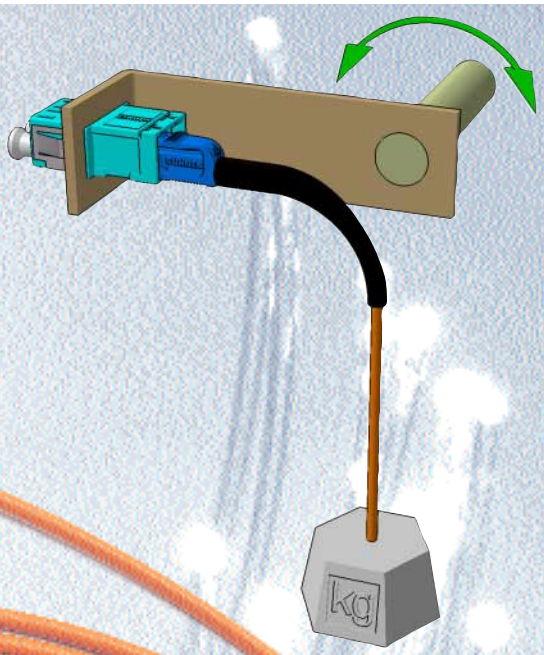
FCPC PM

FiberGate Backplane PM (upon request)

Ordering code

						Description
						Cable type
04A01VX0-						bare fiber
09A01DT0-						0.9 mm tube
21H01DD0-						2.1 mm LSFH™ tube
						Fiber type
	P1-					PM 1550 with UV/UV 400 µm (Standard)
						Connector type 1st side/2nd side
		30/				FCPC
		34/				FCPC APC 8°
		70/				FSC-CMAX
		73/				FSC-CMAX APC 8°
		90/				E-2000™ (LSH)
		93/				E-2000™ (LSH) APC 8°
						Total number of connectors
			2-			terminated on both ends
						Cable length
				1-		1 meter
						ER Performance
					23	Extinction Ratio 23 dB (Standard)
09A01DT0-	P1-	30/30–	2–	1–	23	Example

TEST PROCEDURES



Only an optimized combination of connector, cable, connector boot and termination process can offer the best performance.

Thanks to the HUBER+SUHNER inhouse production and development, outstanding performance and reliability to highest standards is achieved.

HUBER+SUHNER applies severest tests - according to most relevant international standards - to ensure highest mechanical, thermal and optical properties for its singlemode cable assemblies.

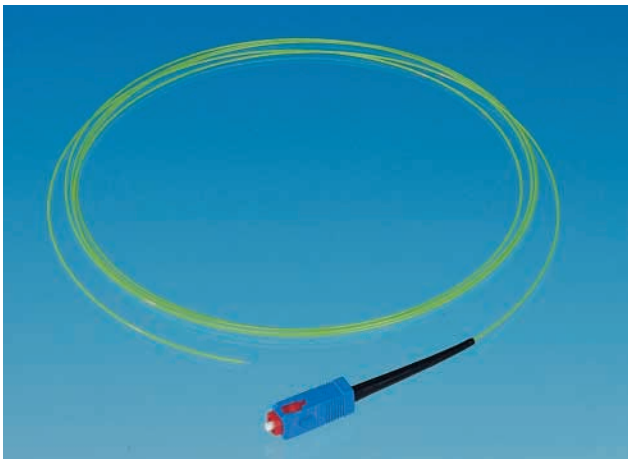
Sequential Test Series according to TELCORDIA GR-326-Core I3 and IEC 61753-1 Cat. O		
including single test procedures like		
Change of temperature	- 40° to + 75°C	IEC 61300-2-22
Torsion ± 900°	>15 N, 10 cycles	IEC 61300-2-5
Tensile Load	> 100 N also for SFF connectors	IEC 61300-2-4
Mating Durability	> 1000 cycles	IEC 61300-2-2
Side Load	13 N also for SFF connectors	IEC 61300-2-42
Flexing ± 90°	8.9 N, 100 cycles also for SFF connectors	IEC 61300-2-44
Vibration 3 axes	10 - 55 Hz, 2h/axis, 1.52 mm amplitude	IEC 61300-2-1

PIGTAILS AND PATCH CABLES

Pigtails
Pigtails are fiber optic cables (usually a 900 µm buffered fiber) fitted with a connector at one end. They are spliced onto multi-fiber loose-tube cables within cable termination boxes and distribution frames. The connector end is either then connected to a patch panel or directly to the transmission equipment.
Standard length is 2 m.

Patch cables
Fiber-optic cables equipped with connectors at both ends are called patch cables. They are mainly used as connections between cable termination boxes and transmission equipment or as jumper cables, in Simplex and Duplex versions.

Standard lengths are 2 m, 5 m or 10 m.



Example: FSC pigtail

Example: FSC patch cable

Length tolerances:					
Nominal size up to	0.5 m	1 m	5 m	25 m	>25 m
Tolerance	+4 cm	+6 cm	+30 cm	+50 cm	+2%

HUBER+SUHNER ASSEMBLY: ORDERING CODE

Code	Description
	Cable type
27H01CD0-	see cable code definition (see next page)
	Fiber type
09-	Singlemode 9/125 µm
LE-	Singlemode LEAF NZDS-fiber
50-	Multimode G50/125 µm
53-	Multimode G50/125 µm OM3
62-	Multimode G62.5/125 µm
20-	Multimode H200/230 µm
	Connector type
20/	Connector left side
20-	Connector right side
	Total number of connectors
1-	1 connector (pigtail)
4-	e.g.: duplex patchcord with 4 simplex connectors
	Length of assembly
2.5-	Length in meters (ferrule tip to ferrule tip)
	Optical performance level **1st letter = connector left side** **2nd letter = connector right side**
K	no connector right side (pigtail)
A A	Singlemode LAN-Eco
B B	Singlemode High-End
C C	Singlemode 0.1 dB
D D	Singlemode High-End UPC
E E	Singlemode High Power
F F	Singlemode 0.1 dB UPC
M M	Multimode

Connector code	Connector type (x= upon request)	Performance level A	B	C	D	E	F	M
00	no connector							
10	FSMA							•
20	FST-HQ	•						•
22	FST-Security	•						•
24	FST-LEAN							•
30	FCPC	•	•	•	•		•	•
33	FCPC APC wide key		•	•				
34	FCPC APC small key		•	•				
40	FLSA		•					•
43	FLSA APC		•					
45	FMU		•		•			
50	MT-RJ without pins	•						•
51	MT-RJ with pins	•						•
55	Optoclip II		•					•
60	FiberGate		•		•	x		•
65	FiberGate APC		•			x		

Connector code	Connector type (x= upon request)	Performance level A	B	C	D	E	F	M
70	FSC	•	•	•	•	•	•	•
73	FSC APC 8°		•	•		•		
74	FSC APC 9°		•	•		•		
77	FSC Duplex	•	•		•			•
78	FSC APC Duplex		•					
80	LX.5		•	•	•	•	•	•
81	LX.5 Duplex		•	•	•	•	•	•
83	LX.5 APC		•	•		•		
84	LX.5 APC Duplex		•	•		•		
85	LC		•	•	•	x	•	•
86	LC APC		•	•		x		
88	LC Duplex		•	•	•	x	•	•
89	LC APC Duplex		•	•		x		
90	FLSH (E-2000™)	•	•	•	•	•	•	•
93	FLSH (E-2000™) APC		•	•	•	•		
97	FLSH (E-2000™) Duplex	•	•	•	•	•	•	•

CABLE CODE DEFINITION FOR ASSEMBLIES

						Description
						Outer Ø of single fiber
09						0.9 mm for example, the following diameters are available: 0.6 / 0.9 / 1.7 / 1.8 / 2.0 / 2.1 / 2.4 / 2.6 / 2.7 / 3.0 mm
						Cable jacket material
	A					no outer jacket (e.g. only 0.9 mm tube)
	H					LSFH™
	T					PVC
	Y					PE
	Z					PUR
	X					other
						Cable construction
		01				Simplex, one fiber
		D8				Duplex Figure "8" (only for LSFH™ and PVC)
		D0				Duplex Figure "0"
		??				number of fibers; for multifiber cable with > 2 fibers
		XX				other
						Secondary coating
			V			V
			F			F
			C			CW
			D			CH
			S			SW
			T			SH
			X			other
						Jacket / tube color
				A		red
				B		green
				E		yellow
				C		blue
				F		white
				K		violet
				D		orange
				G		black
				H		grey
				I		brown
				L		pink
				M		turquoise
				T		transparent
				U		nature
				X		other
						Fiber coating color
					0	not colored
					A	red
					B	green
					E	yellow
					C	blue
					F	white
					K	violet
					D	orange
					G	black
					H	grey
					I	brown
					L	pink
					M	turquoise
					X	other

HUBER+SUHNER ASSEMBLY: CABLE CODE FOR ASSEMBLIES

Cable type	Part No.	New code
01-E9/CH-B9-FA	22520636	09A01DBA
01-E9/CH-E9	22521983	09A01DE0
01-G62/CH-C9	22520967	09A01DC0
01-G50/CH-D9	22520626	09A01DD0
01-G62/F-C9	22523050	09A01FC0
01-G50/F-D9	22521479	09A01FD0
01-E9/F-E9	22521478	09A01FE0
01-G50/SWJH-D17	22523134	17H01SD0
01-G62/SWJH-D17	22523135	17H01SD0
01-E9/SWJH-E17	22523105	17H01SE0
02-G50/FJH-D18	22523205	18HD8FD0
02-G62/FJH-D18	23024635	18HD8FD0
02-E9/FJH-E18	22523207	18HD8FE0
01-E9/SWJH-E21	23014851	21H01SE0
01-E9/SHJH-B21	22521818	21H01TBA
S-VH1E9/125-24	22521624	24H01DE0
01-E9/SWJH-E24	23013083	24H01SE0
02-H200/VJZ-AD26	22521399	26ZD0VD0
01-H200/VJZ-D26	22521050	26Z01VD0
01-H200/VJZ-E26	22521067	26Z01VE0
01-E9/CWJH-E27	22523125	27H01CE0
02-G50/CWJH-AD27	22523253	27HD0CD0
02-G62/CWJH-AD27	22523254	27HD0CD0
02-E9/CWJH-AE27	22523252	27HD0CE0
02-G50/CWJH-D27	22523203	27HD8CD0
02-G62/CWJH-D27	22523204	27HD8CD0
02-E9/CWJH-E27	22523202	27HD8CE0
02-H200/VJH-D27	22521707	27HD8VD0
01-G50/CWJH-D27	22523126	27H01CD0
01-G62/CWJH-D27	22523127	27H01CD0
01-E9/SWJH-E27	23014852	27H01SE0
01-E9/CWJT-D27	22521459	27T01CD0
01-G50/CWJT-D27	22521460	27T01CD0
01-G62/CWJT-D27	22521461	27T01CD0
02-E9/CWJT-AD27	22521470	27TD0CD0
02-G50/CWJT-AD27	22521469	27TD0CD0
02-G62/CWJT-AD27	22521468	27TD0CD0
02-E9/CWJT-D27	22521465	27TD8CD0
02-G50/CWJT-D27	22521466	27TD8CD0
02-G62/CWJT-D27	22521467	27TD8CD0
01-E9/CWJH-E30	22523128	30H01CE0
01-E9/SWJH-E30	23014853	30H01SE0
01-E9/CWJDNH-E30	22521996	30HXXCE0
01-H200/FJH-D27	23031085	27H01FD0
02-H200/FJH-AD27	23031087	27HD0FD0

Cable type	Part No.	New code
for pigtails for compact modules with colored fiber		
01-E9/CH-T9-FA	22521909	09A01DTA
01-G50/CH-T9-FA	22522000	09A01DTA
01-G62/CH-T9-FA	22522012	09A01DTA
01-E9/CH-T9-FB	22521910	09A01DTB
01-G50/CH-T9-FB	22522001	09A01DTB
01-G62/CH-T9-FB	22522013	09A01DTB
01-E9/CH-T9-FC	22521911	09A01DTC
01-G50/CH-T9-FC	22522003	09A01DTC
01-G62/CH-T9-FC	22522015	09A01DTC
01-E9/CH-T9-FD	22521919	09A01DTD
01-G50/CH-T9-FD	22522006	09A01DTD
01-G62/CH-T9-FD	22522018	09A01DTD
01-E9/CH-T9-FE	22521912	09A01DTE
01-G50/CH-T9-FE	22522002	09A01DTE
01-G62/CH-T9-FE	22522014	09A01DTE
01-E9/CH-T9-FF	22521913	09A01DTF
01-G50/CH-T9-FF	22522004	09A01DTF
01-G62/CH-T9-FF	22522016	09A01DTF
01-E9/CH-T9-FG	22521918	09A01DTG
01-G50/CH-T9-FG	22522007	09A01DTG
01-G62/CH-T9-FG	22522019	09A01DTG
01-E9/CH-T9-FH	22521914	09A01DTH
01-G50/CH-T9-FH	22522008	09A01DTH
01-G62/CH-T9-FH	22522020	09A01DTH
01-E9/CH-T9-FI	22521915	09A01DTI
01-G50/CH-T9-FI	22522009	09A01DTI
01-G62/CH-T9-FI	22522021	09A01DTI
01-E9/CH-T9-FK	22521916	09A01DTK
01-G50/CH-T9-FK	22522005	09A01DTK
01-G62/CH-T9-FK	22522017	09A01DTK
01-E9/CH-T9-FL	22521920	09A01DTL
01-G50/CH-T9-FL	22522010	09A01DTL
01-G62/CH-T9-FL	22522022	09A01DTL
01-E9/CH-T9-FM	22521917	09A01DTM
01-G50/CH-T9-FM	22522011	09A01DTM
01-G62/CH-T9-FM	22522023	09A01DTM

STOCK ASSEMBLIES

1st side	2nd side	Fiber type	Assembly code	Part number
Pigtails Cable 01-.../CH-...9				
FST-HQ	none	9/125	09A01DE0 -09-20/00-1-2-SK	23028071
FC-PC	none	9/125	09A01DE0 -09-30/00-1-2-BK	23027128
FSC	none	9/125	09A01DE0 -09-70/00-1-2-BK	23027129
FSC-APC	none	9/125	09A01DE0 -09-73/00-1-2-BK	23027130
FLC	none	9/125	09A01DE0 -09-85/00-1-2-BK	23011344
FLSH	none	9/125	09A01DE0 -09-90/00-1-2-BK	23027125
FLSH-APC	none	9/125	09A01DE0 -09-93/00-1-2-BK	23027126
FST-HQ	none	50/125	09A01DD0 -50-20/00-1-2-MK	22652231
FST-LEAN	none	50/125	09A01DD0 -50-24/00-1-2-MK	23028070
FSC	none	50/125	09A01DD0 -50-70/00-1-2-MK	23028068
FST-HQ	none	62.5/125	09A01DC0 -62-20/00-1-2-MK	22652232
FST-LEAN	none	62/125	09A01DC0 -62-24/00-1-2-MK	22652234
FSC	none	62.5/125	09A01DC0 -62-70/00-1-2-MK	22652236
Patchcords Cable: 01-E9/CWJH-E30				
FCPC	FCPC		30H01CE0-09-30/30-2-2-BB	23027133
FCPC	FCPC		30H01CE0-09-30/30-2-5-BB	23027138
FCPC	FCPC		30H01CE0-09-30/30-2-10-BB	23027143
FSC	FSC		30H01CE0-09-70/70-2-2-BB	23027134
FSC	FSC		30H01CE0-09-70/70-2-5-BB	23027139
FSC	FSC		30H01CE0-09-70/70-2-10-BB	23027144
FSC-APC	FSC-APC		30H01CE0-09-73/73-2-2-BB	23027135
FSC-APC	FSC-APC		30H01CE0-09-73/73-2-5-BB	23027140
FSC-APC	FSC-APC		30H01CE0-09-73/73-2-10-BB	23027145
FLSH	FLSH		30H01CE0-09-90/90-2-2-BB	23027131
FLSH	FLSH		30H01CE0-09-90/90-2-5-BB	23027136
FLSH	FLSH		30H01CE0-09-90/90-2-10-BB	23027141
FLSH-APC	FLSH-APC		30H01CE0-09-93/93-2-2-BB	23027132
FLSH-APC	FLSH-APC		30H01CE0-09-93/93-2-5-BB	23027137
FLSH-APC	FLSH-APC		30H01CE0-09-93/93-2-10-BB	23027142
Cable: 02-G50/CWJH-D27				
FST-LEAN	FST-LEAN		27HD8CD0-50-24/24-4-2-MM	23028064
FSC	FST-LEAN		27HD8CD0-50-70/24-4-2-MM	23030912
FSC	FSC Duplex		27HD8CD0-50-70/77-3-2-MM	23030911
FSC Duplex	FST-LEAN		27HD8CD0-50-77/24-3-2-MM	23028067
FSC Duplex	FSC Duplex		27HD8CD0-50-77/77-2-2-MM	23028065
Cable: 02-G../CWJT-AD27				
FST-HQ	FST-HQ		27TD0CD0-50-20/20-4-2-MM	22652251
FST-HQ	FST-HQ		27TD0CD0-62-20/20-4-2-MM	22652253

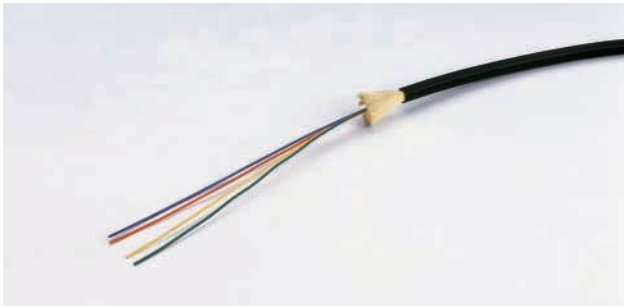
Please ask for a separate and more detailied list of standard stock assemblies or find it on www.hubersuhner.com

MOBILE SYSTEMS

Mobile fiberoptic systems by HUBER+SUHNER FIBER OPTICS include all components which allow and guarantee a safe and easy installation of fiberoptic cable routings and an optimal operation of optical installations within the indoor and outdoor range. The bandwidth of the realizable applications reaches from the installation of temporary data networks to fixed installed cablings. HUBER+SUHNER fiberoptic field cables, lens connectors and components of the "Mobile System" assortment allow the use, under the hardest environmental conditions and, guarantee for a trouble-free function at high data rates.

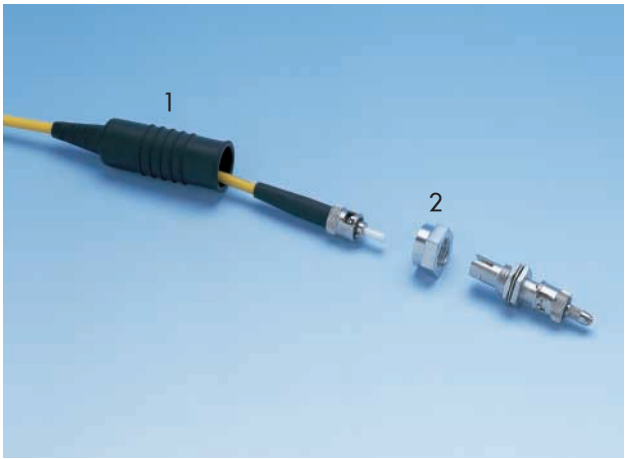
Lens connectors

- 4 poles
- LS 40: four-pole lens connector for outdoor applications
- LG 40: corresponding outlet
- only available assembled



Field cable

This cable type excels by its high mechanical loading capacity and good chemical constancy. It is therefore ideal for rough industrial and military applications.
See also Field cables in the section "Fiber optic cables"



Protection class IP 65 for fiber optic connectors

The use of fiber optic connectors with boot (1) and adapter (2) seal, allow a detachable fiber optic connection with IP 65 protection class. This combination is specially suitable for outdoor connections. The boot can only be used with cables ∅ 2.0 mm.

Ordering information:

Description	Type
Adapter seal for FST connector	MOB-SYS-001
Adapter seal for FCPC connector	MOB-SYS-002
Adapter seal for FLSA connector	MOB-SYS-003
Adapter seal for FSMA connector	MOB-SYS-004
Boot for FOC-, FSC-, FLSH-, FMTJ-, LX.5 connector	MOB-SYS-007
Boot for FST-, FCPC-, FLSA-, FSMA connector	MOB-SYS-008

PASSIVE NETWORK COMPONENTS

Coupler and WDM

Features

- Low insertion loss
- Excellent uniformity
- High stability
- Low cost / high quality

Applications

- Telecom
- CATV
- Subscriber loops
- Local area networks (LAN)

Available types

- Singlemode and Multimode
- Single window and dual window
- Splitting ratios 50:50 40:60 30:70 20:80 10:90
  and for "Tap" Fused couplers
  5:95 1:99
- Coupling ratios 1 x 2 2 x 2
  1 x 4 1 x 8 1 x 16

Customer specific types with higher performance upon request.

Plug type FSC

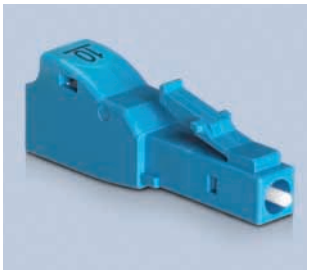
Plug type FCPC

Attenuators Plug type

available from 1 dB to 20 dB, in 1 dB steps

Features

- Wavelength attenuation stability
- Environmental stability
- Low back-reflection
- Low attenuation tolerances



Plug type FLC

Inline Attenuator

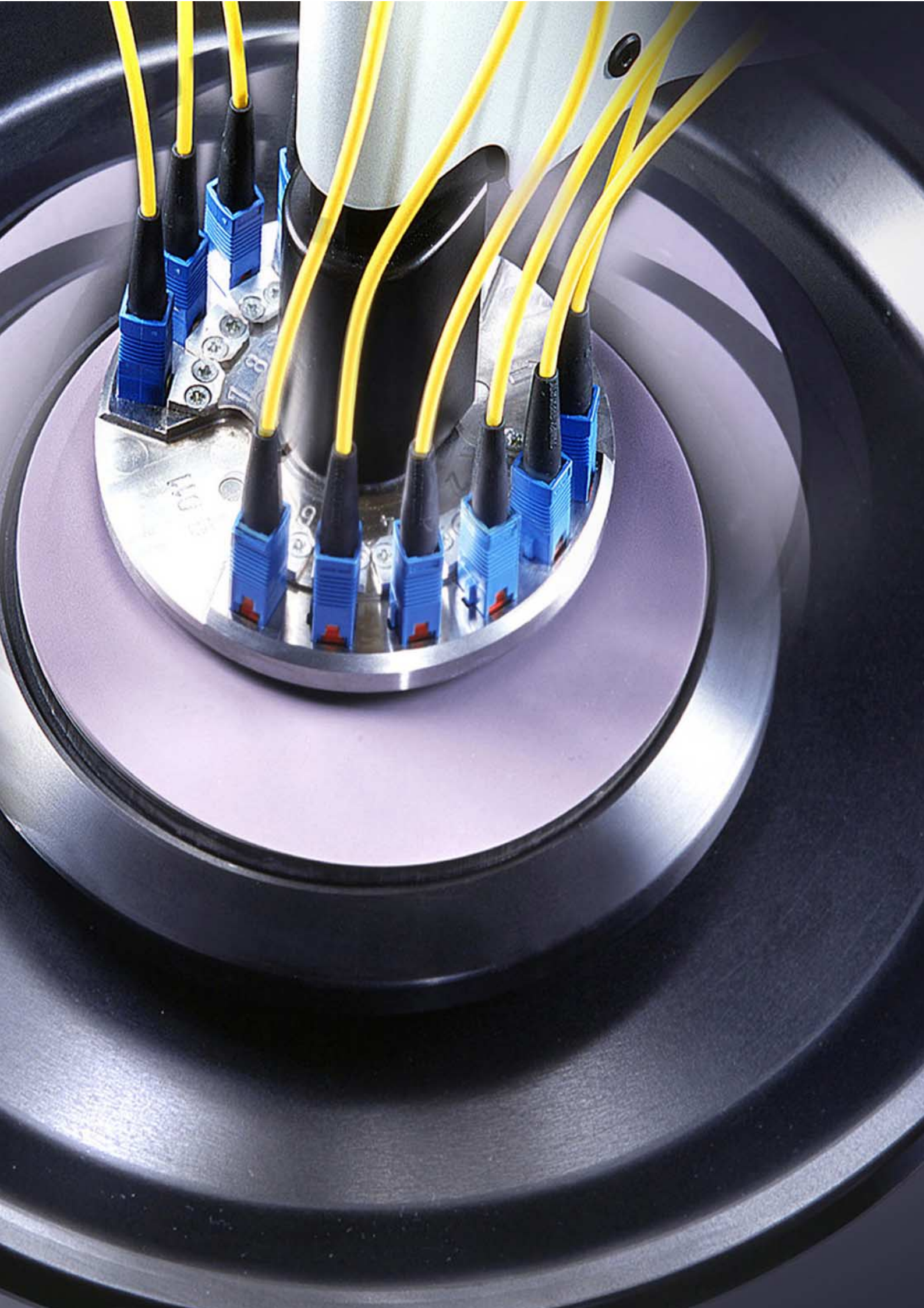
Inline Attenuators

available from 1 dB to 30 dB, in 1 dB steps

Features

- Low insertion loss
- Excellent uniformity
- High stability
- All current SM connectors can be terminated

For detailed information please ask for "Passive Network Components" catalogue.



HSP 03 POLISHING MACHINE

High performance
The quality of an assembled fiberoptic connector mainly depends on the polishing process applied.
HUBER+SUHNER Fiber Optics offers a new polishing machine designed for mass production, with a user-friendly and programmable interface software.

This polishing machine is the result of 15 years of experience. It permanently controls polishing rotation, rotation speed, rotation direction, arm pressure and arm position.

All standard 2.5 mm and 1.25 mm (SFF) connectors can be polished such as LX.5, LC, FC, E-2000TM, SC, ST, MU and MT-RJ.

