

# INSTALLATION MANUAL

**HUBER+SUHNER AG**  
Fiber Optics  
**MASTERLINE Ultimate Hybrid**  
DOC-0000692201 Rev F

July 02, 2018  
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## MASTERLINE Ultimate Hybrid

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### 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 connector head by twisting or bending when routing or locating it
- AVOID installation path around any sharp objects
- AVOID uncontrolled knocking of connector head on any hard object
- AVOID any contact of connector head 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](http://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](http://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.



#### INSTALLATION INSTRUCTIONS / DATA SHEETS

##### Installation manual

MASTERLINE Ultimate hybrid

##### Installation video

[How to install a MASTERLINE Ultimate cable system](#)

#### Step 2

Remove the mounting bracket which is attached to the spool. Secure the mounting bracket with hose clamps (when fitting to a pole/mast) or screws (when fitting to a wall).

We recommend to use Huber+Suhner's quick hose clamps and to tighten the clamps with a torque of 4.0 Nm

item no. 84076411 (pole Ø 30 – 155mm)

item no. 84076412 (pole Ø 60 – 500mm)



**Step 3**

Mount the cable spool onto suitable de-reeling equipment. Start unwinding from the side where the MLUH connector head is located. Do not pull on the side where the pulling tube is attached. Make sure, that the spool can rotate freely when unspooling.

Remove the protection bubble foil only right before attaching the MLUH connector head to the mounting bracket.

**Step 4**

Use a rope to pull up the cable system.



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



Note: 950N / 95kg is only an example and depends on the hybrid cable used

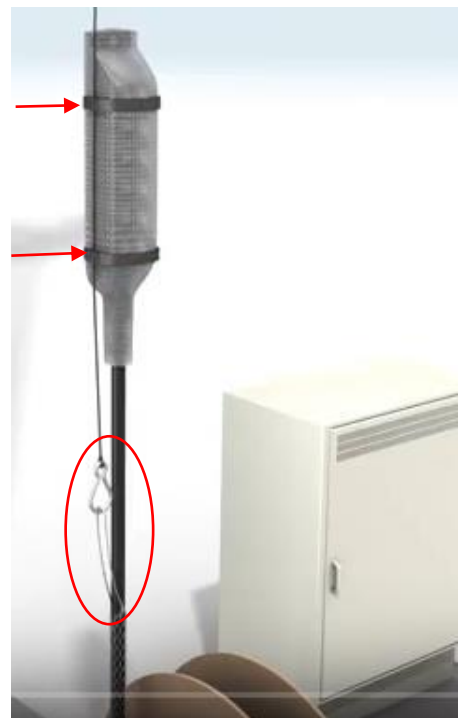
Lead the rope along the left side of the MLUH connector head down onto the cable hoist and secure it.


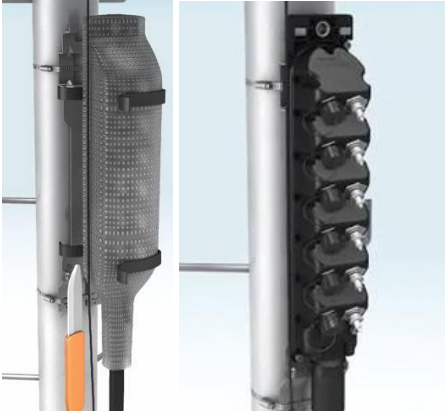



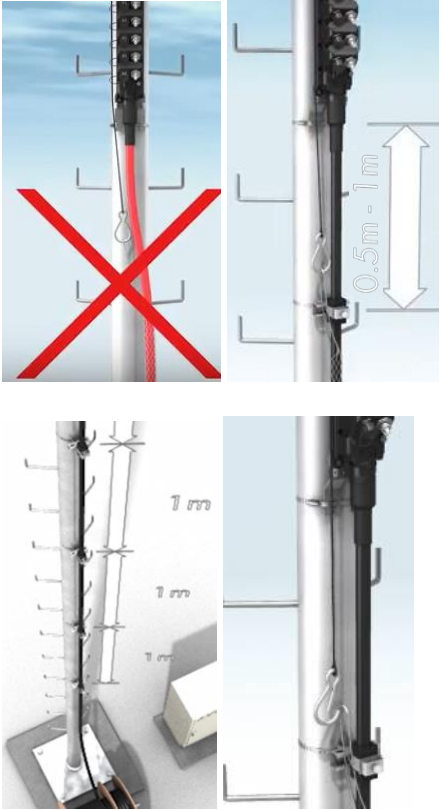
Fix the rope with 2 tapes to the lower and upper end of the connector head.

Do not remove the air bubble bag which protects the connector head while lifting the cabling system.

Pull the cabling system up the mast.

Make sure that the MLUH connector head does not hit against any constructions and does not get bent over edges.



