

INSTALLATION MANUAL

HUBER+SUHNER AG
Fiber Optics
MASTERLINE Extreme Hybrid
DOC-0000692200 Rev J

July 09, 2019
Page 1 of 15

MASTERLINE Extreme Hybrid

Table of contents

• SAFETY NOTES	1
• HANDLING OF THE CABLING SYSTEM	1
• HANDLING OF FIBER OPTIC ASSEMBLIES	1
• RRH END OF ASSEMBLY	2
• BASE STATION END OF ASSEMBLY	8
• FIBRE OPTIC ALLOCATION	13
• POWER CODING	14
• REVISION HISTORY	15

SAFETY NOTES



Installation and maintenance work on this device may only be carried out by an authorized electrician.

National laws and regulations must be observed during installation. The housing and the components used must be checked for exterior damage prior to installation. If the cabling system is defective, it may not be used.

HANDLING OF THE CABLING SYSTEM



To avoid any damage due to improper installation, please keep in mind below points:

- AVOID any additional stress on the divider housing by twisting or bending when routing or locating it
- AVOID installation path around any sharp objects
- AVOID uncontrolled knocking of the divider housing on any hard object
- AVOID any contact of the divider housing with any additional substance such as glue/oil/fat etc. unless prior authorization is given by HUBER+SUHNER AG

See also "User handling manual for cables and cable systems" on
www.hubersuhner.com/en/support

HANDLING OF FIBER OPTIC ASSEMBLIES



In order to guarantee the performance, fiber optic assemblies need to be treaded carefully and with attention on the minimum bend radius and never exposed to dirt.

See also "User handling manual for cables and cable systems" on
www.hubersuhner.com/en/support

RRH END OF ASSEMBLY

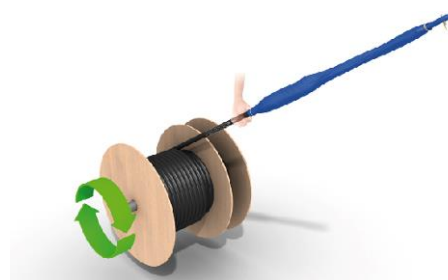
Step 1

Use a smartphone to scan the QR code which is attached on the side of the reel. The QR code leads on HUBER+SUHNER's website with the latest valid revision of the installation video and installation manual.



Step 2

Mount the cable spool onto suitable de-reeling equipment. Start unwinding side where the braided tube is attached. Do not pull side where pulling tube is attached. Make sure, that the spool can turn freely when unspooling.



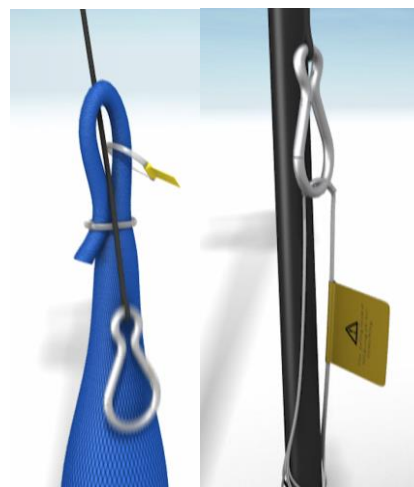
Step 3

Rig a rope to allow cable assembly to be hoisted up. Feed the rope through the loop in the braided tube and down onto the cable hoist. Pull Assembly up the mast.



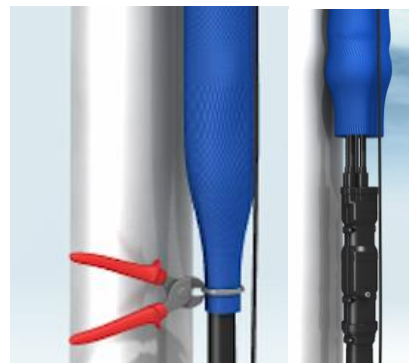
NEVER pull on the divider or the breakout (Fiber optic or power itself), only pull on the hybrid cable below the divider using cable hoist.

