User's Manual

AQ7280 OTDR Getting Started Guide

YOKOGAWA
Yokogawa Test & Measurement Corporation

IM AQ7280-02EN
7th Edition

Thank you for purchasing the AQ7280 OTDR (Optical Time Domain Reflectometer). This manual focuses on the handling precautions, basic operations, and specifications of the AQ7280. For correct operation, please read this manual thoroughly before use.

List of Manuals

The AQ7280 comes with the following manuals. Please keep them in a safe place.

Manual Title	Manual No.	Description
AQ7280 OTDR User's Manual (included in CD)	IM AQ7280-01EN	Explains all AQ7280 features, except for the communication features, and how to use them.
AQ7280 OTDR Getting Started Guide	IM AQ7280-02EN	This manual.
AQ7280 OTDR Communication Interface User's Manual (included in CD)	IM AQ7280-17EN	Explains the features related to using communication commands to control the AQ7280.
Model 739883 Battery Pack Handling Precautions	IM 739883-01EN	Explains the handlling precautions for the battery pack.
AQ7280 OTDR User's Manual	IM AQ7280-92Z1	A manual for China.
739883 Battery Pack User's Manual	IM 739883-92Z1	A manual for China.

* The "EN" and "Z1" in the manual numbers are the language codes.

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

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

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functionality. The figures given in this manual may differ from those that actually appear on your screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
- Copying or reproducing all or any part of the content of this manual without the permission of YOKOGAWA is strictly prohibited.

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Revisions

October 2014	1st Edition
July 2015	2nd Edition
January 2016	3rd Edition
July 2016	4th Edition
October 2017	5th Edition
December 2017	6th Edition
April 2019	7th Edition

Product Registration

Thank you for purchasing YOKOGAWA products.

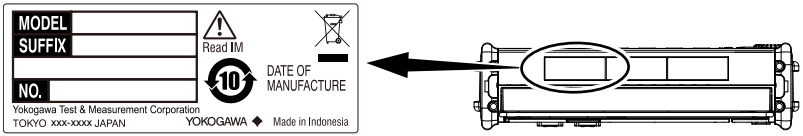
YOKOGAWA provides registered users with a variety of information and services.
Please allow us to serve you best by completing the product registration form accessible from our website.

http://tmi.yokogawa.com/

Checking the Package Contents

After receiving the product and opening the package, check the items described below. If the wrong items have been delivered, if items are missing, or if there is a problem with the appearance of the items, contact your nearest YOKOGAWA dealer.
Check that the product that you have received is the same product that you ordered. For reference, the model name, suffix code, and specifications of the products are listed below.

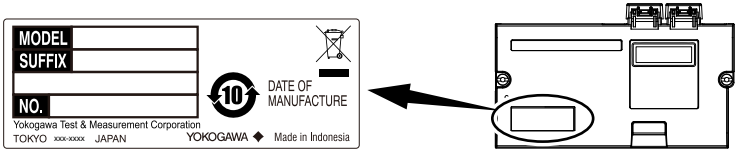
AQ7280 OTDR Mainframe



Model	Suffix[1]		Description
AQ7280			OTDR mainframe
Language	-HE		English (Multi language[2])
	-HM		Chinese
	-HC		Chinese/English
	-HK		Korean/English
	-HR		Russian/English
Options		/MNT	Monitoring function
		/SMP	Smart Mapper function
		/FST	Fiber Surface Test function
		/LAN	Ethernet
		/SB	Shoulder belt

1 For products whose suffix code contains “Z,” an exclusive manual may be included. Please read it along with the standard manual.
2 For details on multi language, see the options displayed in the language setup menu.

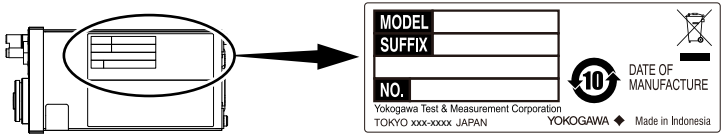
OTDR unit



Model	Suffix[2]		Description
AQ7282A			2WL 1310/1550 nm 38/36 dB
AQ7283A			2WL 1310/1550 nm 42/40 dB
AQ7284A			2WL 1310/1550 nm 46/45 dB
AQ7285A			2WL 1310/1550 nm 50/50 dB
AQ7283E			3WL 1310/1550,1625 nm 42/40, 40 dB (1625 nm port is equipped with a built-in filter)
AQ7283F			3WL 1310/1550,1650 nm 42/40, 40 dB (1650 nm port is equipped with a built-in filter)
AQ7282G			3WL 1310/1490/1550 nm 38/36/36 dB
AQ7283H			3WL 1310/1550/1625 nm 42/40/39 dB
AQ7284H			3WL 1310/1550/1625 nm 46/45/44 dB
AQ7283J			4WL 1310/1383/1550/1625 nm 42/39/40/40 dB
AQ7283K			4WL 1310/1490/1550/1625 nm 42/38/40/40 dB
AQ7282M			2WL 850/1300 nm (MM) 25/27 dB
Connector Adapter[1]	-USC		Universal adapter (SC)
	-UFC		Universal adapter (FC)
	-ULC		Universal adapter (LC)
	-ASC		ASC connector (SC angled physical contact)[3]
	-NUA		No universal adapter
Options		/PC	Power checker[3, 4]
		/SLS	Stabilized light source[5]

1 The connectors that you select are attached to the OTDR ports prior to shipping.
2 For products whose suffix code contains “Z,” an exclusive manual may be included. Please read it along with the standard manual.
3 Not applicable to AQ7282M.
4 Not applicable to the port 2 of AQ7283E and AQ7283F.
5 Not applicable for 1383 nm of AQ7283J.

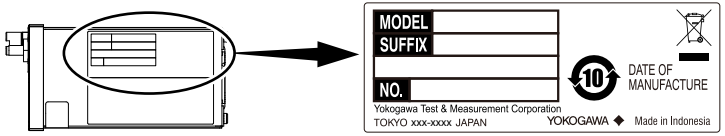
Optical power meter module (OPM module)



Model	Suffix[2]	Description	
AQ2780		OPM module	Power range: –70 dBm to +10 dBm (CW)
AQ2781		High power OPM module	Power range: –50 dBm to +27 dBm (CW)
AQ2780V		OPM & VLS module	Power range: –70 dBm to +10 dBm (CW) with Visible Light Source (Connector: Ø2.5 Ferrule)
AQ2781V		High power OPM & VLS module	Power range: –50 dBm to +27 dBm (CW) with Visible Light Source (Connector: Ø2.5 Ferrule)
Connector Adapter[1]	-SCC	Universal adapter (SC)	
	-FCC	Universal adapter (FC)	
	-LMC	Ferrule adapter (Ø1.25)	

1 The connectors that you select are attached to the OPM ports prior to shipping.
2 For products whose suffix code contains “Z,” an exclusive manual may be included. Please read it along with the standard manual.

AQ4780 Visible light source module



Model	Suffix[1]	Description	
AQ4780		VLS module	Visible Light Source (Connector: Ø2.5 Ferrule)

1 For products whose suffix code contains “Z,” an exclusive manual may be included. Please read it along with the standard manual.

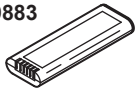
No. (Instrument number)

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

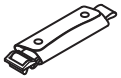
Accessories

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

Battery pack
(lithium-ion)
739883



Hand strap
B8070CX

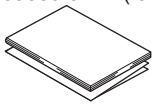


Cover Bracket
(for optical power meter module/visible light source module slot)
B8107DE[2]

Screw (M4 x 5)

Manuals

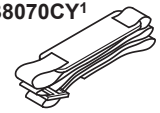
- **IM AQ7280-02EN** (this manual)
- **IM 739883-01EN** (for battery pack)
- **PIM 113-01Z2** (list of worldwide contacts)
- **IM AQ7280-92Z1** (for China)
- **IM 739883-92Z1** (for China)



Manuals (CD)
B8107VA[3]

- **IM AQ7280-01EN** (User's manual)
- **IM AQ7280-17EN** (for communication interface)

Shoulder strap (/SB)
B8070CY[1]



1 Included with models that have the /SB option installed.
2 If a VLS or optical power meter module has not been ordered along with the OTDR mainframe (AQ7280), the cover is attached to the OTDR mainframe.
3 You can purchase the printed IM AQ7280-01EN and IM AQ7280-17EN manuals separately. Contact your nearest YOKOGAWA dealer to purchase a copy.

Optional Accessories (Sold separately)

The following optional accessories are available for purchase separately. For information about ordering accessories, contact your nearest YOKOGAWA dealer.

Name	Model or Component Number	Notes	Manual No.
Soft carrying case	739860	—	—
AC adapter	739874	—	IM 739874-01EN
Battery pack	739883	—	IM 739883-01EN
Shoulder strap	B8070CY	—	—
Additional option license for AQ7280	735050-MNT	Monitoring function	—
	735050-SMP	Smart mapper function	—
	735050-FST	Fiber surface test function	—
Universal adapter (SC)	SU2005A-SCC	for OTDR unit	—

Name	Model or Component Number	Notes	Manual No.
Universal adapter (FC)	SU2005A-FCC	for OTDR unit	—
Universal adapter (LC)	SU2005A-LCC	for OTDR unit	—
Connector adapter (SC)	735480-SCC	for OPM module	—
Connector adapter (FC)	735480-FCC	for OPM module	—
Ferrule adapter (Ø1.25)	735481-LMC	for OPM module	—
Ferrule adapter (Ø2.5)	735481-SFC	for OPM module	—

Manual CD

WARNING

Never play this manual CD, which contains the user's manuals, in an audio CD player. Doing so may cause loss of hearing or speaker damage due to the large sounds that may be produced.

French

AVERTISSEMENT

Ce CD contient les manuels d'utilisation. Ne jamais insérer ce CD dans un lecteur de CD audio.
Cela pourrait entraîner une perte d'audition ou l'endommagement des enceintes en raison du volume potentiellement élevé des sons produits.

The English folder of manual CD contains PDF files of the following manuals. The PDFs of the Japanese manuals are included in the manual CD.

File Name	Manual Title	Manual No.
Features and Operation Manual.pdf	AQ7280 OTDR User's Manual	IM AQ7280-01EN
Communication Interface.pdf	AQ7280 OTDR Communication Interface User's Manual	IM AQ7280-17EN

To view above manuals you need Adobe Reader 5.0 or later.

Safety Precautions

This product is designed to be used by a person with specialized knowledge.
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 guide, the protection provided by the instrument may be impaired.
This manual is an essential part of the product; keep it in a safe place for future reference. 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.

Direct current

Stand-by

French

Avertissement : À manipuler délicatement. Toujours se reporter aux manuels d'utilisation et d'entretien. Ce symbole a été apposé aux endroits dangereux de l'instrument pour lesquels des consignes spéciales d'utilisation ou de manipulation ont été émises. Le même symbole apparaît à l'endroit correspondant du manuel pour identifier les consignes qui s'y rapportent

Danger : Appareil laser à rayonnement.

Courant direct

Veille

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 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.

AC Adapter

Do not use the other than AC adapter designed exclusively for the AQ7280.

Battery Pack

Only use the AQ7280 battery pack. Do not use this battery pack with other instruments. Only use the AQ7280 to charge the battery pack. If the battery pack is still charging after 6 hours, stop charging it immediately. Your clothing may be damaged or you may be injured if you come in contact with the electrolyte due to fluid leakage or the battery pack exploding. Because the electrolyte may cause loss of eyesight, if it comes in contact with your eyes, immediately wash the affected area with clean water, and consult a doctor as soon as possible. When you change the battery pack, be sure to turn the AQ7280 off, and detach the AC adapter power supply from the AQ7280. Failure to do so may lead to electric shock or other accidents. Do not throw the battery pack into fire or heat it. Such actions are dangerous as they may cause the battery pack to explode or the electrolyte to be sprayed about. Follow the additional handling precautions that are included in the battery pack's user's manual.

Laser Beam

Do not look directly or indirectly into the laser beam or at a specular reflection of the beam without protective equipment. Do not aim the laser beam at the eye. The laser beam may cause blindness or damage to your eyes. Attach the cover to the optical connector when it is not in use. Turn the power OFF when you are cleaning the AQ7280.

Connecting Optical Fiber Cables

Use optical fiber cable connectors that conform to the included universal adapter (the universal adapter specified by the suffix code).

Apply Correct Signals to the Optical Connectors

Do not apply light that is –5 dBm or greater to the OTDR unit (AQ7282 series) optical connectors (PORT1 and PORT2). Doing so may damage the OTDR unit.
Do not apply light that is +10 dBm or greater to the OPM module (AQ2780, AQ2780V). Do not apply light that is +27 dBm or greater to the high power OPM module (AQ2781, AQ2781V). Doing so may damage the OPM module.

Do Not Operate in an Explosive Atmosphere

Do not use the instruments in the presence of flammable gasses or vapors. Doing so is extremely dangerous.

Do Not Remove the Covers or Disassemble or Alter the Instrument

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

Installation Position

Handling the stand without firmly supporting the instrument can be dangerous. Only handle the stand when the instrument is on a stable surface.

CAUTION

Operating Environment Limitations

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

AVERTISSEMENT

Utiliser l’instrument aux seules fins prévues
Cet instrument de mesure optique est prévu pour mesurer les caractéristiques optiques des sources lumineuses et évaluer leur performance. Ne pas utiliser cet instrument à d’autres fins que celles de mesure optique.