Features/Benefits
- No pneumatic needed
- Permanently regulated polishing pressure
- Suitable for ceramic, metal, glass and plastic ferrules
- 200 programs with up to 10 steps per programm
- Wet and dry polishing

Easy handling
- LCD screen for easy programming and process management
- Pivoting arm for easy access and cleaning
- User-friendly and easy to adjust
- 100 programs individually and easily programmable

Economical criteria
- Maintenance-free
- No dummies needed due to fully adjustable pressure until 0.1 N per connector
- Short polishing times
- Automatic and precise polishing
- High yield with high quality of the ferrule end face

Further features

- Programms can be downloaded via interface RS 232 from a PC or a laptop
- Suitable for ceramic, metal, glass and plastic ferrules
- 1.25 mm and 2.5 mm ferrules
- APC and PC polish

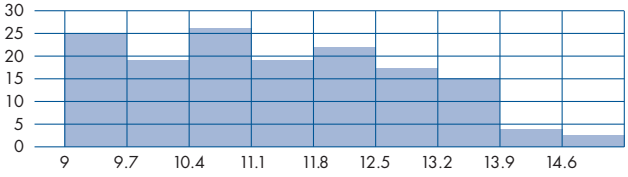
EQUIPMENT FOR LOCAL ASSEMBLY SHOPS

Complete Solutions For Local Assembly Shops
HUBER+SUHNER Fiber Optics is specialized in planing, installing, training and maintaining local assembly shops all over the world.
Permanent technology transfer to local assembly partners are the key to constant high HUBER+SUHNER quality products worldwide.

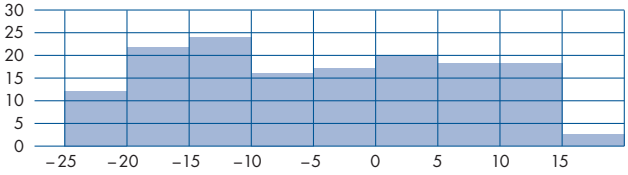
Polishing Process Performance
Fiber height, radius as well as apex offset are the most important parameters of a fiber optic connector end face geometry. The quality characteristics of the HUBER+SUHNER polishing machine HSP 03 are low apex offsets and stable radii together with constant fiber heights (see charts).

The permanent control and regulation of the pressure applied enables the machine to respond immediately to any production influence and to achieve highest yields. Our polishing processes comply with international standards like IEC and Belcore.

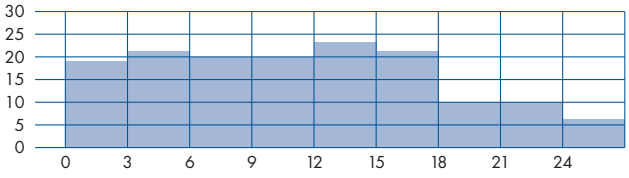
Radius of curvature ROC (mm)



Fiber height (µm) refers to undercut



Apex offset (µm)



HSP 03 POLISHING MACHINE

Polishing machine	Type
Fiber Polish HSP 03	9801.75.L

Polishing jigs – PC polishing tools	
FST	9801.78.G
FCPC	9801.78.F
FSC-CMAX	9801.78.P
FLSH-E2000	9081.78.X
FLSA	9801.78.T
FLC	9081.78.Y
FGAT	9801.78.N
LX.5	9801.78.C
MU	9801.78.Z
MT-RJ	9801.78.H
Replacement snap-on plastic for FSC (PC/APC)	63127200

Polishing jigs – APC polishing tools	
FCPC-APC wide key	9081.79.F
FCPC-APC small key	9801.79.T
FSC-CMAX-APC	9801.79.P
FSC-CMAX-APC 9°	9801.72.A
FSLH-E200-APC	9801.79.V
FLSA-APC	9801.79.S
FGAT-APC	9801.79.Q
LX.5-APC	9801.79.A
LC-APC	9801.79.R

The list of ordering codes for polishing jigs was complete when this catalogue went to press and will be updated with jigs for new connector types. Please ask for information if the polishing jig that you require ist not listed.

Technical Data HSP 03	
Power supply	115 VAC/60HZ 230 VAC/50HZ
Weight	28 kg
Dimensions	L=60 cm / W=52 cm (incl. keyboard) / H=36 cm
Number of programs	200 / 110
Number of program steps	10
Interface	RS 232
Rotation	120 / 150 per minute
Feed	0.9/1.0 per min (depending on rotation)
Number of connectors	Minimum 3 Maximum 12 (16)
Base diameter	5 inches


AC/DC
12V

OVERVIEW FIELD TERMINATION

Quick Assembly™ Tool Kit
for FSC and FST connectors
page 130

EASYFIT
for FSC, FST and FLSH (E-2000™) connectors
page 134

Tool Kit
for all connector types
page 136

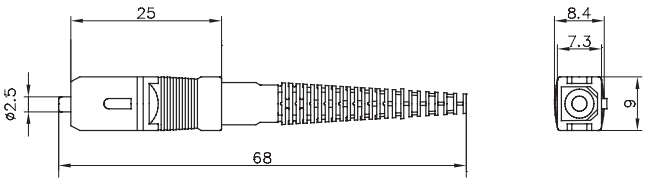
QUICK ASSEMBLY™ CONNECTOR FST, FSC

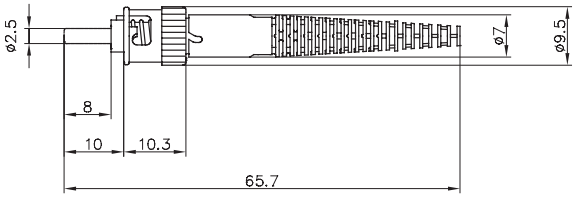
Features
The Quick Assembly™ system represents a revolutionary field termination process for fiber optic connections. It slashes termination times of SC and ST connectors (Singlemode and Multimode) to 1½ minutes thanks to the elimination of waiting times.

No special knowledge or training is needed for this splice-less process. The connection guarantees high reliability and superior optical performance especially for FTTD (Fiber-To-The-Desk) applications. The hand manipulator disposes of an internal power supply, so the installer does not depend on being close to a power socket.

Now the reliable SUHNER FIBEROPTIC Quick Assembly™ system is also available for Singlemode applications. If you already have a Quick Assembly™ tool and now want to terminate Singlemode connectors, you only need to order Quick Assembly™ SM connectors and an upgrade kit.

	FST connector	FSC connector
Assembly procedure	Quick Assembly™	Quick Assembly™
Locking mechanism	Bayonet	Push-Pull
Connection	Physical contact	Physical contact
Standards	EN50173, EIA/TIA 568 A	EN50173, EIA/TIA 568 A
Strain relief	70N	70N
Operating temperature	–25°C to +70°C depending on type of cable	–25°C to +70°C depending on type of cable
Mating cycles	min. 1000	min. 1000
Ferrule material	Full ceramic zirconia	Full ceramic zirconia





QUICK ASSEMBLY™ CONNECTOR FST, FSC

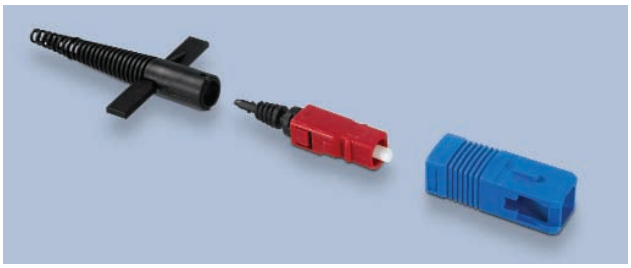
Ordering information: FSC, FST

Connector type	Unit	For fiber type	Insertion loss [dB] (mean/97%)	Return loss [dB]	Type
FSC MM	25	G50/125 G62.5/125	0.3/0.5[1)]	>20	FSC-QXA-B001
FSC MM Duplex	12	G50/125 G62.5/125	0.3/0.5[1)]	>20	FSC-QXA-B001-02
FSC SM	25	E9	0.3/0.5	>26	FSC-QXA-A001
FSC SM Duplex	12	E9	0.3/0.5	>26	FSC-QXA-A001-02
FST MM	25	G50/125 G62.5/125	0.3/0.5[1)]	>20	FST-QXA-B001
FST SM	25	E9	0.3/0.5	>26	FST-QXA-A001

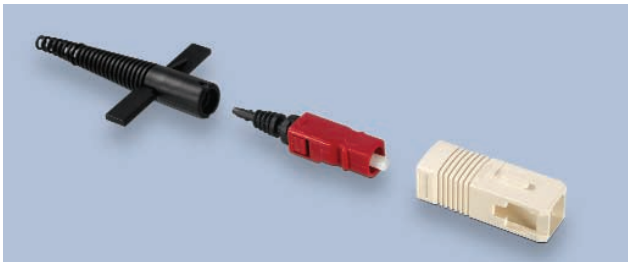
[1)] Measurement according to IEC 61300-3-4

Quick Assembly™ connectors are compatible with all available adapter types, please find more details on adapters in the section "connectors" of this catalogue.

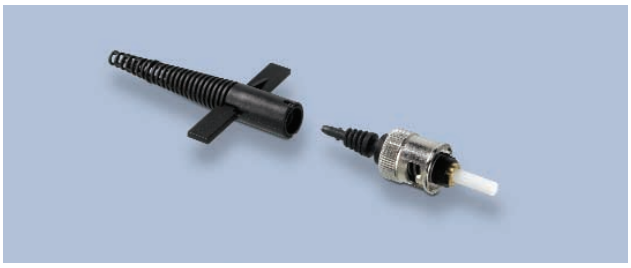
Available types



FSC Singlemode connector



FSC Multimode connector



FST Single- and Multimode connector

QUICK ASSEMBLY™ TOOL SET

Features Manipulator

- User-friendly
- High processing security
- Adapters for FST and FSC connectors available
- Field termination in about 90 seconds
- Operates with accumulator (battery)
- Premixed glue
- Fiber is glued
- Integrated container for fiber remainder
- Polishing without the support of fixed work surface
- Optical inspection of end surface

Features connector

- Halogenfree (UL 94-V0 material)
- One Piece Design
- Full ceramic ferrule
- Special ferrule pre-form for short polishing time
- Resistent to humid environment
- No set-up time

Ordering information: Tool

Description	Type
Manipulator including power supply (230 V), powder container, ceramic cleaver	QXA-015
Manipulator including power supply (115 V), powder container, ceramic cleaver	QXA-016
Adapter for FSC connector	QXA-002
Adapter for FST connector	QXA-001
Polishing set, including lapping wheel, polishing wheel, each with 50 films	QXA-014
Tool pocket complete (including clauss-stripper, polishing set, aramide scissors, marker, cleaning cloths, handmicroscope)	QXA-004
Tool pocket empty	QXA-013

QUICK ASSEMBLY™ TOOL KIT

Ordering information

Article	Type	Description / Usage
Accessories		
Clauss stripper	9801.22.C	Stripping cable jacket, tube, coating
Aramide scissors	9801.24.C	Cutting aramide yarn
Marker	9801.48.C	
Vehicle power supply adapter	QXA-005	
Hand microscope	9801.80.G	Inspection of end surface of connectors 100 times magnification
Consumables		
Singlemode polishing kit	QXA-019	Rubber pad for SM polishing process and 15 x D1 polishing films
15 polishing films	9801.76.F	D1 for SM polishing process
50 polishing films	9801.71.G	3 µm aluminium oxide
50 lapping films	9801.71.H	5 µm silicium carbide
Cleaning tissues	9801.60.E	Set with 10 tissues
Replacement powder container	QXA-006	Gluing the fiber into the connector
Replacement fiber container	QXA-007	
Spare parts		
Heating element	QXA-008	Pre-heating and curing of connectors
Accumulator (battery)	QXA-0095	Power supply for manipulator
Power supply (230 V)	QXA-010	
Power supply (115 V)	QXA-011	
Ceramic cleaver	QXA-012	
Powder container seal	QXA-018	

Removable, connector specific acceptance

Integrated epoxy resin tank

Operating control and display

EASYFIT CONNECTOR FSC, FST, E-2000™

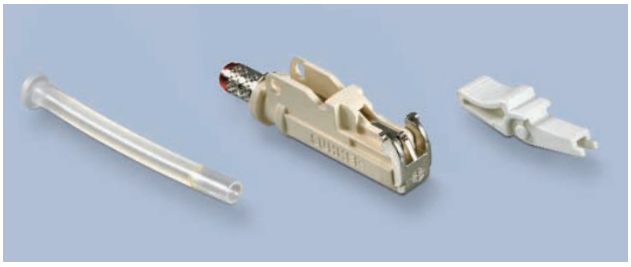
EASYFIT connectors are based on an assembling system, which is made possible by a two-component glue. Each connector is supplied preloaded with resin and a separate dose of primer.
The stripped fiber is first dipped into the dose of primer and then inserted into the connector, a few pumping and rotating motions mix the glue and then the connector is left for 5 minutes to cure. The connector is then processed conventionally.

Features
- Fast and user-friendly
- No power
- No heat
- No syringes
- No special tools needed

Dosing
Wetting the fiber by using a primer tube makes the assembly particularly easy. For bigger quantities, a package with 100 connectors including a bottle of primer is available.

Storing
6 months (–30°C to +25°C)

Available types



E-2000™ EASYFIT connector

FSC-CMAX EASYFIT connector

FST EASYFIT connector

EASYFIT CONNECTOR FSC, FST, E-2000™

Ordering information: FSC, FST, E-2000™

Connector type	Unit	For fiber type	Ferrule out of	Insertion loss [dB] (50% / 98%)	Type
FSC	1 connector/ 1 primer tube	G50/125 G62.5/125	Zirconia	<0.4 / <0.8	FSC-CMAX-B002
	100 connectors/ 1 primer bottle	G50/125 G62.5/125	Zirconia	<0.4 / <0.8	FSC-CMAX-B004
FSC Duplex	1 connector/ 2 primer tubes	G50/125 G62.5/125	Zirconia	<0.4 / <0.8	FSC-CMAX-B002-02
	100 connectors/ 2 primer bottles	G50/125 G62.5/125	Zirconia	<0.4 / <0.8	FSC-CMAX-B004-02
FST	1 connector/ 1 primer tube	G50/125 G62.5/125	Zirconia	<0.4 / <0.8	FST-LEAN-B005
	100 connectors/ 1 primer bottle	G50/125 G62.5/125	Zirconia	<0.4 / <0.8	FST-LEAN-B007
E-2000™	1 connector/ 1 primer tube	G50/125 G62.5/125	Zirconia	<0.2 / <0.5	FLSH-2000-B003
	25 connectors/ 25 primer tubes	G50/125 G62.5/125	Zirconia	<0.2 / <0.5	FLSH-2000-B006
	100 connectors/ 100 primer tubes	G50/125 G62.5/125	Zirconia	<0.2 / <0.5	FLSH-2000-B007

Ordering information: Crimpsets

Cable-Ø (mm)	A Type: flame retardant black	D-Type: UL94-V0 black
<1.0	009-BK-A001	
1.7 – 2.0[1)]		
2.0 – 2.2	021-BK-A001	021-BK-D001
2.3 – 2.6	024-BK-A001	024-BK-D001
2.7 – 2.9	028-BK-A001	028-BK-D001
3.0 – 3.3	030-BK-A001	030-BK-D001
3.4 – 3.6	035-BK-A001	035-BK-D001

Ordering information: Additional primer

Ordering information	Type	
1 bottle	for 100 connectors	9801.50.H

TOOL KIT

Features
Designed in a modular construction the tool kit contains all tools required to assemble HUBER+SUHNER fiberoptic connectors, install material and prepare cables.
Customers can also assemble a tool kit according to their needs.
If a new connector series is released the tool sets will be completed. This means that a completion of the tool kit can be made at a favourable price; existing tools do not have to be replaced.
All tools are also available as single components. When handled properly, the connector tools allow the assembly of more than 10'000 connectors, consumables can be used for approx. 500 connectors.

Tool kit types and sets

Article	Type
Basic tool kit	9801.90.P
Connector sets (please see next page for detailed description)	
FSMA	9801.92.I
FST-HQ, FST-LEAN	9801.92.K
FST-SEC	9801.92.P
FCPC	9801.92.L
FLSA/B	9801.92.M
FSC	9801.92.N
FLSH	9801.92.Q
FLC	9801.92.R
FLX5	9801.92.J

TOOL KIT

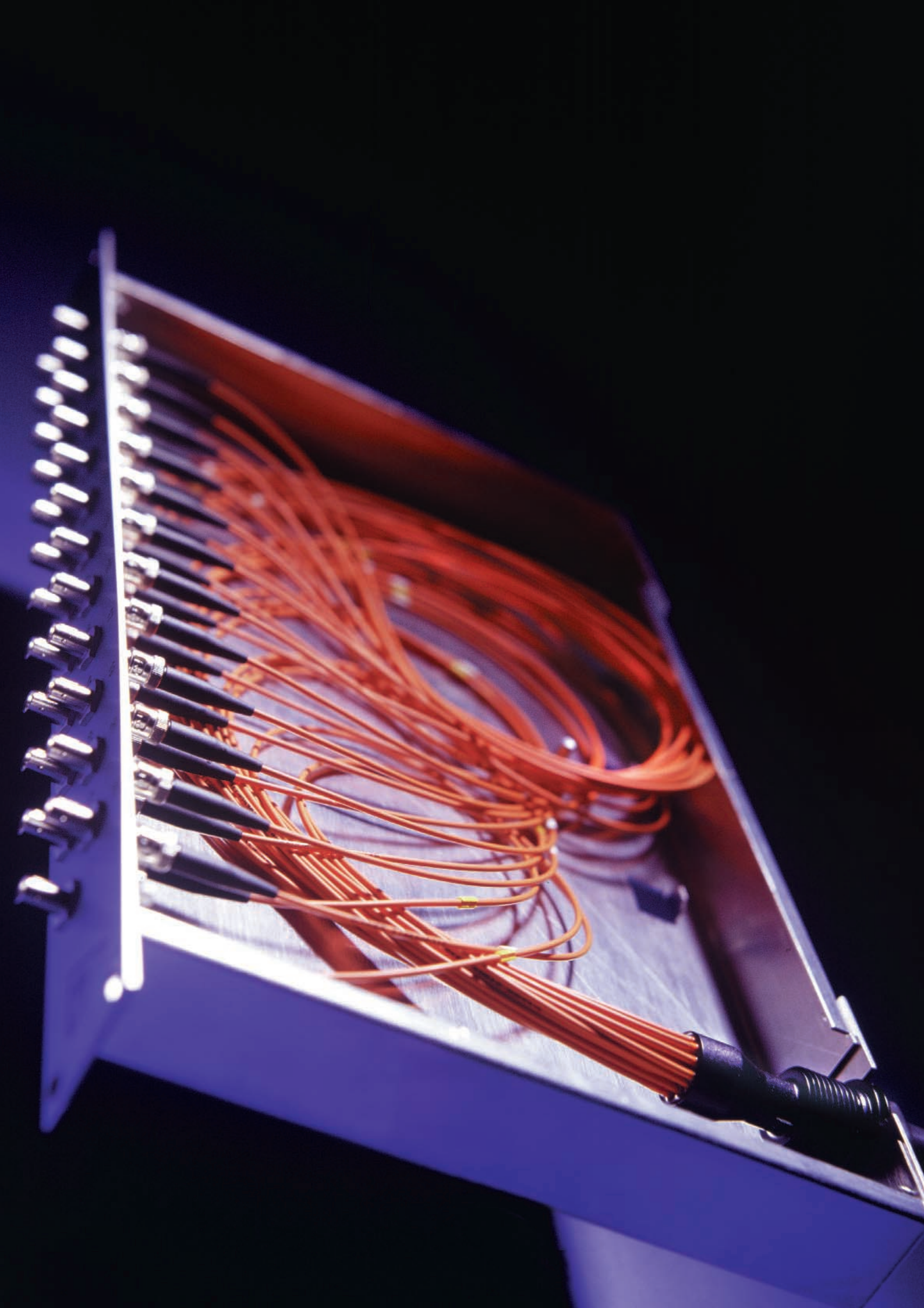
Article	Type	Usage
Basic tool kit	9801.90.P	**Contains all standard tools**
Coating stripper	9801.10.E	Removing coating up to 125 µm
Cleaving tool	9801.12.A	Cleaving the fiber
Universal knife	9801.20.E	Cutting open cables, jackets etc.
T-stripper small	9801.22.A	Cutting and removing 0.9 mm buffer
T-stripper large	9801.22.B	Stripping cable jacket
Cable cutter	9801.24.B	Cutting cable
Aramide scissors	9801.24.C	Cutting aramide yarn
Ruler	9801.32.A	Measuring the stripping lengths
Crimp tool	9801.35.I	Crimping all types of connectors with 2.50 mm ferrule
Screwdriver	9801.41.A	Screwing together the dividers
Epotek 360	9801.50.E	Gluing the fiber in the connector (1 pack)
Syringe needle	9801.52.A	Applying glue (5 needles and 5 syringes)
Cleaning tissues	9801.60.A	Cleaning fibers and connectors (75 tissues)
Isopropyl alcohol bottle, empty	9801.62.D	For cleaning liquid for fibers and connectors
Spirit bottle, empty	9801.62.B	For cleaning liquid for lapping films
Distilled water bottle, empty	9801.62.C	Used during polishing
Glass plate	9801.70.C	Support for polishing/lapping
Rubber pad	9801.75.D	Support for all convex polished connectors
Microscope, 100 times magnification	9801.80.A	Inspection of end surface of all connectors
Lamp for microscope	9801.81.A	Light for microscope
Operating manual	52.23.0150.4	Detailed assembly instructions
Basic case without tools	9801.95.A	Case body
To be ordered separately: Crimp tool	9801.35.J	Crimping all types of connectors with 1.25 mm ferrule
Heating boxes		
Heating box 6-fold	9801.55.H	1 piece
Heating box 24-fold	9801.55.L	1 piece
Connector sets		
FSMA Set	9801.92.I	**Contains all extra tools for FSMA**
Assembly devices	9801.30.F	Assembly help, protecting the fiber
Polishing tool	9801.70.A	Pre-polishing FSMA connectors
Lapping tool	9801.70.B	Polishing FSMA connectors, microscope adapter
Polishing film 1 µm, 1 piece	9801.71.E	Polishing FSMA connectors
Lapping film 9 µm, 1 piece	9801.71.D	Polishing FSMA connectors
FST Set (LEAN, HQ)	9801.92.K	**Contains all extra tools for FST**
Assembly devices	9801.30.O	Assembly help, protecting the fiber
Polishing tool	9801.75.A	Polishing FST connectors, microscope adapter
Polishing film 30 µm	9801.76.A	Pre-polishing FST connectors
Lapping film DR	9801.76.B	Polishing FST connectors
Lapping film DM	9801.76.C	Polishing FST connectors

TOOL KIT

Article	Type	Description / Usage
FST Set (Security)	9801.92.P	**Contains all extra tools for FST**
Assembly devices	9801.30.P	Assembly help, protecting the fiber
Polishing tool	9801.75.A	Polishing FST connectors, microscope adapter
Polishing film 30 µm	9801.76.A	Pre-polishing FST connectors
Lapping film DR	9801.76.B	Polishing FST connectors
Lapping film DM	9801.76.C	Polishing FST connectors
FCPC Set	9801.92.L	**Contains all extra tools for FCPC**
Assembly devices	9801.30.O	Assembly help, protecting the fiber
Polishing tool	9801.75.C	Polishing FCPC connectors, microscope adapter
Polishing film30 µm	9801.76.A	Pre-polishing FCPC connectors
Lapping film DR	9801.76.B	Polishing FCPC connectors
Lapping filmDM	9801.76.C	Polishing FCPC connectors
FLSA/B Set	9801.92.M	**Contains all extra tools for FLSA**
Assembly devices	9801.30.O	Assembly help, protecting the fiber
Polishing tool	9801.75.B	Polishing FLSA connectors, microscope adapter
Polishing film30 µm	9801.76.A	Pre-polishing FLSA connectors
Lapping film DR	9801.76.B	Polishing FLSA connectors
Lapping filmDM	9801.76.C	Polishing FLSA connectors
FSC-CMAX Set	9801.92.N	**Contains all extra tools for FSC-CMAX**
Assembly devices	9801.30.O	Assembly help, protecting the fiber
Polishing tool	9801.75.P	Polishing FSC connectors, microscope adapter
Polishing film30 µm	9801.76.A	Pre-polishing FSC connectors
Lapping film DR	9801.76.B	Polishing FSC connectors
Lapping filmDM	9801.76.C	Polishing FSC connectors
FLSH Set	9801.92.Q	**Contains all extra tools for E-2000™**
Assembly devices	9801.30.O	Assembly help, protecting the fiber
Polishing tool	9801.75.R	Polishing E-2000™connectors, microscope adapter
Press-in tool	9801.36.F	Press-in body (for cable Ø >2.1 mm)
Press-in tool	9801.36.G	Press-in body (for cable Ø >0.9 mm))
Polishing film 30 µm	9801.76.A	Pre-polishing E-2000™ connectors
Lapping filmDR	9801.76.B	Polishing E-2000™connectors
Lapping filmDM	9801.76.C	Polishing E-2000™connectors
FLC Set	9801.92.R	**Contains all extra tools for FLC**
Assembly devices	9801.31.B	Assembly help, protecting the fiber
Polishing tool	9801.75.U	Polishing FLC connectors, microscope adapter
Polishing film30 µm	9801.76.A	Pre-polishing FLC connectors
Lapping film DR	9801.76.B	Polishing FLC connectors
Lapping filmDM	9801.76.C	Polishing FLC connectors
FLX5 Set	9801.92.J	**Contains all extra tools for LX.5**
Assembly devices	9801.31.B	Assembly help, protecting the fiber
Polishing tool	9801.75.H	Polishing LX.5 connectors, microscope adapter
Polishing film30 µm	9801.76.A	Pre-polishing LX.5 connectors
Lapping film DR	9801.76.B	Polishing LX.5 connectors
Lapping filmDM	9801.76.C	Polishing LX.5 connectors

