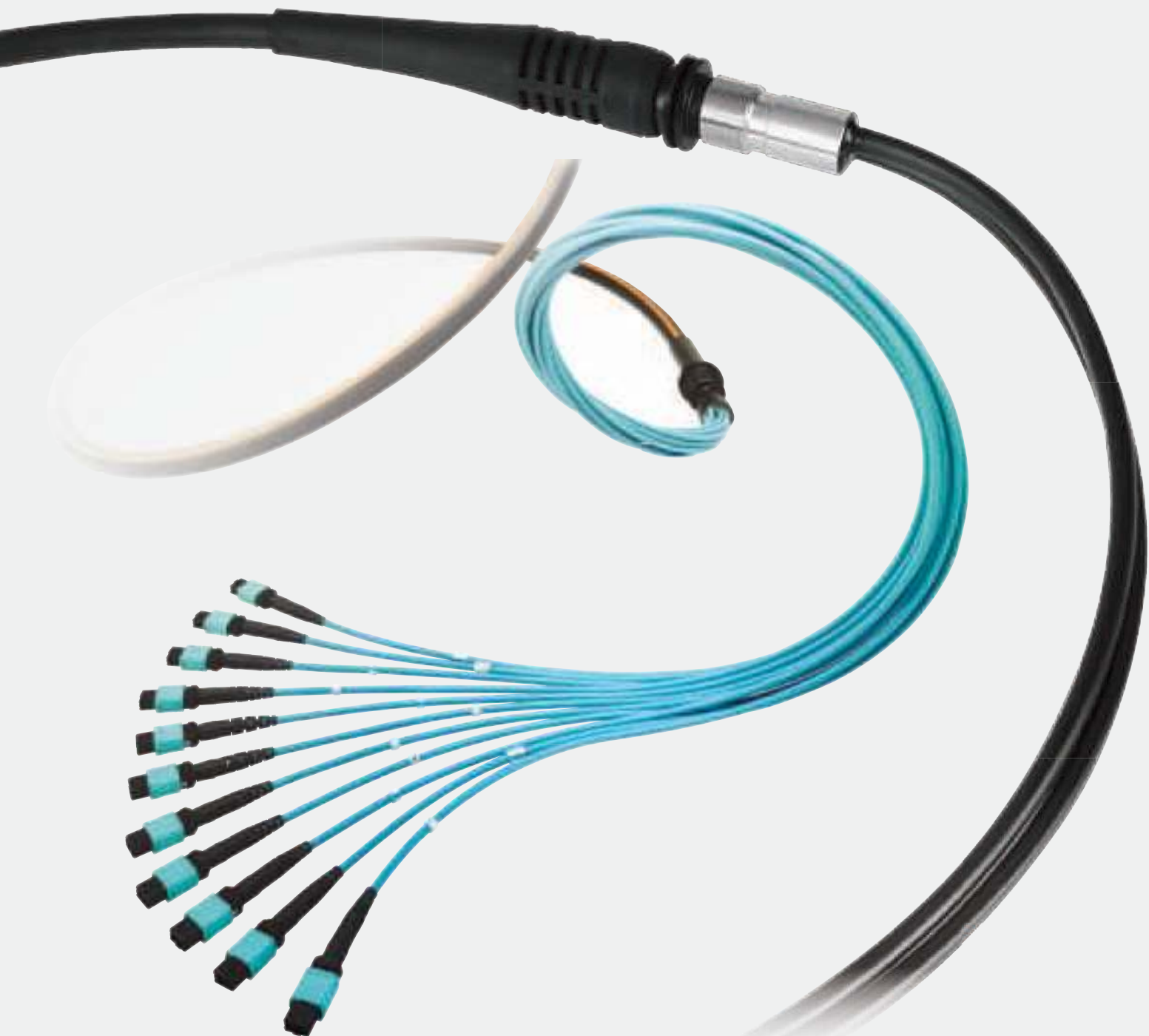


# Fiber Optic Cabling Systems

Edition 2010/2011



# Excellence in Connectivity Solutions





#### **Your partner for system solutions**

The HUBER+SUHNER Group is a leading global supplier of components and systems for electrical and optical connectivity.

Our customers in Communications, Industrial and Transportation markets appreciate that we are specialists with detailed knowledge of practical applications. We offer technical expertise in radio frequency technology, fiber optics and low-frequency under one roof, thus providing a unique basis for continual innovation focused on the needs of our customers all over the world.

HUBER+SUHNER offers a wide portfolio of innovative fiber optic cabling systems suitable for applications in communication, transportation and industrial markets. Dedicated cable systems guarantee highest transmission reliability in indoor and outdoor areas as well as in permanent or mobile installations. Components that are closely matched assure highest mechanical and thermal durability in most demanding environment.

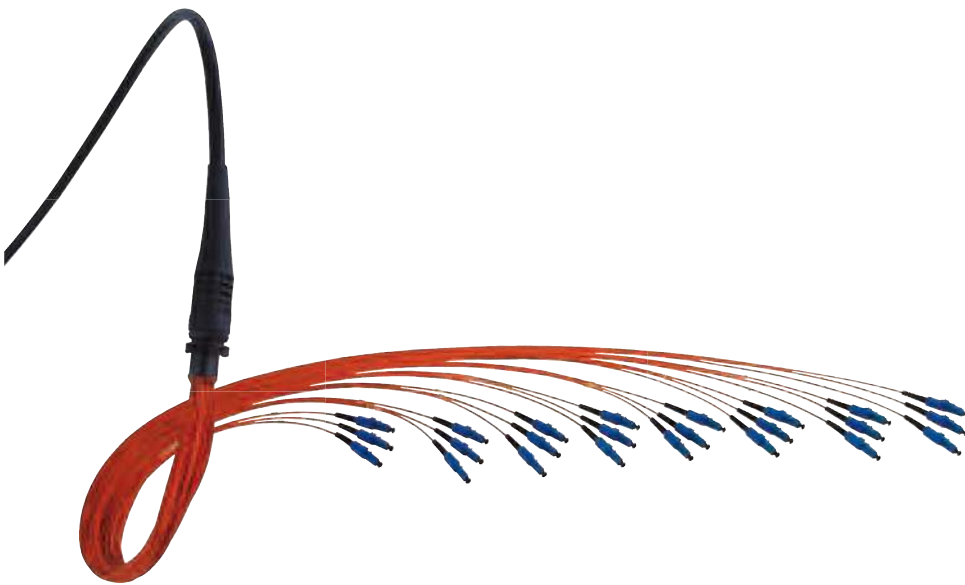


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## MASTERLINE – the pre-assembled Cable Systems

MASTERLINE are cable systems pre-assembled under the highest quality standards that are supplied as an air ring or on reels directly for drawing. The effective protection afforded to the individual cores with connectors by the protective tube as well as the pre-mounted pulling-eye enable extremely easy handling during drawing or laying. Following installation of the cables, the protective tube can be simply dismantled so that the FOC connectors can be connected to the interface. This means that the pre-assembled cable system is ready for operation with no time-consuming splicing or plug assembly using special tools or equipment on-site.

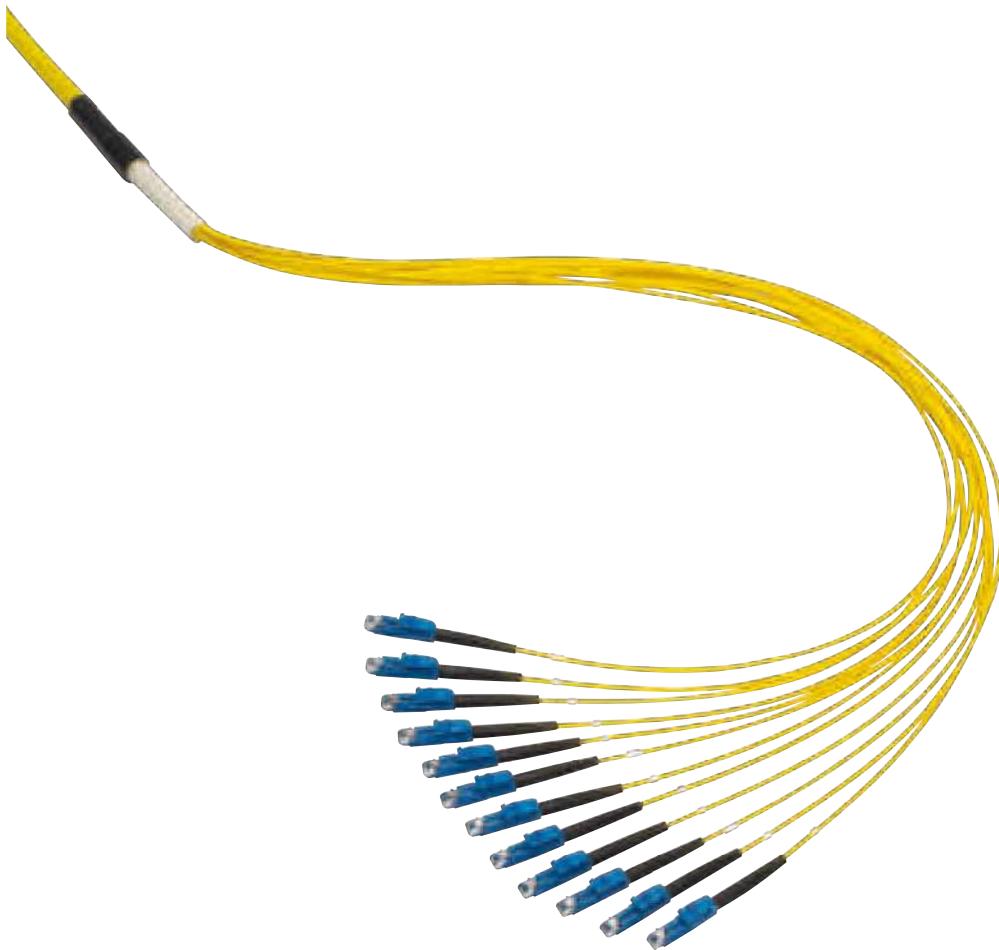


The many different applications and our constant goal of putting the focus on customer benefit keep extending the range of uses. Innovative solutions and combination with our connectors developed in-house produce new cable system types such as MASTERLINE extreme.



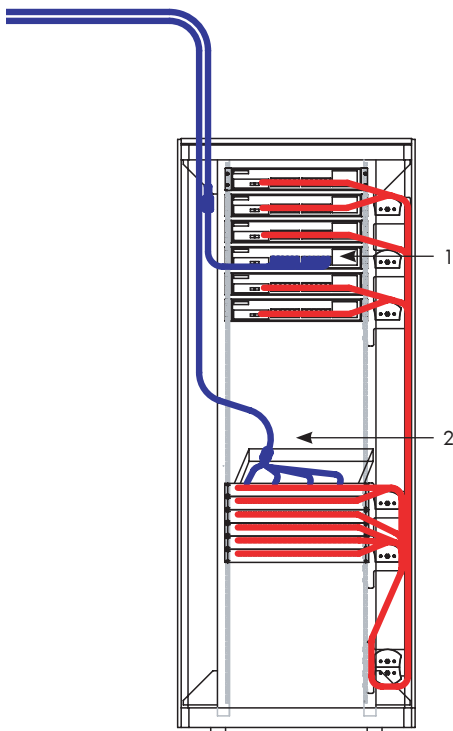
## SMARTLINE – the pre-assembled Cable Systems

SMARTLINE have been primarily developed for indoor use in riser zones or nodes. These cable systems, which are pre-assembled under the highest quality standards, are supplied directly to you with test record as an air ring or on cardboard reels for easy installation. The connectors are terminated directly on breakout or riser cables. This type of system not only reduces the installation costs, but the handling of the cable routing is also much simpler than with individually installed patch cables.



## Installation possibilities

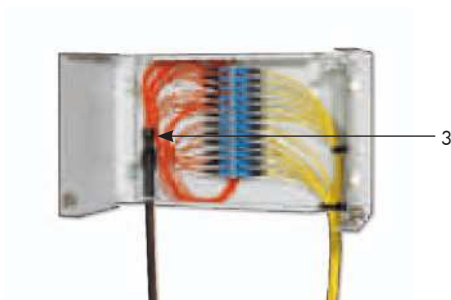
The cable systems allow a fast and easy point-to-point connection of systems and can be installed in different distribution racks and small distribution housings. Dedicated distribution housings of HUBER+SUHNER offer easy fixing variants and allow a fast installation. Accessories have to be ordered separately.



**Example system rack with passiv/activ equipment:**  
MASTERLINE ends can be directly connected (1) to active devices or with a MASTERLINE cable termination box (2) and patch cables to the active devices.



MASTERLINE cable termination box (2).



**Example connection of a wall box WBC:**  
Fixing of the MASTERLINE divider in a u-shape cutout (3). The MASTERLINE ends can be connected directly to the adapters in the patch field.



## Fixing and comparisons

### Fixing of the divider

Different fixing possibilities are available for a secure and fast fixing.

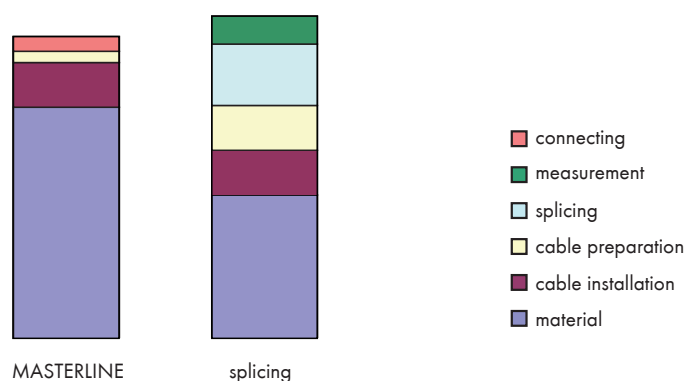
Type of fixing		MASTERLINE					SMARTLINE	
		classic, extreme	lite	compact	mobile	quick	breakout	riser
through hole with nut <sup>1)</sup>		✓	✓	-	✓	-	-	-
in U-shaped cutout		✓	✓	✓	✓	-	-	-
with cable ties <sup>2)</sup>		(✓)	✓	✓	(✓)	✓	✓	✓
with screws		-	-	-	-	✓	-	-

1) nut or fixing kit separately available

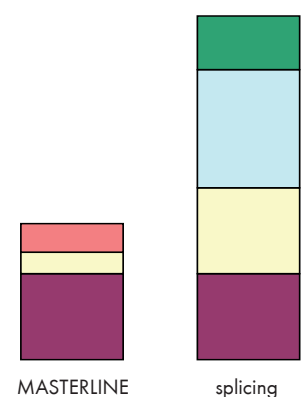
2) cable ties should fix the divider

### Comparison of cost and installation time

To compare the costs of material / labour and installation times respectively are added in graph 1 and 2 of a pre-terminated cable system MASTERLINE and an installation of a cable including splicing. Graph 1 shows that the splice installation cost is slightly higher. A much bigger benefit offers MASTERLINE, as shown in graph 2, based on a much faster installation time. Beside the time benefit the installation of MASTERLINE requires no special know-how.



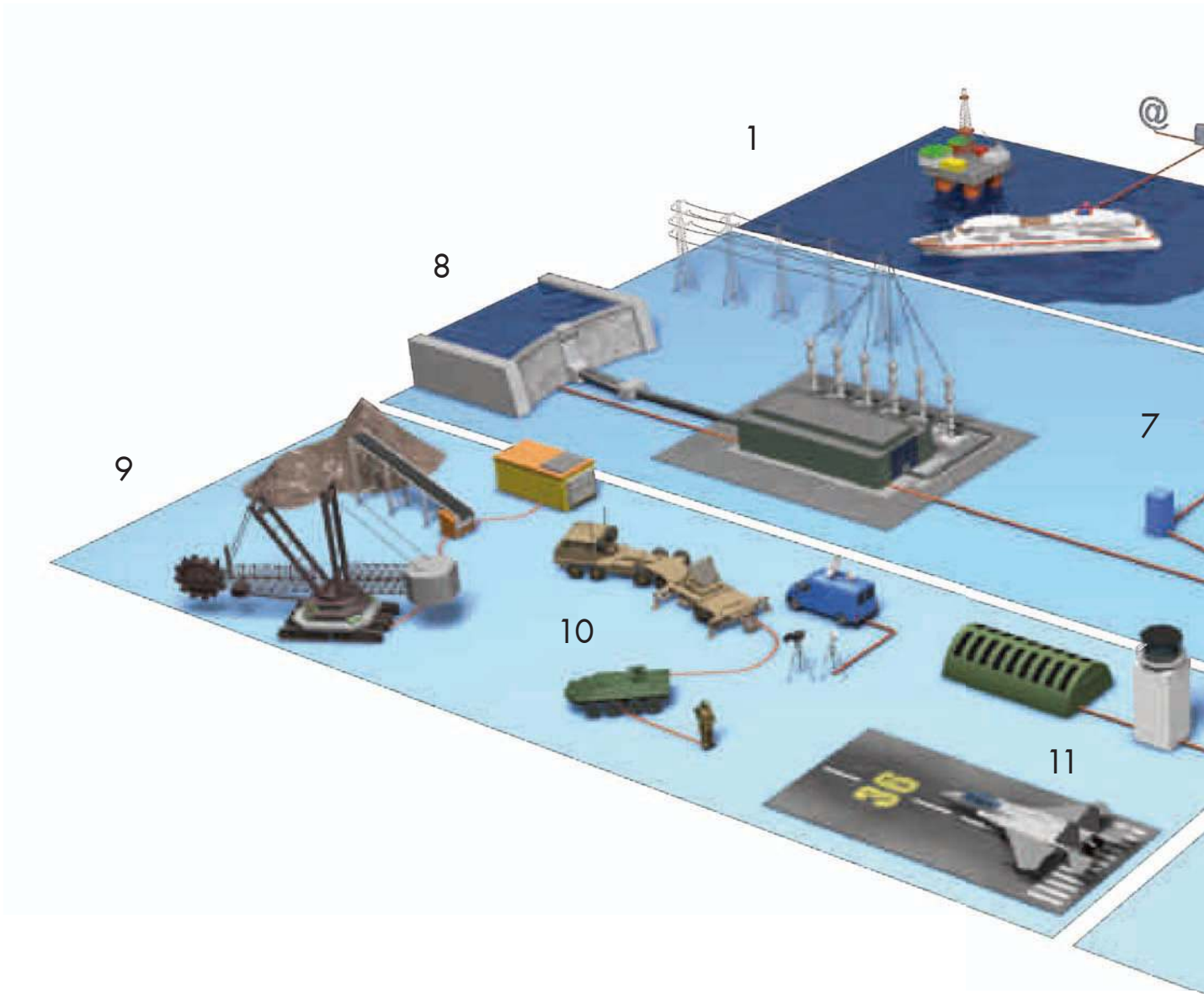
Graph 1 – comparison of total cost



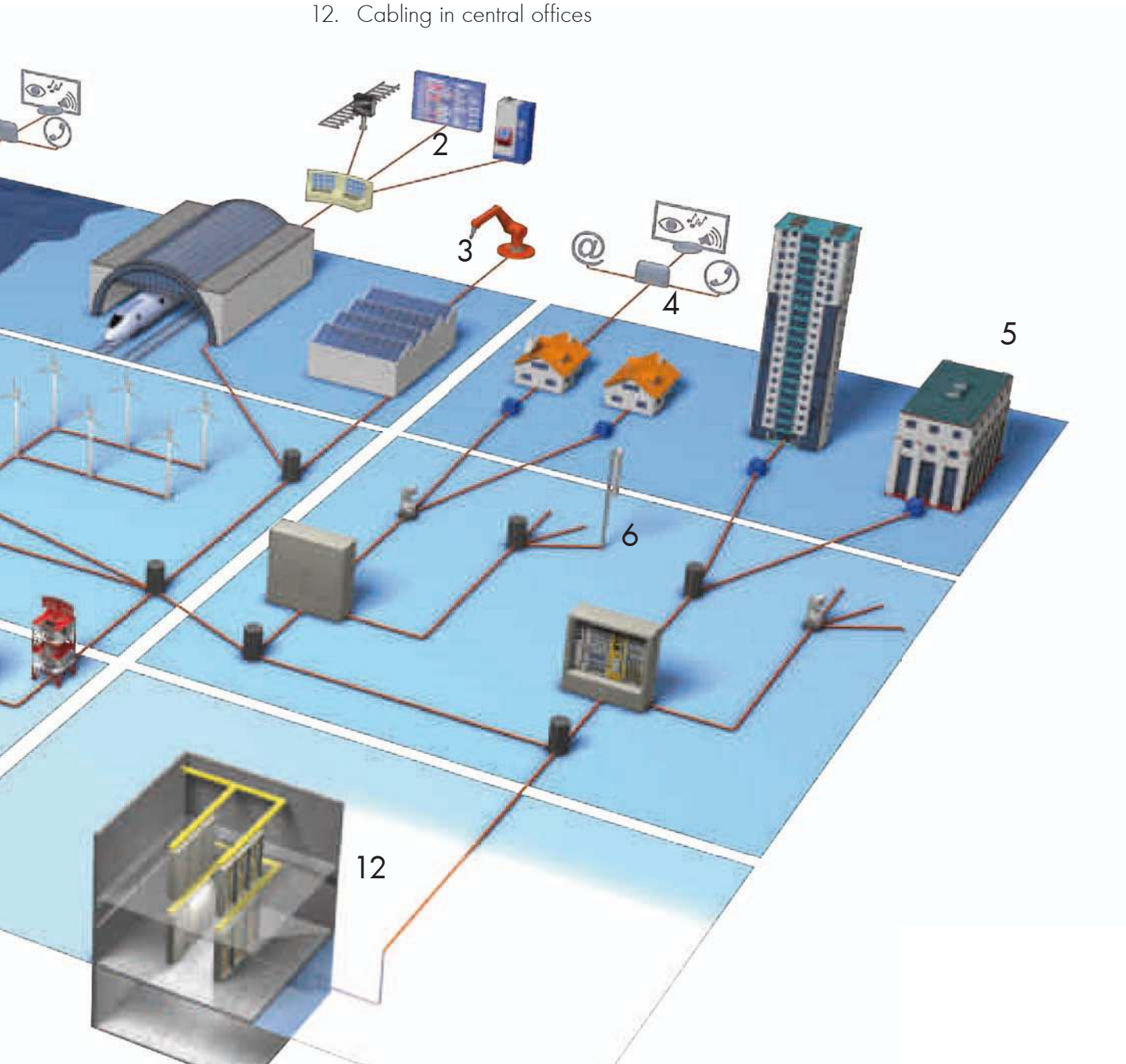
Graph 2 – comparison of installation time

Scope of system: Installation of a complete link with 24 fibers of a length of 100 m, ready-to-connect on each end with a cable termination box including each 24 adapters.

