

# User's Manual

## AQ2170/AQ2170H/AQ2180/AQ2180H/ AQ4280A/AQ4280B/AQ4280C Safety Precautions

Thank you for purchasing the optical power meters or the LD light source. To ensure correct use, please read this manual thoroughly before beginning operation. After reading this manual, keep it in a safe place.

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Printed in Japan

**YOKOGAWA** ◆

IM AQ2170-91EN  
3rd Edition

### Models

Models	Suffix code	Descriptions
AQ2170	–	Pocket size OPM
AQ2170H	–	Pocket size High power OPM
AQ2180	–	Handy OPM
AQ2180H	–	Handy High power OPM
AQ4280A	–	1310/1550nm Optical Light Source
AQ4280B	–	1310/1490/1550nm Optical Light Source
AQ4280C	–	1310/1550, 1490/1625nm Optical Light Source

### Safety Precautions

Make sure to observe the following safety precautions when handling the optical power meter or LD light source. YOKOGAWA assumes no liability for the customer's failure to comply with these safety precautions. Before you use this instrument, read the User's Manual to fully acquaint yourself with its specifications and handling.

**Make sure to observe the following safety precautions to prevent electric shock, personal injury, or damage to the instrument.**



#### WARNING

##### • Laser Beam

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

##### • Do not use in an explosive atmosphere

- To prevent fire and injury, do not use the OPM or LS in a flammable or explosive atmosphere or near steam.

##### • Do not disassemble or modify

- Do not disassemble or modify the product. YOKOGAWA assumes no liability if you disassemble or modify the product.

##### • Stop use if you suspect damage

- If you suspect that the OPM or LS is broken, consult your nearest YOKOGAWA dealer.



#### CAUTION

- This product has not been designed or manufactured for applications in which high reliability is required over a long time period. The OPM or LS is not water or dust resistant. Do not use the instrument in areas with a lot of dust or where water may be spilled.
- Avoid storing or using the OPM or LS in direct sunlight or in areas with high temperature, humidity, or condensation. Deformation and insulation deterioration can occur causing the probe to no longer meet the specifications.
- Avoid vibration, shock, and static electricity during shipping and handling. Take extra care not to drop the OPM or LS.

### The following symbols are used in this manual.



**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 the user's data, and precautions that can be taken to prevent such occurrences.

### Waste Electrical and Electronic Equipment (WEEE)



(This directive is valid only in the EU.)

This product complies with the WEEE Directive marking requirement. This marking indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category

With reference to the equipment types in the WEEE directive this product is classified as a "Monitoring and Control instruments" product.

Do not dispose in domestic household waste. When disposing products in the EU, contact your local Yokogawa Europe B. V. office.

### EU Battery Directive



(This directive is valid only in the EU.)

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

Battery type:

Alkaline battery

You cannot replace batteries by yourself. When you need to replace batteries, contact

### 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.

### Safety Precautions for Laser Products (only for AQ4280A/AQ4280B/AQ4280C)

AQ4280A, AQ4280B, and AQ4280C use a laser light source. These instrument are a Class 1 as defined by IEC 60825-1:2007 Safety of Laser Products—Part1: Equipment classification and requirements. In addition, this instrument complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

#### Laser Class 1 Label

CLASS 1 LASER PRODUCT 1类激光产品  
(IEC 60825-1:2014)  
(IEC 60825-1:2007, GB 7247.1-2012)

### Compliance with the Radio Waves Act (Republic of Korea)

This product complies with the Radio Waves Act (Republic of Korea).

Note the following when using the product in Republic of Korea.

이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

The product is for business use (Class A) and meets the electromagnetic compatibility requirements. The seller and the user must note the above point and use the product in a place except for home.

	AQ2170/AQ2170H	AQ2180/AQ2180H	AQ4280A/AQ4280B/AQ4280C
Registration No:	KCC-REM-IMY-EEN342	KCC-REM-IMY-EEN343	KCC-REM-IMY-EEN344
Equipment Name:	Optical Powermeter	Optical Powermeter	Optical Light Source
Trade Name:	Yokogawa Test & Measurement Corporation		
Manufacturer:	Yokogawa Test & Measurement Corporation		
Country of Origin:	China		

### 环保使用期限

This section is valid in China only.