TOOL KIT

Article	Type	Description
Consumables		
Epotek 360	9801.50.E	1 pack
Araldite	9801.50.D	1 unit
Syringe complete	9801.52.A	5 needles + 5 syringes
Glue set 360	9801.53.E	1 Epotek 360 + 5 needles + 5 syringes
Epoxy resin glue set	9801.53.C	1 cartridge and 2 mixing glands
Cleaning tissues	9801.60.A	1 pack with 75 pieces
Tape	9801.60.B	1 roll
Polishing film 9/1 µm	9801.71.A	10 films 9 µm, 10 films 1 µm
Polishing film 9 µm	9801.71.B	50 films 9 µm
Lapping film 1 µm	9801.71.C	50 fims 1 µm
Polishing film 30 µm	9801.76.A	10 films 30 µm
Lapping film DR 9 µm	9801.76.B	1 films 9 µm
Lapping film DM 3 µm	9801.76.C	1 films 3 µm
Lapping film AF 5D 0.5 µm	9801.76.K	1 films 0.5 µm
Loctite 401	9801.50.I	Glue for connector assembly
Dosing needle	9801.52.D	Glue dosage
Coating stripper 0.18/0.3	9801.10.A	1 piece
Tube cutter	9801.10.F	1 piece
Heating box	9801.55.L	1 piece, 115/230V
Aramide scissors	9801.24.D	Cutting aramide yarn; scissors with big, red plastic handles
Assembly adapter	9801.32.D	10 pieces for E-2000™ EASYFIT or as cleaning adapter for E-2000™ connector



OVERVIEW CABLING SYSTEMS

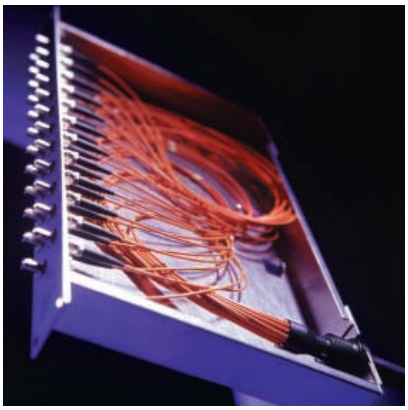
MASTERLINE®
Cabling system
Page 143

SMARTLINE
Page 146

MASTERLINE® CABLING SYSTEM

Customizable MASTERLINE® Cabling System
A customer defines the MASTERLINE® system indicating:

- MASTERLINE® type
- Fiber type
- Cable type
- Cable length
- Number of fibers
- Connector type



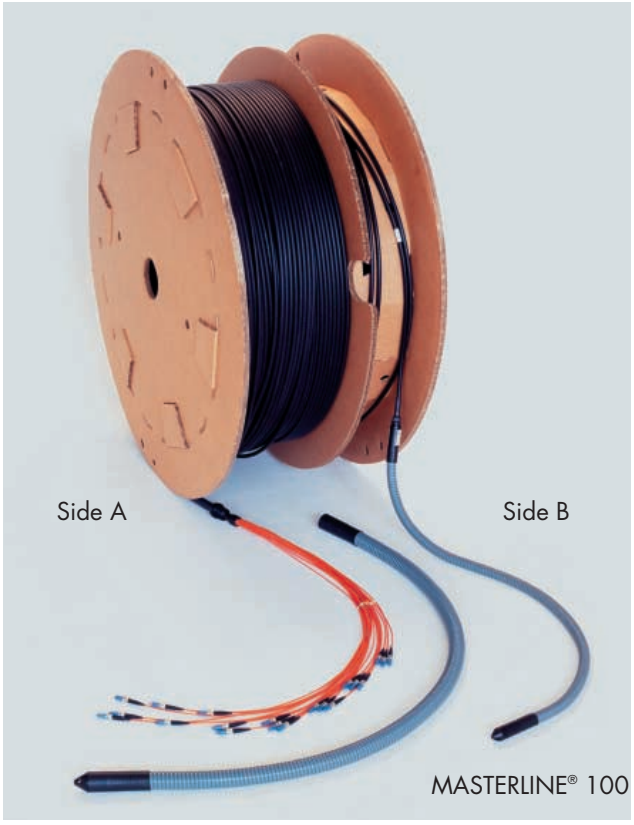
General Features
- Fast and easy
- Ready to use
- Time-saving installation, no need for splicing
- Cable length on drums for direct installation
- 100% optical tested with test results for each system on request

Features MASTERLINE® with pulling tubes
- Rugged, retrofittable and watertight pulling tube protecting connectors
- Small dimensions of manifold and pulling tube
- For pulling through narrow ducts over long distances
- Fixing the manifold in a slot or with a nut
- All non-conductive materials

Features MASTERLINE® with connection boxes
- Rugged metal connection boxes for mounting in 19" racks
- No assembling of connection boxes
- Sturdy bags protect the boxes for transport and installation
- Minimum size of boxes to pass through small openings

Applications
- Indoors and outdoors
- Pulling into ducting
- Laying into ducting or on the ground
- Burying in the soil

MASTERLINE® CABLING SYSTEM



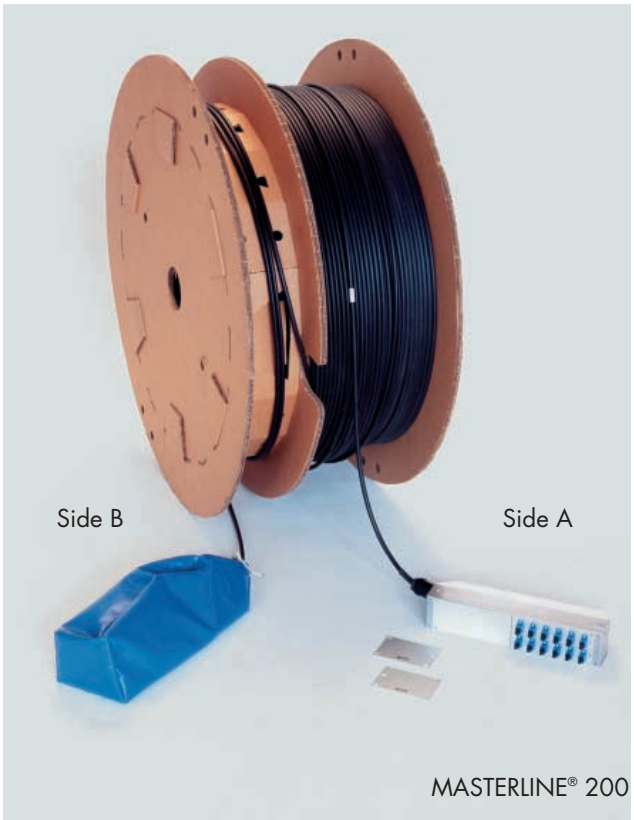
MASTERLINE® 100

MASTERLINE® 100
With MASTERLINE® 100, the cable is pre-terminated with connectors on both sides of the fiber optic cable.
The MASTERLINE® is supplied with a watertight pulling tube on both ends protecting the connectors from damage when pulled through narrow ducts and over long distances. After the cable has been pulled in, the pulling tube is removed and the connectors are plugged into the adapters inside connection boxes. Pulling sleeves are retrofittable so that the cable can be safely moved and re-installed.

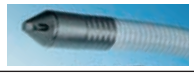
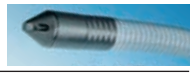
MASTERLINE® 200
MASTERLINE® 200 is supplied with completely installed connection boxes on each side. These boxes are of minimum size in order to pass through ceiling openings, false floors and cable troughs. For transport and installation the boxes are protected in a pull-proof bag.

MASTERLINE® 500
with connectors on side A only, side B is an unterminated cable end.

MASTERLINE® 600
side A with connectors protected by a pulling tube and side B with a connection box.



MASTERLINE® 200

MASTERLINE®	Side A	Side B
100		
200		
500		
600		

MASTERLINE® CABLING SYSTEM

Pulling tube
The spiral pulling tube has been specially developed for the MASTERLINE® system. It accommodates the assembled connectors, protecting them against damage during installation and is watertight.

Number of fibers	Diameter	Length (mm)	max. tensile load
2–12	22 mm	1250	500 N
14–24	31 mm	1150	600 N
26–48	43 mm	1150	1200 N

Manifold cables
- for multi-loose tube cables: orange, Ø 2.1 mm, LSFH™, staggered lengths with numbered fiber management
- for field cables: black, Ø 2.1 mm, LSFH™, staggered lengths with numbered fiber management

MASTERLINE® 100				
Number of fibers		up to 12	up to 24	up to 48
Cable length		up to 2000 m	up to 2000 m	up to 2000 m
Max. diameter of pulling tube		22 mm	31 mm	43 mm
Max. tensile force		500 N	600 N	1200 N
Crush resistance of pulling tube		200 N/cm	250 N/cm	250 N/cm
Min. bending radius		80 mm	150 mm	150 mm
Temperature range[1)]	during installation	-10°C up to +50°C	-10°C up to +50°C	-10°C up to +50°C
	in operation	-25°C up to +70°C	-25°C up to +70°C	-25°C up to +70°C

MASTERLINE® 200		
Number of fibers		up to 48
Cable length		up to 2000 m
Min. diameter of pulling tube		150 mm
Max. tensile force		300 N
Min. bending radius		150 mm
Temperature range[1)]	during installation	-10°C up to +50°C
	in operation	-25°C up to +70°C

[1)] Temperature range can vary depending on fiber and cable type, sleeving cable and cable length

ORDERING INFORMATION MASTERLINE®

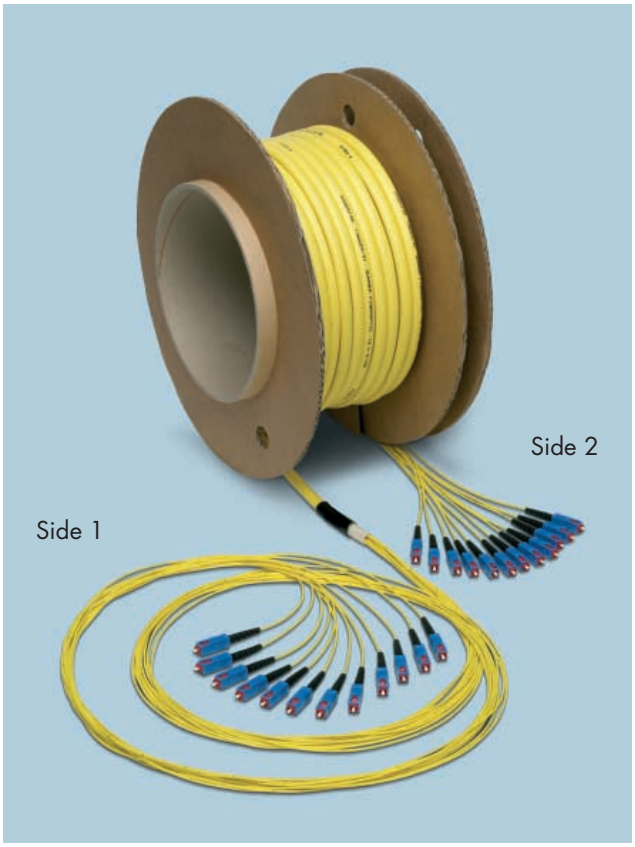
											Description
											MASTERLINE® System
1											100
2											200
5											500
6											600
											Fiber type
	1										Singlemode 9/125 µm
	5										Multimode G50/125 µm
	6										Multimode G62.5/125 µm
	2										Multimode H200/230 µm
											Number of fibers max. 48
		16-									always two figures (eg. 4 fibers = 04)
											Cable type
			1								PE jacket, glass-armoured ≤ 12 fibers ...(ZNG)Y-G... > 12 fibers ...(ZNG)Y-Z...
			2								LSFH™ jacket, glass-armoured ≤ 12 fibers ...(ZNG)H-G...
			3								acc. to customers' requirements
			4								LSFH™ jacket, non-armoured, jellyfree ≤ 12 fibers ...H(ZN)H-...
			9								PUR jacket, field cable, non-armoured ≤ 8 fibers .../FSN(ZN)Z-...
											Connector side A for all MASTERLINE types
				20-							for connector code please see inside back cover
											Connector side B (for MASTERLINE 100/200/600)
					20-						for connector code please see inside back cover
											Cable length in meters max. 2000 m
						0150-					always four figures (eg: 150 m = 0150)
											Front panels side A or IP boots[1] (for MASTERLINE 200)
							12M-				see section "MASTERLINE connection boxes"
							IB0				IP 65 boots on all fibers, round shape (MOB-SYS-008)[1]
							IB4				IP 65 boots on all fibers, square shape (MOB-SYS-007)[1]
											Front panels side B or IP boots[1] (n/a for MASTERLINE 100/500)
								12M-			see section "Installation Products"
								IB0			IP 65 boots on all fibers, round shape (MOB-SYS-008)[1]
								IB4			IP 65 boots on all fibers, square shape (MOB-SYS-007)[1]
											Optical performance 1st letter side A, 2nd letter side B (eg. DD)
										A	LAN-ECO
										B	High-End (Standard for Singlemode)
										D	UPC
										M	Multimode
										K	no connector
2	5	16-	1-	20-	20-	0150-	12M-	12M-	BB		(Example)

[1] Adapter seal has to be ordered separately. Bigger manifold and pulling tube are required to accomodate the big boots

Rules

- Connectors and/or frontplates not used are left out and marked with a space
- Special component types, e.g. OM3 fiber have to be specified separately on the order

SMARTLINE CABLING SYSTEM



SMARTLINE – the pre-assembled cabling system
The SMARTLINE cabling system is used in end-to-end systems, where high packing densities in racks and sub-racks demand pre-terminated cost-efficient cabling solutions.

Application range
- Indoor applications
- Connection between system rack and optical distributor
- Connection between distributors
- Applications with high safety requirements

System characteristics
- 12-fibers
- LSFH™ variant is self-extinguishing, non-toxic and halogen-free
- Integrated divider head (12 mm) is irrelevantly larger than cable diameter
- Divider head with integrated radius limitation for cable breakout
- Cable breakout length and system length are customer-specific
- Available for all singlemode connectors and FiberGate
- Replaces 12 single patch cables
- Time and cost saving due to easy installation
- Test report upon request

Specifications		
Number of fibers	12	
Cable type	12-E9/SWJSNH-E17	
Max. allowable tensile load	on the connector	100 N
	on the SFF connector	70N
Static side load at devider	on one simplex cable	20 N
Temperature range	during installation	0° up to +50 °C
	in service	–25 up to +70 °C
	in storage	–25 up to +60 °C

Please find detailed technical information of the Minicord Breakout Cable in the section "FO cables"

ORDERING INFORMATION SMARTLINE

								Description
SL-								**SMARTLINE**
								Cable type
	001-							12-E9/SWJSNH-E17
								Connector side 1 / side 2
		30/30-						for connector code please see inside back cover
								Optical performance
			B-					High-End (0.4 dB)
			C-					Premium (0.3)
			D-					High-End UPC (0.4/50 dB)
			F-					Premium UPC (0.3/50 dB)
								Breakout cable lengths side 1 in cm (all tubes with same length)
				150-				always three figures (eg: 150 cm = 150)
								Cable length between divider in dm
					0755-			(eg: 75.5 m = 755)
								Breakout cable lengths side 2 in cm (all tubes with same length)
						100-		always three figures (eg: 100 cm = 100)
								Customer-specific information
							A	Standard
							X	Customer-specific
SL-	001-	30/30-	B-	150-	0755-	100-	X	(Example)


SUHNER
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LASER PRODUCT
INVISIBLE
RADIATION
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OVERVIEW LISA PRODUCTS

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Optical Distribution Frames
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Wall Boxes
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Optical Distribution Unit
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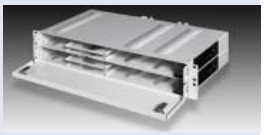

LISA FRONT ACCESS

Compact Modules MCM and SCM
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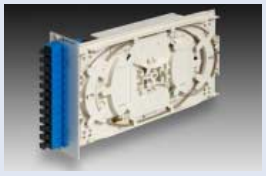

Fiberport Compact Module System
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ACCESSORIES

Ducting
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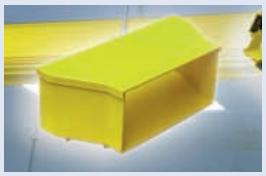

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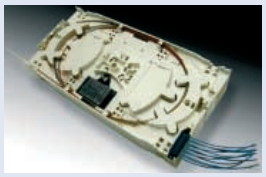

Cable Dividers
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LISA - LEADING INTERCONNECT SYSTEMS APPROACH

Leading Interconnect Systems Approach

Our customer focused approach, supported by a proven track record in the field make HUBER+SUHNER the ideal partner for all Systems requirements.

Systems Solution Partner

HUBER+SUHNER are a "Systems Solution Partner" providing dependable "Turn Key" solutions in all areas of Communications Networks such as Telecom's and LAN's. Combining "excellence in connectivity" with "leading innovation" means that we can tailor our products to suit individual requirements. More than just modular product building blocks, the LISA system (Leading Interconnect Systems Approach) is a philosophy that HUBER+SUHNER have adopted in order to realise the vision of our customers.

The LISA group offers consultancy and support at every level of Network construction. Product Specialists and Network Designers work together to guarantee perfect synergy between existing and future technologies. Training programs and on-site support are available before and during service of the LISA system to ensure effective and repeatable working practises.
Strategic partners are an important piece to the LISA System jigsaw. The LISA group work hand in hand with these partners to guarantee repeatable installations to globally accepted standards.

Product Features

The LISA product range represents a modular group of products that enables seamless construction of SingleCircuit and MultiCircuit Passive Optical Networks. The flexibility of the basic system allows for complete and compatible system solutions within Central Offices, Outside Plants, Customer Premises and LAN applications.

Every product within the LISA family has been developed to allow fast and simple integration into either existing network structures or new projects. Every customer requirement differs slightly depending on application and in order to present an effective solution to global markets HUBER+SUHNER have developed two distinct product branches in the LISA Front Access and the LISA Side Access system. Both products benefit from the same core features with regards to optical performance, however the difference lies in the presentation of the adapter panel and the ability of the Front Access System to accommodate SingleCircuit as well as MultiCircuit applications. The LISA Front Access System is based on vertically mounted compact modules where ports are positioned facing the front, and the LISA Side Access System utilises horizontally mounted trays with adapter ports facing the side.

For more details please ask for the separate LISA catalogue

LISA - LEADING INTERCONNECT SYSTEMS APPROACH

LISA FRONT ACCESS

LISA SIDE ACCESS

Modularity
All of the LISA products have been designed to be as flexible and as modular as possible. This modular approach means that all of the products in the LISA family are inter-changeable and mutually compatible.

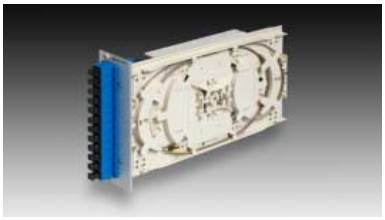
Modularity not only offers infinite functionality but it also allows bite - sized parts of the LISA system to be implemented at strategic stages in the Network roll-out.

This ramp-up facility enables Project Managers to spread the cost of their Network build across longer time frames and ensures more efficient use of project budgets.

User Friendly
Working closely with installers has allowed HUBER+SUHNER to obtain invaluable information relating to the installation of Systems Products.

This information has been used early on in the design process to ensure that the LISA range of products encompasses all current industry practises and preferences.

On-going servicing of the Network is fundamental to the LISA Systems Approach and for this reason all products in the family range incorporate dedicated features for ensuring repeatability.



Fast Deployment
HUBER+SUHNER appreciate the timescale pressures surrounding the Global Communications Industry.

From concept to reality the LISA group have learnt that success depends upon fast response times both in the development room and in the field.

All of the products within the LISA range can be installed and deployed quickly, optimising the project window and minimising the costly effects of network down-time.

Density versus Footprint
The need for customers to maximise available footprint space is becoming more important as networks reach their capacity limit and Real Estate becomes more costly.

The LISA System's modularity allows it to become the perfect package for low to high fiber counts.

Based on a sub-rack construction the LISA system is capable of accomodating anything from 12 to 960 fibers using standard connectivity and up to 1920 fibers using SFF technology such as LX.5 or LC.

FIBER TRAYS FOR PIGTAIL SPLICING

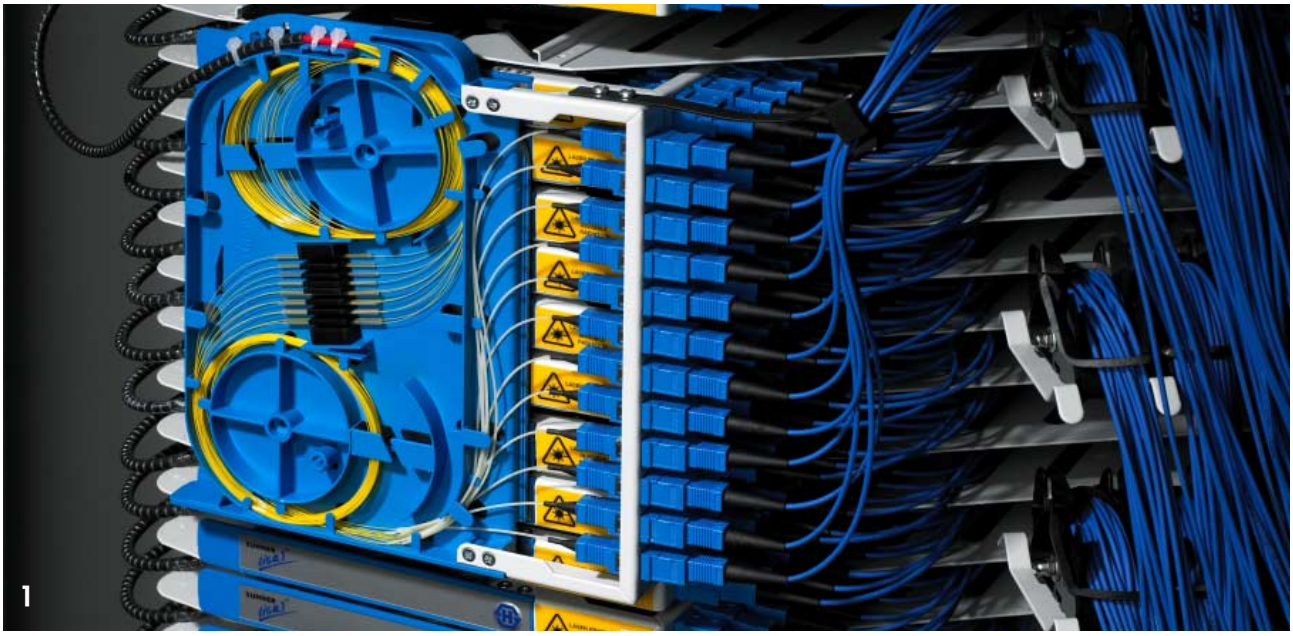
The FT is a flexible platform for integrating fusion splicing, pre-termination and passive devices. Bend radius control throughout the FT's inner/outer geometry and fiber storage areas make splicing and coiling extremely quick and easy.

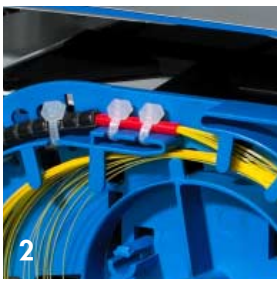
Pigtail fiber and incoming fiber are kept separate in the FT, making the identification and isolation of circuits far easier than other products on the market. The FT is available in 4 colours for different applications and incorporates flexible labelling positions throughout.

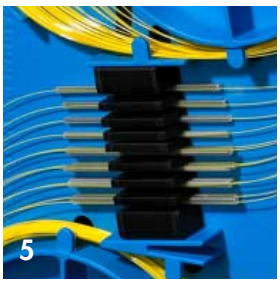
Features
- Fast splicing and coiling time
- Laser safe design (side facing ports)
- Quick access to fibers (telescopic runner)
- High Density/Small Footprint (24 fibers SFF)
- 250 µm pigtails for increased density and easier splicing
- Bend radius control throughout
- Integral hinge for easy access
- Incoming and pigtail fiber seperation
- Fiber overlength take-up
- All connectors available

Ordering information	Description
FTR	Fiber Tray - Right handed
B	Colour Blue
Y	Colour Yellow
G	Colour Grey
O	Colour Orange
H-	Hinge fitted
80–	Connector Code
nn–	Number of fibers
09/	Fiber Type - Singlemode 9/125
50/	Fiber Type - Multimode 50/125
62/	Fiber Type - Multimode 62.5/125
250	Fiber construction - 250 micron
A	Variant (default A)
1	HUBER+SUHNER branding

FIBER TRAYS FOR PIGTAIL SPLICING







1 Fully-radiused madrel system protects bend radius and simplifies the splicing and storing process

2 Intelligent hinge system for easy access to internal fibers even during service

3 Fiber tray lid gives optimum port identification and routing records

4 Laser safety label incorporates fiber tray number label for rapid inter - rack tray identification

5 Integral splice comb allows 24 fusion splices to be stored safely and efficiently

SPLICE THROUGH FIBER TRAYS

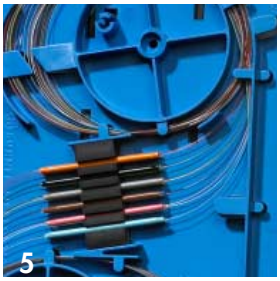
Ruggedised Pigtails
The FT Splice Through allows ruggedised pigtails to be strain relieved to an FT adapter plate for direct non-connectorised splicing. Strain relief is achieved by using a PIGCP gland which grips the internal kevlar of the ruggedised pigtail. PIGCP's are universal and can be fitted to both SC and ST front plates.

Splice Through
2 x 12 fiber loose tubes from different cables can be fixed to the Fiber Tray so as to provide an effective loop-back connection. Each 12 fiber bundle is routed in different areas of the FT making coiling and identification simple. For this application no adapter plate is required.