If a label is attached to the hosting grip, check the maximum pulling force (at 50 °C ambient temperature during 1 hour) as specified on the label. Do not apply higher force! The maximum pulling force equates to the weight of 100 m of cable. The cable weight is specified on the data sheet. Cabling systems longer than 100 m may not be lifted more than 100 m vertically unless a second hoisting grip is used. Contact HUBER+SUHNER for further installation instructions.



Step 4

Once the divider is at the desired height and position, remove cable tie from braided tube end and slide the blue tube up to get access to the housing.



Step 5

Use 2 back-to-back mounted stand-off adapters to fix the housing to the mast. Mount the stand-off adapters as shown in the picture. The distance from the top of the housing to the first hose clamp is 4 cm and 10 cm from the first to the second hose clamps for the small enclosure (MLEH3/x and MLEH6/6).

Make sure the grounding screw is forward-facing and the edge where the 2 housing parts are screwed together does not touch the stand-off adapter.

Use Huber+Suhner's quick hose clamps and to tighten the clamps with a torque of maximum 3.5 Nm.

For the large housing (MLEH6/12 and MLEH9/x), both stand-off adapters are against each other in the middle of the housing. The distance from the top of the enclosure to the 1st hose clamp is 9.5 cm.

Make sure the grounding screw is forward-facing and the edge where the 2 housing parts are screwed together does not touch the stand-off adapter.

Use Huber+Suhner's quick hose clamps and to tighten the clamps with a torque of maximum 3.5 Nm.



Tight the quick hose clamps with a torque of maximum 3.5 Nm. Be careful not to damage the housing by tightening the screws too tightly.

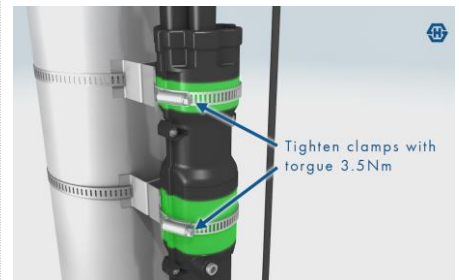
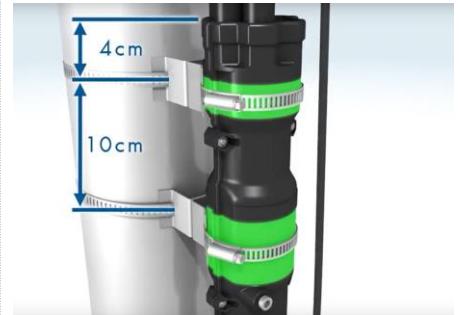
If other hose clamps are preferred, please contact us to define a maximum torque before you have started with the installation

Quick hose clamps

H+S item no. 84076411 (pole Ø 30 – 155mm)

H+S item no. 84076412 (pole Ø 60 – 500mm)

One kit consists of two quick hose clamps



Step 6

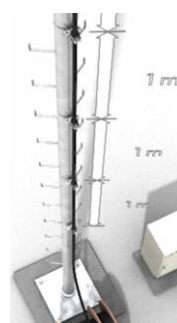
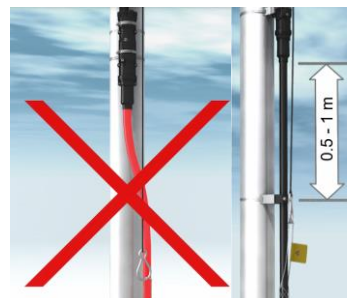
Fix the cable to the mast using HUBER+SUHNER clamps, which are available for different profiles. Recommended spacing between the clamps is 1m.

Clamps should be applied to hybrid cable starting from a point 0.5m to 1.0m below the cable entry proceeding down to the bottom of the mast. The cable must be straight and in line with the MLEH enclosure between the cable entry and the first cable clamp. The maximum allowed misalignment is 5°, or 5 cm at 0.5 m below the cable entry.

The recommended spacing between the clamps is 1 m.
Minimum bending radius of the cable is 10x cable diameter.