Inspecter l’apparence physique
Ne pas utiliser l’instrument si son intégrité physique semble être compromise.

Adaptateur c.a.
Utiliser exclusivement l’adaptateur c.a. prévu pour l’AQ7280.

Pack de batteries
Utiliser exclusivement le pack de batteries de l’AQ7280. Ne pas utiliser ce pack de batteries avec d’autres instruments. Recharger le pack de batteries à l’aide de l’AQ7280 uniquement. Si le pack de batteries est encore en charge au bout de 6 heures, interrompre la charge. Tout contact avec l’électrolyte échappé en raison d’une fuite ou d’une explosion du pack de batteries peut endommager les vêtements ou causer des blessures. L’électrolyte peut entraîner la cécité, par conséquent, en cas de contact avec les yeux, rincer immédiatement à l’eau et consulter un médecin dans les plus brefs délais. Lors du remplacement du pack de batteries, toujours mettre l’AQ7280 hors tension et débrancher l’adaptateur c.a. de l’AQ7280. Le non-respect de cette consigne peut entraîner un choc électrique ou tout autre accident. Tenir le pack de batteries éloigné de toute source de chaleur et des flammes pour éviter le risque d’explosion du pack de batteries ou de déversement d’électrolyte. Respecter les consignes de manipulation supplémentaires fournies dans le manuel d’utilisation du pack de batteries.

Faisceau laser
Ne pas fixer directement ou indirectement le faisceau laser, ni la réflexion spéculaire du faisceau en l’absence d’équipement de protection. Ne pas orienter le faisceau laser en direction des yeux. Le faisceau laser peut entraîner la cécité ou causer des lésions oculaires. Recouvrir le connecteur optique à l’aide du cache pendant les périodes de non-utilisation. Mettre l’AQ7280 HORS tension pendant son nettoyage.

Connexion des câbles à fibre optique

Utiliser des connecteurs de câbles à fibre optique conformes à l'adaptateur universel fourni (adaptateur universel indiqué par le suffixe).

Envoyer les signaux corrects aux connecteurs optiques

Ne pas appliquer de signal de –5 dBm ou plus aux connecteurs optiques de l'unité OTDR (série AQ7282) (PORT1 et PORT2).
Cela pourrait endommager l'unité OTDR.
Ne pas appliquer de signal de +10 dBm ou plus au module OPM (AQ2780, AQ2780V). Ne pas appliquer de signal de +27 dBm ou plus au module OPM haute puissance (AQ2781, AQ2781V). Cela pourrait endommager le module OPM.

Ne pas utiliser dans un environnement explosif

Ne pas utiliser l'instrument en présence de gaz ou de vapeurs inflammables. Cela pourrait être extrêmement dangereux.

Ne pas retirer le capot, ni démonter ou modifier l'instrument

Seul le personnel YOKOGAWA qualifié est habilité à retirer le capot et à démonter ou modifier l'instrument. Certains composants à l'intérieur de l'instrument sont à haute tension et par conséquent, représentent un danger.

Position d'installation

Lorsque vous manipulez les pieds ou le support escamotable, soutenez toujours l'instrument fermement. Prendre les précautions suivantes.

ATTENTION

Limitations relatives à l'environnement opérationnel

Ce produit est un produit de classe A (pour environnements industriels). L'utilisation de ce produit dans un zone résidentielle peut entraîner une interférence radio que l'utilisateur sera tenu de rectifier.

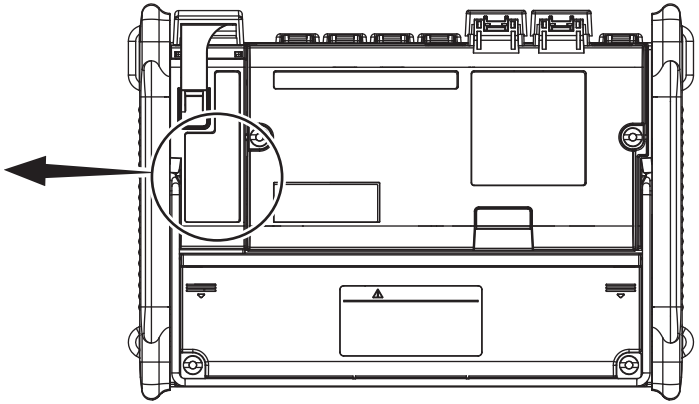
Safety Precautions for Laser Products

This instrument uses a laser light source. This instrument is a Class 1M and Class 3R laser product as defined by IEC 60825-1:2007 Safety of Laser Products—Part1: Equipment classification and requirements. In addition, this instrument complies with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

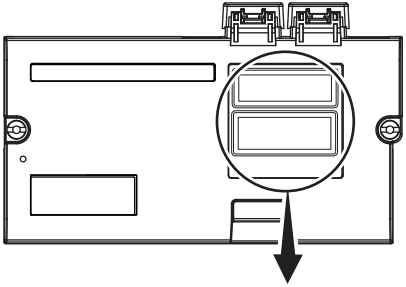
Laser Class 3R Label

Avoid direct eye exposure.

Mainframe



OTDR unit (AQ7284A, AQ7285A, AQ7284H, AQ7283J, AQ7283K)

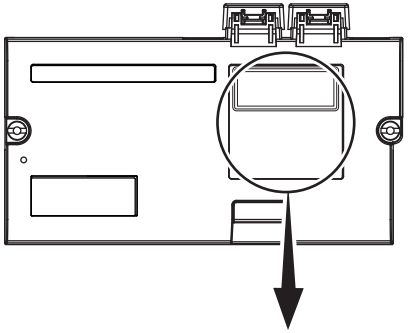


Laser Class 1 Label

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 Class 3R Label
Avoid direct eye exposure.

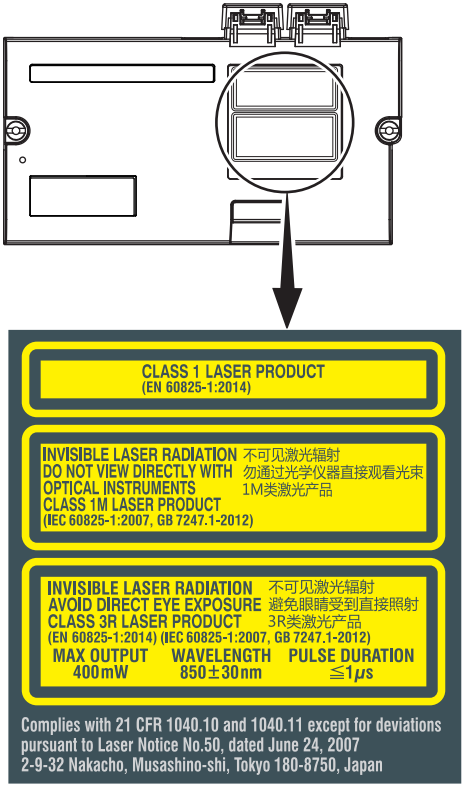
OTDR unit (AQ7282A, AQ7283A, AQ7283E, AQ7283F, AQ7282G, AQ7283H)



Laser Class 1 Label

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.

OTDR unit (AQ7282M)

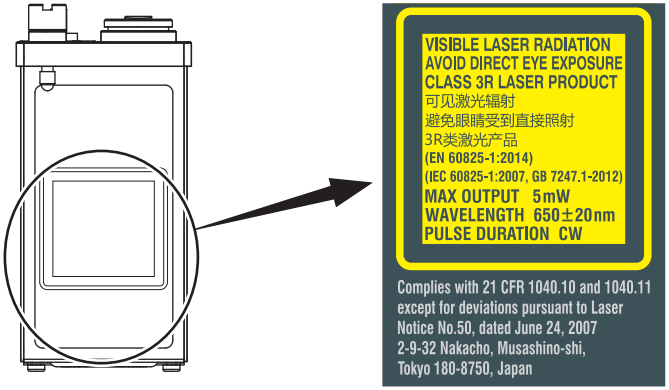


Laser Class 1 Label

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.

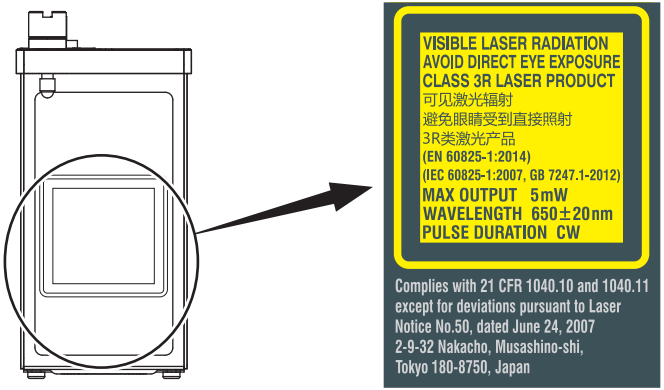
Laser Class 3R Label
Avoid direct eye exposure.

OPM module (AQ2780V, AQ2781V)



Laser Class 3R Label
Avoid direct eye exposure.

VLS module (AQ4780)



Laser Class 3R Label
Avoid direct eye exposure.

OTDR unit

Model	Class	Center Wavelength	Maximum Output Power[1]	Mode Field Diameter	Beam Divergence
AQ7282A	1M[2] or 1[3]	1310 nm/1550 nm	CW: 50 mW@1310 nm/1550 nm PULSE: 200 mW@1310 nm/1550 nm PULSE width: 20 µs@1310 nm/1550 nm, Duty: ≤ 3.0%	9 µm	11.5°
AQ7283A	1M[2] or 1[3]	1310 nm/1550 nm	CW: 50 mW@1310 nm/1550 nm PULSE: 200 mW@1310 nm/1550 nm PULSE width: 20 µs@1310 nm/1550 nm, Duty: ≤ 3.0%	9 µm	11.5°
AQ7284A	3R[2] or 1[3]	1310 nm	CW: 140 mW@1310 nm/1550 nm PULSE: 500 mW@1310 nm/1550 nm PULSE width: 20 µs@1310 nm/1550 nm, Duty: ≤ 3.0%	9 µm	11.5°
	1M[2] or 1[3]	1550 nm			
AQ7285A	3R[2] or 1[3]	1310 nm	CW: 140 mW@1310 nm/1550 nm PULSE: 500 mW@1310 nm/1550 nm PULSE width: 20 µs@1310 nm/1550 nm, Duty: ≤ 3.0%	9 µm	11.5°
	1M	1550 nm			
AQ7283E	1M[2] or 1[3]	1310 nm/1550 nm, 1625 nm	CW: 50 mW@1310 nm/1550 nm, 1625 nm PULSE: 200 mW@1310 nm/1550 nm, 1625 nm PULSE width: 20 µs@1310 nm/1550 nm, 1625 nm, Duty: ≤ 3.0%	9 µm	11.5°
AQ7283F	1M[2] or 1[3]	1310 nm/1550 nm, 1650 nm	CW: 50 mW@1310 nm/1550 nm/1650 nm PULSE: 200 mW@1310 nm/1550 nm/1650 nm PULSE width: 20 µs@1310 nm/1550 nm/1650 nm, Duty: ≤ 3.0%	9 µm	11.5°
AQ7282G	1M[2] or 1[3]	1310 nm/1490 nm/ 1550 nm	CW: 50 mW@1310 nm/1490 nm/1550 nm PULSE: 200 mW@1310 nm/1490 nm/1550 nm PULSE width: 20 µs@1310 nm/1490 nm/1550 nm, Duty: ≤ 3.0%	9 µm	11.5°
AQ7283H	1M[2] or 1[3]	1310 nm/1550 nm/ 1625 nm	CW: 50 mW@1310 nm/1550 nm/1625 nm PULSE: 200 mW@1310 nm/1550 nm/1625 nm PULSE width: 20 µs@1310 nm/1550 nm/1625 nm, Duty: ≤ 3.0%	9 µm	11.5°
AQ7284H	3R[2] or 1[3]	1310 nm	CW: 140 mW@1310 nm/1550 nm/1625 nm PULSE: 500 mW@1310 nm/1550 nm/1625 nm PULSE width: 20 µs@1310 nm/1550 nm/1625 nm, Duty: ≤ 3.0%	9 µm	11.5°
	1M[2] or 1[3]	1550 nm/1625 nm			

Model	Class	Center Wavelength	Maximum Output Power[1]	Mode Field Diameter	Beam Divergence
AQ7283J	3R[2] or 1[3]	1310 nm	CW: 140 mW@1310 nm/1383 nm/1550 nm/1625 nm PULSE: 500 mW@1310 nm/1383 nm/1550 nm/1625 nm PULSE width: 20 µs@1310 nm/1383 nm/1550 nm/1625 nm, Duty: ≤ 3.0%	9 µm	11.5°
	1M[2] or 1[3]	1383 nm/1550 nm/ 1625 nm			
AQ7283K	3R[2] or 1[3]	1310 nm	CW: 140 mW@1310 nm/1490 nm/1550 nm/1625 nm PULSE: 500 mW@1310 nm/1490 nm/1550 nm/1625 nm PULSE width: 20 µs@1310 nm/1490 nm/1550 nm/1625 nm, Duty: ≤ 3.0%	9 µm	11.5°
	1M[2] or 1[3]	1490 nm/1550 nm/ 1625 nm			
AQ7282M	3R[4]	850 nm	CW: 5 mW@850 nm 50 mW@1300 nm PULSE: 400 mW@850 nm/1300 nm PULSE width: 1 µs@850 nm, Duty: ≤ 2.5% PULSE width: 5 µs@1300 nm, Duty: ≤ 1.2%	50 µm	23.1°
	1M[2] or 1[3]	1300 nm			

1 Under single fault conditions.
2 IEC 60825-1:2007, GB 7247.1-2012
3 EN 60825-1:2014
4 EN 60825-1:2014, IEC 60825-1:2007, GB 7247.1-2012

OPM/VLS module

Model	Class	Center Wavelength	Maximum Output Power[1]	Mode Field Diameter	Beam Divergence
AQ2780V	3R	650 nm	CW: 5 mW	9 µm	11.5°
AQ2781V	3R	650 nm	CW: 5 mW	9 µm	11.5°
AQ4780	3R	650 nm	CW: 5 mW	9 µm	11.5°

1 Under single fault conditions.

Laser classes differ depending on the standard number and the year of the standard.
Take safety measures according to the laser class corresponding to standard number and year of the country or region that the instrument will be used in.

