

# INSTALLATION MANUAL

**HUBER+SUHNER AG**  
Fiber Optics  
MASTERLINE Ultimate with Q-ODC-12/24  
(MLUQ)  
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## MASTERLINE Ultimate with Q-ODC-12/24 (MLUQ)

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**ABOUT THIS MANUAL**

This manual is intended for installation and service personnel who are involved in the planning, installation, operation and maintenance of HUBER+SUHNER MASTERLINE Fiber Optic Cable systems.

Please read the complete manual prior to unpacking and installation of the product.

This manual assumes that the installer has at least a basic experience and understanding of passive fiber optic equipment, as well as some familiarity with its operation. The information covered in this manual should be fully understood prior to installation.

**Safety**

The following general safety precautions must be observed during all phases of an installation. Failure to comply with these precautions, or with specific warnings elsewhere in this manual willfully violates the intended use of the product.

WARNING and DANGER statements have been strategically included in the text to alert personnel to possible hazards. The safety advice given must be closely followed.

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HUBER+SUHNER reserves the right to revise this documentation periodically without any obligation to provide notification of such revision or changes.

## EMPLOYED SYMBOLS

Read and understand the safety precautions and application advice given in this document. The following symbols are employed:



**Hazard Indication and Precautions**



**Mandatory Notice and Actions**

## GENERAL SAFETY PRECAUTIONS



**Working Safety Precautions**

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Installation of optical communication systems involves activities, which possibly pose a safety hazard to the installer. The installer is responsible for compliance with all applicable working safety standards and regulations like Occupational Health and Safety, Health and Safety at Work and others.

- Do not work in constricted or sealed areas
- Do not work on unstable workbenches
- Observe ladder safety rules
- Do not work in explosive areas



**Electrical Safety Precautions**

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Any part of an optical communications system as well as the completed system must fully comply with all applicable electrical safety standards and regulations like NFPA 70 (NEC), NESC, OSHA 1910, EN 60950, EN 61557 and others. This also includes compliance to local building and fire codes.

- As a fiber optic installer, do not work with or near electrically energized systems
- Only trained and qualified personnel is allowed to install and work with or near electrical equipment
- Protect de-energized electrical systems or components effectively against re-energizing
- Strictly adhere to applicable grounding and bonding regulations when building optical communications systems
- Exclude all unauthorized personnel from the immediate electrical hazard area



### **Eye Safety Precautions**

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Invisible laser radiation poses risks of serious eye injury. Always work in full conformance with applicable laser safety standards and regulations and use protective eye devices according to OSHA 1926.102 (b), EN 207, EN 208 and others.

- DO NOT look directly into a fiber end without verifying that the line being observed is completely de-energized
- DO NOT examine fiber ends using a microscope without verifying that the line being observed is completely de-energized
- Always use a fiber optic power meter to make certain the fiber is dark



### **Fiber Safety Precautions**

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Always work in full conformance with applicable materials safety standards and regulations like Occupational Health and Safety, Health and Safety at Work and others.

- Always follow the recommended safety practices when working with fibers
- Always wear safety glasses when working with fibers
- Use adhesive tape and sealed containers to trap loose pieces of fiber
- Do not let cut pieces of fiber stick into clothing or drop in the work area
- Do not allow fiber particles remain on clothing and in the working environment
- Exclude all food and drink from the working area
- Dispose of all fiber scraps and cut fiber pieces properly

## HANDLING OF CABLES



### **Cable Bending**

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Excessive cable bending invokes unacceptable fiber stress inside the cable and material degradation. This leads to increased cable link attenuation and to permanent cable damage.

- Always keep cable bend radius above specified limit: Refer to appropriate datasheet for details
- AVOID cable bends around sharp objects
- Use anti-kink devices to prevent kinks and loops in optical cables
- Use bend protection devices to avoid sharp bends in optical cables



### **Cable Crushing**

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Excessive cable crushing invokes unacceptable fiber bending inside the cable and material degradation. This leads to increased cable link attenuation and to permanent cable damage.