Do not remove the rope before all cable clamps are mounted.

**Step 7**

Remove the rope from the cable hoist after all cable clamps are mounted.

Remove the blue braided tube.

**Step 8**

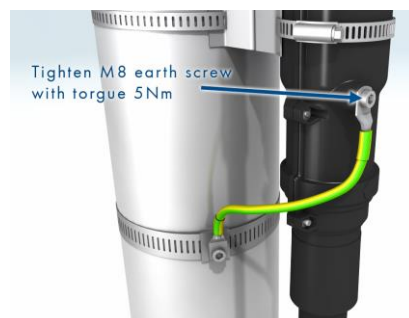
The MLEH enclosure has an integral earth point suitable for M8 lug for grounding. Connect the earth point to an earth bar with a grounding assembly with minimum 16mm² / 6 AWG cross section. Consider the correct order: first the grounding wire lug, secondly the washer, thirdly the spring washer.



Tighten the M8 earth screw with a torque of 5 Nm. Be careful not to damage the enclosure by tightening the M8 earth screw too tightly.

HUBER+SUHNER offers different grounding assemblies:

- Item no. 85086667: 0.5m, black, 16mm², 2x M8 lug
- Item no. 85083781: 0.5m, yellow/green, 16mm², 2x M8 lug
- Item no. 85086668: 0.5m, black, 25mm², 2x M8 lug
- Item no. 85083792: 0.5m, yellow/green, 25mm², 2x M8 lug



Step 9

Fix the power and fiber optic breakouts with suitable HUBER+SUHNER cable clamps. Depending on the number of breakouts and if power breakout cables are connectorised or not, different cable clamps are needed. Contact H+S sales office or see the cable clamp portfolio

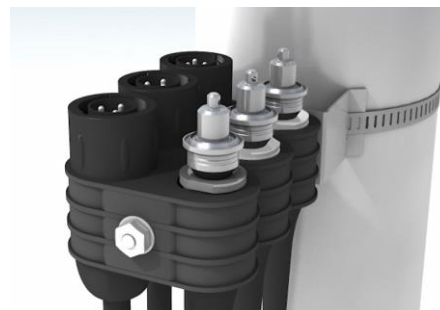
<http://www.hubersuhner.com/en/products/fiber-optics> to select the right cable clamps.

The first clamps has to be applied 0.5m above the housing. The cable has to be fixed straight and in line with the MLEH enclosure. Do not bend breakout cable direct after the housing exit and avoid side load on the housing exit.



Do not over bend the cables. Minimum bend radius for power cable and fiber optic cable is 10 cm. Avoid side load on the power and fiber optic connector.

All connectors (fiber optic and power) are protected using waterproof (IP67) protection caps.

**Step 10**

All connectors on the breakout cables are protected with water proof (IP67) protection caps.



Do not remove the cap if no jumper cable is connected. When removing the cap instantly mate the plug connector to avoid dirt entering the connector.



Step 11

The remote radios are connected with fiber optic jumpers, which are terminated with Q-ODC-2 plug connectors and RRH compatible interfaces.

MLEH versions with connectorised power breakout use power jumpers which are terminated with a rugged circular plastic plug connector and are blunt cut on the RRH side.



power jumper optional

Step 12

Connect the Q-ODC-2 plug connectors on the fiber optic jumpers with the Q-ODC-2 extension connectors on the MLEH breakout cables, which are marked with labels numbered 1 to 6 (12 or 18).

Mating:

Remove protection caps of the plug and extension connectors. Connect instantly the jumper cable to avoid ingress of water or dirt. Push plug connector slightly into extension connector, rotate to find keying position, push connector to mate.

Mated - connector snaps in and is fully strain relieved.

Connect the two protection caps together for later reuse optionally.

Un-mating:

Pull coupling ring to un-mate. Mount instantly the protection cap to avoid ingress of water or dirt.



