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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YOKOGAWA

IM AQ2170-91EN 4th 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.



Laser Beam

WARNING

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." Calls attention to actions or conditions that could cause serious or fatal injury to the WARNING 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.

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



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 판 매자 또는 사용자는 이 점을 주의하시기 바라며 , 가정외의 지역에서 사용하는 것을 목적으 로 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

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 Powe Meter User's Manual	r IM AQ2180-01EN	Explains all the AQ2180 and AQ2180H features. It is included in the accompanying CD.
AQ2180/AQ2180H Optical Powe Meter Operation Guide	r 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	IM AQ4280-01EN	Explains all the AQ4280A, AQ4280B and			
Optical Light Source User's		AQ4280C features. It is included in the			
Manual		accompanying CD.			
AQ4280A/AQ2180B/AQ4280C	IM AQ4280-02EN	Provided as a printed manual. This			
Optical Light Source Operation		guide explains the basic operations, and			
Guide		specifications of the AQ4280A, AQ4280B and AQ4280C.			
AQ2170/AQ2170H/AQ2180/	IM AQ2170-91EN	This manual. Provided as a printed manual.			
AQ2180H/AQ4280A/AQ4280B/		Explains the handling precautions and			
AQ4280C Safety Precautions		specifications of the AQ2170, AQ2170H,			
-		AQ2180, AQ2180H, AQ4280A, AQ4280B, and			

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 office in Europe.

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 your local Yokogawa office in Europe.

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.

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

	•••				
	Model		AQ2170	AQ2170H	
	Wavele (nm)	ength Range	850/1300/1310/1490/1550/ 1625/1650 nm	1310/1490/1550/1625/ 1650 nm	
	Detector		InGaAs		
Sensor Specifications	Applica	ble 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,	5 ferrule	
	Power	Range(dBm)	-70 to +10 dBm	-50 to +26 dBm	
	Noise L	_evel(dBm)	-60 dBm	-40 dBm	
	Uncerta standa	ainty under rd conditions ¹	±5%	±5%	
	Display	ed Resolution	0.01dB(>-60dBm),0.1dBm(≤- 60dBm)	0.01dB(>-40dBm),0.1dBm(≤- 40dBm)	
	Display	ved Unit	Absolute values:dBm, mW, µV	V Relative values: dB	
	Modula	tion Mode	CW, CHOP(270 Hz, 1 kHz, 2 k	(Hz)	
	Measu	rement 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 ²	Approximately 40 hours		
0		Power saving	Power turns off automatically when there is no key input for approximately 10 minutes (this function can be disabled)		
General		Battery check	Battery indicator		
Specifications	Environmental		Operating temperature range:-	·10~50°C	
	conditio	ons	Operating humidity range:20~8	30%	
			Storage temperature range:-20~+70°C(no condensation)		
			Storage humidity range:5~95%(no condensation)		
	Dimens weight ³	sions and	63(W)×116(H)×35(D) mm Approximately160 g		
	EMC	Emissions	Compliant standards: EN 61326-1 Class B, EN 55 EMC standards of Australia Class B, Group 1, Korea Electromagnetic Con 전자파적합성기준)	011 Class B Group 1 and New Zealand EN 55011 formity Standard (한국	
		Immunity	EN 61326-1 Table 2 (for use in ir	ndustrial locations), EN 61326-2-2	
	Environmental standards		EU RoHS Directive compliant.		

1 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

2 Continuation Measurement, using alkaline dry cells, at 23°C±2°C

3 A protector is removed.

AQ2180/AQ2180H

	Model		AQ2180	AQ2180H	
	Wavelength Range		850/1300/1310/1490/1550/	1310/1490/1550/1625/	
	(nm)		1625/1650 nm	1650 nm	
	Detector		InGaAs		
Sensor Specifications	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 C	onnector	FC, SC, LC, \01.25 ferrule, \02.5	ferrule	
	Power Ra	ange(dBm)	-70 to +10 dBm	-50 to +26 dBm	
	Noise Lev	/el(dBm)	-60 dBm	-40 dBm	
	Uncertain standard	ty under conditions ¹	±5%	±5%	
	Displayed	Resolution	0.01 dB, 0.01 dBm, 0.0001 µW		
	Displayed	l Unit	Absolute values:dBm, mW, µW	Relative values: dB	
	Modulatic	n Mode	CW, CHOP(270 Hz, 1 kHz, 2 kH	Hz)	
	Measurer	nent 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 Interface Power supply Battery life ²		999 records		
			USB-B(mini)		
			Dry and Rechargeable Battery	AA	
			Approximately 40 hours		
		Power	Power turns off automatically w	hen there is no key input for	
General		saving	approximately 10 minutes (this	function can be disabled)	
Specifications		Battery	Battery indicator		
	Environm	ental	Operating temperature range:-1	0~50°C	
	conditions	8	Operating humidity range: 20~80%		
			Storage temperature range:-20~+70°C (no condensation)		
			Storage humidity range:5~95% (no condensation)		
	Dimensio weight ³	ns and	76(W)×153(H)×43(D) mm		
	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 inc	lustrial locations), EN 61326-2-2	
	Environme	ental standards	EU RoHS Directive compliant.		