Application examples for MASTERLINE and SMARTLINE



1. Cabling on ships and ship-to-shore
2. Cabling of displays and ticket vending machines
3. Cabling of factories
4. Cabling of homes (FTTH)
5. Cabling of office buildings
6. Cabling of antennas (FTTA)
7. Cabling of wind turbines and wind farms
8. Cabling of subsystems to technical building at dams, power plants and power transmission stations
9. Cabling of mining and construction sites
10. Cabling of mobile vehicles and equipment
11. Cabling of buildings and premises
12. Cabling in central offices



## Terms and Definitions

### MASTERLINE

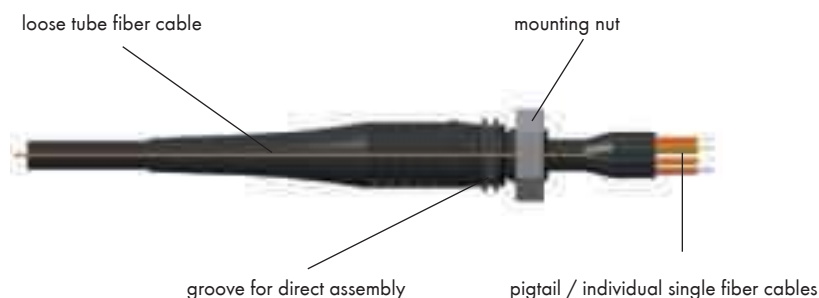
MASTERLINE are supplied on reels and ready-to-install. The effective protection of the single fiber cables by the protection tube allows the operation in harsh environment conditions indoors and outdoors.



### Divider

All MASTERLINE cabling systems are based on cable dividers that are specially designed by HUBER+SUHNER. Inside the divider, the optical fibers from loose tube cables are fitted into individual strain-relieved single fiber cables to which connectors are then fitted. The divider protects the optical fibers mechanically and thermally in the transition from the loose tube cable to the individual single fiber cables.

For easy attachment, e.g. in a distributor housing, the divider can be secured with a counter nut or affixed directly using the groove on the divider.



### Pigtail / individual single fiber cables

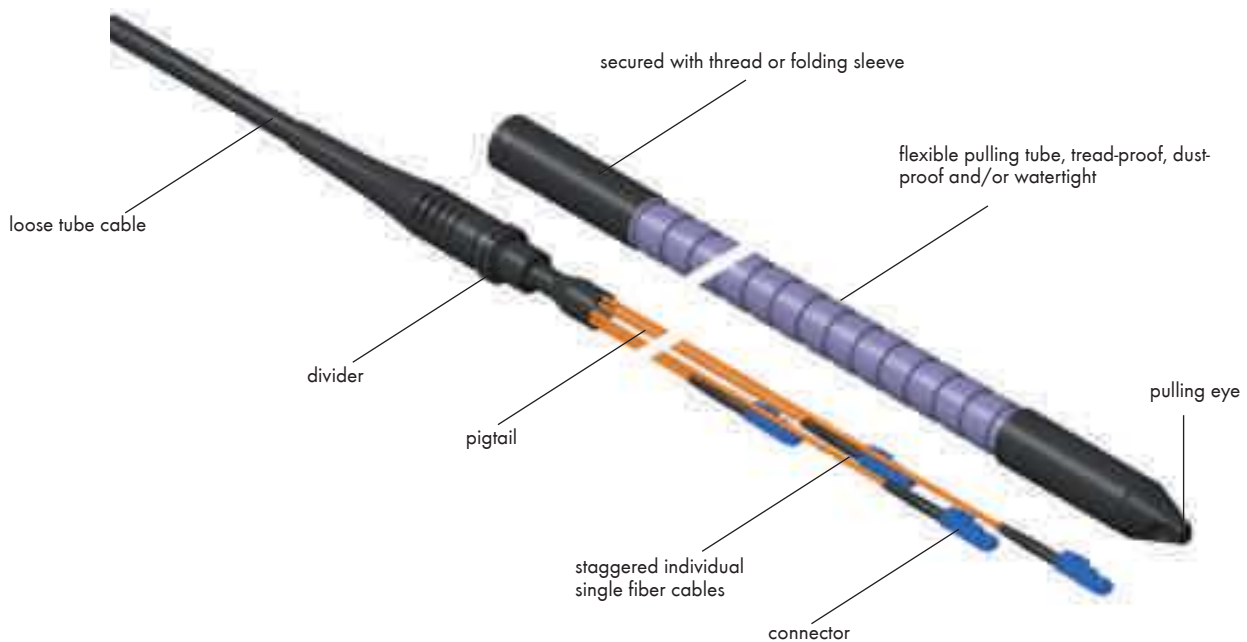
The pigtail protects the optical fiber into individual single fiber cables, which are then labelled for identification purposes. Each single fiber cable is strain-relieved with aramid yarn. The halogen free, self-extinguishing and low smoke LSFH™ jacket material around the individual cables fulfils fire safety requirements.

In the case of MASTERLINE cable systems with a pulling tube, the pigtails are staggered to standard lengths, i.e. allowing the smallest diameter tube to be fitted.

## Terms and Definitions

### Pulling tube (protection tube)

The pulling tube has two functions: it helps to manually or mechanically draw in the cable in pipes or cable ducts and it provides mechanical protection for the connectors. The robust pulling tube is tread-proof and either dust-proof (IP 50) or watertight (IP 67) depending on the version.



### Pulling eye

Each pulling tube has an eye for attaching a pulling apparatus. The specially designed shape allows the cable system to be drawn in quickly and easily, without getting jammed, even under force.

### Loose tube cable

Loose tube cables contain several fibers inside one tube or loose tube. The advantage of this design is that cables with 2 to 144 fibers still have a small outer diameter. Their mechanical and thermal properties make loose tube cables suitable for outdoor and indoor applications.

Loose tube cables for outdoor use with rodent protection or for indoor use with LSFH™ jacket.



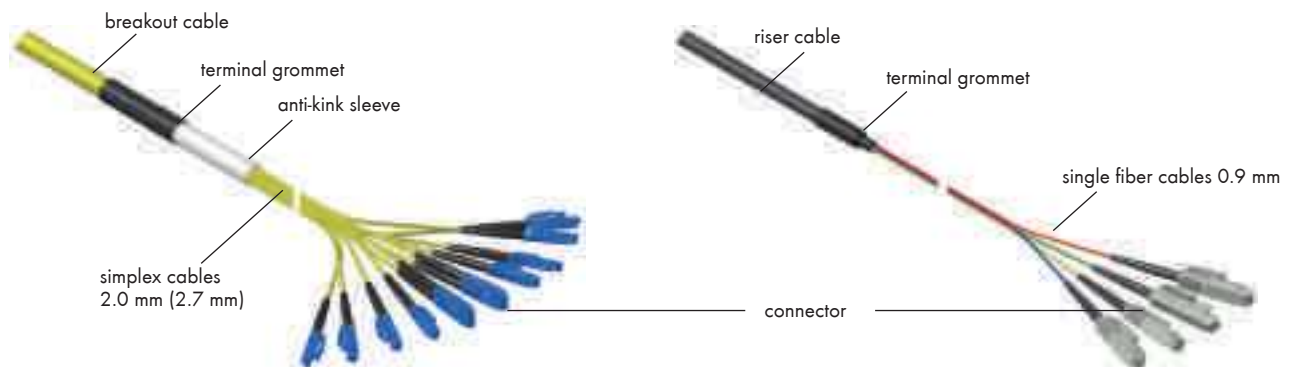
### Connector

MASTERLINE cable systems can be fitted with all HUBER+SUHNER standard connectors.

## Terms and Definitions

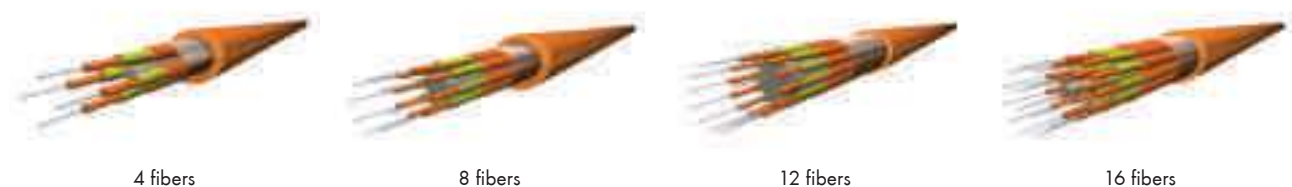
### SMARTLINE

Pre-terminated cable systems with internal ruggedized fibers of 0.9 mm, 2.0 mm or 2.7 mm jackets. The added protection given to the fibers, means that connectors can be directly terminated without the need of a divider. The SMARTLINE breakout cable offers the most protection and this is commonly used as a "multi-patch" cable for point to point connections. The SMARTLINE riser combines an element of protection with the added advantage of being compact, flexible and easy to splice at one end if required.



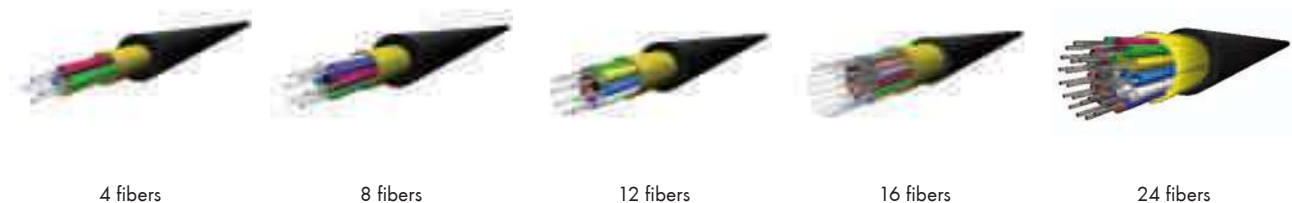
### Breakout cable

Breakout cables contain several 2.0 mm simplex cables (2.7 mm optional) strengthened with aramid and bundled into a single cable.



### Riser cable

Riser cables are several 0.9 mm tight tube cables bound in a strain-relieving material to form a single cable.



### Terminal grommet / anti-kink sleeve

The outer jacket of breakout or riser cables is stripped off depending on the required length of the simplex or single cores. A shrink fit grommet with additional anti-kink sleeve is fixed at the transition point of the SMARTLINE breakout cable and in the case of SMARTLINE riser, a rubber terminal grommet is used.

SMARTLINE cable systems do not include a pulling tube as standard. The length of the simplex cable or individual fiber cables can be manufactured to an equal or staggered length.

### Connector

MASTERLINE cable systems can be assembled with all HUBER+SUHNER standard connectors.



# Colour Codes

Fiber colour codes for cable systems equipped on one side

No.	Swisscom <sup>1</sup>	DIN <sup>2</sup>	ISO	IEC <sup>3</sup>
1	red	red	blue	blue
2	green	green	orange	yellow
3	yellow	blue	green	red
4	blue	yellow	red	natural/white
5	natural/white	natural/white	grey	green
6	violet	grey	yellow	violet
7	orange	brown	brown	orange
8	black	violet	violet	grey
9	grey	turquoise	natural/white	turquoise
10	brown	black	black	black
11	pink	orange	pink	brown
12	turquoise	pink	turquoise	pink

<sup>1</sup> Standard unless otherwise stated  
<sup>2</sup> DIN VDE 0888 Part 3  
<sup>3</sup> IEC 60794-2

## Strands as defined by Swisscom<sup>1</sup>

### Loose tube cables

1	red
2	green
3	white 1
4	white 2
5	white 3
...	.....
Dummies	black

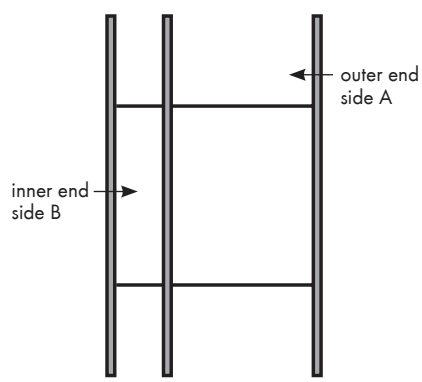
<sup>1</sup> Standard unless otherwise stated



loose tube cable, stranded up to 144 fibers



loose tube cable up to 24 fibers



## Length Definition



L1 = cable length / divider to divider  
 L2 = installed length of divider (dependent on divider type)  
 L3 = Pigtail length

L1, cable length	Tolerance
Up to 0.5 m	+ 4 cm
Up to 1 m	+ 6 cm
Up to 5 m	+ 30 cm
Up to 25 m	+ 50 cm
> 25 m	+ 2 %
L3, pigtail length	Tolerance
All	± 5 cm

## Overview of Cabling Systems



Cabling systems	MASTERLINE classic	MASTERLINE classic <sup>HT</sup>	MASTERLINE lite	MASTERLINE compact
For details see	page 20	page 24	page 26	page 28
Number of fibers	2 up to 144	2 up to 48	2 up to 24	2 up to 24
Divider	yes	yes	yes	yes
Fanout length, standard	staggered	staggered	staggered	not staggered
Diameter of single fiber cables	2.1 oder 1.7 mm (optional 3.0 or 3.4 mm)	2.1 mm	2.1 oder 1.7 mm	2.1 oder 1.7 mm
Protective pulling tube	yes	yes	yes	no
Seal integrity	IP 67	IP 67	IP 50	-

### Mechanical characteristics (at the pulling tube)

Max. tensile strength	1000 / 1200 N	1000 / 1200 N	500 / 700 N	1)
Crush resistance	200 / 250 N/cm	200 / 250 N/cm	20 / 150 N/cm	1)

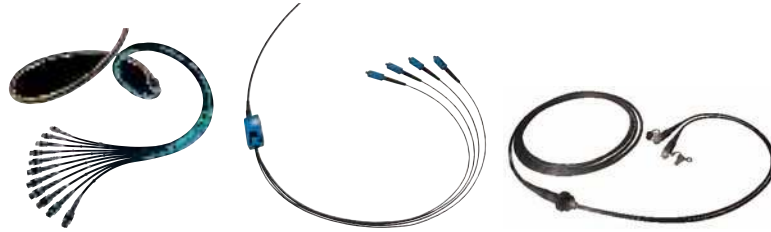
### Thermal characteristics

In service	-25 °C up to +70 °C	-40 °C up to +70 °C	-15 °C up to +70 °C	-25 °C up to +70 °C
In storage	-25 °C up to +70 °C	-40 °C up to +70 °C	-20 °C up to +70 °C	-25 °C up to +70 °C

1) See detailed specifications in data sheet for cable type.



## Overview of Cabling Systems



Cabling systems	MASTERLINE MPO/MTP®	MATERLINE quick	MASTERLINE extreme
For details see	page 30	page 32	page 34
Number of fibers	24 up to 144	2 up to 12	4 up to 6
Divider	yes	yes	yes
Fanlout length, standard	staggered	not staggered	not staggered
Diameter of single fiber cables	3.4 mm	1.7 mm	5.6 mm
Protective pulling tube	no	no	no
Seal integrity	-	-	IP 68 (connector with protective cap)

### Mechanical characteristics

Max. tensile strength	1)	1)	450 / 600 N <sup>2)</sup>
Crush resistance	1)	1)	400 / 100 N <sup>2)</sup>

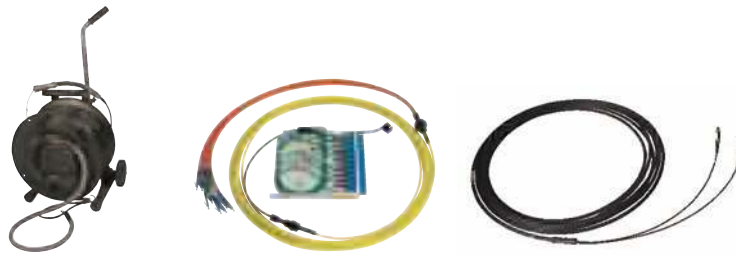
### Thermal characteristics

In service	0 °C up to +70 °C	-25 °C up to +70 °C	-40 °C up to +70 °C
In storage	0 °C up to +70 °C	-25 °C up to +70 °C	-40 °C up to +70 °C

1) See detailed specifications in data sheet for cable type.

2) On ODC connectors.

## Overview of Cabling Systems



Cabling systems	MASTERLINE mobile	M3K und M3KP	ATC Divider
For details see	page 36	page 38	page 42
Number of fibers	2 up to 12	2 up to 24	2 up to 4
Divider	yes	yes	yes
Fanout length, standard	staggered	not staggered	not staggered
Diameter of single fiber cables	2.7 or 3.4 mm	5.0 mm / 1.7 mm	2.1 mm
Protective pulling tube	yes	no	no
Seal integrity	IP 67	-	-

### Mechanical characteristics

Max. tensile strength	1000 N	1)	1)
Crush resistance	200 / 250 N/cm	1)	1)

### Thermal characteristics

In service	-40 °C up to +70 °C	-25 °C up to +70 °C	-30 °C up to +70 °C
In storage	-40 °C up to +70 °C	-25 °C up to +70 °C	-30 °C up to +70 °C

1) See detailed specifications in data sheet for cable type.

# Overview of Cabling Systems



Cabling systems	ATO/ATM divider	SMARTLINE riser	SMARTLINE breakout
For details see	page 44	page 46	page 48
Number of fibers	2 up to 12	4 up to 24	2 up to 16
Divider	no	yes	no
Fanout length, standard	not staggered	not staggered	not staggered
Diameter of single fiber cables	3.4 mm	0.9 mm	2.0 mm optional 2.7 mm
Protective pulling tube	no	no	no
Seal integrity	-	-	-

## Mechanical characteristics

Max. tensile strength	1)	1)	1)
Crush resistance	1)	1)	1)

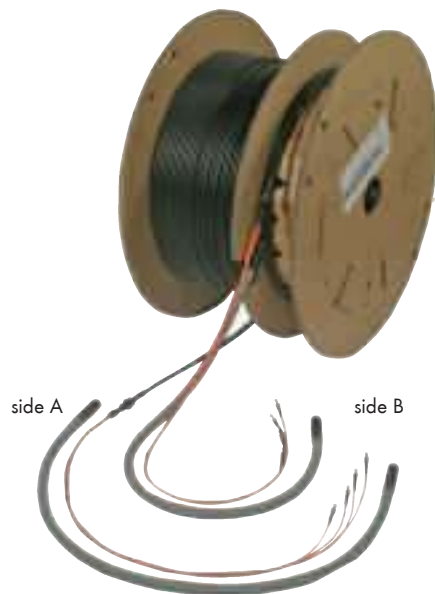
## Thermal characteristics

In service	-25 °C up to +70 °C	-25 °C up to +70 °C	-25 °C up to +70 °C
In storage	-25 °C up to +70 °C	-25 °C up to +70 °C	-25 °C up to +70 °C

1) See detailed specifications in data sheet for cable type.