Sales in Each Country or Region

Waste Electrical and Electronic Equipment (WEEE), Directive

(This directive is valid only in the EU.)
This product complies with the WEEE Directive marking requirement. This marking indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category
With reference to the equipment types in the WEEE directive, this product is classified as a “Monitoring and Control instrumentation” product. When disposing products in the EU, contact your local Yokogawa Europe B.V. office.
Do not dispose in domestic household waste.

EU Battery Directive

(This directive is valid only in the EU.)
Batteries are included in this product. This marking indicates they shall be sorted out and collected as ordained in the EU battery directive.

Battery type:

1. Lithium battery
   You cannot replace batteries by yourself. When you need to replace batteries, contact your local Yokogawa Europe B.V. office.
2. Lithium-ion battery pack (739883)
   When you dispose battery pack, do not disassemble it.
   When you remove battery pack from this product and dispose it, discard it in accordance with domestic law concerning disposal.Take a right action on waste batteries, because the collection system in the EU on waste batteries are regulated.
   For instructions on how to remove the battery pack, see pages 35 to 38 in this manual.

Recycle Mark

Do not dispose together with normal garbage. To protect the environment, please dispose according to the recycling ordinances in your area.

Authorized Representative in the EEA

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

Conventions Used in This Guide

Notes

The notes and cautions in this guide 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.

French

Une manipulation ou une utilisation incorrectes risquent de blesser l'utilisateur ou d'endommager l'instrument. Ce symbole apparaît sur l'instrument pour indiquer à l'utilisateur qu'il doit se reporter au manuel de l'utilisateur afin d'y lire les instructions spécifiques correspondantes. Ce même symbole apparaît à la section correspondante du manuel de l'utilisateur pour signaler lesdites instructions. Dans le manuel de l'utilisateur, ce symbole est accompagné des termes AVERTISSEMENT et ATTENTION.

AVERTISSEMENT Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures graves (voire mortelles), et sur les précautions de sécurité pouvant prévenir de tels accidents.

ATTENTION Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures légères ou d'endommager l'instrument ou les données de l'utilisateur, et sur les précautions de sécurité susceptibles de prévenir de tels accidents.

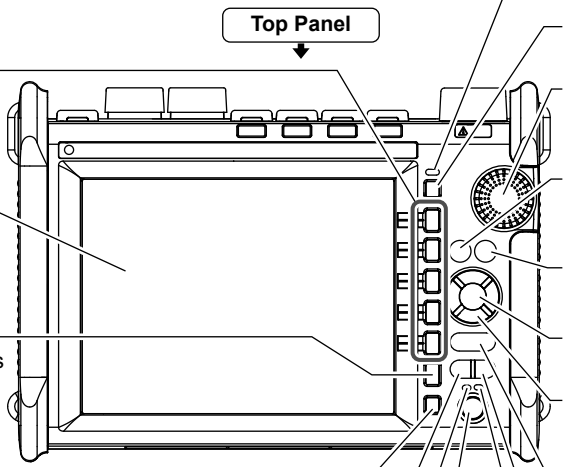
Note Calls attention to information that is important for proper operation of the instrument.

Contents

Memo

Names and Functions of Parts

Front Panel



LASER lamp
Illuminates while the laser is being output.

MENU key
Press to display the top menu.

Rotary knob
Turn to select features, change settings, and move the cursor.

FILE key
Press to save and load measured results and other data.

SCALE key
Press to set the waveform displayscale.

ENTER key
Press to confirm procedures and settings.

Arrow keys
Press to change values, move between digits, and move the cursor.

SETUP key
Press to display the measurement conditions, system setup, and file operation menus.

AVG key
Press to start or stop averaged optical-pulse measurement.

ON LED
Illuminates in green when the AQ7280 is running
Illuminates in red when the battery is low.

Soft keys
Press to select the menu items that are displayed on the right side of the screen.

LCD
Used to perform touch panel operations.

ESC key
Press to return to the previous menu or to cancel the current operation.

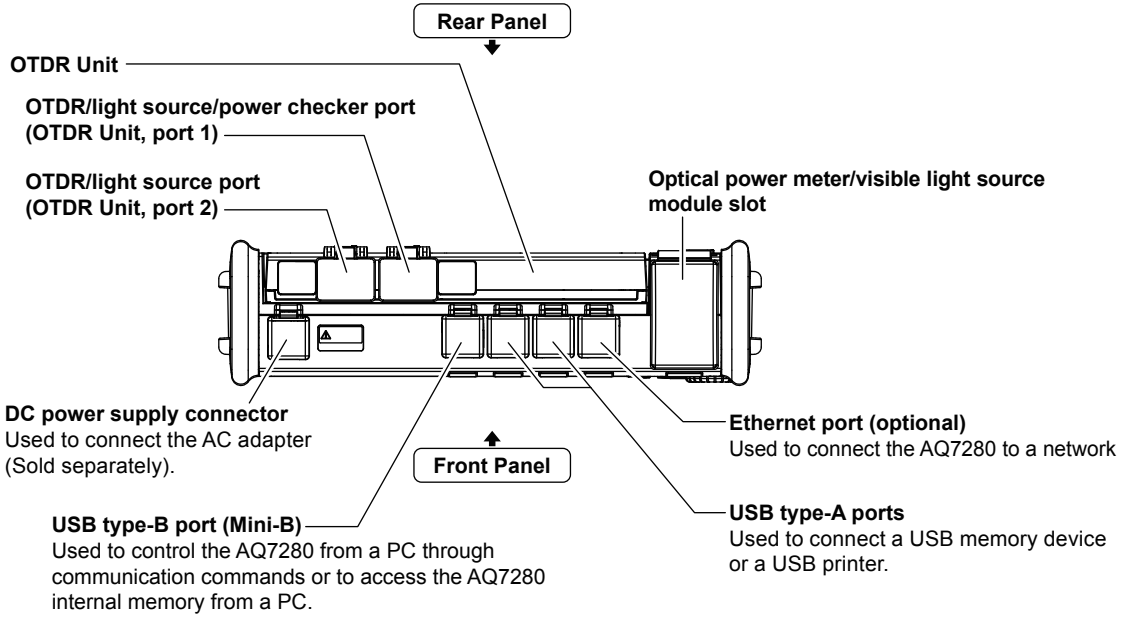
UTIL key
Press to display the utility menu.

REAL TIME key
Press to start or stop real-time optical-pulse measurement.

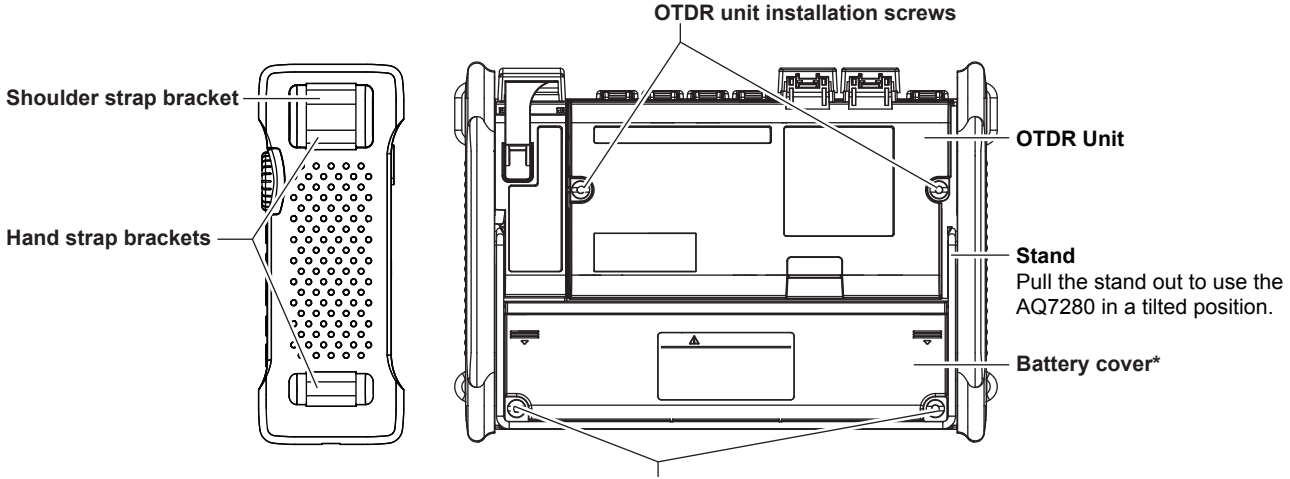
CHARGE LED
Lighting: The battery pack is being charged
Off: The battery pack is finished charging

Power switch
Press to turn the AQ7280 on and off.

Top Panel


Rear Panel
OTDR Unit
OTDR/light source/power checker port
(OTDR Unit, port 1)
OTDR/light source port
(OTDR Unit, port 2)
Optical power meter/visible light source
module slot
DC power supply connector
Used to connect the AC adapter
(Sold separately).
Front Panel
Ethernet port (optional)
Used to connect the AQ7280 to a network
USB type-A ports
Used to connect a USB memory device
or a USB printer.
USB type-B port (Mini-B)
Used to control the AQ7280 from a PC through
communication commands or to access the AQ7280
internal memory from a PC.

Rear and Side Panels



*: SD card slot is located under the battery pack.

Making Preparations for Measurements

Operating Precautions

Safety Precautions

If you are using this instrument for the first time, make sure to thoroughly read “Safety Precautions,” on pages 10 to 21.

Do Not Remove the Case

Do not remove the case from the instrument. Doing so is extremely dangerous. For internal inspection and adjustment, contact your nearest YOKOGAWA dealer.

Unplug If Abnormal Behavior Occurs

If you notice smoke or unusual odors coming from the instrument, immediately turn off the power, unplug the power cord, and contact your nearest YOKOGAWA dealer.

Use the AC Adapter and Power Cord Correctly

Do not place objects on top of the AC adapter or power cord, and keep them away from heat sources. When removing the plug from the power outlet, do not pull on the cord. Pull from the plug. If the AC adapter or power cord is damaged, contact your nearest YOKOGAWA dealer. Refer to page 3 to 6 for the part number to use when placing an order.

General Handling Precautions

Do Not Place Objects on Top of the Instrument

Never place objects such as other instruments or objects that contain water on top of the instrument. Doing so may damage the instrument.

Do Not Subject the Inputs and Outputs to Mechanical Shock

If the I/O connectors or adapters are subjected to mechanical shock, they may be damaged. The instrument may not perform measurements correctly due to damage or deformation that is not visible to the naked eye.

Do Not Scratch the LCD

Because the LCD can be easily scratched, do not allow any sharp objects near it. Also, do not apply vibration or shock to it. Furthermore, do not apply strong shock to the LCD or place objects on top of it.

During Extended Periods of Non-Use

Unplug the power cord from the outlet. Remove the battery pack from the instrument.

When Carrying the Instrument

Remove the power cord and connecting cables. When carrying the instrument, grasp the protector or the attached strap firmly.

Installing and Removing the OTDR Unit

WARNING

Do not install or remove an OTDR unit with the AQ7280 turned on.

CAUTION

There is a ground terminal at the OTDR unit installation area of the OTDR mainframe. Be careful not to injure your hand, or other parts of your body, on it.

French

AVERTISSEMENT

Ne pas installer, ni retirer d'unité OTDR lorsque l'AQ7280 est sous tension.

ATTENTION

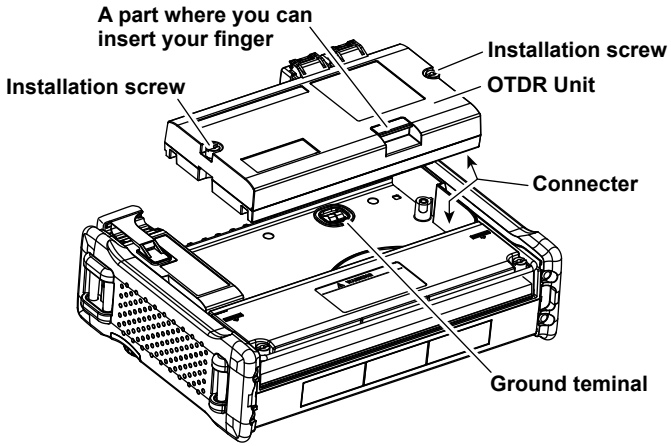
Une borne de terre se trouve dans la zone d'installation de l'unité OTDR du mainframe OTDR. Faites attention de ne pas vous blesser à la main ou toute autre partie du corps.