<b>Step 5</b>	<p>Remove the MLUH head fixation (tape) from the rope and the air bubble bag from the MLUH connector head. Hook MLUH head into the mounting bracket.</p> <div data-bbox="261 544 413 678">  </div> <p>Do not remove the rope from the hoisting grip before all cable clamps are mounted.</p>	
<b>Step 6</b>	<p>Secure the MLUH connector head at the mounting bracket by tightening the two M6 screws on the bottom left and top right corner.</p> <div data-bbox="261 952 413 1086">  </div> <p>Tight the M6 screws with a torque of 2 Nm. Be careful not to damage the housing by tightening the screws too tightly.</p>	
<b>Step 7</b>	<p>Fix the cable to the mast using HUBER+SUHNER clamps, which are available for different profiles. Clamps should be applied to the 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 has to be fixed straight and in line with the MLUH enclosure between the cable entry and the first cable clamp. Maximum allowed misalignment is 15° respective 0.14 m at 0.5 m below the cable entry.</p> <p>Recommended spacing between the clamps is 1 m. The minimum bending radius of the cable is 10x cable diameter.</p> <p>After all cable clamps are attached, remove the rope.</p> <div data-bbox="261 1848 413 1982">  </div> <p>Do not remove the rope before all cable clamps are mounted.</p>	

**Step 8**

The MLUH 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 16 mm<sup>2</sup> / 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.

H+S offers different grounding assemblies:

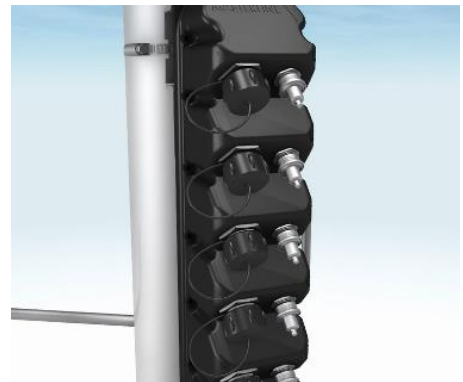
- Item no. 85086667: 0.5m, black, 16mm<sup>2</sup>, 2x M8 lug
- Item no. 85083781: 0.5m, yellow/green, 16mm<sup>2</sup>, 2x M8 lug
- Item no. 85086668: 0.5m, black, 25mm<sup>2</sup>, 2x M8 lug
- Item no. 85083792: 0.5m, yellow/green, 25mm<sup>2</sup>, 2x M8 lug

**Step 9**

All connectors (fiber optic and power) are protected with water proof (IP67) protection caps.



Do remove the cap only at the moment when the plug connector is mated.

**Step 10**

The remote radios are connected with fiber optic jumpers, which are terminated with ODC plug connectors and RRH compatible interfaces. The power jumpers are terminated with a rugged circular plastic plug connector and are blunt cut on the RRH side.





**Step 11**

Connect power jumper on left side of connector head. The 6 power connector sockets are marked with the numbers 1L to 6L starting at the top of the housing.



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 socket on the MLUH. 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 socket 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 socket to find keying position easier.



Make sure the plug connector is in-line with the socket 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 anticlockwise as shown to un-mate the plug connector. Note the lock / unlock symbol. Mount the protection cap to avoid ingress of water or dirt.



**Step 12**

Connect FO jumper on right side of connector head. The 6 Q-ODC-2 fiber optic connectors are marked with the numbers 1R to 6R, starting at the top of the housing.

**Mating:**

Remove protection caps of the plug and socket.  
Connect instantly the jumper cable to avoid ingress of water or dirt. Push plug connector slightly into socket connector, rotate to find keying position, push connector to mate.  
Mated - connector snaps in and is fully strain relieved.  
Connect the two protection caps together for later reuse.

**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](http://www.hubersuhner.com/en/support)

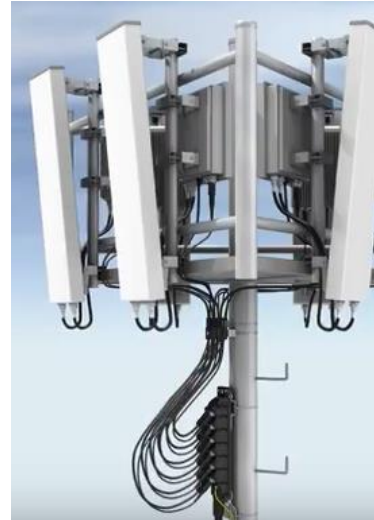


**Step 13**

Ensure smooth routing of all cables from connector head to 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 14**

Optional, a stainless steel protective cover can be easily fitted over MLUH connector head and secured with two screws.



