

Remote radio installation solutions



Work with the leader for remote radio installation solutions

HUBER+SUHNER provides complete installation solution

HUBER+SUHNER is the global leader for remote radio installation solutions. We have a comprehensive offering of Fiber-To-The-Antenna (FTTA), Power-To-The-Antenna (PTTA) and Hybrid-To-The-Antenna (HTTA) products, which are tailored to the customer's needs. We advise operators about which installation methods are available and what their advantages are. We are experts on how to make savings on installation costs and how expensive follow-up costs can be saved. HUBER+SUHNER implements future-proof passive cable network infrastructures, which are compatible with all system vendor products and endure the future generations of active equipment.

MASTERLINE fiber optic cabling systems of HUBER+SUHNER

HUBER+SUHNER offers 3 different FTTA cabling systems, MASTERLINE Classic (MLC), MASTERLINE Extreme (MLE) and MASTERLINE Ultimate (MLU). MASTERLINE cabling systems of HUBER+SUHNER are the most efficient and easiest-to-install fiber optic products available on the market. All MASTERLINE fiber optic cabling systems of HUBER+SUHNER use glass-armoured multifiber loose tube cables (6 to 48 fibers). With a short fiber optic jumper the cabling systems are quickly and easily connected to the vendor specific RRH interfaces.

MASTERLINE Ultimate has a compact, pre-connectorised and factory-sealed connector head with 12 Q-ODC-2 sockets. The robust connector head with an integrated pulling eye allows easy cable lifting. The encapsulated connector head can be directly attached to the mast with a single „click“ at a pre-mounted adapter plate. Short easy-to-install Q-ODC fiber optic jumpers connect the RRH interface.

MASTERLINE Extreme has a robust and very compact divider, which divides the fibers in 6 or 12 single cables terminated with Q-ODC-2 extension connectors. The very compact divider requires only a small space on the mast, minimises the wind-load and can be fed through small holes. Short easy-to-install Q-ODC fiber optic jumpers connect the RRH interface.

MASTERLINE Classic has a divider, which divides the fibers in 6, 12, 18 or 24 single cables terminated with LC duplex connectors. The divider is fixed at a distribution box and the LC duplex connectors connected to adapters. Short LC duplex jumper connect the RRH interfaces.



MASTERLINE Ultimate



MASTERLINE Extreme



MASTERLINE Classic

Work with the leader for remote radio installation solutions

MASTERLINE hybrid cabling systems of HUBER+SUHNER

Hybrid cables, combining optical fiber and DC power for remote radios, have evolved as the dominating solution in North America, Australia and Europe. MASTERLINE hybrid cabling systems of HUBER+SUHNER are the most efficient and easiest-to-install products available on the market. Mobile operators on four continents verified that MASTERLINE Hybrid can be installed in approximately half of the time of competitive hybrid solutions based on corrugated coax cable designs. The factory-terminated „plug & play“ system in combination with a highly flexible and easy-to-route cable makes the HUBER+SUHNER solution the hybrid cable of choice for operators, system vendors and installers alike.

HUBER+SUHNER offers 3 different hybrid cabling systems, MASTERLINE Classic Hybrid (MLCH), MASTERLINE Extreme Hybrid (MLEH) and MASTERLINE Ultimate Hybrid (MLUH). All HUBER+SUHNER's MASTERLINE Hybrid cabling systems use highly flexible hybrid cables with a multifiber loose tube cables (6 to 36 fibers) and up to 18 copper conductors. With a short fiber optic jumper the cabling systems are quickly and easily connected to the vendor specific RRH interfaces.

MASTERLINE Ultimate Hybrid has a compact, pre-connectorised and factory-sealed connector head with up to 6 Q-ODC-2 sockets and up to 6 power sockets. The robust connector head with an integrated pulling eye allows easy cable lifting. The encapsulated connector head can be directly attached to the mast with a single „click“ at a pre-mounted adapter plate. Short easy-to-install Q-ODC fiber optic and power jumpers connect the RRH interface.

The most innovative hybrid cabling system of HUBER+SUHNER for remote radio installation became even more innovative by offering capability to deliver 230 VAC up the mast, allowing much longer cabling with significant cost savings on cables and more efficient power transfer. The pre-connectorised factory-sealed hybrid systems supports up to 12 RRHs and connects the remote radios with easy-to-install Q-ODC fiber optic and power jumpers. The encapsulated connector head can be directly attached to the mast with a single „click“ at a pre-mounted adaptor plate. These unique features make MASTERLINE Ultimate Hybrid High Voltage the only in-class product offering all the advantages of the MASTERLINE Ultimate family together with high voltage conformity confirmed by the worldwide recognised CE marking. For extra safety the whole head is protected by removable cover.

MASTERLINE Extreme Hybrid has a robust and very compact divider, which divides the fibers in up to 18 single cables terminated with Q-ODC-2 extension connectors and up to 9 power cables. The very compact divider requires only a small space on the mast, minimises the wind-load and can be fed through small holes (80/100 mm diameter). Short easy-to-install Q-ODC fiber optic and power jumpers connect the RRH interface.

MASTERLINE Classic Hybrid has a divider, which divides the fibers in 6, 12, 18 or 24 single cables terminated with LC duplex connectors. The hybrid cable is fed into a distribution box. The LC duplex connectors are connected to adapters and the conductors terminated to screw terminals. Short LC duplex and power jumper connect the RRH interfaces.

Work with the leader for remote radio installation solutions

MASTERLINE cabling systems of HUBER+SUHNER: reduced installation cost, flexibility and scalability

Reduced installation costs

MASTERLINE cabling systems are more cost-effective, because only 1 cable is laid instead of 6 or more. As the number of RRHs rises, cost efficiency rises accordingly. The length of time required for installation is a major cost factor. Cabling systems of HUBER+SUHNER are pre-connectorised „plug & play“ solutions and can be connected directly with the active equipment. In addition, the multi-riser cables are more rigid than individual cables due to their increased diameter, meaning that the securing clips can be installed at intervals of between 1.5 and 2 meters. Empirical data indicates that cable installation times can be reduced by between a third and a half (compared to discrete cables). With our latest hybrid cabling system MASTERLINE Ultimate Hybrid High Voltage the installation cost can be reduced further. The capability to deliver 230 VAC up the mast, allows significant cost savings on cables due to more efficient power transfer.

Flexibility

Only the short jumper cables may need to be renewed when upgrading or replacing the RRH. Most of the installed passive infrastructure remains unaffected. This means that the installation is independent of the system and manufacturer and offers maximum flexibility in terms of evolution within the network.

Scalability

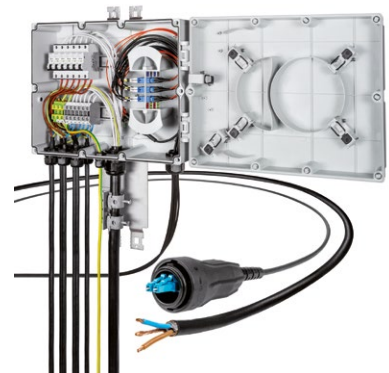
Additional RRHs must be installed when setting up new systems or frequency bands. During initial installation, 12 or 24 integrated fiber optic cores can be laid instead of 6, so that the necessary fibers are already in place if new services are being set up at a later date. No expensive new cable installations are required – all that is needed is a number of additional jumpers.



MASTERLINE Extreme Hybrid



MASTERLINE Ultimate Hybrid

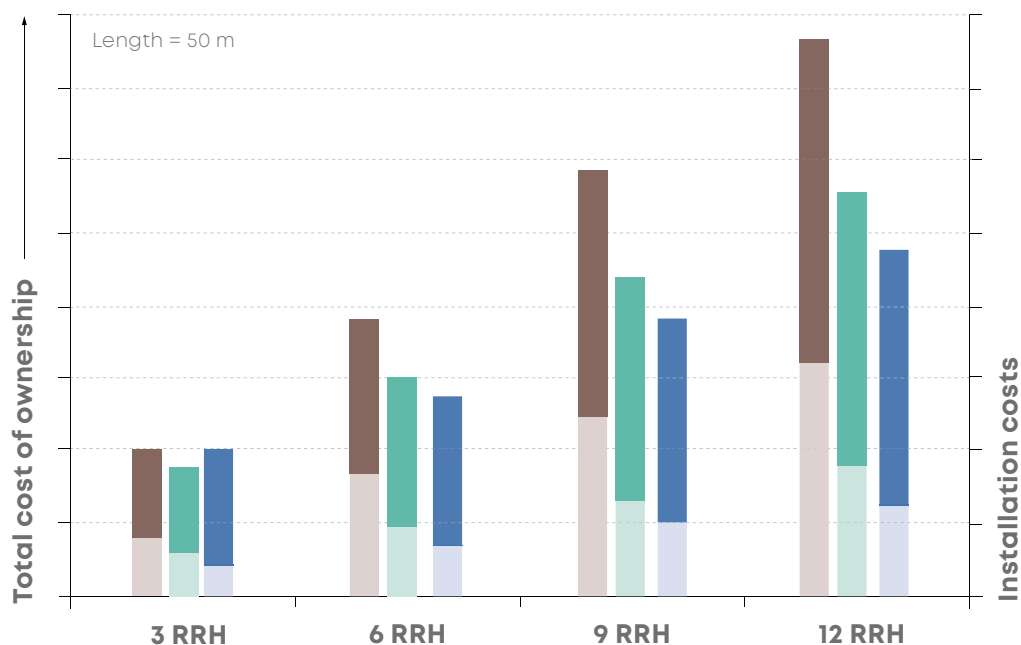


MASTERLINE Classic Hybrid

Work with the leader for remote radio installation solutions

Total cost of ownership analysis

HUBER+SUHNER offers total cost of ownership (TCO) analysis for network upgrades and expansions. In close co-operation with mobile operators we have developed a sound understanding of real costs and roll out issues associated with remote radio systems. The optimum installation solution depends very much on the legacy infrastructure, on the installation phase, on the material supply chain and on future expansion plans. HUBER+SUHNER has consulted with network deployment managers across the globe on how to save millions on installation and material costs by deploying reliable cable infrastructures which are easy and cost effective to install and which fulfill today's and tomorrow's network deployment requirements.



Example: 50 m remote radio head installation in UK

TCO calculation model of HUBER+SUHNER provides a country/operator specific TCO comparison between the different installation solutions.

Please contact your sales representative for an individualised TCO calculation.

Discrete cable

- Material costs
- Installation costs

Hybrid

- Material costs
- Installation costs

Multiriser

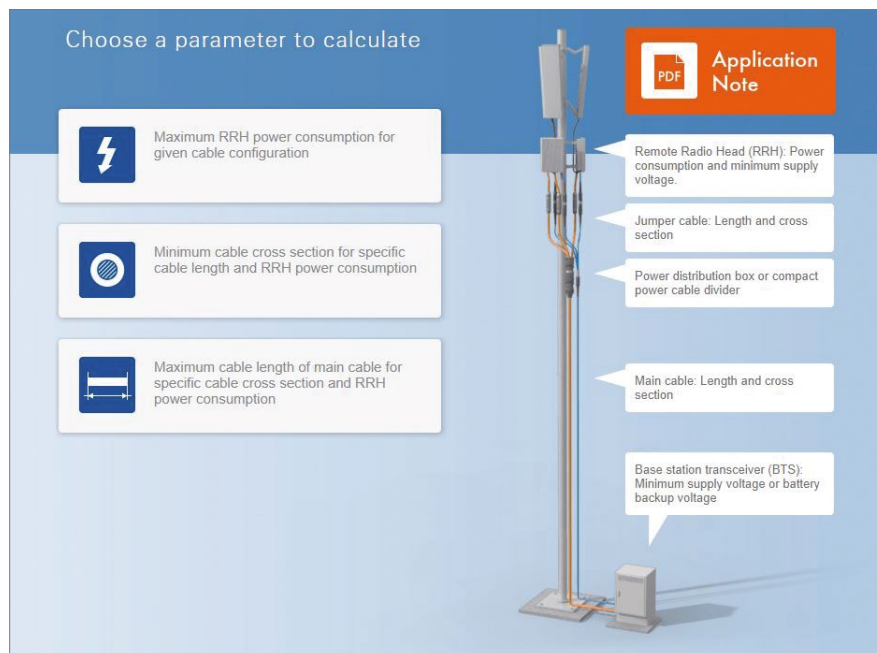
- Material costs
- Installation costs

Work with the leader for remote radio installation solutions

Power design tool for remote radios – Powering 5G networks

Mobile networks are drawing a lot of power. 5G networks will require even more power to bring the benefits it promises. This results in an near duplication of the power requirement per active equipment. The power design tool supports system engineers to correctly dimension DC power cables or to verify the limits of an existing power supply system. It is a powerful and easy-to-use tool to answer the following questions:

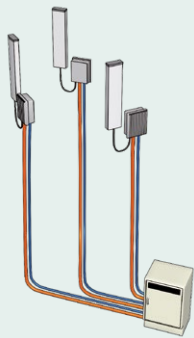
- What is the maximum allowable RRH power consumption at given cable configuration?
- What is the minimum required cable cross section to supply a specific RRH at a given tower height?
- What is the maximum allowed cable length of a pre-specified cable cross section and RRH? E. g., a 1000 W remote radio with 10 mm² power cable.



Make your own power dimensioning under

<https://pdt.hubersuhner.com/>

Quick guide on installation solutions

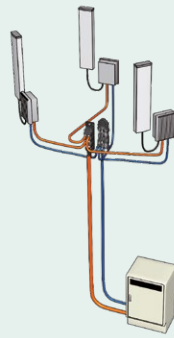


Discrete fiber feeders for single RRH

- One fiber optic feeder per RRH needed
- Default solution of system vendors
- Not scalable and not future-proof
- Vendor specific cables and connectors

Discrete power feeders for single RRH

- One power feeder cable per RRH needed

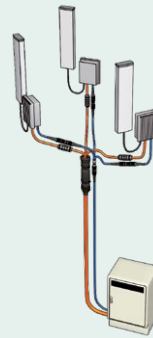


MASTERLINE Ultimate (MLU)

- Multi-riser cable with compact connector head up to 12 RRHs
- Pre-connectorised fiber optic cabling system with up to 12 outdoor socket connectors (Q-ODC)
- Installation friendly plug & play system with outdoor connectors
- Low wind-load and space efficient
- Supports multi-vendor installs

MASTERLINE Ultimate Power (MLUP)

- Multi-wire power cable with compact power connector head for up to 6 RRHs
- Pre-connectorised power cabling system with up to 6 power socket connectors (IP68)

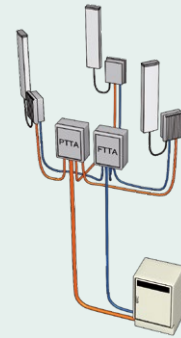


MASTERLINE Extreme (MLE)

- Multi-riser cable with compact divider for up to 12 RRHs
- Pre-assembled fiber optic cabling system with up to 12 outdoor connectors (Q-ODC)
- Installation friendly plug & play system with outdoor connectors
- Low wind-load and space efficient
- Supports multi-vendor installs

MASTERLINE Extreme Power (MLEP)

- Multi-wire power cable with compact divider for up to 6 RRHs
- Pre-assembled power cabling system with up to 6 power socket connectors (IP68) or open-end wires



MASTERLINE Classic (MLC)

- Multi-riser cable with distribution box for up to 24 RRHs
- Pre-assembled fiber optic cabling system with up to 12 indoor connectors (LC duplex)
- Requires handling of indoor fiber optic connectors
- Supports multi-vendor installs

Multicore Power supply cable with distribution box

- 2, 6 or 12 wire shielded power supply cable with distribution box for up to 6 RRHs
- Power distribution box with optional surge protection device and/or circuit breaker

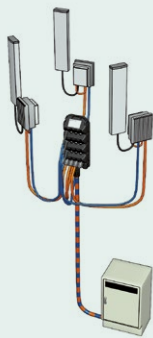
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Quick guide on installation solutions

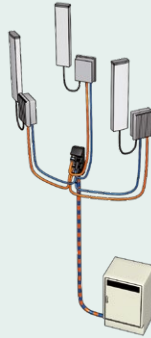


MASTERLINE Ultimate Hybrid High Voltage (MLUH HV)

- Hybrid riser cable with compact connector head high voltage (230 VAC) CE conformity
- Suitable for 230 VAC power supply
- Allowing much longer cabling length
- Significant cost savings on cables
- More efficient power transfer
- Pre-connectorised factory-sealed hybrid cable system for 12 RRH
- Mounting bracket for easy mast-, pole-, and wall-installation
- Integral earth point
- Equipped with protection cover for cable exits



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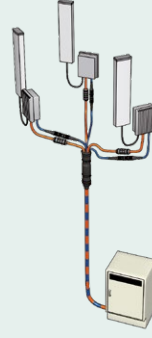


MASTERLINE Ultimate Hybrid (MLUH)

- Hybrid riser cable with compact connector head for up to 6 RRHs
- Pre-connectorised hybrid cabling system with up to 6 fiber optic outdoor socket connectors (Q-ODC) and up to 6 power socket connectors (IP68)
- Optional with Q-ODC-12 connector for up to 18 fiber optic interfaces
- Ultimate „plug & play“ solution
- Fast and safe installation
- Low wind-load and space efficient
- Supports multi-vendor installs
- Hybrid cable combines glass fiber cables and copper conductors within a single cable



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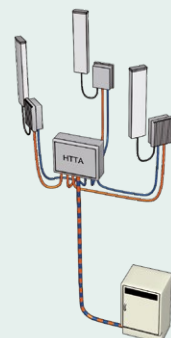


MASTERLINE Extreme Hybrid (MLEH)

- Hybrid riser cable with compact divider for up to 9 RRHs
- Pre-assembled hybrid cabling system with up to 18 fiber optic outdoor connectors (Q-ODC) and up to 9 power socket connectors (IP68)
- Most commonly installed hybrid product globally
- Fast and safe installation
- Low wind-load and space efficient
- Supports multi-vendor installs
- Hybrid cable combines glass fiber cables and copper conductors within a single cable



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MASTERLINE Classic Hybrid (MLCH)

- Hybrid riser cable with distribution box for up to 6 RRHs
- Pre-assembled hybrid cabling system with up to 12 fiber optic indoor connectors (LC duplex) and up to 6 pairs of copper wires
- Hybrid distribution box with optional surge protection device and/or circuit breaker
- High wind-load compared with MLUH and MLEH
- Elaborate box installation at mast required
- Supports multi-vendor installs
- Hybrid cable combines glass fiber cables and copper conductors within a single cable



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Discrete fiber optic feeders for single RRH



The solution with discrete fiber and power cables supports every type of cell site installation, whether the remote radios are co-located (mast-top installation) or distributed on rooftops of buildings.

HUBER+SUHNER has a leading role in the design and manufacturing of harsh environment connectors (e.g. ODC, FullAXS, Q-ODC or Q-XCO) and cable assemblies for remote radio systems. The installation method with discrete cables is the default solution of mobile system vendors.

HUBER+SUHNER is an approved and qualified cable assembly supplier for the majority of the tier 1 and tier 2 system vendors.

Discrete fiber optic feeders for single RRH

RF LISCA RF jumper
page 162



PTTA Power distribution box with surge protection (optional)
page 69



FTTA Discrete fiber optic feeder for single RRH
page 14



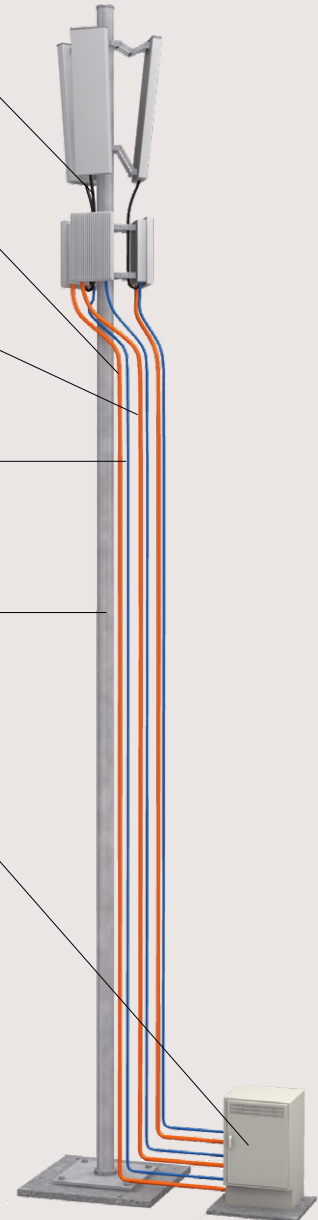
PTTA Discrete power feeder for single RRH
page 21



XTTA Cable clamps
page 134



FTTA Overlength box
page 127



XTTA FTTA, PTTA and HTTA

PTTA Power-To-The-Antenna

RF Radio Frequency

HTTA Hybrid-To-The-Antenna

FTTA Fiber-To-The-Antenna

Discrete fiber feeders for single RRH



Features

- FTTA feeders for all common RRH models and systems
- Ruggedised design and installation proof
- Standard assemblies and customised lengths, available with short lead-time
- Cable diameter 4.8 mm, 5.5 mm
- All cables rodent resistant, CPR compliant and UL (OFNR) approved
- All cable assemblies factory-terminated and tested
- Anatel approved cables, available on request

Specifications

Outer cable diameter	4.8 mm	5.5 mm
Jacket material	LSFH™	
Cable tensile strength (service/during installation)	500/1000 N	
Cable crush resistance (long-term/short-term)	6000/20 000 N/dm	
Temperature range	-40 to +75 °C	
Flame resistance	IEC 60332-1, IEC 60332-3-24, UL1666	
UV resistant	yes	

HUBER+SUHNER cables are deployed on a global scale

Year by year, HUBER+SUHNER produces tens of thousands of FTTA feeder cables and is a leading global supplier to major system vendors and operators. Our customers value our quality products which are manufactured on all continents close to the local markets.

HUBER+SUHNER is also an innovation leader for remote radio interfaces and is the owner of globally successful products like ODC, Q-ODC and Q-XCO.



Discrete fiber feeders for single RRH

Ordering information

FullAXS feeder with 4.8 mm cable



Length	Item no. single-mode E9/125 A2 (G.657.A2)
	CPR D _{ca} and UL listed OFNR
15 m	85101684
20 m	85101685
30 m	85101686
40 m	85101687
50 m	85101688
60 m	85101689
70 m	85101690
80 m	85101691
90 m	85101692
100 m	85101693
125 m	85101694
150 m	85101695

LC feeder with moulded divider and ruggedised break-out 98 mm long, Ø 4.8 mm cable



Length	Item no. single-mode E9/125 A2 (G.657.A2)
	CPR D _{ca} and UL listed OFNR
10 m	85031795
20 m	85031796
30 m	85031797
40 m	85031798
50 m	85031799
60 m	85031800
70 m	85031801
80 m	85031802
90 m	85031803
100 m	85031804
125 m	85031805
150 m	85031806

Discrete fiber feeders for single RRH

LC feeder with metal divider and ruggedised break-out 90 mm long Ø 4.8 mm cable



Length	Item no. single-mode E9/125 A2 (G.657.A2)
	CPR D _{ca} and UL listed OFNR
10 m	85101708
20 m	85101709
30 m	85101710
40 m	85101711
90 m	85101716
100 m	85101717
125 m	85101718
150 m	85101719

Discrete fiber feeders for single RRH

LC feeder with ruggedised break-out 90 mm long, Ø 4.8 mm cable (Ø 7.0 mm at the RRH pre-chamber entry position)







Length	Item no. single-mode E9/125 A2 (G.657.A2)
	CPR D_{ca} and UL listed OFNR
10 m	85101742
15 m	85101743
20 m	85101744
30 m	85101745
40 m	85101746
50 m	85101747
60 m	85101748
70 m	85101749
80 m	85101750
90 m	85101751
100 m	85101752
125 m	85101753
150 m	85101754

Please contact HUBER+SUHNER for other OEM interfaces which are not listed on page 17 to 19.




Discrete fiber feeders for single RRH

Region specific cable assemblies

Ask for approved regional item numbers fulfilling local market requirements.

US/North America	UL approved cables	
Europe	CPR approved cables	
Brazil	Anatel approved cables	
India	Monkey-bite proof cables	

Accessories

Description	Item no.	Page	
For outdoor and indoor installation, stores up to 20 m cable excess length (depending on cable diameter)	84103325	127	
Combined clamps for fiber optic and power cable	depends on cable diameter	134	
SFP/SFP+ transceivers for different protocols, data rates and power budgets	See transceiver selection guide on page 260	259	

Discrete power feeders for single RRH

2 core power cable with aluminium foil shielding, red and white insulation and CPR class B2_{ca}



Features

- Highly flexible power cable with low bending radius and excellent cable routing properties
- Red and white XLPE insulation compliant to IEC60445:2021
- Aluminum foil shielding with tinned copper drain conductor
- CPR compliant class B2_{ca}
- Voltage rating 600V

Specifications

Jacket material	LSFH
Insulation material	XLPE
Insulation color IEC 60445:2021	red, white
Screen	Aluminum/PET foil with tinned copper drain conductor
Drain wire type IEC 60228	Annealed tinned copper class 5
UV-resistant	According to IEC 60068-2-5
CPR classification	B2ca-s1,d1,a1
Standard	IEC 60502 / IEC 60092
Rated voltage	0.6/1.0 kV
Temperature range	-40 to 85 °C
Conductor type IEC 60228	Annealed copper class 5

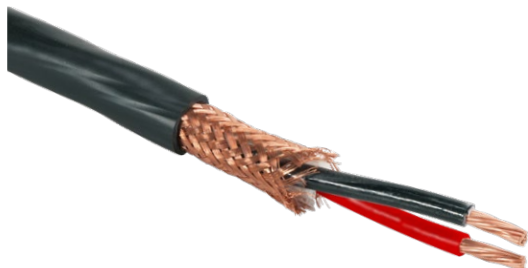
Conductor cross section	6 mm ²	10 mm ²	16 mm ²	25 mm ²
Conductor resistance	3.30 Ω/km	1.91 Ω/km	1.21 Ω/km	0.78 Ω/km
Maximum current rating at 60 °C ambient temperature	45 A	61 A	82 A	105 A
Drain wire cross section	4 mm ²	6 mm ²	6 mm ²	6 mm ²
Cable diameter	11.6 mm	13.7 mm	15.8 mm	19.7 mm
Weight	0.22 kg/m	0.34 kg/m	0.46 kg/m	0.77 kg/m

Ordering information

Item no.	Cross section	Length per reel	Reel flange size
85173020	6 mm ²	1000 m	100 cm
85173021	10 mm ²	1000 m	110 cm
85173926	16 mm ²	1000 m	120 cm
85173058	25 mm ²	1000 m	140 cm

Discrete power feeders for single RRH

2 core power supply cable PVC jacket material, red and black insulation, UL listed



Features

- 2 core copper cable for RRH power supply
- UL listed tray cable TC-ER
- PVC jacket material
- Red and black XLPE insulation
- Braided copper shield
- AWG 10 to AWG 4 conductors

Specifications

Jacket material	PVC
Insulation material	XLPE
Insulation color	Red and black
Screen	Braided screen of copper wires
Installation temperature range	-10 °C to +50 °C
Operating temperature range	-40 °C to +75 °C
Cross section	AWG 8
Resistance	0.63 Ω/kft
Maximum current rating at 50°C ambient temperature	45 A
Cable diameter	0.532" (13.5 mm)
Weight	-10 °C to +50 °C

Ordering information

Cross section	AWG 8
Item number	85219851

Cross sections from AWG 10 to AWG 4 on request

Discrete power feeders for single RRH

2 core power supply cable PVC jacket material, UL listed (TC-ER)



Features

- 2 core copper cable for RRH power supply
- UL listed tray cable TC-ER
- PVC jacket material
- Braided copper shield
- AWG 10 to AWG 2 conductors

Specifications

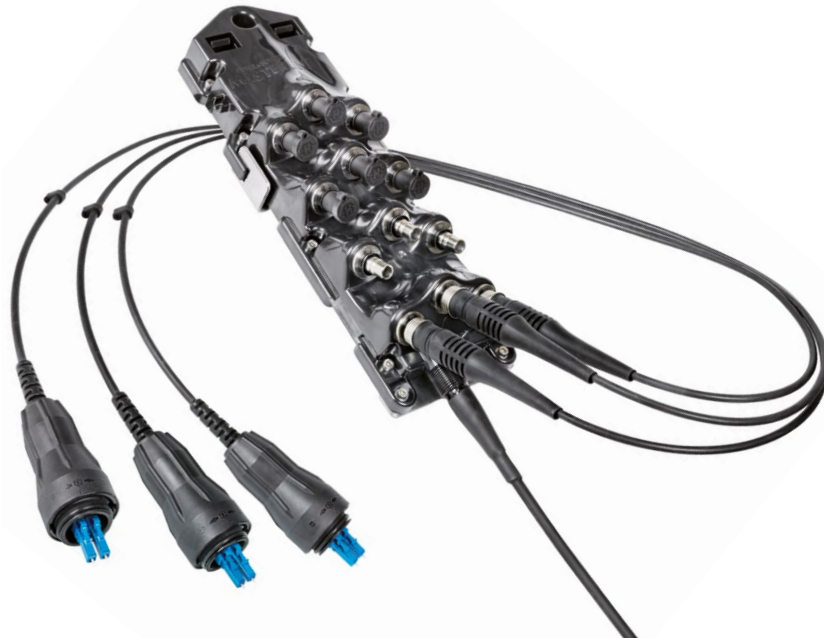
Jacket material	PVC
Conductor type	copper stranded, class C, type THHN/THWN-2
Insulation material	PVC
Insulation colour	black, white
Screen	braid copper shield, coverage 65 to 85%
Rated voltage	0.6/1.0 kV
Temperature range	-40 to 90°C
Minimum bending radius	10 × outer diameter 8 × outer diameter

Cross section	AWG 12	AWG 10	AWG 8	AWG 6	AWG 4
Resistance	1.65 Ω/kft	1.04 Ω/kft	0.64 Ω/kft	0.39 Ω/kft	0.25 Ω/kft
Maximum current rating at 50 °C ambient temperature	25 A	33 A	45 A	62 A	88 A
Cable diameter	0.41" (10.3 mm)	0.47" (11.8 mm)	0.59" (15.9 mm)	0.69" (17.6 mm)	0.87" (22.0 mm)
Cross section braid	AWG 12	AWG 10	AWG 10	AWG 8	AWG 8
Weight	88 lbs/kft	124 lbs/kft	205 lbs/kft	353 lbs/kft	551 lbs/kft

Ordering information

Cross section	AWG 12	AWG 10	AWG 8	AWG 6	AWG 4
Item number	85020805	85020806	85020807	85086434	85086435

MASTERLINE Ultimate (MLU)



Multi-riser cable with compact connector head

MASTERLINE Ultimate is the most innovative fiber optic cabling system of HUBER+SUHNER for remote radio installations. The pre-connectorised factory-sealed fiber optic systems support up to 12 RRHs and connect the remote radios with easy-to-install Q-ODC fiber optic jumpers.

