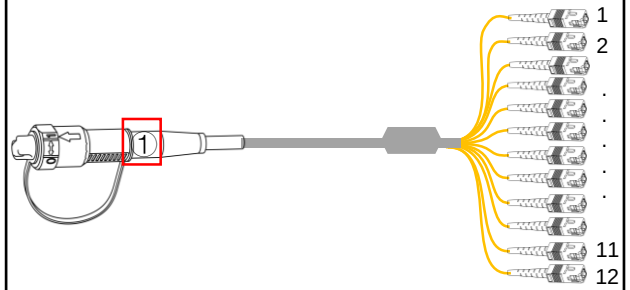
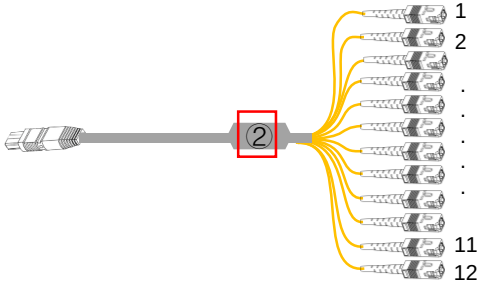
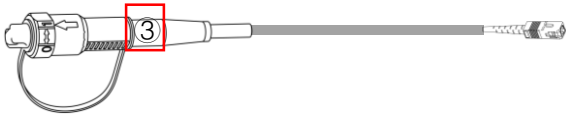
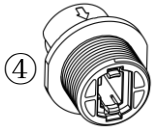
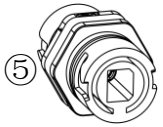
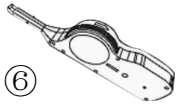
1 Contents

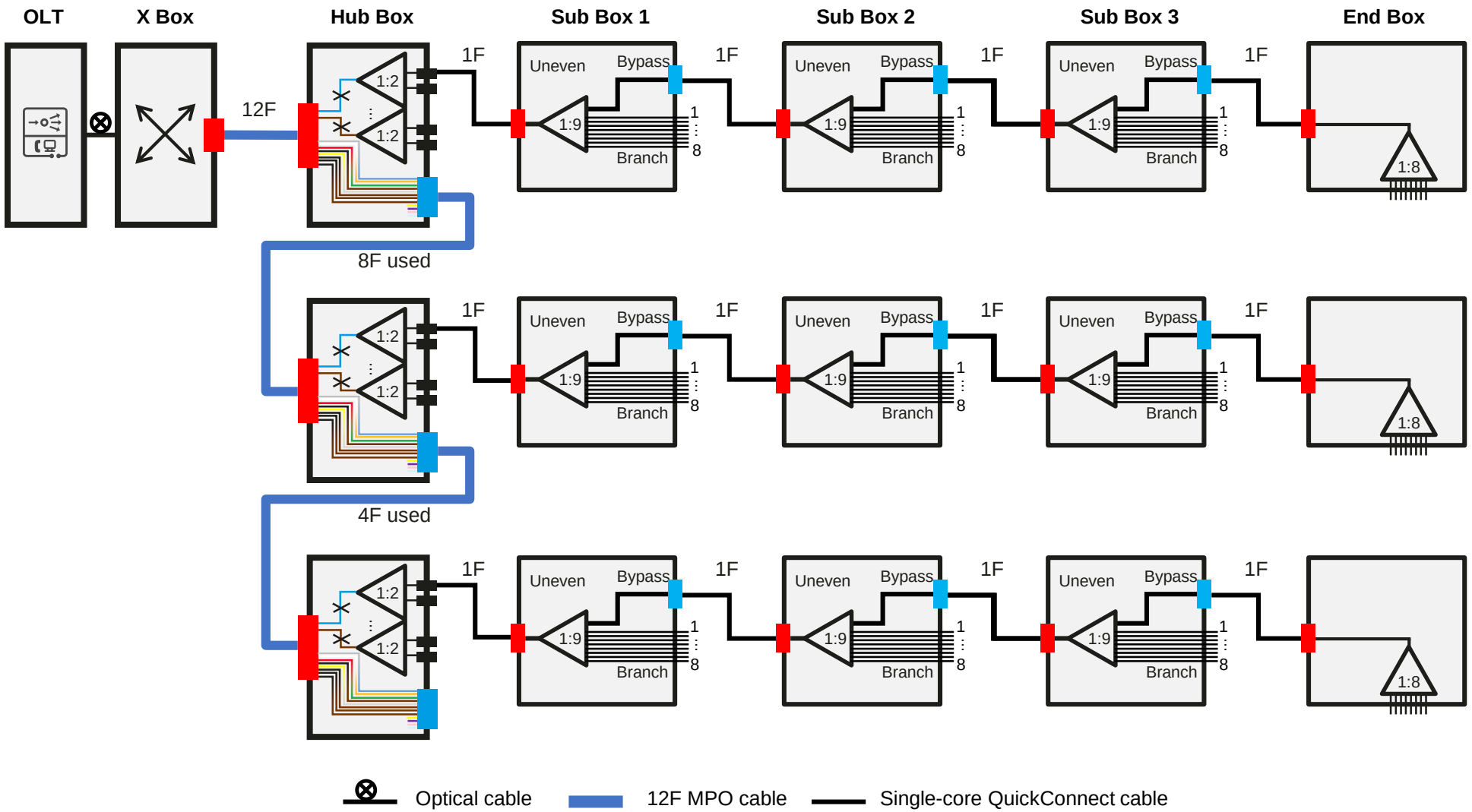
Item list

Category	Label	Picture	No.	Remarks
Cables	①Outdoor MPO QuickConnect test patch cord		2	Used for MPO box acceptance
	②MPO test patch cord		2	Used for optical cable acceptance
	③SC QuickConnect test patch cord		2	Used for single-core distribution port of a Hub Box and single-core FAT acceptance

