

Wireless Infrastructure

Solutions for remote radio systems and conventional cell sites

Edition 2012



Count on proven wireless Technology





Your partner for connectivity solutions

The HUBER+SUHNER group is a leading global supplier of components and systems for electrical and optical connectivity. Our customers in communication, industry and transportation appreciate that we are specialists with detailed knowledge of practical applications. We offer expertise in radio frequency, fiber optics and low frequency all under one roof, thus providing a unique basis for continual innovation which is focused on the needs of our customers all over the world.

Our motto: "EXCELLENCE in CONNECTIVITY SOLUTIONS". At the heart of our offering is a broad range of products that can be relied on to meet high quality standards, backed up by flexible, dependable services with fast response times worldwide. In the wireless market, we concentrate on solutions that allow us to stand out by adding value with special product features, application-specific innovations, reduction of total cost of ownership and excellence in delivery performance.



Work with the Leader for Remote Radio Installation Solutions

Remote radio technology

Remote Radio systems evolved as the dominating technology in the wireless communication industry. Remote radio heads (RRH) significantly reduce the network's energy consumption while at the same time improving the network performance. The number of RRH installations surpassed conventional corrugated cell site installations and poses new challenges for operators, installers and system integrators. The installation industry needs to adapt to new cable technologies, e.g. fiber optics, work with new logistic models, and acquire fundamentally different installation know-how. HUBER+SUHNER helps to build reliable passive infrastructure fulfilling today's and tomorrow's network requirements.

HUBER+SUHNER provides complete installation solutions

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

Be ready for LTE

LTE systems use remote radio technology. HUBER+SUHNER offers solutions that enables an efficient migration from corrugated copper systems to RRHs systems while keeping the real-estate changes at the cell site to an absolute minimum. HUBER+SUHNER has the optimum solution independent of the number or type of RRHs deployed on the mast.





Do not compromise your wireless Network Quality

Conventional cell sites technology

HUBER+SUHNER is an established full-range supplier of antenna supply lines for conventional cell site solutions. From SUCOFEED corrugated cables in all sizes with matching easy-to-install QUICK-FIT connectors on antenna supply lines, to RF LISCA jumpers for connecting the antenna to the network on top of the mast, to lightning protection solutions of all types and additional products for efficient installation. HUBER+SUHNER supplies complete updated passive low PIM (passive intermodulation) components for existing or 4th generation LTE applications.

Global design & manufacturing leader of low passive intermodulation components

HUBER+SUHNER's passive radio frequency components have an outstanding low PIM performance. Our products and material expertise in combination with application know-how enables us to keep intermodulation in the entire signal path small and to minimize unwanted PIM generated signals in the uplink. This performance is of particular importance for operators moving to LTE, where frequency bands ranging from 700 MHz up to 2.6 GHz are used in parallel. Our RF products do not compromise your wireless network performance.



HUBER+SUHNER – a World Class Supplier for wireless Infrastructure

A guarantee of quality

Continuous quality improvement is a top priority for our organisation. For all our employees, high quality means the complete fulfilment of all the expectations of our outside and in-house customers. Our systematic quality and environmental management systems ensure that international standards are observed. Our global management system is certified according to ISO 9001, ISO 14001 and in our automotive units we also have ISO/TS 16949.



A truly global company

Market proximity is the advantage of our global presence, with subsidiaries in Australia, Brazil, Canada, China, Denmark, Germany, France, India, Malaysia, Poland, Singapore, Sweden, Thailand, United Kingdom and the US plus representatives in over 60 countries. Our customers benefit from all the advantages of a global supplier, while being supported by local engineering teams, manufacturing and logistics.



Operational excellence

Considerable cost efficiency for us and our customers is made possible by our specialised competence centres in our three most important markets, namely Europe, the Americas and Asia. Our global, IT-supported production and logistics operations are managed and coordinated centrally, minimising purchasing and warehousing costs and maximising flexibility with regard to fluctuations in demand. We ensure we are able to meet the logistic expectations of our customers, independent of high volume bulk shipments or fast and flexible on-site services with short lead-time requirements. Fulfilling challenging expectations for us is a matter of course.



Innovation and competence

We develop superior products and services in close collaboration with our customers. We are one of the few globally active companies producing components and systems with the key technologies radio frequency, fiber optics and low frequency under one roof - a unique and necessary combination for the leading solution provider for remote radio installations. Our production facilities are state of the art; being based in Switzerland, a hotbed of innovation, and offering high-quality products are both very important factors for us. Our outstanding research and production capabilities mean that we enjoy a great deal of credibility among customers and stakeholders alike.



Corporate culture

Our corporate culture entails taking the long-term view and keeping an eye on the big picture. The cornerstone of our present and future success is the dedication shown by our staff, who benefit from competitive employment conditions and attractive career development opportunities. Openness, mutual respect and teamwork are the means by which we create a working environment where trust and an entrepreneurial spirit reign. Sound finances and an optimally diversified portfolio of business activities give us the independence to guarantee continuity within our company.

Solutions for Cell Sites

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Remote Radio Installation Solutions



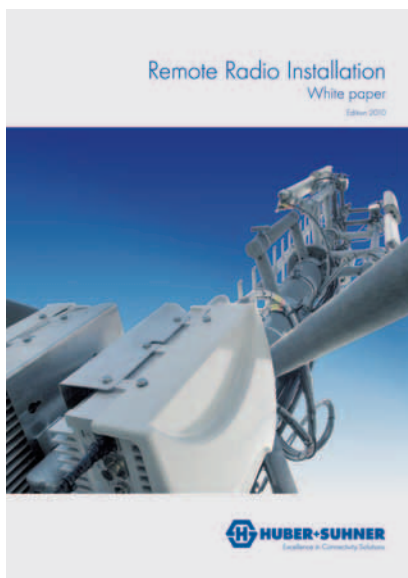
Visit www.wireless-infrastructure.com



The microsite is a powerful guide to design your optimum RRH installation solution and provides comprehensive information about available installation options. It also contains detailed product data sheets, success stories, market news and is an information platform for mobile operators, installation companies and system integrators.

Request your best practices guide: How to install remote radio systems

The installation of remote radio systems poses new challenges for mobile operators, installers and system integrators. What installation methods are available and what are their advantages? How can a network operator install a future-proof passive infrastructure? How can savings be made on installation costs and follow-up costs? HUBER+SUHNER offers expert answers to these questions and discusses optimum installation solutions.




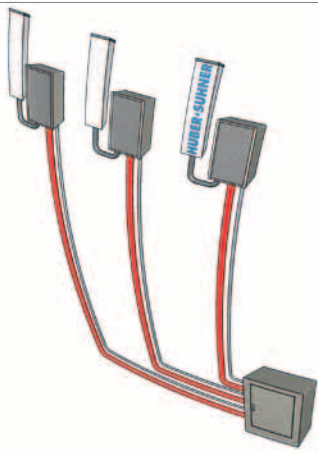
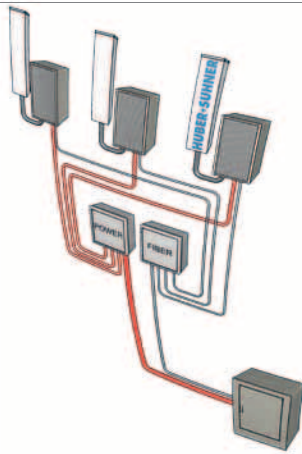
Download the White Paper

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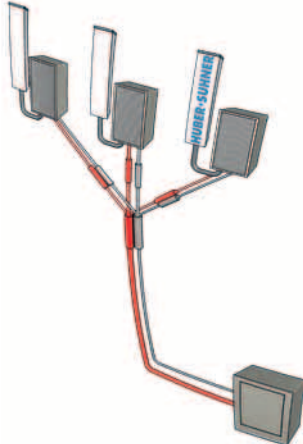
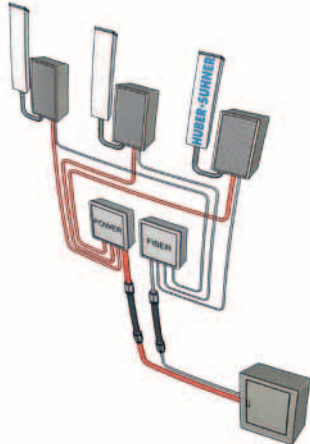
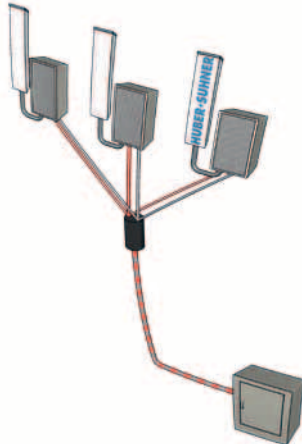
Order paper copy of White Paper

Item no.	Language
84118113	english version
84118112	german version

Overview of RRH Installation Options

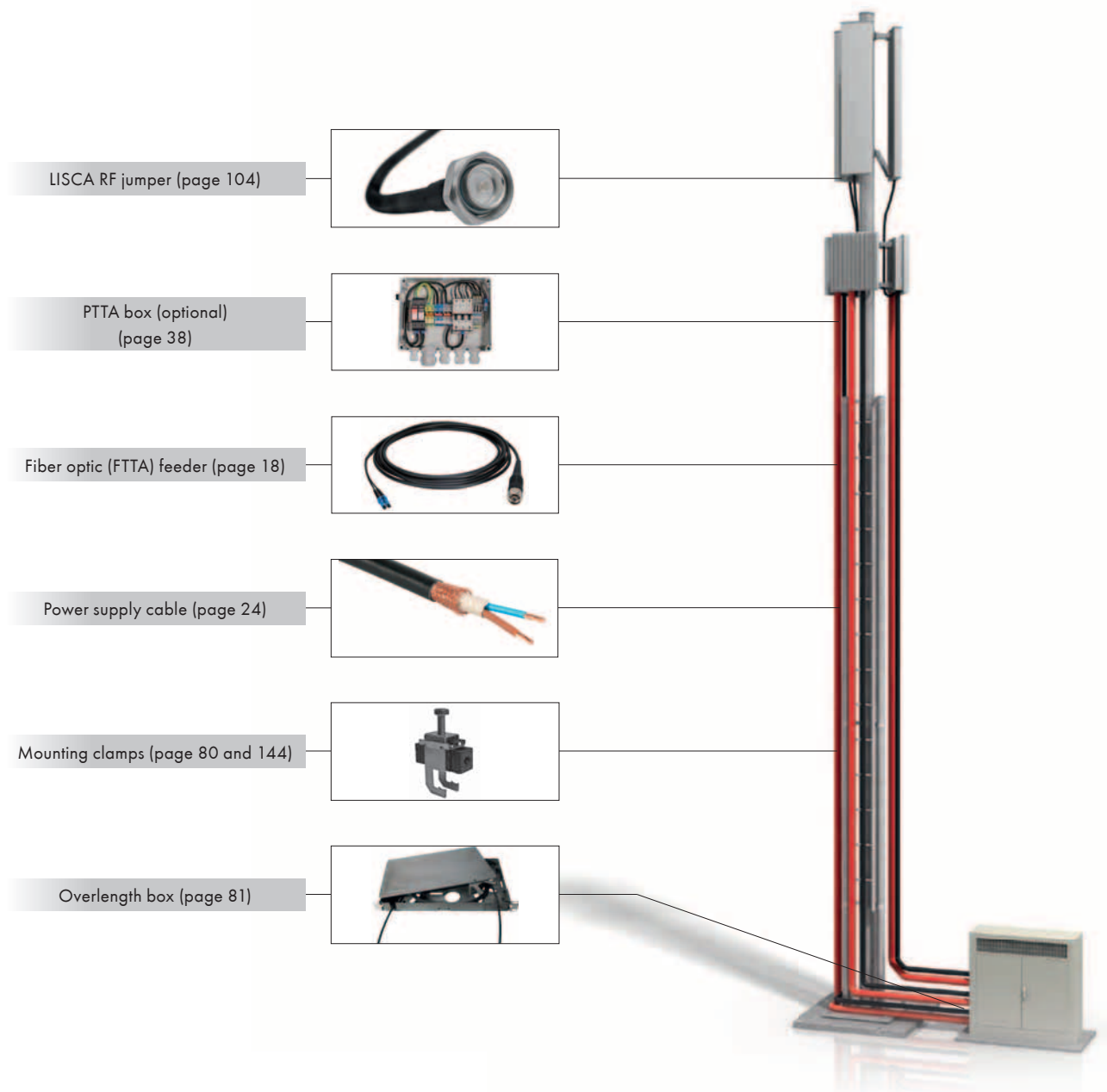
	#1 Individual cables	#2 Multi-riser cables and box
	<ul style="list-style-type: none"> • Fiber optic: 2-fiber riser cables • Power supply: 2-wire copper cables 	<ul style="list-style-type: none"> • Fiber optic: MASTERLINE classic^{HT} with 6 up to 24 fibers and FTTA Box • Power supply: Multi-wire power cable with grounded PTTA box
	See page 16	See page 26
		
Suitable cell sites	co-located and distributed antennas	only co-located antennas
Flexibility during RRH replacement	no	yes
Scalable for 3 to 12 RRHs	no	yes
Future-proof	no	yes
Overlength management	limited	yes
Installation time	medium	efficient
Cost efficiency / overall costs	€ - €€	€
Spread / frequency in practice	system vendor solution	rapid growth

Overview of RRH Installation Options

#3 MASTERLINE extreme	#4 Re-use of corrugated cables	#5 Hybrid cables
<ul style="list-style-type: none"> Fiber optic: MASTERLINE extreme with 3 up to 9 break-outs Power supply: MASTERLINE extreme power with multi-wire power cable 	<ul style="list-style-type: none"> Fiber optic: MASTERLINE classic^{HT} with special feed-through cable, 6 to 12 fibers Power supply: Smart DC kit 	<ul style="list-style-type: none"> Combined fiber optic and power cables
See page 54	See page 62	See page 70
		
only collocated antennas	only collocated antennas	limited application
yes	yes	yes
up to 9 RRHs	up to 6 RRHs	no
yes	yes	no
limited	yes	limited
plug-and-play	efficient	medium
€	€	€€€
rapid growth	swap	used under special conditions

Standard Solution with discrete Cables

The standard solution with discrete cables supports every type of cell site installation whether if 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 or Q-XCO) and cable assemblies for remote radio systems. The installation method with discrete cables is the preferred choice of mobile system vendors and HUBER+SUHNER is an approved and qualified cable assembly supplier for the majority of the tier 1 and tier 2 vendors.





Application and features

- Suited for co-located antennas (e.g. mast-top installation) and distributed antennas (e.g. roof-top installation)
- Method supports any type of cell site installation

Benefits

- Simplest and preferred method of system vendors
- HUBER+SUHNER deliver customized cable assemblies (e.g. in increments of 10 m)
- Vendor approved cable assemblies and guaranteed system compatibility
- Short lead-time to fulfil stringent installation requirements
- Auxiliary material available for trouble-free installation

Issues

- For three sectors six cables need to be installed
- Sub-optimum for longer distances due to time-consuming and complex cable installation
- Minor flexibility with regard to RRH or interface replacement
- Method does not support system expansions or network evolution
- Cables not compatible in case of use of different systems/vendors in same network (e.g. different interfaces or fiber types).



FTTA Fiber-to-the-Antenna Feeder



Features

- FTTA feeders available for all types of RRHs and systems (2G, 3G, 4G, Wimax, Microwave point-to-point links)
- Ruggedized design and installation proof
- Standard assemblies and customized lengths available in short lead-time
- Cable diameter 4.8 mm, 5.5 mm or 7 mm
- All cables rodent resistant and monkey bite protected on request
- All cable assemblies factory-terminated and tested

Specifications

Outer cable diameter	4.8 mm	5.5 mm	7 mm
Jacket material	LSFH™	LSFH™	LSFH™
Maximum tensile strength (during installation/service)	300/500 N	500/1000 N	650/1000 N
Cable crush resistance (short-term/long-term)	200/400 N/cm	200/400 N/cm	300/1000 N/cm
Temperature range	- 40 °C to + 95 °C	- 40 °C to + 80 °C	- 40 °C to + 80 °C
Flame resistance	IEC 60332-1, IEC 60332-3-24, UL1666		
UL approved	none	OFNR	OFNR
UV resistant	yes	yes	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 globally a leading 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 innovation leader for remote radio interfaces and is owner of globally successful products like ODC, XCO or Q-XCO.

FTTA Fiber-to-the-Antenna Feeder



Ordering information

ODC feeder with Ø 5.5 mm cable



Length	Item no. singlemode low-bend	Item no. multimode	Description
1 m	84122151	84124943	09H02FG...A4/88-2-1 ..
2 m	84122152	84124942	09H02FG...A4/88-2-2 ..
5 m	84078725	84078739	09H02FG...A4/88-2-5 ..
10 m	84078726	84078740	09H02FG...A4/88-2-10 ..
15 m	84078727	84078741	09H02FG...A4/88-2-15 ..
20 m	84078728	84078742	09H02FG...A4/88-2-20 ..
30 m	84078729	84078743	09H02FG...A4/88-2-30 ..
40 m	84078730	84078744	09H02FG...A4/88-2-40 ..
50 m	84078731	84078745	09H02FG...A4/88-2-50 ..
60 m	84078732	84078746	09H02FG...A4/88-2-60 ..
70 m	84078733	84078747	09H02FG...A4/88-2-70 ..
80 m	84078734	84078748	09H02FG...A4/88-2-80 ..
90 m	84078735	84078749	09H02FG...A4/88-2-90 ..
100 m	84078736	84078750	09H02FG...A4/88-2-100 ..
125 m	84078737	84078751	09H02FG...A4/88-2-125 ..
150 m	84078738	84078752	09H02FG...A4/88-2-150 ..

ODC feeder also available with 7 mm cable diameter or as 1-fiber version.

LC feeder with metal divider and ruggedized break-out, Ø 5.5 mm cable, low-bend fiber



Length	Item no.	Description	Length	Item no.	Description
1 m	84122153	09H02FGG-LB-88/88-2-1.26 NN	60 m	84120595	09H02FGG-LB-88/88-2-60.26 NN
2 m	84122154	09H02FGG-LB-88/88-2-2.26 NN	70 m	84120596	09H02FGG-LB-88/88-2-70.26 NN
5 m	84120589	09H02FGG-LB-88/88-2-5.26 NN	80 m	84120597	09H02FGG-LB-88/88-2-80.26 NN
10 m	84120590	09H02FGG-LB-88/88-2-10.26 NN	90 m	84120598	09H02FGG-LB-88/88-2-90.26 NN
20 m	84120591	09H02FGG-LB-88/88-2-20.26 NN	100 m	84120599	09H02FGG-LB-88/88-2-100.26 NN
30 m	84120592	09H02FGG-LB-88/88-2-30.26 NN	125 m	84120600	09H02FGG-LB-88/88-2-125.26 NN
40 m	84120593	09H02FGG-LB-88/88-2-40.26 NN	150 m	84120601	09H02FGG-LB-88/88-2-150.26 NN
50 m	84120594	09H02FGG-LB-88/88-2-50.26 NN			

Also available with 4.8 mm cable.

FTTA Fiber-to-the-Antenna Feeder

FullAXS feeder with 4.8 mm cable, singlemode low-bend fiber



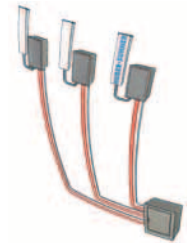
Length	Item no. singlemode	Description
1 m	84137909	09H02FGG-1B-Z4/88-2-1 NN
2 m	84137910	09H02FGG-1B-Z4/88-2-2 NN
5 m	84137911	09H02FGG-1B-Z4/88-2-5 NN
10 m	84137912	09H02FGG-1B-Z4/88-2-10 NN
15 m	84137913	09H02FGG-1B-Z4/88-2-15 NN
20 m	84137914	09H02FGG-1B-Z4/88-2-20 NN
30 m	84137915	09H02FGG-1B-Z4/88-2-30 NN
40 m	84137916	09H02FGG-1B-Z4/88-2-40 NN
50 m	84137917	09H02FGG-1B-Z4/88-2-50 NN
60 m	84137918	09H02FGG-1B-Z4/88-2-60 NN
70 m	84137919	09H02FGG-1B-Z4/88-2-70 NN
80 m	84137920	09H02FGG-1B-Z4/88-2-80 NN
90 m	84137921	09H02FGG-1B-Z4/88-2-90 NN
100 m	84137922	09H02FGG-1B-Z4/88-2-100 NN
125 m	84137923	09H02FGG-1B-Z4/88-2-125 NN
150 m	84137924	09H02FGG-1B-Z4/88-2-150 NN

LC feeder with Ø 5.5 mm cable



Length	Item no. singlemode low-bend	Item no. multimode	Description
2.5 m	84122419	84122420	09H02FG...88/88-2-2.5 ..
5 m	84122418	84104136	09H02FG...88/88-2-5 ..
15 m	84104111	84104137	09H02FG...88/88-2-15 ..
30 m	84104112	84104138	09H02FG...88/88-2-30 ..
50 m	84104113	84104139	09H02FG...88/88-2-50 ..
70 m	84104114	84104140	09H02FG...88/88-2-70 ..
85 m	84104115	84104142	09H02FG...88/88-2-85 ..
100 m	84104116	84104143	09H02FG...88/88-2-100 ..
150 m	84104117	84104144	09H02FG...88/88-2-150 ..
200 m	84104118	84104145	09H02FG...88/88-2-200 ..
250 m	84104120	84104146	09H02FG...88/88-2-250 ..
300 m	84104121	84104147	09H02FG...88/88-2-300 ..

FTTA Fiber-to-the-Antenna Feeder



LC feeder with Ø 7 mm cable



Length	Item no. singlemode low-bend	Item no. multimode	Description
1 m	84106141	84117532	09H02FG...-88/88-2-1 ..
2 m	84106142	84085209	09H02FG...-88/88-2-2 ..
3 m	84106143	84114473	09H02FG...-88/88-2-3 ..
4 m	84125503	84125500	09H02FG...-88/88-2-4 ..
5 m	84105041	84085208	09H02FG...-88/88-2-5 ..
6 m	84125504	84125501	09H02FG...-88/88-2-6 ..
8 m	84125507	84125502	09H02FG...-88/88-2-8 ..
10 m	84104280	84115234	09H02FG...-88/88-2-10 ..
15 m	84106144	84115236	09H02FG...-88/88-2-15 ..
20 m	84106145	84085207	09H02FG...-88/88-2-20 ..
30 m	84106146	84085200	09H02FG...-88/88-2-30 ..
40 m	84106147	84085201	09H02FG...-88/88-2-40 ..
50 m	84106148	84085202	09H02FG...-88/88-2-50 ..
60 m	84106149	84124945	09H02FG...-88/88-2-60 ..
70 m	84106150	84085203	09H02FG...-88/88-2-70 ..
80 m	84106151	84084612	09H02FG...-88/88-2-80 ..
90 m	84106152	84124946	09H02FG...-88/88-2-90 ..
100 m	84106153	84085204	09H02FG...-88/88-2-100 ..
125 m	84106154	84124947	09H02FG...-88/88-2-125 ..
150 m	84106155	84085205	09H02FG...-88/88-2-150 ..
200 m	84124944	84085206	09H02FG...-88/88-2-200 ..

FTTA Fiber-to-the-Antenna Feeder

LC feeder with 90° boot, Ø 7 mm cable, multimode fiber



Only available for vendor approved companies.

Length	Item no.	Description
2 m	84082925	09H02FG0-50-8C/8C-2-2 MM
5 m	84122156	09H02FG0-50-8C/8C-2-5 MM
10 m	84083054	09H02FG0-50-8C/8C-2-10 MM
20 m	84083071	09H02FG0-50-8C/8C-2-20 MM
30 m	84083074	09H02FG0-50-8C/8C-2-30 MM
40 m	84083079	09H02FG0-50-8C/8C-2-40 MM
50 m	84083081	09H02FG0-50-8C/8C-2-50 MM
75 m	84083084	09H02FG0-50-8C/8C-2-75 MM
100 m	84083086	09H02FG0-50-8C/8C-2-100 MM
200 m	84083087	09H02FG0-50-8C/8C-2-200 MM

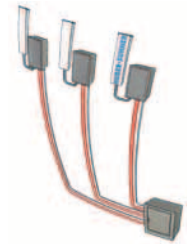
LC feeder with straight boot, Ø 7 mm cable



Only available for vendor approved companies.

Length	Item no. singlemode low-bend	Item no. multimode	Description
1 m	84124936	84124933	09H02FG...8A/88-2-1 ..
2 m	84124937	84124024	09H02FG...8A/88-2-2 ..
5 m	84124938	84124054	09H02FG...8A/88-2-5 ..
10 m	84125616	84123456	09H02FG...8A/88-2-10 ..
15 m	84125617	84124055	09H02FG...8A/88-2-20 ..
20 m	84125618	84124056	09H02FG...8A/88-2-30
30 m	84062386	84124057	09H02FG...8A/88-2-30 ..
50 m	84062387	84062408	09H02FG...8A/88-2-50 ..
70 m	84062388	84062409	09H02FG...8A/88-2-70 ..
90 m	84062389	84062410	09H02FG...8A/88-2-90 ..
110 m	84062390	84062411	09H02FG...8A/88-2-110 ..
130 m	84062391	84062412	09H02FG...8A/88-2-130 ..
150 m	84062392	84062413	09H02FG...8A/88-2-150 ..
170 m	84062393	84062414	09H02FG...8A/88-2-170 ..
190 m	84062394	84062415	09H02FG...8A/88-2-190 ..
210 m	84062395	84062416	09H02FG...8A/88-2-210 ..

FTTA Fiber-to-the-Antenna Feeder



ODC-4 feeder with Ø 5.5 mm cable



Length [m]	Fiber type	Description
L	singlemode low-bend	09H04FGG-LB-J2/88-3-L NN
L	multimode	09H04FG0-50-J2/88-3-L MM

Q-XCO feeder with Ø 5.5 mm cable



Length [m]	Fiber type	Description
L	singlemode low-bend	09H02FGG-LB-XA/88-2-L NN
L	multimode	09H02FG0-50-XA/88-2-L MM

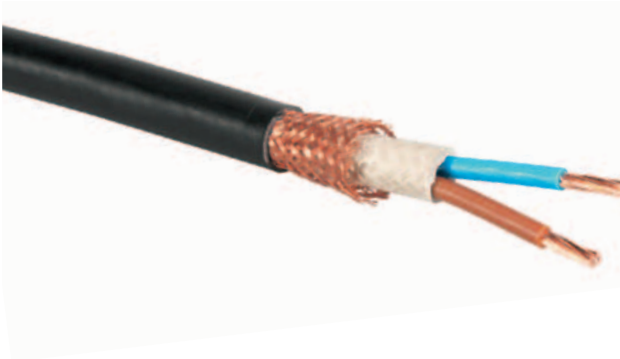
XCO feeder with Ø 5.5 mm cable



Length [m]	Fiber type	Description
L	singlemode low-bend	09H02FGG-LB-X1/88-2-L NN
L	multimode	09H02FG0-50-X1/88-2-L MM

Further FTTA feeders for all types of remote radio systems available (e.g. R2CT, LC push-pull connector, industrial LC connector).

2 Wire Power Supply Cable



Features

- Copper cable for RRH power supply
- 2 wire shielded power supply cable
- Cross section 4 mm², 6 mm², 10 mm², 16 mm², 25 mm²
- Suited for all remote radio systems
- Raw cable or pre-connected cables assemblies available
- For indoor and outdoor application

Specifications

Jacket material	LSFH™
Conductor	copper stranded 4 mm ² , 6 mm ² , 10 mm ² IEC 60228 class 2 16 mm ² , 25 mm ² IEC 60228 class 5
Screen	braided screen of copper wires
Operating voltage	48 V dc
Rated voltage	0.6 / 1.0 kV
Temperature range	- 40 °C to + 90 °C

Cross section	2 x 4 mm ²	2 x 6 mm ²	2 x 10 mm ²	2 x 16 mm ²	2 x 25 mm ²
Resistance (Ω / km)	4.61	3.08	1.83	1.21	0.78
Current per conductor (A)	34	44	61	82	105
Cable diameter (mm)	14	15	18	20	25
Cross section braid (mm ²)	4	6	10	16	16

Ordering information

Cross section	Item no.	Description
2 x 4 mm ²	84119282	0204-02-LSFH14-02
2 x 6 mm ²	84112973	0206-02-LSFH15-02
2 x 10 mm ²	84112975	0210-02-LSFH18-02
2 x 16 mm ²	84115986	0216-02-LSFH20-02
2 x 25 mm ²	84138547	0225-02-LSFH25-02

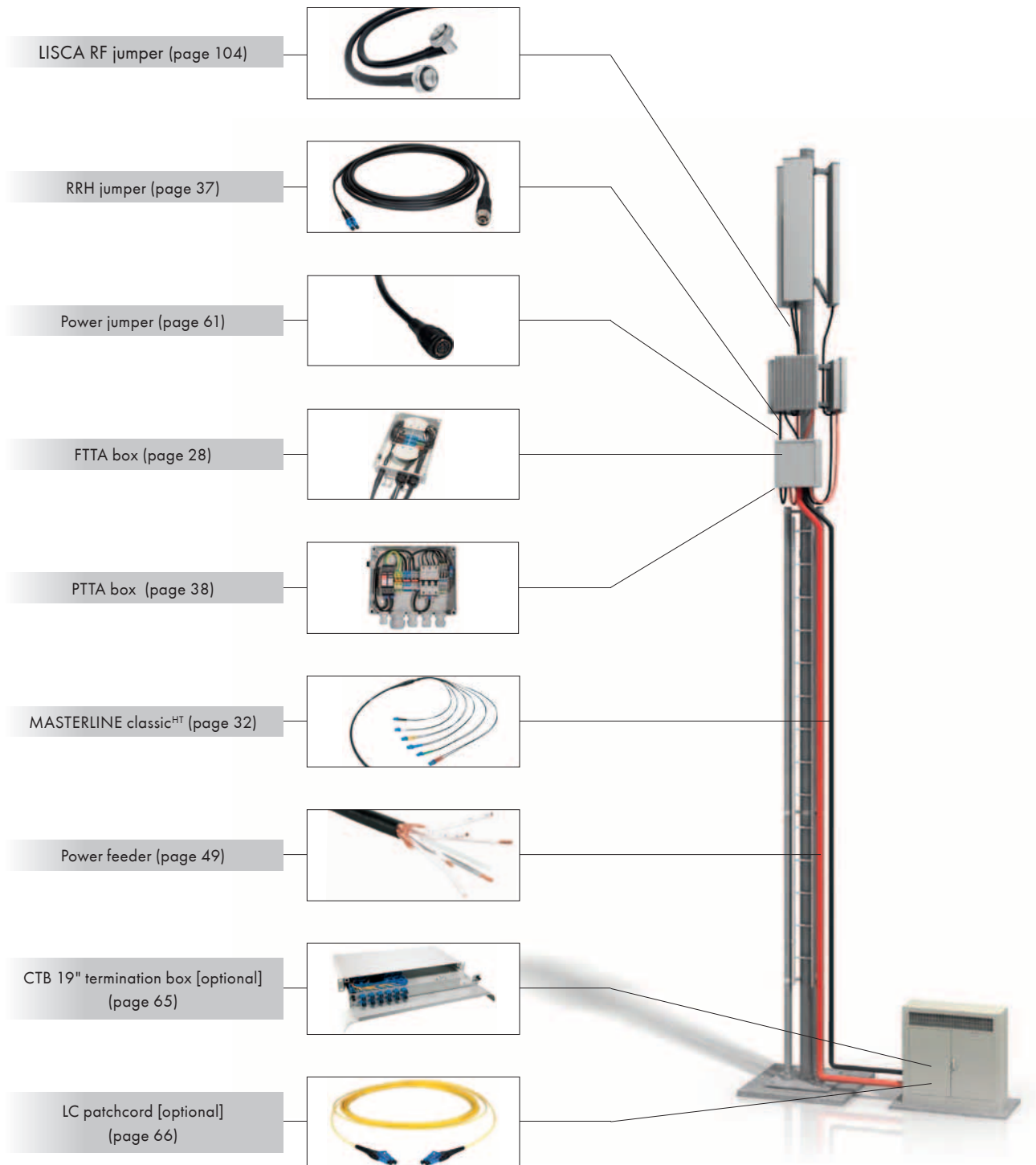


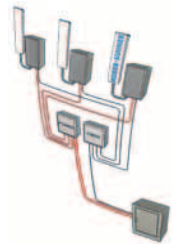
Connectorized power cable assemblies available upon request.



Multi-riser Cable with Distribution Box

This solution uses multi-riser cables for fiber optic and copper that are routed in separate connection boxes (or in a combined hybrid box) which are then linked to the RRHs with short jumper cables. This installation method is cost-effective and installation friendly and is therefore the preferred choice of mobile network operators who have control over network design and deployment. The passive cable infrastructure is future-proof, supports network expansions and saves on installation and follow-up costs. HUBER+SUHNER is a complete solution provider and manufacturer for the passive cable infrastructure between base station and antenna.





Application and features

- Optimum for co-located antennas, e.g. mast-top installation
- Preferred method of network operators
- Passive cable infrastructure is system and vendor independent
- Cable installation systems designed for 20-years life time to support network evolution over future generations of active equipment

Benefits

- Reduced installation times, lower level of investment (CAPEX)
- For 3-sector site, just 2 multi-riser cables instead of 6 individual cables, plug-and play
- Scalable for 3 up to 12 RRHs, perfect for planned LTE roll-outs and expansions
- Future-proof as the passive cable infrastructure supports all aspects of network evolution
- Best flexibility in case of RRH replacement as short jumpers can be easily exchanged
- HUBER+SUHNER designs and delivers complete systems

Issues

- Limited suitability for cell sites with distributed antennas



FTTA Fiber-to-the-Antenna Box



Features

- Ruggedized outdoor fiber distribution box
- Supports up to 8/12 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 integrated screws and pre-mounted brackets
- Compatible with splice cassettes and MTP modules
- Fully electrically isolated / RoHs compliant
- Protective vent to equalize pressure and prevent condensation

Specifications

	small FTTA box	medium FTTA box	
Number of RRH	3, 6, 8 RRH	up to 12 RRH	up to 12 RRH
Compatible with MASTERLINE classic ^{HT}	6, 12, 16 fibers	24 fibers	24 fibers or 2 x 12 fibers
Compatible with MASTERLINE MTP TM	12 fibers	no	24 fibers
Dimensions	255 x 180 x 65 mm	300 x 230 x 85 mm	250 x 320 x 138 mm
Cable entry (left knock-out holes)	2 x M16 for MASTERLINE classic ^{HT} up to 16 fibers or MASTERLINE MTP TM	1 x M26 for MASTERLINE classic ^{HT} 24 fibers	1 x M26 for MASTERLINE classic ^{HT} 24 fibers 2 x M16 for MASTERLINE MTP TM
Cable exit (right knock-out holes)	2 x M25 for 3(4)-fold cable gland	2 x M32 for 6-fold cable gland	4 x M25 for 3-fold cable gland
Material	glass-filled polycarbonate, halogen free		
Material flammability rating	UL 94 V0		
Ingress protection	IP 66/67 (EN 60529), NEMA 1, 4, 4X, 6, 12 and 13		
Impact resistance	IK 07 (EN 62262)		
Operating temperature	- 40 °C to +85 °C		

Customized or hybrid boxes are available upon request.