All HUBER+SUHNER fiber optic assemblies are 100% manufactured in an industrial environment and are governed by standards which are implemented and controlled within the factory environment. The fiber optic cable assemblies as well as the fiber optic systems are inspected for insertion loss and the cleanliness of the ferrule end face. Factory-terminated fiber optic connectors supplied to the market are cleaned and ready for installation.

Despite our careful control, contamination of dust or microscopically small parts on the end faces cannot be 100% excluded.

If cleaning is necessary see cleaning instruction on www.hubersuhner.com/en/support



Step 13

Optional for MLEHs with connectorised power breakouts:

Connect the power plug (male) connectors on the power jumpers with the power receptacle (female) connectors on the MLEH breakout cables, which are marked with labels numbered 1 to 6 (9).



Switch off the power supply before you mate or un-mate the power connector. Otherwise the contacts will get damaged. Connector is not for hot plugging.

Mating:

Remove protection caps of the plug. Twist (120°) the coupling ring of the plug connector to remove protecting cap as shown. Note the lock / unlock symbol on the coupling ring.

Remove protection caps of the power receptacle (female) connectors on the MLEH breakout cables. Twist (120°) the coupling ring of the socket connector anticlockwise to remove protecting cap as shown.

Connect the two protection caps together for later reuse.

Push plug connector slightly and in-line into receptacle connector, rotate to find keying position, twist coupling ring of the plug connector clockwise as shown until you hear and feel a "click".

Align white strip on the plug with the white strip on the receptacle to find keying position easier.



Make sure the plug connector is in-line with the receptacle connector before coupling ring is twisted. Otherwise the connector might be damaged.

Avoid any tilt during mating process since the connector might be damaged

Un-mating:

Twist coupling ring on the **plug** (not on the receptacle) anticlockwise to un-mate the plug connector. Note the lock / unlock symbol. Mount the protection cap to avoid ingress of water or dirt.

**Step 14**

Ensure smooth routing of all cables from fiber optic and power jumper to the RRH equipment using HUBER+SUHRNER cable clamps, which are available for different profiles.







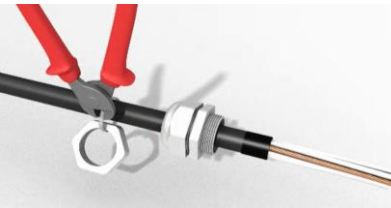

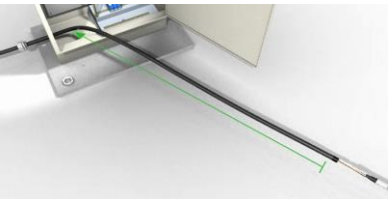
Do not over bend the cables. Minimum bend radius for power cable and fiber optic cable is 10 cm. Avoid side load on the power and fiber optic connector.

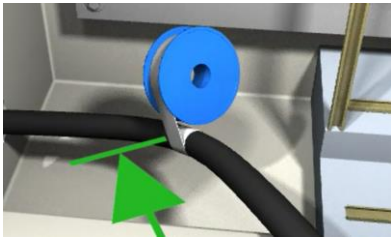

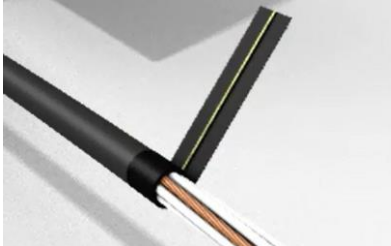
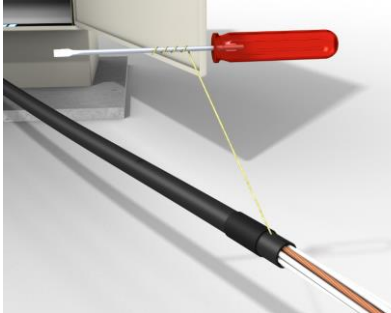

Do not use cable ties to fix cables




Step 15	Connect fiber optic jumper with RRH interface connector and the power conductors with RRH power socket connector or screw terminals.	
----------------	--	--