Features
- Bend radius control throughout
- Up to12 x Pigtail Glands (Square hole)
- Max 2 x loose tube (2 x 12 fibers)
- Integral heatshrink splice comb
- Integral hinge for easy access
- Integral Patchcord arm (not shown)
- Range of glands for different cable diameters
- 250, 600 or 900 micron tails can be spliced
- Integral lid with fiber port label

Ordering information	Description
FTR	Fiber Tray - Right handed
B	Blue
Y	Yellow
G	Grey
O	Orange
H-	Hinge fitted
S1X-	Square hole adapter plate for max. 12 x PIGCP glands
R2X-	Round hole adapter plate for max. 8 x PIGCP glands
NX-	No adapter plate for loose tube - loose tube splicing
12-	Number of fibers to be spliced 12 or less
24-	Number of fibers to be spliced 24 or less
250	Fiber construction 250 micron - up to 24 loose tube fibers
900	Fiber construction - 600/900 micron (max.12 PIGCP's)
A	Variant (default A)
1	HUBER+SUHNER branding

SPLICE THROUGH FIBER TRAYS - KEY FEATURES



1 Ruggedised pigtails can be incorporated into pre-connectorised Fiber Trays for low-loss terminations. The universal pigtail gland can be retro-fitted to either SC/E-2000™ footprint or ST footprint

2 Pigtail Gland enables fast and reliable strain relief to ruggedised pigtails. Slotted boot protects bend-radius as pigtail exits the FT adapter plate

3 Two loose tubes can be glanded to the side of the ODR-TU to allow loose tube-loose tube splicing

4 2 x Loose tubes enter the FT from the same side so as to maximise space efficiency within the rack

5 Intelligent design allows separate routing and storage of each loose tube fiber bundle.

Ordering Information: Pigtail gland

Description	Unit	Part no.
Pigtail gland universal for 2.8 mm pigtails either for fitting to 8 x FST front plate or 12 x E-2000™/SC front plate	1	84004253

M3K

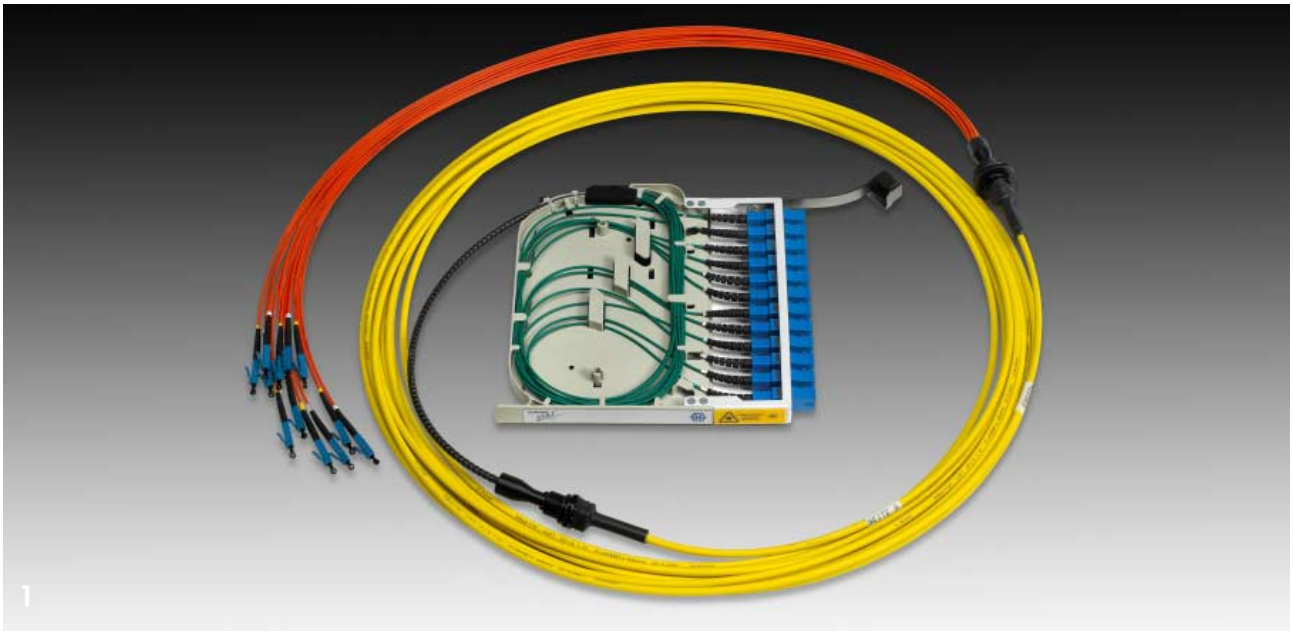
Pre-terminated and factory tested the M3K assembly is loaded into a LISA Fiber Tray allowing high fiber count links to be constructed on site in a matter of minutes without the need for costly and time consuming splicing. Both ends of the M3K assembly can be fitted to a Fiber Tray or if preferred a standard breakout can be used at one end for direct termination to in-line suite equipment.

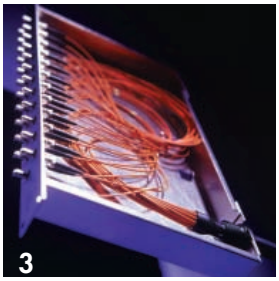
The M3KP is a hybrid of the M3K and allows 24 x 250 micron fibers to be terminated in a single FT.

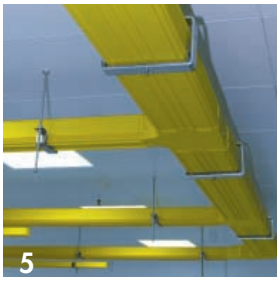
Features
- Reduces on-site installation time
- Deep bodied Fiber Tray houses ruggedised fibers
- All connector types available
- Up to 12 x 1.7mm ruggedised fibers using M3K
- Up to 24 x 250 micron fibers using M3KP
- Pull-sock can be fitted for pulling through ducting systems
- Integrates seamlessly with enclosures housing fusion spliced FT's
- Improved protection of fiber break-outs

Ordering information	Description
M3K-	Ruggedised 1.7mm tails, max. 12 fibers
M3KP-	Primary coated 250/900 tails, max. 24 fibers SFF
1	Cable terminated both ends
5	Cable terminated at one end only
1-	Singlemode 9/125µm
5-	Multimode 50/125µm
6-	Multimode 62.5/125µm
XX	No. of fibers max 12 fibers M3K/max 24 fibers M3KP
ID-	Indoor Cable (others available on request)
80	Connector type End A
A	**End A** Fiber Tray Fitted
B	Pullsock Fitted, FT Supplied Loose (M3K only)
C	Pullsock Fitted, No FT Supplied (M3K only)
D	Standard MASTERLINE breakout
E	FT Supplied Loose, No Pullsock Fitted
/80	Connector type End B
A	**End B** same codes as for side A
XXX	Length of the cable between glands (m)

M3K - TYPICAL APPLICATIONS







1 M3K can be supplied to customer specific lengths allowing efficient port-to-port linking

2 The M3KP achieves a massive 24 fiber capacity by using 250 micron fibers and SFF connectivity, such as the LX.5 and LC

3 MASTERLINE end can be housed internally within HUBER+SUHNER's 19" Fiber Frames for well protected rack to rack fiber links or used for patching to the front side of customer equipment

4 M3K fiber tray mounts into LISA ODR's or ODU enclosures and enables fast high density, rack-to-rack or inter-rack cross-connecting

5 Pull-socks can be fitted to either end of the M3K assembly (not FT end of M3KP) and offer complete protection when routing through duct systems or simply storing under floor prior to install

ODR OPTICAL DISTRIBUTION RACK - ASSEMBLED

ODR 900S

ODR 900S

ODR 600S

Low-entry cost, modular and fully configurable
Capable of housing up to 1920 fibers, the 2.2m ODR is the flagship of the LISA Side Access product range. Available as factory assembled or flat - packed kits, the ODR is infinitely configurable to allow customers a mix and match facility from the LISA sub-rack range.

Not just another Telecoms rack, the LISA ODR is the optimum product for obtaining high density fiber presentation without compromising performance, reliability or handling. All ODR's provide an intelligent package for routing, storing and x-connecting fiberoptic patchcords.

Features ODR 600S
- Low Entry Cost/Grows with Network
- High Density 960 fibers
- Reduced footprint
- Fast deployment time
- Easy to install and maintain
- Modular subracks offer complete customer configuration options
- Compatible with Lightpath Ducting System
- Horizontal and vertical patchcord management
- Patchcord overlength available
- Compatible with all LISA fiber trays
- Bend limiting control throughout
- Various size options
- Supplied fully configured or flat-packed

Features ODR 900S
- Low Entry Cost/Grows with Network
- High Density 1920 fibers using SFF
- Fast deployment time
- Easy to install and maintain
- Modular subracks offer complete customer configuration options
- Compatible with Lightpath Ducting System
- Horizontal and vertical patchcord management
- Top and bottom patchcord exit
- Compatible with all LISA fiber trays
- Bend limiting control throughout
- Tray to tray patching
- Supplied fully configured or flat-packed

Applications
- Telecoms
- CATV
- WAN/MAN
- LAN
- Customer specific applications and projects

For more details please ask for the separate LISA catalogue

ODR OPTICAL DISTRIBUTION RACK - ASSEMBLED

Ordering information ODR 600S	Description
ODRB-SFS-B-SP-	ODR 600 x 300 x 2200 mm with solid door and brush lid[1)]
T	Top entry for incoming cable
B	Bottom entry for incoming cable
T-	Top patchcord exit
B-	Bottom patchcord exit
nn-	Quantity of FT's total or below XC Unit if fitted
ST-	Standard tray units only (no X-Connects)
XC-	X-Connect Unit fitted to rack for top-bottom patching
nn-	Quantity of FT's above XC Unit if fitted
A	Variant (default A)
1	HUBER+SUHNER branding
F	Supplied flat-packed

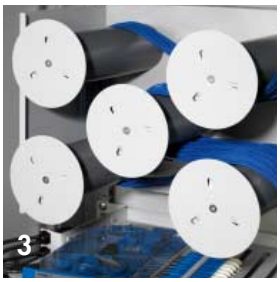
1) Please note: only standard ODR configurations are shown, for customer specific configurations please enquire

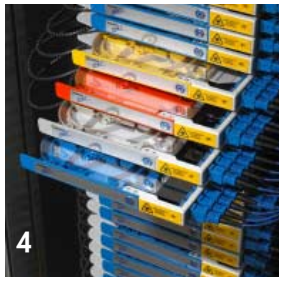
Ordering information ODR 900S	Description
ODRA-SWS-B-SP-	ODR 900 x 300 x 2200 mm with solid wardrobe door and brush lid[1)]
T	Top entry for incoming cable
B	Bottom entry for incoming cable
D-	Top and Bottom patchcord exit
nn-	Quantity of Fiber Trays total
ST-	Standard tray units only
A	Variant (default A)
1	HUBER+SUHNER branding

1) Please note: only standard ODR configurations are shown, for customer specific configurations please enquire

For more details please ask for the separate LISA catalogue

ODR - OPTICAL DISTRIBUTION RACK 600S





1 All LISA ODR's are compatible with the Lightpath Ducting System. A duct fixing kit can be attached to the ODR allowing permanent mounting of the duct system. Full-length appertures in the top of LISA ODR's makes the installation of multiple cables easy and repeatable.

2 Conduit fixing points offer strain relief and guarantee bend radius, also suitable for M3K glands

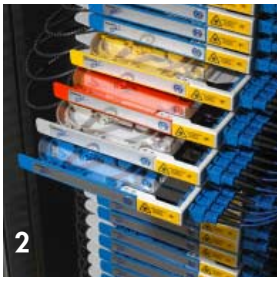
3 The ODR600S incorporates x-connect units for patchcord overlength and inter-rack patching

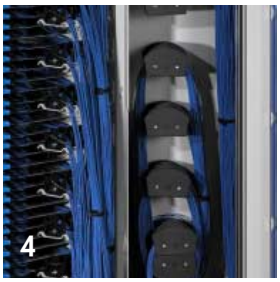
4 All LISA FT's can be housed in the ODR and each type can be mixed and matched depending on customer application

5 Patchcord mandrel units ensure maximum bend radius and allow each fiber tray's patchcord to be managed seperately from the next and enables fiber trays to be removed from the rack without compromising other fiber circuits.

6 Cable breakout units enable flexible clamping of incoming cables

ODR - OPTICAL DISTRIBUTION RACK 900S





1 The ODR900S is the highest density rack in the LISA ODR range, with a capacity of 1920 fibers using SFF.

2 All LISA FT's can be housed in the ODR and each type can be mixed and matched depending on customer application. Fiber trays with up to 24 SFF connectors can be mounted in the ODR giving an overall capacity of 1920 fibers.

3 Patchcord bundles are separated in the center of the rack to allow more effective fiber routing and easier handling. Vertical patchcord mandrels allow comprehensive routing and storage of patchcords.

4 Vertical plates allow effective separation between the fiber tray area and the patchcord storage area. This feature prevents unnecessary tangling of patchcords and therefore of benefit to installers.

ODR BREAK-OUT UNITS

Features

- Provides a secure anchor for incoming loose tube cables within an ODR
- Suitable for all cable diameters
- Provides protection for cable transport tubes
- Reversible - for top and bottom cable entry
- Expandable - further tie bars can be added
- Front-Back mounting of tie bars provides easy access to existing cables and rapid installations of new ones
- Available for cable tie fixing or heatshrink glands
- 19" rear mounted
- Double-sided plate provides fixing points for up to 26 x 5mm cables per rail (cable ties).
- Solid steel door with sliding latch
- Steel construction
- Powder coated RAL 7035 (light grey)
- Includes fixing kit

Ordering Information: ODR Break-out Units

Description	Unit	Part no.
ODR 300 deep B/OUT Box - 4U	1	84004241
ODR 400 deep B/OUT Box - 4U	1	84004243

Odering Information: Accessories

Description	Unit	Part no.
Cable Tie Bar for 300 deep ODR	1	84004245
Cable Tie Bar for 400 deep ODR	1	84004247
Cable ties - Nylon	100	23236335
Heatshrink (1/4")	1m	84004249
Heatshrink (3/4")	1m	84004251

Supply Information

Cable Tie Bars are not supplied with the ODR-B/OUT's and have to be ordered separately. For alternative glanding options and other information please contact our sales personnel.

ODR TRAY UNITS

Features

- Available as 1U, 2U, 3U or 6U units
- Each U accommodates 2 x fiber trays with max. capacity of 24 fibers (SFF)
- 19" rear mounted for improved access
- Integral conduit fixing points give strain relief and guarantee bend radius
- Horizontal fiber tray mounting maximises available height foot-print
- Integrated patchcord mandrels for bend-radius protection
- Allows fiber trays and connected patchcords to slide in and out independently
- Silicon patchcord retaining ring ensures safe clamping of multiple patchcords
- Powder coated steel construction
- Color RAL 7035 (light grey)
- Fixing kit included

Ordering Information: ODR Unit Tray

Description	Height Unit	Unit	Part no.
ODR-TU-1U-STA-A1	1	1	84004185
ODR-TU-2U-STA-A1	2	1	84004188
ODR-TU-3U-STA-A1	3	1	84004190
ODR-TU-6U-STA-A1	6	1	84004192

Odering Information: Accessories

Description	Unit	Part no.
Patchcord retaining ring	100	84004194

Supply Information

The patchcord mandrel units supplied with each ODR-TU are packed loose and should be fixed according to whether the preferred patchcord direction is up or down. When using the ODR-TU for high density ODR configurations, advice should be sought on the most effective use of this and other subracks within the LISA range.

For more details please ask for the separate LISA catalogue

ODR - XU (ODR CROSS-CONNECT UNIT)

Features

- Provides patchcord overlength take-up when patching between Fiber Trays within the ODR
- Divide plate on LHS provides separation between patchcords and conduit tubes within the ODR
- Deep mandrels provide high capacity for patchcords
- Fiber bend-radius control
- Overall height 6U
- 19" rear mounting
- Steel construction
- Powder coated RAL 7035 (light grey)
- Includes fixing kit

Ordering Information: ODR Cross-connect Unit

Description	Unit	Part no.
ODR X Connect Unit	1	84004196

SLBT - STORAGE LOOP BOX TELESCOPIC

Features

- Provides patchcord storage
- Patchcord Entry & Exit through both sides
- Mounted on telescopic rails for easy access
- Integral Mandrels control fiber bend radius
- Removable lid
- Overall height 2U
- 19" front & rear mounting
- Steel construction
- Powder coated RAL 7035 (light grey)

Odering Information: Storage Loop Box

Description	Unit	Part no.
Storage Loop Box Telescopic	1	84004198

WBH - WALL BOX HIGH CAPACITY

WBH MASTERLINE®
- For direct connection with MASTERLINE® or patchcords
- Capacity up to 144 fibers using SFF
- Snap-in gland design for fast installation
- Customer/Subscriber separation
- Laser Safe (side facing)
- Adapter configuration labels

WBH Fusion Spliced
- Capacity up to 144 fibers SFF (6 x fiber trays)
- Fiber trays independently hinged for instant access
- Bend-limiting loose tube protection
- Customer/Subscriber separation
- Central strength member fixing
- Universal glanding options

WBH Fitted with adapter plate and adapters (for MASTERLINE®/Patching)

Ordering information	Description
WBH-	Wallbox High Capacity
AP-	Suitable for MASTERLINE® or Patchcords
80-	Connector Code (see inside back cover)
nn-	Number of Adapters
SM-	Singlemode Adapters
MM-	Multimode Adapters
STA-	Standard Configuration (default)
A	Variant (default A)
1	HUBER+SUHNER branding

Ordering Information: Wall Box Compact For Fusion Splicing

Description	Unit	Part no.
Wallbox High Capacity - Empty	1	84004282
Wallbox High Capacity - Fiber Tray Carriage for 6 x FT's	1	84004284
Installation kit for 6 x fiber trays (6 x loose tubes)	1	84004286
Installation kit for 6 x fiber trays (12 x loose tubes)	1	84004288
WBH Gland Bracket for 2 large MASTERLINES®	1	84004290
WBH Gland Bracket for 1 medium MASTERLINE®, PG9 &13.5 Glands (Kit)	1	84004219
WBH Gland Bracket for 3 medium or 12 small MASTERLINES®	1	84004296

WBC - WALL BOX COMPACT (24/48 FIBER)

WBC MASTERLINE®
- Extremely compact 345 mm x 255 mm x 58 mm
- For direct connection with MASTERLINE® or patchcords
- Capacity up to 48 fibers using SFF
- Snap-in gland desing for fast installation
- Customer/Subscriber separation
- Laser safe (side facing)

WBC Fusion Spliced
- Extremely compact 345 mm x 255 mm x 58 mm
- Allows 2 x fiber trays to be mounted
- Capacity up to 48 fibers SFF (2 x fiber trays)
- Fiber trays independently hinged for instant access
- Customer/Subscriber separation
- Over-length facility for incoming fiber/conduit

WBC Fitted with adapter plate and adapters (for MASTERLINE®/Patching)

Ordering information	Description
WBC-	Wallbox Compact
AP-	Suitable for MASTERLINE®/Patchcords
80-	Connector Code (see inside back cover)
nn-	Number of adapters
SM-	Singlemode adapters
MM-	Multimode adapters
STA-	Standard configuration (default)
A	Variant (default A)
1	HUBER+SUHNER branding

Ordering Information: Wall Box Compact For Fusion Splicing

Description		Unit	Part no.
WBC-STA-A1	Wallbox Compact - Empty	1	84004200
WBC-FTC-2-STA-A1	Fiber Tray Carriage - accommodates 2 x FT's	1	84004203
WBC-KIT-SPL-2-A1	Installation kit for 2 x Fiber Trays (2 x loose tubes)	1	84004208
WBC-KIT-SPL-4-A1	Installation kit for 2 x Fiber Trays (4 x loose tubes)	1	84004210
WB-M-MGB/PG9/13.5-1-A1	Bracket for 1 x medium MASTERLINE®, PG9 & PG 13.5	1	84004219

Note: Fiber Trays are supplied with all accessories necessary for complete installation and service

ODU - OPTIMISED DISTRIBUTION UNITS

The ODU is a 19" subrack that can be front mounted to any standard rack. All of the LISA Fiber Tray range can be housed in the ODU including pre-terminated M3K assemblies. Flexible mounting points at the rear of the ODU make cable glanding quick and easy, whilst bend-limiting conduit gives ultimate protection to the incoming fibers. Patchcord protection is achieved by the ODU's moulded exit guide and lockable steel doors offer complete access security.

Features

- 19" Front Mounting
- Available as 1U, 2U, 3U & 6U
- Each U accommodates 2 Fibre Trays
- Splicing versions and M3K versions
- Lockable & Removable Front Door
- Vented for Air-Flow
- Steel Construction
- Powder Coated RAL 7035 (light grey)
- Fixing & Installation Kit included

Ordering Information: Optimised Distribution Units

Description	Unit	Part no.
ODU 1U unit for splicing 2 x Fiber Trays	1	84004222
ODU 2U unit for splicing 4 x Fiber Trays	1	84004224
ODU 3U unit for splicing 6 x Fiber Trays	1	84004226
ODU 6U unit for splicing 12 x Fiber Trays	1	84004229

Ordering Information: Optimised Distribution Units M3K

Description	Unit	Part no.
ODU 1U unit for 2 x Fiber Trays (M3K)	1	84004232
ODU 2U unit for 4 x Fiber Trays (M3K)	1	84004234
ODU 3U unit for 6 x Fiber Trays (M3K)	1	84004236
ODU 6U unit for 12 x Fiber Trays (M3K)	1	84004238

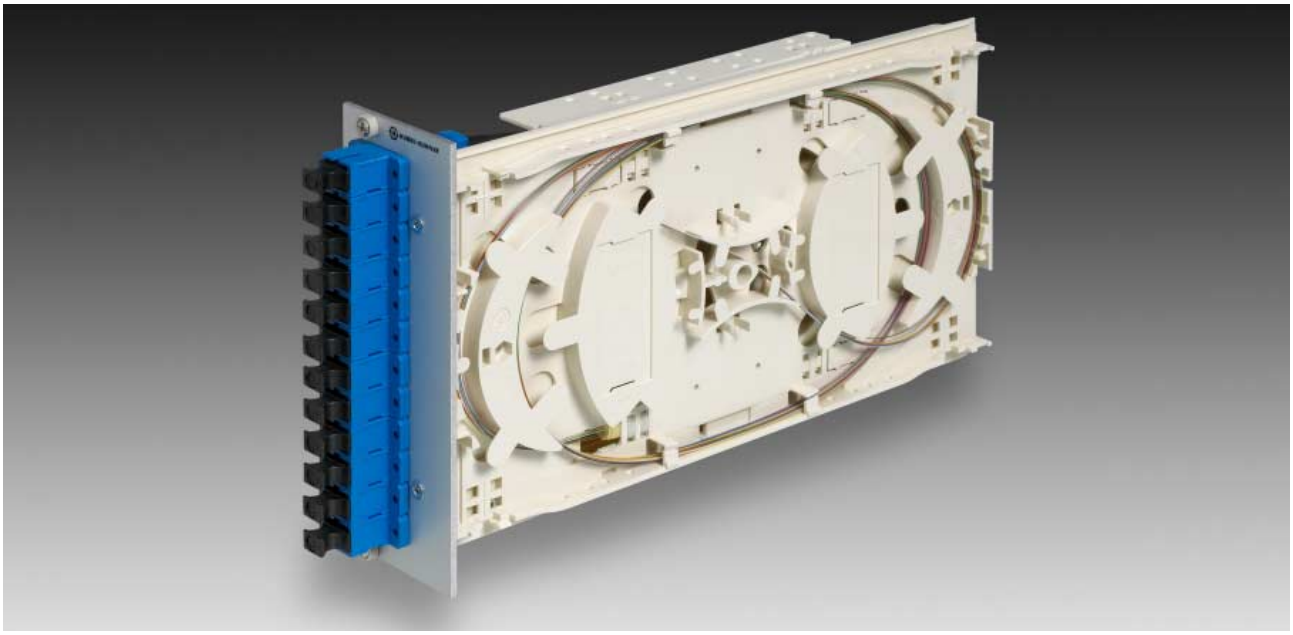
For more details please ask for the separate LISA catalogue

SIDE ACCESS ACCESSORIES AND SPARE PARTS

Description			Unit	Part no.
ODR Accesories				
ODR-FFK-RF-1	For fixing to raised floor		1	84004337
ODR-FFK-SF-1	For fixing to concrete floor		1	84004341
ODR-BAYING-KIT			1	84004348
ODR EARTHING KIT1			1	84004353
ODR-DK-600	For fixing Lightpath ducting to top of PSR/ODR		1	84004325
ODR-DK-900	For fixing Lightpath ducting to top of PSR/ODR		1	84004329
ODR-CMU-30X5-STA-A1	Manages 30 x 5mm cable vertically in ODR		1	84004333
ODR-PATCHCORD-BND-1	Grips patchcords to ODR-TU sub-racks		100	84004194
ODR Conduit Assemblies				
ODR-CA-BK-1-1.0-A1	Simplex conduit assembly	1.0 m long	1	84004376
ODR-CA-BK-1-1.6-A1	Simplex conduit assembly	1.6 m long	1	84004373
ODR-CA-BK-1-2.5-A1	Simplex conduit assembly	2.5 m long	1	84004380
ODR-CA-BK-2-1.0-A1	Duplex conduit assembly	1.0 m long	1	84004362
ODR-CA-BK-2-1.6-A1	Duplex conduit assembly	1.6 m long	1	84004357
ODR-CA-BK-2-2.5-A1	Duplex conduit assembly	2.5 m long	1	84004368
Fiber Tray Accesories				
Fiber Tray hinge assembly			1	84004493
Fiber Tray top cover			1	84004490
Fiber Tray top cover label			1	84004485
Fiber Tray number labels 1-100			10	84004480
Fiber Tray number labels 1-12			10	84004477
Fiber Tray laser warning labels			10	84004473
Splice protectors for 250 micron			12	84004468
Splice protectors for 900 micron			12	84004455
Fiber Tray patchcord arm & fixings			1	84004451
Cable ties small for use with Fiber Tray			100	84004495

Note: Fiber Trays are supplied with all accessories necessary for complete installation and service

MCM COMPACT MODULES



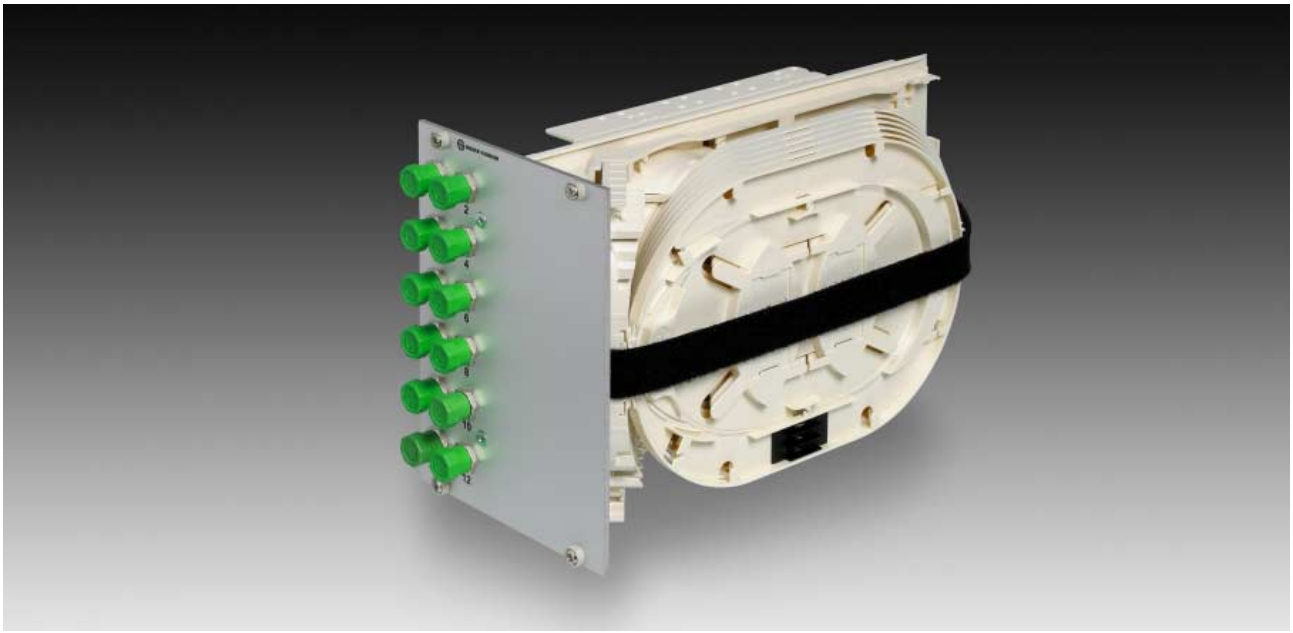
HUBER+SUHNER compact modules for MultiCircuit applications combine simple installation and maximum security for your optical network. An integrated excess length store in each module allows the removal to the splicing machine without disturbing neighbouring modules.