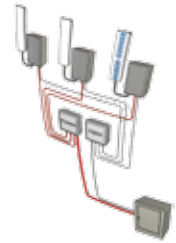


HUBER+SUHNER's MASTERLINE solution is a win for LTE

The multi-fiber cabling and box solution makes the infrastructure easier to deploy, reduces field failures, and supports multi-vendor installations. By installing additional fibers, the sites are ready for LTE roll-outs and scalable for future applications.

Global and local operators are convinced of the benefits of this cabling system. Therefore, names like Vodafone, T-Mobile, Telenor, Bouygues Telecom and many others trust and rely on HUBER+SUHNER's MASTERLINE solution to make their passive infrastructure future-proof, scalable and ready for LTE.

FTTA Fiber-to-the-Antenna Box



Ordering information and accessories

FTTA boxes

Description	Feature	Item no.	Picture
FTTA box small	up to 8 RRH MASTERLINE classic ^{HT} MASTERLINE MTP TM	84074085	
FTTA box medium (old) (phase out 2012)	up to 12 RRH MASTERLINE classic ^{HT}	84112317	
FTTA box medium (new) (available Q1 2012)	Up to 12 RRH MASTERLINE classic ^{HT} MASTERLINE MTP TM	84125865	

Quick hose clamp

The quick hose clamps for mounting the FTTA box onto a mast are available in 2 sizes.

Description	Feature	Item no.	Picture
Quick hose clamp small	clamping diameter 30 - 155 mm stainless steel	84076411	
Quick hose clamp large	clamping diameter 60 - 500 mm stainless steel	84076412	








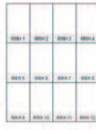
Installation kit

The installation kit includes LC duplex adapters for singlemode or multimode, cable glands, blind plugs, a protective vent, a laser label and description labels for the jumper cables.

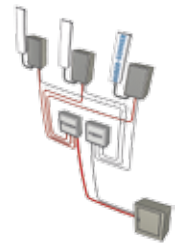
Description	Item no.	Compatibility	Picture
Installation kit singlemode for 3 RRH	84121039	FTTA box small	
Installation kit multimode for 3 RRH	84121041		
Installation kit singlemode for 6 RRH	84121040	FTTA box small and medium	
Installation kit multimode for 6 RRH	84121042		
Installation kit singlemode for 12 RRH	84136955	FTTA box medium (new)	
Installation kit multimode for 12 RRH	84137033		

FTTA Fiber-to-the-Antenna Box

Ordering information for single components

Description	Feature	Item no.	Picture
LC duplex adapter	singlemode, blue	84083886	
	multimode, beige	84090245	
Nut for MASTERLINE (always supplied with the MASTERLINE)	M16 for MASTERLINE classic ^{HT} up to 12 fibers and MASTERLINE MTP TM	23040540	
	M26 for MASTERLINE classic ^{HT} 24 fibers	23236878	
Cable gland M25	3-fold seal cable Ø 5.5 - 7.0 mm	84121958	
Cable gland M32	6-fold seal cable Ø 5.5 - 7.0 mm	84113000	
Blind plugs		84090788	
Protective vent	<ul style="list-style-type: none"> • equalize the pressure • clearing away condensation • preventing the ingress of air and moisture • preserving the seal's integrity 	23038472	
Laser label	warning label LASER PRODUCT	84005276	
Description labels	description labels for jumper cables RRH 1, RRH 2,..., RHH 12	84137099	

19" CTB Cable Termination Box



Features

- Space saving 19" rack installation
- Cable entry from the front
- Front plate with mounted LC duplex adapters
- Pullout tray for easy access
- 3 mandrels for overlength management of the MASTERLINE cable system
- Material standard aluminum

Description	Numbers of fibers	Fiber type	Ordering code	Item no.
CTB 19" fiber frame, LC adapters	12	singlemode	CB1-B88-06ML-09-00-00-00-00SNK	84138010
		multimode	CB1-B88-06ML-50-00-00-00-00SMK	84126559
	24	singlemode	CB1-B88-12ML-09-00-00-00-00SNK	84125915
		multimode	CB1-B88-12ML-50-00-00-00-00SNK	84127072

LC Patchcord



Description	Fiber type	Length	Ordering code	Item no.
LC uniboot patchcord	singlemode	0.5 m	21H02VE0-LB-8U/8U-2-0.5 NN	84138001
		0.7 m	21H02VE0-LB-8U/8U-2-0.7 NN	84125518
		1.0 m	21H02VE0-LB-8U/8U-2-1 NN	84125519
		1.5 m	21H02VE0-LB-8U/8U-2-1.5 NN	84138003
	multimode	0.5 m	21H02VM0-53-8U/8U-2-0.5 MM	84138007
		0.7 m	21H02VM0-53-8U/8U-2-0.7 MM	84125520
		1.0 m	21H02VM0-53-8U/8U-2-1 MM	84125521
		1.5 m	21H02VM0-53-8U/8U-2-1.5 MM	84138009

Fiber Optic MASTERLINE classic^{HT}



Features

- Pre-assembled plug-and-play cabling system
- Ruggedized design with robust pulling tube
- Outdoor and indoor with high flame resistance
- Temperature range - 40 °C up to + 75 °C
- Loose tube cables with up to 24 fibers, rodent-protected and UV resistant
- Fibers and connectors colour-coded for easy channel identification
- Easy and time-saving installation
- Each system factory tested
- Rodent resistant

Specifications

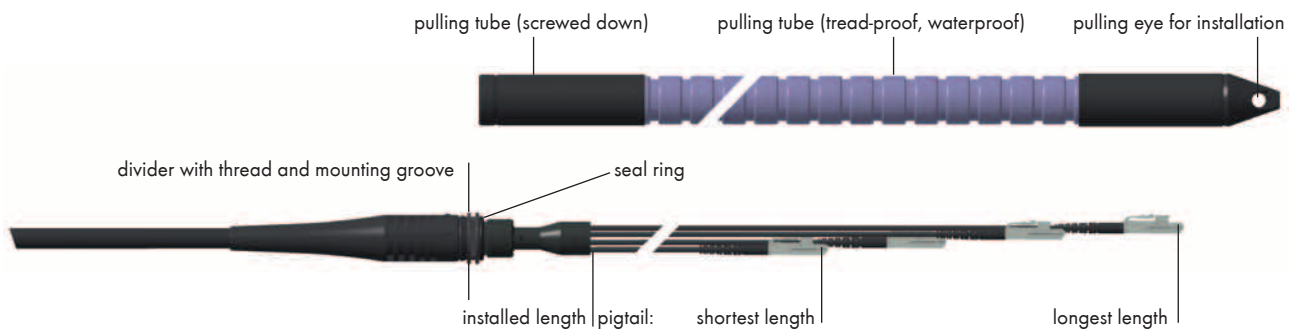
Number of fibers	up to 12	up to 24
Divider	small	medium
Build-in hole dimension	15.6 - 16.4 mm	25.5 - 26.5 mm

Pulling tube with pulling eye

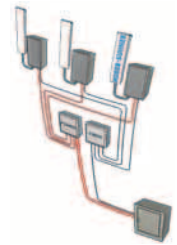
Outer diameter	23.5 mm	31 mm
Maximum tensile strength	1000 N	1000 N
Crush resistance	250 N/cm	250 N/cm
Ingress protection	IP 67	IP 67

Glass-armoured loose-tube cable

Jacket material	LSFH™	
Cable diameter	2 - 24 fibers	8.5 mm
Tensile strength	during installation in service	3000 N 1500 N
Crush resistance	short-term long-term	400 N/cm 200 N/cm
Temperature range	installation service	- 25 °C to + 75 °C - 40 °C to + 75 °C
Flame resistance	IEC 60332-1 IEC 60332-3-24	passed



Fiber Optic MASTERLINE classic^{HT}



Standard portfolio

- MASTERLINE classic^{HT} with 6, 12, and 24 fibers
- Both sides terminated with colour-coded LC duplex connectors
- Small FTTA box compatible with 6 and 12 fibers, medium FTTA box with 24 fibers

Colour coding

RRH 1+7	RRH 2+8	RRH 3+9	RRH 4+10	RRH 5+11	RRH 6+12
red	green	blue	yellow	white	black

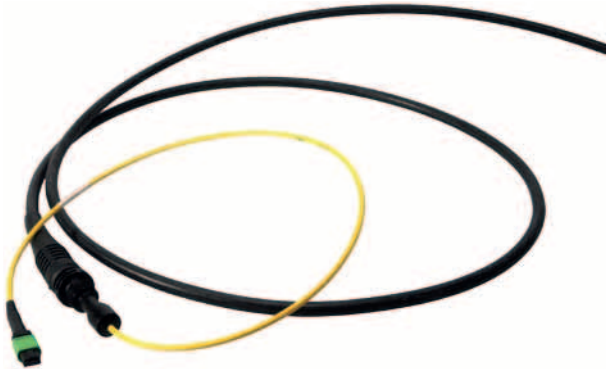
Ordering information

MASTERLINE classic^{HT}



		6 fibers 3 RRH	12 fibers 6 RRH	24 fibers 12 RRH	
Length	Fiber type	Item number			
20 m	singlemode	84117833	84117846	84117858	
30 m		84117834	84117847	84117859	
40 m		84117835	84117848	84117860	
50 m		84117836	84117849	84117861	
60 m		84117837	84117850	84117862	
70 m		84117838	84117851	84117863	
80 m		84117839	84117852	84117864	
90 m		84117840	84117853	84117865	
100 m		84117841	84117854	84117866	
125 m		84117842	84117855	84117867	
150 m		84117843	84117856	84117868	
200 m		84117845	84117857	84117869	
20 m		multimode OM2	84117870	84117882	84117895
30 m			84117871	84117883	84117896
40 m	84117872		84117884	84117897	
50 m	84117873		84117885	84117898	
60 m	84117874		84117886	84117899	
70 m	84117875		84117887	84117900	
80 m	84117876		84117888	84117901	
90 m	84117877		84117889	84117902	
100 m	84117878		84117890	84117903	
125 m	84117879		84117891	84117904	
150 m	84117880		84117892	84117905	
200 m	84117881	84117894	84117906		

Fiber Optic MASTERLINE MPO / MTP™



Features

- Pre-assembled plug-and-play cabling system
- MTP connector with up to 12 fibers
- Ruggedized design with robust pulling tube
- Outdoor and indoor with high flame resistance
- Temperature range - 40 °C up to + 75 °C
- Loose tube cables, rodent-protected and UV resistant
- Easy and time-saving installation
- Each system factory tested
- Compatible with FTTA boxes in combination with MTP cassette

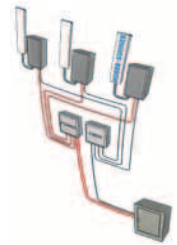
Specifications

Number of fibers	up to 12	up to 24
Number of MTP connectors (without pins)	1	2
Compatibility	small FTTA Box	medium FTTA Box
MASTERLINE divider	small Ø 16 mm	small Ø 16 mm
Whip cable diameter	3.5 mm	

Pulling tube with pulling eye

Outer diameter	23.5 mm
Maximum tensile strength	1000 N
Crush resistance	250 N/cm
Ingress protection	IP 67

MTP Module for FTFA Box



Features

- Pre-assembled MTP fiber module with fan-out to LC duplex adapters
- Compatible to mount into FTFA box small and FTFA box medium
- With 6, 12 and 24 fibers available
- LC adapters colour-coded

Ordering information (module only / without box)

Description	Compatibility	No. of fibers	Fiber type	Item no.
MTP module, 6 fibers MTP (in), 3 LC duplex (out)	FTFA box medium (new), for hybrid configuration	6	singlemode	84122225
			multimode	84122226
MTP module, 12 fibers MTP (in), 6 LC duplex (out)	FTFA box small	12	singlemode	84122227
			multimode	84122228
MTP module, 24 fibers MTP (in), 12 LC duplex (out)	FTFA box medium (new)	24	singlemode	84132113
			multimode	84132184



MTP module 24 fibers



MTP module 12 fibers



MTP module 6 fibers

Ordering information for FTFA box see page 29.

MASTERLINE MTP™ Standard Portfolio

Ordering information

MASTERLINE MTP to MTP



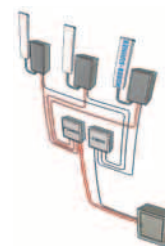
Length	Singlemode			Multimode		
	6 fibers 3 RRH	12 fibers 6 RRH	24 fibers 12 RRH	6 fibers 3 RRH	12 fibers 6 RRH	24 fibers 12 RRH
20 m	84121976	84121988	84132694	84122000	84122012	84132707
30 m	84121977	84121989	84132695	84122001	84122013	84132708
40 m	84121978	84121990	84132697	84122002	84122014	84132709
50 m	84121979	84121991	84132698	84122003	84122015	84132710
60 m	84121980	84121992	84132699	84122004	84122016	84132711
70 m	84121981	84121993	84132700	84122005	84122017	84132712
80 m	84121982	84121994	84132701	84122006	84122018	84132713
90 m	84121983	84121995	84132702	84122007	84122019	84132714
100 m	84121984	84121996	84132703	84122008	84122020	84132715
125 m	84121985	84121997	84132704	84122009	84122021	84132716
150 m	84121986	84121998	84132705	84122010	84122022	84132717
200 m	84121987	84121999	84132706	84122011	84122023	84132718

MASTERLINE classic^{HT} to MTP



Length	Singlemode			Multimode		
	6 fibers 3 RRH	12 fibers 6 RRH	24 fibers 12 RRH	6 fibers 3 RRH	12 fibers 6 RRH	24 fibers 12 RRH
20 m	84122024	84122036	84127419	84122048	84122060	84132682
30 m	84122025	84122037	84127420	84122049	84122061	84132683
40 m	84122026	84122038	84127421	84122050	84122062	84132684
50 m	84122027	84122039	84127422	84122051	84122063	84132685
60 m	84122028	84122040	84127423	84122052	84122064	84132686
70 m	84122029	84122041	84127424	84122053	84122065	84132687
80 m	84122030	84122042	84127425	84122054	84122066	84132688
90 m	84122031	84122043	84127426	84122055	84122067	84132689
100 m	84122032	84122044	84127427	84122056	84122068	84132690
125 m	84122033	84122045	84127428	84122057	84122069	84132691
150 m	84122034	84122046	84127429	84122058	84122070	84132692
200 m	84122035	84122047	84127430	84122059	84122071	84132693

RRH Jumpers



Features

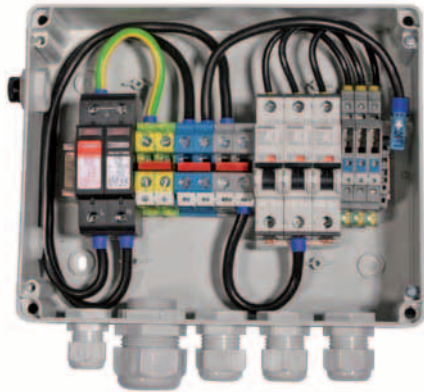
- Jumper available for all types of RRH
- Cable diameter 4.8 mm, 5.5 mm or 7 mm
- Standard lengths of 1, 2 or 5 m, any customized length available.
- On request, colour-coded jumpers for easy installation available.

Ordering information

Jumper description	Length	Item no. singlemode low-bend	Item no. multimode	Picture of RRH connector (second connector LCD)
<ul style="list-style-type: none"> • ODC plug - LC duplex • Cable Ø 5.5 mm 	1 m	84122151	84124943	
	2 m	84122152	84124942	
	5 m	84078725	84078739	
<ul style="list-style-type: none"> • LC jumper with metal divider • Cable Ø 5.5 mm 	1 m	84122153	-	
	2 m	84122154	-	
	5 m	84120589	-	
<ul style="list-style-type: none"> • FullAXS jumper • Cable Ø 4.8 mm 	1 m	84137909	-	available Q2/2012
	2 m	84137910	-	
	5 m	84137911	-	
<ul style="list-style-type: none"> • LC duplex jumper • Cable Ø 5.5 mm 	2.5 m	84122419	84122420	
	5 m	84122418	84104136	
<ul style="list-style-type: none"> • LC duplex jumper • Cable Ø 7 mm 	1 m	84106141	84117532	
	2 m	84106142	84085209	
	5 m	84105041	84085208	
<ul style="list-style-type: none"> • LC boot jumper • Cable Ø 7 mm 	1 m	-	84124939	
	2 m	84132531	84124940	
	5 m	84132532	84124941	
<ul style="list-style-type: none"> • LC boot jumper - straight • Cable Ø 7 mm 	1 m	84124936	84124933	
	2 m	84124937	84124024	
	5 m	84124938	84124054	

Further jumpers for all types for remote radio systems available (e.g. Q-XCO, XCO, R2CT, LC push-pull connector, industrial LC connector). NSN boot only available for approved companies.

PTTA Power-to-the-Antenna Box



Features

- Ruggedized outdoor power distribution box
- Supports 3 or 6 remote radio heads
- Different configurations, with circuit breakers or/and surge protection devices
- Suitable for mounting on poles, walls and tower legs with round, L, V and □-shape
- Easy to mount and install with integrated screws and pre-mounted brackets
- Protective vent to equalize pressure and prevent condensation
- Each box is fully electrical tested

Specifications

	PTTA box small	PTTA box medium
Number of RRH	up to 3 RRH	up to 6 RRH
Dimension	250 x 200 x 115 mm	361 x 252 x 165 mm
U_N rated voltage	- 48 V DC	
I_N rated current per RRH	≤ 16.7 A (depending on the configuration)	
Box material	polycarbonate glass-filled, halogen free, UV resistant	
Flammability rating	UL 94 V0	
Ingress protection	IP 66 (EN 60529)	
Impact resistance	IK 08	
Ambient temperature range	- 40 °C to + 55 °C	
Screw terminals	Up to 16 mm ² stranded with wire end sleeve, up to 25 mm ² without wire end sleeve	
Circuit breaker	Miniature circuit breaker C 20A, type 5SY6120-7	
Surge protection device	SPD type 1 + 2 / class I + II or type 2 / class II	

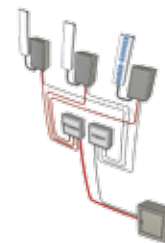
HUBER+SUHNER power-to-the-antenna boxes with pre-installed components and wiring, support up to 3 remote radio heads in the small version and up to 6 remote radio heads in the medium version.

Aside customized box configurations, there are 8 standard configurations available with screw terminals only or optionally with circuit breakers (CB) and/or surge protection devices (SPD).

The boxes include a protective vent to equalize the pressure, preventing the ingress of moisture around seals and preserving the seal's integrity. The vent enables easy passage of water vapour out of the box, quickly clearing away condensation.

Pre-mounted brackets allow an easy installation on poles, walls and tower legs with different shapes.

Each box runs through a high voltage test, an electrical continuity test and a potential equalization test and has CE conformity.



PTTA Power-to-the-Antenna Box

Power entry

For the PTTA (power-to-the-antenna) boxes we recommend HUBER+SUHNER shielded copper cables, either 6 wire cables up to 10 mm² or 2 wire cables up to 25 mm². The 6 wire cable is suited for individual power supply for 3 RRH, special when using circuit breakers. The PTTA box medium has optional a second power entry cable gland. This is useful when a bigger cross section is needed in case of long distances. The cross section can be increased up to 32 mm² (2 x 16 mm²). Further, the second power entry is needed when using 2 separated power supplies, one for RRH 1 - 3 and the other for RRH 4 - 6.

Power exit

The PTTA box exits are compatible with shielded 2 wire cables (cross section 4 mm² or 6 mm²).

Earthing

All boxes have a cable gland and screw terminals for an earthing cable with a cross section up to 16 mm².

Circuit breaker

The ambient temperatures to which the PTTA box is exposed have a big influence on the maximum current load. The self-heating of the circuit breaker in combination with the ambient temperature is a key issue to choose the right circuit breaker.

Surge protection device

In the standard configurations SPD type 2 / class II are used to protect the Remote Radio Heads against surge voltage. SPD type 2 are capable of handling 40 kA (8/20 μs) maximum discharge current due to deployed high-capacity varistor and spark gap.

For lightning protection SPD type 1 + 2 / class I + II with coordinated spark gap technology are optional available. The current discharge capacity is 100 kA (10/350 μs).




PTTA Power-to-the-Antenna Box

Ordering information

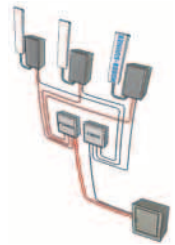
		Description
PTTA-		Number of input cables
1		1 cable
2		2 cables
		Number of RRH
3		3 RRH
6		6 RHH
		Cable gland for earthing
G		cable gland M20 for Ø 5 - 13mm
0		no cable gland for earthing
		Diameter range of input cable
18-25		18 - 25 mm (H+S cable 6 x 6 mm ² , 6 x 10 mm ² , 2 x 10 mm ² , 2 x 16 mm ²)
yy-zz		other diameter range
		Diameter range of output cable
08-17		8 - 17mm (H+S cable 2 x 4 mm ² , 2 x 6 mm ²)
yy-zz		other diameter range
		Circuit breaker
00		none
20		20 A type C, for each RRH
zz		other
		Surge protection device
0		none
1		surge protection type 1 + 2 (lightning protection)
2		surge protection type 2

Description	Features	Item no.
PTTA-13G-18-25-08-17-000	3 RRH, only screw terminals	84137118
PTTA-13G-18-25-08-17-200	3 RRH, CB 20A type C	84137119
PTTA-13G-18-25-08-17-002	3 RRH, SPD type 2	84137120
PTTA-13G-18-25-08-17-202	3 RRH, CB 20A type C, SPD type 2	84137121
PTTA-16G-18-25-08-17-000	6 RRH, only screw terminals	84137122
PTTA-16G-18-25-08-17-200	6 RRH, CB 20A type C	84137123
PTTA-16G-18-25-08-17-002	6 RRH, SPD type 2	84137124
PTTA-16G-18-25-08-17-202	6 RRH, CB 20A type C, SPD type 2	84137125

Ordering information for accessories

Description	Feature	Item no.	Picture
Quick hose clamp (stainless steel)	clamping diameter 30 - 155 mm	84076411	
	clamping diameter 60 - 500 mm	84076412	

Configuration for 3 RRH only Screw Terminals

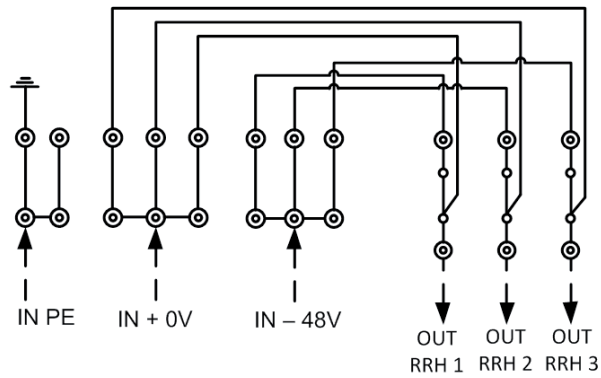


Specifications

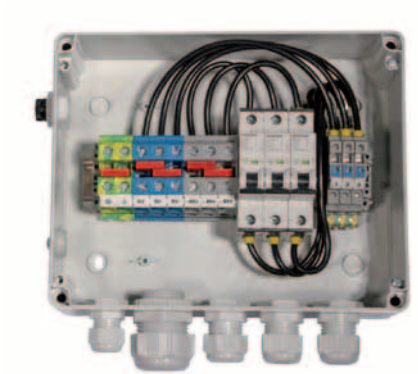
PTTA box small	250 x 200 x 115 mm
Screw terminals	up to 16 mm ² (25 mm ²)
Power entry	1 cable Ø 18 - 25 mm 6 x 6 mm ² , 6 x 10 mm ² 2 x 10 mm ² , 2 x 16 mm ²
Power exit	3 cables Ø 8 - 17 mm 2 x 4 mm ² , 2 x 6 mm ²
Earthing	1 cable Ø 5 - 13 mm 1 x 16 mm ²
I _N rated current per RRH	16.7 A

Including removable bridges for using multiwire cable

Description	Features	Item no.
PTTA-13G-18-25-08-17-000	3 RRH, only screw terminals	84137118



Configuration for 3 RRH with Circuit Breakers

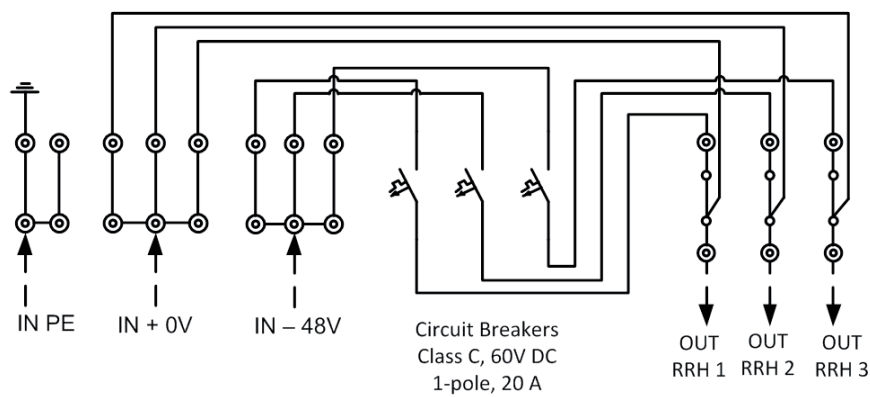


Specifications

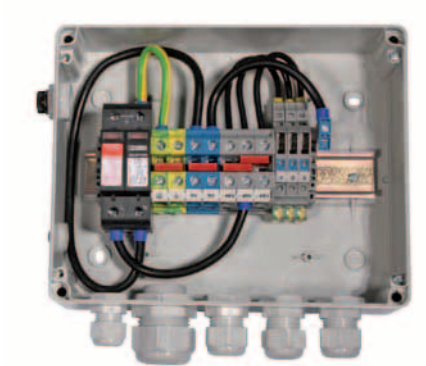
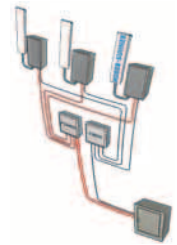
PTTA box small	250 x 200 x 115 mm
Screw terminals	up to 16 mm ² (25 mm ²)
Power entry	1 cable Ø 18 - 25 mm 6 x 6 mm ² , 6 x 10 mm ² 2 x 10 mm ² , 2 x 16 mm ²
Power exit	3 cables Ø 8 - 17 mm 2 x 4 mm ² , 2 x 6 mm ²
Earthing	1 cable Ø 5 - 13 mm 1 x 16 mm ²
Circuit breaker	class C 20 A
I _N rated current per RRH	13.3 A

Including removable bridges for using multiwire cable

Description	Features	Item no.
PTTA-13G-18-25-08-17-200	3 RRH, CB 20A type C	84137119



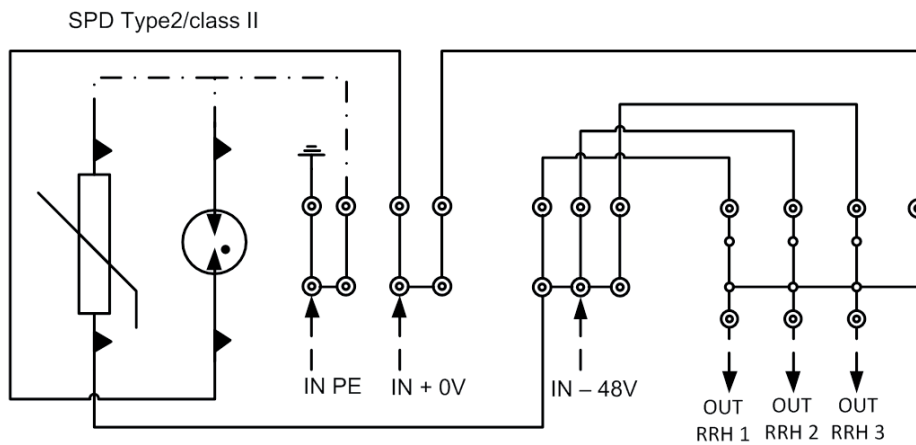
Configuration for 3 RRH with Surge Protection Device Type 2



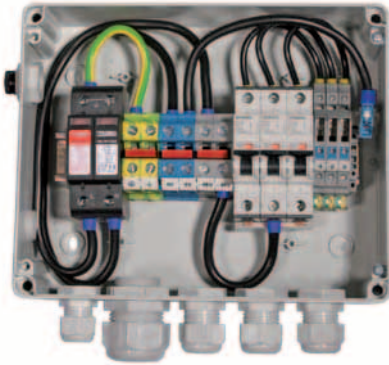
Specifications

PTTA box small	250 x 200 x 115 mm
Screw terminals	up to 16 mm ² (25 mm ²)
Power entry	1 cable Ø 18 - 25 mm 2 x 10 mm ² , 2 x 16 mm ²
Power exit	3 cables Ø 8 - 17 mm 2 x 4 mm ² , 2 x 6 mm ²
Earthing	1 cable Ø 5 - 13 mm 1 x 16 mm ²
Surge protection device	type 2 / class II
I _N rated current per RRH	16.7 A
Optional available with SPD type 1 + 2 / class I + II	

Description	Features	Item no.
PTTA-13G-18-25-08-17-002	3 RRH, SPD type 2	84137120



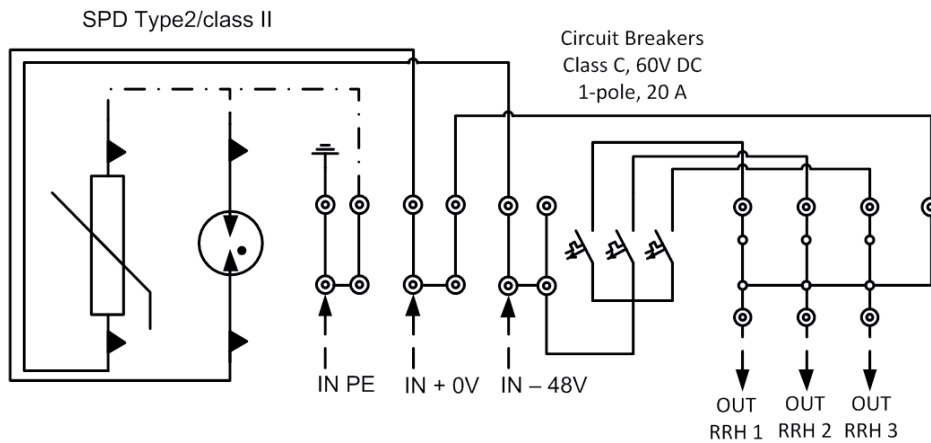
Configuration 3 RRH with Circuit Breakers and Surge Protection Device Type 2



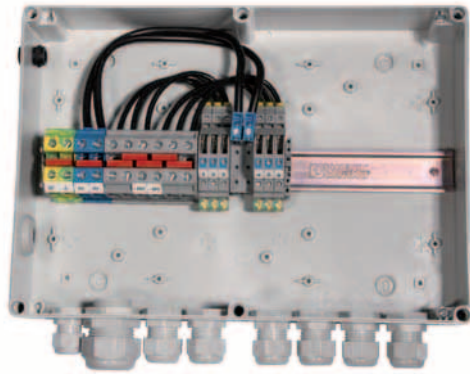
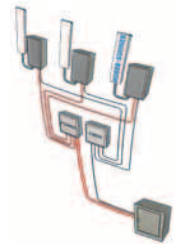
Specifications

PTTA box small	250 x 200 x 115 mm
Screw terminals	up to 16 mm ² (25 mm ²)
Power entry	1 cable Ø 18 - 25 mm 2 x 10 mm ² , 2 x 16 mm ²
Power exit	3 cables Ø 8 - 17 mm 2 x 4 mm ² , 2 x 6 mm ²
Earthing	1 cable Ø 5 - 13 mm 1 x 16 mm ²
Circuit breaker	class C 20 A
Surge protection device	type 2 / class II
I _N rated current per RRH	13.3 A
Optional available with SPD type1 + 2 / class I + II	

Description	Features	Item no.
PTTA-13G-18-25-08-17-202	3 RRH, CB 20A type C, SPD type 2	84137121



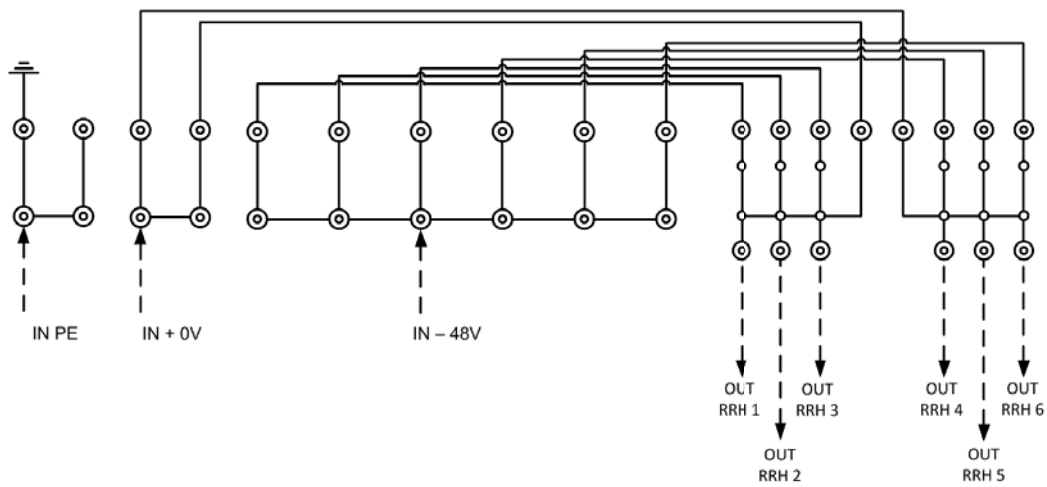
Configuration for 6 RRH only Screw Terminals



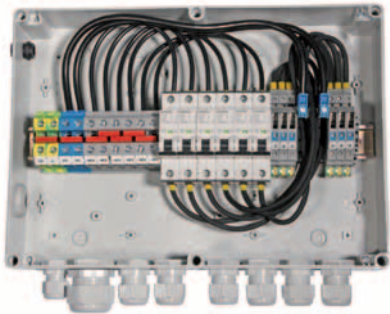
Specifications

PTTA box medium	361 x 252 x 165 mm
Screw terminals	up to 16 mm ² (25mm ²)
Power entry	2 cable Ø 18 - 25 mm 2 x 10 mm ² , 2 x 16 mm ²
Power exit	6 cables Ø 8 - 17 mm 2 x 4 mm ² , 2 x 6 mm ²
Earthing	1 cable Ø 5 - 13 mm 1 x 16 mm ²
I _N rated current per RRH	15 A

Description	Features	Item no.
PTTA-16G-18-25-08-17-000	6 RRH, only screw terminals	84137122



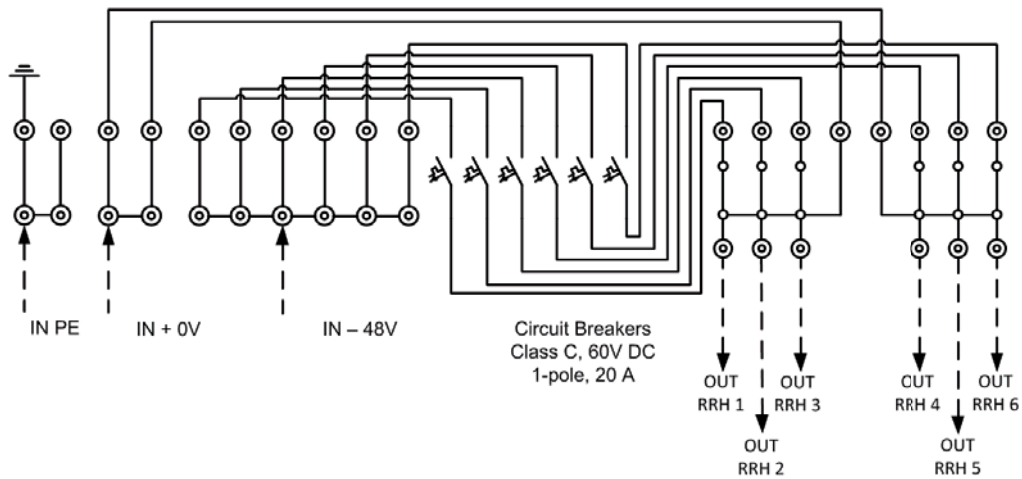
Configuration for 6 RRH with Circuit Breakers



