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The Ando AQ8201A mainframe can host a fairly broad variety of modules. Here is the list.

- AQ8201-03 Display Controller Module
- AQ8201-11 WDM DFB-LD Module (Light source)
- AQ8201-11A WDM DFB-LD Module (Light source for PM fiber)
- AQ8201-11B WDM DFB-LD Module (Light source for L-band)
- AQ8201-12 ASE Module (Light source)
- AQ8201-12A ASE Module (High power type light source)
- AQ8201-13 ECL module (Light source)
- AQ8201-21 OPM Module (Optical power meter)
- AQ8201-31 ATTN Module (Optical attenuator)
- AQ8201-32 ATTN Module (High resolution type optical attenuator)
- AQ8201-33 ATTN Module (High resolution type optical attenuator)
- AQ8201-61 MWA Module (optical spectrum analyzer)
- AQ8201-71 RLM Module (Return loss measurement)

Each module from the above list will be sold with calibration report and pertinent data as appropriate. PLEASE NOTE that some modules such as the AQ8201-4xx optical switches bear the 8201 name but will not work in AQ8201A mainframe. Only in the AQ8202, AQ8203 and AQ8204.

AQ8201 Series
Optical Test &
Measurement System

Instruction Manual

ANDO ELECTRIC CO., LTD.

AS-62521Rev,5.3

WARRANTY

AllAndoElectric'sproductshave been inspected with our severe quality assurance standards.However, if any defect or trouble occurringduringtransportationisfound, contactto our service agency.Do notrepairadefectiveANDO's product byyourself inordertoavoidanyphysicaldamage. ArepairofdefectiveANDO'sproduct must be performedbyaserviceengineerapprovedbyANDOELECTRIC CO., LTD.

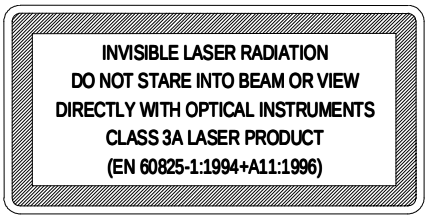
AndoElectricwillreplace,atnocharge,thedefectiveproduct(s) that occur within one year oftheoriginaldateofproductdelivery.However,thedefectsduetoanoperationerror, modification orretrofit by the customer, or those caused by the natural disasters are serviced withcharge.

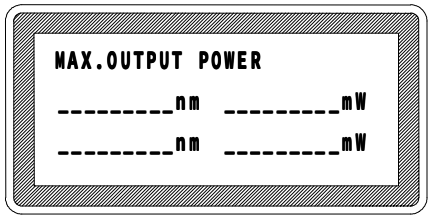
Initial Safety Information for Laser Source Module

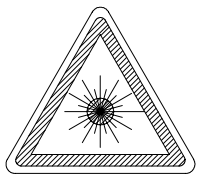
The Specifications for these modules are follows;

	AQ8201-11	AQ8201-11A	AQ8201-11B
Laser Type	DFB-Laser	DFB-Laser	DFB-Laser
Laser Class (According to EN60825-1:1994+A11:1996)	3A	3A	3A
Output Power	+10dBm min	+13dBm min	+10dBm min
Beam Diameter	10μm	10μm	10μm
Numerical Aperture	0.1	0.1	0.1
Wavelength	1524.11 to 1570.01nm	1524.11 to 1570.01nm	1570.42 to 1620.50nm

	AQ8201-12		
Laser Type	ASE		
Laser Class (According to EN60825-1:1994+A11:1996)	3A		
Output Power	+10dBm min		
Beam Diameter	10μm		
Numerical Aperture	0.1		
Wavelength	1550 ± 20nm		







A sheet of laser safety warning labels are include with the laser module. You must stick the labels in the local language onto outside of the mainframe, in a position where they are clearly visible to anyone using the instrument.

Check that the wavelength and light emission written on the attached safety caution seal (the same as the one in the center on the above) satisfy the above specifications.

You MUST return instruments with malfunctioning laser boxes to a Service Center for repair and calibration.

WARNING

Use of controls or adjustments of performance or procedures other than those specified for the laser source may result in hazardous radiation exposure.

WARNING

Refer Servicing only to qualified and authorized personnel.

WARNING

Do not emit a laser light when an optical fiber is not connected on the optical output connector. The optical output connector is located on the front panel of LD module.
The LD module emits laser light when OPT button is pressed.
OPT button is located on the front panel of LD module, just above the optical output connector. A green LED on the front panel of LD module goes on while a laser light is emitted.

WARNING

Under no circumstances look into the end of an optical cable attached to the optical output when the device is operational.
The laser radiation is not visible to the human eye, but it can seriously damage your eyesight.

WARNING

The invisible laser light is output from the light connector of this machine. Please do not look into the fiber connected with the light connector and the light connector.

WARNING

If you watch the laser light, your eyes are damaged.
Please turn off the light output when you detach the light connector.

CAUTION

There is a possibility that the laser light of high power is output when the inside of this machine is dec omposed and is remodeled carelessly.
It is necessary to be requested by our company service man when you repair this machine.

WARNING

The lithium battery is used for this machine. It is only a service worker in an electric engineer of the qualified person or our company to be able to exchange the battery.
There is danger of the explosion when the battery is inadequately exchanged. Please use the battery of the same kind or the same type when you exchange. Please follow the rule in the region when you dispose of the battery.

CAUTION

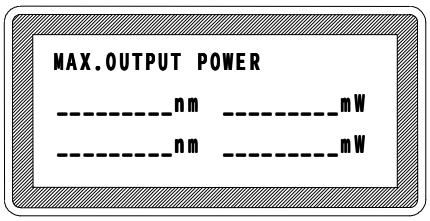
Please wipe the dirt of this machine with a soft, dry cloth.
When the dirt of this machine is cruel, the cloth soaked in water is wiped squeezing hard.
Please use neither benzine nor thinner, etc.

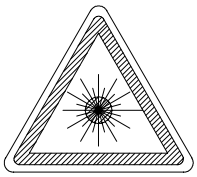
Sicherheitsinformation für Laser Quellen

Die Spezifikationen für die Lasereinschübe sind wie folgt:

	AQ8201-11	AQ8201-11A	AQ8201-11B
Laser Typ	DFB-Laser	DFB-Laser	DFB-Laser
Laser Klasse (Entsprechend EN60825-1:1994+A11:1996)	3A	3A	3A
Ausgangsleistung	+10dBm min	+13dBm min	+10dBm min
Strahldurchmesser	10µm	10µm	10µm
Numerische Apertur	0.1	0.1	0.1
Wellenlänge	1524.11 bis 1570.01nm	1524.11 bis 1570.01nm	1570.42 bis 1620.50nm

	AQ8201-12		
Laser Typ	ASE		
Laser Klasse (Entsprechend EN60825-1:1994+A11:1996)	3A		
Ausgangsleistung	+10dBm min		
Strahldurchmesser	10µm		
Numerische Apertur	0.1		
Wellenlänge	1550 ± 20nm		





Ein Blatt mit Laser Warnaufklebern ist jedem Lasereinschub beigefügt. Die Aufkleber müssen in der Landessprache, für den Anwender gut sichtbar, an der Aussenseite des Grundgerätes angebracht werden.

Überprüfen Sie, ob die Emissions und die wellenlänge, die auf dem beigelegten Sicherheitsaufkleber ausgezeichnet sind (siehe Abbildung oben in der Mitte), tatsächlich den oben genannten Spezifikationen entsprechen.

Defekte Lasereinschübe müssen zur Reparatur oder zur Kalibration an ein Service Büro geschickt werden.

WARNUNG

Bedienung,Abgleicharbeiten oder die Durchführung von Tests,die nicht im Handbuch angegeben sind,können zum Austritt gefährlicher Strahlung führen.

WARNUNG

Reparaturarbeiten dürfen nur von qualifliziertem und bevollmächtigtem Personal durchgeführt werden.

WARNUNG

Wenn kein Lichtwellenleiter an die optische Ausgabe angeschlossen ist, die Laserausgabe nicht auf ENABLE stellen. Der optische Ausgabe-Anschluß befindet sich an der Vorderwand der LD-Einheit. Der Laserstrahl wird durch Betätigen der OPT-Taste auf dem optischen Ausgabeanschluß an der Vorderwand der LD-Einheit ausgegeben.
Während der Laserstrahl ausgegeben wird, leuchtet die grüne LED auf der Vorderwand der LD-Einheit auf.

WARNUNG

Wenn der Laser eingeschaltet ist,darf unter keinen Umständen in das Ende des optischen Kabels oder in den Laserausgang am Gerät geschaut werden.
Der Laserstrahl ist für das menschliche Auge unsichtbar,kann aber das Sehvermögen ernsthaft verletzen.

WARNUNG

Vom otischen Anschluß des Systems wird ein mit bloßem Auge nicht sichtbarer Laserstrahl ausgegeben. Deshalb nie direkt in den optischen Anschluß oder den angeschlossenen Lichtwellenleiter blicken.

WARNUNG

Ein Eintreten des Laserstrahls ins Auge kann das Sehvermögen beeinträchtigen, Deshalb vor dem Auf- und Abbau des optischen Anschlusses diesen vorher immer abschalten.

ACHTUNG

Ein Zerlegen und Wiederzusammenbauen des Systeminneren kann zur Ausgabe eines starken Laserstrahls führen.
Deshalb bei notwendigen Reparaturen unseren Kundendienst kontaktieren.

WARNUNG

Die in diesem System verwendete Lithium-Batterie sollte nur von einem qualifizierten Elektroingenieur oder einem unserer Kundendienstleute ausgewechselt werden.
Ein Fehler bei der Auswechslung kann zur Explosion führen. Beim Auswechseln sicherstellen, daß Batterietyp und -modell identisch sind. Für die Beseitigung der Batterie die örtlichen Bestimmungen befolgen.

ACHTUNG

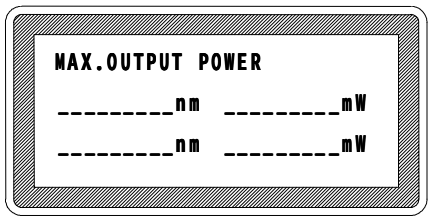
Falls das System verschmutzt ist, es mit einem weichen Tuch säubern.
Ein stark verschmutztes System mit einem feuchten und gut ausgewrungenen Tuch sä ubern. Kein Reinigungsbenzin oder Verdünnungsmittel verwenden.

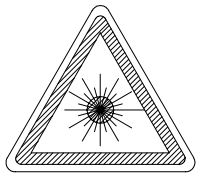
Informations et Consignew de Sécurité Relatives à l'Utilisation des Lasers.

Les Spécifications des Modules Laser sont les Suivantes:

	AQ8201-11	AQ8201-11A	AQ8201-11B
Type de Laser	DFB-Laser	DFB-Laser	DFB-Laser
Classe du Laser (Conforme au STD EN60825-1:1994+A11:1996)	3A	3A	3A
Puissance de Sortie	+10dBm min	+13dBm min	+10dBm min
Diamêtre du Faisceau	10µm	10µm	10µm
Ouverture Numériqcue	0.1	0.1	0.1
Longueur d'Onde	1524.11 à 1570.01nm	1524.11 à 1570.01nm	1570.42 à 1620.50nm

	AQ8201-12		
Type de Laser	ASE		
Classe du Laser (Conforme au STD EN60825-1:1994+A11:1996)	3A		
Puissance de Sortie	+10dBm min		
Diamêtre du Faisceau	10µm		
Ouverture Numériqcue	0.1		
Longueur d'Onde	1550 ± 20nm		





Les etiquettes de sécurité sont incluses dans le module laser. Il est obligatoire de coller une etiquette en langage local à l'exterieur de l'appareil de telle sorte qu'elle soit parfaitement visible par l'utilisateur.

Vérifier que la longueur d'onde et l'émission de la lumière inscrits sur le label de sécurité ci-joint (le même que celui dans le centre au dessus) correspondent aux specifications ci-dessus.

Il est obligatoire de retourner tour appareil présentant un défaut de fonctionnement du laser uniquement à un centre de réparation.

ATTENTION

L'utilisation du laser en dehors de ses limites de performances et des procédures définies par peut conduire à une exposition dangereuse de l'utilisateur aux radiations.

ATTENTION

Seul le personnel autorisé par est qualifié pour intervenir sur le laser.

ATTENTION

Ne pas émettre de lumière quand la fibre optique n'est pas connecté au connecteur de sortie.
Le connecteur de sortie est plasé sur la face avant du module diode laser.
La diode laser émet une lumiére quand le bouton(OPT) est activé.
Le bouton(OPT) est situé sur la face avant du module diode laser, juste au dessus du connecteur de sortie.
Une DEL verte sur la face avant du module diode laser s'allume pendant que la lumière est émise.

ATTENTION

En aucun cas ne tenter de regarder l'extrémité de la fibre optique attachée au connecteur lorsque le laser est en activité.
Bien que la lumière émise par le laser ne soit pas visible elle peut cependant être dangereuse pour la vue.

AVERTISSEMENT

Un rayon laser invisible est produit du connecteur optique de ce systèm. Ne pas regarder directement dans le connecteur optique ou la fibre raccordée à ce connecteur.

AVERTISSEMENT

Si le rayon laser péncètre dans les yeux, il risque d'affecter la vision. Pour éviter ce problème, s'assurer de bien déconnecter la sortie optique lorsque l'on monte ou démonte le connecteur optique.

PRECAUTION

Un démontage fait par mégarde ou un refaconnage de l'intérieur de ce système peut causer la production du rayon laser de haute intensité.
Lorsque l'on doit réparer, s'assurer de contacter notre personnel de service.

AVERTISSEMENT

La batterie au lithium utilisée dans ce système ne devrait être remplacée que par uningénieur de servic equalifié ou par notre personnel de service.
Si la batterie de service est remplacée incorrectement, une explosion pourrait être causée. En cas de remplacement, veiller à utiliser le même modèle ou type de batterie.
Lorsqe l'on se débarrasse de cette batterie, respecter les règlements locaux.

PRECAUTION

Lorsque le système est souillé, le nettoyer avec un chiffon bien propre. S'il est très souillé, le nettoyer avec un chiffon mouillé et bien pressé. Ne pas utiliser de benzine ou de diluant pour le nettoyage.

○ **Carefully read this manual and the precautions for safety before using the device.**

○ **Maintain this manual at a location easy to access.**

Precautions for Safety

This manual employs the following safety alert symbols to provide basic safety rules and precautions.They are intended to ensure correct use of the product and thus to prevent personal injury that could occur to you or other persons and physical damage.The meaning of the safety alert symbols are as follows.

Please take time to familiarize yourself with this section before going to other sections of this manual.

◎ Safety precautions and rules to be observed are identified with the following safety alert symbols:

This symbol represents safety precautions or rules (including Warning and Danger notices) that require users' attention.
(Actual "Signal Word" is entered inside the symbol.)

This symbol represents safety precautions or rules users must observe.
(Actual "Signal Word" is entered inside the symbol.)

This symbol represents banned user actions.

◎ Sample safety alert symbols

 WARNING	This symbol identifies hazards which can result in death or serious personnel injury if this warning is unheeded and the system is improperly handled or operated.

 CAUTION	This symbol identifies hazards which can result in personal injury or physical damage if this caution is unheeded and the system is improperly handled or operated.

	This symbol identifies hazards which can result in fuming or fire hazard if this caution or safety rule is unheeded and the system is improperly handled or operated.
	This symbol instructs to remove the power plug from the plug outlet to ensure work safety.
	This symbol identifies hazards which can result in an electric shock if this precaution or safety rule is unheeded and the system is improperly handled or operated.
	This symbol identifies general safety rules to be observed by users.
	This symbol identifies hazards which can result in bodily hurt if this precaution or safety rule is unheeded and the system is improperly handled or operated.

1. Restrictions on the Operating Environment

	Take care so that water may not flow into the system or the system may not be exposed to water, otherwise fire hazard, an electric shock or system failure can result.
	Connect the system to the ground before starting it up, otherwise an electric shock or system damage can result.

2. Restrictions on the Operating Conditions

	Don't operate the system at any other voltages than the specified, otherwise fire hazard, an electric shock or system failure can result.
	When this system is operated on the supply mains, it must be directly connected to the dedicated plug outlet.
	Don't use an extension cord since it can cause overheat and thus fire hazard.

3. Setup and Installation Work

3.1 Precautions intended for setup and installation personnel

	Avoid disordered, complex wiring from the power supply, otherwise cable overheating or fire hazard can result.
	Insert the power plug securely to the plug outlet, otherwise fire hazard or an electric shock can result if a metal piece touches the power plug.

3.2 Restrictions and bans on the installation environment and conditions

	Don't install the system into a highly humid or dusty place, otherwise an electric shock or system failure can result.
	Don't install the system on an unstable base or inclined place, otherwise personal injury can result when it falls or tumbles down.
	Don't install the system in a place exposed to severe vibrations or shocks , otherwise personal injury can result when it falls or tumbles down.
	Don't insert or drop a metal bar from the system openings, otherwise fire hazard, an electric shock or other personal injury can result.
	Keep the power cord away from the heating units, otherwise fire hazard or an electric shock can result from the damaged coating.
	Hold the plug portion when pulling the power cord out of the outlet, otherwise fire hazard or an electric shock can result from the damaged cord.
	Don't handle the power cord with wet hands, otherwise an electric shock can result.
	Don't place the system in a high temperature environment such as a place exposed to direct sunlight or inside of a vehicle, otherwise system failure can result from overheating of inside the system.

3.3 Banned actions in the system installation

	Don't try to move the system without making sure that the power plug has been removed from the plug outlet and external connection cables have been disconnected.
	Don't block the system ventilation hole, otherwise fire hazard can result from the entrapped heated air inside the system.
	Don't damage or rework the power cord, otherwise fire hazard or an electric shock can result from the cord damaged by a heavy substance placed on it, excessive heat or tension applied to it.

4. Precautions Before Starting the System

Please read this instruction manual carefully and familiarize yourself with the information provided in it.

5. Usage

	Operate the system in accordance with the procedure provided in the instruction manual.
	When a safety alert symbol（Warning, Danger or Caution mark） is provided, operation instructions provided in the manual must be heeded.
	Area surrounding the system must be free of a water filled container or metal pieces, otherwise fire hazard, an electric shock or system failure can result from the split water or dropped metal piece.
	Some modules to be connected to this equipment use an angled PC connector. Failure may occur if other connectors are connected to them.
	Don't rework the power cord nor forcibly bend, twist or pull it, otherwise fire hazard or an electric shock can result.
	Don't try to disassemble or retrofit the system, otherwise fire hazard, an electric shock or bodily injury can result.
	When the system is not to be used for a long period of time, remove the power plug from the plug outlet to ensure safety, otherwise fire hazard, an electric shock or system failure can result from lightning.
	Use caution when opening or closing doors on the system so that your fingers may not be pinched.
	The power plug must be removed from the plug outlet whenever a fuse replacement takes place, otherwise an electric shock or the system damage due to shorting can result.
	Don't use any fuse other than one having the specified rating and property Use of a short bar can aggravate should an accident happened. It can a lso cause fire hazard.

6. Maintenance and Inspection

Periodic system maintenance and inspection are recommended.
When you have any question on the maintenance or inspection, contact us at the list attached at the end of this manual.

	Dusts settled inside the system for a long period can cause fire hazard or system failure.

7. Actions Required for a System Failure

	If the power cord is damaged, contact us for its replacement. Continued use of such cord can cause fire hazard or an electric shock.
	Should a foreign substance dropped into the system, turn the system power off first, then remove the power cord from the plug outlet and contact us. Fire hazard, an electric shock or system failure can result from continued use of the system in such state.
	Should an abnormal state such as fume, smoke or offensive odor is detected on the system, turn the system power switch off immediately, then remove the power plug from the plug outlet. After making sure that fume or smoke is not present any more, contact us for repair. Continued use of the sys tem in such state can result in fire hazard, an electric shock or system failure. Never try to fix the trouble on your own. It is an extremely dangerous try.
	Should the system is dropped or damaged, turn the system power off, remove the power plug from the plug outlet, then contact us. Continued use of the system in such state can result in fire hazard, an electric shock or system failure.
	Should the system failed, customers are strongly advised not to try to fix the failure, otherwise an electric shock or personal injury can result. Our warranty is not applicable to the system repaired without previous not ice to and consent from us.

8. Precautions on Disposal

	Don't place the system in fire for its disposal, otherwise fire hazard or burn can result if it exploded.

Meanings of Items in This Manual and How to Use the Device

Thissectionexplainsthemeaningof the following items described in this manual and how to usethedevice.

1. "**DANGER**", "**WARNING**", "**CAUTION**" and "**NOTE**"

1) Importanceofinformation
The most important information is "DANGER", followed by "WARNING", "CAUTION" and "NOTE"inthisorderbasedonthemeaningswrittenin2) below.

2) Meanings
DANGER: Special information to be emphasized most, indicating imminent danger which leads to death or serious injury.

WARNING: Indicates dangeroussituationwhichmay lead todeath,seriousor non-serious injuryorequipmentdamage.

CAUTION: Indicatessituationwhichmayleadtonon-seriousinjuryorinterrupted systemoperation.

NOTE:Supplementaryexplanationon"Exception", "Modification" or "Limitation" for themainunit.

* Definition of serious injury:Injuries like lost sight, burn (highorlowtemperature), anelectric shock,brokenbone and toxicity whichmayleadtoanaftereffectorrequirehospitalizationor doctor's attention for a long time.
* Definition of non-serious injury: Injuries like burnandanelectricshockwhichdo notrequire hospitalizationordoctor'sattentionforalongtime.

2. Introduction toReference
Indicates thepagetobereferredto.

Example:Reference topage2-1isindicatedas"(→2-1)" usinganarrowandthepage.

3. Expression of Operation Keys in This Manual
Operationkeysareexpressedasfollows:

[ ]: Indicates expressions on thefront andrearpanels.

CONTENTS

5.System Operations ----- 5-1

8.Maintenance

FIGURE & TABLE CONTENTS

DRAWING CONTENTS

1. System Overview

This manualdescribeshowtooperatethemainframe (AQ8201A) andvariousoptionalmodules whichcomposetheAQ8201 series OpticalTest&MeasurementSystem (called"ThisSystem" hereafter).

1.1 SystemOutline

Thissystemconsistsofa main frame to bemounted ontothe rack (called"Frame" hereafter),a separate display and variousmodulesrequiredfor measurement. Eachmodulecanbemountedontotheframebypluggingitin.
Modulesconnectable to theframe are dedicated to thissystemandinclude a light source,an optical attenuator and an optical spectrum analyzer. The framefunctions asageneral-purpose controller for thesemodules.
Variousmeasurement systems can bematerializedbyassembling multiple frames onto a standard 19-inch rack and externally controllingthemusingtheGP-IB.

The figurebelowshowsthesystemoutline.

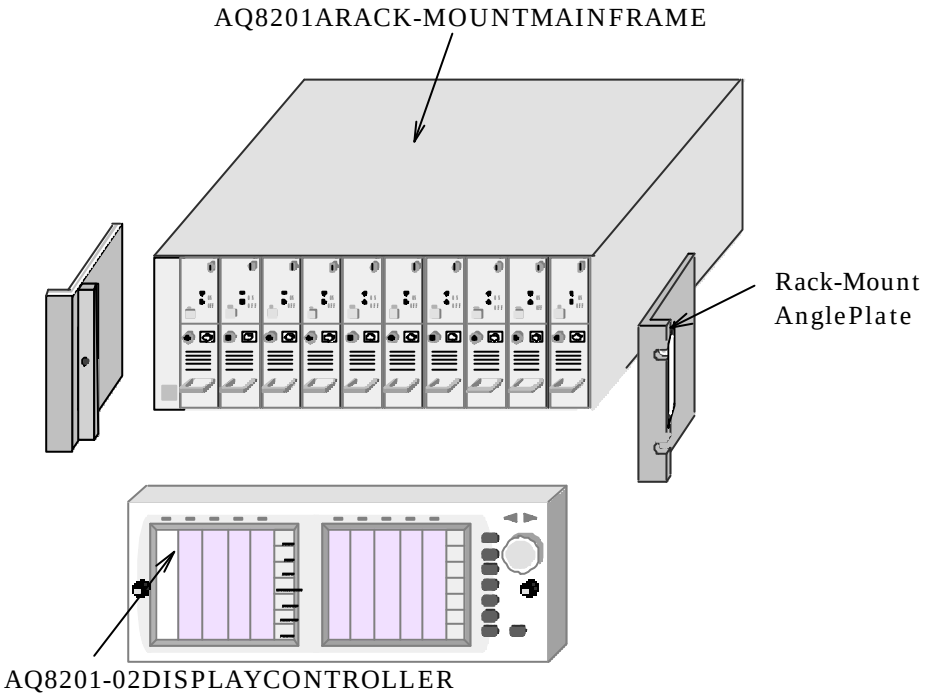


Figure1-1 SystemOutlineDiagram (1)

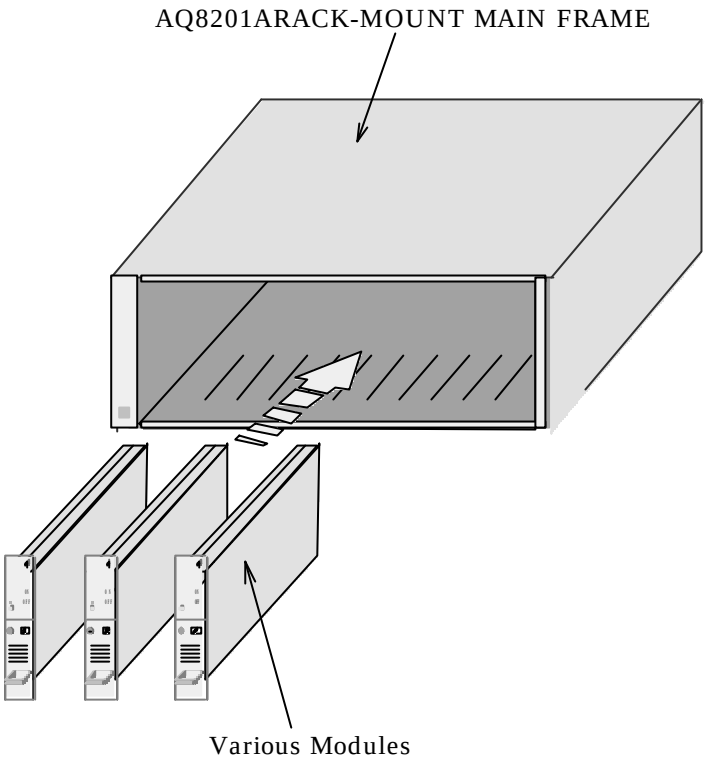


Figure 1-2 System Outline Diagram (2)

1.2 System Configuration

The standardsystem consistsoftheAQ8201A frameand the attachedgoods.
To AQ8201A (frame)

- TheAQ8201-02 Display Controller canconnect.

(Note) When the Display Controller is installed forward, the cable extension separately becomes an option (2 for VGA,1forthekeyboard,and1forthepowersupply/thesignal).

The list of the controlled systemmodule of AQ8201A (frame) is as follows.

- AQ8201-11 WDMDFB-LDMODULE (SMF C-Band)
- AQ8201-11A WDMDFB-LDMODULE (PMF C-Band)
- AQ8201-11B WDMDFB-LDMODULE (SMFL-Band)
- AQ8201-12 ASE MODULE
- AQ8201-13 ECLMODULE (SMF C-Band)
- AQ8201-13B ECL MODULE (SMFL-Band)
- AQ8201-21 OPMMODULE
- AQ8201-31 ATTN MODULE (Resolution 0.05dB)
- AQ8201-32 ATTN MODULE (Resolution 0.01dB)
- AQ8201-33 ATTN MODULE (Resolution 0.001dB)
- AQ8201-61 Multi-Wavelength Analyzer MODULE
- AQ8201-71 RLMMODULE

Two kinds of panels are prepared as a cover ofthemoduleunmountingpart.

- AQ8201-91 BentCover (Thereisaslit).
- AQ8201-92 Blank Cover (None slit).

Table1-1 AQ8201A AccessoryList

№	Accessory	Qty	Remarks
1	Instruction manual	1	
2	Angle forrack installation	2	1 pc.forrightandleft respectively
3	VGA dustcover	2	Alreadymountedonthepanel
4	Powercord	1	3 pole (withathreetotwopole conversion adapter)
5	GP-IB dust cover	1	Alreadymountedonthepanel.
6	DC + LEDdust cover	1	Alreadymountedonthepanel.
7	PS2dustcover	1	Alreadymountedonthepanel.
8	Screwforangle installation	8	Crossholeapplyingplate smallscrews. (M4 × 8)

Table1-2 AQ8201-03AccessoryList

№	Accessory	Qty	Remarks
1	Operationmanual	1	

Table1-3 AQ8201-11/11A/11B/13/13B AccessoryList

№	Accessory	Qty	Remarks
1	Opticalconnectorcap	1	Mountedontheoptical outputconnector.
2	SMAconnectorcap	1	Mountedontheexternalmodulationinput connector.

Table1-4 AQ8201-12AccessoryList

№	Accessory	Qty	Remarks
1	Opticalconnectorcap	1	Mountedontheoptical outputconnector.

Table1-5 AQ8201-21AccessoryList

№	Accessory	Qty	Remarks
1	Opticalconnectorcap	1	Mountedontheoptical input connector.
2	Analogoutplug	1	

Table1-6 AQ8201-31/32/33AccessoryList

№	Accessory	Qty	Remarks
1	Opticalconnectorcap	2	Mountedontheoptical I/O connector.

Table 1-7 AQ8201-61AccessoryList

№	Accessory	Qty	Remarks
1	Operationmanual	1	
2	Opticalconnectorcap	1	Mountedontheoptical input connector.

Table1-8 AQ8201-71AccessoryList

№	Accessory	Qty	Remarks
1	Opticalconnectorcap (FC)	1	Mountedontheoptical input connector.
2	Opticalconnectorcap (SC)	1	Mountedonthe measuringconnector.

1.3 Specification

1.3.1 RACK-MOUNT MAINFRAME (AQ8201A)

① Over view

The mainframe part can be built in 19 inch standard rack.
Display (AQ8201-02) can be fixed by using the angle for the rack mount.
In the frame, there are 10 slots and various modules necessary for measurement can be installed by the plug-in system. However, the number of slots occupied by the module is different.

AQ8201-03	DISPLAY CONTROLLER MODULE	2-SLOTS
AQ8201-11	WDM DFB-LD MODULE	1-SLOT
AQ8201-11A	WDM DFB-LD MODULE	1-SLOT
AQ8201-11B	WDM DFB-LD MODULE	1-SLOT
AQ8201-12	ASE MODULE	2-SLOT
AQ8201-13	ECL MODULE	1-SLOT
AQ8201-13B	ECL MODULE	1-SLOT
AQ8201-21	OPM MODULE	1-SLOT
AQ8201-31	ATTN MODULE	1-SLOT
AQ8201-32	ATTN MODULE	1-SLOT
AQ8201-33	ATTN MODULE	1-SLOT
AQ8201-61	Multi Wavelength Analyzer MODULE	5-SLOTS
AQ8201-71	RLM MODULE	1-SLOT

The frame is a general-purpose controller to control these modules and displays.
Moreover, the installed various modules can do the external control by the GP-IB interface of the frame.
Moreover, two kinds of panels are prepared as a cover of the module unmounting part.

AQ8201-91 Bent Cover (There is a slit).
AQ8201-92 Blank Cover (None slit).

② Specification

Table1-9 shows the specifications of this frame.

Table1-9 AQ8201A Specifications

Display interface	VGA input: 2 channels (D-sub 15 pin)
KEY interface	PS/2 input (DIN 6 pin)
GP-IB interface	Conforms to IEEE-488.2.
DC/LED interface	For connecting the DISPLAY CONTROLLER (AQ8201-02)
Power supply	AC 100 to 120, 200 to 240V, 50/60Hz, 400VA max. (*!)
Environmental requirements	Operating temperature: 5 to +40 ℃ (*2) Storage temperature: 0 to +50 ℃ Humidity: Up to 85%
Dimensions and weight	431.2W × 132.6H × 545Dmm, approx. 13kg (mountable on a 19-inch rack)

(*1): Input voltage setting is automatically changed.
(*2): The allowable operating temperature range is between 10 and 30 ℃ when mounting 10 AQ8201-11LD Modules.