表示该有毒有害物质在该产品中的含量均在GB/T26572标准规定的限量要求以下。

### Manual list

AQ2170 and AQ2170H

Manual Title	Manual No.	Description
AQ2170/AQ2170H Optical Power Meter User's Manual	IM AQ2170-01EN	Explains all the AQ2170 and AQ2170H features. It is included in the accompanying CD.
AQ2170/AQ2170H Optical Power Meter Operation Guide	IM AQ2170-02EN	Provided as a printed manual. This guide explains the basic operations, and specifications of the AQ2170 and AQ2170H.
AQ2170/AQ2170H/AQ2180/AQ2180H/AQ4280A/AQ4280B/AQ4280C Safety Precautions	IM AQ2170-91EN	This manual. Provided as a printed manual. Explains the handling precautions and specifications of the AQ2170, AQ2170H, AQ2180, AQ2180H, AQ4280A, AQ4280B, and AQ4280C.

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

AQ2180 and AQ2180H

Manual Title	Manual No.	Description
AQ2180/AQ2180H Optical Power Meter User's Manual	IM AQ2180-01EN	Explains all the AQ2180 and AQ2180H features. It is included in the accompanying CD.
AQ2180/AQ2180H Optical Power Meter Operation Guide	IM AQ2180-02EN	Provided as a printed manual. This guide explains the basic operations, and specifications of the AQ2180 and AQ2180H.
Terms and Conditions of the Software License	IM AQ2180-61EN	Provided as a printed manual. Terms and conditions of the software license for the free software.
AQ2170/AQ2170H/AQ2180/AQ2180H/AQ4280A/AQ4280B/AQ4280C Safety Precautions	IM AQ2170-91EN	This manual. Provided as a printed manual. Explains the handling precautions and specifications of the AQ2170, AQ2170H, AQ2180, AQ2180H, AQ4280A, AQ4280B, and AQ4280C..

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

AQ4280A, AQ4280B and AQ4280C

Manual Title	Manual No.	Description
AQ4280A/AQ2180B/AQ4280C Optical Light Source User's Manual	IM AQ4280-01EN	Explains all the AQ4280A, AQ4280B and AQ4280C features. It is included in the accompanying CD.
AQ4280A/AQ2180B/AQ4280C Optical Light Source Operation Guide	IM AQ4280-02EN	Provided as a printed manual. This guide explains the basic operations, and specifications of the AQ4280A, AQ4280B and AQ4280C.
AQ2170/AQ2170H/AQ2180/AQ2180H/AQ4280A/AQ4280B/AQ4280C Safety Precautions	IM AQ2170-91EN	This manual. Provided as a printed manual. Explains the handling precautions and specifications of the AQ2170, AQ2170H, AQ2180, AQ2180H, AQ4280A, AQ4280B, and AQ4280C.

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

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

Document Description	Description
PIM 113-01Z2	List of worldwide contacts

## Specifications

### AQ2170/AQ2170H

Model	AQ2170	AQ2170H
Wavelength Range (nm)	850/1300/1310/1490/1550/1625/1650 nm	1310/1490/1550/1625/1650 nm
Detector	InGaAs	InGaAs
Applicable Fibers Type	Light emitted from SM( ITU-T G.652), GI( 50/125 μm), GI( 62.5/125 μm) optical fiber	Light emitted from SM( ITU-T G.652), optical fiber
Optical Connector	FC, SC, LC, φ1.25 ferrule, φ2.5 ferrule	
Power Range(dBm)	-70 to +10 dBm	-50 to +26 dBm
Noise Level(dBm)	-60 dBm	-40 dBm
Uncertainty under standard conditions <sup>1</sup>	±5%	±5%
Displayed Resolution	0.01dB(>-60dBm),0.1dBm(≤-60dBm)	0.01dB(>-40dBm),0.1dBm(≤-40dBm)
Displayed Unit	Absolute values:dBm, mW, μW Relative values: dB	
Modulation Mode	CW, CHOP(270 Hz, 1 kHz, 2 kHz)	
Measurement Interval	Approximately150 ms	
Measurement mode	Absolute value measurement Relative value measurement: Relative value measurement relative to a set reference value Relative value measurement based on a displayed measurement	
Power supply	Dry and Rechargeable Battery AAA	
Battery life <sup>2</sup>	Approximately 40 hours	
Power saving	Power turns off automatically when there is no key input for approximately 10 minutes (this function can be disabled)	
Battery check	Battery indicator	
Environmental conditions	Operating temperature range:-10~50°C Operating humidity range:20~80% Storage temperature range:-20~+70°C(no condensation) Storage humidity range:5~95%(no condensation)	
Dimensions and weight <sup>3</sup>	63(W)×116(H)×35(D) mm Approximately160 g	
EMC Emissions	Compliant standards: EN 61326-1 Class B, EN 55011 Class B Group 1 EMC standards of Australia and New Zealand EN 55011 Class B, Group 1, Korea Electromagnetic Conformity Standard ( 한국 전자파적합성기준 )	
Immunity	EN 61326-1 Table 2 (for use in industrial locations), EN 61326-2-2	
Environmental standard	Compliant standard: EN 50581 Monitoring and control instruments including industrial monitoring and control instruments.	