Installing an OTDR Unit

On a soft, flat surface, place the OTDR mainframe with the rear panel facing up.

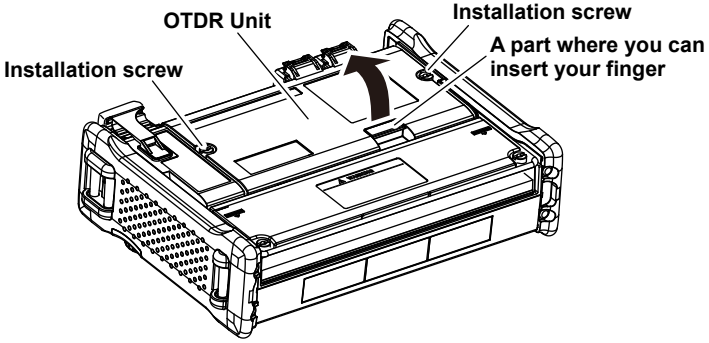
1. Align the connector of the OTDR unit to that of the OTDR mainframe, and gently push down the OTDR unit.
2. Push the part shown in the following figure with a bit of strong force until you hear a click.
3. Check that the OTDR unit is not loose, and then fasten the screws with a coin or a flat-bladed screwdriver.

   The proper tightening torque is about 0.6 N-m.



Removing the OTDR Unit

1. Loosen the OTDR attachment screws with a coin or a flat-bladed screwdriver until the screw head moves up and down. The screws are designed so that they do not come off the OTDR unit.
2. Pull up on the part of the OTDR unit where you can insert your finger. If the screws are not completely loose, loosen them further.



Installing and Removing the OPM/VLS Module

WARNING

Do not install or remove an optical power meter or visible light source module with the AQ7280 turned on.

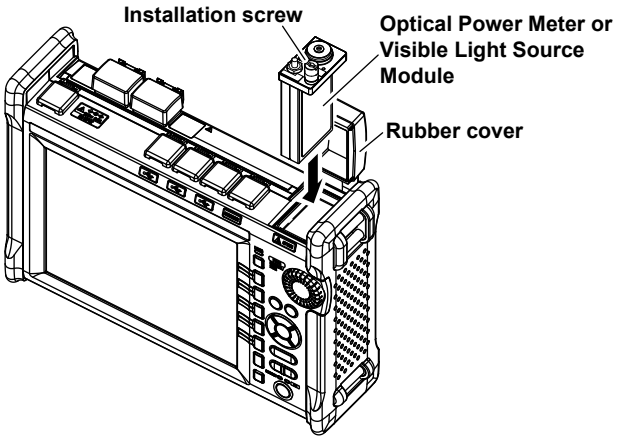
French

AVERTISSEMENT

Ne pas installer, ni retirer un mesureur de puissance optique ou un module de source lumineuse visible lorsque l'AQ7280 est sous tension.

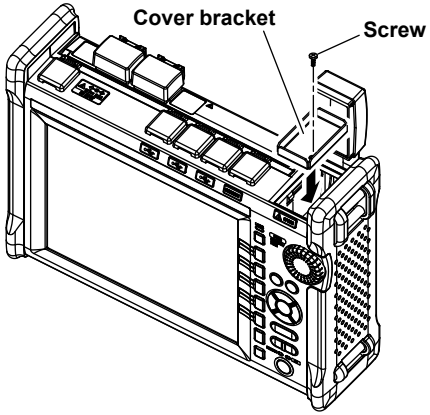
Installing an Optical Power Meter or Visible Light Source Module

1. Remove the rubber cover from the optical power meter/ visible light source module slot of the OTDR mainframe.
   If a cover bracket is attached to the slot, remove the screw with a Phillips screwdriver, and remove the bracket.
2. Insert the optical power meter or visible light source module into the slot of the OTDR mainframe. Be careful of the orientation.
3. Gently push the optical power meter or visible light source module until you hear a click.
4. Tighten the attachment screw with a coin or a flat-bladed screwdriver.
   The proper tightening torque is about 0.6 N-m



Removing the Optical Power Meter or Visible Light Source Module

1. Remove the rubber cover from the optical power meter/visible light source module slot of the OTDR mainframe.
2. Loosen the optical power meter or visible light source module attachment screw with a coin or a flat-bladed screwdriver until the screw head moves up and down. The screw is designed so that it does not come off the module.
3. Hold the screw and pull the optical power meter or visible light source module up from the OTDR mainframe.
4. Attach the included cover bracket. Tighten the screw (M4) with a Phillips screwdriver.
   The proper tightening torque is about 1.2 N-m.



Note

If you are not going to install an optical power meter or visible light source module, attach the cover bracket to prevent foreign substances from entering the slot.

Loading and Removing the Battery Pack

WARNING

- Do not connect or disconnect the battery pack while electricity is being supplied by the AC adapter.
- To prevent problems before they occur, periodically inspect the battery pack exterior to confirm that there is no damage such as cracks or deformations and to confirm that there is no fluid leakage.
- Only use 739883 battery pack. Do not use this battery pack with other instruments.
- Use the AQ7280 to charge the battery pack. Maintain the correct environmental conditions when the battery pack is charging. Failure to do so can cause fluid leakage, heating, smoke, explosions, or fire.
  You need a separately sold AC adapter to charge the battery pack.
- Follow the handling precautions that are included in the battery pack's user's manual.
- The battery pack is made of lithium-ion cells. When transporting the AQ7280, remove the battery pack.
- For information on transporting lithium-ion batteries by air, see the requirement for each packing instruction (lithium battery packing instruction Section II) in the latest IATA Dangerous Goods Regulations.

French

AVERTISSEMENT

- Ne pas installer, ni déposer le pack de batteries lorsque l'électricité est alimentée par l'adaptateur c.a.
- À titre préventif, inspecter régulièrement le boîtier extérieur du pack de batteries afin de déceler tout signe d'endommagement, comme l'apparition de fissures ou de déformations, et vérifier qu'il n'y a aucune fuite.
- Utiliser exclusivement le pack de batteries 739883. Ne pas utiliser ce pack de batteries avec d'autres instruments.
- Recharger le pack de batteries à l'aide de l'AQ7280. Respecter les consignes environnementales prescrites pour la recharge du pack de batteries, afin d'éviter les risques de fuite, de surchauffe, de fumée, d'explosion ou d'incendie.
  L'adaptateur c.a nécessaire pour recharger le pack de batteries est vendu séparément.
- Respecter les consignes de manipulation indiquées dans le manuel d'utilisation du pack de batteries.
- Le pack de batteries est composé de cellules au lithium-ion. Avant de transporter l'AQ7280, déposer le pack de batteries.
- Pour toute information sur le transport aérien des batteries au lithium-ion, consulter les exigences énoncées dans le Règlement de l'IATA sur le transport des marchandises dangereuses (Section II pour les batteries au lithium).

CAUTION

The battery pack weights approximately 500 g. Be careful not to drop it on your feet or hands.

French

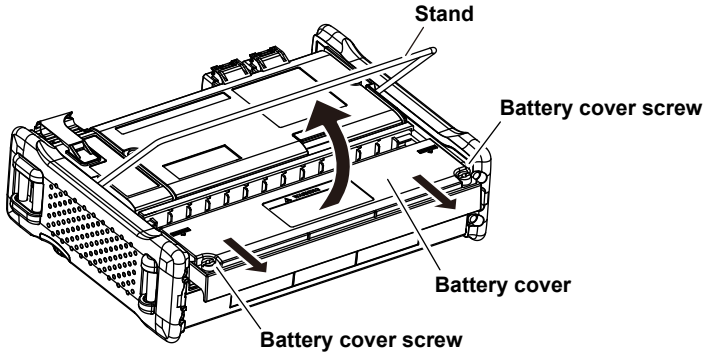
ATTENTION

Le pack de batteries pèse environ 500 g. Éviter de le laisser tomber sur les doigts ou les orteils.

Removing the Battery Cover of AQ7280

On a soft, flat surface, place the OTDR mainframe with the rear panel facing up.

1. Pull out the stand.
2. Loosen the battery cover screws with a coin or a flat-bladed screwdriver until the screw head moves up and down.
3. Slide the battery cover in the direction of the arrow, and remove it.

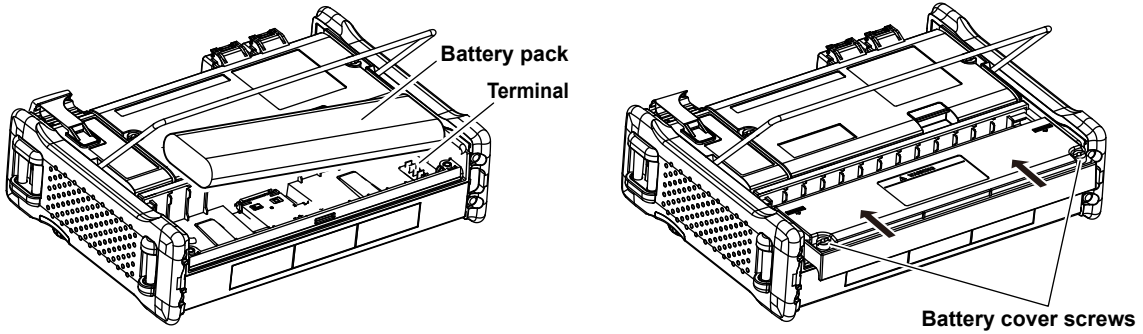


Loading the Battery Pack

1. Align the battery pack terminal with the OTDR mainframe terminal, and place the battery pack in the holder.
   Gently push the battery pack so that the terminals become securely connected.
2. Place the battery cover slightly off the default position as shown in the figure.
3. Slide the battery cover in the direction of the arrow.
4. Check that the battery cover is not loose, and then fasten the attachment screws with a coin or a flat-bladed screwdriver.
   The proper tightening torque is about 0.6 N-m.

Note

Pressing the battery pack's TEST button turns on the indicator that shows the battery level; Illumination of the indicator does not mean a malfunction. The indicator will turn off after a while.



Removing the Battery Pack

1. In the same manner as when loading the battery pack, remove the battery cover.
2. With your fingers, lift the side that does not have the battery terminal.
3. Hold the battery pack securely, and lift it up.

Note

Over Discharge and Long Periods of Storage

- If you do not use the AQ7280 for an extended period of time with the battery pack connected to it, the battery pack may become over discharged. This shortens the service life of the battery pack. To avoid over discharging, if you will not use the AQ7280 for one week or longer, charge the battery pack, remove it from the AQ7280, and store the battery pack away from direct sunlight in a location that has an ambient temperature of 10°C to 30°C.
- When you store the battery pack for six months or longer, to replace the power that has been lost through self discharge, recharge the battery using the AQ7280 once every six months.
- Avoid storing the battery pack for an extended period of time when it is fully charged (after it has just been charged) or when it has no power left (when the AQ7280 will not turn on). Storing the battery pack under these conditions will degrade its performance and reduce its longevity. It is better to store the battery pack when it is 40% to 50% charged. This is equivalent to the state the battery is in after you turn off the AQ7280 and charge an empty battery for an hour at room temperature.
- Use the AQ7280 to charge the battery pack prior to its first use or if it has not been used for an extended period of time.

Connecting the AC Adapter

WARNING

- Confirm that the AQ7280 is off before you connect the power supply.
- Make sure that the power supply voltage matches the AC adapter's rated supply voltage and that it does not exceed the maximum voltage range specified for the power cord.
- Only use the dedicated AC adapter for the instrument.
- Do not connect or disconnect the AC adapter while the AQ7280 is on.
- If you are using the AQ7280 for a long time with the AC adapter connected, remove the battery pack from the AQ7280.
- If an appropriate AC outlet for the supplied power cord is unavailable, do not use the instrument.

French

AVERTISSEMENT

- Vérifier que l'AQ7280 est hors tension avant de raccorder au secteur.
- Vérifier que la tension d'alimentation correspond à la tension d'alimentation nominale de l'adaptateur c.a. et qu'elle ne dépasse pas la plage de tension maximale spécifiée pour le cordon d'alimentation.
- Utiliser exclusivement l'adaptateur c.a. dédié pour l'instrument.
- Ne pas brancher, ni débrancher l'adaptateur c.a. pendant que l'AQ7280 est sous tension.
- Si l'AQ7280 est utilisé de manière prolongée avec l'adaptateur c.a., retirer le pack de batteries de l'AQ7280.
- N'utiliser l'instrument que si une prise secteur appropriée est disponible pour le branchement du cordon d'alimentation.

1. Connect the AC adapter's plug to the AQ7280's DC power supply connector.
2. Connect the power plug to an outlet.

Note

- For details on the AC adapter, contact your nearest YOKOGAWA dealer.
- If the DC power supply connector's cover comes off, bend the cover axle and reattach it.

Inserting and Removing an SD Card

WARNING

Do not insert or remove an SD card with the AQ7280 turned on.

French

AVERTISSEMENT

Ne pas insérer, ni retirer de carte SD lorsque l'AQ7280 est sous tension.

1. The SD card slot is located under the battery pack. Follow the procedure in "Loading and Removing the Battery Pack" to remove the battery pack.
2. Pull up the SD card cover.

