

Thank you for purchasing the AQ7277 Remote OTDR.

This product is an OTDR module, designed to be integrated into a remote fiber test system.

This user's manual explains the handling precautions, specifications, and connection procedures of the AQ7277 Remote OTDR for users that are involved in remote fiber test.

For correct operation, please read this manual thoroughly before use.

The AQ7277 comes with the following manuals. Please keep them in a safe place.

Manual Title	Manual No.	Description
AQ7277 Remote OTDR User's Manual	IM AQ7277-03EN	This manual.
AQ7277 Remote OTDR User's Manual	IM AQ7277-92Z1	A manual for China.

\* The "-EN" in the manual number is the language code.

Contact information of Yokogawa offices worldwide is provided on the following sheet.

Document No.	Description
PIM 113-01Z2	List of worldwide contacts

The following manual is a related manual that is downloaded with the Remote Controller for the AQ7277 Remote OTDR available at the YOKOGAWA website.

Manual Title	Manual No.	Description
Remote Controller for the AQ7277 Remote OTDR Configuring Network Settings and Updating the Firmware	IM AQ7277-61EN	This manual explains how to use the remote controller for configuring the AQ7277.
AQ7277 OTDR Communication Interface User's Manual	IM AQ7277-17EN	Explains the features related to using communication commands to control the AQ7277..

You can download the Remote Controller for the AQ7277 Remote OTDR and the manual from the following webpage.

<https://y-link.yokogawa.com/YL007/>

## Trademarks

- Microsoft, Windows, and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- Adobe and Acrobat are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.
- In this manual, the ® and TM symbols do not accompany their respective registered trademark or trademark names.
- Other company and product names are registered trademarks or trademarks of their respective holders.

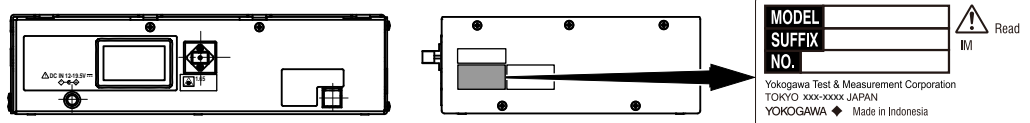
## Revisions

- 1st Edition: April 2015
- 2nd Edition: November 2015
- 3rd Edition: October 2017

## Checking the Package Contents

### AQ7277

Check that the product that you received is what you ordered by referring to the model name and suffix code given on the name plate affixed to the product.



Model	Suffix Code	Description
AQ7277		Remote OTDR
Suffix code	-B01	1650 nm wavelength, SC
	-B02	1650 nm wavelength, SC/Angled-PC

### No. (Instrument number)

When contacting the dealer from which you purchased the instrument, please tell them the instrument number.

### Standard Accessories

The instrument is shipped with the following accessories. Make sure that all accessories are present and undamaged.

Name	Model or Part No.	Quantity	Specifications and Notes
User's manual	IM AQ7277-03EN	1	This manual
	IM AQ7277-92Z1	1	A manual for China
Inquiries	PIM113-01Z2	1	List of worldwide contacts

## Remote Controller for the AQ7277 Remote OTDR

A free software for configuring the Remote OTDR.

You can download the Remote Controller for the AQ7277 Remote OTDR from the following webpage.

<https://y-link.yokogawa.com/YL007/>

## Safety Precautions

The general safety precautions described herein must be observed during all phases of operation. If the instrument is used in a manner not specified in this manual, the protection provided by the instrument may be impaired. YOKOGAWA assumes no liability for the customer's failure to comply with these requirements.

### The following Symbols Are Used on This Instrument.



Warning: handle with care. Refer to the user's manual or service manual. This symbol appears on dangerous locations on the instrument which require special instructions for proper handling or use. The same symbol appears in the corresponding place in the manual to identify those instructions.)



Hazard, radiation of laser apparatus.

### Failure to comply with the precautions below could lead to injury or death.

## WARNING

#### Use the Instrument Only for Its Intended Purpose

This optical measuring instrument with light source is designed to measure the optical characteristics of light sources and evaluate their performance. Do not use this instrument for anything other than as an optical measuring instrument.

#### Check the Physical Appearance

Do not use the instrument if there is a problem with its physical appearance.