1.3.2DISPLAYCONTROLLER(AQ8201-02)

① Over view
ThisdisplayisoperatorcontrolpaneloftheAQ8201Aexclusiveuse.Thisdisplayis composed of the liquidcrystaldisplaymachine (2), theoperationswitch, the VGA interface (two input), and the keyboard interfaces (PS/2 interchangeability).
Frame (AQ8201A) can be controlled by using theoperationbuttonandtherotaryknob on the panel and themanualcanoperatevarious modules mounted in theframe.
Moreover,two displays cometobeabletodisplayrespectivelyamong10slotsinthe frame forfiverightandleftslotsandcandisplayasetstateofthemodulemounted oneachslot,contentandthemeasurementdata,etc.
The displaycanbefixedtothefrontsideandbackeitheroffamebyusingtheangle fortherackmountoftheframe.
However, when thedisplaycontrollerisinstalled forward, thecable extension (2 for VGA, 1 for the keyboard, and 1 for the power supply/the signal) isseparatelyneeded.

② Specification
Table1-10showsthespecificationsof this display.

Table 1-10 AQ8201-02 Specifications

Display	LCD:2pcs. 6.5-inch TFT color monitor
Display interface	VGAinput:2channels (D-sub15 pin)
KEYinterface	Panel key and encoder output (equivalenttoPS/2)
DC/LEDinterface	ForconnectingtheAQ8201A (frame) display interface.
Environmental requirements	Operating temperature: 5 to+40 ℃ Storagetemperature: 0 to +50 ℃ Humidity:Upto85%
Dimensions and weight	425W × 132.5H × 70Dmm,approx.4kg

1.3.3 DISPLAY CONTROLLER (AQ8201-03)

① Over view

This module mounts on the AQ8201A and is a module to do an operation and a set display. This module monopolizes two slots and the installation position is assumed CH9, 10 fixation. The manual can operate various modules mounted in the frame with an operation button on the panel. The display comes to be able to display for one slot and can display a set state of the module mounted on each slot, content and the measurement data, etc.

The module which corresponds to a set display/the change is shown in the following.

AQ8201-11WDMDFB-LDMODULE
AQ8201-11AWDMDFB-LD MODULE
AQ8201-11BWDMDFB-LD MODULE
AQ8201-11Z WDM DFB-LD MODULE
AQ8201-13ECLMODULE
AQ8201-13BECLMODULE
AQ8201-21OPMMODULE
AQ8201-31ATTN MODULE
AQ8201-32ATTN MODULE
AQ8201-33ATTN MODULE

② Specification

Table1-11 shows the specifications of this module.

Table1-11 AQ8201-03Specifications

Display	LCD:160 × 240dots (RF-STN BLACK/WHITE type).
Environmental requirements	Operating temperature: 5 to +40 ℃ Storage temperature: 0 to +50 ℃ Humidity: Up to 85%
Dimensions and weight	79.5(W) × 130(H) × 324(D) mm, approx. 1.5kg

1.3.4 WDM DFB-LD MODULE(AQ8201-11)

① Overview

This module is a source of light by which DFB-LD which corresponds to the wavelength of the WDM channel is installed.
The wavelength can be specified by the accuracy of ± 0.1nm.
It is possible to use by using two or more modules as a source of light for the examination of the WDM communication device and the component.
This module build in to Peltier elements and is possible to change 1.6nm of wavelength by changing temperature.

② Specification

Table 1-12 shows the specifications of this module.

Table 1-12 AQ8201-11 Specifications

Specified wavelength		1524.11 to 1570.01nm (*1)
Center wavelength		λp +/-0.15 nm (*2) (*3)
Wavelength accuracy		Within +/-0.05nm
Spectrum width	Coherence control on	50MHz typ.
	Coherence control off	5 MHz max.
Optical output level		+10 dBm min. (*2)
SMSR		30dB min. (*5)
Stability of output level	15min.	Within +/-0.005 dB (*4)
	24hr.	Within +/-0.03dB (*4)
Stability of wavelength	15min.	Within +/-0.005 nm (*2)
	24hr.	Within +/-0.01nm (*2)
Wavelength adjustment width		1.6 nm min. (*2)
Optical connector		FC/Angled PC (*6)
Compatible fiber		SM(9/125 μm)
Optical attenuation width		10dB (in 0.01 dB steps)
Optical isolation		55dB min.
RIN		-145dB/Hz
Internal modulation		100Hz to 300kHz (CHOP)
External modulation		100Hz to 300kHz (sine wave) (*7)
Environmental requirements		Operating temperature: 5 to +40 ℃ Storage temperature: 0 to +50 ℃ Humidity: Up to 85%
Dimensions and weight		39.5(W)× 130(H)× 339(D)mm, approx. 0.7kg

(*) Specification condition: Afterexecutingwarmupforonehour.
(*1). SelectthewavelengthfromTable1-14.
(*2). Measuredat the connectingfiberoutgoingpoint (FC/APC-FC/SPC, 2m, SMF) withCW light, an attenuation of0.0dBandcoherencecontrolturnedoff.
(*3). λp refers tothespecifiedwavelength.
(*4). Measuredat an ambient temperature between 20and30℃(constanttemperature) with CW light, an attenuation of0.0dB,fiber (FC/APC-FC/SPC, 2m,SMF) andcoherence controlturned on.
(*5). Measuredat an attenuation of 0.0dBincenterwavelength.
(*6). Seiko Giken'sAngledPCwithareturnlossof60dBmin.
(*7). Optional

1.3.5 WDM DFB-LD MODULE(AQ8201-11A)

① Overview

Thismoduleinstalls DFB-LDwhichcorrespondstothewavelengthoftheWDMchannel andisasourceoflightoffixedpolarizationmaintainingfiber (PMF) correspondence. The wavelengthcanbespecifiedbytheaccuracyof ± 0.1nm.
It ispossible to usebyusingtwoormoremodulesasasourceoflightfortheexamination of the WDM communication device andthecomponent.
ThismodulebuildintoPeltierelementsandispossibletochange1.6nmofwavelengthby changing temperature.

② Specification

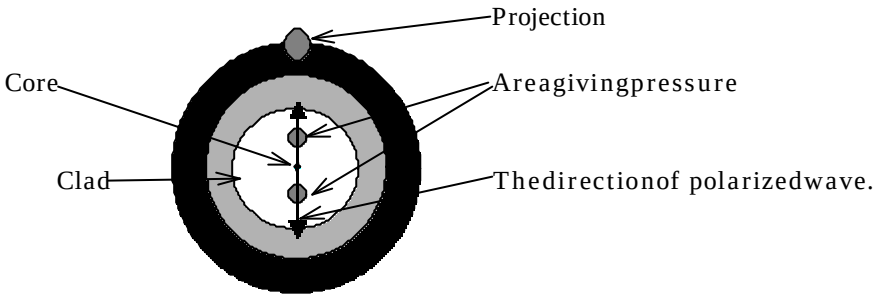
Table1-13showsthespecificationsofthismodule.

Table 1-13 AQ8201-11ASpecifications

Specifiedwavelength		1524.11to 1570.01nm (*1)
Center wavelength		λp +/-0.15 nm (*2) (*3)
Wavelengthaccuracy		Within+/-0.05nm
Spectrum width	Coherence controlon	50MHztyp.
	Coherence controloff	5 MHzmax.
Optical output level		+13 dBm min. (*8)
Extinctpolarization ratio		20dB(typ.) (*8)
SMSR		30dBmin. (*5)
Stability of output level	15min.	Within+/-0.005 dB (*4)
	24hr.	Within+/-0.03dB (*4)
Stability of wavelength	15min.	Within+/-0.005 nm (*2)
	24hr.	Within+/-0.01nm (*2)
Wavelength adjustment width		1.6 nm min. (*2)
Optical connector		FC/Angled PC (*6)
Compatible fiber		PM(9/125μm)
Optical attenuation width		10dB (in 0.01 dBsteps)
Opticalisolation		55dBmin.
RIN		-145dB/Hz
Internal modulation		100Hzto300kHz (CHOP)
External modulation		100Hzto300kHz (sine wave) (*7)
Environmental requirements		Operating temperature: 5 to+40 ℃ Storagetemperature: 0 to +50 ℃ Humidity:Upto85%
Dimensions and weight		39.5(W)×130(H)×339(D)mm, approx. 0.7kg

(*) Specification condition: Afterexecutingwarmupforonehour.
(*1). SelectthewavelengthfromTable1-14.
(*2). Measuredat the connectingfiberoutgoingpoint (FC/APC-FC/SPC, 2m, PMF) with CW light, an attenuation of0.0dBandcoherencecontrolturnedoff.
(*3). λ p refers tothespecifiedwavelength.
(*4). Measuredat an ambient temperature between 20and30℃(constanttemperature) with CW light, an attenuation of0.0dB,fiber (FC/APC-FC/SPC, 2m,PMF) and coherence controlturned on.
(*5). Measuredat an attenuation of 0.0dBincenterwavelength.
(*6). Seiko Giken'sAngledPCwithareturnlossof60dBmin.
(*7). Optional
(*8). Measuredat panelledbindingwearopticalconnectorpowerpoint (FC/APC-FC/SPC, 2m, PMF) with CW light, an attenuationof0.0dBand coherencecontrolturnedoff.

The figure belowshowstheexplanationoffixedpolarizationmaintainingfiber (PMF).



PMF:PolarizationMaintainingFiber

Figure1-3PolarizationMaintainingFiber (PMF)

Table1-14AQ8201-11/11ASpecified Wavelength Range

Sign	Optical Frequency	Wavelength	Sign	Optical Frequency	Wavelength	Sign	Optical Frequency	Wavelength
415	190.95	1570.01	030	192.90	1554.13	345	194.85	1538.58
410	191.00	1569.59	015	192.95	1553.73	360	194.90	1538.19
395	191.05	1569.18	010	193.00	1553.33	365	194.95	1537.79
390	191.10	1568.77	005	193.05	1552.93	380	195.00	1537.40
375	191.15	1568.36	000	193.10	1552.52	385	195.05	1537.00
370	191.20	1567.95	00H	193.15	1552.12	400	195.10	1536.61
355	191.25	1567.54	020	193.20	1551.72	405	195.15	1536.22
350	191.30	1567.13	025	193.25	1551.32	420	195.20	1535.82
335	191.35	1566.72	040	193.30	1550.92	425	195.25	1535.43
330	191.40	1566.31	045	193.35	1550.52	440	195.30	1535.04
315	191.45	1565.90	060	193.40	1550.12	445	195.35	1534.64
310	191.50	1565.50	065	193.45	1549.72	460	195.40	1534.25
295	191.55	1565.09	080	193.50	1549.32	465	195.45	1533.86
290	191.60	1564.68	085	193.55	1548.91	480	195.50	1533.47
275	191.65	1564.27	100	193.60	1548.51	485	195.55	1533.07
270	191.70	1563.86	105	193.65	1548.11	500	195.60	1532.68
255	191.75	1563.45	120	193.70	1547.72	505	195.65	1532.29
250	191.80	1563.05	125	193.75	1547.32	520	195.70	1531.90
235	191.85	1562.64	140	193.80	1546.92	525	195.75	1531.51
230	191.90	1562.23	145	193.85	1546.52	540	195.80	1531.12
215	191.95	1561.83	160	193.90	1546.12	545	195.85	1530.72
210	192.00	1561.42	165	193.95	1545.72	560	195.90	1530.33
195	192.05	1561.01	180	194.00	1545.32	565	195.95	1529.94
190	192.10	1560.61	185	194.05	1544.92	580	196.00	1529.55
175	192.15	1560.20	200	194.10	1544.53	585	196.05	1529.16
170	192.20	1559.79	205	194.15	1544.13	600	196.10	1528.77
155	192.25	1559.39	220	194.20	1543.73	605	196.15	1528.38
150	192.30	1558.98	225	194.25	1543.33	620	196.20	1527.99
135	192.35	1558.58	240	194.30	1542.94	625	196.25	1527.60
130	192.40	1558.17	245	194.35	1542.54	640	196.30	1527.22
115	192.45	1557.77	260	194.40	1542.14	645	196.35	1526.83
110	192.50	1557.36	265	194.45	1541.75	660	196.40	1526.44
095	192.55	1556.96	280	194.50	1541.35	665	196.45	1526.05
090	192.60	1556.55	285	194.55	1540.95	680	196.50	1525.66
075	192.65	1556.15	300	194.60	1540.56	685	196.55	1525.27
070	192.70	1555.75	305	194.65	1540.16	700	196.60	1524.89
055	192.75	1555.34	320	194.70	1539.77	705	196.65	1524.50
050	192.80	1554.94	325	194.75	1539.37	720	196.70	1524.11
035	192.85	1554.54	340	194.80	1538.98			

1.3.6 WDM DFB-LD MODULE(AQ8201-11B)

① Overview

This module isasourceoflightbywhichDFB-LDwhichcorrespondstoL-Bandwavelength ofITU-Tisinstalled..

The wave lengthcanbespecifiedby the accuracy of ± 0.1nm.

It is possible tousebyusingtwoormoremodulesasasourceoflightfortheexaminationof the WDMcommunicationdeviceand thecomponent.

This module buildinto Peltier elements and is possible tochange1.6nmofwavelengthby changing temperature.

② Specification

Table1-15showsthespecificationsofthismodule.

Table1-15 AQ8201-11BSpecifications

Specifiedwavelength		1570.42to 1620.50nm (*1)
Center wavelength		λp+/-0.15nm (*2) (*3)
Wavelength accuracy		Within+/-0.05 nm
Spectrum width	Coherence controlon	50MHztyp.
	Coherence control off	5 MHzmax.
Opticaloutput level		+10dBmmin. (*2)
SMSR		30dBmin. (*5)
Stability of outputlevel	15 min.	Within+/-0.005dB (*4)
	24 hr.	Within+/-0.03 dB (*4)
Stability of wavelength	15 min.	Within+/-0.005nm (*2)
	24 hr.	Within+/-0.01 nm (*2)
Wavelength adjustment width		1.6nmmin. (*2)
Opticalconnector		FC/Angled PC (*6)
Compatible fiber		SM(9/125μm)
Optical attenuation width		10dB (in 0.01dBsteps)
Opticalisolation		55dBmin.
RIN		-145 dB/Hz
Internal modulation		100Hzto300kHz (CHOP)
External modulation		100Hzto300kHz (sinewave) (*7)
Environmental requirements		Operating temperature: 5 to +40 ℃ Storagetemperature: 0 to +50 ℃ Humidity: Upto85%
Dimensions and weight		39.5(W)× 130(H)× 339(D)mm, approx. 0.7kg

(*) Specificationcondition:After executing warm upforonehour.
(*1). SelectthewavelengthfromTable1-16.
(*2). Measured attheconnectingfiberoutgoingpoint (FC/APC-FC/SPC, 2m, SMF) with CW light, an attenuationof0.0dBandcoherencecontrol turned off.
(*3). λ preferstothespecifiedwavelength.
(*4). Measured at an ambienttemperaturebetween20and30 ℃(constanttemperature) with CWlight,anattenuationof0.0dB,fiber (FC/APC-FC/SPC, 2m, SMF) and coherence control turned on.
(*5). Measured at an attenuation of 0.0 dBincenterwavelength.
(*6). Seiko Giken's Angled PC withareturnlossof60dBmin.
(*7). Optional

Table 1-16AQ8201-11B SpecifiedWavelengthRange

Sign	Optical Frequency	Wavelength	Sign	Optical Frequency	Wavelength	Sign	Optical Frequency	Wavelength
1610	185.00	1620.50	1210	187.00	1603.17	0810	189.00	1586.20
1595	185.05	1620.06	1195	187.05	1602.74	0795	189.05	1585.78
1590	185.10	1619.62	1190	187.10	1602.31	0790	189.10	1585.36
1575	185.15	1619.19	1175	187.15	1601.88	0775	189.15	1584.95
1570	185.20	1618.75	1170	187.20	1601.46	0770	189.20	1584.53
1555	185.25	1618.31	1155	187.25	1601.03	0755	189.25	1584.11
1550	185.30	1617.88	1150	187.30	1600.60	0750	189.30	1583.69
1535	185.35	1617.44	1135	187.35	1600.17	0735	189.35	1583.27
1530	185.40	1617.00	1130	187.40	1599.75	0730	189.40	1582.85
1515	185.45	1616.57	1115	187.45	1599.32	0715	189.45	1582.44
1510	185.50	1616.13	1110	187.50	1598.89	0710	189.50	1582.02
1495	185.55	1615.70	1095	187.55	1598.47	0695	189.55	1581.60
1490	185.60	1615.26	1090	187.60	1598.04	0690	189.60	1581.18
1475	185.65	1614.83	1075	187.65	1597.62	0675	189.65	1580.77
1470	185.70	1614.39	1070	187.70	1597.19	0670	189.70	1580.35
1455	185.75	1613.96	1055	187.75	1596.76	0655	189.75	1579.93
1450	185.80	1613.52	1050	187.80	1596.34	0650	189.80	1579.52
1435	185.85	1613.09	1035	187.85	1595.91	0635	189.85	1579.10
1430	185.90	1612.65	1030	187.90	1595.49	0630	189.90	1578.69
1415	185.95	1612.22	1015	187.95	1595.06	0615	189.95	1578.27
1410	186.00	1611.79	1010	188.00	1594.64	0610	190.00	1577.86
1395	186.05	1611.35	0995	188.05	1594.22	0595	190.05	1577.44
1390	186.10	1610.92	0990	188.10	1593.79	0590	190.10	1577.03
1375	186.15	1610.49	0975	188.15	1593.37	0575	190.15	1576.61
1370	186.20	1610.06	0970	188.20	1592.95	0570	190.20	1576.20
1355	186.25	1609.62	0955	188.25	1592.52	0555	190.25	1575.78
1350	186.30	1609.19	0950	188.30	1592.10	0550	190.30	1575.37
1335	186.35	1608.76	0935	188.35	1591.68	0535	190.35	1574.95
1330	186.40	1608.33	0930	188.40	1591.26	0530	190.40	1574.54
1315	186.45	1607.90	0915	188.45	1590.83	0515	190.45	1574.13
1310	186.50	1607.47	0910	188.50	1590.41	0510	190.50	1573.71
1295	186.55	1607.04	0895	188.55	1589.99	0495	190.55	1573.30
1290	186.60	1606.60	0890	188.60	1589.57	0490	190.60	1572.89
1275	186.65	1606.17	0875	188.65	1589.15	0475	190.65	1572.48
1270	186.70	1605.74	0870	188.70	1588.73	0470	190.70	1572.06
1255	186.75	1605.31	0855	188.75	1588.30	0455	190.75	1571.65
1250	186.80	1604.88	0850	188.80	1587.88	0450	190.80	1571.24
1235	186.85	1604.46	0835	188.85	1587.46	0435	190.85	1570.83
1230	186.90	1604.03	0830	188.90	1587.04	0430	190.90	1570.42
1215	186.95	1603.60	0815	188.95	1586.62			

1.3.7 ASE MODULE(AQ8201-12)

① Overview

ThismoduleisaASEsourceoflightofhighstabilitybywhichopticalisolatorisbuiltinto. ASE generated fromEDFisusedand highpowermorebroadbandareachieved.

② Specification

Table1-17showsthespecificationsof this module.

Table 1-17 AQ8201-12Specifications

Spectrum density (-13dBm/nm)		1525to1570nm (typ.) (*1) 1530to1565nm
Integratedoutput power		+10 dBm min (*1)
Stability of output level	5min.	Within +/-0.005dB (*1)(*2)
	1hr.	Within +/-0.05 dB (*1)(*3)
Polarizedwave extinctratio		0.1 dB(typ.)
Optical Isolation		50dBormore
Optical connector		FC/PC (Standard)(*4)
Compatible fiber		SM(9/125 μm)
Optical attenuation width		6.0 dB (in 0.1dBsteps)
Environmental requirements		Operating temperature: 5 to+40 ℃ Storagetemperature: 0 to +50 ℃ Humidity:Upto85%
Dimensions and weight		79.5(W)× 130(H)× 339(D)mm, approx.2kg

(*) Specificationcondition:Afterexecutingwarmupforonehour.

(*1).CW light.Attenuationis0.0dB.SMfiber(FC/PC at bothends,2meterslong). Atemissionend.

(*2).5minutes

(with thetemperaturemaintainedat a constant levelintherangeof20to30℃).

(*3).1hour(0 to40℃ +/-1℃)

(*4). ST andSCconnectors are alsosupported other than FC.

1.3.8 ECL MODULE(AQ8201-13)

① Overview
This module is anexternal resonator laseroftheSinglelengthmodethatwavechangeable length ispossible. Thismodulecanbeusedforthesourceoflightfortheexaminationofthe WDMcommunicationdeviceand the component as an alternative machine of AQ8201-11. (-13B is a moduleoftheL-bandcorrespondence.)

② Specification
Table1-18showsthespecificationsofthismodule.

Table1-18AQ8201-13Specifications

			AQ8201-13	AQ8201-13B
Specified wavelength			1460 to1580nm	1500to1620nm
Wavelength setresolution			10pm	
Wavelength accuracy			Within ± 0.2nm *1)、*2)、*3)、*10)	
Wavelengthrepeatability			+/-50pm (typ.) *1)、*2)、*10)	
Stability ofwavelength		15min.	Within +/-5pm *1)、*2)、*10)	
		24 hr.	+/-10pm (typ.) *1)、*2)、*10)	
Wavelength settime			3sec (typ.) *8)	
Spectrum width	Coherence controlon		100MHz(typ.) *1)、*2)	
	Coherence controloff		5MHz(typ.) *1)、*2)	
SMSR			45dBmin *1)、*2)、*4)	45dBmin *1)、*2)、*4)
Optical output level	1460~1580nm		+6dB min *1)、*2)、*5)	
	1490~1580nm		+8dB min *1)、*2)、*5)	
	1520~1580nm		+10dBmin *1)、*2)、*5)	
	1500~1620nm			+6dB(typ.) *1)、*2)、*5)
	1530~1620nm			+8dB(typ.) *1)、*2)、*5)
	1560~1620nm			+10dB(typ.) *1)、*2)、*5)
Optical attenuation width			10dB(0.01dB step) *1)、*4)	
Stability of output level		15min.	Within+/-0.005dB *1)、*2)、*5)、*10)	
		1hr.	Within +/-0.01dB *1)、*2)、*5)、*10)	
Internal modulation			100Hz to300kHz(CHOP) *6)	
External modulation			100Hzto300kHz(Sine Wave)	
RIN			-145dB/Hz(typ.) *1)、*2)	
Opticalconnector			FC/Angled PC *9)	
Compatiblefiber			SM(10/125 μ m)	
Environmental requirements			Operating temperature: 23+/-5℃ Storage temperature:0 to+50 ℃ Humidity: Up to 85%	
Dimensions and weight			39.5(W)× 130(H)× 339(D)mm, approx.1.2kg	

(*) Specification condition: Afterexecutingwarmupforonehour.
(*1) 23 ℃ constant and CW light, 2m fiberoutput,andsinglelengthmode.
(*2). Optical attenuation: 0.0 dB
(*3). After proofreading the wavelength.
(*4). Wavelength: 1550nm(-13):1500nm(-13B)
(*5). Spectrum width: coherence controlturnedon.
(*6). Setresolution0.1kHzandaccuracy+/-2%
(*7). Surrounding temperature of frame.
(*8). Time of movement infullspan (120nm)
(*9). Seiko Giken'sAngledPCwithareturnlossof60dBmin.
(*10)Specifiedwavelength1520to 1570nm(-13) / 1560to1610nm(-13B)

1.3.9 OPM MODULE(AQ8201-21)

① Overview

Thismoduleisanoptical powermeterwhichachieveda wide wavelengthbeltregion,high precision, andPDLof0.02dBpporless.

Because the wavelengthbeltregionwhere700-1700nmiswideiscoveredandtheprecision of ± 2.5% isguaranteedas for opticalpowerunderastandardcondition,highprecisionof optical powercanbemeasured.

② Specification

Table1-19showsthespecificationsof this module.

Table 1-19 AQ8201-21Specifications

Wavelengthrange		700to1700nm
Opticalsensor		Cooled InGaAs
Application		For the lightemitted from smalldiameterquartz fibers (*1)
Optical connector		FC connectoradapter (Standard) (*2)
Polarizedwave dependency		0.02 dBP-P(typ) (*3)
Power range	CW light	-80to+27dBm (*4)
	CHOP light	-80to+24dBm (*4)
Uncertaintyunderthe standard conditions		+/-2.5% (*5) (atthecalibrationpointof1310nm)
Overall measurement accuracy		+/-5% (1000to1650nm) (*6)
Linearity (*7)		+/-0.05dB (1000 to1650nm,-40to+27dBm)
Noise	CWlight	-73dBmmax (*8)
	CHOP light	
Environmental requirements		Operating temperature: 5 to+40 ℃. Storagetemperature: 0 to 50 ℃ Humidity: 85%maximum.
Dimensions and weight		39.5(W)× 130(H)× 339(D)mm, approx. 1.2kg

(*) Specification condition: Afterexecutingwarmupforonehour.
The performance guaranteeing temperature is 23 +/-5℃ (constant).
(*1). Applicable fiber </=62.5/125μm (GI). NA</=0.275.
(*2). STandSCconnectorsarealsosupportedotherthanFC.
(*3). At wavelength 1550 nmandwhenSMfibercablesareused.
(*4). At wavelength 1310 nm.
(*5). Standard conditions
{1} Power level: -20 dBm (10μW) and CWlight.
{2} SM fiber: SMfiberandmasterFCconnector.
{3} Ambienttemperature: 23 +/-5℃.
{4} Calibration is donewiththeAQ9389B (FC) connector adapter beingattached. (Accuracy promised in the specification may not be met if the connector adapter is removed. When youhavereplacedaconnectoradapter,contactusforthecalibration.)
(*6). Operating conditions
{1} Power level: -20 dBm (10μW) and CWlight.
{2} Applicable optical fiber </=50um. NA</=0.2.
{3} Ambienttemperature: 23 +/-5℃.
{4} With theAQ9389Bconnectoradapterbeingattached.
(*7).{1} It is linearity measuredatanoptional wavelength selectedwithinthe wavelength range specifiedintheoverallmeasuringaccuracy.
{2} With CW lightandtheambienttemperature being maintained at 23℃ +/-5℃.
(*8).{1} After 10 times ofaveraginginonesecond.
{2} Atthewavelength1200to1600nm.
{3} CW or CHOPlight (270Hz).

CAUTION

Do NOT connect ordisconnect theoptical fiber that is emitting CW light orCHOPlight, to/fromthismodule. If you do it, the photo-detectorcanbedamaged.

1.3.10 ATTN MODULE(AQ8201-31/32/33)

① Overview

Thismoduleisahighperformanceandlightchangeableattenuatorstobeabletodothe switch of nointerceptionin0.05 dB (-32:0.01dB ,-33:0.001dB)step as for the attenuation of 0-60 dB. The quantity of light adjustments such as WDM systems and thefiber amplifiers arealsopossible because of (+23dBm)/anopticalhighreturnloss.

② Specification

Table1-20,21 shows thespecificationsofthismodule.

Table 1-20 AQ8201-31/32Specifications

Wavelengthrange	1200to1600nm
Insertion loss	2.5 dBmax. (1310/1550nm)
Maximumattenuation	60dB
Attenuation accuracy	Within+/-0.1dB (1310/1550 nm)
Repeatability	Within+/-0.02dB
Minimumattenuation step	0.05 dB (-32:0.01dB)
Switching time	500ms max. (minimumattenuationstep)
Return loss	60dBmin. (1310/1550nm) (*1)
Polarization dependency	0.05 dBp-pmax. (typ.) (1550 nm)
Maximuminputpower	+23 dBm
Shutter isolation	100dBmin.
Applicable optical fiber	SM(9/125 μm)
Optical connector	FC/APC (*2)
Environmental requirements	Operating temperature: 5 to+40℃ Storagetemperature: 0 to +50℃ Humidity:Upto85%
Dimensions and weight	39.5(W)×130(H)×339(D)mm,approx.1kg

(*) Specification condition: Afterexecutingwarm up foronehour.
Performanceguaranteed temperature: 25+/-3℃

(*1). When FC/APCconnector (optical attenuation: 63 dBmin.) isused.

(*2). FC/APC: FC/AngledPC (made by Seiko Giken)

Table1-21 AQ8201-33Specifications

Wavelength range	1480 to 1650 nm
Insertion loss	2.5dBmax. (1550nm) (*3)
Maximum attenuation	60dB
Attenuationaccuracy	Within+/-0.1 dB (1520to1620nm)
Repeatability	+/-0.005 dB (typ.) (*3)
Minimumattenuation step	0.001dB
Return loss	60dBmin. (1550 nm) (*1)(*3)
Polarization dependency	0.05dBp-p . (typ.) (1550 nm) (*3)
Maximum input power	+23dBm
Shutter isolation	100dBmin.
Applicableoptical fiber	SM(9/125μm)
Opticalconnector	FC/APC (*2)
Environmental requirements	Operating temperature: 5 to +40℃ Storagetemperature: 0 to +50℃ Humidity: Upto85%
Dimensions and weight	39.5(W)×130(H)×339(D)mm,approx.1 kg

(*) Specification condition: Afterexecutingwarmupforonehour.
. Performanceguaranteed temperature: 25+/-3℃
(*1). WhenFC/APC connector (opticalattenuation:63dBmin.) isused.
(*2). FC/APC:FC/Angled PC (madebySeikoGiken)
(*3). Atconstant temperture

1.3.11 MWA MODULE(AQ8201-61)

① Overview

This moduleis opticalspectrumanalyzerwhichcorrespondstoWDMsystemanalysis. TheWDMmeasurementmode is possessed andtheevaluationof theWDMcomponentandthe analysisoftheWDMsystemcanbedone.

This modulehasbasicperformancesofa fastsweep,highsensitivity,highprecision,ahigh dynamicrange,andexcellentlinearity,etc.anditissuitablefortheevaluationofahighly accurateloss wave lengthcharacteristic of the device forWDM.

Moreover, abundantdataprocessingactivitiescanbepossessedandanopticalspectrumbe analyzedwithintherangewithinrange1200-1700nmofthemeasurementwavelength.

② Specification

Table 1-22 shows thespecificationsofthismodule.

Table 1-22 AQ8201-61Specifications

Measuredwavelength range	1200to1700nm (vacuum wavelength)
Wavelengthaccuracy	Within+/-0.05nm (1500 to 1570 nm) (*2) Within+/-0.3nm (1200to1700 nm)
Wavelength linearity	Within+/-0.02nm (1500 to 1570 nm) (*2)
Wavelength repeatability	Within+/-0.005 nm (1min.)
Wavelengthresolution	Maximumresolution:0.08nm (typ.) (1500to1600nm) (*1) Resolution setting: 0.2, 0.5, 1.0nmmax. Resolution accuracy:+/-5% (resolution:0.2nmmin.)
Measurement level range	-90to+20dBm (1200to1600nm) (*1) -80to+20dBm (1600to1700nm)
Level accuracy	+/-0.3dB (typ.) (1310/1550nm, input = -30dBm, measurementsensitivity=HIGH1to3) (*1)
Polaritydependency	Within+/-0.05dB (1310/1550nm) (*1)
Levellinearity	Within+/-0.05dB (input = 0 to-40 dBm, measurementsensitivity=HIGH1to3) (*1)
Level flatness	Within+/-0.1dB (1500 to1570nm) (*2)
Levelreproducibility	Within +/- 0.02dB (1310to1550 nm,input=-23dBm)
Dynamicrange (backlight level)	40dBmin. (1523nm,peak+/-1.0nm,resolution=max.) 30dBmin. (1523nm,peak+/-0.4nm,resolution=max.)
Optical output connector return loss	30dBtyp. (1310/1550nm)
Sweep time	Approx. 1 sec. (span=50nmmax,measurementsensitivity= NORMAL HOLD,averagingnumber=1,samplenumber=AUTO)

Applicableoptical fiber	SM(10/125 μ m)
Opticalconnector	FC/PC(Standard)(*3)
Ambientconditions	Operating temperature: 5 to +40 ℃ Storagetemperature: 0 to +50 ℃ Humidity: Upto85%
Dimensions and weight	200(W)× 130(H)× 342(D)mm,approx. 5 kg (connectableto AQ8201A)
Automatic measurement	Program function (5 programs, 200steps) Long-termfunction
Measurement condition setting	Span setting: 0 to 500nm Measurementsensitivitysetting:NORMALHOLD,AUTO, HIGH1 to3 Averagingnumbersetting:1to1000 Samplenumbersetting: 11 to 20001,AUTO Automatic measurement condition settingfunctionbyautosweep Inter-marker sweepfunction 0-nm sweep function Pulse lightaveragingfunction
Tracedisplay	Levelscalesetting Simultaneous displayofindependent3traces Maximum/minimum value display Successive averagingdisplay Inter-tracecompensationdisplay Power densitydisplay,%display,x-axisfrequencydisplay
Dataanalysis	WDM waveform analysis (wavelength, level, SNRlistdisplay) EDFAanalysis (gain/NF) Peak search, spectral band width search, notch width search, delta marker (100max.), linemarker (analysisrangesetting), graph display oflong-termmeasurementresults
Others	Self wavelengthcalibrationfunction (built-inreferencelight source),wavelength, levelcorrectionfunction, labelfunction
Built-in memory	2 Mbytes

(*) Specification condition:After executing warmupforonehour.
(*1). When the 10/125 μ m single-modefiber (FC/PC connector) isusedatafixed temperature between 10and35 ℃.
(*2). When the 10/125 μ msingle-modefiber (FC/PC connector) is usedat a fixed temperatureof25 +/-3 ℃.
(*3). STandSCconnectorsarealsosupportedotherthanFC.