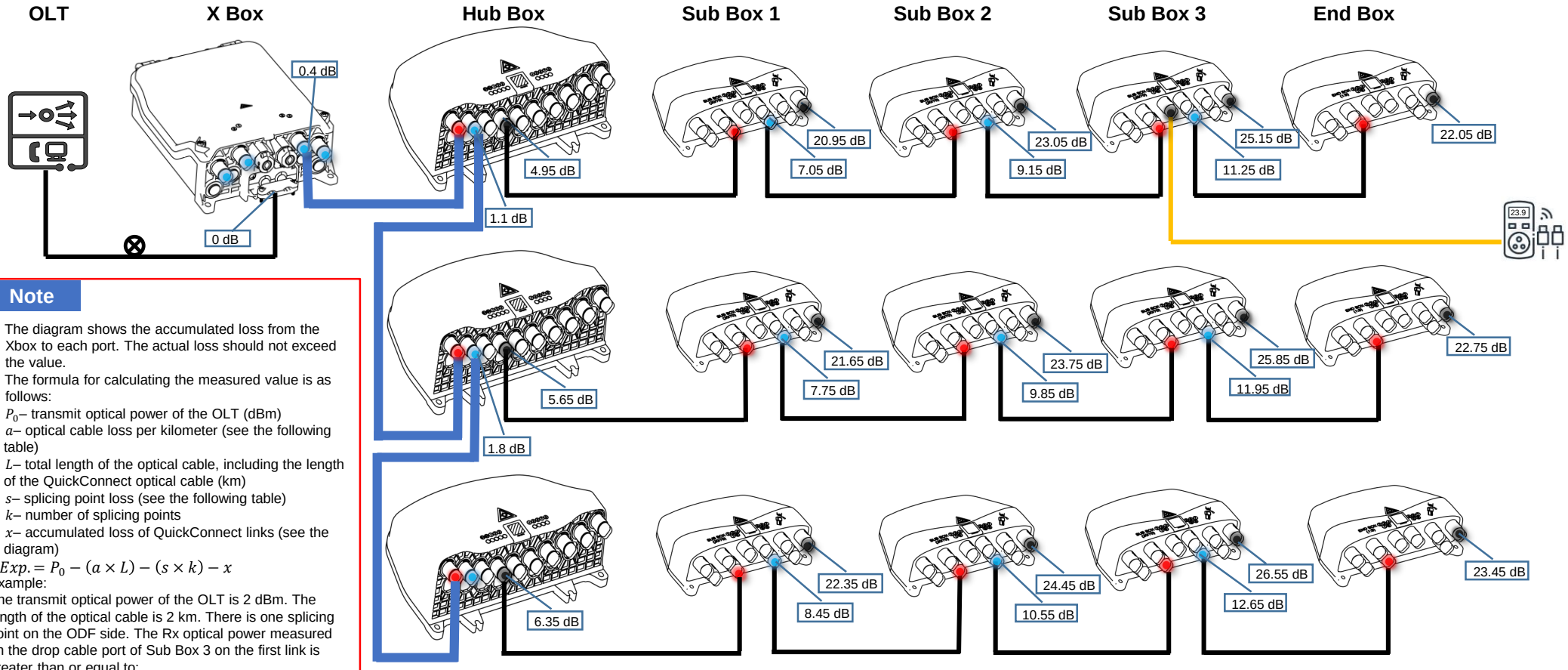
Item list

Category	Label	Picture	No.	Remarks
Adapters	④MPO adapter (outdoor to indoor)		4	
	⑤Single-core dual-ended QuickConnect adapter		2	
Consum-bles	⑥MPO cleaning pen		1	About 500 times
	⑦ Dust-free paper			

2.1 Logical Diagram for Querying the Loss Standard of an ODN 3.0 QuickConnect Section (1:64 Networking)



2.1 Querying the Loss Standard of the ODN 3.0 QuickConnect Section (1:64 Networking)



Note

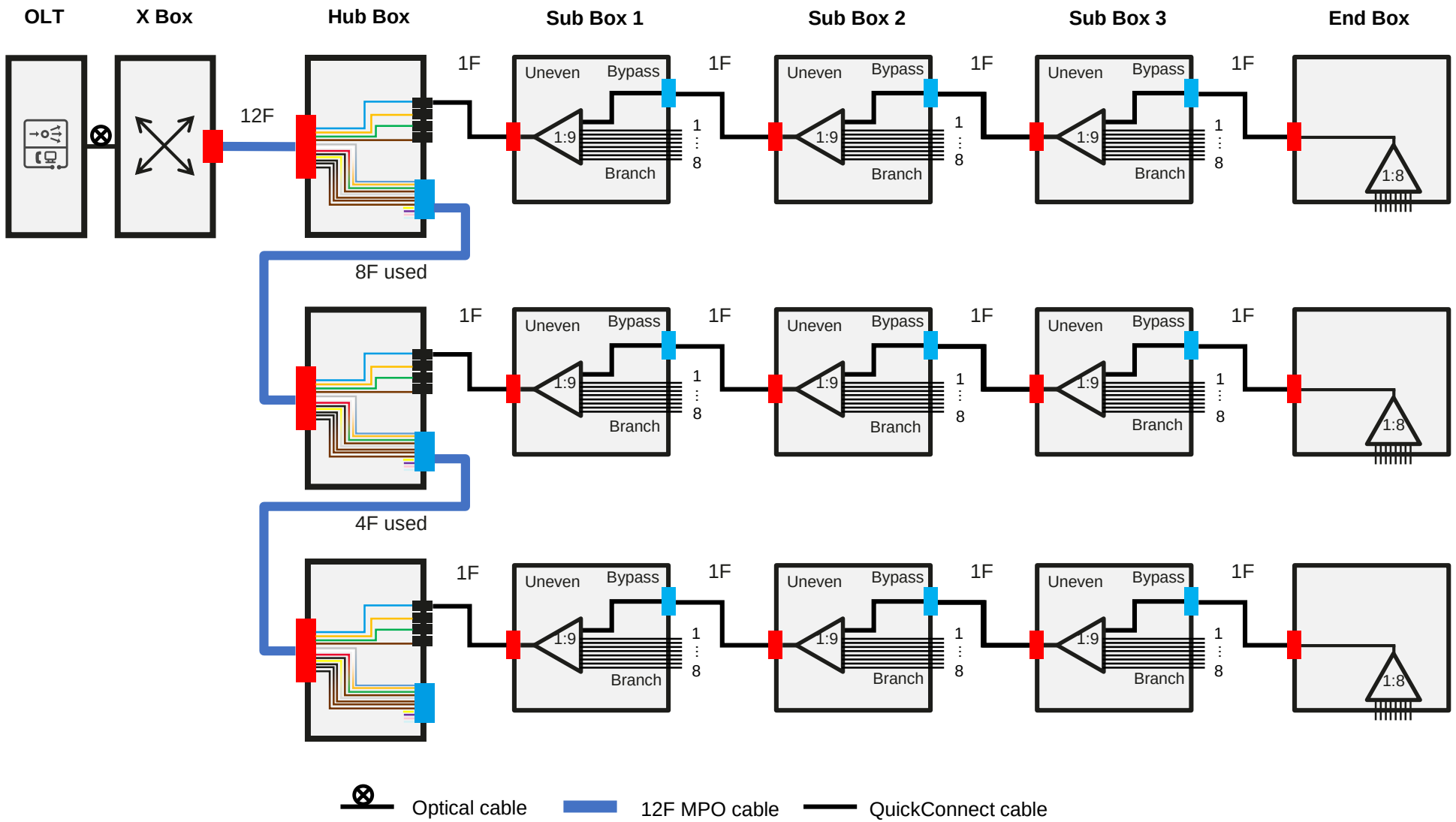
1. The diagram shows the accumulated loss from the Xbox to each port. The actual loss should not exceed the value.
2. The formula for calculating the measured value is as follows:
   P_0– transmit optical power of the OLT (dBm)
   a– optical cable loss per kilometer (see the following table)
   L– total length of the optical cable, including the length of the QuickConnect optical cable (km)
   s– splicing point loss (see the following table)
   k– number of splicing points
   x– accumulated loss of QuickConnect links (see the diagram)