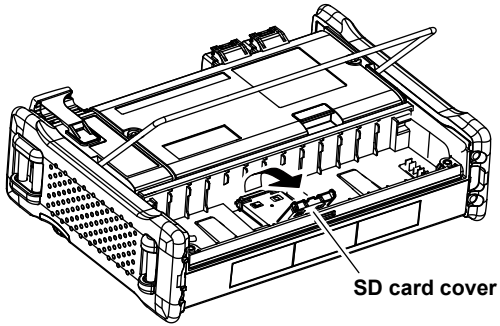
Inserting an SD Card

3. Insert an SD card in the correct orientation as shown in the illustration next to the SD card cover.

   Push the SD card until you hear a click.
4. Place the SD card cover back on until you hear a click.
5. Follow the procedure in "Loading and Removing the Battery Pack" to load the battery pack.

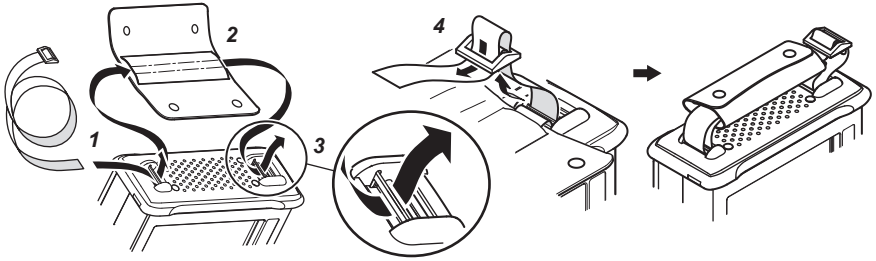
Removing the SD Card

3. Gently push the inserted SD card further into the slot. The latch will disengage, and the SD card will pop out. Remove the SD card.
4. Place the SD card cover back on until you hear a click.
5. Follow the procedure in "Loading and Removing the Battery Pack" to load the battery pack.



Attaching the Strap

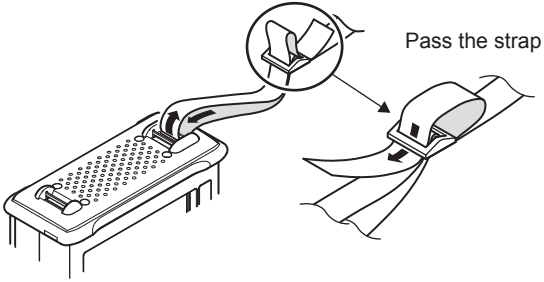
Attaching the Hand Strap



1. Pass the hand strap through the loop on the lower-left side of the AQ7280.
2. Pass the hand strap through the hand strap cover.
3. Pass the hand strap through the loop on the upper-left side of the AQ7280.
4. Pass the strap through the buckle, and use the buttons to close the hand strap cover.

Attaching the Shoulder Strap

Attach the shoulder strap to the shoulder strap brackets on the left and right sides of the AQ7280.
As shown in the figure, securely attach the shoulder strap by passing the strap through the top strap bracket on each side of the instrument and then pass it through the buckle.



Pass the strap through the buckle again so that it does not come loose.

Connecting Optical Fiber Cables

WARNING

- When the AQ7280 generates light, light is emitted from the light source ports. Do not disconnect the connected optical fiber cables. Visual impairment may occur if the light enters the eye.
- Close the covers of any light source ports that do not have optical fiber cables connected to them. On models with two or more light source ports, visual impairment may occur if light that is mistakenly emitted from the wrong port enters the eye.

CAUTION

- Insert the optical fiber cable connectors slowly and straight into the optical ports. If you shake the connector to the left and right or force it into the port, the optical connector or optical port may be damaged.
- If you use optical connectors that do not meet the specifications, the AQ7280 optical ports may be damaged. Use optical connectors that are approved or used by national or local telecom carriers and providers in your area.
- Use optical fiber cable connectors that conform to the included universal adapter and connector adapter (the universal adapter specified by the suffix code).

Using SC Angled Physical Contact Connectors (Suffix code -ASC of OTDR Unit)

- The SC angled physical contact connector's ferrule tip is angle-polished. Use optical fiber cables whose connectors are of the same type. Using a different type of connector may damage the connector end face.
- Only use SC-type (SU2005A-SCC) universal adapters on -ASC OTDR ports. Otherwise, the AQ7280 optical ports or the optical fiber cable connectors may be damaged.

French

AVERTISSEMENT

- Lorsque l'AQ7280 génère de la lumière, la lumière est émise à travers les ports de source lumineuse. Ne pas débrancher les câbles de fibre optique connectés. Des lésions oculaires peuvent être causées si le faisceau lumineux pénètre l'œil.
- Couvrir les caches des ports de source lumineuse libres. Sur les modèles dotés de deux ports de source lumineuse ou plus, protéger les yeux contre l'émission accidentelle de lumière depuis le mauvais port.

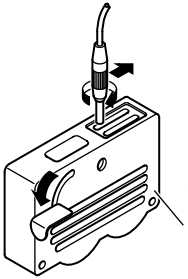
ATTENTION

- Insérer les connecteurs de câbles à fibre optique délicatement et sans les incliner dans les ports optiques. Éviter de faire pression sur le connecteur ou de forcer pour l'insérer dans le port, car cela pourrait endommager le connecteur optique ou le port optique.
- Toujours utiliser des connecteurs optiques conformes aux spécifications, à défaut de quoi les ports optiques de l'AQ7280 pourraient être endommagés. Utiliser des connecteurs optiques homologués ou utilisés par les entreprises et les fournisseurs de services de télécommunications de votre région.
- Utiliser des connecteurs de câbles à fibre optique conformes à l'adaptateur universel et l'adaptateur de connecteur fournis (adaptateur universel indiqué par le suffixe).

Utilisation de connecteurs de contact physique incliné SC (suffixe - ASC de l'unité OTDR)

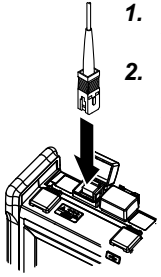
- L'embout à ferrule du connecteur de contact physique incliné SC est poli. Utiliser des câbles à fibre optique dont les connecteurs sont de même type. L'utilisation d'un autre type de connecteur peut endommager l'extrémité du connecteur.
- Utiliser exclusivement des adaptateurs universels de type SC (SU2005A-SCC) sur les ports ASC OTDR, pour éviter d'endommager les ports optiques ou les connecteurs à fibre optique de l'AQ7280.

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



1. Firmly press the connector end face of the optical fiber cable against the cleaning surface of the cleaner.
2. While pressing the end face against the cleaner, turn the cable once.
3. While pressing the end face against the cleaner, move the cable.
4. Repeat steps 1 to 3.

You can purchase an optical fiber connector cleaner from NTT-AT Corporation.



1. Open the optical port cover on the AQ7280 top panel.
2. Properly align the optical fiber cable's connector with the optical port, and insert the connector.

Note

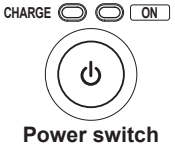
- The optical port that you have to connect to varies depending on how you intend to use the AQ7280. Confirm which port light will be transmitted from before you connect the optical fiber cable.
- On the AQ7283E, light with a 1625 nm wavelength is transmitted from optical port 2.
- On the AQ7283F, light with a 1650 nm wavelength is transmitted from optical port 2.

Turning On the Power

Press the power switch on the AQ7280 front panel. When the AQ7280 starts normally, the ON LED illuminates, and the top screen appears. If power is being supplied from the AC adapter and the battery pack is not connected, the CHARGE LED blinks.

Charging the Battery Pack

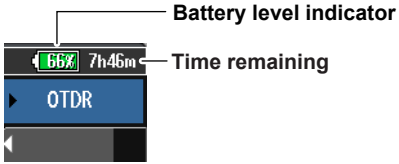
- When the battery is low, a warning message will appear.
- When the battery is low, use the AC adapter to connect the AQ7280 to an electrical outlet, and charge the battery pack. The battery level is indicated at the top of the screen with an estimated battery charge level (%) and time remaining. Use the battery level as a rough guideline.



Power switch

ON LED
Green: Running
Red: Battery low

CHARGE LED
Lighting: Charging
Off: Charging complete
Blinking: Charging suspended



- The time it takes to charge the battery pack is approximately 6 hours with the power turned off. If the battery pack is charged with the power turned on, it may take longer than 15 hours, but charging will be suspended after about 15 hours by the protection circuit.
- If battery charging does not complete within 6 hours with the power turned off, stop immediately.
  The battery pack may be malfunctioning. Do not use the battery pack, and contact your nearest YOKOGAWA dealer.

When the Power-on Operation Does Not Finish Normally

Turn off the power switch, and check the following items.

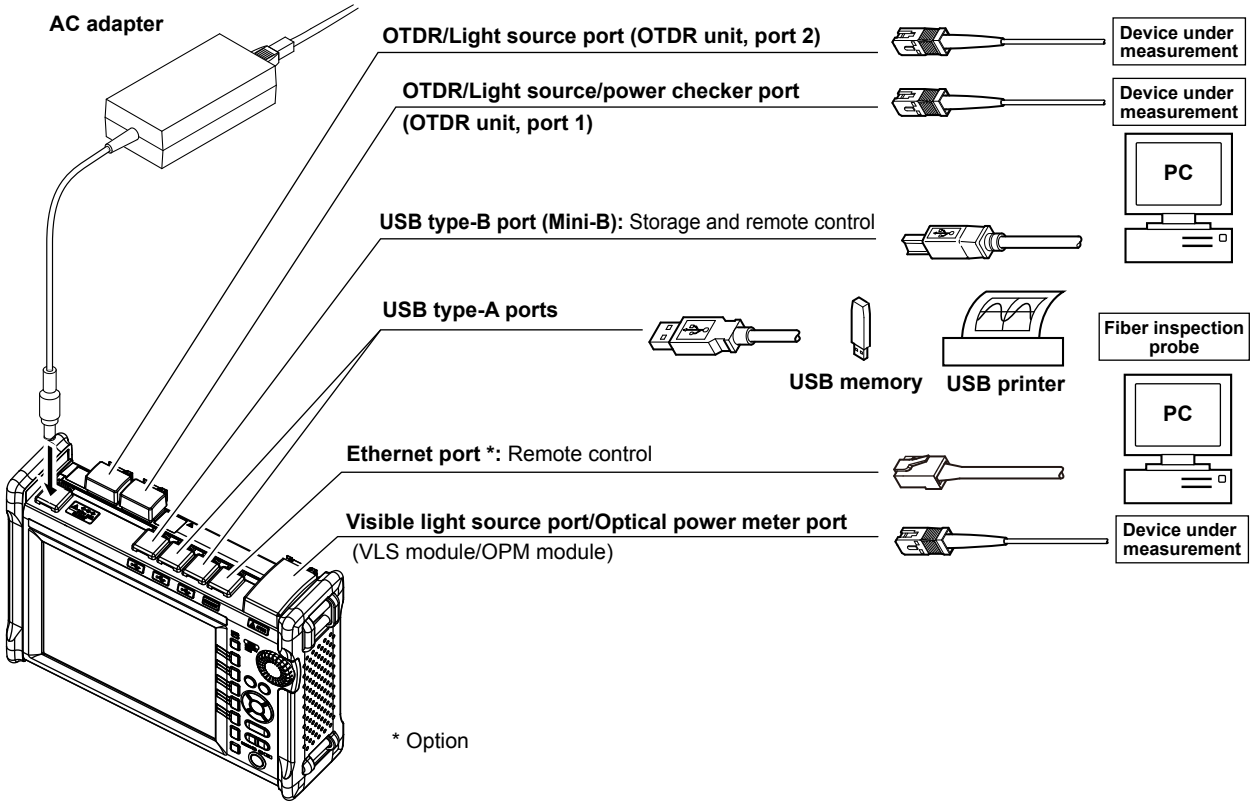
- Is the AC adapter connected correctly? See page 39.
- Is the battery pack loaded correctly? See page 35.
- Are you holding down the power switch for at least 2 seconds?

If the AQ7280 still does not work properly after checking these items, contact your nearest YOKOGAWA dealer for repairs.

Warm Up

To enable more accurate measurements, allow the AQ7280 to warm up for at least 5 minutes after it is turned on.

Connecting Peripheral Devices

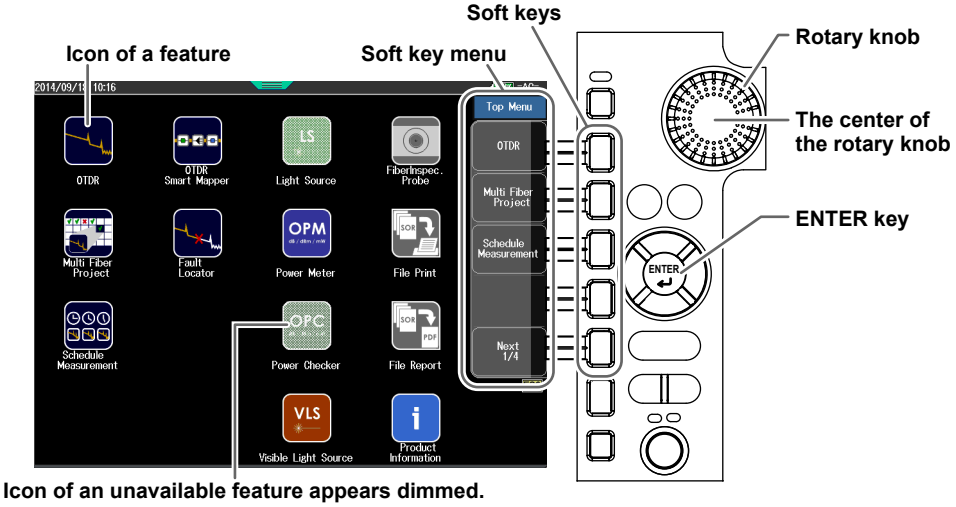


Memo

Top Screen

When you turn the AQ7280 on and it starts, the top screen appears. First select a feature from this top screen, and then configure the feature or carry out the measurement that corresponds to the feature you have selected.