#### Use the Correct Power Supply

Make sure that the power supply voltage matches the AQ7277's rated supply voltage and that it does not exceed the maximum voltage range specified for the power cord.

---

**Check the Power Supply Capacity**

Make sure that the power supply capacity sufficiently meets the AQ7277's maximum power consumption (or current capacity) before you connect the power cord.

**Do Not Look at the Laser Beam**

Do not look directly or indirectly into the laser beam or at a specular reflection of the beam without protective equipment. The laser beam may cause blindness or damage to your eyes.

**Do Not Operate in an Environment with Flammable or Explosive Gasses, Steam, or Dust**

Do not operate the instrument in an environment with flammable or explosive gases, steam, or dust (dangerous places). Operation in such an environment constitutes a safety hazard.

**Do Not Remove the Case or Disassemble or Alter the Instrument**

Only qualified YOKOGAWA personnel may remove the case and disassemble or alter the instrument.

**Remove Connections When Carrying or Moving the Instrument**

When carrying or moving the instrument, remove all cords (including the power cord) and cables.

---

---

**CAUTION**

---

**When Using the Same Wavelength That Is Used in Real Communication to Make Measurements**

If communication light is present in the optical fiber that you want to measure, the communication may be affected. Take appropriate precautions to avoid communication interference.

In addition, to make accurate measurements with the AQ7277, take the measurement environment (such as the presence of communication light) into consideration.

**When Using a Wavelength (1625/1650 nm) Different from That Used in Real Communication to Make Measurements**

When there is communication light in the fiber under measurement, use a light beam with a different wavelength to make measurements.

If the device connected to the system under measurement does not have a filter for blocking 1625 nm and 1650 nm laser beams or depending on the lightfastness power rating or the attenuation characteristics of the blocking filter, the light pulses that the AQ7277 emits may damage the device. Be sure to install an appropriate blocking filter and check that the device's ratings are adequate before making measurements.

**When Using SC Angled Physical Contact Connectors**

When the AQ7277 has SC angled physical contact connectors, connect optical fibers that have the same type of connectors.

The SC angled physical contact connector's ferrule tip is angle-polished. Using a different type of connector may damage the connector end face.

---

---

**CAUTION**

---

**Operating Environment Limitations**

This product is a Class A (for industrial environment) product. Operation of this product in a residential area may cause radio interference in which case the user is required to correct the interference.

---

Safety Precautions for Laser Products

This instrument uses a laser light source. This instrument is a Class 1M laser product as defined by IEC60825-1 Safety of Laser Products—Part1: Equipment Classification, Requirements and User’s Guide (this instrument complies with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007).

Laser Class 1M Label  
Using an optical instrument, such as a loupe, magnifying glass, or microscope, when observing the laser beam from a distance of less than 100 mm may cause eye injury.



Laser Specifications

Model	Wavelength	Output	Pulse Width
AQ7277-B01, -B02	1650 nm	≤ 32mW	≤ 20 us (duty: ≤ 3.0%)

Authorized Representative in the EEA

Yokogawa Europe B. V. is Authorized Representative of Yokogawa Test & Measurement Corporation in the EEA for this Product. To contact Yokogawa Europe B. V., see the separate list of worldwide contacts, PIM 113-01Z2.

Conventions Used in This Manual

The notes and cautions in this manual are categorized using the following symbols.



Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user’s manual for special instructions. The same symbol appears in the corresponding place in the user’s manual to identify those instructions. In the manual, the symbol is used in conjunction with the word “WARNING” or “CAUTION.”

WARNING

Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

CAUTION

Calls attention to actions or conditions that could cause light injury to the user or damage to the instrument or user’s data, and precautions that can be taken to prevent such occurrences.