1.3.12 RLM MODULE(AQ8201-71)

① Overview

Thismoduleisanoptical return lossmeasurement meter with the dynamicrangeof65dB or more. When the opticalreturnlossof0-50dBismeasured,highprecisionofrelative measurement precision ± 0.4dBorlesscanbemeasured.

When theoptical return loss of 50-60 dB is measured, high precision of relative measurement precision ± 0.7dBorlesscanbemeasured.

② Specification

Table1-22showsthespecificationsof this module.

Table 1-22 AQ8201-71Specifications

Measurewavelength	1280to1620nm
Dynamicrange	65dB (*1)
Relative measurement accuracy	+/-0.4dB max (0 to 50dB) (*2) +/-0.7dB max (50 to60dB)
Measurement stability	+/-0.02dB max (*3)
Inputconnector	FC-PC
Output connector	SC-Angled PC (*4)
Applicable optical fiber	SM(9/125 μm)
Ambient conditions	Operating temperature: 5 to+45 ℃ Storagetemperature: 0 to +50 ℃ Humidity:Upto85%
Dimensions and weight	39.5(W)×130(H)×339(D)mm,approx. 1.2kg

(*) Specificationcondition:After executing warm upforonehour.
Temperatureforperformance guarantee 23+/-1 ℃.
When CHOP(270Hz) source oflightofwavelength1550nmandoutputlevel 0 to -5 dBm isused.

(*1). Dependsonmastercordtobeused.

(*2). Dependsonstabilityoflightsourcetobeused,linearityofphotoreceiverand isolation of opticaldirectional coupler.

(*3). Display stability in case of Fresnelreflectionstandard (for5minutes)

(*4). Do notconnectanymastercordotherthanourdesignatedonestotheoutputconnector.

2. Before Starting System Operation

This chapter describes the unpacking and acceptance inspection rules and the general notes that you must follow before starting the operation of this system and its various units.

2.1 Unpacking and Acceptance Inspection

This system and its various units have been checked both mechanically and electrically at the factory and their normal operation have been guaranteed. However, when you receive your system, immediately unpack and check it for any defect caused by transportation.
We recommend to keep the insulator materials and fiberboard containers for future reuse (except for consumable materials).

2.1.1 Mechanical Operation Checkout

Check the appearance, and switch and control operation of this system and its various units for any damage due to transportation. Also, check the inventory of accessories and spare parts by referring to the packing list.

2.1.2 System Operation Test

When the system mechanical operation is normal, check the system performance by system operation test.

2.2 If Any Defect or Trouble is Found

If you have found any defect or trouble on your system, call our service section immediately.

2.3 Repacking

When packing this system and its units again for movement, use the packing materials that you have stored during unpacking. If they are lost or damaged, use the following steps:

(1) Wrap this system and its various units with thick paper or polyethylene sheets. Protect any protrusion with a cushion material.
(2) Prepare a wooden or fiberboard container that has a clearance of approximately 5 to 10 cm between the container walls and this system and its units. Carefully place this system and its units in the container.
(3) Fill the clearance using the polyurethane forms or other cushion materials. Insufficient cushion materials can cause a damage of this system and its units due to vibration during transportation.
(4) Close the top cover of the wooden container, and bundle using steel bands, or close the top cover of the fiberboard container and seal it securely using adhesive tapes or the like.
(5) Write down the following information in the easy-to-read position of the container:

- Name of products
- Destination
- Consignor (sender)

CAUTION

When the main frame is transported, it is necessary to put up the panel for transportation.

2.4 Safety of Electric Systems

This system operates with the 100 to 120 VAC or 200 to 240 VAC, 50/60 Hz power supply.
Take appropriate actions to prevent the following personal injury and problems:

- Personal injury due to an electric shock
- Damage of internal system units due to an abnormal voltage
- Problems due to the ground current

Always follow the operation instructions given below.

2.4.1 Polarity of Power Cords

The three-pole power receptacle has the live line, the neutral line and the earth terminal as shown in Figure 2-1. You can just plug the power cord into the receptacle.

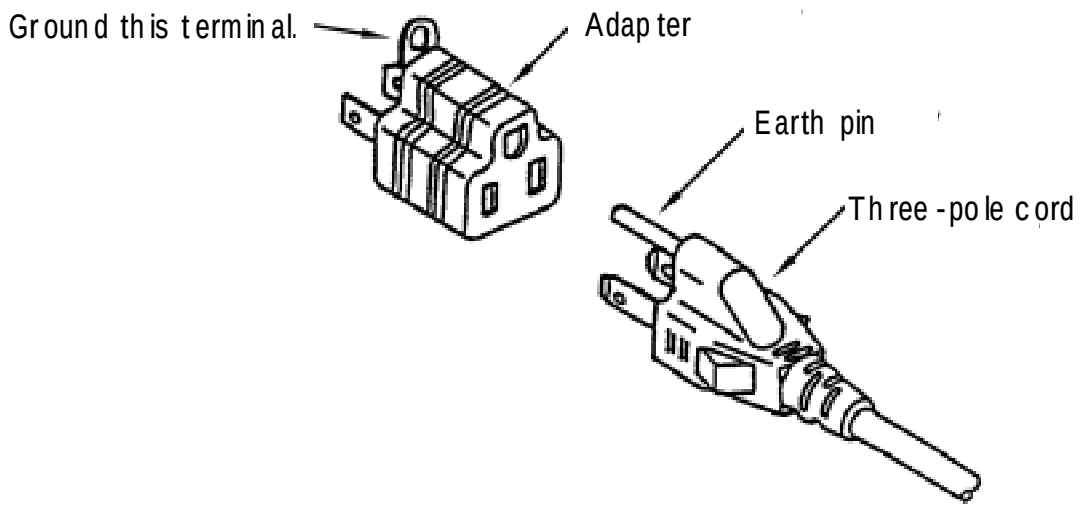


Figure 2-1 Three-pole Power Cord (For Japan)

2.4.2 Protective Grounding

1) Grounding using the three-pole power receptacle
If the three-pole power socket is provided, you can plug the system power cord into the socket. The system frame is grounded to the earth potential.

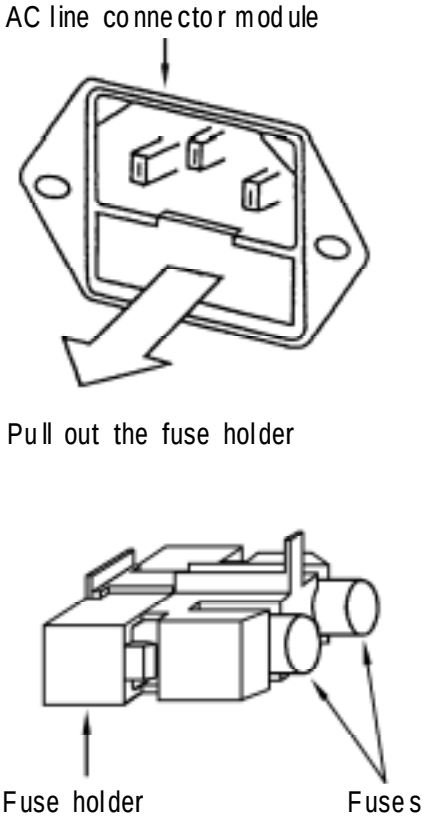
2) Grounding using the power adapter
If the three-pole power socket is NOT provided, use the three-to-two pole conversion adapter of the accessory kit and ground the adapter GND terminal.

2.4.3 Fuse Replacement

Two power fuses are mounted in the AC voltage input receptacle on the rear panel of this system. See Table 2-1 for the power fuses used, and see Figure 2-2 for fuse replacement.

Table 2-1 Power Fuses

Power voltage	Fuse rating	Remarks
AC100 to 120V	F 5A 250V	Glass tube-type fuse (5.2 mm dia by 20 mm long) Fast-acting
AC200 to 240V		



The AC line connector module is mounted on the rear panel of this system. The power fuses are mounted on the fuse holder of the AC line connector module. Use the following procedure to replace the fuses.

1) Turn the POWER switch off and unplug the power cord.

2) Pull the fuse folder toward you.

3) Replace both of two fuses with new ones even if one of them is not blown since it may be damaged.

4) Insert the fuse holder securely and plug the power cord into the power socket.

Figure 2-2 Replacement of Power Fuse

CAUTION

- Before replacing the fuses, turn the POWER switch off and unplug the power cord from the receptacle. If you try to replace the fuse with the power on, you may be injured by an electric shock.
- After you have replaced the fuses, make sure that the system has been grounded correctly and the AC power voltage is appropriate to your system. Then, turn the POWER switch on. If you turn the system power on without grounding, you may be injured by an electric shock. Also, if the AC power voltage is inappropriate to your system, the internal system units may be damaged by the abnormal voltage.

3.System Operation Notes

This chapter gives the basic system operation notes that you must follow when using this system

3.1 RACK-MOUNT MAIN FRAME (AQ8201A)

3.1.1 Handling Notes

1) This frame is a Safety Class-1 (IEC348) instrument.
2) Avoid applying an excessive impact to the frame.
3) Do not leave the frame in a high-temperature or high-humidity place for a long period.
4) Keep the frame away from large magnetic fields or radiation source. Otherwise malfunction may occur.
5) Do not connect any other module than specified to the module housing of this frame. Otherwise failure may occur.
6) Be sure to turn the power off before connection or disconnecting a module to/from this frame. Otherwise, the frame and the module may be damaged.
7) Allow a clearance of at least 1 inch above and under the frame. The frame and the module may be damage due to abnormal temperature rise if used with the ventilation hole closed.
8) Do not use or store this frame in a place subject to static electricity. Otherwise, the frame may be damaged.
9) Do not touch the metallic terminal of the connector of this frame. Otherwise, this frame may malfunction due to static electricity.
10) The frame has a fuse against an over current. If it blows, unplug the power cord and replace the fuse on the AC voltage input socket.
11) Only service personnel is allowed to remove covers of this frame.
12) When using this frame mounted on the rack, keep the temperature inside the rack at 40 ℃ or lower.

CAUTION

When using this frame at an ambient temperature of 40 ℃ or higher, do not connect more than five AQ8201-11.
Otherwise, this frame and the modules may be damaged due to abnormal temperature rise.

CAUTION

When lifting or carrying this main frame which installed some modules, work always by two persons.

3.2 DISPLAY CONTROLLER (AQ8201-02)

3.2.1 Handling Notes

1) Avoid applying an excessive impact to the module. Although the display panel is covered with a plastic cover, the glass surface and be scratched or broken by the impact.
2) Do not leave the module in a high-temperature or high-humidity place for a long period.
3) Keep the frame away from large magnetic fields or radiation source. Otherwise malfunction may occur.
4) Do not connect this module to other equipment than the AQ8201A. Otherwise, failure may occur.
5) Be sure to turn the power of the AQ8201A off before connecting or disconnecting this module to it. Otherwise, this module and the AQ8201A may be damaged.
6) Do not use or store this frame in a place subject to static electricity. Otherwise, the module may be damaged.
7) Do not touch the metallic terminal of the connector of this module. Otherwise, this frame may malfunction due to static electricity.

3.3 DISPLAY CONTROLLER MODULE (AQ8201-03)

3.3.1 Handling Notes

1) Avoid applying an excessive impact to the module. Although the display panel is covered with a plastic cover, the glass surface and be scratched or broken by the impact.
2) Do not leave the module in a high-temperature or high-humidity place for a long period.
3) Keep the frame away from large magnetic fields or radiation source. Otherwise malfunction may occur.
4) Do not connect this module to other equipment than the AQ8201A. Otherwise, failure may occur.
5) Be sure to turn the power of the AQ8201A off before connecting or disconnecting this module to it. Otherwise, this module and the AQ8201A may be damaged.
6) Do not use or store this frame in a place subject to static electricity. Otherwise, the module may be damaged.
7) Do not touch the metallic terminal of the connector of this module. Otherwise, this frame may malfunction due to static electricity.

3.4 WDM DFB-LD MODULE (AQ8201-11/11A/11B)

3.4.1 Handling Notes

1) Avoid applying an excessive impact to the module. Although the display panel is covered with a plastic cover, the glass surface and be scratched or broken by the impact.
2) Do not leave the module in a high-temperature or high-humidity place for a long period.
3) Keep the frame away from large magnetic fields or radiation source. Otherwise malfunction may occur.
4) Do not connect this module to other equipment than the AQ8201A/AQ8203. Otherwise, failure may occur.
5) Be sure to turn the power of the AQ8201A off before connecting or disconnecting this module to it. Otherwise, this module and the AQ8201A may be damaged.
6) Do not use or store this frame in a place subject to static electricity. Otherwise, the module may be damaged.
7) Do not touch the metallic terminal of the connector of this module. Otherwise, this frame may malfunction due to static electricity.

3.4.2 Application Notes on Optical System Components

DANGER

The optical output from this module is infrared rays and thus NOT visible. Take Extreme care NOT to watch the optical source emission. Otherwise, your eyes may be damaged.
If an optical device is used for this module, your eyes may be damaged.

If the optical connector of this module is scratched, its stability may be lost. Use the following handling notes.

1) Keep this module away from excessive dusts.
2) Connect an optical fiber having no scratches on the fiber end to this module.
3) Wipe and clean the optical fiber end with alcohol or the like before connecting it to this module.
4) Before connecting the fiber to this module, check the end for scratches or dirt using a microscope. (Make sure that no light is emitted from the optical fiber before checking).
5) Do not use a bare fiber adapter or the like when connecting an optical fiber to this module.
6) When this module is not used, cover it with a protection cap to protect the optical output port from dirt.
7) Be sure to use an FC/Angled PC connector for this module. This module may be damaged if a normal FC/PC connector is connected.

3.5 ASE MODULE (AQ8201-12)

3.5.1 Handling Notes

1) Avoid applying an excessive impact to the module. Although the display panel is covered with a plastic cover, the glass surface and be scratched or broken by the impact.
2) Do not leave the module in a high-temperature or high-humidity place for a long period.
3) Keep the frame away from large magnetic fields or radiation source. Otherwise malfunction may occur.
4) Do not connect this module to other equipment than the AQ8201A/AQ8203. Otherwise, failure may occur.
5) Be sure to turn the power of the AQ8201A off before connecting or disconnecting this module to it. Otherwise, this module and the AQ8201A may be damaged.
6) Do not use or store this frame in a place subject to static electricity. Otherwise, the module may be damaged.
7) Do not touch the metallic terminal of the connector of this module. Otherwise, this frame may malfunction due to static electricity.

3.5.2 Application Notes on Optical System Components

DANGER

The optical output from this module is infrared rays and thus NOT visible. Take Extreme care NOT to watch the optical source emission. Otherwise, your eyes may be damaged.
If an optical device is used for this module, your eyes may be damaged.

If the optical connector of this module is scratched, its stability may be lost. Use the following handling notes.

1) Keep this module away from excessive dusts.
2) Connect an optical fiber having no scratches on the fiber end to this module.
3) Wipe and clean the optical fiber end with alcohol or the like before connecting it to this module.
4) Before connecting the fiber to this module, check the end for scratches or dirt using a microscope. (Make sure that no light is emitted from the optical fiber before checking).
5) Do not use a bare fiber adapter or the like when connecting an optical fiber to this module.
6) When this module is not used, cover it with a protection cap to protect the optical output port from dirt.

3.6 ECL MODULE (AQ8201-13/13B)

3.6.1 Handling Notes

1) Avoid applying an excessive impact to the module. Although the display panel is covered with a plastic cover, the glass surface and be scratched or broken by the impact.
2) Do not leave the module in a high-temperature or high-humidity place for a long period.
3) Keep the frame away from large magnetic fields or radiation source. Otherwise malfunction may occur.
4) Do not connect this module to other equipment than the AQ8201A/AQ8203. Otherwise, failure may occur.
5) Be sure to turn the power of the AQ8201A off before connecting or disconnecting this module to it. Otherwise, this module and the AQ8201A may be damaged.
6) Do not use or store this frame in a place subject to static electricity. Otherwise, the module may be damaged.
7) Do not touch the metallic terminal of the connector of this module. Otherwise, this frame may malfunction due to static electricity.

3.6.2 Application Notes on Optical System Components

DANGER

The optical output from this module is infrared rays and thus NOT visible. Take Extreme care NOT to watch the optical source emission. Otherwise, your eyes may be damaged.
If an optical device is used for this module, your eyes may be damaged.

If the optical connector of this module is scratched, its stability may be lost. Use the following handling notes.

1) Keep this module away from excessive dusts.
2) Connect an optical fiber having no scratches on the fiber end to this module.
3) Wipe and clean the optical fiber end with alcohol or the like before connecting it to this module.
4) Before connecting the fiber to this module, check the end for scratches or dirt using a microscope. (Make sure that no light is emitted from the optical fiber before checking).
5) Do not use a bare fiber adapter or the like when connecting an optical fiber to this module.
6) When this module is not used, cover it with a protection cap to protect the optical output port from dirt.
7) Be sure to use an FC/Angled PC connector for this module. This module may be damaged if a normal FC/PC connector is connected.

3.7 OPM MODULE (AQ8201-21)

3.7.1 Handling Notes

1) Avoid applying an excessive impact to the module. Although the display panel is covered with a plastic cover, the glass surface and be scratched or broken by the impact.
2) Do not leave the module in a high-temperature or high-humidity place for a long period.
3) Keep the frame away from large magnetic fields or radiation source. Otherwise malfunction may occur.
4) Do not connect this module to other equipment than the AQ8201A/AQ8203. Otherwise, failure may occur.
5) Be sure to turn the power of the AQ8201A off before connecting or disconnecting this module to it. Otherwise, this module and the AQ8201A may be damaged.
6) Do not use or store this frame in a place subject to static electricity. Otherwise, the module may be damaged.
7) Do not touch the metallic terminal of the connector of this module. Otherwise, this frame may malfunction due to static electricity.

3.7.2 Application Notes on Optical System Components

This module employs optical parts processed with ultra precision machining. These parts play a critical role in warranting the module accuracy, thus you are required strictly observe the following instructions:

1) Don't expose them to incident light exceeding the specified optical power measurement range. Otherwise, the optical sensor can be damaged.

2) Make sure that the optical sensor's detecting surface and optical connector are free form damages or stains. Otherwise, the intended performance of the module may not be obtained.

3) When incident light is directly applied to the optical sensor, use reasonable care so that its detecting surface may not be damaged.

3.8 ATTN MODULE (AQ8201-31/32/33)

3.8.1 Handling Notes

1) Avoid applying an excessive impact to the module. Although the display panel is covered with a plastic cover, the glass surface and be scratched or broken by the impact.
2) Do not leave the module in a high-temperature or high-humidity place for a long period.
3) Keep the frame away from large magnetic fields or radiation source. Otherwise malfunction may occur.
4) Do not connect this module to other equipment than the AQ8201A/AQ8203. Otherwise, failure may occur.
5) Be sure to turn the power of the AQ8201A off before connecting or disconnecting this module to it. Otherwise, this module and the AQ8201A may be damaged.
6) Do not use or store this frame in a place subject to static electricity. Otherwise, the module may be damaged.
7) Do not touch the metallic terminal of the connector of this module. Otherwise, this frame may malfunction due to static electricity.

3.8.2 Application Notes on Optical System Components

This module has very high-precision optical system components. Since they are critical parts for assuring system performance, follow the operation instructions and notes given below.

1) Do not allow excessive incident light exceeding the optical power measurement range from entering. Otherwise, the photo sensor elements may be damaged.

2) The performance of this module deteriorates if any damage or dirt exists on the optical connector.

3) Be sure to use an FC/Angled PC connector for this module. This module may be damaged if a normal FC/PC connector is connected.

NOTE

If the connector adapter is dirty, wipe and clean it using absolute alcohol or the like.

3.9 MWA MODULE (AQ8201-61)

3.9.1 Handling Notes

1) Avoid applying an excessive impact to the module. Although the display panel is covered with a plastic cover, the glass surface and be scratched or broken by the impact.
2) Do not leave the module in a high-temperature or high-humidity place for a long period.
3) Keep the frame away from large magnetic fields or radiation source. Otherwise malfunction may occur.
4) Do not connect this module to other equipment than the AQ8201A/AQ8203. Otherwise, failure may occur.
5) Be sure to turn the power of the AQ8201A off before connecting or disconnecting this module to it. Otherwise, this module and the AQ8201A may be damaged.
6) Do not use or store this frame in a place subject to static electricity. Otherwise, the module may be damaged.
7) Do not touch the metallic terminal of the connector of this module. Otherwise, this frame may malfunction due to static electricity.

3.9.2 Application Notes on Optical System Components

This module has very high-precision optical system components. Since they are critical parts for assuring system performance, follow the operation instructions and notes given below.

1) Do not allow excessive incident light exceeding the optical power measurement range from entering. Otherwise, the photo sensor elements may be damaged.

2) The performance of this module deteriorates if any damage or dirt exists on the optical connector.

3.10 RLM MODULE (AQ8201-71)

3.10.1 Handling Notes

1) Avoid applying an excessive impact to the module. Although the display panel is covered with a plastic cover, the glass surface and be scratched or broken by the impact.
2) Do not leave the module in a high-temperature or high-humidity place for a long period.
3) Keep the frame away from large magnetic fields or radiation source. Otherwise malfunction may occur.
4) Do not connect this module to other equipment than the AQ8201A/AQ8203. Otherwise, failure may occur.
5) Be sure to turn the power of the AQ8201A off before connecting or disconnecting this module to it. Otherwise, this module and the AQ8201A may be damaged.
6) Do not use or store this frame in a place subject to static electricity. Otherwise, the module may be damaged.
7) Do not touch the metallic terminal of the connector of this module. Otherwise, this frame may malfunction due to static electricity.

3.10.2 Application Notes on Optical System Components

This module employs optical parts processed with ultra precision machining. These parts play a critical role in warranting the module accuracy, thus you are required strictly observe the following instructions:

1) Be sure to connect our designated master cords only to the master cord connection. Otherwise, the ferrule may be broken.

2) If the light receiving plane of the photo detector or the optical connector is damaged or soiled, this module will not work efficiently.

NOTE

If the connector adapter is dirty, wipe and clean it using absolute alcohol or the like.

4. System Functions

This chapter explains the basic functions of operation and display sections of this system and its various modules.

4.1 RACK-MOUNT MAIN FRAME(AQ8201A)

4.1.1 Explanation of Each Section

Figure 4-1 shows the configuration of this frame. The numbers in this figure correspond to the name and functions of each part given in Table 4-1.

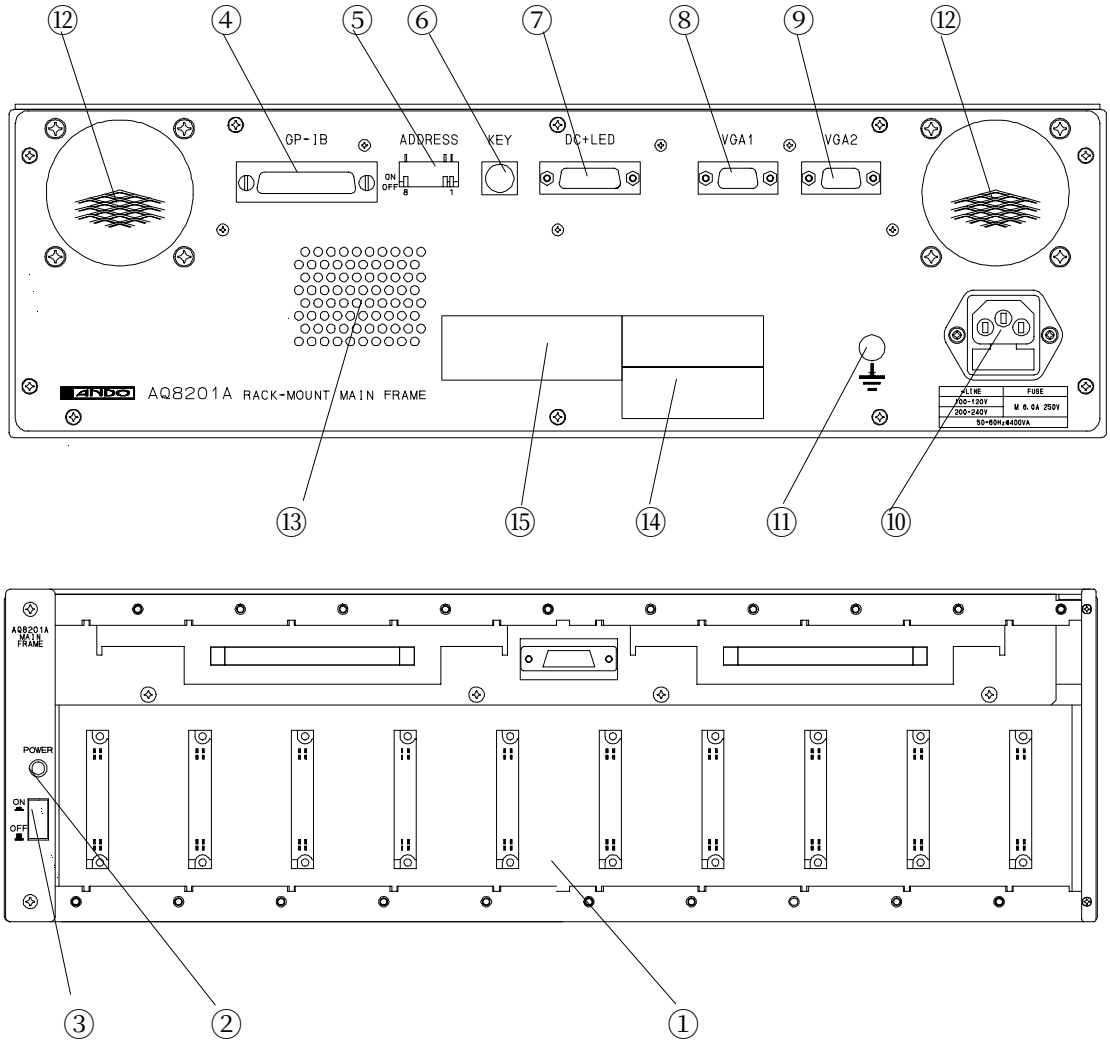


Figure 4-1 Configuration of AQ8201A

4.System Function
4.1 RACK-MOUNT MAIN FRAME (AQ8201A)

Table 4-1 Name and Functions of AQ8201A.

No.	Name	Unit display	Functions
①	Module housing		Accommodates modules. Turn the power off before connecting or disconnecting modules.
②	Power lamp	[POWER]	This lamp lights when the power supply is turning on. .
③	Power switch	[▬ ON] [▙ OFF]	Turns the power on and off.
④	GP-IB	[GP-IB]	Twenty four-pole connector for GP-IB interfacing.
⑤	Address switch	[ADDRESS]	DIP switch for setting GP-IB address.
⑥	Keyboard connector	[KEY]	Connector for keyboard interface (compatible with PS/2).
⑦	DC + LED connector	[DC+LED]	Connector for connecting AQ8201-02 dedicated display.
⑧	VGA1 connector	[VGA1]	VGA output (corresponds to slots 1 to 5).
⑨	VGA2 connector	[VGA2]	VGA output (corresponds to slots 6 to 10).
⑩	Power supply plug socket		Socket with built-in fuses for receiving the power supply plug.
⑪	GND terminal		Grounding
⑫	Fan		Fan for radiating heat. Note that it turns hot.
⑬	Ventilation holes (on the upper, lower and rear surfaces)		Note that it turns hot.
⑭	Name plate		Shows the serial number.
⑮	Software version label		Shows the software version.

4.2 DISPLAY CONTROLLER(AQ8201-02)

4.2.1 Explanation of Each Section

Figure 4-2 shows the configuration of this module. The numbers in this figure correspond to the name and functions of each part given in Table 4-2.

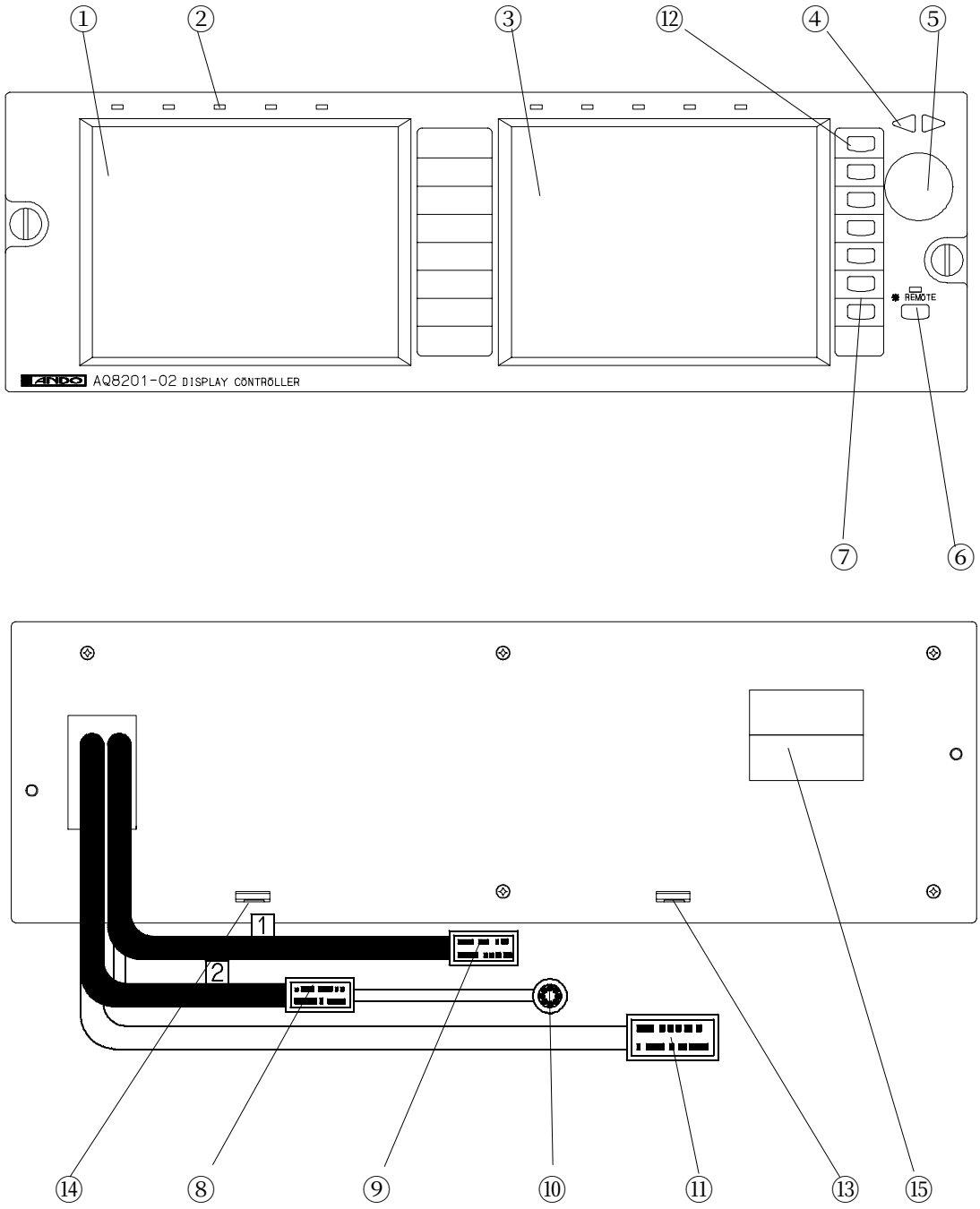


Figure 4-2 Configuration of AQ8201-02

Table 4-2 Name and Functions of AQ8201-02

No.	Name	Unit display	Functions
①	LCD1		Displays the measured waveform, measurement conditions, measured values and the like.
②	Module selection lamp		Displays the selected module.
③	LCD2		Displays the measured waveform, measured conditions, measured values and the like.
④	Module selection key		Switches modules.
⑤	Rotary knob		Used to change measurement conditions.
⑥	Local switch	[○ REMOTE]	Used to switch the remote mode to the local mode. The LED is on in the remote mode. Disabled in the LLO (local lockout) state.
⑦	Function key		Executes the function displayed on the screen.
⑧	VGA2 plug		VGA input (corresponds to slots 6 to 10).
⑨	VGA1 plug		VGA input (corresponds to slots 1 to 5).
⑩	Keyboard plug		Transmits key operation signals to the AQ8201A.
⑪	DC+LED plug		Connects the AQ8201A.
⑫	Mode key		Mounts the AQ8201-61.
⑬	Light adjusting volume		Adjusts the brightness of LCD1.
⑭	Light adjusting volume		Adjusts the brightness of LCD2.
⑮	Name plate		Shows the serial number.

