User's Manual

AQ6374E Optical Spectrum Analyzer Getting Started Guide

YOKOGAWA
Yokogawa Test & Measurement Corporation

IM AQ6374E-02EN
3rd Edition

User Registration

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

https://tmi.yokogawa.com/support/

Contact Us

If you want to resolve a technical support issue or need to contact YOKOGAWA, please fill out the inquiry form on our website.

https://tmi.yokogawa.com/contact/

Thank you for purchasing the AQ6374E Optical Spectrum Analyzer. This instrument enables high speed measurement of the optical properties of LD and LED light sources, optical amps, and other devices.
This getting started guide primarily explains the handling precautions and basic operations of this instrument. For correct operation, please read this manual thoroughly before use. After reading this manual, keep it in a convenient location for quick reference in the event a question arises during operation. The manuals for this instrument are listed on the next page. Please read all manuals.

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 improvements to the instrument's performance and functionality. Refer to our website to view our latest manuals.
- 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 contents of this manual without the permission of YOKOGAWA is strictly prohibited.

Trademarks

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- 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 companies.

Updating the Firmware

It is recommended to update the firmware to the latest version to improve the features and usability of this instrument. Download the latest firmware from the YOKOGAWA website, or contact your nearest YOKOGAWA dealer for details.

Revisions

- October 2023 1st Edition
- February 2024 2nd Edition
- November 2024 3rd Edition

3rd Edition: November 2024 (YMI)

Manuals

The following manuals, including this one, are provided as manuals for this instrument. Please read all manuals.

Manuals Included with the Product

Manual Title	Manual No.	Description
AQ6374E Optical Spectrum Analyzer Getting Started Guide	IM AQ6374E-02EN	This manual. This guide explains the handling precautions, installation procedure, basic operations, and specifications of this instrument.
AQ6374E Optical Spectrum Analyzer Request to Download Manuals	IM AQ6374E-73EN	Describes the manuals provided on the website.
Optical Spectrum Analyzer	IM AQ6360-92Z1	A document for China.
Safety Instruction Manual	IM 00C01C01-01Z1	A document for the EU.

Manuals Provided on the Website

Download the following manuals from our website.

Manual Title	Manual No.	Description
AQ6374E Optical Spectrum Analyzer User's Manual	IM AQ6374E-01EN	Explains all functions and operating procedures of the AQ6374E except remote control and program functions.
AQ6374E Optical Spectrum Analyzer Remote Control User's Manual	IM AQ6374E-17EN	Explains functions for controlling the instrument with communication commands and program functions.

For details on downloading manuals, see Request to Download AQ6374E Manuals (IM AQ6374E-73EN).

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

Online Help

The content similar to the IM AQ6374E-01EN, is included in this instrument as a help file (some the content may be omitted). For instructions on how to use the help file, see section 9.7 in the IM AQ6374E-01EN.

Checking the Contents of the Package

Unpack the box, and check the following before operating the instrument. 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.

AQ6374E Main Unit

Check that the model and suffix on the name plate on the rear of the instrument match those of your order. When contacting the dealer from which you purchased the instrument, please give them the instrument number.

Model	Suffix Code[1]	Specifications
AQ6374E		AQ6374E Optical Spectrum Analyzer
Specification	-10	Standard Model
Built-in light source	-L1	Wavelength reference source
Power Cord [2]	-D	UL/CSA standard and PSE compliant, Rated Voltage: 125 V
	-F	VDE/Korean standard, Rated Voltage: 250 V
	-R	Australian standard, Rated Voltage: 250 V
	-Q	British standard, Rated Voltage: 250 V
	-H	Chinese standard, Rated Voltage: 250 V
	-N	Brazilian standard, Rated Voltage: 250 V
	-T	Taiwanese standard, Rated Voltage: 125 V
	-B	Indian standard, Rated Voltage: 250 V
	-U	IEC Plug Type B, Rated Voltage: 250 V
	-Y	No power cord included.[3]
Options	/FC	AQ9447(FC) Connector Adapter[4]
	/SC	AQ9447(SC) Connector Adapter[4]
	/RFC	AQ9441(FC) Connector Adapter[5]
	/RSC	AQ9441(SC) Connector Adapter[5]

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

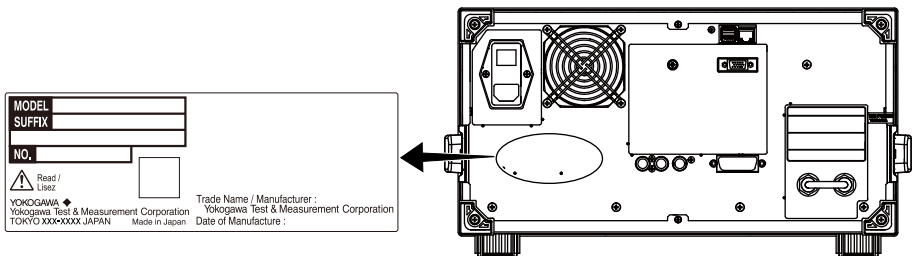
2 Make sure that the attached power cord meets the designated standards of the country and area that you are using it in.

3 Prepare a power cord that complies with the standard specified by the country or region that the instrument will be used in.

4 Already attached to the optical input of the AQ6374E front panel.

5 Already attached to the calibration light source output of the AQ6374E front panel.

- **No. (Instrument Number)**
  When contacting the dealer from which you purchased the instrument, please give them the instrument number.



Standard Accessories

The standard accessories below are supplied with the instrument. Check that all contents are present and undamaged.

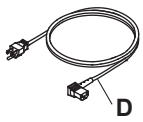
Item		Model or Part No.	Quantity	Specifications and Notes
Power cord[1]		See the figure below.	(1)	Included or not included depending on the suffix code
Rubber stoppers		A9088ZM	1	—
Manuals				
	Printed manuals	IM AQ6374E-02EN	1	Getting Started Guide (this guide)
		IM AQ6374E-73EN	1	Describes the manuals provided on the website.
		IM AQ6360-92Z1	1	Document for China
		IM 00C01C01-01Z1	1	Document for the EU.
		PIM 113-01Z2	1	List of worldwide contacts

Standard accessories are not covered by warranty.

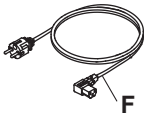
1 Make sure that the attached power cord meets the designated standards of the country and area that you are using it in. If the suffix code is -Y, a power cord is not included.

Power cord (one cord that matches the suffix code is included)[1]

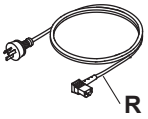
UL/CSA standard A1006WD



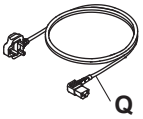
VDE standard, Korean standard A1009WD



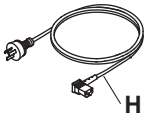
Australian standard A1024WD



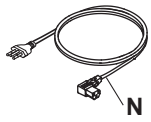
BS standard A1054WD



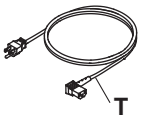
Chinese standard A1064WD



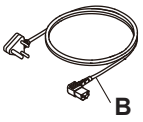
Brazilian standard A1103WD



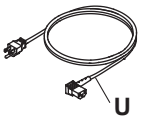
Taiwanese standard A1100WD



Indian standard A1101WD



IEC plug Type B A1102WD



Accessories (Sold Separately)

Part Name	Model or Part No.	Specifications
AQ9447 Connector Adapter	AQ9447-FC	FC connector (for optical input)
	AQ9447-SC	SC connector (for optical input)
AQ9441 Connector Adapter	AQ9441-FC	FC connector (for calibration light source output)
	AQ9441-SC	SC connector (for calibration light source output)

Conventions Used in This Manual

Prefixes k and K

Prefixes k and K used before units are distinguished as follows:

k:	Denotes 1000.	Example: 12 kg, 100 kHz
K:	Denotes 1024.	Example: 720 KB (file size)

Displayed Characters

Bold characters in procedural explanations are used to indicate panel keys and soft keys that are used in the procedure and menu items that appear on the screen.

Notes and Cautions

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.

French

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 the proper operation of the instrument.

Safety Precautions

This product is designed to be used by a person with specialized knowledge.
This instrument is an IEC safety class I instrument (provided with a terminal for protective earth grounding).
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.
This manual is part of the product and contains important information. Store this manual in a safe place close to the instrument so that you can refer to it immediately. Keep this manual until you dispose of the instrument.
YOKOGAWA assumes no liability for the customer's failure to comply with these requirements.

The following symbols are used on this instrument.

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.

Alternating current

ON (power)

OFF (power)

French

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.

Courant alternatif

Marche (alimentation)

Arrêt (alimentation

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

WARNING

Use the Instrument Only for Its Intended Purpose
This instrument is a waveform measuring device that monitors and measures electrical signals. Do not use this instrument for anything other than as a waveform measuring device.

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

Use the Correct Power supply
First, ensure that the source voltage matches the rated supply voltage of the instrument and that it is within the maximum rated voltage of the power cord you will use. Then connect the power cord.

Use the Correct Power Cord and Plug
To prevent the possibility of electric shock or fire, be sure to use the power cord for the instrument. The main power plug must be plugged into an outlet with a protective earth terminal. Do not invalidate this protection by using an extension cord without protective earth grounding. Further, do not use this power cord with other instruments.

Connect the Protective Ground Terminal
Be sure to connect the protective earth to prevent electric shock before turning ON the power. The power cord that you can use for the instrument is a three-prong cord. Connect the power cord to a properly grounded three-prong outlet.

Do Not Impair the Protective Grounding
Never cut off the internal or external protective earth wire or disconnect the wiring of the protective earth terminal. Doing so may result in electric shock or damage to the instrument.

Do Not Use When the Protection Functions Are Defective
Before using this instrument, check that the protection functions, such as the protective grounding and fuse, are working properly. If you suspect a defect, do not use the instrument.

Reference light source output light
The instrument has a built-in reference light source for wavelength calibration, and infrared light is always being output from the optical output connector. Never look into the optical output connector. Infrared light entering the eyes can cause severe injury and loss of vision.

Do Not Operate in an Explosive Atmosphere
Do not operate the instrument in the presence of flammable gases 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. The inside of the instrument is dangerous because parts of it have high voltages.

Accessories

Use the accessories specified in this manual. Moreover, use the accessories of this product only with Yokogawa products that specify them as accessories. Do not use faulty accessories.

Install or Use the Instrument in Appropriate Locations

- Do not install or use the instrument outdoors or in locations subject to rain or water.
- Install the instrument so that you can immediately remove the power cord if an abnormal or dangerous condition occurs.

CAUTION

Operating Environment Limitations

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

French

AVERTISSEMENT

Utiliser l’instrument aux seules fins pour lesquelles il est prévu
Cet instrument est un appareil de mesure de forme d’onde pour le contrôle et la mesure des signaux électriques. Ne pas utiliser cet instrument à d’autres fins que celles de mesure de forme d’onde.

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

Vérifier l’alimentation
Assurez-vous que la tension d’alimentation correspond à la tension d’alimentation nominale de l’appareil et qu’elle ne dépasse pas la plage de tension maximale du cordon d’alimentation à utiliser.

Utiliser le cordon d’alimentation et la fiche adaptés
Pour éviter tout risque de choc électrique, utiliser exclusivement le cordon d’alimentation prévu pour cet instrument. La fiche doit être branchée sur une prise secteur raccordée à la terre. En cas d’utilisation d’une rallonge, celleci doit être impérativement reliée à la terre. Par ailleurs, ne pas utiliser ce cordon d’alimentation avec d’autres instruments.

Brancher la prise de terre
Avant de mettre sous tension, veiller à brancher la mise à la terre de protection afin d’éviter les chocs électriques. Le cordon d’alimentation que vous utilisez pour l’instrument est un cordon à trois broches.
Brancher le cordon d’alimentation sur une prise de courant à trois plots et mise à la terre.

Ne pas entraver la mise à la terre de protection
Ne jamais neutraliser le fil de terre interne ou externe, ni débrancher la borne de mise à la terre. Cela pourrait entraîner un choc électrique ou endommager l’instrument.

Ne pas utiliser lorsque les fonctions de protection sont défectueuses
Avant d’utiliser l’instrument, vérifier que les fonctions de protection, telles que le raccordement à la terre et le fusible, fonctionnent correctement. En cas de dysfonctionnement possible, ne pas utiliser l’instrument.

Source de lumière de référence
Cet instrument dispose d’une source de lumière de référence intégrée pour les ajustements d’alignement. La lumière infrarouge est toujours émise depuis le connecteur de sortie optique. Ne regardez jamais directement dans le connecteur de sortie optique. La lumière infrarouge risquerait de gravement vous blesser ou de provoquer une perte de vision.

Ne pas utiliser dans un environnement explosif
Ne pas utiliser l'instrument en présence de gaz et de vapeur 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.

Relier l'instrument à la terre avant de le brancher sur des connexions externes
Toujours relier l'instrument à la terre avant de le brancher aux appareils à mesurer ou à une commande externe. Avant de toucher un circuit, mettre l'instrument hors tension et vérifier l'absence de tension. Pour éviter un choc électrique et un accident, connecter la terre des sondes ou les connecteurs d'entrée au potentiel de terre de l'appareil faisant l'objet de la mesure. La terre de chaque borne d'entrée du signal (connecteur d'entrée) de cet instrument est commune à la terre de protection de l'instrument (voir le schéma fonctionnel à l'annexe 3). Ne pas appliquer de signaux de potentiel flottant à la terre du connecteur d'entrée. Ceci est extrêmement dangereux car le potentiel de terre risque d'être court-circuité.

Catégorie de mesure
La catégorie de mesure des bornes d'entrée du signal de cet instrument est Autre (O). Ne pas l'utiliser pour mesurer l'alimentation électrique, ni pour les catégories de mesure II, III et IV.

Accessoires
Utiliser les accessoires spécifiés dans ce manuel. En outre, utiliser les accessoires de ce produit uniquement avec des produits Yokogawa pour lesquels ils sont spécifiés comme accessoires.
Ne pas utiliser d'accessoires défectueux.

Installer et utiliser l'instrument aux emplacements appropriés
- Ne pas installer, ni utiliser l'instrument à l'extérieur ou dans des lieux exposés à la pluie ou à l'eau.
- Installer l'instrument de manière à pourvoir immédiatement le débrancher du secteur en cas de fonctionnement anormal ou dangereux.

Accessoires
Utiliser les accessoires spécifiés dans ce manuel. En outre, utiliser les accessoires de ce produit uniquement avec des produits Yokogawa pour lesquels ils sont spécifiés comme accessoires.
Ne pas utiliser d'accessoires défectueux.

ATTENTION

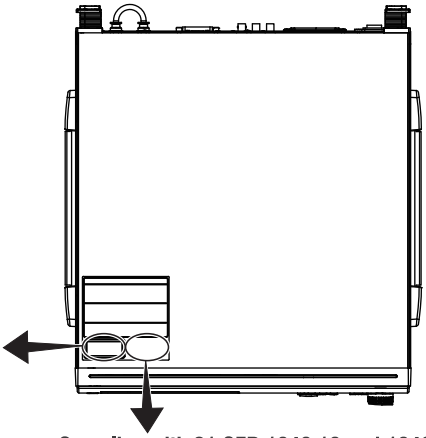
Limitations relatives à l'environnement opérationnel

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 1 laser product as defined by IEC 60825-1:2014 Safety of Laser Products-Part 1: Equipment Classification and Requirements. In addition, this instrument complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed.3., as described in Laser Notice No. 56, dated May 8, 2019.

Laser Class 1 Label
Avoid direct eye exposure.



Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.
4-9-8 Myojin-cho, Hachioji-shi,
Tokyo 192-8566, Japan

Information about the Laser Light Source Used

Class	Laser Type	Wavelength	Maximum Output Power	Diameter of Mode Field	Repetation Rate	Numerical Aperture
1	EE-LED	1.53 µm	0.3 mW	9 µm	CW	0.1

Laser classes differ depending on the standard number and year. 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.

Regulations and Sales in Each Country or Region

Waste Electrical and Electronic Equipment (WEEE)

(EU WEEE Directive valid only in the EEA* and UK WEEE Regulation in the UK)
This product complies with the WEEE marking requirement. This marking indicates that you must not discard this electrical/electronic product in domestic household waste. When disposing of products in the EEA or UK, contact your local Yokogawa office in the EEA or UK respectively.
* EEA: European Economic Area

Batteries and Waste batteries

(EU Battery Directive/Regulation valid only in the EEA and UK Battery Regulation in the UK)
Batteries are included in this product. This marking indicates they shall be sorted out and collected as ordained in the EU battery Directive/Regulation and UK battery Regulation.
Battery type: Lithium battery
When you need to replace batteries, contact your local Yokogawa office in the EEA or UK respectively.

Authorized Representative in the EEA

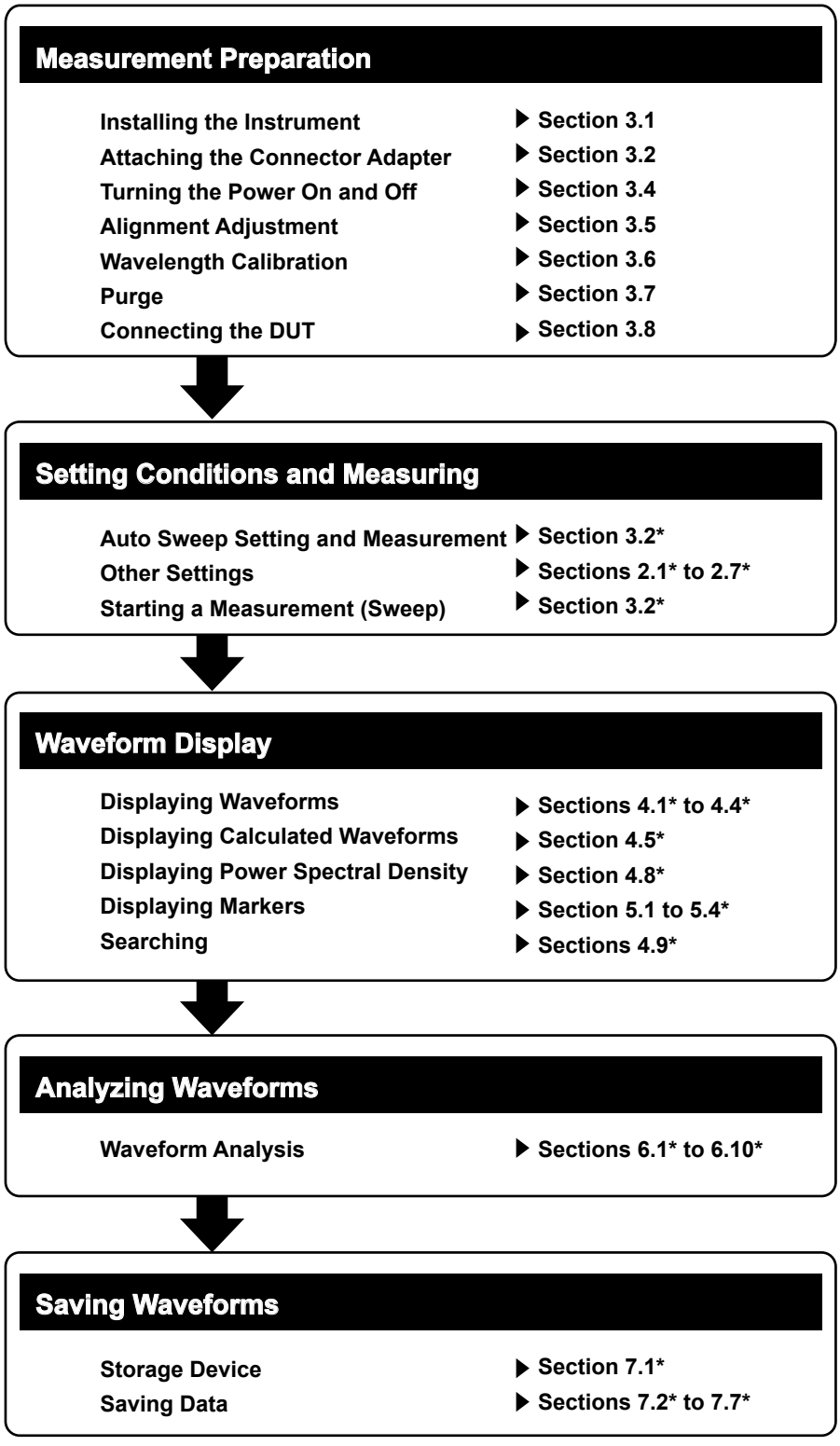
Yokogawa Europe B.V. is the authorized representative of Yokogawa Test & Measurement Corporation for this product in the EEA. To contact Yokogawa Europe B. V., see the separate list of worldwide contacts, PIM 113-01Z2.

關於在台灣銷售

This section is valid only in Taiwan.
關於在台灣所販賣的符合其相關規定的電源線 A1100WD 的限用物質含量信息，請至下麵的網址進行查詢
https://tmi.yokogawa.com/support/service-warranty-quality/product-compliance/

Flow of Operation

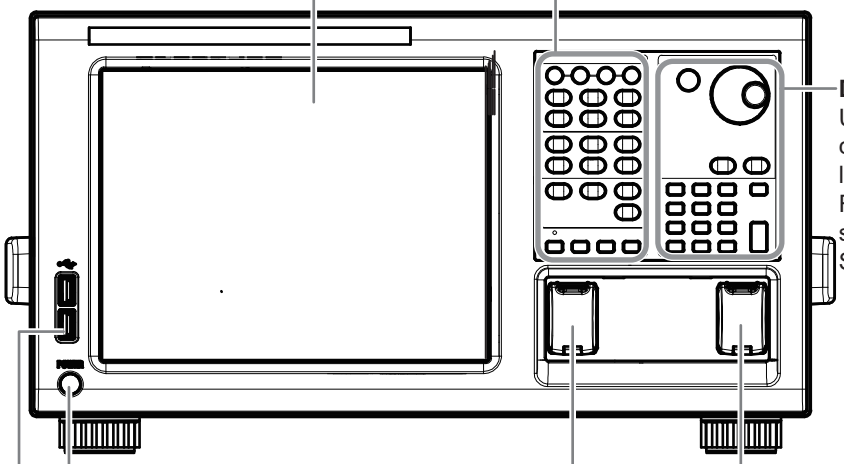
The figure below is provided to familarize the first-time user with the general flow of this instrument operation. For the details of each item, see the relevant section in IM AQ6374E-01EN or IM AQ6374E-02EN.



*** IM AQ6374E-01EN**

Contents

1.1 Front Panel



Touch panel
Displays measured waveforms, measurement conditions, measured values, and various controls.
For details on the LCD screen, see section 1.4. For details on touch panel operations, see section 4.1.

FUNCTION section
Used to enter settings pertaining to all measurements (sweep, measurement conditions, data analysis, and various functions). For details on the keys, see "DATA ENTRY Section " in section 1.3.

DATA ENTRY section
Used for measurement condition parameter input, label input, etc.
For details on the keys, see "DATA ENTRY Section " in section 1.3.

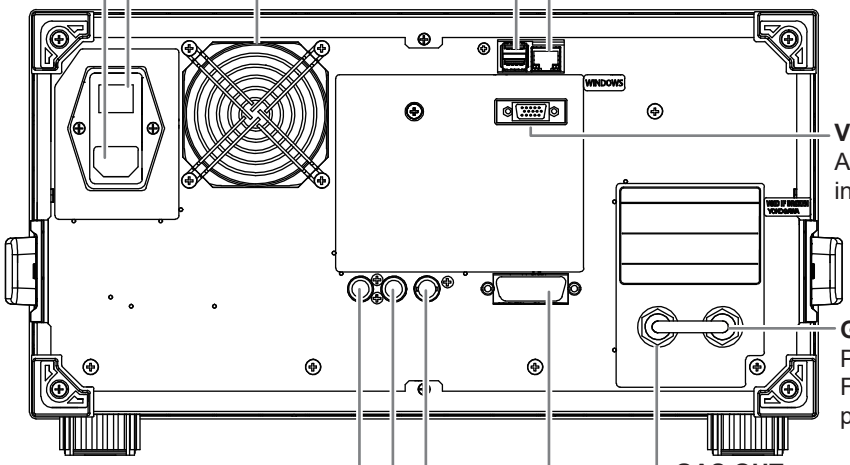
POWER
Used to start and shut down the instrument. For details on the Power ON/OFF, see section 3.4.

OPTICAL INPUT
Optical input connector. For details on the usable optical fiber cables, see section 3.9.

CALIBRATION OUTPUT
Reference light source optical output connector used for alignment adjustments and wavelength calibration, see section 3.5 and 3.6.

USB interface
Used to connect USB storage media. For details on the devices, see section 3.3.

1.2 Rear Panel



Power cord connector
Connect the power cord to this connector. For details on the Power cord, see section 3.4.

MAIN POWER
Used to turn the main power ON/OFF. For details on the Power ON/OFF, see section 3.4.

Exhaust holes

USB interface
Used to connect USB storage media. For details on the devices, see section 3.3.

ETHERNET
Ethernet Interface. For details on the Ethernet, see section 9.5 in IM AQ6374E-01EN.

VIDEO OUT (XGA)
Analog RGB video signal interface.

GAS IN
Purge gas filling port. For details on the purge, see section 3.7.

GAS OUT
Purge gas outlet port. For details on the purge, see section 3.7.

TRIGGER IN
Trigger input. For details on the trigger input, see section 3.4 in IM AQ6374E-01EN.

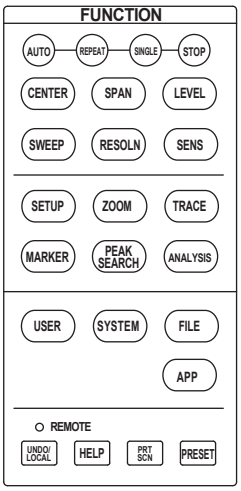
GP-IB
GP-IB port for controlling this unit through an external computer. For details on the GP-IB, see chapter 2 in IM AQ6374E-17EN.