The robust connector head with an integrated pulling eye allows easy cable lifting without the need for hoisting grips. The encapsulated connector head can be directly attached to the mast with a single „click“ at a pre-mounted adaptor plate.

MASTERLINE Ultimate is available with Q-ODC-12/24 (MLUQ), a 12 or 24 fiber outdoor connector, instead of a hardwired multi-riser cable. MLUQ allows the use of RRH/antenna pole mount frames to further reduce on-site installation time.

These unique features make MASTERLINE Ultimate the best-in-class product in terms of ease of mast-top installation, installation robustness and efficiency.

MASTERLINE Ultimate (MLU)

RF

LISCA RF jumper

page 162



FTTA

Q-ODC RRH jumpers

page 30



PTTA

Power jumpers

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FTTA

MASTERLINE Ultimate with Q-ODC-2
MASTERLINE Ultimate with Q-ODC-24

page 26



PTTA

MASTERLINE Ultimate Power

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XTTA

Cable clamps

page 134



FTTA

Overlength box

page 127



FTTA

CTB 19" patching box

page 130



FTTA

LC patchcord

page 133



XTTA

FTTA, PTTA and HTTA

PTTA

Power-To-The-Antenna

RF

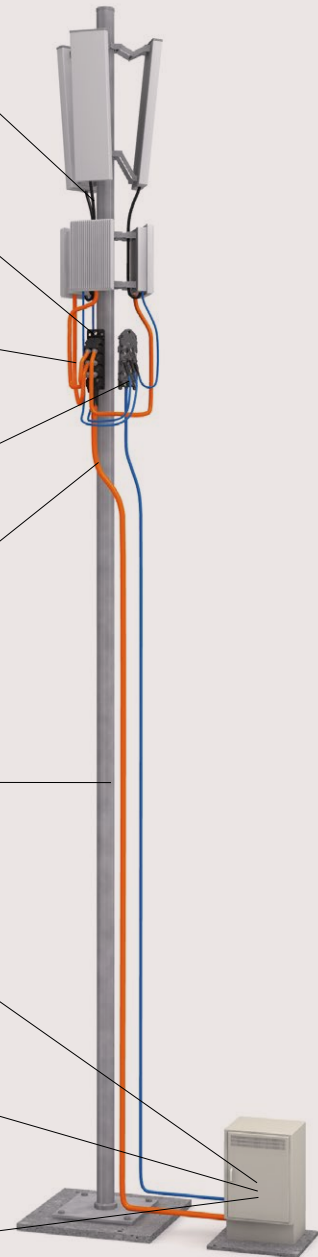
Radio Frequency

HTTA

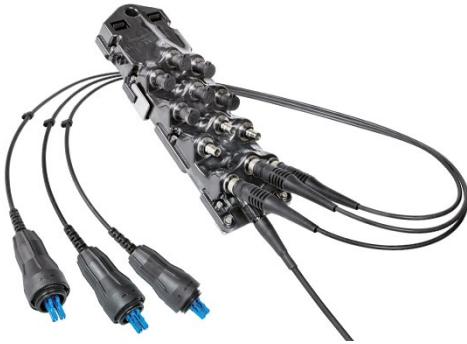
Hybrid-To-The-Antenna

FTTA

Fiber-To-The-Antenna



MASTERLINE Ultimate (MLU)



Features

- Pre-connectorised factory-sealed „plug & play“ fiber optic cabling system for up to 12 RRHs
- Robust connector head with 6 or 12 Q-ODC sockets
- Connects the RRH with easy-to-install Q-ODC fiber optic jumpers
- Integrated pulling eye for easy cable lifting
- Loose tube cables with up to 24 fibers, rodent protected and UV resistant and CPR compliant
- Connectors numbered for easy channel identification
- Easy and time-saving installation

Specifications

Number of Q-ODC connector socket		6 or 12 (specifications see page 145)
Dimensions L x W x H	enclosure without cover	293 x 110 x 46 mm
	enclosure with cover	460 x 160 x 110 mm
Temperature range	during installation	-10 up to +50 °C
	in service	-40 up to +75 °C
Ingress protection		IP67
Impact resistance		IK 07
UV resistant for outdoor use		ISO 4892-3
Cable type		glass-armoured multifiber loose tube cable
Jacket material		LSFH™, black
Cable diameter		7.0 mm
Minimum bending radius	during installation	110 mm
	in service	70 mm
Cable flame resistance	IEC 60332-1	passed
	IEC 60332-3-24	
CPR compliant		class D _{co} s1a, d0, a1
Protection tube BTS side	outer diameter	36 mm



MASTERLINE Classic with LC uniboot at BTS side



Protective cover for connector is optional available

MASTERLINE Ultimate (MLU)

Ordering information

MASTERLINE Ultimate with Q-ODC sockets and LC uniboot connectors



Length	Item no. Fiber type: single-mode E9/125 A2 (G.657.A2)				Item no. Fiber type: multimode G50/125 OM3	
	Cable type: LSFH™, CPR D _{ca}		Cable type: LSFH™, UL listed		Cable type: LSFH™, CPR D _{ca}	
	12 fibers – 6 RRH	24 fiber – 12 RRH	12 fibers – 6RRH	24 fibers – 12 RRH	12 fibers – 6 RRH	24 fibers – 12 RRH
20 m	85019356	85019892	85183908	85019905	85087480	85087490
30 m	85019357	85019893	85183909	85019906	85087481	85087491
40 m	85019358	85019894	85183910		85087482	85087492
50 m	85019359	85019895	85183911		85087483	85087493
60 m	85019360	85019896	85183912	85019911	85087484	85087494
70 m	85019361	85019897	85183913		85087485	85087495
80 m	85019362	85019898	85183914		85087486	85087496
90 m	85019363	85019899	85183915		85087487	85087497
100 m	85019364	85019900	85183916	85019916	85087488	85087498
125 m	85019365	85019901	85183917	85184419		
150 m	85019366	85019902	85183919	85184420		
200 m	85019367	85019903	85183920	85184421		

Up to 80 m supplied as air ring and for longer cable systems on a double-flange reel.

Option:

- Customizable in length

MLU installation

Easiest-to-install fiber optic product available on the market.

Installation features



Pulling

The robust connector head with integrated pulling eye allows for easy cable lifting without the need for hoisting grips. The small form factor allows pulling of the connector head even inside of a mono pole.

Mounting bracket

The MLU connector head can be locked easily to the mounting bracket. The bracket has provision for fixation either to a mast or directly onto a wall.



Q-ODC push-pull connector

The Q-ODC push-pull connector allows for a quick and reliable connection of the remote radio head with jumper cables. The Q-ODC connector is used by an ever-growing number of operators and OEMs world-wide.



Protection tube on BTS side

Supplied with robust protection tube to protect the fibers breakouts on BTS side from damage during installation. Can be easily removed by pulling the rip cord.

NEW: MASTERLINE Ultimate with ODC-2

MASTERLINE Ultimate fiber optic cabling system is also available with ODC-2 connector sockets.

The ODC-2 connector has a screwed locking mechanism, instead a push-pull coupling mechanism like Q-ODC-2 connector.

Specifications see page 149.



MASTERLINE Ultimate (MLU)

Q-ODC connectors



Q-ODC plug
on the jumper



Q-ODC socket on MLU head

Features

- Robust push-pull coupling mechanism – two clearly defined mating states
- Highest outdoor installation safety
- Available for all types of RRH
- Waterproof, dust proof and corrosion resistant; does not require secondary wrapping

Specifications see page 144.

Mating/un-mating sequences



Push plug connector slightly into socket connector, rotate to find keying position, push connector to mate.



Mated – connector snaps in and is fully strain relieved.



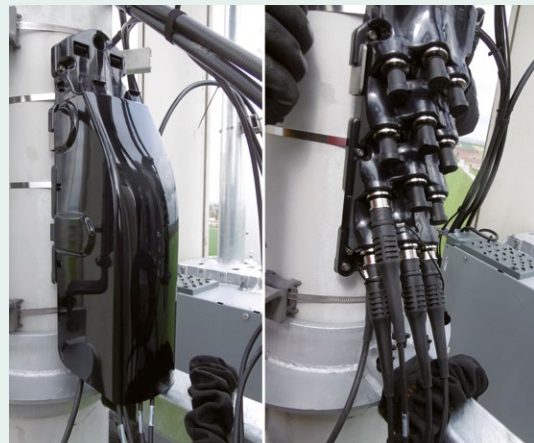
Pull coupling ring to un-mate.

Easiest-to-install fiber cabling system

The robust connector head with an integrated pulling eye allows easy cable lifting. The encapsulated connector head can be directly attached to the mast with a single «click» at a pre-mounted adaptor plate.

MLU offers highest variability and security in connecting remote radio units to the fiber optic network. With the unique shape of the top end and the additional protection cover this new connection system is providing a stream-line shaped appearance that provides less wind load.

These unique features make MASTERLINE Ultimate the best-in-class product in terms of ease of mast-top installation, installation robustness and efficiency.



MASTERLINE Ultimate (MLU)

Q-ODC RRH jumpers



Features

- Compatible with MLE, MLEH, MLU and MLUH terminated with Q-ODC
- Ruggedised and robust RRH jumper cable – easy and reliable to install
- Available for all types of RRH
- Cable diameter 4.8 mm, 5.5 mm or 7 mm
- Standard lengths of 2, 5 and 10 m, customised lengths available
- Ingress protection IP68 (Q-ODC)

Ordering information

Q-ODC plug to LC duplex jumper with moulded divider and ruggedised break-out 98 mm long, Ø 4.8 mm cable



Length	Item no. single-mode E9/125 A2 (G.657.A2)
	CPR D _{ca} and UL listed OFNR
2 m	85032280
5 m	85032282
10 m	85032283

Q-ODC plug to FullAXS, cable Ø 4.8 mm



Length	Item no. single-mode E9/125 A2 (G.657.A2)
	CPR D _{ca} and UL listed OFNR
2 m	85006042
5 m	85006043
10 m	85006044

MASTERLINE Ultimate (MLU)

Ordering information

Q-ODC plug to LC duplex jumper with ruggedised break-out 85 mm long, cable Ø 5.5 mm



Length	Item no. multimode G50/125 OM3
	CPR D _{ca}
2 m	85002965
5 m	85002966

Q-ODC plug to LC duplex jumper with ruggedised break-out 90 mm long, Ø 7.0 mm cable



Length	Item no. single-mode E9/125 A1 (G.657.A1)
	CPR D _{ca}
2 m	84204528
5 m	84204530
10 m	84204532

Q-ODC plug to PDLC, cable Ø 7.0 mm



Length	Item no. single-mode E9/125 A1 (G.657.A1)
	CPR D _{ca}
2 m	84204521
5 m	84204523

Q-ODC plug RRH jumpers to other OEM interfaces

Please contact HUBER+SUHNER for Q-ODC plug RRH jumpers for other OEM interfaces which are not listed above.

MASTERLINE Ultimate with Q-ODC-12/24 (MLUQ)



Features

- Pre-connectorised factory-sealed “plug & play” fiber optic cabling system for up to 12 RRHs
- Modular RRH installation solution – connector head and multifiber cable can be installed separated
- Q-ODC-12 or Q-ODC-24 connectivity between the connector head and multifiber cable
- Connectorised multifiber cable can be installed through a hole with a minimum diameter of only 22 mm
- Robust connector head with 6 or 12 Q-ODC-2 sockets to connect the RRH with Q-ODC-2 fiber optic jumpers
- Easy and time-saving installation

Specifications

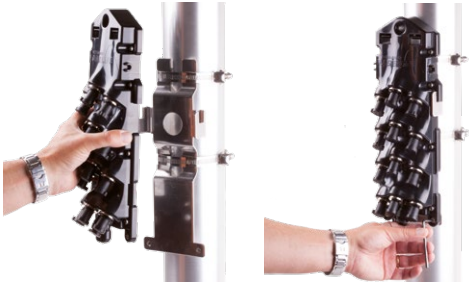
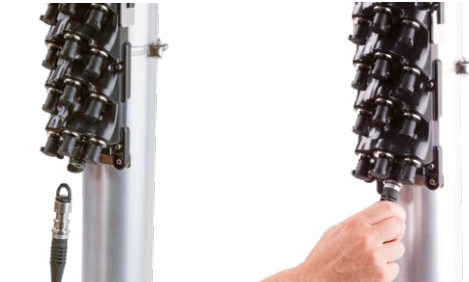
Connector head			
Number of Q-ODC-2 connector socket			6 or 12
Number of Q-ODC-12/24 connector socket (reverse plug)			1
Dimensions L × W × H	enclosure without cover		293 × 110 × 46 mm
	enclosure with cover		460 × 160 × 110 mm
Temperature range	during installation		−10 up to +50 °C
	in service		−40 up to +75 °C
Ingress protection			IP67
Impact resistance			IK 07
UV resistant for outdoor use			ISO 4892-3
Mounting bracket material			stainless steel

Multifiber cable			
Cable type			glass-armoured multifiber loose tube cable
Jacket material			LSFH™, black
Cable diameter			7.0 mm
Minimum bending radius	during installation		110 mm
	in service		70 mm
Fire propagation			IEC 60332-1 and IEC 60332-3-25
CPR compliant			class D _{ca} s1a, d0, a1



Protective cover for connector is optional available

MASTERLINE Ultimate installation

	<p>Hook in MLU head to mounting bracket</p> <p>The MLU connector head can be easily hooked in to the pre-mounted bracket and firmly fixed with two captive screws at the bottom of the connector head.</p>
	<p>Lift the connectorised multifiber cable</p> <p>Use the integrated pulling eye at the Q-ODC12/24 connector cap to lift the multifiber cable, connectorised with Q-ODC-12/24 extension, up to the mast.</p> <p>Connect the Q-ODC-12/24 extension to the Q-ODC-12/24 socket (reverse plug) at the bottom of the MLUQ.</p>

Modularity for reduced on-site installation

MASTERLINE Ultimate with Q-ODC-12/24 (MLUQ) is a modular cabling system which allows the use of RRH/antenna pole mount frames. A multifiber cable connectorised with Q-ODC-12/24 extension on the top side is installed at the mast or pole separately from the RRH installation.

The operator builds it's frames with the RRHs, antennas and MLUQ connector head at their logistics centers. Usually 3 or 4 Radios are installed on a pole mount frame (a frame per sector or frequency). At the site the whole radio/antenna frame is lifted up and fixed to the mast and with one click the MLUQ connector head (for up to 12 RRHs) gets connected via the Q-ODC-12/24 connector and multifiber cable fed down to the BBU.



MASTERLINE Ultimate (MLUQ)

Q-ODC-12/Q-ODC-24 connector



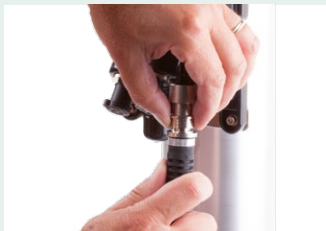
Features

- Up to 24 fibers, single-mode or multimode
- Compact design with MT ferrules
- Robust push-pull coupling mechanism – two clearly defined mating states
- Highest outdoor installation safety
- Waterproof, dust proof and corrosion resistant
- Waterproof protection caps available

Q-ODC-12/24 extension terminated to the multifiber cable and Q-ODC-12/24 socket (reverse plug) on the MLUQ enclosure

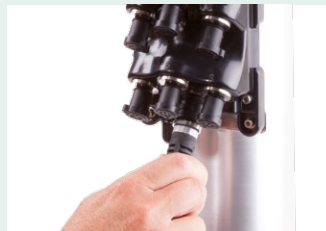
Specifications on page 147.

Mating/unmating sequences



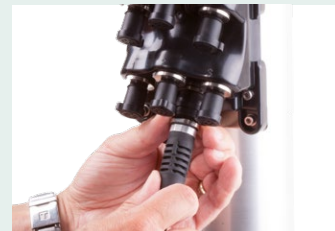
Un-mate protection cap with pulling eye

Pull back metal coupling ring at the Q-ODC-12/24 protection cap and remove protective cap



Mating sequence

Push extension connector slightly into socket (reverse plug) connector, rotate to find keying position, push connector to mate. Use arrows on the boot for pre-alignment. Mated – connector snaps in and is fully strain relieved.



Un-mating sequence

Push black rubber coupling ring at the MLUQ socket (reverse plug) to unmate. Replace dust protection caps.

Q-ODC-2 connector



Features

- 2 fibers, single-mode or multimode
- Compact design with 2 × 1.25 mm ferrules
- Robust push-pull coupling mechanism – two clearly defined mating states
- Highest outdoor installation safety
- Waterproof, dust proof and corrosion resistant
- Waterproof protection caps available
- Fulfills performance standard IEC 61753-1 Cat. E

Specifications and mating/unmating sequences on page 143.

MASTERLINE Ultimate with Q-ODC-12/24 (MLUQ)

Ordering information

MASTERLINE Ultimate with Q-ODC-12/24 (MLUQ) and multifiber cable connectorised with Q-ODC-12/24 extension and 6/12 × LC duplex connector



MLUQ connector head

Item no. MLUQ connector head with 12 fiber, 6 × Q-ODC-2 socket and 1 × Q-ODC-12 socket (reverse plug) including mounting bracket Fiber type: single-mode E9/125 A2 (G.657.A2)	Item no. MLUQ connector head with 24 fiber, 12 × Q-ODC-2 socket and 1 × Q-ODC-24 socket (reverse plug) including mounting bracket Fiber type: single-mode E9/125 A2 (G.657.A2)
85089691	85089688

Connectorised multifiber cable

Length	Item no. Multifiber cable connectorised with Q-ODC-12 extension and 6 × LC duplex connector, 12 fiber Fiber type: single-mode E9/125 A2 (G.657.A2)	Item no. Multifiber cable connectorised with Q-ODC-24 extension and 12 × LC duplex connector, 24 fiber Fiber type: single-mode E9/125 A2 (G.657.A2)
20 m	85032143	85096335
30 m	85032144	85096336
40 m	85032145	85096337
50 m	85032146	85096338
60 m	85032147	85096339
70 m	85032148	85096340
80 m	85032149	85096341
90 m	85032150	85096342
100 m	85032151	85096343










Q-ODC-12/24 extension with pulling eye cap



MASTERLINE Classic with LC duplex connector at BTS side

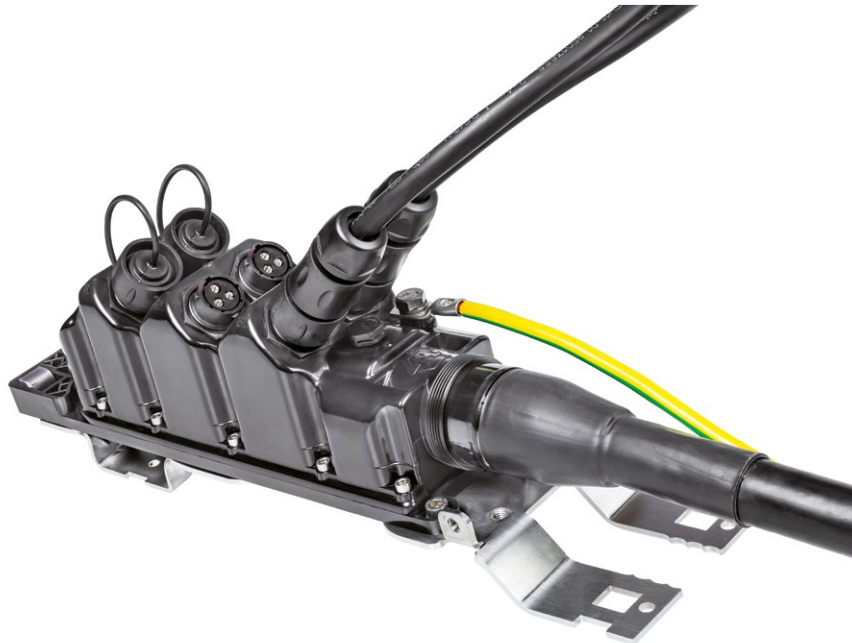
MASTERLINE Ultimate (MLU)

Accessories

Description		Item no.	Page	Picture
Protective cover for connector head		85108554	--	
Overlength box for outdoor and indoor installation, stores up to 20 m cable excess length (depending on cable diameter)		84103325	127	
Combined clamps for fiber optic and power cable		depends on cable diameter	134	
19" CTB patching box	6, 12, 18 or 24 LC duplex adapter blue	depends on quantity of LC adapter	130	
LC patchcords	0.5 m, 0.7 m or 1 m length, single-mode	depends on length	133	
Quick hose clamps. Stainless steel. One set includes 2 pieces hose clamps.	clamping Ø 30 to 155 mm	84076411	140	
	clamping Ø 60 to 500 mm	84076412		
SFP/SFP+ transceivers for different protocols, data rates and power budgets.		See transceiver selection guide on page 260	259	



MASTERLINE Ultimate Power (MLUP)



Multi-wire power cable with compact connector head

MASTERLINE Ultimate Power enables a power supply installation with only one power cable, instead of 6 individual power cables. The compact pre-connectorised head supplies –48 Vdc for up to 6 RRHs.

Power jumpers, available in different lengths, connect the RRHs with –48 Vdc. A pre-laced hoisting grip below the robust connector head allows for easy cable lifting. The encapsulated connector head can be directly attached to the mast at a pre-mounted adaptor plate.

MASTERLINE Ultimate Power (MLUP)

RF

LISCA RF jumper

page 162



FTTA

Q-ODC RRH jumpers

page 30



PTTA

Power jumpers

page 43



FTTA

MASTERLINE Ultimate

page 24



PTTA

MASTERLINE Ultimate Power

page 38



XTTA

Cable clamps

page 134



FTTA

Overlength box

page 127



FTTA

CTB 19" patching box

page 130



FTTA

LC patchcord

page 133



XTTA

FTTA, PTTA and HTTA

PTTA

Power-To-The-Antenna

RF

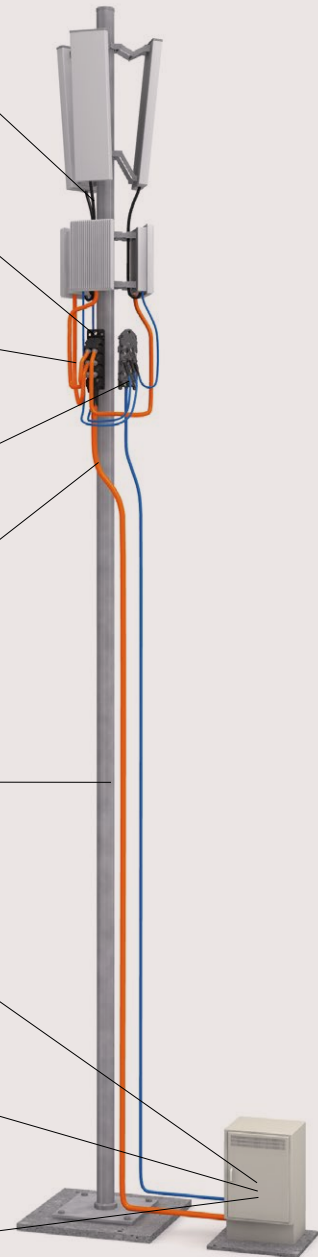
Radio Frequency

HTTA

Hybrid-To-The-Antenna

FTTA

Fiber-To-The-Antenna



MASTERLINE Ultimate Power (MLUP)



Features

- Pre-connectorised factory-sealed power cabling system for up to 6 RRHs
- Modular „plug & play“ system with 6 power connectors
- Highly flexible 12-core power cable 6 mm² to 16 mm² and AWG 10 to AWG 6
- Hoisting grip for cable lifting
- Mounting bracket for easy mast-, pole-, and wall-installation
- Space-efficient, low wind-load
- Integral earth point which can be connected to an earth lead with M8 ring terminal

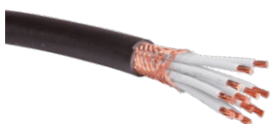
Connector head specifications

Number of power connector (rugged circular plastic socket)		6
Maximum current rating		up to 42 A per power socket (depending on the conductor cross section selected)
Dimensions L × W × H		310 × 90 × 97 mm
Ambient temperature range	during installation	–10 up to +50 °C
	in service	–40 up to +75 °C
Ingress protection (IEC 60529)		IP67
Impact resistance (IEC 62262)		IK 10
Material housing		high-performance polycarbonate
UV resistance, ISO 4892-3 (methode A/cylce 1)		1000 h
Material flammability rating		UL94-V0

Power cable specifications

	LSFH™ power cable, global market			UL listed power cable, US market		
Jacket material	thermoplastic, LSFH™			PVC		
Rated voltage	0.6 kV/1 kV (1.2 kV)			0.6 kV/1 kV (1.2 kV)		
Conductor type	IEC 60228 class 5			class C THHN/THWN-2		
Cable shielding	braided screen of copper wires			copper foil		
CPR compliant	yes, class D _{ca}			no		
Number of conductor	12					
Conductor cross section	6 mm²	10 mm²	16 mm²	AWG 10	AWG 8	AWG 6
Resistance	3.30 Ω/km	1.91 Ω/km	1.21 Ω/km	3.41 Ω/km	2.13 Ω/km	1.30 Ω/km
Maximum current rating	25 A	35 A	42 A *	16 A	23 A	31 A
Outer diameter	23.7 mm	27.4 mm	32.2 mm	23.5 mm (0.93")	29.5 mm (1.16")	33.5 mm (1.32")
Weight	1.06 kg/m	1.58 kg/m	2.20 kg/m	1.14 kg/m	1.64 kg/m	2.33 kg/m
Shielding/drain wire cross section	8 mm ²	10 mm ²	14 mm ²	AWG 6	AWG 6	AWG 6

* limitation through power connector maximum current rating 42 A (IEC) and 44A (UL)



12-core power cable

MASTERLINE Ultimate Power (MLUP)

Power connectors



plug at

Features

- Rugged circular plastic plug connector for remote radio installations
- Machined crimp contacts Ø 3.6 mm for high current
- Bayonet coupling system for easy and quick mating
- 2 wire shielded copper cable with cross section of 4 or 6 mm²
- 3-pol connector for 2-wire shielded copper cable



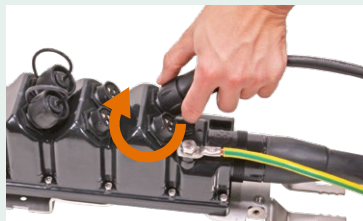
Power connector flange socket at the MLUP connector head

The bayonet coupling system enables a simple and fast mating. With only a 1/3 twist of the coupling ring, connectors are mated with an audible and tactile „click“. The machined 3.6 mm crimp contacts ensure a vibration safe termination and a high current rating.

Mating/unmating sequences



Twist the coupling ring of the plug connector to remove protecting cap as shown.



Push plug connector slightly into flange connector, rotate to find keying position, twist coupling ring of the plug connector as shown.



Twist coupling ring as shown to unmate the plug connector.