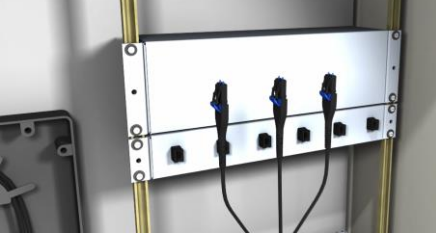
BASE STATION END OF ASSEMBLY

Step 1	<p>After unwinding the whole assembly from the reel, while handling the assembly make sure to leave the pulling tube as long as possible on the assembly. Pulling tube ensures IP65 and gives protection to the FO and DC tails inside.</p>	
Step 2	<p>To remove protective tube hold tube and loosen gland nut.</p> <div data-bbox="269 922 408 1043">  </div> <p>Do NOT twist the tube at any stage of removal.</p> <p>Pull tube off to reveal the tails within.</p>	 
Step 3	Remove gland nut from cable and keep it safe.	 
Step 4	Feed tails through cabinet/cabin.	

Step 5	Mark the "strip-back point" using tape.	
Step 6	Feed gland nut over cable to secure to cable entry gland if required.	
Step 7	Unwind black tape at cable butt to reveal rip cord. This cord is used to open the cable jacket and gain access to the cable elements within.	
Step 8	Use a screwdriver (or similar) to cut the cable jacket back to the "strip-back point" marked using the tape.	
Step 9	Remove cable jacket carefully.	

Step 10	Unwrap copper tape from cable using gloves due to potential sharp edges up to the “strip-back point”.	 
Step 11	Make sure not to leave any sharp edges where the copper foil goes under the jacket: carefully remove excess foil with pin-nosed pliers and then cover it with tape.	
Step 12	Carefully unwind the fibre optic cable element from the DC tails and from a loop to separate it.	
Step 13	<p>During this process (at any stage) ensure the fibre optics are not kinked where they exit the cable butt. Use tape to protect the FO cable against over bending.</p> <div data-bbox="256 1205 405 1339">  </div> <p>Do not over bend the cable. Minimum bend radius for the fiber optic cable is 8 cm</p>	
Step 14	Once fiber optic cable is separated from DC wires, attach it temporarily to base station to keep it secure and clean.	
Step 15	Tighten cable gland to secure cable and ensure IP protection.	
Step 16	Measure the required DC tail length and cut them.	

Step 17	 <p>Do not cut at any stage the fiber optic cable</p>	
Step 18	<p>Route DC cable element to their respective termination points and connect.</p> <p>Route earth wire to earth bonding point and connect.</p>	
Step 19	<p>If earthing is required outside cabinet/cabin use universal grounding kit and follow separate instructions.</p> <p>NOTE: the earthing cable can also come in black.</p>	
Step 20	<p>Store any fibre optic cable over-length inside base station by using cable over-length storage box which can be mounted on a wall, panel or mounted horizontally within an equipment rack.</p> <p>Over length box HUBER+SUHNER Item no 84103325</p> 	

Step 21	Release snap-lock fastener using a screwdriver.	
Step 22	Carefully remove protective tube to gain access to fibre optic tails.	
Step 23	Route fibre optic tails carefully and following a smooth route to their respective connection points. Remove dust caps of LC connectors and plug into equipment.	
Step 24	<div data-bbox="256 1115 395 1240" data-label="Image"> </div> <p> All HUBER+SUHNER fiber optic assemblies are 100% manufactured in an industrial environment and are governed by standards which are implemented and controlled within the factory environment. </p> <p> The fiber optic cable assemblies as well as the fiber optic systems are inspected for insertion loss and the cleanliness of the ferrule end face. Factory-terminated fiber optic connectors supplied to the market are cleaned and ready for installation. </p> <p> Despite our careful control, contamination of dust or microscopically small parts on the end faces cannot be 100% excluded. </p> <p> If cleaning is necessary see cleaning instruction on www.hubersuhner.com/en/support </p>	