ANALOG OUT
Analog output. For details on the analog output, see section 3.6 in IM AQ6374E-01EN.

TRIGGER OUT
Trigger output. For details on the trigger output, see section 3.5 in IM AQ6374E-01EN.

1.3 Panel Keys and Knobs

FUNCTION Section



The FUNCTION section contains 16 function keys and 8 auxiliary keys. When you press a function key, information about the function is displayed on the soft key menu located on the right side of the LCD display.

AUTO
Executes auto sweep

REPEAT
Executes repeat sweep

SINGLE
Executes single sweep

STOP
Stops sweeping

CENTER
The CENTER key contains functions related to setting the center wavelength, center frequency, and center wavenumber for measurements. The soft key functions change depending on whether the screen display mode is wavelength display mode or frequency display mode.

SPAN
The SPAN key contains functions pertaining to settings for the wavelength span, frequency span or wavenumber span being measured. The soft key functions change according to whether the screen display mode is wavelength display mode or frequency display mode.

LEVEL
The LEVEL key contains functions related to level axis settings.When you press the LEVEL key, the soft key menu for setting reference level appears.

SWEEP
The SWEEP key contains functions related to sweeping. When you press the SWEEP key, the soft key menu for sweeping appears.

RESOLN
The RESOLN key contains functions related to wavelength resolution settings. When you press the RESOLN key, the soft key menu for resolution appears.

SENS
The SENS key contains functions related to sensitivity settings. When you press the SENS key, the soft key menu for sensitivity appears.

SETUP
The SETUP key contains functions related to measurement condition settings.

ZOOM
The ZOOM key contains the zoom function, which allows the user to freely enlarge or reduce a measured waveform in order to check a small area of the measured waveform, or to check the overall waveform. This key is used to set the waveform enlarged/reduced display conditions.

TRACE
The TRACE key contains functions related to trace mode settings.

MARKER
The MARKER key contains functions related to markers.

PEAK SEARCH
The PEAK SEARCH key contains functions for searching for peaks and bottoms in measured waveforms.

ANALYSIS
The ANALYSIS key contains functions related to measured waveform analysis.

USER
Frequently used soft keys can be registered on the soft key menu in the USER key. Registering frequently used soft keys in the USER key allows you to execute frequently used functions in a small number of steps.

SYSTEM
The SYSTEM key contains system-related functions such as monochromator adjusting optical alignment, wavelength adjustment, hardware setup, and setting initialization.

FILE
Contains functions for saving and loading waveform data from the instrument's internal memory and USB storage memory.

APP
The APP key contains functions related to application functions. When you press the APP key, the screen and soft key menu for application appears.

UNDO/LOCAL
The key's function changes depending on the status of the instrument when the UNDO/LOCAL key is pressed. The following table shows the key's functions.

Status of Instrument	Function
UNDO action is allowed	If the UNDO key is pressed after changing parameter settings, changing or deleting data, etc., the previous action (change, deletion, etc.) is canceled and the state preceding that action is restored.
During user key registration	If the UNDO key is pressed during user key registration, registration mode is canceled and the soft key menu which appeared when the SYSTEM key was pressed is displayed again.
During remote control by external PC (Remote light is on)	Changes the state from the remote state back to the local state. The remote light turns off.

HELP

When you press the HELP key, a soft key menu of the currently displayed screen is displayed explanations.

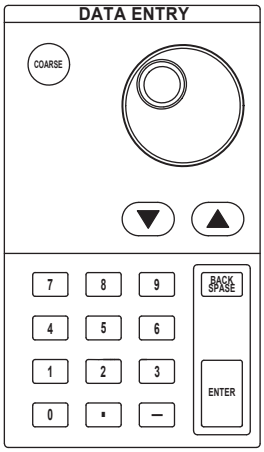
PRT SCN

The PRT SCN key is used to output the measurement screen to a file. When you press the PRT SCN key, the measured waveforms and lists displayed on the screen are output to a file.

PRESET

The PRESET key clears all internal settings of the AQ6374E except for the remote interface (ETHERNET and GP-IB) settings.

DATA ENTRY Section



This unit allows you to enter measurement conditions and various other parameters through the DATA ENTRY section. Three different entry methods can be used in the DATA ENTRY section, the rotary knob, the arrow keys, and the numeric keypad.

Rotary knob

When you press a soft key which has a parameter, the current setting is displayed in the parameter entry window. Turning the rotary knob raises or lowers the numeric value shown in the parameter entry window (turn clockwise to increase and counterclockwise to decrease), and the internal setting changes at the same time. Note that if the COARSE key is on (lamp on), the numeric value increase/decrease step will be larger.

Arrow keys (▲, ▼)

Pressing the ▲ key has the same effect as turning the rotary knob clockwise. Likewise, pressing the ▼ key has the same effect as turning the rotary knob counterclockwise. Holding an arrow key down for 0.5 second or longer activates auto-repeat. If the multi-marker function has been selected, the arrow keys can be used to scroll the marker value display in the data area.

COARSE Key

You can raise the digit of settings being entered or the increase/decrease step for numerical values. Each time you press this key the setting toggles between ON and OFF. When ON, the lamp lights.

Numeric keypad

You can enter numerical values directly into the parameter input window by pressing keys of the numeric keypad. After you have pressed a parameter soft key to display the current setting in the parameter display area, you can press a numeric keypad key to display the numeric keypad input area including the entered numeric value. If the value entered with the numeric keypad is not in the allowed value range, the nearest allowed value will be set.

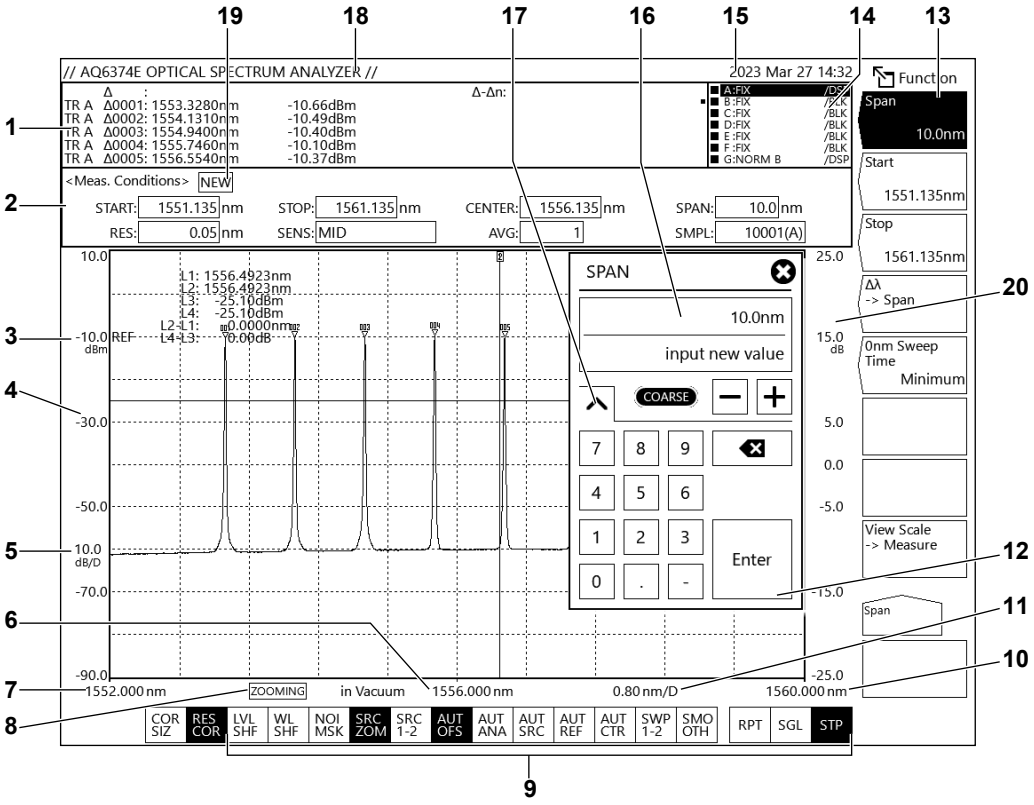
ENTER Key

Enters values input using the numeric keypad or the parameter input window.

BACK SPACE Key

Use this key if you make an error when inputting values with the numeric keypad. The last entered (right-most) character is removed, allowing entry of the correct character. By holding the BACK SPACE key down, you can erase the entire entry in the numeric keypad input area and make the numeric keypad input area disappear, returning it to the condition preceding numeric keypad input.

1.4 LCD Screen



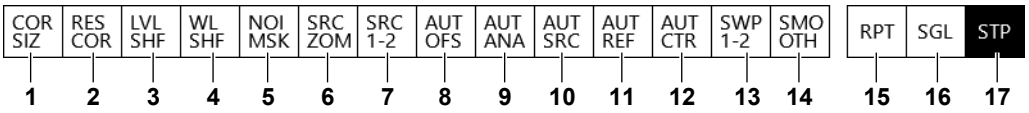
No.	Name	Function	See
1	Data area	Displays marker values and analysis results. If there are five or more data values, you can scroll the data area with arrow key..	Chapter 5*, Chapter 6*
2	Measurement conditions area	You can set a parameter directly within the frame of the value.	Section 2.1 to 2.7*
	START	Displays and sets the start wavelength, start frequency, or start wavenumber	Section 2.1*
	STOP	Displays and sets the stop wavelength, stop frequency, or stop wavenumber	Section 2.1*
	CENTER	Displays and sets the center wavelength, center frequency, or center wavenumber	Section 2.1*
	SPAN	Displays and sets the sweep span	Section 2.1*
	RES	Displays and sets the resolution	Section 2.2*
	SENS	Displays and sets the sensitivity	Section 2.4*
	AVG	Displays and sets the average times	Section 2.7*
	SMPL	Displays and sets the sampling points, or interval	Section 2.3*
3	Reference level	Displays the reference level. You can change the vertical display position of the reference level. You can set it directly by clicking the value.	Section 2.5*
4	Level axis scale	Displays the level axis value.	Section 2.5*
5	dB/D	Displays level axis scale per DIV	Section 2.5*
6	Center wavelength	Displays and sets the center wavelength or center frequency	Section 2.1*
7	Start wavelength	Displays and sets the start wavelength or start frequency	Section 2.1*

No.	Name	Function	See
8	ZOOMING	Appears when the zoom feature is in use.	Section 4.1*
9	Shortcut keys	Shortcuts to frequently used settings. You can quickly specify settings by simply clicking them. When a setting is on, the shortcut key is highlighted.	Section 1.4
10	Stop wavelength	Displays and sets the stop wavelength or stop frequency	Section 2.1*
11	Wavelength axis scale	Displays the wavelength axis scale per division. You can set it directly by clicking the value.	Section 2.1*
12	Overview screen	Appears only when the zoom feature is in use.	Section 4.1*
13	Soft key menu	For configuring various settings.	Section 4.2
14	Trace setting area	Displays the status of each trace. Click to display the setup screen.	Chapter 4*
15	Year, month, day, time		Section 4.5
16	Parameter display area	Displays the parameter entered numerical values.	Section 4.4
17	Parameter input area	Enters numerical values using the nemeric keypad.	Section 4.4
18	Label area	Up to 56 characters	Section 4.4
19	NEW	Appears when measurement conditions are changed.	Section 2.1*
20	Subscale	Displays relative levels of differential waveforms and normalized waveforms.	Section 2.6*

* See the relevant chapter or section in IM AQ6374E-01EN.

Shortcut Keys

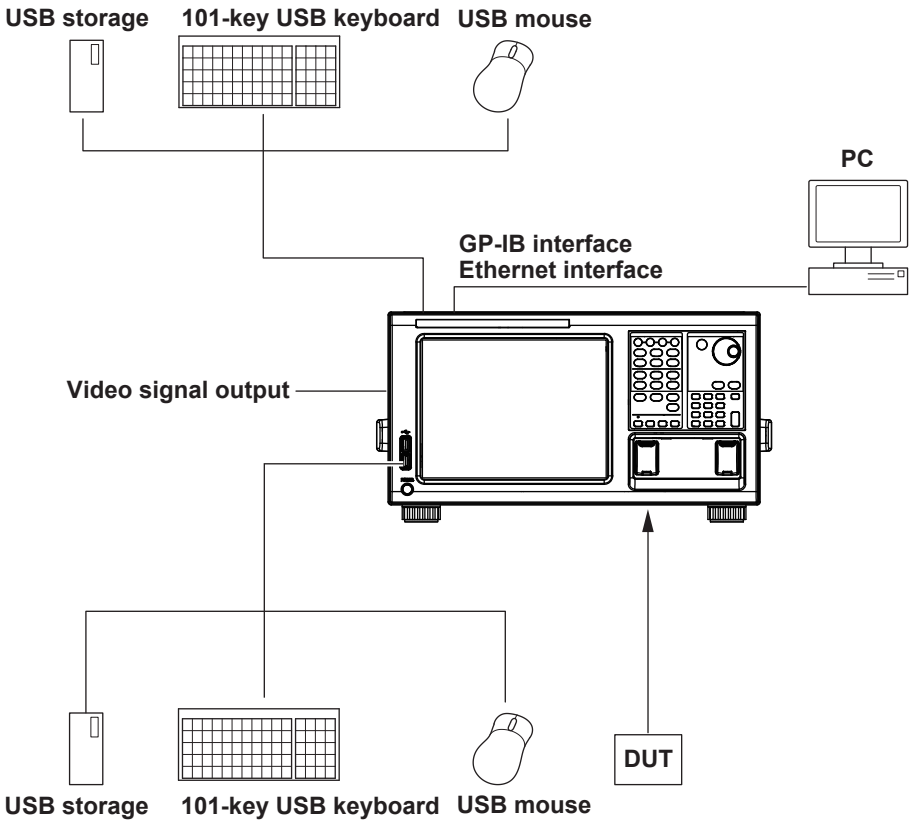
The states of frequently used settings are displayed below the waveform display area at all times.



You can change the following settings by tapping them. You can also set them using the function menus.

1	Set the optical fiber core size.	**10**	Turn on or off auto search.
2	Turn on or off resolution correction.	**11**	Turn on or off the auto configuration of the reference level.
3	Set the amount of level shift.	**12**	Turn on or off the auto configuration of the center wavelength, center frequency or center wavenumber.
4	Set the amount of wavelength shift.	**13**	Turn on or off the inter-line marker sweep.
5	Set the noise mask value.	**14**	Turn on or off smoothing.
6	Turn on or off the zoom area analysis/search.	**15**	Start a repeat sweep.
7	Turn on or off the inter-line marker analysis/ search.	**16**	Start a single sweep.
8	Turn on or off auto offset.	**17**	Stop sweeping.
9	Turn on or off auto analysis.		

2.1 System Configuration



2.2 Measurement Summary

Measurement (Details chapter 2 in IM AQ6374E-01EN)

Sweep Settings

The instrument controls its internal optical system (monochromator) and measures the optical spectrum (the optical power with respect to the wavelength).

The available sweep modes are (1) single sweep, which makes a single measurement, (2) repeat sweep, which repeats measurements using the same measurement conditions, and auto measurement, which makes measurements by automatically setting the measurement conditions to the optimal conditions. If the optimal measurement conditions are unknown, auto measurement is convenient. In addition, sweeping between markers, which makes measurements within the specified sweep wavelength range, and 0 nm sweeping, which measures the variation in the level over time with a fixed wavelength measurement point are available.

The 0 nm sweeping function is useful for aligning the optical axis when a light source is input into an optical fiber.

Measurement Condition Settings

Measurements can be performed by setting various conditions. In addition to center wavelength, span, wavelength resolution, and measurement sensitivity, a smoothing function that reduces measurement waveform noise and a function for switching between air wavelength and vacuum wavelength are available. By using the one-action key functions, you can set measurement conditions using the waveform data of the active trace (trace set as the control or calculation target). To use them, a waveform must be displayed in the active trace.

- **One-Action Keys**

One-action key name	Description
Peak Level → Ref Level	The reference level is set to the peak level of the active trace measurement waveform.
Marker → Ref Level	The reference level is set to the moving marker level.
Peak WL → Center	The center wavelength, center frequency or wavenumber is set to the peak wavelength, peak frequency or peak wavenumber of the active trace measurement waveform.
Mean WL → Center	The center wavelength, center frequency or center wavenumber is set to the RMS 20 dB center wavelength, center frequency or center wavenumber of the active trace measurement waveform.
View Scale → Measure	The measurement scale (CENTER, START, STOP, SPAN) of the next sweep to the zoom scale currently displayed.
Marker → Center	The center wavelength, center frequency or center wavenumber is set to the moving marker wavelength, frequency or wavenumber.
Δλ → Span	The sweep span is set to RMS 20 dB span × 6 of the active trace measurement waveform.
Marker L1-L2 → Span	The sweep span is set to the span between line markers 1 and 2.
Peak → Zoom Ctr	The center wavelength of the zoom display is set to the peak wavelength of the active trace measurement waveform.
Marker → Zoom Ctr	The center wavelength of the zoom display is set to the moving marker wavelength.
Marker L1-L2 → Zoom Span	The sweep span of the zoom display is set to the span between line markers 1 and 2.

Scale (Details chapter 2 in IM AQ6374E-01EN)

Vertical Scale

The vertical axis of the waveform display area has a level scale and a sub level scale, and each scale can be set to a log scale, linear scale, or dB/km scale to display optical power levels.
In addition, a power spectral density display function, which shows power per nm (dB/nm) and a noise mask function, which masks levels at or less than the specified value are available.

Horizontal Scale

The horizontal scale of the waveform display area can be set to wavelength (nm), frequency (THz) or wavenumber (cm^{-1}).
You can specify a wavelength to zoom in on a waveform or pinch out or pinch in on the touch panel to adjust the zoom display.
While the zoom display is shown, an overview window (entire waveform) is shown at the bottom of the waveform display area where you can view the zoom range.

2.3 Waveform Display

Trace (Details chapter 4 in IM AQ6374E-01EN)

Display Function

This instrument has seven independent traces in which measured waveforms and calculated waveforms are drawn.
For each trace, you can turn the waveform display on and off as well as set the trace to write mode or calculation mode.
Write mode is further divided into (1) MAX/MIN HOLD mode, which detects and writes the maximum and minimum values of each sweep, (2) roll average (sweep average) mode, which takes a cumulative average for each sweep and writes the result, and (3) FIX mode in which no writing takes place.
In calculation mode, calculated results such as calculation between traces, normalization of waveforms, and approximation (curve fitting) of waveforms can be displayed in another trace.

Marker and Search

Marker (Details chapter 5 in IM AQ6374E-01EN)

The marker function is used to place the moving marker (▼) on a displayed waveform and show the wavelength and level at the marker position.
The function can be used to easily search for peak wavelengths and peak levels. Further, by setting up to 1024 fixed markers, you can measure the wavelength difference or level difference between adjacent fixed markers and between the moving marker and a fixed marker. In addition, markers can be placed to display the power value per normalization bandwidth (power spectral density) and integrated power of a specified range.

In addition to the normal marker, there are two vertical and horizontal line markers (wavelength line marker and level line marker).
Wavelength line markers show wavelengths and wavelength difference while level line markers show levels and level difference. Line markers can be used to specify a sweep range or analysis range.

Search (Details section 4.9 in IM AQ6374E-01EN)

The peak/bottom search function can be used to detect waveform peak levels and bottom levels.
The function has two search modes: single, in which a single peak or a single bottom of the measured waveform's level are detected, and multi, in which multiple peaks and bottoms are detected in a single search.
Markers are displayed at the peak and bottom points.
There is also an auto search function that automatically performs peak/bottom searches during each sweep. This is useful when you want to observe the changes to the peak and bottom levels during repeat sweeping.

2.4 Data Analysis

Analysis Function (Details chapter 6 in IM AQ6374E-01EN)

The following analysis functions are available.

Spectral Width Measurement

The spectral width and center wavelength can be displayed using the following four calculation methods.

- THRESH
- ENVELOPE (envelope curve)
- RMS
- PEAK RMS

Notch Width Measurement

Passband/notch width can be analyzed by measuring filters with V-shaped or U-shaped wavelength characteristics.

Device Analysis

Light source parameter analysis can be performed by measuring the DFB-LD, FP-LD, LED, and TLS light sources.

- SMSR measurement of DFB-LD
  Side mode suppression ratio (SMSR) can be analyzed by measuring a DFB-LD.
- Total power measurement of FP-LD and LED
  Optical power can be analyzed by integrating the measured waveform levels.
- TLS SSER/STSSER Measurement
  Signal to Spontaneous Emission Ratio (SSER) and Signal to Total Source Spontaneous Emission Ratio (STSSER) can be analyzed by measuring the TLS device light source.

WDM Analysis

WDM transmission signals can be analyzed. The wavelength, level, wavelength spacing, SMSR, and OSNR of up to 1024 channels of WDM signals are measured collectively, and the analysis results are shown in a data table.

Optical Amplifier Measurement

The signal light to an optical amplifier and the output light from the amplifier can be measured to analyze the gain and noise figure (NF) of the amplifier.

Optical Filter Characteristics Measurement

The input light to an optical filter and the output light from the filter can be measured to analyze the characteristics of the filter.
Analysis is possible not only for single-channel optical filters but also multi-channel WDM filters.

2.5 Others Functions

Wavelength Calibration (Details in chapter 3)
The built-in reference light source can be used to perform wavelength calibration of the instrument.

USB Mouse Operation (Details in chapter 3)
You can connect a USB mouse to perform the same operations that you can perform by tapping the instrument's touch panel. Connect a USB mouse to a USB port on the instrument's front panel.

User Keys (Details chapter 9 in IM AQ6374E-01EN)
Frequently used keys can be registered in the function menu (user keys).
By registering user keys, you can execute specific operations with less steps.
Up to 24 keys can be registered. By default, none of the keys are registered.

Application Feature (APP Feature) (Details chapter 8 in IM AQ6374E-01EN)
The application feature (APP feature) is an expansion feature used to install and uninstall various dedicated software applications designed for this instrument. Various applications are available to assist with the measurement condition setup, analysis, and data saving according to the measurement target, such as DFB-LD, LED, and other light signals and WDM signals.
Add-on applications can be downloaded from YOKOGAWA webpage and installed to expand the features of the instrument.

Data Initialization (Details chapter 9 in IM AQ6374E-01EN)
Settings can be reset to their factory defaults.

Help (Details chapter 9 in IM AQ6374E-01EN)
Explanations of various settings, function menus, and keys can be shown on the instrument's screen.

Key Lock (Details chapter 9 in IM AQ6374E-01EN)
Operation of keys other than the registered user keys can be locked to prevent operation mistakes by the user.

Remote (Details in IM AQ6374E-17EN)
This instrument can be remotely controlled over a network from a PC or other controllers.

3.1 Installing the Instrument

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 Apply Shock to the Instrument

Non-horizontal orientation, and do not drop the instrument from a height of 2 cm or more. This can adversely affect the accuracy of the internal monochromator and inhibit performance.
Take great care when transporting the instrument, and use packaging with a shock absorbing capacity that is greater than or equal to the packaging used upon shipment from the factory. Never use inferior packaging materials that are unable to sufficiently absorb vibrations and shocks occurring during transport. This can adversely affect the accuracy of the internal monochromator and inhibit performance.

When unpacking

When the instrument is packaged in a box and moved, prevent condensation by allowing sufficient time for the instrument to acclimatize before removing it from the box.

French

AVERTISSEMENT

- L’instrument est prévu pour une utilisation en intérieur. Ne pas l’installer, ni l’utiliser à l’extérieur.
- Installer l’instrument de manière à pourvoir immédiatement le débrancher du secteur en cas de fonctionnement anormal ou dangereux.

ATTENTION

Ne pas heurter l'instrument

En position non horizontale et ne faites pas chuter l'instrument d'une hauteur de 2 cm ou plus. Cela risquerait d'endommager la précision du monochromateur interne et les performances de l'instrument.

Transportez l'instrument avec maintes précautions et utilisez un emballage d'une capacité d'absorption supérieure ou égale à celle de l'emballage utilisé pour la livraison depuis l'usine. N'utilisez jamais de matériaux d'emballage de qualité inférieure, incapables d'absorber correctement les vibrations et les chocs survenant au cours du transport.

Cela risquerait d'endommager la précision du monochromateur interne et les performances de l'instrument.

Déballage

Lorsque l'instrument est emballé dans un carton et transporté, évitez toute condensation en le laissant s'adapter aux conditions environnementales suffisamment longtemps avant de le retirer du carton.

Installation Conditions

Install the instrument so that the following conditions are met.

Flat Horizontal Location

Place the instrument in a stable location that is flat in all directions. If the instrument is used in an unstable or angled surface, the accuracy of the internal monochromator can be compromised.

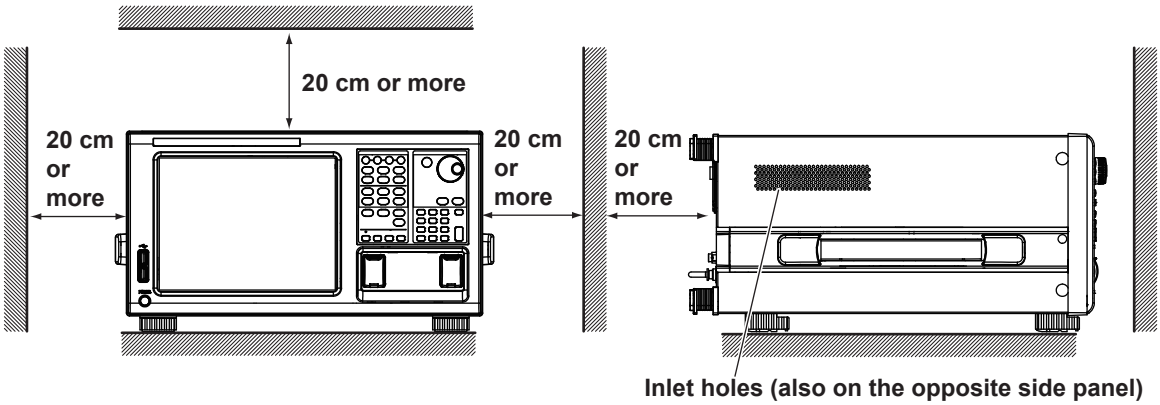
Location without Vibration

Do not install the instrument in a location subject to vibration. Use in a location that experiences large vibrations can lead to instability of operation, measurement stopping before completion, or notable decreases in accuracy of the wavelength and level axes.