# MASTERLINE classic

Can be drawn directly into pipes and ducts for demanding indoor and outdoor applications.



### General features

- Ready to use, plug and play system
- Fast and simple installation
- No splicing or connector assembly required
- Single-sided or double-sided equipment versions available
- Tread-proof, waterproof pulling tube with high tensile strength (IP 67)

### Properties

- 2 - 144 fibers
- Robust divider with screw-on mounting
- Cable for indoor and outdoor use, with or without rodent protection
- Can be assembled with all standard connector types
- Reusable, highly robust pulling tube
- Can be supplied as a cable coil, on cardboard or wooden reel

### Applications

MASTERLINE classic is a robust, pre-assembled cable system for mechanically demanding indoor and outdoor applications.

- Building backbone (horizontal wiring) or campus backbone (exterior wiring)
- Wiring in MAN, WAN, SAN and private networks and computer centres
- Wiring in industrial environments



### Accessories

Mounting nut for divider		Item no.
M 16 x 1;	2 up to 12 fibers	23040541
M 26 x 2;	up to 24 fibers	22649055

Adapter for fitting a larger pulling tube		Item no.
1 Adapter_SM_A_longneck		23039455
2 Adapter_SM_A_shortneck		84082085
3 Adapter_SM_A_open*		84069245

\* not watertight with mounted pulling-tube.

## MASTERLINE classic

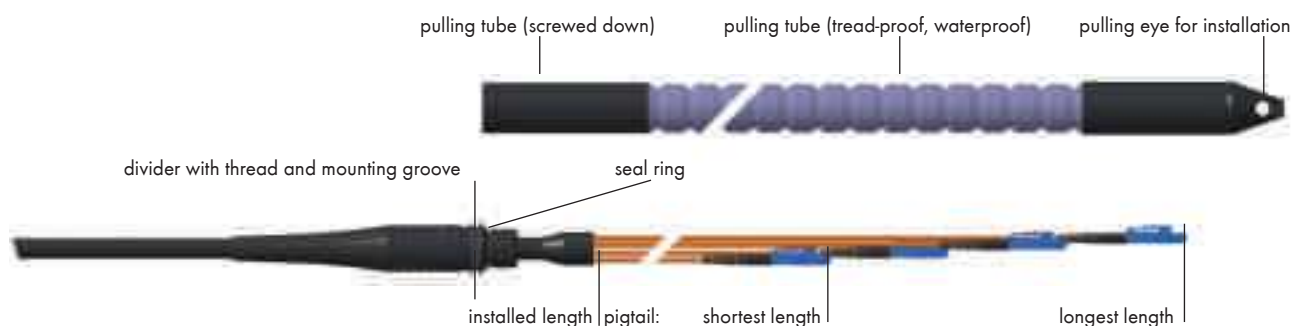
Specifications	MASTERLINE classic			
Number of fibers	up to 12	up to 24	up to 24	up to 60
Divider	small	medium	small	medium
Outer diameter	22 mm	31 mm	22 mm	31 mm
Installed length	48 mm	58 mm	48 mm	58 mm
Bore diameter for mounting	15.6 - 16.4 mm	25.5 - 26.5 mm	15.6 - 16.4 mm	25.5 - 26.5 mm
Thread size for mounting	M16 x 1	M26 x 2	M16 x 1	M26 x 2
Size of mounting groove	15.2 mm	19.2 mm	15.2 mm	19.2 mm
Maximum tensile load on divider	1000 N	1000 N	1000 N	1000 N
Fanout cable	standard fiber density		higher fiber density	
Diameter of single fiber cable	2.1 mm	2.1 mm	1.7 mm	1.7 mm
Standard fanout length (staggered) <sup>1)</sup>	longest length	1165 mm +/- 50	1045 mm +/- 50	1235 mm +/- 50
	shortest length	450 mm +/- 50	520 mm +/- 50	650 mm +/- 50
Identification of single fiber cable	coded numbers			
Jacket material	LSFH™ low smoke, halogen free and self-extinguishing			
Connector	all HUBER+SUHNER standard connectors			
Pulling tube with pulling eye				
Outer diameter	23.5 mm	31 mm	23.5 mm	31 mm
Maximum tensile strength <sup>2)</sup>	1000 N	1000 N	1000 N	1000 N
Crush resistance	200 N/cm	250 N/cm	250 N/cm	250 N/cm
Watertightness	IP 67	IP 67	IP 67	IP 67
Cable				
Maximum length <sup>3)</sup>	4000 m	4000 m	4000 m	4000 m
Cable diameter max.	8.5 mm	15 mm	9.4 mm	15 mm
Cable types (with / without rodent protection)	LSFH™ for indoor applications, halogen free and self-extinguishing			
	PE for outdoor applications, longitudinal and transversal watertight			
Temperature range <sup>4)</sup>				
During installation	- 10 °C up to +50 °C			IEC 61300-2-22
In service	- 25 °C up to +70 °C			
In storage	- 25 °C up to +70 °C			

1) Length of fanout can be freely defined, but max. of 5.0 m. Pulling tube cannot be fitted without staggered setup.

2) Tensile load on entire cable system, including pulling tube. For tensile load on cable, see data sheet for cable type.

3) Longer cable lengths by agreement with technical support.

4) Temperature range for entire cable system.



# MASTERLINE classic

Can be drawn directly into pipes and ducts for demanding indoor and outdoor applications.



### General features

- Ready to use, plug and play system
- Fast and simple installation
- No splicing or connector assembly required
- Single-sided or double-sided equipment versions available
- Tread-proof, waterproof pulling tube with high tensile strength (IP 67)

### Properties

- 48 - 144 fibers
- Robust divider with screw-on mounting
- Cable for indoor and outdoor use, with or without rodent protection
- Can be assembled with all standard connector types
- Reusable, highly robust pulling tube
- Can be supplied as a cable coil, on cardboard or wooden reel

### Applications

MASTERLINE classic is a robust, pre-assembled cable system for mechanically demanding indoor and outdoor applications.

- Building backbone (horizontal wiring) or campus backbone (exterior wiring)
- Wiring in MAN, WAN, SAN and private networks and computer centres
- Wiring in industrial environments



### Accessory

Mounting nut for divider	Item no.
PG 29, 48 up to 144 fibers	22649056

## MASTERLINE classic

Specifications		MASTERLINE classic		
Number of fibers		up to 48	up to 72	up to 144
Divider		big	big	big
Outer diameter		45 mm	45 mm	45 mm
Installed length		70 mm	70 mm	70 mm
Bore diameter for mounting		37.0 – 39.0 mm	37.0 – 39.0 mm	37.0 – 39.0 mm
Thread size for mounting		PG 29	PG 29	PG 29
Size of mounting groove		30.2 mm	30.2 mm	30.2 mm
Maximum tensile load on divider		1200 N	1200 N	1200 N
Fanout cable				
Diameter of single fiber cable		2.1 mm	1.7 mm	1.7 mm
Standard fanout staggered <sup>1)</sup>	longest length	1045 mm +/- 50	graduation on request	graduation on request
	shortest length	520 mm +/- 50	graduation on request	graduation on request
Identification of single fiber cable		coded numbers		
Jacket material		LSFH™ low smoke, halogen free and self-extinguishing		
Connector		all HUBER+SUHNER standard connectors		
Pulling tube with pulling eye				
Outer diameter		45 mm	on request depending on connector type and pigtail	on request depending on connector type and pigtail
Maximum tensile strength <sup>2)</sup>		1200 N		
Crush resistance		250 N/cm		
Watertightness		IP 67		
Cable				
Maximum length <sup>3)</sup>		4000 m	on request	on request
Cable diameter max.		15 mm	16.5 mm	22.0 mm
Cable types (with / without rodent protection)		LSFH™ for indoor applications, halogen free and self-extinguishing		
		PE for outdoor applications, longitudinal and transversal watertight		
Temperature range <sup>4)</sup>				
During installation		- 10 °C up to +50 °C		IEC 61300-2-22
In service		-25 °C up to +70 °C		
In storage		-25 °C up to +70 °C		

1) Length of fanout can be freely defined, but max. of 5.0 m. Pulling tube cannot be fitted without staggered setup.

2) Tensile load on entire cable system, including pulling tube. For tensile load on cable, see data sheet for cable type.

3) Longer cable lengths by agreement with technical support.

4) Temperature range for entire cable system.

## MASTERLINE classic<sup>HT</sup>

MASTERLINE classic<sup>HT</sup> has primary been developed for outdoor use in extreme temperatures.



### General features

- Temperature range -40 °C up to +70 °C
- Pre-assembled cabling system
- Ready-to-use system
- Easy and time-saving installation
- For loose tube cables with up to 48 fibers
- 100% tested with test documentation for each system

### Properties

- Number of fibres: 2 to 48
- Fiber types: singlemode, multi mode, HCS
- Sturdy, compact divider
- All loose tube, glass fiber-reinforced cables can be terminated
- All common connector types can be assembled
- Version can be equipped at both ends or one end

### Applications

MASTERLINE classic<sup>HT</sup> declares uphill struggle on increased attenuation at extreme temperatures. This is because only MASTERLINE classic<sup>HT</sup> can consistently guarantee proper data traffic as a complete system in a temperature range from at least -40 °C to +70 °C.

\*) HT = high temperature





## MASTERLINE classic<sup>HT</sup>

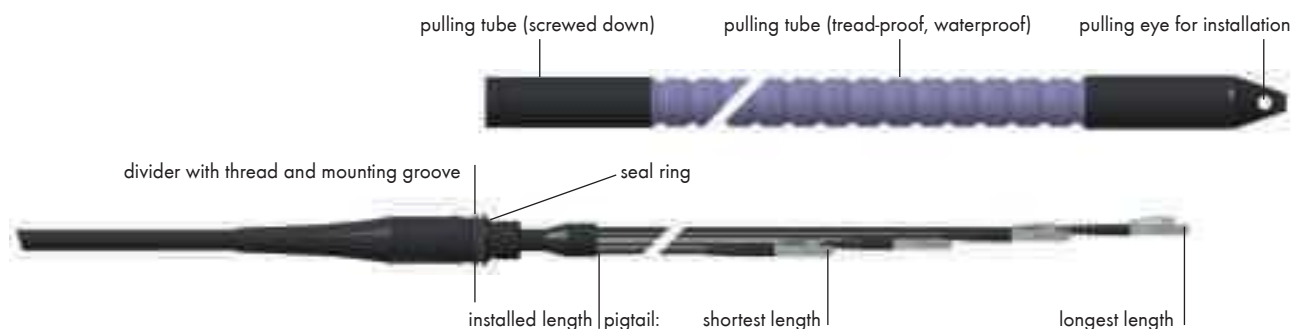
Specifications		MASTERLINE classic <sup>HT</sup>		
Number of fibers		up to 12	up to 24	up to 48
Divider		small	medium	large
Outer diameter		22 mm	31 mm	45 mm
Installed length		48 mm	58 mm	70 mm
Bore diameter for mounting		15.6 – 16.4 mm	25.5 – 26.5 mm	37.0 – 39.0 mm
Thread size for mounting		M16 x 1	M26 x 2	PG 29
Size of mounting groove		15.2 mm	19.2 mm	30.2 mm
Maximum tensile load on divider		1000 N	1000 N	1200 N
Fanout				
Diameter of single fiber cable		2.1 mm	2.1 mm	2.1 mm
Standard pigtail staggered <sup>1)</sup>	longest length	1045 mm +/- 50	1455 mm +/- 50	1045 mm +/- 50
	shortest length	520 mm +/- 50	520 mm +/- 50	520 mm +/- 50
Identification of single fiber cable		coded numbers		
Jacket material		RADOX® high temperature, low smoke, halogen free and self-extinguishing		
Connector		all HUBER+SUHNER standard connectors		
Pulling tube with pulling eye				
Outer diameter		23.5 mm	31 mm	49 mm
Maximum tensile strength <sup>2)</sup>		1000 N	1000 N	1200 N
Crush resistance		250 N/cm	250 N/cm	250 N/cm
Watertightness		IP 67	IP 67	IP 67
Cable				
Maximum length <sup>3)</sup>		4000 m	4000 m	4000 m
Cable diameter max.		8.5 mm	15.0 mm	15.0 mm
Cable types (with / without rodent protection)		LSFH™ low smoke, halogen free and self-extinguishing		
		PE for outdoor applications, longitudinal and transversal watertight		
Temperature range <sup>4)</sup>				
During installation		- 10 °C up to +50 °C		IEC 61300-2-22
In service		-40 °C up to +70 °C		
In storage		-40 °C up to +70 °C		

1) Length of Fanout can be freely defined, but max. of 5.0 m. Pulling tube cannot be fitted without staggered setup.

2) Tensile load on entire cable system, including pulling tube. For tensile load on cable, see data sheet for cable type.

3) Longer cable lengths by agreement with technical support.

4) Temperature range for entire cable system.



# MASTERLINE lite

Low-cost, lightweight cable system for quick and easy installation in indoor applications.



### General features

- Ready to use, plug and play system
- Fast and simple installation
- No splicing or connector assembly required
- Single-sided or double-sided equipment assemblies
- Tread-proof and dust-proof pulling tube (IP50)

### Properties

- 2 - 24 fibers
- Easy-to-mount dividers (with slot or screw-on fixture)
- Cable for indoor use, with or without anti-rodent protection
- Can be assembled with all standard connector types
- Reusable pulling tube with hinged fixing sleeve
- Can be supplied as a cable coil, on cardboard or wooden reel

### Applications

MASTERLINE lite is a low-cost, pre-assembled cable system designed primarily for indoor applications.

- Building backbone (horizontal wiring)
- LAN wiring and private networks



### Accessories

Mounting kit (thread retainer and nut)	Item no.
ML lite up to 12 fibers	84016231
ML lite up to 24 fibers	84016234

Adaptor for fitting a larger pulling tube	Item no.
Adapter_SM_L_open	84099173

# MASTERLINE lite

Specifications		MASTERLINE lite		
Number of fibers		up to 12	up to 24	up to 24
Divider		small	medium	small
Outer diameter		18 mm	18 mm	18 mm
Installed length, two mounting grooves		50 mm / 60 mm	50 mm / 60 mm	50 mm / 60 mm
Size of mounting groove		15 mm / 15 mm	15 mm / 15 mm	15 mm / 15 mm
Optional accessories: thread size for mounting min. bore for mounting width across flats		PG 16 22.5 mm 26 mm	PG 16 22.5 mm 26 mm	PG 16 22.5 mm 26 mm
Maximum tractive force on divider		500 N	500 N	500 N
Fanout cable				
Diameter of single fiber cable		2.1 mm	2.1 mm	1.7 mm
Standard fanout length (staggered) <sup>1)</sup>	longest length	1235 mm +/- 50 mm	1235 mm +/- 50 mm	1235 mm +/- 50 mm
	shortest length	520 mm +/- 50 mm	520 mm +/- 50 mm	520 mm +/- 50 mm
Identification of single fiber cable		coded numbers		
Jacket material		LSFH™ low smoke, halogen free and self-extinguishing		
Connector		all HUBER+SUHNER standard connectors		
Pulling tube with pulling eye				
Outer diameter		22 mm	25 mm	25 mm
Outer diameter, folding sleeve, pulling tube		26 mm	30 mm	30 mm
Maximum tensile strength <sup>2)</sup>		500 N	500 N	500 N
Crush resistance		120 N/cm	120 N/cm	120 N/cm
Dust-proofing		IP 50	IP 50	IP 50
Cable				
Maximum length <sup>3)</sup>		2000 m	2000 m	2000 m
Cable diameter max.		8.5 mm	10 mm	8.5 mm
Cable types (with / without rodent protection)		LSFH™ for indoor applications, halogen free and self-extinguishing		
		PE for outdoor applications, longitudinal and transversal watertight		
Temperature range <sup>4)</sup>				
During installation		- 5 °C up to +50 °C		IEC 61300-2-22
In service <sup>5)</sup>		- 15 °C up to +70 °C		
In storage		- 20 °C up to +70 °C		

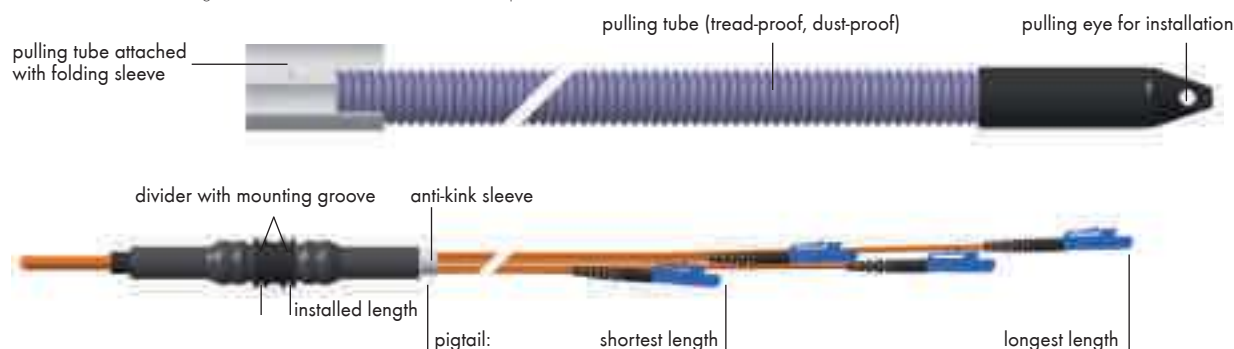
1) Length of fanout can be freely defined, but max. of 5.0 m. Pulling tube cannot be fitted without staggered setup.

2) Tensile load on entire cable system, including pulling tube. For tensile load on cable, see data sheet for cable type.

3) Longer cable lengths by agreement with technical support.

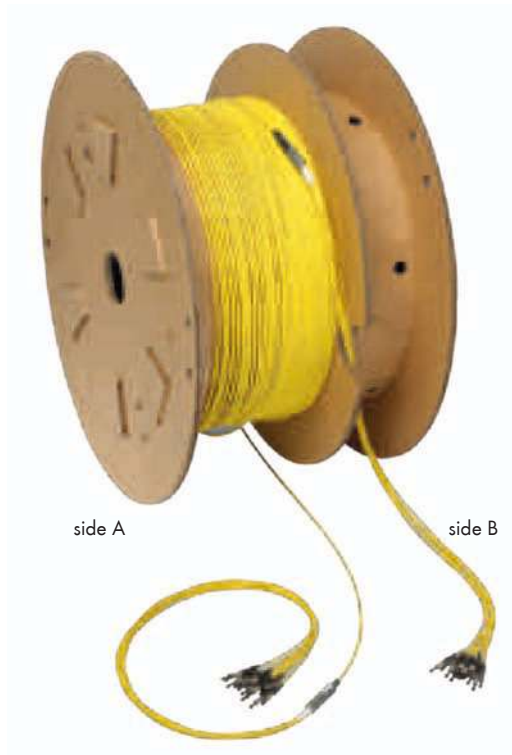
4) Temperature range for entire cable system.

5) Standard with 1300 nm, singlemode with 1550 nm in service -5 °C up to +60 °C.



# MASTERLINE compact

Compact and robust cable system for indoor applications with restricted available space.



## General features

- Ready to use, plug and play system
- Narrow cable divider
- Good thermal properties
- Fast and simple installation
- No splicing or connector assembly required
- Single-sided or double-sided equipment assemblies

## Properties

- 2 - 24 fibers
- Dividers with mounting slot to fix in distribution boxes
- Cable for indoor use, with or without rodent protection
- Can be assembled with all standard connector types
- Can be supplied as a cable coil, on cardboard or wooden reel

## Applications

MASTERLINE compact is a pre-assembled cable system which is extremely suitable as a patch or connecting cable between two distributor units for short to medium distances.