1. Turn on the AQ7280.
2. Select a feature.
   Select it in the following manner.
   - Select an icon with arrow keys or rotary knob, and press ENTER.
   - Select a feature with the soft keys.
   - Tap an icon on the screen.



Screen Explanation

The OTDR screen will be used as an example to explain the screen interface.

Battery level indicator

Appears when the AC adapter is in use
If the AC adapter is not in use, the estimated remaining time on battery is displayed.

You can show and hide the SETUP menu by tapping the panel.

Ports in use

Tapping a display area with a ▶ mark displays a list of options that you can use to change the setting. If there only two options, tapping will toggle the setting.

Menu title
If a ◀/▶ mark is displayed, you can show and hide the soft key menu by tapping the panel.

Soft key menu

You can show and hide the UTILITY menu by tapping the panel.

You can use the touch panel to perform the same operations as with the MENU, ESC, and UTIL keys.

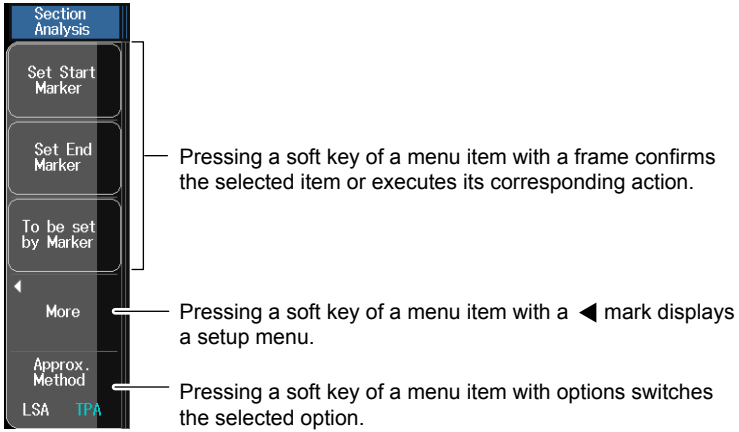
Message display area

You can execute the function by tapping the panel.

You can change the ratio of the display areas by dragging.

Soft Key Menu

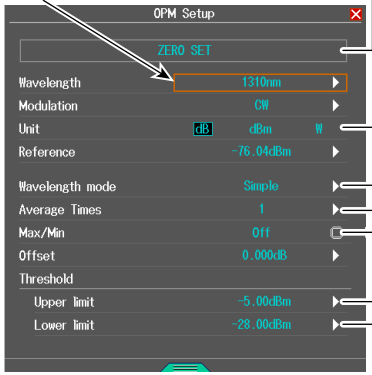
There are three types of soft key menus depending on the function.



Rotary Knob and Arrow Key Operations

We will use the dialog box that appears when you press the **OPM Setup** soft key as an example to explain the rotary knob and arrow key operations.

Using the **rotary knob** or the **up and down** keys, move the cursor to the item you want to set.

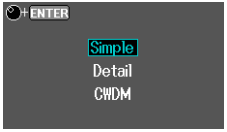


Below are the different types of setup operations that you may encounter.

Pressing **ENTER** confirms the selected item or executes its corresponding action.

For an item with options, the selected item switches each time you press **ENTER**.

For an item with a ▶ mark, pressing **ENTER** displays a setup menu.



Items set from a list of options

- Using the **rotary knob** or the **up and down arrow** keys, move the cursor to the item you want to select.
- Press **ENTER** to confirm the selected item.
- To reset the selected item to its previous setting, press **ESC**.

Items that require a value to be entered

- To increase or decrease a value, use the **rotary knob** or the **up and down arrow** keys.
  To move between digits, use the **left and right arrow** keys.
- Press **ENTER** to confirm the entered value.
- To reset the selected item to its previous setting, press **ESC**.

For an item with a check box, the on/off state switches each time you press **ENTER**.

Touch Panel Operations

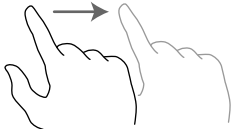
The basic touch panel operations are described below.

Tap

Tap refers to the act of gently hitting the screen with your finger.
Tapping is used on the AQ7280 screen to select areas with a ▶ mark, close a setup menu, and so on.

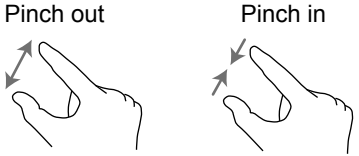
Drag

Drag refers to the act of pressing your finger against the screen and sliding your finger.
Dragging is used to display the SETUP menu, change the ratio of the waveform display area to the measurement condition display area, and so on.



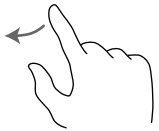
Pinch Out and Pinch In

Pinch out refers to the act of pressing two fingers against the screen and spreading them apart. Pinch in refers to the act of pressing two fingers against the screen and drawing them together.
On a screen displaying waveforms, you can pinch out to zoom in and pinch in to zoom out.



Flick

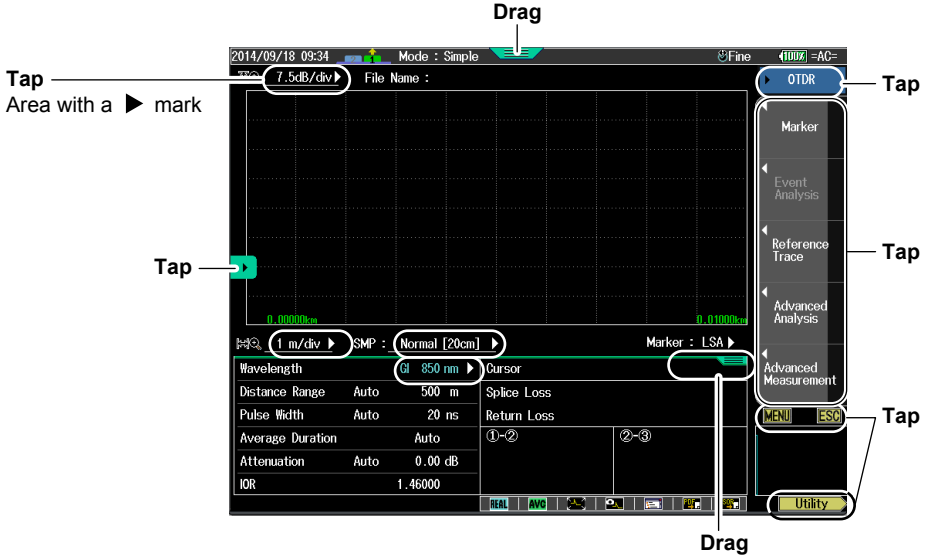
Flick refers to the act of pressing your finger against the screen and moving your finger abruptly.
This is used to scroll on a menu display and the like.



Where Touch Panel Operations Can Be Used

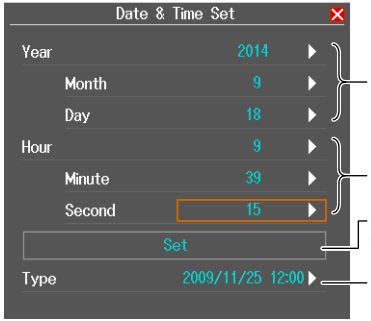
Touch panel operations can be used in the following areas.

In addition, touch panel operations can be used to zoom in and out.



Setting the Date and Time

1. Press **MENU** to display the top menu.
2. Press **SETUP**.
3. Using the **rotary knob** and **ENTER**, select **Date & Time Set** to display the following screen.



Set the year, month, and day.

Set the hour, minute, and second.

Set the AQ7280's date and time to the specified values.
The set date and time are displayed in the upper left of the screen.

Set the date and time display format (Off, Year/Month/Day Time, Day/Month/Year Time, Year. Month (name). Day Time).

Year, Month, and Date

The year is displayed according to the Gregorian calendar. The AQ7280 supports leap years.

Hour, Minute, and Second

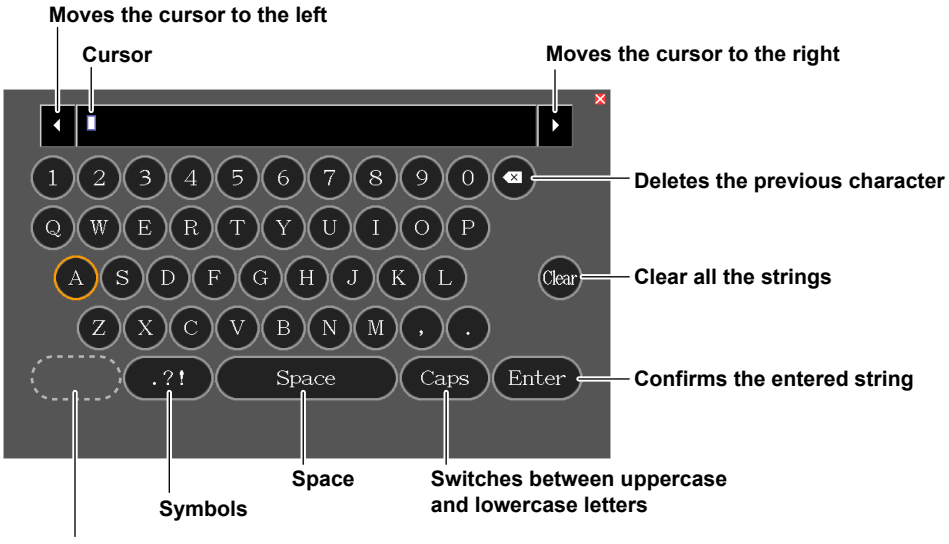
The hour can be set to a value from 0 to 23.

Note

A display example of the date and time is shown in the "Type" box. This is not the actual date and time.

Entering Character Strings

After you have selected a setup item, a character input dialog box will appear if it is necessary. This section explains the operations that you can perform after the dialog box appears.



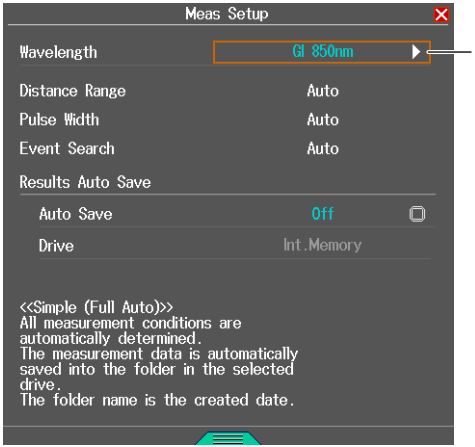
The displayed language vary depending on the suffix code.

Optical Pulse Measurement in Simple Mode

Configuring the Simple Mode Conditions

In this mode, the absolute minimum amount of measurement conditions are set manually. You only have to set the wavelength. Conditions such as Distance Range, Pulse Width, and Event Search are set automatically when measurement starts.

1. Select **OTDR**.
2. Press **SETUP** and then the **Mode** soft key.
3. Press the **Simple** soft key. The following screen appears.



Set the wavelength (The available wavelengths vary depending on the OTDR unit that is installed.).

Performing Averaged Measurements

In an averaged measurement, the data that is acquired from each pulse is averaged and displayed. When averaged measurement is performed, the signal-to-noise ratio rises. Averaged measurement is useful when you want to detect faint events that would normally be obscured by noise.

1. Using the **rotary knob** and **ENTER**, select **OTDR**.
2. Press **AVG** to start the measurement and display the measured waveform on the screen.
   The menu switches to the averaged measurement menu. During measurement, the averaging duration and the progress appear in the upper right of the screen.
   During measurement, a mark appears on the display to indicate that the laser light is on.
3. When averaging finishes, measurement stops automatically. To stop averaged measurement before it finishes, press **AVG** again during measurement.
   The soft key menu switches to the OTDR menu. The mark that indicates that the laser light is on disappears from the display.