Well Ventilated Location

Ventilation holes are present at the sides and rear of the instrument. To keep the internal temperature from rising, always maintain a gap of 200 mm or more between the ventilation holes and the installation surfaces.

Also be sure to maintain sufficient clearance for connecting measurement cables.



Ambient Temperature and Humidity

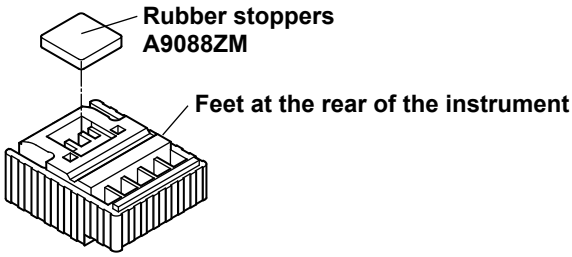
Ambient temperature: 5 to 35°C
Ambient humidity: 20%RH to 80%RH (no condensation present)

Note

Condensation may occur if the instrument is moved to another place where the ambient temperature is higher, or if the temperature changes rapidly. In such cases, allow sufficient time for the instrument to adjust to the ambient temperature before use.
When the instrument is packaged in a box and moved, prevent condensation by allowing sufficient time for the instrument to acclimatize before removing it from the box.

Flat, Even Surface

Install the instrument with the correct orientation on a stable, horizontal surface. If the instrument is installed in a horizontal position, rubber stoppers can be attached to the feet at the rear of the instrument to prevent the instrument from sliding. One set of rubber stoppers (two stoppers) are included with the instrument.



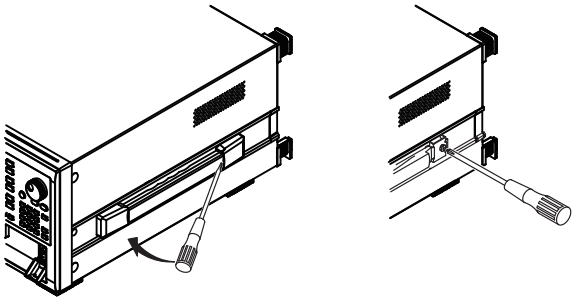
Rack Mounting

To rack-mount the instrument, use the separately sold rack mount kit.

Product Name	Model
Rack Mounting Kit for EIA Single	751535-E5
Rack Mounting Kit for JIS Single	751535-J5

An outline of the mounting procedure is given below. For detailed instructions, see the manual that is included with the rack mount kit.

1. Remove the handles from both sides of the instrument.
2. Remove the four feet from the bottom of the instrument.
3. Remove the four seals the rack mount attachment holes on each side of the instrument near the front.
4. Place seals over the feet and handle attachment holes.
5. Attach the rack mount kit to the instrument.
6. Mount the instrument on a rack.



Note

- When rack-mounting the instrument, allow at least 10 cm of space around the inlet and exhaust holes to prevent internal heating.
- Make sure to provide adequate support from the bottom of the instrument. The support should not block the inlet and exhaust holes.

Do Not Install the Instrument in the Following Places

- Outdoors.
- Dangerous locations where flammable or explosive gasses, vapors, or dust is present, or where the possibility of explosions or fires exists.
- In direct sunlight or near heat sources.
- Where an excessive amount of soot, steam, dust, or corrosive gas is present.
- Location where mechanical vibration is high.
- In an unstable place.
- Where the instrument is exposed to water or other liquids.

General Handling Precautions

Take Proper Care When Carrying the Instrument

Hold the instrument by the handles on the sides of the case. The instrument weighs approximately 19 kg. Take precautions against injuries when carrying it. Also, always turn the power switch OFF, remove the power cable, and confirm that no other cables are connected before carrying the instrument.

Do Not Place Anything on Top of the Instrument

Never stack instruments or place any other objects on top of the instrument, especially those containing water. Doing so can lead to malfunction.

Clean the Instrument Properly

When removing dirt from the case or the operation panel, disconnect the power to the circuits under test and the instrument, remove the instrument's power cord from the power outlet, then wipe gently with a clean, dry cloth. Do not use volatile chemicals since this might cause discoloring and deformation.

3.2 Attaching the Connector Adapter

Procedure

WARNING

Always turn the power OFF before replacing the connector adapter. The instrument has a built-in reference light source for wavelength calibration, and infrared light is always being output from the optical output connector. Never look into the optical output connector. Infrared light entering the eyes can cause severe injury and loss of vision.

CAUTION

- As there may be dust adhering to calibration output, be sure to clean it before attaching the connector adapter.
- Do not exhale or blow compressed air into the monochromator from the optical input. Doing so may allow dust or other materials to enter the monochromator, adversely affecting its optical performance. Also, if debris is adhering to the optical components inside the monochromator when a strong light source is input, the monochromator may be damaged.
- When attaching or removing the connector adapter, carefully insert it perpendicularly to the ferrule so as not to damage the ferrule end.
- Moving the connector adapter to the right or left or inserting it forcefully can damage the ferrule or the connector adapter.

French

AVERTISSEMENT

Toujours éteindre l’avant de remplacer l’adaptateur de connecteur.
Cet instrument dispose d’une source de lumière de référence intégrée pour les ajustements d’alignement. La lumière infrarouge est toujours émise depuis le connecteur de sortie optique. Ne regardez jamais directement dans le connecteur de sortie optique. La lumière infrarouge risquerait de gravement vous blesser ou de provoquer une perte de vision.

ATTENTION

- Comme il peut y avoir de la poussière adhérant à la sortie d'étalonnage, assurez-vous de le nettoyer avant de fixer l'adaptateur de connecteur.
- Ne pas expirer ou souffler de l'air comprimé dans le monochromateur de l'entrée optique. Cela pourrait permettre à la poussière ou d'autres matériaux pour entrer dans le monochromateur, nuire à ses performances optiques. En outre, si des débris adhère aux composants optiques à l'intérieur du monochromateur quand une forte source de lumière est entrée, le monochromateur peut être endommagé.
- Lors de la fixation ou du retrait de l'adaptateur de connecteur, insérer soigneusement perpendiculairement à la virole de manière à ne pas endommager l'extrémité virole.
- Déplacement de l'adaptateur de connecteur vers la droite ou vers la gauche ou en l'insérant de force peut endommager la virole ou de l'adaptateur de connecteur.

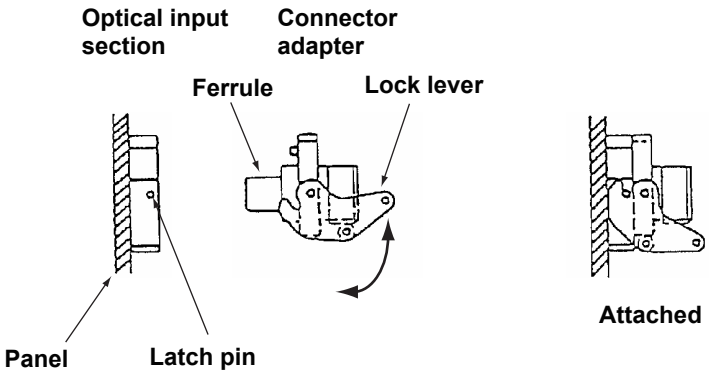
A connector adapter is required for connecting the optical connector to the AQ6374E.
On products with the /FC, /SC, /RFC, or /RSC option, connector adapters come attached to the optical input and calibration light source output on the AQ6374E front panel.
On products without these options, attach a connector adapter appropriate for the optical connector.

Note

A different connector adapter is used for OPTICAL INPUT and CALIBRATION OUTPUT.
Make sure not to use the wrong connector adapter.

Removal Procedure

1. Confirm that the power is OFF.
2. Turn the connector adapter's lock lever up. The lock lever's lock is released.
3. Pull the connector adapter all the way out.
4. Close the optical connector cover at the front of the instrument.



Attachment Procedure

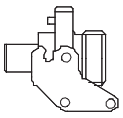
1. Confirm that the power is OFF.
2. Open the optical connector cover at the front of the instrument.
3. Clean the ferrule edge of the optical input section using a swab soaked with a small amount of pure alcohol.
4. Insert the connector adapter all the way in.
5. Push the connector adapter's lock lever down.

   The adapter has been attached correctly if the groove in the lock lever interlocks with the latch pin of the optical input/output section.

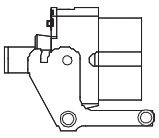
Explanation

Types of Connector Adapter

The connector adapter for internal reference light output (AQ9441) comes in the following two types.

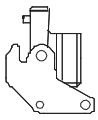


FC type

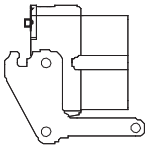


SC type

The optical input connector adapter (AQ9447) comes in the following two types.



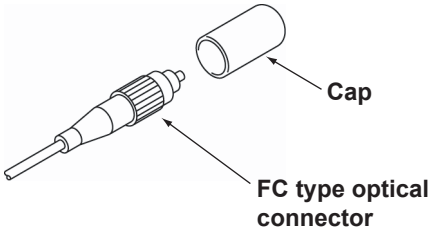
FC type

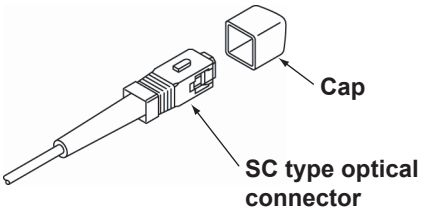


SC type

Optical Connectors Types

The instrument can use FC, or SC type optical connectors.





3.3 Connecting the Device

Connecting the Mouse

You can use a USB mouse.

Supported USB Mouse

The instrument can support a USB HID Class Ver. 1.1 compliant mouse (with wheel).

Connections

Connect a USB mouse to one of the USB interfaces on the front or rear panel of the instrument.

1. Orient the mouse connector so that it matches the orientation of the interface, then insert the connector.

Note

- There are 2 USB interfaces each on front and rear panels, but do not connect more than one mouse at a time.
- In addition to a USB mouse, the USB interfaces can be used to connect USB storage and keyboards.

For information on operations using the mouse, see section 4.3.

Connecting a Keyboard

You can connect a keyboard for entering file names, comments, and other items. Also, the functions and settings of the instrument are assigned to keyboard keys, allowing you to manipulate them with a keyboard just as you would by using the instrument's panel keys.

Supported Keyboards

The instrument supports any 101 English USB keyboard.

Connecting

Connect a USB keyboard to one of the USB interfaces on the front or rear panel of the instrument.

1. Orient the mouse connector so that it matches the orientation of the interface, then insert the connector.

Note

- There are 2 USB interfaces each on front and rear panels, but do not connect more than one keyboard at a time.
- In addition to a USB keyboard, the USB interfaces can be used to connect USB storage and a USB mouse.

For information on operations using the keyboard, see section 4.3.

Connecting a USB Storage Device

Supported USB Storage Devices

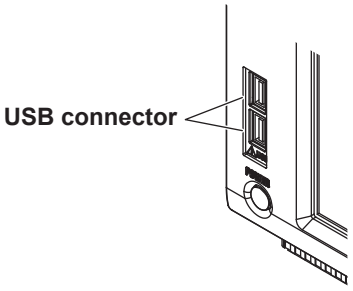
The instrument supports USB memory (USB card adapters).

You cannot use a USB storage device not recognized by the instrument. If the USB storage device's drive is partitioned, only the primary partition is recognized. If there are two or more USB storage devices, only the first connected device is recognized.

If you restart the instrument, it the USB storage devices that were connected will still be recognized.

Connections

Connect the USB storage device to the USB connector on the front panel of the instrument.



Removing

See section 7.1 in IM AQ6374E-01EN. (You will use the Remove USB Storage soft key.)

CAUTION

Do not remove the USB storage device or turn the power OFF while the USB storage device access indicator is blinking. This can damage the data on the device or the device itself.

French

ATTENTION

Ne retirez pas le dispositif de stockage USB et ne coupez pas l'alimentation lorsque le voyant d'accès au dispositif de stockage USB clignote. Cela risquerait d'endommager le dispositif ou les données se trouvant sur ce dernier.

Connecting with Other Devices

The GP-IB or Ethernet interface can be used to connect external devices to this instrument. For details, see the Remote Control User's Manual, IM AQ6374E-17EN.

Note

Before connecting a GP-IB instrument, such as an external computer, or a LCD monitor or other display to the instrument, check the wiring, and be sure to turn OFF the power to the instrument and the instruments to be connected first.

Leaving the power ON while making connections can damage the equipment.

3.4 Turning the Power ON/OFF

Before Connecting the Power

Take the following precautions before turning on the power supply. Failure to do so can result in electric shock or damage to instruments.

WARNING

- Make sure that the power supply voltage matches the instrument's rated supply voltage and that it does not exceed the maximum voltage range of the power cord to use.
- Check that the instrument's power switch is OFF before connecting the power cord.
- To prevent electric shock or fire, use the power cord for the instrument.
- Make sure to connect protective earth grounding to prevent electric shock. Connect the power cord to a three-prong power outlet with a protective earth terminal.
- Do not use an extension cord without protective earth ground. Otherwise, the protection function will be compromised.
- If there is no AC outlet that is compatible with the power cord that you will be using and you cannot ground the instrument, do not use the instrument.

French

AVERTISSEMENT

- Assurez-vous que la tension d'alimentation correspond à la tension d'alimentation nominale de l'appareil et qu'elle ne dépasse pas la plage de tension maximale du cordon d'alimentation à utiliser.
- Vérifiez que l'interrupteur d'alimentation de l'instrument est sur OFF avant de brancher le cordon d'alimentation.
- Pour éviter tout risque de choc électrique, utiliser exclusivement le cordon d'alimentation prévu pour cet instrument.
- Relier l'instrument à la terre pour éviter tout risque de choc électrique. Brancher le cordon d'alimentation sur une prise de courant à trois plots reliée à la terre.
- N'utilisez pas de rallonge si celle-ci n'est pas reliée à la terre, car la fonction de protection serait compromise.
- Si une sortie CA conforme au câble d'alimentation fourni n'est pas disponible et que vous ne pouvez pas relier l'instrument à la terre, ne l'utilisez pas.

Preparing to Turn ON the Power

The AQ6374E has a MAIN POWER switch for turning the main power ON/OFF, and a POWER switch for starting and shutting down the instrument. The POWER switch is a push-button switch; press once to turn it ON and press again to turn it OFF.

- Confirm that the MAIN POWER switch on the rear panel of the instrument is OFF.
- Connect the power cord plug to the power connector on the rear panel.
- Connect the other end of the cord to an outlet that meets the following conditions. Use a grounded three-prong outlet.

Item	
Rated supply voltage*	100 VAC to 240 VAC
Permitted supply voltage range	90 VAC to 264 VAC
Rated power supply frequency	50/60 Hz
Permitted supply frequency range	48 Hz to 63 Hz
Maximum power consumption	Approx. 100 VA

* This instrument can use a 100 V or a 200 V power supply. The maximum rated voltage differs according to the type of power cord. Check that the voltage supplied to the instrument is less than or equal to the maximum rated voltage of the power cord that you will be using before use.

Turn ON the Power

CAUTION

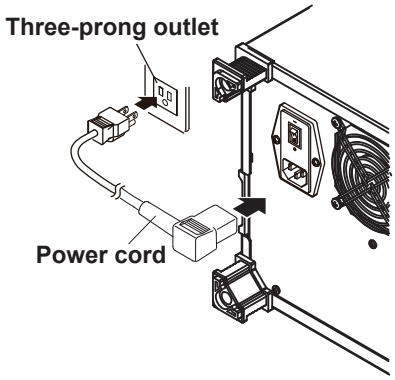
Do not input a strong light source to the instrument when turning the power ON. If a strong light source is input, the optical section can be damaged.

ATTENTION

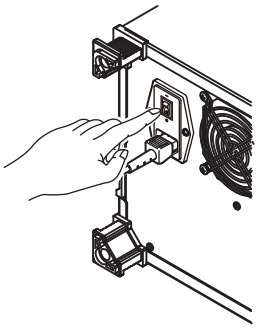
Ne retirez pas le dispositif de stockage USB et ne coupez pas l'alimentation lorsque le voyant d'accès au dispositif de stockage USB clignote. Cela risquerait d'endommager le dispositif ou les données se trouvant sur ce dernier.

Power On and Screen Display

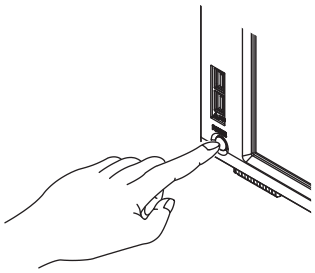
1. Connect the power cord to the power cord connector on the back side of the instrument.



2. Turn ON the **MAIN POWER** switch on the rear panel of the instrument. The POWER switch on the front panel of the instrument lights orange.



3. Wait a few seconds after step 2, and then press the POWER switch on the front panel of the instrument. The color of the switch turns from orange to green. The operating system starts up, and initialization of the instrument begins. The instrument will not start for a few seconds immediately after step 2 even if you press the POWER switch.



The initialization screen appears, and the internal initialization process starts. STEP 1/9 through STEP 9/9 are displayed in the lower right part of the screen to indicate the progress of initialization.

CAUTION

Do not press the POWER or MAIN POWER switches while initialization is in progress. Doing so can cause malfunction.

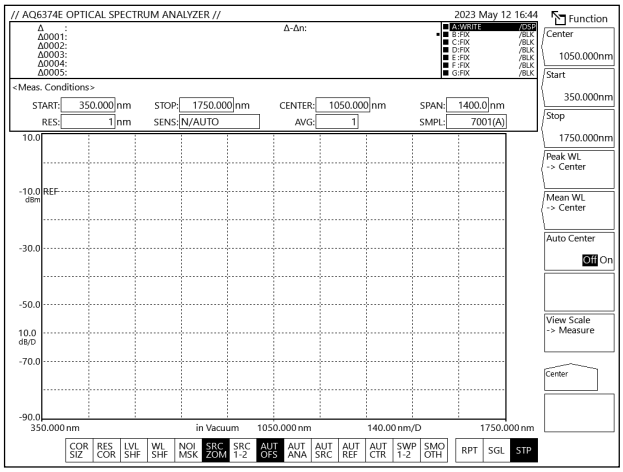
French

ATTENTION

N’appuyez pas sur les interrupteurs POWER ou MAIN POWER pendant l’initialisation. Cela pourrait provoquer des dysfonctionnements.

Operations Performed When the power is Turned On

When the initialization finishes successfully, the following measurement screen appears.



For this instrument to meet its specifications, a Wavelength Calibration and an Optical Alignment Adjustment must be performed. Please perform according to the guidelines below.

Alignment Adjustment

Always perform alignment adjustment the first time you use the instrument, if the instrument was vibrated when being moved, or if the temperature in the operating environment has changed.
Perform the alignment adjustment after a one-hour warm-up.
For details on alignment adjustment, see section 3.5.

Wavelength Calibration

Perform wavelength calibration before starting measurement (a warm-up of one hour is also required prior to measurement). Unless the Wavelength Calibration is carried out, the wavelength accuracy of the instrument cannot be guaranteed.
For details on wavelength calibration, see section 3.6.

When the Power-on Operation Does Not Finish Normally

Turn off the power switch, and check that :

- The instrument is installed properly. See section 3.1, “Installing the Instrument.”
- The power cord is connected properly. See the previous page.

If the instrument still does not work properly, contact your nearest YOKOGAWA dealer for repairs.
If a memory error or other errors occur during initialization, initialization is cancelled at the step in which the error occurs (STEP @/9, where @ is a number from 1 to 9). Then, the screen changes to the measurement screen, and a warning message is displayed.
If this occurs, repairs are necessary. Contact your nearest YOKOGAWA dealer immediately.

Turning the Power OFF

CAUTION

Do not cut the power to the instrument with the MAIN POWER switch on the rear panel when an operation is in progress. The operating system configuration file will not be backed up, possibly resulting in malfunctions upon start up the next time the instrument is turned ON. Furthermore, since the monochromator will not be retracted, transporting or moving the instrument repeatedly in this condition may damage the monochromator. Be sure to follow the above procedure to shut down the instrument. Always use the above procedure to shut down.

French

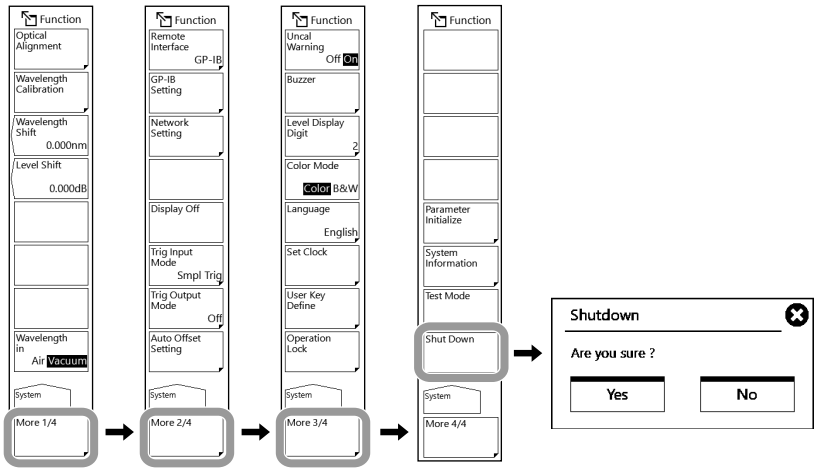
ATTENTION

Lorsque l'instrument est en cours de fonctionnement, ne coupez pas son alimentation à l'aide de l'interrupteur MAIN POWER situé sur le panneau arrière.
Le fichier de configuration du système d'exploitation ne serait pas sauvegardé, ce qui entraînerait probablement des dysfonctionnements à la prochaine mise sous tension de l'instrument. Suivez toujours la procédure ci-dessous.
En outre, le monochromateur ne se rétractant pas, le transport ou le déplacement répété de l'instrument dans cet état risque de provoquer l'endommagement du monochromateur. Veiller à suivre la procédure ci-avant pour arrêter l'instrument.

1. Press the **POWER** switch on the front panel of the instrument. A shut down confirmation message is displayed along with the **Yes** and **No**.
2. Tap the **Yes**. The message, "AQ6374E is shutting down. Please wait..." appears, and shut-down begins. If you do not wish to shut down, tap the **No**. The screen returns to the original soft key menu.
3. After the **POWER** switch changes from green to orange, turn OFF the MAIN POWER switch on the rear panel of the instrument.

You can also shut down the instrument using panel keys and soft keys.

1. Press **SYSTEM**.
2. Tap the **More** three times.
3. Tap the Shut Down. The Shutdown screen is displayed.
4. Tap the **Yes**. Shut down begins.
5. After the **POWER** switch changes from green to orange, turn OFF the **MAIN POWER** switch on the rear panel of the instrument.

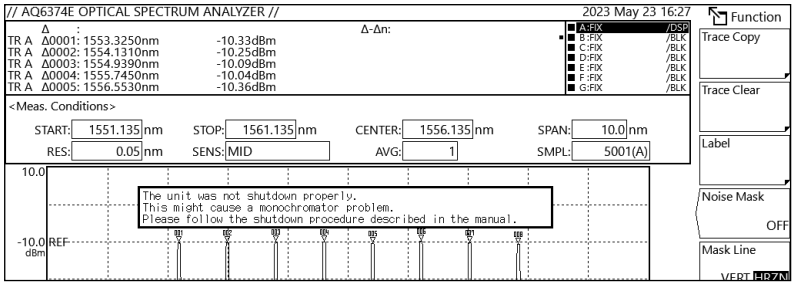


Note

If for some reason the instrument fails to shut down normally, hold down the POWER switch for approximately four seconds or longer to force standby mode. Note that the operating system configuration file will not be backed up, possibly resulting in malfunctions upon start up the next time the instrument is turned on.

Screen when the instrument was not shut down

If the shutdown procedure was not performed after the previous session, the following message appears after start up. Failure to properly shut down the instrument can result in damage to the monochromator. When turning OFF the power, always perform the shut down procedure.
Press any key to clear this message.



3.5 Alignment Adjustment

WARNING

The instrument has a built-in reference light source for wavelength calibration, and infrared light is always being output from the optical output connector. Never look into the optical output connector. Infrared light entering the eyes can cause severe injury and loss of vision.

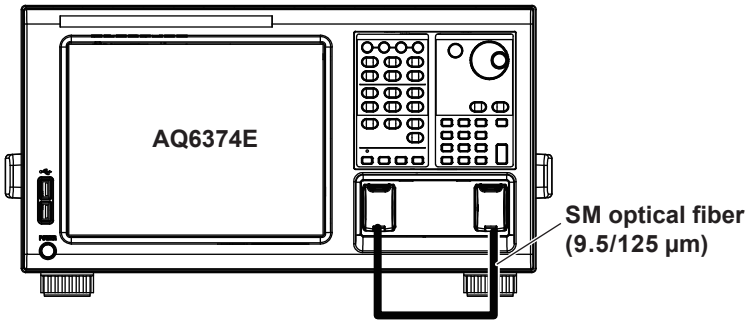
French

AVERTISSEMENT

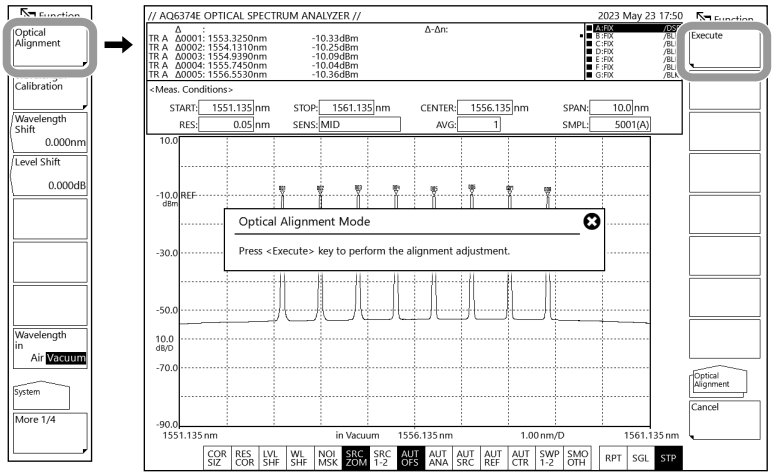
Cet instrument dispose d'une source de lumière de référence intégrée pour les ajustements d'alignement. La lumière infrarouge est toujours émise depuis le connecteur de sortie optique. Ne regardez jamais directement dans le connecteur de sortie optique. La lumière infrarouge risquerait de gravement vous blesser ou de provoquer une perte de vision.