- 23°C±2°C ambient temperature reference conditions/Wavelength setting of Power Meter : 1310 nm/Wavelength of light source to be measured : 1310 nm/Spectral width of the light source to be measured : Less than 5 nm/Power of measured light source : -10 dBm/Modulation : CW/Use Fiber : SM fiber (ITU-T G652)/Connector Type : FC/Does not include the polarization dependence and polarization conditions/1 year aging/Including uncertainty in attaching and removing the adapter
- Continuation Measurement, using alkaline dry cells, at 23°C±2°C
- A protector is removed.

Note : Specifications are at 23°C±2°C unless otherwise noted.Optical connector: FC/PC

### AQ2180/AQ2180H

Model	AQ2180	AQ2180H
Wavelength Range (nm)	850/1300/1310/1490/1550/1625/1650 nm	1310/1490/1550/1625/1650 nm
Detector	InGaAs	InGaAs
Applicable Fibers Type	Light emitted from SM( ITU-T G.652), GI( 50/125 μm), GI( 62.5/125 μm) optical fiber	Light emitted from SM( ITU-T G.652), optical fiber
Optical Connector	FC, SC, LC, φ1.25 ferrule, φ2.5 ferrule	
Power Range(dBm)	-70 to +10 dBm	-50 to +26 dBm
Noise Level(dBm)	-60 dBm	-40 dBm
Uncertainty under standard conditions <sup>1</sup>	±5%	±5%
Displayed Resolution	0.01 dB, 0.01 dBm, 0.0001 μW	
Displayed Unit	Absolute values:dBm, mW, μW Relative values: dB	
Modulation Mode	CW, CHOP(270 Hz, 1 kHz, 2 kHz)	
Measurement Interval	Approximately150 ms	
Measurement mode	Absolute value measurement Relative value measurement: Relative value measurement relative to a set reference value Relative value measurement based on a displayed measurement	
Memory function	999 records	
Interface	USB-B(mini)	
Power supply	Dry and Rechargeable Battery AA	
Battery life <sup>2</sup>	Approximately 40 hours	
Power saving	Power turns off automatically when there is no key input for approximately 10 minutes (this function can be disabled)	
Battery check	Battery indicator	
Environmental conditions	Operating temperature range:-10~50°C Operating humidity range:20~80% Storage temperature range:-20~+70°C (no condensation) Storage humidity range:5~95%(no condensation)	
Dimensions and weight <sup>3</sup>	76(W)×153(H)×43(D) mm Approximately 280 g	
EMC Emissions	Compliant standards: EN 61326-1 Class B, EN 55011 Class B Group 1 EMC standards of Australia and New Zealand EN 55011 Class B, Group 1, Korea Electromagnetic Conformity Standard ( 한국 전자파적합성기준 )	
Immunity	EN 61326-1 Table 2 (for use in industrial locations), EN 61326-2-2	
Environmental standard	Compliant standard: EN 50581 Monitoring and control instruments including industrial monitoring and control instruments.	

- 23°C±2°C ambient temperature reference conditions/Wavelength setting of Power Meter : 1310 nm/Wavelength of light source to be measured : 1310 nm/Spectral width of the light source to be measured : Less than 5 nm/Power of measured light source : -10 dBm/Modulation : CW/Use Fiber : SM fiber (ITU-T G652)/Connector Type : FC/Does not include the polarization dependence and polarization conditions/1 year aging/Including uncertainty in attaching and removing the adapter
- Continuation Measurement, using alkaline dry cells, at 23°C±2°C
- A protector is removed.

Note : Specifications are at 23°C±2°C unless otherwise noted.Optical connector: FC/PC