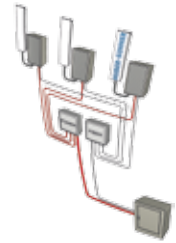
Specifications

PTTA box medium	361 x 252 x 165 mm
Screw terminals	up to 16 mm ² (25 mm ²)
Power entry	2 cable Ø 18 - 25 mm 2 x 10 mm ² , 2 x 16 mm ²
Power exit	6 cables Ø 8 - 17 mm 2 x 4 mm ² , 2 x 6 mm ²
Earthing	1 cable Ø 5 - 13 mm 1 x 16 mm ²
Circuit breaker	class C 20 A
I _N rated current per RRH	11.7 A

Description	Features	Item no.
PTTA-16G-18-25-08-17-200	6 RRH, CB 20A type C	84137123



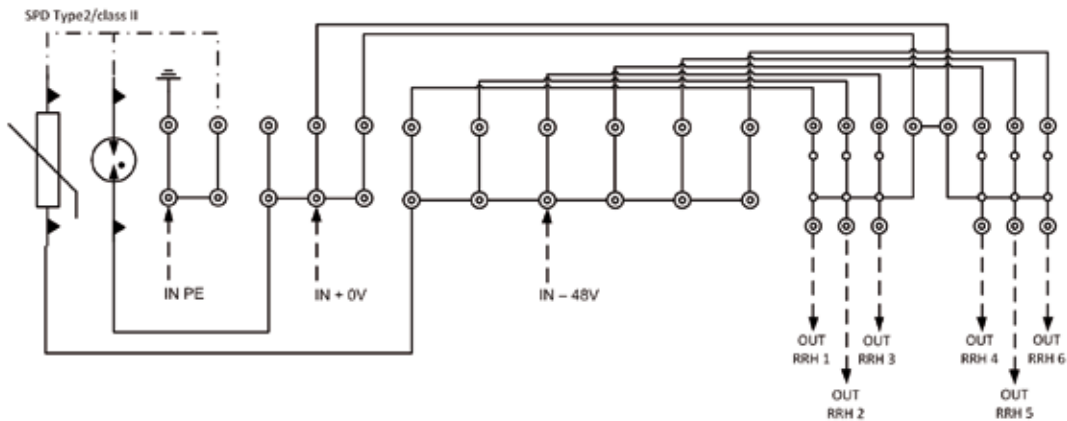
Configuration for 6 RRH with Surge Protection Device Type 2



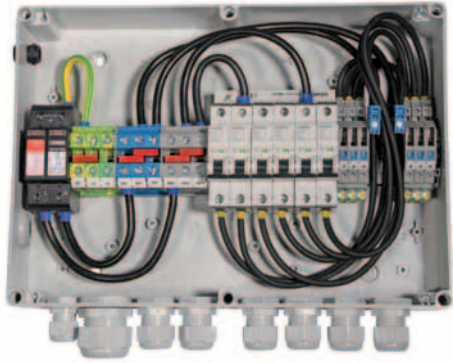
Specifications

PTTA box medium	361 x 252 x 165 mm
Screw terminals	up to 16 mm ² (25 mm ²)
Power entry	2 cable Ø 18 - 25 mm 2 x 10 mm ² , 2 x 16 mm ²
Power exit	6 cables Ø 8 - 17 mm 2 x 4 mm ² , 2 x 6 mm ²
Earthing	1 cable Ø 5 - 13 mm 1 x 16 mm ²
Surge protection device	type 2 / class II
I _N rated current per RRH	15 A
Optional available with SPD type 1 + 2 / class I + II	

Description	Features	Item no.
PTTA-16G-18-25-08-17-002	6 RRH, SPD type 2	84137124



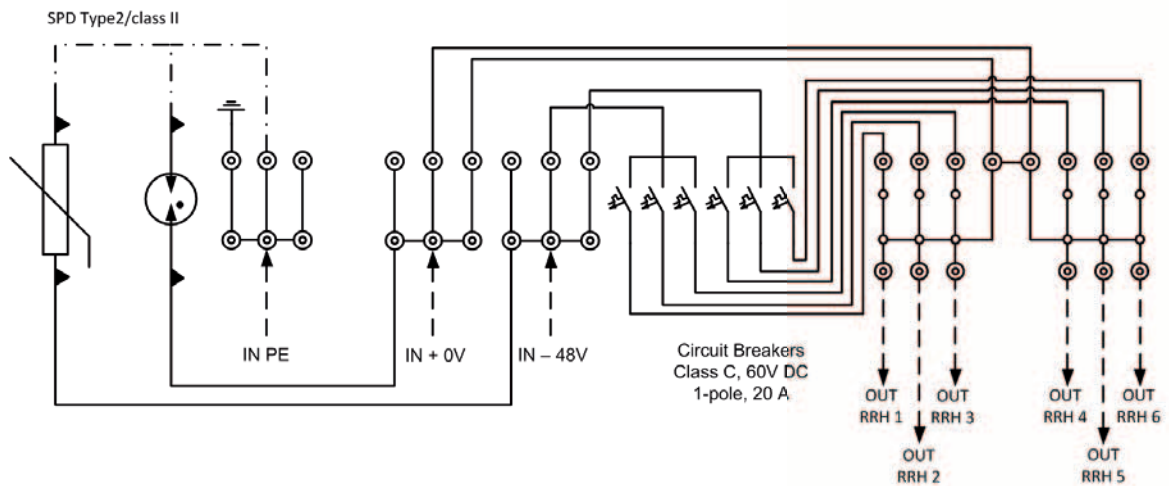
Configuration 6 RRH with Circuit Breakers and Surge Protection Device Type 2



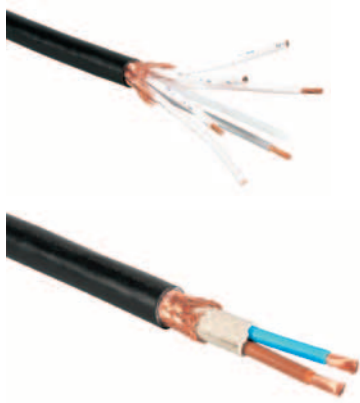
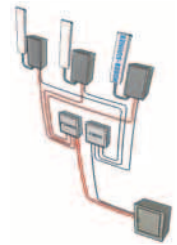
Specifications

Screw terminals	up to 16 mm ² (25 mm ²)
Power entry	2 cable Ø 18 - 25 mm 2 x 10 mm ² , 2 x 16 mm ²
Power exit	6 cables Ø 8 - 17 mm 2 x 4 mm ² , 2 x 6 mm ²
Earthing	1 cable Ø 5 - 13 mm 1 x 16 mm ²
Circuit breaker	class C 20 A
Surge protection device	type 2 / class II
I _N rated current per RRH	11.7 A
Optional available with SPD type1 + 2 / class I + II	

Description	Features	Item no.
PTTA-16G-18-25-08-17-202	6 RRH, CB 20A type C, SPD type 2	84137125



2 and 6 Wire Power Supply and Jumper Cable



Features

- Copper cable for RRH power supply
- 2 or 6 wire shielded power supply cable with cross sections up to 25 mm² for connection between BTS and PTTA box
- 2 wire shielded power supply cable with cross section 4 mm² or 6 mm² for connection between PTTA box and RRH
- Suited for all remote radio systems
- Raw cable or pre-connected cables assemblies available
- For indoor and outdoor application

Specifications

Jacket material	LSFH™
Conductor	copper stranded 4 mm ² , 6 mm ² , 10 mm ² IEC 60228 class 2 16 mm ² , 25 mm ² IEC 60228 class 5
Screen	braided screen of copper wires
Operating voltage	48 V dc
Rated voltage	0.6 / 1.0 kV
Temperature range	- 40 °C to + 90 °C

2 and 6 wire shielded power supply cable for connection between BTS and PTTA box

	6 wire cable		2 wire cable		
	6 x 6 mm ²	6 x 10 mm ²	2 x 10 mm ²	2 x 16 mm ²	2 x 25 mm ²
Cross section	6 x 6 mm ²	6 x 10 mm ²	2 x 10 mm ²	2 x 16 mm ²	2 x 25 mm ²
Resistance (Ω / km)	3.08	1.83	1.83	1.21	0.78
Current per conductor (A)	28	39	61	82	105
Cable diameter (mm)	18	22	18	20	25
Cross section braid (mm ²)	6	10	10	16	16

2 wire shielded power supply for connection between PTTA box and RRH

	Jumper cable	
Cross section	2 x 4 mm ²	2 x 6 mm ²
Resistance (Ω / km)	4.61	3.08
Current per conductor (A)	34	44
Cable diameter (mm)	14	15
Cross section braid (mm ²)	4	6

Ordering information

Cross section	Item no.	Description
6 x 6 mm ²	84119330	0606-02-LSFH18-02
6 x 10 mm ²	84119329	0610-02-LSFH22-02
2 x 10 mm ²	84112975	0210-02-LSFH18-02
2 x 16 mm ²	84115986	0216-02-LSFH20-02
2 x 25 mm ²	84138547	0225-02-LSFH25-02
2 x 4 mm ²	84119282	0204-02-LSFH14-02
2 x 6 mm ²	84112973	0206-02-LSFH15-02

Surge Protection Device (SPD) Type 1+2, Class I + II



RRH protection circuits for 48 V DC, 60 V (U_N) max.
 SPD acc.
 EN 61643-1: type 1/2
 IEC 61643-1: class I/II

Specifications

Operating temperature range	- 40 °C ... + 80 °C
Operating state/fault indication	green / red
Cross-sectional area min.	2.5 mm ² solid / stranded
Cross-sectional area max.	35 mm ² solid / 25 mm ² stranded
For mounting on	35 mm DIN rail acc. to EN 60715
Enclosure material	thermoplast, black, UL 94 V-0
Degree of protection	IP 20
Vibration- and shock tested according to EN 60068-2	

Electrical data

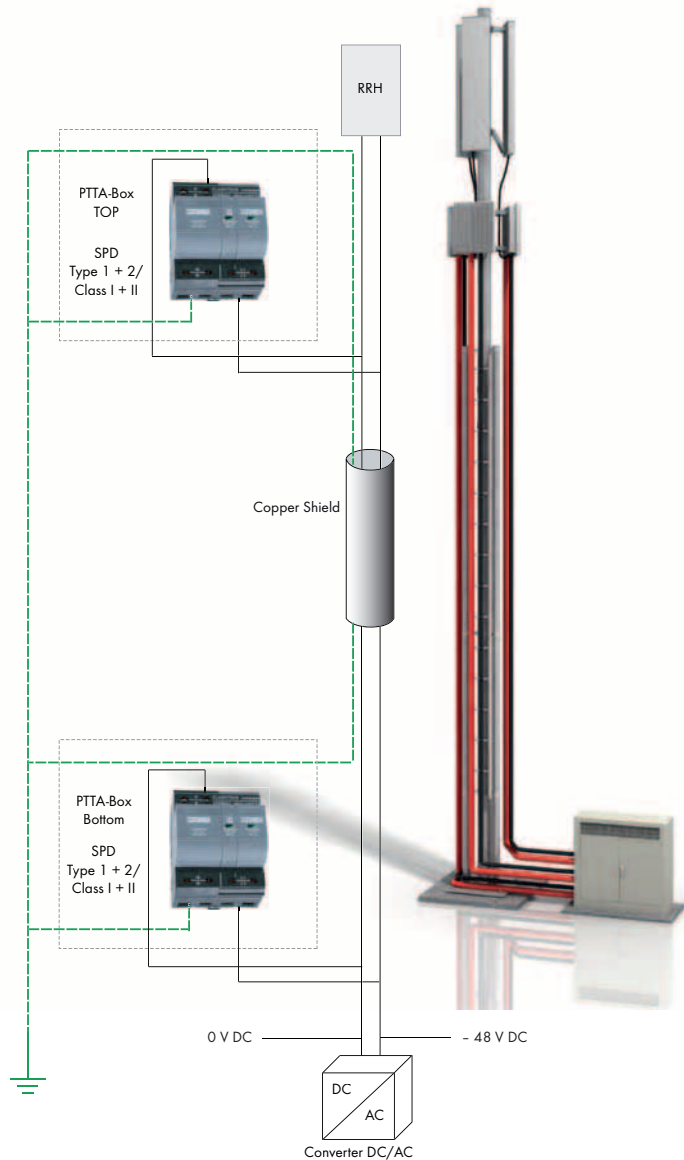
Max. continuous operating voltage (U_C)	350 V AC 240 V DC
Lightning impulse current (10/350 μ s) I_{imp}	100 kA
Nominal discharge current (8/20 μ s) I_n	25 kA
Voltage protection level U_p	1.5 kV
Response time t_A (L-N / L(N)-PE)	≤ 25 ns / ≤ 100 ns

Ordering information

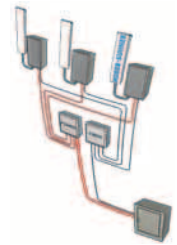
Description	Item no.
SPD T1+2 complete unit	84139066
Module spark gap	84139067
Module spark gap N/PE	84139068
Module Type 2/class II	84139069

Features

- Solution for lightning protection
- Lightning current arrestors type 1 + 2, class I + II coordinated spark gap technology with 100 kA (10/350 μ s) current discharge capacity
- AEC combined T1 / T2 arrestor
- Low voltage protection level
- Operating state / fault indication by indicator flag and with optional remote signalling contacts for the monitoring system
- Easy replacement of protection modules



Surge Protection Device (SPD) Type 2, Class II



RRH DC protection circuit for 48 V DC, max. 60 V (U_N)
 SPD acc.
 EN 61643-11: type 2
 IEC 61643-1: class II

Features

- Solution for surge protection
- Surge arrester type 2, class II capable of handling 40 kA (8/20 μ s) maximum discharge current due to deployed high-capacity varistor and spark gap
- Low voltage protection level
- Operating state / fault indication by indicator flag and with optional remote signalling contacts for the monitoring system
- Easy replacement of protection modules

Specifications

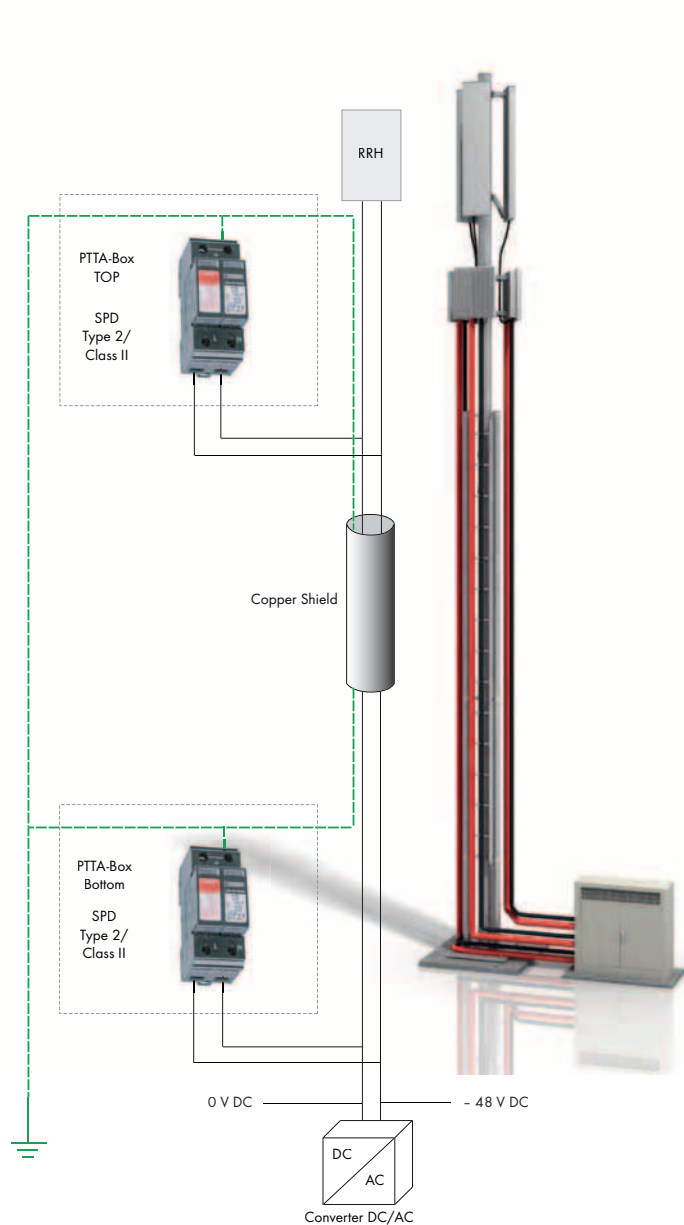
Operating temperature range	- 40 °C ... + 80 °C
Operating state/fault indication	red / defect
Cross-sectional area min.	1.5 mm ² solid / stranded
Cross-sectional area max.	35 mm ² solid / 25 mm ² stranded
For mounting on	35 mm DIN rail acc. to EN 60715
Enclosure material	thermoplast, black, UL 94 V-0
Degree of protection	IP 20
Vibration- and shock tested according to EN 60068-2	

Electrical data

Max. continuous operating voltage (U_c)	75 V AC 100 V DC
Max. discharge current (8/20 μ s) I_{max}	40 kA
Nominal discharge current (8/20 μ s) I_n	15 kA +/- 500 V +/PE 1.5 kV
Voltage protection level U_p	≤ 0.4 kV
Response time t_A (L-N / L(N)-PE)	≤ 25 ns / ≤ 100 ns

Ordering information

Description	Item no.
SPD T2 complete unit	84139070
T2 high-capacity varistor (1-pole)	84139071
Current spark gap	84139072
Base element for T2 arresters	84139073



Circuit Breaker (CB)



Features

- Circuit breaker type 5SY6120-7 with 20 A rated current
- Switching capacity 6 kA
- The devices are approved for worldwide use according to IEC standards for systems up to 60 V DC.

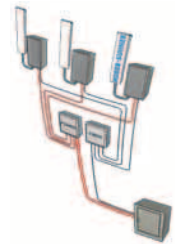
Specifications miniature circuit breaker 5SY6120-7

Standards	EN 60898-1, EN 60947-2
Operational voltage	60 V DC
Rated current (at 30 °C)	20 A
Rated switching capacity	6 kA DC (EN 60898)
Tripping characteristic	C
Poles	1 pole
Conductor cross-sections	0.75 ... 35 mm ² (solid and stranded) 0.75 ... 25 mm ² (finely stranded, with end sleeve)
Ambient temperature	- 25 °C ... + 55 °C, max. 95 % humidity
Storage temperature	- 40 °C ... + 75 °C
Shock	150 m/s ² for 11 ms half-sine (IEC 60068-2-27)
Resistance to vibrations	50 m/s ² at 25 .. 150 Hz and 60 at 35 Hz (4 sec) (IEC 60068-2-6)

Tripping characteristic C at ambient temperature + 30 °C for 5SY6120-7, rated current 20 A

Standard	Thermal trips		Electromagnetic trips	
	limiting test current tripping time > 1 h	minimum test current tripping time < 1 h	hold tripping time > 0.1 s	latest tripping instant tripping time < 0.1 s
IEC/EN 60898-1	22.6 A (1.13 x I _N)	29 A (1.45 x I _N)	100 A (5 x I _N)	200 A (10 x I _N)

See picture tripping characteristic C

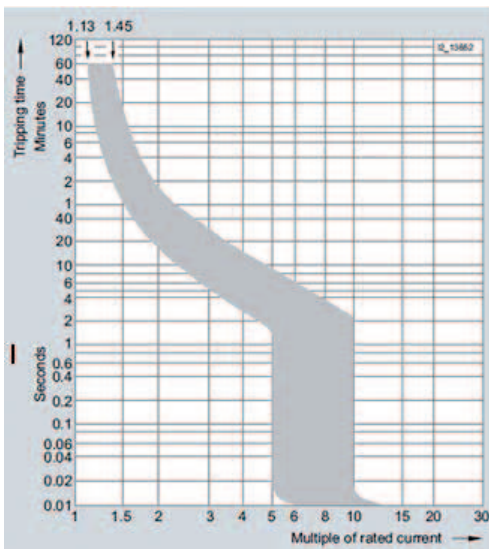


Circuit Breaker (CB)

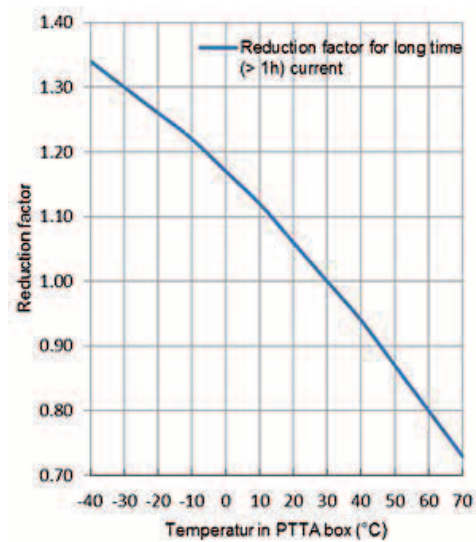
Dependence of the permissible continuous load current on the ambient temperature in the PTTA box for 5SY6120-7

The permissible load current changes at different ambient temperatures according to the correction factor for the rated current (20 A).

Thermal trips at different ambient temperatures (Standard IEC/EN 60898-1)		
Temperature in the PTTA box	Reduction factor	Limiting test current at tripping time > 1 h
-30 °C	1.30	29.4 A
-10 °C	1.22	27.6 A
10 °C	1.12	25.3 A
30 °C	1.00	22.6 A
50 °C	0.87	19.7 A
70 °C	0.73	16.5 A



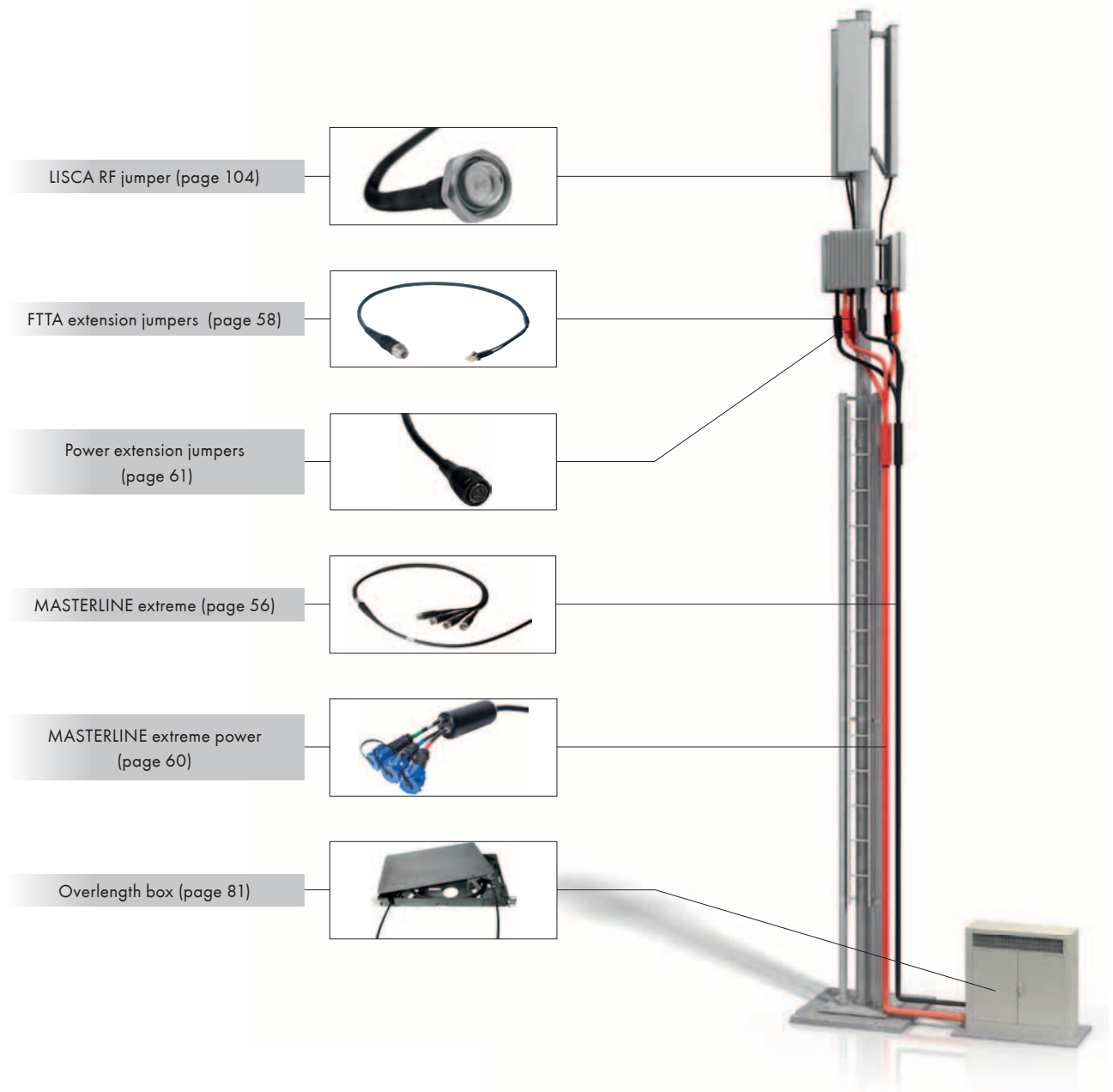
Tripping characteristic C at 30°C

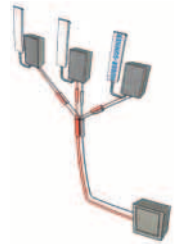


Reduction factor for long time current at different ambient temperatures

Multi-riser Cable with compact Divider

This installation method uses robust cable divider instead of distribution boxes which makes the solution compact and space-saving. The genuine plug-and-play cabling system makes this method most cost-effective and installation friendly. It is the preferred choice of network installers who care about reliable and efficient field deployment without troubles. HUBER+SUHNER's MASTERLINE extreme product family is unique in the market and provides the best value for money. The resulting passive cable infrastructure is future-proof, supports network expansions and saves installation and follow-up costs.





Application and features

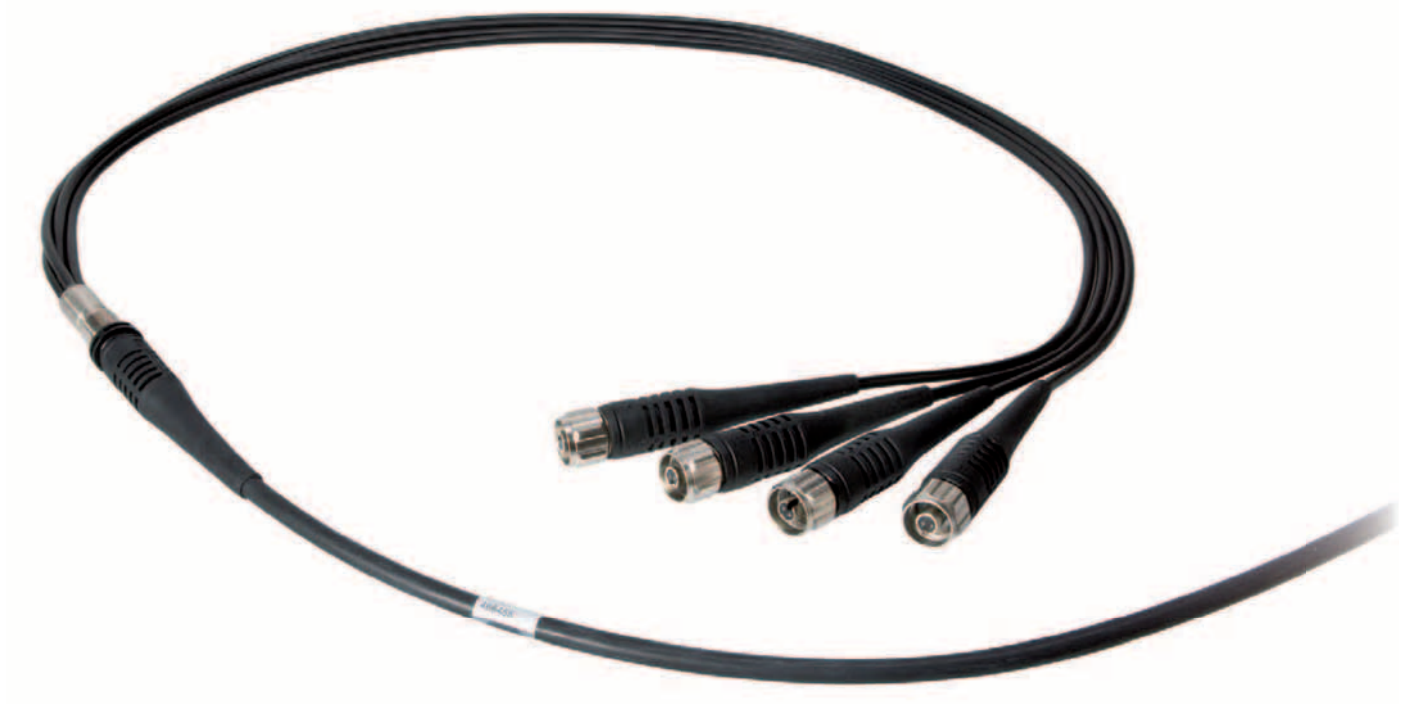
- Optimum for co-located antennas, e.g. mast-top installation
- Preferred method of network installers
- Use of ODC jumper cables makes the passive cable infrastructure system and vendor independent
- Cable system designed for 20-years life time which enables network evolution for future generations of active equipment

Benefits

- The most cost-effective installation method (CAPEX)
- Minimum installation times, genuine plug-and-play system
- Flexible in relation to RRH replacement with ODC jumpers
- Scalable for 3 up to 9 RRH, supports planned LTE roll-outs and network expansions
- Future-proof as passive cable infrastructure supports all aspects of network evolution
- Space saving and low wind load

Issues

- Limited suitability for cell sites with distributed antennas
- Slightly reduced flexibility and scalability in comparison with the box solution



Fiber Optic MASTERLINE extreme



Features

- Pre-assembled plug-and-play cabling system
- Terminated with ODC or with RRH-specific interface
- Ruggedized design with robust break-out cables
- Outdoor and indoor with high flame resistance
- Temperature range - 40 °C up to + 75 °C
- Loose tube cables with up to 24 fibers, rodent-protected and UV resistant
- Fibers and connectors colour-coded for easy channel identification
- Easy and time-saving installation

Specifications

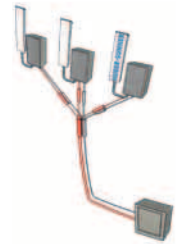
Number of fibers	6	up to 18
Numer of RRHs	3	up to 9
Divider	small	medium
Build-in hole dimension	15.6 - 16.4 mm	25.5 - 26.5 mm
Tensile load on individual break-out cables	600 N	
Ingress protection with ODC connector	IP68	
Maximum break-out lengths	4 m	
Break-out cable diameter	Ø 5 mm	

Glass-armoured loose-tube cable

Jacket material	LSFH™	
Cable diameter	2 - 24 fibers	8.5 mm
Tensile strength	during installation	3000 N
	in service	1500 N
Crush resistance	short-term	400 N/cm
	long-term	200 N/cm
Temperature range	installation	- 25 °C to + 75 °C
	in service	- 40 °C to + 75 °C
Flame resistance	IEC 60332-1, IEC 60332-3-24	passed



MASTERLINE extreme



Standard portfolio

- MASTERLINE extreme with 6, 8, and 12 fibers
- Side A (RRH) terminated with ODC connectors
- Side B (base station) terminated with LC connectors (MASTERLINE classic^{HT})
- Adaptation to any RRH interface with ODC extension jumpers
- Colour-coded connectors

Colour coding

RRH 1+7	RRH 2+8	RRH 3+9	RRH 4+10	RRH 5+11	RRH 6+12
red	green	blue	yellow	white	black

Ordering information

MASTERLINE extreme with ODC / MASTERLINE classic^{HT} with LC duplex connectors



Length	Fiber type	6 fibers - 3 RRH	8 fibers - 4 RRH	12 fibers - 6 RRH	
		Item number			
20 m	singlemode	84118386	84118411	84118435	
30 m		84118387	84118412	84118436	
40 m		84118388	84118413	84118437	
50 m		84118389	84118414	84118438	
60 m		84118390	84118415	84118439	
70 m		84118391	84118416	84118440	
80 m		84118392	84118417	84118441	
90 m		84118393	84118418	84118442	
100 m		84118395	84118419	84118443	
125 m		84118396	84118420	84118444	
150 m		84118397	84118421	84118445	
200 m		84118398	84118422	84118446	
20 m		multimode OM2	84118399	84118423	84118447
30 m			84118400	84118424	84118448
40 m	84118401		84118425	84118449	
50 m	84118402		84118426	84118450	
60 m	84118403		84118427	84118451	
70 m	84118404		84118428	84118452	
80 m	84118405		84118429	84118453	
90 m	84118406		84118430	84118454	
100 m	84118407		84118431	84118455	
125 m	84118408		84118432	84118456	
150 m	84118409		84118433	84118457	
200 m	84118410		84118434	84118458	

Fiber Optic MASTERLINE

Further MASTERLINE product configurations are available upon request.

MASTERLINE extreme with ODC / MASTERLINE classic^{HT} with MTP connector



MASTERLINE extreme with RRH specific connectors for direct mating



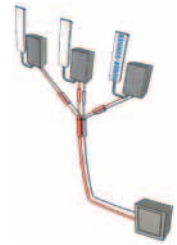
ODC Extension Jumpers



Features

- Ruggedized and robust cable extension - easy and reliable to install
- ODC extension connector (female) compatible with ODC plug connector (male)
- Used in combination with MASTERLINE extreme terminated with ODC connectors
- Extension jumpers available for all types of RRH
- Cable diameter 4.8 mm, 5.5 mm or 7 mm
- Standard lengths of 1, 2 or 5 m, any customized length available.
- Ingress protection IP 68
- Tensile load 800 N
- On request, colour-coded jumpers for easy installation available

ODC Extension Jumpers



Ordering information

Jumper description	Length	Item no. singlemode low-bend	Item no. multimode	Picture
<ul style="list-style-type: none"> • Extension jumper with LC duplex and metal divider • Cable Ø 5.5 mm 	1 m	84094368	-	
	2 m	84122229	-	
	5 m	84122230	-	
<ul style="list-style-type: none"> • Extension jumper with FullAXS • Cable Ø 4.8 mm 	1 m	84137925		 available Q2/2012
	2 m	84137926		
	5 m	84137927		
<ul style="list-style-type: none"> • Extension jumper with LC duplex • Cable Ø 5.5 mm 	1 m	84124951	84124954	
	2 m	84124952	84124955	
	5 m	84124953	84124956	
<ul style="list-style-type: none"> • Extension jumper with LC duplex • Cable Ø 7 mm 	1.5 m	84124948	84096703	
	3 m	84124949	84096917	
	6 m	84124950	84096918	
<ul style="list-style-type: none"> • Extension jumper with LC boot 90 degree • Cable Ø 7 mm 	1 m	84132088	84122231	
	2 m	84132087	84122232	
	5 m	84132085	84122233	
<ul style="list-style-type: none"> • Extension jumper with LC straight degree • Cable Ø 7 mm 	1 m	84124959	84087050	
	2 m	84124960	84124957	
	5 m	84124961	84124958	

Further jumpers for all types for remote radio systems available (e.g. Q-XCO, XCO, R2CT, LC push-pull connector, industrial LC connector). NSN boot only available for approved companies.