FIBRE OPTIC ALLOCATION

RRH	RRH End		Base Station End	BBU	RRH	RRH End		Base Station End	BBU
	Connector PIN		Connector PIN			Connector PIN		Connector PIN	
	Q-ODC/ODC-2	ODC-4	LC			Q-ODC/ODC-2	ODC-4	LC	
1	1	1	B	1	7	1	1	B	13
	2	2	A			2	2	A	
	-	3	B	2		-	3	B	14
	-	4	A			-	4	A	
2	1	1	B	3	8	1	1	B	15
	2	2	A			2	2	A	
	-	3	B	4		-	3	B	16
	-	4	A			-	4	A	
3	1	1	B	5	9	1	1	B	17
	2	2	A			2	2	A	
	-	3	B	6		-	3	B	18
	-	4	A			-	4	A	
4	1	1	B	7	10	1	1	B	19
	2	2	A			2	2	A	
	-	3	B	8		-	3	B	20
	-	4	A			-	4	A	
5	1	1	B	9	11	1	1	B	21
	2	2	A			2	2	A	
	-	3	B	10		-	3	B	22
	-	4	A			-	4	A	
6	1	1	B	11	12	1	1	B	23
	2	2	A			2	2	A	
	-	3	B	12		-	3	B	24
	-	4	A			-	4	A	

POWER CODING

	RRH end			BTS end	
RRH	conductor color code			conductor color code	
	Option 1	Option 2 (USA)	Option 3 (USA)	Option 1	Option 2 (US)
1	Brown	Black	Black	1-White	1-Black
	Blue	Grey	White	2-White	2-White
	Braided screen			Common drain wire	
2	Brown	Black	Black	3-White	3-Red
	Blue	Grey	White	4-White	4-Green
	Braided screen			Common drain wire	
3	Brown	Black	Black	5-White	5-Orange
	Blue	Grey	White	6-White	6-Blue
	Braided screen			Common drain wire	
4	Brown	Black	Black	7-White	7-White/Black
	Blue	Grey	White	8-White	8-Red/Black
	Braided screen			Common drain wire	
5	Brown	Black	Black	9-White	9-Green/Black
	Blue	Grey	White	10-White	10-Orange/Black
	Braided screen			Common drain wire	
6	Brown	Black	Black	11-White	11-Blue/Black
	Blue	Grey	White	12-White	12-Black/White
	Braided screen			Common drain wire	
7	Brown	Black	Black	13-White	13-Red/White
	Blue	Grey	White	14-White	14-Green/White
	Braided screen			Common drain wire	
8	Brown	Black	Black	15-White	15-Blue/White
	Blue	Grey	White	16-White	16-Black/Red
	Braided screen			Common drain wire	
9	Brown	Black	Black	17-White	17-White/Red
	Blue	Grey	White	18-White	18-Orange/Red
	Braided screen			Common drain wire	
10	Brown	Black	Black	19-White	-
	Blue	Grey	White	20-White	-
	Braided screen			Common drain wire	

REVISION HISTORY

Revision	Description of detailed changes	Manager/Engineer	Applicable date
Rev. A	First Version	Gentiana Odza	2015-03-18
Rev. B	Step, 7, 13, 19 modified	Elina Bunka	2016-04-08
Rev. C	Step 3, 5, 6 and Power coding modified	Marco Senn	2017-09-11
Rev. D	Step 5 and 7 modified	Marco Senn	2017-09-20
Rev E	Step, 5, 6, 7 modified	Marco Senn	2017-10-04
Rev F	Step 5 and 8 modified	Marco Senn	2017-10-26
Rev G	step 8: order of lug, washer and spring washer step 12: cleaning instruction step 24: cleaning instruction	Müller René	2017-12-01
Rev H	Step 1 QR-code Step 5 changed, fixation of the housing Step 9 changed, breakout fixation Step 14 changed, power jumper	Marco Senn	2018-06-19
Rev I	Step 3 check maximum pulling force Step 9 new pictures of the breakout fixation	Marco Senn	2018-11-07
Rev J	Step 5 hose clamp torque force 5 Nm changed to 3.5 Nm. Ordering information back-to-back stand-off adapter deleted.	Marco Senn	2019-07-09