AQ4280A/AQ7280B/AQ4280C					
	Model		AQ4280A	AQ4280B	AQ4280C
	Light	emitter	LD		·
	Comp	oliant fiber	SM (ITU-T G.652)		
	Cente	er wavelength ¹	1310/1550±20 nm	1310/1550±20 nm 1490±10 nm	1310/1550±20 nm 1490/1625±10 nm
	Spec	tral width ^{1, 2}	<5 nm(1310 nm)	<5nm (1310 nm, 1490 nm)	<5 nm(1310 nm, 1490 nm,1625 nm)
Light Source			<10 nm(1550 nm)	< 10 nm(1550 nm)	< 10 nm(1550 nm)
Specifications	Optic	al output level ³	-5 dBm±1 dB	-5 dBm±1 dB	-5 dBm±1 dB
	Level (15m	stability in) ^{1, 3}	<±0.05 dB	<±0.05 dB (1310/1550 nm)	<±0.05 dB (1310/1550 nm)
				<±0.1 dB (1490 nm)	<±0.1 dB (1490/1625 nm)
	Modu	lation 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 ⁴	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		Operating temperatu	re range:-10~50°C	
	condi	tions	Operating humidity range:20~80%		
			Storage temperature range:-20~+70°C (no condensation)		
			Storage humidity range:5~95%(no condensation)		
General	Dime weigh	nsions and າt ⁵	76(W)×153(H)×43(D) mm, Approximately 300 g		
Specifications	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 전자파직학성기준)		
		Immunity	EN 61326-1 Table 2 (f	or use in industrial loca	tions), EN 61326-2-2
	Environmental standards		EU RoHS Directive compliant.		

1 Modulation Mode:CW, ambient temperature: 23°C±2°C

2 RMS (2σ, -20 dB)

3 In the case of the PC/FC 2m code connection

4 Continuation Measurement, using alkaline dry cells, at 23°C±2°C

>2s SET

5 A protector is removed.

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

Operation AQ2170/AQ2170H



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	2	À	Selects measurement wavelength in sequence of 850/1300/ 1310/1490/1550/1625/1650 nm (AQ2180H:1310/1490/1550/1625/1650) 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	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 alls record.
6	4	>2s SAVE	Long key press over 2seconds to store the current test value. Short keypress to display the record.
			Short key press to display reference value of present test wavelength.

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

3 A protector is removed.

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

5	Rer	and Long key press over 2 seconds browse the afterward 20 record.
6	Ö	Switches backlighting on/off.

Long key press over 2seconds to set a new reference value of

AQ4280A/AQ4280B/AQ4280C

1

0_

3

F93 F93	No.	Key	Function
YOKOGAWA	1	>21 PERM	Switches Instrument on/off. Long Key press over 2 seconds while powering on to activate the instrument without Auto-off function.
²⁷⁰⁰⁰ 8. 8. 8. 8. 8 _{авт}	2	shift	Select CH1 , CH2(Only AQ4280C), CH1 and CH2 can emit light independently. CH which is not used should stop light emitting.
	3	CWUHZ	Modulated Wavelength Shifting Key: Switches modulated wavelength and continuous wavelength.
	4	λ	AQ4280A:1310nm, 1550nm AQ4280B:1310nm, 1490nm, 1550nm AQ4280C:1310nm, 1550nm + 1490nm, 1625nm
AQ4280 OPTICAL LIGHT SOURCE	5	TWIN	SINGLE: Auto-wavelength recognition is off. TWIN: Auto-wavelength recognition is on.
	6		Switches backlighting on/off.

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