MASTERLINE extreme - a preferred solution in North American and European market

This ruggedized cable systems reduces the installation time and helps operators to roll out their networks efficiently. Installers are positive about the real plug-and-play system which proved to be extremely robust and hard-wearing in the field.

HUBER+SUHNER has delivered thousands of MASTERLINE extreme solutions to operators, e.g. Sasktel, and additional network roll-outs are planned in North America and Europe.

MASTERLINE extreme power



Features

- Pre-assembled plug-and-play power cabling system
- Open-end or terminated with power connector
- Ruggedized design with robust break-out cables
- Heat, moisture and sunlight (UV) resistant
- Outdoor and indoor with high flame resistance
- Colour coding for easy channel identification
- Easy and time-saving installation
- Break-out cable available with cross section 2 x 4 mm² (AWG 12) and 2 x 6 mm² (AWG 10)
- Main-cable available with cross section 6 x 6 mm² (AWG 10), 6 x 10 mm² (AWG 8) and 2 x 16 mm² (AWG 6)
- Optional with additional power jumpers for higher installation flexibility

Specifications

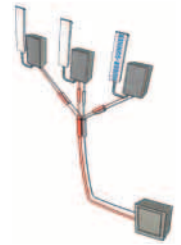
Enclosure	aluminium, black anodized	
Connector	polyimide, UL94V-0/UV resistant	
Contacts	nickel brass, 32 A	
Temperature range	- 40 °C to + 75 °C	
Ingress protection	IP 68	
Tensile load	1700 N (depended on cable type)	
Max. available length	200 m	
Packaging	individual cable reels	
Cable	European version (under development)	US version
Jacket material	heat, moisture, and sunlight resistant LSFH™ jacket	heat, moisture, and sunlight resistant polyvinyl chloride (PVC) jacket
Conductor	tinned copper stranded	class B stranded, soft drawn, bare copper conductors
Braid	tinned copper	tinned copper (85 % coverage)
Ground wires	no	3 symmetrical wires
Bending radius	200 mm	230 mm (AWG 10) / 300mm (AWG 8)
Temperature range	- 40 °C to + 70 °C	- 40 °C to + 90 °C
Flammability rating	flame resistant	FT4 vertical flame test
Voltage	breakdown 300 VRMS, 60 Hz, 1 minute between conductors	voltage rating 600 V
Cable diameter	6 x 6 mm ²	14.50 ± 0.50 mm
	6 x 10 mm ²	19.20 ± 0.80 mm
	6 x 10 AWG	20.1 ± 0.50 mm
	6 x 8 AWG	24.5 ± 1 mm

MASTERLINE extreme power, connectorized



Please contact HUBER+SUHNER for customized MASTERLINE extreme power solutions.

MASTERLINE extreme power Jumpers



Features

- Power jumper for connection between MASTERLINE extreme power and RRH
- Plug-and-play for direct deployment (no tools required)
- Open-end or terminated with second RRH power connector
- Heat moisture and sunlight (UV) resistant
- Outdoor and indoor with high flame resistance
- Easy and time-saving installation
- Break-out cable available with cross section 2 x 4 mm² (AWG 12) and 2 x 6 mm² (AWG 10)

Specifications

Connector	polyamide, UL94V-0/UV resistant		
Contacts	nickel brass, 32A		
Temperature range	- 40 °C to + 75 °C		
Ingress protection	IP 68		
Jacket material	LSFH™	PVC	
Conductor	tinned copper stranded	bare copper	
Braid	tinned copper	tinned copper	
Temperature range	- 40 °C to + 70 °C	- 40 °C to + 90 °C	
Cable diameter	2 x 4 mm ²	9.4 mm	2 x 12 AWG 10.9 mm
	2 x 6 mm ²	10.6 mm	-

Power jumper for MASTERLINE extreme power

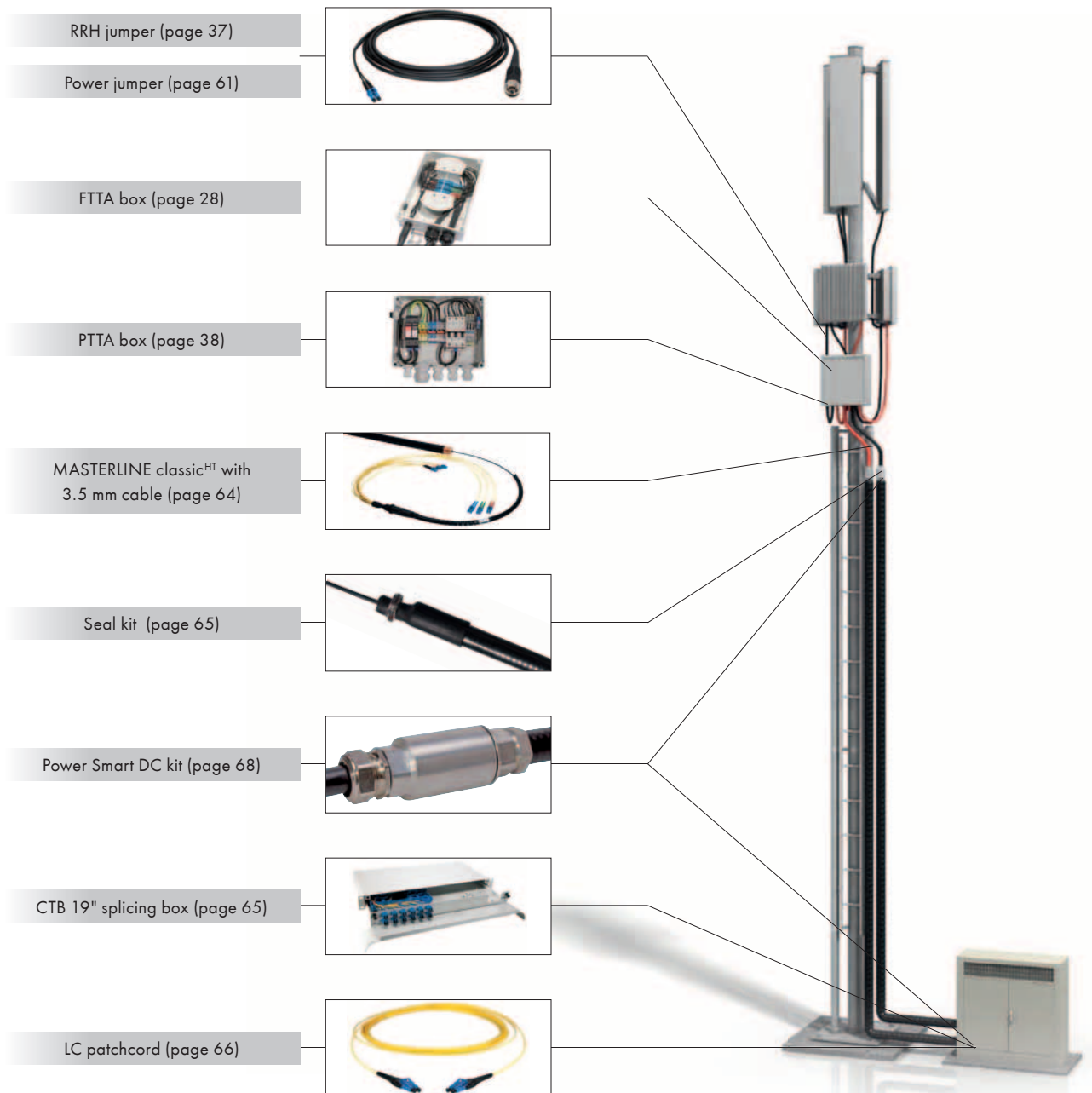


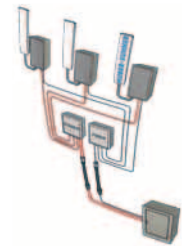
Please contact HUBER+SUHNER for customized MASTERLINE extreme power solutions.

Re-use of Corrugated Copper Cables

In recent network upgrades, conventional cell sites using corrugated cables are often converted into remote radio systems. The installed corrugated cables are decommissioned, cut at both ends and re-used as supply lines for the RRHs.

The inner and outer conductor of a corrugated cable are used for the power supply. The special Power Smart DC adapter is fitted at both ends of the corrugated cable, guaranteeing secure and reliable contacts. Short jumper cables are laid on both sides, leading to the base station or to the box on the mast. A thin multi-riser fiber optic cable is drawn into the inner conductor of a second corrugated cable from "above" (RRH side). The MASTERLINE classic is pre-terminated with connectors on one side and is inserted into the box, while the cable is spliced on the base station side. This installation method saves expensive work on the "cable path" and consequently, no structural work is required for wall and roof ducts, cable conduits do not need to be opened and no new cables need to be laid.





Applications and features

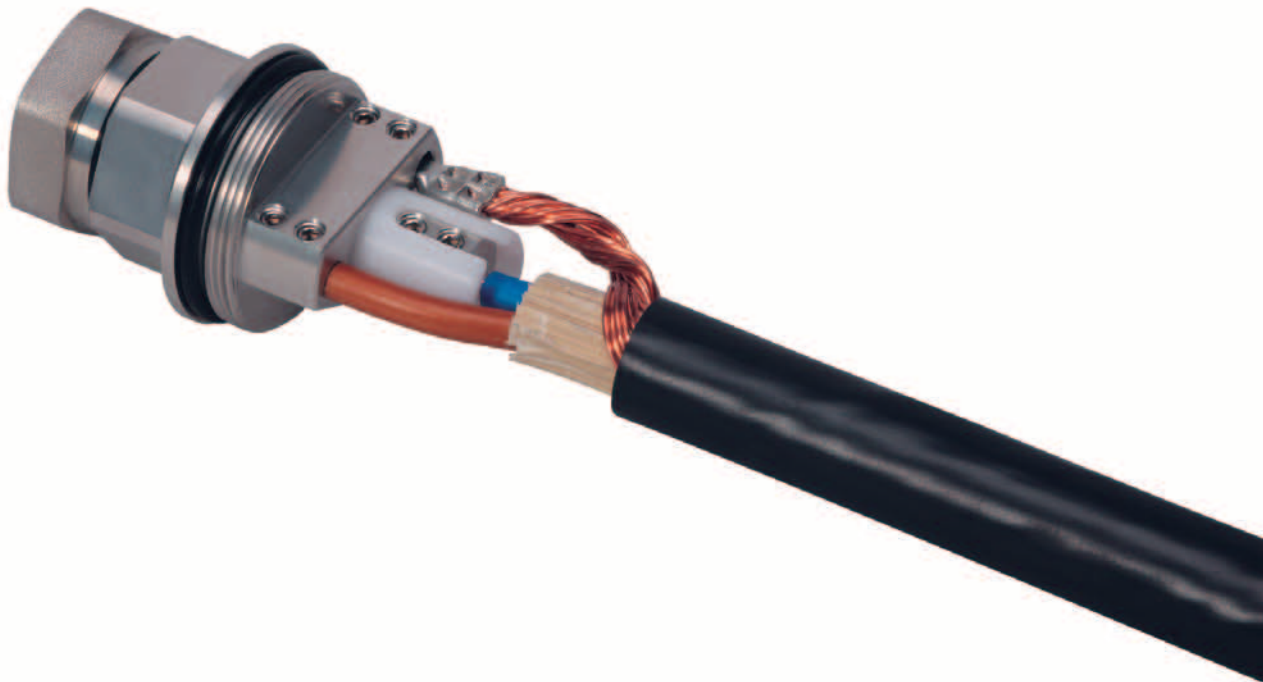
- Conversion of conventional cell sites (with corrugated feeders) into RRH systems
- Re-use of corrugated feeder cables - no new cable installation required
- Optimum for co-located antennas, e.g. mast-top installation
- 3 corrugated cables do support up to 6 RRHs (2 cables for power supply, 1 cable for fiber optic routing)

Benefits

- Significant savings per converted cell site
- No expensive installation work on the "cable path" required
- Reduced installation times, lower level of investment (CAPEX)
- Scalable for 3 up to 6 RRH, suited for planned LTE roll-outs and expansions
- Future-proof because the passive cable infrastructure supports all aspects of network evolution
- Best flexibility in case of RRH replacement as short jumpers can be easily exchanged

Issues

- Limited suitability for cell sites with distributed antennas



Fiber Optic MASTERLINE classic^{HT} for Corrugated Cables



Features

- Special cabling system pulled to inner conductor of corrugated copper cable
- Compatible with 7/8", 1 1/4" and 1 5/8" cables
- Cable drawn from "above" (RRH side) - tested for cable runs up to 50 m (with repeated bendings)
- System supports up to 12 fibers (6 RRHs)
- MASTERLINE classic^{HT} plugged into FTTA box and spliced at base station
- Ruggedized design with robust pulling tube
- Easy and time-saving installation

Specifications

General MASTERLINE classic ^{HT} specifications	see page 32	
Cable type	multifiber loose-tube cable	
Cable jacket	PE flame retardant / halogen-free	
Cable diameter	3.5 mm	
Tensile strength	during installation	900 N
	in service	250 N
Crush resistance	short-term	300 N/cm
	long-term	100 N/cm
	in service	35 mm
Temperature range	installation	- 25 °C to + 50 °C
	in service	- 40 °C to + 70 °C

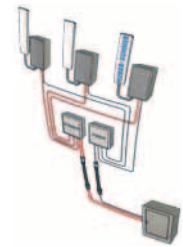
Contact HUBER+SUHNER to design and order MASTERLINE classic^{HT} for corrugated feeders.

MASTERLINE classic^{HT} 3.5 mm cable with 12 fibers (for 6 RRHs)

Lenght	Fiber type	Item no.	Description
10 m	singlemode	84132007	H0112-B0010C-SG038Z000008800NK
20 m		84132009	H0112-B0020C-SG038Z000008800NK
30 m		84131108	H0112-B0030C-SG038Z000008800NK
40 m		84127492	H0112-B0040C-SG038Z000008800NK
50 m		84131114	H0112-B0050C-SG038Z000008800NK
60 m		84124014	H0112-B0060C-SG038Z000008800NK
70 m		84131121	H0112-B0070C-SG038Z000008800NK
80 m		84132016	H0112-B0080C-SG038Z000008800NK
90 m		84132018	H0112-B0090C-SG038Z000008800NK
100 m		84132020	H0112-B0100C-SG038Z000008800NK

Multimode upon request.

Seal Kit for Corrugated Cables



Features

- Sealing of fiber optic cable entry into corrugated feeders
- Field mountable kit
- Seal kits for 7/8", 1 1/4" and 1 5/8" cables
- Ingress protection IP 67

Ordering information

Description	Quantity	Item no.
Seal kit 7/8"	2 seals	84074074
Seal kit 1 1/4" and 1 5/8"	2 seals	84074075

19" CTB Cable Termination Box



Features

- Space saving 19" rack installation
- Cable entry from the front
- Front plate with mounted LC duplex adapters
- Pullout tray for easy access
- Interface for MCM splice cassette with bend radius 35 mm throughout
- LC pigtailed for splicing included
- Material standard aluminum

Ordering information

Description	Number of fibers	Fiber type	Ordering code	Item no.
CTB 19" fiber frame, MCM splice cassette, LC pigtailed, LC adapters	12	singlemode	CB1-B88-0612-09-11-S1-00-00SNK	84138011
	12	multimode	CB1-B88-0612-50-11-S1-00-00SMK	84138012
	24	singlemode	CB1-B88-1224-09-11-S1-00-00SNK	84125914
	24	multimode	CB1-B88-1224-50-11-S1-00-00SNK	84127071

LC Connector Patchcords

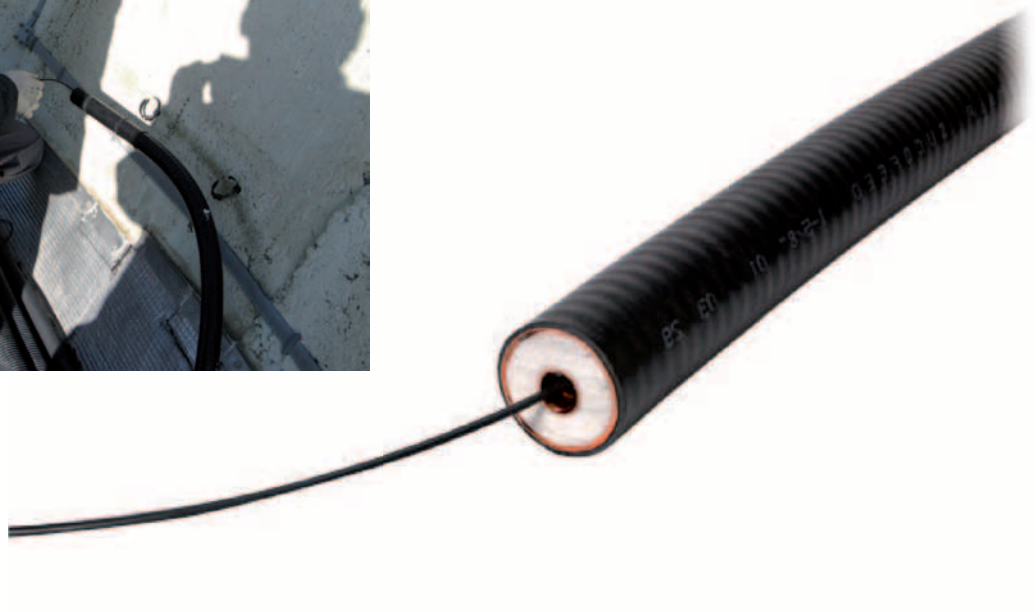


Features

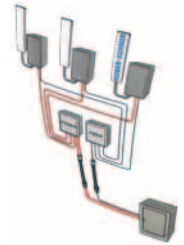
- LC patchcord to connect 19" CTB to active equipment (base station)
- Robust 2 mm cable
- Duplex patchcords available
- Upon request, colour-coded connectors

Ordering information

Description	Length	Item no.	Ordering code
LC uniboot patchcord singlemode	0.5 m	84138001	21H02VE0-LB-8U/8U-2-0.5 NN
	0.7 m	84125518	21H02VE0-LB-8U/8U-2-0.7 NN
	1.0 m	84125519	21H02VE0-LB-8U/8U-2-1 NN
	1.5 m	84138003	21H02VE0-LB-8U/8U-2-1.5 NN
LC uniboot patchcord multimode	0.5 m	84138007	21H02VM0-53-8U/8U-2-0.5 MM
	0.7 m	84125520	21H02VM0-53-8U/8U-2-0.7 MM
	1.0 m	84125521	21H02VM0-53-8U/8U-2-1 MM
	1.5 m	84138009	21H02VM0-53-8U/8U-2-1.5 MM



Re-use of Corrugated Copper Cables



Re-use of corrugated cables – HUBER+SUHNER pioneered first successful roll-out with Vodafone Germany

An increasing number of traditional base stations using corrugated feeder cables are converted into RRH systems. With the use of HUBER+SUHNER's Smart DC Kits and MASTERLINE classic, cell sites can be upgraded with minimum downtime and with completely avoiding expensive cable routing. These advantages saved millions of Euros of installation costs for Vodafone Germany. HUBER+SUHNER was the preferred partner to upgrade the 3G network. More conversions all over Europe are on their way, especially with the increasing number of LTE installations.

Additional products

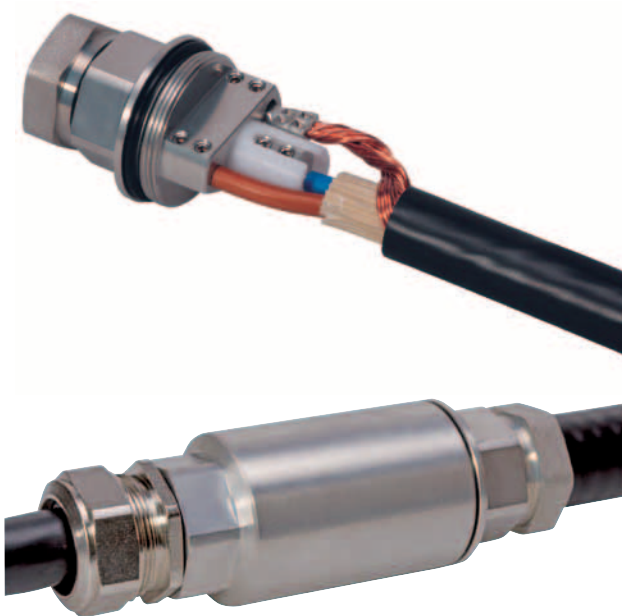


FTTA Fiber-to-the-antenna box
See page 28



RRH jumpers
See page 37

Smart DC Kits



Features

- For the connection of DC power cable to corrugated copper cable
- Kits for cables sizes 7/8", 1 1/4" and 1 5/8"
- Available as stand-alone kit or pigtail version with 2 x 10 mm² or 2 x 16 mm² DC cable (solid or stranded wire)
- DC current rating 40/60 A
- Lightning current handling 50 kA
- Multibrand corrugated cable compatibility

Benefits

- Saving installation time and costs
- Quick and easy field installation
- Tooling support for both - stripping and easy coax flaring

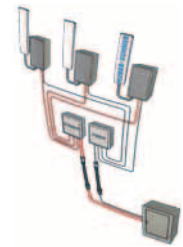


Specifications

Product conformity (TÜV approved)	IEC/EN 61984
Corrugated cable compatibility list	refer to datasheets
DC current rating	7/8": 40 A; 1 1/4" and 1 5/8": 60 A ¹⁾
DC voltage rating	100 V
Rated impulse voltage	1.5 kV, 1.2/50 µs
Overvoltage category IEC 60664-1	III
Partial lightning current handling	50 kA, 10/350 µs, 3 pulses
IP rating IEC 60529	IP 67
Pollution degree	1
Upper limiting temperature	+ 85 °C
Lower limiting temperature	- 40 °C
Cable retention / cable gland	≥ 70 N, typ. 105 N

Material	
Body	brass, nickel plated
Contact holder	brass, nickel plated
Centre contact	CuBe or bronze, nickel plated
Cable gland	brass, nickel plated

1) With 2 x 10 mm² DC cable 40 A only

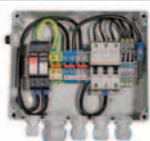


Smart DC Kits

Ordering information

Smart DC kits	H+S type	Item no.	Description
Smart DC kits for solid wire 2 x 10 mm² cable NYCWY 2 x 10RE/10			
7/8"	73_Z-50-23-5	84117348	no pigtail
	73_Z-50-23-8	84123654	assembled with 5 m DC cable
	73_Z-50-23-9	84123656	assembled with 10 m DC cable
1 1/4"	73_Z-50-32-5	84122432	no pigtail
	73_Z-50-32-8	84123745	assembled with 5 m DC cable
	73_Z-50-32-9	84123754	assembled with 10 m DC cable
1 5/8"	73_Z-50-42-5	84122550	no pigtail
	73_Z-50-42-8	84123742	assembled with 5 m DC cable
	73_Z-50-42-9	84123743	assembled with 10 m DC cable
Smart DC kits for solid wire 2 x 16 mm² cable NYCWY 2 x 16RE/16			
7/8"	73_Z-50-23-5	84117348	no pigtail
	73_Z-50-23-6	84115873	assembled with 5 m DC cable
	73_Z-50-23-7	84115875	assembled with 10 m DC cable
1 1/4"	73_Z-50-32-5	84122432	no pigtail
	73_Z-50-32-6	84122548	assembled with 5 m DC cable
	73_Z-50-32-7	84122549	assembled with 10 m DC cable
1 5/8"	73_Z-50-42-5	84122550	no pigtail
	73_Z-50-42-6	84122553	assembled with 5 m DC cable
	73_Z-50-42-7	84122557	assembled with 10 m DC cable
Smart DC kits for stranded wire 2 x 16 mm² cable N2XC2Y 2 x 16			
7/8"	73_Z-50-23-15	84123563	no pigtail
1 1/4"	73_Z-50-32-15	84123734	no pigtail
1 5/8"	73_Z-50-42-15	84123746	no pigtail
Trimming and flaring tools for coaxial cable			
7/8"	74_Z-0-23-18	84074476	trimming tool
1 1/4"	74_Z-0-32-14	23010533	jacket stripping
	74_Z-0-32-15	84120843	flaring tool
1 5/8"	74_Z-0-42-14	23010534	jacket stripping
	74_Z-0-42-15	84085074	flaring tool

Additional products



PTTA Power-to-the-Antenna box

See page 38



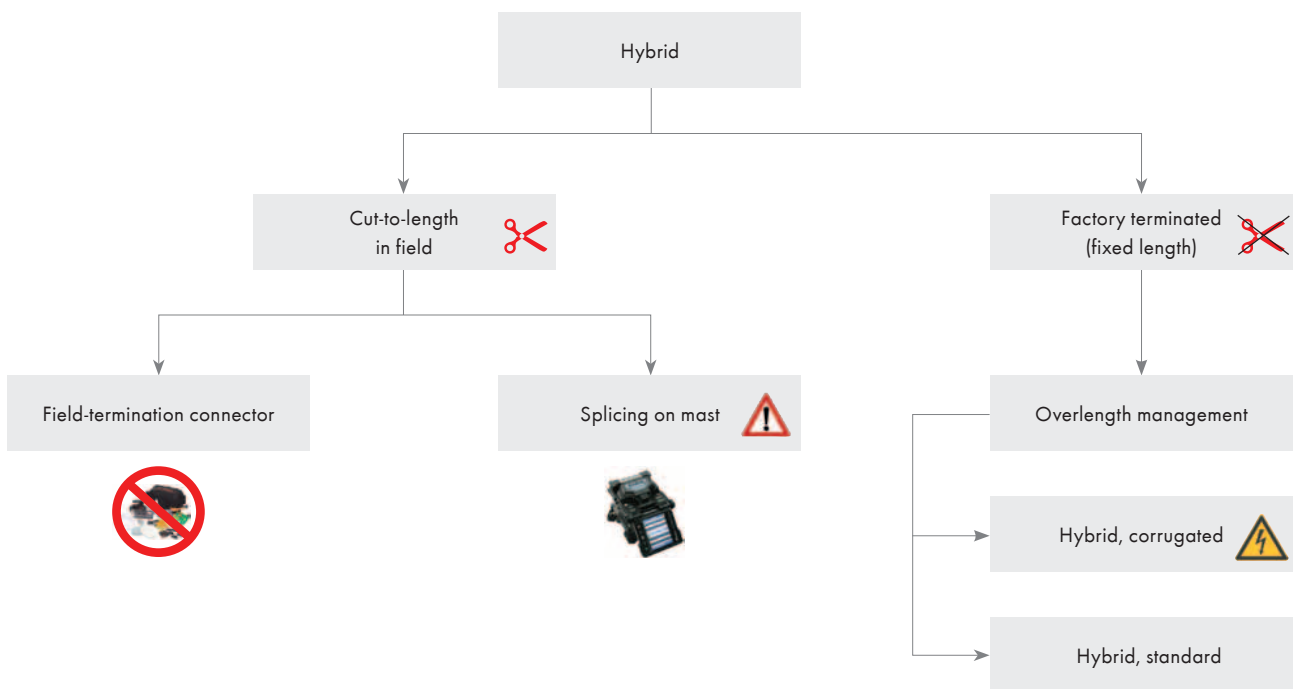
Power supply cable

See page 24

Hybrid Solutions

Hybrid cables combine glass fibers and copper wires in a single cable and are used to supply RRH directly. At first glance, hybrid seems to be easy and straight-forward. In fact, hybrid cables are the most complex and cost-intensive installation method and certain hybrid solutions can even be regarded as an obstacle to installation. Nevertheless, there are installation scenarios and niche-applications for which hybrid cables can be the optimum choice.

In contrast to corrugated feeder or power supply cables, **hybrid cables can not be cut to length in the field and terminated.** Cutting hybrid cables to length requires either that the fiber optic connectors are able to be terminated in the field or that the optical fibers are spliced with pre-terminated connector pigtailed. Most RRH interfaces require harsh environment connectors or ruggedized cable designs which can only be factory produced. Field-termination of fiber optic connectors is simply a no-go. The other option is fusion splicing of optical fibers. Splicing requires special skills and equipment but is a reliable process in protected environments, e.g. inside telecom rooms or cabinets. However, at roof-top or mast applications, remote radios are exposed to extreme temperature changes, vibrations due to wind load and changes in humidity. These extreme conditions can lead to breakage of fusion splices resulting in drop outs of the radio cells. Fusion splices bear an unpredictable network reliability risk.



Factory terminated cables are always delivered with a certain excess length to prevent installation failures because of cables that are too short. Cable **overlength management is necessary** and is usually done at the bottom of the mast or inside the cabinet. While storage of thin and flexible fiber optic excess cable is common practice, overlength management for thick and bulky hybrid cable can be a real challenge and is a waste of expensive copper cable. Standard hybrid cables with braided shieldings are relatively flexible and the copper part of the cable can be stripped back avoiding space consuming cable storage. Corrugated hybrid cables are more rigid, provide no flexibility in terms of overlength management and are comparatively expensive. However, standard grounding and mounting clamps for corrugated copper cables can be used.



Applications and features

- Only suited for special installation scenarios
- Complex and expensive installation method
- Disadvantageous combination of two cable technologies which are fundamentally different
 - Fiber optic cables are bending radius sensitive, factory terminated, connectorized, and delivered at pre-defined lengths
 - Copper cables can be cut and clamped in the field, need to be shielded and grounded, and are 3 to 5 times thicker than fiber optic cables.
- Fiber optic cables can support distances beyond 1 km while hybrid cables are limited to distances of about 100 m.

Benefits

- Only one cable needs to be installed.

Disadvantages

- Hybrid cables are always more expensive than separated fiber optic and power supply cables
- Long site installation times and inefficient
- Hybrid cable overlength management challenging or impossible for pre-assembled systems
- Field termination of hybrid cables is very complex and entails high levels of risk in terms of installation and reliability
- Corrugated hybrid cables are not compatible with RRH interfaces and required cable diameters.



MASTERLINE extreme hybrid

This factory-terminated hybrid cable assembly minimizes the amount of cables running up the mast. A compact divider splits the multi-fiber / wire cable into individual ruggedized outdoor cables which are linked to the RRHs - either directly or via extension jumpers. The jumpers allow an adaptation to different RRH interfaces and therefore make the solution independent from the system vendor's hardware.

MASTERLINE extreme hybrid is tailored for mobile operators who do not have own tower infrastructure but rent the majority of their tower cell sites. A common cost model is that the tower owner charges a variable rental fee based on the amount of cables running up the mast. The hybrid solution minimizes the annually recurring rental fee at the one-time cost of a more expensive and complex cable infrastructure. However, without having this special rental requirement, a cable infrastructure with separated fiber optic cables and power cables is the better choice.



MASTERLINE extreme hybrid



Features

- Hybrid cabling system for 3 up to 6 RRHs
- Ruggedized enclosure with robust break-out cables
- Overlength management - easy to strip and cut power cable at base station
- No special installation tools required
- Robust pulling tubes for cable lifting
- Supplied on double-flange reels for straight-forward unspooling
- Fiber optic breakout cables terminated with ODC plugs to connect to FTTA extension jumpers
- Power cable connectorized or open ended
- Colour coding for easy channel identification

Specifications

Enclosure	aluminium, black anodized	Ø 90 mm, height 230 mm
Pulling tube force	braided sleeve with pulling eye	2000 N (short-term during installation)
Temperature range	service installation	- 40 °C to + 75 °C - 25 °C to + 65 °C
Ingress protection	radio end base station (with protection tube)	IP 68 IP 65
Cable retention force at enclosure	fiber break-out cable power break-out cable hybrid cable	200 N 500 N 1000 N
Break-out cable length	fiber power	0.5 m (customized lengths possible) 4 m (customized lengths possible)
Salt mist	IEC 61300-2-26	96 h
Vibration	IEC 61300-2-1	10 - 500 Hz/ 10 g
Shock	IEC 61300-2-9	100 g
Cable head connectors (radio end)	fiber power	ODC plug or RRH connector open end or connectorized
Cable head connectors (base station)	fiber power	MASTERLINE classic ^{HT} with LC duplex open ended
Packaging	individual double-flange reels	Ø 810 mm, width 510 mm

MASTERLINE extreme hybrid

Hybrid cable

Jacket material	PVC, resistant to sunlight (UV), moisture, and corrosive agents
Installation	suitable for use in duct, conduits, arial, exposed runs, cable trays, and direct burial installations
Copper	6 mm ² (10 AWG) or 10 mm ² (8 AWG)
Conductors	class C stranded, bare copper
Drain wire	class B stranded, bare copper
Cable shielding	copper/mylar tape (100 % coverage)
Fiber optic	5 mm loose-tube cable with up to 12 fibers (singlemode or multimode)
Voltage rating	600 V
Flammability rating	UL 1685 (UL 1581) vertical tray flame test (70 000 BTU/hr)

Colour coding

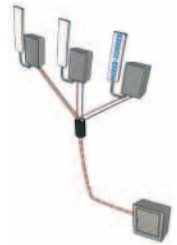
RRH 1	RRH 2	RRH 3	RRH 4	RRH 5	RRH 6
red	green	blue	yellow	white	black



MASTERLINE extreme hybrid is currently deployed nationwide in US.

A large American operator has selected the hybrid solution in order to minimize the variable rental fee based on the amount of cables running up the mast. The cabling system is a real plug-and-play solution and has excellent installation features - like robust pulling tubes and a field-manageable method to strip and cut the excess power cable at the base station. MASTERLINE extreme does not need any special tools for installation and allows for cable overlength management. These unique features convince operators and installers at the same time - there no other hybrid solution which comes close.