## Specifications

### Interface

	Item	Specification
External control I/F	USB port	TYPE B×1
	LAN port	Ethernet (10BASE-T/100BASE-TX)
External I/F	DC power supply input port	For +12 VDC supply HEC3900-010-110 (or equivalent) For +12 VDC supply MDF6-4DP3.5DS (or equivalent)
	LED connector	For driving LEDs (power supply, light emission, alarm)

### OTDR Features

Item	Specification
Wavelength (nm)	1650 ± 5 (at the -20 dB point from the pulse output peak) 1650 ± 10 (at the -60 dB point from the pulse output peak)
Pulse light output	+15 dBm or less
Event dead zone <sup>1</sup>	1.2 m
Attenuation dead zone <sup>2</sup>	12 m (typ)
Dynamic range <sup>3</sup>	30 dB
Distance range	500 m, 1 km, 2 km, 5 km, 10 km, 20 km, 50 km, 100 km, 200 km, 300 km, 400 km
Pulse width <sup>4</sup>	3 ns, 10 ns, 20 ns, 50 ns, 100 ns, 200 ns, 500 ns, 1 μs, 2 μs, 4 μs, 5 μs, 10 μs, 20 μs
Distance measurement accuracy	±1 m + measured distance × 2 × 10 <sup>-5</sup> ± the sampling resolution
Loss measurement accuracy	±0.05 dB
Sampling resolution	5 cm, 10 cm, 20 cm, 50 cm, 1 m, 2 m, 4 m, 8 m, 16 m, 32 m
Reading resolution	Horizontal axis: 1 cm min. Vertical axis: 0.001 dB min.
Sample data points	100,000 points max.
Index of reflection	1.30000 to 1.79999 (in 0.00001 steps)
Distance unit	km
Measurement functions	Distance, loss, return loss
Compliant fiber	SM (ITU-T G.652)
Optical connector	SC (fixed type) (-B01), SC/Angled-PC (fixed type) (-B02)
Laser class	1M

1 At the -1.5 dB point from the unsaturated peak value with the pulse width at 3 ns and return loss greater than or equal to 45 dB

2 At the point where the back scattering light level is within ±0.5 of the steady-state value with the pulse width at 10 ns and return loss greater than or equal to 45 dB

3 SNR = 1, 20 μs pulse width, 200 km distance range, 8 m sampling resolution, 3 minute measurement time

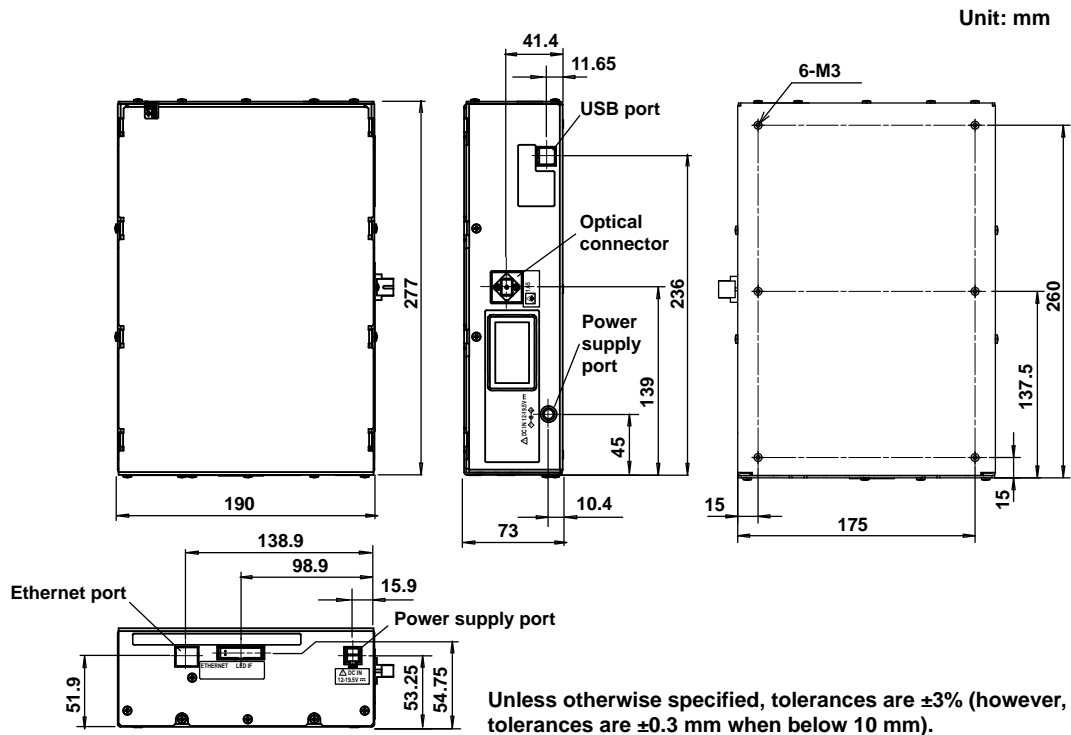
4 The range depends on the distance range.