$$Exp. = P_0 - (a \times L) - (s \times k) - x$$

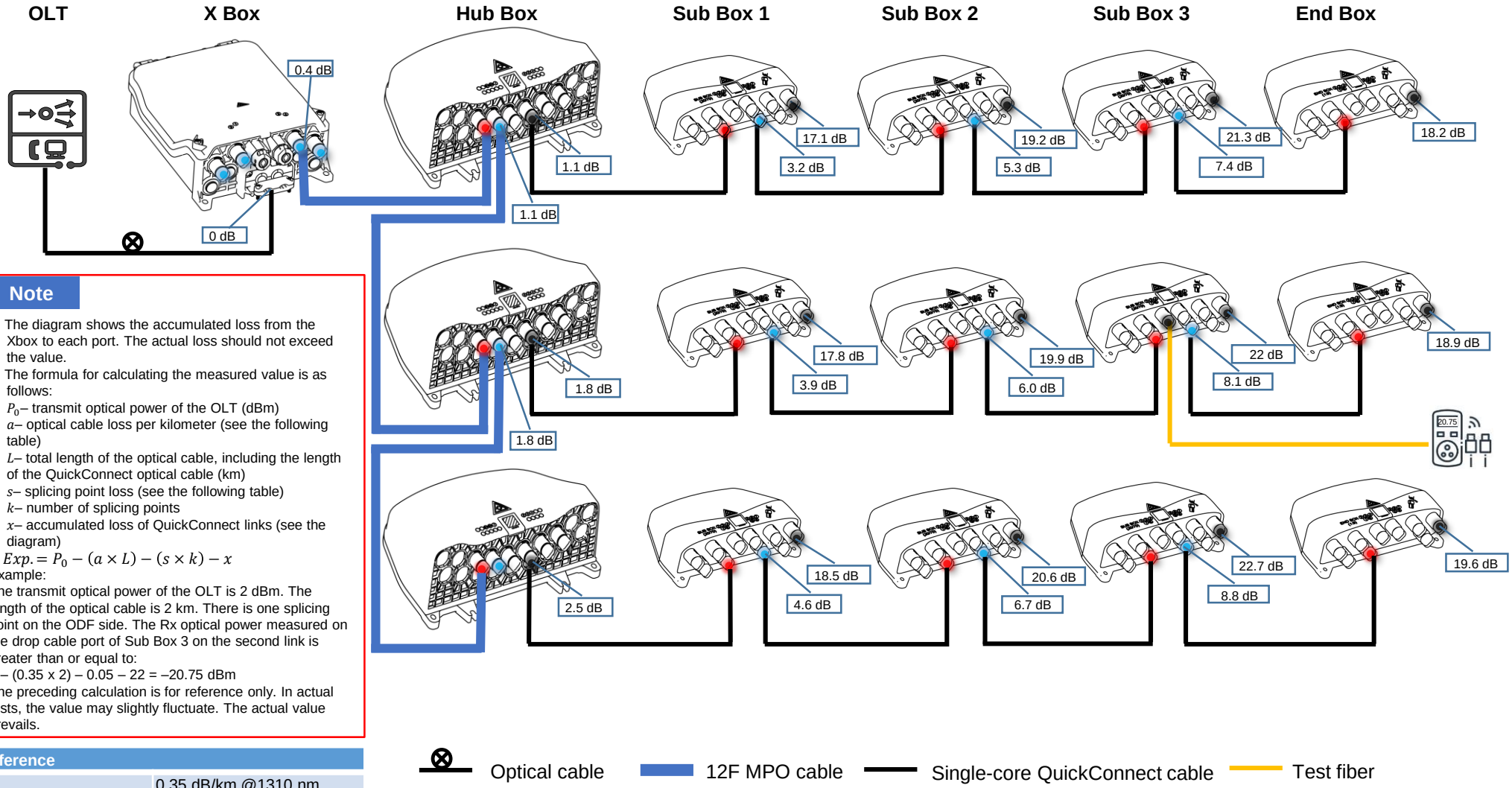
Example:
The transmit optical power of the OLT is 2 dBm. The length of the optical cable is 2 km. There is one splicing point on the ODF side. The Rx optical power measured on the drop cable port of Sub Box 3 on the first link is greater than or equal to:
2 – (0.35 x 2) – 0.05 – 25.15 = –23.9 dBm
The preceding calculation is for reference only. In actual tests, the value may slightly fluctuate. The actual value prevails.

Reference	
Optical cable loss (a)	0.35 dB/km @1310 nm 0.25 dB/km @1490 nm
Splicing point loss (s)	0.05 dB/each

2.2 Logical Diagram for Querying the Loss Standard of an ODN 3.0 QuickConnect Section (1:32 Networking)



2.2 Querying the Loss Standard of the ODN 3.0 QuickConnect Section (1:32 Networking)



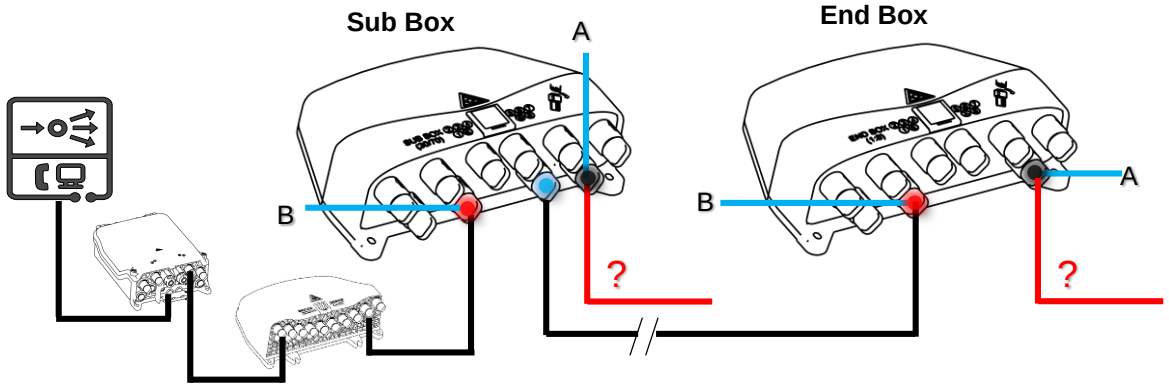
Note

1. The diagram shows the accumulated loss from the Xbox to each port. The actual loss should not exceed the value.
2. The formula for calculating the measured value is as follows:
   P_0– transmit optical power of the OLT (dBm)
   a– optical cable loss per kilometer (see the following table)
   L– total length of the optical cable, including the length of the QuickConnect optical cable (km)
   s– splicing point loss (see the following table)
   k– number of splicing points
   x– accumulated loss of QuickConnect links (see the diagram)
   $Exp. = P_0 - (a \times L) - (s \times k) - x$

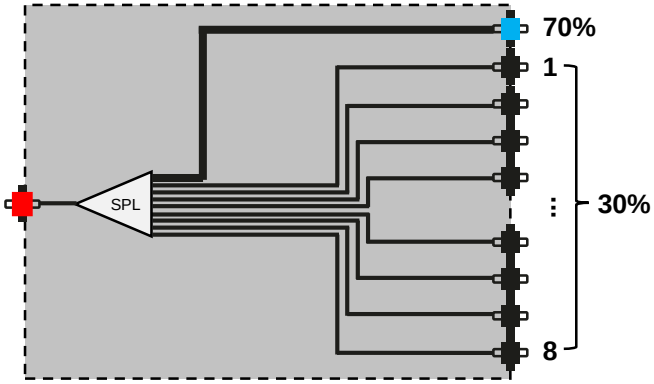
Example:
The transmit optical power of the OLT is 2 dBm. The length of the optical cable is 2 km. There is one splicing point on the ODF side. The Rx optical power measured on the drop cable port of Sub Box 3 on the second link is greater than or equal to:
2 – (0.35 x 2) – 0.05 – 22 = –20.75 dBm
The preceding calculation is for reference only. In actual tests, the value may slightly fluctuate. The actual value prevails.