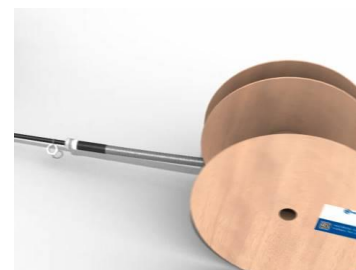
Attach the safety cord to the bracket and the protective cover.

Protection cover for MLUH 3/3:  
Stainless steel, dimensions (L x H x W) 365 x 200 x 90 mm  
 • Item no. 85032157




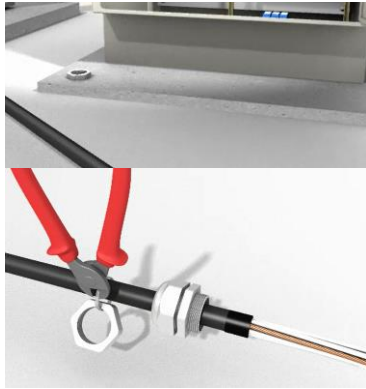
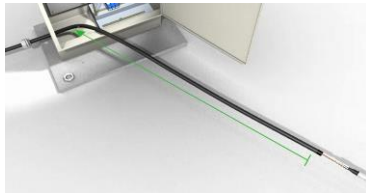
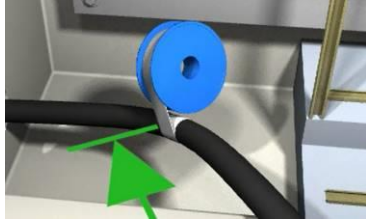
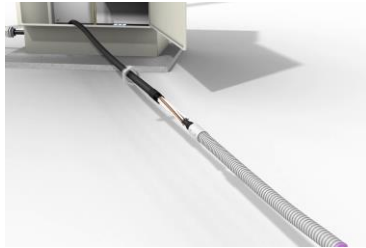
Protection cover for MLUH 6  
Stainless steel, dimension (L x H x W) 550 x 250 x 90 mm  
 • Item no. 85032156


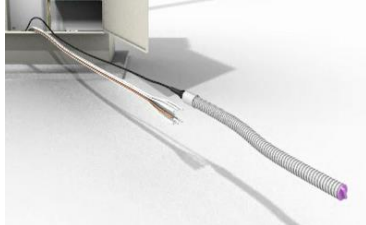

**BASE STATION END OF ASSEMBLY**
**Step 1**




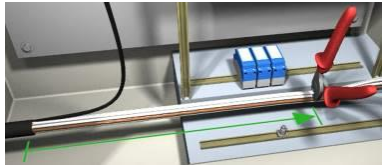
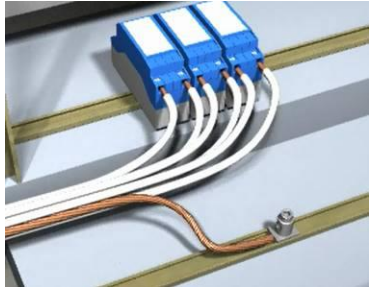
After unwinding the whole assembly from the reel, while handling the assembly make sure to leave the pulling tube as long as possible on the assembly.  
Pulling tube ensures IP65 and gives protection to the FO and DC tails inside.

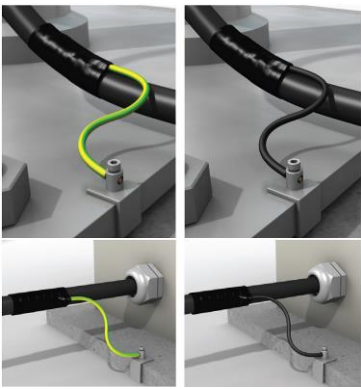








<b>Step 2</b>	<p>To remove protective tube hold tube and loosen gland nut.</p> <div data-bbox="258 412 400 539">  </div> <p>Do NOT twist the tube at any stage of removal.</p> <p>Pull tube off to reveal the tails within.</p>	 
<b>Step 3</b>	<p>Remove gland nut from cable and keep it safe.</p>	
<b>Step 4</b>	<p>Feed tails through cabinet/cabin.</p>	
<b>Step 5</b>	<p>Mark the "strip-back point" using tape.</p>	
<b>Step 6</b>	<p>Feed gland nut over cable to secure to cable entry gland if required.</p>	

<b>Step 7</b>	<p>Unwind black tape at cable butt to reveal rip cord.</p> <p>This cord is used to open the cable jacket and gain access to the cable elements within.</p>	
<b>Step 8</b>	<p>Use a screwdriver (or similar) to cut the cable jacket back to the "strip-back point" marked using the tape.</p>	
<b>Step 9</b>	<p>Remove cable jacket carefully.</p>	
<b>Step 10</b>	<p>Unwrap copper tape from cable using gloves due to potential sharp edges up to the "strip-back point".</p>	
<b>Step 11</b>	<p>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.</p>	
<b>Step 12</b>	<p>Carefully unwind the fibre optic cable element from the DC tails and from a loop to separate it.</p>	