Procedure

1. Turn the power to the instrument ON. Turn ON the **MAIN POWER** switch and press the **POWER** switch. For instructions on turning the power ON and OFF, see section 3.4.
2. Use a 9.5/125 µm SM optical fiber to connect the instrument's optical input connector with the optical output connector.



3. Press the **SYSTEM**. The system menu is displayed.
4. Tap the **Optical Alignment**.
5. Tap the **Execute**. Alignment adjustment is executed automatically by using the alignment light source built into the instrument. Adjustment finishes a few minutes thereafter, and you are returned to the original screen.



6. Tap **Cancel** to cancel alignment adjustment partway through the process.

Note

- If you are using this instrument for the first time or using it after it has been severely shaken while being moved, you must perform the alignment adjustment procedure after warm-up ends.
- After alignment has been executed, wavelength calibration is also performed automatically inside the instrument. Alignment adjustments will be incorrect if an external light source is used.
- The alignment adjustment has no effect if the process is stopped. The instrument remains in the state prior to execution of the alignment adjustment.

3.6 Wavelength Calibration

WARNING

The instrument has a built-in reference light source for wavelength calibration, and infrared light is always being output from the optical output connector. Never look into the optical output connector. Infrared light entering the eyes can cause severe injury and loss of vision.

French

AVERTISSEMENT

Cet instrument dispose d'une source de lumière de référence intégrée pour les ajustements d'alignement. La lumière infrarouge est toujours émise depuis le connecteur de sortie optique. Ne regardez jamais directement dans le connecteur de sortie optique. La lumière infrarouge risquerait de gravement vous blesser ou de provoquer une perte de vision.

Procedure

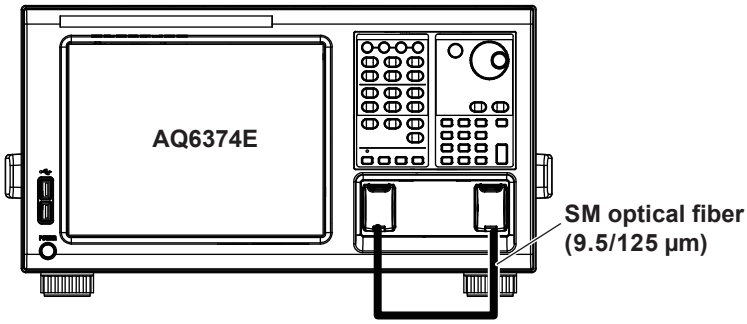
Wavelength Calibration Using the Internal Reference Light Source

1. Turn the power to the instrument ON.

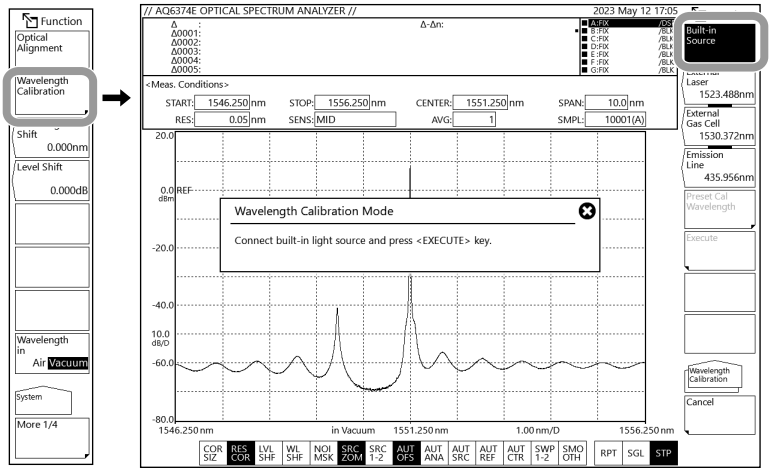
   Turn ON the **MAIN POWER** switch and press the **POWER** switch.

   For instructions on turning the power ON and OFF, see section 3.4.

2. Use a 9.5/125 µm SM optical fiber to connect the instrument's optical input connector with the optical output connector.



3. Press the **SYSTEM** key. The SYSTEM menu is displayed.
4. Tap **Wavelength Calibration**.
5. Tap **Built-in Source**.
6. Tap **Execute**. The wavelength is calibrated using the instrument's built-in reference light source. Wavelength calibration is executed for several minutes. The previous screen is displayed again after the calibration process ends.



7. Tap **Cancel** during wavelength calibration to cancel the wavelength calibration process.

Note

- Always perform wavelength calibration after turning ON the power to the instrument and allowing the warm-up to finish.
- If the wavelength error of the instrument is outside of ±5 nm, you cannot perform wavelength calibration with the internal reference light source.
  (Readjustment required. Contact your nearest Yokogawa dealer.)

Wavelength Calibration Using and External Light Source

Instead of using the internal reference light source, it is also possible to calibrate the instrument using an external light source. However, the following light sources cannot be used for wavelength calibration.

Laser type

- When the specified wavelength is different from that of the calibration light source
- If the instrument's wavelength error is greater than or equal to ±5 nm, readjustment is necessary. Contact your nearest YOKOGAWA dealer.
- If the calibration light source level is less than or equal to –40 dBm

Gas cell absorption line type

- When using a reference light source with multiple absorption lines if the instrument's wavelength deviation is greater than the wavelength spacing of the absorption lines (because the adjacent absorption line will be assumed to be the reference wavelength)

Emission Line Light Source Type

- When the specified wavelength is different from that of the calibration light source
- If multiple emission lines are included in the calibration wavelength ±0.5 nm range
- If the AQ6374E's wavelength error is greater than or equal to ±0.5 nm, recalibration is necessary. Contact your nearest YOKOGAWA dealer.
- If the calibration light source level is less than approximately -65 dBm (varies depending on the wavelength)

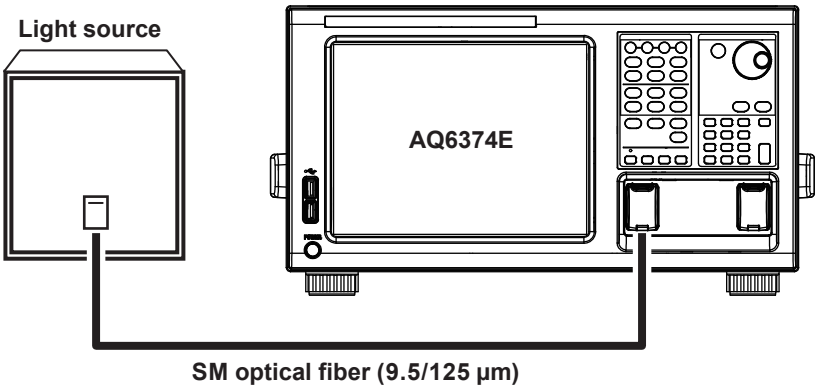
Connecting the External Light Source

1. Turn the power to the instrument ON.

Press the **MAIN POWER** switch and press the **POWER** switch.

For instructions on turning the power ON and OFF, see section 3.4.

2. Use a 9.5/125 µm SM optical fiber to connect the external light source's optical output connector with the optical input connector.



Note

- Use a 9.5/125 µm single mode optical fiber.
- If you have to use an optical fiber with a large core diameter, such as when using an external emission line light source, use an optical fiber with a core diameter of 100 µm or less. Correct wavelength calibration may not be obtained when the core diameter is larger than 100 µm.

Setting the Type of External Light Source and Calibration Wavelength Value

3. Press **SYSTEM**. The SYSTEM menu is displayed.

4. Tap the **Wavelength Calibration**.

Select the type of external light source (laser-type external light source, emission line external light source, or gas cell absorption line type external light source) and set the calibration wavelength value.

There are three different ways to set the wavelength value.

For Laser Type Light Sources

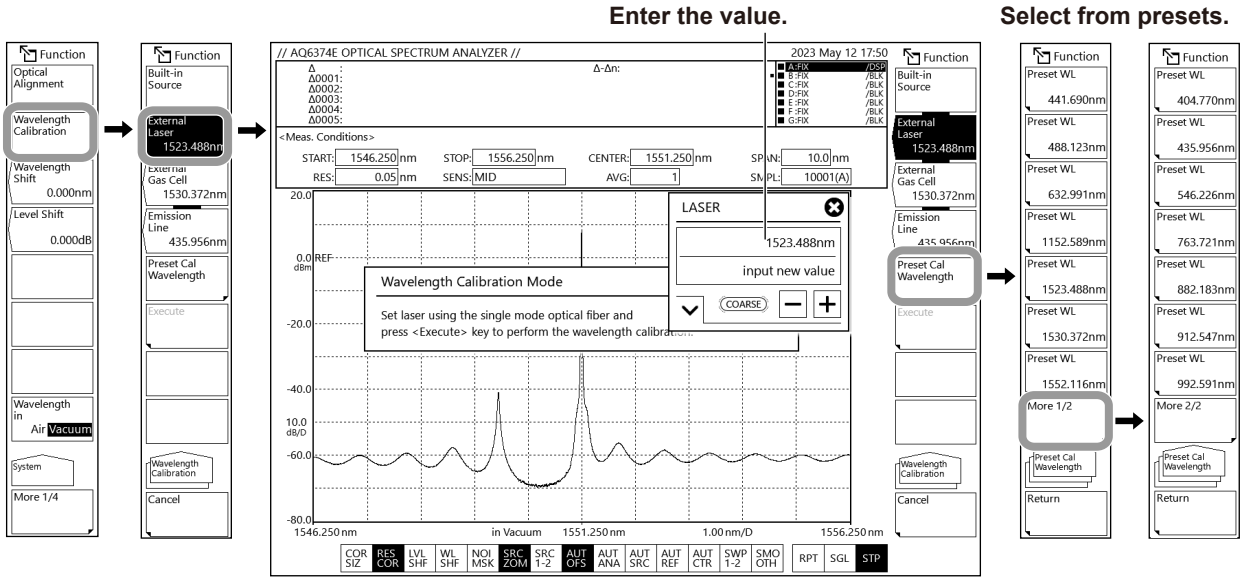
5. Tap the **External Laser**. A screen for specifying the wavelength of the external light source is displayed.

6. Select the laser wavelength value using the rotary knob or the arrow keys. The allowed wavelength range is 350–1750 nm.

7. Press **ENTER**. The wavelength value is set.

8. Tap the **Execute**. Wavelength calibration is executed. The previous screen is displayed again after the calibration process ends.

9. Tap the **Cancel** during wavelength calibration to cancel the wavelength calibration process.



For Gas Cell Absorption Line Type Light Sources

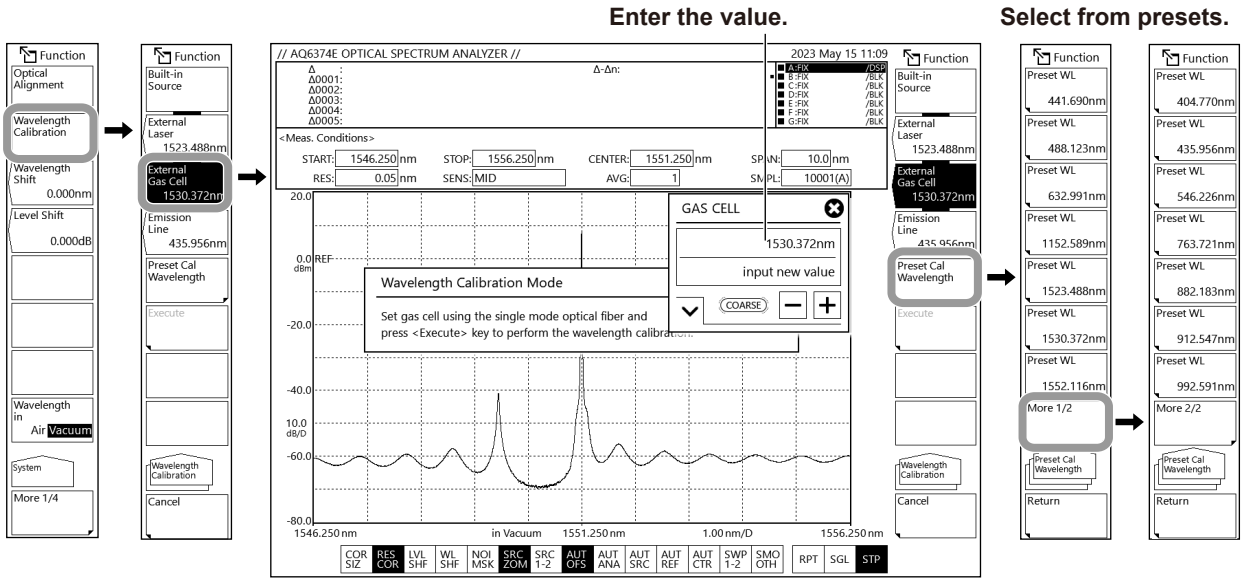
5. Tap the **External Gas** Cell. A screen for specifying the wavelength of the external light source is displayed.

6. Select the gas cell absorption line wavelength value using the rotary knob or the arrow keys. The allowed wavelength range is 350–1750 nm.

7. Press **ENTER**. The wavelength value is set.

8. Tap the **Execute**. Wavelength calibration is executed. The previous screen is displayed again after the calibration process ends.

9. Tap the **Cancel** during wavelength calibration to cancel the wavelength calibration process.



For Emission Line Light Source

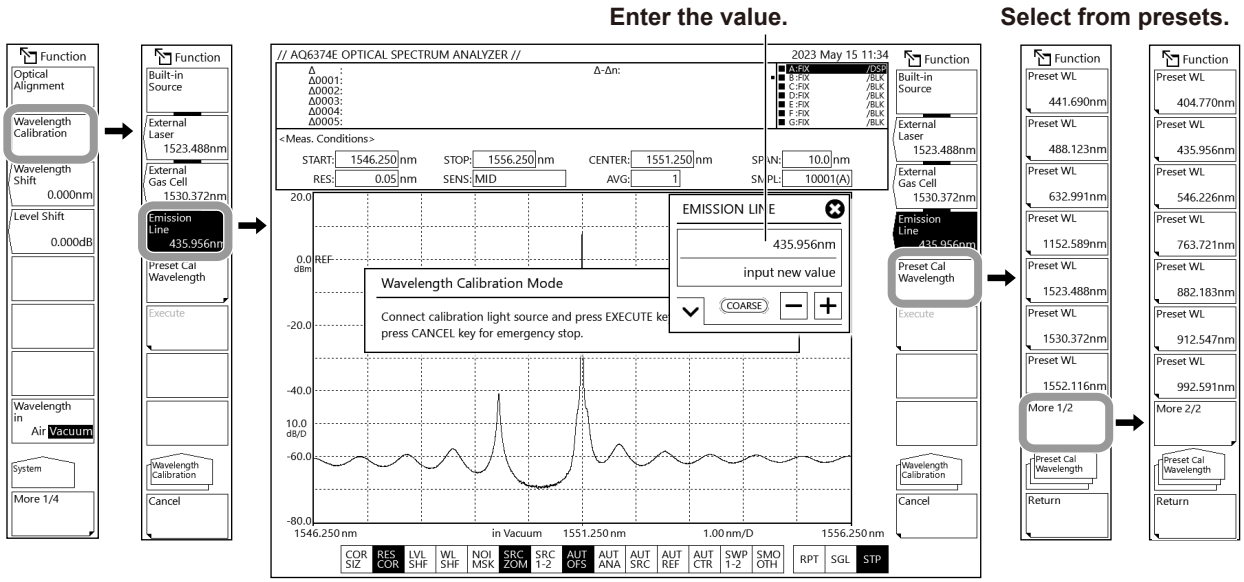
5. Tap the **Emission Line**. A screen for specifying the wavelength of the external light source is displayed.

6. Select the emission line wavelength value using the rotary knob or the arrow keys. The allowed wavelength range is 350–1750 nm.

7. Press **ENTER**. The wavelength value is set.

8. Tap the **Execute**. Wavelength calibration is executed. The previous screen is displayed again after the calibration process ends.

9. Tap the **Cancel** during wavelength calibration to cancel the wavelength calibration process.



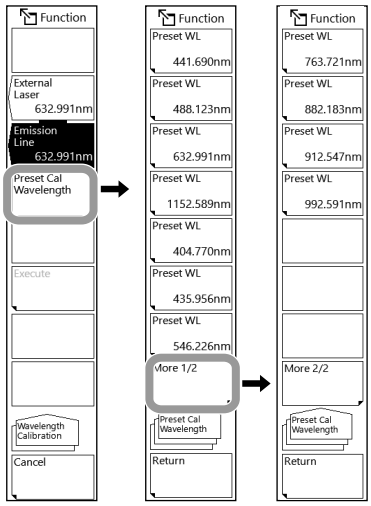
Using the Instrument's Internal Calibration Wavelength Value

5. Tap **Preset Cal Wavelength**. The function menu changes to show wavelength values.

6. Tap the function key corresponding to the appropriate wavelength value.

7. Tap **Execute**. Wavelength calibration is executed. The previous screen is displayed again after the calibration process ends.

8. Tap **Cancel** during wavelength calibration to cancel the wavelength calibration process.



Note

- Always perform wavelength calibration after turning ON the power to the instrument and allowing the warm-up to finish.
- It is not necessary to perform calibration on multiple wavelengths. If calibration is performed on multiple wavelengths, only the results from the final calibration are applied.
- When performing wavelength calibration, specify on the instrument whether the wavelength is in the air or in a vacuum. The wavelength measurement will be erroneous if the setting is incorrect. The default is wavelength in a vacuum. The wavelength value of an external light source is set as a wavelength in a vacuum. For wavelengths in the air, change the setting. For the procedure, see section 2.1 in IM AQ6374E-01EN.

Explanation

Instrument's Internal Calibration Wavelength Value

The wavelength value displayed in the soft key menu is for in the air or in a vacuum depending on the measurement wavelength setting on the instrument.

Measurement Wavelength Setting List

Wavelength in the air	Wavelength in a vacuum
441.565 nm	441.690 nm
487.986 nm	488.123 nm
632.816 nm	632.991 nm
1152.274 nm	1152.589 nm
404.656 nm	404.770 nm
435.834 nm	435.956 nm
546.074 nm	546.226 nm
763.511 nm	763.721 nm
881.941 nm	882.183 nm
912.297 nm	912.547 nm
992.319 nm	992.591 nm

3.7 Purge

CAUTION

- NEVER use a flammable gas to purge the AQ6374E.
- The purge gas must be free of moisture, oil, carbon dioxide and other reactive or infrared-absorbing materials.

French

ATTENTION

- N'utilisez JAMAIS de gaz inflammable pour purger le AQ6374E.
- Le gaz de purge doit être exempt d'humidité, d'huile, de dioxyde de carbone et d'autres matériaux absorbant le rayonnement infrarouge.

Principles and objectives

Water vapor present in the monochromator absorb light in the 1350–1450 nm area, resulting in ripples in the measurement waveform.

The AQ6374E can be purged with high purity nitrogen or purge gas in order to reduce water vapor absorption lines in the measurement results. Nitrogen gas is recommended for AQ6374E which has hygroscopic optical components and ambient water vapor may interfere with measurements.

CAUTION

The instrument warranty will be void if damage is caused by the use of inappropriate facilities.

French

ATTENTION

La garantie de l'instrument est nulle si les dommages sont causés par l'utilisation de locaux inadaptés.

Nitrogen purge equipment

The nitrogen purge equipment is NOT supplied by YOKOGAWA, but the required hardware is available from appropriate commercial suppliers.

The on/off valve, the pressure regulator, the flowmeter and the tubing must be dry, oil-free and uncontaminated.

Supply tubing

The AQ6374E has 1/4" outer diameter quick connectors on the back panel. Use clean flexible 1/4" outer diameter nylon tubing (6.35 mm inner diameter) and never use rubber tubing.

CAUTION

- Before purge with nitrogen, ensure that there is adequate ventilation in the room.
- The instrument warranty will be void if damage is caused by the use of inappropriate nitrogen and purge gas.

French

ATTENTION

- Avant toute purge à l'azote, vérifiez que la pièce est correctement ventilée.
- La garantie de l'instrument est nulle si les dommages sont causés par l'utilisation d'azote ou d'air sec inadaptés.

Purge gas

Use ultra-high purity liquid nitrogen which must be 99.9999% pure grade with the heat exchanger is recommended. The gas temperature must be 23±5°C.
If compressed nitrogen must be used, the gas must be dry, oil-free and uncontaminated. Never use compressed nitrogen from a supplier who uses oil or water in the compression process.

Maximum rating

Pressure and flow rate of purge gas must be lower than the following maximum rating.
Pressure: 1.5 psig (0.01 MPaG)
Flow rate: 25 SCFH (12 L/min)

Purge Gas Temperature Specifications

Gas temperature: 23±5°C

Note

- A pressure regulator and precision flowmeter must be used.
- Aprecision flowmeter with an adjustable needle valve is recommended.

CAUTION

The instrument warranty will be void if damage is caused by incorrect setting of pressure and flow rate.

French

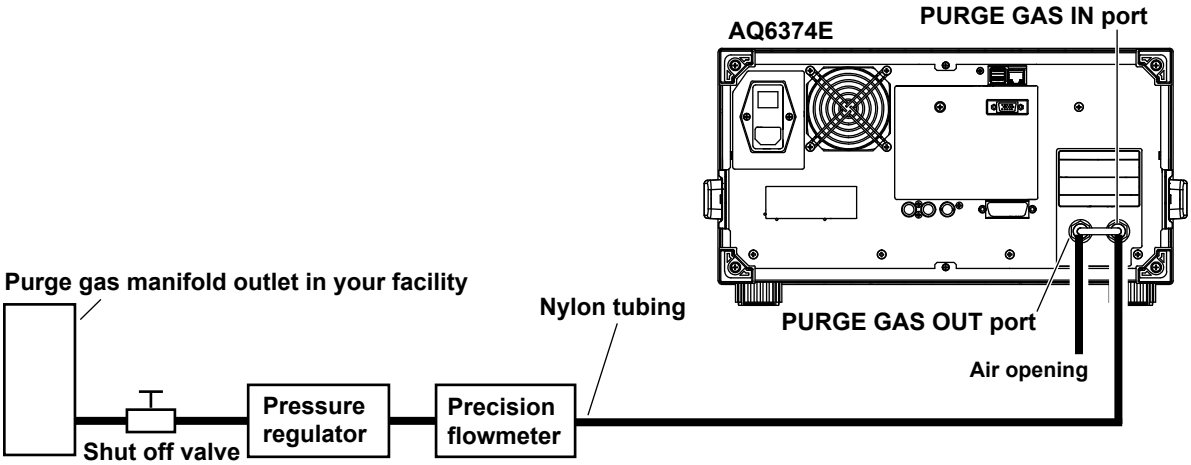
ATTENTION

La garantie de l'instrument est nulle si les dommages sont causés par un paramètre incorrect de pression ou de débit.

Installation and operation

The pressure regulator and the precision flowmeter must be inserted in the system between the purge gas manifold outlet in your facility and the AQ6374E.
Moreover, gas out port of the AQ6374E must not be blocked and be sure there is adequate ventilation in the room.

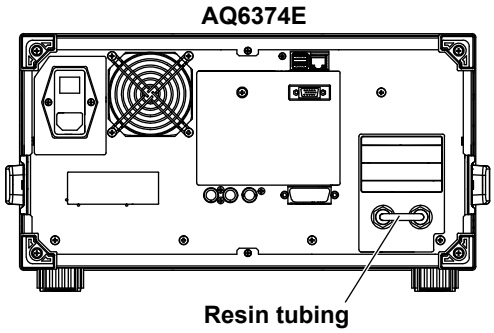
Recommended Equipments for Purge	QTY.	Comments
Shut off valve for 1/4" tubing	1	Must be free of oil
Adjustable pressure regulator	1	To regulate up to: 75 psig (0.5 MPaG)
Flowmeter with needle valve	1	To control up to: 25 SCFH (12 L/min)
1/4" outer diameter nylon tubing	As Required	Must not be rubber
Purge gas	As Required	99.9999% pure grade nitrogen gas recommended



1. Open the purge gas shut off valve then adjust the pressure regulator to provide an appropriate supply pressure below the maximum rating of the precision flowmeter.
2. Adjust the needle valve of the precision flowmeter slowly to provide an appropriate purge gas flow rate. The internal moisture of the AQ6374E can be displaced by the purge gas within approx. 60 minutes using a flow rate of 21 SCFH (10 L/min).
3. To use the AQ6374E in a purged condition, perform alignment adjustment and wavelength calibration with the internal air replaced with purge gas. See section 3.4 for details on the alignment adjustment operation, and 3.5 for wavelength calibration.