Reference	
Optical cable loss (a)	0.35 dB/km @1310 nm 0.25 dB/km @1490 nm
Splicing point loss (s)	0.05 dB/each

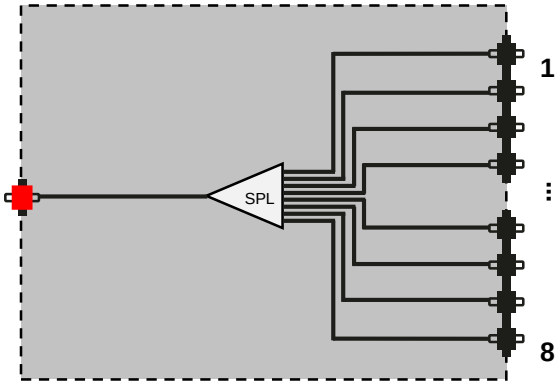
3.1 Sub / End Box Fault Fault Locating



Internal diagram of a Sub Box



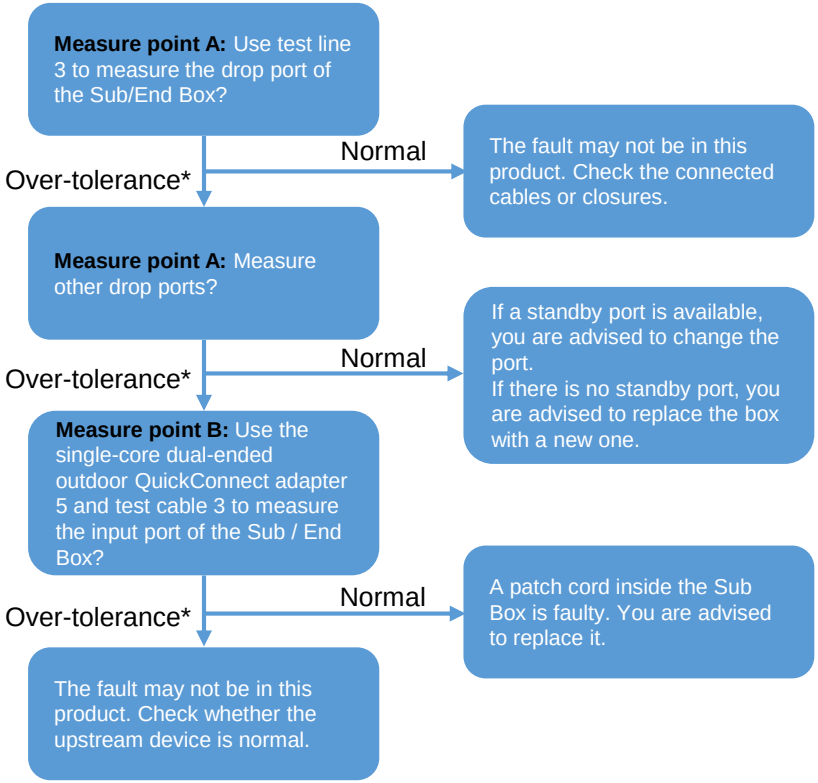
Internal diagram of an End Box



- Input: outdoor QuickConnect adapter (single-core)
- Extended output: outdoor QuickConnect adapter (single-core)
- Splitter output: outdoor QuickConnect adapter (single-core)
- SPL PLC splitter: 1:9 uneven splitter (30/70)

- Input: outdoor QuickConnect adapter (single-core)
- Splitter output: outdoor QuickConnect adapter (single-core)
- SPL PLC splitter: 1:8 even splitter

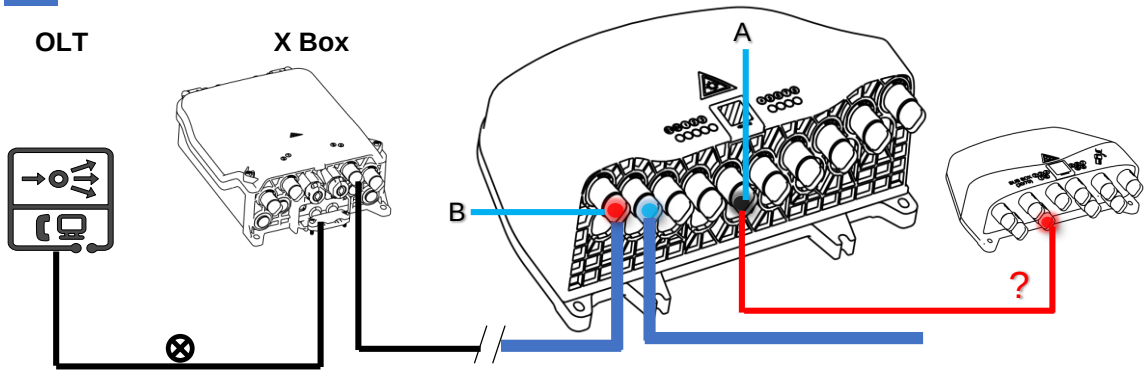
⚠ CAUTION This page is used to locate faults only when the measured power of the Sub / End Box is obviously lower than the result calculated in the link budget diagram.



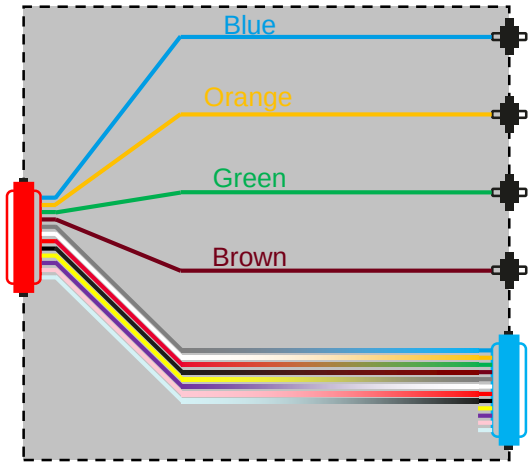
*Before the final conclusion, ensure that optical signals can be transmitted from the OLT to the corresponding optical path and that the end faces have been cleaned.