MASTERLINE extreme hybrid



Installation features

	<p>Unspooling The MASTERLINE extreme hybrid 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 The product is equipped with a robust pulling tube which protects the break-out cables and withstands a installation tensile load of 2000 N. Once the cable is lifted and attached to the mast, the pulling tube can be easily removed with standard tools.</p>
	<p>RRH connection The remote radios are connected with variable fiber extension jumpers, which are terminated with ODC extension connectors and RRH compatible interfaces. The copper cable is cut to the correct length and either clamped or connected with a field-termination power connector.</p>
	<p>Grounding The shielding of the hybrid cable can be grounded with standard grounding kits. There is not need for special tools or installation processes.</p>
	<p>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.</p>
	<p>Overlength management 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 overlength of the pre-terminated fiber cable is stored inside the base station or in an overlength box.</p>
	<p>Example of required installation tools</p>

MASTERLINE extreme hybrid

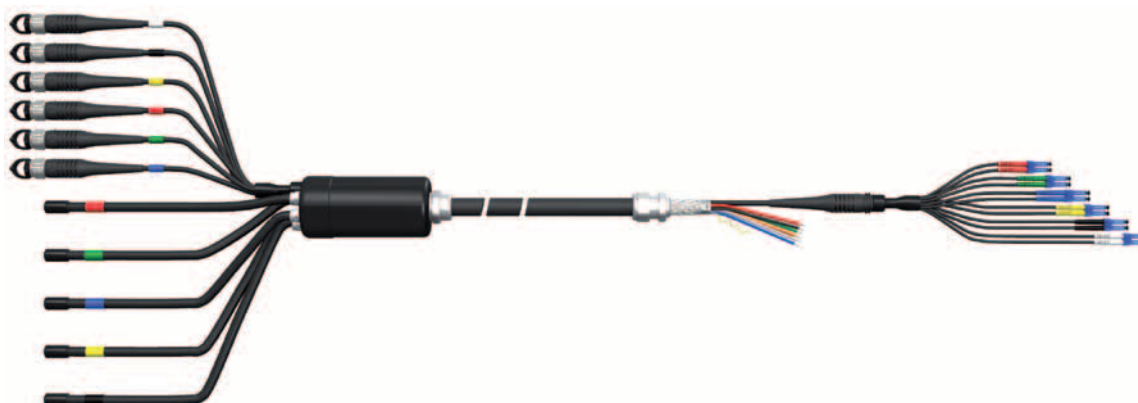
Ordering information

MASTERLINE extreme hybrid for 3 RRHs (3/3 configuration)



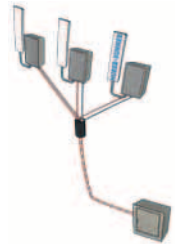
Length	Item no.	Description	Power	Fiber
30 m	84132544	MLE Hybrid 3/3-10AWG-SM-30m	6 x 6 mm ² (10 AWG)	6 fibers singlemode
40 m	84132546	MLE Hybrid 3/3-10AWG-SM-40m		
50 m	84132547	MLE Hybrid 3/3-10AWG-SM-50m		
60 m	84132548	MLE Hybrid 3/3-10AWG-SM-60m		
70 m	84132549	MLE Hybrid 3/3-8AWG-SM-70m	6 x 10 mm ² (8 AWG)	
80 m	84132550	MLE Hybrid 3/3-8AWG-SM-80m		
90 m	84132551	MLE Hybrid 3/3-8AWG-SM-90m		
100 m	84132552	MLE Hybrid 3/3-8AWG-SM-100m		

MASTERLINE extreme hybrid with 5/6 configuration



Length	Item no.	Description	Power	Fiber
30 m	84132554	MLE Hybrid 5/6-10AWG-SM-30m	10 x 6 mm ² (10 AWG)	12 fibers singlemode
40 m	84132555	MLE Hybrid 5/6-10AWG-SM-40m		
50 m	84132556	MLE Hybrid 5/6-10AWG-SM-50m		
60 m	84132557	MLE Hybrid 5/6-10AWG-SM-60m		
70 m	84132558	MLE Hybrid 5/6-8AWG-SM-70m	10 x 10 mm ² (8 AWG)	
80 m	84132559	MLE Hybrid 5/6-8AWG-SM-80m		
90 m	84132560	MLE Hybrid 5/6-8AWG-SM-90m		
100 m	84132561	MLE Hybrid 5/6-8AWG-SM-100m		

MASTERLINE extreme hybrid



For customized MASTERLINE extreme hybrid solutions contact HUBER+SUHNER.



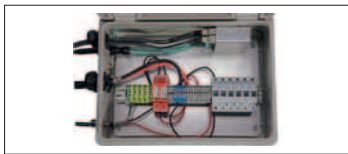
Hybrid Roof Top Application

In urban areas and highly populated areas, antennas are often mounted on rooftops of tall buildings. In the case of traditional corrugated feeder systems, large and heavy base stations need to be lifted by crane to the rooftops and require high-power provisioning. Remote radio systems allow for longer distances between antennas and the base station which can therefore be located in special telecoms room inside the building.

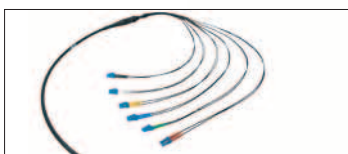
On the rooftop, cables need be laid from a distribution box (or base station) to the individual RRHs close to the antennas. In this scenario, factory-terminated hybrid cable can be the optimum choice. Instead of running separated signal and power supply cables in special conduits, ruggedized hybrid cables (e.g. reinforced against being stepped on) are routed. Additionally, the required cable runs are usually well known and the hybrid cable can be terminated at the exact required length at the factory - overlength management is not an issue in this case.



Hybrid cable assembly (page 79)



Hybrid box



MASTERLINE classic^{HT} (page 32)



Power feeder (page 49)



Hybrid Assemblies



Features

- Pre-assembled hybrid cable at pre-defined length
- Integrated power cable with braided shielding
- Ruggedized cable design and splitter
- Power cable connectorized at RRH or open ended at both sides
- Fiber optic cable connectorized at both ends
- Plug-and-play installation - no field termination / wrapping / preparation necessary
- Available in all dimensions and fiber types upon request
- Outdoor and indoor with high flame resistance

Specifications

Cable divider	glued heat shrink	
Ingress protection	connectors, cable and divider	IP 68
Cable head connectors (radio end)	fiber power	ODC plug or RRH connector open end or connectorized
Cable head connectors (base station)	fiber power	LC duplex or ODC plug open ended
Break-out cables	fiber power	Ø 5.5 mm (2 or 4 fibers) shielded copper cables
Copper cross section	2 x 4 mm ² , 2 x 6 mm ² , or 2 x 10 mm ²	
Cable diameter	hybrid	15 - 20 mm (depending cross section)
Temperature range	service installation	- 40 °C to + 75 °C - 25 °C to + 65 °C
Tensile load	fiber break-out cable power break-out cable	800 N 1000 N
Salt mist	IEC61300-2-26	96 h
Vibration	IEC 61300-2-1	10 - 500 Hz/ 10 g
Shock	IEC 61300-2-9	100 g

Portfolio / ordering

There does not exist a standard portfolio since too many combinations of parameters are possible.



Please contact HUBER+SUHNER to define your customized product.

- Singlemode or multimode, 2 or 4 fibers
- Cross-section of copper wires (2 x 4 mm², 2 x 6 mm², or 2 x 10 mm²)
- Shielded or un-shielded
- Type of fiber optic connectors (ODC, RRH compatible connector, LC)
- Type of power termination (connectorized or open-ended)
- Assembly length (dependent on cross-section)
- Break-out length at remote radio and at base station

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. Cleaning kits and robust fiber-check tools enable installers to detect and potentially eliminate failures directly on-site. 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.



Excess Length Box



Features

- Outdoor and indoor installation
- Store up to 20 m cable excess length (depending on cable diameter)
- Easy 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

Ordering information

Description	Item no.
Excess length box	84103325

Fiber optic cleaning, checking and installation tools

	Description	Type	Item no.	
1	Installation and cleaning kit. Content 1a, 1b, 1c (2x), 1d (2x25 pcs.)	FIBER OPTIC CLEANING KIT	84038056	
1 a	Red bag	QbE FO cleaning system	–	
1 b	QbE cube cleaning system	FW2150 Electro-Wash MX	84041085	
1 c	MX cleaning pen	pen	84041105	
1 d	Fiber optic cleaning swabs	51121 cleaning swab	84041108	
2	IBC cleaner 1.25 mm ferrule	cleaner, IBC, 1.25 mm	84108852	
3	Torque wrench 1 Nm	74_Z-0-0-321	84016417	
4	Fiber check tool for 2.5 mm ferrule connectors	TOOL-MEAS-LIGT-CHECK	23032064	
5	ODC adapter for fiber check tool	TOOL-MEAS-LIGT-CHECK-ADA-1-25	84041807	

Cable Clamps for FTTA/PTTA Installations



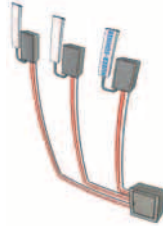
Features

- Suited for FTTA/PTTA installations, combined solution for power cables (DC) and fiber optic cables (FO)
- Easy and quick installation
- High corrosion resistance
- Defined clamping ranges for secure fixing of the fiber and power cable

MCC clamps	Description	Mounting profile	Picture
Main features	<ul style="list-style-type: none"> • Fixing up to 6 FO / Power cables • Space-saving block • Easy and quick installation 		
Components	<ul style="list-style-type: none"> • SAC calibrated double saddle • MIM 8 clamp • Threaded bar M8 or M10 • Hexagon nuts UNI 5588 • Flat washer • Flexible hinge 		
Material	<ul style="list-style-type: none"> • Stainless steel AISI 304 • Polyamide PA 6 UV proof. black 		
MRF clamps	Description	Mounting profile	Picture
Main features	<ul style="list-style-type: none"> • Fixing up to 3 FO / Power cables • Space-saving block • Easy and quick installation 		
Components	<ul style="list-style-type: none"> • DAS/DAT calibrated double saddle • Self-locking pressure screw • Sliding pressure plate 		
Material	<ul style="list-style-type: none"> • Stainless steel AISI 304 • Polyamide PA 6 UV proof. black 		
OXM clamps	Description	Mounting profile	Picture
Main features	<ul style="list-style-type: none"> • Fixing up to 3 FO / Power cables • Space-saving block • Easy and quick installation 		
Components	<ul style="list-style-type: none"> • SAT twin calibrated saddle • Stainless steel bow • Self-locking pressure screw M6 • Sliding pressure plate • SAT twin calibrated saddle 		
Material	<ul style="list-style-type: none"> • Stainless steel AISI 304 • Fiberglass Polyamide proof. black 		

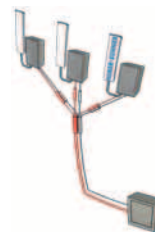
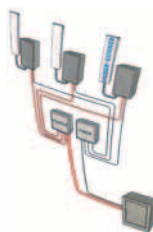
Combined Clamps for Fiber and Power

Combined clamps for standard solution



Item no.	Description	Fiber	Power cable		Picture
		Cable diameter	Cable diameter	Cross section	
84138624	MCCX_0_0114_0105-0	Ø 4.8 mm	Ø 11 - 14 mm	2 x 4 mm ²	
84138630	MCCX_0_0117_0105-0		Ø 14 - 17 mm	2 x 6 mm ²	
84138744	MCCX_0_0120_0205-0		Ø 17 - 20 mm	2 x 10 mm ²	
84138627	MCCX_0_0114_0107-0	Ø 5.5 - 7 mm	Ø 11 - 14 mm	2 x 4 mm ²	
84138633	MCCX_0_0117_0107-0		Ø 14 - 17 mm	2 x 6 mm ²	
84138747	MCCX_0_0120_0207-0		Ø 17 - 20 mm	2 x 10 mm ²	
84138625	MCCX_0_0114_0105-3	Ø 4.8 mm	Ø 11 - 14 mm	2 x 4 mm ²	
84138631	MCCX_0_0117_0105-3		Ø 14 - 17 mm	2 x 6 mm ²	
84138745	MCCX_0_0120_0205-3		Ø 17 - 20 mm	2 x 10 mm ²	
84138628	MCCX_0_0114_0107-3	Ø 5.5 - 7 mm	Ø 11 - 14 mm	2 x 4 mm ²	
84138634	MCCX_0_0117_0107-3		Ø 14 - 17 mm	2 x 6 mm ²	
84138748	MCCX_0_0120_0207-3		Ø 17 - 20 mm	2 x 10 mm ²	
84138626	MCCX_0_0114_0105-6	Ø 4.8 mm	Ø 11 - 14 mm	2 x 4 mm ²	
84138632	MCCX_0_0117_0105-6		Ø 14 - 17 mm	2 x 6 mm ²	
84138746	MCCX_0_0120_0205-6		Ø 17 - 20 mm	2 x 10 mm ²	
84138629	MCCX_0_0114_0107-6	Ø 5.5 - 7 mm	Ø 11 - 14 mm	2 x 4 mm ²	
84138635	MCCX_0_0117_0107-6		Ø 14 - 17 mm	2 x 6 mm ²	
84138749	MCCX_0_0120_0207-6		Ø 17 - 20 mm	2 x 10 mm ²	

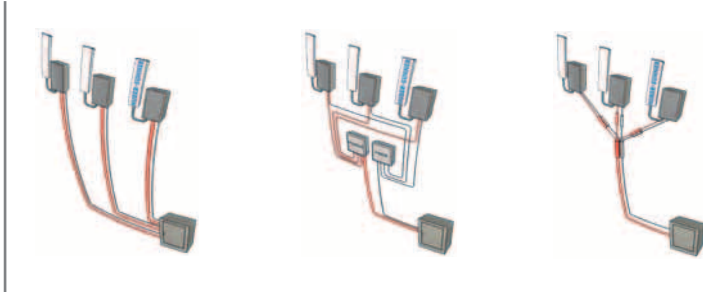
Combined clamps for multi-riser cables

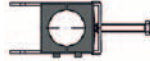



Item no.	Description	Fiber	Power cable		Picture
		Cable diameter	Cable diameter	Cross section	
84138636	MCCX_0_0120_0209-0	Ø 8.5 mm	Ø 17 - 20 mm	6 x 6 mm ² 2 x 10 mm ²	
84138638	MCCX_0_0123_0209-0	Ø 8.5 mm	Ø 20 - 23 mm	6 x 10 mm ² 2 x 16 mm ²	
84138743	OXXM_0_0134_SAT_0209-0	Ø 8.5 mm	Ø 22 - 34 mm	2 x 25 mm ²	

Clamps for Fiber Optic Cables

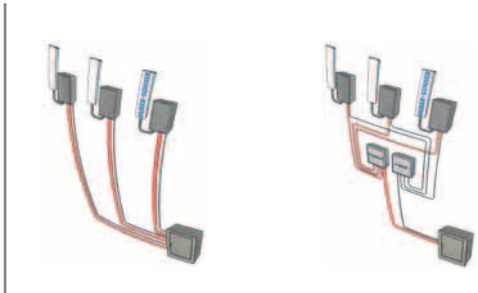
FTTA installation scenarios





Item no.	Description	Fiber	Picture
		Cable diameter	
84138594	MRFX_E_0105-0	Ø 4.8 mm	
84138597	MRFX_E_0106-0	Ø 5.5 mm	
84138600	MRFX_E_0107-0	Ø 7.0 mm	
84138603	MRFX_E_0109-0	Ø 8.5 mm	
84138595	MRFX_E_0305-0	Ø 4.8 mm	
84138598	MRFX_E_0306-0	Ø 5.5 mm	
84138601	MRFX_E_0307-0	Ø 7.0 mm	

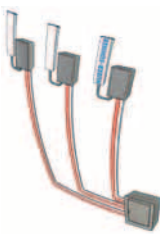
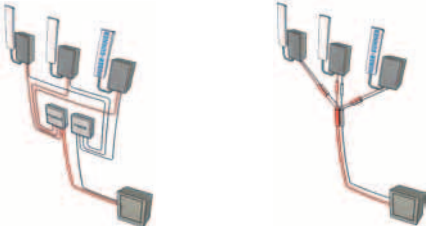
Clamps for power cables

PTTA installation scenarios



Item no.	Description	Power cable		Picture
		Cable diameter	Cross section	
84138614	OXXM_O_0122-0	Ø 12 - 22 mm	2 x 4 mm ² 2 x 6 mm ² 2 x 10 mm ² 2 x 16 mm ²	
84138742	OXXM_O_0134-0		Ø 22 - 34 mm	
84138615	OXXM_O_0322-0	Ø 12 - 22 mm	2 x 4 mm ² 2 x 6 mm ² 2 x 10 mm ² 2 x 16 mm ²	

Overview of HUBER+SUHNER Cable Combinations

Solution	Fiber cable	Power cable	
		Cable diameter	Cross section
With discrete cables 	4.8 mm (FTTA feeder)	Ø 13.9 mm	2 x 4 mm ²
	5.5 mm (FTTA feeder)	Ø 15.6 mm	2 x 6 mm ²
	7 mm (FTTA feeder)	Ø 17.9 mm	2 x 10 mm ²
With multi-riser cables 	8.5 mm (MASTERLINE)	Ø 17.9 mm	6 x 6 mm ²
		Ø 21.7 mm	6 x 10 mm ²
		Ø 17.9 mm	2 x 10 mm ²
		Ø 20.4 mm	2 x 16 mm ²
		Ø 23.5 mm	2 x 25 mm ²

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 like 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 for 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 the ODC.



Content

Q-XCO quick-lock ruggedized SFP connector	88
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FullAXS ruggedized sealing system	98
XCO ruggedized exchangeable SFP connector	100

Q-XCO – Quick-lock ruggedized SFP Connector



Features

- Quick-lock mating connector for remote radio head and industrial applications
- Ruggedized outdoor design with 2 x LC interface
- Plugs directly into SFP module, compatible with all standard SFP modules
- Full compensation of positioning tolerances and SFP module tolerances
- Bayonet, blind-mating mechanism and highest installation safety
- Full protection of optical interface during installation
- Access and exchange of SFP module possible
- RoHs compliant

Mating mechanism

Mating	1-step blind mating	bayonet
	mating references	visual and latch
Compensation of positioning tolerances of SFP module	z-axis	± 2.25 mm
	x,y-axis: ± 0.4 mm (± 0.6 mm depending on SFP module)	± 0.6 mm (± 0.8 mm depending on SFP module)
Latching of LC connector	use of LC HQ technology	automating latching and unlatching
Mating durability	IEC 61300-2-2	100 cycles
Force on SFP module		no force in mated state

Specifications

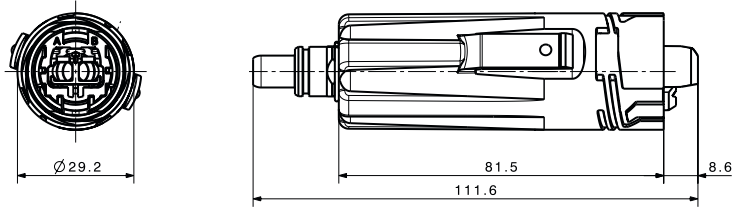
Technology		LC full ceramic ferrules
Housing material	connector	high-performance plastic
	socket	die-casting with zinc plating
Material flammability rating		UL 94-V0
Mechanical performance	IEC 61300-2-4	≤ 400 N tensile load
	IEC 61300-2-42	≤ 30 N static side load
	IEC 61300-2-5	180° cable torsion, passed
Thermal performance	operation, IEC 61300-2-22	- 40 °C to + 85 °C
	installation	- 40 °C to + 55 °C
Ingress protection	IEC 60529-20	IP 67 (mated or with dust cap)
Salt mist	IEC 61300-2-26, MIL-STD-202G Method 101E	192 h
Vibration	IEC 61300-2-1, MIL-STD-202G, Method 204G	passed 10 Hz - 500 Hz / 10 g
Shock	IEC 61300-3-3, MIL-STD-202G, Method 213B	passed 50 g
UV resistance	ISO 4982-2	passed 2000 h @ 2000 MJ/m ²

Optical performance

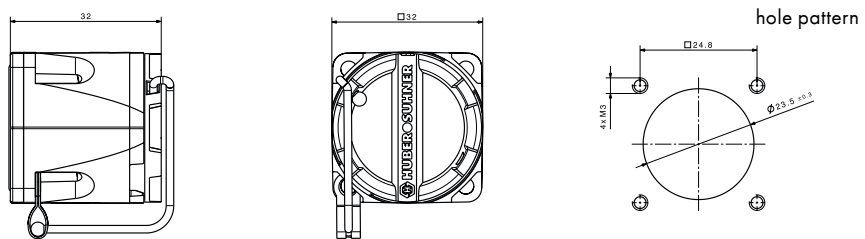
Insertion loss	singlemode	typ. ≤ 0.20 dB	97% ≤ 0.45 dB
	multimode	typ. ≤ 0.20 dB	97% ≤ 0.50 dB
Return loss	singlemode	≥ 50 dB	

Q-XCO – Quick-lock ruggedized SFP Connector

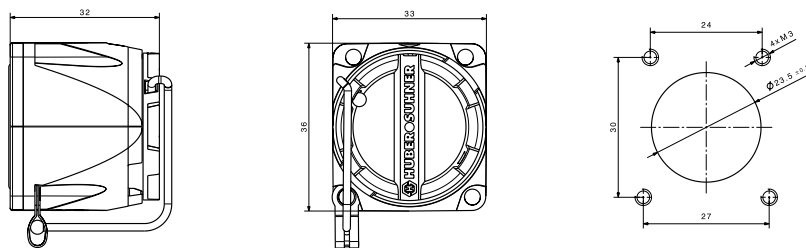
Q-XCO plug



Q-XCO flange small



Q-XCO flange large with asymmetric build-in dimension



Description	Picture	Dust cap
XA (for assembly code)	Q-XCO connector	
Item no. 84108683	Q-XCO flange small	
Item no. 84108684	Q-XCO flange large	

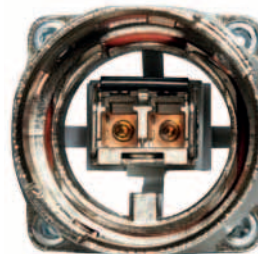
Q-XCO - Quick-lock ruggedized SFP Connector



Installation safety for LTE and microwave links

Q-XCO is the most installation safe fiber optic interface on the market. The connector is designed for harsh outdoor applications and for installation in challenging environments like high up on radio masts under any atmospheric condition. Its "one-hand" blind mating performance in combination with full SFP tolerance compensation makes this connector the best in its class. For that reason, leading system vendors have chosen Q-XCO as the fiber optic interface for LTE remote radios and for state-of-the-art microwave backhaul systems - simply to have better connections.

Tolerance compensation



The connector compensates for all tolerances of SFP modules and for mounting tolerances



Exchange of SFP module
Release and pull SFP module

Mating sequence



Rotate to find correct keying position



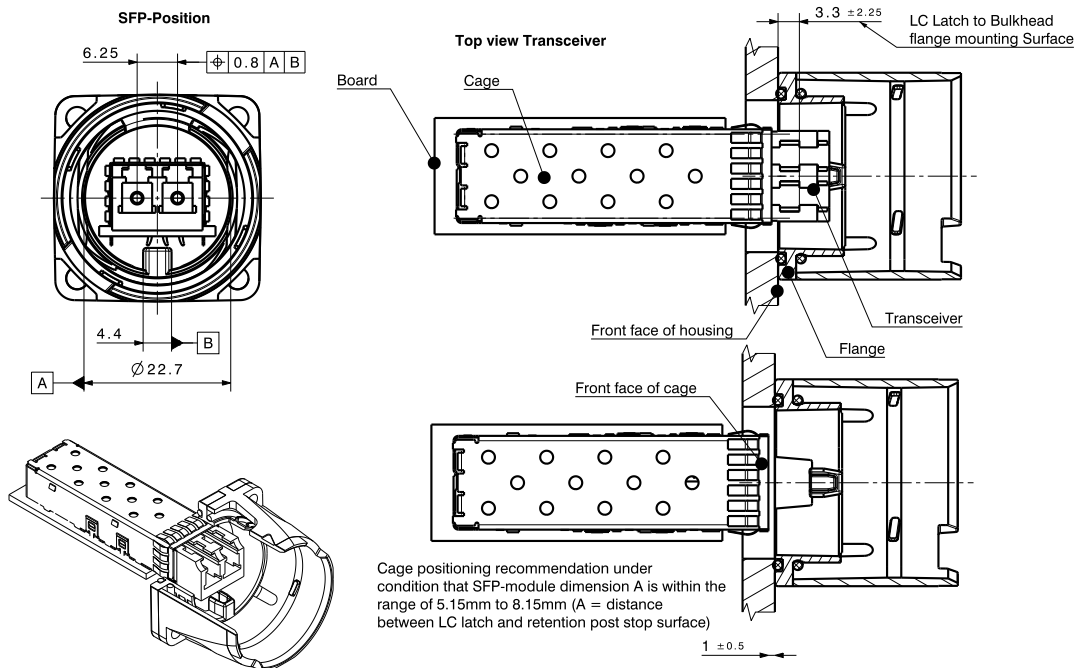
Slide connector into flange and rotate 155° until snap-in position



Connector mated with visual reference for correct installation

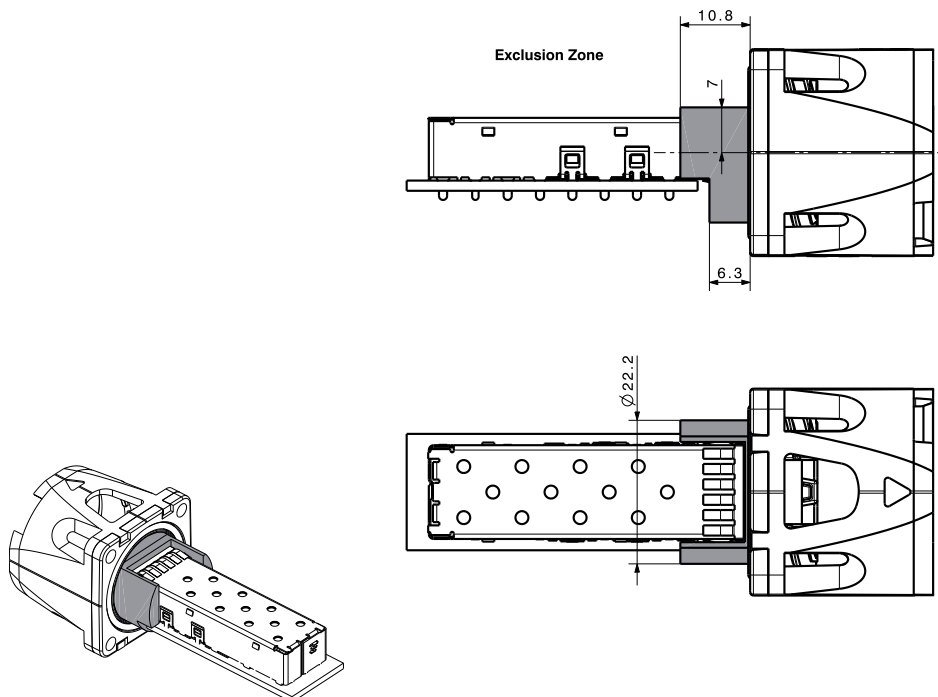
Q-XCO - Quick-lock ruggedized SFP Connector

SFP cage positioning specification



Module width and height extending outside of cage, see SFF-8432 Specification for Improved Pluggable Formfactor Rev. 5.0, July 16, 2007

Exclusion zone for connector mating



ODC[®]-2 outdoor Connector Plug / Socket



Features

- 2 fibers, singlemode or multimode
- Compact design with 2 x 1.25 mm ferrules
- Built-in socket with square or hexagonal flange
- Extension connector for cable chaining
- Screwed locking mechanism
- Easy and safe installation
- Waterproof, dust proof and corrosion resistant
- Waterproof protection caps
- EMI protected
- RoHs compliant
- Full compatibility with previous version
- Fulfills performance standard IEC 61753-1 Cat. E

Specifications

Technology		full ceramic ferrule and sleeve
Housing material		nickel-plated brass
Mechanical performance	ODC plug	≤ 800 N tensile load ≤ 30 N static side load
	ODC socket	≤ 30 N tensile load
Installation torque force	min. 1 Nm	max. 2 Nm
Operating temperature ¹⁾	IEC 61300-2-22	- 40 °C up to + 85 °C
Mating durability		1000 cycles ²⁾
Ingress protection (mated)	IEC 60529	IP 68
Salt mist	IEC 61300-2-26	30 days passed
Vibration	IEC 61300-2-1	passed 10 - 500 Hz / 10g
Shock	IEC 61300-2-9	passed 100 g

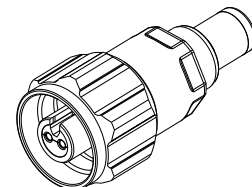
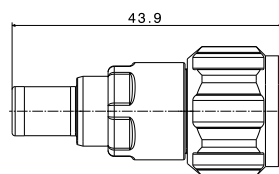
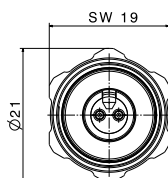
¹⁾ depending on cable type

²⁾ with repeated cleaning

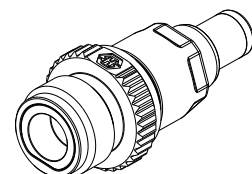
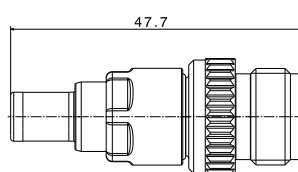
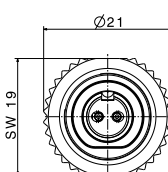
Optical performance

Insertion loss IEC 61300-3-34	singlemode	typ. ≤ 0.20 dB	97% ≤ 0.45 dB
	multimode	typ. ≤ 0.20 dB	97% ≤ 0.50 dB
Return loss	singlemode	≥ 50 dB	

Standard type A1, A4: ODC-2 plug





Standard type E1, E3: ODC-2 extension



ODC[®]-2 outdoor Connector Plug / Socket

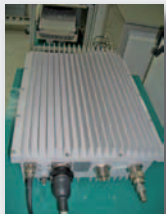


Overview of ODC-2 connector types

Type	Connector	Dust cap
A1	ODC-2 plug 	screwed cap with chain 
A4		screwed cap with pulling feature 
E1	ODC-2 extension (socket type) 	screwed cap 
E3		screwed cap with chain 
C1	ODC-2 socket, square small 	screwed cap 
C3		screwed cap with chain 

ODC - Worldwide the most often installed remote radio interface

We believe there is no country in the world in which ODC assemblies have not been installed yet. There is no other RRH interface which is used more often and which was chosen by more system vendors. The success comes from the fact that ODC is an extremely robust outdoor connector which withstands all installation hazards - and most important - does not permit handling errors. ODC makes mobile networks more reliable and guarantees 100% performance.



Q-ODC® outdoor Connector Plug / Socket



Features

- 2 fibers, singlemode or multimode
- Compact design with 2 x 1.25 mm ferrules
- Built-in socket with square flange
- Extension connector for cable chaining
- Robust push-pull coupling mechanism - two clearly defined mating states
- Highest outdoor installation safety
- Waterproof, dust proof and corrosion resistant
- Waterproof protection caps available
- EMI protected
- RoHs compliant
- Fulfills performance standard IEC 61753-1 Cat. E

Specifications

Technology		full ceramic ferrule and sleeve
Housing material		nickel-plated brass
Mating mechanism		push-pull with two clearly defined states
Mechanical performance	Q-ODC plug	≤ 450 N tensile load ≤ 30 N static side load
	Q-ODC socket	≤ 30 N tensile load
Operating temperature ¹⁾	IEC 61300-2-22	- 40 °C up to + 85 °C
Mating durability	IEC 61300-2-2	200 cycles ²⁾
Ingress protection (mated)	IEC 60529	IP 67
Salt mist	IEC 61300-2-26	30 days passed
Vibration	IEC 61300-2-1 IEC 61373	passed 10 Hz - 500 Hz / 10 g passed category 1A/B, 2, 3
Shock	IEC 61300-2-9 IEC 61373	passed 50 g passed category 1, 2

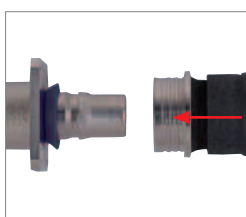
¹⁾ depending on cable type

²⁾ with repeated cleaning

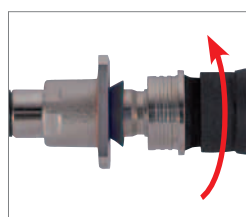
Optical performance

Insertion loss / IEC 61300-3-34	singlemode	typ. ≤ 0.20 dB	97% ≤ 0.45 dB
	multimode	typ. ≤ 0.20 dB	97% ≤ 0.50 dB
Return loss	singlemode	≥ 50 dB	

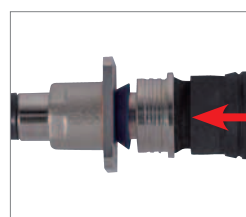
Mating sequence



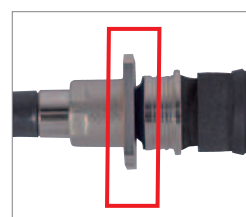
Push plug slightly into connector socket



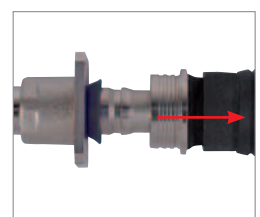
Rotate to find keying position



Unmated - push connector to mate







Mated - connector snaps in and is fully strain relieved



Pull coupling ring to unmate

Q-ODC® outdoor Connector Plug / Socket

Overview of Q-ODC connector types

Type	Connector	Dust cap
QA	 Q-ODC plug	push-on  IP54
QC		snap-on  IP67
QB		snap-on with chain  IP67
QE	 Q-ODC extension	push-on  IP54
QF		snap-on  IP67
QG		snap-on with chain  IP67
QS	 Q-ODC socket square	push-on  IP54
QT		snap-on  IP67
QU		snap-on with chain  IP67



Q-ODC – Push-pull connector for modular cell site installations

Q-ODC is used by a growing number of operators who build a modular and flexible cell site cable infrastructure. The push-pull connectors allows for quick and reliable cable connections, e.g. for top-mast boxes or jumpers. Additionally, the interface is designed that it is either mated or unmated – nothing in between. This makes each installation of cell site infrastructure safe.