Power connector specifications

Maximum current rating	42 A (IEC), 44 A (UL), 30 A (CSA)
Rated voltage	230 V (IEC), 600 V (UL), 600 V (CSA)
Operating temperature	-40 to 105 °C (40/10/21 per NFF 61-030)
Flammability rating	UL 94 V0
Salt spray	> 500 hours
UV resistant for outdoor use	ISO 4892
Ingress protection mated	IP67 (EN 60529)
Dimensions	Ø 35.1 mm, length 70 mm
Cable diameter range	5 to 14 mm
Material body connector and backshell	thermoplastic, halogen-free
Crimp contacts	machined Ø 3.6 mm
Material crimp contacts	copper alloy, plating 2 µ Ni + 2 µ Ag
Mating cycles	100
RoHS compliant	yes
Compliance	UL1977: certificate ECBT2 file number E169916 CSA C22.2 n°182.3: certificate ECBT8 file number E169916

MASTERLINE Ultimate Power (MLUP)

Ordering information



RRH side	BTS side
6 rugged circular plastic sockets	6 pairs of wires blunt cut wire cross section 6 mm ² , 10 mm ² , 16 mm ² , AWG 10, AWG 8, AWG 6

Market	Length	Item no.		
		6 mm²	10 mm²	16 mm²
Global CPR class D _{ca}	30 m	85098414		
	40 m	85098415	85120913	
	50 m	85098416	85119794	
	60 m		85098417	
	70 m		85098418	85120920
	80 m		85098419	85120921
	90 m		85098420	85120922
US UL listed		AWG 10	AWG 8	AWG 6
	30 m	85098421		
	40 m	85098422		
	50 m	85098423		
	60 m		85098424	
	70 m		85098425	85142088
	80 m		85098426	85142089
	90 m		85098427	85142090

Option:
• Other length

Accessories

Description	Item no.	Page	Picture
Clamps for hybrid cable	depends on cable diameter	136	
Grounding kits	85015070	138	
Grounding cable, 0.5 m, 16 mm ² and 25 mm ² , black and yellow/green	depends on cross section and colour	139	
Auxiliary tool to open and close power connector	85013939	--	
Protection cover for MLUH 3 Stainless steel Dimension (L × H × W) 365 × 200 × 90 mm	85032157	--	

MASTERLINE Ultimate Power (MLUP)

Power jumpers



Features

- Compatible with MLUP, MLEP, MLUH and MLUH
- Terminated with a rugged circular plastic plug connector and blunt cut on the RRH side
- 2 wire shielded copper cable with a cross section of 4 mm² to 10 mm² and AWG 10 to AWG 8
- Standard length 2, 5 and 10 m

Specifications

	Global market			UL listed US market		
Jacket material	LSFH™			PVC, flame retardant		
Conductor type	4 mm² IEC 60228 class 2, 6 mm²/10 mm² IEC 60228 class 5			THHN/THWN-2, class C		
Insulation colour	blue, brown			black, white		
Cable shielding	braided screen of copper wires, coverage 65 to 85 %					
Rated voltage	0.6/1.0 kV					
Number of conductor	2					
Conductor cross section	4 mm²	6 mm²	10 mm²	AWG 12	AWG 10	AWG 8
Resistance	4.61 Ω/km	3.30 Ω/km	1.91 Ω/km	1.65 Ω/kft	1.04 Ω/kft	0.64 Ω/kft
Maximum power current	34 A	42 A *	42 A *	25 A	33 A	44 * A
Cable diameter	10.7 mm	12.1 mm	13.3 mm	0.41" (10.3 mm)	0.47" (11.8 mm)	0.524" (13.3 mm)
Cross section shielding	4 mm²	5 mm²	6 mm²	AWG 12	AWG 12	AWG 10

* limitation through power connector maximum current rating 42 A (IEC)/44 A (UL)

Ordering information



Market	Length	Item no.		
Global		4 mm ²	6 mm ²	10 mm ²
	2 m	85006013	85006015	85109382
	5 m	84149463	84149464	85109384
	10 m	85006014	85006016	85109386
US UL listed		AWG 12	AWG 10	AWG 8
	2 m	85086893	85086894	85142464
	5 m	85086575	85086895	85142465
	10 m	85080185	85086896	85142466

MASTERLINE Extreme (MLE)



Multi-riser cable with compact divider

MASTERLINE Extreme with Q-ODC-2 connectors is an efficient solution in terms of ease of installation, cost and required space on the mast. The compact divider minimises the wind-load and can be fed through small holes (80 mm diameter). The ruggedised push-pull connector Q-ODC allows the installer to connect the RRH jumper cables with a single „click“, making it a genuine „plug & play“ cabling system. MLE with Q-ODC is available to support up to 12 remote radios.

MASTERLINE Extreme with one Q-ODC-12 connector allows the installer to connect 6 RRH jumper cables with a single „click“ and can even be installed through holes with a diameter of 20 mm. The Q-ODC-12 connector has the highest fiber density, based on the proven QN push-pull mating system and can connect 12 fibers in one mating step.

MASTERLINE Extreme is the preferred choice of network installers who require trouble free, reliable and efficient field deployments. MASTERLINE Extreme product family of HUBER+SUHNER is unique in the market and provides the best value for money.

MASTERLINE Extreme (MLE)

RF

LISCA RF jumper

page 162



FTTA

Q-ODC RRH jumper
Q-ODC-12 RRH jumper

page 30, 50



PTTA

Power jumpers (optional)

page 43



FTTA

MASTERLINE Extreme with Q-ODC
MASTERLINE Extreme with Q-ODC-12

page 46, 49



PTTA

MASTERLINE Extreme Power

page 54



XTTA

Cable clamps

page 134



FTTA

Overlength box

page 127



FTTA

CTB 19" patching box

page 130



FTTA

LC patchcord

page 133



XTTA

FTTA, PTTA and HTTA

PTTA

Power-To-The-Antenna

RF

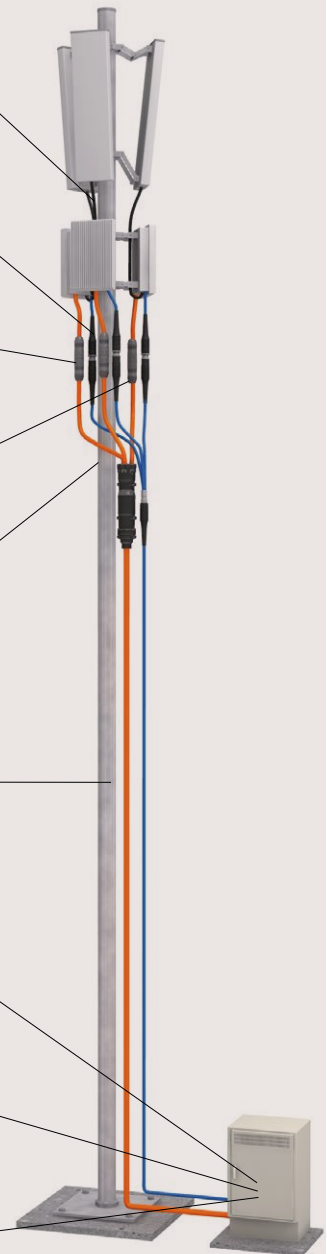
Radio Frequency

HTTA

Hybrid-To-The-Antenna

FTTA

Fiber-To-The-Antenna



MASTERLINE Extreme (MLE) with Q-ODC



Features

- Pre-assembled „plug & play“ cabling system
- Terminated with Q-ODC extension connectors on RRH side
- Adaptation to any RRH interface with Q-ODC plug jumpers
- BTS side terminated with LC uniboot connectors
- Ruggedised design with robust break-out cables
- Robust pulling tube for cable lifting
- Loose tube cables with 12 or 24 fibers, rodent protected and UV resistant and CPR compliant
- Connectors numbered for easy channel identification
- Easy and time-saving installation

Specifications

Number of fibers		12	24
Build-in hole dimension divider BTS side		15.6 to 16.4 mm	
Outer diameter divider	RRH side	22.0 mm	28.0 mm
Tensile load on individual break-out cables		600 N	
Ingress protection with Q-ODC connector		IP67	
Break-out lengths		0.55/0.64 m	0.55/0.64/0.73/0.82 m
Break-out cable diameter		5 mm	
Cable type		glass-armoured multifiber loose tube cable	
Jacket material		LSFH™, black	
Cable diameter		7.0 mm	
Temperature range	installation	-10 to +50 °C	
	in service	-40 to +75 °C	
Fire propagation		IEC 60332-1 and IEC 60332-3-25	
CPR compliant		class D _{ca} s1a, d0, a1	
Flame resistance	IEC 60332-1	passed	
	IEC 60332-3-24		
Pulling tube with pulling eye	outer diameter	60 mm	
Protection tube BTS side	outer diameter	36 mm	



LC uniboot at BTS side



Protecting tube at BTS side



Pulling tube with pulling eye

MASTERLINE Extreme (MLE) with Q-ODC

Q-ODC connectors



Q-ODC plug on the jumper

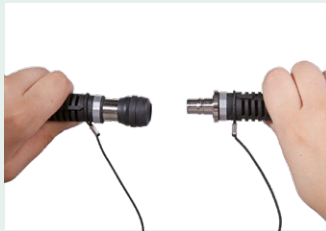
Features

- Robust push-pull coupling mechanism – two clearly defined mating states
- Highest outdoor installation safety
- Waterproof, dust proof and corrosion resistant; does not require secondary wrapping



Q-ODC extension on the MLE

Mating/unmating sequences



Push plug connector slightly into extension connector, rotate to find keying position, push connector to mate.



Mated – connector snaps in and is fully strain relieved.



Pull coupling ring to unmate.

Q-ODC RRH jumpers



Features

- Compatible with MLE, MLEH, MLU and MLUH terminated with Q-ODC
- Ruggedised and robust RRH jumper cable – easy and reliable to install
- Available for all types of RRH
- Cable diameter 4.8 mm, 5.5 mm or 7 mm
- Standard lengths of 2, 5 and 10 m, customised lengths available

For ordering information, please see page 30.

MASTERLINE Extreme (MLE) with Q-ODC

Ordering information

MASTERLINE Extreme with Q-ODC extensions and LC uniboot connectors.



Length	Item no. Fiber type: single-mode E9/125 A2 (G.657.A2)				Item no. Fiber type: multimode G50/125 OM3	
	Cable type: LSFH™, CPR D _{ca}		Cable type: LSFH™, UL listed		Cable type: LSFH™, CPR D _{ca}	
	12 fibers – 6 RRH	24 fiber – 12 RRH	12 fibers – 6 RRH	24 fibers – 12 RRH	12 fibers – 6 RRH	24 fibers – 12 RRH
20 m	85005467	85005609	85004452	85004479	85009293	85014283
30 m	85005468	85005610	85004453	85004481	85009294	85014284
40 m	85005469	85005611	85004454	85004482	85009295	85014285
50 m	85005470	85005612	85004455	85004483	85009064	85014286
60 m	85005471	85005613	85004456	85004484	85009296	85014287
70 m	85005472	85005614	85004457	85004485	85009297	85014288
80 m	85005473	85005615	85004458	85004486	85009299	85014289
90 m	85005474	85170077	85004459	85004487	85009300	85014300
100 m	85005475	85005617	85004460	85004488	85009301	85014301
125 m	85005478	85005620	85004461	85004489	85014280	85014302
150 m	85005479	85005621	85004462	85004490	85014281	85014303
200 m	85005480	85005622	85004463	85004491	85014282	85014304

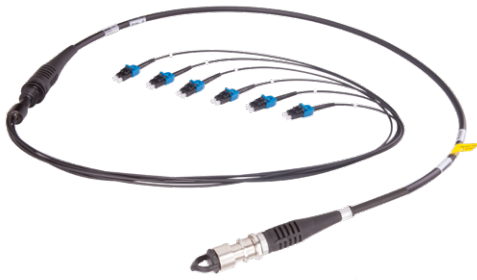
Options:

- Other length



Supplied on a double-flange reel

MASTERLINE Extreme (MLE) with Q-ODC-12

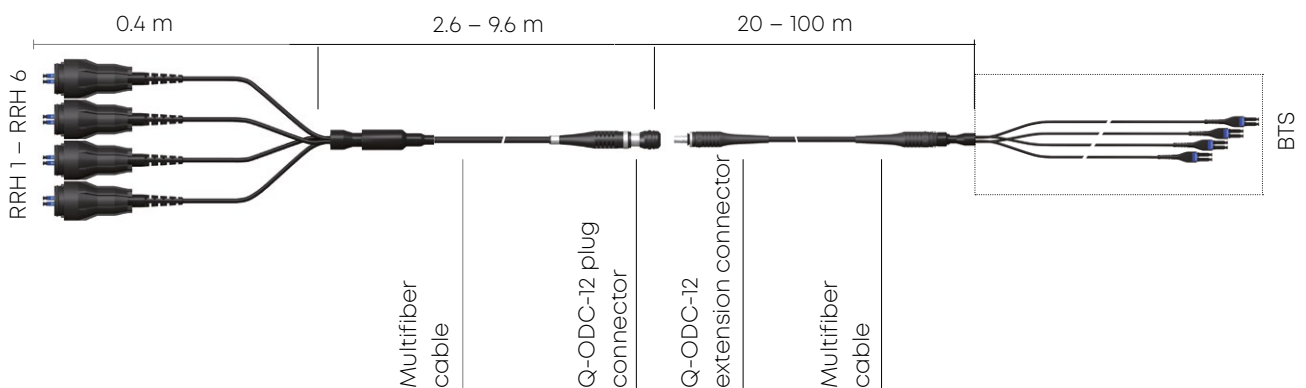


Features

- Pre-assembled „plug & play“ cabling system
- Terminated with Q-ODC-12 extension connectors on RRH side
- Adaptation to any RRH interface with Q-ODC-12 plug connector
- BTS side terminated with LC uniboot connectors
- Ruggedised design with robust break-out cables
- Robust connector cap with pulling eye
- Loose tube cables with 8/12 fibers, rodent protected and UV resistant and CPR compliant
- Connectors numbered for easy channel identification
- Easy and time-saving installation

Specifications

Number of fibers	8/12	
Build-in hole diameter BTS side	15.6 to 16.4 mm	
Outer diameter divider BTS side	22.0 mm	
Break-out cable diameter	5.0 mm	
Ingress protection with Q-ODC 12 (mated)	IP68	
Cable type	yellow-free glass-armoured multifiber loose tube cable	
Jacket material	LSFH™, black	
Cable diameter	7.0 mm	
Temperature range	installation	-10 to +50 °C
	in service	-40 to +75 °C
Fire propagation	IEC 60332-1 and IEC 60332-3-25	
CPR compliant	class D _{ca} s1a, d0, a1	
Flame resistance	IEC 60332-1	passed
	IEC 60332-3-24	
Pulling tube with pulling eye	outer diameter	20 mm
Protection tube BTS side	outer diameter	36 mm



LC uniboot at BTS side



Protecting tube at BTS side

MASTERLINE Extreme (MLE) with Q-ODC-12

Q-ODC-12 connector



Q-ODC-12 plug on the
multi-branch RRH jumper



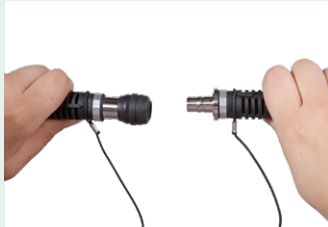
Q-ODC-12 extension with robust
connector cap pulling eye

Specifications on page 147.

Features

- Connects 12 fibers in one mating step
- Compact design with MT ferrules
- Robust push-pull coupling mechanism – two clearly defined mating states
- Highest outdoor installation safety
- Waterproof, dust proof and corrosion resistant

Mating/unmating sequences



Push plug connector slightly
into extension connector, rotate
to find keying position,
push connector to mate.



Mated – connector snaps in
and is fully strain relieved.



Pull coupling ring to unmate.

MASTERLINE Extreme (MLE) with Q-ODC-12

Ordering information

Glass-armoured 8/12 fiber loose tube cable with Q-ODC-12 extension and LC uniboot connectors



Length	Item no. : 8 fiber, single-mode E9/125 A2	Item no. 12 fiber, single-mode E9/125 A2	
	Cable type: LSFH™, CPR D _{ca}	Cable type: LSFH™, CPR D _{ca}	Cable type: LSFH™, UL listed
20 m	85085658	85032143	85032158
30 m	85085663	85032144	85032159
40 m	85085667	85032145	85032160
50 m	85085677	85032146	85032161
60 m	85085680	85032147	85032162
70 m	85085690	85032148	85032163
80 m	85085693	85032149	85032164
90 m	85085698	85032150	85032165
100 m	85085737	85032151	85032166
125 m	85085739	85032152	85032167
150 m	85085740	85032154	85032169
200 m	85085741	85032155	85032170

Option:

- Multimode OM3



Supplied on a double-flange reel

MASTERLINE Extreme (MLE) with Q-ODC-12

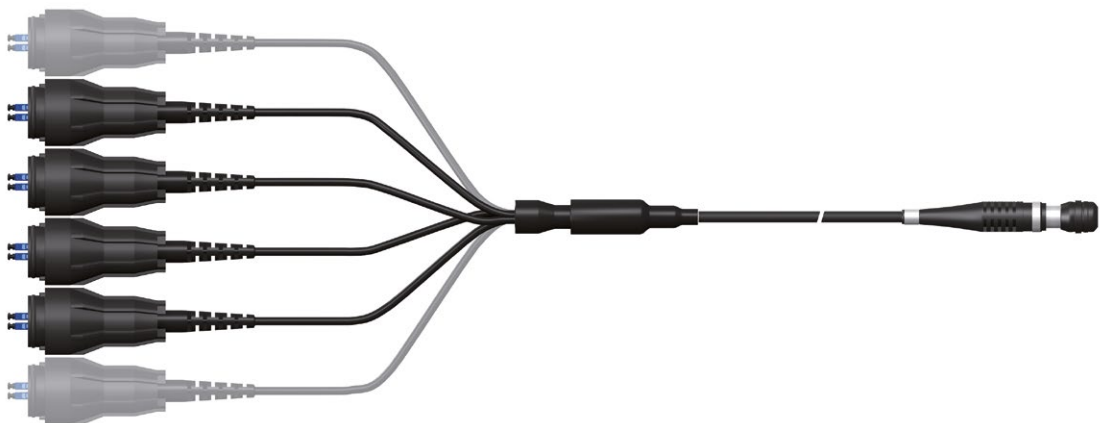
Q-ODC-12 multi-branch RRH jumper



- Features**
- Terminated with Q-ODC-12 plug and with 2 to 6 RRH-specific interfaces
 - Connects up to 6 RRH jumper cables with a single „click“
 - Ruggedised design with robust break-out cables
 - RRH-specific interface numbered for easy channel identification
 - Ingress protection IP68 (Q-ODC-12, mated)

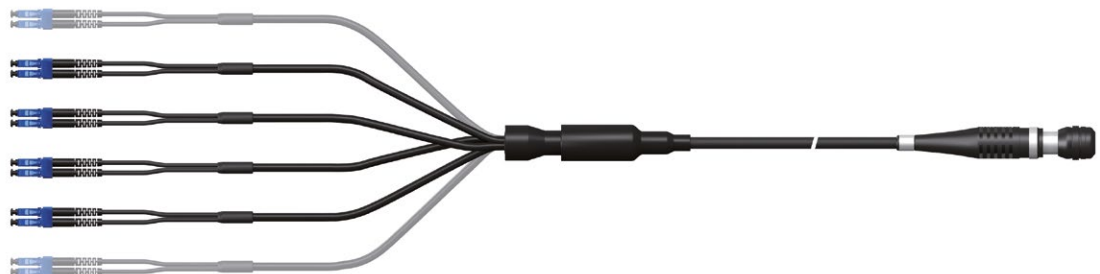
Ordering information

Q-ODC-12 multi-branch RRH jumper with 4/6 FullAXS connector and cable Ø 5.0 mm, single-mode fiber



No. of connectors	Total length	Branch break-out length	Item no.
6	3 m	2 m	85031204
4	3 m	0.4 m	85127434


Q-ODC-12 multi-branch RRH jumper with 4/6 LC duplex, moulded divider and ruggedised break-out 90 mm long and cable Ø 5.0 mm, single-mode fiber



No. of connectors	Total length	Branch break-out length	Item no.
6	3 m	2 m	85032210
4	3 m	0.4 m	85127435

MASTERLINE Extreme (MLE)

Accessories

Description		Item no.	Page	Picture
Overlength box for outdoor and indoor installation, stores up to 20 m cable excess length (depending on cable diameter)		84103325	127	
Combined clamps for fiber optic and power cable		depends on cable diameter	134	
19" CTB patching box	6, 12, 18 or 24 LC duplex adapter blue	depends on quantity of LC adapter	130	
LC patchcords	0.5 m, 0.7 m or 1 m length, single-mode	depends on length	133	
3 fold cable clamp suitable for ODC boot to fix the Q-ODC extension connectors		85012939	136	
6 fold cable clamp suitable for ODC boot to fix 6 Q-ODC extension connectors		85066072	134	
Clamp for MLE 12 fiber divider (22 mm)		85015525	136	
Clamp for MLE 24 fiber divider (28 mm)		85013128	136	
SFP/SFP+ transceivers for different protocols, data rates and power budgets.		See transceiver selection guide on page 260	259	

MASTERLINE Extreme Power (MLEP)



Multi-wire power cable with compact divider

MASTERLINE Extreme Power enables -48 Vdc power supply installation with only one power cable, instead of 6 individual power cables. The compact and robust factory sealed divider splits the DC power cable into 6 ruggedised break-out cables, which are linked to the RRHs – either directly or via extension jumpers in different lengths. With a hoisting grip, attached below the divider, the cable system is lifted up to the mast.

MASTERLINE Extreme Power (MLEP)

RF

LISCA RF jumper

page 162



FTTA

Q-ODC RRH jumper

Q-ODC-12 RRH jumper

page 30, 50



PTTA

Power jumpers (optional)

page 43



FTTA

MASTERLINE Extreme with Q-ODC

MASTERLINE Extreme with Q-ODC-12

page 46, 49



PTTA

MASTERLINE Extreme Power

page 54



XTTA

Cable clamps

page 134



FTTA

Overlength box

page 127



FTTA

CTB 19" patching box

page 130



FTTA

LC patchcord

page 133



XTTA

FTTA, PTTA and HTTA

PTTA

Power-To-The-Antenna

RF

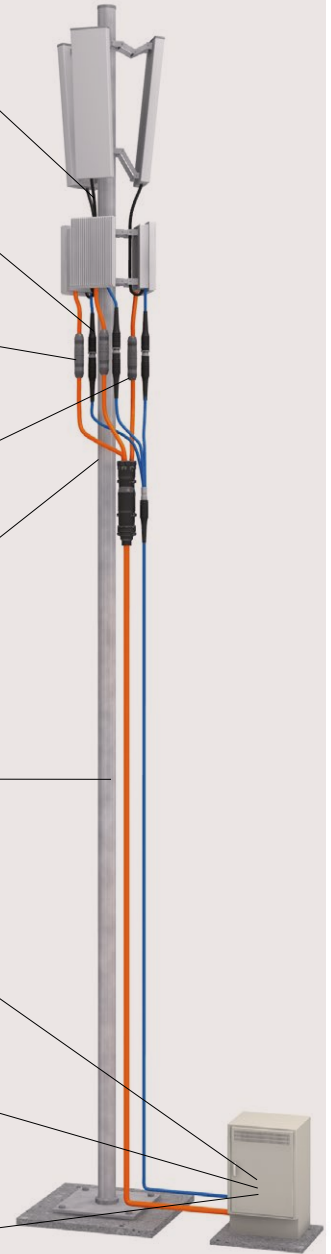
Radio Frequency

HTTA

Hybrid-To-The-Antenna

FTTA

Fiber-To-The-Antenna



MASTERLINE Extreme Power (MLEP)



Features

- Power cabling system for up to 6 RRHs
- Ruggedised powder coated aluminum with robust breakout cables
- Highly flexible 12-core power cable 6 mm² to 16 mm² and AWG 10 to AWG 6
- Break-out cable open-end or terminated with power connector
- Hoisting grip on the cable for cable lifting
- Supplied on double-flange reels for straight forward unspooling
- Integral earth point which can be connected to an earth lead with M8 ring terminal
- Optional connectorised power jumpers for higher installation flexibility

Enclosure specifications

Number of break-out power cable		6
Dimensions		length 253 mm Ø 76 mm
Housing material		Powder coated aluminum
Maximum current rating		up to 46 A per RRH (depending on the power cable)
Temperature range	operation	−40 to +75 °C
	installation	−10 to +50 °C
Ingress protection (IEC 60529)		IP68
Impact resistance (IEC 62262)		IK 10
Flammability		UL94-V0
UV resistance, ISO 4892-3 (methode A/cylce 1)		1000 h



Hoisting grip for hybrid cable lifting



Mounting bracket with snap-in mechanism for quick and easy fixation of the divider housing. The UV resistant clips can be closed by hand without any tool.

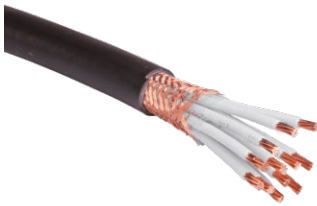
MASTERLINE Extreme Power (MLEP)

12-core power cable specifications

	LSFH™ power cable, global market			UL listed power cable, US market		
Jacket material	thermoplastic, LSFH™			PVC		
Rated voltage	0.6 kV/1 kV (1.2 kV)					
Conductor type	IEC 60228 class 5			class C THHN/THWN-2		
Cable shielding	braided screen of copper wires			copper foil		
CPR compliant	yes, class D _{ca}			no.		
Number of conductor	12					
Conductor cross section	6 mm ²	10 mm ²	16 mm ²	AWG 10	AWG 8	AWG 6
Resistance	3.30 Ω/km	1.91 Ω/km	1.21 Ω/km	3.41 Ω/km	2.13 Ω/km	1.30 Ω/km
Maximum current rating	25 A	34 A	46 A **	16 A	23 A	31 A
Outer diameter	23.7 mm	27.4 mm	32.2 mm	23.5mm (0.93")	29.5mm (1.16")	33.5mm (1.32")
Weight	1.06 kg/m	1.58 kg/m	2.20 kg/m	1.14 kg/m	1.64 kg/m	2.33 kg/m
Shielding/drain wire cross section	8 mm ²	10 mm ²	14 mm ²	AWG 6	AWG 6	AWG 6

* Limitation through 2-core 6 mm² break-out power cable

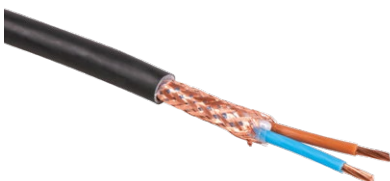
** 46 A with 10 mm² breakout power cable



12-core power cable

2-core break-out power cable specifications

	LSFH™ power cable, global market		UL listed power cable, US market	
Jacket material	LSFH™		PVC, flame retardant	
Conductor type	IEC 60228 class 5		class C THHN/THWN-2	
Screen	braided screen of copper wires, coverage 65 to 85 %			
Rated voltage	0.6 kV/1 kV		0.6 kV/1 kV	
Number of conductor	2			
Conductor cross section	6 mm ²	10 mm ²	AWG 10	AWG 8
Resistance	3.30 Ω/km	1.91 Ω/km	3.41 Ω/km	2.13 Ω/km
Maximum current rating	44 A	61 A	33 A	45 A
Cable diameter	12.1 mm	13.3 mm	0.45" (11.4 mm)	0.524" (13.3 mm)
Cross section braid	5 mm ²	6 mm ²	AWG 10	AWG 10



2-core power cable

MASTERLINE Extreme Power (MLEP)






Ordering information

MASTERLINE Extreme for 6 RRHs

Radio end side		BTS side		
6 break-out power cable, blunt cut, 6 mm ² /AWG 10, 4 m length		12-core power cable, blunt cut, 6 mm ² , 10 mm ² , 16 mm ² and AWG 10, AWG 8, AWG 6		

Market	Length	Item no.		
		6 mm²	10 mm²	16 mm²
global not UL listed CPR class Dca	30 m	85006954		
	40 m	85173462		
	50 m	85006956		
	60 m		85173468	
	70 m		85108703	85142121
	80 m		85173470	85142122
	90 m		85173471	85142123
		AWG 10	AWG 8	AWG 6
US UL listed	30 m	85006962		
	40 m	85006963		
	50 m	85006964		
	60 m		85006965	
	70 m		85006966	85142124
	80 m		85006967	85142125
	90 m		85006968	85142126

Accessories

Description		Item no.	Page	Picture
Option: <ul style="list-style-type: none"> Power breakouts with power connector Other length 10 mm² or AWG 8 power breakouts MLEP with 3 or 9 break-out power cable 				
Mounting bracket with snap-in mechanism for fixation of the divider housing. The UV resistant clips can be closed by hand without any tool.		85140742	140	
Clamps for hybrid cable		depends on cable diameter	136	
Grounding kits		85015070	138	
Grounding cable, 0.5 m, 16 mm ² and 25 mm ² , black and yellow/green		depends on cross section and colour	139	
Quick hose clamps Stainless steel One set includes 2 pieces hose clamps	clamping Ø 30 to 155 mm	84076411	140	
	clamping Ø 60 to 500 mm	84076412		



MASTERLINE Classic (MLC)



Multi-riser cable with distribution box

MASTERLINE Classic uses separate multifiber and multi-conductor copper riser cables that are connected to mast mounted FTTA/PTTA distribution boxes which are then linked to the RRHs with short jumper cables. Traditionally multi-riser cables with distribution boxes have been the preferred solution for multi-RRH installations, however with the increasing number of remote radios per site mast space limitations and wind loading have become critical issues to operators.