- External patch / connecting cable (interconnection)
- As a connection between the main distribution device and transmitters
- As a connection between the main distribution device and terminal area



## MASTERLINE compact

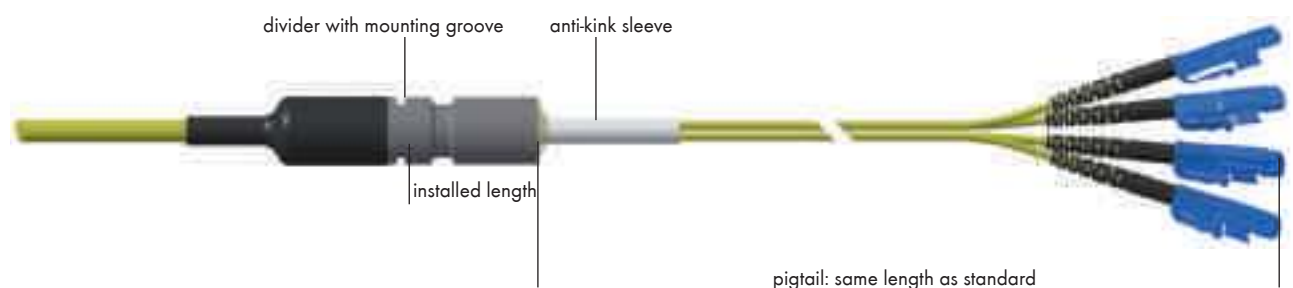
Specifications		MASTERLINE compact	
Number of fibers		up to 12	up to 24
Divider		small	small
Outer diameter		15 mm	15 mm
Installed length		30 mm	30 mm
Size of mounting groove		12 mm	12 mm
Maximum tensile load on divider		800 N	800 N
Fanout cable			
Diameter of single fiber cable		2.1 mm	
Standard fanout length		not staggered <sup>1)</sup>	1000 mm +/- 50 mm
		staggered <sup>1)</sup>	optional available
Identification of single fiber cable		coded numbers	
Jacket material		LSFH™ low smoke, halogen free and self-extinguishing	
Connector		all HUBER+SUHNER standard connectors	
Pulling tube with pulling eye		no	
Cable			
Maximum length <sup>3)</sup>		2000 m	2000 m
Cable diameter max.		8.5 mm	8.5 mm
Cable types (with / without anti-rodent protection)		LSFH™ for indoor applications, halogen free and self-extinguishing PE for outdoor applications, longitudinal and transversal watertight	
Temperature range <sup>4)</sup>			
During installation		- 10 °C up to +50 °C	IEC 61300-2-22
In service <sup>5)</sup>		-25 °C up to +70 °C	
In storage		-20 °C up to +70 °C	

1) Length of fanout can be freely defined, but max. of 5.0 m.

3) Longer cable lengths by agreement with technical support.

4) Temperature range for entire cable system.

5) Standard with 1300 mm, singlemode with 1550 mm in service -5 °C up to +60 °C.



## MASTERLINE MPO / MTP®

Compact multi-fiber cable system for comfortable installation in data center applications.



### General features

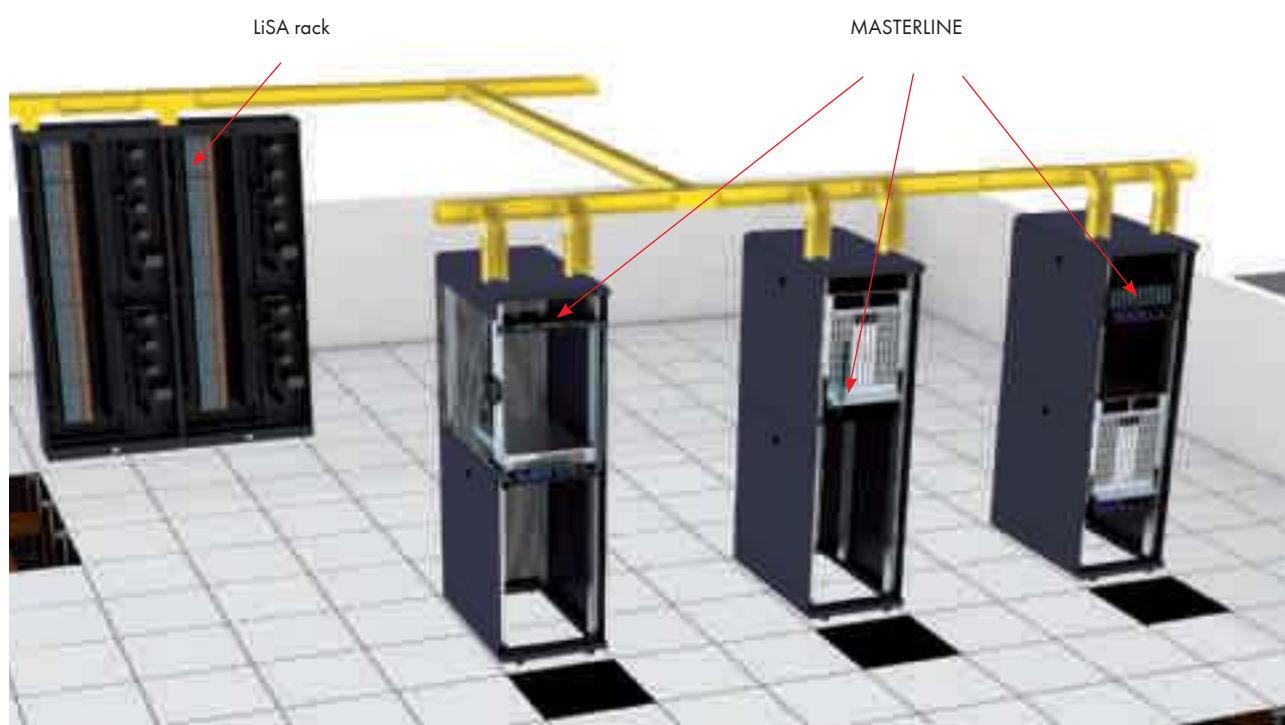
- Ready-to-use, ready-to-draw system
- For easy and time-saving installation
- No splicing or plug assembly necessary
- Colour coded by fiber type (SM, MM OM3 or OM4)
- Versions finished at one end or both ends available
- Resistant to environmental influences

### Properties

- 24 - 144 fibers per assembly
- Sturdy divider with thread and assembly groove
- Cable for indoor/outdoor applications, with or without rodent protection
- Whip diameter: 3.5 mm
- MTP® without pins (as standard)

### Applications

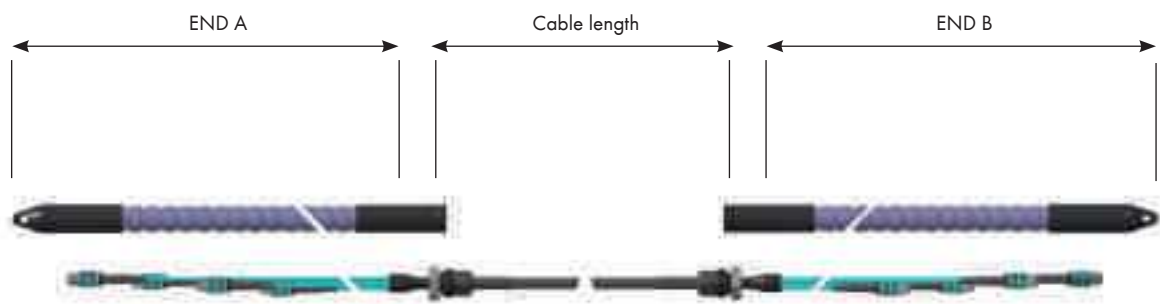
MASTERLINE MPO/MTP® can be used to connect the optical distributor racks (ODR) and the equipment racks. With up to 144 fibers, this is one of the fastest ways of establishing a multi-fiber link between two points.



# MASTERLINE MPO / MTP®

## Ordering code

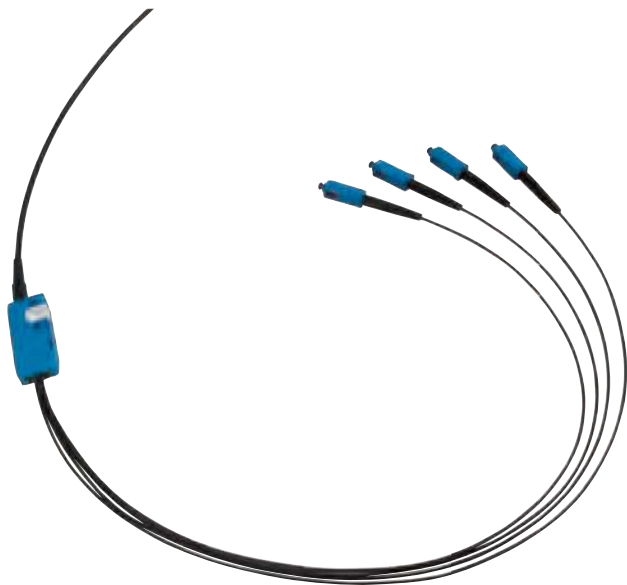
		Description
RC-		ruggedised tails (12 fibers per connector)
1-		singlemode 9/125 µm
3-		multimode 50/125 µm OM3
5-		multimode 50/125 µm OM2
7-		multimode 50/125 µm OM4
H		LSFH™ (low smoke, halogen free and self-extinguishing)
nnn		number of fibers in cable up to 144
R-		round cable and tail construction
		<b>Connector side A</b>
52/		connector left side MTP without pins FEMALE
		<b>Connector side B</b>
00-		no connector right side (SIDE B)
52-		connector right side MTP without pins FEMALE
		<b>Length side A</b>
150/		length between divider and connector in <b>decimeters</b> (e.g 15 m = 150 dm = 150)
SPE/		customer specific staggered breakout lengths or colour coded connectors
		<b>Length side B</b>
150-		length between divider and connector in <b>decimeters</b> (e.g 15 m = 150 dm = 150)
SPE-		customer specific staggered breakout lengths or colour coded connectors
75		cable length between dividers in meters
K		no connector right side
P P		singlemode MT ferrule
M M		multimode
RC-	1- H 144 R- 52/ 52- 20/ 20- 75 M M	Example





## MASTERLINE quick

Guarantee a simple and fast connection, especially in Fiber To The Home (FTTH) applications.



### General features

- Compact flat divider in „One-piece Design“
- Cost optimised dividing solution
- Less space required
- No splicing required
- Divider available in different colours
- As pre-terminated cable system or mounting set for field termination

### Properties

- 2 - 12 fibers
- Each single fiber cable 1.7 mm strain-relieved
- Compatible with different connecting cables
- Can be assembled with all standard connector types
- Different fixation possibilities of the divider

### Applications

MASTERLINE quick is an optimised divider solution as pre-terminated MASTERLINE or as mounting set for field termination.

- For FTTH (Fiber to the home) – home side
- Divider system in building backbone and FTTD
- Cable divider for protected industry application



### MASTERLINE quick as mounting set

MASTERLINE quick as mounting set for direct field pre-termination.

### Properties

- Fast and easy mounting
- Field termination
- Prepared fanout 2 up to 12 fibers
- Each cable strain-relieved (LSFH™ black Ø 1.7 mm)
- Termination instruction
- Divider housing available in blue, green, beige or black

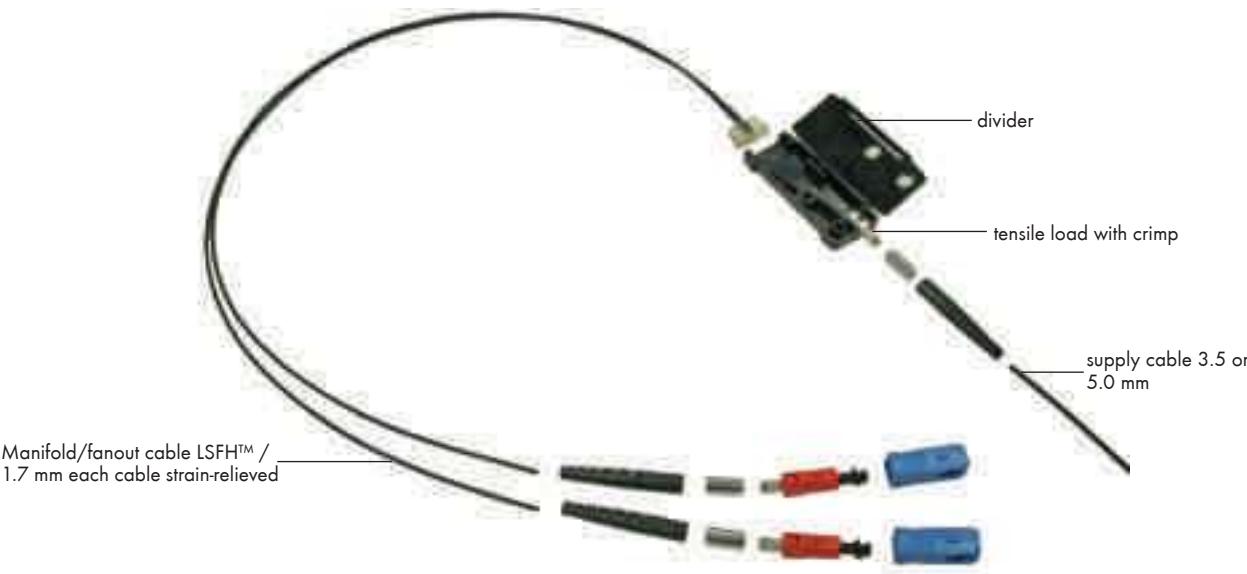


Order information see page 65.



# MASTERLINE quick

Specifications	MASTERLINE quick	
Number of fibers	2 up to 12	
Divider		
Dimensions	55 × 24 × 9 mm (L×W×H)	
Colours of dividers	blue, green, beige, black	
Opening security device	warranty seal	
Mounting possibilities	2 mounting holes 3.5 mm (M3); groove for cable tie	
Max. tensile load; supply cable - divider	50 N	
Max. tensile load; fanout cable - divider	20 N	
Manifold / fanout cables LSFH™		
Diameter	1.7 mm (2.0 mm)	
Bend radius in service / during installation	25 mm / 50 mm	
Length	0.5 +/- 0.06 m (optional possible 2.0 m)	
Identification of single fiber cable	coded numbers	
Colour	black (optional orange, yellow)	
Jacket material	LSFH™ low smoke, halogen free and self-extinguishing	
Connector	all HUBER+SUHNER standard connectors	
Supply cable		
Diameter	3.5 mm	5.0 mm
Bend radius in service / during installation	35 mm / 52.5 mm	50 mm / 75 mm
Outer jacket	LSFH™	LSFH™ / PE
Temperature range		
During installation	- 15°C up to +50°C	
In service	-25°C up to +70°C	
In storage	-25°C up to +70°C	



## MASTERLINE extreme

MASTERLINE extreme is a multi-fiber cable system directly equipped with the well-known HUBER+SUHNER ODC® connectors.



### General features

- Ready-to-use cabling system
- Extreme temperature resistance
- Extreme mechanical properties
- Sturdy dividers and connector components
- Waterproof, dustproof and corrosion resistant
- Different cable types can be used
- High installation reliability
- 100% tested with test documentation for each system

### Properties

- Versions with ODC®-2 (screw-in) or Q-ODC® (2x Push-Pull)
- With 2 x 2-off or 3 x 2-off per side (max. 6 fibers)
- As singlemode or multimode fiber
- Versions can be equipped at one end or both ends
- Adapter M32 for direct mounting available

### Applications

MASTERLINE are pre-assembled fiber optic cable systems for reliable, easy and time-saving installation. MASTERLINE extreme can be used for demanding applications inside and outside.



# MASTERLINE extreme

Specifications	MASTERLINE extreme	
Number of fibers	up to 6	
Divider	small	
Outer diameter	22 mm	
Installed length	approx. 40 mm	
Bore diameter for mounting <sup>1)</sup>	16 mm	
Thread size for mounting	M16 x 1	
Size of mounting groove	15.2 mm	
Maximum tensile load on divider	600 N	
Fanout cable		
Diameter of single fiber cable	5.6 mm	
Standard fanout length (not staggered) <sup>2)</sup>	1000 mm +/- 50 mm	
Identification of single fiber cable	coded numbers	
Jacket material	PUR high chemical resistance, wide temperature range	
Connector	ODC®-2 and Q-ODC® connectors	
Pulling tube with pulling eye	not available	
Cable		
Maximum length <sup>3)</sup>	4000 m	
Cable diameter max.	7.0 mm	
Cable type (with / without rodent protection)	LSFH™ low smoke, halogen free and self extinguishing	
	PUR for high chemical resistance and wide temperature range	
Temperature range <sup>4)</sup>		
During installation	- 10 °C up to +50 °C	IEC 61300-2-22
In service	-40 °C up to +70 °C	
In storage	-40 °C up to +70 °C	

1) Optional 32 mm with adapter.  
 2) Length of fanout can be freely defined, but max. of 4.0 m.  
 3) Longer cable lengths by agreement with technical support.  
 4) Temperature range for entire cable system.



## MASTERLINE mobile

The ready-to-use fiber optic cabling system for mobile applications in the field.



### General features

- Mobile, ready-to-operate cable system
- Highly robust, specially designed for in-the-field applications
- Cable types suitable for use in the field
- Choice of different reels
- Tread-proof, waterproof protection tube with high tensile strength (IP 67)

### Properties

- 2 - 12 fibers
- Robust divider with screw-on mounting
- Used with cable types suitable for use in the field (up to 12 fibers)
- Can be assembled with all standard connector types
- Reusable, highly robust protection tube
- Available on metal or plastic reel for mobile applications

### Applications

The MASTERLINE mobile fiber optic cabling system, available in different versions, can be used as temporary emergency wiring or for mobile signal transmission in indoor and outdoor applications.

- Broadcasting, e.g. mobile deployment for TV transmissions
- Emergency wiring, as temporary replacement for when sections of fiber optic break down
- Military and security applications
- Events
- Industry, flexible wiring solution for moving system parts

### Accessories

Mounting nut for divider	Item no.
M 16 x 1; small	23040541
M 26 x 2; medium	22649055

Adapter for fitting a larger protection tube	Item no.
Adapter_SM_A_shortneck	84082085

# MASTERLINE mobile

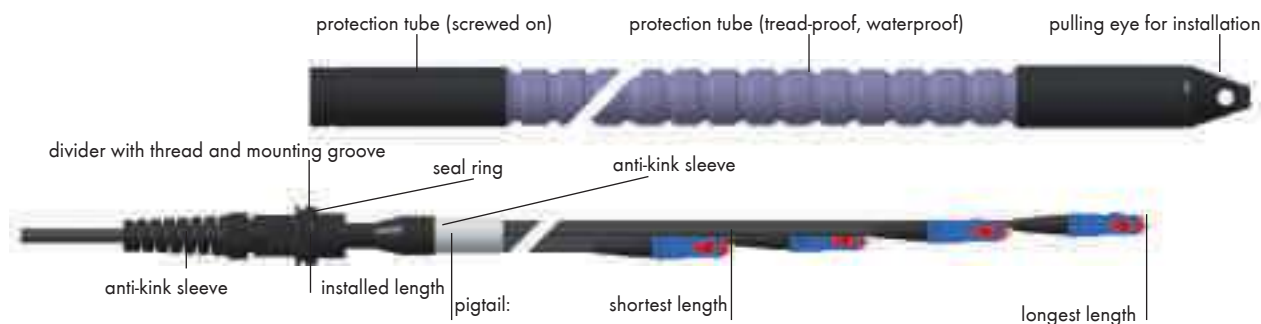
Specifications	MASTERLINE mobile				
Number of fibers	up to 4		up to 8		up to 12
Dividers	small	medium	small	medium	medium
Outer diameter	22 mm	31 mm	22 mm	31 mm	31 mm
Installed length	48 mm	58 mm	48 mm	58 mm	58 mm
Bore for mounting	15.6 - 16.4 mm	25.5 - 26.5 mm	15.6 - 16.4 mm	25.5 - 26.5 mm	25.5 - 26.5 mm
Thread size for mounting	M16 x 1	M26 x2	M16 x 1	M26 x 2	M26 x 2
Size of mounting groove	15.2 mm	19.2 mm	15.2 mm	19.2 mm	19.2 mm
Maximum tensile strength on divider	1000 N	1000 N	1000 N	1000 N	1000 N
Fanout / breakout cable					
Diameter of single fiber cables	2.7 mm 3.4 mm optional		2.7 mm	2.7 3.4 mm opt.	2.7 mm 3.4 mm optional
Standard pigtail length (staggered) <sup>1)</sup>	longest length	1165 mm +/- 50		1165 mm +/- 50	
	shortest length	970 mm +/- 50		710 mm +/- 50	
Identification of single fiber cables black	coded numbers				
Jacket material	LSFH™ low smoke, halogen free and self-extinguishing				
Connector	all HUBER+SUHNER standard connectors				
Protection tube with pulling eye <sup>2)</sup>	small	medium	small	medium	medium
Outer diameter	23.5 mm	31 mm	23.5 mm	31 mm	31 mm
Maximum tractive force <sup>2)</sup>	1000 N	1000 N	1000 N	1000 N	1000 N
Crush resistance	200 N/cm	250 N/cm	200 N/cm	250 N/cm	250 N/cm
Watertightness	IP 67	IP 67	IP 67	IP 67	IP 67
Cable	mobile field cable		mobile field cable		drag chain cable
Outer diameter	5.6 mm		6.8 mm		13.0 mm
Outer jacket material	PUR		PUR		PUR
Maximum length <sup>3)</sup>	on request				
Temperature range <sup>4)</sup>					
During installation	- 10° C up to +50 °C				IEC 61300-2-22
In service	-40 °C up to +70 °C				
In storage	-40 °C up to +70 °C				

1) Length of fanout can be freely defined, but max. of 2.0 m. Protection tube cannot be fitted without staggered setup. Larger protection tube with adapter can be fitted by agreement with technical support.