3.2 Hub Box Fault Locating

Taking a 8 ports Hub Box as an example

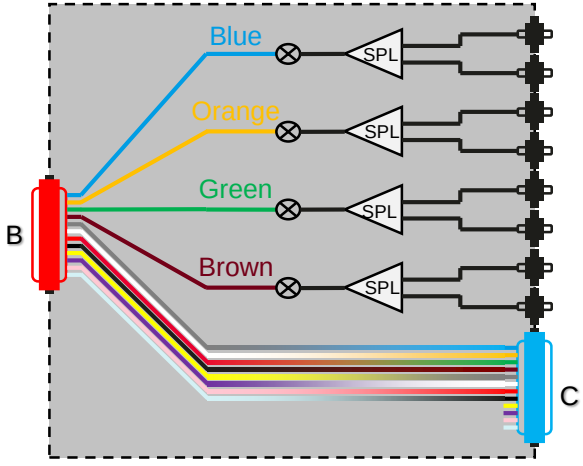


Internal Logical Diagram of 4 ports Hub Box



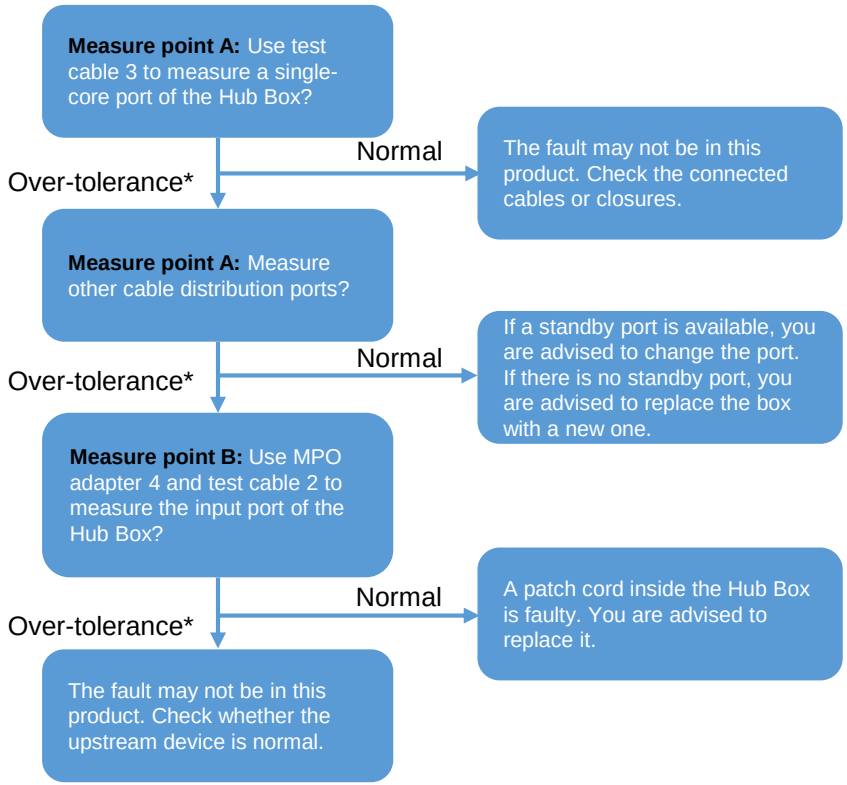
Input: outdoor QuickConnect adapter (multi-core)
Cascading end: outdoor QuickConnect adapter (multi-core)
Termination: outdoor QuickConnect adapter (single-core)

Internal Logical Diagram of 8 ports Hub Box



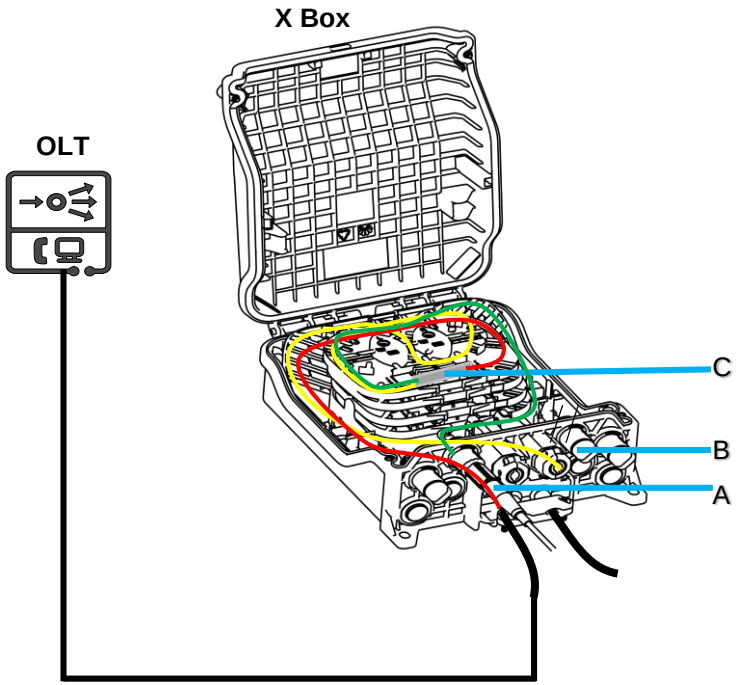
Input: outdoor QuickConnect adapter (multi-core)
Cascading end: outdoor QuickConnect adapter (multi-core)
Termination: outdoor QuickConnect adapter (single-core)
SPL PLC splitter: 1:2 even splitter

CAUTION This method is used to locate the fault only when the measured power of the first Sub Box on the link is obviously lower than the reference value in the link budget diagram.



*Before the final conclusion, ensure that optical signals can be transmitted from the OLT to the corresponding optical path and that the end faces have been cleaned.

3.3 X Box Fault Locating



Straight-through optical cable (stripping the loose tube)

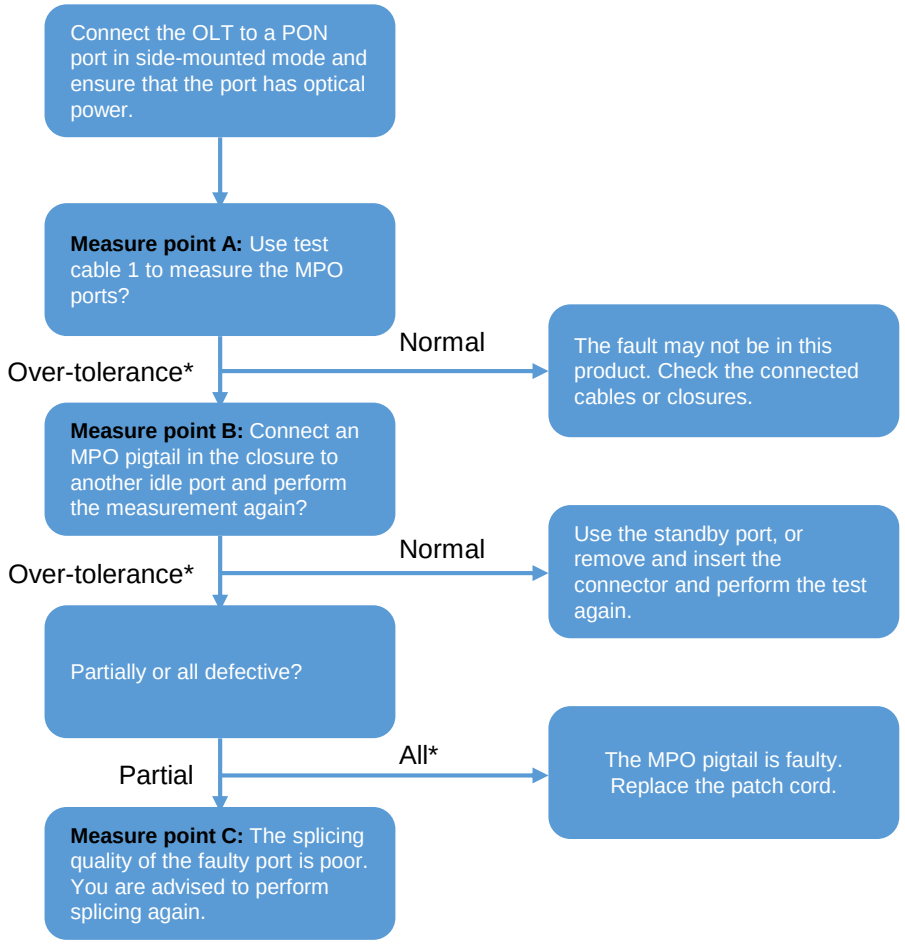
Straight-through optical cable

Branching optical cable

MPO pigtail

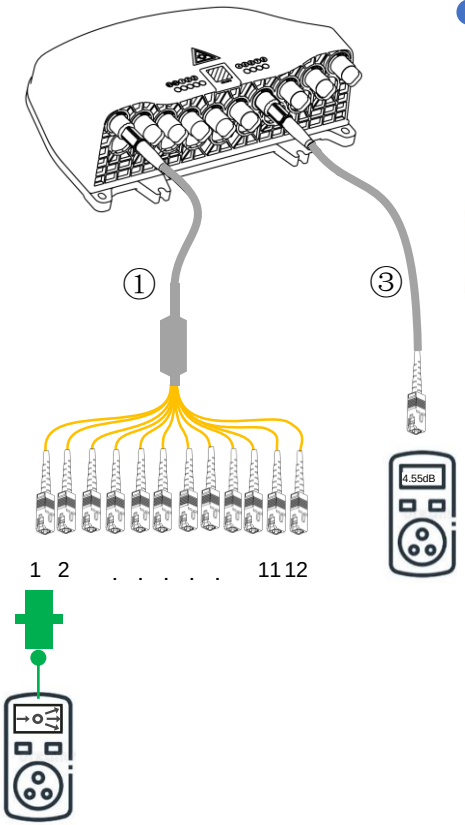
Splice protection tube

⚠ CAUTION Used only for fault locating when necessary.