Moreover some operators can incur extra leasing costs for every box placed on the mast, thus distribution box based systems are gradually being superseded by box-less solutions like MASTERLINE Extreme (see page 44). In general, the installation method with boxes is cost effective and offers installation flexibility but it does require handling and connecting of indoor LC connectors at the mast-top distribution box. Many operators want to avoid the risk of opening and maintaining mast-top boxes by non-trained or non-authorized persons.

MASTERLINE Classic (MLC)

RF

LISCA RF jumper

page 162

FTTA

LC duplex RRH jumpers

page 66

PTTA

2-core power cable

page 68

FTTA

FTTA distribution box

page 62

PTTA

PTTA distribution box

page 69

FTTA

MASTERLINE Classic

page 60

PTTA

Multicore power cable

page 68

XTTA

Cable clamps

page 134

FTTA

CTB 19" patching box (optional)

page 130

FTTA

LC patchcord

page 133

XTTA

FTTA, PTTA and HTTA

RF

Radio Frequency

FTTA

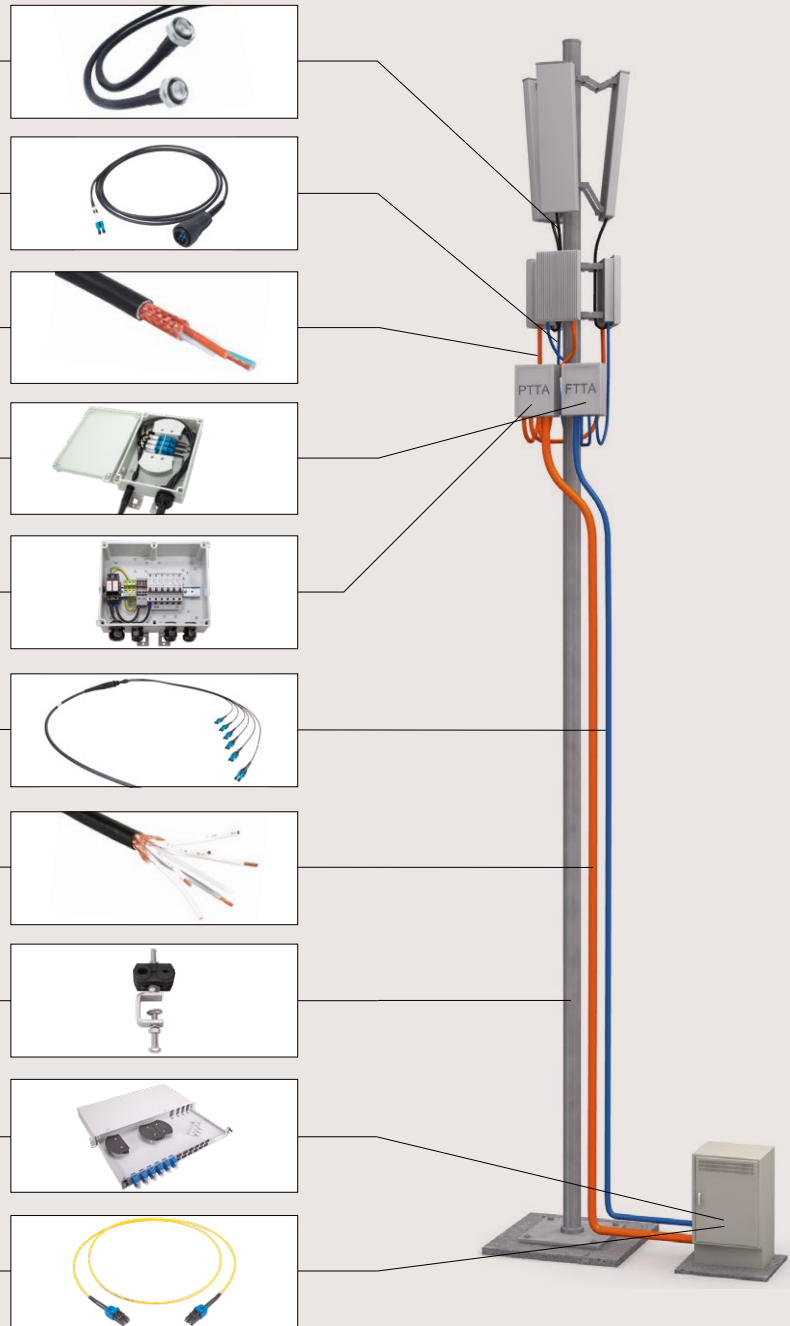
Fiber-To-The-Antenna

PTTA

Power-To-The-Antenna

HTTA

Hybrid-To-The-Antenna



MASTERLINE Classic (MLC)



Features





- Ruggedised outdoor fiber distribution box
- Supports up to 24 remote radio heads
- Fitted with bend radius limiting mandrels
- Suitable for mounting on poles, walls and tower legs with round-, L-, V- and □-shape.
- Easy to mount and install with pre-mounted brackets
- Compatible with MASTERLINE Classic
- Fully electrically isolated
- Protective vent equalises pressure and prevents water condensation

Specifications

Number of RRH		up to 6 RRH (12 fibers)	up to 12 RRH (24 fibers) up to 18 RRH (36 fibers)	up to 24 RRH (48 fibers)
Dimensions		255 × 180 × 65 mm	240 × 240 × 132 mm	250 × 320 × 138 mm
Cable entry		1 × MLC 12 fibers (Ø 16 mm)	2 × MLC 12 fibers (Ø 16 mm) 1 × MLC 24 fibers (Ø 26 mm)	2 × MLC 12 fibers (Ø 16 mm) 1 × MLC 48 fibers (Ø 26 mm)
Cable exit (pre-installed cable gland)		up to 6 jumper cable 1 x M32 cable gland with 6-fold seal for jumper cables with Ø 4.7 to 5.6 mm	up to 18 jumper cable 3 × M32 cable gland with 6-fold seal for jumper cable with Ø 4.7 to 5.6 mm	up to 24 jumper cable 4 × M32 cable gland with 6-fold seal for jumper cable with Ø 4.7 to 5.6 mm
Material		glass-filled polycarbonate, halogen-free, UV resistant		
Colour		grey RAL 7035		
Flammability rating		UL 94 V0		
Operating temperature	during inst.	-10 to +50 °C		
	in service	-40 to +75 °C		
Protective vent		typical airflow 2500 ml/min		
Ingress protection		IP66/67		
Impact resistance		IK 07 (EN 62262)		







MASTERLINE Classic (MLC)

FTTA distribution box – ordering information

Description	Item no. single-mode	Item no. multimode OM3	Picture
FTTA box small Compatible with MASTERLINE Classic 12 fibers Cable glands for up to 6 jumper 6 LC duplex adapter (blue/aqua)	85169840	85174583	
FTTA box medium Compatible with MASTERLINE Classic 12/24 fibers Cable glands for up to 12 jumper 12 LC duplex adapter (blue/aqua)	85174585	85174629	
FTTA box medium Compatible with MASTERLINE Classic 12/24/36 fibers Cable glands for up to 18 jumper 18 LC duplex adapter (blue/aqua)	85174630	85002620	
FTTA box large Compatible with MASTERLINE Classic 12/24/36/48 fibers Cable glands for up to 24 jumper 24 LC duplex adapter (blue/aqua)	85028863	85174631	

All boxes are pre-assembled with fiber management components, cable glands and quick-hose clamps.

Accessories – ordering information

Description		Item no.	Page	Picture
For outdoor and indoor installation, stores up to 20 m cable excess, length (depending on cable diameter)		84103325	127	
Combined clamps for fiber optic and power cable		depends on cable diameter	134	
19" CTB patching box	6, 12, 18 or 24 LC duplex adapter	depends on quantity of LC adapter	130	
LC patchcords	0.5 m, 0.7 m or 1 m length, single-mode	depends on length	133	
Quick hose clamps Stainless steel One set includes 2 pieces hose clamps	clamping Ø 30 to 155 mm	84076411	140	
	clamping Ø 60 to 500 mm	84076412		
SFP/SFP+ transceivers for different protocols, data rates and power budgets.		see transceiver selection guide on page 260	259	

MASTERLINE Classic (MLC)



Features

- Pre-assembled „plug & play“ cabling system
- Ruggedised design with robust pulling tube
- Outdoor and indoor with high flame resistance
- Temperature range –40 up to +75 °C
- Ingress protection IP67 when installed
- Loose tube cables with up to 48 fibers, rodent protected and UV resistant and CPR compliant
- Both sides terminated with LC uniboot connectors
- Breakouts numbered for easy channel identification
- Easy and time-saving installation
- Each system factory tested

Specifications

		MLC 12 fiber	MLC 24 fiber	MLC 36 fiber	MLC 48 fiber
Number of fibers		12	24	36	48
Number of LC-HQ duplex uniboot connectors each side		6	12	18	24
Build-in hole dimension	FTTA box side	15.6 to 16.4 mm	25.5 to 26.5 mm	25.5 to 26.5 mm	25.5 to 26.5 mm
	BTS side	15.6 to 16.4 mm	15.6 to 16.4 mm	25.5 to 26.5 mm	25.5 to 26.5 mm
Cable type		Glass-armoured multifiber loose tube cable			
Jacket material		LSFH™, black			
Cable diameter		7.0 mm		9.6 mm	
Minimum bending radius	during installation	110 mm		140 mm	
	in service	70 mm		100 mm	
Temperature range	during installation	−10 to +50 °C			
	in service	−40 to 75 °C			
Ingress protection		IP67, when installed with FTTA box			
Halogen-free		IEC 60754-1			
Fire propagation		IEC 60332-1 and IEC 60332-3-25			
CPR compliant		class D _{co} s1a, d0, a1			
Pulling tube with pulling eye	outer diameter	36 mm			50 mm
Protection tube BTS side	outer diameter	36 mm			50 mm



Protecting tube at BTS side



Pulling tube with pulling eye at RRH side

MASTERLINE Classic (MLC)

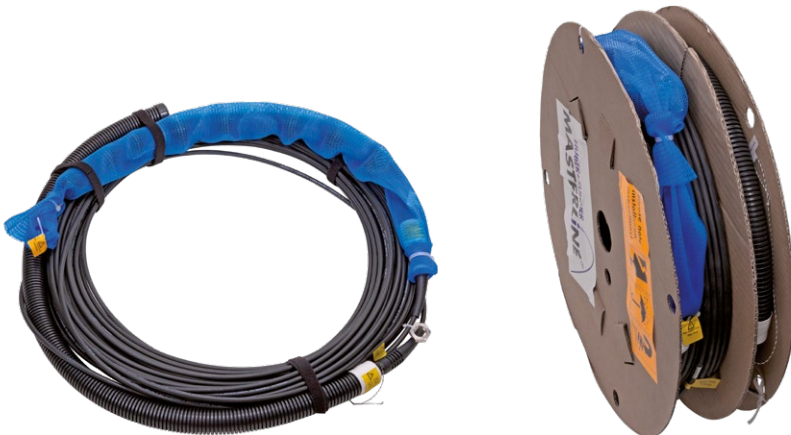
Ordering information



Length	Item no. :					
	12 fibers/6 RRH		24 fibers/12 RRH		36 fibers/18 RRH	48 fibers/24 RRH
	single-mode E9/125 A2	multimode G50/125 OM3	single-mode E9/125 A2	multimode G50/125 OM3	single-mode E9/125 A2	single-mode E9/125 A2
20 m	85012382	85164945	85012383	85142756	85066843	85074331
30 m	85012502	85164946	85012589	85142757	85066962	85074332
40 m	85012503	85164947	85012590	85142758	85066964	85074333
50 m	85012504	85164948	85012592	85142759	85066966	85074334
60 m	85012505	85164949	85012593	85142768	85066979	85074335
70 m	85012506	85164950	85012594	85142769	85066986	85074336
80 m	85012543	85164951	85012595	85142780	85066987	85074337
90 m	85012544	85164952	85012596	85087968	85066988	85074338
100 m	85012545	85164953	85012597	85142781	85066989	85074339
125 m	85012546	85004887	85012598	85142782	85068299	85074340

Option:

- Other length
- Multimode OM4
- UL listed (OFNR)



Up to 80 m supplied as air ring and for longer cable systems on a double-flange reel

MASTERLINE Classic (MLC)



Features

- Jumper available for all types of remote radios
- Cable diameter 4.8 mm, 5.5 mm or 7 mm
- Standard lengths of 2 m and 5 m, any customised length available

Ordering information

LC duplex to ODC plug, jumper cable Ø 5.5 mm



Length	Item no. single-mode E9/125 A1 (G.657.A1)
2 m	84122152
5 m	84078725

LC duplex to LC duplex with moulded divider and ruggedised break-out 98 mm long, cable Ø 4.8 mm cable



Length	Item no. single-mode E9/125 A2 (G.657.A2)
2 m	85031793
5 m	85031794

LC duplex to LC duplex jumper, with metal divider and ruggedised break-out 90 mm long, cable Ø 4.8 mm



Length	Item no. single-mode E9/125 A2 (G.657.A2)
2 m	84142320
5 m	84142321

MASTERLINE Classic (MLC)

LC duplex to FullAXS jumper, cable Ø 4.8 mm



Length	Item no. single-mode E9/125 A2 (G.657.A2)
2 m	84137910
5 m	84137911

LC duplex to LC duplex jumper with ruggedised break-out 90 mm long, cable Ø 4.8 mm (Ø 7.0 mm at the RRH pre-chamber entry position), single-mode bend insensitive fiber



Length	Item no. single-mode E9/125 A2 (G.657.A2)
2 m	85015008
3 m	85015009

LC duplex to PDLC, jumper cable Ø 7 mm



Length	Item no. single-mode E9/125 A2 (G.657.A2)
2 m	84150634
5 m	84150635

LC duplex RRH jumper for other OEM interfaces

Please contact HUBER+SUHNER for LC duplex RRH jumper for other OEM interfaces which are not listed above.

Options:

- Other length
- Multimode OM4

Multicore power supply cable

6, 12 and 24 core power supply cable



Features

- Highly flexible power cable with low bending radius
- White and red insulation according IEC 60445:2021
- 6, 12 and 24 core power supply cables with cross section up to 25 mm²
- Aluminum foil shielding and earth conductor for grounding
- CPR compliant class B2_{ca}
- LSFH jacket material

Specifications

Jacket material	Thermoplastic LSFH (low smoke free of halogen)
Insulation material	XLPE
Insulation color	Red and white, IEC 60445:2021
Screen	Aluminum foil with earth conductor copper tinned 6 mm ²
UV-resistant	passed according to EN ISO 4892-2
CPR classification	class B2 _{ca} -s1a,d1,a1
Standard	IEC 60502-1
Rated voltage	0.6 / 1.0 kV
Operating temperature range	-40 °C to +90 °C
Installation temperature range	-10 °C to +50 °C
Conductor type IEC 60228	annealed copper class 5

	6 core cable				12 core cable			24 core cable		
Cross section	6 mm ²	10 mm ²	16 mm ²	25 mm ²	6 mm ²	10 mm ²	16 mm ²	6 mm ²	10 mm ²	16 mm ²
Resistance	3.30 Ω/km	1.91 Ω/km	1.21 Ω/km	0.78 Ω/km	3.30 Ω/km	1.91 Ω/km	1.21 Ω/km	3.30 Ω/km	1.91 Ω/km	1.21 Ω/km
Current rating*	31.3 A	42.7 A	57.2 A	74.1 A	26.0 A	35.0 A	46.5 A	20.1 A	27.5 A	36.7 A
Cable diameter	16.7 mm	19.7 mm	22.7 mm	28.1 mm	21.7 mm	25.9 mm	30.3 mm	29.9 mm	36.3 mm	42.7 mm
Weight	0.52 kg/m	0.79 kg/m	1.13 kg/m	1.71 kg/m	0.89 kg/m	1.39 kg/m	2.02 kg/m	1.66 kg/m	2.62 kg/m	3.92 kg/m

Ordering information

Item no.	Cross section	Length per reel	Item no.	Cross section	Length per reel	Item no.	Cross section	Length per reel
85202643	6 x 6 mm ²	1000 m	85202638	12 x 6 mm ²	1000 m	85202582	24 x 6 mm ²	500 m
85202642	6 x 10 mm ²	1000 m	85202627	12 x 10 mm ²	1000 m	85202581	24 x 10 mm ²	250 m
85202646	6 x 16 mm ²	1000 m	85202622	12 x 16 mm ²	1000 m	85202645	24 x 16 mm ²	250 m
85202644	6 x 25 mm ²	500 m						

Multicore power cables are delivered on wooden reel with flange diameter 140 cm or 160 cm

2 core power jumper cable

2 core power cable with aluminium foil shielding, red and white insulation and CPR class B2_{ca}



Features

- Suitable for HUBER+SUHNER's PTTA boxes
- Highly flexible power cable with low bending radius and excellent cable routing properties
- Red and white XLPE insulation compliant to IEC60445:2021
- Aluminum foil shielding with tinned copper drain conductor
- CPR compliant class B2_{ca}
- Voltage rating 600 V

Specifications

Jacket material	LSFH
Insulation material	XLPE
Insulation color IEC 60445:2021	red, white
Screen	Aluminum/PET foil with tinned copper drain conductor
Drain wire type IEC 60228	Annealed tinned copper class 5
UV-resistant	According to IEC 60068-2-5
CPR classification	B2ca-s1,d1,a1
Standard	IEC 60502 / IEC 60092
Rated voltage	0.6/1.0 kV
Temperature range	-40 to 85 °C
Conductor type IEC 60228	Annealed copper class 5

Conductor cross section	6 mm ²	10 mm ²	16 mm ²	25 mm ²
Conductor resistance	3.30 Ω/km	1.91 Ω/km	1.21 Ω/km	0.78 Ω/km
Maximum current rating at 60 °C ambient temperature	45 A	61 A	82 A	105 A
Drain wire cross section	4 mm ²	6 mm ²	6 mm ²	6 mm ²
Cable diameter	11.6 mm	13.7 mm	15.8 mm	19.7 mm
Weight	0.22 kg/m	0.34 kg/m	0.46 kg/m	0.77 kg/m

Ordering information

Item no.	Cross section	Length per reel	Reel flange size
85173020	6 mm ²	1000 m	100 cm
85173021	10 mm ²	1000 m	110 cm
85173926	16 mm ²	1000 m	120 cm
85173058	25 mm ²	1000 m	140 cm

PTTA distribution box

PTTA distribution box 6 RRH



Features

- Ruggedised outdoor power distribution box
- Supports up to 6 remote radio heads
- Maximum current rating 40 A
- Push-in terminals with front connection to enable wiring in a confined space
- Suitable for mounting on poles, walls and tower legs with round, L, V and □-shape

The Power-to-the-Antenna distribution box 6 RRH is fitted with the latest connection technology – push in terminals – for conductors up to 16 mm² cross section. The push in terminals have front access to allow easy and fast connection. By using cable glands with 6-fold seals, the PTSA box has very small dimensions. The 6-fold seal is tailored to HUBER+SUHNER 2-core power jumper with 6 mm², 10 mm² and 16 mm² conductors. With a maximum current of 40 A, the PTSA Box can be used for RRHs with high power consumption.

The opened lid is secured with a wire against falling down. The box is optional available with a hinged cover.

Specifications

Number of RRH	up to 6
Dimension	278 x 188 x 130 mm
Power entry	Cable gland M50 with wrench size 60 mm, 2 seals for Ø 21.0 – 25.5 / Ø 25.5 – 36.0 mm 1 cable 12 core shielded up to 16 mm ²
Power exit	Cable gland M63 with wrench size 73 mm, 3 seals for Ø 11.8 / 13.7 / 15.5 mm
Grounding cable	Ø 6.0 – 12 mm
Maximum voltage rating	- 74 Vdc
Maximum current rating per RRH	40 A (with 16 mm ² 12 core power cable)
Terminals	Push-in type up to 16 mm ²
Temperature range during installation	-10 to +40 °C
Temperature range during service	-40 to +75 °C
Box material	Polycarbonat, light grey (RAL 7035), halogen free
UV resistance	according UL 508
Ingress protection	IP 65 EN 60529
Impact resistance	IK 08 EN 62262

Ordering information

Description	Item no.
PTSA distribution box 6 RRH for an installation with a 12 core power cable up to 16 mm ² and 6 power jumper cable 6 to 16 mm ² , push-in terminals, quick hose clamps for pole diameter 30 to 155 mm are included	85145915

Customized PTSA (Power-To-The-Antenna) boxes

In addition to pure power distribution from multi-core copper cables to 2-core power jumper cables, HUBER+SUHNER offers customised configurations with circuit breakers and surge protection devices. The DC circuit breakers with hydraulic-magnetic technology have a rating capability that is independent of the ambient temperature, which is a great advantage when used on outdoor installations. The circuit breakers are available with 20A, 25A, 32A or 40A current rating. Surge protection device type 1/2 (class I/II) for grounded return installation are used for lightning protection or optional a lightning current arrester, in accordance with type 1 (class I) with impulse discharge current (10/350) µs 25 kA / 100 kA.



PTTA distribution box

PTTA distribution box 12 RRH



Features

- Ruggedised outdoor power distribution box
- Supports up to 12 remote radio heads
- Maximum current rating 36 A
- Push-in terminals with front connection to enable wiring in a confined space
- Suitable for mounting on poles, walls and tower legs with round, L, V and □-shape

Specifications

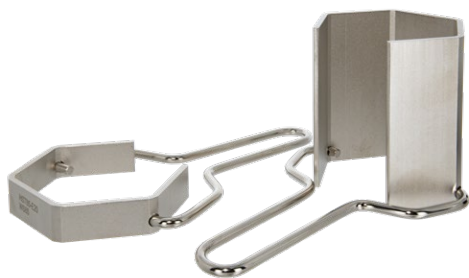
Number of RRH	up to 12
Dimension	378 x 188 x 130 mm
Power entry	Cable gland M63 with wrench size 73 mm, 3 seals for Ø 28.0 – 35.0 / 35.0 – 41.0 / 41.0 – 47.0 mm 1 cable 24 core shielded up to 16 mm ²
Power exit	2 cable glands M63 with wrench size 73 mm, 3 seals for Ø 11.8 / 13.7 / 15.5 mm up to 12 cables 2-core shielded up to 10 mm ²
Grounding cable	Ø 6.0 – 12 mm
Maximum voltage rating	- 74 Vdc
Maximum current rating per RRH	36 A (with 16 mm ² 24 core power cable)
Terminals	Push-in type up to 16 mm ²
Temperature range during installation	-10 to +40 °C
Temperature range during service	-40 to +75 °C
Box material	Polycarbonat, light grey (RAL 7035), halogen free
UV resistance	according UL 508
Ingress protection	IP 65 EN 60529
Impact resistance	IK 08 EN 62262

Ordering information

Description	Item no.
PTTA distribution box 12 RRH for an installation with a 24 core power cable up to 16 mm ² and 6 power jumper cable 6 to 16 mm ² , push-in terminals, quick hose clamps for pole diameter 30 to 155 mm are included	85145922

PTTA distribution box

Cable gland tools



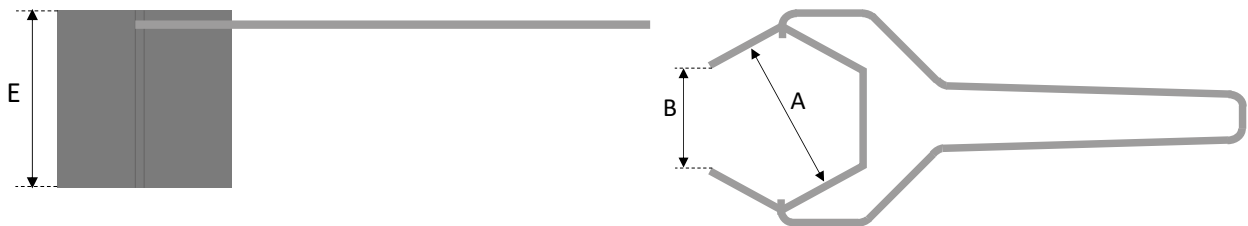
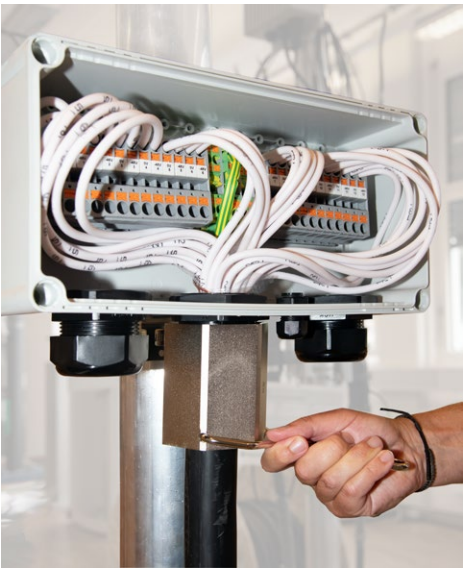
Features

- hexagonal steel tube with a handle
- suitable for large cable glands with wrench size 60 to 85mm

To tighten the cable glands use the hexagonal tube with a handle. You will then torque to completion using the torque spanner to finish up the job for the best results. For the correct torque value please refer to the installation manual.

Specifications

Material wrench	Cr12 alloy tool steel
Material hand shank	Stainless steel



Ordering information

Item number	Wrench size	Dimensions A / B / E	
85162588	60 mm	60.5 / 37.4 / 100 mm	
85162589	68 mm	68.5 / 41.8 / 100 mm	
85162590	73 mm	73.5 / 44.0 / 100 mm	
85162591	80 mm	80.5 / 49.0 / 100 mm	
85162725	60 mm	60.5 / 37.4 / 20 mm	
85162669	75 mm	75.5 / 46.0 / 20 mm	
85162669	85 mm	85.5 / 51.0 / 20 mm	



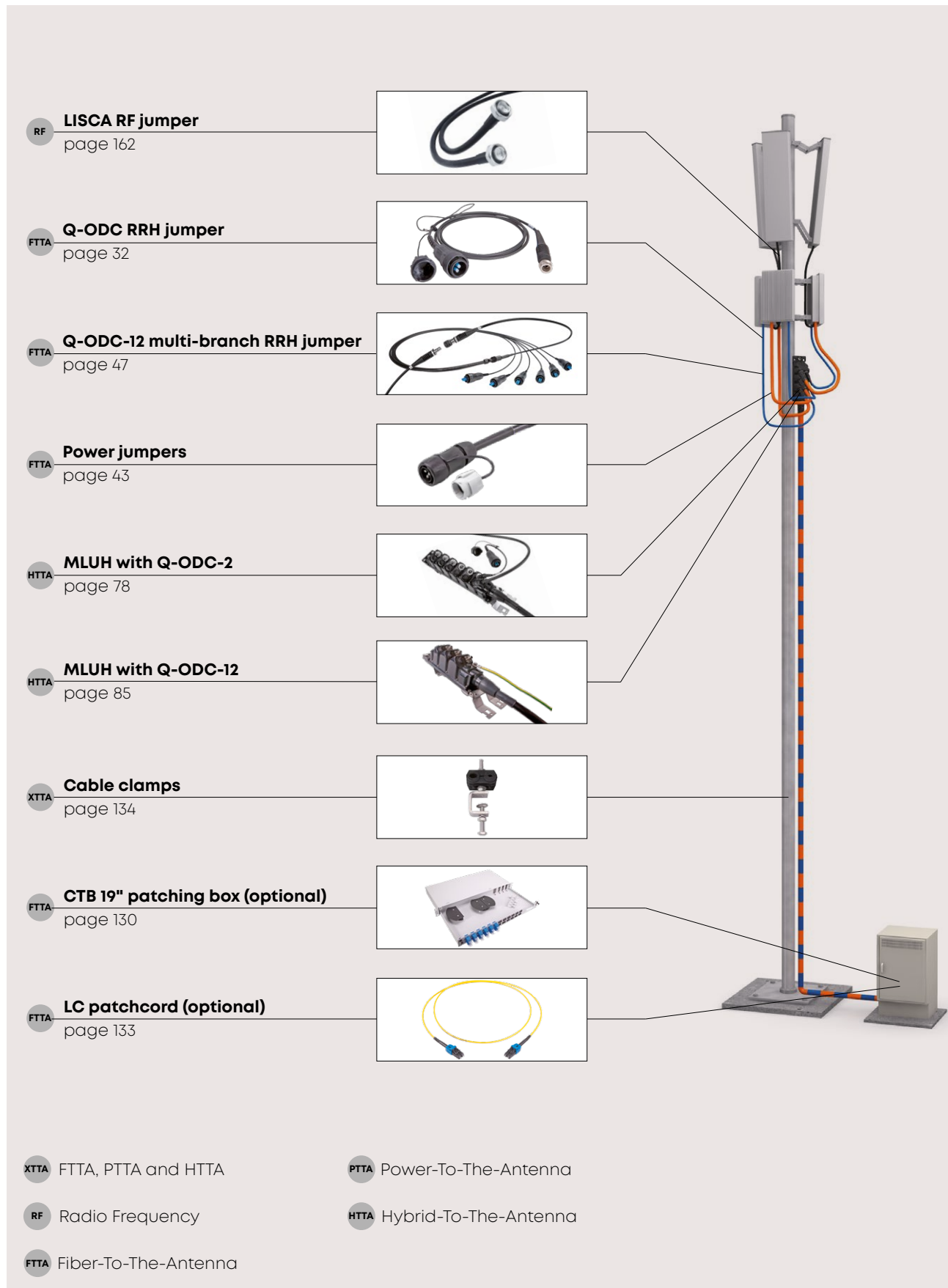
MASTERLINE Ultimate Hybrid (MLUH)



Hybrid-riser cable with compact connector head

The most innovative hybrid cabling system from HUBER+SUHNER for remote radio installation: MASTERLINE Ultimate Hybrid. The pre-connectorised factory-sealed hybrid systems supports up to 6 RRHs and connects the remote radios with easy-to-install Q-ODC fiber optic and power jumpers. A pre-laced hosting grip below the robust connector head allow for easy cable lifting. The encapsulated connector head can be directly attached to the mast at a pre-mounted bracket. These unique features make MASTERLINE Ultimate Hybrid the best-in-class product in terms of ease of mast-top installation, installation robustness and efficiency.