At 23 °C ± 2 °C unless otherwise specified.

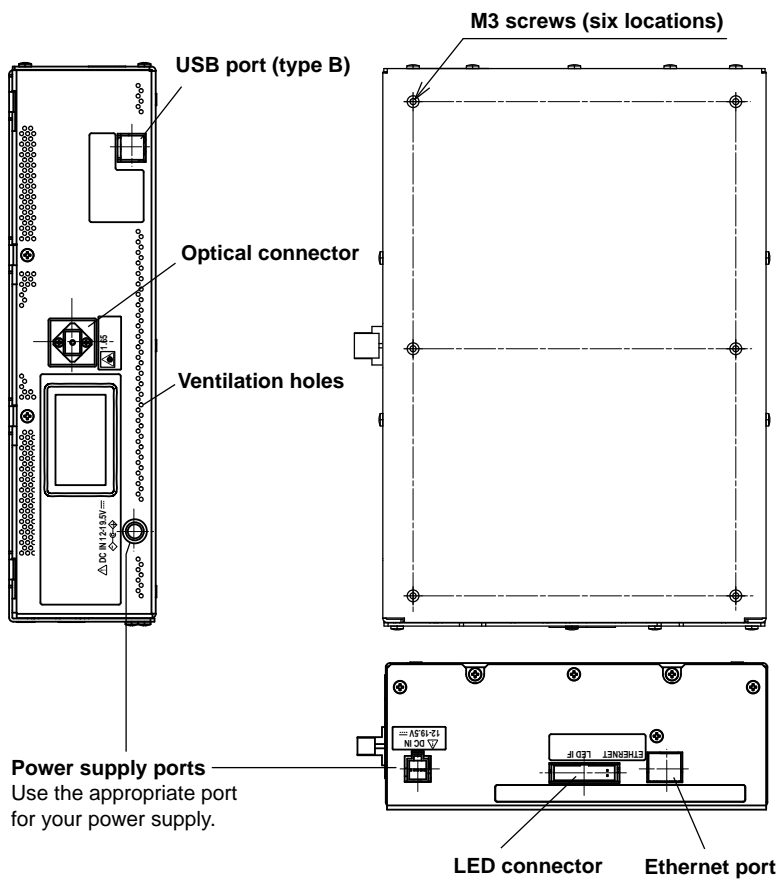
### General Specifications

	Item	Specification
Operating environment	Ambient temperature	0 to 50 °C
	Ambient humidity	20 to 85% RH (no condensation)
	Elevation	2000 m or less
Storage environment	Ambient temperature	-20 to 60 °C
	Ambient humidity	20 to 85% RH (no condensation)
	Elevation	3000 m or less
DC power supply	Rated supply voltage	12 VDC to 19.5 VDC 1.5 A or less at 12 DCV, 1 A or less for 19.5 VDC
	Permitted supply voltage range	10.8 VDC to 20.0 VDC
Warm-up time		At least 30 minutes
Dimensions and weight	Dimensions (W × H × D)	277 mm (W) × 73 mm (H) × 190 mm (D), excluding protrusions
	Weight	Approx. 2 kg
EMC standards		EN61326-1 Class A EN55011 Class A, Group1 EMC Regulatory Arrangement in Australia and New Zealand EN55011 Class A, Group1
Environmental Standard		EN50581 monitoring and control Instruments

## External Dimensions



## Component Names and Functions



---

## Installation

---

### WARNING

- This instrument is designed to be used indoors. Do not install or use it outdoors.
  - Install the instrument so that you can immediately remove the power cord if an abnormal or dangerous condition occurs.
- 

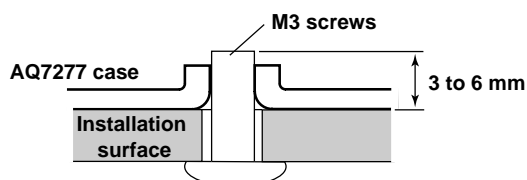
---

### CAUTION

Do not block the ventilation holes.  
If you block the ventilation holes on the front and rear panels of the AQ7277, the AQ7277 will become hot and may break down.