2) Tensile load on entire cable system, including protection tube. For tensile load on cable, see data sheet for cable type.

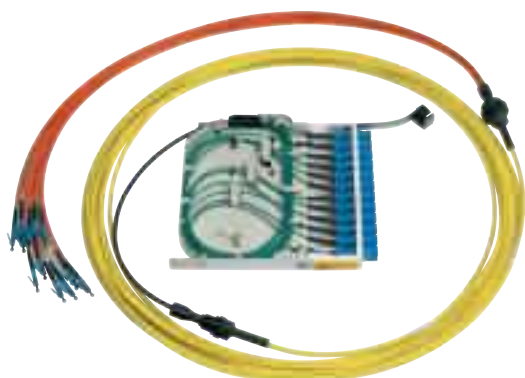
3) Cable length depends on selected reel.

4) Temperature range for entire cable system.



## M3K and M3KP

For the connection of LiSA racks.



M3K



M3KP

### General features M3K/M3KP

- Ready-to-use, ready-to-draw system
- For easy and time-saving installation
- No splicing or plug assembly necessary
- All connector types available
- Installation tube can be secured for drawing through complex conduit systems

### Features M3K

- Up to 12 fibers in each M3K module
- Up to 2 modules for each cable when using TWINTUBE cables
- Ruggedised tails within the module (Ø 1.7 mm)
- 3 different MASTERLINE systems<sup>1)</sup> can be chosen

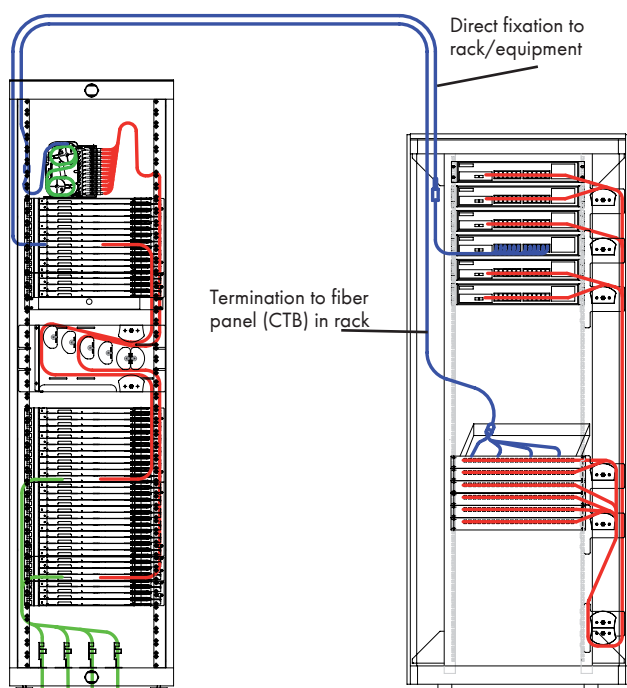
### Features M3KP

- Up to 24 in each module when using SFF connectors
- Primary coated tails within the module (Ø 0.9 mm)
- 3 different MASTERLINE systems<sup>1)</sup> can be chosen

<sup>1)</sup> MASTERLINE classic, MASTERLINE lite, MASTERLINE compact

### Applications

Pre-terminated and factory tested the M3K cable system is loaded into a LiSA Fiber Tray unit allowing high fiber count links to be constructed on site in a matter of minutes without the need for costly and time-consuming splicing.



- loose tube cable (line)
- PatchCord
- cable between M3K and system rack

## M3K and M3KP

### Order code

Description	
<b>System type</b>	
MK -	M3K assembly with ruggedised 1.7 mm breakout tails for max. 12 fibers
MKP -	M3KP assembly with primary coated fibers for max. 24 fibers
MX -	M3KP (side A), M3K (side B) mixed
<b>Fiber type</b>	
09 -	singlemode 9/125 µm, OS2
50 -	multimode 50/125 µm, OM2
53 -	multimode 50/125 µm, OM3
54 -	multimode 50/125 µm, OM4
62 -	multimode 62.5/125 µm, OM1
nn -	number of fibers terminated
<b>Cable design</b>	
A	LSFH™ jacket, not armoured, jelly filled ≤ 12 fibers...BW(ZN)H...35
B	LSFH™ jacket, not armoured, jelly free ≤ 24 fibers...H(ZN)H...50
C	PE jacket, not armoured, jelly filled ≤ 24 fibers...W(ZN)Y...50
E	LSFH™ jacket, glass armoured, jelly filled ≤ 24 fibers...W(ZNG)H...85
F	PE jacket, glass armoured, jelly filled ≤ 24 fibers...W(ZNG)Y...85
H	LSFH™ TWINTUBE, glass armoured, jelly filled ≤ 24 fibers...W(ZNG)H...94
Z	PE TWINTUBE, glass armoured, jelly filled ≤ 24 fibers...W(ZNG)Y...94
<b>Cable jacket colour</b>	
A	H+S standard colour for cable outer jacket
<b>Cable termination side A</b>	
xx	connector type (see connector/adaptor code)
00	no connector
F	Fiber Tray module fitted to end
A	MASTERLINE classic pigtail breakout on end
C	MASTERLINE compact pigtail breakout on end
L	MASTERLINE lite pigtail breakout on end
Z	open cable end for direct splicing

cont. see following page

## M3K and M3KP

		<b>Pigtail configuration side A</b>
nnnn		shortest pigtail length in mm
P -		Fiber Tray module fitted or open cable end
Q -		standard staggered pigtail setup
S -		same pigtail length for all pigtails
		<b>Cable termination: side B</b>
xx -		connector type end B (see connector/adaptor code)
F -		Fiber Tray module fitted to end
X -		pulling tube fitted to end B, Fiber Tray module supplied loose
		<b>Cable length</b>
nn -		total length between glands
		<b>System configuration</b>
	O	standard
		<b>Performance class side A</b>
	A	singlemode LAN ECO APC
	B	singlemode High-End APC
	C	singlemode 0.1 dB APC
	D	singlemode High-End UPC
	E	singlemode HighPower (APC/UPC)
	F	singlemode 0.1 dB UPC
	M	multimode
	N	singlemode LAN-ECO-UPC
	K	no connector
		<b>Performance class side B</b>
	A	singlemode LAN ECO APC
	B	singlemode High-End APC
	C	singlemode 0.1 dB ABP
	D	singlemode High-End UPC
	E	singlemode HighPower (APC/UPC)
	F	singlemode 0.1 dB UPC
	M	multimode
	N	singlemode LAN-ECO-UPC

Please note: For all M3K cable systems the Fiber Tray module is always equipped with hinge.



## Dividers

The flexibility and field of application of HUBER+SUHNER divider solutions are unique. No matter if field termination or pre-terminated cables are required, dividers are used wherever a cable needs to be terminated in a rapid and user friendly manner. All HUBER+SUHNER standard connectors can be terminated using the divider as a matter of course.



# ATC Divider

ATC dividers are multi-functional dividers that are used indoor and outdoor.



## General features

- Ready-to-install cabling system
- Ready-to-use system
- Easy and time-saving installation
- All field, 3star, riser and single loose tube cables with up to 4 fibers can be used
- 100% tested with test documentation for each system
- Divider available as pre-terminated assembly

## Properties

- 2 – 4 fibers
- Fiber types: singlemode, multi mode, HCS
- Sturdy, very compact divider
- Wide range of cable designs can be terminated
- Loose tube cables 5.0 mm
- Riser, field and 3star cables
- All common connector types can be assembled
- Version can be equipped at both ends or one end

## Applications

ATC dividers are the innovative solution for terminating tight tubes and bare fibers with strain relief and protection using the standard connector range from HUBER+SUHNER.



# ATC Divider

Specifications	ATC divider	ATC divider
Number of fibers	2 and 4	2 and 4
Divider	small	small
Outer diameter	9 mm	9 mm
Installed length	approx. 29 mm	approx. 29 mm
Size of mounting groove <sup>1)</sup>	7 mm	7 mm
Maximum tensile load on divider	100 N	100 N
Fanout cable		
Diameter of single fiber cable	2.1 mm	2.1 mm
Standard fanout length (not staggered) <sup>2)</sup>	1000 mm +/- 50	1000 mm +/- 50
Identification of single fiber cable	coded numbers	
Jacket material	LSFH™ low smoke, halogen free and self extinguishing	
Connector	all HUBER+SUHNER standard connectors	
Pulling tube with pulling eye <sup>3)</sup>	not standard	
Cable		
Maximum length <sup>4)</sup>	1000 m	1000 m
Cable diameter max.	5.6 mm	7 mm
Cable types	loose tube cable Ø 5 mm field/riser cable up to Ø 5.6	field/riser cable Ø 6-7 mm
Cable types (with / without rodent protection)	LSFH™ low smoke, halogen free and self extinguishing PE for outdoor applications, longitudinal and transversal watertight PUR for high chemical resistance and wide temperature range	
Temperature range <sup>5)</sup>		
During installation	- 10 °C up to +70 °C	IEC 61300-2-22
In service	-30 °C up to +70 °C	
In storage	-30 °C up to +70 °C	

1) Suitable for fixation with cable tie.  
2) Length of fanout can be freely defined, but max. of 4.0 m.  
3) Special applications by agreement with technical support.  
4) Longer cable lengths by agreement with technical support.  
5) Temperature range for entire cable system pending on cable type.



## Cable Dividers ATO / ATM



### Features

- Allows division of multi-fiber loose tube cable with up to 12 fibers
- Connectors can directly be terminated on the supplied, strain-relieved empty tube cables
- Multi-fiber loose tube cables and empty tube cables are anti-rotation protected inside the divider
- Divider is available as pre-terminated assembly or in a single-part kit

### Scope of supply

- Housing
- Cable entry and crimp sleeve
- Shrink tube
- ATO/ATM/ATF:  
1 m length of fiber sleeving material with outside Ø of 3.4 mm, PE jacket black, inside Ø min. 1.0 mm
- ATOS/ATMS:  
1 m length of fiber sleeving material with outside Ø of 2.1 mm, LSFH™ jacket black, inside Ø min. 0.40 mm
- **Not included:**  
Glue to fix cable jacket of glass-armoured and field cables

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

### Cable divider

Divider	Use with following cable types	Diameter [mm]	Dimensions L × B × H [mm]	Article code for single-part kit	
				Type 3.4 mm	Type 2.1 mm
2 way	02-2..../...(ZN)...	5.0	40 × 21 × 11	ATO-BK-2	ATOS-BK-2
	02-2..../W(ZNG)...	8.5	40 × 21 × 11	ATM-BK-2	ATMS-BK-2
	02-..../FSN(ZN)Z-...	6.0	40 × 21 × 11	ATF-BK-2	–
4 way	04-4..../...(ZN)...	5.0	60 × 60 × 11	ATO-BK-4	ATOS-BK-4
	04-4..../W(ZNG)...	8.5	60 × 60 × 11	ATM-BK-4	ATMS-BK-4
	04-..../FSN(ZN)Z-...	6.0	60 × 60 × 11	ATF-BK-4	–
6 way	06-6..../...(ZN)...	5.0	60 × 60 × 11	ATO-BK-6	ATOS-BK-6
	06-6..../W(ZNG)...	8.5	60 × 60 × 11	ATM-BK-6	ATMS-BK-6
10 way	10-10..../...(ZN)...	5.0	60 × 60 × 22	ATO-BK-10	ATOS-BK-10
	10-10..../W(ZNG)...	8.5	60 × 60 × 22	ATM-BK-10	ATMS-BK-10
12 way	12-12..../...(ZN)...	5.0	60 × 60 × 22	ATO-BK-12	ATOS-BK-12
	12-12..../W(ZNG)...	8.5	60 × 60 × 22	ATM-BK-12	ATMS-BK-12

## Mini Cable Divider



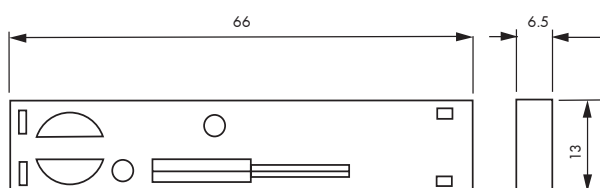
Compact cable dividers are suitable for the division of non-stranded multi-fiber loose tube cables in protected areas such as cable ducts, wall outlets and for the simplification of patch areas.

Description	Item no.
Mini cable divider	22653064

### Features

- Easy, time-saving installation
- Built-in fiber insertion aid
- Compact design
- Up to 12 fibers

Dimensions in mm:

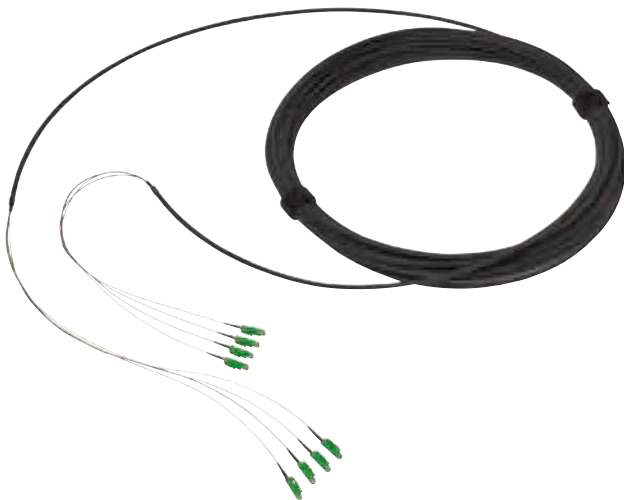


### Scope of supply

- Housing
- 0.9 mm PE tube, 15 m
- Shrink tube

## SMARTLINE riser

Pre-assembled riser cable for indoor use.



### General features

- Ready to use, plug and play system
- Without divider, no strain relief for connectors
- Fast and simple installation
- No splicing or connector assembly required
- Single-sided or double-sided equipment assemblies

### Properties

- 4 - 24 fibers
- Single fiber cables 0.9 mm not strain-relieved
- Connectors mounted directly on single fiber cables without divider
- LSFH™ riser cable: halogen free, low smoke and self-extinguishing
- Can be assembled with all standard connector types
- Can be supplied as cable coil, on cardboard or wooden reel

### Applications

SMARTLINE riser is a lightweight pre-assembled cable system with small cable diameters, suitable for protected installation.

- Installation inside buildings
- Distributor cable system for indoor use in protected environment
- FTTD (Fiber To The Desk)



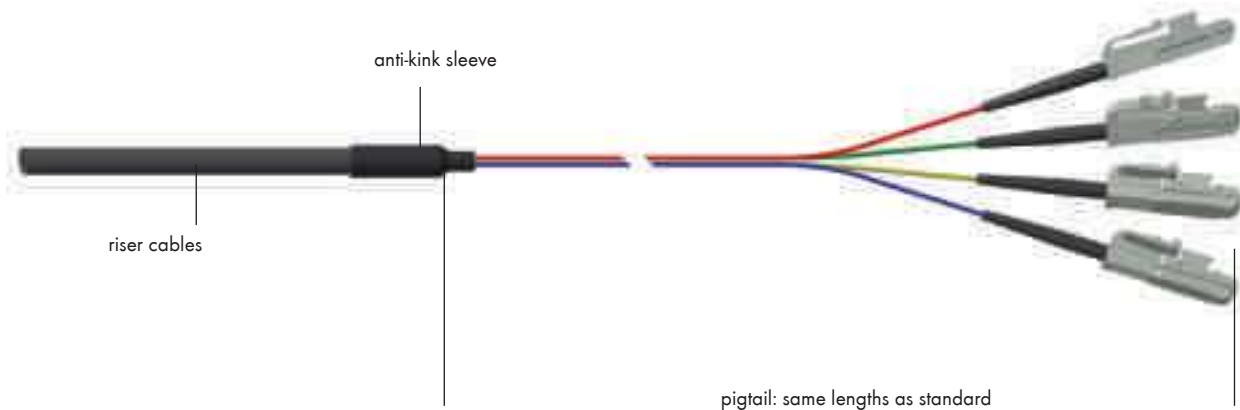
# SMARTLINE riser

Specifications	SMARTLINE riser						
Number of fibers	4	6	8	12	16	24	
Riser cables							
Outer diameter	5.0 mm	5.5 mm	6.0 mm	7.0 mm	8.5 mm	8.8 mm	
Weight	28	30	33	52	64	77	
Max. tensile strength during installation	1200 N	1600 N	2400 N	3000 N	4200 N	4500 N	IEC 60794-1-2 E1
Min. bend radius in service	50 mm	50 mm	60 mm	70 mm	85 mm	100 mm	IEC 60794-1-2 E11
Maximum length <sup>1)</sup>	500 m						
Jacket material	LSFH™ low smoke, halogen free and self-extinguishing						
Pigtail							
Diameter of single fiber cable	0.9 mm tight tube cable						
Max. tensile strength in service per single fiber cable	10 N						IEC 60794-1-2 E1
Min. bend radius in service	10 mm						IEC 60794-1-2 E11
Pigtail length, standard <sup>2)</sup>	as requested by customer						
Identification of single fiber cable	colour-coded						
Jacket material	TPE, halogen free						
Connector	all HUBER+SUHNER standard connectors						
Pulling tube	no						
Temperature range <sup>3)</sup>							
During installation	- 10 °C up to +50 °C						IEC 61300-2-22
In service	-20 °C up to +70 °C						
In storage	-25 °C up to +70 °C						

1) Longer cable lengths by agreement with technical support.

2) Length of pigtail can be defined: standard 1.0 m unless specified otherwise, not staggered.

3) Specifications for singlemode fibers at 1550 nm, for multimode fibers at 1300 nm.



# SMARTLINE breakout

Pre-assembled breakout cable for primarily indoor use.



## General features

- Ready to use, plug and play system
- Without divider, with protected transition
- Each fiber enclosed in strain-relieved individual core
- Fast and simple installation
- No splicing or connector assembly required
- Single-sided or double-sided equipment assemblies

## Properties

- 4 - 16 fibers
- Individual single fiber cables: 2.0 mm standard, 2.7 mm optional
- LSFH™ breakout cable: halogen free, low smoke and self-extinguishing
- Without divider, with protected transition
- Can be assembled with all standard connector types
- Can be supplied as cable coil, on cardboard or wooden reel

## Applications

The SMARTLINE breakout cable is suitable for shorter link lengths and it is commonly used as a "multi-patch" cable for point-to-point connections.