### AQ4280A/AQ4280B/AQ4280C

Model	AQ4280A	AQ4280B	AQ4280C
Light emitter	LD		
Compliant fiber	SM (ITU-T G.652)		
Center wavelength <sup>1</sup>	1310/1550±20 nm	1310/1550±20 nm 1490±10 nm	1310/1550±20 nm 1490/1625±10 nm
Spectral width <sup>1,2</sup>	<5 nm(1310 nm) <10 nm(1550 nm)	<5nm (1310 nm, 1490 nm) < 10 nm(1550 nm)	<5 nm(1310 nm, 1490 nm,1625 nm) < 10 nm(1550 nm)
Optical output level <sup>3</sup>	-5 dBm±1 dB	-5 dBm±1 dB	-5 dBm±1 dB
Level stability (15min) <sup>1,3</sup>	<±0.05 dB	<±0.05 dB (1310/1550 nm) <±0.1 dB (1490 nm)	<±0.05 dB (1310/1550 nm) <±0.1 dB (1490/1625 nm)
Modulation Mode	CW, CHOP(270 Hz, 1 kHz, 2 kHz)		
Optical Connector	FC, SC, ST		
Laser Class	Class 1 (EN 60825-1:2014, IEC 60825-1:2007, GB 7247.1-2012)		
Power supply	Dry and Rechargeable Battery AA		
Battery life <sup>4</sup>	Approximately 25 hours		
Power saving	Power turns off automatically when there is no key input for approximately 10 minutes (this function can be disabled)		
Battery check	Battery indicator		
Environmental conditions	Operating temperature range:-10~50°C Operating humidity range:20~80% Storage temperature range:-20~+70°C (no condensation) Storage humidity range:5~95%(no condensation)		
Dimensions and weight <sup>5</sup>	76(W)×153(H)×43(D) mm, Approximately 300 g		
Safety standard	Compliant standards: EN 61010-1, EN 60825-1:2014 (laser safety), IEC 60825-1:2007 (laser safety), FDA 21 CFR 1040.10 (laser safety), GB 7247.1-2012 (laser safety)		
EMC Emissions	Compliant standards: EN 61326-1 Class B, EN 55011 Class B Group 1 EMC standards of Australia and New Zealand EN 55011 Class B, Group 1, Korea Electromagnetic Conformity Standard ( 한국 전자파적합성기준 )		
Immunity	EN 61326-1 Table 2 (for use in industrial locations), EN 61326-2-2		
Environmental standard	Compliant standard: EN 50581 Monitoring and control instruments including industrial monitoring and control instruments.		

- Modulation Mode: CW, ambient temperature: 23°C±2°C
- RMS (2σ, -20 dB)
- In the case of the PC/FC 2m code connection
- Continuation Measurement, using alkaline dry cells, at 23°C±2°C
- A protector is removed.

Note : Specifications are at 23°C±2°C unless otherwise noted.Optical connector: FC/PC

## Operation

### AQ2170/AQ2170H



No.	Key	Function
1	ON/OFF	Switches instrument on/off. Long keypress over 2 seconds while powering on is to activate the instrument without Auto-off function.
2	λ	Selects measurement wavelength in sequence of 850/1300/1310/1490/1550/1625/1650nm (AQ2170H:1310/1490/1550/1625/1650)
3	dBm/dB/mW	Switches measurement units among dBm, dB and mW.
4	REF	Short keypress to display reference level of present test wavelength. Long Key press over 2seconds to set a new reference level of present test wavelength.
5	Backlighting	Switches backlighting on/off.

### AQ2180/AQ2180H



No.	Key	Function
1	ON/OFF	Switches instrument on/off. Long keypress over 2 seconds while powering on is to activate the instrument without Auto-off function.
2	λ	Selects measurement wavelength in sequence of 850/1300/1310/1490/1550/1625/1650 nm and to Long key press over 2 seconds activate auto-wavelength recognition(TWIN). In memory, browse the forward records and Long key press over 2seconds browse the forward 20 record.
3	dBm/dB/mW	Switches measurement unit among dBm,dB and mW. In memory, delete current record and Long key press over 2 seconds delete all record.
4	SAVE/LOAD	Long key press over 2seconds to store the current test value. Short keypress to display the record.
5	REF	Short key press to display reference value of present test wavelength. Long key press over 2seconds to set a new reference value of present test wavelength. In memory,browse the afterward records and Long key press over 2 seconds browse the afterward 20 record.
6	Backlighting	Switches backlighting on/off.

### AQ4280A/AQ4280B/AQ4280C



No.	Key	Function
1	ON/OFF	Switches Instrument on/off. Long Key press over 2 seconds while powering on to activate the instrument without Auto-off function.
2	shift	Select CH1 , CH2(Only AQ4280C), CH1 and CH2 can emit light independently. CH which is not used should stop light emitting.
3	CW/Hz	Modulated Wavelength Shifting Key: Switches modulated wavelength and continuous wavelength.
4	λ	AQ4280A:1310nm, 1550nm AQ4280B:1310nm, 1490nm, 1550nm AQ4280C:1310nm, 1550nm + 1490nm, 1625nm
5	TWIN	SINGLE: Auto-wavelength recognition is off. TWIN: Auto-wavelength recognition is on.
6	Backlighting	Switches backlighting on/off.