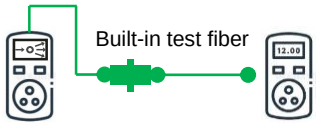


*Before the final conclusion, ensure that optical signals can be transmitted from the OLT to the corresponding optical path and that the end faces have been cleaned.

3.4 Hub Box Function Verification



1. In the 1310 nm wavelength, connect the built-in test fiber of the optical source to the optical power meter. The reference value returns to zero.

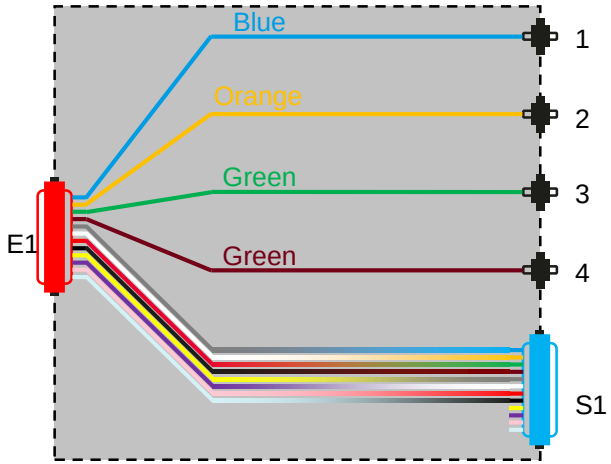


2. Connect the outdoor MPO end of optical cable 1 to the red input end (E1) of the Hub Box, and connect the other end of optical cable ① with a common SC/APC connector to the optical source with a built-in test fiber using an SC adapter.
3. Insert the outdoor QuickConnect connector of optical cable ③ into the black single-core output end (1–8) of the Hub Box, and insert the other end of the common SC/APC connector of optical cable ③ into an optical power meter.
4. Read the loss value on the optical power meter.

Hub Box loss reference		
4 ports Hub Box	**E1-1 / 2 / 3 / 4**	≤ 0.7 dB
	E1-S1	≤ 1.0 dB

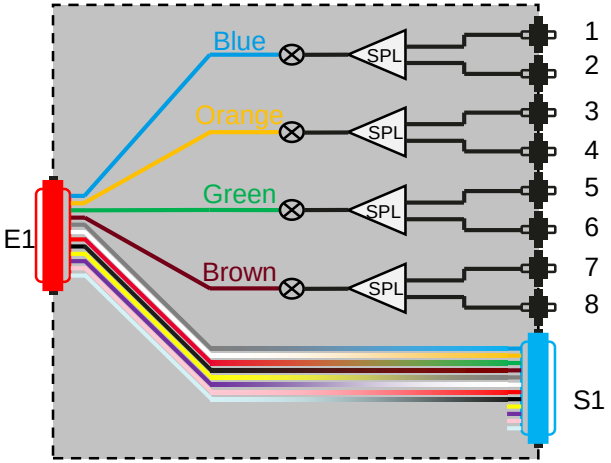
Hub Box loss reference		
8 ports Hub Box	**E1-1 / 2 / 3 / 4 / 5 / 6 / 7 / 8**	≤ 4.55 dB
	E1-S1	≤ 1.0 dB

Internal Logical Diagram of 4 ports Hub Box



Input: outdoor QuickConnect adapter (multi-core)
Cascading end: outdoor QuickConnect adapter (multi-core)
Termination: outdoor QuickConnect adapter (single-core)

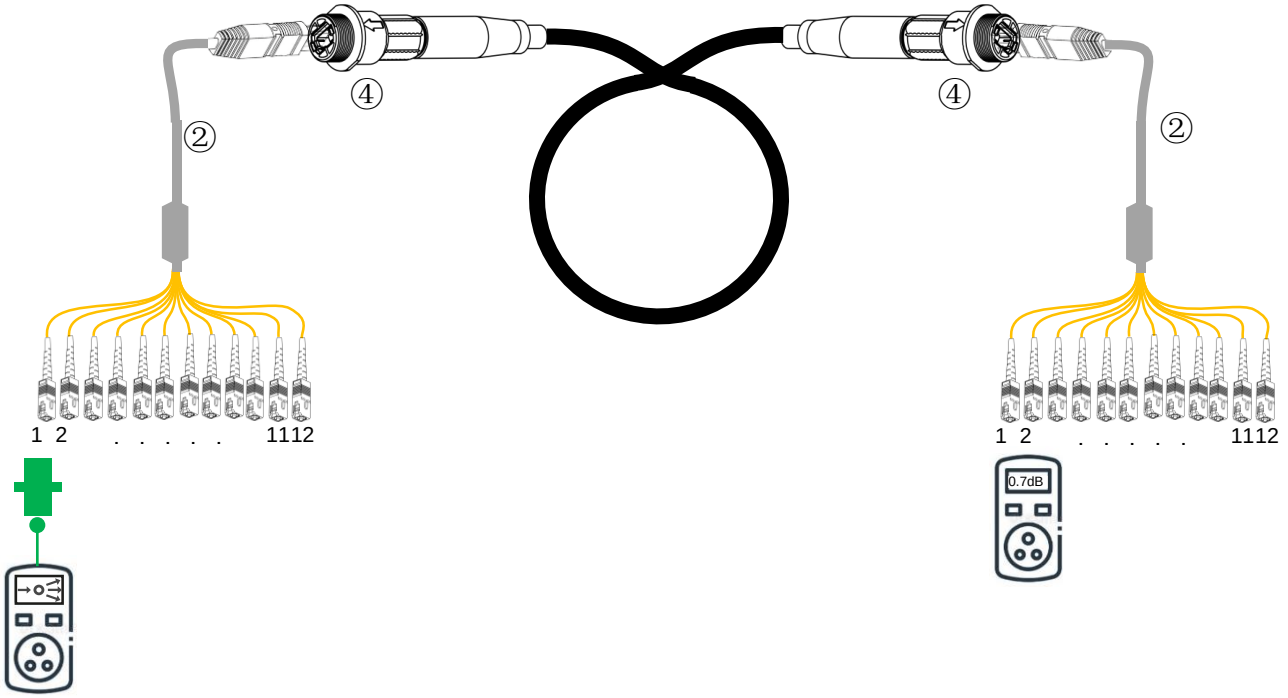
Internal Logical Diagram of 8 ports Hub Box



Input: outdoor QuickConnect adapter (multi-core)
Cascading end: outdoor QuickConnect adapter (multi-core)
Termination: outdoor QuickConnect adapter (single-core)
SPL PLC splitter: 1:2 even splitter

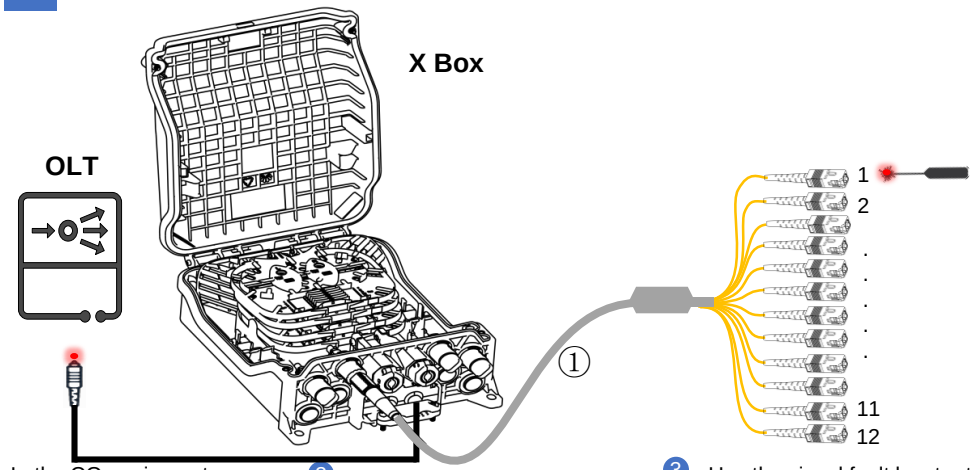
If the optical specifications exceed the expectations, search for the index data on page 6.