- Avoid cable crushing exceeding the acceptable limit: Refer to appropriate datasheet for details
- Avoid crushing optical cables between sharp objects
- DO NOT use cable ties to attach optical cables
- DO NOT use hose clamps to attach optical cables
- Avoid placing heavy objects on optical cables
- Avoid overriding optical cables by heavy vehicles
- Use cable conduits to protect optical cables from lateral pressure



### **Cable Pulling**

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Excessive cable tensile loading invokes unacceptable fiber stress inside the cable and material degradation. This leads to increased cable link attenuation and to permanent cable damage.

- Always keep tensile loads in optical cables below the specified limit at any time: Refer to appropriate datasheet for details
- DO NOT use winches without load limitation to pull optical cables
- DO NOT sharply twist optical cables to transmit pulling forces
- DO NOT use wire-rope clamps to transmit pulling forces
- AVOID stretching the jacket of optical cables

- Do not apply pulling forces at connectors
- Avoid dragging optical cables over sharp edges
- Use smooth turns on a mandrel with at least 20 times the cable diameter to transmit pulling forces
- To pull cabling system provided with protecting tube use eye of protecting tube to transmit pulling forces



#### **Handling of cables at low temperature**

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Plastic materials become rigid and brittle at very low temperatures. This leads to permanent cable damage during improper handling.

- DO NOT coil or uncoil optical cables below specified minimum installation temperature: Refer to appropriate datasheet for details
- AVOID deploying optical cables below specified minimum installation temperature
- AVOID relocating optical cables below specified minimum installation temperature
- Allow optical cables to reach specified minimum installation temperature before handling



#### **Handling of cables at high temperature**

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Plastic materials become soft and stretchy at very high temperatures. This leads to permanent cable damage during improper handling.

- DO NOT coil or uncoil optical cables above specified maximum installation temperature: Refer to appropriate datasheet for details
- AVOID deploying optical cables above specified maximum installation temperature
- AVOID relocating optical cables above specified maximum installation temperature
- Allow optical cables to reach specified maximum installation temperature before handling

## HANDLING OF FIBER OPTIC CONNECTORS



### Fiber End cleaning Advice

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Contaminated fiber ends in connectors due to inappropriate connector cleaning may damage the optical interface of the connection. This leads to increased link attenuation, degraded return loss, increased Bit Error Rates or even catastrophic link failures.



**WARNING! Invisible Laser Radiation Hazard - Bears risk of serious injuries!**

- Do NOT look into a fiber end without verifying that the line is completely de-energized
- Do NOT examine fiber ends using a microscope without verifying that the line is completely de-energized
- Always clean fiber ends before connecting
- Follow approved fiber end cleaning procedures
- Use an accepted solvent and lint-free wipes
- Use purpose-built swabs to clean fiber optic adaptors
- Allow solvents to evaporate before connecting
- NEVER use metallic objects to clean fiber ends
- Always replace dust caps when disconnecting fiber ends

**INSTALLATION OF MLUQ ENCLOSURE**

**Step 1**

**MLUQ mounting bracket**

First fix the MLUQ mounting bracket.

**Mast mounted**

The mounting bracket can be fixed to the antenna mast with standard hose clamps. The mounting bracket has provisions to support different size of hose clamps for different sizes of antenna poles.

**Wall mounted**

The mounting bracket has 4 holes with Ø 6.35mm for wall mounting.

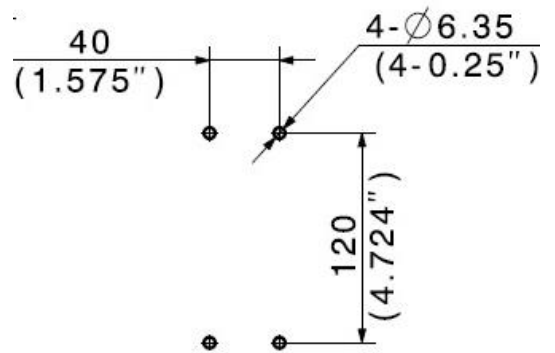
We recommend to use Huber+Suhner's quick hose clamps, H+S item no. 84076411 (pole Ø 30 – 155mm) or H+S item no. 84076412 (pole Ø 60 – 500mm).

The quick hose clamps need to be ordered separately.