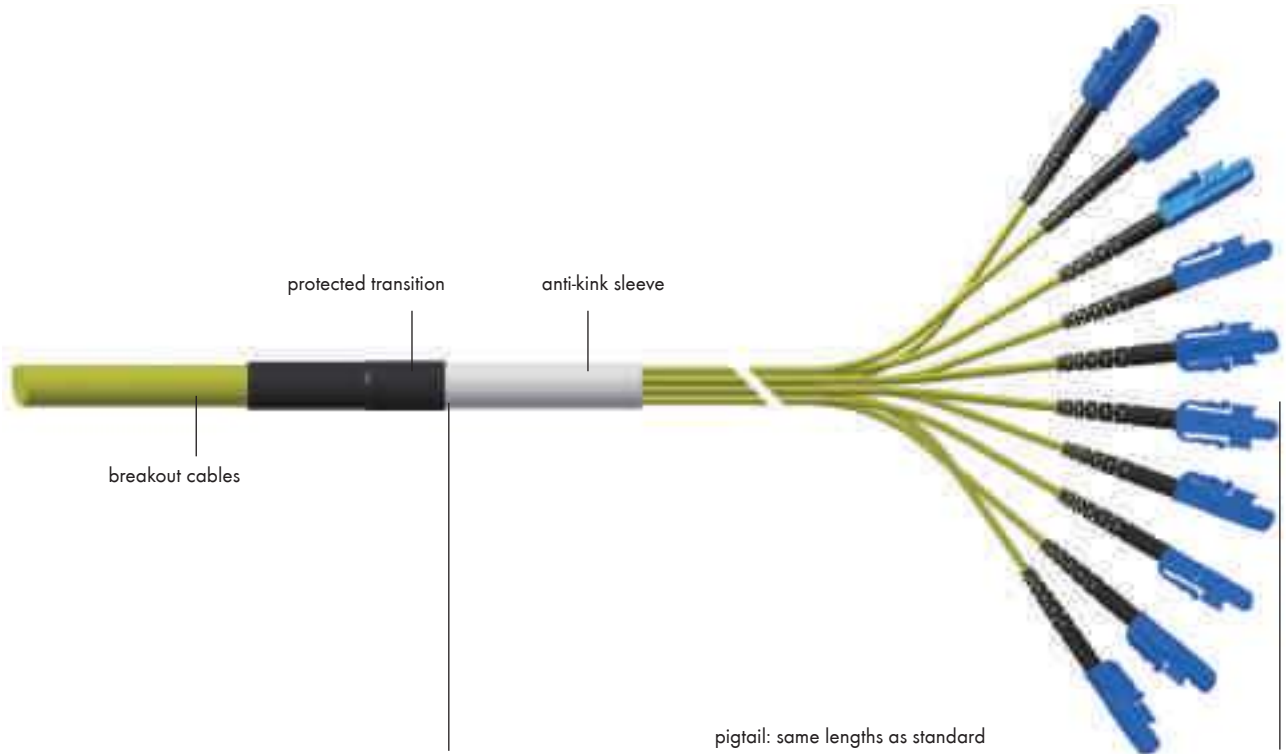
- Installation inside buildings
- Data cable in distribution networks
- For horizontal cabling and collapsed backbone



# SMARTLINE breakout

Specifications	SMARTLINE breakout				
Number of fibers	4	8	12	16	
Breakout cable 2.0 mm					
Outer diameter <sup>1)</sup>	7.0 mm	9.0 mm	12.0 mm	12.0 mm	
Weight	47 kg/km	82 kg/km	144 kg/km	135 kg/km	
Max. tensile strength during installation	1200 N	2400 N	4000 N	4000 N	IEC 60794-1-2 E1
Min. bend radius in service	70 mm	80 mm	120 mm	120 mm	IEC 60794-1-2 E11
Maximum length <sup>1)</sup>	2000 m				
Jacket material	LSFH™ low smoke, halogen free and self-extinguishing				
Pigtail / breakout cable					
Diameter of single fiber cable	2.0 mm (2.7 mm optional) <sup>2)</sup>				
Max. tensile strength in service per single fiber cable	100 N				IEC 60794-1-2 E1
Min. bend radius in service	25 mm				IEC 60794-1-2 E11
Pigtail length, standard <sup>3)</sup>	as requested by customer				
Identification of single fiber cable	coded numbers				
Jacket material	LSFH™ low smoke, halogen free and self-extinguishing				
Connector	all HUBER+SUHNER standard connectors				
Protection tube	on request				
Temperature range <sup>4)</sup>					
During installation	- 10 °C up to +60 °C				IEC 61300-2-22
In service	-25 °C up to +70 °C				
In storage	-25 °C up to +70 °C				

1) With single fiber cables of diameter 2.7 mm, the outer diameter of the cable is larger.  
2) Longer cable lengths by agreement with technical support.  
3) Length of pigtail can be defined: standard 1.0 m unless specified otherwise, not staggered.  
4) Specifications for singlemode fibers at 1310 nm, for multimode fibers at 1300 nm.



## Overview of Mobile Cable Systems



Mobile cable systems	Metal drum no. 1 - 6/500	Metal drum no. 2 - 6/220	Plastic drum no. 3 - 6/350	Metal drum no. 4 - 6/800
More details	page 52	page 53	page 54	page 55
Item no.	84018823	84018826	84018827	84040374
Weight	10 kg	7 kg	7.5 kg	12 kg
Standard colour	blue	blue	black	blue
Other colours available as option	yes	yes	no	yes
Outer diameter, drum	442 mm	410 mm	445 mm	380 mm
Width of cable drum	408 mm	300 mm	315 mm	732 mm
Core diameter of cable drum	215 mm	225 mm	295 mm	222.5 mm
Maximum cable length with diameter of 5 mm	750 m	400 m	500 m	1000 m
Maximum cable length with diameter of 8 mm	300 m	125 m	200 m	480 m



### Accessories

Carriage with handle

Item no.	84018824
Weight	5.0 kg



84018981
4.0 kg



Reinforced reel kit > 12 kg

Item no.	84018825
Weight	1.0 kg

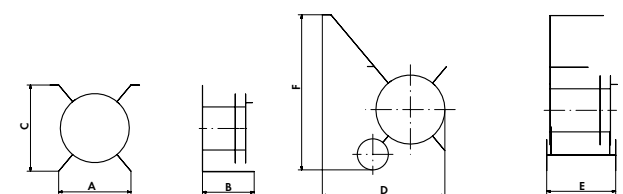
## Overview of Mobile Cable Systems



Mobile cable systems	Metal drum no. 5 - 6/1240	Metal drum no. 6 - 6/480	Backpack	Cable bag
More details	page 56	page 57	page 58	page 59
Item no.	84020552	84085910	on request	84018822
Weight	18.8 kg	4.24 kg	9.6 kg / 11 kg	0.5 kg
Standard colour	orange / metal	olive / metal	olive green	grey / black
Other colours available as option	yes, olive green	no	yes	no
Outer diameter, drum	460 mm	380 mm	280 mm / 410 mm	330 mm
Width of cable drum	695 mm (with crank)	394 mm	-	400 mm
Core diameter of cable drum	280 mm		90 mm	-
Maximum cable length with diameter of 5 mm	1240 m	580 m	300 m / 700 m	50 m
Maximum cable length with diameter of 8 mm	800 m	275 m	-	30 m

## Metal Drum No. 1-6/500

Metal cable drum for mobile deployment of suitable fiber optic cables in indoor and outdoor applications. Can be fitted with transport frame and handle for easier mobility and transportation.



### General features

- Metal support drum
- Easy handling for indoor and outdoor applications
- Two-part drum for protected inner cable end
- Both cable ends accessible
- Easy-to-attach cable ends
- Cable drum fitted with brake/anti-rotation protection
- Minimal bend radius (limited by optimised drum core)
- Easy-to-retrofit optional extras

### Optional

- Transport frame with large rubber wheels for all terrains
- Reinforced reel kit for cable weight 12 kg up to max. 30 kg
- Colour of standard drum: blue

### Applications

Portable metal drum for mobile applications involving MASTERLINE mobile or in combination with cables and connectors suitable for use in the field.

- Temporary fiber optic networks
- Emergency wiring for when sections of fiber optic break down (disaster recovery)
- General mobile deployment of fiber optic cables in the field

Description	Weight	Item no.
Metal drum no. 1 - 5/500 blue	10.0 kg	84018823
Carriage with handle	5.0 kg	84018824
Reinforced reel kit for cable weight 12 kg - 30 kg	1.0 kg	84018825

### Dimensions (mm)

A	B	C	D	E	F	core-Ø
442	408	574	667	545	1096	215

### Cable volume

Cable diameter	5 mm	6 mm	7 mm	8 mm	13 mm
Max. length <sup>1)</sup>	750 m	500 m	400 m	300 m	70 m
Approx. cable weight	16.5 kg	14 kg	15.6 kg	15.6 kg	15.4 kg

<sup>1)</sup> Cable lengths available from 12 kg with reinforced reel kit.

# Metal Drum No. 2-6/220

Lightweight metal cable drum for mobile deployment of fiber optic cable systems suitable for use in the field over short distances.



### General features

- Metal support drum
- Easy handling for indoor and outdoor applications
- Two-part drum for protected inner cable end
- Both cable ends accessible
- Easy-to-mount cable ends
- Cable drum fitted with brake / anti-rotation protection
- Minimal bend radius (limited by optimised drum core)

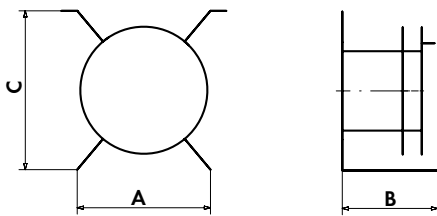
### Optional

- Colour of standard drum: blue

### Applications

Lightweight, portable metal drum for mobile applications involving MASTERLINE mobile or in combination with cables and connectors suitable for use in the field.

- Temporary fiber optic networks
- Emergency wiring for when sections of fiber optic break down (disaster recovery)
- General mobile deployment of fiber optic cables in the field



Description	Weight	Item no.
Metal drum no. 2-6/220 blue	7.0 kg	84018826

Dimensions (mm)			
A	B	C	core-Ø
410	300	500	225

### Cable volume

Cable diameter	5 mm	6 mm	7 mm	8 mm	13 mm
Max. length	400 m	220 m	160 m	125 m	45 m
Approx. cable weight	11 kg	6.1 kg	6.2 kg	6.5 kg	10 kg

# Plastic Drum No. 3-6/350

Lightweight plastic cable drum for mobile deployment of fiber optic cables for use in the field in indoor and outdoor applications. Can be fitted with transport frame and handle for easy mobility and transport of cable drum.



## General features

- Plastic support drum
- Easy handling for indoor and outdoor applications
- Two-part drum for protected inner cable end
- Both cable ends accessible
- Easy-to-mount cable ends
- Cable drum fitted with brake/anti-rotation protection
- Minimal bend radius (ensured by optimised drum core)
- Easy-to-retrofit transport frame

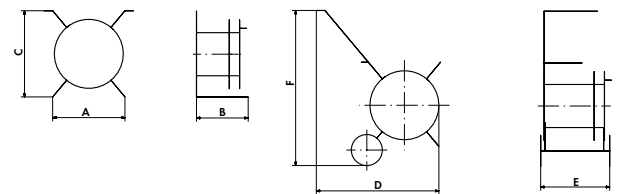
## Optional

- Transport frame with rubber wheels and handle for mobile applications

## Applications

The plastic drum, which is either portable or mobile, is ideal for mobile applications involving MASTERLINE mobile or in combination with cables and connectors suitable for use in the field.

- Temporary fiber optic networks
- Broadcasting, equipment in TV transmission trucks
- Emergency wiring for when sections break down (disaster recovery)
- General mobile deployment of fiber optic cables in the field



Description	Weight	Item no.
Plastic drum no. 3-6/350 black	7.5 kg	84018827
Carriage with handle	4.0 kg	84018981

## Dimensions (mm)

A	B	C	D	E	F	core-Ø
445	315	555	440	550	916	295

## Cable volume

Cable diameter	5 mm	6 mm	7 mm	8 mm	13 mm
Max. length	500 m	350 m	260 m	200 m	75 m
Approx. cable weight	11.0 kg	9.8 kg	10.1 kg	10.4 kg	16.5 kg

# Metal Drum No. 4-6/800

Mobile metal drum with light weight construction and big wheels for an easy handling of the cable in the field.



### General features

- Sturdy metal design
- Big wheels for easy transport
- Easy to handle, for use in the field
- Two-part drum for protected inner cable end so both cable ends are accessible
- Suitable for MASTERLINE mobile or tactical assembly
- Max. length is 800 m with cable diameter of 6 mm

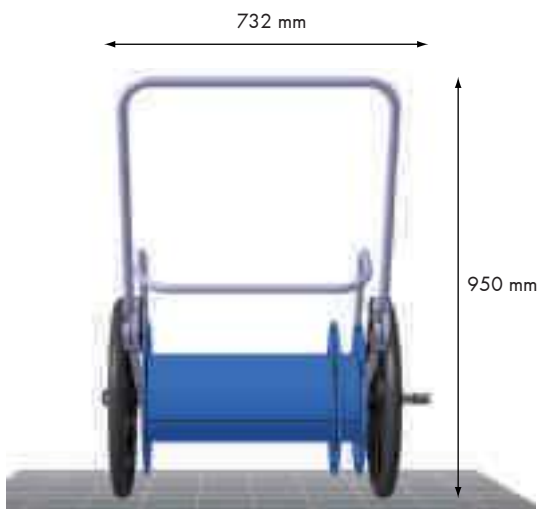
### Properties

Due to the new drum design long cable lengths can be easily installed. The frame can be fold up for an easy coiling and recoiling of the cable or for a space-saving transport.

### Applications

As a moveable drum for mobile and temporary application with MASTERLINE mobile or tactical assembly.

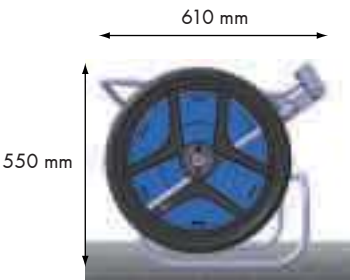
- Temporary network
- Emergency connection for long distances
- General for mobile and outdoor use



Description	Weight	Item no.
Metal drum no. 4-6/800	12.0 kg	84040374

### Dimensions (mm)

Flange	width	core-Ø	
380	445/50	222.5	mm

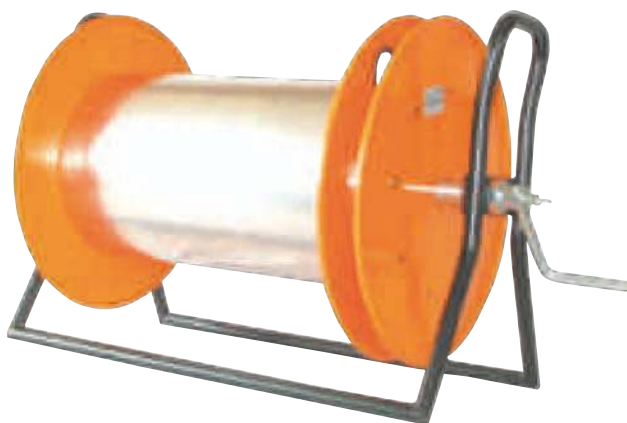


### Cable volume

Cable diameter	5.5 mm	6 mm	7 mm	8 mm
Max. length	950 m	800 m	630 m	480 m
Approx. cable weight	24.7 kg	22.4 kg	24.6 kg	25 kg

## Metal Drum No. 5-6/1240

Sturdy metal cable drum for mobile deployment of fiber optic cable systems suitable for use in the field over long distances.



### General features

- Sturdy metal design
- Easy to handle, with removable crank
- Two-part drum for protected inner cable end
- Cable feedthrough 60 mm central flange
- Both cable ends accessible
- Easy-to-attach cable ends
- Free-standing drum
- Minimal bend radius (limited by optimised drum core)

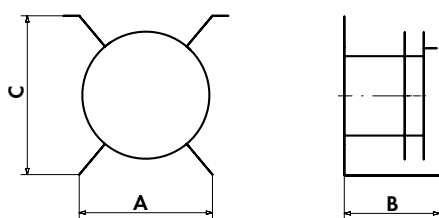
### Options

- Military version in olive green

### Applications

Sturdy metal drum with longer cable lengths for mobile applications involving MASTERLINE mobile or in combination with cables and connectors suitable for use in the field.

- Temporary fiber optic networks for civilian or military applications
- General deployment of fiber optic cable in the field



Description	Weight	Item no.
Metal drum no. 5-6/1240 orange	18.8 kg	84020552
Metal drum no. 5-6/1240 military version: olive green	18.8 kg	84020553

### Dimensions (mm)

A	B	B incl. crank	C	core-Ø
460	695	829	550	280

### Cable volume

Cable diameter	5 mm	6 mm	7 mm	8 mm	13 mm
Max. length	1500 m	1240 m	900 m	700 m	260 m
Approx. cable weight	33 kg	35 kg	35 kg	36 kg	38 kg



# Metal Drum No. 6 – 6/480

The cable reel is designed for fiber optic cable and for mobile application.



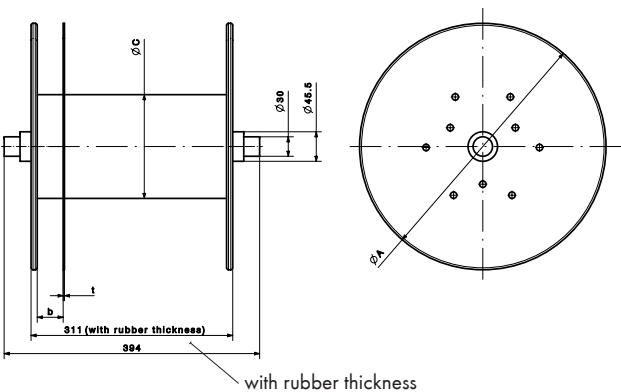
### General features

- Robust metal construction
- Lightweight and compact design
- Two compartments for easy access to both cable ends
- Telescopic axes
- Rubber-protected flanges
- Including two connector belts and one main compartment cover for cable protection

### Applications

Metall drum for mobile deployment of fiber optic cable in the field in military/defence applications.

Optional: suitable carrier frame on request.



Description	Weight	Item no.
Metal drum no. 6-6/480 olive (RAL6006)	4.24 kg	84085910

### Dimensions (mm)

Flange diameter	Core diameter	Flange thickness	Sheet thickness
A	C	t	b
460	695	829	550

### Cable volume

Cable diameter	5.5 mm	6 mm	7 mm
Max. length	580 m	480 m	350 m
Approx. cable weight	14 kg	14 kg	14 kg

# Mobile Backpack

The backpack system is designed and tested under extreme conditions for deployment in harsh environments in the field.



backpack 1



carrier frame



large cable reel



lateral adjustment of shoulder strap



lock against rotation

## General features

- Robust carrier frame with metal drum
- Cable drum easily removable
- Carrying strap with adjustable length and sides
- Reinforced hip belt
- Both cable ends accessible
- Easy-to-attach connectors
- Continuous bend radius guidance
- Cable drum fitted with anti-rotation protection
- Pocket for crank and documents

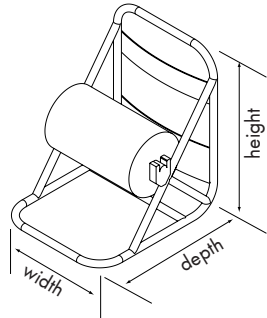
## Applications

Backpack for mobile deployment of fiber optic cable in the field in military/defence applications.

Description	Max. cable length with cable Ø of 6.0 mm	Weight without cable	Flange Ø of reel
Backpack 1 army green	300 m	9.6 kg	280 mm
Backpack 2 army green	700 m	11.0 kg	410 mm

## Backpack

Description	Width	Depth	Height
Backpack 1 300 m	435 mm	360 mm	555 mm
Backpack 2 700 m	400 mm	470 mm	555 mm



## Specifications

Shock	30 g, 11 ms	MIL-STD 810D Method 516.3 EN 60068-2-27
Vibration	passed	MIL-STD 810D Method 514.3
Salt mist	passed	MIL-STD 810D Method 509.4 IEC 60068-1

## Cable Bag

This handy, lightweight cable bag is made of high-quality Cordura nylon. It is suitable for transporting mobile fiber optic cables not longer than 50 m.



### General features

- Cordura nylon bag with padded inside compartment
- Dirt-repellent, moisture-repellent surface
- Velcro-type fastening
- Front flap with zip fastening
- 2 document pockets
- Sturdy shoulder belt
- Max. air ring length of 50 m with cable diameter of 5 – 6 mm

### Applications

This handy, lightweight cable bag is suitable for transporting MASTERLINE mobile and field assemblies.