---

Fix the AQ7277 in place using the six M3 screws (screw tightening torque: 0.6 to 0.7 N•m).  
Adjust each screw so that the portion of the screw that is inserted into the AQ7277 case is 3 mm to 6 mm in length.



### Do Not Install the Instrument in the Following Places

- Outdoors
- In direct sunlight, or near sources of heat
- In an environment with excessive amounts of soot, steam, dust, or corrosive gases
- Near sources of strong magnetic fields
- Near high-voltage equipment or power lines
- In an environment that is subject to large levels of mechanical vibration
- On an unstable surface
- Where the instrument is exposed to water or other liquids.

## Connecting Optical Fiber Cables

### Cleaning the Connector End Faces of Optical Fiber Cables

Clean the connector end face of the optical fiber cable under measurement before connecting it to the instrument. If dust is adhered to the connector end face, it may damage the instrument's optical connector. If this happens, the instrument will not be able to make correct measurements.

### Connecting a Optical Cable to the AQ7277

Connect the optical cable to the optical connector of the AQ7277.

---

### CAUTION

Insert the optical fiber cable connector slowly and straight into the optical port. If you shake the connector to the left and right or force it into the port, the optical connector may be damaged.  
Some optical connectors on the market do not meet the specifications. Use optical connectors that are approved or used by national or local telecom carriers and providers in your area.

---

## Connecting to the Power Supply

### WARNING

Make sure to follow the warnings below when connecting the power cord. Failure to do so may cause electric shock or damage to the instrument.

- Check that power is not being supplied to the power cord before connecting it to the AQ7277.
- Be sure to use a power cord that matches the power supply terminal of this instrument.
- Check that the power supply meets the AQ7277's rated supply voltage and the permitted supply voltage range.
- Do not place objects on top of the power cord, and keep it away from heat sources.
- Do not use two power supply ports at the same time.

Connect the power cord to one of the power supply ports.

The AQ7277 has two types of power supply ports: HEC3900-010-110 and MDF6-4DP3.5DS. Use the appropriate port that matches your power supply.

## Power-on Operation

If you are using the Remote Controller for the AQ7277 Remote OTDR (available at the YOKOGAWA website) and the AQ7277 starts normally, the top menu will appear in the control window of the Remote Controller that is displayed in the PC monitor window.

Control window of the Remote Controller for the AQ7277 Remote OTDR that is displayed in the PC monitor window



Top menu



---

For instructions on how to install the Remote Controller and how to connect the AQ7277 to a PC, see the User's Manual IMAQ7277-61EN (Remote Controller for the AQ7277 Remote OTDR: Configuring Network Settings and Updating the Firmware).

---

**Note**

You can download the Remote Controller for the AQ7277 Remote OTDR from the YOKOGAWA website.  
<https://y-link.yokogawa.com/YL007/>

---

## If the AQ7277 Does Not Start Normally When the Power Is Turned On

Check the following items.

- Check that power is being supplied through the power cord.
- Check that the power cord is connected properly.

If the AQ7277 still does not start normally after checking these items, contact your nearest YOKOGAWA dealer for repairs.

## Connecting the USB Interface or Ethernet Interface

Connect the USB or Ethernet interface depending on the network you are using.

### USB Interface Specifications

Electrical and mechanical specifications:	USB 1.0
Connector:	Type B (receptacle)
Number of ports:	1

---

**Note**

To use the USB interface, you need to obtain the USB driver and communication library.  
Download them from the YOKOGAWA Web page.  
<https://y-link.yokogawa.com/YL007/>

---

### Ethernet Interface Specifications

Number of ports:	1
Electrical and mechanical specifications:	IEEE802.3
Transmission system:	Ethernet (10BASE-T/100BASE-TX)
Data rate:	10 Mbps/100 Mbps
Communication protocol:	TCP/IP
Connector:	RJ45
Port number:	10001/tcp

---

**Note**

- To use the Ethernet interface, you need obtain the communication library.  
Download it from the YOKOGAWA Web page.
  - To use the Ethernet interface, you need to configure the TCP/IP settings in advance.  
Configure them using the dedicated software, Remote Controller for the AQ7277 Remote OTDR. You can download the software from the YOKOGAWA Web page.  
<https://y-link.yokogawa.com/YL007/>
-