ODC[®]-4 outdoor Connector Plug / Socket



Features

- 4 fibers, singlemode or multimode
- Compact design with 4 x 1.25 mm ferrules
- Built-in socket with square or hexagonal flange
- Extension connector for cable chaining
- Screwed locking mechanism
- Easy and safe installation
- Waterproof, dust proof and corrosion resistant
- Waterproof protection caps
- EMI protected
- RoHs compliant
- Full compatibility with previous version
- Fulfills performance standard IEC 61753-1 Cat. E

Specifications

Technology		full ceramic ferrule and sleeve
Housing material		nickel-plated brass
Mechanical performance	ODC-4 plug	≤ 800 N tensile load ≤ 30 N static side load
	ODC-4 socket	≤ 30 N tensile load
Installation torque force	min. 1 Nm	max. 2 Nm
Operating temperature ¹⁾	IEC 61300-2-22	- 40 °C up to + 85 °C
Mating durability		1000 cycles ²⁾
Ingress protection (mated)	IEC 60529	IP68
Salt mist	IEC 61300-2-26	30 days passed
Vibration	IEC 61300-2-1	passed 10 - 500 Hz / 10g
Shock	IEC 61300-2-9	passed 100 g

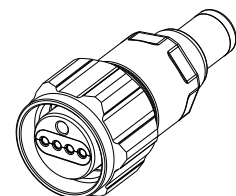
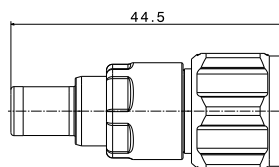
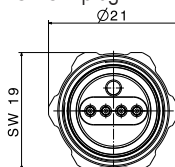
¹⁾ depending on cable type

²⁾ with repeated cleaning

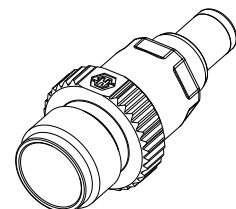
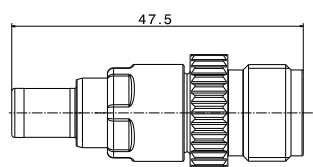
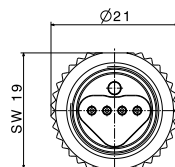
Optical performance

Insertion loss IEC 61300-3-34	singlemode	typ. ≤ 0.20 dB	97% ≤ 0.45 dB
	multimode	typ. ≤ 0.20 dB	97% ≤ 0.50 dB
Return loss	singlemode	≥ 50 dB	

Type J2, J3: ODC-4 plug

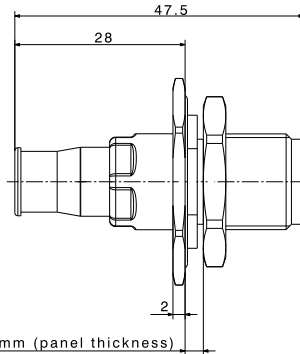
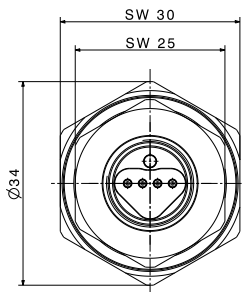


Type E4, E6: ODC-4 extension

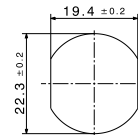


ODC[®]-4 outdoor Connector Plug / Socket

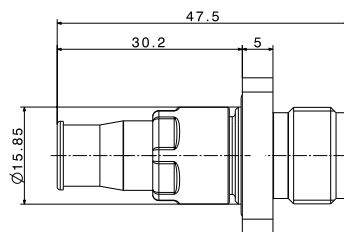
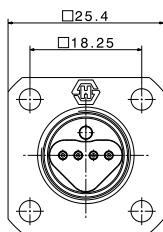
Standard type K2, K3: ODC-4 socket - hexagonal



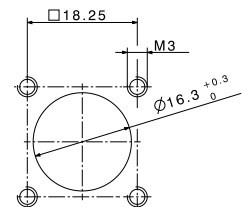
hole pattern



Standard type K6, K7: ODC-4 socket - square small



hole pattern



Overview of ODC-4 connector types

Type	Connector	Dust cap
J2	ODC-4 plug	screwed cap with pulling feature 
J3		screwed cap with chain 
E4	ODC-4 extension (socket type)	screwed cap 
E6		screwed cap with chain 
K2	ODC-4 socket, hexagonal	screwed cap 
K3		screwed cap with chain 
K6	ODC-4 socket, square small	screwed cap 
K7		screwed cap with chain 

FullAXS – ruggedized sealing System



Available Q1 2012

Features

- Ruggedized sealing system for fiber-to-the-antenna and industrial application
- Open bulkhead for easy access to SFP
- Positive mechanical feedback to operator when fully mated
- Duplex LC interface
- Robust bayonet locking for easy, fast, and secure mating
- Water proof (IP 65), dust proof and corrosion resistant.
- Expansion to RJ45 and power possible

Specifications

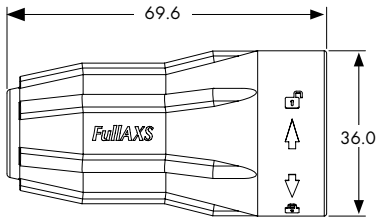
Mating mechanism		bayonet style locking
Housing material		high performance plastic
Technology		LC with full ceramic ferrules
Mechanical performance	tensile load	150 N
	static side load	30 N
Operating temperature		- 40 °C to + 70 °C
Mating durability	IEC 61300-2-2	100 cycles
Ingress protection (mated)	IEC 60529	IP 65
Vibration	IEC 61300-2-1	passed 10 Hz - 500 Hz / 10 g
Performance standards	IEC 61753-1 cat. E	compliant
	Telcordia GR 3120	compliant

Optical performance

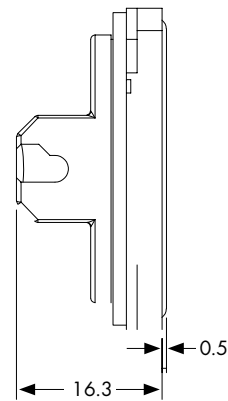
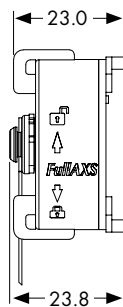
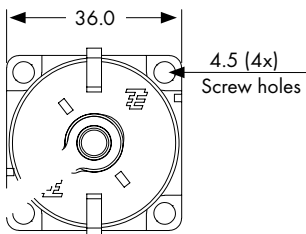
Insertion loss	singlemode	typ. ≤ 0.20 dB	$97\% \leq 0.45$ dB
	multimode	typ. ≤ 0.20 dB	$97\% \leq 0.50$ dB
Return loss	singlemode	≥ 50 dB	







FullAXS – ruggedized sealing System

Type Z4: FullAXS plug



Type: FullAXS build-in flange



Type	Connector	Picture	Dust cap
Z4	FullAXS plug		
84143159	FullAXS build-in flange		
84143964	FullAXS adapter		

FullAXS is a registered trademark of TE.

XCO - ruggedized exchangeable SFP Connector



Features

- 2 fibers, singlemode or multimode
- Standard LC duplex interface
- Ruggedized outdoor connector for fiber-to-the-antenna and industrial applications
- Exchange and service of SFP module possible
- Easy manual installation – no tool required
- High installation safety due to reliable snap-in strain relief system (patent pending)
- Waterproof protection cap with pulling eye
- EMI protected
- RoHs compliant

Specifications

Technology		LC with full ceramic ferrules
Housing material		nickel-plated brass
Mating mechanism		snap-in strain relief system
Mechanical performance		≤ 500 N tensile load ≤ 30 N static side load
Operating temperature ¹⁾		- 40 °C up to + 85 °C
Mating durability	IEC 61300-2-2	500 cycles
Ingress protection (mated)	IEC 60529	IP 67
Salt mist	IEC 61300-2-26	30 days passed
Vibration	IEC 61300-2-1	passed 10 Hz - 500 Hz / 10 g
Shock	IEC 61300-2-9	passed 50 g

¹⁾ depending on cable type

Optical performance

Insertion loss	singlemode	typ. ≤ 0.20 dB	97% ≤ 0.45 dB
	multimode	typ. ≤ 0.20 dB	97% ≤ 0.50 dB
Return loss	singlemode	≥ 50 dB	

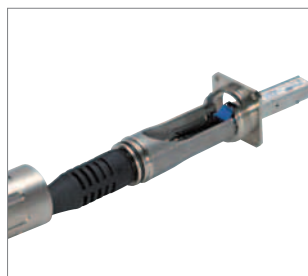
Mating sequence



Remove protection cap and slide back connector housing



Snap connector into flange – full strain relief



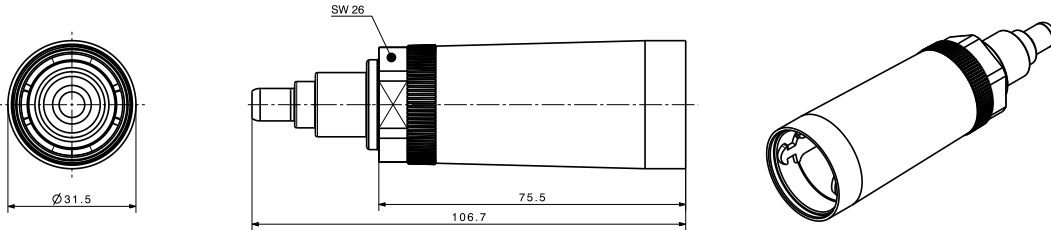
Remove LC dust caps and plug LC duplex connectors into SFP module



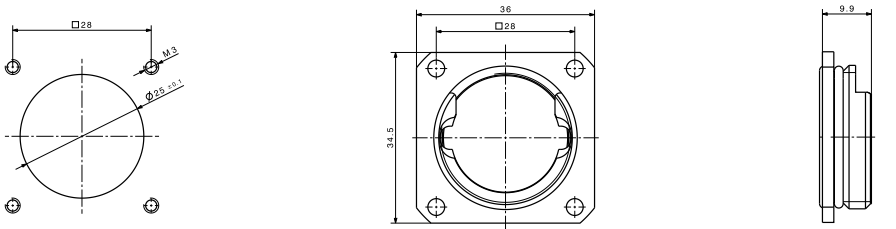
Screw-on housing to seal connector




XCO - ruggedized exchangeable SFP Connector

Type X1: XCO connector plug

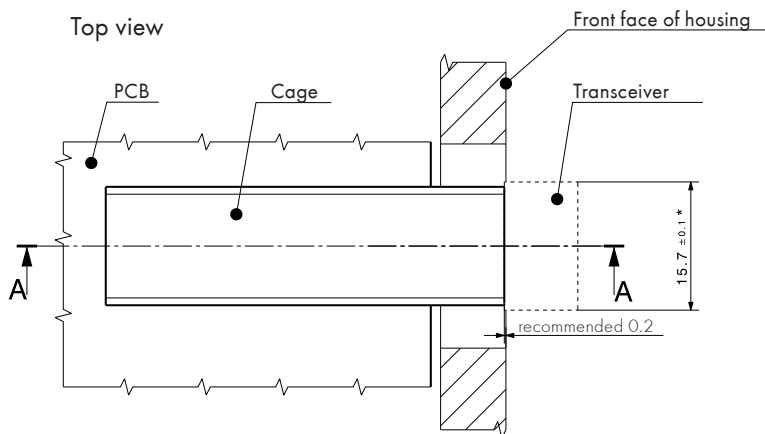


Type: XCO build-in flange

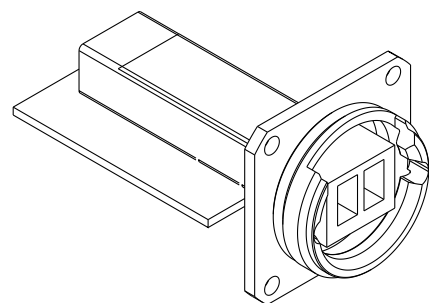


Description	Connector	Dust cap
X1	XCO connector	 IP 67
Item no. 84074439	XCO build-in flange	 IP 67
Item no. 84102696 Suitable for cable with a diameter from 5 to 9 mm	XCO adapter	 IP 67

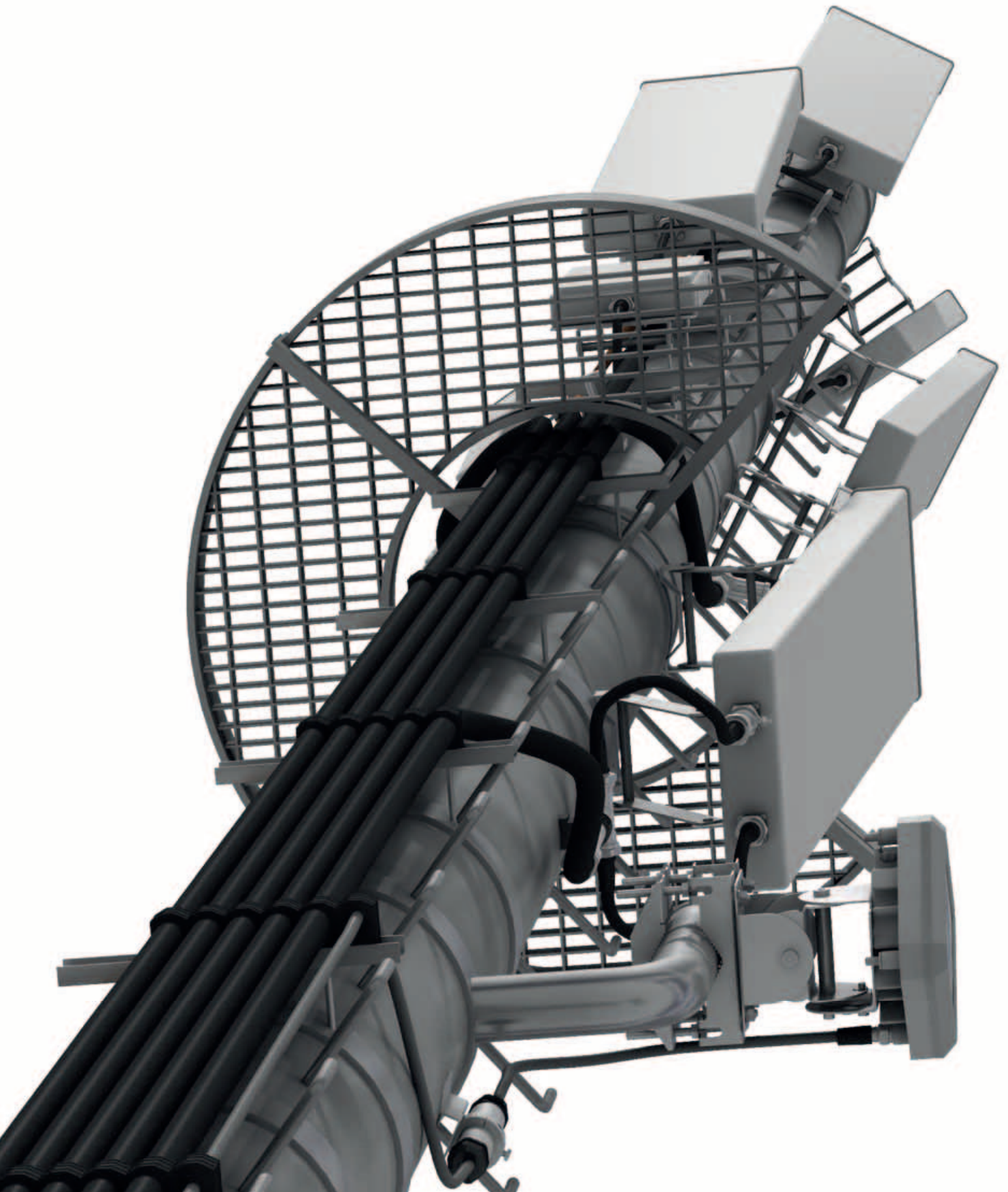
Positioning dimensions of SFP module



Lateral mounting tolerance between SFP module and XCO flange = ± 0.5 mm



Conventional Cell Site Solutions



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RF Jumpers - LISCA

LISCA products are designed to meet customer specifications, delivery requirements and budgets.

LISCA - Low **L**oss and Low **I**ntermodulation **S**oldered **C**orrugated Cable **A**ssembly.



Application

This product line is designed to be used:

- As jumper cables for indoor and outdoor applications
- As internal connections for mobile phone base stations
- In antenna links
- As test leads for low intermodulation test equipment
- In general radio transceivers with requirements for low reflection (VSWR), low attenuation and low intermodulation products

Features

- Excellent RF performance
- High RF shielding efficiency
- Low attenuation
- Moisture protection IP68
- High flexibility and small bending radius
- Low, stable intermodulation products

Benefits

- RoHS compliant (2002/95/EC)
- Wide variety of corrugated cable and connector types
- Standard products as well as customized assemblies with special lengths and markings according to customer specifications
- High volume capacity thanks to standard assembly processing at all main HUBER+SUHNER production sites worldwide



RF Jumpers – LISCA

Description

LISCA cable assemblies are specially developed for applications where low VSWR and low attenuation combined with low intermodulation products are required. The excellent performance is achieved by utilizing corrugated cables with low intermodulation connectors and a controlled assembly process with HUBER+SUHNER solder technology.

These products are factory-made cable assemblies and can only be ordered in predetermined lengths. A hot-polyamide moulding between connector and cable jacket guarantees highest stability and tightness.

Standard LISCA assemblies

These assemblies are produced under stringent quality manufacturing standards in order to achieve consistent high performance. All standard products are based on SUCOFEED cables with black PE jacket material. The assemblies are 100% tested for attenuation and return loss according to the technical data. These LISCA products are factory-made cable assemblies and can only be ordered in predetermined lengths.

Customized LISCA assemblies

HUBER+SUHNER's strengths also include the production of products according to customer specifications. This product line offers additional possibilities for demanding customer wishes based on the LISCA standard requirements.

Additional features:

- Improved return loss values
- Example: better -28 dB at 2.2 GHz with straight N or DIN 7/16 connectors
- 100% factory tested products for intermodulation
- Example: max. -155 dBc at 1.8 GHz with 2 x 20 W carriers
- Factory tested products on phase length/tolerance and delay time
- Specified for frequencies up to 6 GHz
- Customized marking, labelling and product packaging
- Special connector designs
- Products with lengths up to 150 m



RF Jumpers – LISCA

Assembly performance code

Performance code	LIS...-51	LIS...-52		LIS...-71	LIS...-81	LIS...-01	
Description	Standard	LTE*		USA ¹⁾	Test leads	Customer specific	
Impedance	50 Ω	50 Ω		50 Ω	50 Ω	50 Ω	
Frequency (max. operating)	6 GHz	6 GHz	6 GHz	6 GHz	6 GHz	6 GHz	
Length of assemblies	≤ 10 m	≤ 5 m	≤ 12 m	≤ 5 m	≤ 5 m	≤ 120 m	
Return loss	DC ..1.0 GHz ≥ 28 dB >1.0 .. 2.2 GHz ≥ 26 dB >2.2 .. 2.7 GHz - >2.2 .. 4.0 GHz - >4.0 .. 6.0 GHz -	≥ 28 dB ≥ 26 dB - - -	≥ 28 dB ≥ 26 dB ≥ 23 dB - -	≥ 28 dB ≥ 26 dB ≥ 21 dB - -	≥ 28 dB ≥ 26 dB - ≥ 22 dB -	≥ 24 dB ≥ 24 dB - - -	open
Intermodulation	IM3 (2 x 20 W) -162 dBc (typical)	-150 dBc -162 dBc (typical)		-160 dBc	-165 dBc QN: -155 dBc	open	
RF power	see cable specification						
Attenuation	see cable specification						

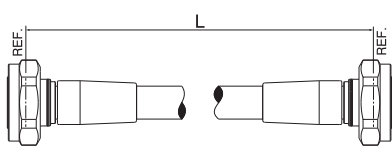
LTE = Long Term Evolution

¹⁾ special marking on cable

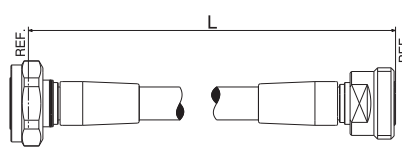
Order number for standard LISCA

		Example:	LIS-C9F-11	716-16	716-02000	-51
		Product name				
SUCOFEED_1/4_HF	C5	Cable type				
SUCOFEED_3/8_HF	C7					
SUCOFEED_1/2_HF	C9					
SUCOFEED_1/2	C12					
Flame retardant: F PE: no indication						
Straight male	11	Pattern of connector	1			
Right angle male	16					
Straight female	21	Pattern of connector		2		
DIN 7/16	716	Connector interface		1	2	
N	N					
QN	QN					
		Assembly length in mm				
Jumper performance code	example: 51	Technical performance				

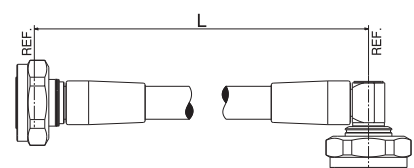
Assembly length: tolerance +/- 1%



Plug to plug



Plug to jack



Plug to right angle plug

RF Jumpers – LISCA

LISCA connector pattern

Description	Series DIN 7/16	Series N	Series QN
Straight male (Pattern code: 11)			
	cable: C5, C7, C9, C12	cable: C5, C7, C9, C12	cable: C5, C7, C9, C12
Right angle male (Pattern code: 16)			
	cable: C5, C7, C9, C12	cable: C5, C7, C9, C12	cable: C5, C7, C9, C12
Straight female (Pattern code: 21)			
	cable: C5, C7, C9, C12	cable: C5, C7, C9, C12	
Straight bulkhead female (Pattern code: 24)			
	cable: C5, C7, C9	cable: C5, C7	
Right angle bulkhead female (Pattern code: 29)			
	cable: C5, C7	cable: C7	
Straight bulkhead female (Pattern code: 25)			
	cable: C5, C7		



SUCOFEED - Corrugated Cables

HUBER+SUHNER SUCOFEED product range of foam corrugated coaxial cables with suitable stripping tools and connectors has excellent electrical, mechanical and climatic properties for indoor as well as for outdoor installations.

The cables guarantee optimal shielding, low attenuation, low VSWR, excellent intermodulation performance and flexibility for handling and installation on sites.



Applications

- Antenna links and internal connection of cellular base station
- Jumper cables and feeder lines

Features

- Low attenuation design available
- High power capability
- High shielding effectiveness
- UV-resistant
- Guaranteed performance up to 3 GHz

Benefits

- In copper and aluminum
- Long history and experience
- Designed for:
 - Harsh environments in polar regions
 - Extreme heat in the desert
 - High humidity in the rain forest



SUCOFEED – Corrugated Cables



1/4" high-flex

Cable design	Order/ type no.	SUCOFEED_1/4_HF	SUCOFEED_1/4_HF_FR	SUCOFEED_1/4_HF_FR_UL
	Dimension	1/4" high-flex	1/4" high-flex	1/4" high-flex
	Cable group	M5	M5	M5
	Jacket version	standard	flame retardant	flame retardant / UL-listed
Inner conductor	(Ø in mm)	1.90		
Dielectric	(Ø in mm)	4.60		4.40
Outer conductor	(Ø in mm)	6.40		
Jacket	(Ø in mm)	7.60		7.95

Electrical data				
Typ. operating frequency	(GHz)	≤ 18		
Impedance	(W)	50 ± 1		
Capacitance	(pF/m)	79.7		80
Relative signal propagation	(%)	83.5		83
Signal delay	(ns/m)	4.00		
Max. operating voltage	(kVrms)	0.6		
Typ. attenuation @ 1 GHz	(dB/100m)	19.54		19.56
Typ. attenuation @ 2 GHz	(dB/100m)	28.45		28.53
Typ. attenuation @ 2.2 GHz	(dB/100m)	29.98		30.08
Typ. attenuation @ 2.5 GHz	(dB/100m)	32.17		32.30
Typ. attenuation @ 3.0 GHz	(dB/100m)	35.60		35.77
Max. power @ 1 GHz (40°C)	(kW)	≤ 0.290		
Max. power @ 2 GHz (40°C)	(kW)	≤ 0.205		
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 0.196		
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 0.183		
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 0.167		

General data				
Temp. range operating	(°C)	- 55 / + 85	- 40 / + 85	
Temp. range installation	(°C)	- 25 / + 60		
Typ. weight	(kg/100m)	7.5	8.7	
Min. bending radius	(mm)	25		

For detailed data sheets please go to www.hubersuhner.com and then search for type "SUCOFEED".

SUCOFEED – Corrugated Cables



3/8" high-flex

Cable design	Order/ type no.	SUCOFEED_3/8_HF	SUCOFEED_3/8_HF_FR	SUCOFEED_3/8_HF_FR_UL
	Dimension	3/8" high-flex	3/8" high-flex	3/8" high-flex
	Cable group	M7	M7	M7
	Jacket version	standard	flame retardant	flame retardant / UL-listed
Inner conductor	(Ø in mm)	2.80		
Dielectric	(Ø in mm)	7.00		6.90
Outer conductor	(Ø in mm)	9.50		
Jacket	(Ø in mm)	10.80		11.15

Electrical data		SUCOFEED_3/8_HF	SUCOFEED_3/8_HF_FR	SUCOFEED_3/8_HF_FR_UL
Typ. operating frequency	(GHz)	≤ 12		
Impedance	(W)	50 ± 1		
Capacitance	(pF/m)	79.5		80
Relative signal propagation	(%)	83		
Signal delay	(ns/m)	4.00		
Max. operating voltage	(kVrms)	0.9		
Typ. attenuation @ 1 GHz	(dB/100m)	13.33		
Typ. attenuation @ 2 GHz	(dB/100m)	19.43		
Typ. attenuation @ 2.2 GHz	(dB/100m)	20.48		
Typ. attenuation @ 2.5 GHz	(dB/100m)	21.99		
Typ. attenuation @ 3.0 GHz	(dB/100m)	24.34		
Max. power @ 1 GHz (40°C)	(kW)	≤ 0.540		
Max. power @ 2 GHz (40°C)	(kW)	≤ 0.382		
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 0.364		
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 0.342		
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 0.312		

General data		SUCOFEED_3/8_HF	SUCOFEED_3/8_HF_FR	SUCOFEED_3/8_HF_FR_UL
Temp. range operating	(°C)	- 55 / + 85	- 40 / + 85	
Temp. range installation	(°C)	-25 / +60		
Typ. weight	(kg/100m)	12.2	13.2	14.2
Min. bending radius	(mm)	25		

SUCOFEED – Corrugated Cables



1/2" high-flex

Cable design	Order/ type no.	SUCOFEED_1/2_HF	SUCOFEED_1/2_HF_FR	SUCOFEED_1/2_HF_FR_UL
	Dimension	1/2" high-flex	1/2" high-flex	1/2" high-flex
	Cable group	M9	M9	M9
	Jacket version	standard	flame retardant	flame retardant / UL-listed
Inner conductor	(Ø in mm)	3.60		
Dielectric	(Ø in mm)	9.0		
Outer conductor	(Ø in mm)	12.20		12.10
Jacket	(Ø in mm)	13.40		13.65

Electrical data				
Typ. operating frequency	(GHz)	≤ 10		
Impedance	(W)	50 ± 1		
Capacitance	(pF/m)	80.3		78.5
Relative signal propagation	(%)	81		85
Signal delay	(ns/m)	4.00		3.90
Max. operating voltage	(kVrms)	1.27		
Typ. attenuation @ 1 GHz	(dB/100m)	11.77		10.67
Typ. attenuation @ 2 GHz	(dB/100m)	17.48		15.69
Typ. attenuation @ 2.2 GHz	(dB/100m)	18.48		16.56
Typ. attenuation @ 2.5 GHz	(dB/100m)	19.92		17.81
Typ. attenuation @ 3.0 GHz	(dB/100m)	22.19		19.78
Max. power @ 1 GHz (40°C)	(kW)	≤ 0.83		≤ 0.780
Max. power @ 2 GHz (40°C)	(kW)	≤ 0.587		≤ 0.552
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 0.56		≤ 0.526
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 0.525		≤ 0.499
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 0.479		≤ 0.450

General data				
Temp. range operating	(°C)	- 55 / + 85		- 40 / + 85
Temp. range installation	(°C)			- 25 / + 60
Typ. weight	(kg/100m)			20
Min. bending radius	(mm)			25

For detailed data sheets please go to www.hubersuhner.com and then search for "SUCOFEED".

SUCOFEED – Corrugated Cables



1/2" annular

Cable design	Order/ type no.	SUCOFEED_1/2	SUCOFEED_1/2_FR	SUCOFEED_1/2_FR_UL
	Dimension	1/2"	1/2"	1/2"
	Cable group	M12	M12	M12
	Jacket version	standard	flame retardant	flame retardant / UL-listed
Inner conductor	(Ø in mm)	4.80		
Dielectric	(Ø in mm)	12.10		11.90
Outer conductor	(Ø in mm)	13.80		13.70
Jacket	(Ø in mm)	15.90		16.00

Electrical data			
Typ. operating frequency	(GHz)	≤ 8	
Impedance	(W)	50 ± 1	
Capacitance	(pF/m)	75.9	
Relative signal propagation	(%)	88	
Signal delay	(ns/m)	3.80	
Max. operating voltage	(kVrms)	1.60	
Typ. attenuation @ 1 GHz	(dB/100m)	7.29	
Typ. attenuation @ 2 GHz	(dB/100m)	10.62	
Typ. attenuation @ 2.2 GHz	(dB/100m)	11.20	
Typ. attenuation @ 2.5 GHz	(dB/100m)	12.02	
Typ. attenuation @ 3.0 GHz	(dB/100m)	13.31	
Max. power @ 1 GHz (40°C)	(kW)	≤ 1.040	
Max. power @ 2 GHz (40°C)	(kW)	≤ 0.735	
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 0.701	
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 0.658	
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 0.600	

General data				
Temp. range operating	(°C)	- 55 / + 85	- 40 / + 85	
Temp. range installation	(°C)	- 25 / + 60		
Typ. weight	(kg/100m)	25.0	27.6	25.8
Min. bending radius	(mm)	70		

SUCOFEED – Corrugated Cables



7/8" high-flex and annular

Cable design	Order/ type no.	SUCOFEED_7/8_HF	SUCOFEED_7/8
	Dimension	7/8" high-flex	7/8"
	Cable group	M24	M23
	Jacket version	standard	standard
Inner conductor	(Ø in mm)	9.40	9.00
Dielectric	(Ø in mm)	22.40	22.30
Outer conductor	(Ø in mm)	25.00	24.80
Jacket	(Ø in mm)	27.50	27.60

Electrical data

Typ. operating frequency	(GHz)	≤ 4.9	≤ 5
Impedance	(W)	50 ± 1	50 ± 1
Capacitance	(pF/m)	75.4	75.8
Relative signal propagation	(%)	85	88
Signal delay	(ns/m)	3.90	3.80
Max. operating voltage	(kVrms)	3.00	2.91
Typ. attenuation @ 1 GHz	(dB/100m)	4.25	4.11
Typ. attenuation @ 2 GHz	(dB/100m)	6.42	6.11
Typ. attenuation @ 2.2 GHz	(dB/100m)	6.81	6.46
Typ. attenuation @ 2.5 GHz	(dB/100m)	7.37	6.96
Typ. attenuation @ 3.0 GHz	(dB/100m)	8.26	7.76
Max. power @ 1 GHz (40°C)	(kW)	≤ 1.940	≤ 2.190
Max. power @ 2 GHz (40°C)	(kW)	≤ 1.372	≤ 1.549
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 1.308	≤ 1.476
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 1.227	≤ 1.385
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 1.120	≤ 1.264

General data

Temp. range operating	(°C)	- 55 / + 85	
Temp. range installation	(°C)	- 25 / + 60	
Typ. weight	(kg/100m)	48.0	53
Min. bending radius	(mm)	90	120

For detailed data sheets please go to www.hubersuhner.com and then search for "SUCOFEED".

SUCOFEED – Corrugated Cables



7/8" annular

Cable design	Order/ type no.	SUCOFEED_7/8_FR	SUCOFEED_7/8_LA	SUCOFEED_7/8_LA_FR
	Dimension	7/8"	7/8" low attenuation	7/8" low attenuation
	Cable group	M23	M25	M25
	Jacket version	flame retardant	standard	flame retardant
Inner conductor	(Ø in mm)	9.00	9.50	9.50
Dielectric	(Ø in mm)	22.30	22.70	22.70
Outer conductor	(Ø in mm)	24.80	25.40	25.40
Jacket	(Ø in mm)	27.60	27.90	27.90

Electrical data

Typ. operating frequency	(GHz)	≤ 5	≤ 5.0	≤ 5.0
Impedance	(W)	50 ± 1	50 ± 1	50 ± 1
Capacitance	(pF/m)	75.8	73.8	73.8
Relative signal propagation	(%)	88	90.3	90.3
Signal delay	(ns/m)	3.80	3.70	3.70
Max. operating voltage	(kVrms)	2.91	3.00	3.00
Typ. attenuation @ 1 GHz	(dB/100m)	4.11	3.76	3.76
Typ. attenuation @ 2 GHz	(dB/100m)	6.11	5.53	5.53
Typ. attenuation @ 2.2 GHz	(dB/100m)	6.46	5.83	5.83
Typ. attenuation @ 2.5 GHz	(dB/100m)	6.96	6.28	6.28
Typ. attenuation @ 3.0 GHz	(dB/100m)	7.76	6.97	6.97
Max. power @ 1 GHz (40°C)	(kW)	≤ 2.190	≤ 2.440	≤ 2.440
Max. power @ 2 GHz (40°C)	(kW)	≤ 1.549	≤ 1.725	≤ 1.725
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 1.476	≤ 1.645	≤ 1.645
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 1.385	≤ 1.543	≤ 1.543
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 1.264	≤ 1.409	≤ 1.409

General data

Temp. range operating	(°C)	- 40 / + 85	- 55 / + 85	- 40 / + 85
Temp. range installation	(°C)		- 25 / + 60	
Typ. weight	(kg/100m)	65.0	48	52
Min. bending radius	(mm)		120	

SUCOFEED – Corrugated Cables



1 1/4" annular

Cable design	Order/ type no.	SUCOFEED_1_1/4	SUCOFEED_1_1/4_FR
	Dimension	1 1/4"	1 1/4"
	Cable group	M32	M32
	Jacket version	standard	flame retardant
Inner conductor	(Ø in mm)	13.10	
Dielectric	(Ø in mm)	32.40	
Outer conductor	(Ø in mm)	35.80	
Jacket	(Ø in mm)	39.50	

Electrical data		
Typ. operating frequency	(GHz)	≤ 3
Impedance	(W)	50 ± 1
Capacitance	(pF/m)	76.5
Relative signal propagation	(%)	88
Signal delay	(ns/m)	3.80
Max. operating voltage	(kVrms)	4.20
Typ. attenuation @ 1 GHz	(dB/100m)	2.94
Typ. attenuation @ 2 GHz	(dB/100m)	4.43
Typ. attenuation @ 2.2 GHz	(dB/100m)	4.69
Typ. attenuation @ 2.5 GHz	(dB/100m)	5.08
Typ. attenuation @ 2.7 GHz	(dB/100m)	5.68
Max. power @ 1 GHz (40°C)	(kW)	≤ 3.120
Max. power @ 2 GHz (40°C)	(kW)	≤ 2.206
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 2.104
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 1.973
Max. power @ 2.7 GHz (40°C)	(kW)	≤ 1.801

General data			
Temp. range operating	(°C)	- 55 / + 85	- 40 / + 85
Temp. range installation	(°C)	- 25 / + 60	
Typ. weight	(kg/100m)	92	110.0
Min. bending radius	(mm)	200	

For detailed data sheets please go to www.hubersuhner.com and then search for "SUCOFEED".

SUCOFEED – Corrugated Cables



1 5/8" annular

Cable design	Order/ type no.	SUCOFEED_ 1_5/8	SUCOFEED_ 1_5/8_FR	SUCOFEED_ 1_5/8_LA	SUCOFEED_ 1_5/8_LA_FR
	Dimension	1 5/8"	1 5/8"	1 5/8" low att.	1 5/8" low att.
	Cable group	M42	M42	M43	M43
	Jacket version	standard	flame retardant	standard	flame retardant
Inner conductor	(Ø in mm)	17.30		17.60	
Dielectric	(Ø in mm)	42.40		41.00	
Outer conductor	(Ø in mm)	46.50		46.50	
Jacket	(Ø in mm)	49.80		50.30	
Electrical data					
Typ. operating frequency	(GHz)	≤ 2.75			
Impedance	(W)	50 ± 1			
Capacitance	(pF/m)	76.80		72.50	
Relative signal propagation	(%)	87.50		92	
Signal delay	(ns/m)	3.80			
Max. operating voltage	(kVrms)	5.40		5.50	
Typ. attenuation @ 1 GHz	(dB/100m)	2.43		2.25	
Typ. attenuation @ 2 GHz	(dB/100m)	3.71		3.36	
Typ. attenuation @ 2.2 GHz	(dB/100m)	3.94		3.56	
Typ. attenuation @ 2.5 GHz	(dB/100m)	4.27		3.84	
Typ. attenuation @ 2.7 GHz	(dB/100m)	4.48		4.02	
Max. power @ 1 GHz (40°C)	(kW)	≤ 4.100			
Max. power @ 2 GHz (40°C)	(kW)	≤ 2.899			
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 2.764			
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 2.593			
Max. power @ 2.7 GHz (40°C)	(kW)	≤ 2.495			
General data					
Temp. range operating	(°C)	- 55 / + 85	- 40 / + 80	- 55 / + 85	- 40 / + 85
Temp. range installation	(°C)	-25 / +60			
Typ. weight	(kg/100m)	144.8	160.0	110.0	130.0
Min. bending radius	(mm)	300		300	

SUCOFEEED Aluminium – Corrugated Cables

HUBER+SUHNER SUCOFEEED_LW is a foam dielectric corrugated coaxial cable designed with an aluminium outer conductor and a copper inner conductor. This low weight SUCOFEEED_LW family is a cost efficient alternative to the copper transmission line. The performance of the aluminium cables is equivalent to the copper transmission cables.