MASTERLINE Ultimate Hybrid (MLUH)



MASTERLINE Ultimate Hybrid (MLUH)



- Features**
- Pre-connectorised factory-sealed hybrid cable system for 3 and 6 RRHs
 - Modular „plug & play“ system compatible with Q-ODC/Q-ODC-12 and power jumpers
 - Highly flexible 6-/12-core hybrid cable up to 16 mm²/AWG 6
 - Encapsulated IP67 sealed connector head housing
 - Hoisting grip for cable lifting
 - Space-efficient, low wind-load
 - Mounting bracket for easy mast-, pole-, and wall-installation
 - Integral earth point which can be connected to an earth lead with M8 ring terminal
 - Optional protection cover for cable exits available

Specifications

	Small	Large
Number of rugged circular power sockets	3	6
Number of Q-ODC-2 sockets	3 (2 fibers per socket)	6 (2 fibers per socket)
Dimensions L × W × H	310 × 90 × 97 mm	477 × 90 × 97 mm
Housing material	high-performance polycarbonate	
UV resistance, ISO 4892-3 (methode A/cycle 1)	1000 h	
Maximum current rating	up to 42A per power socket (depending on the hybrid cable)	
Ambient temperature range	in service	−40 to +75 °C
	installation	−10 to +50 °C
Ingress protection (IEC 60529)	IP67	
Impact resistance (IEC 62262)	IK 10	
Material flammability rating	UL94-V0	



MASTERLINE Classic at BTS side



Supplied on a double-flange reel



Integral earth connection

MASTERLINE Ultimate Hybrid (MLUH)

Hybrid cable general specifications

	LSFH™ hybrid cable, global market	UL listed hybrid cable, US market
Jacket material	thermoplastic, LSFH™	PVC
Standard	IEC 60502-1:2004-04	UL 1277, TC-OF-ER
Rated voltage	0.6 kV/1 kV (1.2 kV)	
Min. bending	during installation	10 × cable Ø
	in service	8 × cable Ø
Cable shielding	copper foil 100 % coverage (contacted with drain wire)	
Conductor type	IEC 60228 class 5	class C THHN/THWN-2
Halogen-free	yes	no
Flame retardant	IEC 60332-1-2:2004	UL 1685 (UL 1581) vertical tray flame test
CPR compliant	yes, class Dca	no

Hybrid cable specification MLUH 3/3

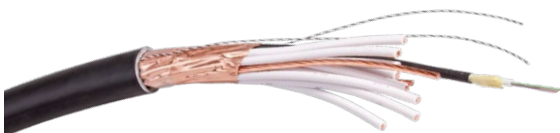
	LSFH™ hybrid cable, global market			UL listed hybrid cable, US market		
Conductor cross section	6 mm ²	10 mm ²	16 mm ²	AWG 10	AWG 8	AWG 6
Resistance	3.08 Ω/km	1.83 Ω/km	1.21 Ω/km	3.41 Ω/km	2.13 Ω/km	1.30 Ω/km
Maximum current rating	31 A	42 A *	42 A *	26 A	36 A	44 A *
Outer diameter	22 mm	22 mm	27.5 mm	19.6 mm (0.77")	23.4 mm (0.92")	23.9 mm (0.945")
Weight	0.73 kg/m	0.96 kg/m	1.36 kg/m	0.69 kg/m	1.05 kg/m	1.4 kg/m
Drain wire cross section	6 mm ²	10 mm ²	10 mm ²	AWG 6	AWG 6	AWG 6
Fiber optic	5 mm loose tube cable with 6 fibers single-mode E9/125 A2 or multimode OM3					

Hybrid cable specification MLUH 6/6

	LSFH™ hybrid cable, global market			UL listed hybrid cable, US market		
Conductor cross section	6 mm ²	10 mm ²	16 mm ²	AWG 10	AWG 8	AWG 6
Resistance	3.08 Ω/km	1.83 Ω/km	1.21 Ω/km	3.41 Ω/km	2.13 Ω/km	1.30 Ω/km
Maximum current rating	26 A	35 A	42 A *	16 A	23 A	31 A
Outer diameter	27.5 mm	28 mm	36 mm	25.4 mm (1.00")	30.0 mm (1.18")	33.0 mm (1.28")
Weight	1.17 kg/m	1.72 kg/m	2.46 kg/m	1.25 kg/m	1.64 kg/m	2.28 kg/m
Drain wire cross section	6 mm ²	10 mm ²	10 mm ²	AWG 6	AWG 6	AWG 6
Fiber optic	5 mm loose tube cable with 6 fibers single-mode E9/125 A2 or multimode OM3					

* limitation through power connector maximum current rating 42 A (IEC) and 44 A (UL)

Hybrid cable with 6 pairs power wire and 6 pairs of fiber optic



Hybrid cables of HUBER+SÜHNER combine optical fiber and DC power, are highly flexible and easy-to-route. Two rip cords between the shielding and the jacket allows a quick stripping of the jacket. The shielding, a copper foil under the jacket and the drain wire maintain contact throughout the cable run and allow potential equalisation and a safe installation with regard to lightning strikes.

MASTERLINE Ultimate Hybrid (MLUH)

Power connectors



Power connector plug at the jumper



Power connector flange socket at the MLUH connector head

Features

- Rugged circular plastic plug connector for remote radio installations
- Machined crimp contacts Ø 3.6 mm for high current
- Bayonet coupling system for easy and quick mating
- 2 wire shielded copper cable with cross section of 4 or 6 mm²

The bayonet coupling system enables a simple and fast mating. With only a 1/3 twist of the coupling ring, connectors are mated with an audible and tactile „click“. The machined 3.6 mm crimp contacts ensure a vibration safe termination and a high current rating. Specifications see page 41 (MLUP).

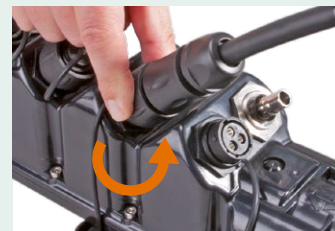
Mating/un-mating sequences



Twist the coupling ring of the plug connector to remove protecting cap as shown.



Push plug connector slightly into flange connector, rotate to find keying position, twist coupling ring of the plug connector as shown.



Twist coupling ring as shown to un-mate the plug connector.

Q-ODC connectors



Q-ODC plug on the jumper



Q-ODC socket on MLUH head

Features

- Robust push-pull coupling mechanism – two clearly defined mating states
- Highest outdoor installation safety
- Waterproof, dust proof and corrosion resistant; does not require secondary wrapping

Mating/un-mating sequences



Push plug connector slightly into socket connector, rotate to find keying position, push connector to mate.



Mated - connector snaps in and is fully strain relieved.


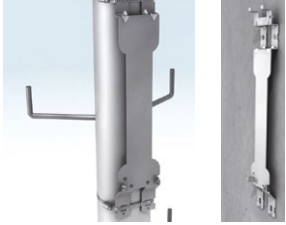
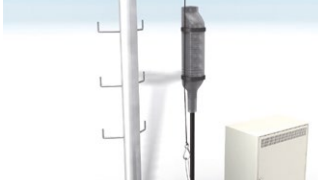


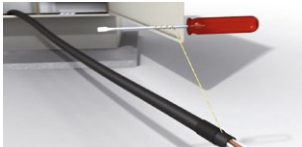


Pull coupling ring to un-mate.

MLUH installation

Easiest-to-install hybrid product available on the market.

Installation features

	<p>Installation video and manual</p> <p>With a smartphone the QR code attached to the spool can be scanned and it takes you directly to the relevant internet site where the installation manual or installation video can be chosen.</p>
	<p>MLUH mounting bracket</p> <p>The MLUH mounting bracket is fixed to the mast or wall before the MLUH is lifted.</p>
	<p>Unspooling</p> <p>The MLUH is supplied on a double-flange reel which allows for easy and straight-forward unspooling while lifting the cable up the mast.</p>
	<p>Pulling</p> <p>With a pre-laced hosting grip below the MLUH connector head, the cable system is lifted up to the mast.</p>
	<p>Hook-in MLUH head at mounting bracket</p> <p>After the protection air bubble bag is removed, the MLUH connector head can be hooked-in to the mounting bracket.</p>
	<p>RRH connection</p> <p>The remote radios are connected with fiber optic jumpers, which are terminated with Q-ODC/ Q-ODC-12 plug connectors and RRH compatible interfaces. The power jumpers are terminated with a rugged circular plastic plug connector and are blunt cut on the RRH side.</p>
	<p>Earthing</p> <p>The MLUH head has an integral earth point which can be connected to an earth lead with M8 ring terminal. Optional, the shielding of the hybrid cable can be grounded with standard grounding kits.</p>
	<p>Base station connection</p> <p>The pre-terminated LC fiber optic connectors are protected with a IP65 protection tube. Once the protection tube is screwed-off, the installer has access to the fiber optic breakout cables and the individual copper/ground wires.</p>
	<p>Overlength management</p> <p>The hybrid cable has 2 rip cords below the jacket to allow easy stripping of the jacket over a distance of several meters. This allows the installer to cut the excess length of the copper wire while the overlength of the pre-terminated fiber cable is stored inside the base station or in an overlength box.</p>

MASTERLINE Ultimate Hybrid (MLUH) with Q-ODC-2

Ordering information

MASTERLINE Ultimate Hybrid for 3 RRHs – MLUH 3/3



	Radio end side	BTS side
Fiber optic	3 Q-ODC sockets	3 LC uniboot
Power	3 rugged circular plastic sockets	3 pairs of wire blunt cut wire, cross section 6 mm², 10 mm², 16 mm², AWG 10, AWG 8, AWG 6

Hybrid cable	Market	Length	Item no.		
			6 mm²	10 mm²	16 mm²
3 pairs conductor 3 pairs fiber optic single-mode A9/125 A2	global CPR compliant	10 m	85098348		
		20 m	85098349		
		30 m	85098350		
		40 m	85098351		
		50 m	85098352	85136269	85107819
		60 m		85098353	85107815
		70 m		85098354	85107812
		80 m		85098355	85107810
		90 m		85098356	85107807
		100 m		85098357	85107805
	US UL listed		AWG 10	AWG 8	AWG 6
		10 m	85098360		
		20 m	85098361		
		30 m	85098362		
		40 m	85098363		
		50 m	85098364		
		60 m		85098365	
		70 m		85098366	
		80 m		85098367	
		90 m		85098368	85136271
		100 m		85098369	85136272

Option:

- Multimode OM3
- Other length

MASTERLINE Ultimate Hybrid (MLUH) with Q-ODC-2

Ordering information

MASTERLINE Ultimate Hybrid for 6 RRHs – MLUH 6/6



	Radio end side	BTS side
Fiber optic	6 Q-ODC sockets	6 LC uniboot
Power	6 rugged circular plastic sockets	6 pairs of wire blunt cut wire, cross section 6 mm², 10 mm², 16 mm², AWG 10, AWG 8, AWG 6

Hybrid cable	Market	Length	Item no.		
			6 mm²	10 mm²	16 mm²
6 pairs conductor 6 pairs fiber optic single-mode A9/125 A2	global CPR compliant	10 m	85098374		
		20 m	85098375		
		30 m	85098376		
		40 m	85098377		
		50 m	85098378		
		60 m		85098379	
		70 m		85098380	
		80 m		85098381	85127886
		90 m		85098382	85127887
		100 m		85098383	85127888
	US UL listed		AWG 10	AWG 8	AWG 6
		10 m	85098384		
		20 m	85098385		
		30 m	85098386		
		40 m	85098387		
		50 m	85098388	85136282	
		60 m		85098390	
		70 m		85098391	
		80 m		85098392	
		90 m		85098393	85136283
		100 m		85098394	85136284

Option:

- Multimode OM3
- Other length

MASTERLINE Ultimate Hybrid (MLUH) with Q-ODC-2

Q-ODC RRH jumpers



Features

- Compatible with MLE, MLEH, MLU and MLUH terminated with Q-ODC
- Ruggedised and robust RRH jumper cable – easy and reliable to install
- Available for all types of RRH
- Cable diameter 4.8 mm, 5.5 mm or 7 mm
- Standard lengths of 2, 5 and 10 m, customised lengths available

Jumpers for all types of remote radio systems available.
Ordering information see page 30 (MLU).

Power jumpers



Features

- Compatible with MLUP, MLEP, MLEH and MLUH
- Terminated with a rugged circular plastic plug connector and blunt cut on the RRH side
- 2 wire shielded copper cable with a cross section of 4 mm² to 10 mm² and AWG 12 to AWG 8
- Standard length 2, 5 and 10 m

Ordering information see page 43 (MLUP).

MASTERLINE Ultimate Hybrid (MLUH) is the most innovative hybrid cabling system of HUBER+SUHNER for remote radio installation.

The pre-connectorised factory-sealed hybrid systems supports up to 6 RRHs and connects the remote radios with easy-to-install Q-ODC fiber optic and power jumpers. A pre-laced hoisting grip below the robust connector head allow for easy cable lifting. The encapsulated connector head can be directly hooked in to a pre-mounted bracket.

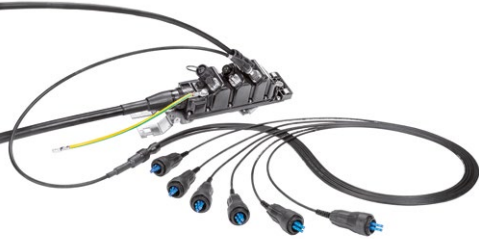
The MLUH head has an integral earth point which can be connected to an earth lead with M8 ring terminal. Optional, the shielding of the hybrid cable can be grounded with standard grounding kits.

The hybrid cable is designed in a way that the outer jacket and shielding can be easily stripped off over a distance of several meters. This allows the installer to cut the excess length of the copper wire while the over-length of the pre-terminated fiber cable is stored inside the base station or in an overlength box.

These unique features make MASTERLINE Ultimate Hybrid the best-in-class product in terms of ease of mast-top installation, installation robustness and efficiency.



MASTERLINE Ultimate Hybrid (MLUH) with Q-ODC-12



Features

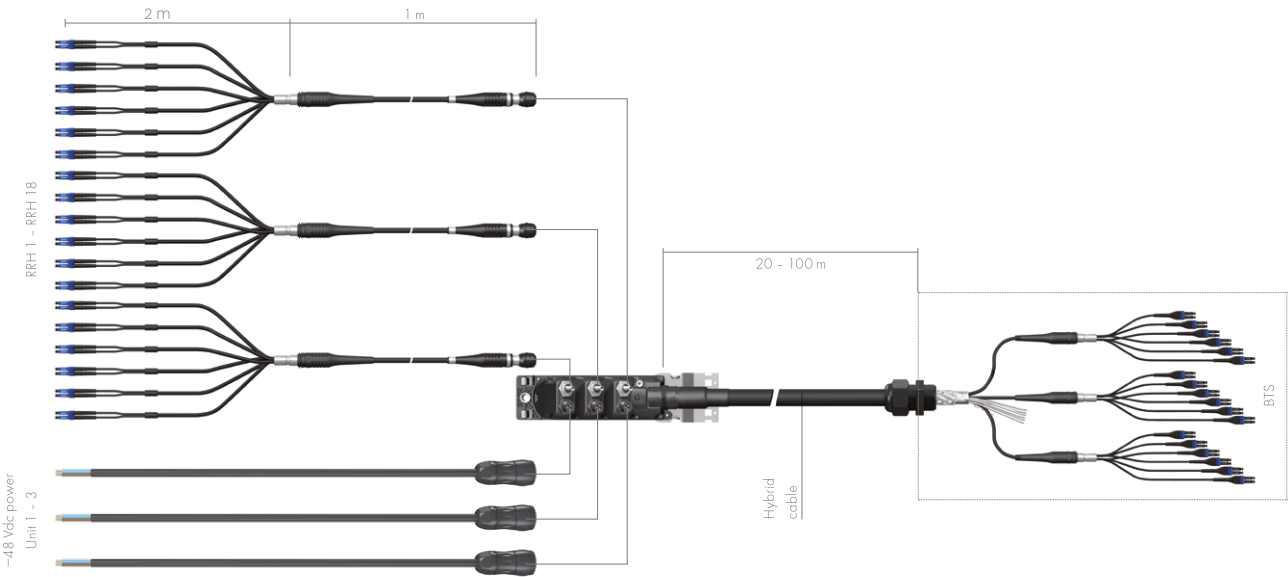
- Pre-connectorised factory-sealed hybrid cable system with 3 power connectors and 3 Q-ODC-12 connectors
- Modular „plug & play“ system compatible with Q-ODC-12 jumpers
- Encapsulated IP67 sealed connector head housing
- Hoisting grip for cable lifting
- Space-efficient, low wind-load
- Mounting bracket for easy mast-, pole- and wall-installation
- Integral earth point which can be connected to an earth lead with M8 ring terminal
- Optional protection cover for cable exits available

Specifications

Number of rugged circular power sockets		3
Number of Q-ODC-12 sockets		3 (12 fibers per socket)
Dimensions L × W × H		310 × 90 × 97 mm
Rated current		up to 42 A per power socket
Ambient temperature range	in service	−40 to +75 °C
	installation	−10 to +50 °C
Ingress protection (IEC 60529)		IP67
Impact resistance (IEC 62262) IK 10		IK 10
Material housing		high-performance polycarbonate
UV resistant for outdoor use		EN ISO 4892-3:2016
Material flammability rating		UL94-V0

MASTERLINE Ultimate Hybrid with Q-ODC-12 allows the connection to 18 remote radio interfaces and 3 power supply units.

The MLUH connector head is equipped with 3 power connectors and 3 Q-ODC-12 sockets.



MASTERLINE Ultimate Hybrid (MLUH) with Q-ODC-12

Q-ODC-12 connector



Q-ODC-12 plug on the multi-branch RRH jumper



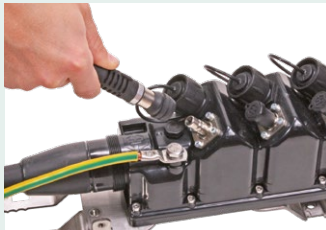
Q-ODC-12 socket on MLUH head

Features

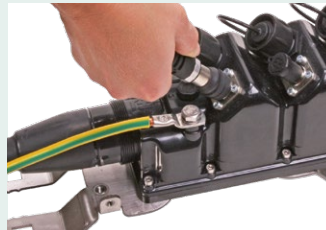
- Connects 12 fibers in one mating step
- Compact design with MT ferrules
- Robust push-pull coupling mechanism – two clearly defined mating states
- Highest outdoor installation safety
- Waterproof, dust proof and corrosion resistant

Specifications on page 145.

Mating/unmating sequences



Push plug connector slightly into extension connector, rotate to find keying position, push connector to mate.



Mated – connector snaps in and is fully strain relieved.



Pull coupling ring to unmate.

MASTERLINE Ultimate Hybrid (MLUH) with Q-ODC-12

Ordering information

MASTERLINE Ultimate Hybrid with 3 power connector and 18 fiber optic interfaces – MLUH 3/18



	Radio end side	BTS side
Fiber optic	3 Q-ODC 12 sockets	18 LC uniboot
Power	3 rugged circular plastic sockets	3 pairs of wire blunt cut wire, cross section 6 mm², 10 mm², 16 mm², AWG 10, AWG 8, AWG 6

Hybrid cable	Market	Length	Item no.	
6 pairs conductor 6 pairs fiber optic single-mode A9/125 A2	global not UL listed CPR compliant		6 mm²	10 mm²
		20 m	85098395	
		30 m	85098396	
		40 m	85098397	
		50 m	85098398	
		60 m		85098399
		70 m		85098400
		80 m		85098401
		90 m		85098402
		100 m		85098403
	US UL listed		AWG 10	AWG 8
		20 m	85098404	
		30 m	85098405	
		40 m	85098406	
		50 m	85098407	
		60 m		85098408
		70 m		85098409
		80 m		85098410
		90 m		85098411
		100 m		85098412

Options

- Multimode OM3
- Other length
- 16 mm²/AWG 6

MASTERLINE Ultimate Hybrid (MLUH) with Q-ODC-12

Q-ODC-12 multi-branch RRH jumper



Features

- Terminated with Q-ODC-12 plug and with 6 RRH-specific interfaces
- Connects 6 RRH jumper cables with a single „click“
- Ruggedised design with robust breakout cables
- Cable diameter 4.8 mm, 5.5 mm or 7 mm
- RRH-specific interface numbered for easy channel identification
- Ingress protection IP rating (Q-ODC-12, mated)

Ordering information see page 52 (MLE with Q-ODC-12).

Power jumpers










Features

- Compatible with MLUP, MLEP, MLUH and MLEH
- Terminated with a rugged circular plastic plug connector and blunt cut on the RRH side
- 2 wire shielded copper cable with a cross section of 4 mm² to 10 mm² and AWG 12 to AWG 8
- Standard length 2, 5 and 10 m

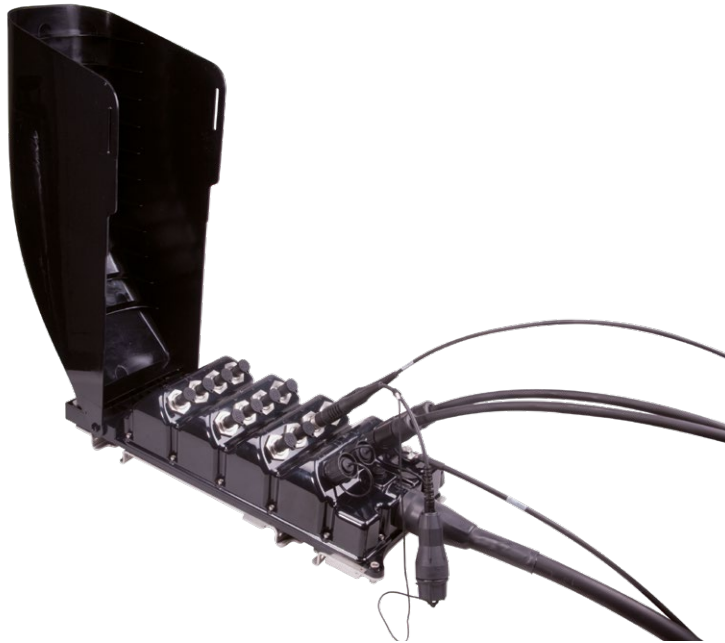
Ordering information see page 43 (MLUP).

MASTERLINE Ultimate Hybrid (MLUH)

Accessories

Description		Item no.	Page	Picture
Overlength box for outdoor and indoor installation, stores up to 20 m cable excess length (depending on cable diameter)		84103325	127	
Clamps for hybrid cable		depends on cable diameter	134	
Grounding kits		85015070	138	
Grounding cable, 0.5 m, 16 mm² and 25 mm², black and yellow/green		depends on cross section and colour	139	
19" CTB patching box	6, 12, 18 or 24 LC duplex adapter blue	depends on quantity of LC adapter	130	
LC patchcords	0.5 m, 0.7 m or 1 m length, single-mode	depends on length	133	
Protection cover for MLUH 3 Stainless steel Dimension (L × H × W) 365 × 200 × 90 mm		85032157	--	
Protection cover for MLUH 6 Stainless steel Dimension (L × H × W) 550 × 250 × 90 mm		85032156	--	
Auxiliary tool to open and close power connector		85013939	--	
Quick hose clamps Stainless steel One set includes 2 pieces hose clamps	clamping Ø 30 to 155 mm	84076411	140	
	clamping Ø 60 to 500 mm	84076412		
SFP/SFP+ transceivers for different protocols, data rates and power budgets.		see transceiver selection guide on page 260	259	

MASTERLINE Ultimate Hybrid High Voltage (MLUH HV)



Hybrid-riser cable with compact connector head high voltage CE conformity

The most innovative hybrid cabling system of HUBER+SUHNER for remote radio installation became even more innovative by offering capability to deliver 230 VAC up the mast, allowing much longer cabling with significant cost savings on cables and more efficient power transfer. The pre-connectorised factory-sealed hybrid systems supports up to 12 RRHs and connects the remote radios with easy-to-install Q-ODC fiber optic and power jumpers. The encapsulated connector head can be directly attached to the mast with a single „click“ at a pre-mounted adaptor plate. These unique features make MASTERLINE Ultimate Hybrid High Voltage the only in-class product offering all the advantages of the MASTERLINE Ultimate family together with high voltage conformity confirmed by the worldwide recognised CE marking. For extra safety the whole head is protected by removable cover.

MASTERLINE Ultimate Hybrid High Voltage (MLUH HV)

RF

LISCA RF jumper

page 162



FTTA

Q-ODC RRH jumper

page 30



PTTA

Alternative power jumper

page 43



HTTA

MLUH HV with Q-ODC-2

page 90



XTTA

Cable clamps

page 134



FTTA

CTB 19" patching box (optional)

page 130



FTTA

LC patchcord (optional)

page 133



XTTA

FTTA, PTTA and HTTA

PTTA

Power-To-The-Antenna

RF

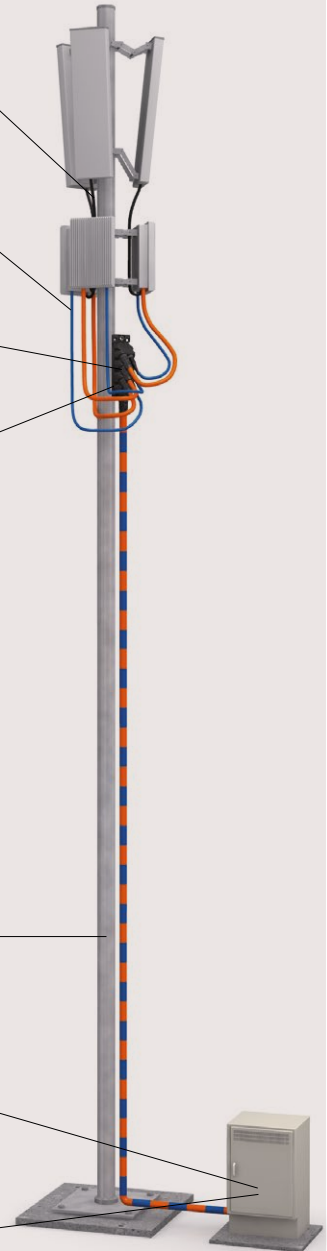
Radio Frequency

HTTA

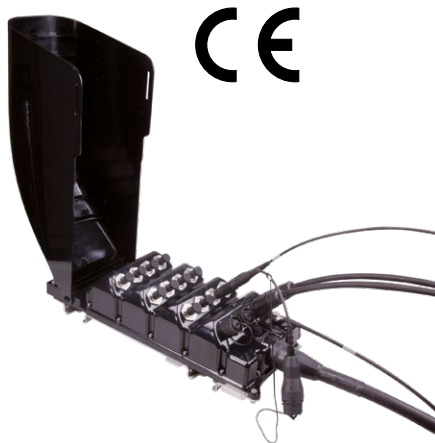
Hybrid-To-The-Antenna

FTTA

Fiber-To-The-Antenna



MASTERLINE Ultimate Hybrid High Voltage (MLUH HV)



Features

- Pre-connectorised factory-sealed hybrid cable system for 12 RRHs
- Modular „plug & play“ system compatible with Q-ODC/Q-ODC-12 and power jumpers
- Encapsulated IP67 sealed connector head housing
- Hoisting grip for cable lifting
- Space-efficient, low wind-load
- Mounting bracket for easy mast-, pole-, and wall-installation
- Integral earth point which can be connected to an earth lead with M8 ring terminal
- Equipped with protection cover for cable exits as a standard
- CE conformity for 230 VAC (higher voltages on request)

Specifications

Number of rugged circular power sockets		4
Number of Q-ODC-2 sockets		12 (2 fibers per socket)
Dimensions L × W × H		515 × 195 × 234 mm
Dimensions without cover L × W × H		515 × 195 × 110 mm
Rated current (IEC 60364-5-52, method E)		40 A (4 × 10A)
Rated voltage		230 VAC
Ambient temperature range	in service	−40 to +75 °C
	installation	−10 to +50 °C
Ingress protection (IEC 60300)		IP65/IP67
Impact resistance (IEC 60300)		IK 10
Halogen-free IEC (60754-2)		yes
UV resistant for outdoor use		ISO 4892-3 (1000h)
Material flammability rating		UL94-V0
Housing material		high-performance polycarbonate



MASTERLINE Classic at BTS side

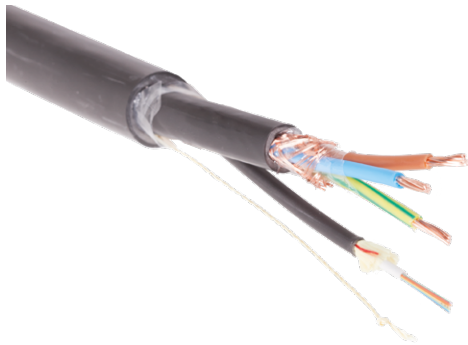


Supplied on a double-flange reel



Integral earth connection

MASTERLINE Ultimate Hybrid High Voltage (MLUH HV)



Hybrid cables of HUBER+SUHNER combine optical fiber and AC power, are highly flexible, easy-to-route and offer substantial costs savings due to lower number of copper conductors. The rip cord between the shielding and the jacket allows a quick stripping of the jacket. The power cable consist of three conductors extra shielded by the braided copper shield.