All modules can be rapidly installed and clipped into the universal mounting subrack.

Features
- For MultiCircuit Management
- Integrated loose tube management
- For all connector types including SFF
- Generous loose tube reserves
- Bend radius limits of 35mm for fibers and 45mm for loose tubes
- Simple front mounting

						Description MCM compact module	
MCM3-9U						MCM compact module with 9 sub-units	
	LX5-					Assembled with LX.5 pigtails	
	FLC-					Assembled with LC pigtails	
	FLSH-					Assembled with E-2000™ pigtails	
	FSC-					Assembled with SC pigtails	
	FSCD-					Assembled with SC-Duplex pigtails	
	FST-					Assembled with ST pigtails	
	FC-					Assembled with FCPC pigtails	
	MTRJ-					Assembled with MT-RJ pigtails	
	SPL-					For splicing	
		12-				Number of pigtails	
			AS			Singlemode APC 8°	9 µm
			BS			Singlemode PC	9 µm
			CS			Multimode	50 µm
			DS			Multimode	62.5 µm
				B-		High-End Assembly class	for Singlemode only
				C-		0.1 dB Assembly class	for Singlemode only
				M-		Multimode	
					SW0	Splice holder for sandwich splice protectors	
					HS0	Splice holder for heat shrink splice protectors	

SCM COMPACT MODULES

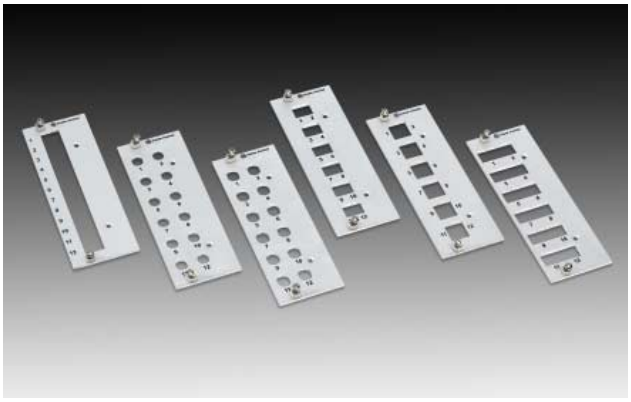


HUBER+SUHNER compact modules for SingleCircuit applications combine simple installation and maximum security for your optical network. An integrated excess length store in each module allows the removal to the splicing machine without disturbing neighbouring modules.

All modules can be rapidly installed and clipped into the universal mounting subrack.

Features
- For SingleCircuit Management
- Integrated loose tube management
- For all connector types including SFF
- Generous loose tube reserves
- Bend radius limits of 35mm for fibers and 45mm for loose tubes
- Simple front mounting

						Description SCM compact module	
SCM3-18U-						SCM compact module with 18 sub-units	
	LX5-					Assembled with LX.5 pigtails	
	FLC-					Assembled with LC pigtails	
	FLSH-					Assembled with E-2000™ pigtails	
	FSC-					Assembled with SC pigtails	
	FST-					Assembled with ST pigtails	
	FC-					Assembled with FCPC pigtails	
	MTRJ-					Assembled with MT-RJ pigtails	
	SPL-					For splicing	
		12-				Number of pigtails	
			AS			Singlemode APC 8°	9 µm
			BS			Singlemode PC	9 µm
			CS			Multimode	50 µm
			DS			Multimode	62.5 µm
				B-		High-End Assembly class	for Singlemode only
				C-		0.1 dB Assembly class	for Singlemode only
				M-		Multimode	
					SW0	Splice holder for sandwich splice protectors	
					HS0	Splice holder for heat shrink splice protectors	

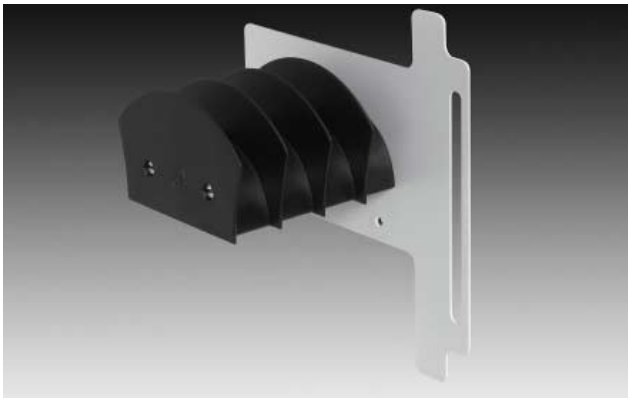


Description	Unit	Part. no
Adapter front plates 3U, 9SU wide Incl. mounting material For connection of pre-terminated breakout cables front plates for standard and hybrid adapters		
12 SC/E-2000™ Simplex[1)]	1	84003006
12 FC	1	84003001
12 ST	1	84003005
6 LX.5 Duplex	1	84003003
6 LC Duplex	1	84003002
6 SC Duplex	1	84003004
Blind front plate, 9U wide	1	84003000

1) only for E-2000™ compact adapters

Subrack ODR 900F, 4U For mounting of 8 MCM compact modules or 4 SCM compact modules incl. cable entries for the secure fixing with strain relief of all connected cables Suitable for ODR 800F and ODR 900F	1	23040051

Loose tube guiding kit ODR 900F For protection and radius limitation of loose tubes within the subrack ODR 900F, 4U	1	84003334



Patchcord Management, 4U For storage with bend radius limitation of all connected patchcords	1	23040070

FIBERPORT COMPACT MODULE SYSTEM

Features:

- 3U height (12.9 cm), 7SU width (3.5 cm), aluminium front plate
- Designed to be equipped with connector types E-2000™, LX.5, FLC, FSC, FSC Duplex, FST, FCPC or MT-RJ
- The pigtails in the splicing cassette are dismantled and ready for splicing
- Pigtails are protected from being damaged by a lockable overlength and the splicing cassette itself
- For the E-2000™ module:
  a subsequent adapter assembling is always possible

Content:

• Rack unit 19″	KPM3-BGT-7TE
• Compact modules	see order code
• Blanking plates 7SU	KPM3–BLD-7TE
• Guiding channel	KPM3-RANG-001
• Conveyor tray	KPM3-UEB-001

Ordering information: Compact Module

							Description
KPM3 –							Compact module 3U
	7U –						7 sub-units with multi-fiber loose tube entrance
		FLSH –					Assembled with E-2000™ pigtails
		FSC –					Assembled with FSC pigtails
		FST –					Assembled with FST-HQ pigtails
		FCPC –					Assembled with FCPC pigtails
		FSCD –					Assembled with FSC-Duplex pigtails
		FLC –					Assembled with FLC pigtails
		LX5 –					Assembled with LX.5 pigtails
		FMTJ –					Assembled with MT-RJ pigtails
			12 –				Number of pigtails
				AS-			Singlemode APC 8°
				BS-			Singlemode PC
				CS-			Multimode 50 µm
				DS-			Multimode 62.5 µm
					SW0		Splice holder for sandwich splice protectors
					HS0		Splice holder for heat shrink splice protectors

Ordering information: Accessories

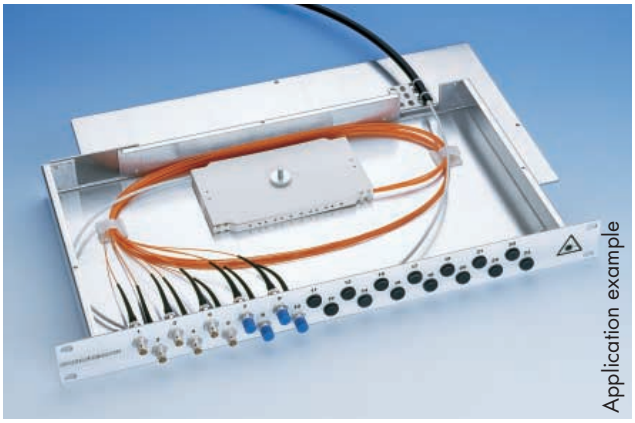
Description	Part no.
Blanking plate 7SU	**22664014**
Rack unit 19″	**22664013**
Guiding channel	**22664012**
Conveyor tray	**22664011**

Types printed in bold are stock types

ORDERING CODE FOR ASSEMBLED CTB'S

Code	Description
	Housing variant
KSD1–	KEV 19" 1 U Standard
KSD2–	KEV 19" 2 U Standard
KFB1–	KEV 19" 1 U FiberFrame
KFB2–	KEV 19" 2 U FiberFrame
	Front panel variant
A–	20-way for Standard 1U
B–	24-way
C–	24-way zigzag alignment
D–	48-way
E–	48-way zigzag alignment
F–	customer-specific alignment
	Connector code
20–	please see inside back cover
	Number of loose tubes
6–	1 – 6
	Number of fibers
48–	1 – 48
	Fiber type
09–	9 µm
50–	50 µm
62–	62.5 µm
	Splice cassette
1–	LISA MCM
2–	Quante
3–	Reichle & De-Massari
	Cover for splice cassette
0–	without cover
1–	with cover
	Splice-protection and holder
1–	Sandwich, 12-way
2–	Shrinked, 60 mm, 6-way
3–	Shrinked, 45 mm, 6-way
4–	Shrinked, 23 mm, 10-way
	Cable entry
A	Perforated plate
B	ML 2-12 fibers
C	ML 14-24 fibers
D	ML 26-48 fibers
E	with cable gand 90° PG 11-5-12
F	with cable gand 90° PG 16-8-15
G	with cable gand 90° PG 21-11-20.5
H	with cable gand 45° PG 7/11-3-10
I	with cable gand 45° PG 11/16-5-14
K	Dust protection cover

CTB 19" 1 U/2 U; STANDARD



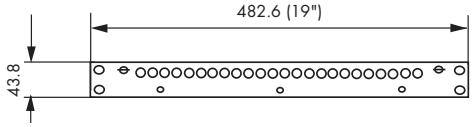
Application example

Features:
- Space-saving 19" rack installation
- 12 to 48 adapter holes
- Spare multi-fiber loose tube and pigtail tube in housing

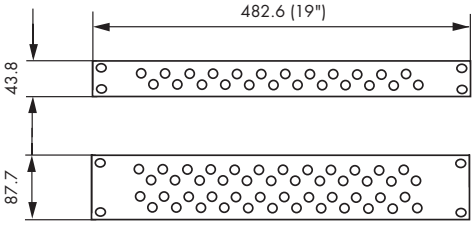
Material:
- Standard aluminium
- Front plate: anodized aluminium

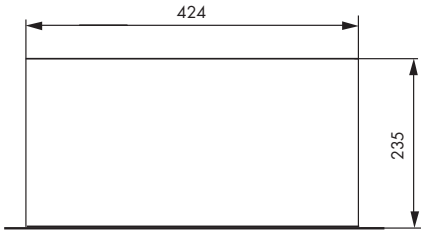
Content of unpopulated CTB's:
- Housing including cover
- Front plate
- Cable entry with perforated plate

Dimensions in mm:



Zigzag alignment:



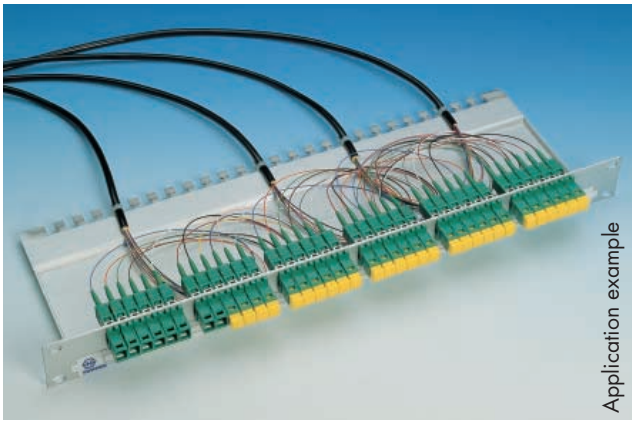


Ordering information: for unpopulated CTB's

Description	Part no.	Height Unit
For max. 20 FST adapters	**22653006**	1
For max. 20 FCPC adapters	22653004	1
For max. 20 FSC adapters	22653012	1
For max. 12 FLC adapters	**23025982**	1
For max. 12 LX.5 adapters	**23027717**	1
For max. 12 MT-RJ adapters	23027716	1
Zigzag alignment		
For max. 24 FSMA adapters	22653009	1
For max. 24 FST adapters	**22653010**	1
For max. 24 FCPC adapters	22653011	1
For max. 24 FSC adapters	**22653008**	1
For max. 12 FSC Duplex adapters	23037075	1
For max. 24 E-2000™ adapters	**23017093**	1
For max. 48 FSMA adapters	22653013	2
For max. 48 FST adapters	22653014	2
For max. 48 FCPC adapters	22653015	2
For max. 48 FSC adapters	23036904	2
For max. 48 E-2000™ adapters	23036905	2

Types printed in bold are stock types

CTB 19" 1 U; RISER FRAME LIGHT



Application example

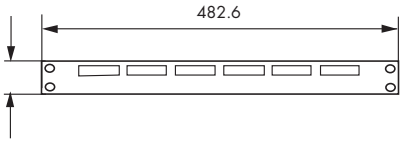
An economic alternative to the regular RISER-FRAME is the RISER-FRAME LIGHT without housing box, suitable for FSC EASYFIT or FSC Quick Assembly.

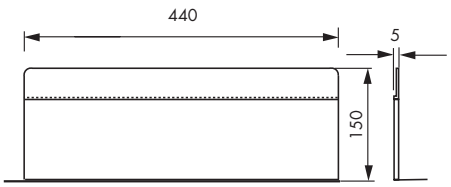
Features:
- Time-saving installation
- Can be equipped with up to 36 connectors
- No splicing, no pigtails needed
- Space-saving installation into 19" rack
- Adapters with integrated fixing spring

Material:
- Standard aluminium
- Front plate: anodized aluminium

Content of unpopulated CTB's:
- Front/ground panel
- Inscription system
- 4 cable binders

Dimensions in mm:



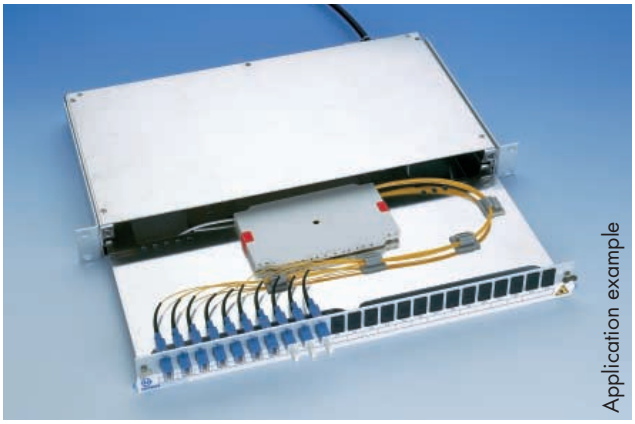


Ordering information: for unpopulated CTB's

Description	Part no.	Height Unit
For max. 36 FSC adapters	22652215	1

Upon request RISER FRAME LIGHT CTB's can be ordered populated.

CTB 19" 1 U/2 U; FIBER FRAME



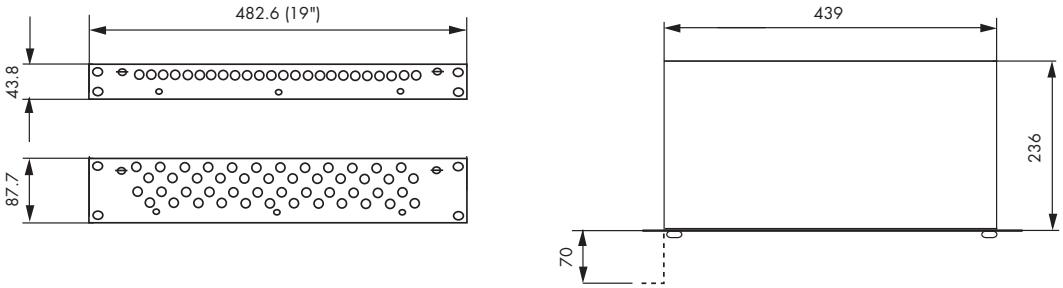
Application example

Features:
- Space-saving 19" rack installation
- Flush or recessed (70 mm) installation
- Up to 24 connectors
- Telescopic, pullout tray for easy access
- Easy, time-saving installation
- Universal inscription system including laser warning sign

Material:
- Standard aluminium
- Front plate: anodized aluminium

Content of unpopulated CTB's:
- Housing with cable entry and perforated plate
- Instription system
- Front plate

Dimensions in mm:

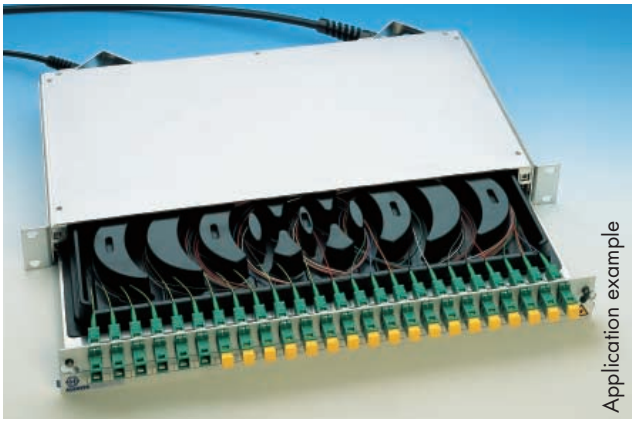


Ordering information: for unpopulated CTB's

Description	Part no.	Height Unit
For max. 20 E-2000™ adapters	23036903	1
For max. 24 FST adapters	**22653016**	1
For max. 24 FCPC adapters	**22653017**	1
For max. 24 FSC adapters	**22653018**	1
For max. 24 E-2000™ adapters	**22653019**	1
For max. 12 E-2000™ Duplex adapters	**23020225**	1
For max. 12 FSC Duplex adapters	**22653020**	1
For max. 12 FLC adapters	**23020224**	1
For max. 12 LX.5 adapters	**23027715**	1
For max. 12 MT-RJ Duplex adapters	23027714	1
For max. 48 FST adapters	**22653021**	2
For max. 48 FCPC adapters	23653022	2
For max. 48 FSC adapters	23653023	2
For max. 48 E-2000™ adapters	23653024	2
For max. 24 SC Duplex adapters	23653025	2

Types printed in bold are stock types

CTB 19" 1 U; RISER FRAME



Application example

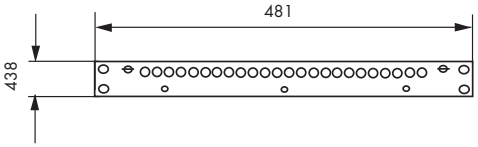
RISER-FRAME supports a spliceless fiber distribution concept. Instead of a splice tray, a secure fiber guiding system is used.
Pigtails are replaced by FSC-EASYFIT or FSC QuickAssembly connectors allowing a quick field termination.

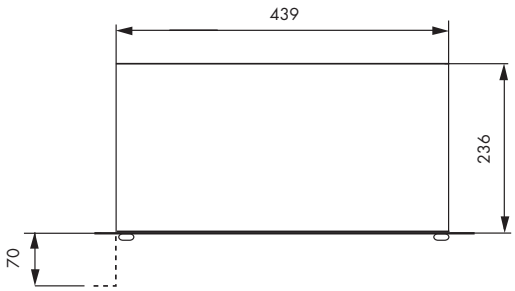
Features:
- Time-saving installation
- Up to 24 connectors
- No splicing, no pigtails needed
- Space-saving installation into 19″ rack
- Cable insertion 45° or 90° possible
- Security with fiber guiding system

Material:
- Standard aluminium
- Front plate: anodized aluminium

Content of unpopulated CTB's:
- Housing with cable entry perforated plate
- Inscription system
- Fiber guiding system
- Front panel
- 4 cable binders

Dimensions in mm:



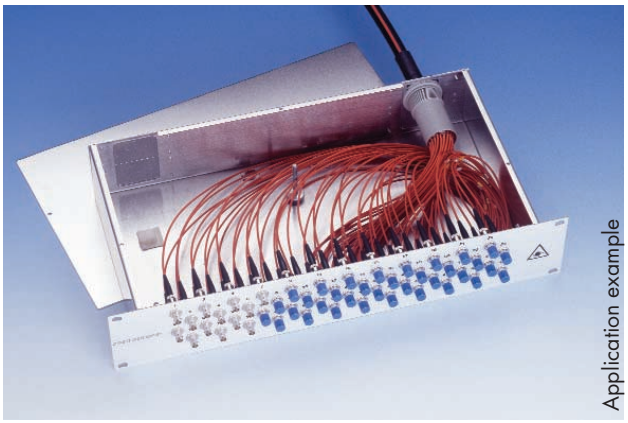


Ordering information: for unpopulated CTB's

Description	Part no.	Height Unit
For max. 24 FSC adapters	22652214	1

Upon request RISER FRAME CTB's can be ordered populated.