Laser on indication

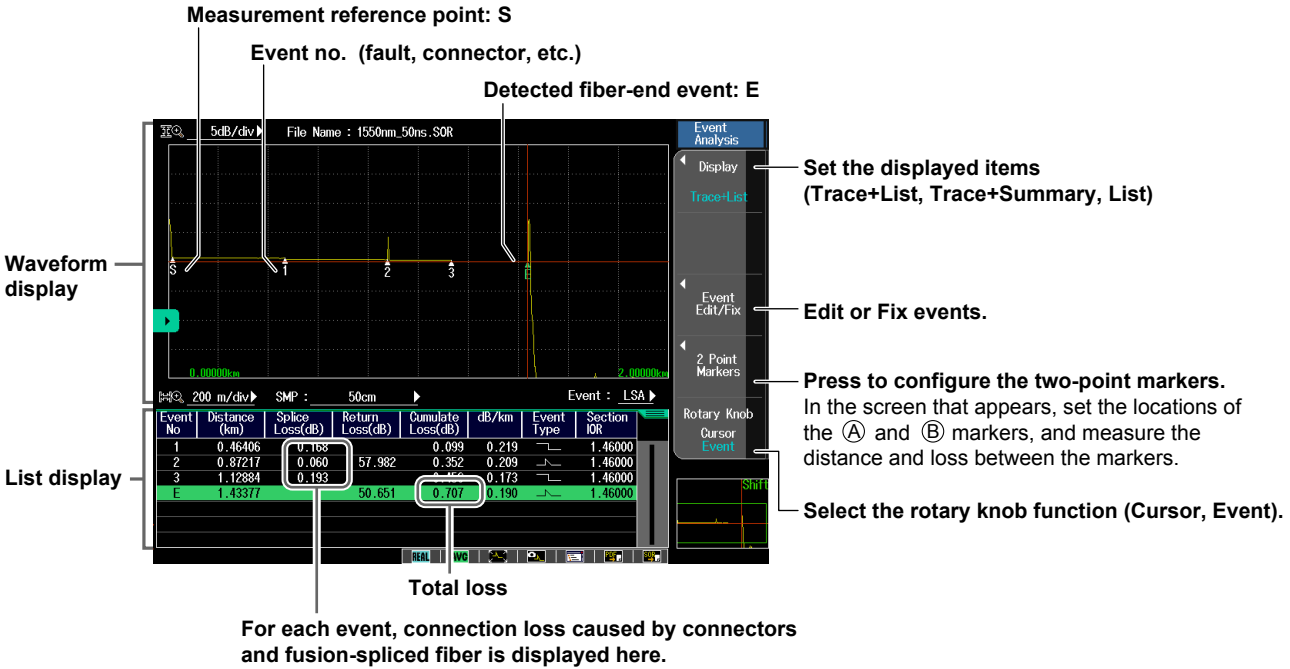
Waveform display screen

Averaging duration or progress

If “the duration to average over” is set to Auto, the averaging duration is displayed. If set to any other value, the progress is displayed. When the measurement completes successfully, 100% is displayed. The time it takes to complete a measurement varies depending on settings such as the distance range and the average count.

Event Screen

When Event Analysis is set to Auto, the event screen appears after averaged measurement ends normally.
In the event screen, you can display the distance to each event and each event's loss.



Analysis Using the Emulation Software

The waveform data that is measured by the AQ7280 can be analyzed on your PC using the AQ7932 OTDR emulation software (version 5.01 or later). The software comes with a report creation wizard that is convenient in creating construction reports.

Specifications

AQ7280 OTDR Mainframe

Item	Specification
Display[1]	8.4 inch color TFT LCD (Multi-touch capacitive touchscreen) Total number of displayed pixels: 800 (horizontal) × 600 (vertical) pixels
LED	POWER (power supply ON/OFF display), CHARGE (charging condition), Laser (Laser emitting status)
External I/F	
Unit	Unit interface x 1
Module	Module interface x 1
USB port	USB2.0 x 3 (TYPE A × 2, TYPE B (mini) × 1)
LAN (Option)	Ethernet I/F (10/100BASE-T)
SD slot	1 (Support SDHC)
DC power-supply connector	Connect the dedicated AC adapter
Remote Control	USB TYPE B (mini), Ethernet (option)
Data Storage	
Storage	Internal storage: ≥1000 waveforms, External storage: USB memory, SD memory card
File format	Write: SOR, CSV, SET, BMP, JPG, CFG, PDF, Read: SOR, SET
Installation position	Hand, place a vertical position, place a horizontal position, place a slanting position
Dimensions	Approx. 287 mm (W) × 210 mm (H) × 80 mm (D) (excluding projections)
Weight	Approx. 2.2 kg (including battery pack, excluding OTDR unit, OPM module, and VLS module)

1 The LCD may contain some pixels that are always ON or OFF (0.002% or fewer of all displayed pixels including RGB), but this is not indicative of a general malfunction.

OTDR Function

Item	Specification
Minimum readout resolution	Horizontal axis: 1 cm, Vertical axis: 0.001 dB
Group refractive index	1.30000 to 1.79999 (in 0.00001 steps)
Unit of distance	km, mile, kft
Backscatter level	Selectable: PW = 1 µs or 1 ns
Measurement functions	Distance measurement, Loss measurement, Return loss measurement and Return loss measurement between any arbitrary points on the trace.
Analysis functions	Multi-wavelength analysis, Two wavelength combine, Difference analysis, Section analysis, Macro bending analysis
Others	Multi fiber project, Fault locator, Work completion notice, File report, Auto event search, Pass/Fail judgment, Schedule measurement (Option), Smart mapper (Option)

OTDR Unit

AQ7282A, AQ7083A, AQ7284A, AQ7285A

Item	Specifications			
Model	AQ7282A	AQ7283A	AQ7284A	AQ7285A
Wavelength (nm)	1310 ± 25 / 1550 ± 25			
Number of optical port	1			
Optical fiber	SM (ITU-T G.652)			
Distance range (m)	0.2, 0.5, 1, 2, 5, 10, 20, 30, 50, 100, 200, 300, 400, 512			
Pulse width (ns)	3, 10, 20, 30, 50, 100, 200, 300, 500, 1000, 2000, 5000, 10000, 20000			
Sampling resolution	Min. 2 cm			
Number of sampling points	Max. 256000 points			
Distance measurement accuracy	± (0.75 m + Measurement distance × 2 × 10^{-5} + sampling resolution)			
Event dead zone[1] (m)	0.6			0.5
Attenuation dead zone[2] (m)	3.5/4			
Dynamic range[3] (dB)	38/36	42/40	46/45	50/50
Loss measurement accuracy[4]	± 0.03 dB/dB			
Return loss measurement accuracy	± 2 dB			
Optical connector	Universal Adapter SC, FC, LC, and SC Angled-PC			
Laser class	Class 1M[5] or 1[6]		Class 1M[5] or 1[6](1550 nm), Class 3R[5] or 1[6] (1310 nm)	
Maximum optical pulse output power	-			
Dimension	Approx. 211 mm (W) × 110 mm (H) × 32 mm (D) (excluding projections)			
Mass	Approx. 420 g			

1 Pulse width: 3 ns, Return loss: ≥55 dB, Group refractive index: 1.5, at 1.5 dB below the unsaturated peak level, Typical
2 Pulse width: 10 ns, Return loss: ≥55 dB, Group refractive index: 1.5, at a point where the backscatter level is within ±0.5 dB of the normal level, Typical
3 Pulse width: 20000 ns, Measurement time: 3 minutes, SNR = 1, Typical, Decrease by 0.5 dB with an angled-PC connector, Decrease by 0.5 dB with /SLS option for AQ7284A, AQ7285A.
4 For a loss 1 dB or less, the accuracy is ±0.05 dB.
5 IEC 60825-1:2007, GB 7247.1-2012
6 EN 60825-1:2014

AQ7283F, AQ7283H, AQ7284H, AQ7283K, AQ7282M

Item	Specifications				
Model	AQ7283F	AQ7283H	AQ7284H	AQ7283K	AQ7282M
Wavelength (nm)	1310 ±25/ 1550 ±25, 1650 ±5[5] ±10[6]	1310 ±25/ 1550 ±25/ 1625 ±25		1310 ±25/ 1490 ±25/ 1550 ±25/ 1625 ±25	850 ±30/ 1300 ±30
Number of optical port	2 (Port 2: 1650 nm with filter)	1			
Optical fiber	SM (ITU-T G.652)				GI50, GI62.5
Distance range (km)	0.2, 0.5, 1, 2, 5, 10, 20, 30, 50, 100, 200, 300, 400, 512				0.2, 0.5, 1, 2, 5, 10, 20, 30, 50, 100
Pulse width (nm)	3, 10, 20, 30, 50, 100, 200, 300, 500, 1000, 2000, 5000, 10000, 20000				3, 10, 20, 30, 50, 100, 200, 300, 500, 1000, 2000[7] ,5000[7]
Sampling resolution	Min. 2 cm				
Number of sampling points	Max. 256000 points				
Distance measurement accuracy	± (0.75 m + Measurement distance × 2 × 10^{-5} + sampling resolution)				
Event dead zone[1] (m)	0.6				0.6[8]
Attenuation dead zone[2] (m)	3.5/4, 4	3.5/4/4		3.5/4/4/4	4/5[8]
Dynamic range[3] (dB)	42/40, 40	42/40/39	46/45/44	42/38/40/40	25/27[9]
Loss measurement accuracy[4]	± 0.03 dB/dB				
Return loss measurement accuracy	± 2 dB				
Optical connector	Universal Adapter: SC, FC, LC, Angled-PC				Universal Adapter: SC, FC, LC
Laser class	Class 1M[10] or 1[11]		Class 1M[10] or 1[11] (1550/1625 nm), Class 3R[10] or 1[11] (1310 nm)	Class 1M[10] or 1[11] (1490/ 1550/1625 nm), Class 3R[10] or 1[11] (1310 nm)	Class 1M[10] or 1[11] (1300 nm), Class 3R[12] (850 nm)

Item	Specifications				
Model	AQ7283F	AQ7283H	AQ7284H	AQ7283K	AQ7282M
Maximum optical pulse output power	+15 dBm or less (1650 nm)	–			
Dimension	211 mm (W) × 110 mm (H) × 32 mm (D) (excluding projections)				
Mass	Approx. 420 g				

1 Pulse width: 3 ns, Return loss: ≥55 dB, Group refractive index: 1.5, at 1.5 dB below the unsaturated peak level, Typical
2 Pulse width: 10 ns, Return loss: ≥55 dB, Group refractive index: 1.5, at a point where the backscatter level is within ±0.5 dB of the normal level, Typical
3 Pulse width: 20000 ns, Measurement time: 3 minutes, SNR = 1, Typical, Decrease by 0.5 dB with an angled-PC connector, Decrease by 0.5 dB with /SLS option for AQ7284H, Typical
4 For a loss 1 dB or less, the accuracy is ±0.05 dB.
5 At 20 dB below the spectral peak of pulsed optical output, at 23˚C, after warm-up of 30 minutes
6 At 60 dB below the spectral peak of pulsed optical output, at 23˚C, after warm-up of 30 minutes
7 1300 nm only
8 Return loss condition changes to ≥40 dB.
9 Pulse width: 500 ns (850 nm)/1000 ns (1300 nm), Measurement time: 3 minutes, SNR = 1, GI50, Typical
10 IEC 60825-1:2007, GB 7247.1-2012
11 EN 60825-1:2014
12 EN 60825-1:2014, IEC 60825-1:2007, GB 7247.1-2012

AQ7283E, AQ7082G, AQ7283J

Item	Specifications		
Model	AQ7283E	AQ7282G	AQ7283J
Wavelength (nm)	1310 ±25/1550 ±25, 1625 ±10	1310 ±25/1490 ±15/ 1550 ±25	1310±25/1383±2/ 1550±25/1625±25
Number of optical port	2 (Port 2: 1625 nm with filter)	1	
Optical fiber	SM (ITU-T G.652)		
Distance range (m)	0.2, 0.5, 1, 2, 5, 10, 20, 30, 50, 100, 200, 300, 400, 512		
Pulse width (ns)	3, 10, 20, 30, 50, 100, 200, 300, 500, 1000, 2000, 5000, 10000, 20000		
Sampling resolution	Min. 2 cm		
Number of sampling points	Max. 256000 points		
Distance measurement accuracy	± (0.75 m + Measurement distance × 2 × 10^{-5} + sampling resolution)		
Event dead zone[1] (m)	0.6		
Attenuation dead zone[2] (m)	3.5/4, 4	3.5/4/4	3.5/4/4/4
Dynamic range[3] (dB)	42/40, 40	38/36/36	42/39/40/40
Loss measurement accuracy[4]	± 0.03 dB/dB		
Return loss measurement accuracy	± 2 dB		
Optical connector	Universal Adapter SC, FC, LC, and SC Angled-PC		
Laser class	Class 1M[5] or 1[6]		Class 1M[5] or 1[6] (1383/1550/1625 nm), Class 3R[5] or 1[6] (1310 nm)
Maximum optical pulse output power	–		
Dimension	Approx. 211 mm (W) × 110 mm (H) × 32 mm (D) (excluding projections)		
Mass	Approx. 420 g		

1 Pulse width: 3 ns, Return loss: ≥55 dB, Group refractive index: 1.5, at 1.5 dB below the unsaturated peak level, Typical
2 Pulse width: 10 ns, Return loss: ≥55 dB, Group refractive index: 1.5, at a point where the backscatter level is within ±0.5 dB of the normal level, Typical
3 Pulse width: 20000 ns, Measurement time: 3 minutes, SNR = 1, Typical, Decrease by 0.5 dB with an angled-PC connector.
4 For a loss 1 dB or less, the accuracy is ±0.05 dB.
5 IEC 60825-1:2007, GB 7247.1-2012
6 EN 60825-1:2014

Optional functions for OTDR units

Item		Specifications			
Model		AQ7282A	AQ7283A	AQ7284A	AQ7285A
Power checker (/PC)	Wavelength setting	1310/1490/1550/1625/1650 nm			
	Power range[1]	–50 to –5 dBm			
	Measurement accuracy[2]	±0.5 dB			
	Optical input port	OTDR port			
Stabilized light source (/SLS)	Wavelength (nm)	1310 ±25/1550 ±25			
	Optical output power	–3 dBm ±1 dB			
	Output power stability[3] (dB)	±0.05			
	Modulation mode	CW, 270 Hz, 1 kHz, 2 kHz			
	Optical output port	OTDR port			
	Laser class	Class 1M[8] or 1[9]			