<b>Step 13</b>	<p>During this process (at any stage) ensure the fibre optics are not kinked where they exit the cable butt.</p> <p>Use tape to protect the FO cable against overbending.</p>	
<b>Step 14</b>	<p>Once fiber optic cable is separated from DC wires, attach it temporarily to base station to keep it secure and clean.</p>	
<b>Step 15</b>	<p>Tighten cable gland to secure cable and ensure IP protection.</p>	
<b>Step 16</b>	<p>Measure (twice) the required DC tail length and cut them.</p>	
<b>Step 17</b>	<div data-bbox="252 1310 402 1444" data-label="Image"> </div> <p>Do not cut at any stage the fibre optic element.</p>	
<b>Step 18</b>	<p>Route DC cable element to their respective termination points and connect.</p> <p>Route earth wire to earth bonding point and connect.</p>	

<b>Step 19</b>	<p>If earthing is required outside cabinet/cabin use universal grounding kit and follow separate instructions.</p> <p>Note: the grounding cable can also come in black</p>	
<b>Step 20</b>	<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</p> <ul style="list-style-type: none"> <li>Item no 84103325</li> </ul>	
<b>Step 21</b>	<p>Release snap-lock fastener using a screwdriver.</p>	
<b>Step 22</b>	<p>Carefully remove protective tube to gain access to fibre optic tails.</p>	
<b>Step 23</b>	<p>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.</p>	

**Step 24**

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**FIBRE OPTIC ALLOCATION**

MLUH with Q-ODC/ODC-2					MLUH with ODC-4					
RRH	RRH End	Base Station End	BBU		RRH	RRH End	Base Station End	BBU		
	Connector PIN	Connector PIN				Connector PIN				
	Q-ODC/ODC-2	LC				ODC-4	LC			
1	1	B	1	1	1	1	B	1		
	2	A				2	A			
2	1	B	2			2	2	3	B	2
	2	A						4	A	
3	1	B	3	3	3			1	B	3
	2	A						2	A	
4	1	B	4			4	4	3	B	4
	2	A						4	A	
5	1	B	5	5	5			1	B	5
	2	A						2	A	
6	1	B	6			6	6	3	B	6
	2	A						4	A	
				7	7			1	B	7
								2	A	
						8	8	3	B	8
								4	A	
				9	9	1	B	9		
						2	A			
						10	10	3	B	10
								4	A	
				11	11	1	B	11		
						2	A			
						12	12	3	B	12
								4	A	

MLUH with Q-ODC12 (1st row)					MLUH with Q-ODC 12 (2nd row)			
RRH	RRH End	Base Station End	BBU		RRH	RRH End	Base Station End	BBU
	Connector PIN	Connector PIN				Connector PIN	Connector PIN	
	Q-ODC 12	LC				Q-ODC 12	LC	
1	1	B	1	4	1	B	1	
	2	A			2	A		
	3	B	2		3	B	2	
	4	A			4	A		
	5	B	3		5	B	3	
	6	A			6	A		
	7	B	4		7	B	4	
	8	A			8	A		
	9	B	5		9	B	5	
	10	A			10	A		
	11	B	6		11	B	6	
	12	A			12	A		
2	1	B	7	5	1	B	7	
	2	A			2	A		
	3	B	8		3	B	8	
	4	A			4	A		
	5	B	9		5	B	9	
	6	A			6	A		
	7	B	10		7	B	10	
	8	A			8	A		
	9	B	11		9	B	11	
	10	A			10	A		
	11	B	12		11	B	12	
	12	A			12	A		
3	1	B	13	6	1	B	13	
	2	A			2	A		
	3	B	14		3	B	14	
	4	A			4	A		
	5	B	15		5	B	15	
	6	A			6	A		
	7	B	16		7	B	16	
	8	A			8	A		
	9	B	17		9	B	17	
	10	A			10	A		
	11	B	18		11	B	18	
	12	A			12	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 (USA)
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	

## REVISION HISTORY

Revision	Description of detailed changes	Manager/Engineer	Applicable date
Rev. A	First Version	Gentiana Odza	2015-03-18
Rev. B	Hole document formatted	Elina Bunka	2016-04-08
Rev. C	Handling of assembly added (Page 1)	Daniel Langenegger	2016-11-28
Rev D	RRH END: Step 1 to 14 modified BTS END: step 24: cleaning instruction Fibre optic Allocation and Power coding modified	Müller René	2018-01-08
Rev E	RRH End: Step 4. Label max. pulling force added.	Marco Senn	2018-02-06
Rev F	Update of safety and handling instructions. Update of steps 1, 2, 7, 13	Marco Senn	2018-07-03