Hybrid cable consisting of a shielded power cable with 3 conductors (L, N, PE) and a fiber optic cable with 24 fibers

Specifications

Jacket material		thermoplastic, low smoke, free of halogen
Standard		IEC 60502-1:2004-04
Temperature range	in service	-40 to +75 °C
	installation	-10 to +50 °C
Operating voltage		230 VAC
Rated voltage		0.6 kV/1 kV (1.2 kV)
Min. bending radius	during installation	10 × cable-Ø
	in service	8 × cable-Ø
Conductors		4 mm ²
Fiber optic		non-armoured multifiber loose tube jelly-filled
Halogen-free		yes
Flame retardant		IEC 60332-1-2:2004.
UV resistant		IEC 60068-2-5
CE conform		yes
CPR compliant		yes, class D _{ca}

Ask your local sales contact for further information or find more information at <http://literature.hubersuhner.com/Technologies/Fiberoptics/LowInductanceWhitepaper/>.

MASTERLINE Ultimate Hybrid High Voltage (MLUH HV)

Power connectors



Power connector plug at the jumper



Power connector flange socket at the MLUH connector head

Features

- Rugged circular plastic plug connector for remote radio installations
- Machined crimp contacts Ø 3.6 mm for high current
- Bayonet coupling system for easy and quick mating
- 3 wire shielded copper cable with 1.5 mm² cross section

The bayonet coupling system enables a simple and fast mating. With only a 1/3 twist of the coupling ring, connectors are mated with an audible and tactile „click“. The machined 3.6 mm crimp contacts ensure a vibration safe termination and a high current rating. Specifications see page 41 (MLUP).

Mating/unmating sequences



Twist the coupling ring of the plug connector to remove protecting cap as shown.



Align white strip on the plug with the white strip on the socket to find keying position easier. Make sure the plug connector is in-line with the socket connector before coupling ring is twisted.



Twist coupling ring as shown to mate or unmate the plug connector.

Q-ODC connectors



Q-ODC plug on the jumper



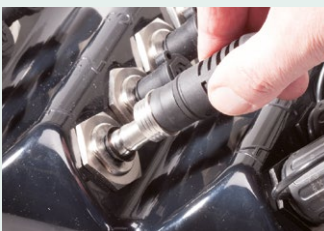
Q-ODC socket on MLUH HV

Features

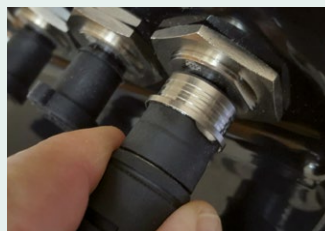
- Robust push-pull coupling mechanism – two clearly defined mating states
- Highest outdoor installation safety
- Waterproof, dust proof and corrosion resistant; does not require secondary wrapping

Specification see page 145 (Fiber optic interfaces).

Mating/unmating sequences



Push plug connector slightly into socket connector, rotate to find keying position, push connector to mate.



Mated - connector snaps in and is fully strain relieved.



Pull coupling ring to unmate.

MLUH HV installation

Easiest-to-install hybrid product available on the market.

Installation features

	<p>Installation video and manual</p> <p>With a smartphone the QR code attached to the spool can be scanned and it takes you directly to the relevant internet site where the installation manual or installation video can be chosen.</p>
	<p>MLUH HV mounting bracket</p> <p>The MLUH HV mounting bracket is fixed to the mast or wall before the MLUH HV is lifted.</p>
	<p>Unspooling</p> <p>The MLUH HV is supplied on a double-flange reel which allows for easy and straight-forward unspooling while lifting the cable up the mast.</p>
	<p>Pulling</p> <p>With a pre-laced hosting grip below the MLUH connector head, the cable system is lifted up to the mast.</p>
	<p>Hook-in MLUH HV head at mounting bracket</p> <p>After the protection air bubble bag is removed, the MLUH HV connector head can be hooked-in to the mounting bracket.</p>
	<p>RRH connection</p> <p>The remote radios are connected with fiber optic jumpers, which are terminated with Q-ODC/ Q-ODC-12 plug connectors and RRH compatible interfaces. The power jumpers are terminated with a rugged circular plastic plug connector and are blunt cut on the RRH side.</p>
	<p>Earthing</p> <p>The MLUH HV head has an integral earth point which can be connected to an earth lead with M8 ring terminal. Optional, the shielding of the hybrid cable can be grounded with standard grounding kits.</p>
	<p>Base station connection</p> <p>The pre-terminated LC fiber optic connectors are protected with a IP65 protection tube. Once the protection tube is screwed-off, the installer has access to the fiber optic breakout cables and the individual copper/ground wires.</p>
	<p>Overlength management</p> <p>The hybrid cable has 1 rip cord below the jacket to allow easy stripping of the jacket over a distance of several meters. This allows the installer to cut the excess length of the copper wire while the overlength of the pre-terminated fiber cable is stored inside the base station or in a overlength box.</p>

MASTERLINE Ultimate Hybrid High Voltage (MLUH HV) with Q-ODC

Ordering information

MASTERLINE Ultimate Hybrid for 12 RRHs - MLUH HV 4/12



	Radio end side	BTS side
Fiber optic	12 Q-ODC sockets	12 uniboot
Power	3 conductors (phase, zero, grounding) blunt cut	3 conductors (phase, zero, grounding) blunt cut wire cross section 4 mm ²

Hybrid cable	Fiber optic	Market	Jacket material	Wire cross section Cable diameter Cable weight	Length	Item no.
3 pairs conductors	12 pairs single-mode	global CPR compliant	LSFH™	4 mm ² 22 mm (5/8") 0.57 kg/m	10 m	85105314
					20 m	85098600
					30 m	85105315
					40 m	85105316
					50 m	85105318
					60 m	85105319
					70 m	85105320
					80 m	85105321
					90 m	85105322
					100 m	85105323

Option

- Multimode fiber
- Other length

MASTERLINE Ultimate Hybrid High Voltage (MLUH HV) with Q-ODC

Q-ODC RRH jumpers



Features

- Compatible with MLE, MLEH, MLU and MLUH terminated with Q-ODC
- Ruggedised and robust RRH jumper cable – easy and reliable to install
- Available for all types of RRH
- Cable diameter 4.8 mm, 5.5 mm or 7 mm
- Standard lengths of 2, 5 and 10 m, customised lengths available

Jumpers for all types of remote radio systems available. Ordering information see page 30 (MLU).

Power jumpers



Features

- Compatible with MLUH HV
- Terminated with a rugged circular plastic plug connector and blunt cut on the RRH side
- 3 copper conductor 1.5 mm² with braided copper shielding for 230 VAC power supply
- Standard length 2, 5 and 10 m

Ordering information see below.

Specifications

Jacket material	LSFH™
Conductor type	copper stranded, IEC 60228 class 2
Insulation colour	blue, brown, yellow/green (grounding)
Cable shielding	braided screen of copper wires, coverage 65 to 85 %
Rated voltage	0.6/1.0 kV
Conductor cross section	3 × 1.5 mm ²
Resistance	12.1 Ω/km
Current per conductor	10 A
Cable diameter	11 mm
Cross section braid	3.1 mm ²










Ordering information

Market	Length	Item no.
Global Not UL listed	2 m	85099139
	5 m	85099140
	10 m	85099141

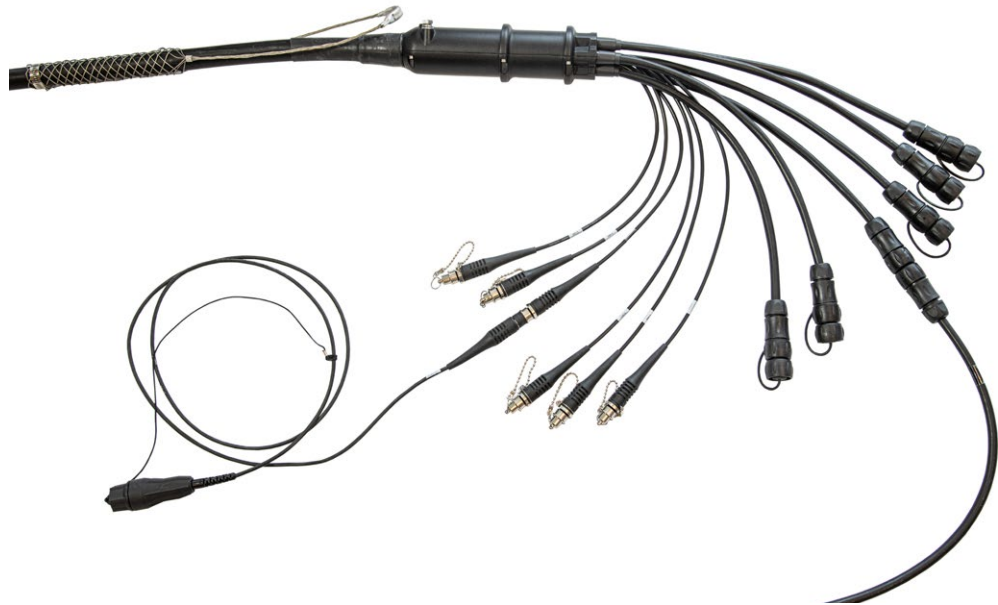
MASTERLINE Ultimate Hybrid High Voltage (MLUH HV)

Accessories

Description		Item no.	Page	Picture
Overlength box for outdoor and indoor installation, stores up to 20 m cable excess length (depending on cable diameter)		84103325	127	
Clamps for hybrid cable		depends on cable diameter	134	
Grounding cable, 0.5 m, 16 mm² and 25 mm², black and yellow/green		depends on cross section and colour	139	
19" CTB patching box	6, 12, 18 or 24 LC duplex adapter blue	depends on quantity of LC adapter	130	
LC patchcords	0.5 m, 0.7 m or 1 m length, single-mode	depends on length	133	
Quick hose clamps Stainless steel One set includes 2 pieces hose clamps	clamping Ø 30 to 155 mm	84076411	140	
	clamping Ø 60 to 500 mm	84076412		
SFP/SFP+ transceivers for different protocols, data rates and power budgets.		see transceiver selection guide on page 260	259	



MASTERLINE Extreme Hybrid (MLEH)



Hybrid-riser cable with compact divider

The hybrid cabling system of HUBER+SUHNER is the most efficient and easiest to install product available on the market. Mobile operators on four continents verified that MASTERLINE Extreme Hybrid can be installed in half of the time of competitive hybrid solutions based on corrugated coax cable designs. The factory-terminated „plug & play“ system in combination with a highly flexible and easy-to-route cable makes the HUBER+SUHNER solution the hybrid cable of choice for operators, system vendors and installers alike.

The pre-terminated hybrid cable assembly minimises the quantity of cables running up the mast. The compact divider splits the optical fiber and DC power cable into individual ruggedised outdoor cables which are linked to the RRHs – either directly or via extension jumpers without the need for bulky mast mount distribution boxes. The RRH jumpers allow an adaptation to different RRH interfaces and therefore make the solution independent from the system vendor's hardware.

MASTERLINE Extreme Hybrid (MLEH)

RF LISCA RF jumper
page 162



FTTA Q-ODC RRH jumpers
page 30



PTTA Power jumpers (optional)
page 43



HTTA MASTERLINE Extreme Hybrid
page 100



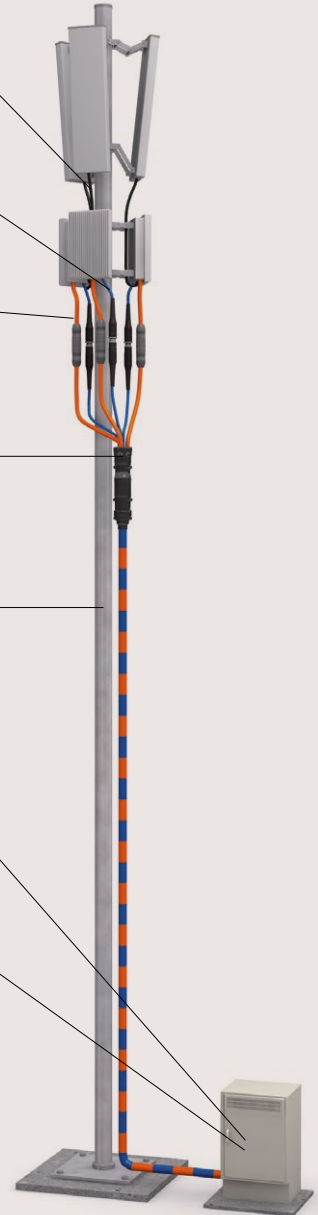
XTTA Cable clamps
page 134



FTTA CTB 19" patching box (optional)
page 130



FTTA LC patchcord (optional)
page 133



XTTA FTTA, PTTA and HTTA

PTTA Power-To-The-Antenna

RF Radio Frequency

HTTA Hybrid-To-The-Antenna

FTTA Fiber-To-The-Antenna

MASTERLINE Extreme Hybrid (MLEH)



Features

- Hybrid cabling system for up to 9 RRHs
- Highly flexible hybrid cable with low bending radius and excellent cable routing properties
- Overlength management – cable jacket with ripcords for easy and quick stripping
- Ruggedised powder coated aluminum with robust breakout cables
- Mounting bracket for easy mast-, pole- and wall-installtion
- Hoisting grip for cable lifting
- Supplied on double-flange reels for straight forward unspooling
- Fiber optic breakout cables terminated with Q-ODC extensions to connect with Q-ODC RRH jumpers
- Power cable connectorised or blunt cut
- Integral earth point which can be connected to an earth lead with M8 ring terminal

Specifications

		Small divider	Large divider
Number of power wire pairs/connectors		up to 6	up to 9
Number of fiber optic pairs/Q-ODC-2 extension connectors		up to 8	up to 18
Housing material		Powder coated aluminum	
Rated current		up to 40A per RRH (depending on the hybrid cable)	
Dimensions		length 253 mm, Ø 76 mm	length 225 mm, Ø 97 mm
Temperature range (IEC 60529)	in service	-40 to +75 °C	
	during installation	-10 to +50 °C	
Impact resistance (IEC 62262)	radio end	IP67	
	base station	IP65 (with protection tube)	
IK class		IK 10	
UV resistance, ISO 4892-3 (methode A/cylce 1)		1000 h	



MASTERLINE Classic at BTS side



Hoisting grip for hybrid cable lifting



Integral earth connection

MASTERLINE Extreme Hybrid (MLEH)

Hybrid cable general specifications

	LSFH™ hybrid cable, global market	UL listed hybrid cable, US market
Jacket material	thermoplastic, LSFH™	PVC
Standard	IEC 60502-1:2004-04	UL 1277, TC-OF-ER
Rated voltage	0.6 kV/1 kV (1.2 kV)	
Min. bending	during installation	10 × cable Ø
	in service	8 × cable Ø
Cable shielding	copper foil 100 % coverage (contacted with drain wire)	
Conductor type	IEC 60228 class 5	class C THHN/THWN-2
Flame retardant	IEC 60332-1-2:2004	UL 1685 (UL 1581) vertical tray flame test
CPR compliant	yes, class Dca	no

Hybrid cable specification MLEH 3/3 or MLEH 3/6

	LSFH™ hybrid cable, global market			UL listed hybrid cable, US market		
Conductor cross section	6 mm ²	10 mm ²	16 mm ²	AWG 10	AWG 8	AWG 6
Resistance	3.08 Ω/km	1.83 Ω/km	1.21 Ω/km	3.41 Ω/km	2.13 Ω/km	1.30 Ω/km
Maximum current rating	31 A	42 A *	42 A *	26 A	36 A	44 A *
Outer diameter	22 mm	22 mm	27.5 mm	19.6 mm (0.77")	23.4 mm (0.92")	23.9 mm (0.945")
Weight	0.73 kg/m	0.96 kg/m	1.36 kg/m	0.69 kg/m	1.05 kg/m	1.4 kg/m
Drain wire cross section	6 mm ²	10 mm ²	10 mm ²	AWG 6	AWG 6	AWG 6
Fiber optic	5 mm loose tube cable with 6 or 12 fibers single-mode E9/125 A2 or multimode OM3					

Hybrid cable specification MLEH 6/6 or MLEH 6/12

	LSFH™ hybrid cable, global market			UL listed hybrid cable, US market		
Conductor cross section	6 mm ²	10 mm ²	16 mm ²	AWG 10	AWG 8	AWG 6
Resistance	3.08 Ω/km	1.83 Ω/km	1.21 Ω/km	3.41 Ω/km	2.13 Ω/km	1.30 Ω/km
Maximum current rating	26 A	35 A	42 A *	16 A	23 A	31 A
Outer diameter	27.5 mm	28 mm	36 mm	25.4 mm (1.00")	30.0 mm (1.18")	33.0 mm (1.28")
Weight	1.17 kg/m	1.72 kg/m	2.46 kg/m	1.25 kg/m	1.64 kg/m	2.28 kg/m
Drain wire cross section	6 mm ²	10 mm ²	10 mm ²	AWG 6	AWG 6	AWG 6
Fiber optic	5 mm loose tube cable with 12 or 24 fibers single-mode E9/125 A2 or multimode OM3					

Hybrid cable specification MLEH 9/9 or MLEH 9/18

	LSFH™ hybrid cable, global market		UL listed hybrid cable, US market	
Conductor cross section	6 mm ²	10 mm ²	AWG 10	AWG 8
Resistance	3.08 Ω/km	1.83 Ω/km	3.41 Ω/km	2.13 Ω/km
Maximum current rating	22 A	30 A	16 A	23 A
Outer diameter	36 mm	36 mm	29 mm (1.14")	36 mm (1.42")
Weight	1.17 kg/m	1.72 kg/m	1.25 kg/m	1.64 kg/m
Drain wire cross section	6 mm ²	10 mm ²	AWG 6	AWG 6
Fiber optic	5 mm loose tube cable with 12 fibers single-mode E9/125 A2 or OM3			

* limitation through power connector maximum current rating 42 A (IEC) and 44 A (UL)






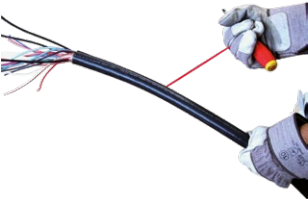
MASTERLINE Extreme Hybrid (MLEH)

Easiest-to-install hybrid product available on the market.

The easy way to your installation instructions „Please consider the environment before printing“. With this well-known statement in mind we have decided to stop printing installation manuals. As of today the hybrid cable system spools from HUBER+SUHNER fiber optics will feature a QR code. Whilst on site, scanning it with your smartphone or tablet takes you directly to the relevant online installation instructions. Just scan the QR code and choose installation manual or video to get exclusive installation support by HUBER+SUHNER. This approach works with any available QR code scanner for mobile devices.



Installation features

	Unspooling The MLEH is supplied on a double-flange reel which allows for easy and straight-forward unspooling while lifting the cable up the mast.
	Lifting The radio end is equipped with a robust braided sleeve with pulling eye which protects and keeps the break-out cables in vertical position during installation. With the hoisting grip, attached below the divider, the cable system is lifted up to the mast.
	Fixation The MLEH mounting bracket has a snap-in mechanism for quick and easy fixation of the divider housing. The clips can be closed by hand without any tool.
	Earthing The MLEH enclosure has an integral earth point which can be connected to an earth lead with M8 ring terminal. Optional, the shielding of the hybrid cable can be grounded with standard grounding kits.
	Base station connection The pre-terminated LC fiber optic connectors are protected with a IP65 protection tube. Once the protection tube is screwed-off, the installer has access to the fiber optic break-out cables and the individual copper/ground wires.
	Overlength management The hybrid cable is designed in a way that the outer jacket and shielding can be easily stripped off with a ripcord over a distance of several meters. This allows the installer to cut the excess length of the copper wire while the overlength of the pre-terminated fiber cable is stored inside the base station or in an overlength box.

MASTERLINE Extreme Hybrid (MLEH)

Available configurations

Configuration	Pairs of power wires	Pairs of fiber optic	Market	Wire cross section	Power breakout	Fiber optic breakout
MLEH 3/3	3	3	global US	6, 10, 16 mm ² 10, 8, 6, 4 AWG	connectorised or blunt cut	Q-ODC or ODC on radio end
MLEH 3/6	3	6	global US	6, 10, 16 mm ² 10, 8, 6, 4 AWG	6 or 10mm ² 10 or 8 AWG	LC uniboot on base station side
MLEH 6/6	6	6	global US	6, 10, 16 mm ² 10, 8, 6, 4 AWG		
MLEH 6/12	6	12	global US	6, 10, 16 mm ² 10, 8, 6, 4 AWG		
MLEH 9/9	9	9	global US	6, 10 mm ² 10, 8 AWG		
MLEH 9/18	9	18	global US	6, 10 mm ² 10, 8 AWG		

Q-ODC-2 connectors



Q-ODC plug on the jumper



Q-ODC extension on the MLE

MASTERLINE Extreme Hybrid allow for quick and reliable connections of fiber optic jumpers. The fiber optic connector Q-ODC has a robust push-pull coupling mechanism with two clearly defined mating states for highest outdoor installation safety.

Specification see page 145 (fiber optic interfaces).

Power connectors



Power connector plug at the jumper

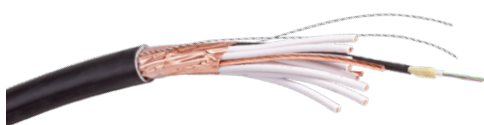


Power connector extension at the MLEH (0.5 m long breakout)

The power breakout cables are either direct connected to the screw terminals of the RRHs or via power jumper, which are terminated with a rugged circular connector. The power connectors have a bayonet coupling system which enables a simple and fast mating. With only a 1/3 twist of the coupling ring, connectors are mated with an audible and sensitive „click“. The machined 3.6 mm crimp contact ensure a vibration safe termination and a high current rating.

Specification see page 41 (MLUP).

Hybrid cable



Hybrid cable with 6 pairs power wire and 6 pairs of fiber optic

Hybrid cables of HUBER+SUHNER combine optical fiber and DC power, are highly flexible and easy-to-route. Two rip cords between the shielding and the jacket allows a quick stripping of the jacket. The shielding, a copper foil under the jacket and the drain wire maintain contact throughout the cable run and allow potential equalisation and a safe installation with regard to lightning strikes.


MASTERLINE Extreme Hybrid (MLEH)

Ordering information

MASTERLINE Extreme Hybrid for 3 RRHs – MLEH 3/3



	Radio end side	BTS side
Fiber optic	Q-ODC breakout length 0.50 m	LC uniboot
Power	blunt cut wire cross section 6 mm ² /AWG 10 breakout length 4 m	blunt cut wire cross section 6 mm ² /AWG 10 or 10 mm ² /AWG 8

Power wire	Fiber optic	Market	Jacket material	Wire cross section Cable diameter Cable weight	Length	Item no.
3 pairs	3 pairs single-mode	global not UL listed CPR compliant	LSFH™	6 mm ² 22 mm (5/8") 0.73 kg/m	10 m	85006998
					20 m	85006999
					30 m	85007000
					40 m	85007001
					50 m	85007002
				10 mm ² 22 mm (5/8") 0.96 kg/m	60 m	85007003
					70 m	85007004
					80 m	85007005
					90 m	85007006
					100 m	85007007
		US 	PVC	AWG 10 19.6 mm (0.77") 0.69 kg/m	10 m	85007008
					20 m	85007009
					30 m	85007010
					40 m	85007011
					50 m	85007012
				AWG 8 23.4 mm (0.92") 1.40 kg/m	60 m	85007013
					70 m	85007014
					80 m	85007015
					90 m	85007016
					100 m	85007017

Options

- Multimode fiber
- Other length
- 16 mm² or AWG 6 conductors
- Power breakout with power connector

MASTERLINE Extreme Hybrid (MLEH)

Ordering information

MASTERLINE Extreme Hybrid for 3 RRHs – MLEH 3/6 with power connector



	Radio end side	BTS side
Fiber optic	Q-ODC breakout length 0.50 m/0.62 m	LC uniboot
Power	power connector wire cross section 6 mm ² breakout length 0.50 m	blunt cut wire cross section 6 mm ² or 10 mm ²

Power wire	Fiber optic	Market	Jacket material	Wire cross section Cable diameter Cable weight	Length	Item no.
3 pairs	6 pairs single-mode	global not UL listed CPR compliant	LSFH™	6 mm ² 22 mm (5/8") 0.73 kg/m	10 m	85173472
					20 m	85011141
					30 m	85011142
					40 m	85009251
					50 m	85011143
				10 mm ² 22 mm (5/8") 0.96 kg/m	60 m	85011154
					70 m	85011155
					80 m	85011156
					90 m	85011157
					100 m	85011158

Options

- Multimode fiber
- Other length
- 16 mm² or AWG 6 conductors
- Power breakout 4 m blunt cut
- UL listed hybrid cable

MASTERLINE Extreme Hybrid is currently deployed nationwide in US

Two US operators (T-Mobile and Sprint) have selected MLEH for their nationwide network rollout. No other hybrid cabling system can be installed faster and more efficiently. The „plug & play“ solution has excellent installation features like robust pulling tubes or a field-manageable method to strip and cut the excess power cable at the base station. These unique features convince operators and installers at the same time – there no other hybrid solution which comes close.



MASTERLINE Extreme Hybrid (MLEH)

Ordering information

MASTERLINE Extreme Hybrid for 6 RRHs – MLEH 6/6 with power connector



	Radio end side	BTS side
Fiber optic	Q-ODC breakout length 0.50 m/0.62 m	LC uniboot
Power	power connector wire cross section 6 mm ² breakout length 0.5 m/0.62 m	blunt cut wire cross section 6 mm ² or 10 mm ²

Power wire	Fiber optic	Market	Jacket material	Wire cross section Cable diameter Cable weight	Length	Item no.
6 pairs	6 pairs single-mode	global not UL listed CPR compliant	LSFH™	6 mm ² 27.5 mm (7/8") 1.17 kg/m	10 m	85001318
					20 m	85001319
					30 m	85001320
					40 m	85001321
					50 m	85001322
				10 mm ² 28 mm (7/8") 1.72 kg/m	60 m	85001323
					70 m	85001324
					80 m	85001325
					90 m	85001326
					100 m	85001327

Options

- Multimode fiber
- 16 mm² or AWG 6 conductors
- Other length
- UL listed hybrid cable

Customer voices – best system to install

Installers are impressed by how easy and fast the MASTERLINE Extreme Hybrid can be installed. An experienced rigger in UK brought it to the point: „This is the best system to install“. The HUBER+SUHNER hybrid cable is flexible, easy to pull up the mast and to route inside of conduits or monopoles. Competitive solutions suffer from stiff corrugated cables designs and a Latin American operator wrote in an installation report „difficult to install due to cable's inflexibility, handling problems to install the cable up the mast, long time to install the boxes on the top“. The HUBER+SUHNER MLEH is a boxless solution, all connectors have quick-lock mechanisms and overlength management is efficiently solved.