4.3 DISPLAY CONTROLLER MODULE(AQ8201-03)

4.3.1 Explanation of Each Section

Figure 4-3 shows the configuration of this module. The numbers in this figure correspond to the name and functions of each part given in Table 4-3.

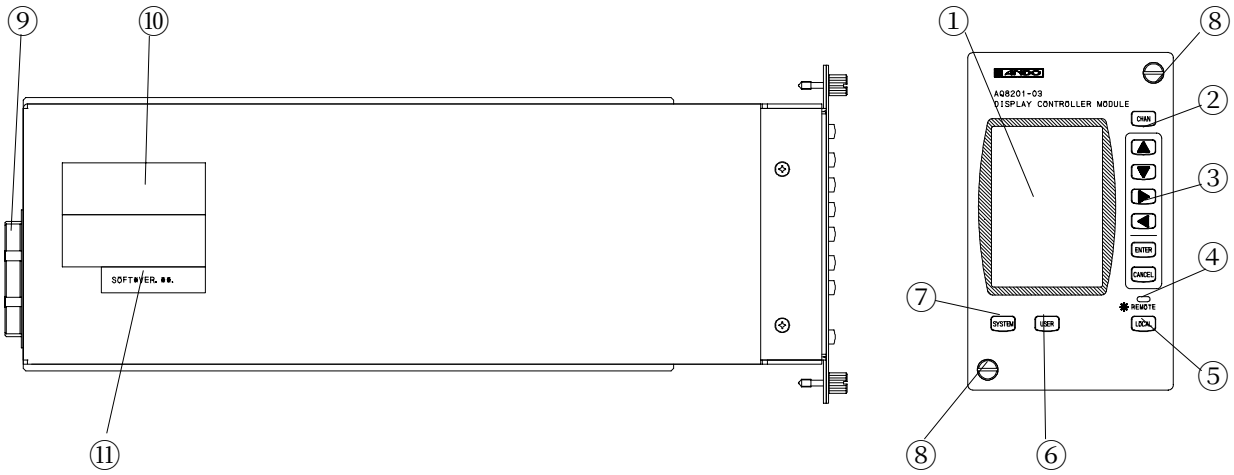


Figure 4-3 Configuration of AQ8201-03

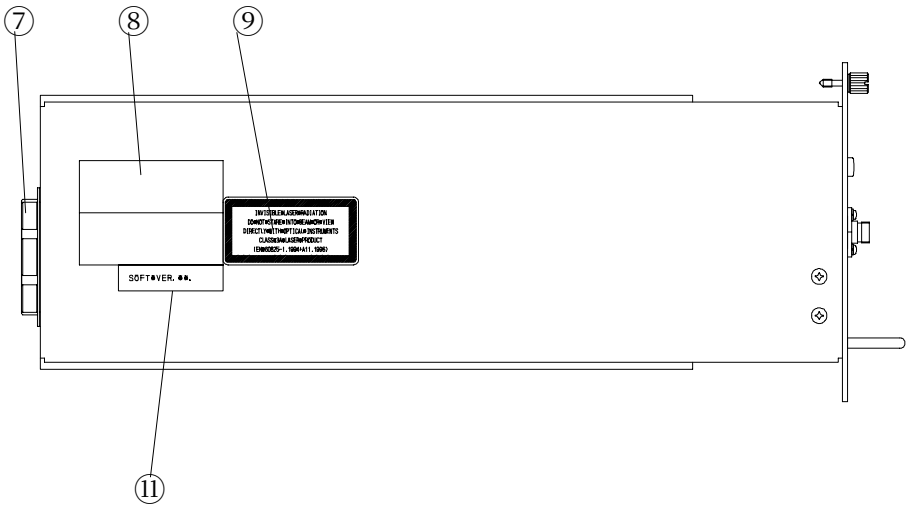
Table 4-3 Name and Functions of AQ8201-03

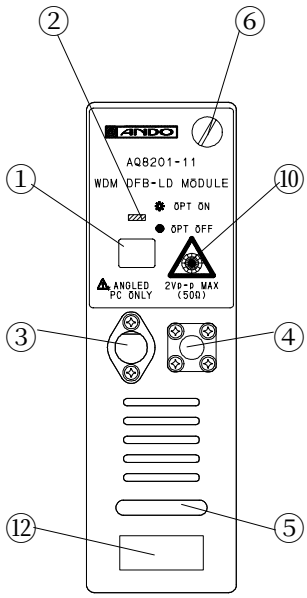
No.	Name	Unit display	Functions
①	LCD		Displays the measurement conditions, measured values and the like.
②	Module selection key	[CHAN]	Switches the module.
③	Function key		Setting of the selection of each menu is done.
④	Remote lamp	[○ REMOTE]	Lights when in the remote mode.
⑤	Local key	[LOCAL]	Switches when in the remote mode to the local mode.
⑥	User key	[USER]	The operation set by the user is done.
⑦	System key	[SYSTEM]	Opens the system menu.
⑧	Mounting screw		Fixes the AQ8201-03 and the AQ8201A.
⑨	Main unit connector		Used for mounting the AQ8201-03 on the AQ8201A.
⑩	Name plate		Shows the serial number.
⑪	Software version label		Shows the software version.

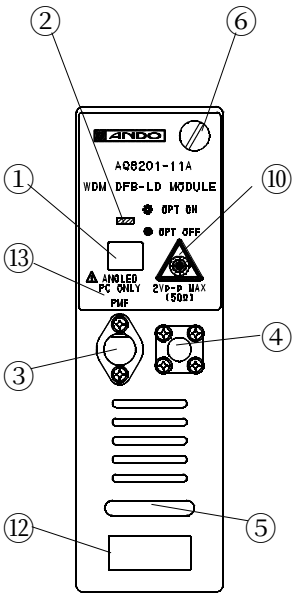
4.4 WDM DFB-LD MODULE(AQ8201-11/11A/11B)

4.4.1 Explanation of Each Section

Figure 4-4 shows the configuration of this module. The numbers in this figure correspond to the name and functions of each part given in Table 4-4.







AQ8201-11(AQ8201-11B) AQ8201-11A

* AQ8201-11B is somewhat different from the above figure.

Figure 4-4 Configuration of AQ8201-11/11A/11B

Table 4-4 Name and Functions of AQ8201-11/11A/11B

No.	Name	Unit display	Functions
①	OPT switch		Turns the optical output on and off.
②	OPT display lamp	[○ OPT ON] [● OPT OFF]	Comes on when light is output.
③	Optical output port		Connectable to an FC/APC connector.
④	External modulation input connector		Receives external modulation signals.
⑤	Pull-out lever		Pull this lever toward you when removing the AQ8201-11/11A/11B from the frame.
⑥	Mounting screw		Fixes the AQ8201-11/11A/11B and the frame.
⑦	Main unit connector		Used for mounting the AQ8201-11 /11A/11B on the frame.
⑧	Name plate		Shows the serial number.
⑨	Laser safety instruction		Explains laser handling precautions.
⑩	Warning label		Warning label.
⑪	Software version label		Shows the software version.
⑫	Wavelength/ Frequency label		Shows the wavelength and the frequency at the time of shipment.
⑬	PMF mark		Shows correspondence to the PMF.

4.5 ASE MODULE(AQ8201-12)

4.5.1 Explanation of Each Section

Figure 4-5 shows the configuration of this module. The numbers in this figure correspond to the name and functions of each part given in Table 4-5.

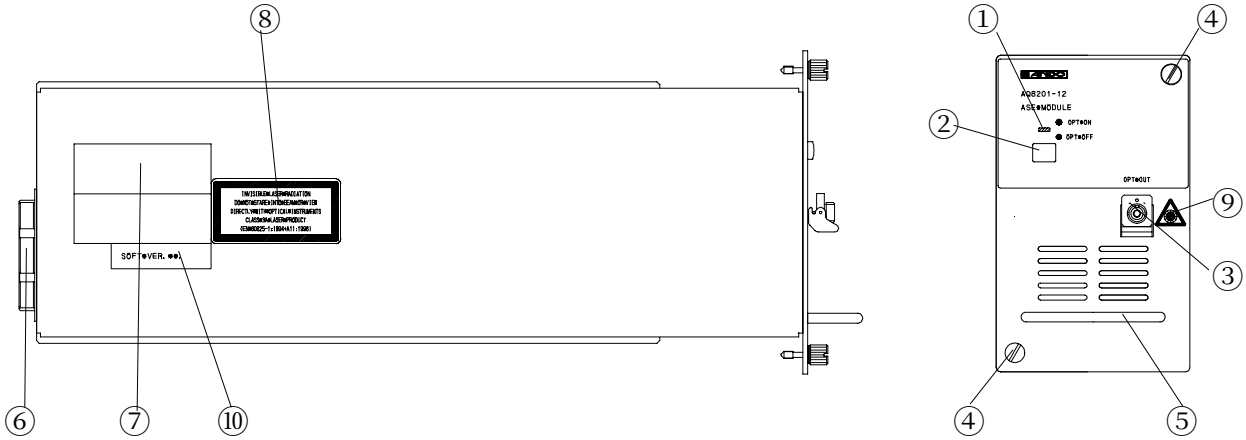


Figure 4-5 Configuration of AQ8201-12

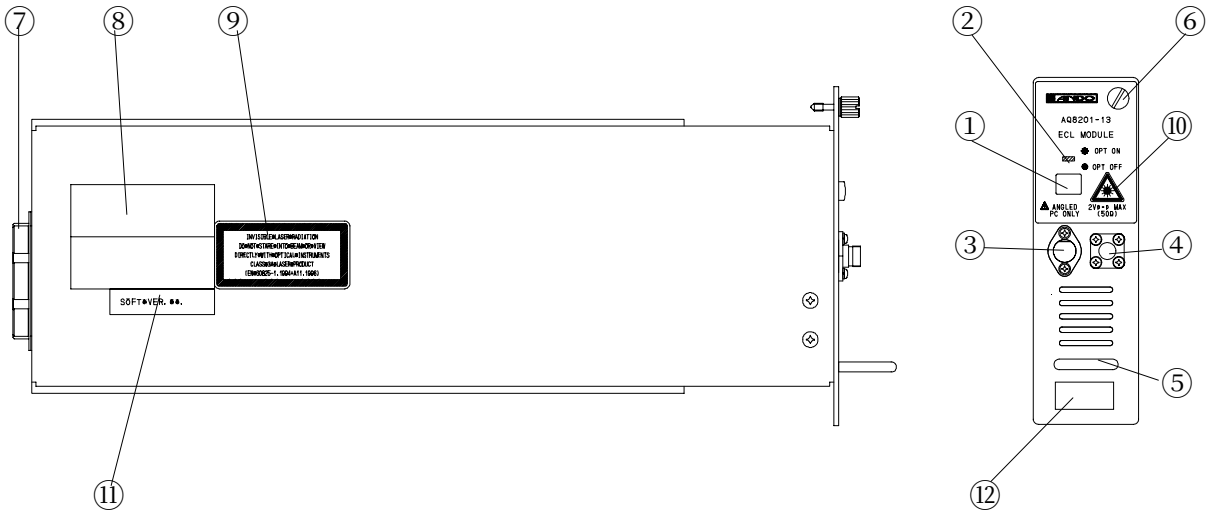
Table 4-5 Name and Functions of AQ8201-12

No.	Name	Unit display	Functions
①	OPT switch		Turns the optical output on and off.
②	OPT display lamp	[○ OPT ON] [● OPT OFF]	Comes on when light is output.
③	Optical output port (Universal connector)		Connectable to an FC/PC connector.
④	Mounting screw		Fixed the AQ8201-12 and the frame.
⑤	Pull-out lever		Pull this lever toward you when removing the AQ8201-12 from the frame.
⑥	Main unit connector		Used for mounting the AQ8201-12 on the frame.
⑦	Name plate		Shows the serial number.
⑧	Laser safety instruction		Explains laser handling precautions.
⑨	Warning label		Warning label.
⑩	Software version label		Shows the software version.

4.6 ECL MODULE(AQ8201-13/13B)

4.6.1 Explanation of Each Section

Figure 4-6 shows the configuration of this module. The numbers in this figure correspond to the name and functions of each part given in Table 4-6.



* AQ8201-13B is somewhat different from the above figure.

Figure 4-6 Configuration of AQ8201-13/13B

Table 4-6 Name and Functions of AQ8201-13/13B

No.	Name	Unit display	Functions
①	OPT switch		Turns the optical output on and off.
②	OPT display lamp	[○ OPT ON] [● OPT OFF]	Comes on when light is output.
③	Optical output port		Connectable to an FC/APC connector.
④	External modulation input connector		Receives external modulation signals.
⑤	Pull-out lever		Pull this lever toward you when removing the AQ8201-13/13B from the frame.
⑥	Mounting screw		Fixes the AQ8201-13/13B and the frame.
⑦	Main unit connector		Used for mounting the AQ8201-13/13B on the frame.
⑧	Name plate		Shows the serial number.
⑨	Laser safety instruction		Explains laser handling precautions.
⑩	Warning label		Warning label.
⑪	Software version label		Shows the software version.
⑫	Wavelength label		Shows the range of wavelength which can be set.

4.7 OPM MODULE(AQ8201-21)

4.7.1 Explanation of Each Section

Figure 4-7 shows the configuration of module. The numbers in this figure correspond to the name and functions of each part given in Table 4-7.

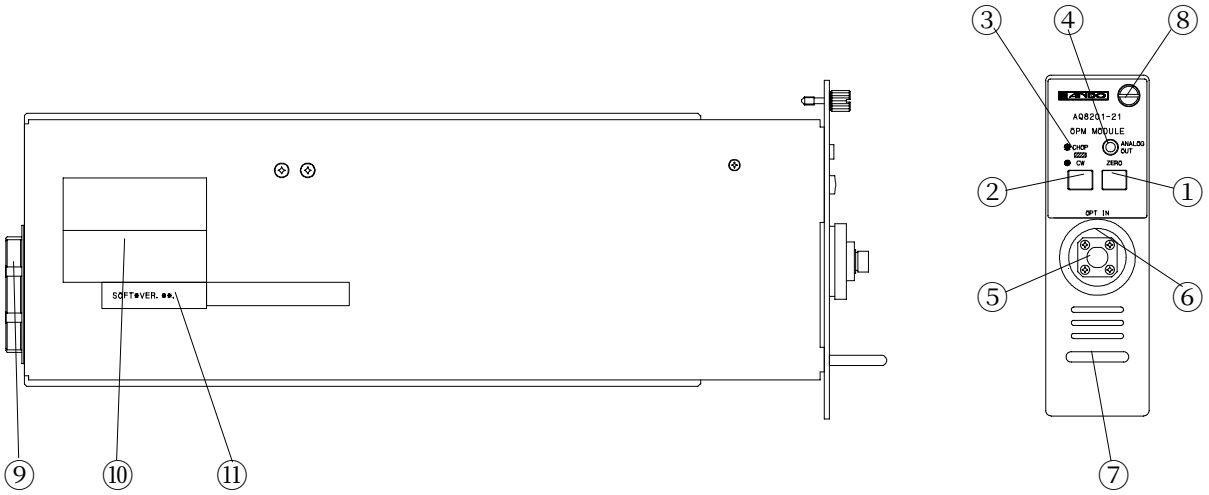


Figure 4-7 Configuration of AQ8201-21

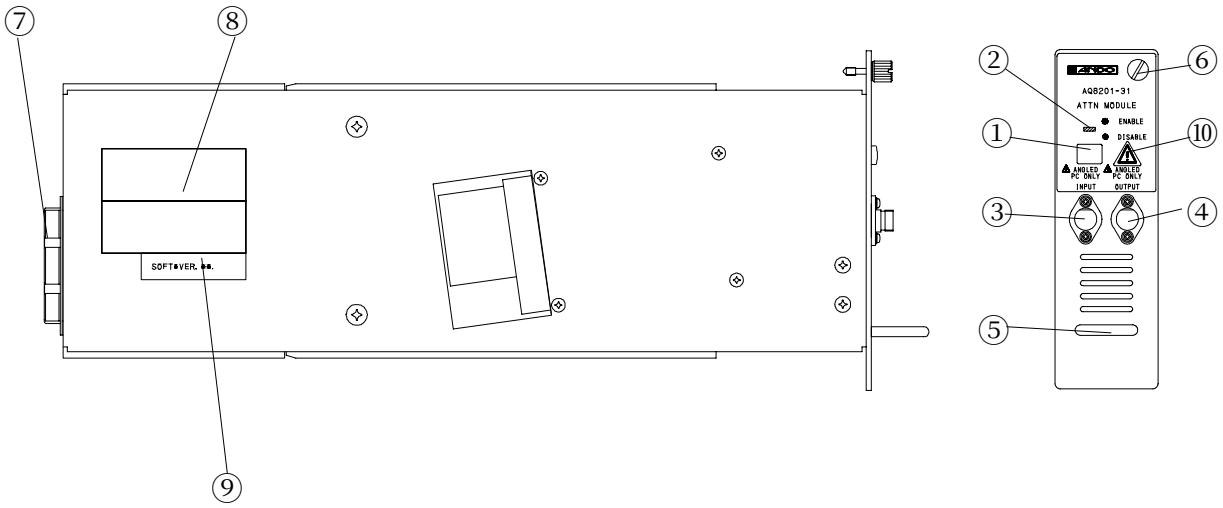
Table 4-7 Name and Functions of AQ8201-21

No.	Name	Unit display	Functions
①	ZERO SET switch	[ZERO]	Used for turning on the ZERO SET.
②	CW/CHOP switch		Used for switching the optical modulation mode (CHOP frequency is selected from the frame).
③	CW/CHOP indicator lamp	[○ CHOP] [● CW]	It comes on when CHOP light is selected.
④	Analog output terminal	[ANALOG OUT]	Outputs linear value within a single range in voltage.
⑤	Optical sensor	[OPT IN]	Used for detecting light. It can be connected to a various types of connector adapters.
⑥	Connector adapter		Used for splicing fiber cords equipped with a various types connectors. The connector adapter for FC is offered as a standard part.
⑦	Pull-out lever		Pull this lever to your side to disconnect the AQ8201-21 from the frame.
⑧	Mounting screw		Used for assembling AQ8201-21 to the frame.
⑨	Main unit connector		Used for installing the AQ8201-21 on the frame.
⑩	Name plate		Shows the serial number.
⑪	Software version label		Shows the software version.

4.8 ATTN MODULE(AQ8201-31/32/33)

4.8.1 Explanation of Each Section

Figure 4-8 shows the configuration of this module. The numbers in this figure correspond to the name and functions of each part given in Table 4-8.



* AQ8201-32/33 is somewhat different from the above figure.

Figure 4-8 Configuration of AQ8201-31/32/33

Table 4-8 Name and Functions of AQ8201-31/32/33

No	Name	Unit display	Functions
①	Shutter switch		Opens and closes the shutter.
②	Shutter LED	[○ ENABLE] [● DISABLE]	Comes on when the shutter is open.
③	Optical fiber connector	[INPUT]	This is the optical input connector. Connectable to an FC/APC connector.
④	Optical fiber connector	[OUTPUT]	This is the optical output connector. Connectable to an FC/APC connector.
⑤	Pull-out lever		Pull this lever toward you when the AQ8201-31/32/33 from the frame.
⑥	Mounting screw		Fixes the AQ8201-31/32/33 and the frame.
⑦	Main unit connector		Used for mounting the AQ8201-31 /32/33 on the frame.
⑧	Name plate		Shows the serial number.
⑨	Software version label		Shows the software version.
⑩	Warning mark		Warning mark.

4.9 MWA MODULE(AQ8201-61)

4.9.1 Explanation of Each Section

Figure 4-9 shows the configuration of this module. The numbers in this figure correspond to the name and functions of each part given in Table 4-9.

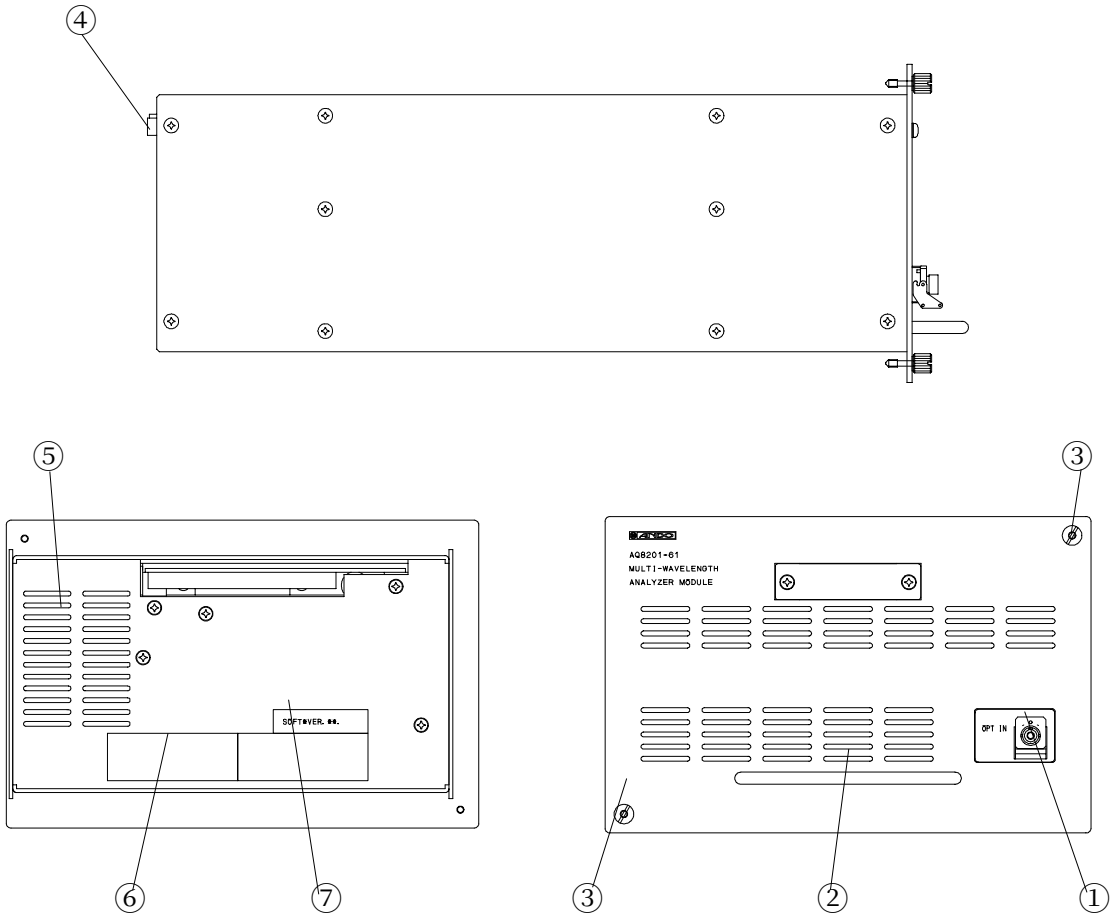


Figure 4-9 Configuration of AQ8201-61

Table 4-9 Name and Functions of AQ8201-61

No	Name	Unit display	Functions
①	Optical fiber connector (Universal adapter)	[OPT IN]	Optical input connector.
②	Pull-out lever		Pull this lever toward you when removing the AQ8201-61 from the AQ8201A.
③	Mounting screw		Fixes the AQ8201-61 and the AQ8201A.
④	Main unit connector		Used for mounting the AQ8201-61on the AQ8201A.
⑤	Fan		Fan for radiating heat.
⑥	Name plate		Shows the serial number
⑦	Software version label		Shows the software version.

4.10 RLM MODULE(AQ8201-71)

4.10.1 Explanation of Each Section

Figure 4-10 shows the configuration of module. The numbers in this figure correspond to the name and functions of each part given in Table 4-10.

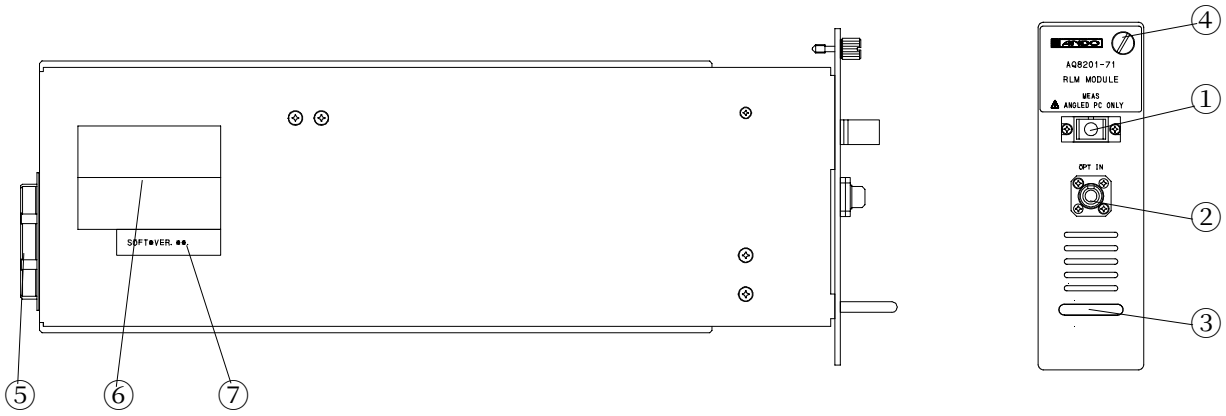


Figure 4-10 Configuration of AQ8201-71

Table 4-10 Name and Functions of AQ8201-71

No	Name	Unit display	Functions
①	Master cord connection port	[MEAS]	Connects the standard master cord.
②	Optical input port	[OPT IN]	Receives an optical signal. Plug an SM fiber having the FC connector into this port.
③	Pull out lever		Pull this lever to your side to disconnect the AQ8201-71 from frame.
④	Set screw		Used for assembling the AQ8201-71 to the frame.
⑤	Main unit connector		Used for installing the AQ8201-71 on the connector frame.
⑥	Nameplate		The module serial number is marked on it
⑦	Software version label		Indicates version of the software.

5. System Operations

This chapter explains how to use this system and its various modules.

5.1 Before Turning ON

1) Make sure that this system has been turned off.

2) Check that the capacity of the fuses in the power supply plug socket is correct.

3) Check that the supply voltage is compatible with the input voltage of this system.

4) Insert the module to use in the module housing of this system.

CAUTION

Turn the power of this system off before mounting or dismounting a module.
Otherwise, the module may be damaged.

CAUTION

Do not connect any other module than specified to this system. Otherwise, the system and the connected module may be damaged.

5) Plug the attached power cord to this system and an appropriate wall receptacle.
When using a two-pole socket, use the attached adapter to ground the earth terminal

6) Make sure that the ambient conditions satisfy the requirements of this system.
Keep the system away from excessive dust.

7) Place this system on a stable and horizontal workbench. Make sure that the ventilation hole is not closed.

8) Make sure that all necessary modules are securely connected to this system.

5.1.1 Cleaning of Optical Connectors

Before plugging an optical fiber cord to a module, always wipe and clean the optical fiber connector and the module connector port. Dust and foreign matters may damage the connected connectors and the internal optical parts of the module.

1) Cleaning of modules
The NTT International's Cure-Top Cleaning Sticks are recommended to be used for cleaning the module connector ports. (If the MWA MODULE has a universal adapter, remove it and wipe and clean it using absolute alcohol.)
Figure 5-1 shows how to clean the optical connector port.

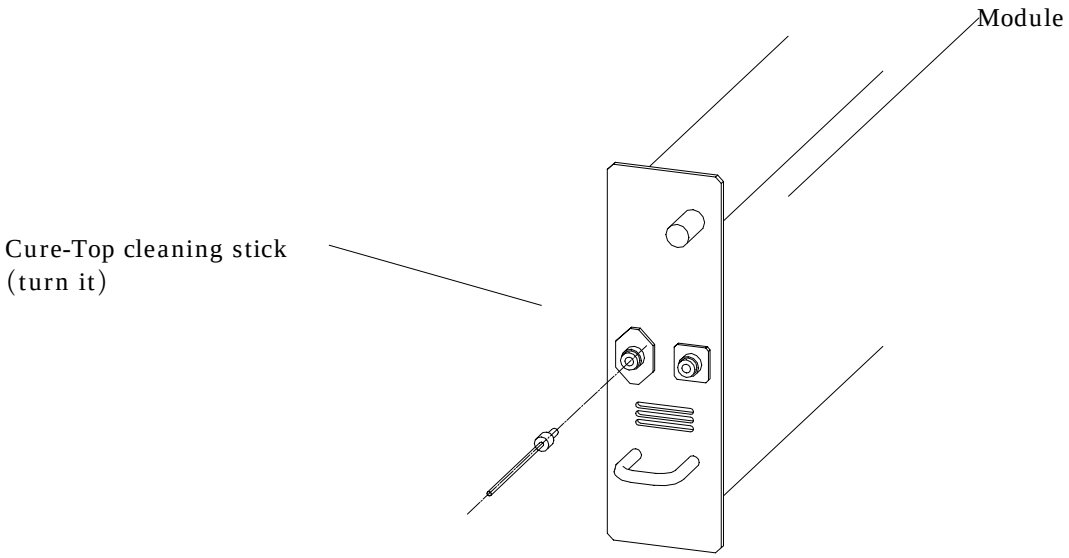


Figure 5-1 Cleaning of Optical Connector Port

2) Cleaning of optical connector
Drop a small amount of absolute alcohol on clean wiping paper, and wipe and clean the optical connector of the fiber.(Always use clean wiping paper during cleaning.)

NOTE

After cleaning the connector with absolute alcohol, a foreign matter may remain on the surface. It is recommended to check the optical connector end for dirt using a microscope.

5.1.2 Mounting/Dismounting the Blank Panel

This panel is designed to protect the module housing. Be sure to mount it when no module is housed.

Figure 5-2 shows how to mount and dismount the blank panel.

CAUTION

Take care not to drop any conductive metal in the module housing. Otherwise, this system may malfunction.

1) Mounting the blank panel
Engage the screws of the blank panel with the holes on the upper and lower parts of the module housing to fix the panel to this system as shown in Figure 5-2.

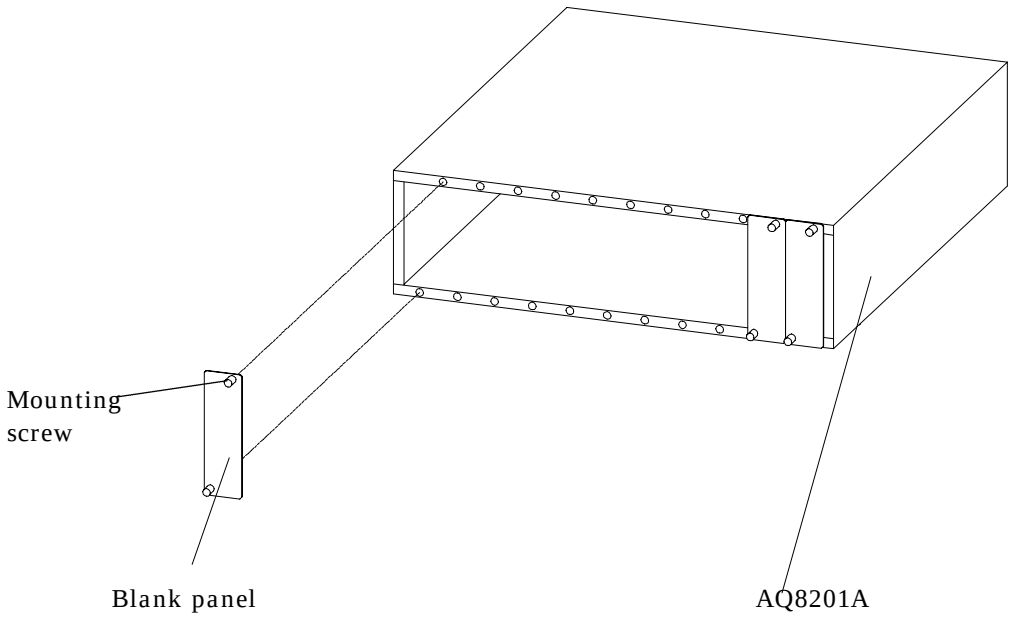


Figure 5-2 Mounting/Dismounting the Blank Panel

5.1.3 Module Mounting on the AQ8201A

1) Make sure that the power supply of the AQ8201A is turned off.
2) Place a module on the guide rail of the module housing of the AQ8201A, fully insert it and fix it by tightening the screw on the upper part of the module.