Applications

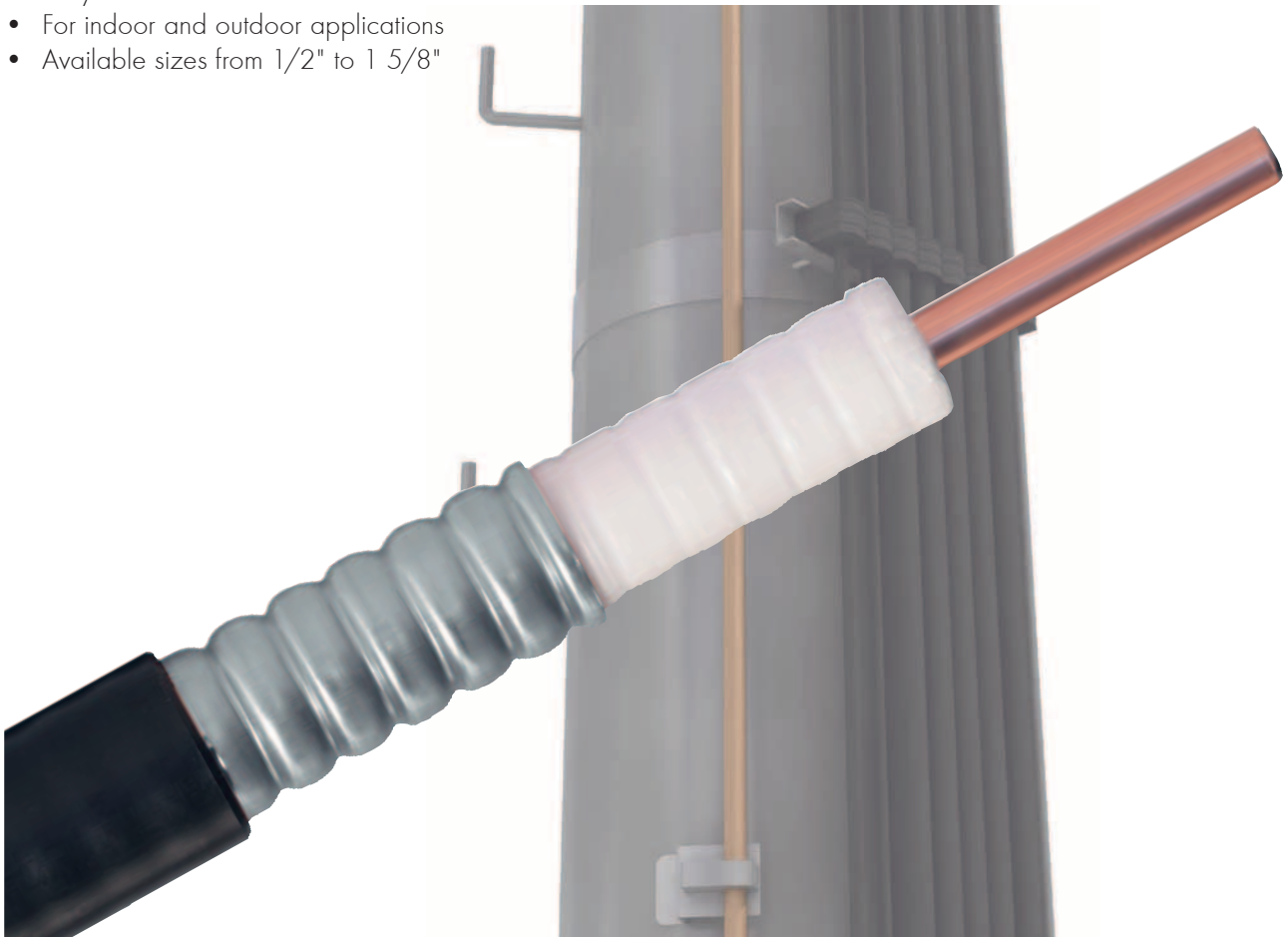
- Antenna links and internal connection of cellular base stations
- Jumper cables and feeder lines

Features

- Light weight
- Electrical performance equal to copper cables
- HUBER+SUHNER connectors are fully compatible with aluminium and copper cables
- Available with UV-resistant polyethylene jackets, flame-retardant jackets on request

Benefits

- Cost efficient solution
- Easy installation
- For indoor and outdoor applications
- Available sizes from 1/2" to 1 5/8"



SUCOFEEED Aluminium – Corrugated Cables



1/2" and 7/8" light weight

Cable design	order/type no.	SUCOFEEED_1/2_LW	SUCOFEEED_7/8_LW_LA
	dimension	1/2"	7/8" low attenuation
	cable group	M9	M23
	jacket version	PE	PE
Inner conductor	(Ø in mm)	4.80	9.40
Dielectric	(Ø in mm)	12.20	22.80
Outer conductor	(Ø in mm)	13.80	25.30
Jacket	(Ø in mm)	15.90	27.90

Electrical data			
Typ. Operating frequency	(GHz)	≤ 8.8	≤ 5
Impedance	(W)	50 ± 1	50 ± 1
Capacitance	(pF/m)	76	74
Relative signal propagation	(%)	88	90
Signal delay	(ns/m)	3.80	3.80
Max. operating voltage	(kVrms)	1.95	2.95
Typ. attenuation @ 1 GHz	(dB/100m)	7.76	4.16
Typ. attenuation @ 2 GHz	(dB/100m)	11.38	6.08
Typ. attenuation @ 2.2 GHz	(dB/100m)	12.00	6.41
Typ. attenuation @ 2.5 GHz	(dB/100m)	12.90	6.88
Typ. attenuation @ 3.0 GHz	(dB/100m)	14.31	7.62
Max. power @ 1 GHz (40°C)	(kW)	≤ 1.020	≤ 2.520
Max. power @ 2 GHz (40°C)	(kW)	≤ 0.721	≤ 1.782
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 0.688	≤ 1.699
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 0.645	≤ 1.594
Max. power @ 3.0 GHz (40°C)	(kW)	≤ 0.589	≤ 1.455

General data			
Temp. range operating	(°C)	- 55 / + 85	- 55 / + 85
Temp. range installation	(°C)	- 40 / + 60	- 40 / + 60
Typ. weight	(kg/100m)	≤ 17.5	≤ 37
Min. bending radius (single/rep.)	(mm)	70 / 125	120 / 250

For detailed data sheets please go to www.hubersuhner.com and then search for type «SUCOFEEED»

SUCOFEEED Aluminium – Corrugated Cables



1-1/4" and 1 5/8" light weight

Cable design	order/type no.	SUCOFEEED_1-1/4_LW	SUCOFEEED_1-5/8_LW_LA
	dimension	1-1/4"	1-5/8" low attenuation
	cable group	M32	M43
	jacket version	PE	PE
Inner conductor	(Ø in mm)	13.10	17.60
Dielectric	(Ø in mm)	32.00	41.50
Outer conductor	(Ø in mm)	36.00	46.50
Jacket	(Ø in mm)	39.20	50.30

Electrical data			
Typ. Operating frequency	(GHz)	≤ 3.60	≤ 2.75
Impedance	(W)	50 ± 1	50 ± 1
Capacitance	(pF/m)	75	74
Relative signal propagation	(%)	88	89
Signal delay	(ns/m)	3.8	3.8
Max. operating voltage	(kVrms)	4.2	5.6
Typ. attenuation @ 1 GHz	(dB/100m)	3.20	2.48
Typ. attenuation @ 2 GHz	(dB/100m)	4.70	3.69
Typ. attenuation @ 2.2 GHz	(dB/100m)	4.97	3.91
Typ. attenuation @ 2.5 GHz	(dB/100m)	5.34	4.21
Typ. attenuation @ 2.7 GHz	(dB/100m)	5.58	4.41
Max. power @ 1 GHz (40°C)	(kW)	≤ 3.350	≤ 4.100
Max. power @ 2 GHz (40°C)	(kW)	≤ 2.369	≤ 2.899
Max. power @ 2.2 GHz (40°C)	(kW)	≤ 2.259	≤ 2.764
Max. power @ 2.5 GHz (40°C)	(kW)	≤ 2.119	≤ 2.593
Max. power @ 2.7 GHz (40°C)	(kW)	≤ 2.039	≤ 2.690

General data			
Temp. range operating	(°C)	- 55 / + 85	- 55 / + 85
Temp. range installation	(°C)	- 40 / + 60	- 40 / + 60
Typ. weight	(kg/100m)	≤ 65	≤ 99
Min. bending radius (single/rep.)	(mm)	200 / 400	280 / 500

For detailed data sheets please go to www.hubersuhner.com and then search for type «SUCOFEEED»



QUICK-FIT Coaxial Connectors

General description

HUBER+SUHNER QUICK-FIT connectors are worldwide approved N and 7/16 connectors for foam dielectric corrugated copper tube cables. They offer a greatly simplified and economic approach to cable preparation and assembly. The product line meets the requirements of multi-carrier, high-channel-count transceivers such as base stations of today's mobile communication infrastructure networks.



Application

- Rugged connectors for easy outdoor termination of corrugated feeder and jumper cables
- Meeting the special requirements of BTS applications

Features

- Excellent RF performance
- Low, stable and reproducible PIM (Passive Intermodulation Product) - typically -165 dBc
- Safe assembly process performance - in-field termination with reproducible electrical performance
- Quick and easy assembly - 2 main connector parts, 4 steps in less than 4 minutes
- High IP rating - IP68
- Multi-brand, multi-design and multi-material cable compatibility
- Backward compatibility

Benefits

- Easy field installation
- Time saving
- Simplified logistics
- Low cost of ownership
- Support quality of a proven connector house
- Compatible for copper and aluminium cables



QUICK-FIT Coaxial Connectors

Technical data

Electrical data	Requirements
Impedance	50 Ω
Frequency range (for connector interface)	N: DC ... 11 GHz 7/16: DC ... 7.5 GHz
VSWR	≤ 1.06 (RL ≥ 30 dB); f ≤ 2.5 GHz
PIM ¹⁾	better than -155 dBc

1) Carrier to 3rd order intermodulation product ratio with 2 x 20 W (43 dBm) carrier power, f ≤ 1.88 GHz

Mechanical data	Requirements
Recommended coupling nut torque IEC	N: 0.68 ... 1.13 Nm / 0.49 ... 0.82 ft lb. IEC 61169-16 7/16: 25 ... 30 Nm / 18.05 ... 21.66 ft lb. IEC 61169-4
Recommended coupling nut torque HUBER+SUHNER	N: 3 Nm / 2.2 ft lb. with 100 matings max.
Coupling nut retention force	N: ≥ 450 N / 101.2 lbs. 7/16: ≥ 1000 N / 225.0 lbs.
Centre contact	captivated
Durability (matings)	≥ 500

Environmental data	Requirements
Temperature range	- 40 °C ... + 85 °C / - 40 °F ... + 185 °F
IP rating	IP 68 (acc. to IEC 60529)

Material data	Material	Plating
Connector part		
Cable entry	brass	SUCOPLATE®
Connector head	brass	SUCOPLATE®
Outer contact	brass	SUCOPLATE®
Centre contact	spring bronze/brass	silver
Insulators	PTFE or PFA	
Gaskets	rubber	

Some connectors may have a specification that differs from the above mentioned data. The products are designed and guaranteed to pass the above mentioned test procedures. Any additional or different requirement arising from specific applications or environmental conditions which is not covered by these test procedures is subject to request.

QUICK-FIT Coaxial Connectors

For cable size 1/2" _HF; 1/2" _HF_FR and 1/2" _HF_FR_UL

Type no.	Connector style	Item no.	Assembly instruction	Stripping tool	Item no. stripping tool
11_716-50-9-9	DIN 7/16 male	22660309	DOC-0000179418	74_Z-0-9-15	23001006
16_716-50-9-5	DIN 7/16 male right angle	23007298			
21_716-50-9-9	DIN 7/16 female	22660310			
11_N-50-9-9	N male	22660311			
16_N-50-9-6	N female right angle	23007299			
21_N-50-9-9	N female	22660312			

Cable compatibility list on request.



For cable size 1/2"; 1/2" _FR and 1/2" _FR_UL

Type no.	Connector style	Item no.	Assembly instruction	Stripping tool	Item no. stripping tool
11_716-50-12-10	DIN 7/16 male	22658311	DOC-0000179113	74_Z-0-12-15	23000319
16_716-50-12-11	DIN 7/16 male right angle	23011827			
21_716-50-12-10	DIN 7/16 female	22658313			
11_N-50-12-10	N male	22658314			
16_N-50-12-9	N female right angle	23011828			
21_N-50-12-10	N female	22658315			

Cable compatibility list on request.



For cable size 7/8"; 7/8" _FR; 7/8" _LA; 7/8" _LA_FR and 7/8" _HF

Type no.	Connector style	Item no.	Assembly instruction	Stripping tool	Item no. stripping tool
11_716-50-23-44	DIN 7/16 male	84069135	DOC-0000295365	74_Z-0-23-18	84074476
21_716-50-23-44	DIN 7/16 female	84069194			
11_N-50-23-43	N male	84124063			
21_N-50-23-43	N female	84124062			

Cable compatibility list on request.



QUICK-FIT Coaxial Connectors

For cable size 1_1/4" and 1_1/4"_FR

Type no.	Connector style	Item no.	Assembly instruction	Stripping/flairing tool	Item no. stripping tool
11_716-50-32-4	DIN 7/16 male	84116088	DOC-0000341341	74_Z-0-32-14/	23010533/
21_716-50-32-4	DIN 7/16 female	84116150		74_Z-0-32-15	84120843

Cable compatibility list on request.



For cable size 1_5/8"_LA

Type no.	Connector style	Item no.	Assembly instruction	Stripping/flairing tool	Item no. stripping tool
11_716-50-42-4	DIN 7/16 male	84079343	DOC-0000299051	74_Z-0-42-14/	23010534/
21_716-50-42-4	DIN 7/16 female	84079305		74_Z-0-42-15	84085074

Cable compatibility list on request.



Tools for QUICK-FIT Coaxial Connectors

Cable stripping tools and spare parts

For easy cable preparation in one single operation (can be used manually or with electrical power tool)

Type no.	Item no.	Part description	1/2" HF	1/2"	7/8"	1 1/4"	1 5/8"	1 5/8" _LA
74_Z-0-9-15	23001006	stripping tool (1/2" HF)	X					
74_Z-0-12-15	23000319	stripping tool (1/2")		X				
74_Z-0-23-18	84074476	stripping tool (7/8")			X			
74_Z-0-32-14	23010533	stripping tool (1_1/4")				X		
74_Z-0-32-15	84120843	flaring tool (1_1/4")				X		
74_Z-0-42-14	23010534	stripping tool (1_5/8")					X	X
74_Z-0-42-15	84085074	flaring tool (1_5/8")					X	X
74_Z-0-0-359	23014976	handle (for stripping tools)	X ⁴⁾	X ⁴⁾	optional	optional	optional	optional
74_Z-0-0-402	22652193	abrasive paper 320	X	X				
74_Z-0-0-424	23001952	spanner AF 17 mm						
74_Z-0-0-425	23001953	spanner AF 18 mm						
74_Z-0-0-426	23001954	spanner AF 19 mm						
74_Z-0-0-427	23001955	spanner AF 21 mm	X					
74_Z-0-0-428	23001956	spanner AF 22 mm	X	X				
74_Z-0-0-429	23001957	spanner AF 24 mm		X				
74_Z-0-0-415	22652206	counter sink			X ¹⁾	X ¹⁾	X ¹⁾	X ¹⁾
74_Z-0-0-418	22652209	Stanley knife	X	X	X	X	X	X
74_Z-0-0-420	22652211	steel brush		X	X	X	X	X
74_Z-0-0-422	22652213	steel measure 200 mm	X ²⁾	X ²⁾	X ²⁾	X ²⁾	X ²⁾	X ²⁾
74_Z-0-0-432	23002005	screw driver ²⁾		X				
74_Z-0-0-433	23002007	screw driver ⁴⁾			X	X	X	X
74_Z-0-0-12	22642718	small metal saw	X	X	X	X	X	X
74_Z-0-0-434	23002166	monkey wrench ³⁾				X	X	X
Type no.	Item no.	Part description						
74_Z-0-0-347	23000937	blade (cutting corrugated copper tube) for 74_Z-0-12-15						
74_Z-0-0-349	23001008	blade (cutting corrugated copper tube) for 74_Z-0-9-15						
74_Z-0-0-355	23008264	blade (cutting jacket) for 74_Z-0-32-14						
74_Z-0-0-356	23010537	blade (cutting jacket) 74_Z-0-42-14						
Type no.	Item no.	Part description						
74_Z-0-0-416	22652207	allen wrench AF 2.5 mm/.098 in. for 74_Z-0-9-15, 74_Z-0-12-15, 74_Z-0-32-14 and 74_Z-0-42-14						
74_Z-0-0-423	23000311	allen wrench AF 4 mm/.157 in. for removing the BIT adapter						
74_Z-0-0-421	22652212	screwdriver, Torx 1 (Torx T7) for changing the triangle knife 74_Z-0-0-348						

1) for assembly use either the Stanley knife or the counter sink

2) only necessary without HUBER+SUHNER stripping tool

3) 2 wrenches are needed for assembling

4) handle included in QUICK-FIT stripping tool delivery

Cold shrink Tubes for additional Protection

This special cold shrink tube reliably protects coaxial connectors against humidity and harsh environmental influences like icy conditions or a polluted atmosphere. It especially allows for outdoor feeder line installations in mobile communications and other wireless systems.

The simple and fast assembly of this cold shrink tube, by pulling out the supporting spiral, enables a reliable installation without special tools. After the assembly the cold shrink tube provides reliable protection by its continuous radial contact pressure.

Features

- Quick and easy installation without tool
- No torches or heat required
- Accommodates a wide range of cable sizes
- Good thermal stability
- Resists acids and bases, ozone and UV radiation
- Water resistant

Type no.	Item no.	For connector pair
73_Z-0-0-678/--_E	84062968	1/2" HF - 1/2" HF 1/2" HF - 1/2" 1/2" HF - 7/8" 1/2" - 1/2" 1/2" - 7/8" 7/8" - 7/8"
73_Z-0-0-339/--_E	22658885	1/2" HF - 1 1/4" 1/2" HF - 1 5/8" 1/2" - 1 1/4" 1/2" - 1 5/8" 7/8" - 1 1/4" 7/8" - 1 5/8"
73_Z-0-0-340/--_Y	22658886	1 1/4" - 1 1/4" 1 1/4" - 1 5/8" 1 5/8" - 1 5/8"

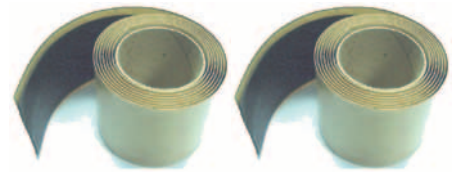


Fast-Wrap weatherproofing Kit

Fast-Wrap is a unique, time saving, weatherproofing solution for the telecom industry. The cross-linked butyl on elastomer carrier becomes a powerful sealing mechanism that can withstand the continued assault of outdoor elements above or below ground. This same material technology has been used successfully for over thirty years in the roofing and construction industries where it is exposed to the harshest environments. In fact, time and heat only serve to enhance it's self amalgamation and sealing properties. Fast-Wrap is a comprehensive replacement for common butyl tape weatherproofing kits and installs three times faster. Unlike butyl tape, Fast-Wrap is clean, easy to cut, simple to wrap, removable, and will not flow after installation.

Applications

- Outdoor corrugated feeder line to jumper cable connections
- Cable to lightning protector or antenna connections
- Grounding kits
- Fiber or dataline connections above or below ground
- Component connections



Colour	Black	
Dimensions	2-1/8" x 5 ft per roll	2 rolls per kit
Specific gravity	1.08 +/- .05	tested per ASTM D792-79
Penetration	40/120	tested per ASTM D217 (300Cone)
Ozone/UV resistance	high	tested per ASTM D1149-81 with no degradation
Elongation	300%	tested per ASTM D412-80
Low temperature	- 49F	tested per ASTM D746
Flash point	350F	tested per ASTM D92
Shear strength	15 PSI min	tested per ASTM D816
Peel strength	3 PSI min.	tested per ASTM D413
Tensile strength	50 PSI max.	v per ASTM D412
Odor	nil	
Volatile % by volume	.001 %	
Shelf life	10 years	
Resistance to	5 % acids, 5 % NaOH, water soluble solvents, acid and basic soils, heat up to 90 °C for one year, heat spikes at 130 °C for 24 hrs	
Do not expose to	Oil, carbon tetrachloride, naphtha, mineral spirits, gasoline	
Warranty	3 years	
Patent pending		

For connector pair	Connections per kit
1-5/8" to 1/2"	2
1-1/4" to 1/2"	2
7/8" to 1/2"	4
1/2" to 1/2"	12
7/8" to device	12
1/2" to device	12

Item number:
84125631
Inquiries to be made at
HUBER+SUHNER Inc. (USA)



Lightning Protectors

General description

Four decades of experience in developing and manufacturing coaxial lightning EMP and NEMP protectors are the foundation of the current HUBER+SUHNER RF-protection portfolio. Our products are designed to meet the stringent requirements of the RF/microwave, telecommunications and wireless industry and cover civil, security and defense applications. An extensive high-voltage impulse laboratory has been established to verify our designs in accordance with the valid international lightning, surge and NEMP standards. Important inventions are covered by worldwide patents.



Application

- Lightning protection for all mobile communication bands
- BIAS-T with lightning protection for applications with active electronics on top of the mast
- Lightning protection for active electronics in Point to Point / Backhaul applications
- Lightning protection for active electronics in GPS applications
- DC block for multiband / site sharing installations with TMAs
- DC line protection circuits for Radio Remote Heads in FTTA applications (for details see page 86, fiber optic chapter "Fiber Optic Interfaces for Remote Radio Heads")

Features

- Broadband designs
- Excellent RF performance
- High lightning current handling capability
- Low residual energy
- PIM optimized
- High CW and PIP power rating

Benefits

- Elevates system availability
- Lowers operational risk
- LP's perform the same before and after rated lightning pulses
- Best suited for outdoor installations
- Easy installation



Broadband Cellular Lightning Protectors

Application

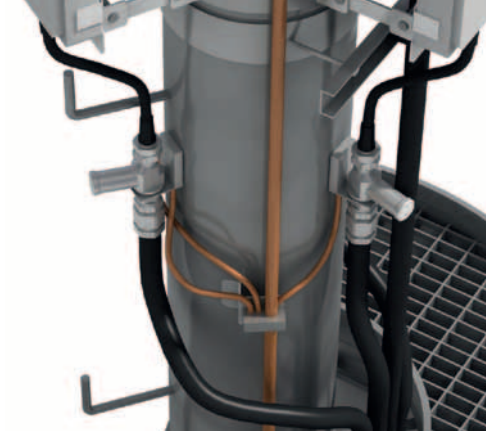
- $\lambda/4$ shorting stub lightning protectors for high power and low PIM applications without DC
- Broadband GDT protectors for single channel or low power applications
- Hybrid GDT protectors for multiple channel, high power and low PIM applications
- Bias-T protectors to support active electronics with DC on top of the mast
- Optimized for outdoor installations

Broadband cellular

	QUARTER LAMBDA SHORTING STUB 3400		
			
Type no.	3400.17.0431 ¹⁾	3400.41.0263 ¹⁾	3400.41.0257 ¹⁾
Frequency range	690 to 2200 MHz	690 to 2200 MHz	790 to 2620 MHz
Return loss	≥ 24 dB	≥ 26 dB	≥ 20.8 dB
Insertion loss	≤ 0.15 dB	≤ 0.15 dB	≤ 0.1 dB
Supports AISG at	-	-	-
RF Interface			
7/16 female / female	-	-	-
7/16 male / female	-	✓	✓
N male / female	✓	-	-
DC interface	-	-	-
PIM 3rd order	≤ -150 dBc	≤ -155 dBc	≤ -150 dBc
RF power (CW) max.	≤ 500 W	≤ 1500 W	≤ 1000 W
RF power (PIP) max.	25 kW	25 kW	-
GDT	n.a.	n.a.	n.a.
max. DC voltage	no DC	no DC	no DC
Surge current (8/20 μ s)			
single	50 kA	80 kA	80 kA
multiple	50 kA	80 kA	60 kA
Residual energy (typ.) 4 kV 1.2/50 μ s; 2 kA 8/20 μ s	10 μ J	10 μ J	9 μ J
Ingress protection rating	IP 67	IP 67	IP 68
Order information			
Item no.	84080266	84092647	84062515
Type no.	3400.17.0431	3400.41.0263	3400.41.0257



¹⁾ LTE = Long term evolution



Characteristics and specialities

- Excellent RF performance
- High lightning current handling capability
- Low passive intermodulation
- Low residual energy
- Supports AISG frequency (2.176 MHz)
- 25 kW PIP performance allows the multiple channel operation with "Linear Simulcast Modulation Techniques"

	GDT 3402	HYBRID 3409	BIAS T 3410
			
Type no.	3402.41.A ^{1) and 2)}	3409.41.0084 ^{1) and 2)}	3410.41.0029 ^{1) and 2)} 3410.41.0030 ^{1) and 2)}
Frequency range	DC to 2500 MHz	690 to 2200 MHz	690 to 2200 MHz
Return loss	≥ 20 dB	≥ 24 dB	≥ 24 dB
Insertion loss	≤ 0.2 dB	≤ 0.15 dB	≤ 0.1 dB
Supports AISG at	2.176 MHz	2.176 MHz	2.176 MHz
RF Interface			
7/16 female / female	✓	-	-
7/16 male / female	-	✓	✓
N male / female	-	-	-
DC interface	-	-	TNC female
PIM 3rd order	n.a.	≤ -155 dBc	≤ -155 dBc
RF power (CW) max.	dep. on GDT	≤ 1500 W	≤ 500 W
RF power (PIP) max.	-	25 kW	25 kW
GDT	replaceable	replaceable,	fix installed,
max. DC voltage	not included	9071.99.0548/90 V	90 V
	dep. on GDT	≤ 48 V	≤ 48 V
Surge current (8/20 μs)			
single	30 kA	30 kA	30 kA
multiple	20 kA	20 kA	20 kA
Residual energy (typ.) 4 kV 1.2/50 μs; 2 kA 8/20 μs	350 μJ	350 μJ	20 μJ
Ingress protection rating	IP 67	IP 67	IP 67

Order information			
Item no.	22642813	84092645	84115900
Type no.	3402.41.A	3409.41.0084	3410.41.0029
Item no.	-	-	84115182
Type no.	-	-	3410.41.0030

²⁾ AISG = Antenna Interface Standards Group



Cellular Backhaul Lightning Protectors

Application

- Protection of backhaul equipment with coaxial interfaces
- Protection of backhaul equipment with RJ45 interfaces

Cellular backhaul - POINT-TO-POINT radios

	GDT 3402	GDT 3406
		
Type no.	3402.17.0088 3402.17.0089	3406.17.0027 3406.17.0028
Frequency range	0 to 2500 MHz	DC to 4000 MHz
Return loss	≥ 20 dB	≥ 20 dB
Insertion loss	≤ 0.2 dB	≤ 0.2 dB
RF Interface		
N female / female	3402.17.0088	3406.17.0027
N male / female	3402.17.0089	3406.17.0028
RF power (CW) max.	dep. on GDT	≤ 60 W
RJ45	-	-
GDT	replaceable, not included	not replaceable, fix installed, 90 V
Max. DC voltage	dep. on GDT	60 V
Surge current (8/20 μ s)		
single	30 kA	10 kA
multiple	20 kA	5 kA
$I_{\text{nominal (line-PG)}}$	-	-
Total $I_{\text{nominal (line-PG)}}$	-	-
$I_{\text{nominal (shield-PG)}}$	-	-
Residual energy (typ.) 4 kV 1.2/50 μ s; 2 kA 8/20 μ s	350 μ J	250 μ J
Ingress protection rating	IP 65	IP 68

Order information		
Item no.	84102700	84041874
Type no.	3402.17.0088	3406.17.0027
Item no.	84102779	84041875
Type no.	3402.17.0089	3406.17.0028



Characteristics and specialities

- Coaxial protector with bandwidth DC to 2500 MHz
- Optional with self extinguishing GDT technology
- Data line protector supports cat. 5 class D and alternatively Gigabit Ethernet cat. 6, class E
- Indoor and outdoor versions available

	3414.99.0001 / 3414.99.0008		3414.99.0021 / 3414.99.0022	
				
	3414.99.0001 for indoor	3414.99.0008 for outdoor	3414.99.0021 for indoor	3414.99.0022 for outdoor
Type no.	3414.99.0001		3414.99.0021	
Frequency range	DC to 100 MHz		DC to 250 MHz	
Ethernet cabling standard	cat. 5; class D		cat. 6; class E	
Insertion loss	-		-	
RF Interface				
N female / female	-		-	
N male / female	-		-	
RF power (CW) max.				
RJ45	3414.99.0001		3414.99.0021	
	3414.99.0008		3414.99.0022	
GDT	not replaceable, fix installed		not replaceable, fix installed	
Max. DC voltage	58 V between pairs		58 V between pairs	
Surge current (8/20 µs)				
single	-		-	
multiple	-		-	
I _{nominal (line-PG)}	2.5 kA		2.5 kA	
Total I _{nominal (line-PG)}	10 kA		10 kA	
I _{nominal (shield-PG)}	6 kA		shield (connected) to PG	
Residual energy (typ.) 4 kV 1.2/50 µs; 2 kA 8/20 µs	-		-	
Ingress protection rating	indoor: IP 20 (3414.99.0001) outdoor: IP 68 (3414.99.0008)		indoor: IP 20 (3414.99.0021) outdoor: IP 68 (3414.99.0022)	

Order information			
Item no.	23033695	84108159	
Type no.	3414.99.0001	3414.99.0021	
Item no.		84014284	84122191
Type no.		3414.99.0008	3414.99.0022

GPS Lightning Protectors



Application

- Fine protector hybrid technology to protect GPS electronics

Characteristics and specialities

- Very low residual pulse energy
- Full lightning protection (20kA ; 8/20µs)
- DC bypass function
- Easy bulkhead installation

GPS

		Fine protector 3403
		
Type no.		3403.17.0060 3403.17.0063
Frequency range		800 to 2500 MHz
Return loss		≥ 26 dB
Insertion loss		≤ 0.3 dB
RF Interface	N female / female N male / female	3403.17.0060 3403.17.0063
DC bypass voltage	other voltage on request	≤ 6 V
DC bypass current		≤ 4 A
Surge current (8/20 µs)	single	20 kA
	multiple	10 kA
Residual energy (typ.)	4 kV 1.2/50 µs; 2 kA 8/20 µs	6 µJ
Ingress protection rating		IP 67

Order information	
Item no.	84030303
Type no.	3403.17.0060
Item no.	84038163
Type no.	3403.17.0063

DC Block



Application

- Blocking of DC (galvanic isolation of the inner conductor)
- Blocking or reducing of switching transients on transmission lines

Characteristics and specialities

- Broadband operation for all cellular bands
- Max. operation DC voltage ≤ 1 kV
- Isolation @ 1 kHz ≥ 80 dB
- Robust and compact
- Low weight
- IP67 rated

DC block

		DC block 9077	
Type no.		9077.41.0035	
Frequency range		350 - 3000 MHz	650 - 2700 MHz
Return loss		≥ 20 dB	≥ 26.5 dB
Insertion loss		≤ 0.1 dB	
Interface		7/16 male / female	
RF power (CW) max.		750 W, 10 kW (peak)	
RF power (PIP) max.		25 kW	
PIM 3rd order		≤ -160 dBc typ.	
DC blocking voltage		≤ 1 kV	
Isolation	at 100 kHz	≥ 40 dB	
	at 10 kHz	≥ 60 dB	
	at 1 kHz	≥ 80 dB	
Ingress protection rating		IP 67	
Order information			
Item no.		84082135	
Type no.		9077.41.0035	

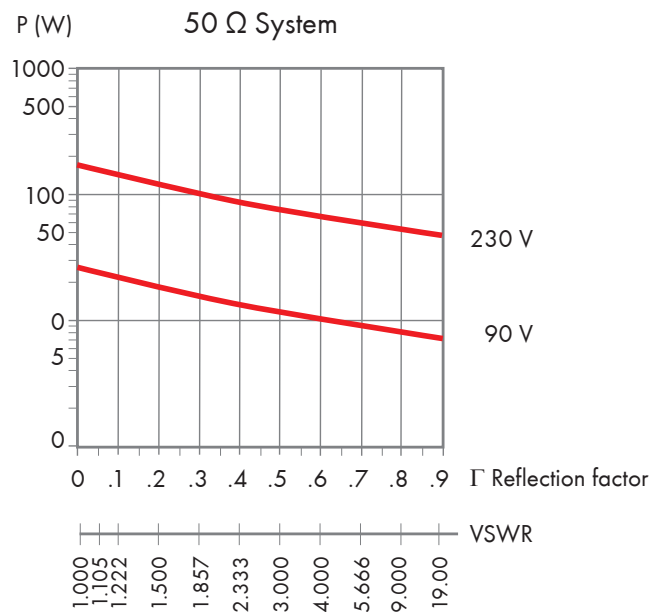
Gas Discharge Tube (GDT)

Gas discharge tubes

The best fitting gas discharge tube (GDT) can be selected according to the applied continuous RF power. If a DC signal is superimposed on the RF transmission line follow the guidelines given in the Lightning protection catalogue.