MASTERLINE Extreme Hybrid (MLEH)

Ordering information

MASTERLINE Extreme Hybrid for 6 RRHs – MLEH 6/6



	Radio end side	BTS side
Fiber optic	Q-ODC breakout length 0.50 m/0.62 m	LC uniboot
Power	blunt cut wire cross section 6 mm ² /AWG 10 breakout length 4 m	blunt cut wire cross section 6 mm ² /AWG 10 or 10 mm ² /AWG 8

Power wire	Fiber optic	Market	Jacket material	Wire cross section Cable diameter Cable weight	Length	Item no.
6 pairs	6 pairs single-mode	global not UL listed CPR compliant	LSFH™	6 mm ² 27.5 mm (7/8") 1.17 kg/m	10 m	85020114
					20 m	85014799
					30 m	85097074
					40 m	85097075
					50 m	85097076
				10 mm ² 28 mm (7/8") 1.72 kg/m	60 m	85014798
					70 m	85014797
					80 m	85014796
					90 m	85014795
					100 m	85009156
		US 	PVC	AWG 10 25.4 mm (1.00") 1.25 kg/m	10 m	85020115
					20 m	85020116
					30 m	85020117
					40 m	85020118
					50 m	85020119
				AWG 8 30.0 mm (1.18") 1.80 kg/m	60 m	85020120
					70 m	85020121
					80 m	85020122
					90 m	85020123
					100 m	85020124

Options

- Multimode fiber
- Other length
- 16 mm² or AWG 6 conductors


MASTERLINE Extreme Hybrid (MLEH)

Ordering information

MASTERLINE Extreme Hybrid for 6 RRHs – MLEH 6/12
12 × Q-ODC



	Radio end side	BTS side
Fiber optic	Q-ODC breakout length 0.50 m/0.62 m/0.74 m/0.86 m	LC uniboot
Power	blunt cut wire cross section 6 mm ² /AWG 10 breakout length 4 m	blunt cut wire cross section 6 mm ² /AWG 10 or 10 mm ² /AWG 8

Power wire	Fiber optic	Market	Jacket material	Wire cross section Cable diameter Cable weight	Length	Item no.
6 pairs	12 pairs single-mode	global not UL listed CPR compliant	LSFH™	6 mm ² 27.5 mm (7/8") 1.17 kg/m	10 m	85124227
					20 m	85124230
					30 m	85124232
					40 m	85124234
					50 m	85124236
				10 mm ² 27.5 mm (7/8") 1.72 kg/m	60 m	85124243
					70 m	85124245
					80 m	85124247
					90 m	85173478
					100 m	85173479
		US 	PVC	AWG 10 25.4 mm (1.00") 1.25 kg/m	10 m	85019974
					20 m	85019976
					30 m	85019977
					40 m	85019978
					50 m	85019979
				AWG 8 30.0 mm (1.18") 1.80 kg/m	60 m	85019980
					70 m	85019981
					80 m	85019982
					90 m	85019983
					100 m	85019984

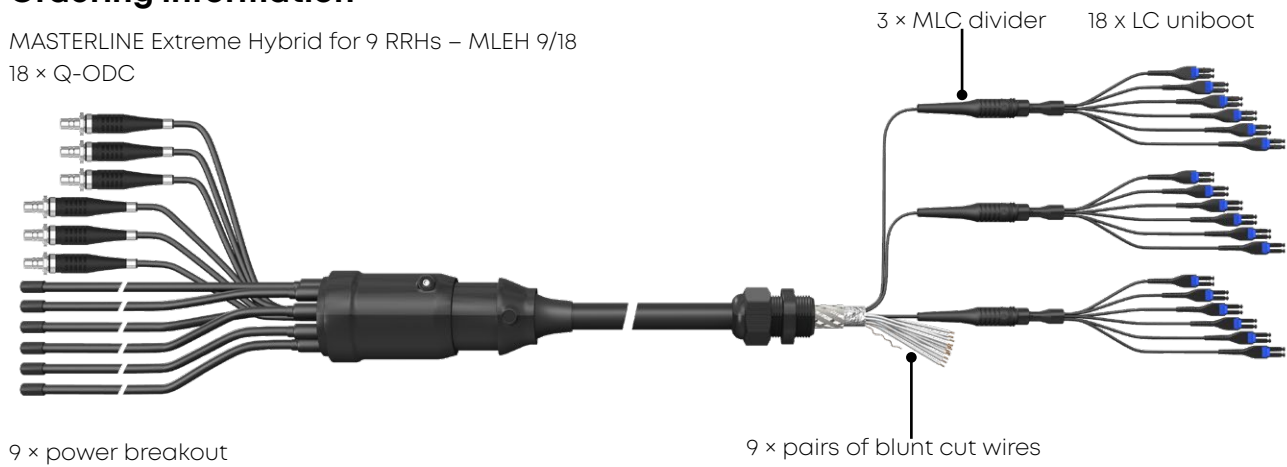
Options

- Multimode fiber
- Other length
- 16 mm² or AWG 6 conductors
- Power breakout with power connector


MASTERLINE Extreme Hybrid (MLEH)

Ordering information

MASTERLINE Extreme Hybrid for 9 RRHs – MLEH 9/18
18 × Q-ODC



	Radio end side	BTS side
Fiber optic	Q-ODC breakout length 0.50 m/0.62 m/ 0.74 m/0.86 m/0.98 m/1.10 m	LC uniboot
Power	blunt cut wire cross section AWG 10 breakout length 4 m	blunt cut wire cross section 6 mm ² /AWG 10 or 10 mm ² /AWG 8

Power wire	Fiber optic	Market	Jacket material	Wire cross section Cable diameter Cable weight	Length	Item no.
9 pairs	18 pairs single-mode	global not UL listed CPR compliant	LSFH™	6 mm ² 36.0 mm 1.90 kg/m	10 m	85021731
					20 m	85021732
					30 m	85021733
					40 m	85021734
					50 m	85021735
				10 mm ² 36 mm 2.61 kg/m	60 m	85021736
					70 m	85021737
					80 m	85021738
					90 m	85021739
					100 m	85021740
		US 	PVC	AWG 10 29.2 mm (1.15") 1.67 kg/m	10 m	85007085
					20 m	85007087
					30 m	85007088
					40 m	85007089
					50 m	85007090
				AWG 8 36.8 mm (1.45") 2.48 kg/m	60 m	85007091
					70 m	85007092
					80 m	85007093
					90 m	85007094
					100 m	85007095

Options

- Multimode fiber
- Other length
- Power breakout with power connector

MASTERLINE Extreme Hybrid (MLEH)

Q-ODC RRH jumpers



Features

- Compatible with MLE, MLEH, MLU and MLUH terminated with Q-ODC
- Ruggedised and robust RRH jumper cable – easy and reliable to install
- Available for all types of RRH
- Cable diameter 4.8 mm, 5.5 mm or 7 mm
- Standard lengths of 2, 5 and 10 m, customised lengths available

Jumpers for all types of remote radio systems available. Ordering information see page 30 (MLU).

Power jumpers



Features

- Compatible with MLEP, MLEH and MLUH
- Terminated with a rugged circular plastic plug connector and blunt cut on the RRH side
- 2 wire shielded copper cable with a cross section of 4 or 6 mm²/ AWG 10
- Standard length 2, 5 and 10 m

Ordering information see page 43 (MLUP).

Global supply chain for hybrid assemblies

HUBER+SUHNER operates hybrid assembly shops in Poland, Mexico, China and has plans to expand the manufacturing network to other regions as well. Being close to our customers is a must for bulky hybrid assemblies with weights exceeding 100 kg.

Our operations network enables HUBER+SUHNER to respond immediately to our customers' needs and to provide a fast and flexible delivery performance.



MASTERLINE Extreme Hybrid (MLEH)

Power connectors



Power connector plug at the jumper



Power connector extension at the MLEH (0.5 m long breakout)

Features

- Rugged circular plastic plug connector for remote radio installations
- Machined crimp contacts Ø 3.6 mm for high current
- Bayonet coupling system for easy and quick mating
- 2 wire shielded copper cable with cross section of 4 or 6 mm²/AWG 10

MASTERLINE Extreme Hybrid is optional available with a rugged circular plastic power connector. The bayonet coupling system enables a simple and fast mating. With only a 1/3 twist of the coupling ring, connectors are mated with an audible and tactile „click“. The machined 3.6 mm crimp contacts ensure a vibration safe termination and a high current rating.

Mating/unmating sequences



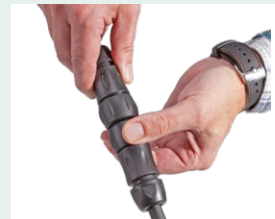
Twist the coupling ring of the power jumper plug connector to remove protecting cap as shown.



Twist the coupling ring of the MLEH receptacle connector to remove protecting cap as shown.



Push plug connector slightly into receptacle connector, rotate to find keying position.










Twist coupling ring of the power jumper plug connector to mate the connectors as shown.

Accessories

Description	Item no.	Page	Picture
Mounting bracket with 2 clips for MLEH small with snap-in mechanism for fixation of the divider housing. The UV resistant clips can be closed by hand without any tool.	85140742	140	
Mounting bracket with 1 double-clip for MLEH large with snap-in mechanism for fixation of the divider housing. The UV resistant clips can be closed by hand without any tool.	85140743	140	

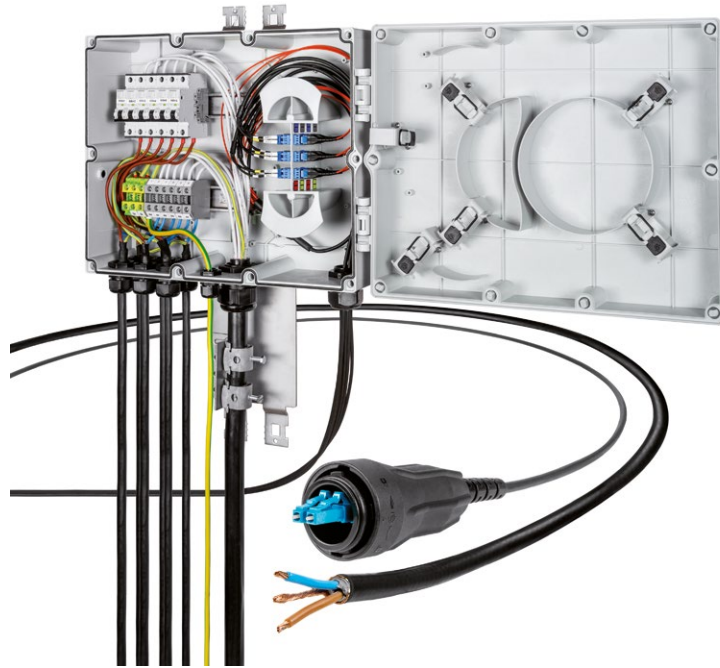
MASTERLINE Extreme Hybrid (MLEH)

Accessories

Description		Item no.	Page	Picture
Overlength box for outdoor and indoor installation, stores up to 20 m cable excess length (depending on cable diameter)		84103325	127	
Clamps for hybrid cable		depends on cable diameter	134	
Grounding kits		85015070	138	
Grounding cable, 0.5 m, 16 mm² and 25 mm², black and yellow/green		depends on cross section and colour	139	
19" CTB patching box	6, 12, 18 or 24 LC duplex adapter blue	depends on quantity of LC adapter	130	
LC patchcords	0.5 m, 0.7 m or 1 m length, single-mode	depends on length	133	
3 fold cable clamp suitable for ODC boot to fix the Q-ODC extension connectors		85012939	136	
6 fold cable clamp suitable for 3 ODC boot and 3 power connectors		85028293	134	
Quick hose clamps Stainless steel One set includes 2 pieces hose clamps	clamping Ø 30 to 155 mm	84076411	140	
	clamping Ø 60 to 500 mm	84076412		
SFP/SFP+ transceivers for different protocols, data rates and power budgets		see transceiver selection guide on page 260	259	



MASTERLINE Classic Hybrid (MLCH)

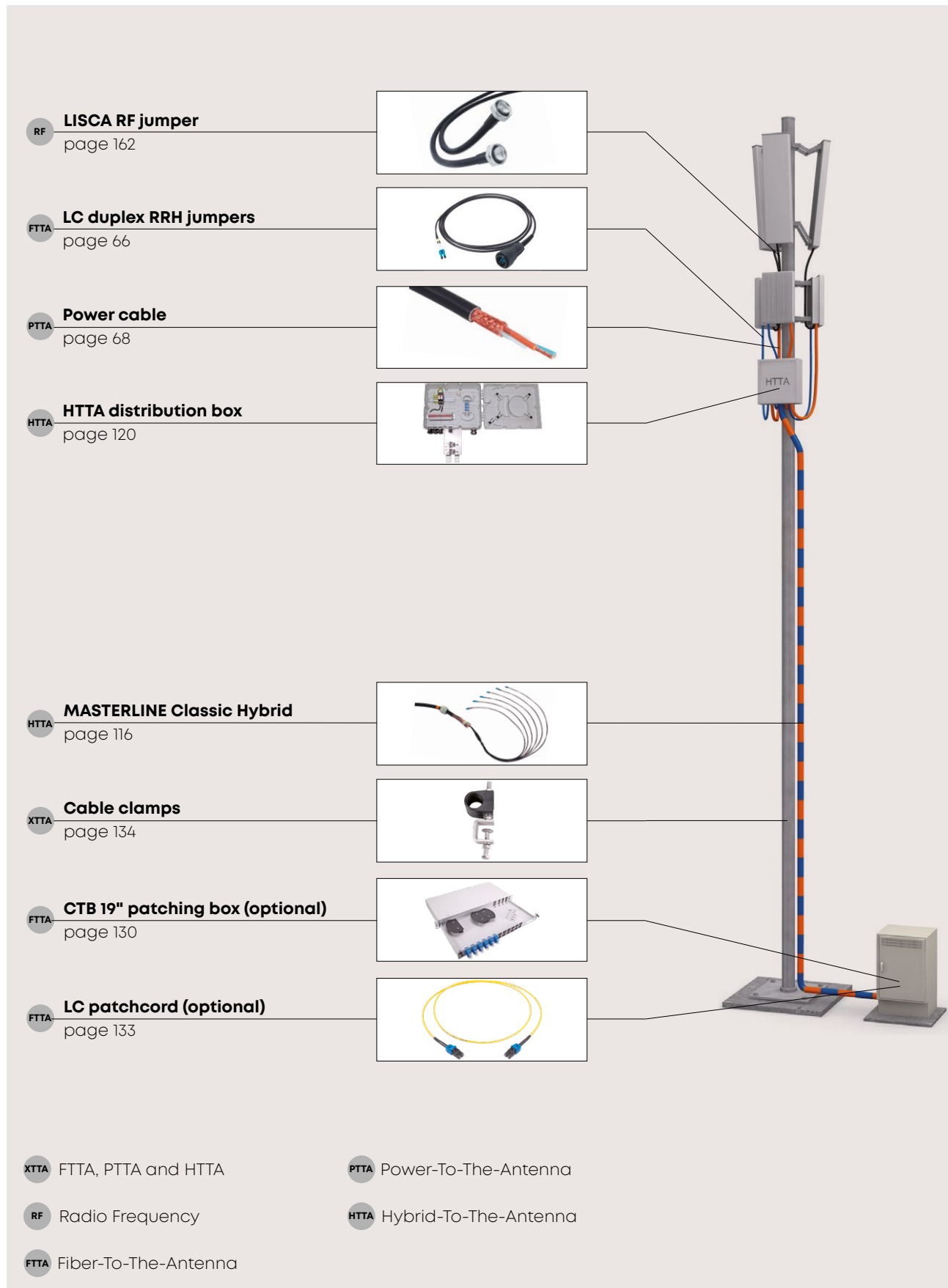


Hybrid-riser cable with distribution box

This solution, a factory-terminated hybrid-riser cable assembly, minimises the amount of cables running up the mast. At the hybrid distribution box the multifiber/wire cable are split into individual cables which are linked to the RRHs with short jumper cables. The jumpers allow an adaptation to different RRH interfaces and therefore make the solution independent from the system vendor's hardware. A box solution enables the use of circuit breaker and/or surge protection devices.

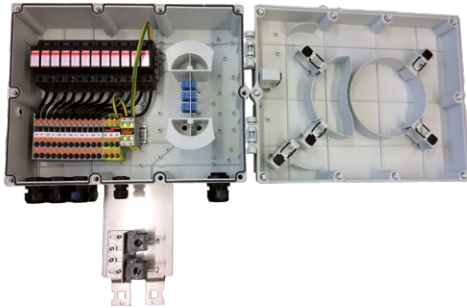
However, this installation method requires large and bulky boxes on the top of the mast. With increasing number of remote ratios per site, space limitations and wind load become critical issues. Many operators also want to avoid the risk of opening and maintaining mast-top boxes by non-trained or non-authorised persons.

MASTERLINE Classic Hybrid (MLCH)



MASTERLINE Classic Hybrid (MLCH)

Distribution box



Features

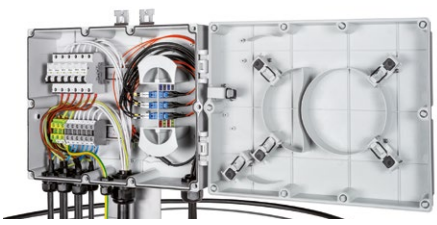



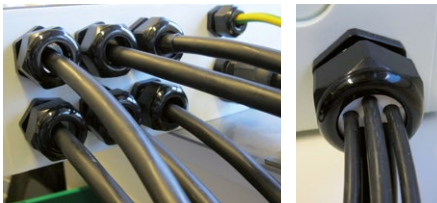
- Ruggedised outdoor distribution box for fiber optic and power supply
- Supports up to 6 remote radio heads
- Fitted with bend radius limiting mandrels
- Power distribution up to 15 A per remote radio head
- Optional with circuit breaker or/and surge protection devices
- Cover stores up to 20 m fiber optic cables excess length
- Suitable for mounting on poles, walls and tower legs
- Easy to mount and install with pre-mounted brackets
- Hybrid cable clamp integrated on mounting brackets
- Protective vent to equalise pressure and prevent condensation

Specifications

Number of RRH		up to 6 RRH
Compatible with MASTERLINE Classic Hybrid		up to 12 fibers and up to 12 power wire
Box dimensions		429 × 390 × 159 mm
U _N rated voltage		–48 V DC
I _N rated current per RRH	without circuit breaker	15.0 A
	with circuit breaker	11.7 A
Ambient temperature range	operation	–40 to +75 °C (with CB +55 °C)
	installation	–10 to +50 °C
Box material		glass-filled polycarbonate
Ingress protection		IP67
Impact resistance		IK 07 (EN 62262)
Colour		RAL 7035 grey
Halogen-free		IEC 60754-2
UV resistant for outdoor use		ISO 4892-3
Material flammability rating		UL94-V0
Screw terminals	cable entry	6 mm ² to 16 mm ² (25 mm ² without wire end sleeves)
	cable exit	4 mm ² to 6 mm ²
Circuit breaker (optional)		miniature circuit breaker C 20 A
Surge protection device (optional)		SPD type 1+2/class I+II or type 2/class II, specifications see page 74

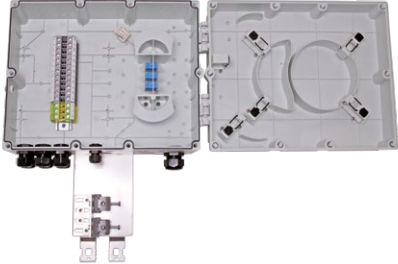
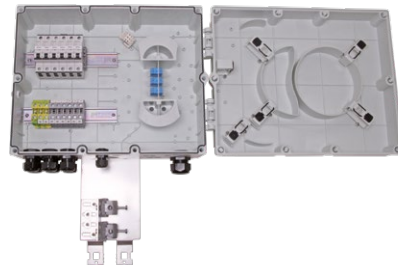
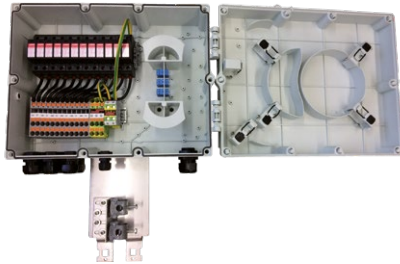
MASTERLINE Classic Hybrid (MLCH)

Distribution box – installation features

	<p>Pre-installed power distribution and fiber management components</p> <p>Pre-installed screw terminals and optional circuit breaker and/or surge protection device for up to 6 RRHs. Bend radius limiting mandrels and an LC duplex adaptor plate ensure safe fiber management. Glands for power and fiber optic jumper cable are pre-mounted.</p>
	<p>Pulling</p> <p>The HTTA box has a robust mounting bracket with which the box and hybrid cable can be lifted up the mast.</p>
	<p>Overlength management in cover</p> <p>Up to 20 m of jumper or multi-riser cable can be stored in the cover. The cable is routed and retained to allow for easy opening/closing of the cover without affecting the cable excess length.</p>
	<p>Cable entry</p> <p>A knock-out holes with Ø 40.0 mm in the middle of the bottom allows to enter the MLCH with its pre-mounted M40 cable gland.</p> <ul style="list-style-type: none"> • 1 × M40 cable gland for MLCH Ø 18.0 to 32.0 mm <p>As an option , the HTTA box can be used for an installation with 1 or 2 power main cables and a separate multifiber riser cable (MLC) instead of a hybrid cable.</p> <ul style="list-style-type: none"> • 1 × M40 cable gland for power main cable Ø 16.0 to 28.0 mm • 1 × M32 cable gland for an optional 2nd power main cable Ø 18.0 to 25.0 mm • 1 × hole 16 mm for MLC 12 fibers and 1 × hole 26 mm or for MLC 24 fibers
	<p>Cable exits</p> <p>The standard configuration is designed for 6 fiber optic and power jumper cables with the option to increase the number of fiber optic jumpers up to 12. The HTTA box can be electrically grounded with a 16 mm² earthing cable through a M20 cable gland.</p> <ul style="list-style-type: none"> • 1 × M32 cable gland with 6-fold seal for 6 jumper cable Ø 4.8 to 7.0 mm • 6 × M25 cable glands for 6 power main cable Ø 9.0 to 16.0 mm • 1 × M20 cable gland for earthing cable Ø 6.0 to 12.0 mm

MASTERLINE Classic Hybrid (MLCH)

Ordering information distribution box

Description	Item no.	Picture
HTTA box power distribution only <ul style="list-style-type: none"> Screw terminals for 12-wire hybrid cable up to 16 mm² (25 mm²) and 6 power jumper, individual power supply circuits 6 LC duplex adapter (single-mode, blue) 6 cable gland for power jumper, 1 cable gland for 6 fiber optic jumper, 1 cable gland for earthing cable Mounting bracket with 2 cable clamps for MLCH Quick hose clamp for Ø 60 to 500 mm 	84143745	
HTTA box with circuit breaker <ul style="list-style-type: none"> Screw terminals for 12-wire hybrid cable up to 16 mm² (25 mm²) and 6 power jumper, individual power supply circuits 6 circuit breaker 20A with C tripping characteristic 6 LC duplex adapter (single-mode, blue) 6 cable gland for power jumper, 1 cable gland for 6 fiber optic jumper, 1 cable gland for earthing cable Mounting bracket with 2 cable clamps for MLCH Quick hose clamp for Ø 60 to 500 mm 	85002397	
HTTA box with SPD <ul style="list-style-type: none"> Screw terminals for 12-wire hybrid cable up to 16 mm² (25 mm²) and 6 power jumper, common power supply circuit 6 surge protection device type 1/2, class I/II 6 LC duplex adapter (single-mode, blue) 6 cable gland for power jumper, 1 cable gland for 6 fiber optic jumper, 1 cable gland for earthing cable Mounting bracket with 2 cable clamps for MLCH Quick hose clamp for Ø 60 to 500 mm 	85098828	

Options:

- 12 LC duplex adapter
- Multimode adapter
- Customised DIN-Rail (screw terminal, circuit breaker, surge protection device)

The hybrid box is designed for flexible configurations (e.g. with surge protection devices), ease and quick deployment of up to 6 remote radio heads. Its innovative design allows for installation using MASTERLINE Classic Hybrid (MLCH), a factory-terminated hybrid cable assembly or MASTERLINE Classic (MLC) bundled fiber and bundled power riser cables.

All power distribution and fiber management components are pre-installed and the robust mounting bracket allows the hybrid cable to be pulled up with the box.

The HTTA box also has the capability to store up to 20 m of fiber cabling (riser or jumper) in its cover and has the option to have connectorised outputs for the ultimate in flexibility.



MASTERLINE Classic Hybrid (MLCH)

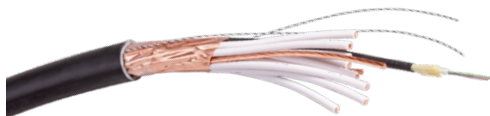
Hybrid cable general specifications

		LSFH™ hybrid cable, global market	UL listed hybrid cable, US market
Jacket material		thermoplastic, low smoke, free of halogen (LSFH™)	PVC
Standard		IEC 60502-1:2004-04	UL 1277, TC-OF-ER
Temperature range	in service	-40 to +75 °C	
	installation	-10 to +50 °C	
Operating voltage		48 Vdc	
Rated voltage		0.6 kV/1 kV (1.2 kV)	
Min. bending	during installation	10 × cable Ø	12 × cable Ø
	in service	8 × cable Ø	10 × cable Ø
Cable shielding		copper foil 100 % coverage (contacted with drain wire)	
Halogen free		yes	no
Flame retardant		IEC 60332-1-2:2004	UL 1685 (UL 1581) vertical tray flame test (70 000 BTU/hr)
UV resistant		IEC 60068-2-5	UL1581
CPR compliant		yes, class Dca	no

12-core hybrid cable specification for MLCH 6/6 and MLCH 6/12

	LSFH™ hybrid cable, global market		UL listed hybrid cable, US market	
Number of cross section	12			
Conductor cross section	6 mm²	10 mm²	AWG 10	AWG 8
Resistance	3.08 Ω/km	1.83 Ω/km	3.41 Ω/km	2.13 Ω/km
Maximum current rating	25 A	35 A *	16 A	23 A
Outer diameter	27.5 mm	28 mm	25.4 mm (1.00")	30 mm (1.18")
Weight	1.17 kg/m	1.72 kg/m	1.25 kg/m	1.64 kg/m
Drain wire cross section	6 mm²	10 mm²	AWG 6	AWG 6
Fiber optic	5 mm loose tube cable with 6 fibers single-mode E9/125 A2 or multimode OM3			

* limitation through power connector maximum current rating 42 A (IEC) and 44 A (UL)



Hybrid cable with 6 pairs power wire and 6 pairs of fiber optic

Hybrid cables of HUBER+SUHNER combine optical fiber and DC power, are highly flexible and easy-to-route. Two rip cords between the shielding and the jacket allows a quick stripping of the jacket. The shielding, a copper foil under the jacket and the drain wire maintain contact throughout the cable run and allow potential equalisation and a safe installation with regard to lightning strikes.

MASTERLINE Classic Hybrid (MLCH)

Ordering information

MASTERLINE Classic Hybrid for 6 RRHs – MLCH 6/6



	Radio end side	BTS side
Fiber optic	LC uniboot	LC uniboot
Power	blunt cut wire cross section 6 mm²/AWG 10 or 10 mm²/AWG 8	blunt cut wire cross section 6 mm²/AWG 10 or 10 mm²/AWG 8

Hybrid cable	Market	Length	Item no.	
			6 mm²	10 mm²
6 pairs conductor 6 pairs fiber optic single-mode A9/125 A2	global not UL listed CPR compliant	10 m	85007381	
		20 m	85007382	
		30 m	85007383	
		40 m	85007384	
		50 m	85007385	
		60 m		85007386
		70 m		85007387
		80 m		85007388
		90 m		85007389
		100 m		85007390
	US UL listed		AWG 10	AWG 8
		10 m	85007392	
		20 m	85007393	
		30 m	85007394	
		40 m	85007395	
		50 m	85007396	
		60 m		85007397
		70 m		85007398
		80 m		85007399
		90 m		85007400
		100 m		85007401

Options

- 12 pairs fiber optic single mode A9/125 A2
- 6 or 12 pairs fiber optic multimode OM3
- Other length

MASTERLINE Classic Hybrid (MLCH)

LC duplex RRH jumpers

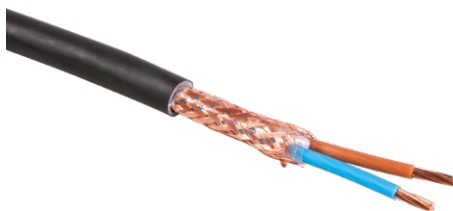


Features

- Jumper available for all types of remote radios
- Cable diameter 4.8 mm, 5.5 mm or 7 mm
- Standard lengths of 2 m and 5 m, any customised length available

The HTTA box enables the use of 6 RRH jumper cables (optional 12) through 2 cable glands with pre-split sealings. Ordering information see page 66 (MLC).

2-core power jumpers



Features

- 2 core copper cable for RRH power supply
- LSFHTM jacket material
- Braided copper shield
- 4, 6 and 10 mm² cross section

Ordering information see page 21 (MLC).