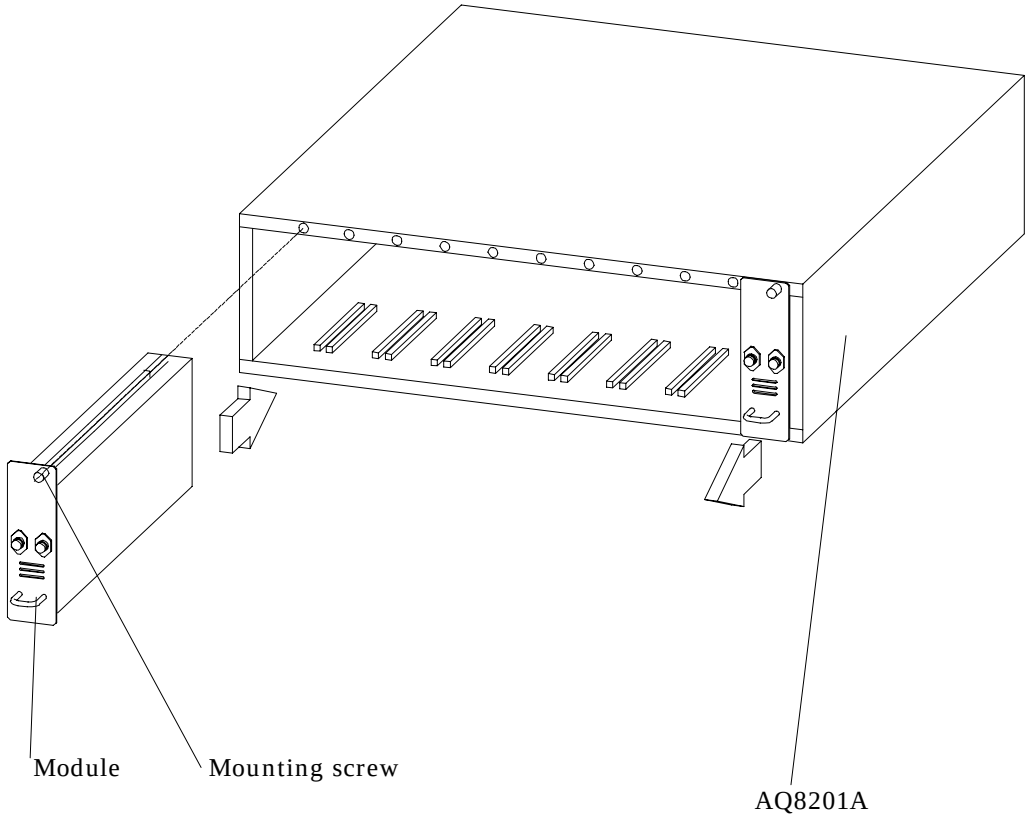


Figure 5-3 Module Mounting

When removing the module, remove the screw on the upper part of the module first.

CAUTION

Be sure to turn the power of this system off before mounting or dismounting a module to/from the AQ8201A. Otherwise, the module and the AQ8201A may be damaged.

CAUTION

Please do not do carrying which uses the pulling out lever because the pulling out lever of the module is for detaching to AQ8201A alone.
The installation part is damaged and it is likely to fall.

※ Please mount most right as shown in the figure below when you mount AQ8201-03.

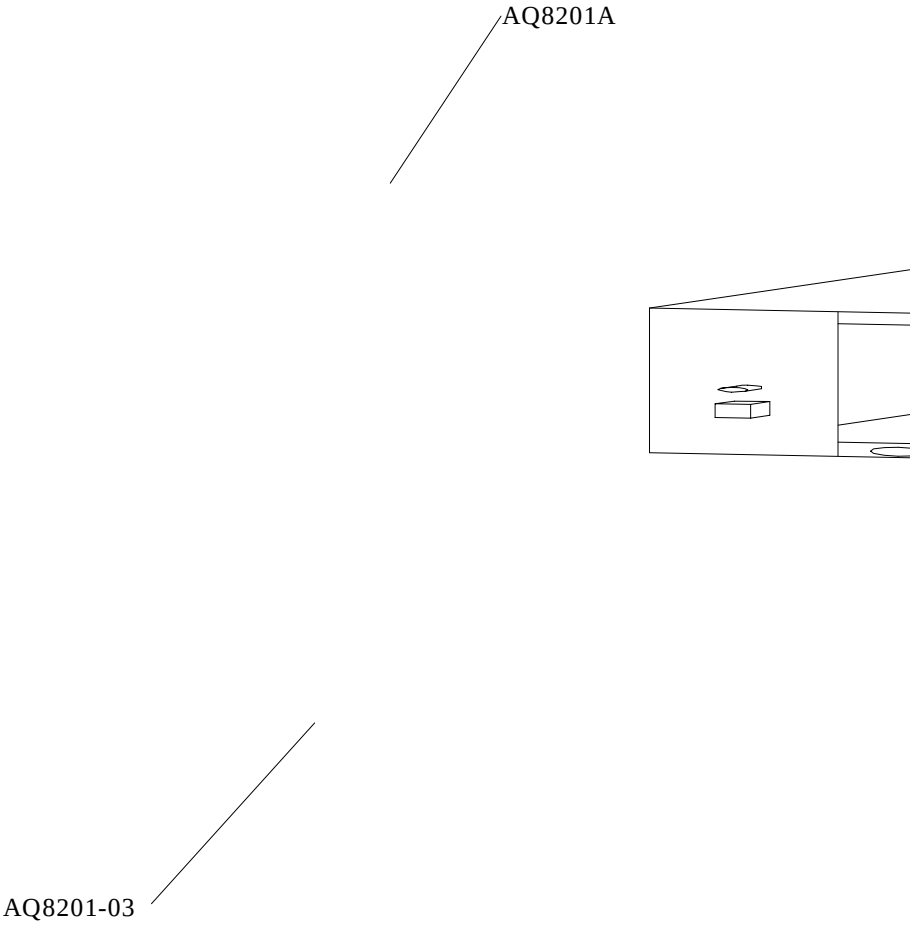


Figure 5-4 Method of mounting AQ8201-03.

5.1.4 Mounting/Dismounting the Universal Adaptor (AQ8201-12,-61)

The above-mentioned module can connect various optical connectors by installing various connector adaptors in the optical connector.

1) Method of Dismounting

① The detaching lever of a universal adaptor is improved up and the lock is released.

② When the lock is released, the detaching lever is pulled out from the plinth.

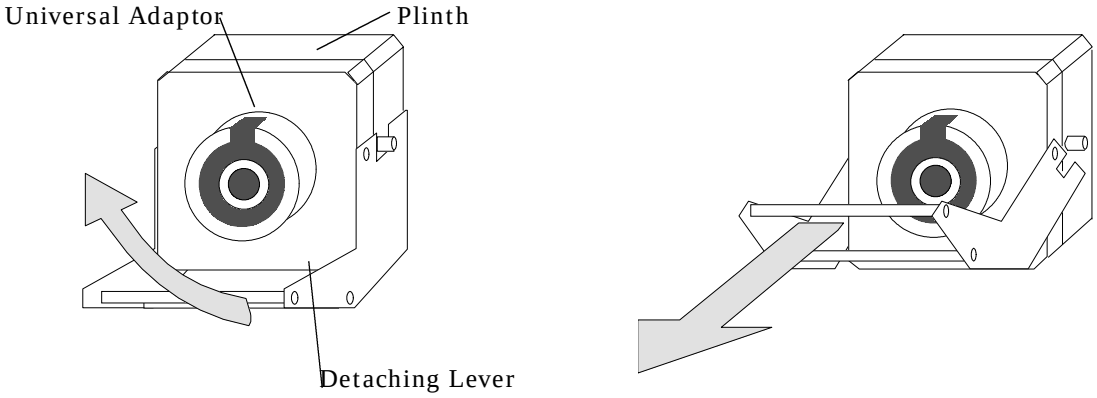


Figure 5-5 Method of Dismounting the Universal Adaptor

2) Method of mounting

① To combine intuition with the guide hall of the plinth, guide pin of a universal adaptor is inserted.

② The detaching lever is reduced the under and a universal adaptor is locked.

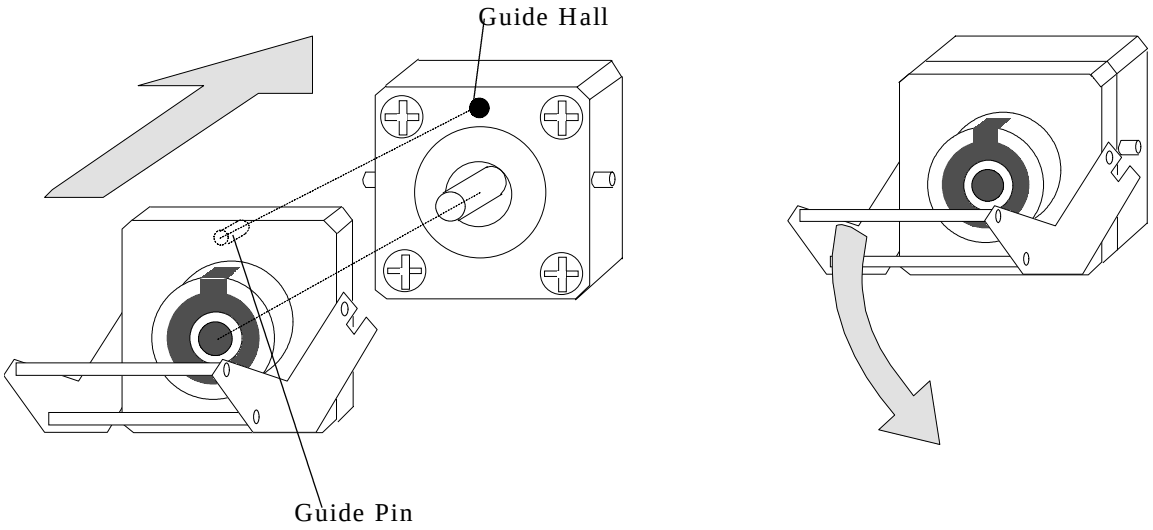


Figure 5-6 Method of Mounting the Universal Adaptor

5.2 Operation Checkout

When the power supply is turned on, the screen shown in Figure 5-7 is displayed.

Figure 5-7 Display at environment operating

Software is started in power supply ON of the AQ8201A.
Do error indication when the error occurs in initialization, 486B, and the during starting of SUB CPU and the system start is interrupted. (However, a part of error is excluded)

・Memory Initialize
The access check of the main memory and SUB the dual port memory 486B dual port memory is done.

・Battery Check
The remainder amount of the battery is checked.

・Strings File Load
Initialization and the message of data variable are progressed from the file to the memory.

・GP-IB Initialize
GP-IB is initialized.

・486 CPU Initialize
The initialization completion of 486B is checked.

・Sub CPU Initialize
The initialization completion of SUB CPU is checked.

・Unit Initialize
The MWA module is checked and other module data is obtained.
The status data of maximum value/minimum value/OPM of each data is obtained.

・RGB Initialize
The system color and the color register are set and shelter of a standard palette and the color register is done.

5.3 Method of Operating Various Modules

Display, the operation, and the measurement method when various modules when display controller (AQ8201-02) is used are mounted are shown in the following.

5.3.1 DISPLAY CONTROLLER MODULE (AQ8201-03)

Please refer to the manual of the operation of the AQ8201-03 DISPLAY CONTROLLER MODULE of the separate volume for the method of operating AQ8201-03.

5.3.2 WDM DFB-LD MODULE (AQ8201-11/11A/11B)

This section explains operation when the AQ8201-11/11A/11B is mounted.

(1)Descriptions of the screen

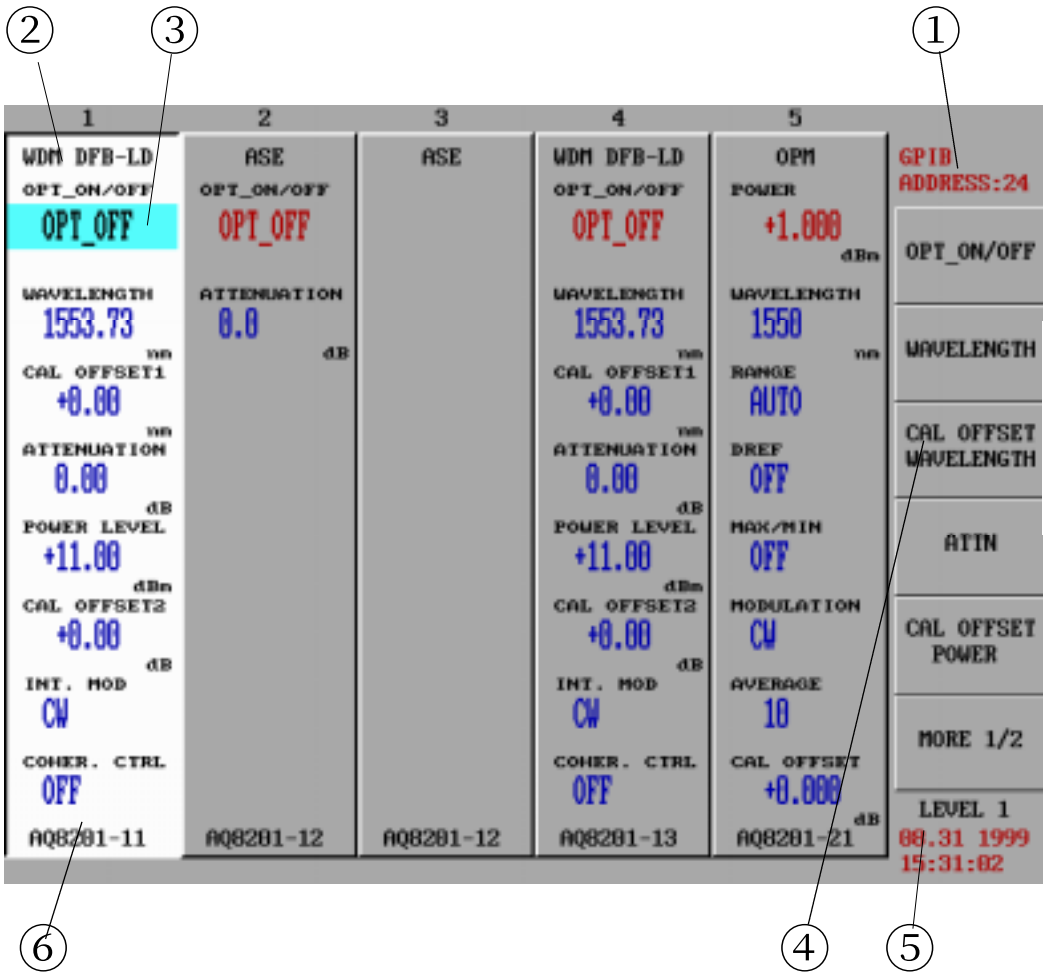


Figure 5-8 Screen When AQ8201-11/11A/11B is Mounted

Table 5-1 Descriptions of Screen Display

No.	Descriptions
①	GP-IB Address
②	Name of the module
③	Menu selection cursor
④	Module menu currently selected
⑤	Date/time
⑥	Type of the module

(2) Setting
Set the AQ8201-11/11A/11B by selecting it using the ◁ or ▷ key.

(3) Key operation
[F1] to [F6] keys: Execute soft key menus.
Rotary knob: Operation differs based on functions.
When selecting a menu
Turning the knob: Selects a menu.
Pressing the knob: Opens the menu.
When setting a numeric value
Turning the knob: Changes a value.
Pressing the knob: Confirms the value or changes the digit.

(4) Descriptions of each key
a. AQ8201-11/11A/11B menu
The menu bar as shown below appears after selecting the AQ8201-11/11A/11B.

OPT_ON/OFF	····· Selects the OPT_ON/OFF menu (-> b).
WAVELENGTH	····· Selects the WAVELENGTH menu (-> c).
CALOFFSET WAVELENGTH	····· Selects the CAL OFFSET WAVELENGTH menu (-> d).
ATTN	····· Selects the ATTN menu (-> e).
CAL OFFSET POWER	····· Selects the CAL OFFSET POWER menu (-> f).
MORE1/2	····· Displays the next page.

LEVEL 1

MODULATION	····· Selects the MODULATION menu (-> g)
COHERENCE	····· Selects the COHERENCE menu (-> h)
WL/FREQ	····· Switches the display between the wavelength and the optical frequency.
MORE2/2	····· Displays the previous page.

LEVEL 1

b.OPT_ON/OFF menu

The menu bar as shown below appears after opening the OPT_ON/OFF menu.
This menu is used to turn the optical output on and off.

OPT_ON: Turns the optical output on.
OPT_OFF: Turns the optical output off.
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

c.WAVELENGTH menu

The menu bar as shown below appears after opening the WAVELENGTH menu.
This menu is used to set the wavelength.
When the wavelength display is selected, the settable range is 1.6 nm or longer (setting resolution: 0.01 nm) including the specified wavelength.
When the optical frequency display is selected, the optical frequency can be set.

UP	····· Lengthens the wavelength.
DOWN	····· Shortens the wavelength.
NEXT FIGURE	····· Changes the digit of the setting.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

NOTE

The error might grow when converting into FREQ with the maximum value or a minimum value of WL set.

NOTE

One to two minutes are required before the wavelength becomes stabilized after setting.

NOTE

A wavemeter may not be able to measure the wavelength accurately when the output light is modulated or the coherence control is turned on.

c.CAL OFFSET WAVELENGTH menu

The menu bar as shown below appears after opening the CAL OFFSET WAVELENGTH menu. This menu is used to set the offset value of wavelength.
The settable range is between -10.00 and 10.00 dB (setting resolution: 0.01 dB).

UP	····· Increases the offset value.
DOWN	····· Decreases the offset value.
NEXT FIGURE	····· Changes the digit of the setting.
ENTER	····· Confirm the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

e.ATTN menu

The menu bar as shown below appears after opening the ATTN menu.
This menu is used to set the optical attenuation.
The settable range is between 0 and 10.00 dB (setting resolution: 0.01 dB).

UP	····· Increases the optical attenuation.
DOWN	····· Decreases the optical attenuation.
NEXT FIGURE	····· Changes the digit of the setting.
EXIT	····· Returns to the previous page (-> a).

LEVEL 2

NOTE

The attenuation setting increases or decreases in real-time as changed.

NOTE

One to two minutes are required before the optical level becomes stabilized after setting.

f.CAL OFFSET POWER menu

The menu bar as shown below appears after opening the CAL OFFSET POWER menu.
This menu is used to set the offset value of level.
The settable range is between -80.00 and 80.00 dB (setting resolution: 0.01 dB).

UP	····· Increases the offset value.
DOWN	····· Decreases the offset value.
NEXT FIGURE	····· Changes the digit of the setting.
ENTER	····· Confirm the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

g.MODULATION menu

The menu bar as shown below appears after opening the MODULATION menu.
This menu is used to set the external/internal modulation.

INT. MOD: Sets the internal modulation (-> g-1).
EXT. MOD: Sets the external modulation (-> g-2).
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a/g-1/g-2).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

g-1.INT. MOD menu

The menu bar as shown below appears after opening the INT.MOD menu.
This menu is used to set the internal modulation.
The settable range is between 0.10 and 300 kHz.

CW: Sets the internal modulation at CW.
0.27: Sets the internal modulation at 0.27 kHz.
1: Sets the internal modulation at 1.00 kHz.
2: Sets the internal modulation at 2.00 kHz.
INT: Sets the internal modulation at 0.10 to 300.00 kHz (setting resolution: 0.10 kHz).
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward when selecting a menu or increases a numeric value when setting it.
DOWN	····· Moves the cursor downward when selecting a menu or decreases a numeric value when setting it
NEXT FIGURE	····· Changes the digit when setting a numeric value.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

NOTE

After turning the external modulation on, the internal modulation is automatically set at CW. On the other hand, the external modulation is turned off after the internal modulation is set with the external modulation on.

NOTE

When a high modulation frequency (approximately 20 kHz) is set with the internal modulation set at INT, the actual modulation frequency may differ from the set frequency.

g-2.EXT. MOD menu

The menu bar as shown below appears after opening the EXT.MOD menu.
This menu is used to set the external modulation.

ON: Turns the external modulation on.
OFF: Turns the external modulation off.
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

CAUTION

Make sure that the external modulation signal does not exceed 2 Vp-p. This module may be damaged if excessive amplitude is input.

NOTE

The wavelength or the optical attenuation may differ from the setting when the external modulation is selected.

h.COHERENCE menu

The menu bar as shown below appears after opening the COHERENCE menu.
This menu is used to set the coherence control

ON: Turns the coherence control on.
The spectral band of the output light widens when the coherence control is turned on. By using this function when measuring an optical part, the interference inside the part can be restrained and thus stable measurement is enabled.

OFF: Turns the coherence control off

CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

5.3.3 ASE MODULE (AQ8201-12)

This section explains operation when the AQ8201-12 is mounted.

(1)Descriptions of the screen

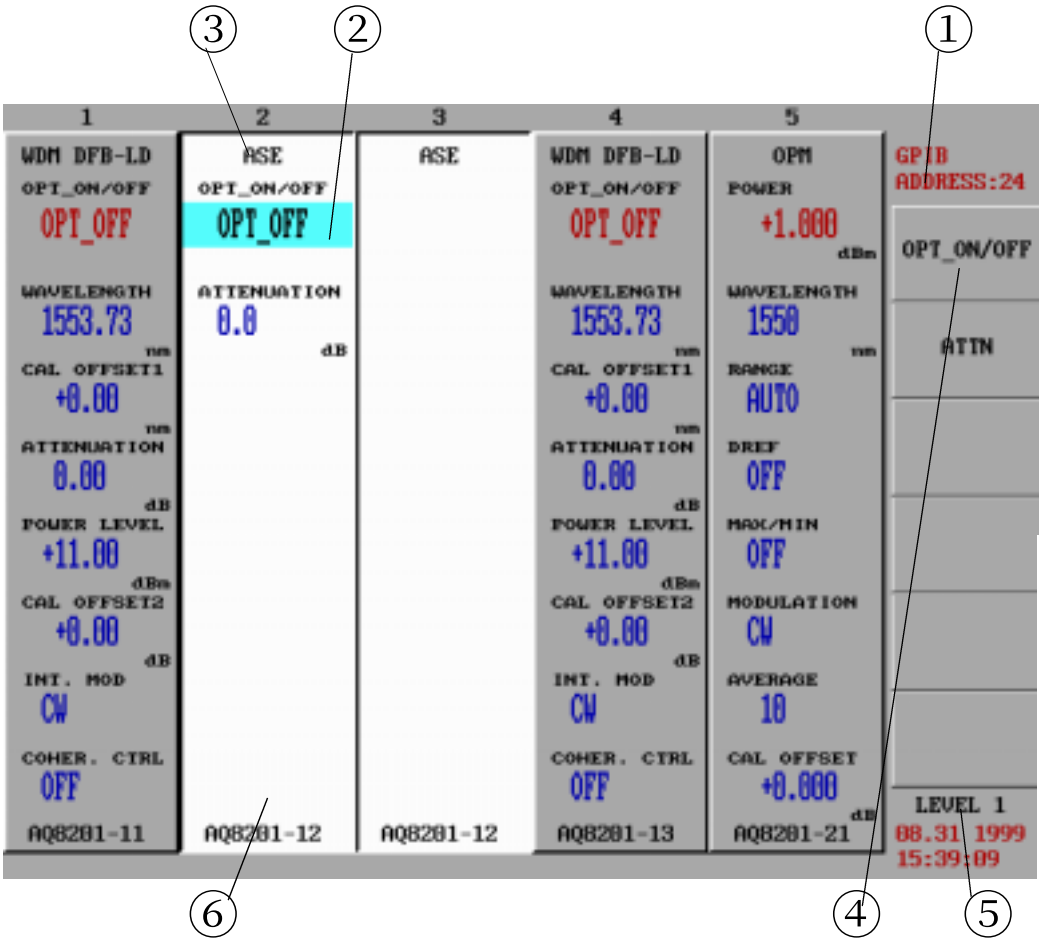


Figure 5-9 Screen When AQ8201-12 is Mounted

Table 5-2 Descriptions of Screen Display

No.	Descriptions
①	GP-IB Address
②	Name of the module
③	Menu selection cursor
④	Module menu currently selected
⑤	Date/time
⑥	Type of the module

(2)Setting
Set the AQ8201-12 by selecting it using the ◁ or ▷ key.

(3)Key operation
[F1] to [F6] keys: Execute soft key menus.
Rotary knob: Operation differs based on functions.
When selecting a menu
Turning the knob: Selects a menu.
Pressing the knob: Opens the menu.
When setting a numeric value
Turning the knob: Changes a value.
Pressing the knob: Confirms the value or changes the digit.

(4)Descriptions of each key
a.AQ8201-12 menu
The menu bar as shown below appears after selecting the AQ8201-12.

OPT_ON/OFF	····· Selects the OPT_ON/OFF menu (-> b).
ATTN	····· Selects the ATTN menu (-> c).

LEVEL 1

b.OPT_ON/OFF menu

The menu bar as shown below appears after opening the OPT_ON/OFF menu.
This menu is used to turn the optical output on and off.

OPT_ON: Turns the optical output on.
OPT_OFF: Turns the optical output off.
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

c.ATTN menu

The menu bar as shown below appears after opening the ATTN menu.
Level of optical attenuation is set from this menu.
Setting is available in the range of 0 to 6.0 dB(setting resolution 0.1 dB).

UP	····· Increases optical attenuation.
DOWN	····· Decreases optical attenuation.
NEXT FIGURE	····· Changes digit of the currently set value.
EXIT	····· Returns to the previous page (-> a).

LEVEL 2

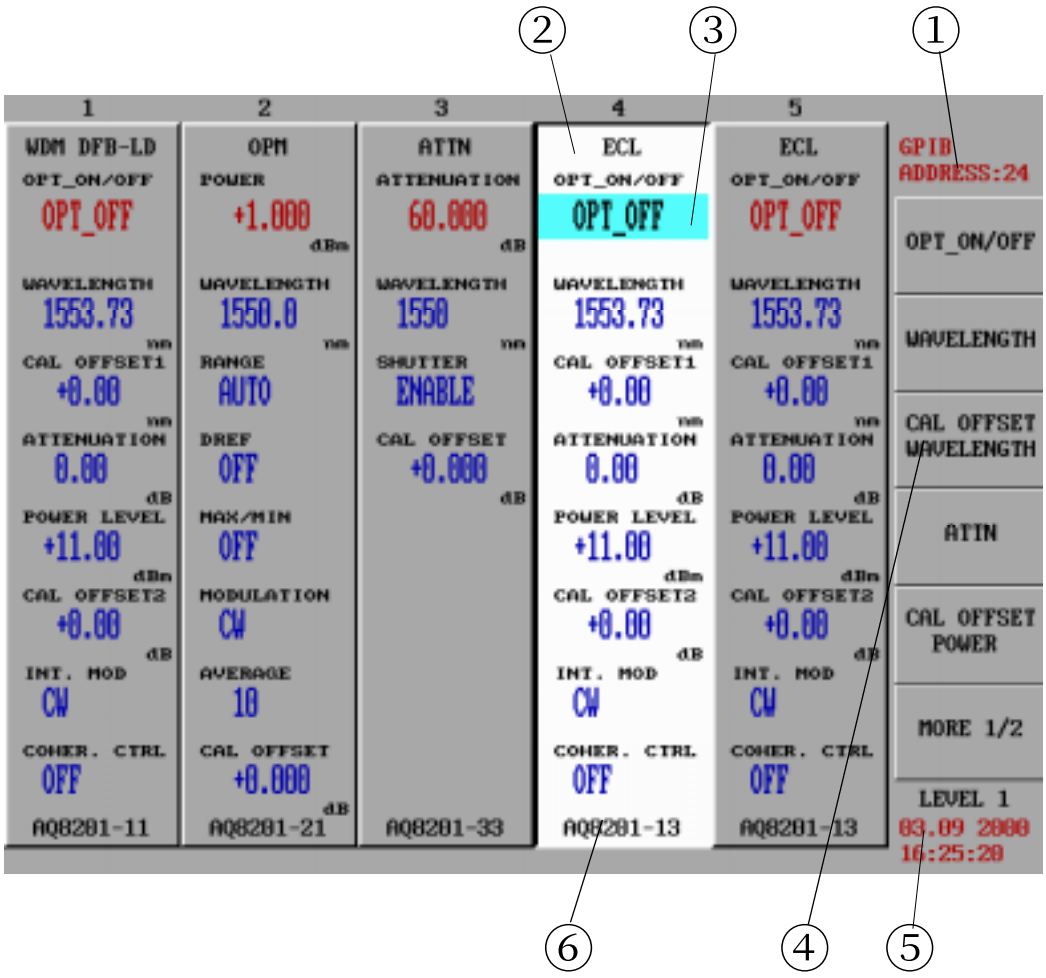
NOTE

Modification done on the attenuation is reflected on the real-time basis, namely attenuation is increased or decreased the moment you have specified.

5.3.4 ECL MODULE (AQ8201-13/13B)

This section explains operation when the AQ8201-13/13B is mounted.

(1)Descriptions of the screen



* AQ8201-13B is somewhat different from the above figure.
Figure 5-10 Screen When AQ8201-13/13B is Mounted

Table 5-3 Descriptions of Screen Display

No.	Descriptions
①	GP-IB Address
②	Name of the module
③	Menu selection cursor
④	Module menu currently selected
⑤	Date/time
⑥	Type of the module

(2) Setting
Set the AQ8201-13/13B by selecting it using the ◁ or ▷ key.

(3) Key operation
[F1] to [F6] keys: Execute soft key menus.
Rotary knob: Operation differs based on functions.
When selecting a menu
Turning the knob: Selects a menu.
Pressing the knob: Opens the menu.
When setting a numeric value
Turning the knob: Changes a value.
Pressing the knob: Confirms the value or changes the digit.

(4) Descriptions of each key
a. AQ8201-13/13B menu
The menu bar as shown below appears after selecting the AQ8201-13/13B.

OPT_ON/OFF	····· Selects the OPT_ON/OFF menu (-> b).
WAVELENGTH	····· Selects the WAVELENGTH menu (-> c).
CAL OFFSET WAVELENGTH	····· Selects the CAL OFFSET WAVELENGTH menu (-> d).
ATTN	····· Selects the ATTN menu (-> e).
CAL OFFSET POWER	····· Selects the CAL OFFSET POWER menu (-> f).
MORE1/2	····· Displays the next page.

LEVEL 1

MODULATION	····· Selects the MODULATION menu (-> g)
COHERENCE	····· Selects the COHERENCE menu (-> h)
WL/FREQ	····· Switches the display between the wavelength and the optical frequency.
WL CAL	····· Selects the WL CAL menu (-> i)
MORE2/2	····· Displays the previous page.

LEVEL 1

b.OPT_ON/OFF menu

The menu bar as shown below appears after opening the OPT_ON/OFF menu.
This menu is used to turn the optical output on and off.

OPT_ON: Turns the optical output on.
OPT_OFF: Turns the optical output off.
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

c.WAVELENGTH menu

The menu bar as shown below appears after opening the WAVELENGTH menu.
This menu is used to set the wavelength.
The settable range -13 : 1480 to 1580 nm (setting resolution: 0.01 nm).
-13B : 1500 to 1620 nm (setting resolution: 0.01 nm).
When the optical frequency display is selected, the optical frequency can be set.

UP	····· Lengthens the wavelength.
DOWN	····· Shortens the wavelength.
NEXT FIGURE	····· Changes the digit of the setting.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

NOTE

The error might grow when converting into FREQ with the maximum value or a minimum value of WL set.

NOTE

One to two minutes are required before the wavelength becomes stabilized after setting.

NOTE

A wavemeter may not be able to measure the wavelength accurately when the output light is modulated or the coherence control is turned on.

c.CAL OFFSET WAVELENGTH menu

The menu bar as shown below appears after opening the CAL OFFSET WAVELENGTH menu. This menu is used to set the offset value of wavelength.
The settable range is between -10.00 and 10.00 dB (setting resolution: 0.01 dB).

UP	····· Increases the offset value.
DOWN	····· Decreases the offset value.
NEXT FIGURE	····· Changes the digit of the setting.
ENTER	····· Confirm the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

e.ATTN menu

The menu bar as shown below appears after opening the ATTN menu.
This menu is used to set the optical attenuation.
The settable range is between 0 and 10.00 dB (setting resolution: 0.01 dB).

UP	····· Increases the optical attenuation.
DOWN	····· Decreases the optical attenuation.
NEXT FIGURE	····· Changes the digit of the setting.
EXIT	····· Returns to the previous page (-> a).

LEVEL 2

NOTE

The attenuation setting increases or decreases in real-time as changed.