3.5 QuickConnect MPO Cable Verification

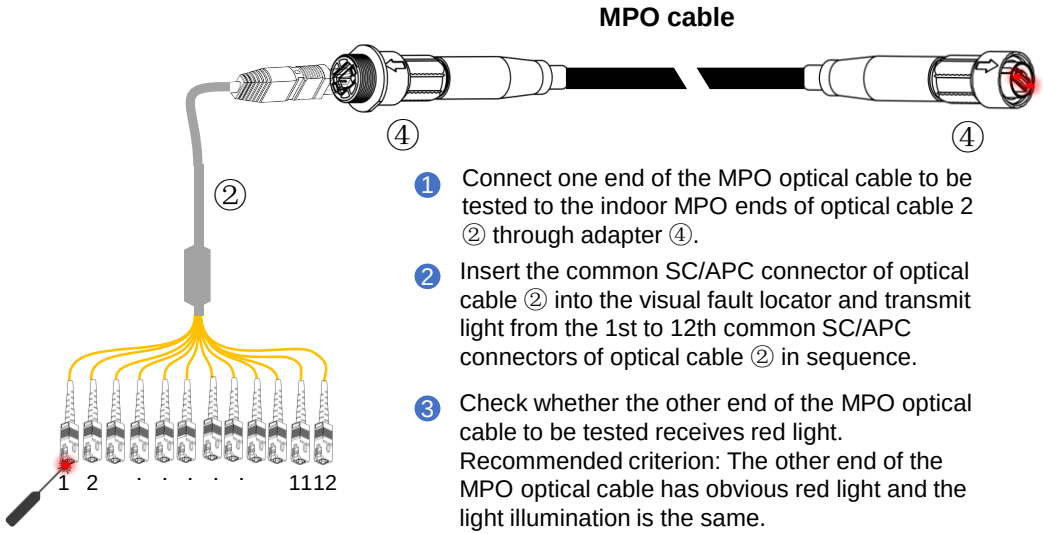


1. In the 1310 nm wavelength, connect the built-in test fiber of the optical source to the optical power meter. The reference value returns to zero.
2. Both ends of the MPO optical cable to be tested are respectively connected to indoor MPO ends of the two optical cables ② by using adapters ④.
3. Connect the 1-12 SC/APC common connectors of one optical cable ② to the built-in test fibers of the optical source one by one. Insert the 1-12 SC/APC common connectors of the other optical cable ② into the optical power meter one by one.
4. Read the loss of connectors 1 to 12 on the optical power meter. Recommended criterion: The insertion loss of cores 1–12 of the MPO optical cable to be tested is less than or equal to 0.7 dB.

4 Node Fault Locating–Optical Transmission Method

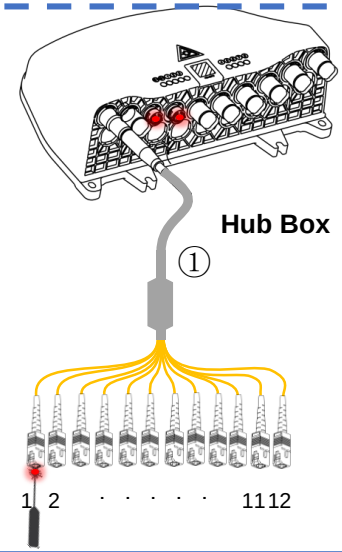


1. In the CO equipment room, remove the corresponding SC patch cord from the PON port to prevent the visual fault locator from damaging the PON port.
2. Insert the outdoor MPO end of optical cable ① into the output of the X Box, and insert the common SC/APC connector of optical cable ① into the visual fault locator.
3. Use the visual fault locator to transmit light and check whether the ODF patch cord connectors have obvious red light.



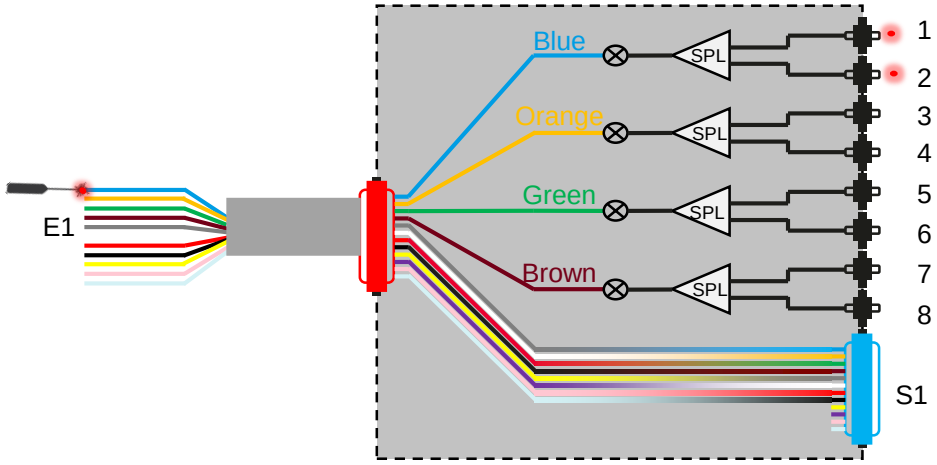
1. Connect one end of the MPO optical cable to be tested to the indoor MPO ends of optical cable 2 ② through adapter ④.
2. Insert the common SC/APC connector of optical cable ② into the visual fault locator and transmit light from the 1st to 12th common SC/APC connectors of optical cable ② in sequence.
3. Check whether the other end of the MPO optical cable to be tested receives red light.
   Recommended criterion: The other end of the MPO optical cable has obvious red light and the light illumination is the same.

CAUTION When handling fibers, do not get your eyes close to the fiber outlet or directly look into it without eye protection.



1. Connect the red input of the Hub Box to the outdoor MPO end of optical cable ①. Taking a box with 8 ports as an example
2. Insert the visual fault locator into the common SC/APC end of optical cable ①, use the visual fault locator to transmit light, and check whether the output end of the Hub Box has obvious red light.