MASTERLINE® CTB 19" 1U/2U, STANDARD



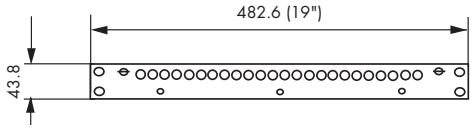
Application example

Features:
- Cable termination box for MASTERLINE® 100, 500 and 600 system
- Space-saving aluminium insert for 19" standard racks
- Up to 48 adapter holes

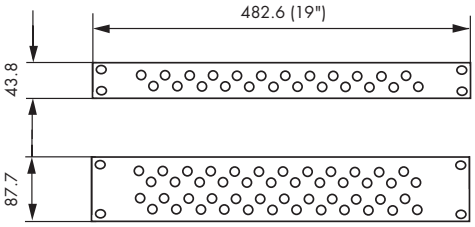
Material:
- Standard aluminium
- Front plate: anodized aluminium

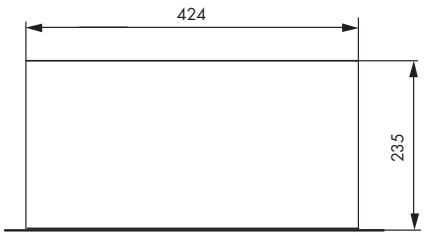
Extent of supply:
- Housing including cover
- Front plate
- Plate for MASTERLINE® entry
- Fixing screws
- Fixed adapters, up to 48 pieces

Dimensions in mm:



Zigzag alignment:

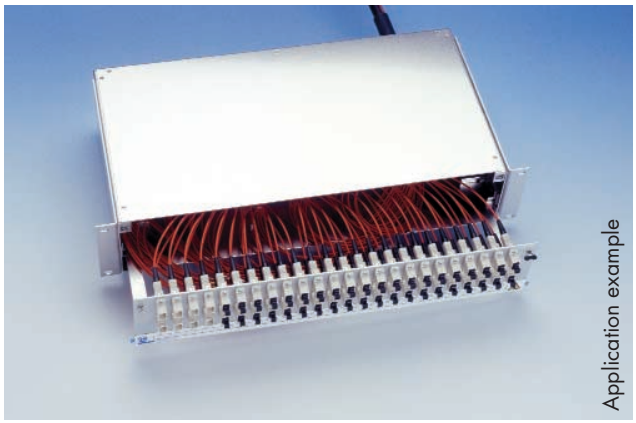




Ordering information:

Description	Type	Height Unit
for max. 20 FST adapters	KEV1-STD-FST-20-ML	1
for max. 20 FCPC adapters	KEV1-STD-FCPC-20-ML	1
for max. 20 FSC adapters	KEV1-STD-FSC-20-ML	1
for max. 20 FLSH adapters	KEV1-STD-FLSH-20-ML	1
Zickzack alignment		
for max. 24 FST adapters	KEV1-STD-FST-24-ML	1
for max. 24 FCPC adapters	KEV1-STD-FCPC-24-ML	1
for max. 24 FSC adapters	KEV1-STD-FSC-24-ML	1
for max. 24 FLSH adapters	KEV1-STD-FLSH-24-ML	1
for max. 12 FLC duplex adapters	KEV1-STD-FLC-24-ML	1
for max. 12 LX.5 duplex adapters	KEV1-STD-LX5-24-ML	1
for max. 12 FSC duplex adapters	KEV1-STD-FSCD-24-ML	1
for max. 48 FST adapters	KEV2-STD-FST-48-ML	2
for max. 48 FCPC adapters	KEV2-STD-FCPC-48-ML	2
for max. 48 FSC adapters	KEV2-STD-FSC-48-ML	2
for max. 48 FLSH adapters	KEV2-STD-FLSH-48-ML	2

MASTERLINE® CTB 19" 1U/2U, FIBER FRAME



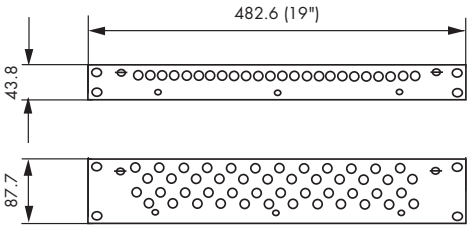
Application example

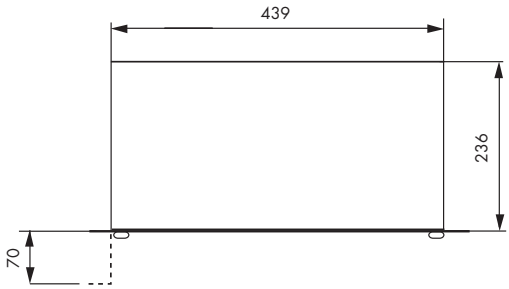
Features:
- Cable termination box for MASTERLINE® 100, 500 and 600 system
- Space-saving aluminium insert for 19" standard racks
- Up to 48 adapter holes
- Flush or recessed installation
- Telescopic, pullout tray for easy access

Material:
- Standard aluminium
- Front plate: anodized aluminium

Extent of supply:
- Housing including cover
- Front plate
- Inscription system
- Plate for MASTERLINE® entry
- Fixing screws
- Fixed adapters, up to 48 pieces

Dimensions in mm:

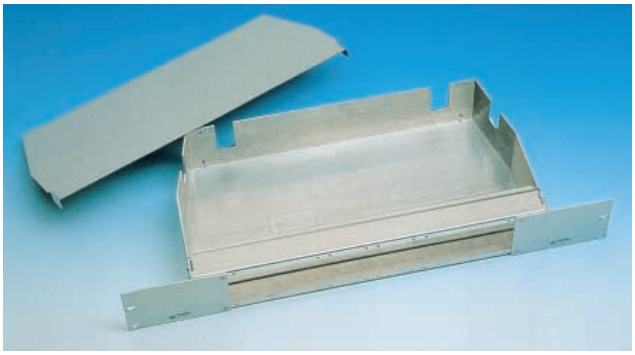




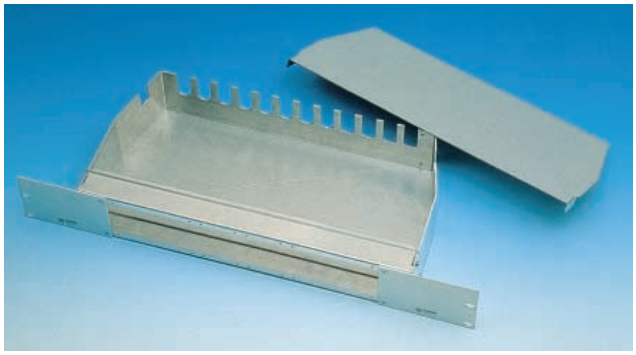
Ordering information:

Description	Type	Height Unit
for max. 24 FST adapters	KEV1-FBF-FST-24-ML	1
for max. 24 FCPC adapters	KEV1-FBF-FCPC-24-ML	1
for max. 24 FSC adapters	KEV1-FBF-FSC-24-ML	1
for max. 24 FLSH adapters	KEV1-FBF-FLSH-24-ML	1
for max. 12 FLC duplex adapters	KEV1-FBF-FLC-24-ML	1
for max. 12 LX.5 duplex adapters	KEV1-FBF-LX5-24-ML	1
for max. 12 FSC duplex adapters	KEV1-FBF-FSCD-24-ML	1
for max. 12 FLSH duplex adapters	KEV1-FBF-FLSH-24-02-ML	1
for max. 20 FLSH adapters	KEV1-FBF-FLSH-20-ML	1
for max. 48 FST adapters	KEV2-FBF-FST-48-ML	2
for max. 48 FCPC adapters	KEV2-FBF-FCPC-48-ML	2
for max. 48 FSC adapters	KEV2-FBF-FSC-48-ML	2
for max. 48 FLSH adapters	KEV2-FBF-FLSH-48-ML	2
for max. 24 FLC duplex adapters	KEV2-FBF-FLC-48-ML	2
for max. 24 LX.5 duplex adapters	KEV2-FBF-LX5-48-ML	2
for max. 24 FSC duplex adapters	KEV2-FBF-FSCD-48-ML	2

MASTERLINE® CONNECTION BOXES 300 AND 400



Connection box 300 for up to 4 divider heads Ø 31 mm



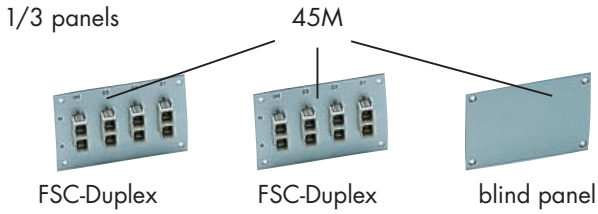
Connection box 400 for up to 14 divider heads Ø 22 mm

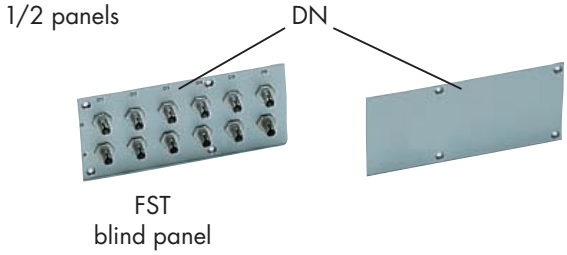
Connections boxes for MASTERLINE® systems 100/500/600
- Designed for 19" rack, 1.5 Height Unit
  355 x 185 x 66 mm (without adapters and fishplate)
- Material: aluminium

Front panels are supplied along with connection boxes 300 and 400. When ordering MASTERLINE® 200 and 600 systems or connection boxes the panel type has to be specified according to the code stated in the table beneath. The sequence of panels is defined by the order of codes in the order number. Standard boxes can hold front panels with up to 24 fibers.

Order information for connections boxes		
300-0000-		Connection box 300
400-0000-		Connection box 400
	45M	Front panel equipment, see list below

Examples:

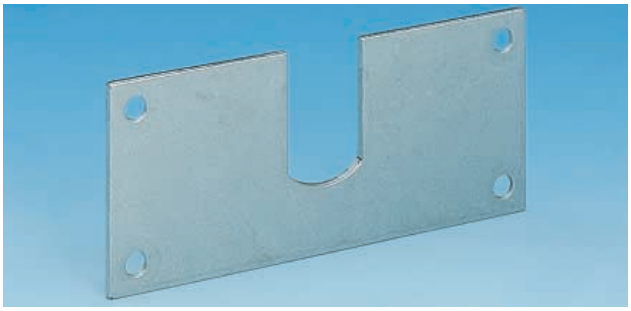




Front panel type	Width	Position	Inscription	Code
8 times FST	1/3	left	01-04	1
		center	05-08	2
		right	09-12	3
12 times FST	1/2	left	01-06	D
		right	07-12	E
4 times FSC Duplex	1/3	left	01-04	4
		center	05-08	5
		right	09-12	6
6 times FSC Duplex	1/2	left	01-06	F
		right	07-12	G
8 times E-2000™	1/3	left	01-04	P
		center	05-08	Q
		right	09-12	R
12 times E-2000™	1/2	left	01-06	S
		right	07-12	T
8 times FCPC	1/3	left	01-04	U
		center	05-08	V
		right	09-12	W
12 times FCPC	1/2	left	01-06	X
		right	07-12	Y
Blind panel	1/3		none	M
	1/2		none	N

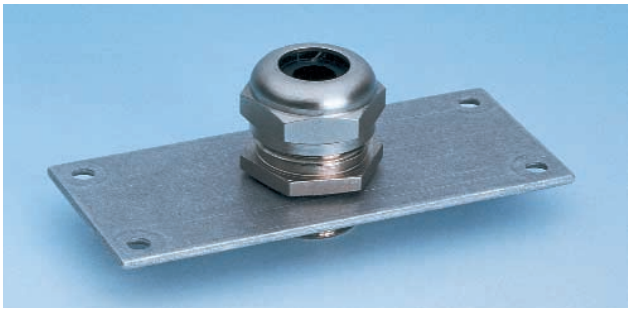
Upon request a connection box for 48 fibers (2.5 U) is available with front panels for FST and FSC Duplex adapters.

CTB ACCESSORIES - TERMINATION AND CONNECTOR BOXES



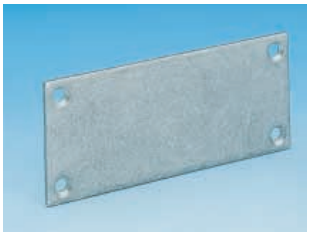
Description	Part no.
Cable entry for MASTERLINE® CTB	
2 – 12 fibers, Ø 22 mm*	**22653045**
14 – 24 fibers, Ø 31 mm*	**22653046**
26 – 48 fibers, Ø 43 mm*	**22653047**

* Ø of pulling tube



Description	Part no.
Cable entry with cable gland	
Size Pg 11 (Ø 5 – 12 mm)	**22653048**[1)]
Size Pg 16 (Ø 8 – 15 mm)	**22653049**[1)]
Size Pg 21 (Ø 11 – 20.5 mm)	**22653050**[1)]

Description	Part no.
Cable entry 45° with cable gland and antikink protection	
Size Pg 7/11 (Ø3 up to 10 mm)	**22653053**[1)]
Size Pg 11/16 (Ø5 up to 14 mm)	**22653052**[1)]
Backnut for MASTERLINE® 100 to install dividers in a hole	
2 – 12 fibers M 16x1	**22649054**
14 – 24 fibers M 26x2	**22649055**
26 – 48 fibers Pg 29	**22649056**

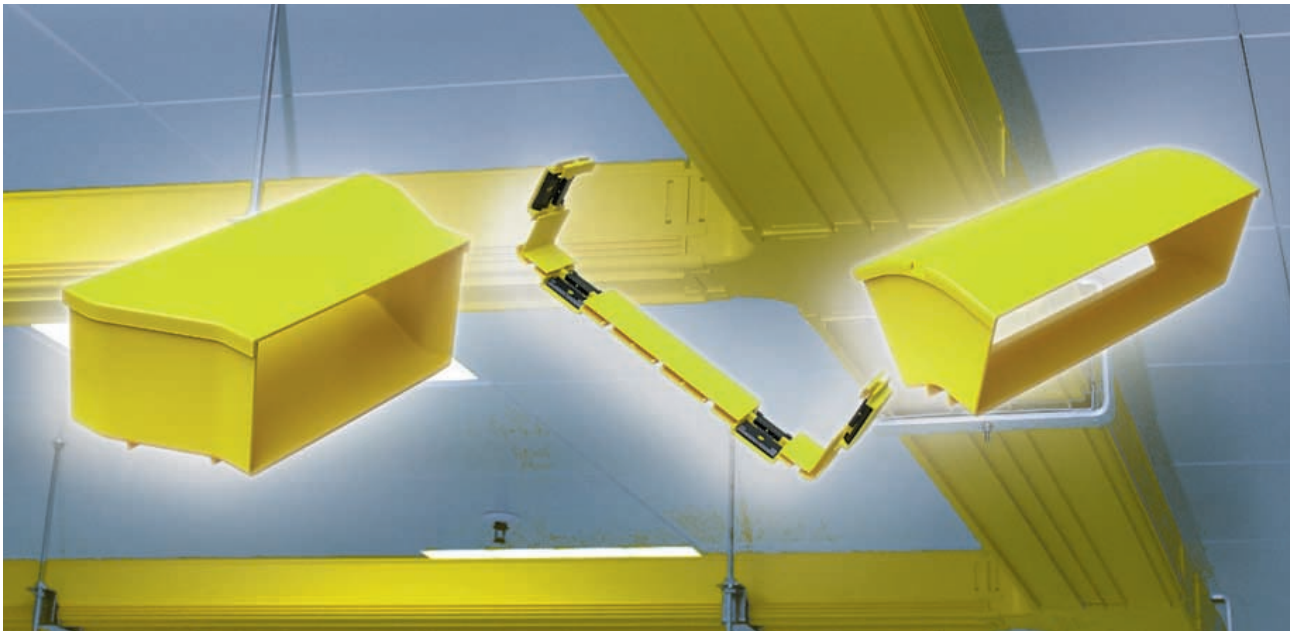


Description	Part no.
Dust protection cover for CTB	**22653051**
Cable entry with perforated plate for CTB	**22653043**

Description	Part no.
Blanking caps for front panel	Unit: 12 pieces
1 FST	**22653059**
2 FCPC	**22653056**
3 FSC, E-2000™, LX.5, MT-RJ, OPTOCLIP II	**22653057**
FSC Duplex	**22653054**
FSMA	**22653058**

[1)] phase out type, new type with metric thread
Types printed in bold are stock types

CABLE DUCTING SYSTEM LIGHTPATH

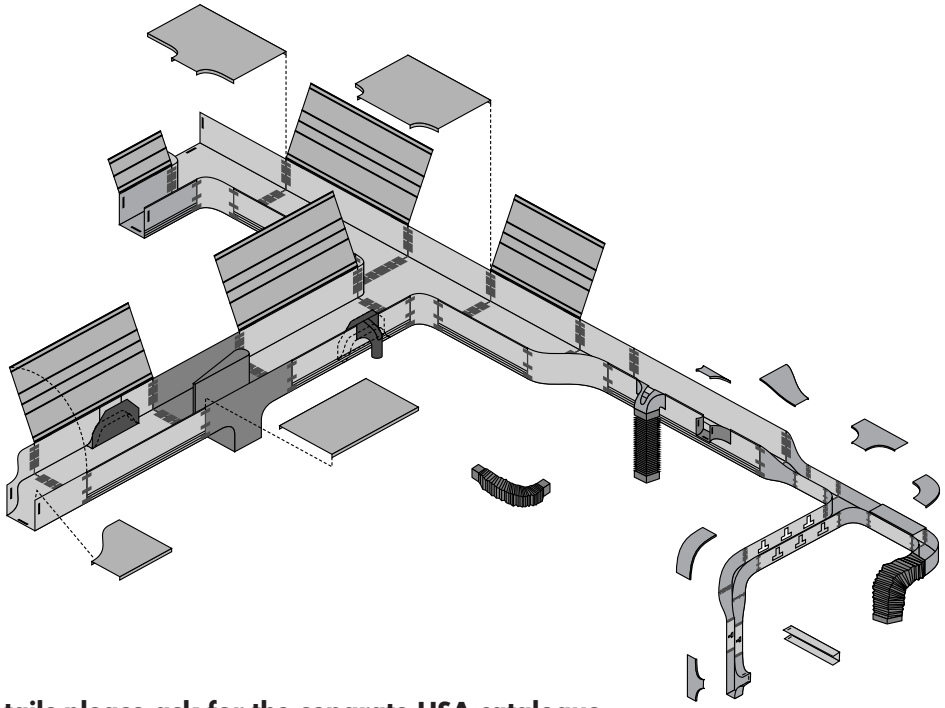


The concept of the HUBER+SUHNER cable ducting system guarantees for a secure and stress-free fiber management between different FO central distribution cabinets for example.

All components have compatible ducting accessories (T-pieces, ellows, bends, reducers etc.) to ensure a minimum bend radius of 30mm. Lids are available for all individual components to ensure cable protection.

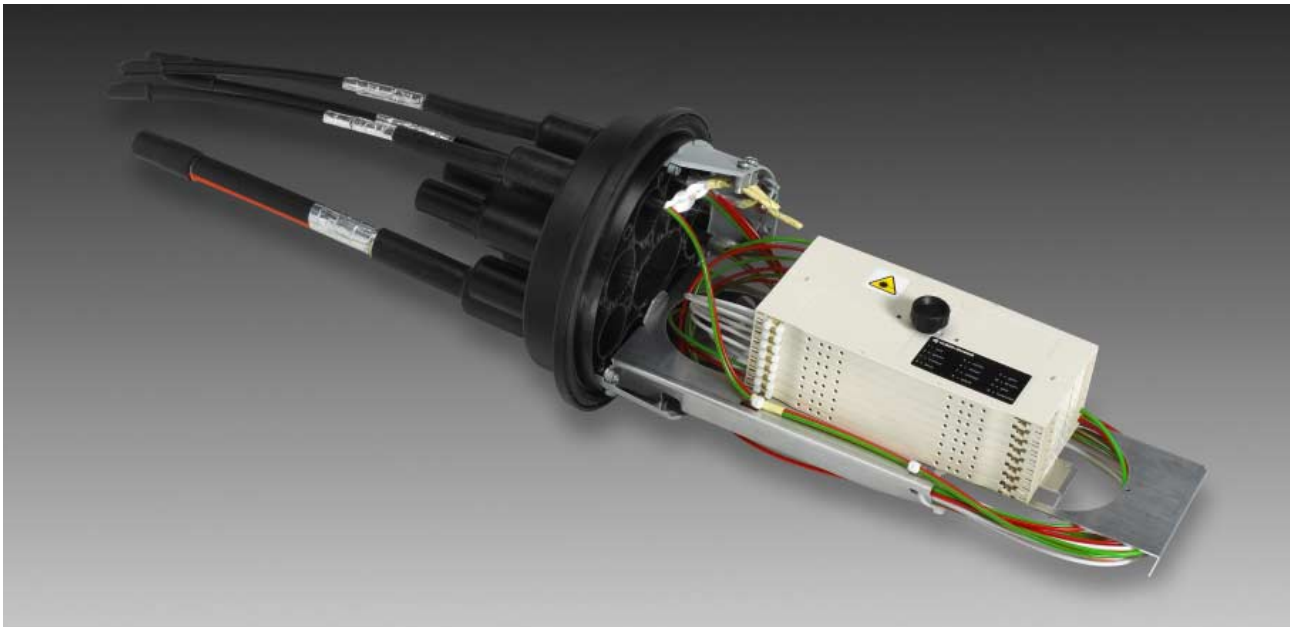
Features

- Flexible tube and vertical ducting provide access to multiple fiberoptic transmission system equipment within a rack
- A range of components is available to allow easy installation of the system in both old and new overhead and underground exchange situations
- Available in four sizes: 30, 50, 100 and 220 mm
- Ducting length: 2000 mm (standard)
- Material: halogen free plastics (Noryl)



For more details please ask for the separate LISA catalogue

FIBER OPTIC CABLE SPLICE CLOSURES



All USC dome closures can be opened and closed without the need for specialized equipment, replacement seals or sealing materials. Access to the fiberoptic cassettes for fitting or servicing is achieved through the removal of the dome.

The large variety of cable entry openings, for non-stripped cables also, makes the USC closure family the perfect solution for all cable types used in the LAN and Telecom markets. An air vent for testing the integrity of the seals is integrated into the closure, as is a central strain relief element.

Features

- Dome body for Multi and SingleCircuit Management
- Max. capacity of 192 splice connections for MultiCircuit, 96 for SingleCircuit
- Bend radius limits of 35mm for fibers, 45mm for loose tubes
- Integrated fiber management without protective sleeves
- Generous loose tube reserves
- For fitting to masts, walls, cable ducts or direct burial
- Simple cable entry fittings using heatshrink
- Integrated fixings for cables central strength member
- Closure openings for cut and uncut fiberoptic cables

echnical Data	USC600	USC750	USC500
Length (mm)	600	750	500
Diameter (mm)	205	205	150
Weight approximately (kg)	2.1 kg	2.3 kg	4.0 kg
Colour RAL 9005, black	•	•	•
Protection type (DIN 40050)	IP 67	IP 67	IP 67
Material Polypropelene	•	•	•
Operating temperature	-30°C to +60°C	-30°C to +60°C	-30°C to +60°C
Installation temperature	-5°C to +45°C	-5°C to +45°C	-5°C to +45°C
Capacity of LISA MCM[1] splice cassettes and splice connections	8 96	16 192	4 48
Capacity of LISA SCM[2] splice cassettes and splice connections	30 60	48 96	- -

[1] MCM - MultiCircuit-Management [2] SCM - SingleCircuit (Single Fiber) Management

UNIVERSAL SPLICE CLOSURES USC600

Description USC600	Part no.
incl. 8 MCM splice cassettes with 8 splice holders for sandwich splice protection	USC600-MCM-96-SW-U
incl. 8 MCM splice cassettes with 16 splice holders for heat shrink splice protection	USC600-MCM-96-HS-U

Description USC600	Part no.
incl. 30 SCM splice cassettes with 30 splice holders for sandwich splice protection	USC600-SCM-60-SW-U
incl. 30 SCM splice cassettes with 30 splice holders for heat shrink splice protection	USC600-SCM-60-HS-U

For more details please ask for the separate LISA catalogue

UNIVERSAL SPLICE CLOSURES USC750

Description USC750	Part no.
incl. 16 MCM splice cassettes with 16 splice holders for sandwich splice protection	USC750-MCM-192-SW-U
incl. 16 MCM splice cassettes with 32 splice holders for heat shrink splice protection	USC750-MCM-192-HS-U

Description USC750	Part no.
incl. 48 SCM splice cassettes with 48 splice holder for sandwich splice protection	USC750-SCM-96-SW-U
incl. 48 SCM splice cassettes with 48 splice holders for heat shrink splice protection	USC750-SCM-96-HS-U

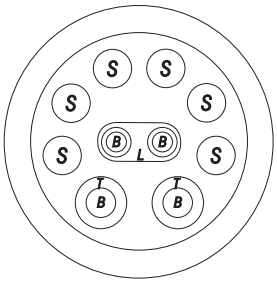
For more details please ask for the separate LISA catalogue

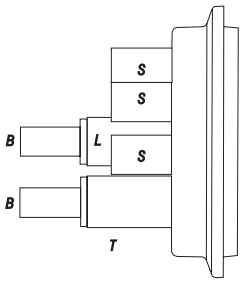
FIBER OPTIC CABLE SPLICE CLOSURES

Ordering information closures					Description
USC600-					Closure 600 (MCM: max. 96 splices; SCM: 60 splices)
USC750-					Closure 750 (MCM: max. 192 splices; SCM: 96 splices)
	MCM-				MultiCircuit Management
	SCM-				SingleCircuit Management
		12- 24- 192-			Number of splices (Max. capacity please see above) 12, 24, 36 etc splices in steps of 12 up to the max. capacity
			SW-		Sandwich splice protection holder
			HS-		Shrink splice protection holder
				U	Single parts, unassembled
				A	Assembled
USC600-	MCM-	72-	SW-	A	Example

Deliverables for splice closure USC600, USC750:

- Closure body
- Closure entry
- Fastening ring for closure body
- Abrasive paper for cable preparation
- Assembly instructions
- Cleaning cloths
- Central strength member fitting for strain relief
- Universal mounting plate for SCM or MCM cassettes
- Fixing material for splice cassettes
- Cassettes and accessories as ordered





Cable entries	Qty	Ø (mm)	Length (mm)	Suitable cable Ø
L	1	66x36	73	2x (8-24)
T	2	37	73	8-36
S	6	26.5	55	12-26
B	4	19	55	6-18

1

2

Description	Unit	Part no.
1 Universal wall fitting for USC600/750	1	23039741
2 USC heatshrink kit		
L, incl. clip	1	23039742
B/S	2	23039743
T	2	23039744

For more details please ask for the separate LISA catalogue

UNIVERSAL SPLICE CLOSURE USC500

Equipped with an integrated fiber management for up to 48 fibers, the USC500 is ideal for trunk and local access networks where re-entry is required.

The closure is supplied with 2 circular ports, an oval port for loop through applications and 4 splice cassettes, which can accomodate different types of splice holders and a storage basket for loop through fiber buffer tubes.

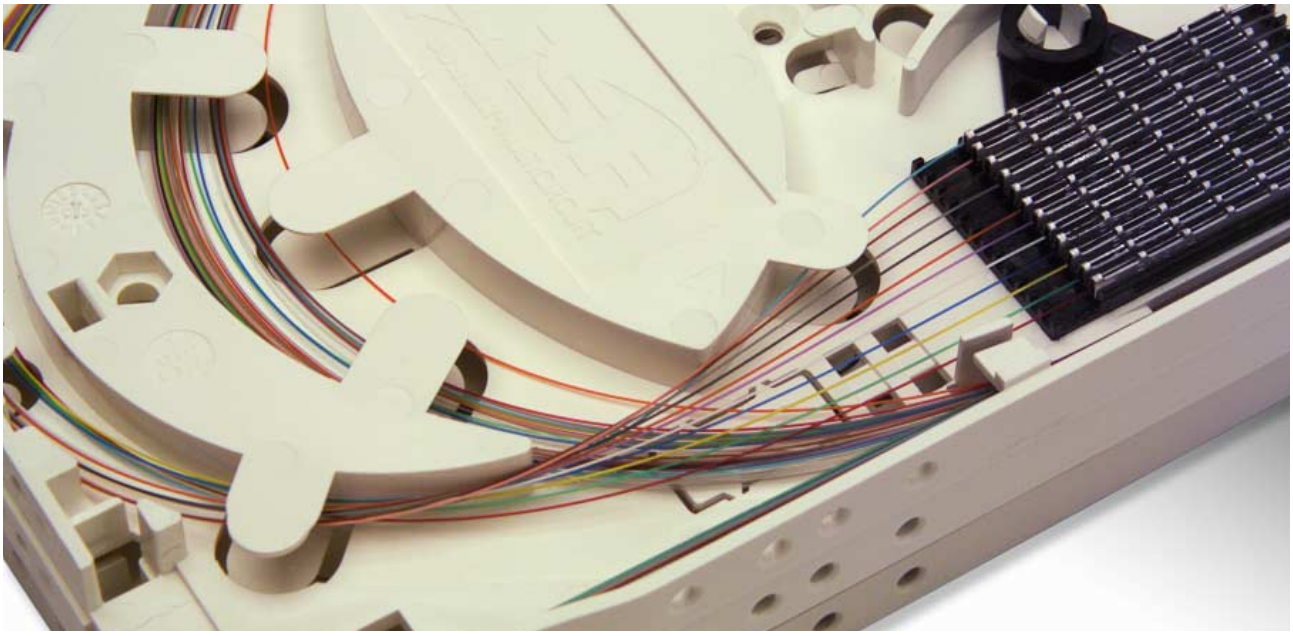
An O-ring and a moulded plastic clamp provide the seal between the cover and the base, in addition an adhesive, heat shrink sleeve is used to seal cables to the base.