- Broadcasting, events and other mobile applications
- For short jumper cables, emergency wiring and other temporary uses
- Wherever you need a simple, cost-effective solution for a mobile cable system



Description	Weight	Item no.
Cable bag: silver/black outside blue/black inside	0.5 kg	84018822

### Dimensions

Length	Depth	Height
400 mm	120 mm	330 mm

### Cable volume

Cable diameter	5 mm	6 mm	7 mm	8 mm	13 mm
Max. length	50 m	50 m	40 m	30 m	20 m
Approx. cable weight	1.3 kg	1.4 kg	1.5 kg	1.5 kg	4.4 kg

## Order Code Cable Systems

	Description
<b>System type side A</b>	
A	MASTERLINE classic
L	MASTERLINE lite
C	MASTERLINE compact
M	MASTERLINE mobile
Q	MASTERLINE quick
E	MASTERLINE extreme
H	MASTERLINE classic <sup>HT</sup>
R	SMARTLINE riser
B	SMARTLINE breakout
T	ATC divider
U	ATF divider
V	ATM divider
W	ATO divider
O	no divider
<b>System type side B</b>	
A	MASTERLINE classic
L	MASTERLINE lite
C	MASTERLINE compact
M	MASTERLINE mobile
Q	MASTERLINE quick
E	MASTERLINE extreme
H	MASTERLINE classic <sup>HT</sup>
R	SMARTLINE riser
B	SMARTLINE breakout
T	ATC divider
U	ATF divider
V	ATM divider
W	ATO divider
O	no divider
<b>Fiber type</b>	
0	E9/125 low bend [G.657 A1/2]
1	E9/125 [G.652-D]
2	G50/125-OM2
3	G50/12-OM3
4	G50/125-OM4
6	G62.5/125-OM1
8	HCS200/230/500
<b>Numbers of fibers</b>	
n n -	numbers of fibers, always 2-digits
	up to 99
	A=100
	B=110
	C=120
	D=130
	E=140 (e.g. 144=E4)

A A 1 2 4 -

Example

## Order Code Cable Systems

Cable type				
A	non-stranded loose tube cable, non-armoured, LSFH™			
B	non-stranded mini-loose tube cable, non-armoured, LSFH™			
C	non-stranded loose tube cable, non-armoured, PE			
D	stranded loose tube cables non-armoured, PE			
E	non-stranded loose tube cable, glass-armoured, LSFH™			
F	non-stranded loose tube cable, glass-armoured, LSFH™, reinforced 12mm			
G	non-stranded loose tube cable, glass-armoured, TWINTUBE, LSFH™			
H	stranded loose tube cable, glass-armoured, LSFH™, reduced outer diameter 11.6mm			
I	stranded loose tube cable, glass-armoured, LSFH™			
J	stranded loose mini-loose tube cable, glass-armoured, LSFH™			
K	non-stranded loose tube cable, steel-armoured, LSFH™			
L	non-stranded loose tube cable, steel-armoured, TWINTUBE, LSFH™			
N	non-stranded loose tube cable, glass-armoured, PE			
O	non-stranded loose tube cable, glass-armoured, PE, reinforced 10 mm			
P	non-stranded loose tube cable, glass-armoured, PE, reinforced 12 mm			
Q	non-stranded loose tube cable, glass-armoured, TWINTUBE, PE			
R	stranded loose tube cable, glass-armoured, PE			
S	stranded mini-loose tube cable, glass armoured, PE			
T	non-stranded loose tube cable, steel-armoured, PE			
U	non-stranded loose tube cable, steel-armoured, TWINTUBE, PE			
V	non-stranded loose tube cable, jellyfree, non-armoured, LSFH™ (also TWINTUBE)			
W	stranded loose tube cable, jellyfree, glass-armoured, LSFH™			
X	breakout cable			
Y	riser cable			
Z	order/customer specific			
1	glass-armoured riser cable			
2	field cable			
3	tactical field cable			
4	mobile field cable			
5	drag chain cable			
6	field cable 3star			
Cable length				
n	n	n	n	cable length in m, always 4-digits
Drum type				
A				air ring
B				cable bag
C				ODC drum 500
D				small carton drum 700
E				big carton drum 900
F				plywood drum 900
G				wooden drum 1250
H				wooden drum 1450
M				mobile drum no. 1
N				mobile drum no. 1, with reinforcing kit
P				mobile drum no. 1, with carriage
Q				mobile drum no. 1, with carriage and reinforcing kit
R				mobile drum no.2
S				mobile drum no.3
T				mobile drum no.3 with carriage
U				mobile drum no.4
A	A	1	2	4 -
E	0	1	5	0
Example				

## Order Code Cable Systems

V	mobile drum no.5, standard orange
W	mobile drum no.5, special olive green
Z -	delivered drum
Y	mobile drum no. 6, olive green
<b>Divider construction</b>	
S	divider small (classic, lite, compact, mobile, extreme, ATC)
M	divider medium (classic, lite, mobile)
L	divider large (classic)
1	divider blue
2	divider green
3	divider beige
4	divider black
0	no divider
<b>Fanout type A</b>	
A	0.6 mm
B	0.9 mm
E	1.7 mm
F	2.0 mm
G	2.1 mm
H	2.2 mm
I	2.7 mm
J	3.4 mm
M	5.2 mm/2 x 0.25
N	5.6mm/2 x 0.9
0	no fanout
<b>Fanout length A, shortest fanout length</b>	
n n n	fanout length A, in cm, always 3-digits
STD	standard length
<b>Fanout construction A</b>	
A	fanout graduated
B	standard fanout graduated, special length, minimum 30 cm
E	fanout equal length 1.0 m
F	fanout equal length, special length
Q	fanout equal length standard 50 cm
0	no fanout
Z	special, minimum 30 cm
<b>Fanout type B</b>	
A	0.6 mm
B	0.9 mm
E	1.7 mm
F	2.0 mm
G	2.1 mm
H	2.2 mm
I	2.7 mm
J	3.4 mm
M	5.2 mm/2 x 0.25
N	5.6 mm/2 x 0.9
0	no fanout

A A 1 2 4 - E 0 1 5 0 E - S E 0 3 0 A M

Example

# Order Code Cable Systems

			<b>Fanout length B, shortest fanout length</b>
n	n	n	fanout length B, in cm, always 3-digits
			<b>Fanout construction B</b>
A			standard fanout graduated
B			standard fanout graduated, special length, minimum 30 cm
E			fanout equal length 1.0 m
F			fanout equal length, special length
Q			fanout equal length, standard 50 cm
O			no fanout
Z			special
			<b>Connector type A</b>
x	x		connector type (see connector code page 64)
			<b>Connector type B</b>
	x	x	connector type (see connector code page 64)
			<b>Quality side A</b>
A			singlemode LAN ECO APC
B			singlemode High End APC
C			singlemode 0.1 dB APC
D			singlemode High-End UPC
E			singlemode HighPower (APC/UPC)
F			singlemode 0.1dB UPC
M			multimode
N			singlemode LAN-ECO-UPC
			<b>Quality side B</b>
A			singlemode LAN ECO APC
B			singlemode High End APC
C			singlemode 0.1 dB APC
D			singlemode High-End UPC
E			singlemode HighPower (APC/UPC)
F			singlemode 0.1 dB UPC
M			multimode
N			singlemode LAN-ECO-UPC

A A 1 2 4 - E 0 1 5 0 E - S E 0 3 0 A E S T D B 8 6 8 6 B B **Example**

## Connector Code

Connector code type		Performance level							
x = upon request		A	B	C	D	E	F	M	N
00	no connector								
10	FSMA							•	
20	ST-HQ							•	•
22	ST-Security							•	•
24	ST-LEAN							•	
30	FCPC				•		•	•	•
33	FCPC APC wide key	•	•	•					
34	FCPC APC small key	•	•	•					
40	LSA				•			•	
43	LSA APC		•						
45	MU				•			•	•
70	SC				•	x	•	•	•
73	SC APC 8°	•	•	•		x			
74	SC APC 9°	•	•	•		x			
77	SC duplex				•	x	•	•	•
A <sub>1,4</sub>	ODC-2 connector							•	•
E <sub>1,4</sub>	ODC-2 extension							•	•


Connector code type		Performance level							
x = upon request		A	B	C	D	E	F	M	N
78	SC APC duplex	•	•	•		x			
79	SC APC 9° duplex	•	•	•		x			
80	LX.5				•	•	•	•	
81	LX.5 duplex				•	•	•	•	
83	LX.5 APC		•	•		•			
84	LX.5 APC duplex		•	•		•			
85	LC				•	x	•	•	•
8P	LC Push-Pull				•	x	•	•	•
86	LC APC	•	•	•		x			
8Q	LC APC Push-Pull	•	•	•		x			
8R	LC duplex Push-Pull	•	•	•	•	x	•	•	•
8S	LC APC duplex Push-Pull	•	•	•		x			
90	LSH				•	•	•	•	
93	LSH APC		•	•		•			
97	LSH duplex				•	•	•	•	
98	LSH APC duplex		•	•		•			
Q <sub>C,B</sub>	Q-ODC connector							•	•
Q <sub>F,G</sub>	Q-ODC extension							•	•





# MASTERLINE quick kit Checklist

When ordering, the following options are possibles and have to be defined:



1.	outer diameter supply cable	3.5 mm, 5.0 mm (H+S standard)
2.	number of fibers and single cables respectively	2-way, 4-way or 12-way
3.	colour of divider housings	blue, green, beige, black

## Order information

MLQ-KIT		MASTERLINE quick kit	
1-		blue divider	(singlemode PC)
2-		green divider	(singlemode APC)
3-		beige divider	(multimode PC)
4-		black divider	
	02-	2-way pigtail	
	04-	4-way pigtail	
	12-	12-way pigtail	
	050-	pigtail length 50 cm	(3 digits 50 cm = 050)
	17-	1.7 mm diameter pigtail cable	(standard, black)
	21-	2.1 mm diameter pigtail cable	(optional)
	20-	2.0 mm diameter pigtail cable	
	35-	3.5 mm diameter pigtail cable	
	50-	5.0 mm diameter pigtail cable	
Example: MLQ-SET-2-04-050-17-35		green divider, fourfold with 1.7 mm / 50 cm pigtail LSFH™ and 3.5 mm supply cable	

# Reels Checklist

## 1. Reels for MASTERLINE mobile

Name	Type		Empty weight	Maximum length with cable diameter of				
				5 mm	6 mm	7 mm	8 mm	13 mm
Metal drum optional: mobile	No. 1 - 6/500		10 kg	750 m	500 m	400 m	300 m	70 m
Metal drum	No. 2 - 6/220		7 kg	400 m	220 m	160 m	125 m	45 m
Plastic drum optional: mobile	No. 3 - 6/350		7.5 kg	500 m	350 m	260 m	200 m	75 m
Metal drum	No. 4 - 6/800		12 kg	1000 m	800 m	630 m	480 m	180 m
Metal drum	No. 5 - 6/1240		18.8 kg	1500 m	1240 m	900 m	700 m	260 m
Metal drum	No. 6 - 6/480		4.24 kg	580 m	480 m	350 m	275 m	-
Cable bag			0.5 kg	50 m	50 m	40 m	30 m	20 m

What details are required for reel definition?

- Total cable length, length of cable inner end
- Cable diameter
- Cable weight

## 2. Standard supply reels for MASTERLINE, SMARTLINE and divider

Type	ODC 500 <sup>1)</sup>	Small cardboard reel	Large cardboard reel	Wooden reel 900	Wooden reel 1250
Flange-Ø D1	500 mm	700 mm	900 mm	900 mm	1250 mm
Core Ø D2	300 mm	500 mm	700 mm	600 mm	880 mm
Overall width L2	100 mm	405 mm	415 mm	510 mm	710 mm
Winding width L1	65 mm	250 mm	245 mm	360 mm	630 mm
Empty weight	1 kg	2 kg	6 kg	40 kg	67 kg

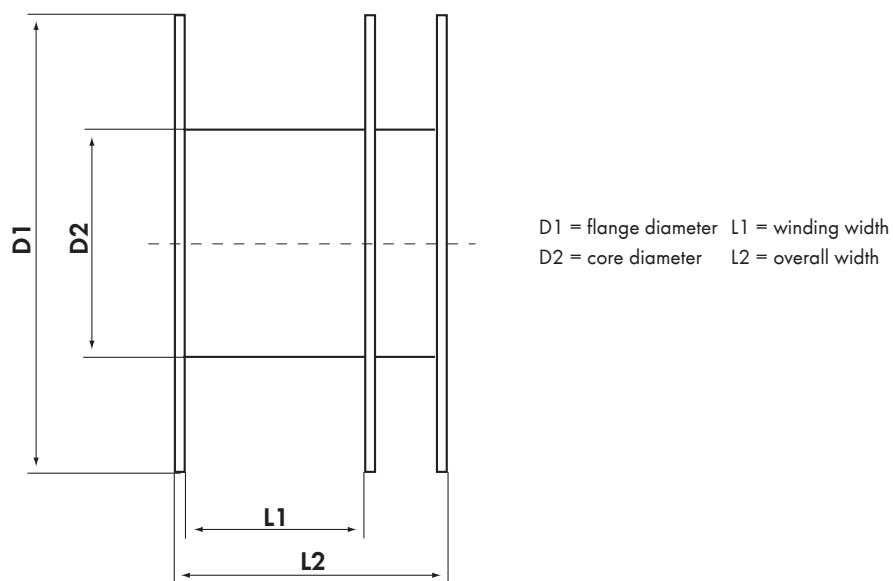
1) Suitable box (item no. 84031448) 470 x 470 mm - to be mentioned when ordering.

## Maximum possible cable length per reel type

Standard supply reel	Maximum length with cable diameter of				
	5 mm	8.5 mm	10 mm	12 mm	15 mm
Cable coil without reel	50 m	50 m	50 m	30 m	30 m
ODC drum	150 m	80 m	-	-	-
Small cardboard reel	600 m	200 m	120 m	100 m	80 m
Large cardboard reel	1000 m	300 m	210 m	160 m	100 m
Wooden reel	2000 m	1200 m	980 m	720 m	400 m
Wooden reel 1250	<sup>1)</sup>	3500 m <sup>1)</sup>	2500 m <sup>1)</sup>	2000 m <sup>1)</sup>	1650 m <sup>1)</sup>

<sup>1)</sup> Maximum length intended for use of MASTERLINE.

All reels are designed in two sections, to keep the inner end protected and permanently accessible.





## Connecting Systems

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## Connector Overview



Connector type	LSH (E-2000™)	LX.5	LC-HQ	SC	MU
Compliance	IEC 61754-15 TIA 604-16	IEC 61754-23 TIA 604-13	IEC 61754-20 TIA 604-10-A	IEC 61754-4 TIA 604-3	IEC 61754-6
<b>Tuning</b>					
In steps of	60°	45°	45°	45°	90°
<b>Mech./therm. perform.</b>					
Tensile load [N]	100	100	100	100	70
Mating durability [cycles]	1000	1000	1000	1000	1000
Operating temperature	-40° to +85 °C	-40° to +85 °C	-40° to +85 °C	-40° to +85 °C	-40° to +85 °C
<b>Flammability</b>					
UL 94 V-0	•	•	•	•	•
<b>Colour of housing</b>					
SM PC	blue	blue	blue	blue	brown
SM APC	green	green	green	green	
MM	beige	beige	black/beige	beige	
OM3	beige	beige	black/aqua	aqua	
Brass nickel-plated					
<b>Fiber type</b>					
E9/125	•	•	•	•	•
G50/125/OM3	•	•	•	•	•
G62.5/125	•	•	•	•	•
HCS200/230	•	-	-	•	-
<b>Features</b>					
One-piece Design	•	•	•	•	-
Automatic metal shutter	•	•	-	-	-
SFF connector	-	•	•	-	•
Colour coding	•	•	•	-	-
For HighPower applications	•	•	•	•	-
Cable diameter [mm]	0.6 up to 3.5	0.6 up to 2.8	0.6 up to 2.8	0.6 up to 3.5	0.6 up to 2.0
<b>Insertion loss [dB]*</b>					
MM/OM3 typ. ≤	0.20	0.20	0.20	0.20	0.20
97 % ≤	0.50	0.50	0.50	0.50	0.50
SM 0.1dB typ. ≤	0.06	0.06	0.06	0.06	n/a
97 % ≤	0.15	0.15	0.15	0.15	n/a
SM High-End typ. ≤	0.12	0.12	0.12	0.12	0.12
97 % ≤	0.25	0.25	0.25	0.25	0.25
SM LAN-Eco typ. ≤	0.20	0.20	0.20	0.20	0.20
97 % ≤	0.45	0.45	0.45	0.45	0.45
<b>Return loss [dB]</b>					
Singlemode PC >	45	45	45	45	45
UPC >	50	50	50	50	50
APC >	85	85	85	85	-

\* each-to-each

## Connector Overview



FCPC	ST-LEAN	ST- HQ	ST-SEC	LSA (DIN)	FSMA	MT-RJ
IEC 61754-13 TIA 604-4-A	IEC 61754-2 TIA 604-2	IEC 61754-2 TIA 604-2	IEC 61754-2 TIA 604-2	IEC 61754-3 DIN 47256	IEC 61754-22	IEC 61754-18 TIA 604-12
PC infinitely						
APC 60°				60°		
100	100	100	100	100	100	70
1000	1000	1000	1000	1000	1000	500
-40° to +85 °C	-40° to +85 °C	-40° to +85 °C	-40° to +85 °C	-40° to +85 °C	-40° to +85 °C	-25° to +70 °C
						black
						black
•	• (black nut)	•	•	•	•	
•	-	•	•	•	-	•
•	•	•	•	•	•	•
•	•	•	•	•	•	•
•	-	•	-	-	•	-
•	•	•	•	•	•	-
-	-	-	-	-	-	-
-	-	-	-	-	-	•
-	-	-	-	-	-	-
-	-	-	-	-	-	-
0.6 up to 3.5	0.6 up to 3.5	0.6 up to 3.5	0.6 up to 3.5	0.6 up to 3.5	0.6 up to 4.5	0.6 and 1.7
0.20	0.25	0.20	0.20	0.20	1.00	0.25
0.50	0.70	0.50	0.50	0.50	1.50	0.70
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	n/a	n/a	n/a	0.12	n/a	n/a
0.25	n/a	n/a	n/a	0.25	n/a	n/a
0.20	n/a	0.20	0.20	0.20	n/a	0.25
0.45	n/a	0.45	0.45	0.45	n/a	0.70
45	-	45	45	45	-	35
50	-	50	50	50	-	35
85	-	-	-	85	-	-

E-2000™ is manufactured under licence of DIAMOND SA, CH LOSONE

## Fiber Management Systems



### For central offices (WAN)

- Two systems: front and side facing fiber position (Front-Access/SideAccess)
- High fiber density per footprint
- Different rack dimensions for max. 120 to 1920 fibers per rack
- Easy access to fibers from the front side
- Continuous bend radius limitation
- Clearly arranged and secure fiber, patchcord and cable management
- SingleCircuit or MultiCircuit fiber management
- Integration of splice and splitter modules
- Steamless interface to cable ducting system



## Fiber Specification Singlemode Fiber E9/125/245



E9/125/245  $\mu\text{m}$

### Optical characteristics singlemode fiber E9/125

Conditions		E9/125/245	E9/125/245-LB	NZ-DS	
Standards according		G.652D	G.657 class A2	G.655	
Attenuation typical (in cable)	1310 nm	$\leq 0.34$	$\leq 0.35$	-	dB/km
	1383 nm	$\leq 0.34$	$\leq 0.35$	-	dB/km
	1550 nm	$\leq 0.20$	$\leq 0.21$	$\leq 0.20$	dB/km
	1625 nm	$\leq 0.23$	$\leq 0.23$	$\leq 0.22$	dB/km
Attenuation maximum (in cable)	1310 nm	$\leq 0.40$	$\leq 0.40$	-	dB/km
	1383 nm	$\leq 0.40$	$\leq 0.40$	-	dB/km
	1550 nm	$\leq 0.25^{1)}$	$\leq 0.25^{1)}$	$\leq 0.22$	dB/km
	1625 nm	$\leq 0.25^{1)}$	$\leq 0.25^{1)}$	$\leq 0.24$	dB/km
Chromatic dispersion	1285 - 1330 nm	$\leq 3.50$	$\leq 3.50$	-	ps/nm $\times$ km
	1550 nm	$\leq 18.0$	$\leq 18.0$	2.0 - 6.0	ps/nm $\times$ km
Cable cut-off wavelength $\lambda_{cc}$	standard	$\leq 1260$	$\leq 1260$	-	nm
	special application	$\leq 1180$	$\leq 1180$	-	nm
Polarization mode dispersion	link value	$\leq 0.06$	$\leq 0.06$	$\leq 0.08$	ps/ $\sqrt{\text{km}}$
	individual	$\leq 0.20$	$\leq 0.20$		ps/ $\sqrt{\text{km}}$
Zero dispersion wavelength $\lambda_0$		1300 - 1324	1300 - 1324	-	nm
Zero dispersion slope $S_0$ at $\lambda_0$		$\leq 0.090$	$\leq 0.090$	-	ps/nm <sup>2</sup> $\times$ km
Mode-field diameter	1310 nm	$9.2 \pm 0.4$	8.6 - 9.5	-	$\mu\text{m}$
	1550 nm	$10.4 \pm 0.8$	8.6 - 10.4	$9.6 \pm 0.4$	$\mu\text{m}$
Group index of refraction typical	1310 nm	1.466 - 1.467	1.467	-	
	1550 nm	1.467 - 1.468	1.468	1.469	
Macrobending loss $r = 10 \text{ mm}$ , 1 turn	1550 nm	-	0.1 dB	-	dB
	1625 nm	-	0.2 dB	-	dB
Macrobending loss $r = 15 \text{ mm}$ , 10 turn	1550 nm	-	0.03 dB	-	dB
	1625 nm	-	0.1 dB	-	dB

1) Single fiber cables at 1550 nm up to max. 0.90 dB/km.