Accessories

Description		Item no.	Page	Picture
Clamps for hybrid cable		depends on cable diameter	134	
Grounding kits		85015070	138	
19" CTB patching box	6, 12, 18 or 24 LC duplex adapter blue	depends on quantity of LC adapter	130	
LC patchcords	0.5 m, 0.7 m or 1 m length, single-mode	depends on length	133	
SFP/SFP+ transceivers for different protocols, data rates and power budgets		see transceiver selection guide on page 260	259	

MASTERLINE Classic Hybrid (MLCH)

Hybrid RRH jumper



Features

- Pre-assembled hybrid jumper with 2 or optional 4 fibers
- Jumper terminated with vendor approved RRH connectors
- Power cable shielded from end-to-end, easy ground connection inside box and at RRH, no additional grounding kits required
- Ruggedised cable design and cable divider
- „Plug & play“ installation – no field termination/wrapping/ preparation necessary

Specifications

Temperature range	-4 0 to +75 °C	
Operating voltage	48 VDC	
Rated voltage	0.6 kV/1 kV	
Fiber (radio end)	FullAXS connector	LC duplex connector
Power (radio end)	blunt-cut	blunt-cut
Fiber (HTTA box)	LC duplex connector	
Power (HTTA box)	blunt-cut	

Portfolio/ordering

Due to the number of variables involved there is no standard portfolio

FullAXS

Compatible to
RRH connector



LC duplex
10 AWG
power pair

LC duplex

10 AWG
power pair



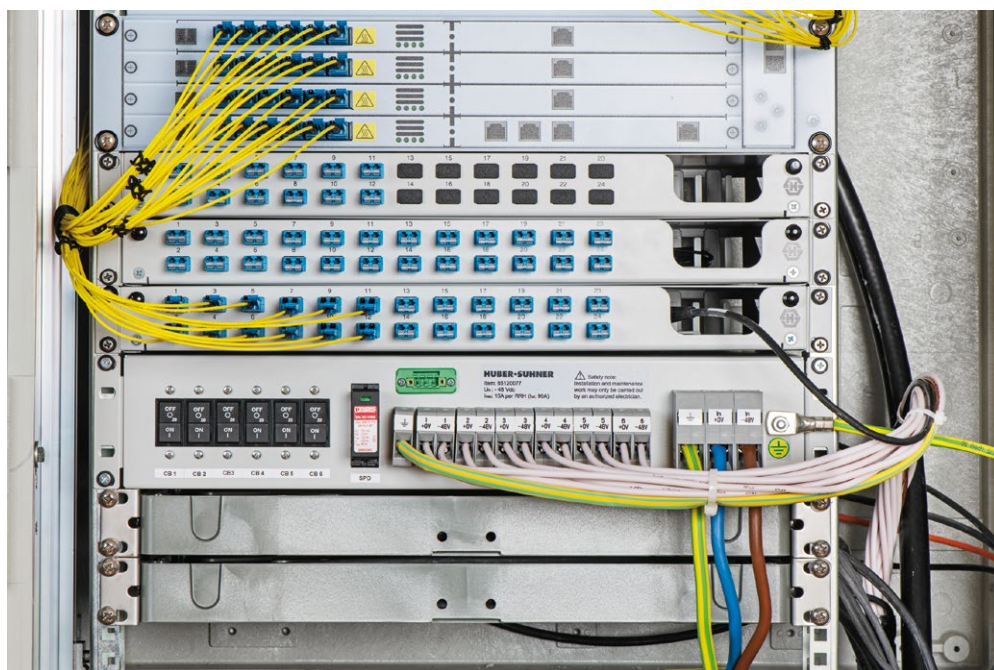
LC duplex
10 AWG
power pair

Please contact HUBER+SUHNER to define your customised product.

- Single-mode or multimode, 2 or 4 fibers
- Cross section of copper wires ($2 \times 4 \text{ mm}^2$, $2 \times 6 \text{ mm}^2$, or $2 \times 10 \text{ mm}^2$)
- Shielded or un-shielded
- Type of fiber optic connectors (ODC, RRH compatible connector, LC)
- Type of power termination (connectorised or open-ended)
- Assembly length (dependent on cross section)
- Breakout length at remote radio



Accessories for remote radio installation solutions



HUBER+SUHNER is an experienced partner for remote radio installation and we are close to the installers working in the field. We understand the daily installation issues and the need for field-proven tools and accessories.

Excess cable boxes help to safely store fiber optic cable at the bottom of the mast or in 19" racks. The 19" CTB patching box with a pullout tray for easy access fits to the MASTERLINE cable system.

19" power distribution units for up to 6 radio heads - each electrical circuit is fused with a circuit breaker - are compatible with MASTERLINE hybrid cabling systems of HUBER+SUHNER.

Further, we offer a basic cable clamp portfolio, which covers most of the RRH installation solutions and cable combinations. The used clamps are field-proven, easy to install and allow for an upgrade or exchange of cables.

We offer a universal grounding kit specially designed to accommodate the range of HUBER+SUHNER power and hybrid cable sizes. Also available is a heavy-duty cable stripping tool.

Accessories

Distribution box



Features

- Outdoor and indoor installation
- Store up to 30 m cable excess length (depending on cable diameter)
- Easily mountable on poles, on walls or in 19" racks (1U)
- Supplied with fixing brackets, screws, a laser warning label and some hook and loop cable ties

Specifications

Dimensions without mounting bracket		477 × 280 × 43.8 mm (1 unit)
Mandrel radius		60 mm
Material		glass-filled polycarbonate, halogen-free, UV resistant
Flammability		UL 94 V0
Operating temperature		−40 to 75°C
Cable excess length capacity	cable Ø 4.8 mm	30 m
	cable Ø 7.0 mm	20 m

Ordering information

Description	Item no.
Overlength box	84103325

19" Power distribution unit

19" Power distribution unit for 6 RRH with circuit breaker and surge protection device



Features

- Power distribution unit for 19" racks
- 6 DC-circuits with circuit breaker
- Surge protection device with remote indication contact
- Compatible with MASTERLINE Hybrid and Power cabling systems

Specifications

Number of RRH		6
Dimensions	height	2 units, 87.6 mm
	width incl. brackets	482 mm
	Width w/o brackets	444 mm
	depth	240 / 315 mm
U _N rated voltage		-48 V DC
I _{IN max}		120 A (6 × 20 A)
I _N rated current per RRH		20 A
Circuit breaker rating, type		20 A, DD frame , medium delay (code BS) CBI, p/n D2SBXM0063
Surge protection device, type		varistor-based plug-in lightning/surge arrester for L-N protection with remote indication contact Phoenix Contact, type VAL-MS-T1/T2 48/12.5/O-FM (2906282)
Ambient temperature range	operation	-20 to +75 °C
	installation	-10 to +50 °C
Material		powder coated steel
Colour		RAL7035, light grey
Power supply input		3 × screw terminals for maximum 50 mm ² (-48Vdc, 0V, PE)
Power supply output		13 × screw terminals for maximum 16 mm ² (6 × -48Vdc, 6 × 0V, PE)
Protective earth		M6 bolt
Test standards		EN 61439-1

The power distribution unit is compatible with HUBER+SUHNER cabling systems MASTERLINE Ultimate Hybrid/ Power, MASTERLINE Extreme Hybrid / Power and MASTERLINE Classic Hybrid / Power for up to 6 radio heads. Each electrical circuit is fused with a 20A circuit breaker. A varistor-based plug-in lightning/surge arrester T1/T2 between L (-48Vdc) and N (+0V) is used to protect the equipment against surges.



19" patching box

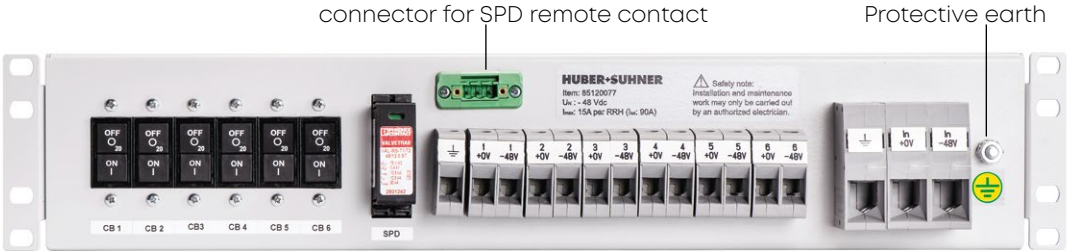
19" power distribution box

Hybrid cable with fiber optic cable and conductors

19" overlength box

HUBER+SUHNER's 19" patching boxes can be used for easy connection with the MASTERLINE cabling systems fiber optic connectors. Up to 30 m fiber optic cables can be stored with 19" overlength box of HUBER+SUHNER.

19" Power distribution unit



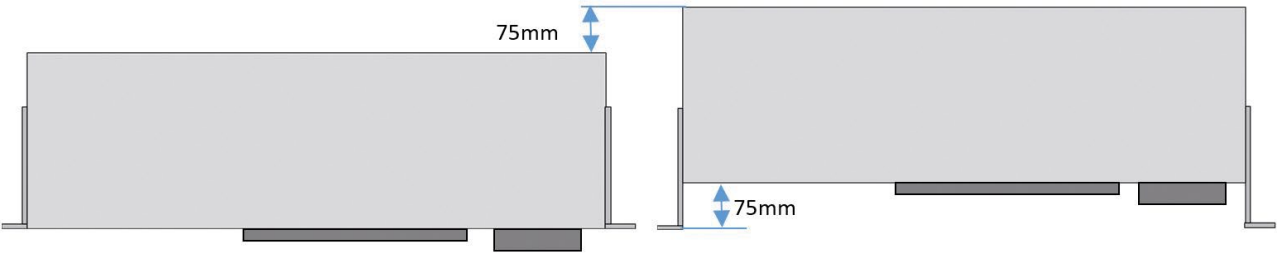
Circuit breaker 20 A 1...6

MLUH, MLUP, MLEH or MLEP

Power input up to 50 mm²

GND/PE
RRH 1, +0V / -48Vdc
RRH 2, +0V / -48Vdc
RRH 3, +0V / -48Vdc
RRH 4, +0V / -48Vdc
RRH 5, +0V / -48Vdc
RRH 6, +0V / -48Vdc

The chassis bracket can be mounted in 2 different positions, aligned with the front panel or 75 mm further ahead.



Ordering information distribution box

Description	Item no.
19" Power distribution unit for 6 RRH with 1 surge protection devices and 6 circuit breaker 20 A 19INPDU26-620-13	85120077

Customised configurations on request.

Accessories

19" CTB patching box




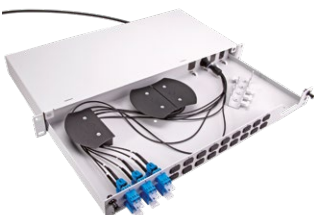






Features

- Space saving 19" rack installation
- Cable entry from the front and back for up to 3 MASTERLINE cable systems
- Pullout tray for easy access
- Fitted with 6, 12, 18 or 24 LC duplex adapter
- 3 mandrels for overlength management of the MASTERLINE cable system
- Optional patchcord guide available

Specifications






Dimensions (W × D × H)	482 × 209 × 43.5 mm (1 unit)
Connectivity	6, 12, 18 or 24 LC duplex adapter blue
Cable entry front or back	3 × MASTERLINE Classic 12 fiber or 24 fiber (small divider) 1 × MASTERLINE Classic 36 fiber (medium divider)
Material	powder coated steel
Weight	3 kg
Colour	RAL 7035 light grey

Installation features

Back or front cable entry		
Pullout tray for easy access		
Fixation of the divider, front or back entry		
Patchcord guide optional available		

Accessories

Ordering information

Description	Item no.	Picture
19" patching box 6 LC duplex adapter blue 18 blind caps extendible to 24 LC duplex adapter	85028405	
19" patching box 12 LC duplex adapter blue 12 blind caps extendible to 24 LC duplex adapter	85028406	
19" patching box 18 LC duplex adapter blue 6 blind caps extendible to 24 LC duplex adapter	85028407	
19" patching box 24 LC duplex adapter blue	85028408	
Patchcord guide Including 3 screws and nuts for mounting with the 19" CTB patching box	84125960	

Multimode available on request.

Accessories

19" CTB splicing box









Features

- Space saving 19" rack installation
- Splice cassette for 24 fibers
- Including 24 LC single-mode PC pigtails
- Fitted with 12 LC duplex adapter
- Cable entry from the front and back for MASTERLINE cable systems
- Pullout tray for easy access
- Optional patchcord guide available

Specifications



Dimensions (W × D × H)	482 × 209 × 43.5 mm (1 unit)
Connectivity	12 LC duplex adapter blue
Splice cassette	24 fiber
Pigtails	24 LC single-mode PC
Cable entry front or back	2 × MASTERLINE Classic 12 fiber or 1 × MASTERLINE Classic 24 fiber
Material	powder coated steel
Weight	3 kg
Colour	RAL 7035 light grey

Installation features

Pullout tray for easy access		
Fixation of the divider, front or back entry		
Patchcord guide optional available		

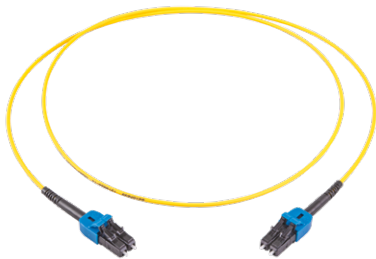
Accessories

Ordering information

Description	Item no.	Picture
19" splicing box including: <ul style="list-style-type: none"> splice cassette for 24 fibers 24 LC single-mode PC pigtails 12 LC duplex adapter blue 12 blind caps 	85028409	
Patchcord guide Including 3 screws and nuts for mounting with the 19" CTB splicing box	84125960	

Multimode available on request.

LC-HQ uniboot patchcord



Features

- LC-HQ uniboot patchcord to connect 19" CTB to active equipment (base station)
- Robust 2.1 mm cable
- Polarity flipping without tool

Specifications

Compliance	IEC 61754-20, TIA 604-10-A
Operating temperature	-25 to 70 °C
Mechanical resistance tensile load	70 N
Flammability	UL 94 V-0

Ordering information

Description	Cable and fiber type	Length	Item no.
LC uniboot patchcord	single-mode A2 2.1 mm yellow	0.5 m	84138001
		0.7 m	84125518
		1.0 m	84125519
		1.5 m	84138003
		2.0 m	84141892
	multimode OM 3 2.1 mm turquoise	0.5 m	84138007
		0.7 m	84125520
		1.0 m	84125521

Accessories

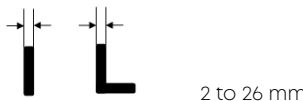
Combined cable clamps for fiber optic and power cables



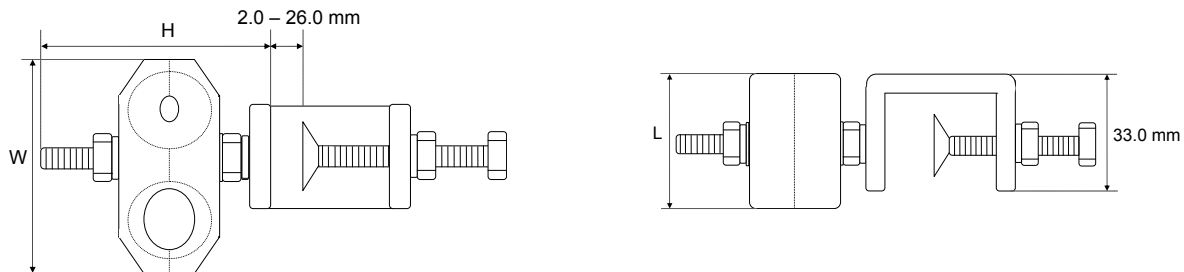
Features

- Combined cable clamps for 1 or 3 pairs of fiber optic and power feeders
- Easy and quick installation
- Stainless steel bracket
- Double saddle with rubber cushions

Specifications

Mounting profile	
Threaded bar M8	installation with 13 mm hex wrench and torque 6 to 8 Nm
Salt mist, IEC 61300-2-26	168 h
Material bracket	stainless steel AISI 304
Material saddle	polypropylene, UV resistant
Material cushions	black rubber

Dimensions

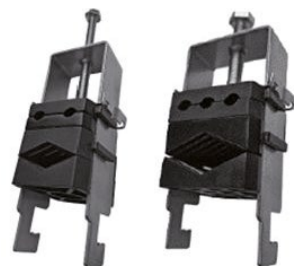


Ordering information

No. of cable pairs	Diameter range fiber optic cable	Diameter range power cable	Dimensions H × W × L	Item no.
1	4.8 to 7.0 mm	10.0 to 13.0 mm	70 × 53 × 40 mm	85011985
		13.0 to 16.0 mm		85012013
3		10.0 to 13.0 mm	130 × 53 × 40 mm	85011986
		13.0 to 16.0 mm		85012014
1	5.5 to 7.0 mm	17.5 to 20.0 mm	85 × 91 × 50 mm	85012007
		20.5 to 23.0 mm		85012005
		23.5 to 26.5 mm	90 × 65 × 50 mm	85142813
		27.0 to 28.0 mm		85142812
		30.5 to 33.5 mm		85142814
3	20.5 to 23.0 mm	20.5 to 23.0 mm	175 × 91 × 50 mm	85066072
		27.0 to 29.0 mm		85028293

Accessories

Combined cable clamps for fiber optic and power cables



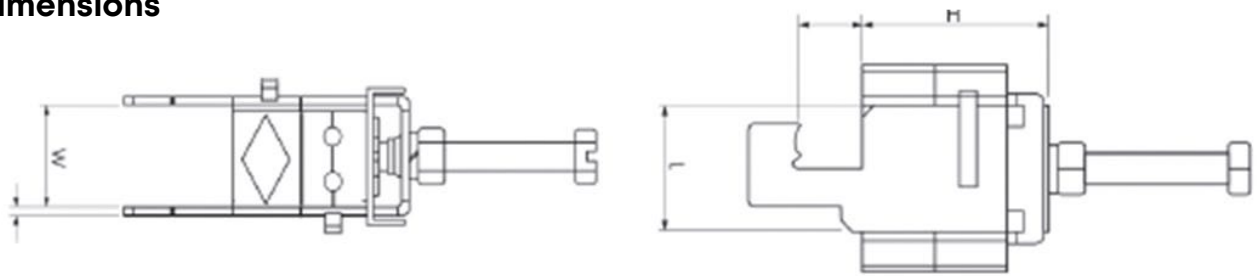
Features

- Combined cable clamp for 2 (3) fiber optic and 1 power cable
- Suitable for C section 40 × 22, flat and round profiles (3-12 mm)
- Stainless steel bracket

Specifications

Mounting profile		
Salt mist, IEC 61300-2-26		672 h (28 d)
Material bracket		stainless steel AISI 304
Material saddle		polyamide, UV resistant
Temperature range	in service	−40°C to 75 °C
	during installation	−10°C to 50 °C

Dimensions



Specifications

Number of power cables	Power cable diameter range	Number of fiber cable	Fiber cable diameter range	Dimensions H × W × L	Packaging quantity	HUBER+SUHNER item no.	
1	15 to 34 mm	2	6 to 7 mm	88 × 35 × 46	5 pcs	85119795	
	18 to 45 mm	3		88 × 46 × 46	5 pcs	85126122	

Accessories

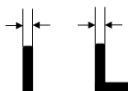
Cable clamps for power and hybrid cables



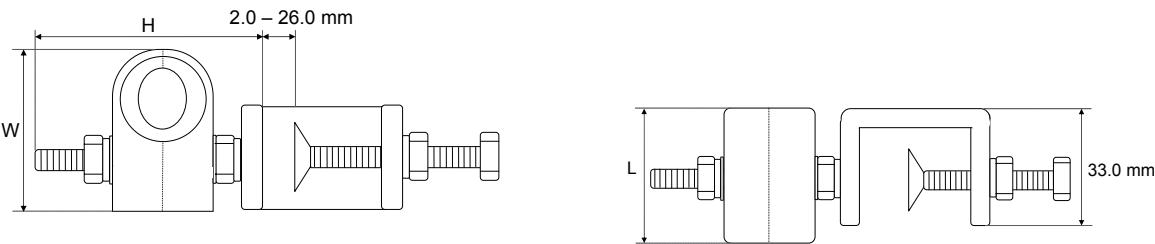
Features

- Cable clamp for power and hybrid cables
- Easy and quick installation
- Stainless steel bracket
- Standard size without rubber cushion

Specifications

Mounting profile	 2 to 26 mm
Threaded bar M8	installation with 13 mm hex wrench and torque 6 to 8 Nm
Salt mist, IEC 61300-2-26	168 h
Material bracket	stainless steel AISI 304
Material saddle	polypropylene, UV resistant
Material cushions	black rubber

Dimensions

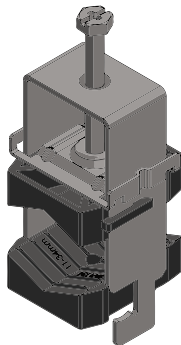


Ordering information

No. of cable	Cable diameter range	Dimensions H × W × L	Item no.
1	21.0 to 23.0 mm (5/8")	180 × 38 × 46 mm	85015525
	23.0 to 25.0 mm	100 × 51 × 55 mm	85065434
	27.0 to 29.0 mm (7/8")		85013128
	30.0 to 32.0 mm	120 × 76 × 59 mm	85014014
	32.0 to 34.5mm		85014015
	35.0 to 37.0mm		85065435
	37.0 to 40.0mm (1 1/4") 85014016		85014016
3	18.2 to 22.00 mm	175 x 55 x 51 mm	85012939

Accessories

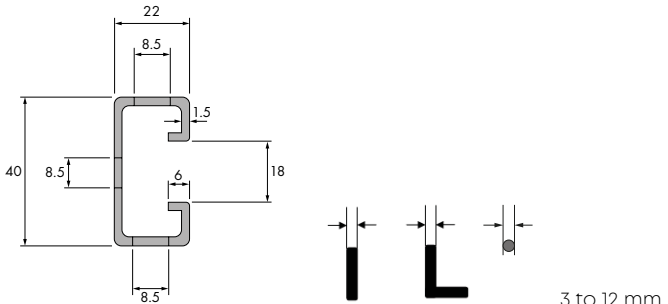
Cable clamps for power and hybrid cables



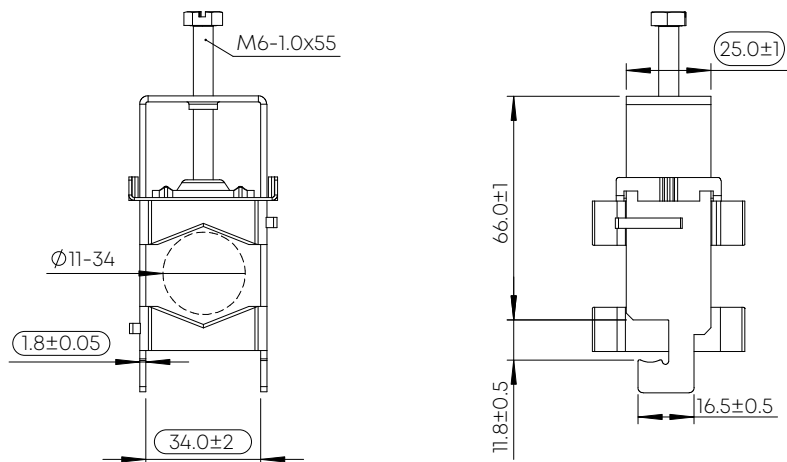
Features

- Cable clamp for power and hybrid cable
- Large cable diameter range
- Suitable for C section rail 40 × 22
- Stainless steel bracket

Specifications

Mounting profile	 <p>C section rail 40 × 22</p>	
Salt mist, IEC 61300-2-26	720 h	
Material bracket	stainless steel AISI 304	
Material saddle	polyamide	

Dimensions



Ordering information

Cable diameter range	Dimensions H x W x L	Item no.
7.0 to 22.0mm	50 x 22 x 25 mm	85234735
11.0 to 34.0mm	66 x 34 x 25 mm	85234736
16.0 to 46.0mm	86 x 46x 25 mm	85234740

Accessories

Grounding kit for hybrid cables



Features

- Universal grounding kit for hybrid cables
- Cable diameter range 16 mm to 40 mm
- 0.5 m long grounding wire 16 mm²
- Tin plated copper lug for M8 screw

The universal grounding kit is specially designed to accommodate the range of HUBER+SUHNER hybrid cable sizes. The tinned copper strap and associated hardware facilitates a proper attachment to the braided screen or copper foil. The 16 mm² (AWG 6), stranded copper wire with a one-hole lug (Ø 8.5 mm) provides a low inductance transfer of lightning induced current from the hybrid cable to the system ground. Installation of grounding kits is recommended at the top and bottom of each vertical run, at 20 m (66 ft) increments and just prior to building entry.

Specifications

Typical contact transition resistance	1 mΩ
Current handling capability (10/350 μs)	25 kA
Ingress protection	IP67
Ambient temperature range	–40 to 75 °C

Installation features

<p>List of components</p> <ul style="list-style-type: none">• Tinned copper strap assembly with 0.5 m grounding wire and one-hole lug (Ø 8.5 mm)• 50.8 mm × 6.1 m (2" × 20") roll electrical tape (PVC)• 63.5 mm × 0.4 m (2-1/2" × 15") roll butyl mastic• Coiling tool• Installation manual	
<p>The ground strap is wrapped around the exposed screen. The end of the strap has to be pulled through the slot at the strap. With the attached coiling tool the strap has to be tightened. There is an expansion joint at the strap which provides a visual indication if the strap is tightened enough. Note: H+S recommend to use the adjustable heavy-duty cable stripping tool with H+S item no. 85029959.</p>	
<p>Butyl mastic is placed around the clamp and acts as a filler. The vinyl electrical tape is wrapped around the hole ground strap to make it waterproof.</p>	

Ordering information

Description	Item no.
Universal grounding kit for hybrid cables	85015070

Accessories

Grounding cable



Features

- Flexible single core grounding cable
- RADOX 125 jacket material with excellent outdoor characteristics
- Stranded tin plated copper conductor
- M8 lugs on both ends
- Available in both black or yellow/green colours

HUBER+SUHNER grounding cables with RADOX 125 (electron beam crosslinked polyolefin copolymer) jacket and M8 lugs on both ends fits onto the integral earth stud of MLEP, MLEH, MLUP and MLUH cabling systems.



Specifications

Conductor	stranded tin plated copper, class 5 acc. to EN 60228
Jacket material	electron beam crosslinked polyolefin copolymer
Ambient temperature range	-40 to 75°C
Rated Voltage U0/U	600 V/1000 Vac
Test voltage	3500 Vac
Halogen-free	acc. EN 50363
Lug type	tubular standard cable lug
Size of bolt diameter	M8
Lug material	tin-plated copper acc. to EN 13600
Vibration	acc. DIN EN 61373 class 1 B

Ordering information



Cable cross section	Cable length	Cable colour	Size of bolt diameter left side	Size of bolt diameter right side	Item no.
16 mm ²	0.5 m	black	M8	M8	85086667
16 mm ²	0.5 m	yellow/green	M8	M8	85083781
25 mm ²	0.5 m	black	M8	M8	85086668
25 mm ²	0.5 m	yellow/green	M8	M8	85083792

Options:

- Other length
- Other lugs (e.g. angled, dual hole)

Accessories

Heavy-duty cable stripping tool for power and hybrid cable

Adjustable heavy-duty cable stripping tool Wire size: 4.5 to 40 mm/0.18" to 1.57" Stripping dimensions adjustable up to 4.5 mm/0.18" insulation thickness	85029959	
Spare blade for adjustable heavy-duty cable stripping tool (85029959)	85032058	

MLEP/MLEH mounting bracket



mounting bracket
MLEH small



mounting bracket
MLEH large

Features



- Quick and easy to install
- Robust stainless steel bracket
- UV resistant plastic clip with snap-in mechanism
- Clip can be closed without tool
- Suitable for poles and walls

The MLEP/MLEH mounting bracket has a snap-in mechanism for quick and easy fixation of the divider housing. The clips are UV resistant can be closed by hand without any tool. With a medium size screw drive the clip can be reopened at any time.

Specifications

Bracket material	stainless steel	
Plastic clip	PA12 black	
Dimension W x H x D	mounting bracket MLEH small	159 mm x 122 mm x 89 mm
	mounting bracket MLEH large	159 mm x 164 mm x 89 mm

Ordering information

Description	Item no.	
Mounting bracket with 2 clips for MLEP/MLEH small	85140742	
Mounting bracket with 1 double clip for MLEP/MLEH large	85140743	

Quick hose clamp



Features

- Stainless steel
- Diameter 40 to 160 mm or 60 to 500 mm

Specifications

Material	stainless steel 304
Material thickness	0.65 mm
Dimension width	14.2 mm
Dimension range	30 to 155 mm/60 to 500 mm

Ordering information

Description		Item no.
Quick hose clamp One set including 2 pieces	diameter range 30 to 155 mm	84076411
	diameter range 60 to 500 mm	84076412



Fiber optic interfaces for remote radio heads



HUBER+SUHNER is the leading supplier of harsh environment fiber optic interfaces for remote radio heads. RRH are installed in many different types of environments such as coastal areas, urban buildings or rural tower sites and extreme temperatures, vibration, salt mist, corrosive gases and humidity are all typical challenges. Therefore robustness and reliability are crucial for the design of RRH interfaces. Additionally, the interface needs to be safe to install and must not cause any installation errors – this is essential to compensate for unskilled installers. Damage to fiber optic interfaces is the number one cause of defects during RRH installation. Innovation and field-experience enables HUBER+SUHNER to design leading RRH interfaces like ODC and Q-ODC.