Features
- Low cost installation
- Durable
- UV stabilised
- Rugged and compact design
- No compounds needed for sealing
- Locking possibilities on closure clamp
- For aerial and underground applications

Deliverables for splice closure USC500:
- 1 Closure body
- 1 Closure entry with storage basket
- 1 Closing ring
- 4 Splice cassettes
- 4, resp. 8 Splice holders, acc. to part number ordered
- 10 Hinges for splice cassettes
- 16 Cable ties
- 1 Heat shrink assembly kit
- 1 Wall fitting

Ordering information USC500	Part no.
incl. 4 MCM splice cassettes with 4 splice holders for sandwich splice protection	USC500-MCM-48-SW-U
incl. 4 MCM splice cassettes with 8 splice holders for heat shrink splice protection holders	USC500-MCM-48-HS-U

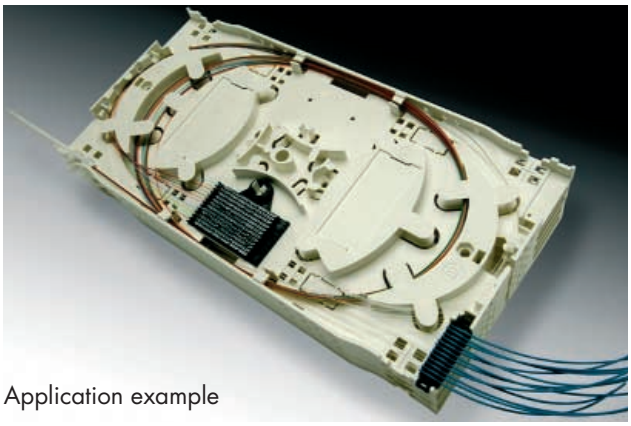
UNIVERSAL SPLICE CASSETTE



Using the MCM splice cassette makes the handling of fiber easier. An integrated bend radius limitation of 35mm, for DWDM applications for example, allows for secure storage of fibers.

A large range of entry possibilities and cassette break outs for bundle tubes and fibers, make the HUBER+SUHNER splice cassette a suitable tool for all telecom and LAN applications.

Features
- Minimum bend radius of 35mm
- Max. 24 splice connections
- For all standard splice holders
- Integrated cross over field
- Separate storage for dark fiber
- Break outs, snap on lid and hinges for "book system"
- Multiple cable entry possibilities
- Anti-twist feature when stacking cassettes
- Optional hinge system for all sides
- Generous labelling field



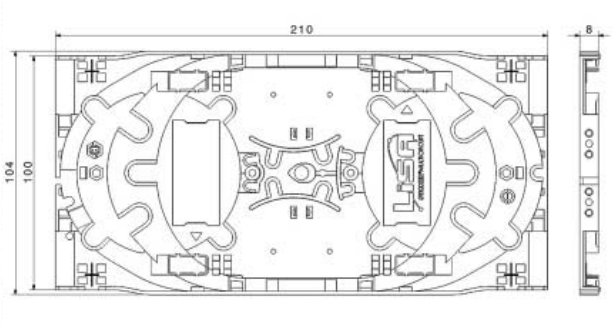
Application example

Description	Unit	Part. no
LISA MCM splice cassette, empty	4	23039730
Lid for LISA MCM splice cassette incl. laser sign	1	23039731
Splice cassette R+M	1	22653034
Splice cassette Quante	1	23004859
Lid for splice cassette R+M	1	22653036
Lid for splice cassette Quante	1	23004842

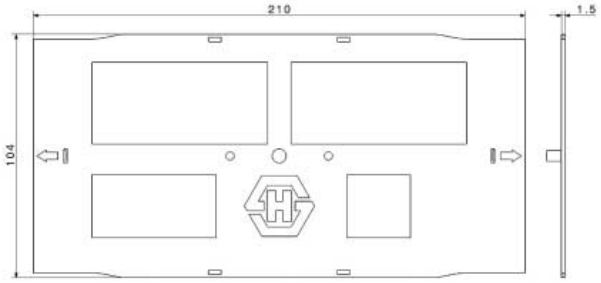
SPLICE ACCESSORIES

Technical Data MCM	Splice cassette	Cassette lid	Hinge
Dimensions(TxBxH)mm	210x104x8	210x104x1.5	13x11x4
Material	ABS/PC UL94 V-0	ABS/PC UL94 V-0	PA
Weight (g)	52 g	38 g	approx. 1 g
Colour	RAL 1013 (pearl white)	RAL 1013 (pearl white)	RAL 5005 (blue)

Splice cassette



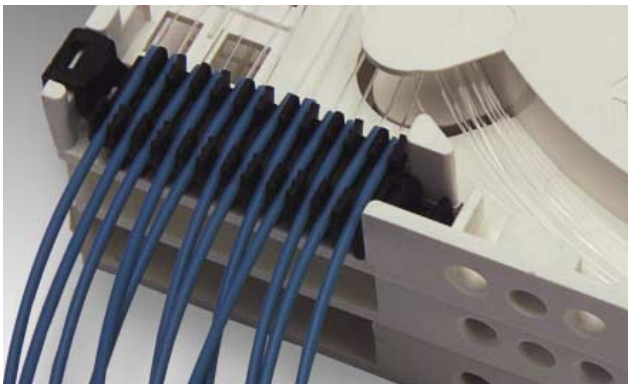
Cassette lid



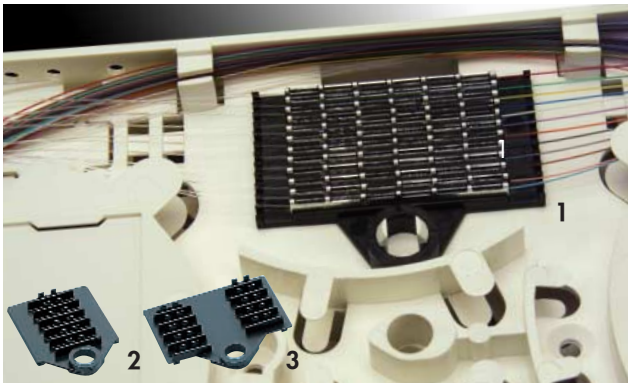
For more details please ask for the separate LISA catalogue

SPLICE CASSETTES AND ACCESSORIES

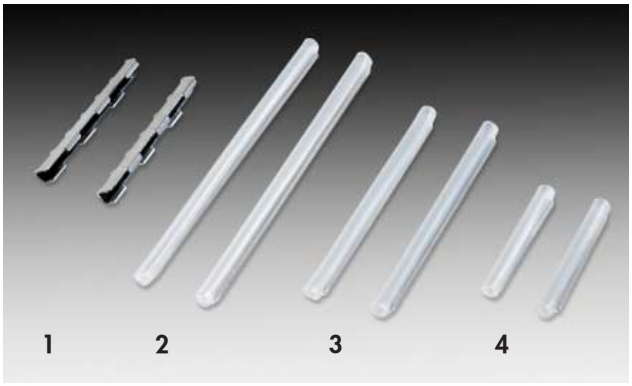
Description	Unit	Part no.
Hinge for book system for LISA MCM splice cassettes	10	23039732
Hinge for book system for multiple cassettes R+M	12	23025625
Hinge for cover fixing R+M/Quante	12	23025626
Fixing tape for multiple cassettes	12	23025627



Description	Unit	Part no.
Pigtail strain relief for LISA MCM and Quante splice cassettes for Ø 0.9 or 1.1 mm pigtails	50	23041278
Pigtail strain relief for for R+M splice cassettes for Ø 0.9 - 1.1 mm tubes	12	23025624

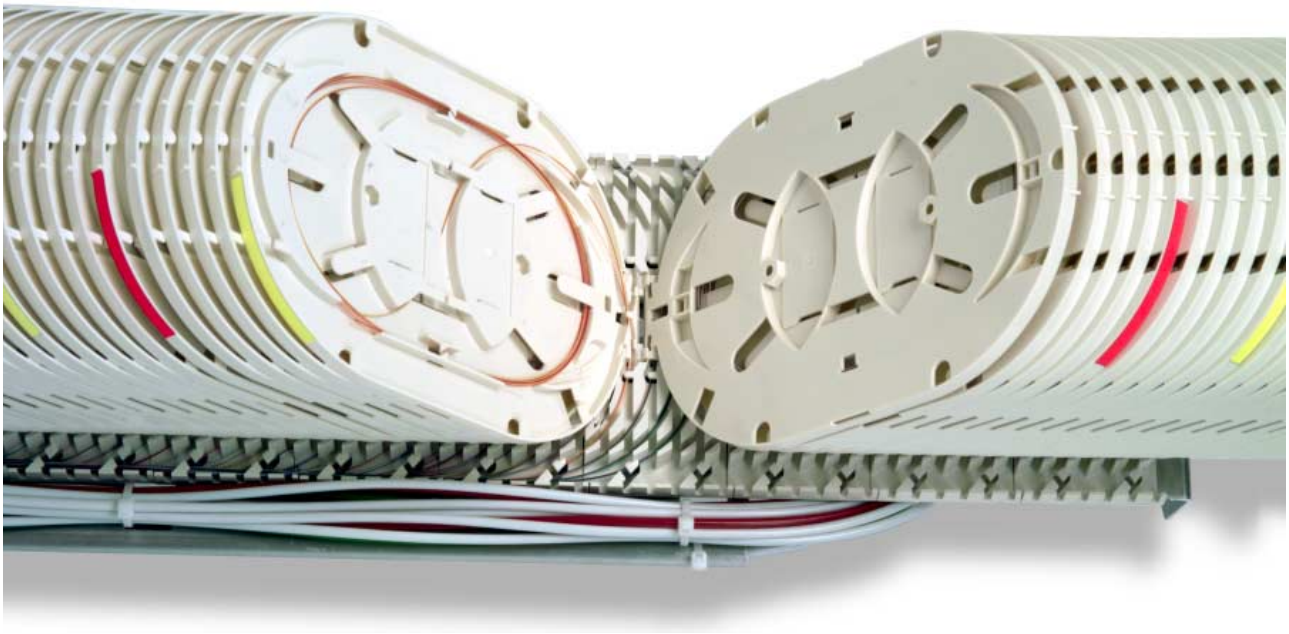


Description	Unit	Part no.
1 Splice holder for ANT sandwich splice protection12-way	10	84004068
2 Splice holder for shrink splice protection 45/60 mm 6-way	10	84004066
3 Splice holder for shrink splice protection 23 mm 10-way	10	22653039



Description	Unit	Part no.
1 ANT-sandwich splice protection Dimensions 1.2 x 3.2 x 30 mm recommended for LISA	150	84005554
2 Shrink splice protection Dimensions Ø 3 mm x 60 mm	100	84005212
3 Shrink splice protection Dimensions Ø 3 mm x 45 mm recommended for LISA	100	84005211
4 Shrink splice protection Dimensions Ø 3 mm x 23 mm	100	84005210

SINGLECIRCUIT SPLICE CASSETTE



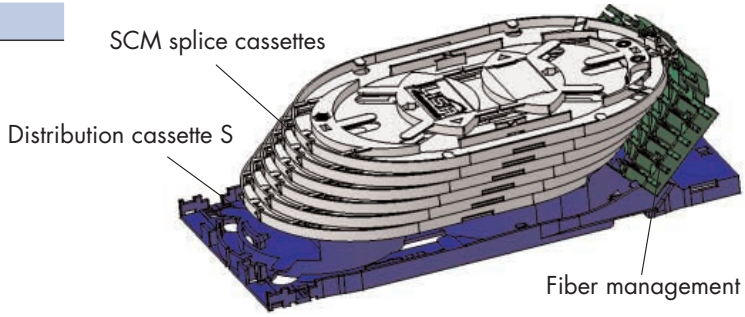
SingleCircuit Management for specialised applications with: higher network and reliability requirements, subscriber networks carrying sensitive or high volume traffic, networks which experience a high customer turnover or are frequently restructured.

Access to the fibers is possible by folding away neighbouring cassettes, all previously spliced fibers remain undisturbed.

Features
- Minimum bend radius of 35mm for fibers
- Modular cassette design
- SCM cassettes for 2x3 splices
- Secure and tubeless fiber management
- For heatshrink and sandwich splice protectors
- Distribution cassette with multiple cable fixings
- Integrated cross over field within the SCM cassette
- Generous labelling field
- Easy installation

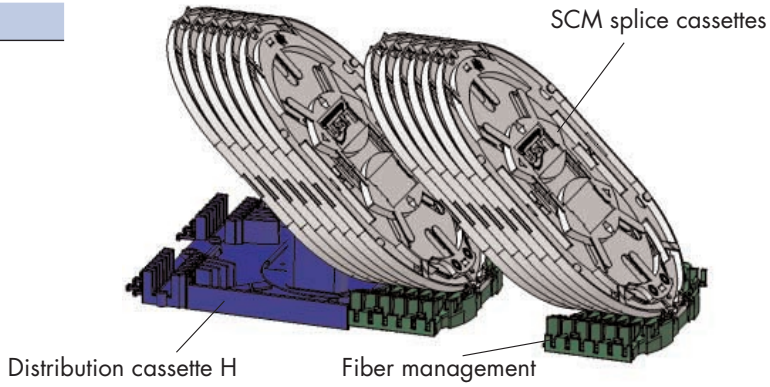
Stack fitting

For example in
- Compact modules
- Wall distribution boxes
- Small distribution boxes



Horizontal fitting

For example in
- Dome enclosures
- Splicing boxes (horizontal construction)
- Wall distribution boxes
- Large distribution boxes



LISA SINGLECIRCUIT MANAGEMENT SYSTEM

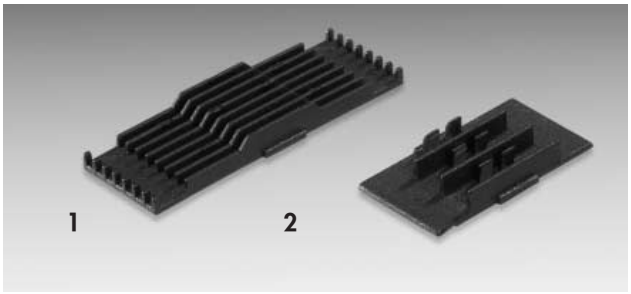
Description	Unit	Part no.
SCM Base Module H Distribution cassette H incl. 6 SCM splice cassettes and 1 fiber management for horizontal fiber management	1	23039733

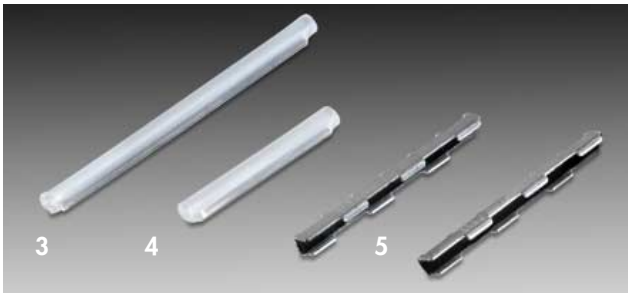
SCM Base Module S Distribution cassette S incl. 6 SCM splice cassettes and 1 fiber management for angled fiber management	1	23039734

SCM Expansion Module 6 SCM splice cassettes and 1 fiber management for connection to an SCM base module H and S	1	23039735

For more details please ask for the separate LISA catalogue

LISA SINGLECIRCUIT MANAGEMENT SYSTEM

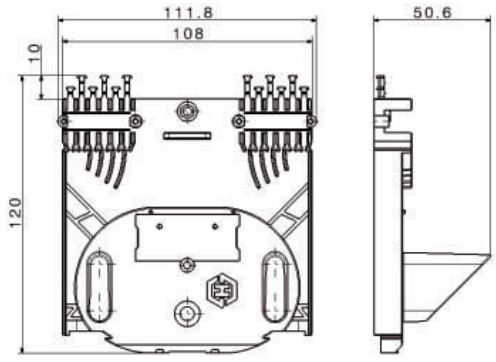




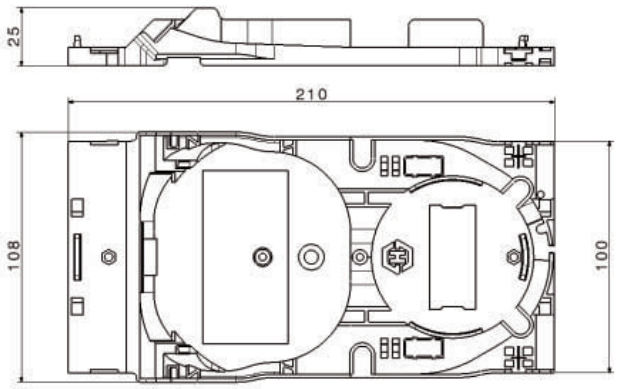
Description	Unit	Part no.
1 Sandwich Splice Holder		
6 way for SCM Splice cassettes	6	84004065
2 Heatshrink Splice Holder		
3 way for SCM Splice cassettes	6	84004064
Splice Protectors		
Heatshrink Protectors		
3 Size Ø 3x45mm	100	84005211
4 Size Ø 3x23mm	100	84005210
5 Sandwich Protectors		
Type ANT Size 1.2x3.2x30mm	150	84005554

Technical Data SCM	Splice cassette	Distr. cassette S	Distr. cassette H	Fiber mgt.
Dimensions (TxBxH) mm	164.5x108x5	210x108x25	108x120x51.5	52.2x108x15.8
Material ABS/PC	•	•	•	•
Weight	23 g	64 g	42 g	21 g
Colour RAL 1013 (pearl white)	•	•	•	•

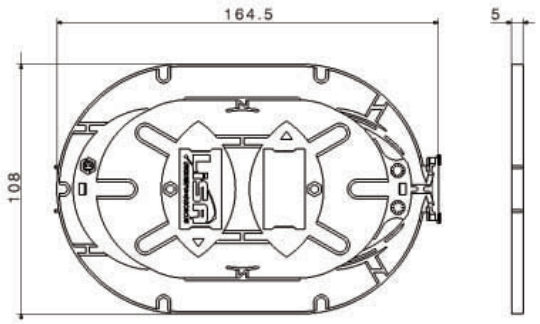
SCM Distribution cassette H



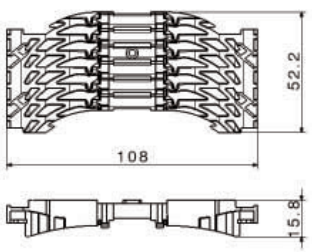
SCM Distribution cassette S



SCM Splice cassette



SCM Fiber management

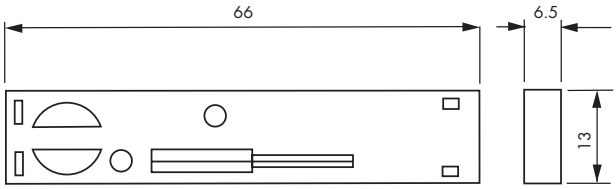


MINI DIVIDER

Compact cable dividers are suitable for the division of non-stranded multi-fiber loose tube cables in protected areas such as cable ducts, wall outlets and for the simplification of patch areas.

Features:
- Easy, time-saving installation
- Built-in fiber insertion aid
- Compact design
- Up to 12 fibers
- For non-stranded multi-fiber loose tube cables

Dimensions in mm:

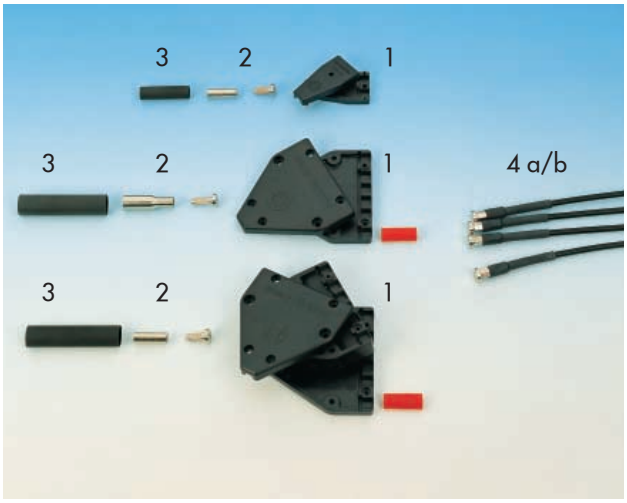


Ordering information:

Description	Part no.
Mini-Divider	**22653064**

Extent of supply:
- Housing
- 900 µm PE tube 15m
- Shrink tube

CABLE DIVIDERS



Features:
- Allows division of multi-fiber loose tube cable with up to 12 fibers
- Connectors can directly be terminated on the empty tube cables supplied, which are strain relieved
- Multi-fiber loose tube cables and empty tube cables are anti-rotation protected inside the divider

Extent of supply:
1 Housing
2 Cable entry and crimp sleeve
3 Shrink tube
4a ATO/ATM/ATF: 1m length of fiber sleeving material with outside diameter of 3.4mm, PE jacket black, inside diameter min. 1.0mm, insertion of fibers
4b ATOS/ATMS/ATFS: 1m length of fiber sleeving material with outside diameter of 2.1mm, LSFH jacket black, inside diameter min. 0.55mm, insertion of standard and H200 fibers

Not included:
Glue to fix cable jacket of glass-armoured and field cables.

Type	cable dividers
ATO...	for non-armoured multi-fiber loose tube cables
ATM...	for glass-armoured multi-fiber loose tube cables
ATF...	for field cables; ATF for insertion of 0.9 mm tubes

Ordering information:

Divider	Use with following cable types	Diameter [mm]	Dimensions [LxBxH]	Type 3.4 mm	Type 2.1 mm
2 way	02-2..../...(ZN)...	5.0	40x21x11	**ATO-BK-2**	**ATOS-BK-2**
	02-2..../W(ZNG)...	8.5	40x21x11	**ATM-BK-2**	**ATMS-BK-2**
	02-.../FSN(ZN)Z-...	6.0	40x21x11	ATF-BK-2	ATFS-BK-2
4 way	04-4..../...(ZN)...	5.0	60x60x11	**ATO-BK-4**	**ATOS-BK-4**
	04-4..../W(ZNG)...	8.5	60x60x11	**ATM-BK-4**	**ATMS-BK-4**
	04-.../FSN(ZN)Z-...	6.0	60x60x11	ATF-BK-4	ATFS-BK-4
6 way	06-6..../...(ZN)...	5.0	60x60x11	**ATO-BK-6**	**ATOS-BK-6**
	06-6..../W(ZNG)...	8.5	60x60x11	**ATM-BK-6**	**ATMS-BK-6**
10 way	10-10..../...(ZN)...	5.0	60x60x22	ATO-BK-10	ATOS-BK-10
	10-10..../W(ZNG)...	8.5	60x60x22	ATM-BK-10	ATMS-BK-10
12 way	12-12..../...(ZN)...	5.0	60x60x22	ATO-BK-12	ATOS-BK-12
	12-12..../W(ZNG)...	8.5	60x60x22	ATM-BK-12	ATMS-BK-12

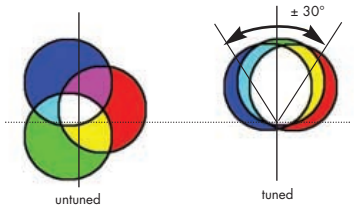
Types printed bold are stock items


input
launch fibre
500 m 62.5 / 125 / 250 µ
output
tail fibre
500 m 62.5 / 125
250 µ
SUHNER FIBEROPTIC

OVERVIEW TEST + MEASUREMENT

Fiber Optic
Master Cables
page 198

Fiber Optic
Tuning and Outcoupling Cables
page199



Measurement Fiber Box
page 200

Fiber Optic
Measurement Equipment Adapters
page 202

Fiber Optic Inspection Set
page 203

MASTERLINE® Line-Check
page 204

FIBER OPTIC MASTER CABLES

Master cables serve as a reference for repeatable IL / RL measurements of assemblies. The measurement method against master is defined in standards: IEC 60874-1 method 7 and IEC 60868/8110/CC.

Content:

- Master cable, length 3 m
- Label with serial number guarantees for tracability
- Wooden box
- Test certificate

HUBER+SUHNER fiberoptic master cables can be returned to repolish the ferrules and to up date test parameters. However, master connectors can only be repolished as long as the ferrule length does not fall below the minimum length indicated in the appropriate connector standard.

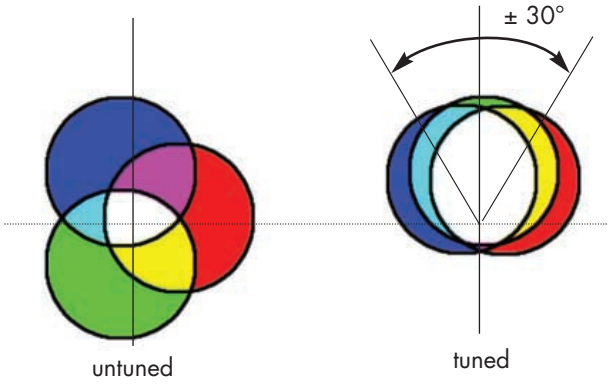
Technical Specification

Radius of Curvature	7 - 20 mm	for PC SFF connectors (1.25 mm ferrules)
	10 - 20 mm	for PC 2.5 mm ferrules
	5 - 12 mm	for APC connectors
Apex offset	for all Master connectors	≤ 50 µm
Undercut / Protrusion	for all Master connectors	± 50 nm
Fiber core eccentricity		≤ 0.5 µm (or ≤ 0.2 µm)
Tuning angle		± 30°
Tilt angle		< 0.2°
Insertion loss	against other Master	≤ 0.1 dB
Return loss	PC	> 50 dB
	APC	> 80 dB

Ordering information

Description	Measurement equipment interface	Part no.
Master cables		
FSC PC	FC-APC wide key	23020399
FSC APC 8°	FC-APC wide key	23020400
FSC APC 9°	FC-APC wide key	23020401
FCPC PC	FC-APC wide key	22664032
FCPC APC 8°	FC-APC wide key	22652379
FLC PC	FC-APC wide key	23020402
FLC APC	FC-APC wide key	23032339
Master Cables with max. 0.2 µm fiber core eccentricity		
FSC PC 0.2 µm	FC-APC wide key	23025393
FSC APC 8° 0.2 µm	FC-APC wide key	23025390

FIBER OPTIC TUNING CABLES



Tuning cables are needed to optimize the fiber core alignment. Ferrule centre eccentricities of assembled fiber optic connectors can be aligned in 30° steps due to anti-rotation measures in the connector. The fiber core of the tuning cable is calibrated in such a way that it is already precisely located in the best sector. In addition, it is provided with a fiber undercut polish, ensuring that the connector to be adjusted is not damaged.