NOTE

One to two minutes are required before the optical level becomes stabilized after setting.

f.CAL OFFSET POWER menu

The menu bar as shown below appears after opening the CAL OFFSET POWER menu.
This menu is used to set the offset value of level.
The settable range is between -80.00 and 80.00 dB (setting resolution: 0.01 dB).

UP	..... Increases the offset value.
DOWN	..... Decreases the offset value.
NEXT FIGURE	..... Changes the digit of the setting.
ENTER	..... Confirm the setting (-> a).
CANCEL	..... Cancels the setting (-> a).

LEVEL 2

g.MODULATION menu

The menu bar as shown below appears after opening the MODULATION menu.
This menu is used to set the external/internal modulation.

INT. MOD: Sets the internal modulation (-> g-1).
EXT. MOD: Sets the external modulation (-> g-2).
CANCEL: Cancels the setting.

UP	..... Moves the cursor upward.
DOWN	..... Moves the cursor downward.
NEXT FIGURE	..... Not used.
ENTER	..... Confirms the setting (-> a/g-1/g-2).
CANCEL	..... Cancels the setting (-> a).

LEVEL 2

g-1.INT. MOD menu

The menu bar as shown below appears after opening the INT.MOD menu.
This menu is used to set the internal modulation.
The settable range is between 0.10 and 300 kHz.

CW: Sets the internal modulation at CW.
0.27: Sets the internal modulation at 0.27 kHz.
1: Sets the internal modulation at 1.00 kHz.
2: Sets the internal modulation at 2.00 kHz.
INT: Sets the internal modulation at 0.10 to 300.00 kHz (setting resolution: 0.10 kHz).
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward when selecting a menu or increases a numeric value when setting it.
DOWN	····· Moves the cursor downward when selecting a menu or decreases a numeric value when setting it
NEXT FIGURE	····· Changes the digit when setting a numeric value.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

NOTE

After turning the external modulation on, the internal modulation is automatically set at CW. On the other hand, the external modulation is turned off after the internal modulation is set with the external modulation on.

NOTE

When a high modulation frequency (approximately 20 kHz) is set with the internal modulation set at INT, the actual modulation frequency may differ from the set frequency.

g-2.EXT. MOD menu

The menu bar as shown below appears after opening the EXT.MOD menu.
This menu is used to set the external modulation.

ON: Turns the external modulation on.
OFF: Turns the external modulation off.
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

CAUTION

Make sure that the external modulation signal does not exceed 2 Vp-p. This module may be damaged if excessive amplitude is input.

NOTE

The wavelength or the optical attenuation may differ from the setting when the external modulation is selected.

h.COHERENCE menu

The menu bar as shown below appears after opening the COHERENCE menu.
This menu is used to set the coherence control

ON: Turns the coherence control on.
The spectral band of the output light widens when the coherence control is turned on. By using this function when measuring an optical part, the interference inside the part can be restrained and thus stable measurement is enabled.

OFF: Turns the coherence control off

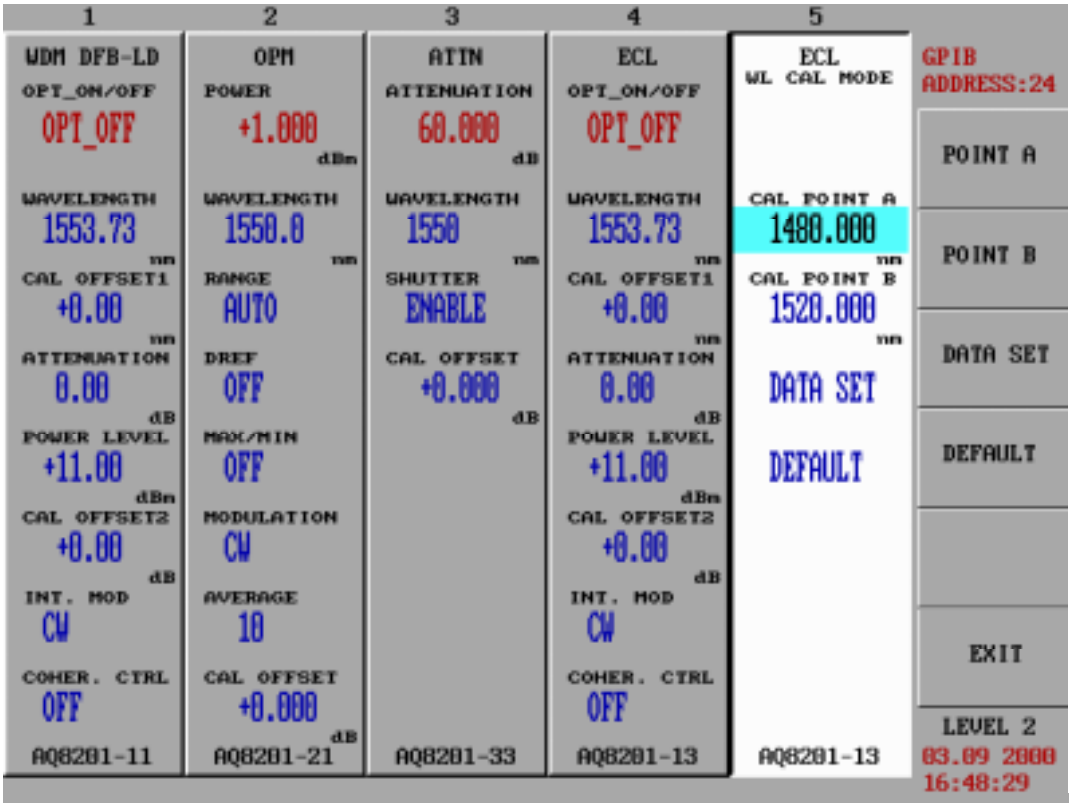
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

i.WL CAL menu

When the WL CAL menu is opened, the screen of WL CAL MODE shown in the following is displayed.



* AQ8201-13B is somewhat different from the above figure.

Figure 5-11 Screen of AQ8201-13/13B WL CAL MODE

POINT A	····· Selects the POINT A menu(→j)
POINT B	····· Selects the POINT B menu(→k)
DATA SET	····· Selects the DATA SET menu(→l)
DEFAULT	····· Selects the DEFAULT menu(→m)
EXIT	····· Displays the previous page.(→a)

LEVEL 2

CAUTION

Please inquire because some breakdowns are thought when the measurement wavelength exceeds ± 10nm from the proofreading wave length.

j.POINT A menu

The menu bar as shown below appears after opening the POINT A menu.
In this menu, the measurement wavelength in POINT A is set.
The settable range -13 : 1510 to 1530 nm (setting resolution: 0.01 nm).
-13B : 1550 to 1610 nm (setting resolution: 0.01 nm).

UP	····· Lengthens the wavelength.
DOWN	····· Shortens the wavelength.
NEXT FIGURE	····· Changes the digit of the setting.
ENTER	····· Confirms the setting (-> i).
CANCEL	····· Cancels the setting (-> i).

LEVEL 3

k.POINT B menu

The menu bar as shown below appears after opening the POINT B menu.
In this menu, the measurement wavelength in POINT B is set.
The settable range -13 : 1560 to 1580 nm (setting resolution: 0.01 nm).
-13B : 1600 to 1620 nm (setting resolution: 0.01 nm).

UP	····· Lengthens the wavelength.
DOWN	····· Shortens the wavelength.
NEXT FIGURE	····· Changes the digit of the setting.
ENTER	····· Confirms the setting (-> i).
CANCEL	····· Cancels the setting (-> i).

LEVEL 3

l.DATA SET menu

The menu bar as shown below appears after opening the DATA SET menu. In this menu, the wave length is corrected according to the value set with POINT A and POINT B.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> i).
CANCEL	····· Cancels the setting (-> i).

LEVEL 3

5.3.5 OPM MODULE (AQ8201-21)

This section explains operation when the AQ8201-21 is mounted.

(1)Descriptions of the screen

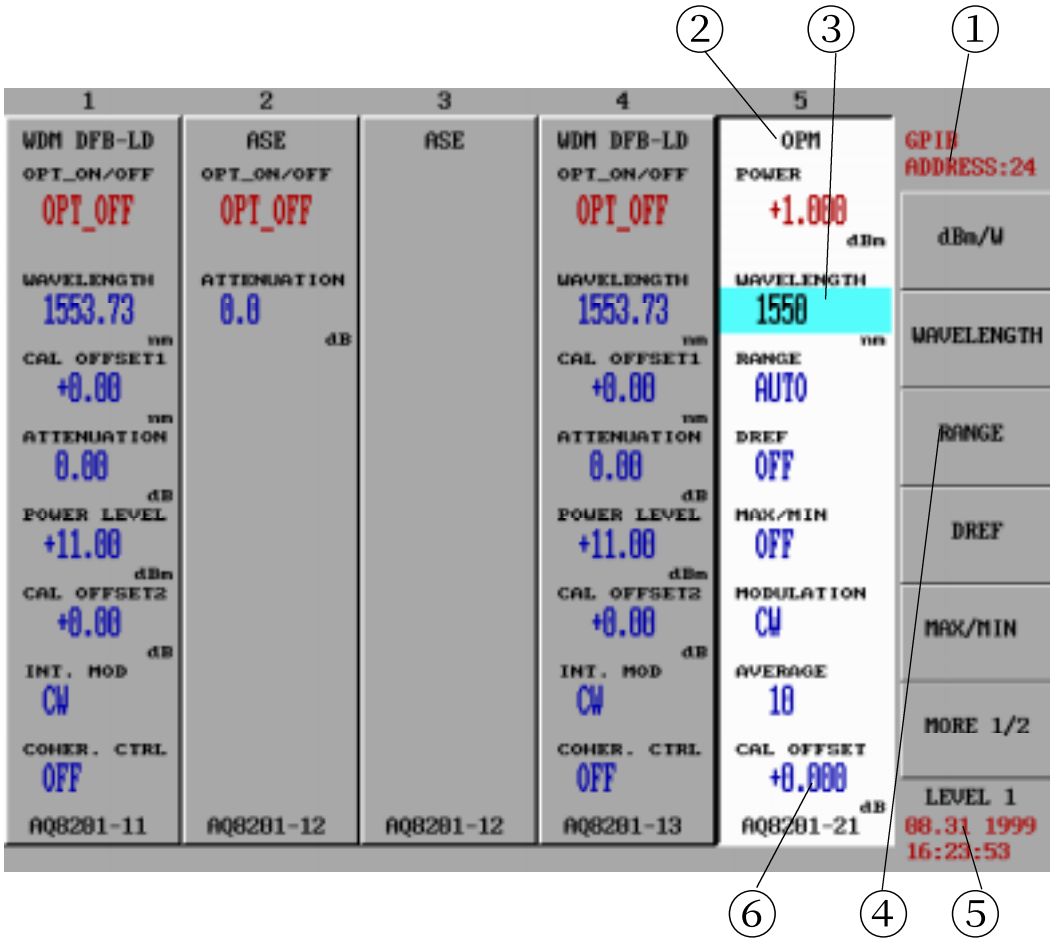


Figure 5-12 Screen When AQ8201-21 is Mounted

Table 5-4 Descriptions of Screen Display

No.	Descriptions
①	GP-IB Address
②	Name of the module
③	Menu selection cursor
④	Module menu currently selected
⑤	Date/time
⑥	Type of the module

(2) Setting
Set the AQ8201-21 by selecting it using the ◁ or ▷ key.

(3) Key operation
[F1] to [F6] keys: Execute soft key menus.
Rotary knob: Operation differs based on functions.
When selecting a menu
Turning the knob: Selects a menu.
Pressing the knob: Opens the menu.
When setting a numeric value
Turning the knob: Changes a value.
Pressing the knob: Confirms the value or changes the digit.

(4) Descriptions of each key

a.OPM MODULE menu
The menu bar as shown below appears after selecting the OPM MODULE.

dBm/W	····· Selects display either in dBm or W.
WAVELENGTH	····· Selects the WAVELENGTH menu (-> b).
RANGE	····· Selects the RANGE menu (-> c).
DREF	····· Selects the DREF menu (-> d).
MAX/MIN	····· Selects the Maximum/Minimum/Difference Measurement menu (-> e).
MORE1/2	····· Displays the next page.

LEVEL 1

MODULATION	····· Selects the MODULATION menu (-> f).
AVERAGE	····· Specifies the averaging count (-> g).
CAL OFFSET	····· Selects the CAL OFFSET menu (-> h).
ZERO	····· Selects the ZERO SET menu(-> i).
MORE2/2	····· Displays the previous page.

LEVEL 1

b. WAVELENGTH menu
The menu bar as shown below appears after opening the WAVELENGTH menu.
This menu is used for setting the calibration wavelength.
The setting is available in the range from 700 to 1700 nm
(setting resolution 1 nm).

UP	····· Lengthens the wavelength.
DOWN	····· Shortens the wavelength.
NEXT FIGURE	····· Changes the digit of the setting.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

c. RANGE menu
The menu bar as shown below appears after opening the RANGE menu.
This menu is used for setting the measurement range.
AUTO: Selecting this menu option automatically selects an optimum measurement range and turns on the measurement in selected range.
HOLD: Measurement is continued with the measurement range being fixed to the currently selected one.
+30 - -60: A measurement range is selected between +30 dBm and -60 dBm.
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

d. DREF menu
The menu bar as shown below appears after opening the DREF menu.
This menu is used for implementing relative measurement employing the measured values as the reference.
OFF: Selecting this menu option displays normal measurement values.
ON: Displays relative measurement values of the measured values that are provided when this mode is turned on.
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

e. MAX/MIN menu
The menu bar as shown below appears after opening the MAX/MIN menu.
This menu is used for measuring the maximum value, minimum value and difference between them.
OFF: Selecting this menu option displays normal measurement values.
MAX: Displays the maximum value measured since this mode is turned on.
MIN: Displays the minimum value measured since this mode is turned on.
DIFF: Displays difference between the maximum and minimum values measured since this mode is turned on.
STOP: Stops the maximum and minimum value measurement. You can reset the display selecting the option OFF.
CANCEL: Cancels the setup.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

f. MODULATION menu
The menu bar as shown below appears after opening the MODULATION menu.
This menu is used for selecting desired optical modulation approach.
CW: Select CW light.
0.27: Selects 0.27 kHz CHOP light.
1: Select 1 kHz CHOP light.
2: Selects 2 kHz CHOP light.
EXT. MOD: Selects other CHOP light (0.1 kHz or above).
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

g.AVERAGE menu
The menu bar as shown below appears after opening the AVERAGE menu.
This menu is used for specifying averaging count. Sequential additional averaging is employed for the averaging method.
OFF: Selects not to implement the averaging.
2: Executes 2 times of averaging operations.
5: Executes 5 times of averaging operations.
10: Executes 10 times of averaging operations.
20: Executes 20 times of averaging operations.
50: Executes 50 times of averaging operations.
100: Executes 100 times of averaging operations.
200: Executes 200 times of averaging operations.
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

h.CAL OFFSET menu
The menu bar as shown below appears after opening the CAL OFFSET menu.
This menu is used for setting the offset value of level.
The settable range is between -80.000 and 80.000 dB (setting resolution: 0.001 dB).

UP	····· Lengthens the wavelength.
DOWN	····· Shortens the wavelength.
NEXT FIGURE	····· Changes the digit of the setting.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

i.ZERO SET menu
The menu bar as shown below appears after opening the ZERO SET menu.
This menu is used for implementing the zero set. Before turning on this operation, make sure to shield the light to the optical input connector using the attached optical connector cap.
ENTER: Executes the zero set.
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

NOTE

If the AQ8201-21 photo sensor port is poor shielded and if the ZERO key is pressed, the Zero Set is NOT executed but the error message is displayed approximately three seconds. Then, the AQ8201-21 returns to its normal measurement mode.If such zero adjustment is made, an error may increase during absolute value measurement.

NOTE
An electrical offset of sensors and internal circuits may change depending on the ambient temperature and power conductive time. This value is defined as the noise level of each sensor in the specifications .If you measure an optical level below-40 dBm or at the highest accuracy, for example, you must execute the Zero set immediately before the measurement.

NOTE
The electrical offset of the AQ8201-21 may change due to the changed ambient temperature. If it has occurred, wait until the temperature becomes stable and execute the Zero set.

NOTE
To start the CHOP optical signal measurement, set the modulation frequency to be measured and execute the Zero set.

NOTE
The modulation light cannot be measured with the CW light set.
For this case, please measure by setting EXT.MOD.

5.3.6 ATTN MODULE (AQ8201-31/32/33)

This section explains operation when the AQ8201-31/32/33 is mounted.

(1) Descriptions of the screen

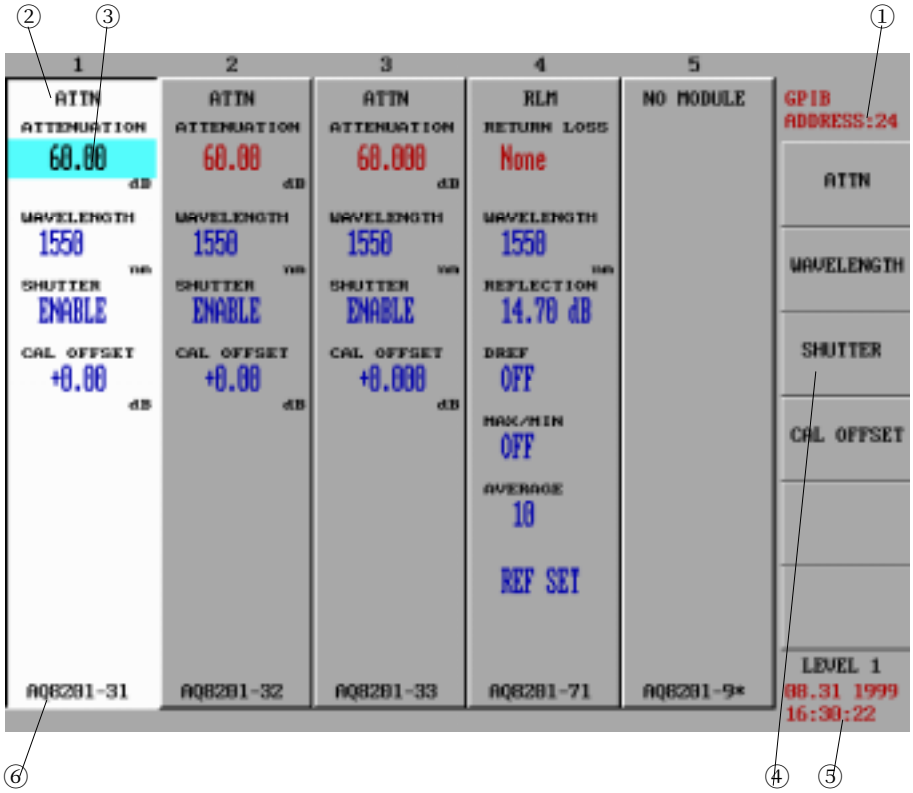


Figure 5-13 Screen When AQ8201-31 is Mounted

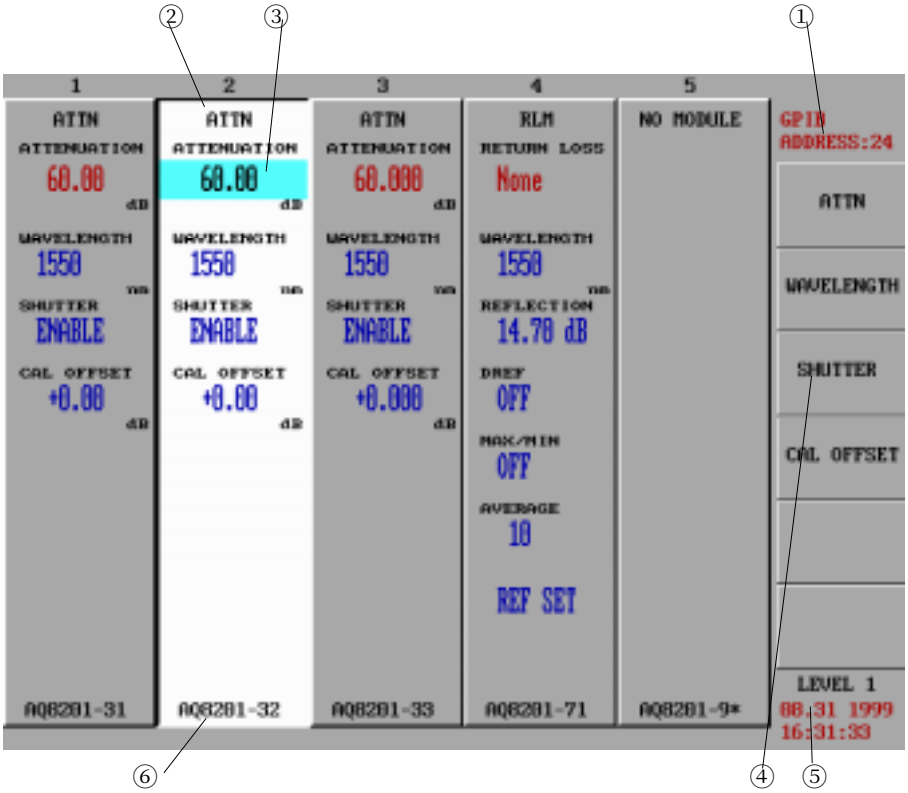


Figure 5-14 Screen When AQ8201-32 is Mounted

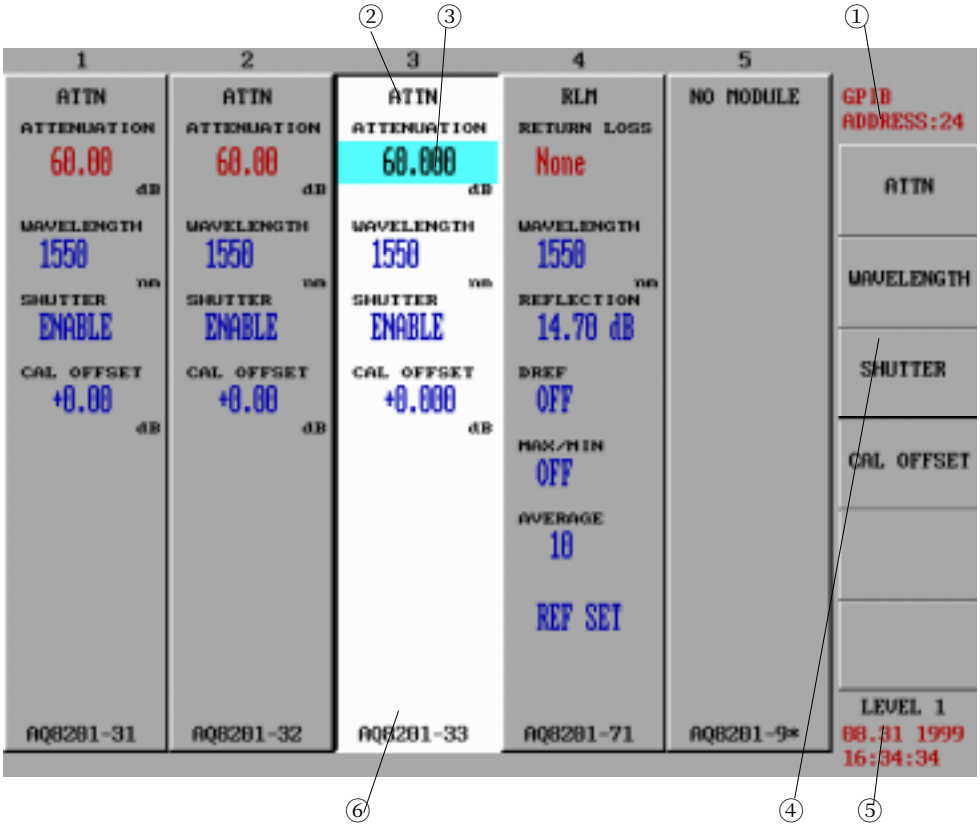


Figure 5-15 Screen When AQ8201-33 is Mounted

Table 5-5 Descriptions of Screen Display

No.	Descriptions
①	GP-IB Address
②	Name of the module
③	Menu selection cursor
④	Module menu currently selected
⑤	Date/time
⑥	Type of the module

(2) Setting
Set the AQ8201-31/32/33 by selecting it using the ◁ or ▷ key.

(3) Key operation
[F1] to [F6] keys: Execute soft key menus.
Rotary knob: Operation differs based on functions.
When selecting a menu
Turning the knob: Selects a menu.
Pressing the knob: Opens the menu.
When setting a numeric value
Turning the knob: Changes a value.
Pressing the knob: Confirms the value or changes the digit.

(4) Descriptions of each key
a. ATTN MODULE menu
The menu bar as shown below appears after selecting the ATTN MODULE.

ATTN	····· Selects the ATTN menu (-> b).
WAVELENGTH	····· Selects the WAVELENGTH menu (-> c).
SHUTTER	····· Selects the SHUTTER menu (-> d).
CAL OFFSET	····· Selects the CAL OFFSET menu (-> e).

LEVEL 1

b. ATTN menu
The menu bar as shown below appears after opening the ATTN menu.
This menu is used to set the optical attenuation.
The settable range is between 0 and 60.00 dB
(setting resolution: -31:0.05 dB -32:0.01dB -33:0.001dB).

UP	····· Increases the optical attenuation.
DOWN	····· Decreases the optical attenuation.
NEXT FIGURE	····· Changes the digit of the setting.
EXIT	····· Returns to the previous page (-> a).

LEVEL 2

NOTE
The attenuation setting increases or decreases in real-time as changed.

c. WAVELENGTH menu
The menu bar as shown below appears after opening the WAVELENGTH menu.
This menu is used to set the wavelength.
The settable range is between 1200 and 1600 nm (setting resolution:1 nm).
(-33:1480 to 1650 nm)

UP	····· Lengthens the wavelength.
DOWN	····· Shortens the wavelength.
NEXT FIGURE	····· Changes the digit of the setting.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

d. SHUTTER menu

The menu bar as shown below appears after opening the SHUTTER menu.
This menu is used to open or close the shutter.

ENABLE: Opens the shutter.
DISABLE: Closes the shutter.
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Not used.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

e.CAL OFFSET menu

The menu bar as shown below appears after opening the CAL OFFSET menu.
This menu is used to set the offset value of attenuation.
The settable range is between -80.00 and 80.00 dB
(setting resolution:-31: 0.05 dB -32:0.01dB -33:0.001dB).

UP	····· Increases the offset value.
DOWN	····· Decreases the offset value.
NEXT FIGURE	····· Changes the digit of the setting.
ENTER	····· Confirm the setting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

5.3.7 MWA MODULE (AQ8201-61)

Refer to the separate AQ8201-61 MWA MODULE Operation Manual for how to operate the multi wavelength analyzer module (MWA MODULE).

5.3.8RLMMODULE (AQ8201-71)

ThissectionexplainsoperationwhentheAQ8201-71 is mounted.

(1) Descriptions ofthescreen

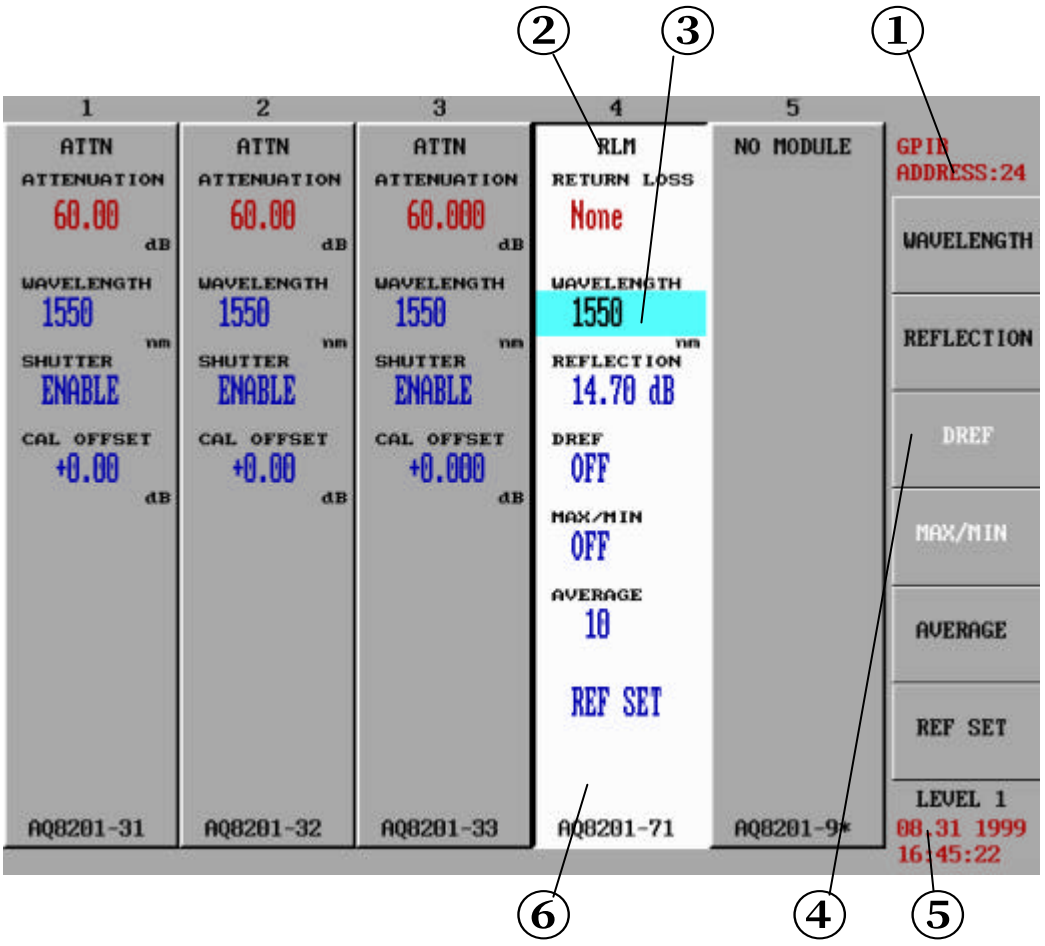


Figure 5-16 ScreenWhenAQ8201-71isMounted

Table 5-6 DescriptionsofScreenDisplay

No.	Descriptions
①	GP-IBAddress
②	Name of themodule
③	Menu selection cursor
④	Module menucurrentlyselected
⑤	Date/time
⑥	Type of the module

(2) Setting
Set the AQ8201-71byselectingit using the ◁ or ▷ key.

(3) Keyoperation
[F1] to [F6] keys:Execute softkeymenus.
Rotaryknob:Operationdiffersbased on functions.
When selectingamenu
Turning theknob:Selectsa menu.
Pressing the knob: Opens themenu.
When settinganumericvalue
Turning theknob:Changesavalue.
Pressing the knob: Confirms the value orchangesthedigit.

(4) Descriptions of each key
a. AQ8201-71menu
Themenubarasshownbelowappearsafterselectingthe AQ8201-71.

WAVELENGTH	····· Selects theWAVELENGTHmenu (-> b).
REFLECTION	····· Selects theREFLECTIONmenu (-> c).
DREF	····· Selects theDREFmenu (-> d).
MAX/MIN	····· Selects theMAX/MIN menu (-> e).
AVERAGE	····· Selects theAVERAGE menu (-> f).
REF SET	····· Selects theREFSETmenu (-> g).

LEVEL1

b.WAVELENGTH menu

Themenubarasshownbelowappearsafteropening theWAVELENGTHmenu.
This menuisusedtosetthewavelength.
Thesettablerangeis between 1280and 1620nm (setting resolution:1 nm).

UP	····· Lengthens the wavelength.
DOWN	····· Shortens the wavelength.
NEXT FIGURE	····· Changes the digit of thesetting.
ENTER	····· Confirms thesetting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

NOTE

Be sure to setthelight output mode ofthelight source to CHOP (270Hz) before turning on the light output device.

NOTE

Be sure toset WAVELENGTH and REFLECTION before REF SET. Iftheyareset during themeasurement ofreturnloss,themeasurementwill beinterrupted.

c.REFLECTION menu

The menubarasshownbelowappearsafteropeningtheREFLECTIONmenu.
Thismenuisusedtosetreflectionreference.
14.70dB:Setsthereflectionreference on theFresnelreflectionreference(14.70dB).
0.20dB:Setsthereflectionreference on thetotalreflectionreference (0.20dB).
CANCEL:Cancels thesetting.

UP	····· Moves thecursorupward.
DOWN	····· Moves thecursordownward.
NEXT FIGURE	····· Notused.
ENTER	····· Confirms thesetting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

d. DREF menu

The menu bar as shown below appears afteropeningtheDREFmenu.
Thismenuisusedforimplementingrelativemeasurementemployingthemeasured values as thereference.

OFF:Selectingthismenuoptiondisplays normal measurementvalues.
ON: Displaysrelativemeasurementvaluesof the measuredvaluesthatare provided when this modeisturnedon.
CANCEL:Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Notused.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels thesetting (-> a).