Type no.	Item no.	U_{Zstat} (V)	$U_{Zdyn max.}$ (V)	I_s 8/20 μs (kA)	I_{sG} 8/20 μs (kA)	U_{ARC} (V)	Dim. (mm)
9071.99.0547	23034582	230 \pm 15 %	675	20	30	10 - 15	6 x 8
9071.99.0548	23011009	90 \pm 20 %	500	20	30	10 - 15	6 x 8



SEMPER™ – self-extinguishing Gas Discharge Tube with automatic Recovery

Features and benefits

- Self-extinguishing gas discharge tube with automatic recovery
- Extinguishing under any coaxial line condition including:
 - Malfunction of electronic fused DC supplies
 - Malfunction of RF line monitoring
 - Absence of any such mechanism
- Can be employed for any HUBER+SUHNER GDT protector with exchangeable gas tube
- Field replacement allows cost-effective system upgrades
- Product options ensure availability for any application
- Higher safety
- Negligible system downtime



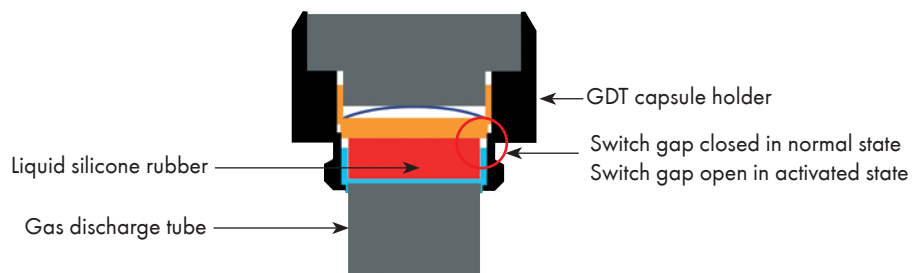
SEMPER™ GDT units for retrofit and replacement for series 3401 and 3402

Type no.	Item no.	U_{Zstat} (V)	$U_{Zdyn max.}$ (V)	I_S 8/20 μs (kA)	I_{SG} 8/20 μs (kA)	U_{ARC} (V)
9071.99.0647	84015427	$230 \pm 15 \%$	675	20	30	10 - 15
9071.99.0648	84010426	$90 \pm 20 \%$	500	20	30	10 - 15

SEMPER™ GDT units for retrofit and replacement for series 3409

Type no.	Item no.	U_{Zstat} (V)	$U_{Zdyn max.}$ (V)	I_S 8/20 μs (kA)	I_{SG} 8/20 μs (kA)	U_{ARC} (V)
9071.99.0747	84014462	$230 \pm 15 \%$	675	20	30	10 - 15
9071.99.0748	84014401	$90 \pm 20 \%$	500	20	30	10 - 15

Sectional view of SEMPER™ GDT module



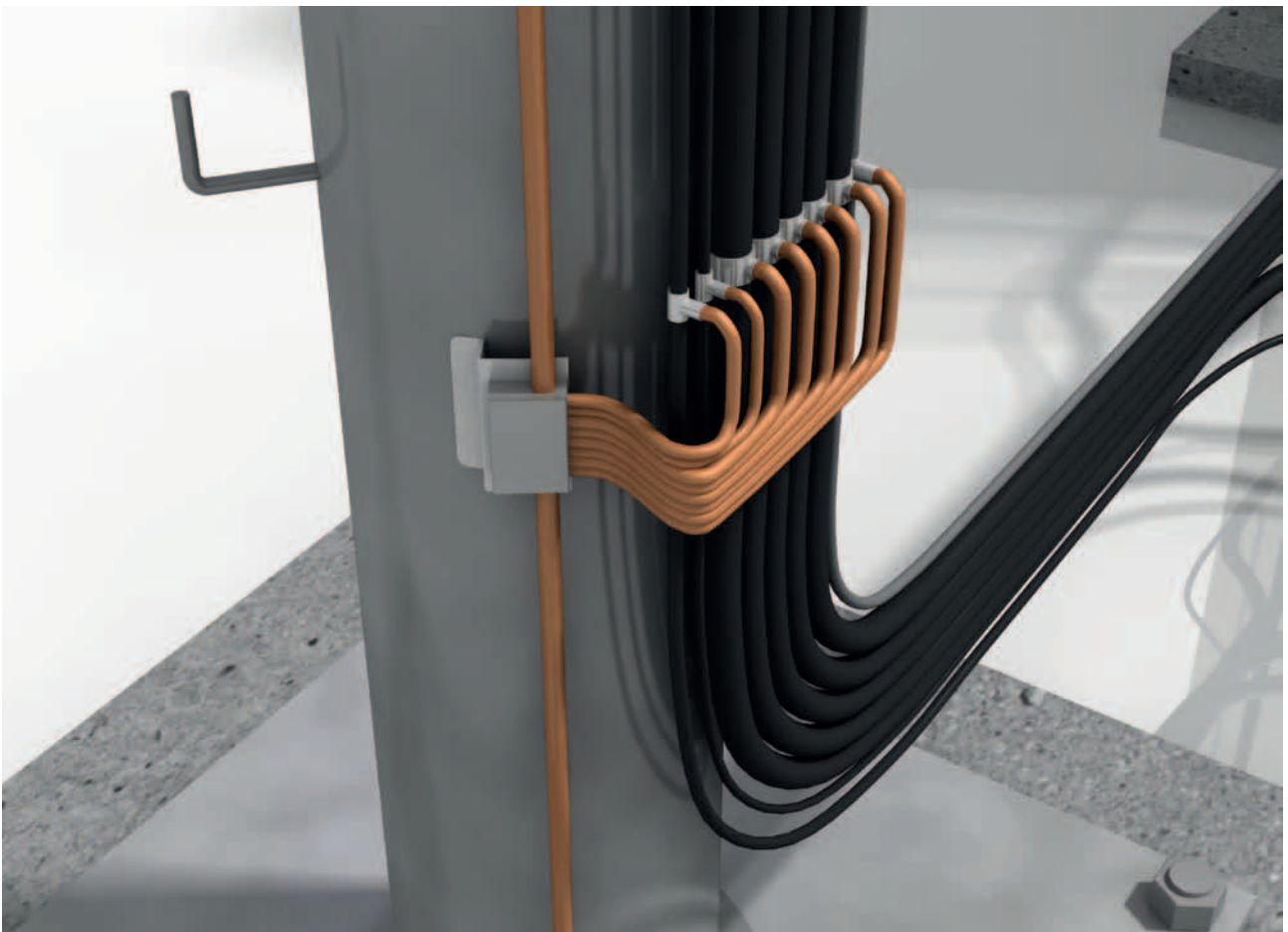
Grounding Kits

Application

- Series 9076 grounding kits enable reliable outdoor grounding of today's usual corrugated copper tube and RG cables for radio transmitter antenna installations.

Characteristics and specialities

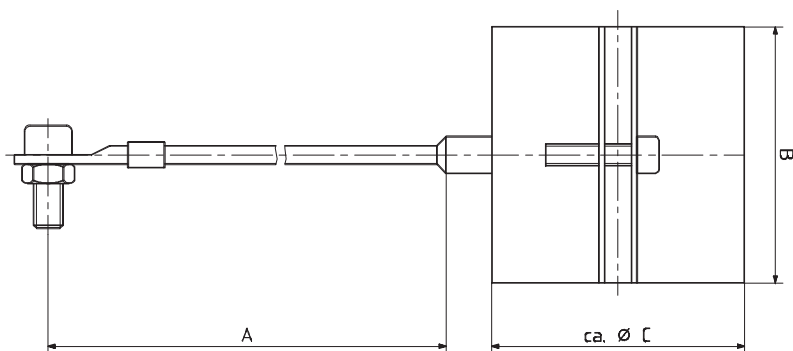
- Quick and easy installation
- No loose parts
- Low contact transition resistance (1 mΩ max.)
- Grounding cable AWG 6 (16 mm²)
- Current handling capability 100 kA, 8/20 μs; 25 kA, 10/350 μs
- Waterproof IP 67
- Corrosion resistant



Grounding Kits



Type no.	Item no.	For cable size SUCOFEEED Andrew, Nokia, Kabelmetal, RFS, Eupen, etc.	"A" (mm)	"B" (mm)	"C" (mm)	Stripping length (mm)	Grounding screw
9076.99.N013-50	84124422	1/2" highflex	500	50	32	26	M8
9076.99.N012-50	84124423	1/2"	500	50	32	26	M8
9076.99.N078-50	84069990	7/8", 7/8" highflex	500	50	44	26	M8
9076.99.N114-50	84069991	1 1/4"	500	50	59	26	M8
9076.99.N158	23012647	1 5/8"	840	70	69	30	M8



Accessories for Conventional Cell Sites

General description

We offer a large selection of advanced products, which are rich in exclusive features and highly appreciated by the operators of leading companies in the sector because we provide total fastening safety along with practical and easy mounting.



Application

- Secure fixing of the corrugated, fiberoptic and DC cables on the mast

Features

- Small structure
- Resistance to atmospheric factors (rays and salty air)
- Fixing of 1 to 8 coaxial cables depending on version

Benefits

- Solutions for conventional and FTTH available
- Secured components for easy and quick installation
- Absolute safety for cables and installer



Accessories for Conventional Cell Sites

General:

This product summary shows only a small range of products. Clamps for other profiles or cable types on request.

RFM self clamping hanger	Description	For profile	Picture
Main features	<ul style="list-style-type: none"> • Easy and quick installation • Resistance to atmospheric factors 		
Components	<ul style="list-style-type: none"> • SAS single saddle or SAT twin saddle • Metal bow • Hexagon headed locking screw • Metal pressure plate 		
Material	<ul style="list-style-type: none"> • Stainless steel AISI 301 • Reglas reinforced polyamide, black 		

USC single clamp	Description	For profile	Picture
Main features	<ul style="list-style-type: none"> • Space-saving block • Resistance to atmospheric factors 		
Components	<ul style="list-style-type: none"> • SAM single saddle • Threaded bar M8 • Flat washer RPI 10/20 • Hexagonal nuts UNI 5588 • Flexible hinge • Adapter self locking M8 (compact clamp) 		
Material	<ul style="list-style-type: none"> • Stainless steel AISI 304 (V 2A) • Reglass HDPE., UV proof, black 		

UCC twin clamp	Description	For profile	Picture
Main features	<ul style="list-style-type: none"> • Space-saving block • Resistance to atmospheric factors 		
Components	<ul style="list-style-type: none"> • SAB twin saddle • Threaded bar M8 • PUC steel-flanges • Hexagonal nuts UNI 5588 • Elastic washer DIN 6798 • Adapter self locking M8 (compact clamp) 		
Material	<ul style="list-style-type: none"> • Stainless steel AISI 304 (V 2A) • Reglass HDPE, UV proof, black 		

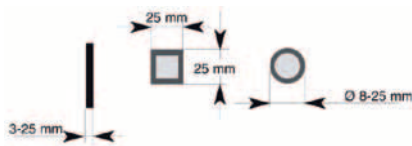
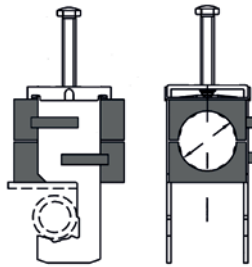
LCC quick-fit fastener	Description	For profile	Picture
Main features	<ul style="list-style-type: none"> • Easy and quick installation • Resistance to atmospheric factors 		
Components	<ul style="list-style-type: none"> • SAL twin saddle • Threaded bar M8 • PSL steel-flanges • Hexagon nuts UNI 5588 • Elastic washer DIN 6798 • Adapter self locking M8 (compact clamp) 		
Material	<ul style="list-style-type: none"> • Stainless steel AISI 304 (V 2A) • Reglass HDPE, UV proof, black 		

SCM click collar	Description	For profile	Picture
Main features	<ul style="list-style-type: none"> • Easy and quick installation 		
Components	<ul style="list-style-type: none"> • Metal collar • Adapter M6 (compact clamp) 		
Material	<ul style="list-style-type: none"> • Stainless steel AISI 304 (V 2A) 		

Accessories for Conventional Cell Sites

Type: RFM

Self clamping hanger with calibrated saddles for flat 3 - 25 mm and round 8 - 25 mm profile



Main features:

- Easy and quick installation
- Resistance to atmospheric factors

Components:

- Single saddle SAS or twin saddle SAT
- Metal bow
- Hexagon headed locking screw
- Metal pressure plate

Material:

- Stainless steel AISI 301
- Reglass reinforced polyamide, black

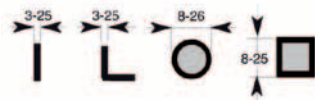
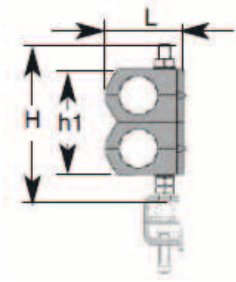
Number of cables:



Cable type	H+S description	No. of cables	Item no.	Quantities kit with	Weight in g	L (mm)	L1 (mm)	h1 (mm)	h2 (mm)
1/2" (Ø17)	RFM_1556_0012	1x	84107915	50 pcs	68	22	28	34	63
	RFM_1556_0212	2x	84107916	50 pcs	98	22	28	63	90
	RFM_1556_0312	3x	84107917	50 pcs	126	22	28	91	117
	RFM_1556_0412	4x	84107918	50 pcs	160	46	53	58	93
	RFM_1556_0612	6x	84107919	50 pcs	185	46	53	85	117
7/8" (Ø28)	RFM_1556_0078	1x	84045465	50 pcs	108	34	41	46	74
	RFM_1556_0278	2x	84045466	50 pcs	166	34	41	87	112
	RFM_1556_0378	3x	84045467	50 pcs	223	34	41	128	150
	RFM_1556_0478	4x	84107920	25 pcs	240	70	77	83	117
	RFM_1556_0678	6x	84107921	25 pcs	276	70	77	123	153
1-1/4" (Ø40)	RFM_1556_0114	1x	84107922	50 pcs	153	46	53	58	92
	RFM_1556_2114	2x	84107923	50 pcs	238	46	53	111	143
	RFM_1556_3114	3x	84107925	50 pcs	322	46	53	165	194
1-5/8" (Ø52)	RFM_1556_0158	1x	84107926	25 pcs	188	58	65	72	105
	RFM_1556_2158	2x	84045469	25 pcs	211	58	65	137	169
	RFM_1556_3158	3x	84045470	25 pcs	403	58	65	202	233

Type: USC

Single clamp with elastic cushions including angle adapter for flat and angular 3 - 25 mm and round 8 - 26 mm profile



Main features:

- Space-saving block
- Resistance to atmospheric factors

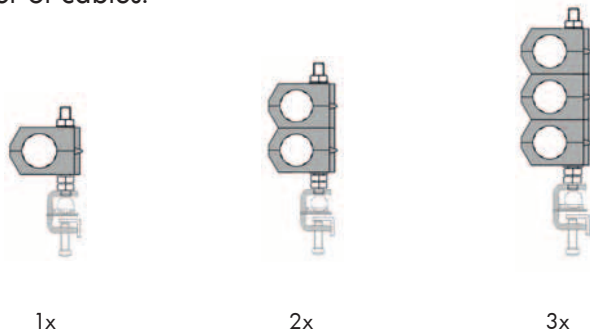
Components:

- SAM single saddle, threaded bar M8
- RPI 10/20 flat washer, hexagonal nuts UNI 5588
- Flexible hinge
- Adapter self locking M8 (compact clamp)

Material:

- Stainless steel AISI 304 (V 2A)
- Reglass HDPE, UV proof, black

Number of cables:

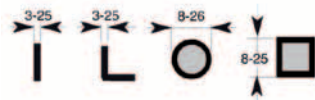
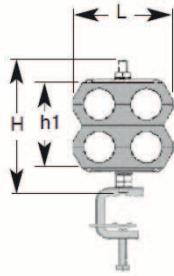


Cable type	H+S description	No. of cables	Item no.	Quantities kit with	Weight in g	H (mm)	h1 (mm)	L (mm)
1/2" (Ø17)	USC_1572_0012	1x	84107927	20 pcs	105	75	27	34
	USC_1572_0212	2x	84107928	20 pcs	130	100	54	34
	USC_1572_0312	3x	84107929	20 pcs	155	125	81	34
7/8" (Ø28)	USC_1572_0078	1x	84107930	20 pcs	132	100	38	45
	USC_1572_0278	2x	84107931	20 pcs	170	125	76	45
	USC_1572_0378	3x	84107932	20 pcs	207	200	114	45
1-1/4" (Ø40)	USC_1572_0114	1x	84107933	20 pcs	155	100	54	57
	USC_1572_2114	2x	84107934	20 pcs	200	200	108	57
	USC_1572_3114	3x	84107935	20 pcs	245	250	150	57
1-5/8" (Ø52)	USC_1572_0158	1x	84107936	20 pcs	155	125	66	68
	USC_1572_2158	2x	84107937	20 pcs	200	200	132	68
	USC_1572_3158	3x	84107938	20 pcs	290	300	198	68

Accessories for Conventional Cell Sites

Type: UCC

Twin clamp with elastic cushions including angle adapter for flat 3 - 25 mm and round 8 - 26 mm profile



Main features:

- Space-saving block
- Resistance to atmospheric factors

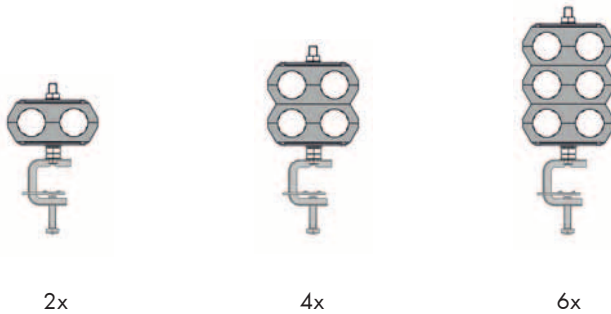
Components:

- Twin saddle SAB, threaded bar M8
- PUC steel-flanges, hexagonal nuts UNI 5588
- Elastic washers DIN 6798
- Adapter self locking M8 (compact clamp)

Material:

- Stainless steel AISI 304 (V 2A)
- Reglass HDPE, UV proof, black

Number of cables:



2x

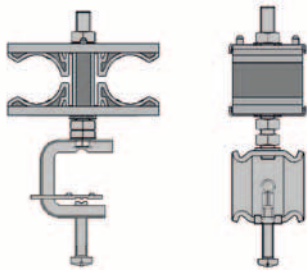
4x

6x

Cable type	H+S description	No. of cables	Item no.	Quantities kit with	Weight in g	H (mm)	h1 (mm)	L (mm)
1/2" (Ø17)	UCC_1560_0212	2x	84107943	20 pcs	210	75	27	68
	UCC_1560_0412	4x	84107944	20 pcs	260	125	54	68
	UCC_1560_0612	6x	84107945	20 pcs	310	150	81	68
7/8" (Ø28)	UCC_1560_0278	2x	84107946	20 pcs	265	100	38	90
	UCC_1560_0478	4x	84107947	20 pcs	340	150	76	90
	UCC_1560_0678	6x	84107949	20 pcs	415	200	114	90
1-1/4" (Ø40)	UCC_1560_2114	2x	84107950	20 pcs	310	150	54	114
	UCC_1560_4114	4x	84107951	20 pcs	400	200	108	114
	UCS_1560_6114	6x	84107953	20 pcs	490	250	150	114
1-5/8" (Ø52)	UCC_1560_2158	2x	84107954	20 pcs	310	150	66	137
	UCC_1560_4158	4x	84107955	20 pcs	400	250	132	137
	UCC_1560_6158	6x	84107956	20 pcs	580	300	198	137

Type: LCC

Quick-fit fastener with elastic cushions including angle adapter for flat and angular 3 - 25 mm and round 8 - 26 mm profile



Main features:

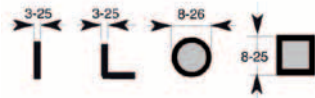
- Easy and quick installation
- Resistance to atmospheric factors

Components:

- SAL twin saddle, threaded bar M8
- PSL steel flanges, hexagonal nuts UNI 5588
- Elastic washers DIN 6798
- Adapter self locking M8 (compact clamp)

Material:

- Stainless steel AISI 304 (V 2A)
- Reglass HDPE, UV proof, black



Number of cables:



2x



4x



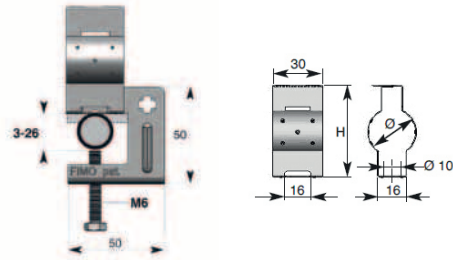
6x

Cable type	H+S description	No. of cables	Item no.	Quantities kit with	Weight in g	H (mm)	h1 (mm)	L (mm)
1/2" (Ø17)	LCC_1563_2012	2x	84107958	20 pcs	240	75	30	62
	LCC_1563_4012	4x	84107960	20 pcs	270	100	54	62
	LCC_1563_6012	6x	84107962	20 pcs	300	125	84	62
7/8" (Ø28)	LCC_1563_2078	2x	84107964	20 pcs	250	75	41	84
	LCC_1563_4078	4x	84107965	20 pcs	290	125	79	84
	LCC_1563_6078	6x	84107966	20 pcs	330	150	117	84
1-1/4" (Ø40)	LCC_1563_2114	2x	84107968	20 pcs	280	100	53	102
	LCC_1563_4114	4x	84107970	20 pcs	350	150	103	102
	LCC_1563_6114	6x	84107971	20 pcs	420	200	153	102
1-5/8" (Ø52)	LCC_1563_2158	2x	84107973	20 pcs	310	100	64	119
	LCC_1563_4158	4x	84107974	20 pcs	390	200	125	119
	LCC_1563_6158	6x	84094910	20 pcs	470	250	186	119

Accessories for Conventional Cell Sites

Type: SCM

Click collar made in metal including angle adapter for flat and angular 3 - 25 mm and round 8 - 26 mm profile



Main features:

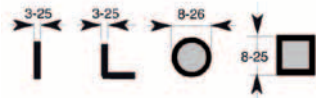
- Easy and quick installation

Components:

- Metal collar
- Adapter M6 (compact clamp)

Material:

- Stainless steel AISI 301



Number of cables:



1x

Cable type	H+S description	No. of cables	Item no.	Quantities kit with	Weight in g	H (mm)
1/2" (Ø17)	SCM_2012_4013	1x	84107976	20 pcs	77	44
7/8" (Ø28)	SCM_2012_4020	1x	84107977	20 pcs	80	55
1-1/4" (Ø40)	SCM_2012_4030	1x	84107979	20 pcs	85	67
1-5/8" (Ø52)	SCM_2012_4150	1x	84107980	20 pcs	88	79



Power Splitters

General description

The RF power splitters are low loss reactive splitters for the distribution of RF signals to radio transceiver antenna systems and radiating cables. The RF power is equally distributed to all outputs with excellent amplitude and phase balance.

A broad range of power splitters with N, DIN 7/16 and SMA connectors has been designed to split even high power multi-carrier signals of all existing mobile phone systems. Multiband units simplify logistics for OEMs and multi-system operators. Smaller units with SMA connectors can be provided for picocell wireless communication systems.



Application

- Power splitters for most mobile communication bands
- RF signal distribution to antennas and radiating cables
- 2-way, 3-way or 4-way RF-power splitting

Features

- Superior RF performance, low VSWR and insertion loss
- 50 Ω Impedance
- PIM level typically -150 dBc (3rd order, N and 7/16 connector styles)
- Available in the frequency range from 698 MHz to 6 GHz
- 2-way, 3-way and 4-way configurations
- DC continuity for outdoor powering
- Rugged and reliable design
- Waterproof IP 65 or IP 67 (depends on the model)
- Protective cover kit optionally for outdoor installations available (depends on the model)

Benefits

- Cost efficient solution for connecting a couple or more antennas to only one radio transceiver
- Installer friendly robust design



Functionality

Nominal split loss	2 way splitters	3.0 dB
	3 way splitters	4.8 dB
	4 way splitters	6.0 dB
Isolation between ports	2 way splitters	6.0 dB
	3 way splitters	9.5 dB
	4 way splitters	12.0 dB

Power Splitters

DIN 7/16 types with frequency range 800 – 2500 MHz



Type no.	5502.41.0026	5502.41.0027	5502.41.0028
Item no.	84020588	84023443	84023731
Split	2-way	3-way	4-way
Frequency	800 - 2500 MHz	800 - 2500 MHz	800 - 2500 MHz
Input port	7/16 female	7/16 female	7/16 female
Output port	7/16 female	7/16 female	7/16 female
Return loss (input)	min. 20 dB	min. 20 dB	min. 20 dB
Insertion loss	typ. 0.3 dB	typ. 0.3 dB	typ. 0.2 dB
Average power	500 W	500 W	500 W
IP rating	IP65	IP65	IP65
Operating temperature range	- 40 °C ... + 85 °C / - 40 °F ... + 185 °F		
Weight	0.85 kg	0.95 kg	1.05 kg
Protective cover kit	73_Z-0-0-614/-_E	73_Z-0-0-614/-_E	73_Z-0-0-614/-_E
Mounting hardware	9075.99.0001 9075.99.0002	9075.99.0001 9075.99.0002	9075.99.0001 9075.99.0002

N types with frequency range 2000 – 6000 MHz



Type no.	5504.17.0004	5504.17.0005
Item no.	84005364	84011465
Split	2-way	2-way
Frequency	2000 - 6000 MHz	2000 - 6000 MHz
Input port	N male	N female
Output port	N female	N female
Return loss (input)	min. 20 dB	min. 20 dB
Insertion loss	typ. 0.2 dB	typ. 0.2 dB
Average power	300 W	300 W
IP rating	IP65	IP65
Operating temperature range	- 40 °C ... + 85 °C / - 40 °F ... + 185 °F	
Weight	0.8 kg	0.8 kg
Mounting hardware	9075.99.0001 9075.99.0002	9075.99.0001 9075.99.0002

Power Splitters – Accessories

Protective cover kit

The protective cover kit provides additional protection for RF Power Splitters exposed to harsh environmental conditions.

Important: The installation of the protective cover kit requires right angle adaptors on all output ports. As the power splitters are supplied with straight connector shapes (female) only, you will have to use either jumpers with right angle interfaces (male) or separately ordering right angle adapters as listed below



Type no.	Item no.	Weight (kg)
73_Z-0-0-614/-_E	84072501	0.4334

The protective cover kit includes the protective cover with screw M8x1 and screw fixation cord and rubber bellows with hose clamp.

Right angle adaptors to be ordered separately

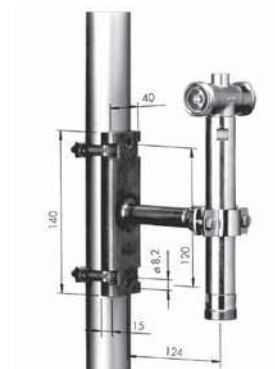
1 adaptor required per output port



Type no.	53_N-50-0-4/133_UE	53_716-50-0-1/003_E
Item no.	22658908	22641259
Shape	right angle adaptor	right angle adaptor
Connector series	N	7/16
Connector gender	plug/jack [m/f]	plug/jack [m/f]

Mounting hardware

This mounting hardware allows you to fix RF power splitters on masts of 40 to 360 mm diameter by means of non corrosive steel hose clamps. It can be used for wall mounting (2 x 8.0 mm diameter holes) too.



Type no.	Item no.	For mast diameter	Weight (kg)
9075.99.0001	22648739	40 - 50 mm	0.35
9075.99.0002	22648738	50 - 360 mm	0.45

One set consists of a complete bracket plus two steel hose clamps adjusted to the selected mast diameter.

Power Splitters

DIN 7/16 types with frequency range 698 - 2700 MHz for LTE



Type no.	5502.41.0029	5502.41.0030	5502.41.0031
Item no.	84086614	84104878	84104879
Split	2-way	3-way	4-way
Frequency	698 - 2700 MHz	698 - 2700 MHz	698 - 2700 MHz
Input port	7/16 female	7/16 female	7/16 female
Output port	7/16 female	7/16 female	7/16 female
Return loss (input)	min. 24 dB	min. 23 dB	min. 19 dB
Insertion loss	max. 0.05 dB	max. 0.05 dB	max. 0.05 dB
Average power	500 W	500 W	500 W
IP rating	IP 67	IP 67	IP 67
Operating temperature range	-35 °C...+75 °C / -31 °F...+167 °F		
Weight	0.85 kg	1.00 kg	1.15 kg
Mounting hardware	Wall mounting hardware included		

SMA types with frequency range 2000 - 2500 MHz



Type no.	5502.19.0004	5502.19.0005	5502.19.0006
Item no.	22650303	22650304	22650305
Split	2-way	3-way	4-way
Frequency	2000 - 2500 MHz	2100 - 2500 MHz	2100 - 2500 MHz
Input port	SMA male	SMA male	SMA male
Output port	SMA female	SMA female	SMA female
Return loss (input)	min. 19 dB	min. 17.5 dB	min. 16.5 dB
Insertion loss	typ. 0.2 dB	typ. 0.2 dB	typ. 0.2 dB
Average power	100 W	100 W	100 W
IP rating	IP 20	IP 20	IP 20
Operating temperature range	- 40 °C ... + 85 °C / - 40 °F ... + 185 °F		
Weight	0.012 kg	0.014 kg	0.015 kg

Low PIM and Cable Impairment Test Kit

Features

- Use of high performing PIM components
 - N and DIN 7/16
 - Load
 - Standard / source

Benefits

- Existing and approved technology
- All components are available for on-site IM testing
- High mating cycles



Technical data

Electrical		
Impedance	50 Ω	
Frequency range	690 MHz to 2700 MHz	
RF CW power	50 W	
Environmental		
Operating temperature	0 °C up to +40 °C	
2002/95/EC (RoHS)	compliant	
Mechanical		
Number of matings	500 with max. torque of 30 Nm for DIN 716 or max. torque of 1 Nm for N interfaces, increased torque may reduce the number of matings significantly	
Material		
Piece part	Material	Surface Plating
Body	Brass	Tri-metal plating
Centre contact female	Copper beryllium alloy	Gold plating / Silver plating / Tri-metal plating
Centre contact male	Brass	Gold plating / Silver plating / Tri-metal plating
Order information		
Low PIM and cable impairment test kit, item no. 84108289		

Low PIM and Cable Impairment Test Kit

Kit content

Part ID	Description	Configuration (connector series - gender)
PIM Adapter, ≤ -155dBc, 3rd order IM level, at 2 x 43 dBm (2 x 20 Watt) carrier power		
ADP-1	adapter 1	DIN 7/16 female - female
ADP-2	adapter 2	DIN 7/16 male - male
ADP-3	adapter 3	DIN 7/16 male - female
ADP-4	adapter 4	N male - DIN 7/16 female
ADP-5	adapter 5	N female - DIN 7/16 female
ADP-6	adapter 6	N male - DIN 7/16 male
ADP-7	adapter 7	DIN 7/16 male - N female
ADP-8	adapter 8	N female - female
PIM Standard, adjusted to -57 dBm for 3rd order IM level, at 2 x 43 dBm (2 x 20 Watt) carrier power		
IMS-1	IM standard 1, at 900 MHz	DIN 7/16 male - female
IMS-2	IM standard 2, at 1800 MHz	DIN 7/16 male - female
PIM Load, ≤ -155dBc, 3rd order IM level, at 2 x 43 dBm (2 x 20 Watt) carrier power		
LOD-1	Load termination 1	DIN 7/16 male and female

Part ID	Description	Configuration (connector series - gender)
Open Circuit, ≤ -155 dBc typ. for 3rd order PIM performance		
OPN-1	open circuit 1	N male
OPN-2	open circuit 2	N female
OPN-3	open circuit 3	DIN 7/16 male
OPN-4	open circuit 4	DIN 7/16 female
Short Circuit, ≤ -155 dBc typ. for 3rd order PIM performance		
SHT-1	short circuit 1	N male
SHT-2	short circuit 2	N female
SHT-3	short circuit 3	DIN 7/16 male
SHT-4	short circuit 4	DIN 7/16 female
50 Ω Termination, power rating: 1 W, VSWR max.: 1.1 for N series; 1.15 for DIN 7/16 series, no PIM rating		
TRM-1	fixed termination 1	N male
TRM-2	fixed termination 2	N female
TRM-3	fixed termination 3	DIN 7/16 male
TRM-4	fixed termination 4	DIN 7/16 female



Radio Frequency Antennas

Wireless communication applications have taken off over the past years. In addition to voice services, wireless systems are now also handling an increasing volume of data traffic, with the demand being for high transmission capacities.

To provide these capacities, mobile radio cells (GSM, UMTS and LTE) are steadily shrinking, allowing multiple use of frequency bands, which in turn enables capacity to be increased.

HUBER+SUHNER provides application specific antennas for base station synchronization for Radio Access Networks (RAN).



GPS Antennas

General description

Accurate timing, phase and frequency synchronisation are essential for today's wireless networks in the field of digital communication. Handover, TDD scheduling, interference cancellation and terminal location tracking are based on GPS or Glonass time reference.

HUBER+SUHNER offers a high-quality portfolio of standard and customised GPS and GLONASS antennas for the synchronisation of mobile communication base stations and the support of position detection for mobile terminal equipment.

The GPS/Glonass antennas are equipped with a low-noise preamplifier and are provided with integral lightning and overvoltage protection. This is of crucial importance in view of the often exposed position of the antennas. Through the location of the EMP protection in the antennas, separate installation of an external EMP protection can be dispensed with. The antennas thus combine compact size with optimal functionality and reliability.

Applications

- For timing and frequency synchronisation in cellular base stations derived from the GPS or GLONASS signal
- Use in position-detection systems for the tracking of mobile terminal equipment

Features







- Small and unobtrusive design
- Low-noise preamplifier for compensation of antenna cable loss
- Amplifier feed via antenna cable
- Integrated lightning and overvoltage protection
- Cone-shaped radome prevents snow, ice and dirt deposits
- Mounting bracket for mast and wall mounting included in the scope of supply

Benefits

- Reliably supports timing and frequency synchronisation in mobile communication networks
- Can be used with all standard GPS/GLONASS receivers
- Simple and time-saving installation; no special tools required
- Easy commissioning

GPS Antennas

Product overview

Type no. Item no.	1315.17.0026 84119684	1315.17.0028 84121280	1315.17.0027 84119712	1315.17.0029 84121325	1316.17.0002 84061412	1316.17.0001 84058690
						
Frequency [MHz]	1565 - 1585 (GPS)		1565 - 1585 (GPS)		1565 - 1625 (GPS + GLONASS)	
Antenna gain [dB]	5		5		5	
Antenna gain @ 10° elevation [dB]	2		2		-	
LNA gain [dB]	31		40		40	
Noise figure [dB]	3		3		3.5	
VSWR	1.8		1.8		2	
Operational voltage	4V-6V DC		4V-6V DC		4V-6V DC	
Current consumption	50 mA		50 mA		50 mA	
Lightning protector	integrated		integrated		integrated	
Radome colour	RAL 9003(signal white)		RAL 9003(signal white)		RAL 7035(light grey)	
Mounting bracket	L- shape bracket for pole and wall mounting included	bracket not included	L- shape bracket for pole and wall mounting included	bracket not included	L- shape bracket for pole and wall mounting included	bracket not included



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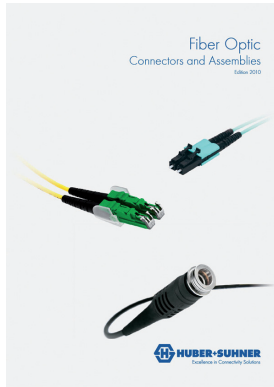
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Additional Catalogues



Fiber Optic Connectors and Assemblies

Item no. 84101808

Connectors and adapters
Cable assemblies
Connectors for harsh environment
Equipment for serial production and measurement



Distributed Antenna Systems

Item no. 84078171

RF connectors, cables, assemblies, components
Antennas
Fiber management systems



Fiber Optic Cables

Item no. 84019826

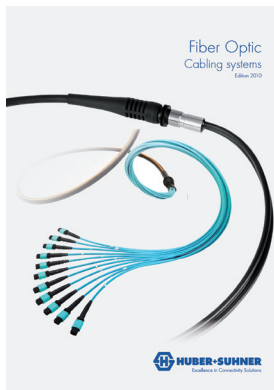
Indoor cables
Universal cables
Outdoor cables
Special cables



RF and Microwave Components

Item no. 84068668

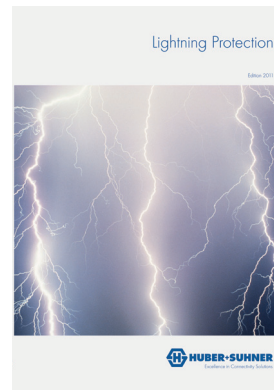
Coaxial attenuators
Terminations
RF power splitters
Special products



Fiber Optic Cabling Systems

Item no. 23029084

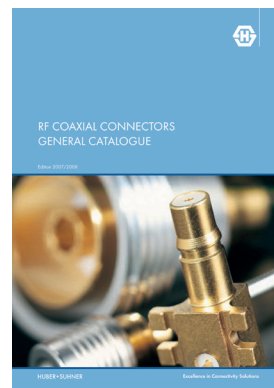
Pre-terminated cabling systems
MASTERLINE
SMARTLINE
Mobile cabling system



Lightning Protection

Item no. 23002023

Lightning EMP protectors
NEMP protectors
Data line protectors
DC blocks



RF Coaxial Connectors General Catalogue

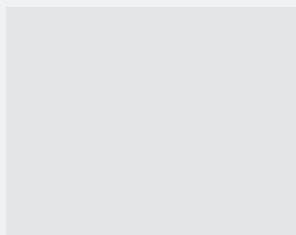
Item no. 84019826

Micro miniature connectors
Cable connectors
Subminiature connectors
Adaptors

HUBER+SUHNER is certified according to ISO 9001, ISO 14001, ISO/TS 16949 and IRIS.

WAIVER

It is exclusively in written agreements that we provide our customers with warrants and representations as to the technical specifications and/or the fitness for any particular purpose. The facts and figures contained herein are carefully compiled to the best of our knowledge, but they are intended for general informational purposes only.



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84126953 Rev. A/10.2011



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