Content:
- Tuning cable, length 3 m

Technical Specification

Undercut	1000 - 5000 nm
Eccentricity	6 µm
Tuning angle	± 10°

Ordering information

Tuning cable	Measurement equipment interface	Part no.
FCPC for all 2.5 mm ferrule connectors	FCPC-Z/M-A001	22653078
FLC for all 1.25 mm ferrule connectors	FCPC-Z/M-A001	23011582

FIBER OPTIC OUTCOUPLING CABLES

Used in conjunction with Master Cables to perform simultaneus IL and RL measurements on power meter equipment (e.g. from Agilent). Outcoupling cables also serve as "adapter" between the measurement device and patch cables in order to protect the device against damage caused by repeated plugging.

Features:
- 14 µm fiber in order to capture all the light emitted by the 9 µm fiber
- cable jacket purple

Technical Specification

Radius of Curvature	7 - 20 mm	for PC SFF connectors
	10 - 20 mm	for PC 2.5 mm ferrules
	5 - 12 mm	for APC connectors
Apex offset		≤ 50 µm
Undercut / Protrusion		± 50 µm
Return loss	PC	> 50 dB
	APC	> 80 dB

Ordering information

Outcoupling cable	Measurement equipment interface	Part no.
FSC PC	FC-APC wide key	23020404
FCPC	FC-APC wide key	23020405
FLSA	FC-APC wide key	23020406
FLC	FC-APC wide key	23020407

MEASUREMENT FIBER BOX - ACCESSORIES FOR OTDR TEST EQUIPMENT

1 height unit box for launch fiber 240 x 197 x 70 mm

Features

- Possible fiber types:
  9 µm, Singlemode LEAF, 50 µm, 62.5 µm or 200 µm
  other fiber types upon request
- Standard lengths:
  100, 200, 500, 1000 and 2000 m
  other lengths available (max. 4000 m per height unit or max. 1000 m for H200 fiber)
- Connectors:
  FLC, FLX.5, FST, FLSA, FCPC, FSC-CMAX, E-2000™, FSMA

2 height unit box for launch and tail fiber in one box
240 x 197 x 117 mm

Optional case for Measurement Fiber Box
450 x 370 x 135 mm
Same case for 1 height unit and 2 height unit boxes

Type 9801.90.N
Part No. 23026601

ORDERING CODE MEASUREMENT FIBER BOX

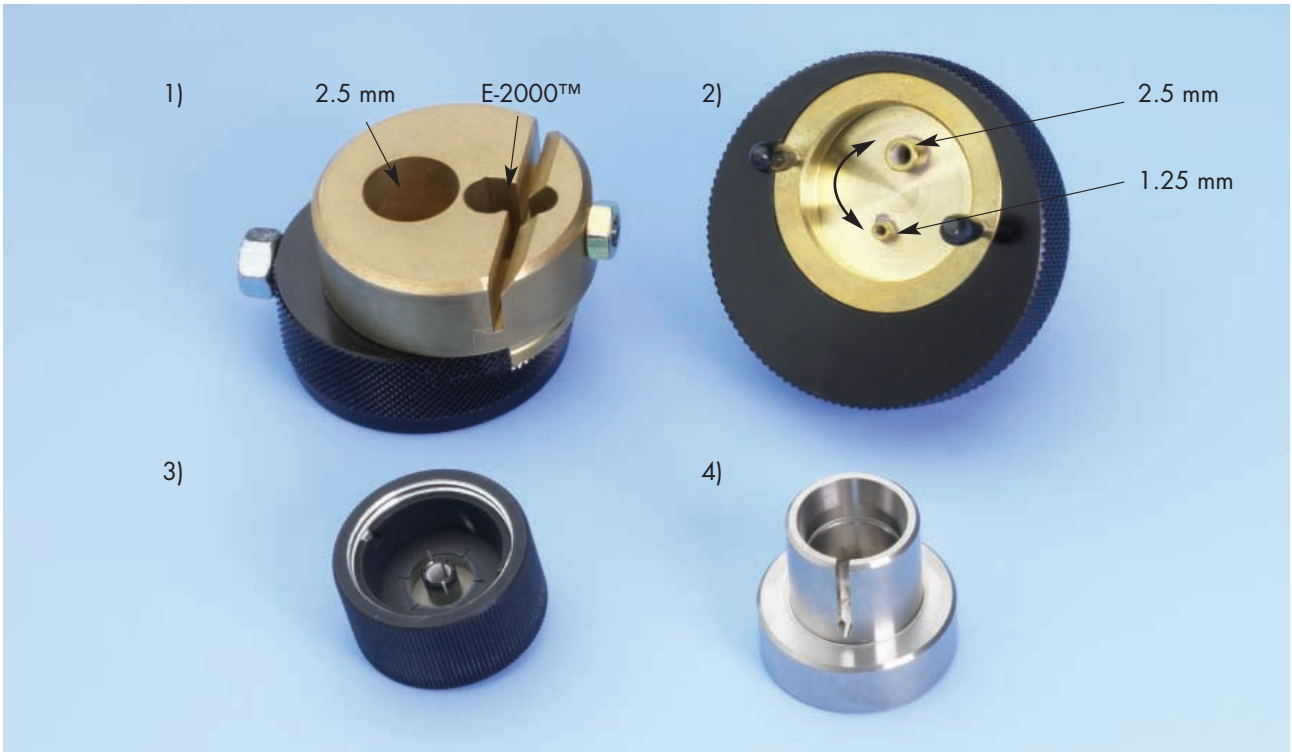
Code	Description
	Launch fiber type
09-	Singlemode 9/125 µm
LE-	Singlemode LEAF fiber
50-	Multimode 50/125 µm
53-	Multimode 50/125 µm OM3
62-	Multimode 62.5/125 µm
20-	Multimode H200/230 µm
	Length Launch Fiber
01-	100 m
02-	200 m
05-	500 m
10-	1000 m
20-	2000 m (not possible for H200)
	Connector type
XX/	Connector[1] side A - Input launch fiber
XX-	Connector[1] side B - Output launch fiber
	Cable type
0	without cable
A	2.1 mm LSFH™, orange
B	3.4 mm PE black
	Cable length
00-	without cable, only with adapters
15-	Standard length (1.5 m)
10-	1 m (miminum length)
20-	2 m
50-	5 m (maximum length)
00	no tail fiber (= 1 height unit)
with tail fiber 2 height unit	**Tail fiber type**
09-	Singlemode 9/125 µm
LE-	Singlemode LEAF fiber
50-	Multimode 50/125 µm
53-	Multimode 50/125 µm OM3
62-	Multimode 62.5/125 µm
20-	Multimode H200/230 µm
	Length Tail Fiber
01-	100 m
02-	200 m
05-	500 m
10-	1000 m
20-	2000 m (not possible for H200)
	Connector type
XX/	Connector[1] side A - Input tail fiber
XX	Connector[1] side B - Output tail fiber

Measurement Fiber Box

FIBER 1 (LAUNCH FIBER)			1 U
Input	1000 m	Output	
FIBER 2 (TAIL FIBER)			2 U
Input	200 m	Output	

[1] Connector code please refer to inside back cover

FIBER OPTIC MEASUREMENT EQUIPMENT ADAPTERS



Universal adapters for Power Meter equipment
These universal adapters can be used for 1.25 mm and/or 2.5 mm ferrules independent of connector types. Special adapters with shutter fixation are available to allow easy handling of FLSH (E-2000™) connectors.

Ordering information Universal measurement adapter

Power Meter manufacturer		Ferrule	Remarks	Part No.
Agilent (HP)		2.5 mm		23019870
Agilent (HP)		1.25 mm		23020219
Rifocs	4)	2.5 mm		23019872
Rifocs		1.25 mm		23020217
Rifocs		1.25 mm/2.5 mm	switchable 2.5 mm/1.25 mm	23019871
Agilent (HP)	2)	1.25 mm/2.5 mm	switchable 2.5 mm/1.25 mm	23019869
Agilent (HP)	1)	2.5 mm/FLSH 2.5 mm	switchable 2.5 mm/E-2000™	23023230
Agilent (HP)		1.25 mm/FLSH 2.5 mm	switchable 1.25 mm/E-2000™	23023229
EXFO	3)	2.5 mm		23032263
EXFO		1.25 mm		23032262

FIBER OPTIC INSPECTION SET

A fiber optic inspection set includes the necessary tools and material to perform a professional expertise and cleaning of fiber optic connectors in the field. The application range includes the operation as well as the maintenance of fiber optic networks. The components allow to use the fiber optic inspection set for multimode and singlemode applications.

Inspection set content		**Part no.**
Inspection set	Set including the following tools to inspect and clean fibers	24300789
WOS microscope/400/SUH	Magnification 400 times, universal adapter for 2,5 mm connector, adapter for E-2000™, inlcuding batteries	
Laserpointer RIF-163L/SUH	with universal adapter 2,5 mm to detect damaged fibers, inlcuding batteries for visual fault finder	
Cleaning brushes	to clean adapters (Proximal brushes, 12 pieces)	
Air pressure	to clean adapters (200 ml)	
Cleaning tissues	to clean connector endface (Kimwipes, 200 pieces)	
Isoprophyl alcohol bottle	to clean connectors and adapters (9801-62-D, empty, 50 ml)	

FIBER CHECK TOOL

With the help of the fiber check tool, a light control can be performed at the fiber and breaking points recognized. Operation modes are CW mode and contiuous dash

Technical specification

Wavelength		635 mn
Output power	in 9 µm singlemode fibers	0.3 mW
	in 50 µm multimode fibers	0.7 mW

Ordering information

Description	**Type**	**Part no.**
Fiber tool check for 2.5 mm ferrule connectors incl. universal adapter for FSC, E-2000™, FST, FCPC and DIN (not compatible with FSMA)	9801.86.A	23032064
Fiber tool check for 1.25 mm ferrule connectors includes universal adapter for LX.5 and FLC	9801.86.B	23032065

MASTERLINE® LINE-CHECK

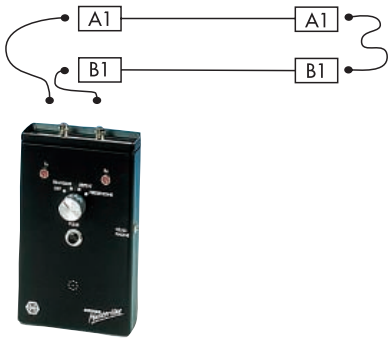
Line-Check

The MASTERLINE® Line-Check system is designed to simplify continuity and performance checking of multimode fiber optic networks.

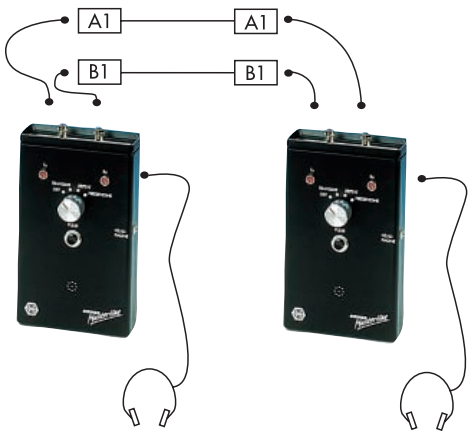
In case of no external phone reception it is possible to use the Line-check as a phone connection. Each Line-Check can operate in two modes: Loop-back and talk mode

Extent of supply:

1 Case
2 MASTERLINE®-Check single-channel units
4 Measuring cables with FST-LEAN connector
4 Adapters FST
2 Headphones
8 Batteries
Instructions for use



Loop-back:
With one unit at one end of the cable, by looping back the fibers under test, at the push of a button, the unit will indicate Pass/Fail.



Talk mode:
With one unit at each end of the cable connected to the fibers under test, the Line-Check can be used to check continuity and performance or as a fiber phone.

Technical data

Description	Line-Check-001
Dimensions	170x95x50 mm
Weight	approx.350 g
Wavelength	850 nm
Fiber parameter (up to 2000 m)	62.5/125 µm; 50/125 µm
Connector type	FST
Measuring cable	Length 2 m
Operating temperature	0°C – 40°C
Power supply	4x1.5 V (LR6/AA)

GLOSSARY OF TERMS

APC (Angle Polished Connector)	Refer to HRL
ATM	Asynchronous Transfer Mode
Attenuation	Reduction of the optical signal power in a fiber, a splice or between two connectors. It depends on the wavelength. Measured in dB (decibels). $A=10*\log(P_{in}/P_{out})$
Bandwidth	The information capacity of a channel. Bandwidth is a measure of the difference between the upper and lower limiting frequencies of that channel. Bandwidth is normally measured in Hertz (cycles per second). The wider the bandwidth, the more information can be transmitted.
Bandwidth-length product	A measure for the frequency range that an optical fiber of one kilometer length can transmit. The product of the bandwidth and the length of the optical fiber is constant.
Cable core	All of the stranding, strength members, tension relief and binding members inside a cable, as well as glass roving if included.
Cable jacket	Plastic jacket protecting the cable core against environmental influences.
Cladding	The entire optical material of an optical fiber enveloping the core. Its index of refraction is somewhat lower than that of the core.
CWDM	(Coarse Wavelength Division Multiplexing) Various wavelength were sent through the fiber at the same time. CWDM requires not the same network complexity as DWDM. CWDM is a cost-effective solution for metropolitan area and access networks. According to ITU proposal up to 18 channels can be used in the wavelength range from 1270 to 1610nm.
Connector	Component for the detachable connection of two optical fibers.
Core	Center of an optical fiber serving for the guiding of waves. The fiber designation indicates the diameter of the core and of the cladding (e.g. 50/125 µm).
Crimp	Production of a good mechanical joint by the permanent cold deformation of a sleeve around an optical fiber tube. This provides the strain relief between cable and connector.
Decibel [dB]	Measure for the attenuation of the power transported.
DMD	(Differential Mode Delay) is an important characteristic for high data rates, e.g. 10GbE. The OM3 fiber has to meet a DMD specification according to IEC/PAS 60793-1-49.
DWDM	please refer to WDM
EFM	Ethernet in the First Mile. Ethernet technology for the Access network. IEEE standard 802.3ah
Ethernet	Ethernet for data transmission of 10Mb/s. Ethernet is the most used data protocol for premises networks.
Fast Ethernet	Ethernet for data transmission of 100Mb/s.
Ferrule	Connector pin responsible for the accurate axial guidance of the fiber in the plug-in connection.

GLOSSARY OF TERMS

Fiber	Transmission medium consisting of the core and the cladding.
Fiber optics	Transmission technique in which information is passed through an optical fiber in the form of light.
FTTD	(Fiber To The Desk) Structured building cabling system (LAN) using optical fibers up to the workplace
GbE	Gigabit Ethernet for data transmission of 1Gb/s (1GbE) or 10Gb/s (10GbE). IEEE standard 802.3z respectively 802.3ae
Graded-index fiber	Glass fiber type whose core exhibits a refraction index profile with an index of refraction decreasing in the form of a parabola from the inside to the outside. This allows better dispersion and transmission characteristics to be achieved.
HCS fiber	Hard Clad Silica fiber with a core of quartz glass and a cladding of plastic. Our H200 is a HCS construction.
HRL or APC	(High Return Loss) HRL connectors eliminate reflection problems at connections and help to preserve the transmitted signal integrity in broadband communications by keeping reflected light to a minimum. By polishing the end face of the connector at an angle (8°), reflections at the connector interface exceed the critical angle for total internal reflection, and the unwanted light is lost in the fiber cladding.
Hybrid adapter	Adapter with two different connections for different connector types
Hybrid cable	Cable with different transmission lines such as optical fibers, copper conductors, RF conductors
IEEE	Institute of Electrical and Electronics Engineers, Inc., www.ieee.org
Indoor cable	Cable for a wide variety of applications inside buildings
Insertion loss	Ratio of the input light power to the output power of an optical system component. Attenuation caused by the insertion of an optical component in an optical transmission path. Measured in decibels (dB).
IP	Internet Protocol
Jelly	From “petroleum jelly”. One of the tixotropic fluids used as a water blocking agent within multi-fiber tubes (also known as gel)
LAN	(Local Area Network) A local network for the bit-serial transmission of information between independent terminal units
LED	Light Emitting Diodes are cheap light sources and for low data rates
Light	The term “light” was originally limited to the electromagnetic waves visible to the human eye, with a wavelength between 380 nm (violet) and 780 nm (red). However, it has now become common to also include the radiation in the spectral ranges next to visible light, which is why we speak of optical wave guides.
Loose tube	An optical fiber tube where the fiber and its protective coating are protected by a plastic tube. The cavity in between is either dry or filled with jelly
Low water peak	Low water peak fibers don't have an attenuation peak at 1400nm. Therefore they can be used for CWDM up to 18 channels with 20nm distance. In contrary to conventional singlemode fiber the E-band can also be used. That adds 5 more channels to the limit of 12 channels for conventional singlemode fiber. Commercially available fibers: SMF-28e™, AllWave™, E-SMF, PureBand™, FullBright etc.

GLOSSARY OF TERMS

LSFH™	Low smoke and free of halogen are characteristic of material behaviour. LSFH™ is a Trademark of HUBER+SUHNER AG. Usually these materials are flame retardant and self-extinguishing, they are made of polyethylene and metalhydroxide additives. Similar abbreviations are LSOH and LSZH.
MAN	(Metropolitan Area Network) Inter-regional network for the transmission of information
Mode	Possible propagation paths for light in an optical fiber. Allowed solutions of the wave equation for the optical fiber.
Multi-fiber cable	A cable with several fibers
Multi-fiber loose tube	Consists of several optical fibers in a common loose tube
Multimode fiber	Fibre type in whose core several modes can be propagated. Typical dimensions are 50/125 µm and 62.5/125 µm
NDF	(Negative Dispersion Fiber) NDF is a singlemode fiber with an optimized dispersion characteristic. Cost-effective solution for metropolitan area networks with up to 10Gb/s per channel and over 200km. For direct modulated distributed feedback (DFB) laser. The positive chirp of the lasers can be compensated through a negative dispersion, in order to reach a higher uncompensated range. Thereby the network complexity is reduced. Applicable for CWDM in different windows. Commercially available fibers: MetroCor™, WideLigth™ etc
NZDSF	(Non-zero dispersion-shifted fiber) is an optimized singlemode fiber for DWDM and long-haul application. The optimization of the effective area and the dispersion offers an ideal performance for DWDM. Commercially available fibers: LEAF›, TrueWave› RS, TeraLigth Ultra™, FreeLigth™, PureGuide™ etc.
OWG	(Optical wave guide) Dielectric wave guide with a core of optically transparent material with low attenuation. It is enveloped by a cladding of optically transparent material with an index of refraction lower than that of the core. The optical wave guide serves for the transmission of signals with electromagnetic waves in the range of optical frequencies. Optical wave guides are generally provided with a coating. Optical wave guides are commonly referred to as optical fibers.
Optical window	Wavelength ranges in which optical fibers exhibit particularly low attenuations. 1st optical window: 850 nm 2nd optical window: 1300 nm 3rd optical window: 1550 nm
Outdoor cables	Cables designed and sized to satisfy all requirements for installation in the earth and in ducts.
OFL	Overfilled launch, the maximal allowable modes are used for data transmission. Common sources are LEDs.
Patchcord	Cable assembly with connectors on both ends
PCS fiber	(Plastic Cladded Silicon) Optical fiber with a core of quartz glass and plastic cladded silicon.
Pigtail	Piece of fiber with a connector at one end.
PMD	(Polarization Mode Dispersion) the different speeds of the two perpendicular light pulses lead to a delay in propagation velocity, also known as Polarization Mode Dispersions retardation. PMD delays are the cause of bit errors at high data rates and at long distances and appear only in singlemode fibers.

GLOSSARY OF TERMS

POF	(Plastic Optical Fiber) optical fiber made of PMMA or fluorinated polymer with a core cladding diameter 980/1000 µm. Applications of POF are: automotive, aeronautics, industrial LAN, residential network cabling (SOHO).
Primary coating	The plastic layer applied for mechanical protection directly onto the cladding of an optical fiber. This protects the surface against damage.
Return loss	Ratio of the input light power to the returned power of an optical system component in an optical transmission path. Measured in decibels (dB).
Ribbon	Ribbon fibers have several fibers aligned and held together with plastic. For ribbon fibers special connectors as well as specific splicing tools exist, which include and splice all fibers at the same time. Common fiber counts are: 2, 4, 8, 12 and 24.
SAN	Storage Area Network
Semi-tight tube	An optical fiber tube where the fiber is protected by a plastic jacket (with the space in between dry or jelly-filled).
SDH	Synchronous Digital Hierarchy
Singlemode fiber	Fibre type in whose core only one mode can be propagated. A typical dimension is 9/125 µm.
SOHO	Small Office and Home Office
SONET	Synchronous Optical NETwork
Splice	Permanent joint between two optical fibers ruptured in a plane, created by fusion, clamping or gluing.
Step index fiber	Glass fiber type with a core exhibiting a constant index of refraction, for example 200/230 µm.
TCP	Transport Control Protocol
TDM	Time Division Multiplexing
Tight tube	Where the primary coating is directly enveloped by a tight plastic layer (intermediate layer of silicone).
UFL	Underfilled launch, the maximal allowable modes are not used for data transmission. The small laser beam fills the center of the core. Common sources are lasers or VCSEL.
UL94	is defined as a material test from Underwriters Laboratories Inc, (UL,www.ul.com) testing inflammable material in regards to the fire behaviour. Therefore after exposing a test rod to fire for 60 seconds the self-extinguishing bahaviour is analysed. V describes the test with a vertical test rod, whereas H is with a horizontally fixed rod. The behaviour of the vertical test is classified into 0, 1, or 2 with 0 showing the best self-extinguishing behaviour.
UPC	An ultra-pyhisical-contact polished connector has a higher return loss than a common PC connector.
VCSEL	(Vertical Cavity Surface Emitting Laser) The light beam emits vertical to the surface of the laser. Not expensive light source with a small wavelength spectrum. They are used for Gigabit data transmission.

GLOSSARY OF TERMS

WAN (Wide Area Network)	World-spanning network for the transmission of information (long-haul).
WDM/DWDM	(Dense Wavelength Division Multiplexing): instead of sending one wavelength through the fiber, light rays of various wavelengths are generated. Commercial DWDM systems put 32 wavelengths through the fiber, which corresponds, at a rate of 10 Gigabits/s per signal to a total rate of 320 Gigabits.
WLAN	Wireless Local Area Network

INDEX

ORDERING CODE CONNECTORS

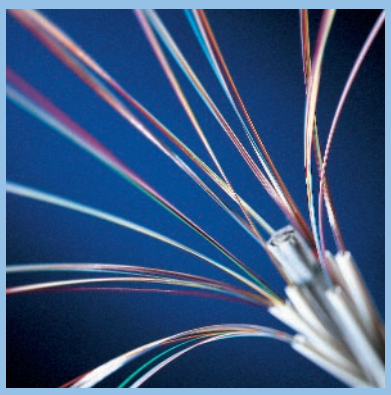
This connector code is used to order cable assemblies, MASTERLINE® and SMARTLINE® cabling system

Connector code	type (x= upon request)	Performance level A	B	C	D	E	F	M
00	no connector							
10	FSMA							•
20	FST-HQ	•						•
22	FST-Security	•						•
24	FST-LEAN							•
30	FCPC	•	•	•	•		•	•
33	FCPC APC wide key		•	•				
34	FCPC APC small key		•	•				
40	FLSA		•					•
43	FLSA APC		•					
45	FMU		•		•			
50	MT-RJ without pins	•						•
51	MT-RJ with pins	•						•
55	Optoclip II		•					•
60	FiberGate		•		•	x		•
65	FiberGate APC		•			x		

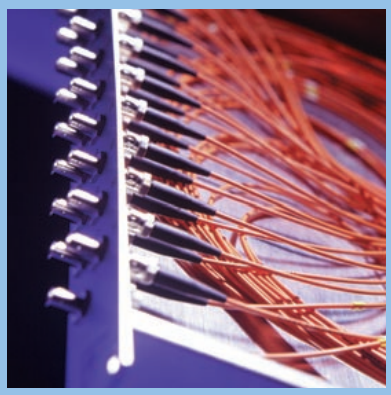
Connector code	type (x= upon request)	Performance level A	B	C	D	E	F	M
70	FSC	•	•	•	•	•	•	•
73	FSC APC 8°		•	•		•		
74	FSC APC 9°		•	•		•		
77	FSC Duplex	•	•		•			•
78	FSC APC Duplex		•					
80	LX.5		•	•	•	•	•	•
81	LX.5 Duplex		•	•	•	•	•	•
83	LX.5 APC		•	•		•		
84	LX.5 APC Duplex		•	•		•		
85	LC		•	•	•	x	•	•
86	LC APC		•	•		x		
88	LC Duplex		•	•	•	x	•	•
89	LC APC Duplex		•	•		x		
90	FLSH (E-2000™)	•	•	•	•	•	•	•
93	FLSH (E-2000™) APC		•	•	•	•		
97	FLSH (E-2000™) Duplex	•	•	•	•	•	•	•

HUBER+SUHNER FIBER OPTICS
Your Partner for cables, connectors, assemblies, accessories and engineering services in the field of signal transmission

Connectors
HUBER+SUHNER offers optical connectors designed to international standards and for all industrial LAN/WAN/MAN and telecommunication applications.



Cables
The HUBER+SUHNER line of products includes a wide range of cables of different designs for indoor and outdoor applications.



Assemblies and accessories
HUBER+SUHNER offers assemblies on the basis of customers' specification and a wide selection of cable termination boxes, splicing boxes etc. for optimum installation.

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