**Option mast mounted**



**Option wall mounted**



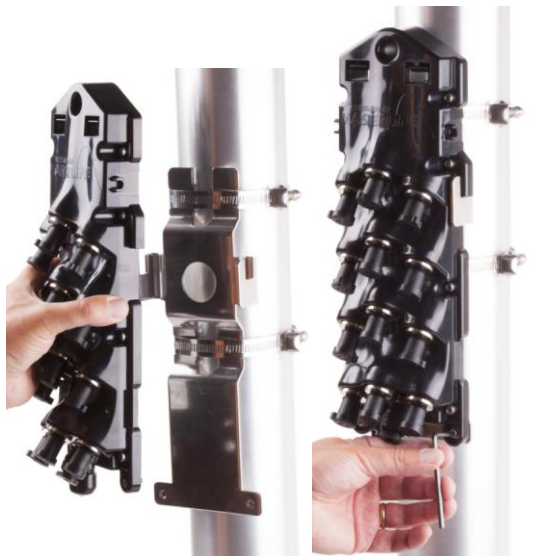
**Step 2**

**Hook-in MLUQ enclosure**

Hook-in MLUH enclosure at the pre-mounted bracket and secure it with the 2 retained hexagon socket screws (M4) at the bottom of the enclosure.



Tight the screws with a torque of 1.5 Nm. Be careful not to damage the enclosure by over-tighten the screws.





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**Step 3****Lift the connectorized multi-fiber cable**

Use the integrated pulling eye at the Q-ODC12/24 connector cap to lift the multi-fiber cable up to the mast.

Fix cable with clamps to the mast. Recommended spacing between clamps is 0.7m to 1m. HUBER+SUHNER offers combined clamps for Ø 7.0mm fiber optic cables and power cables (Ø 17.5mm to 29.0mm)

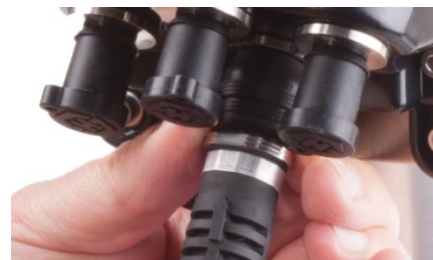
**Step 4****Connect Q-ODC-24**

Connect the Q-ODC-12/24 extension to the Q-ODC-12/24 socket (reverse plug) at the bottom of the MLUQ.

1. Un-mate protection cap with pulling eye Pull back metal coupling ring at the Q-ODC-12/24 protection cap and remove protective cap.
2. Mating sequence: Push extension connector slightly into socket (reverse plug) connector, rotate to find keying position, push connector to mate. Use arrows on the boot for pre-alignment. Mated – connector snaps in and is fully strain relieved

**Un-mating sequence:**

Pull black rubber coupling ring at the MLUQ socket (reverse plug) to un-mate. Replace dust protection caps.



### INSTALLATION OF THE Q-ODC-2 RRH JUMPER

#### Step 5

##### RRH connection

The remote radios then are connected with fiber optic jumpers. A variety of jumpers with various connector interfaces to the remote radio head are available from HUBER+SUHNER. Refer to the datasheet or catalogue to select the corresponding jumper types.

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

Pull coupling ring to un-mate



#### Step 6

##### Protection cover

Snap in the protection cover lug onto the 2 shafts on the left and right at the top of the enclosure.

Note: The protection cover has to be ordered separately  
 H+S item no 85019191



### INSTALLATION OF THE FIBER OPTIC CABLE TO THE BASE STATION

#### Step 7

##### Feed fiber optic cable into the BTS

After unwinding the whole assembly, while handling the assembly make sure to leave the protecting tube as long as possible on the assembly. It prevents the connectors from being contaminated during handling. Feed fiber optic cable through knock-out hole of the generic base frame below the base station.

#### Step 8

##### Store fiber optic cable over-length inside the base station

A box for over-length management of 20m cable (Ø 7.0mm) is available from HUBER+SUHNER and can be ordered separately.

H+S item 84103325



#### Step 9

##### Remove protection tube

Remove shrink tube by dint of the ripcord. Then remove the tube down from the divider adapter.



**Step 10****Connect the LCs to the BTS or 19"CTB**

Remove the dust caps from the connectors and plug them into the base station or optional into the 19" CTB.

Notice the numbering of the fan-outs to correctly allocate the channels.

HUBER+SUHNER offers 19" patching boxes with front and back entry and pullout tray for easy access.

H+S item no 85028406 for 19" patching box with 12 LC adapters