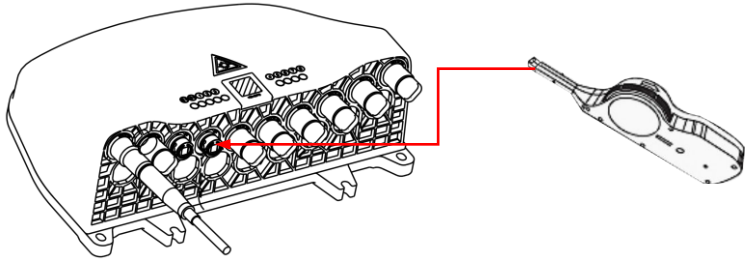
Taking a 8 ports Hub Box as an example



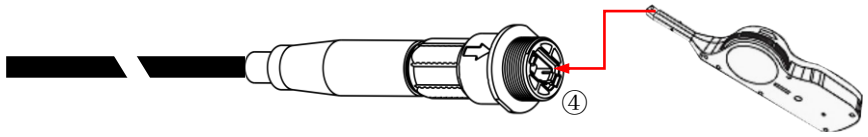
5 Common Troubleshooting Methods

Cleaning MPO End Faces

1. Cleaning the adapters of the box: Insert an MPO cleaning pen into an adapter and press it three times to clean the adapter.

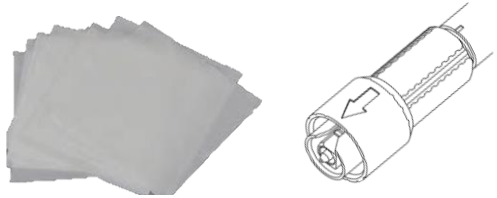


2. Cleaning of indoor MPO connectors of test fibers: Install an MPO indoor-to-outdoor adapter ④, and insert an MPO cleaning pen into an adapter and press it three times to clean the adapter.



Cleaning SC End Faces

1. Cleaning an single-core QuickConnect connector: Wet the smooth side of the dust-free paper with alcohol and wipe the end face of the connector ferrule from one direction to the other direction.
(Do not use the rough surface to wipe directly, or wipe back and forth)



Troubleshooting High MPO Loss

Symptom

The Sub Box loss on some links from the X Box exceeds the threshold.

Cause Analysis

- The AirPON or OLT optical module is not properly inserted into the port.
- The MPO QuickConnect cable is not rotated and locked properly.
- The MPO ports of the X Box and Hub Box are contaminated.
- The MPO QuickConnect cable is contaminated.

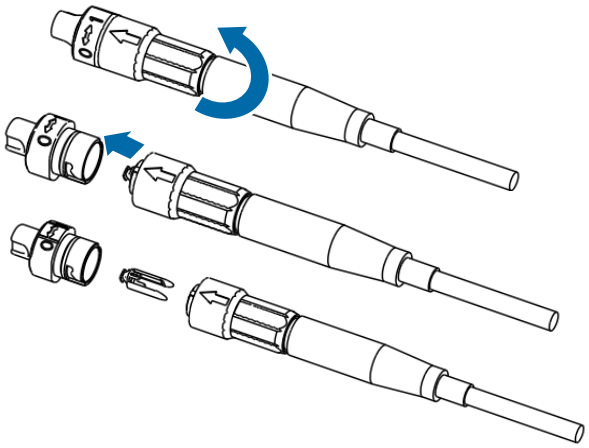
Handling Process

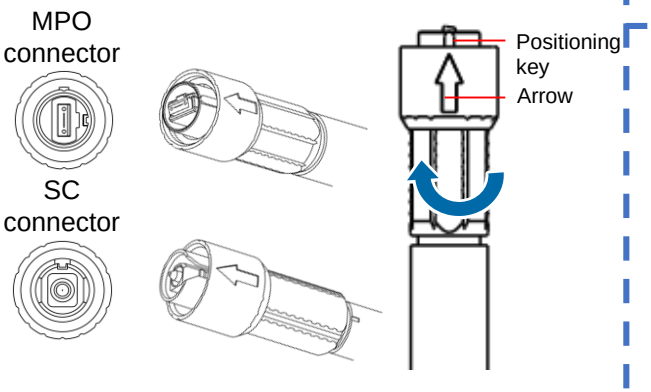
1. Use the optical power meter to test whether the output optical power of each PON port is normal.
2. Check whether the arrow of each MPO QuickConnect cable is rotated to the position marked by 1 and whether the cable is securely installed. Check whether the loss is normal again.
3. Use the optical power of the optical source to test the loss of a single Hub Box and MPO. For details about the test method, see pages 9 and 10.
4. Clean the MPO port and MPO QuickConnect cable.

5 Common Troubleshooting Methods

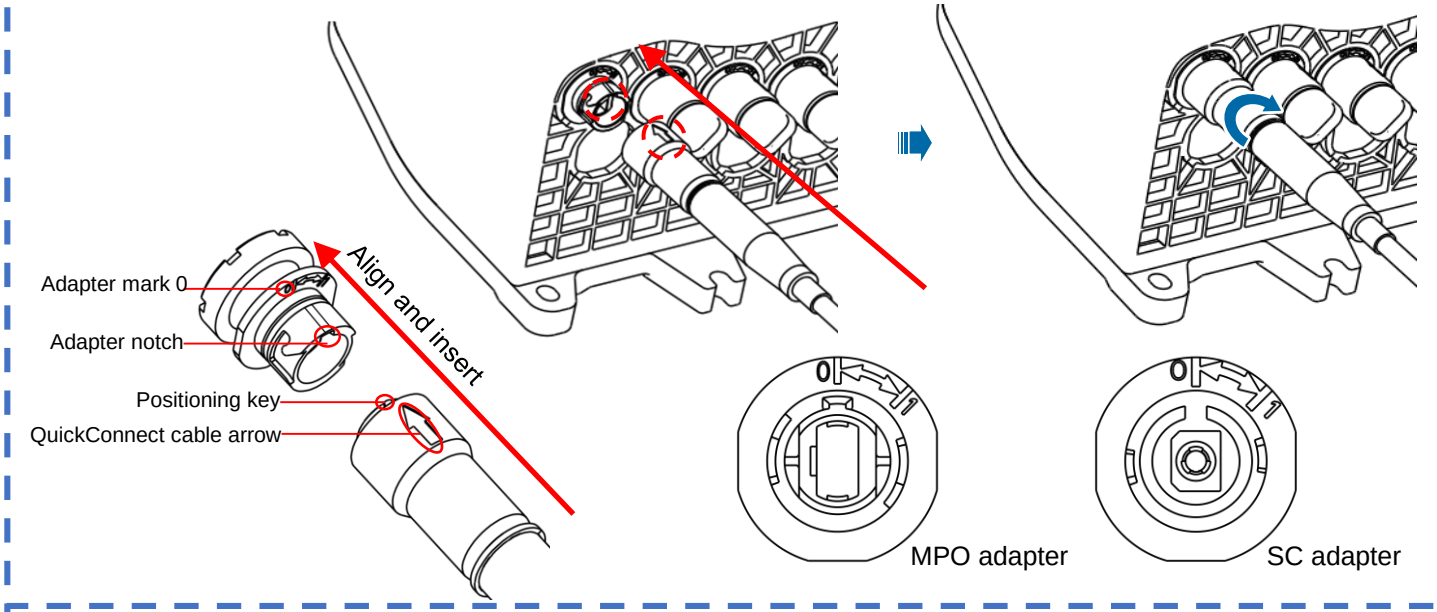
Check whether the MPO connectors are securely inserted into the closure as follows:

1. Remove the dustproof cap from the QuickConnect optical cable connector and remove the dustproof cap from the ferrule. Rotate the flange counterclockwise to ensure that the arrow is aligned with the positioning key.





2. Insert the QuickConnect optical cable into the closure and rotate it clockwise from 0 to 1.



3. Secure the dustproof caps of the QuickConnect optical cable connector and adapter together.