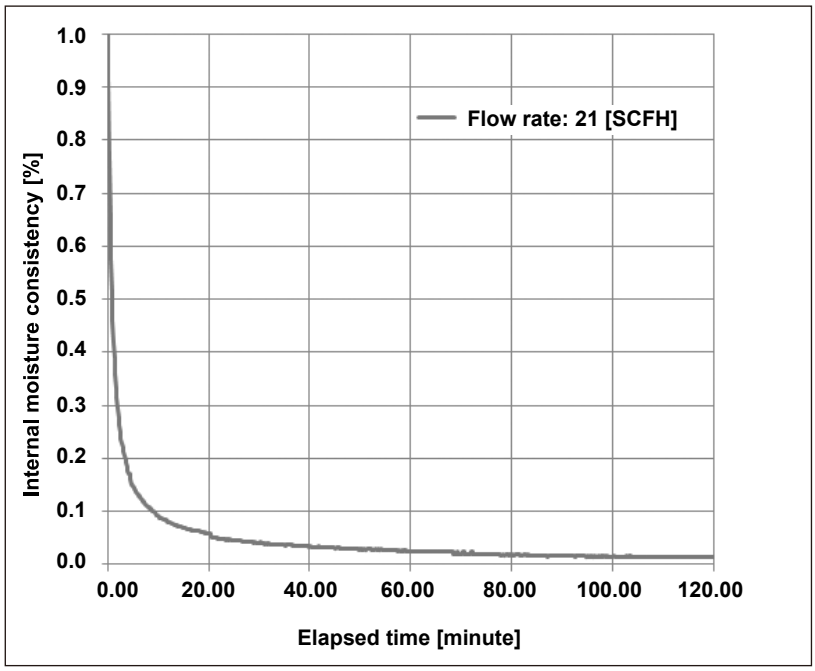
Note

When the AQ6374E is shipped from the factory, a resin tube is attached to the PURGE GAS IN and PURGE GAS OUT terminals to prevent dust from entering the inside.
When installing required equipment and components, remove this resin tube.



The recommended purge gas flow rate into the AQ6374E is 15 to 21 SCFH (10 L/min).
The figure below shows the purge efficiency by 21 SCFH pure nitrogen gas flow rate.

Purge efficiency of the AQ6374E



3.8 Connecting the DUT

WARNING

Do not look at the optical fiber laser light that you are measuring or point the laser at another person's eye. Doing so may cause eye damage or impair one's health.

CAUTION

- Before connecting an optical fiber to the instrument, make sure that the start-up initialization process has finished. If a strong light source is input during start-up, the optical section can be damaged.
- Be sure to clean the tip of the optical fiber's optical connector before connecting.
- As there may be dust adhering to calibration output, be sure to clean it before connecting optical fiber.
- Do not try to forcefully attach the optical fiber's optical connector with the plug inserted at a slanted angle. Doing so may damage the instrument's optical connector's components or the connector itself.
- Before connecting the input light, make sure that it does not exceed the AQ6374E's maximum rated level. If input light exceeding the maximum rated level is introduced, the optical section may be damaged.
- Press the optical connector hard against the cleaning surface of the special cleaner to clean it. If it is not pressed hard against the cleaning surface, it may not be possible to properly clean the optical connector.

French

AVERTISSEMENT

Ne regardez pas directement la lumière du laser à fibre optique et ne pointez pas le laser vers le yeux d'une tierce personne, pour ne pas provoquer de blessures ou de dommages oculaires.

ATTENTION

- Avant de connecter l'instrument à une fibre optique, vérifiez que la procédure d'initialisation de démarrage est terminée. Si vous connectez une source de lumière puissante au démarrage, la section optique risque d'être endommagée.
- Veillez à nettoyer l'extrémité du connecteur de la fibre optique avant le raccordement.
- Comme il peut y avoir de la poussière adhérant à la sortie d'étalonnage, assurez-vous de le nettoyer avant de fixer l'adaptateur de connecteur.
- Ne forcez pas le connecteur de la fibre optique dans la fiche en l'insérant de manière inclinée. Vous risqueriez de l'endommager ou d'endommager ses composants.
- Avant de connecter la lumière d'entrée, vérifiez qu'elle ne dépasse la valeur nominale maximale de l'analyseur AQ6374E, car si tel était le cas, la section optique pourrait être endommagée.
- Appuyez fermement le connecteur optique sur la surface nettoyante du nettoyeur. Si vous n'appuyez pas fermement, le connecteur optique risque de ne pas être correctement nettoyé.

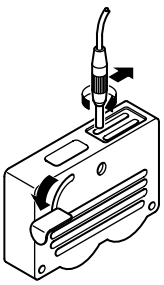
Cleaning the Optical Fiber End Face

1. Firmly press the connector end face of the optical fiber against the cleaning surface of the cleaner.

2. While pressing the end face against the cleaner, turn it once.

3. While pressing the end face against the cleaner, move it.

4. Repeat steps 1 to 3.



Note

- If you do not firmly press the connector end face of the optical fiber against the cleaner, the end face may not be cleaned completely.
- You can purchase an optical fiber connector cleaner from NTT-AT Corporation.

Connecting Optical Fibers

5. Open the instrument's optical input connector cover.

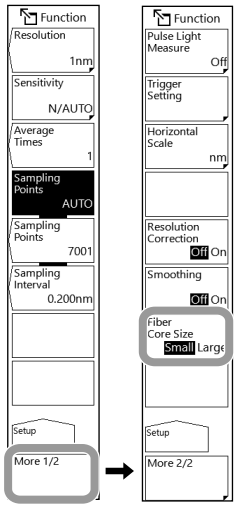
6. Connect the optical fiber's optical connector to the optical input connector on the instrument.

Setting the optical fiber core size

7. Press **SETUP**. The SETUP menu is displayed.

8. Tap the **More** one time.

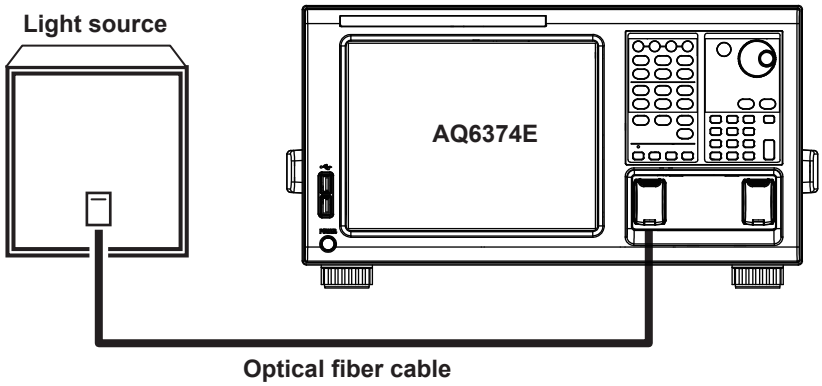
9. Tap the **Fiber Core Size**. Tapping the key repeatedly toggles between Small and Large. If the core diameter of the fiber under test is 100 µm or less, choose Small. If larger than 100 µm, choose Large.



Connecting the DUT (Light Source)

10. Clean the top of the optical connector on the other end of the optical fiber with a fiber cleaner.

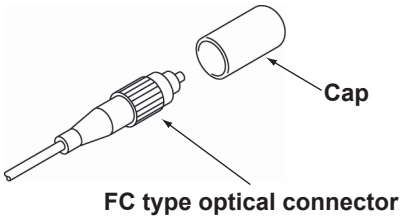
11. Connect the optical connector on the other end of the optical fiber to the optical connector on the DUT.



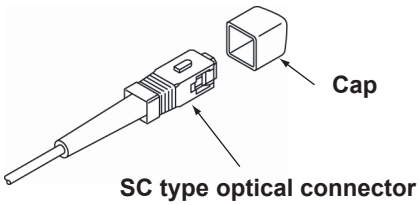
Explanation

Optical Connectors Types

The instrument can use FC, or SC type optical connectors.



FC type optical connector



SC type optical connector

3.9 Types of Optical Fibers That Can Be Used with This Instrument

Types of Optical Fibers

In addition to single mode optical fibers with core diameters of 5 to 9.5 µm, and multimode (GI) optical fibers with core diameters of 50 and 62.5 µm, the instrument can use large core size optical fibers of up to 800 µm. Functions may be limited or restricted depending on which type of optical fiber is used. The table below shows which of the typical types of fiber may be used and the limitations on their use.

- **Limitations on Wavelength Resolution**

  The maximum wavelength resolution for the instrument is 0.05 nm, which is only obtainable when using a single-mode optical fiber with a core diameter of 9.5 µm or less. As shown in Table, the maximum wavelength resolution decreases when optical fibers with thicker core diameters are used.

  Setting a resolution value finer than those shown in the table below will simply result in an inaccurate measurement level without improving resolution.

  Optical fibers with a thick core diameter are especially useful for inputting spatial light for measurement, but they have poor resolution.

  Choose the best type of optical fiber for your particular application.

  Note that the instrument is designed for input through optical fiber only. It will not work with inputs that do not pass through optical fiber, such as direct input of a gas laser beam to the optical input connector, or bonding an LED to the optical input connector. It is important to note that optical spectrum measurements taken through such inputs are completely unreliable.

  For spatial light measurements, input the spatial light to the optical fiber and from the optical fiber to the instrument. A variety of adapters are available for this purpose.

Summary of usable optical fiber types and usage limitations

Optical Fiber Type		Obtained Wavelength Resolution (in nm)	Absolute Level Accuracy	Core Size Setting
Type	Core Diameter			
SM	5	0.05	No	Small
SM	9.5	0.05	Yes	Small
GI	50	0.20	No	Small
GI	62.5	0.20	No	Small
SI	50	0.20	No	Small
SI	80	0.20	No	Small
SI	100	0.50	No	Small
SI	200	0.50	No	Large
SI	400	1.00	No	Large
SI	800	2.00	No	Large

4.1 Touch Panel Operations

Basic Touch Panel Operations

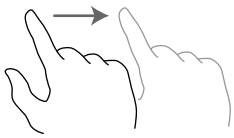
The basic touch panel operations are described below.

Tap

Tap refers to the act of gently hitting the screen with your finger.
This is used to select a menu, enter data, and so on.

Drag

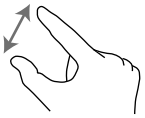
Drag refers to the act of pressing your finger against the screen and sliding your finger.
This is used to move the displayed waveform or marker position.



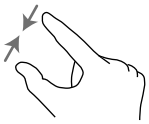
Pinch Out and Pinch In

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.

Pinch out



Pinch in



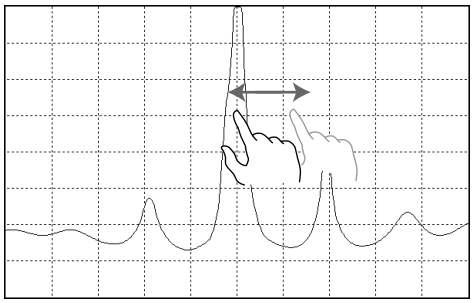
Note

For operations using a mouse or external keyboard, see section 4.3, “Using the Mouse and External Keyboard.”

Displayed Waveform Operation

Waveforms can be moved or zoomed using touch panel operation.

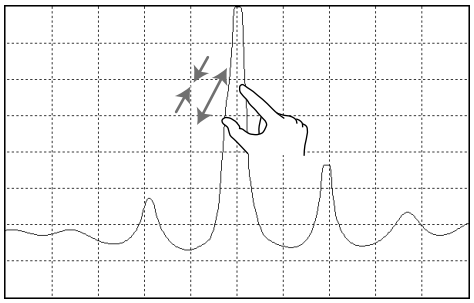
Moving a Waveform



With the waveform displayed on the screen, drag the waveform display area in any direction.

- Dragging diagonally causes movement in both vertical and horizontal directions at the same time.
- Dragging vertically or horizontally limits the movement to vertical or horizontal movement.
- When a waveform is moved vertically, the reference level also changes in sync.
- When a waveform is moved horizontally, the zoom center wavelength (center frequency or center wavenumber), the zoom start wavelength (start frequency or start wavenumber), and the zoom stop wavelength (stop frequency or stop wavenumber) also change in sync.

Zooming a Waveform

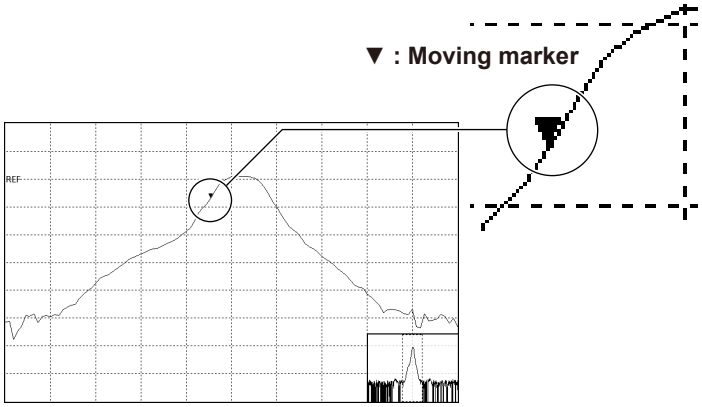


With the waveform displayed on the screen, pinch out or pinch in the waveform display area in any direction.

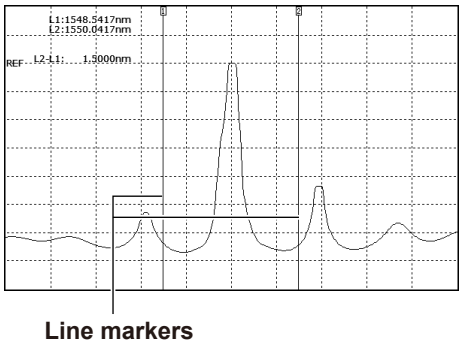
- Pinching out or pinching in vertically or horizontally limits the zoom operation to vertical or horizontal zoom.
- When a waveform is zoomed vertically, the log scale (linear scale) changes in sync.
- When a waveform is zoomed horizontally, the displayed sweep span changes in sync.
- Pinching out or pinching in diagonally causes the waveform to be zoomed both vertically and horizontally at the same time.

Marker Operation

You can move the moving marker by dragging this line horizontally.

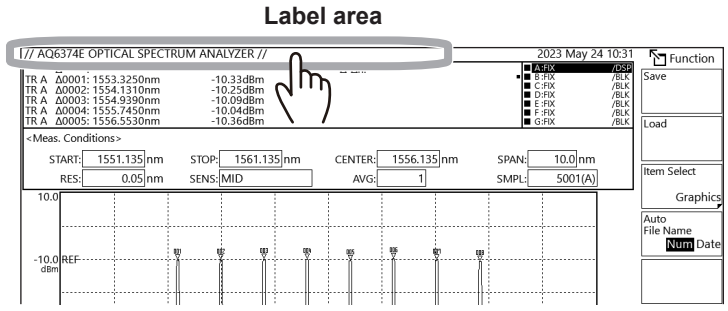


You can move a line marker by dragging the line marker line.



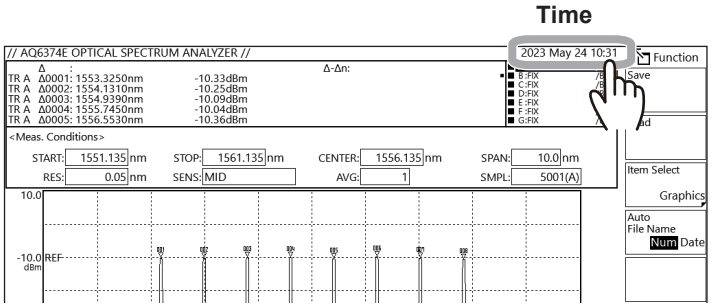
Label Operation

When you tap the label area, a keyboard appears, which you can use to enter a label.
For the procedure to enter text, see section 4.4.



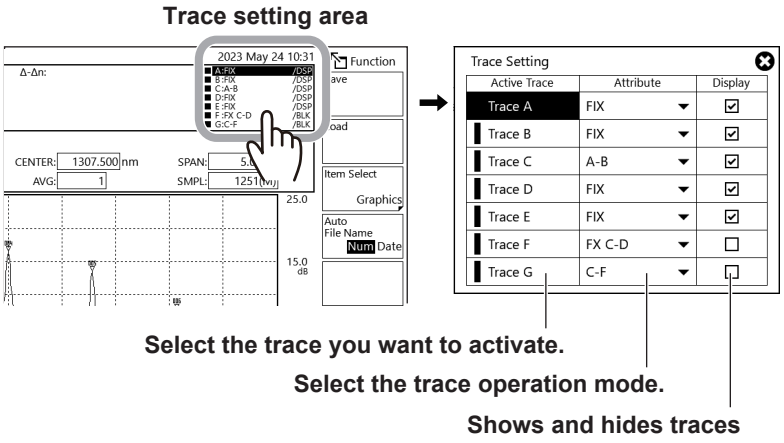
Clock Operation

When you tap the clock, a Set Clock Mode window appears, which you can use to set the clock. For the setup procedure, see section 4.5.



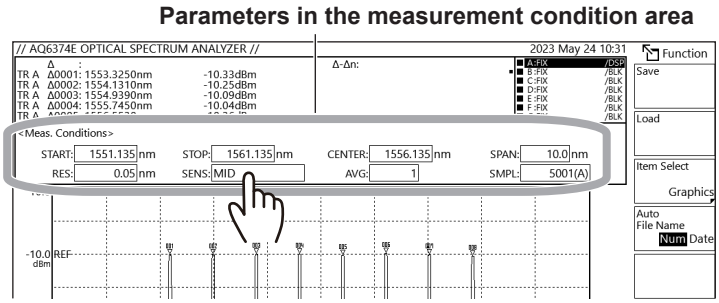
Trace Operation

When you tap the trace setting area, a Trace Setting window appears, which you can use to set the trace conditions. For details on trace functions, see chapter 4 in IM AQ6374E-01EN.

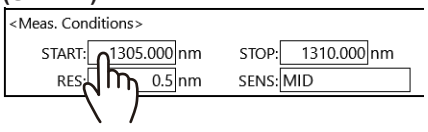


Measurement Condition Operation

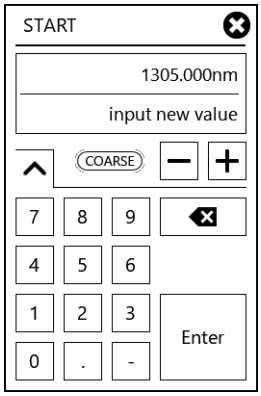
When you tap a parameter in the measurement condition area, a parameter input window or parameter selection window appears, which you can use to set the parameter.
For the setup procedure, see chapter 2 in IM AQ6374E-01EN.



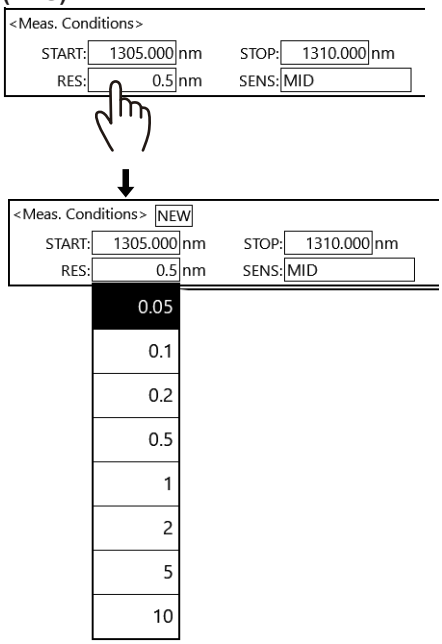
Example of a parameter input window (START)



Parameter input window (see section 4.4)



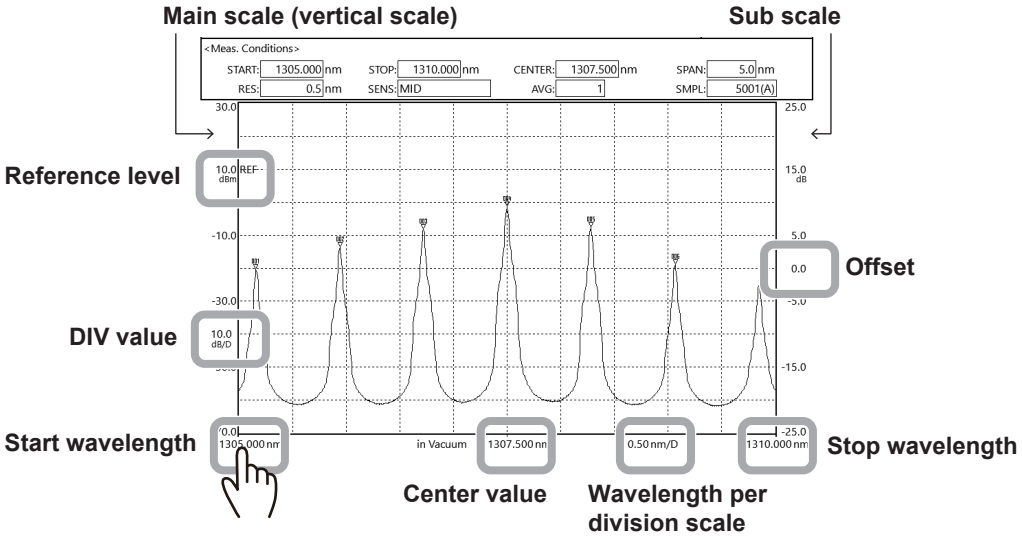
Example of a parameter selection window (RES)



Level Scale Operation (Main Scale/Sub Scale)

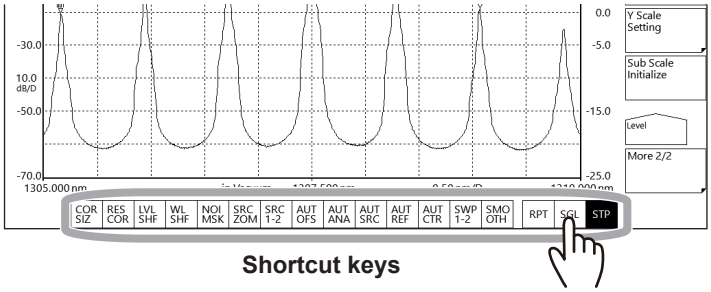
When you tap the reference level, DIV value, or the like on the main scale or the offset value or the like on the sub scale, a parameter input window or parameter selection window appears, which you can use to set the parameter.

For the setup procedure, see sections 2.5 and 2.6 in IM AQ6374E-01EN.



Shortcut Key Operation

When you tap a shortcut key at the bottom of the waveform display area, the function assigned to the key will be executed. For a description of each shortcut key, see section 1.4.



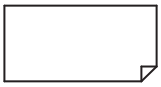
Shortcut keys

4.2 Description of Function Menu

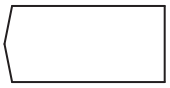
When you press a function key, the soft key menu (inside the screen) located on the right side of the screen changes. The soft key menus are designed to provide a certain level intuitiveness, with the individual soft keys having particular forms which make them easy to understand.

Forms and Behavior

This is a normal menu.
Tap to execute its function immediately.

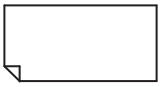


Contains a submenu.
Indicates that there is a submenu of additional items related to the current item.
Tap to display the submenu.

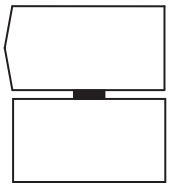


A separate window will be displayed.
Tap to display a separate window in the screen for entry of numerical parameters.
A submenu and separate window will be displayed.

Tap to move to the submenu and display a separate window.
This menu returns to the previous menu.

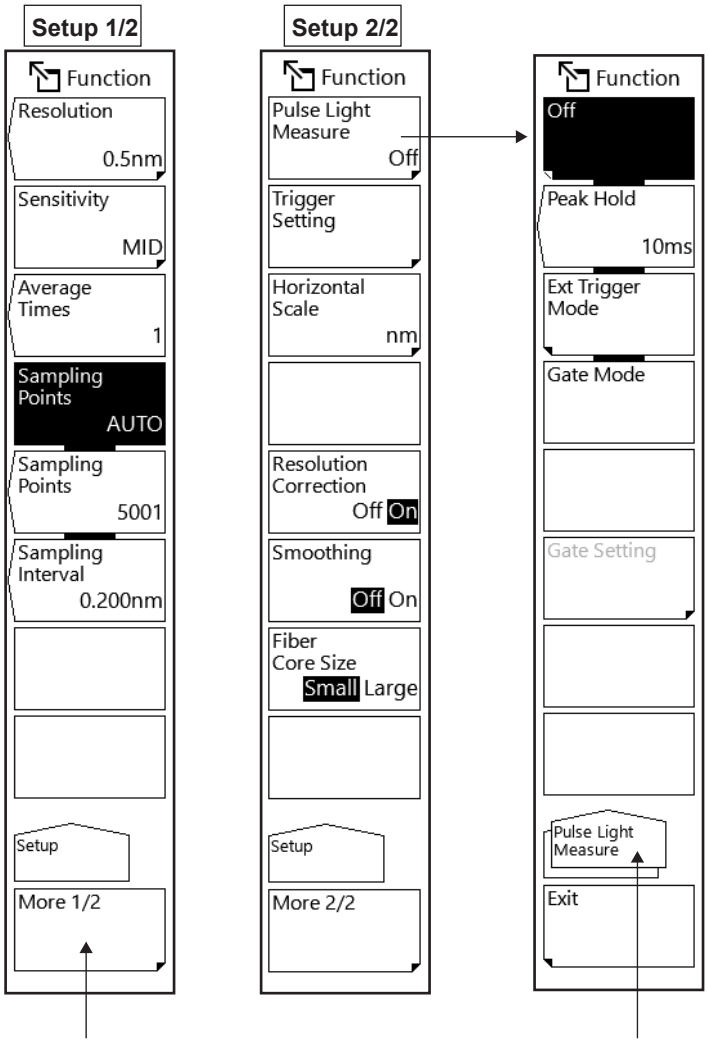


Tap to display the previous menu.
This is a selection menu.



Select one of the menus connected with the black band.
When selected, the menu is displayed in reverse video.
Several soft keys can be connected.