Model		AQ7283F	AQ7283H	AQ7284H	AQ7283K
Power checker (/PC)	Wavelength setting	1310/1490/1550/1625/1650 nm			
	Power range[1]	–50 to –5 dBm			
	Measurement accuracy[2]	±0.5 dB			
	Optical input port	OTDR port[4]	OTDR port		
Stabilized light source (/SLS)	Wavelength (nm)	1310 ±25/1550 ±25, 1650 ±5[5] ±10[6]	1310 ±25/1550 ±25/1625 ±25		1310 ±25/1490 ±25 /1550 ±25/1625 ±25
	Optical output power	–3 dBm ±1 dB			
	Output power stability[3] (dB)	±0.05/±0.05, ±0.15	±0.05/±0.05/±0.15		±0.05/±0.15/±0.05 /±0.15
	Modulation mode	CW, 270 Hz, 1 kHz, 2 kHz			
	Optical output port	OTDR port			
	Laser class	Class 1M[8] or 1[9]			

Item		Specifications			
Model		**AQ7283E**	**AQ7282G**	**AQ7283J**	**AQ7282M**
Power checker (/PC)	Wavelength setting	1310/1490/1550/1625/1650 nm			–
	Power range[1]	–50 to –5 dBm			–
	Measurement accuracy[2]	±0.5 dB			–
	Optical input port	OTDR port[4]	OTDR port		–
Stabilized light source (/SLS)	Wavelength (nm)	1310 ±25/ 1550 ±25, 1625 ±10	1310 ±25/ 1490 ±15/ 1550 ±25	1310 ±25/ 1550 ±25/ 1625 ±25[7]	850±30/ 1300±30
	Optical output power	– 3 dBm ±1 dB			> – 20 dBm
	Output power stability[3] (dB)	±0.05/±0.05, ±0.15	±0.05/±0.15/ ±0.05	±0.05/±0.05/ ±0.15	±0.15
	Modulation mode	CW, 270 Hz, 1 kHz, 2 kHz			CW, 270 Hz
	Optical output port	OTDR port			
	Laser class	Class 1M[8] or 1[9]			

1 CW, Safe maximum input power: 0 dBm (1 mW).
2 CW, 1310 nm, −10 dBm
3 Constant temperature, 5 minutes after warm-up of 5 minutes.
4 Not applicable to Port 2.
5 At 20 dB below the spectral peak of pulsed optical output, at 23˚C, after warm-up of 30 minutes.
6 At 60 dB below the spectral peak of pulsed optical output, at 23˚C, after warm-up of 30 minutes.
7 Not applicable for 1383 nm of AQ7283J.
8 IEC 60825-1:2007, GB 7247.1-2012
9 EN 60825-1:2014

OPM/VLS modules

Item		Specifications				
Model		AQ2780 OPM	AQ2781 High Power OPM	AQ2780V OPM + VLS	AQ2781V High Power OPM + VLS	AQ4780 VLS
Optical power meter (OPM)						
Wavelength setting		Mode: 850/1300/1310/1490/1550/1625/1650 nm, Detail mode: 800 to 1700 nm (1 nm steps), CWDM mode: 1270 to 1610 nm (20 nm steps)				–
Power range	CW	+10 to −70 dBm	+27 to −50 dBm[1]	+10 to −70 dBm	+27 to −50 dBm[1]	–
	CHOP	+7 to −70 dBm	+24 to −50 dBm[1]	+7 to −70 dBm	+24 to −50 dBm[1]	–
Noise level[2]		0.5 nW (–63 dBm)	50 nW (–43 dBm)	0.5 nW (–63 dBm)	50 nW (–43 dBm)	–
Uncertainty[3]		±5%				–
Readout resolution		0.01dB				–
Level unit		Absolute: dBm, mW, µW, nW, Relative: dB				–
Modulation mode		CW, 270 Hz, 1 kHz, 2 kHz				–
Averaging		1, 10, 50, 100 times				–
Data save		100 data per file (up to 1000 files)				–
Data logging		Logging intervals: 0.5, 1, 2, 5, 10 sec., Number of data: 10 to 1000 data				–
Optical connector		Universal Adapter: SC, FC, Ferrule Adapter: Ø1.25				–
Visible light source (VLS)						
Wavelength		–		650 ±20 nm		
Optical output power		–		−3 dBm or more (Peak)		
Modulation mode		–		CW, CHOP (Approx. 2 Hz)		
Optical connector		–		2.5 mm ferrule type		
Laser class		–		Class 3R		
Dimensions		Approx. 47 mm (W) × 87 mm (H) × 29 mm (D) (excluding projections)				
Weight		Approx. 140 g				

1 1300 to 1600 nm
2 1310 nm
3 Input power: 100 µW (-10 dBm), CW, 1310 ±20 nm, Spectral width: ≤10 nm, SM (ITU-T G.652), FC/PC, Wavelength setting: Measured wavelength ±0.5 nm, excluding a secular change of equipment.

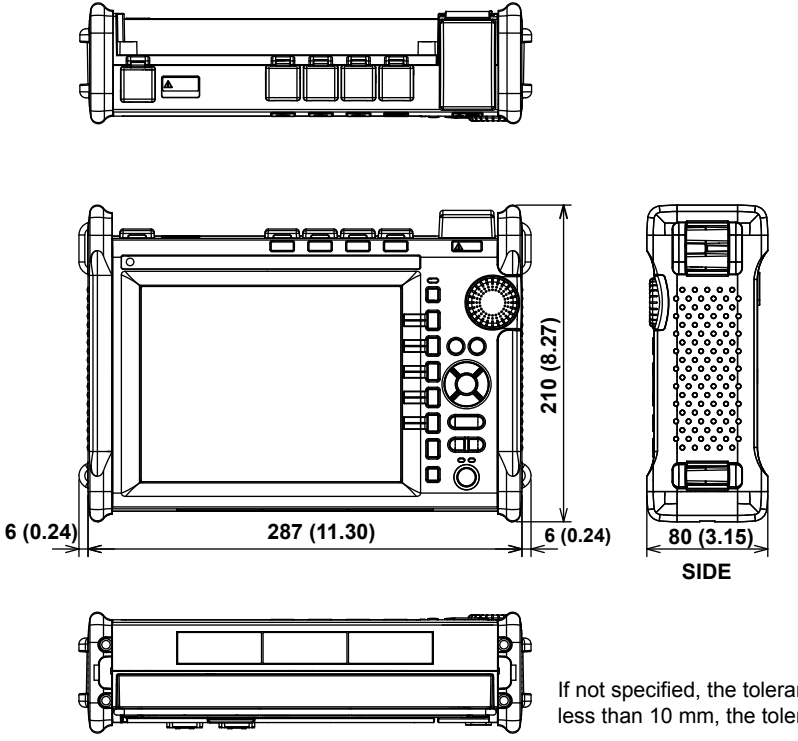
General specifications

Item		Specification
Operating environment	Ambient temperature	–10°C to 50°C (0°C to 40°C: when AC adapter is being used, 0°C to 35°C: when battery is being charged)
	Humidity	0% to 90% (no ondensation) (20 to 90% when AC adapter is being used)
	Altitude	4000 m or less
Storage environment	Ambient temperature	–20°C to 60°C
	Humidity	0% to 90% (no ondensation)
Power requirements (AC adapter)	Rated supply voltage	100 to 240 VAC
	Supply voltage accepted range	90 to 264 VAC
	Rated supply frequency	50/60 Hz
	Supply frequency accepted range	47 to 63 Hz
Battery pack	Type	Lithium-ion
	Operating time[1]	15 hours (Telcordia GR-196-CORE Issue 2 2010), 10 hours[2] (Continuous measurement)
	Recharge time[1]	6 hours
Warm up time		5 minutes or more
Safety standard[3]		Compliant standards: EN61010-1, EN 60825-1:2014 (laser safety), IEC 60825-1:2007 (laser safety), FDA 21 CFR 1040.10 (laser safety), GB7247.1-2012 (laser safety)
EMC[3]	Emissions	Compliant standards: EN61326-1 class A, EN55011 class A, group 1 EMC Regulatory Arrangement in Australia and New Zealand EN 55011 Class A, Group 1 Korea Electromagnetic Conformity Standard (한국 전자파적합성기준) This product is a Class A (for industrial environments) product. Operation of this product in a residential area may cause radio interference in which case the user will be required to correct the interference.
	Immunity	Compliant Standard: EN61326-1 Table 2 (for use in industrial locations)
Environmental Standard[3]		Compliant Standard: EN50581 Monitoring and control instruments including industrial monitoring and control instruments.

1 Typical
2 Power save mode, without an option module
3 AQ7280 OTDR mainframe together with OTDR unit, OPM module, and VLS module.

External Dimensions

AQ7280 OTDR Mainframe

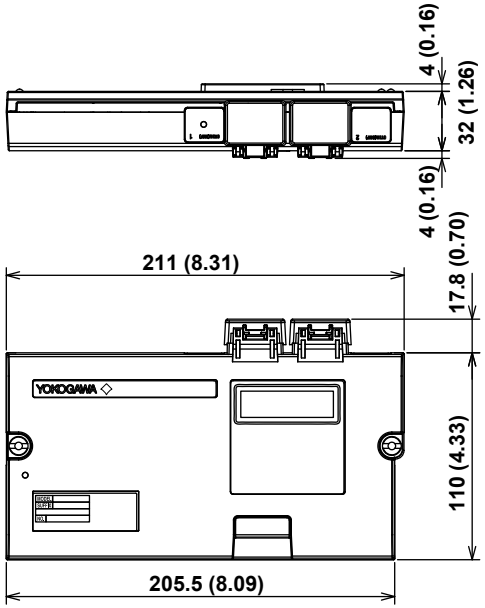


Unit: mm
(approx. inch)

If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

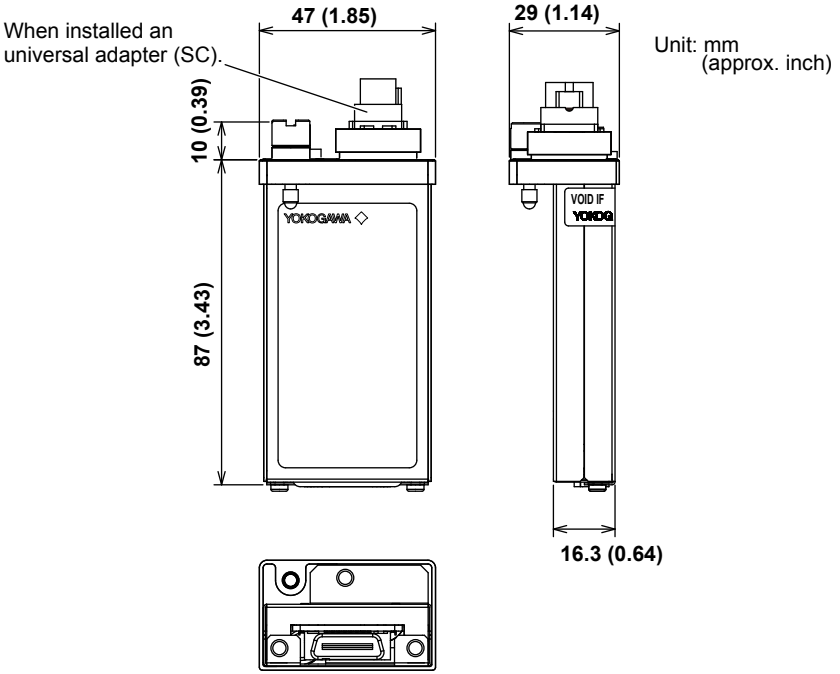
OTDR unit (AQ7282A, AQ7283A, AQ7284A, AQ7285A, AQ7283E, AQ7283F, AQ7282G, AQ7283H, AQ7284H, AQ7283J, AQ7283K, AQ7282M)

Unit: mm
(approx. inch)



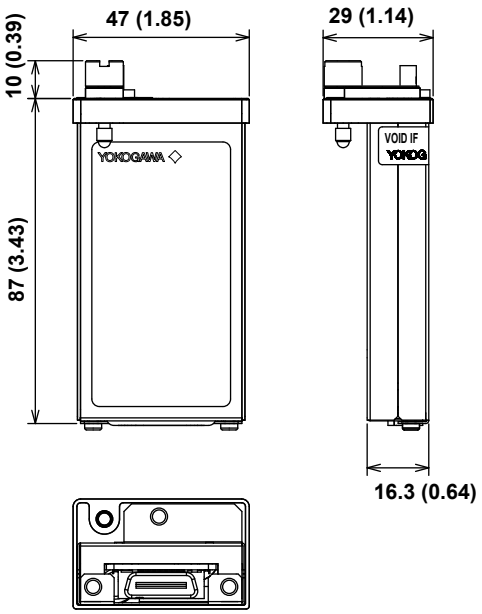
If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

Optical power meter module (AQ2780, AQ2780V, AQ2781, AQ2781V)



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

AQ4780 Visible light source module



Unit: mm
(approx. inch)

If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.