# Fiber Specification Singlemode Fiber E9/125/245

## Geometrical characteristics

	E9/125/245	E9/125/245-LB	NZ-DS	
Cladding diameter	125 ± 0.7	125 ± 0.7	125 ± 0.7	µm
Coating diameter (uncoloured)	242 ± 7	242 ± 7	245 ± 5	µm
Concentricity error core/cladding	≤ 0.5	≤ 0.5	≤ 0.5	µm
Concentricity error cladding/coating	≤ 12.0	≤ 12.0	≤ 12.0	µm
Cladding non-circularity	≤ 0.7	≤ 0.7	≤ 0.7	%
Coating non-circularity	≤ 5	≤ 5	≤ 5	%

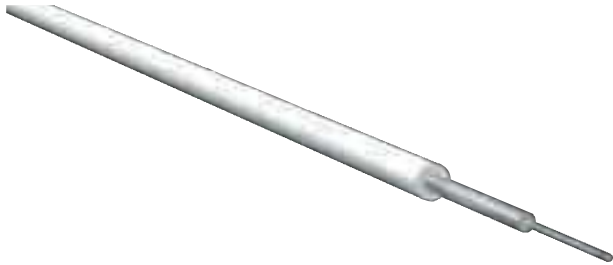
## Mechanical and environmental characteristics

	E9/125/245	E9/125/245-LB	NZ-DS	
Coating-Material	acrylate	acrylate	acrylate	
Tensile proof test (Fiber elongation ≤ 1%)	≥ 8.8 (100)	≥ 8.8 (100)	≥ 8.8 (100)	N (Kpsi)
Operation temperature range -60°C to 85°C	1310, 1550 & 1625 nm ≤ 0.05	≤ 0.05	≤ 0.05	ΔdB/km
Water immersion 23°C for 30 days	1310, 1550 & 1625 nm ≤ 0.05	≤ 0.05	≤ 0.05	ΔdB/km

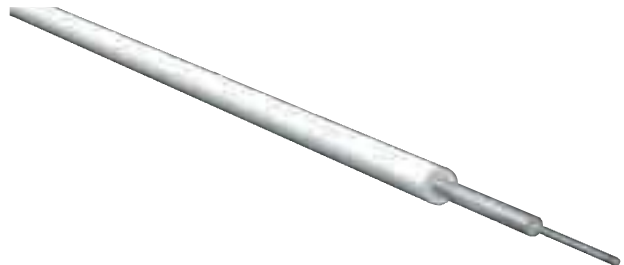
## Approvals

	E9/125/245	E9/125/245-LB	NZ-DS	
Standards	- ITU G.652-D - IEC 60793-2-50 Typ B1.3 - DIN VDE 0888 part 3	- ITU G.657 class A	- ITU G.655 - IEC 60793-2-50 Typ B4	

## Fiber Specification Multimode Fiber



G50/125/245 μm



G62.5/125/245 μm

### Optical characteristics multimode fiber

Fiber class		G50/125/245	G62.5/125/245	
Fiber class available by HUBER+SUHNER		OM2 / OM3	OM1 / OM2	
Bandwidth (overfilled launch)		see table "link length for standardized fiber types" page 76		
Attenuation typical (in cable)	850 nm	2.3	2.7	dB/km
	1300 nm	0.5	0.5	dB/km
Attenuation maximum (in cable)	850 nm	≤ 2.7	≤ 3.0	dB/km
	1300 nm	≤ 1.0	≤ 1.0	dB/km
Effective group index of refraction	850 nm	1.482	1.496	
	1300 nm	1.477	1.491	
Numerical aperture		0.200 ± 0.015	0.275 ± 0.015	

### Geometrical characteristics

Fiber class		G50/125/245	G62.5/125/245	
Core diameter		50 ± 2.5	62.5 ± 2.5	μm
Cladding diameter		125 ± 2	125 ± 2	μm
Coating diameter (uncoloured)		245 ± 10	245 ± 10	μm
Concentricity error core/cladding		≤ 1.5	≤ 1.5	μm
Core non-circularity		≤ 5	≤ 5	μm
Cladding non-circularity		≤ 1	≤ 1	%
Coating non-circularity		≤ 6	≤ 6	%

# Fiber Specification Multimode Fiber

## Mechanical and environmental characteristics

		G50/125/245	G62.5/125/245	
Coating material		acrylate	acrylate	
Tensile proof test (Fiber elongation $\leq 1\%$ )		$\geq 8.8$ (100)	$\geq 8.8$ (100)	N (Kpsi)
Operation temperature range -60°C to 85°C	850 nm, 1300 nm	0.1	0.1	$\Delta$ dB/km
Water immersion 23°C for 30 days	850 nm, 1300 nm	0.2	0.2	$\Delta$ dB/km

## Approvals

	G50/125/245	G62.5/125/245	
Standards	– ITU G.651 – IEC 60793-2-10 A1a – DIN VDE 0888	– IEC 60793-2-10 A1b	

## Link lengths for standardized fiber types

			Multimode G50/125				Multimode G62.5/125	
Fiber class according to HUBER+SUHNER <sup>1)</sup>			standard	E	F	G	standard	D
Standardized fiber types			OM2	OM2 plus	OM3	OM4	OM1	OM2
Min. modal bandwidth	850 nm		500	600	1500	3500	200	500
overfilled launch bandwidth [MHz*km]	1300 nm		500	1200	500	500	500	500
Min. modal bandwidth effective laser launch bandwidth <sup>2)</sup> [MHz*km]	850 nm		n/s	n/s	2000	4700	n/s	n/s
Gigabit Ethernet 1000 BASE	– SL	850 nm	550 m	750 m	1000 m	1100 m	275 m	550 m
	– LX	1300 nm	550 m	2000 m	550 m	550 m	550 m	550 m
10 Gigabit Ethernet 10 GBASE	– SX	850 nm	–	–	300 m	550 m	–	–
	– LX4		–	–	300 m	550 m	–	–

According to IEEE 802.3, ISO / IEC 11801-2<sup>nd</sup> edition

1) Fiber class allocation for HUBER+SUHNER cable code.

n/s = not standardized

2) Effective laser launch bandwidth is assured using DMD as specified in IEC/PA 60793-1-49.

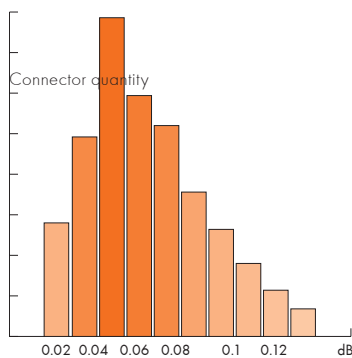
# Assembly Classes

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/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

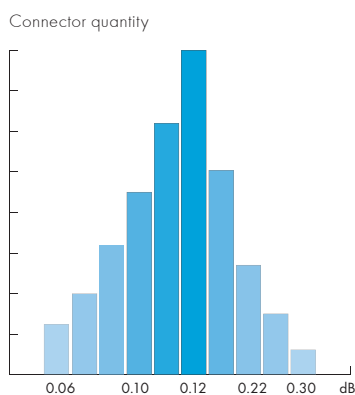
### Compatibility

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

### Attenuation

	Each-to-each		Against ref.	
IL <sup>1)</sup>	IEC 61300-3-34	0.15 dB 0.06 dB	IEC 61300-3-4 max.	0.15 dB
RL	IEC 61300-3-6		PC UPC APC	
	>45 dB >50 dB >85 dB			

### High-end class



### Applications

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

### Compatibility

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

### Attenuation

	Each-to-each		Against ref.	
IL <sup>1)</sup>	IEC 61300-3-34	0.25 dB 0.12 dB	IEC 61300-3-4 max.	0.35 dB
RL	IEC 61300-3-6		PC UPC APC	
	>45 dB >50 dB >85 dB			

1) at 1310 nm

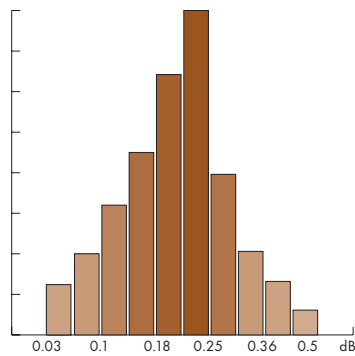
### Please note

0.1 dB Assemblies have max. losses lower than today's measurement accuracy in the field. Measurement equipment (power meter/OTDR) and measurement set-up, reference cables and adapters, environmental conditions and dirt easily cause measurement uncertainties of > 0.2 dB. Reliable and reproducible measurements at accuracies below 0.1 dB are feasible under laboratory conditions only.

# Assembly Classes

## LAN-eco class

Connector quantity



### Applications

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

### Compatibility

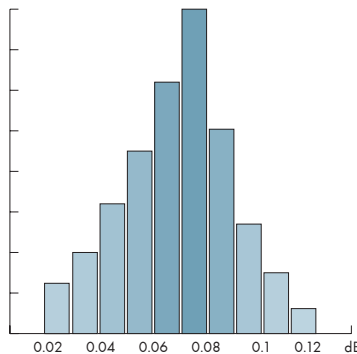
- Connectors are not tuned
- Fiber according to ITU-T G.652

### Attenuation

	Each-to-each		Against ref.	
IL <sup>1)</sup>	IEC 61300-3-34 97% mean	0.70 dB 0.25 dB	IEC 61300-3-4 max.	0.35 dB
RL	IEC 61300-3-6 >45 dB >50 dB >85 dB		PC UPC APC	

## HighPower assemblies

Connector quantity



### Applications

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

### Compatibility

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

### Attenuation

	Each-to-each		Against ref.	
IL <sup>1)</sup>	IEC 61300-3-34 97% mean	0.15 dB 0.06 dB	IEC 61300-3-4 max.	0.15 dB
RL	IEC 61300-3-6 >50 dB >85 dB		UPC APC	

1) at 1310 nm

### Please note

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

## Glossary

ADSL	Asymmetric Digital Subscriber Line – at the moment the most commonly used communication technique for digital broadband transmission of Internet contents for end-users
Access Network	Sub network for customer access to a carrier network, up to 20 km (12 miles)
Access Node	Network point for the access transfer – usually built as central office including ODR's
APC	Angled Physical Contact is a angled polished endface (usually 8°), so that the reflected light is not travelling back in the fiber, but can escape sideways. Thereby an even lower back reflexion can be achieved as with UPC.
BEP	Building entry point
CCTV	Closed Circuit Television – describes a video surveillance system in industrial applications
CTB	Cable Termination Box
CWDM	Coarse Wavelength Division Multiplexing - Various wavelengths are sent through the fiber at the same time. CWDM does not require 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 1610 nm
DIN	German Institute of Standardization (Deutsche IndustrieNorm)
DP	Demarcation point
CO	Central office
CPE	Customer premise equipment
DSL, DSLx	Digital Subscriber Line – describes different techniques for transmitting data over two or four copper wires of the phone line, so called network termination, with high speed.
DSLAM	Digital Subscriber Line Access Multiplexer – part of required infrastructure for operation of DSL. DSLAM's are located at a place where all the lines of network terminations are connected
DWDM	Dense Wavelength Division Multiplexing – WDM using a lot of different wavelength in a wavelength range with a small channel spacing. Commercial DWDM systems put 32 wavelength through one fiber, which corresponds, at a rate of 10 Gigabits/s per signal to a total rate of 320 Gigabits/s.
EFM	Ethernet in the First Mile – using the Ethernet protocol in the access network. The working group for EFM (standard IEEE 802.3ah) wants to replace ATM from the access network.
EN	European Standard
Ethernet	Ethernet for data transmission of 10Mb/s. It is the most widely-used data protocol for premises networks.
FiTH	Fiber in the Home – buildings and households are wired with optical fibers from the building entry point (BEP) to the optical network terminal unit (ONT)
FT	Fiber Tray – a splice or distribution cassette with telescopic and hinged functionality holding fibers, splice connections and/or adapters. The FT has lateral fiber access to adapters called Side Access.
FTTB	Fiber-To-The-Building - network access with optical fibers to the building
FTTC	Fiber-To-The-Curb – network access with optical fibers to the curb
FTTD	Fiber-To-The-Desk – structured building cabling system (LAN) using optical fibers up to the workplace
FTTH	Fiber-To-The-Home – network access with optical fibers to the home
FTTO	Fiber-To-The-Office – structured building cabling system (LAN) using optical fibers up to the office
FTTP	Fiber-To-The-Premises – network access with optical fibers to the premises
Fiber	Optical fibers are dielectric waveguides which light is transmitted through the core. The cladding has a lower refractive index than the core. Thus the light is refracted at the boundary layer and is guided through the core. The fibers are made of silica (silica glass – pure silicon dioxide) or plastic (e.g. PMMA). The fiber is protected against mechanical damage and humidity with a special plastic coating. Today optical fibers are used to transmit data, to transmit power in the material processing, for illumination and reproduction purposes and in the measurement technique.
FrontAccess	Access to fibers and adapters from the front of the rack, where usually a door is located

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HCS	Hard Clad Silica are optical fibers with a step index profile and with a core made of common mineral glass and the cladding of a special plastic. A known fiber type has a core diameter of 200µm and a cladding diameter of 230 µm. The fibers are used for short distances and in particular for industrial cabling.
HDTV	High Definition TeleVision – television with high resolution (16:9), 1920 x 1080 pixels
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. <a href="http://www.ieee.org">www.ieee.org</a>
IP	Internet Protocol
IPxx	Describes the degree of protection by housings according IEC 60529 (DIN 40050). As protection the immersion of water and particles is specified and digits are assigned to it. The first digit describes the protection of particles with 0 to 6 and the second digit the protection against water with 0 to 8. For example IP67 describes the protection against particles with approx. 50µm and against water maximal 1m below the surface for 30 minutes.
ITU	International Telecommunication Union
LAN	Local Area Network – for the transmission of information between independent terminal units
LiSA	Leading Interconnect Systems Approach - HUBER+SUHNER is using this term for passive optical network solutions with different application specifications
LSFH™	Low smoke and free of halogen are characteristics 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.
M3K	Pre-terminated and factory tested assembly with maximum 12 fibers including usually a fiber tray at one end and a MASTERLINE manifold at the other
M3KP	A hybrid of the M3K allowing for 24 x 250 µm fibers to be terminated in a single fiber tray
MAN	Metropolitan Area Network – Inter-regional network for the transmission of information
MCM	MultiCircuit Management – MCM splice cassettes incorporate a bend radius limitation of 35 mm, for DWDM applications for example, allowing for secure storage of spliced fibers up to 24 splice connections
ML	MASTERLINE – A pre-terminated, factory tested and ready-to-use cabling system with 2 to 144 fibers, any connector type including SFF and specified length
Multimode	That is a fiber whose core diameter compared to the wavelength of the light is big. Typical core diameters are 50µm (EU standard) and 62.5µm (US standard). In the core a big number of waves can propagate. As a result of many paths signal interference occurs based on running time differences. Multimode fibers are suitable for data transmission over shorter distances.
NT	Network Termination – network termination with fiber or copper technique
OAN	Optical Access Network – access network using optical fibers
ODR	Optical Distribution Rack – interconnects incoming and outgoing optical fibers in a controlled way. Each fiber can be connected to every other fiber within the rack by simple patching
ODU	Optimised Distribution Unit – Subrack that can be front mounted to any standard 19" rack
OLT	Optical Line Termination
OMx	Optical Multimode fiber type describes the types of multimode fibers for different applications classes according ISO/IEC 11801 and EN 50173-1. Three classes are defined: OM1, OM2 and OM3. OM3 is today the highest class of multimode fibers for transmission of 10 Gigabit Ethernet (10GbE) and link length of 300m. For that purpose a laser source is used at 850nm and light is launched into the inner part of the fiber core.
ONT	Optical Network Termination – network termination with fiber optics
ONU	Optical Network Unit – transfer point from the carrier to the premises network, also called Network Termination
Patchcord	Cable assembly with connectors on both ends
PC	Physical Contact occurs between two endfaces of connectors, if they are pressed together by a spring in the



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connected situation.

PE	Polyethylene is made of ethene by polymerisation and a thermoplastic. Polyethylene is used for cable jackets, that have a high protection against environmental influences. The material is halogen free and can be recycled without concern.
PIGCP	A gland with a boot for ruggedised pigtails that can be incorporated into pre-connectorized fiber trays for low-loss terminations
Pigtail	Cable assembly with connector on one end; typically cable Ø 0.9 mm
PON	Passive Optical Network – an all optical network architecture without electrical/optical conversion and vice versa
POTS	Plain Old Telephone Service – common connection in the conventional telephone network
Primary coating	First buffer around the fiber protecting the fiber against humidity and mechanical stress; typically 250 µm
PUR	Polyurethanes are thermoplastics that are produced from a dialcohol and a polyisocyanate by polyaddition. Because of the excellent mechanical characteristics some polyurethane are suitable for application, where a high abrasive resistance, a high mechanical flexibility and a good fluid resistance are required.
Ruggedised pigtail	Pigtail with reinforced cable than contains usually aramide yarns beneath the outer seath
SCM	The SingleCircuit Management system secures and separates handling of all fibers and fiber pairs for higher reliability and handling requirements. Access to the fibers is possible by folding away of neighbouring cas-ettes, all previously spliced fibers remain undisturbed.
Secondary coating	Second buffer around the fiber; typically 900 µm
SideAccess	Access to fibers and adapters laterally of the rack, usually facing a side wall
Singlemode	The light travels through the fiber only in one wave, because the core diameter is small compared to the wave-length of the light (approx. 9 µm). Thus long distances and high data volume are possible with the fiber.
SFF	Small-Form-Factor connector with usually Ø 1.25 mm ferrule, the small size allows to have a bigger packing density within a given space. Available types: LX.5, LC, MU etc.
Splice	Permanent joint between 2 optical fibers ruptured in a plane, created by fusion, clamping or gluing
1SU	One width unit for modules vertically mounted to subracks 5.08 mm
TCP	Transport Control Protocol
Triple Play	Includes telephony, internet and television
1U/1HU	One height unit for subracks mounted to equipment racks 44.45 mm
UL94	is defined as a material test from Underwriters Laboratories Inc, ( <a href="http://www.ul.com">www.ul.com</a> ) testing inflammable material in regards to the fiber behaviour. Therefore after exposing a test rot to fire for 60 seconds the self-extinguishing behaviour is analyzed. 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 behav-iour.
USC	Universal Splice Closure – accommodates splice connection in MultiCircuit or SingleCircuit Management and is suitable for outside plant applications
UPC	Ultra Physical Contact connectors have to have an excellent endface quality and therefore have a lower back reflexion resp. a lower return loss that ordinary PC connectors.
VDSL	Very High Speed Digital Subscriber Line – VDSL is the fastest of all DSL technologies. It allows a data trans-mission up to 52 Mbit/s over a phone line, though the usable transmission bandwidth declines with the length of the line. For the maximal speed the length may not exceed 300 m; with 900 m it reduces to half and with 1.4 km to a fourth. The speed of the data transmission enables to offer Triple Play via VDSL including televi-sion channels, internet and voice traffic. Planned application of VDSL is the transmission of HDTV, whereas also several channels can be transmitted simultaneously.
VDSL2	The successor standard VDSL2 offers a data rate up to 100 Mbit/s. For that speed the range of 350 m is aimed at, however excellent phone lines and the absence of open line ends are required.

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VoIP	Voice over IP – uses the internet to transport the voice
WAN	Wide Area Network – World-spanning network for the transmission of information (long-haul)
WDM	Wavelength Division Multiplexing – WDM using a lot of different wavelength in a wavelength range with a small channel spacing and transmitted through the same fiber simultaneously
XC	Cross-Connect – point where incoming and outgoing fibers are connected accordingly

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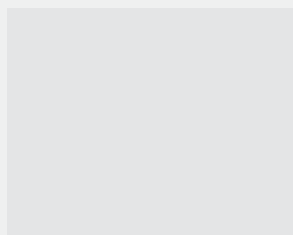
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