Display Examples



The SETUP menu is split into two parts. This key switches between the menus. In addition, in some cases this may change to a function that closes the window. For example, when the More 1/2 menu is taped, the menu changes to the Setup 2/2 menu, and the menu display changes to More 2/2.

Shows the submenu of the function menu. In this example, the function menu is within the Pulse Light Measure submenu (for display only, no menus are available).

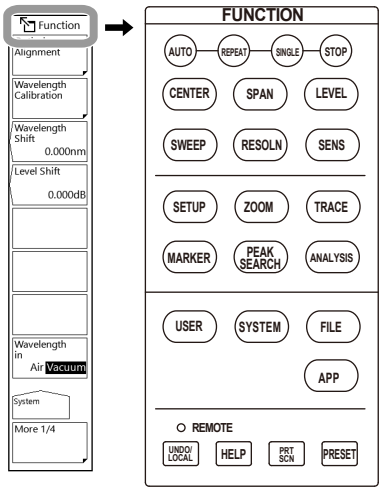
4.3 Using the Mouse and External Keyboard

Using the Mouse

With a connected mouse you can perform the same operations as with the instrument's panel keys. Also, if you move the mouse pointer over the item in the menu screen that you wish to select and click it, the instrument responds exactly as if you had pressed the corresponding soft key. The USB mouse is connected to the USB interface on the front panel of the instrument.
For instructions on connecting the mouse, see section 3.3.

Operations the Same as the Panel Keys

- **Displaying the Panel Keys Menu**
  Click the Function in the upper right of the screen. The names of the front panel keys in the instrument's FUNCTION section are displayed. You can also do the same by right-clicking the mouse.



- **Selecting Items**
  Move the pointer to the item you wish to select and click. A setting menu for the selected item appears. The list of front panel key names disappears.

- **Clearing the Panel Keys Menu**
  Move the pointer away from the panel keys menu and click.

Operations the Same as the Soft Keys

- **Selecting Functions from the Soft Key Menu**
  Move the pointer to the soft key you wish to select and click. A screen corresponding to the action of the soft key appears.

Using the External Keyboard

The functions of each of the front panel keys of the instrument are assigned to keyboard keys, allowing you to manipulate them with a keyboard just as you would by using the instrument's panel keys. The panel key correspondence table below shows the correspondences between the panel keys and the keys on the keyboard. Also, you can directly enter labels, file names, and numbers.

Panel Key Correspondence Table

Type		Function	External Keyboard	Description
FUNCTION	Sweep	SWEEP	[SHIFT]+[F1]	Executes/sets sweep
	Meas. settings	CENTER	[SHIFT]+[F2]	Sets measurement center wavelength
		SPAN	[SHIFT]+[F3]	Sets measurement span
		LEVEL	[SHIFT]+[F4]	Sets level axis
		SETUP	[SHIFT]+[F5]	Sets resolution, sensitivity, etc.
	Display settings	TRACE	[SHIFT]+[F6]	Sets trace
		ZOOM	[SHIFT]+[F7]	Sets display scale
		DISPLAY	[SHIFT]+[F8]	Sets screen display
	Analysis functions	MARKER	[SHIFT]+[F9]	Sets marker
		SEARCH	[SHIFT]+[F10]	PEAK/BOTTOM search function
		ANALYSIS	[SHIFT]+[F11]	Sets analysis function
	Other	USER	[ALT]+[F1]	User settings menu
		FILE	[ALT]+[F3]	Saves/opens files, file actions
		APP	[ALT]+[F5]	Application function
		SYSTEM	[ALT]+[F6]	System settings
Auxiliary keys		UNDO/LOCAL	[ALT]+[F9]	Local: UNDO function Remote: Returns to the local state.
		PRT SCN	[ALT]+[F10]	Screen copy
		PRESET	[ALT]+[F11]	Clears settings except remote settings
		HELP	[ALT]+[F12]	Displays Help (use UNDO/LOCAL to exit Help)
DATA ENTRY		Numeric keypad	0123456789.-	Numeric value input
		BACK SPACE	Back Space	Deletes one character from input value
		um/ENTER	None	Confirms entry
		nm/ENTER	ENTER	Confirms entry
		Rotary knob	[→],[←]	Changes numeric values/items
		Arrow keys ([UP] [DOWN])	[↑],[↓]	Numeric value one-step change, item change, table scrolling
		COARSE	[ALT]+[N]	Switches between fine and coarse encoder

4.4 Entering Numerical Values and Strings

Entering Numerical Values

You can use the numeric keypad, rotary knob, or arrow keys in the DATA ENTRY section.

1. Tap the function menu of a parameter. The currently set value is shown in the parameter input window.

Direct Entry Using the Numeric Keypad

2. Press a **numeric keypad** key. The numeric keypad input area appears, and the number of the pressed key is displayed.
3. After entering the value, press **ENTER**. The value in the numeric keypad input area appears in the parameter input window, and is set internally.

If you make an error when inputting values with the numeric keypad:

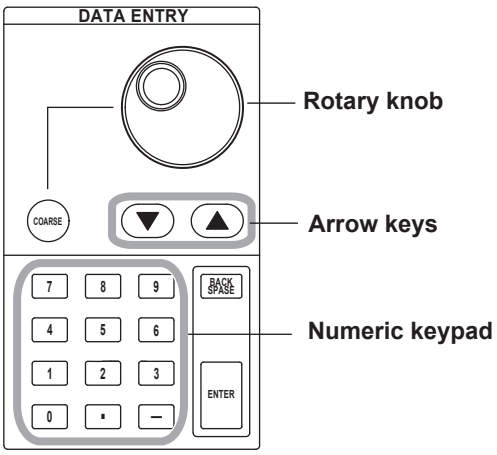
4. Press **BACK SPACE** key. The last (right-most) entered character in the numeric keypad input area is removed, allowing entry of the correct character.

Note

- If the value entered with the numeric keypad is not in the allowed value range, the nearest allowed value will be set.
- By holding the BACK SPACE key down, you can erase the entire entry in the numeric keypad input area and make the numeric keypad input area disappear, returning to the condition preceding numeric keypad input.

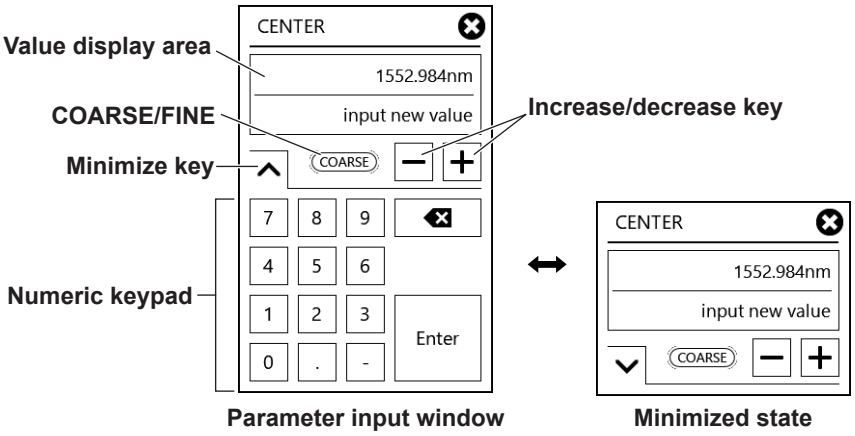
Entry Using the Rotary Knob and Arrow Keys

2. Continuing on from step 1, turn the **rotary knob**, or press an **arrow key**. The currently set value is changed.
3. When you press the **COARSE** key the digit of the setting to be changed rises, or the numeric value increase/decrease step increases. Press the **COARSE** key again to restore the previous digit/step. When COARSE is selected, the COARSE key lights.



Using the parameter input window

1. Tap a key of a function menu with parameters. A parameter input window appears, and the current value is displayed in the value display area.
2. Tap the **numeric keypad** to input a value. The input value appears below the current value.
   To correct a value, tap (backspace) to delete numbers from the right, and enter the correct numbers.
3. After entering a value, tap **nm/ENT** depending on the parameter unit.
   The value is applied.
4. Tap to close the parameter input window.



Note

If the value entered with the numeric keypad is not in the allowed value range, the nearest allowed value will be set.

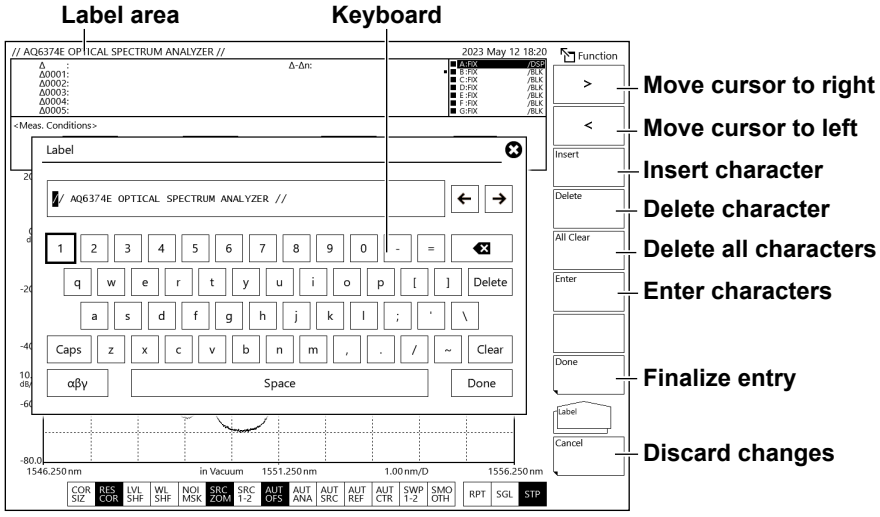
Entering Strings

Use the keyboard that appears on the screen to enter character strings.

Entry Procedure

The following is an example of entering a label.

1. Tap the label area. A keyboard appears.



2. Tap a position in the character input area where you want to input characters to move the cursor to that position.

You can also use the function menu to move the cursor, insert characters, delete all characters, and so on.

3. Tap a character on the keyboard to input the character.

Tap **Enter** on the function menu to enter the character selected on the keyboard.

4. To finish character string input, tap **Done**. The input character string is confirmed.

Note

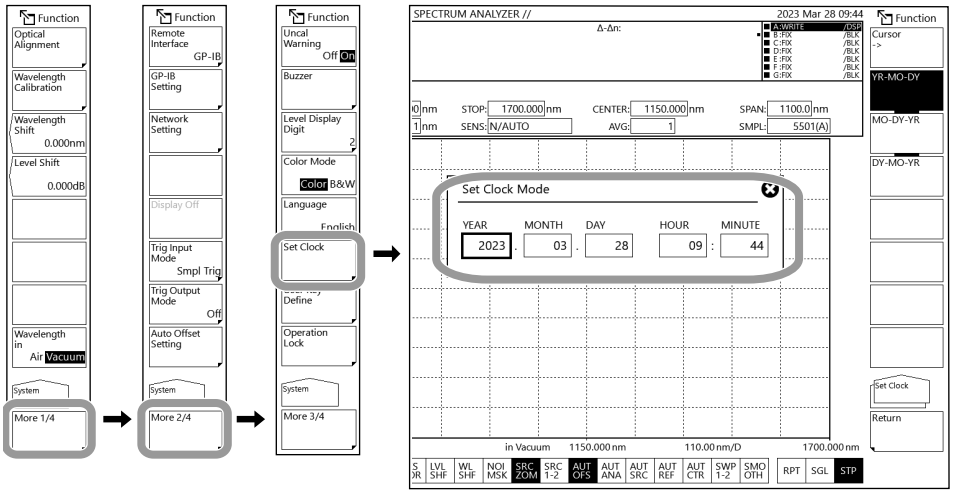
- You can also enter numbers directly from the numeric keypad of an external keyboard.
- Numerical input can be performed directly from the numeric key pad.

4.5 Setting the Date and Time

The AQ6374E displays the date and time in the upper right corner of the screen.
This information is used for a time stamp when recording data.

Displaying the Date and Time Dialog Box

1. Press the SYSTEM key. The SYSTEM menu is displayed.
2. Tap the **More** two times. The function menu switches to the More 3/4 menu.
3. Tap the **Set Clock**. The internal clock setting screen is displayed.



Entering the Date and Time

4. Tap the value you want to set. The cursor moves to the value you tapped, and a parameter input window appears.

   The cursor position also moves by tapping **Cursor**→ on the function menu.

5. Use the numeric keypad to input a value.
6. Tap the **nm/ENT**. The input value is confirmed.

Changing the Display Format

7. Tap **MO-DY-YR**. The date is displayed in the order Month, Day, Year.

   Tap **DY-MO-YR**. The date is displayed in the order Day, Month, Year.

   Tap **YR-MO-DY**. The date is displayed in the order Year, Month, Day.

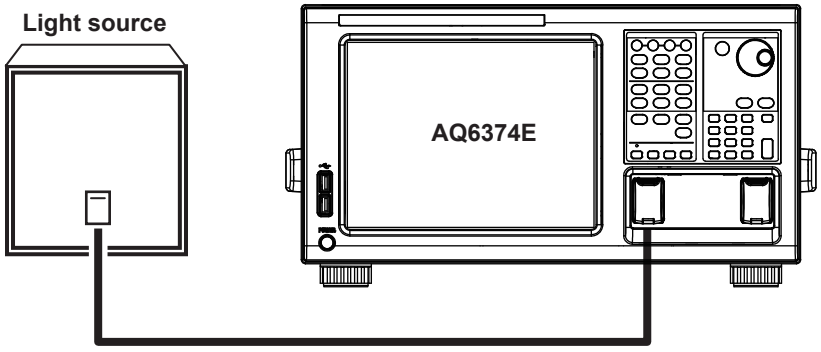
Concluding the Settings

8. Tap **Return**. The settings are concluded, and the screen returns to the previous stage.

5.1 Inspection of Wavelength Accuracy

Perform a check of the instrument's wavelength accuracy.

Use a light source such as a gas laser whose wavelength accuracy is known.



Procedure

1. Connect a light source to the instrument as shown in the figure above, then measure spectrums of the light source.

   Confirm that the THRESH 3 dB center wavelength of the measured spectrum matches the wavelength of the light source (is within the wavelength accuracy standard).

   For more information, see section 6.2, "Spectrum Width Measurement," in IM AQ6374E-01EN.

2. If the wavelength error is large, use the internal reference light source to calibrate wavelengths.

   For the calibration procedure, see section 3.6.

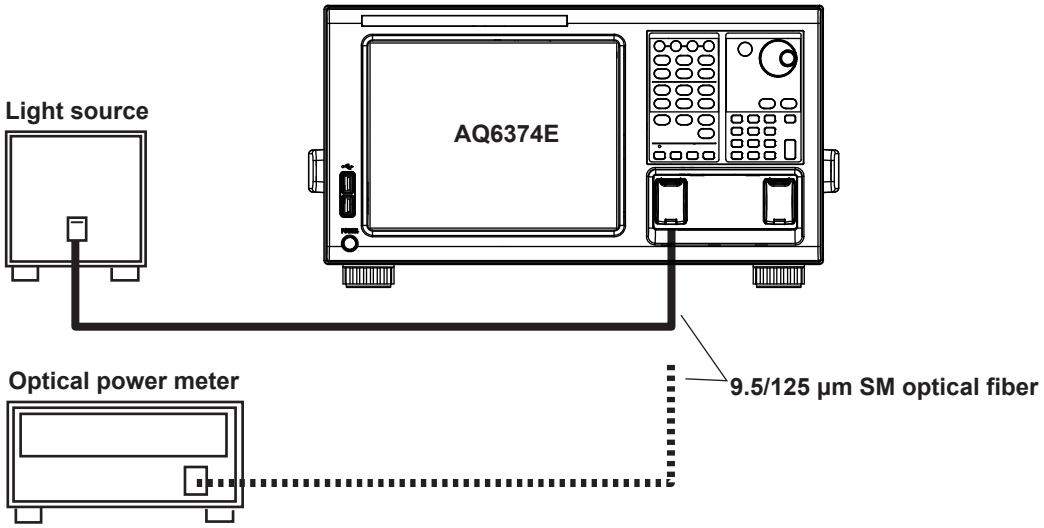
3. For performing wavelength calibration, check wavelength accuracy again according to procedure.

Note

If the wavelength error of the instrument is outside of [+/-] 5 nm, you cannot perform wavelength calibration with the internal reference light source. In this case, readjustment is necessary. Please contact your nearest Yokogawa representative.

5.2 Inspection of Level Accuracy

Perform a check of the instrument's level accuracy. Use a single longitudinal mode laser of 1550 nm.



Procedure

1. Execute the alignment adjustment function on the unit's internal monochromator.
   For details, see section 3.5, "Alignment Adjustment."
2. Connect the light source and instrument with a 9.5/125 µm SM optical fiber and turn the light source ON.
3. Press **SWEEP**. The SWEEP menu is displayed.
4. Tap the **Auto**. The spectrum of the light source is automatically measured.
5. When automatic measurement is complete and REPEAT sweep begins, press SETUP.
6. Tap the **Resolution**. The RESOLN menu is displayed.
7. Tap the **More** repeatedly until the More 2/2 menu is displayed.
8. Tap the **2nm**.
9. Press **PEAK SEARCH** then measure the peak level of the waveform.
10. Remove the SM optical fiber from the instrument and connect the light source to an optical power meter.
11. Use the optical power meter to measure power values of the light source.
12. Check that peak level values obtained in step 9 agree with the ones obtained by the optical power meter (within the specified level accuracy). For information on level accuracy, see chapter 6, "Specifications."

Note

- For the light source, prepare a line spectrum light source such a gas laser or DFB-LD. If a wide spectrum light source is used, the power measurements may not be accurate.
- The level measurement error of the instrument changes as shown in the figure below, according to the numerical aperture (NA) of the optical fiber connected to the input connector. The instrument's absolute level is calibrated using a 9.5/125 µm single-mode optical fiber (SSMA type in JIS C6835, with PC polishing, 9.5 µm mode field diameter, and 0.104 to 0.107 NA). Even if a single-mode optical fiber is used, the level accuracy will be outside the specifications if the NA is not in the range shown above.

5.3 Updating the Firmware

When there is a firmware update, such as when new functions are added, you can update the firmware in the AQ6374E. Download the update firmware from the YOKOGAWA website.
http://www.yokogawa.com/ymi/

CAUTION

- When the firmware is being updated, do not manually turn the power off. If you do, you may not be able to start the AQ6374E.
- If there are multiple update firmware files in the USB memory device, the AQ6374E will not be updated.

French

ATTENTION

- Lorsque le micrologiciel est en cours de mise à jour, ne pas mettre manuellement l'instrument hors tension. Le cas échéant, l'AQ6374E risque de ne pas démarrer.
- L'AQ6374E ne sera pas mis à jour en cas de présence de plusieurs fichiers de mise à jour micrologicielle sur la clé USB, l'AQ6374E n'est pas mis à jour.

Preparing to Update the Firmware

The AQ6374E can read the update firmware (.UPD extension) in one of two ways. Prepare the update firmware according to your environment.

- **Reading the Firmware from a USB Memory Device**
  Create a directory named "UPDATE" in the USB memory device, and save the update firmware (.upd extension) in that directory.
  Check that the AQ6374E is not connected to a network. If it is, you will not be able to update.
- **Reading the Firmware from an External PC**
  Save the update firmware (.upd extension) in the external PC, and connect the PC to the AQ6374E over a network.

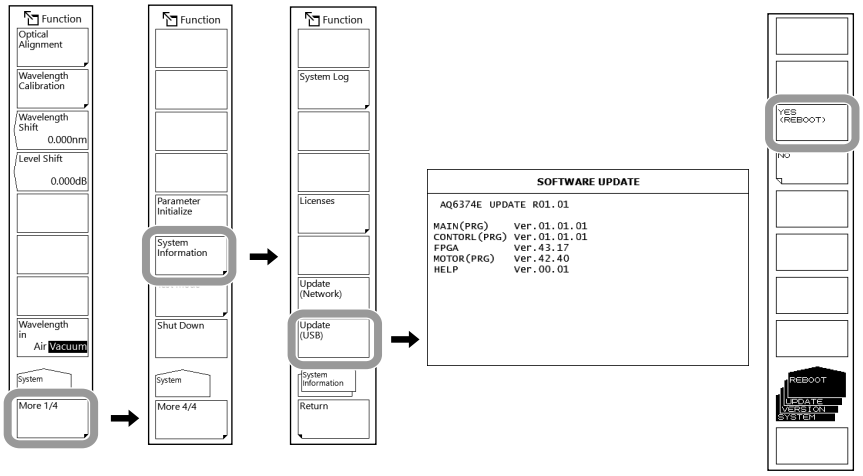
Procedure

Reading the Firmware from a USB Memory Device

1. Press **SYSTEM**. A SYSTEM menu appears.
2. Tap the **More** repeatedly until the More 4/4 menu is displayed.
3. Tap the **System Information**. The firmware version is displayed.
4. Tap the **Update(USB)**. The "Insert Update Files" message appears.
5. Connect a USB memory device containing the update firmware to the AQ6374E.
6. Tap the **Continue**. A list of update firmware is displayed.
7. The message "Please remove USB storage device" appears. Remove the USB memory device.

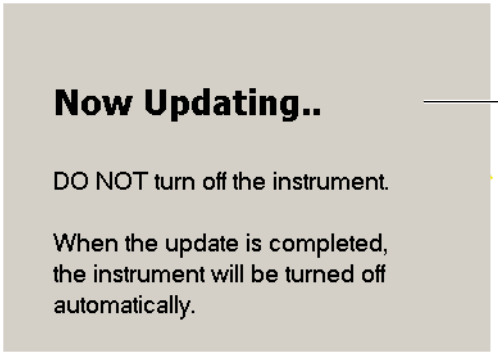
8. Tap the **Yes(Reboot)**.

The AQ6374E automatically restarts and starts updating. A update-in-progress screen appears while the firmware is being updated. When updating is complete, the AQ6374E automatically shuts down. This completes the update procedure. Turn the power on, and the AQ6374E will start normally.



Note

Once updating starts, you cannot abort the process until it is complete. You can cancel using the No soft key or another key in any of the steps before step 7.



The screen that appears while updating

Reading the Firmware from a PC

1. Press **SYSTEM**. A SYSTEM menu appears.
2. Tap the **More** repeatedly until the More 4/4 menu is displayed.
3. Tap the **System Information**. The firmware version is displayed.
4. Tap the **Update(NETWORK)**. The “Insert Update Files (NETWORK)” message appears.
5. Connect the PC containing the update firmware to the AQ6374E over a network.

   You need to enter a user name and password when establishing a connection.

   User name: user

   Password: yokogawa
6. Use a file management software on the PC to copy the update software (.upd extension) to the UPDATE directory of the AQ6374E internal memory.
7. For the remaining of the procedure, follow the steps from step 6 in “Reading the Firmware from a USB Memory Device.”

Note

When you update the firmware, the setup data will be initialized.
If necessary, save the setup data. For the operating procedure, see section 7.5 in IM AQ6374E-01EN .

5.4 Mechanical Inspection

WARNING

When performing inspection, turn OFF the MAIN POWER switch on the rear panel and remove the power cable.

CAUTION

- If any foreign particles become trapped in the various connectors, malfunction or damage can result.
- If any of the various types of connectors do not fit snugly, the instrument may not operate normally.
- If any abnormalities occur, please contact your nearest Yokogawa representative.

French

AVERTISSEMENT

Lors de la réalisation d'une inspection, mettre l'instrument hors tension en plaçant l'interrupteur MAIN POWER sur OFF sur le panneau arrière, puis débrancher le cordon d'alimentation.

ATTENTION

- Si des corps étrangers se retrouvent emprisonnés dans les différents connecteurs, un dysfonctionnement ou un endommagement risque de se produire.
- Si l'ajustement de l'un des différents types de connecteurs n'est pas parfait, l'instrument risque de ne pas fonctionner normalement.
- En cas d'anomalie, contacter le représentant Yokogawa le plus proche.

Check the following:

- That the instrument's exterior is not damaged or deformed.
- That all switches, connectors, and other assembled parts are not loose.
- That switches can be operated smoothly.

5.5 Operational Inspection

Checking the Operation of the Front Panel Keys and Touch Panel

With the power turned on, operate all the front panel keys and the function menus displayed on the touch panel to check that the instrument operates normally.

5.6 Replacing Fuses

There is a fuse inside the instrument. However, you should not replace the fuse yourself.
It could indicate additional internal damage.
If you believe the fuse is blown, please contact your nearest YOKOGAWA dealer.