LEVEL 2

NOTE
As for DREF and MAX/MIN,itisexecutable only when thereturnlossismeasuring.

e. MAX/MIN menu

The menu bar as shown below appears afteropeningtheMAX/MINmenu.
Thismenuisusedformeasuringthemaximumvalue,minimumvalueanddifference between them.

OFF:Selectingthismenuoptiondisplays normal measurementvalues.
MAX: Displays themaximumvaluemeasured sincethismodeisturnedon.
MIN: Displays the minimumvalue measured since this modeisturnedon.
DIFF:Displaysdifference between themaximumand minimum values measured since this mode is turned on.
STOP:Stopsthemaximumandminimumvaluemeasurement. Youcanresetthedisplay selecting the option OFF.
CANCEL: Cancels the setting.

UP	····· Moves the cursor upward.
DOWN	····· Moves the cursor downward.
NEXT FIGURE	····· Notused.
ENTER	····· Confirms the setting (-> a).
CANCEL	····· Cancels thesetting (-> a).

LEVEL 2

f.AVERAGE menu

The menu bar asshownbelowappearsafteropeningtheAVERAGEmenu.
This menu isusedforspecifyingaveragingcount. Sequential additional averaging is employed fortheaveragingmethod.

OFF: Selectsnottoimplementtheaveraging.
2: Executes2timesofaveragingoperations.
5: Executes5timesofaveragingoperations.
10: Executes 10 timesofaveragingoperations.
20: Executes 20 timesofaveragingoperations.
50: Executes 50 timesofaveragingoperations.
100: Executes100timesofaveragingoperations.
200: Executes200timesofaveragingoperations.
CANCEL: Cancels thesetting.

UP	····· Moves thecursorupward.
DOWN	····· Moves thecursordownward.
NEXT FIGURE	····· Notused.
ENTER	····· Confirms thesetting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

g.REF SET menu

ThemenubarasshownbelowappearsafteropeningtheREFSETmenu.
This menuisforsettingexecutionofreferencereflectionmeasurementandstartof return lossmeasurement.

When measuring reference reflection,
Makesurethatthedisplaylevelfor Fresnelreflectionis14.7+/-0.02dB.
And makesurethatthedisplaylevelfortotalreflectioncomesto0.2+/-0.02 dB.

REFSET:Starts measuring referencereflectionandreturnloss.
. CANCEL:Cancels thesetting.

UP	····· Moves thecursorupward.
DOWN	····· Moves thecursordownward.
NEXT FIGURE	····· Notused.
ENTER	····· Confirms thesetting (-> a).
CANCEL	····· Cancels the setting (-> a).

LEVEL 2

NOTE

When several measured values of reference reflection do not satisfy the tolerance of +/-0.02dB, the LD light source might have been unstable or the optical fiber connections and the optical fiber connectors might have been soiled. The LD light source is AQ4211 or equivalent. When measured values do not satisfy the tolerance of +/-0.02dB even after the optical fiber connector, the input section of this device or the master cord connection is cleaned by using alcohol, this device might have been out of order. In this case, contact our Service Department, the Sales Department of our head office or our branch or sales office in your area.

(5) Measuring Method

1) Measurement of Reference Reflection
After the following setup, REF SET is executed.

1-1. When reflection reference is Fresnel reflection reference (14.70dB),
Make sure that our designated master cord with the same master connector as the measuring object is connected to the master cord connection of the AQ8201-71.
Clean the ferrule at the end of the master connector using alcohol so as to prevent light entry.

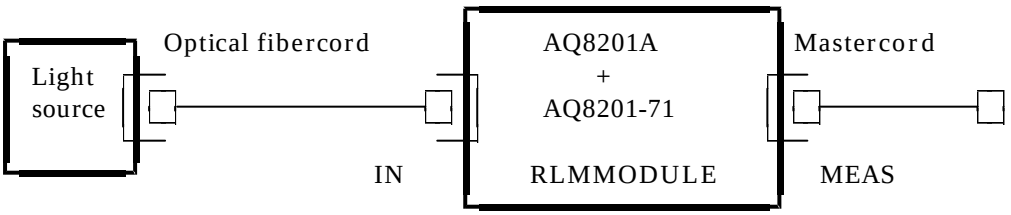


Figure. 5-17 Measurement System of Fresnel Reflection Reference

1-2. When reflection reference is total reflection reference (0.20dB),
Make sure that our designated master cord is disconnected to the master cord connection of the AQ8201-71 and that a total reflection master cord disconnected with adapter to the master connector side.

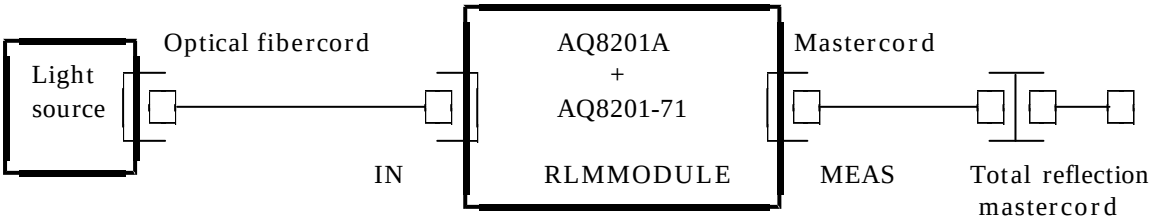


Figure. 5-18 Measurement System of Total Reflection Reference

2) Measurement ofReturnLoss
After measuring referencereflection, connect the measuring objecttothemastercord, andareturnloss will appear on the display.

2-1. IncaseofFresnelReflectionStandard,
Connectameasuringobjecttothemasterconnectorsideofourdesignatedmaster cord connectedto theAQ8201-71 connectorbyusinganadapter.Maketheother endofthemeasuringconnectorofthemeasuringobjectthereflectionlesstermination.

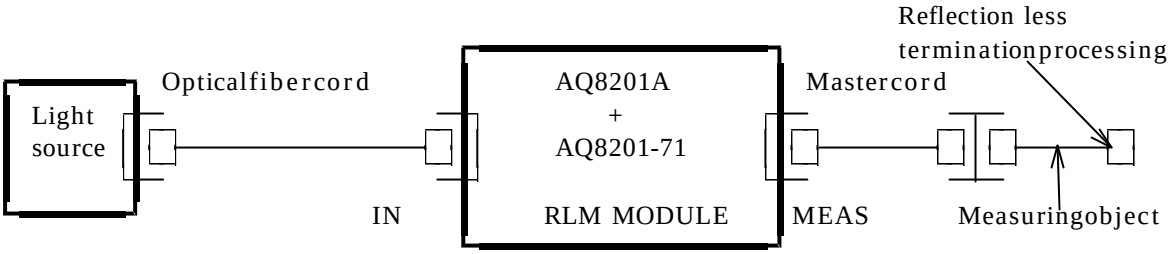


Figure.5-19Setup ofMeasuringObject

2-2. IncaseofTotalReflectionReference
Disconnectourdesignated mastercordconnected to the mastercord connection ofthe AQ8201-71andthe totalreflectionmastercord (or thetotalreflectionmaster cord only when the measuring connectoris the same type with the masterconnector of the mastercord),andconnect the measuring object as shown in Figure.5-19.

NOTE
Pleasemake output leveltheoneof0to-5dBmaboutthesourceoflightusedforthe measurement.
When AQ8201-11isused, it isnecessarytoattenuateoutputlevel withattenuatoretc.

5.4 Control via GP-IB (IEEE488 Standards)

This system has a built-in GP-IB interface to control each parameter setup, parameter modification and data transmission and reception via the GPIB interface bus.
This system uses an IEEE-488 standard, receptacle-type connector.

CAUTION
Turn the power switch off before connecting or disconnecting the GP-IB cord.

This system does not accept any GP-IB program code for one minute (max.) after the power is turned on.

5.4.1 Interface Functions

Table 5-7 GP-IB Interface Functions

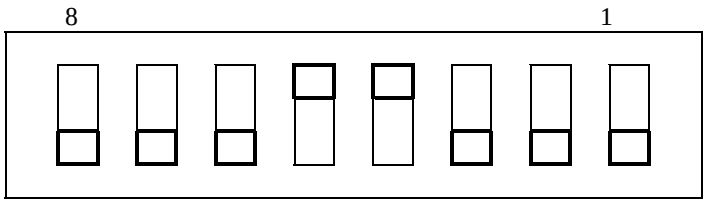
Function	Explanation
SH1	Source handshaking full functions
AH1	Acceptor handshaking full functions
T6	Basic talker function
L4	Basic listener function
SR1	Service request function
RL1	Remote/local function
PP0	No parallel polling function
DC1	Device clear function
DT0	No device trigger function
C0	No control function
E1	Open collector driver

5.4.2 Explanation of Basic Functions

(1)GP-IB address

The address of this system can be set using 1 to 5 bits of the DIP switch on the rear of this system.

Example: Address "24" is set as follows:



The address is set at"24" at default.

(2) Address setting with AQ8201-03

In the address of this device, setting by AQ8201-03 is also possible.
When the dip switch of this device is "0", the address set by AQ8201-03 becomes effective. (The set value is backed up with this device)
※ Please refer to the AQ8201-03 operation manual for details.

(3) AQ8201-61 address setting

This system and the AQ8201-61 communicate via the GP-IB.
When using the AQ8201-61, set the GP-IB address of the MWA as follows:

AQ8201-61 mounting position	AQ8201-61 address
When using 1 to 5 ch (MWA1)	1
When using 6 to 10 ch (MWA2)	2

Refer to a separate operation manual for how to set the address of the AQ8201-61.
The address is set at "1" at default.

NOTE

Set the DIP switch after turning the power off.
The value of the DIP switch is read when the power is turned on.
Setting with the power on is disabled.

(4) Local mode

Refers to the state where this system is controlled by operation keys of the DISPLAY CONTROLLER and each module. In this state, all operation keys of the controller and each module are enabled.

(5) Remote mode
Refers to the state where this system is controlled by other controller via the GP-IB.
In this state, all operation keys except the local switch of the DISPLAY CONTROLLER are disabled.
In this mode, the LED lamp on the local switch remains on.

5.4.3 Interface Message

(1)LLO
This system assumes the LLO state after receiving the "LLO" universal command in the remote mode. In this state, all operation keys (including the local switch) are disabled. To release this state, release the REN (remote enable) and turn the power of the system again.

(2)DCL
Data in the I/O buffer is cleared after receiving this command.

(3)SDC
Data in the I/O buffer is cleared after receiving this command with the listener specified.

(4)GTL
This system returns to the local state after receiving this command with the listener specified.

(5)GET
Valid only for the AQ8201-61.
The AQ8201-61 is swept once after receiving this command.
This functions in the same way as the "SGL" program code of the AQ8201-61.

CAUTION

Handshaking may be stopped depending on controllers after a command, a program code or the like is executed immediately after executing a DCL command.

5.4.4 Common Command

(1)*ESR?
The contents of the event status register (ESR) can be read in the NRf format.
The contents are cleared after reading.

(2)*ESE(NRf)
Sets the event status enable register (ESR) in the NRf format.

(3)*ESE?
ESR query. Readable in the NRf format.

(4)*STB?
The contents of the status byte register can be read in the NRf format.

(5)*SRE(NRf)
Sets the service request enable register in the NRf format.

(6)*SRE?
The contents of the service request enable register can be read in the NRf format.

(7)*RST
Clears the contents of the all event registers summarized in the status bytes.
Also clears the data in the output queue.
Resets the settings of the main unit and each module to the default values.

(8)*IDN?
Reads the ID number.
ID number format:
ANDO-ELECTRIC, AQ8203, <serial No. (8 digits)>, <software version (8 digits)>

(9)*TST?
The self test is designed to test the GP-IB interface and output "0".

(10)*TRG
This command functions in the same way as the "GET" interface message.
The AQ8201-61 is swept once after receiving this command.

(11)*OPC
When all the reservation operations are completed, 0BIT of ESR is set.
When all reservation operation is completed, "1" (3BIT) is set in the output queue.

(12)*OPC?
Sets the information in 0 bit of the ESR in the output queue.
This does not depend on the enable conditions of *ESE.
At operation :"0" ,At completion: "1"

(13)*WAI
Stops execution of other command or query until retention is completed.
By executing *WAI, the command to be executed following *WAI is executed after operation by the following commands is completed.

- ･RESET (*RST): After RESET is completed.
- ･LW ,LUCWL*: After wavelength setting is completed.(AQ8201-13/13B)
- ･LUDSET: When wavelength proofreading setting is completed.(AQ8201-13/13B)
- ･LUCRST:At wavelength proofreading value completion of default of setting. (AQ8201-13/13B)
- ･LUCAL: When set mode change is completed.(AQ8201-13/13B)
- ･PZ:After zero set is completed.(AQ8201-21)
- ･AAV: After attenuation setting is completed.(AQ8201-31/32/33)
- ･RREF:When reference measurement is completed (AQ8201-71)

5.4.5 Control by Program Code

(1) Program code

Tables 5-8-1 to 5-8-10 show the program codes of this system.

Table 5-8-1 AQ8201A Program Codes

Program code	Setting contents	System operation	Request code
C** (*1)	1 to 3	Sets one of the modules mounted onto frame to be controlled.	C? Data format [C**]
CALL		Sets all modules mounted onto frame to be controlled.	C? Data format [CALL]
CLD		Sets all AQ8201-11/11A/11B/13 modules mounted onto frame to be controlled.	C? Data format [CLD]
CASE		Sets all AQ8201-12 mounted onto frame to be controlled.	C? Data format [CASE]
COPM		Sets all AQ8201-21 mounted onto frame to be controlled.	C? Data format [COPM]
CATTN CATTN1		Sets all AQ8201-31 mounted onto frame to be controlled.	C? Data format [CATTN/CATTN1]
CATTN2		Sets all AQ8201-32 mounted onto frame to be controlled.	C? Data format [CATTN2]
CATTN3		Sets all AQ8201-33 mounted onto frame to be controlled.	C? Data format [CATTN3]
CMWA1		Sets one of the AQ8201-61 mounted onto 1 to 5 channels to be controlled.	C? Data format [CMWA1]
CMWA2		Sets one of the AQ8201-61 mounted onto 6 to 10 channels to be controlled.	C? Data format [CMWA2]
CMWA0		Sets two of the AQ8201-61 mounted onto 1 to 10 channels to be controlled.	C? Data format [CMWA0]
CRLM		Sets all AQ8201-71 mounted onto frame to be controlled.	C? Data format [CRLM]
DATE****.**.**	yyyy/mm/dd	Sets the system internal date.	DATE? Data format [****.**.**]
TIME**.**.**	hh/mm/ss	Sets the system internal time (in 24 hour units).	TIME? Data format [**.**.**]
CMD/DELIM*	0、1	Sets the system delimiter. 0: CR + LF + EOI 1: EOI only	CMD/DELIM? Data format [CMD/DELIM*]

BATT?		Checks the main unit battery and writes the results in the output queue.	Data format [BATT*] 1:OK 0:LO
ERR?		Writes main unit error information in the output queue.	See Table 5-11 for the error code.
END? (*2)		Writes end status register information in the output queue in the NRf format.	Data format END(NRf) 0 to 65535
ENDMASK (NRf) (*2)		Sets the end status enable register in the NRf format.	ENDMASK? Data format ENDMASK (NRf)
MOD?		Displays the currently implemented module.	Refer to Table 5-10.

(*1) An error occurs if a channel with no module mounted is specified.
(*2) Refer to clause 5.4.6 for details.

Table 5-8-2 Program Codes Commom to All Modules
(It is necessary to specify the controlled module.)

Program code	Setting contents	System operation	Request code
RESET (excluding the AQ8201-03)		Resets the module settings to the default values. AQ8201-31/32 is returned to the home position.	
MBATT? (excluding the AQ8201-03/61)		Checks the module battery and writes the results in the output queue.	Data format [MBATT*] 1:OK 0:LO
MODEL? (excluding the AQ8201-03)		Fetches module information.	Refer to Table 5-10

Table 5-8-3 Program Codes Dedicated to AQ8201-03
(It is unnecessary to specify the controlled module.)

Program code	Setting contents	System operation	Request code
DBL*	0 , 1	Back light is set. 0:OFF 1:ON	DBL? Data format [DBL*]
DCH*	1 to 8 , M , S	The display setting is done. 1 to 8 : Single display (Channel No.) M : Multi display S : System menu display	DCH? Data format [DCH*]
DMODEL?		Fetches module information.	Refer to Table 5-10.
DRESET		Resets the module settings to the default values.	

Table 5-8-4 Program Codes Dedicated to AQ8201-11/11A/11B/13/13B
(It is necessary to specify the controlled module.)

Program code	Setting contents	System operation	Request code
LOPT*	0、1	Sets whether to turn light emission on or off. 0: Off 1: On	LOPT? Data format [LOPT*]
LATL**.**	0.0 to 10.0 Step: 0.01 (Unit: dB)	Sets the level attenuation.	LATL? Data format [LATL**.**]
LATLC		Sets the level attenuation at 0 dB.	
LEMO*	0、1	1: Turns the external modulation input on. 0: Turns the external modulation input off.	LEMO? Data format [LEMO*]
LIMO*	0 to 3	Sets the internal modulation mode. 0: CW (successive light) 1: 270 Hz (rectangular wave) 2: 1 kHz (rectangular wave) 3: 2 kHz (rectangular wave)	LIMO? Data format [LIMO*]
LIMOD***.*	0.1 to 300 Step: 0.1 (Unit: kHz)	Sets the internal modulation mode using numeric values.	LIMO? Data format [LIMOD***.*]
LW****.** *1)	Step: 0.01 (Unit: nm)	Sets the center wavelength. The settable range differs depending on products.	LW? Data format [LW****.**]
LF***.** *1)	Step: 0.01 (Unit: THz)	Sets the center wavelength in frequency units. The settable range differs depending on products.	LF? Data format [LF***.**]
LCOHR*	0、1	Sets whether to turn the coherence control on or off. 0: Off 1: On	LCOHR? Data format [LCOHR*]
LWMAX? LWMIN? *1)		Calls the maximum and minimum values of the settable wavelength and writes them in the output queue	Data format [LWMAX****.**] [LWMIN****.**] Unit: nm
LFMAX? LFMIN? *1)		Calls the maximum and minimum values of the settable frequency and writes them in the output queue.	Data format [LFMAX***.**] [LFMIN***.**] Unit: THz
LWC? *1)		Writes the default wavelength in the output queue.	Data format [LWC****.**]
LFC? *1)		Writes the default frequency in the output queue.	Data format [LFC***.**]
LUS*	0、1	Changes the wavelength setting unit. 0: nm 1: THz	LUS? Data format [LUS*] 0:nm 1:THz

LD? *1)		Writes LD information in the output queue in the specified data format.	Refer to Table 5-10.
LWLCAL***.**	-10.00 to +10.00 Step:0.01 [Unit:nm]	In this case, wavelength displayed includes the specified offset value.	LWLCAL? Data format [LWLCAL***.**]
LPLCAL***.**	-80.00 to +80.00 Step:0.01 [Unit:dB]	In this case, power displayed includes the specified offset value.	LPLCAL? Data format [LPLCAL***.**]
LPL *2)	Initial value to Initial value-10 dB Step:0.01 [Unit:dB]	The output light power is set.	LPL? Data format [LPL***.**]
LUCAL* (Only -13/13B) *3)	0,1	The wavelength proofreading is executed. 0:ON 1:OFF	LUCAL? Data format [LUCAL*]
LUCWL* (Only -13/13B) *3)	0,1	The wavelength of the proofread point is output. 0:A point 1:B point	LUCWL? Data format [LUCWL*]
LUCALD /****.***/****.*** A point B point (Only -13/13B) *3)		The proofreading wavelength of each point is set.	LUCALD? Data format [LUCALD/ ****.***/****.***]
LUDSET (Only -13/13B) *3)		The set proofreading wavelength of each point is written in the module.	
LUCRST (Only -13/13B) *3)		It becomes a default value when this is shipped.	
LMSTAT (Only -13/13B) *3)		The state of the stop/the movement of the motor is confirmed and the result is written in the output queue.	LMSTAT? Data format [LMSTAT*] 0: Motor stop 1: Motor operation
LUMAX? LUMIN? (Only -13/13B) *3)		The MAX/MI N-ary of the wave length which can be set when the wave length is proofread is called and the value is written in the output queue.	LUMAX? LUMIN? Data format [LUMAX***.**] [LUMIN***.**] Unit: dB

*1) The set value and the output value contain the value set by LWLCAL.
Moreover, the range of setting changes according to the LWLCAL value.
*2) The set value and the output value contain the value set by LPLCAL.
Moreover, the range of setting changes according to the LPLCAL value.
*3) It is effective only during the wave length proofreading execution.

NOTE

The settable ranges of LW and LF are between LWMAX and LWMIN or LFMAX and LFMIN respectively. The ranges are 1.6 nm min. including the user-specified wavelength.

Table 5-8-5 Program Codes Dedicated to AQ8201-12
(It is necessary to specify the controlled module.)

Program code	Setting contents	System operation	Request code
EOPT*	0,1	Turns on or off optical emission. 0:OFF 1:ON	EOPT? Data format [EOPT*]
EATL**. *	0.0 to 06.0 Step:0.1 [Unit:dB]	Sets up level attenuation.	EATL? Data format [EATL**. *]
EATLC		Clears level attenuation to 0 dB.	
ED?		Writes data from ASE to the output queue in the specified format.	Refer to Table 5-10.

Table 5-8-6 Program Codes Dedicated to AQ8201-21
(It is necessary to specify the controlled module.)

Program code	Setting contents	System operation	Request code
PW****.*	700 to 1700 Step: 0.1 [Unit: nm]	Selects the calibration wavelength.	PW? Data format [PW****.*]
PR*	A,C to L,Z	Selects the range. A: AUTO. C to L: +30 to -60 dBm [Step: 10]. Z: Holds the current range.	PR? Data format [PR*]
PMO*	0 to 4	Select an optical modulation mode. 0: CW 1: 0.27 kHz 2: 1kHz 3: 2kHz 4: Expansion CHOP.	PMO? Data format [PMO*]
PDR*	0,1	Selects a display difference. 1: Using the current power value as the reference, the OPM module displays its relative value. 0: Restores the original display	PDR? Data format [PDR*]
PH*	0 to 4	Selects the maximum/minimum value measurement. 0: OFF 1: MAX measurement 2: MIN measurement 3: DIF measurement 4: STOP	PH? Data format [PH*]
PA*	A to H	Select the averaging count. A: 1(OFF) B: 2 C: 5 D: 10 E: 20 F: 50 G: 100 H: 200	PA? Data format [PA*]

PZ*		Executes the sensor zero set.	
PF*	A,B	Changes the unit used. A: W display. B: dBm display.	PF? Data format [PF*]
POD? *)		Requests output of measured data in the specified output format.	Refer to Table 5-10.
PFR? *)		Requests output of reference value in the specified output format.	Refer to Table 5-10.
PHD/MAX? PHD/MIN? PHD/DIF? *)		Requests output of maximum value, minimum value or difference between them in the specified output format.	Refer to Table 5-10.
PCAL***.***	-80.000 to +80.000 Step:0.001 [Unit:dB]	Adds the specified offset value to the currently displayed power.	PCAL? Data format [PCAL***.***]

*) The output value contains the value set by PCAL.

Table 5-8-7 Program Codes Dedicated to AQ8201-31/32/33
(It is necessary to specify the controlled module.)

Program code	Setting contents	System operation	Request code
AAV**.*** AAV**.***	0.00 to 60.00 Step: -31 : 0.05 -32 : 0.01 -33:0.001 (Unit: dB)	Sets the attenuation.	AAV? Data format [AAV**.***] [AAV**.***]
AW****	-31,-32: 1200 to 1600 -33:1480 to 1650 Step: 1 (Unit: nm)	Sets the wavelength.	AW? Data format [AW****]
ASHTR*	0、1	Opens or closes the shutter.	ASHTR? Data format [ASHTR*] 0: Close 1: Open
AMSTAT?		Checks whether the motor stops or operates and writes the results in the output queue.	Data format [AMSTAT*] 0: Motor stops 1: Motor operates
AD? *)		Writes Attn information in the output queue in the specified data format.	Refer to Table 5-10.
ACAL***.***	-80.00 to +80.00 Step -31 : 0.05 -32 : 0.01 -33:0.001 [Unit:dB]	Adds the specified offset value to the attenuation currently displayed.	ACAL? Data format [ACAL***.***]

*) The set value and the output value contain the value set by ACAL.
Moreover, the range of setting changes according to the ACAL value.

Table 5-8-8 AQ8201-61 Program Codes

Control command	Description	Talker command	Talker output data format
CTRWL****.**	Center wavelength setting (unit: nm) ****.**: 1200.00 to 1700.00 (0.01 step)	CTRWL?	1200.00 to 1700.00
CTRF***.***	Sets the center frequency (unit: THz). ***.***:176.500 to 249.820 (0.001 step)	CTRF?	176.500 to 249.820
STAWL****.**	Sets the measurement start wavelength (unit: nm). ****.**: 950.00 to 1700.00 (0.01 step)	STAWL?	950.00 to 1700.00
STAF***.***	Sets the measurement start frequency (unit: THz). ***.***:153.673 to 249.948 (0.001 step)	STAF?	153.673 to 249.948
STPWL****.**	Sets the measurement finish wavelength (unit: nm). ****.**: 1200.00 to 1950.00 (0.01 step)	STPWL?	1200.00 to 1950.00
STPF****.***	Sets the measurement finish frequency (unit: THz). ***.***:176.500 to 286.570 (0.001 step)	STPF?	176.500 to 286.570
CTR=P	Sets the peak of the waveform to the center wavelength.	None	
SPAN****.*	Sets the span (unit: nm) ****.*: 0, 1.0 to 500.0 (0.1 step)	SPAN?	0,1.0 to 500.0
SPANF**.**	Sets the span (unit: THz) **.**: 0, 1.00 to 73.50(0.01 step)	SPANF?	0,1.00 to 73.50
SPN=W	Sets the span according to the spectral band width.	None	
XUNT*	Sets the x-axis unit. *: 0: Wavelength mode 1: Frequency mode	XUNT?	Output Wavelength mode 0 Frequency mode 1
REFL***.*	Sets the reference level (with log scale). (unit: dBm) ***.*: -90.0 to 20.0 (0.1 step)	REFL?	-90.0 to 20.0
REFLP*.**	Sets the reference level (with linear scale). (unit: pW) *.**: 1.00 to 9.99 (0.01 step) 10.0 to 99.9 (0.1 step) 100 to 999 (1 step)		PW1.00 to 999
REFLN*.**	Sets the reference level (with linear scale). (unit: nW) *.**: 1.00 to 9.99 (0.01 step) 10.0 to 99.9 (0.1 step) 100 to 999 (1 step)		NW1.00 to 999

Control command	Description	Talker command	Talker output data format
REFLU*.**	Sets the reference level (with linear scale). (unit: uW) *.**: 1.00 to 9.99 (0.01 step) 10.0 to 99.9 (0.1 step) 100 to 999 (1 step)		UW1.00 to 999
REFLM*.**	Sets the reference level (with linear scale). (unit: mW) *.**: 1.00 to 9.99 (0.01 step) 10.0 to 100.0 (0.1 step)		MW1.00 to 100.0
LSCL**.*	Sets the level axis scale. **.*: 0.1 to 10.0 (0.1 step, unit: dB/DIV) Or, LIN. LIN (linear scale)	LSCL?	"0" is output when the scale is 0.1 to 10.0 or LIN.
REF=P	Sets the peak to the reference level.	None	
LSUNT*	Switches the level axis scale display between dBm (W) and dBm/nm(W/nm). * = 0: dBm (W) 1: dBm/nm (W/nm)	LSUNT?	Output dBm(W) 0 dBm/nm(W/nm) 1
SLOG**.*	Sets the sub-scale (with log scale). **.*: 0.1 to 10.0 (0.1 step)	SLOG?	0.1 to 10.0
SPS***.*	Sets the sub-scale to %/D. ***.*: 0.1 to 125.0 (0.1 step)	SPC?	0.1 to 125.0
LOFST***.*	Sets the scale offset level (unit: dB). ***.*: -99.9 to 99.9 (0.1 step)	LOFST?	-99.9 to 99.9
SMINP****.*	Sets the minimum scale value for % sub-scale. ***.*: 0 to(/DIV) x 10(0.1 step)	SMINP?	0 to 1250.0
STP	Stops sweep.	SWEEP?	Outputs the measurement state. State output STOP 0 SINGLE 1 REPEAT 2 AUTO 3
SGL	Starts single sweep.		
RPT	Starts repetitive sweep.		
AUTO	Starts automatic sweep.		
LTSWP	Executes long-term measurement.	None	
LTINTVL ****	Sets the interval of long-term measurement. ****: 1 to 1000 min	LTINTVL?	0 to 1000
LTTIME ****	Sets the times of long-term measurement. ****: 1 to 1000	LTTIME?	0 to 1000
RESLN*.*	Sets the resolution (unit: nm). *.*: 0, 0.2, 0.5, 1 (0: Max.)	RESLN?	0,0.2,0.5,1.0
RESLNF***	Sets the resolution (unit: GHz) ***: 0, 20, 50, 100 (0: Max.)	RESLNF?	0,20,50,100

Control command	Description	Talker command	Talker output data format
SNHD	Sets the measurement sensitivity.	SENS?	Outputs the measurement sensitivity. Sensitivity Output SENS HIGH1 1 SENS HIGH2 2 SENS HIGH3 3 SENS NORM RANG HOLD 4 SENS NORM RANG AUTO 5
SNAT			
SHI1			
SHI2			
SHI3			
SMPL*****	Sets the times of measurement sampling. *****: 11 to 20001 (1 step), 0 (auto)	SMPL?	11 to 20001,0
AVG****	Sets the times of measurement averaging. ****: 1 to 1000 (1 step)	AVG?	1 to 1000
LPF*	Measures chopped light using a low-pass filter. * = 0: Off 1: On	LPF?	Output OFF 0 ON 1
EXEC*	Executes the specified program. * = 1 to 5: Program number	EXEC?	Output During execution 1 During stoppage 0
PREXT	Stops the program.	None	
PMSTP	Stops the power monitor function.	PMST?	Output STOP 0 SINGLE 1 REPEAT 2
PMSGL	Sets single measurement.		
PMRPT	Sets repetitive measurement.		
AREA***	Sets the measured wavelength range to the preset area or the specified channel. * = 0: Preset area 1 to 100: Channel	AREA?	0:PRESET AREA 1 to 100:CHANNEL
FIXA	Sets the data fixing mode of trace A.	TRA?	Output WRITE 0 FIX 1 MAX HLD 2 ROL AVG 3+number of AVG times
WRTA	Sets the write mode of trace A.		
MAXA	Sets the maximum value detection mode of trace A.		
RAVA	Sets the successive addition mode of trace A.		
DSPA	Displays or blanks trace A.	DSPA?	Output BLANK 0 DISP 1
BLKA			
ACTV*	Selects the active trace. * = 0: Trace A 1: Trace B 2: Trace C	ACTV?	Output Trace A 0 Trace B 1 Trace C 2

Control command	Description	Talker command	Talker output data format
FIXB	Sets the data fixing mode of trace B.	TRB?	Output WRITE 0 FIX 1 MIN HLD 2 ROL AVG 3+number of AVG times
WRTB	Sets the write mode of trace B.		
MINB	Sets the minimum value detection mode of trace B.		
RAVB	Sets the successive addition mode of trace B.		
DSPB	Displays or blanks trace B.	DSPB?	Output BLANK 0 DISP 1
BLKB			
FIXC	Sets the data fixing mode of trace C.	TRC?	Output WRITE 0 FIX 1 A-B 2 B-A 3
WRTC	Sets the write mode of trace C.		
A-BC	Subtracts trace B from trace A and copies the result to trace C (logarithmic calculation).		
B-AC	Subtracts trace A from trace B and copies the result to trace C (logarithmic calculation).		
DSPC	Displays or blanks trace C.	DSPC?	Output BLANK 0 DISP 1
BLKC			
B=A	Copies trace A to trace B.	None	
C=A	Copies trace A to trace C.	None	
CLR A	Clears trace A.	None	
A=B	Copies trace B to trace A.	None	
C=B	Copies trace B to trace C.	None	
CLR B	Clears trace B.	None	
A=C	Copies trace C to trace A.	None	
B=C	Copies trace C to trace B.	None	
CLR C	Clears trace C.	None	
WDMAN	Analyzes WDM.	None	
WDMABS	Displays the absolute value of WDM LIST.	None	
WDMREL	Displays the relative value of WDM LIST.	None	
WDMOS*	elects the item to display in the WDM list. * = 0: Offset 1: Spacing	WDMOS?	Output OFFSET 0 SPACING 1