5.7 Warning Display Function

No.	Message	Cause of Warning
No.1 - 49: Message generation after the execution of functions		
1	Unsuitable resolution	Data may not be extracted completely, because the resolution setting is not appropriate for the span and the sampling number.
2	Unsuitable level scale	A level scale larger than 5 dB/DIV has been set in the range fixed mode (SENS:NORM HOLD).If a level scale is set to 5 dB/DIV or more in the range fixed mode, data from the top and bottom of the screen may not be properly displayed.
3	Unsuitable REF Level	Although an attempt was made to set the peak level of a waveform to the reference level, the nearest value within the range was chosen because the peak level value was outside the setting range of the reference level values.
4	Unsuitable marker value	Although an attempt was made to set a maker value to the reference level, the nearest value within the range was chosen because the marker value was outside the setting range of the reference level values.
5	<Auto Analysis> turned off	Selection of the <AUTO ANALYSIS> key was canceled.
6	<Auto Search> turned off	Selection of the <AUTO SEARCH> key was canceled.
7	Resolution mismatch between traces	When the calculation between traces was performed, resolutions of traces were set differently.
9	Trace * state changed	The HOLD state was canceled because the state of traces under HOLD was changed from FIX to another state.
10	<Auto Ref Level> turned off	Selection of the <AUTO REF LEVEL> key was canceled.
11	<Auto Sub Scale> turned off	Selection of the <AUTO SUB SCALE> key was canceled.
14	Unsuitable sampling point	Sample point setting for using the smoothing function is missing.
15	<Marker Setting> changed	The Marker type was changed to Normal Marker.
17	<Level Unit> changed	The <LEVEL UNIT> key setting was changed.
18	<Power/NBW> trace fixed	The <POWER/NBW> trace setting in trace settings was changed to FIX mode.
19	Inappropriate analysis	Because analysis was performed on a POWER/NBW trace, a correct analysis result may not be displayed.
20	Optical power too high	The input light intensity is too high, and the measured waveform may be saturated.
21	<Pulse Light Meas> turned off	The pulse light measurement mode was turned off.
22	<Sens> changed	The sensitivity setting was changed.
23	<Avg> changed	The average setting was changed.
24	<Sens><Avg> changed	The sensitivity setting mode and average setting were changed.
25	<Sens><Pulse Light Meas> changed	The sensitivity setting mode and pulse light measurement mode were changed.
26	<Avg><Pulse Light Meas> changed	The average setting and pulse light measurement mode were changed.
27	<Wavelength in AIR/VACUUM> changed	The Air/Vacuum mode setting was changed as a result of loading a file.
28	Fitting source trace data loaded	A fitting source trace was loaded from a curve fit waveform file.
No.50 - 199: Generation of a reason why a function cannot be executed		
54	Unsuitable logging item setting	Logging item setting is not correct.
101	All traces in FIX state	Waveforms cannot be re-written, because all traces have been set to FIX.
102	Sweep stopped	Sweep was stopped, because all traces were set to FIX during the sweep.
103	No data in active trace	An attempt was made to execute analysis functions when there was no data in an active trace. An attempt was made to execute the EDFA-NF analysis function or the WDM analysis function (DUAL TRACE = ON) when there was no data in traces A and B.

No.	Message	Cause of Warning
104	Logging Mode2 is not applicable	An attempt was made to execute logging in LOGGING MODE 2 with TRACE LOGGING set to ON, but execution is not possible because the number of samples exceeds 50001 pt.
108	Marker setting out of range	An attempt was made to execute the analysis function between markers in the state where both line marker 1 and line marker 2 were set outside the measurement range.
109	Auto sweep failed	Although the AUTO sweep started, the sweep stopped because optimum conditions were not found.
110	No data between line markers	An attempt was made to execute the analysis function in a state where there was no data in the line markers of an active trace.
111	<G=MKR FIT> failed	Trace G cannot write fitting curve because numbers of data is not sufficient during <G=MKR FIT>.
120	USB storage not found	USB storage medium not inserted.
121	USB storage not initialized	SUB storage not initialized.
122	USB storage write protected	The USB storage device is write protected.
123	File not found	The specified file cannot be read because it has not been found. Or, the file does not exist on the disk.
124	Improper directory name	Directory cannot be created because the name is not valid.
125	Improper file name	A file cannot be saved due to an incorrect file name.
126	Directory already exists	Directory cannot be created because a directory of the same name already exists.
127	File already exists	File cannot be created because a file of the same name already exists.
128	A write-protected file	The file cannot be re-written or deleted because its property has been set to READ ONLY.
129	Storage full	The file cannot be saved, because the hard disk or the USB storage device is full.
130	Directory full	No files can be created because the directory area is full.
131	No data	There was no data to be saved, although an attempt was made to save the file.
132	Trace file not found	The file cannot be read because it is not a waveform file.
133	File is not a program file	The file cannot be read because it is not a program file.
134	Data file not found	The file cannot be read because it is not a data file.
135	Setting file not found	The file cannot be read because it is not a settings file.
138	Copy denied for invalid file name	The file copy cannot be executed because the “copy from” file and the “copy to” file have the same name.
139	Unsuitable Write item	Write item is not appropriate.
140	No paste possible	The paste operation cannot be executed during the editing of programs because the number of blank rows is not sufficient.
141	No merge possible	It is not possible to execute a merge during the editing of programs because the merged result would exceed the maximum number of rows.
142	WL calibration failed	Calibration cannot be executed because the level of a light source is not sufficient during the wavelength calibration or because wavelength deviations exceed the calibration range.
143	Optical alignment failed	Alignment adjustment cannot be executed because the level of a light source is not sufficient during the alignment adjustment.
150	File is not a logging file	The file cannot be loaded because it is not a logging file.
151	Disk space is not enough for logging	Logging cannot be started because there is not enough space for saving waveform files with the logging function.
152	Logging was skipped for Auto zeroing	Unable to log at the specified interval because auto offset was in progress at the time logging would have occurred (displayed only the first time after logging is started).
153	Sweep time exceeds the set interval	Unable to log at the specified interval because the sweep time is longer than the interval (displayed only the first time after logging is started).
154	Incompatible file type	The file could not be loaded because the model does not support it.
170	Invalid character	An illegal character was entered for a network name.

No.	Message	Cause of Warning
171	Invalid address	An illegal address was set to an IP address.
172	Incompatible firmware version	Attempted to load an incompatible update file.
173	Update file read error	An incorrect number of files or file corruption was found when attempting to load the update file.
174	Invalid password	The password entered for the key lock is not correct.
175	Re-enterd password unmatched	The two passwords entered for the key lock do not match.
176	Enter 4-digit number for password	The password entered for the key lock is not a 4-digit number.
177	Invalid port number	An attempt was made to set the port number for remote control to an invalid number (1025, 20001, 30001).
180	APP: File not found	There is no valid update file for installing an application.
181	APP: File format error	The application update file format is incorrect.
182	APP: File data error	The application update file data is incorrect.
183	APP: Out of storage space	There is not enough free space to install the application.
184	APP: File operation error	A file operation error occurred during application installation.
185	APP: Unexpected error	An unexpected error occurred during application installation.
No. 200 - 299: Warnings for hardware failures		
200	Fan motor stopped	The fan motor (main unit) stopped. Automatically shuts down after 10 seconds from occurrence.
201	Calibration data failed	Started up in emulation mode because there was a problem with the instrument's calibration data.
204	Calibration data failed	There is an error in the instrument's calibration data.
205	Internal communication error	An abnormality occurred during instrument-internal communication.
206	Internal communication error	An abnormality occurred during instrument-internal communication.
207	Abnormal internal temperature	Internal temperature is abnormally high. Automatically shuts down after 10 seconds from occurrence.
210	Internal Temparature warning	Warning for rising internal temperature.
211	Auto offset error	Obtained an abnormal value during AUTO OFFSET operation.
212	Auto offset error	Obtained an abnormal value during AUTO OFFSET operation.
213	Auto temperature control error	Problem with the light detector temperature control.
214	Measurement sequence error	The sweep stopped because measurement sequence fell into disorder during the sweep.
215	System optimization required	System optimization is required. Restart the system.
220	Boot sequence error	Started up in emulation mode because an abnormality occurred upon start-up
221	Boot sequence error	Started up in emulation mode because an abnormality occurred upon start-up
222	Emulation mode.	Entered emulation mode because an abnormality occurred.
223	Boot sequence error!	Started up in emulation mode because an abnormality occurred upon start-up
224	Internal communication error	An abnormality occurred during instrument-internal communication.
225	Internal communication error	An abnormality occurred during instrument-internal communication.
226	Internal communication error	An abnormality occurred during instrument-internal communication.
227	Internal communication error	An abnormality occurred during instrument-internal communication.
228	Memory allocation error	Data memory initialization failed.
230	Monochromator error	Entered emulation mode because an abnormality with the operation of the monochromator occurred.
231	Monochromator error	Entered emulation mode because an abnormality with the operation of the monochromator occurred.
232	Monochromator error	Entered emulation mode because an abnormality with the operation of the monochromator occurred.
233	Monochromator error	Entered emulation mode because an abnormality with the operation of the monochromator occurred.
234	Monochromator error	Entered emulation mode because an abnormality with the operation of the monochromator occurred.
235	Monochromator error	Entered emulation mode because an abnormality with the operation of the monochromator occurred.
236	Monochromator error	Entered emulation mode because an abnormality with the operation of the monochromator occurred.

No.	Message	Cause of Warning
237	Monochromator error	Entered emulation mode because an abnormality with the operation of the monochromator occurred.
No. 300 - 399: Errors during the execution of program functions		
300	Parameter out of range	A variable value is out of range or is not defined for a command that sets a parameter using variables.
302	Scale unit mismatch	There is a difference between the Y-axis scale of the active trace and the unit of a parameter in the “LINE MKR 3 or 4” command.
303	No data in Active trace	Setting of the moving marker, a peak (or bottom) search, or activation of the analysis function was made with no data in the active trace.
304	Marker value out of range	Specified wavelength was out of the sweep range in the moving marker or line wavelength marker setting command.
305	No data in trace A or B	No waveform data in traces A or B when executing the “EDFA NF” command.
306	Invalid data	Trace had no data when attempting to save it to memory or to write it to FD/HDD.
307	Unsuitable Write item	All data items were OFF at execution of “WRITE DATA”.
320	Undefined variable	A command containing an undefined variable was executed.
321	Variable unit mismatch	The unit of each variable does not agree within a command containing two or more variables.
322	Overflow	An overflow occurred in an arithmetic operation.
323	Undefined marker variable	A command containing a marker-value variable was executed when no marker had been displayed.
324	Invalid marker variable	A command containing the corresponding variable was executed at a time other than immediately after execution of a spectrum width search, peak search, etc.
325	Undefined line number	GOTO command’s jumping destination is a number other than 1 to 200.
326	F1 greater than F2	F1>F2 when the “IF F1 ≤ @@@@@ ≤ F2” command was executed.
345	Option does not respond	No response from an external device.
346	Option is not connected	No external device is connected.
360	Disk full	No file can be created due to insufficient free space on the USB storage medium.
361	USB Storage not inserted	USB storage medium not inserted.
362	USB Storage is write protected	The USB storage device is write protected.
363	USB Storage not initialized	USB storage not initialized. Or, it has been formatted in a format not supported by this instrument.
364	Directory full	Directory is full, therefore no file can be created.
365	File not found	The specified file cannot be read because it has not been found. Or, the file does not exist on the disk.
366	File is write protected	The file is specified to be read only, so that it cannot be rewritten or deleted.
367	No data	No data to store.
368	File is not a trace file	A file cannot be read because it is not a trace file.
369	Illegal file name	A file cannot be saved due to an incorrect file name.
370	File type mismatch	Loading or saving the file is not possible because the specified type of file does not match that of the command.
380	Undefined program	An attempt was made to run a program that is not defined.
381	Syntax error	Command incorrect (a program has been rewritten for some reason).

5.8 Daily Maintenance

Cleaning the Exterior of the Instrument

When removing dirt from the case or operation panel, remove the power cord from the power outlet, then wipe gently with a clean, dry cloth. Do not use volatile chemicals since this might cause discoloring and deformation.

Cleaning the Optical Output Section of the Internal Reference Light Source

WARNING

The instrument has a built-in reference light source for alignment adjustments, and infrared light is always being output from the optical output connector. Never look into the optical output connector. Infrared light entering the eyes can cause severe injury and loss of vision.

French

AVERTISSEMENT

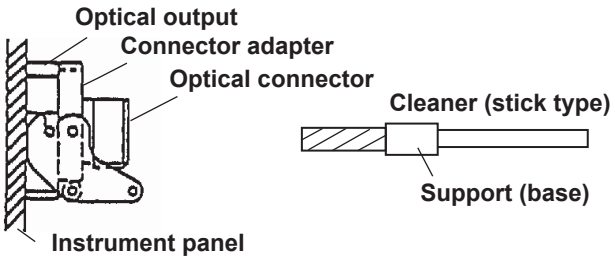
Cet instrument dispose d'une source de lumière de référence intégrée pour les ajustements d'alignement. La lumière infrarouge est toujours émise depuis le connecteur de sortie optique. Ne regardez jamais directement dans le connecteur de sortie optique. La lumière infrarouge risquerait de gravement vous blesser ou de provoquer une perte de vision.

Cleaning the Optical Connector Connection Section

It is recommended that the following cleaner be used for this procedure.

Recommended cleaner: "Cletop Stick Type" (NTT-ME)

1. Open the optical connector cover at the front of the unit.
2. Use the cleaner to clean the optical connector connection section.
3. Insert the cleaner straight into the optical connector connection section and rotate it. Grasp it as close to the cleaner support (base) as possible.



Note

Wiping with a soiled cleaner can damage the optical outputs.

Cleaning the Optical Output

WARNING

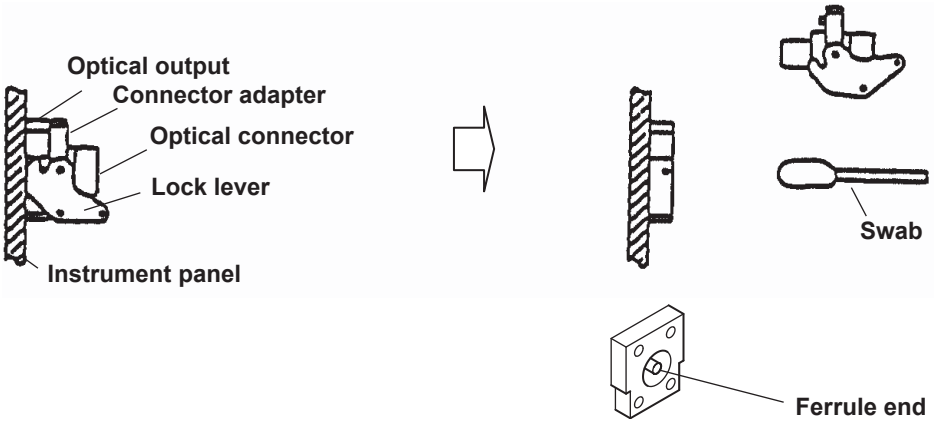
The instrument has a built-in reference light source for alignment adjustments, and infrared light is always being output from the optical output connector. Never look into the optical output connector. Infrared light entering the eyes can cause severe injury and loss of vision.

French

AVERTISSEMENT

Cet instrument dispose d'une source de lumière de référence intégrée pour les ajustements d'alignement. La lumière infrarouge est toujours émise depuis le connecteur de sortie optique. Ne regardez jamais directement dans le connecteur de sortie optique. La lumière infrarouge risquerait de gravement vous blesser ou de provoquer une perte de vision.

1. Turn the power OFF.
2. Remove the connector adapter from the instrument. For removal, refer to section 3.2, "Attaching the Connector Adapter."
3. Use a swab dipped into a small quantity of undiluted alcohol to clean the ferrule end of the optical output section. Be sure to use a new swab each time.
4. After the cleaning is finished, connect the connector adapter to the instrument.



Note

- When attaching or removing a connector adapter, be careful not to damage the ferrule edge or adapter.
- Wiping with a soiled swab can damage the optical outputs.

5.9 Care during Storage

If the instrument is stored for a long time, sufficient care should be taken of the following:

- Wipe off any dust, fingerprints, or other dirt that has adhered to the instrument.
- Perform the inspections given in section 5.5, “Operational Inspection” to check that the instrument operates properly.
- Do not store the unit in the following locations:
  Where it would be exposed to direct sunlight or excessive dust
  Where water droplets can contact the instrument, or where high humidity can cause them to form on the instrument
  Where active gas is present, or where the instrument may be subject to corrosion
  Where the humidity indicated below can occur
  Where temperatures can exceed 50°C
  Where the temperature can fall below -10°C
  Where the humidity can exceed 80% (no condensation)

For extended storage, it is recommended that the instrument be stored within the range of the following environmental conditions while, at the same time, the above conditions are met.

- Temperature 5 to 30°C
- Humidity 40 to 70%
- Daily fluctuations of temperature/humidity are small.

5.10 Recommended Replacement Parts

The life and replacement period for expendable items varies depending on the conditions of use.
Refer to the table below as a general guideline.
For part replacement and purchase, contact your nearest YOKOGAWA dealer.

Parts with Limited Service Life

Part Name	Replacement Period
LCD backlight	At normal operating conditions, approximately 70000 hours

Consumable Parts

Part Name	Replacement Period
Cooling fan	3 years
Backup battery (lithium)	5 years

5.11 Disposal

When disposing of the YOKOGAWA produts, follow the laws and ordinances of the country or region where the product will be disposed of.
If you are disposing of the product in the EEA or UK, see also page xii.

6.1 Specifications

Specifications

Item	Specifications
Applicable fiber	SM (9.5/125), MM (GI 50/125, GI 62.5/125, Large core size fibers (core diameter of up to 800 µm))
Wavelength range[1]	350 nm to 1750 nm
Span[1]	0.5 nm to 1400 nm (full wavelength range), 0 nm
Wavelength accuracy[1, 2, 5]	±0.05 nm (633 nm) (After user wavelength calibration with a 633 nm HeNe laser), ±0.05 nm (1523 nm) ±0.20 nm (full wavelength range)
Wavelength repeatability[1, 2, 5]	±0.015 nm (1 minute)
Wavelength resolution setting[1, 2]	0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10 nm
Minimum sampling resolution[1]	0.002 nm
Wavelength sampling points	101 to 200001, AUTO
Level sensitivity setting	NORM_HOLD, NORM_AUTO, NORMAL, MID, HIGH1, HIGH2 and HIGH3
Level sensitivity[2, 3, 6]	–80 dBm (900 nm to 1600 nm), –70 dBm (400 nm to 900 nm) (measurement sensitivity:HIGH3)
Safe max. input power[2, 3]	+20 dBm (total input power, 550 nm to 1750 nm) +10 dBm (total input power, 400 nm to 550 nm)
Level accuracy[2, 3, 4]	±1.0 dB (1550 nm, input level: –20 dBm, sensitivity setting: HIGH1 to HIGH3)
Level linearity[2, 3]	±0.2 dB (input level: –40 dBm to 0 dBm, sensitivity setting: HIGH1 to HIGH3)
Polarization dependency [2, 3, 4]	±0.15 dB (1550 nm)
Dynamic range[1, 2, 8]	60 dB (±1.0 nm of peak wavelength, resolution: 0.05 nm at 633 nm/1523 nm)
Optical connector	For optical input, AQ9447(*) connector adapter (option) required. For wavelength reference light source output, AQ9441(*) connector adapter required. (*): Connector types: FC, SC
Built-in calibration light source	For alignment and wavelength calibration
Sweep time[1, 6, 7]	0.5 s (NORM_AUTO), 1 s (NORMAL), 2 s (MID), 20 s (HIGH1)
Built-in calibration light source	For alignment and wavelength calibration
Sweep time[1, 6, 7]	0.5 s (NORM_AUTO), 1 s (NORMAL), 2 s (MID), 5 s (HIGH1)
Warm-up time	At least 1 hour After warm-up ends, alignment adjustment with the internal reference light source required.
Electrical interface	GP-IB, Ethernet, USB, VGA output, analog output port, trigger input port, trigger output port
Remote control[9]	GP-IB, Ethernet (TCP/IP) AQ6317 series compatible commands (IEEE488.1) and IEEE488.2
Data storage	Internal storage: 512 MB or more, external storage: USB storage device (memory, HDD), format: FAT32, File type: CSV (text), binary, BMP, PNG, JPEG
Display[10]	10.4-inch color LCD (capacitive touch panel, resolution: 1024×768 pixels)
Environmental conditions	Performance guaranteed temperature range: +18 to +28°C Operating temperature range: +5 to +35°C Storage temperature range: –10 to +50°C Ambient humidity: 20 to 80% RH (no condensation) Installation location: indoor use, altitude: 2000 m or less
Power supply	100 to 240 VAC, 50/60 Hz, 100 VA or less

6.1 Specifications

Item		Specifications
Permitted supply voltage range		90 VAC to 264 VAC
External dimensions		Approx. 426 (W) × 221 (H) × 459 (D) mm (excluding the protector and handle)
Weight		Approx. 19 kg
Recommended calibration period		1 year
Safety standards		EN 61010-1, EN60825-1, Overvoltage category II[11], Pollution degree 2 [12]
	Laser	EN 60825-1:2014+A11:2021, IEC 60825-1:2014, GB/T 7247.1-2024 class 1
Emissions	Compliant standards	EN 61326-1 Class A Group 1[13] Table 2 EN 61000-3-2 EN 61000-3-3 EMC Regulatory Arrangement in Australia and New Zealand EN 61326-1 Class A Group 1 Table 2 Korea Electromagnetic Conformity Standard (한국 전자파적합성기준) This product is classified as Class A (for use in industrial environments). Operation of this product in a residential area may cause radio interference, in which case the user will be required to correct the interference.
	Cable conditions	• Ethernet connector Use category 5 or better Ethernet cables.[14] • VIDEO OUT connector Use a shielded D-sub 15 pin VGA cable.[14] • USB port Use USB peripherals (e.g., mouse) with shielded USB cables.[14] • GP-IB interface connector Use a shielded GP-IB cable.[14] • TRIGGER IN, TRIGGER OUT, ANALOG OUT terminal Use a BNC cable.[14]
Immunity	Compliant standards	EN 61326-1 Table 2
	Influence in the immunity environment (criteria A)	
		Wavelength measurement accuracy: ±0.1 nm
	Cable conditions	The same as the cable conditions listed above for emissions
Environmental standards[15]		EU RoHS Directive compliant

1 Horizontal axis scale: In wavelength display mode
2 9.5/125 µm single mode fiber, after alignment adjustment with a built-in wavelength reference light source, when the purge gas is not used.
3 Vertical scale: absolute value level display mode, resolution setting: 0.2 nm or more.
4 When using 9.5/125 µm single mode fiber (SSMA type in JIS C6835, PC polishing, mode field diameter: 9.5 µm, NA: 0.104 to 0.107)
5 Resolution: 0.05 nm
6 Pulse light measurement mode: OFF
7 Span 100 nm or less (excluding measurement wavelength range 570 nm to 580 nm and 900 nm to 1000 nm), wavelength sampling points: 1001, averaging times: 1
8 High dynamic mode: SWITCH, fiber core size: Small
9 Certain commands may not support the AQ6317 depending on the relationship between the target model specifications and functions.
10 The LDC display may contain defective pixels (always ON or always OFF). (0.002% or fewer of all pixels including RGB). Does not indicate a general malfunction.
11 The overvoltage category is a value used to define the transient overvoltage condition and includes the rated impulse withstand voltage. Category II applies to electrical equipment that is powered through a fixed installation, such as a wall outlet wired to a distribution board.
12 Pollution Degree applies to the degree of adhesion of a solid, liquid, or gas that deteriorates withstand voltage or surface resistivity. Pollution Degree 1 applies to sealed space (with no pollution or only dry non-conductive pollution). Pollution Degree 2 applies to normal indoor atmospheres (with only non-conductive pollution).
13 Group 1: Equipment that does not intentionally generate or use radio-frequency (RF) energy
14 Use a cable with a length of 3 m or less.
15 For conformity to environmental regulations and/or standards other than EU, contact your nearest YOKOGAWA office (PIM113-01Z2).
*: Typical values(typ.) are typical or mean values. They are not strictly guaranteed.

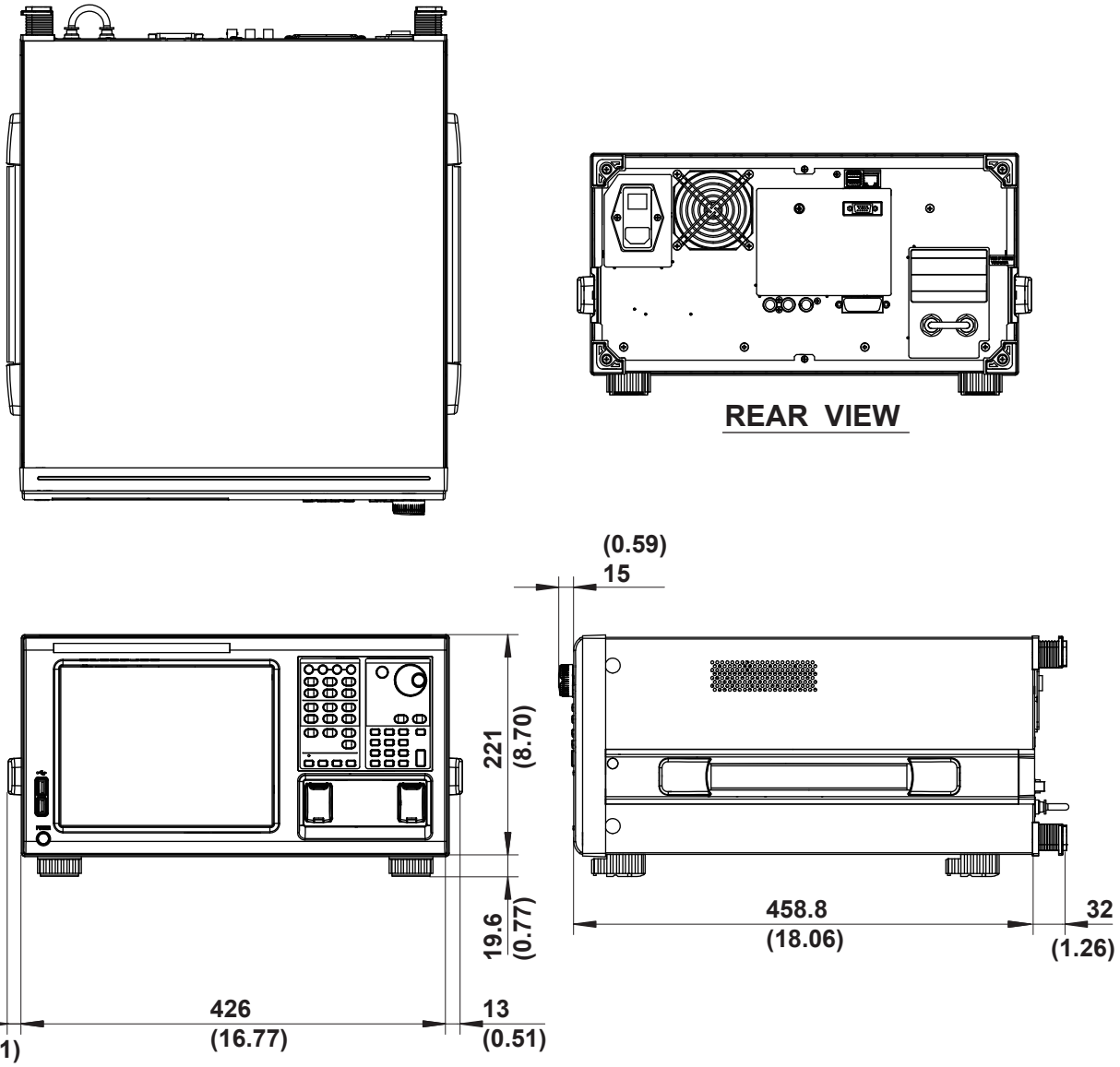
Function

Item	Function	
Measurement	Setting of measuring conditions	Center wavelength, span, wavelength sampling points, wavelength resolution, measurement sensitivity, high dynamic mode, average count (1 to 999), double-speed measurement mode, smoothing, correcting the resolution, large core size fiber mode
	Sweep settings	Single, repeat, AUTO (automatically sets measuring conditions), inter-line marker sweep
	Measurement function	CW measurement, pulse light measurement, external trigger measurement, gate measurement, air/vacuum wavelength measurement
	Other	Sweep status output, analog output
Display	Vertical scale	Level scale (0.1 to 10 dB/div, linear), level subscale (0.1 to 10 dB/div, linear), reference level, divisions (8, 10), percentage (%), dB/km, power spectral density (dB/nm), noise mask
	Horizontal scale	Wavelength (nm), frequency (THz), wave number (cm^{-1}), trace zoom in/out
	Display items	Measurement conditions, traces, data table, labels
Trace	Display function	7 independent traces, MAX/MIN hold, trace-to-trace calculation, normalization, rolling average (2 to 100), curve fitting, peak curve fitting, marker curve fitting, POWER/NBW
	Other	Trace copy, trace clear, write mode fixed mode setting, show/hide setting
Marker and search	Marker	Delta markers (up to 1024 markers), power spectral density markers, power integral markers, line markers
	Search	Peak search (single/multi), bottom search (single/multi), auto search (ON/OFF), search between wavelength line markers, search within zoom area
Data analysis		Spectral width analysis (Threshold, Envelope, RMS, Peak-RMS, Notch), WDM (OSNR) analysis, EDFA-NF analysis, filter analysis (peak/bottom), WDM filter analysis (peak/bottom), DFB-LD analysis, FP-LD analysis, LED analysis, TLS analysis, SMSR analysis, WDM SMSR analysis, power analysis, chromaticity diagram analysis, auto analysis ON/OFF, analysis between wavelength line markers, analysis in the zoom area
Applications		SC light source test, WDM test, DFB-LD test, LED test, FP-LD test, fiber end face test, application management (add/remove), program, data logging
Other	Optical axis adjustment	Auto alignment adjustment using the built-in light source
	Calibration	Auto wavelength calibration using built-in calibration light source or an external light source

6.2 External Dimensions

Unit: mm
(approx. inch)

Unless otherwise specified, tolerances are ±3% (however, tolerances are ±0.3 mm when below 10 mm).



Appendix 1 MICROSOFT SOFTWARE LICENSE TERMS

WINDOWS 10 IOT ENTERPRISE & MOBILE (ALL EDITIONS)

IF YOU LIVE IN (OR IF YOUR PRINCIPAL PLACE OF BUSINESS IS IN) THE UNITED STATES, PLEASE READ THE BINDING ARBITRATION CLAUSE AND CLASS ACTION WAIVER IN SECTION 8. IT AFFECTS HOW DISPUTES ARE RESOLVED.

Thank you for choosing Microsoft!

Depending on how you obtained the Windows software, this is a license agreement between (i) you and the device manufacturer or software installer that distributes the software with your device; or (ii) you and Microsoft Corporation (or, based on where you live or if a business where your principal place of business is located, one of its affiliates) if you acquired the software from a retailer. Microsoft is the device manufacturer for devices produced by Microsoft or one of its affiliates, and Microsoft is the retailer if you acquired the software directly from Microsoft.

This agreement describes your rights and the conditions upon which you may use the Windows software. You should review the entire agreement, including any supplemental license terms that accompany the software and any linked terms, because all of the terms are important and together create this agreement that applies to you. You can review linked terms by pasting the (aka.ms/) link into a browser window.

By accepting this agreement or using the software, you agree to all of these terms, and consent to the transmission of certain information during activation and during your use of the software as per the privacy statement described in Section 3. If you do not accept and comply with these terms, you may not use the software or its features. You may contact the device manufacturer or installer, or your retailer if you purchased the software directly, to determine its return policy and return the software or device for a refund or credit under that policy. You must comply with that policy, which might require you to return the software with the entire device on which the software is installed for a refund or credit, if any.

1. **Overview.**
   a. Applicability. This agreement applies to the Windows software that is preinstalled on your device, or acquired from a retailer and installed by you, the media on which you received the software (if any), any fonts, icons, images or sound files included with the software, and also any Microsoft updates, upgrades, supplements or services for the software, unless other terms come with them. It also applies to Windows apps developed by Microsoft that provide functionality such as mail, calendar, contacts, music and news that are included with and are a part of Windows. If this agreement contains terms regarding a feature or service not available on your device, then those terms do not apply.
   b. Additional terms. Depending on your device's capabilities, how it is configured, and how you use it, additional Microsoft and third party terms may apply to your use of certain features, services and apps.
      (i) Some Windows apps provide an access point to, or rely on, online services, and the use of those services is sometimes governed by separate terms and privacy policies, such as the Microsoft Services Agreement at (aka.ms/msa). You can view these terms and policies by looking at the service terms of use or the app's settings, as applicable; please read them. The services may not be available in all regions.
      (ii) The manufacturer or installer may also preinstall apps, which will be subject to separate license terms.
      (iii) The software may include third party software such as Adobe Flash Player that is licensed under its own terms. You agree that your use of Adobe Flash Player is governed by the license terms for Adobe Systems Incorporated at (aka.ms/adobeflash). Adobe and Flash are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.
      (iv) The software may include third party programs that are licensed to you under this agreement, or under their own terms. License terms, notices and acknowledgements, if any, for the third party program can be view at (aka.ms/thirdpartynotices).

2. Installation and Use Rights.

a. License. The software license is permanently assigned to the device with which you acquired the software. You many only use the software on that device.

b. Device. In this agreement, “device” means a physical hardware system) with an internal storage device capable of running the software. A hardware partition or blade is considered to be a device.

c. Restrictions. The manufacturer or installer and Microsoft reserve all rights (such as rights under intellectual property laws) not expressly granted in this agreement. For example, this license does not give you any right to, and you may not:

(i) use or virtualize features of the software separately;

(ii) publish, copy (other than the permitted backup copy), rent, lease, or lend the software;

(iii) transfer the software;

(iv) work around any technical restrictions or limitations in the software;

(v) use the software as server software, for commercial hosting, make the software available for simultaneous use by multiple users over a network, install the software on a server and allow users to access it remotely, or install the software on a device for use only by remote users;

(vi) reverse engineer, decompile, or disassemble the software, or attempt to do so, except and only to the extent that the foregoing restriction is (a) permitted by applicable law; (b) permitted by licensing terms governing the use of open source components that may be included with the software; or (c) required to debug changes to any libraries licensed under the GNU Lesser General Public License which are included with and linked to by the software; and

(vii) when using Internet-based features you may not use those features in any way that could interfere with anyone else’s use of them, or to try to gain access to or use any service, data, account, or network, in an unauthorized manner.

d. Multi use scenarios.

(i) **Multiple versions.** If when acquiring the software, you were provided with multiple versions (such as 32-bit and 64-bit versions), you may install and activate only one of those versions at a time.

(ii) **Multiple or pooled connections.** Hardware or software you use to multiplex or pool connections, or reduce the number of devices or users that access or use the software, does not reduce the number of licenses you need. You may only use such hardware or software if you have a license for each instance of the software you are using.

(iii) **Device connections.** You may allow up to 20 other devices to access the software installed on the licensed device for the purpose of using the following software features: file services, print services, Internet information services, and Internet connection sharing and telephony services on the licensed device. The 20 connection limit applies to devices that access the software indirectly through “multiplexing” or other software or hardware that pools connections. You may allow any number of devices to access the software on the licensed device to synchronize data between devices. This section does not mean, however, that you have the right to install the software, or use the primary function of the software (other than the features listed in this section), on any of these other devices.

(iv) **Remote access.** Users may access the licensed device from another device using remote access technologies, but only on devices separately licensed to run the same or higher edition of this software.

(v) **Remote assistance.** You may use remote assistance technologies to share an active session without obtaining any additional licenses for the software. Remote assistance allows one user to connect directly to another user’s computer, usually to correct problems.

(vi) **POS application.** If the software is installed on a retail point of service device, you may use the software with a point of service application (“POS Application”). A POS Application is a software application which provides only the following functions: (i) process sales and service transactions, scan and track inventory, record and/or transmit customer information, and perform related management functions, and/or (ii) provide information directly and indirectly to customers about available products and services. You may use other programs with the software as long as the other programs: (i) directly support the manufacturer’s specific use for the device, or (ii) provide system utilities, resource management, or anti-virus or similar protection. For clarification purposes, an automated teller machine

("ATM") is not a retail point of service device.

(vii) **Cloud Computing Devices.** If your device uses Internet browsing functionality to connect to and access cloud hosted applications: (i) no desktop functions may run locally on the device, and (ii) any files that result from the use of the desktop functions may not be permanently stored on the system. "Desktop functions," as used in this agreement, means a consumer or business task or process performed by a computer or computing device. This includes but is not limited to email, word processing, spreadsheets, database, scheduling, network or internet browsing and personal finance.

(viii) **Desktop Functions.** If your system performs desktop functions, then you must ensure that they: (i) are only used to support the application, and (ii) operate only when used with the application.

e. **Windows 10 IoT Enterprise Features for Development and Testing Only.**

(1) **Device Health Attestation.** You may only implement Device Health Attestation in a commercial use if you execute a Microsoft Windows IoT Core Services Agreement at: https://azure.microsoft.com/en-us/services/windows-10-iot-core/.

f. **Specific Use.** The manufacturer designed the licensed device for a specific use. You may only use the software for that use.

3. Privacy; Consent to Use of Data. Your privacy is important to us. Some of the software features send or receive information when using those features. Many of these features can be switched off in the user interface, or you can choose not to use them. By accepting this agreement and using the software you agree that Microsoft may collect, use, and disclose the information as described in the Microsoft Privacy Statement available at (aka.ms/privacy), and as may be described in the user interface associated with the software features.

4. Authorized Software and Activation. You are authorized to use this software only if you are properly licensed and the software has been properly activated with a genuine product key or by other authorized method. When you connect to the Internet while using the software, the software will automatically contact Microsoft or its affiliate to confirm the software is genuine and the license is associated with the licensed device. You can also activate the software manually by Internet or telephone. In either case, transmission of certain information will occur, and Internet, telephone and SMS service charges may apply. During activation (or reactivation that may be triggered by changes to your device's components), the software may determine that the installed instance of the software is counterfeit, improperly licensed or includes unauthorized changes. If activation fails the software will attempt to repair itself by replacing any tampered Microsoft software with genuine Microsoft software. You may also receive reminders to obtain a proper license for the software. Successful activation does not confirm that the software is genuine or properly licensed. You may not bypass or circumvent activation. To help determine if your software is genuine and whether you are properly licensed, see (aka.ms/genuine). Certain updates, support, and other services might only be offered to users of genuine Microsoft software.

5. Updates. You may obtain updates only from Microsoft or authorized sources, and Microsoft may need to update your system to provide you with those updates. The software periodically checks for system and app updates, and may download and install them for you. To the extent automatic updates are enabled on your device, by accepting this agreement, you agree to receive these types of automatic updates without any additional notice.

6. Geographic and Export Restrictions. If your software is restricted for use in a particular geographic region, then you may activate the software only in that region. You must also comply with all domestic and international export laws and regulations that apply to the software, which include restrictions on destinations, end users, and end use. For further information on geographic and export restrictions, visit (aka.ms/exporting).

7. Support and Refund Procedures. For the software generally, contact the device manufacturer or installer for support options. Refer to the support number provided with the software. For updates and supplements obtained directly from Microsoft, Microsoft may provide limited support services for properly licensed software as described at (aka.ms/mssupport). If you are seeking a refund, contact the manufacturer or installer to determine its refund policies. You must comply with those policies, which might require you to return the software with the entire device on which the software is installed for a refund.

8. Binding Arbitration and Class Action Waiver if You Live in (or if a Business Your Principal Place of Business is in) the United States.

We hope we never have a dispute, but if we do, you and we agree to try for 60 days to resolve it informally. If we can't, you and we agree to **binding individual arbitration before the American Arbitration Association ("AAA") under the Federal Arbitration Act ("FAA"), and not to sue in court in front of a judge or jury.** Instead, a neutral arbitrator will decide and the arbitrator's decision will be final except for a limited right of appeal under the FAA. **Class action lawsuits, class-wide arbitrations, private attorney-general actions, and any other proceeding where someone acts in a representative capacity aren't allowed. Nor is combining individual proceedings without the consent of all parties.** "We," "our," and "us" includes Microsoft, the device manufacturer, and software installer.

a. **Disputes covered—everything except IP.** The term "dispute" is as broad as it can be. It includes any claim or controversy between you and the manufacturer or installer, or you and Microsoft, concerning the software, its price, or this agreement, under any legal theory including contract, warranty, tort, statute, or regulation, **except disputes relating to the enforcement or validity of your, your licensors', our, or our licensors' intellectual property rights.**
b. **Mail a Notice of Dispute first.** If you have a dispute and our customer service representatives can't resolve it, send a Notice of Dispute by U.S. Mail to the manufacturer or installer, ATTN: LEGAL DEPARTMENT. If your dispute is with Microsoft, mail it to Microsoft Corporation, ATTN: LCA ARBITRATION, One Microsoft Way, Redmond, WA 98052-6399. Tell us your name, address, how to contact you, what the problem is, and what you want. A form is available at (aka.ms/disputeform). We'll do the same if we have a dispute with you. After 60 days, you or we may start an arbitration if the dispute is unresolved.
c. **Small claims court option.** Instead of mailing a Notice of Dispute, and if you meet the court's requirements, you may sue us in small claims court in your county of residence (or if a business your principal place of business) or our principal place of business–King County, Washington USA if your dispute is with Microsoft. We hope you'll mail a Notice of Dispute and give us 60 days to try to work it out, but you don't have to before going to small claims court.
d. **Arbitration procedure.** The AAA will conduct any arbitration under its Commercial Arbitration Rules (or if you are an individual and use the software for personal or household use, or if the value of the dispute is $75,000 USD or less whether or not you are an individual or how you use the software, its Consumer Arbitration Rules). For more information, see (aka.ms/adr) or call 1-800-778-7879. To start an arbitration, submit the form available at (aka.ms/arbitration) to the AAA; mail a copy to the manufacturer or installer (or to Microsoft if your dispute is with Microsoft). In a dispute involving $25,000 USD or less, any hearing will be telephonic unless the arbitrator finds good cause to hold an in-person hearing instead. Any in-person hearing will take place in your county of residence (of if a business your principal place of business) or our principal place of business—King County, Washington if your dispute is with Microsoft. You choose. The arbitrator may award the same damages to you individually as a court could. The arbitrator may award declaratory or injunctive relief only to you individually to satisfy your individual claim.
e. **Arbitration fees and payments.**
   (i) **Disputes involving $75,000 USD or less.** The manufacturer or installer (or Microsoft if your dispute is with Microsoft) will promptly reimburse your filing fees and pay the AAA's and arbitrator's fees and expenses. If you reject our last written settlement offer made before the arbitrator was appointed, your dispute goes all the way to an arbitrator's decision (called an "award"), and the arbitrator awards

you more than this last written offer, the manufacturer or installer (or Microsoft if your dispute is with Microsoft) will: (1) pay the greater of the award or $1,000 USD; (2) pay your reasonable attorney's fees, if any; and (3) reimburse any expenses (including expert witness fees and costs) that your attorney reasonably accrues for investigating, preparing, and pursuing your claim in arbitration. The arbitrator will determine the amounts unless you and we agree on them.

(ii) **Disputes involving more than $75,000 USD.** The AAA rules will govern payment of filing fees and the AAA's and arbitrator's fees and expenses.

(iii) **Disputes involving any amount.** If you start an arbitration we won't seek our AAA or arbitrator's fees and expenses, or your filing fees we reimbursed, unless the arbitrator finds the arbitration frivolous or brought for an improper purpose. If we start an arbitration we will pay all filing, AAA, and arbitrator's fees and expenses. We won't seek our attorney's fees or expenses from you in any arbitration. Fees and expenses are not counted in determining how much a dispute involves.

f. Must file within one year. You and we must file in small claims court or arbitration any claim or dispute (except intellectual property disputes — see Section 9.a.) within one year from when it first could be filed. Otherwise, it's permanently barred.

g. Severability. If the class action waiver is found to be illegal or unenforceable as to all or some parts of a dispute, those parts won't be arbitrated but will proceed in court, with the rest proceeding in arbitration. If any other provision of Section 9 is found to be illegal or unenforceable, that provision will be severed but the rest of Section 9 still applies.

h. Conflict with AAA rules. This agreement governs if it conflicts with the AAA's Commercial Arbitration Rules or Consumer Arbitration Rules.

i. Microsoft as party or third-party beneficiary. If Microsoft is the device manufacturer or if you acquired the software from a retailer, Microsoft is a party to this agreement. Otherwise, Microsoft is not a party but is a third-party beneficiary of your agreement with the manufacturer or installer to resolve disputes through informal negotiation and arbitration.

9. Governing Law. The laws of the state or country where you live (or if a business where your principal place of business is located) govern all claims and disputes concerning the software, its price, or this agreement, including breach of contract claims and claims under state consumer protection laws, unfair competition laws, implied warranty laws, for unjust enrichment, and in tort, regardless of conflict of law principles. In the United States, the FAA governs all provisions relating to arbitration.

10. Consumer Rights, Regional Variations. This agreement describes certain legal rights. You may have other rights, including consumer rights, under the laws of your state or country. You may also have rights with respect to the party from which you acquired the software. This agreement does not change those other rights if the laws of your state or country do not permit it to do so. For example, if you acquired the software in one of the below regions, or mandatory country law applies, then the following provisions apply to you:

a. Australia. References to "Limited Warranty" are references to the express warranty provided by Microsoft or the manufacturer or installer. This warranty is given in addition to other rights and remedies you may have under law, including your rights and remedies in accordance with the statutory guarantees under the Australian Consumer Law.

In this section, "goods" refers to the software for which Microsoft or the manufacturer or installer provides the express warranty. Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

b. Canada. You may stop receiving updates on your device by turning off Internet access. If and when you re-connect to the Internet, the software will resume checking for and installing updates.

c. Germany and Austria.

(i) **Warranty.** The properly licensed software will perform substantially as described in any Microsoft materials that accompany the software. However, the manufacturer or installer, and Microsoft, give no contractual guarantee in relation to the licensed software.

(ii) **Limitation of Liability.** In case of intentional conduct, gross negligence, claims based on the Product Liability Act, as well as, in case of death or personal or physical injury, the manufacturer or installer, or Microsoft is liable according to the statutory law.

Subject to the preceding sentence, the manufacturer or installer, or Microsoft will only be liable for slight negligence if the manufacturer or installer or Microsoft is in breach of such material contractual obligations, the fulfillment of which facilitate the due performance of this agreement, the breach of which would endanger the purpose of this agreement and the compliance with which a party may constantly trust in (so-called “cardinal obligations”). In other cases of slight negligence, the manufacturer or installer or Microsoft will not be liable for slight negligence.

d. Other regions. See (aka.ms/variations) for a current list of regional variations

11. Additional Notices.

a. Networks, data and Internet usage. Some features of the software and services accessed through the software may require your device to access the Internet. Your access and usage (including charges) may be subject to the terms of your cellular or internet provider agreement. Certain features of the software may help you access the Internet more efficiently, but the software’s usage calculations may be different from your service provider’s measurements. You are always responsible for (i) understanding and complying with the terms of your own plans and agreements, and (ii) any issues arising from using or accessing networks, including public/open networks. You may use the software to connect to networks, and to share access information about those networks, only if you have permission to do so.

b. H.264/AVC and MPEG-4 visual standards and VC-1 video standards. The software may include H.264/MPEG-4 AVC and/or VC-1 decoding technology. MPEG LA, L.L.C. requires this notice:
THIS PRODUCT IS LICENSED UNDER THE AVC, THE VC-1, AND THE MPEG-4 PART 2 VISUAL PATENT PORTFOLIO LICENSES FOR THE PERSONAL AND NON-COMMERCIAL USE OF A CONSUMER TO (i) ENCODE VIDEO IN COMPLIANCE WITH THE ABOVE STANDARDS (“VIDEO STANDARDS”) AND/OR (ii) DECODE AVC, VC-1, AND MPEG-4 PART 2 VIDEO THAT WAS ENCODED BY A CONSUMER ENGAGED IN A PERSONAL AND NON-COMMERCIAL ACTIVITY AND/OR WAS OBTAINED FROM A VIDEO PROVIDER LICENSED TO PROVIDE SUCH VIDEO. NO LICENSE IS GRANTED OR SHALL BE IMPLIED FOR ANY OTHER USE. ADDITIONAL INFORMATION MAY BE OBTAINED FROM MPEG LA, L.L.C. SEE WWW.MPEGLA.COM

c. Malware protection. Microsoft cares about protecting your device from malware. The software will turn on malware protection if other protection is not installed or has expired. To do so, other antimalware software will be disabled or may have to be removed.

12. Entire Agreement. This agreement (together with the printed paper license terms or other terms accompanying any software supplements, updates, and services that are provided by the manufacturer or installer, or Microsoft, and that you use), and the terms contained in web links listed in this agreement, are the entire agreement for the software and any such supplements, updates, and services (unless the manufacturer or installer, or Microsoft, provides other terms with such supplements, updates, or services). You can review this agreement after your software is running by going to (aka.ms/useterms) or going to Settings - System - About within the software. You can also review the terms at any of the links in this agreement by typing the URLs into a browser address bar, and you agree to do so. You agree that you will read the terms before using the software or services, including any linked terms. You understand that by using the software and services, you ratify this agreement and the linked terms. There are also informational links in this agreement. The links containing notices and binding terms are:

- Windows 10 Privacy Statement (aka.ms/privacy)
- Microsoft Services Agreement (aka.ms/msa)
- Adobe Flash Player License Terms (aka.ms/adobeflash)

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NO WARRANTY

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IF YOUR LOCAL LAWS IMPOSE A WARRANTY, GUARANTEE, OR CONDITION EVEN THOUGH THIS AGREEMENT DOES NOT, ITS TERM IS LIMITED TO 90 DAYS FROM WHEN THE FIRST USER ACQUIRES THE SOFTWARE. IF THE MANUFACTURER OR MICROSOFT BREACHES SUCH A WARRANTY, GUARANTEE, OR CONDITION, YOUR SOLE REMEDY, AT THE MANUFACTURER’S OR MICROSOFT’S ELECTION, IS (I) REPAIR OR REPLACEMENT OF THE SOFTWARE AT NO CHARGE, OR (II) RETURN OF THE SOFTWARE (OR AT ITS ELECTION THE DEVICE ON WHICH THE SOFTWARE WAS INSTALLED) FOR A REFUND OF THE AMOUNT PAID, IF ANY. THESE ARE YOUR ONLY REMEDIES FOR BREACH OF A WARRANTY, GUARANTEE, OR CONDITION YOUR LOCAL LAWS IMPOSE.

TO THE EXTENT NOT PROHIBITED BY YOUR LOCAL LAWS, IF YOU HAVE ANY BASIS FOR RECOVERING DAMAGES, YOU CAN RECOVER FROM THE MANUFACTURER OR MICROSOFT ONLY DIRECT DAMAGES UP TO THE AMOUNT YOU PAID FOR THE SOFTWARE (OR UP TO $50 USD IF YOU ACQUIRED THE SOFTWARE FOR NO CHARGE). YOU WILL NOT, AND WAIVE ANY RIGHT TO, SEEK TO RECOVER ANY OTHER DAMAGES OR REMEDY, INCLUDING LOST PROFITS AND DIRECT, CONSEQUENTIAL, SPECIAL, INDIRECT, OR INCIDENTAL DAMAGES, UNDER ANY PART OF THIS AGREEMENT OR UNDER ANY THEORY. THIS LIMITATION APPLIES TO (I) ANYTHING RELATED TO THIS AGREEMENT, THE SOFTWARE (INCLUDING THE APPS), THE DEVICE, SERVICES, CORRUPTION OR LOSS OF DATA, FAILURE TO TRANSMIT OR RECEIVE DATA, CONTENT (INCLUDING CODE) ON THIRD PARTY INTERNET SITES OR THIRD PARTY PROGRAMS, AND (II) CLAIMS FOR BREACH OF CONTRACT, WARRANTY, GUARANTEE, OR CONDITION; STRICT LIABILITY, NEGLIGENCE, OR OTHER TORT; VIOLATION OF A STATUTE OR REGULATION; UNJUST ENRICHMENT; OR UNDER ANY OTHER THEORY.

THE DAMAGE EXCLUSIONS AND REMEDY LIMITATIONS IN THIS AGREEMENT APPLY EVEN IF YOU HAVE NO REMEDY (THE SOFTWARE IS LICENSED “AS IS”), IF REPAIR, REPLACEMENT, OR A REFUND (IF REQUIRED BY YOUR LOCAL LAW) DOES NOT FULLY COMPENSATE YOU FOR ANY LOSSES, IF THE MANUFACTURER OR MICROSOFT KNEW OR SHOULD HAVE KNOWN ABOUT THE POSSIBILITY OF THE DAMAGES, OR IF THE REMEDY FAILS OF ITS ESSENTIAL PURPOSE.

Check with your device manufacturer to determine if your device is covered by a warranty.