Control command	Description	Talker command	Talker output data format
WDMRW****.* *	Sets the channel peak closest to the set wavelength as the reference (unit: nm). ****.**: 1200.00 to 1700.00 (0.01 step)	WDMRW?	1200.00 to 1700.00
WDMRN***	Sets the channel peak of the set number as the reference. ***: 1 to 100 (1 step)	WDMRN?	1 to 100
WDMREFSET	Sets the latest WDM analysis results as the reference data.	None	
WDMREFINI	Sets the preset value as the reference data.	None	
PKSR	Detects the peak level.	None	
NSRR	Selects the peak level (or bottom level) on the right of the move marker.	None	
NSRL	Selects the peak level (or bottom level) on the left of the move marker.	None	
SW*	Measures the spectral band width. *=0:ENVELOPE 1:THRESH 2:RMS 3:PEAK RMS 4:NOTCH	SW?	Output ENVELOPE 0 THRESH 1 RMS 2 PEAK RMS 3 NOTCH 4
SWTHR**.*	Sets spectral band width measurement using the threshold method. **.*: 0.01 to 50.00 dB (0.01 step)		
MODFT*	When measuring the spectral band width using the threshold method (power = 1): * = 0: Sets the marker at the mode peak. 1: Sets the marker at the position corresponding to the threshold level.	MODFT?	0: Sets the marker at the mode peak 1: Sets the marker at the position corresponding to the threshold level.
THRTH**.**	Sets the threshold value for spectral band width search using the threshold method (unit: dB). **.**: 0.01 to 50.00 (0.01 step)	THRTH?	0.01 to 50.00

Control command	Description	Talker command	Talker output data format
SWRMS**.*	Sets spectral band width measurement using the RMS method. **.*: 0.01 to 50.00 dB (0.1 step)		
RMSTH**.**	Sets the spectral band width search threshold value using the RMS method (unit: dB). **.**: 0.01 to 50.00 (0.01 step)	RMSTH?	0.01 to 50.00
SWPRM**.*	Sets spectral band width measurement using the PK RMS method. **.*: 0.01 to 50.00 dB (0.01 step)		
PRMTH**.**	Sets the spectral band width search threshold value using the PK RMS method (unit: dB). **.**: 0.01 to 50.00 (0.01 step)	PRMTH?	0.01 to 50.00
L3DBM****.** (LOG SCALE)	Sets line maker 3 (unit:dBm) ****.****:-170.00 to 40.00	L3MK?	Outputs the level at line maker 3.
L3LN*.***E ±** (LIN SCALE)	Sets line maker 3 *.***E ±**:0 to 1.000E+02		
L4DBM****.** (LOG SCALE)	Sets line maker 4 (unit:dBm) ****.****:-170.00 to 40.00	L4MK?	Outputs the level at line maker 4.
L4LN*.***E ±** (LIN SCALE)	Sets line maker 4 *.***E ±**:0 to 1.000E+02		
LMKCL	Clears the line marker and its value.	None	
SWPM*	Turns inter-marker sweep on or off. * = 1: On 0: Off	SWPM?	Output ON 1 OFF 0
LTWL	Displays the wavelength list of all channels.	None	
LTL	Displays the level list of all channels.	None	
LTSNR	Displays the SNR list of all channels.	one	
LTCH***	Displays the specified single channel. ***: 1 to 100	LTCH?	1 to 100
LTABS	Displays the wavelength, the level, the noise and the SNR with absolute values.	None	

Control command	Description	Talker command	Talker output data format
LTREL	Displays the wavelength, the level, the noise and the SNR with values relative to the reference data.	None	
LTREFSET	Sets the latest WDM analysis results as the reference data.	None	
LTREFINI	Sets the preset value as the reference data.	None	
LTCLR	Clears data.	None	
LTCHCUR***	Sets a channel for long-term measurement. ***: 1 to 100 (channel)	None	
LTTMCUR***	Sets a data point for long-term measurement ***: 1 to 1000 (data point)	None	
LBL '***...***'	Sets the label input mode. ***...***: Character string (50 max.)	LBL?	Displayed character string
WCALS*	Calibrates the wavelength using the internal optical source. * = 1: On 0: Off	None	
WCAL****.***	Calibrates the absolute wavelength value (unit: nm). ****.***: 1200.00 to 1700.00 (0.01 step)	WCAL?	1200.00 to 1700.00
WLSFT**.**	Sets the wavelength shift amount(unit: nm). **.**: -5.00 to 5.00 (0.01 step)	WLSFT?	-5.00 to 5.00
LVSFT***.**	Sets the level shift amount (unit: dB). ***.**: -30.00 to 30.00 (0.01 step)	LVSFT?	-30.00 to 30.00
WCALT****/±%.%%%	Sets the wavelength CAL table (unit: nm). ****: Table wavelength (1200 to 1600, 1 step) %.%%%: Compensation value (-0.200 to 0.200, 0.001 step)	WCALT?****	The compensation value (-0.200 to 0.200) is output by executing the command after specifying the wavelength in "****".
LCALT****/±%.%%%	Sets the level CAL table (unit: dB). ****: Table wavelength (1200 to 1600, 1 step) %.%%%: Compensation value (-1.000 to 1.000, 0.001 step)	LCALT?****	The compensation value (-1.000 to 1.000) is output by executing the command after specifying the wavelength in "****".

Control command	Description	Talker command	Talker output data format
WDMMAX***	Sets the maximum number of channel peaks. ***: 1 to 100 (1 step)	WDMMAX?	1 to 100
DUTCH***/ %%%.%%%	Sets the number of WDM analyzing channels and the wavelength edit. ***: 1 to 100 (1 step) %%%.%%%: 1200.000 to 1700.000 nm (0.001 step)	DUTCH? ***	Outputs the wavelength of the specified channel by specifying the number of channels and executing the command. 1200.00 to 1700.000
DUTLEV***.**	Presets the level value. -90.00 to 20.00 dBm (0.01 step)	DUTLEV?	-90.00 to 20.00
DUTSNR**.**	Presets the SNR value. 0 to 50.00 dB (0.01 step)	DUTSNR?	0 to 50.00
WDMCHAUT*	Selects whether to give channel numbers to mode peaks by referring to the preset wavelength or automatically numbering them from the left. * = 0: Preset 1: Auto	WDM CHAUT?	Output PRESET 0 AUTO 1
WDMDIF**.**	Sets the minimum difference between the maximum and minimum values when detecting a channel peak (unit: dB). **.**: 0.01 to 50.00 (0.01 step)	WDMDIF?	0.01 to 50.00
WDMTH**.**	Sets the channel peak threshold value (unit: dB). **.**: 0 to 50.00 (0.01 step)	WDMTH?	0 to 50.00
WDMNOI*	Selects whether to set the noise measuring point to the mode center or the fixed point. * = 0: Fixed 1: Center	WDMNOI?	Output FIXED 0 CENTER 1
WDMNOIP**.**	Sets the noise measuring point. **.** = 0 to 10.00 nm (0.01 step)	WDM NOIP?	0 to 10.00
LTWLLIM**.**	Sets the wavelength drift limit. **.** = 0 to 99.99 nm (0.01 step)	LTWLLIM?	0 to 99.99
LTLLOW***.**	Sets the lower level limit. ***.** = -90.00 to 20.00 dBm (0.01 step)	LTLLOW?	-90.00 to 20.00
LTLHI***.**	Sets the upper level limit. ***.** = -90.00 to 20.00 dBm (0.01step)	LTLHI?	-90.00 to 20.00

Control command	Description	Talker command	Talker output data format
OFIN***.**	Sets the signal light offset (unit: dB). ***.**: -99.99 to 99.99 (0.01 step)	OFIN?	-99.99 to 99.99
OFOUT***.**	Sets the output light offset (unit: dB). ***.**: -99.99 to 99.99 (0.01 step)	OFOUT?	-99.99 to 99.99
PMCTRWL****.**	Presets the center wavelength value. 1200.00 to 1700.00 nm (0.01 step)	PMCTR WL?	1200.00 to 1700.00
PMSPN***.*	Presets the sweep width. 1.0 to 500.0 nm (0.1 step)	PMSPN?	1.0 to 500.0
PMBW***.*	Sets the sweep width of each channel. 0.1 to 100.0 nm (0.1 step)	PMBW?	0.1 to 100.0
THRK**.**	Sets the spectral band width search power using the threshold method. **.**: 0.01 to 50.00 (0.01 step)	THRK?	0.01 to 50.00
RMSK**.**	Sets the spectral band width search power. **.**: 0.01 to 50.00 (0.01 step)	RMSK?	0.01 to 50.00
PRMK**.**	Sets the spectral band width search power. **.**: 0.01 to 50.00 (0.01 step)	PRMK?	0.01 to 50.00
ENVK**.**	Sets the spectral band width search power using the envelope method. **.**: 0.01 to 50.00 (0.01 step)	ENVK?	0.01 to 50.00
ENVT2**.**	Sets the spectral band width search threshold value using the envelope method (unit: dB). **.**: 0.01 to 50.00 (0.01 step)	ENVT2?	0.01 to 50.00
NCHK**.**	Sets the notch width measurement power. **.**: 0.01 to 50.00 (0.01step)	NCHK?	0.01 to 50.00
POFS***.**	Sets the inter-marker power measurement compensation value(unit: dB). ***.**: -10.00 to 10.00 (0.01step)	POFS?	-10.00 to 10.00
SSMSR**.**	Sets the mask area. 0 to 99.99 nm (0.01 step)	SSMSR?	0 to 99.99
MODIF**.**	Sets the level difference for mode judgement (unit: dB). **.**: 0 to 50.00 (0.01 step)	MODIF?	0 to 50.00
RAVG***	Sets the times of roll averaging. ***: 2 to 1000 (1 step)	RAVG?	2 to 100

Control command	Description	Talker command	Talker output data format
HMODE*	Selects either "Center & Span" or"Start & Stop". * = 0: Center & Span 1: Start & Stop	HMODE?	Output CENTER&SPAN 0 START&STOP 1
FIG*	Sets the decimal place of the displayed dB value. * = 0: To the third decimal place 1: To the second decimal place 2: To the first decimal place	FIGR	Outputs the decimal place setting of the displayed dB value. Output To the third decimal place 0 To the second decimal place 1 To the first decimal place 2
DTE*	Selects whether to display the date or not and its format. * = 0: No display 1: MM.DD.YYYY 2: DD.MM.YYYY 3: YYYY.MM.DD	DTER	Outputs the date display setting. Output No display 0 MM.DD.YYYY 1 DD.MM .YYYY 2 YYYY.MM.DD 3
LD*	Selects whether to display the label or not. * = 0: No label display 1:Label display	LDR	Outputs the label display setting. Output No label display 0 Label display 1
GD*	Selects whether to display the grid or not. * = 0: No grid display 1: Grid display	GDR	Outputs the grid display setting. Output No grid display 0 Grid display 1
BEEP*	Selects whether to beep or not. *= 0: No beep 1: Beep	BEEPR	Outputs the beep setting. Output No beep 0 Beep 1
INIT	Initializes data excluding program or memory	None	

Control command	Description	Talker command	Talker output data format
HD*	Adds the header to the talker data for the output request command. *=1:When ON 0:When OFF The default is OFF	HD?	Output ON 1 OFF 0
LDATA R*****-R*****	Trace A level data *****: 1 to 20001 R1-R20001 when the underlined part is omitted.		Refer to Table 5-8-9 Output Data Format.
LDATB R*****-R*****	Trace B level data *****: 1 to 20001 R1-R20001 when the underlined part is omitted.		
LDATC R*****-R*****	Trace C level data *****: 1 to 20001 R1-R20001 when the underlined part is omitted.		
WDATA R*****-R*****	Trace A wavelength data *****: 1 to 20001 R1-R20001 when the underlined part is omitted.		
WDATB R*****-R*****	Trace B wavelength data *****: 1 to 20001 R1-R20001 when the underlined part is omitted.		
WDATC R*****-R*****	Trace C wavelength data *****: 1 to 20001 R1-R20001 when the underlined part is omitted.		
LDTDIG*	Specifies the decimal place to be displayed when level data (log) is output via the GP-IB. * = 2:To the second decimal place, immediately after turning the power on 3:To the third decimal place	LDTDIG?	Output To the second decimal place 2 To the third decimal place 3

* For LDATA and WDATA, restrain the number to 20 per time.

For example, acquire 20000 pieces of data by separately acquiring them in 20 × 1000 times.

Control command	Description	Talker command	Talker output data format
None	Requests the move marker value.	MKR?	Refer to Table 5-8-9 Output Data Format.
None	Requests the marker value output. ***: 1 to 100	MKR***?	
None	Requests the value of fixed ▽ marker 1.	MKR?1	
None	Requests the value of fixed ▽ marker 2.	MKR?2	
None	Requests the value (wavelength) of line marker 1.	L1MK?	
None	Requests the value (wavelength) of line marker 2.	L2MK?	
None	Requests the value (level) of line marker 3.	L3MK?	
None	Requests the value (level) of line marker 4.	L4MK?	
None	Requests the analysis results.	ANA?	
None	Requests data using the power monitor function.	PMTR?	
None	Requests the last warning error number.	WARN?	

Table 5-8-9 AQ8201-61 output data format

<table>
<tr><th>Talker command</th><th colspan="3">Talker output data format</th></tr>
<tr><td>LDATA
R****-R****
LDATB
R****-R****
LDATC
R****-R****
****:1 to 20001</td><td colspan="3">Continued at number of the data
※(SD) String delimiter
(Header)*****(SD)±***.**(SD)・・・・±***.**(BD) (BD) plotter delimiter
#:Space
Number of the data (1 to 20001)
Data (+210.00 to -210.00)
(Header) "DBM"in case of absolute value
"DB#"in case of relative value</td></tr>
<tr><td>LDATA
R****-R****
LDATB
R****-R****
LDATC
R****-R****
****:1 to 20001</td><td colspan="3">Continued at number of the data
※(SD) String delimiter
(Header)*****(SD)*.***E ±**(SD)・・・・*.***E ±**(BD) (BD) Plotter delimiter
#:Space
Number of the data (1 to 20001)
Data (1.000E+21 to 1.000E-21)
(Header) "LNW"in case of absolute value
"LN#"in case of relative value</td></tr>
<tr><td>WDATA
R****-R****
WDATB
R****-R****
WDATC
R****-R****
****:1 to 20001</td><td colspan="3">Continued at number of the data
※(SD) String delimiter
NM*****(SD)****.***(SD)・・・・****.***(BD) (BD) Plotter delimiter
Number of the data (1 to 20001)
Data (1.000E to 1.000E-21)</td></tr>
<tr><td rowspan="2">MKR?
MKR?1
MKR?2</td><td colspan="2">(For the wavelength and the LOG scale)
WMKR##****.***(SD)±**.**(BD)
WMKR1#***.***(SD)±**.**(BD)
WMKR2#***.***(SD)±**.**(BD)
Wavelength (nm) Level (dBm or dB)
#:Space</td><td>(For the wavelength and the LIN scale)
WMKR##****.***(SD)*.***E ±*(BD)
WMKR1#***.***(SD)*.***E ±*(BD)
WMKR2#***.***(SD)*.***E ±*(BD)
Wavelength (nm) Level (W or No unit)
#:Space</td></tr>
<tr><td colspan="2">(For the frequency and the LOG scale)
FMKR##***.***(SD)±**.**(BD)
FMKR1#**.***(SD)±**.**(BD)
FMKR2#**.***(SD)±**.**(BD)
Frequency (THz) Level (dBm or dB)
#:Space</td><td>(For the frequency and the LIN scale)
FMKR##***.***(SD)*.***E ±*(BD)
FMKR1#**.***(SD)*.***E ±*(BD)
FMKR2#**.***(SD)*.***E ±*(BD)
Frequency (THz) Level (W or No unit)
#:Space</td></tr>
<tr><td>L1MK?
L2MK?</td><td colspan="2">(For the wavelength)
LMKR1#***.***(BD)
LMKR2#***.***(BD)
Wavelength (nm)</td><td>(For the frequency)
LFMK1#**.***(BD)
LFMK2#**.***(BD)
Frequency (THz)</td></tr>
<tr><td>L3MK?
L4MK?</td><td>(LOG SCALE)
L3DBM****.**(BD)
L4DBM****.**(BD)
Level(dBm)</td><td>(SUBLOG SCALE)
L3DB****.**(BD)
L4DB****.**(BD)
Level(dB)</td><td>(LIN SCALE)
L3LN*.***E ±**(BD)
L4LN*.***E ±**(BD)
Level</td></tr>
</table>

*The underlined part of Talker output data format can be output to the third place of the decimal point by using "LDTDIG3".
Table 5-8-9 AQ8201-61 output data format

<table>
<tr><th>Talker command</th><th colspan="2">Talker output data format</th></tr>
<tr><td rowspan="5">ANA?</td><td colspan="2">(SPECTRAL WIDTH)
[When marker is wavelength display]
(Header)#***.**(SD)****.***(SD)***(BD)
Center wavelength Spectrum width Number of modes
(nm) (nm)
[When marker is frequency display]
(Header)#**.***(SD)***.***(SD)***(BD)
Center wavelength Spectrum width Number of modes
(THz) (THz)
(Header):ENV → "SWEN"
THRESH → "SWTH"
RMS → "SWRM"
PK RMS → "SWPR"</td></tr>
<tr><td>(For the POWER LOG scale)
PDBM#±***.**(BD)
POWER
(dBm)</td><td>(For the POWER LIN scale)
PLNW#*.***E ±**(BD)
POWER
(W)</td></tr>
<tr><td colspan="2">(EDFA NF)
EDNF#***.**(SD)****.***(SD)±**.**(SD)***.**(BD)
Gain Resolution ASE power NF
(dB) (nm) (dBm) (dB)</td></tr>
<tr><td colspan="2">(WDM)
[When marker is wavelength display]
WDM***(SD)***.***(SD)***.**(SD)***.**(SD)·····(BD)
Number of modes Peak wavelength Peak level SNR Clause 2-4 repetition
(nm) (dBm) (dB)
[When marker is frequency display]
WDM***(SD)***.***(SD)***.**(SD)***.**(SD)·····(BD)
Number of modes Peak frequency Peak level SNR Clause 2-4 repetition
(THz) (dBm) (dB)</td></tr>
<tr><td colspan="2">(NOTCH)
[When marker is wavelength display]
SWNC****.***(SD)****.***(BD)
Center wavelength Notch width
(nm) (nm)
[When marker is frequency display]
SWNC***.***(SD)***.***(BD)
Center wavelength Notch width
(THz) (THz)</td></tr>
<tr><td colspan="2">(SMSR)
SMSR·**.**(SD)***.**(SD)****.**(SD)***.**(SD)****.**(SD)***.**(BD)
Peak wavelength Peak level 2nd peak wavelength 2nd peak wavelength Peak-2nd wavelength SMSR
(nm) (dBm) (nm) (dBm) (nm) (dB)</td></tr>
</table>

*The underlined part of Talker output data format can be output to the third place of the decimal point by using "LDTDIG3".

Talker command	Talker output data format
	(PMD) PMD#****.****(SD)****.****(SD)*****.***(BD) Left side mode peak (THz) Right side mode peak (THz) PMD(ps)
LTST?	LTST ***(SD)****(SD)****(BD) Number of channel Number of repeat Repeat time interval
LTDAT?****	****:Data No.(1 to 1000) LTDAT***(SD)****.***(SD)±***.**(SD)***.**(SD)...(BD) Number of channel Peak wavelength(nm) Peak level(dBm) SNR(dB)
PMTR?	(Absolute LOG scale) PMDBM#**.**(BD) Power (dBm) ・A numeric part is replaced with"OVR"at"OVER" ・A numeric part is replaced with"UND"at"UNDER"
MODEL?	AQ8201-61(SD)********(SD)HOST**.**(SD)SUB**.**(BD) Instrument name Serial No. Main Sub soft version
WARN?	WARN#*(BD) Number

*The underlined part of Talker output data format can be output to the third place of the decimal point by using "LDTDIG3".

Table 5-8-10 ProgramCodesDedicatedto AQ8201-71
(Moduleto becontrolledisrequired tobespecified)

Program code	Settingcontents	System operation	Requestcode
RW****	1280to1620 Step: 1 (Unit: nm)	Sets the wavelength.	RW? Data format [RW****]
RDR*	0,1	Selects a displaydifference. 1:Using the current power value as thereference, the return lossdisplays its relativevalue. 0:Restores theoriginal display.	RDR? Data format [PDR*]
RH*	0 to 4	Selects the maximum/minimum valuemeasurement. 0:OFF 1:MAX measurement 2:MIN measurement 3:DIF measurement 4:STOP	RH? Data format [RH*]
RA*	A to H	Selects the averaging count. A:1(OFF) B:2 C:5 D:10 E:20 F:50 G:100 H:200	RA? Data format [RA*]
RFL?	A,B	Selectsreflectionreference. A:Fresnelreflectionreference B:Total reflectionreference	RFL? Data format [RFL*]
RREF		Measuresreference reflections.	
RREF?	0 to 2	Checks measurement of reference reflections. 2:Beingmeasured 1:Alreadymeasured 0:Notmeasuredyet	Data format [RREF*]
RD?		Requestsoutputofmeasured datainthespecifiedoutput format.	Refer to Table 5-10.
RHD/MAX? RHD/MAX? RHD/DIF?		Requestsoutputofmeasured datainthespecifiedoutput format.	Refer to Table 5-10.

(2) Default values for control via GP-IB

This section explains the default values of this system and each module.
The system or module is reset to the default value by executing the *RST or RESET command or turning the power on again.
For the MWA MODULE, refer to the separate operation manual.

Table 5-9-1 AQ8201A Default Values

Program code	Default value
*ESE	0 (full mask)
*SRE	0 (full mask)
ENDMASK	65535 (open)
CMD/DELIM	0 (CR,LF,EOI)
C	All (all channels specified)

Since the settings of *ESE and *SRE are backed up inside the system, they are not reset to the default values by turning the power on again.

Table 5-9-2 AQ8201-03 Default Values

Program code	Default value	
DBL	1	(ON)
DCH	M	(Multi Display)

Table 5-9-3 AQ8201-11/11A/11B/13/13B Default Values

Program code	Default value	
LOPT	0	(OFF)
LATL	0	(0.00dB)
LEMO	0	(OFF)
LIMO	0	(CW)
LW、LF	Values of LWC or LFC	
LCOHR	0	(OFF)
LWLCAL	0	(+0.00nm)
LPLCAL	0	(+0.00dB)
LUCAL	0	(OFF)
LUCWL	0	(A point)
LUCALD	1520.000/1570.000	

Since the settings other than LOPT are backed up inside the system, they are not reset to the default values by turning the power on again.

Table 5-9-4 AQ8201-12 DefaultValues

Programcode	Defaultvalue	
EOPT	0	(OFF)
EATL	0	(0.0 dB)

SincethesettingsotherthanEOPTarebackedupinsidethesystem, they are notresettothedefaultvalues by turning the power on again.

Table 5-9-5 AQ8201-21 DefaultValues

Programcode	Defaultvalue	
PW	1310	(1310nm)
PR	A	(AUTO)
PMO	0	(CW)
PDR	0	(OFF)
PH	0	(OFF)
PA	A	(OFF)
PCAL	0	(+0.000 nm)

SincethesettingsotherthanPDRandPHarebackedupinside thesystem, they are notresettothedefaultvaluesbyturningthepoweronagain.

Table 5-9-6 AQ8201-31/32/33DefaultValues

Programcode	Defaultvalue	
AAV	0	(0.000dB)
AW	1550	(1550nm)
ASHTR	0	(DISABLE)
ACAL	0	(+0.000dB)

SincethesettingsotherthanASHTRarebackedupinside thesystem, they are notresettothedefaultvaluesbyturningthepoweronagain.

Table 5-9-7 AQ8201-71 DefaultValues

Programcode	Defaultvalue	
RW	1550	(1550 nm)
RDR	0	(OFF)
RH	0	(OFF)
RA	A	(OFF)
RFL	A	(+14.70dB)
RREF	0	(None)

SincethesettingsotherthanRDR,RHandRREFarebackedupinside thesystem, they are notresettothedefaultvaluesbyturningthepoweronagain.

(3) Data format

Table 5-10 shows the data format.

Table 5-10 Data format.

Command	Output data format
*IDN?	ANDO-ELECTRIC,AQ8201A,serial No.,Host,Subsoftware version
MODEL? DMODEL?	[AQ8201-**/serial No./software version/option No.]
MOD?	[AQ8201-**,AQ8201-**,.....]
LD?	[LD**◇○○. ○○□□□□. □□] **:Channel No.(01 to10) ◇:Status (0:LD_OFF,1:LD_ON) ○○. ○○:Set optical attenuation □□□□. □□:Set wavelength (The output value includes the value set by LWLCAL)
ED?	[ED**◇○○. ○] **:Channel No.(01 to09) ◇:Status (0:LD_OFF,1:LD_ON) ○○. ○:Set optical attenuation
POD? PFR? PHD/MAX? PHD/MIN? PHD/DIF?	[@@@**◇△○◎□□□□□□□□] @@@:Header **:Channel No.(01 to10) ◇:Status Z:Zeroset,I:Inrange,U:Underrange,O:Overrange, R:During the switch of frange,A:Averaging △:Function information 1:Measurement data,3:Maxvalue,4:Minvalue, 5:Max-Min value, A:Display difference value,C:Reference value ○:Unit L:GW,M:MW,N:KW,O:W,P:mW,Q:μ W,R:nW,S:pW,T:fW,Z:aW,U:dBm,V:dB W:No unit ◎:Range information CtoL:+30 to -60dBm □□□□□□□□:Data Eight digits with sign(Decimal data) (The output value includes the value set by PCAL)
AD?	[AD**◇○□□□□△△. △△△] **:Channel No.(01 to10) ◇:Motor status (0:Stopped,1:Operating) ○:Shutter status (0:Off,1:On) □□□□:Set wavelength △△. △△△:Set attenuation (The output value includes the value set by PCAL)
RD? RHD/MAX? RHD/MIN? RHD/DIF?	[@@@**◇○△□□□□□□□□] @@@:Header **:Channel No.(0 to10) ◇:Status F:Measuring reference reflection,R:Measruing return loss, A:Averaging,N:Before measuring ○:Function information 1:Measurement data,3:Maxvalue,4:Minvalue, 5:Max-Minvalue △:Reflection reference 1:Fresnel reflection reference,2:Total reflection reference □□□□□□□□:Data Eight digits with sign (Decimal data)

NOTE

When sending a query command such as CALL, COPM, CATTN, CLD with several modules set to be controlled, data is divided into 3 module units by commas.
For example, the data format when sending "CALL,AAV?" with the ATTN Modules mounted on the 1, 3 channels is as follows:
"AAV10,,AAV10"

NOTE

The output queue is ready to receive an answer to a query command.
After executing a new query command, the data remaining in the queue is cleared and always updated to the latest information.
So, read the data in the queue before executing another query command.

(4) Delimiter
An available delimiter is CRLF (EOI), EOI.

(5) Maximum receivable program code character number
Program codes can be sent by combining them with commas.
Up to 512 characters (including delimiters) can be received at a time. All program codes are disabled and an error is output if characters exceeding this number is received.

NOTE

Blank can be inserted to any places since it is neglected.

(6) Maximum sendable character number
Up to 512 characters (including delimiters) can be sent at a time.

5.4.6 ErrorOutputFormat

(1) ERR?

Output format:E□□□□

Write the following error code in "□□□□" in the output queue.

Table 5-11 Error Code Table

Errorcode	Contents
E0001	"SUBCPUSEND DATA ERROR " Datacannotbesenttothesub-CPU.
E0002	"SUBCPURECEIVEERROR " Datafrom thesub-CPU cannotbereceived.
E0003	"UNITTYPE MISS MATH ERROR " Datafrom a differentunithasbeenreceived.
E0004	"486BCPU SENDDATAERROR " Datacannotbesent tothe486BCPU.
E0005	"486BCPU RECEIVEERROR " Datafrom the 486B CPU cannot be received.
E0050	"GP-IB COMMAND SYNTAX ERROR " GP-IB:Thecommandsyntaxiswrong.
E0051	"GP-IB COMMAND EXECUTE ERROR " GP-IB:Commandexecutionhasfailed.
E0053	"GP-IB BUFFEROVERFLOW " GP-IB:Thereceivingbufferhasoverflowed.
E0054	"GP-IB MWA1&2 COMMUNICATIONBUFFER OVERFLOW " GP-IB:Thereceivingbuffers oftheMWA1&2units have overflowed.
E0055	"GP-IB CAN'T SENDMESSAGE TOHOST " GP-IB:NomessagecanbesenttothehostPC.
E0056	"GP-IB MWA1UNITCOMMUNICATION ERROR " GP-IB:Communication with the MWA1 unit isdisabled.
E0057	"GP-IB MWA2UNITCOMMUNICATION ERROR " GP-IB:Communication with the MWA2 unit isdisabled.
E0058	"GP-IB INPUT QUE OVERFLOW " GP-IB:Theinputqueuehasoverflowed.
E0059	"GP-IB OUTPUTQUEOVERFLOW " GP-IB:Theoutput queuehasoverflowed.
E0101	"[01]UNIT SENDCOMMANDERROR " (Errorcommontoallunits) The commandiswrong.
E0102	"[02]UNIT SENDDATA OVER ERROR " (Errorcommontoallunits) The input data has exceeded the limit

E0103	"[03] UNIT RAM WRITE ERROR " (Error common to all units) No data can be written to the RAM.
E0104	"[04] UNIT SERIAL-BUS COMMUNICATION ERROR " (Error common to all units) Serial communication is disabled.
E0117	"[11] UNIT LIGHT OUTPUT LIMIT OPERATION " (Error unique to AQ8201-11/11A/11B/12/13/13B) The light output limiter is activated.
E0133	"[21] OPM ERROR " (Error unique to AQ8201-21) Operation is disabled.
E0135	"[23] OPM ZERO SET ERROR " (Error unique to AQ8201-21) Zero set error
E0136	"[23] OPM ERROR " (Error unique to AQ8201-21) The input frequency is different from the set CHOP frequency.
E0149	"[31] ATTN-UNIT " (Error unique to AQ8201-31/32/33) Operation is disabled.
E0213	"[71] RLM ERROR " (Error unique to AQ8201-71) Operation is disabled.
E0216	"[74] RLM MODE ERROR " (Error unique to AQ8201-71) The input frequency is not the 270Hz.
E0217	"[75] RLM REF ERROR " (Error unique to AQ8201-71) Ref set error.

5.4.7 Register

Eventprocessingregistersofthissystemareclassifiedintothreefunctiongroups.
The standardeventstatusregister (ESR) andthestatusbyteregister (SBR) are usedto savethespecified-type eventsoccurringduringsystemoperation.
These registers aredefined in theIEEE-488.2-1987standard.
Thissystemisalsoequippedwiththeendeventstatusregister (EESR), whichsaves whether eachmodulehas completed its operation.

(1) Standard eventstatusregister
TheESRsaves8-typeeventsoccurringinsidethesystem.
Thecontentsoftheregistercanbereadusingthe*ESR?querycommand.

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Table 5-12 FunctionsofESRBits

Bit	Operation ofsetbit
7 BIT	PON (power on) Set after thissystemisturnedon.
6 BIT	URQ (userrequest) Notused
5 BIT	CME (command error) Set after a syntax error occurs,acommanddoesnotconformto thereceivable format,a unique command inapplicable to the specifiedmodule isreceived,etc.
4 BIT	EXE (execution error) Set after anerroroccursduetoinappropriatesetdataor limitation on setting/querycontentsduringmoduleoperation.
3 BIT	DDE (device error) Set after anerroroccursduetomodulehardwareandtheerror commandisunreceivable.

2 BIT	QYE (query error) Set after an output queue with no or unprocessed data is read or data in the output queue is lost.
1 BIT	RQC (request control) Not used
0 BIT	OPC (operation completed) Set after retention has been completed. This bit is generated for the following instructions only. •RESET (*RST): After RESET is completed. •LW, LUCWL*: After wavelength setting is completed. (AQ8201-13) •LUDSET: When wavelength proofreading setting is completed. (AQ8201-13) •LUCRST: At wavelength proofreading value completion of default of setting. (AQ8201-13) •LUCAL: When set mode change is completed. (AQ8201-13) •PZ: After zero set is completed. (AQ8201-21) •AAV: After attenuation setting is completed. (AQ8201-31/32/33) •RREF: When reference measurement is completed (AQ8201-71) When two or more modules are selected and completion of operation (OPC) is used, OPC of each completion of operation of each module is output.

(2) Status byte register
Each bit oftheSBRsaveswhetherdatais ready in theoutputqueue,thissystem requests service or any eventhasbeensavedintheESR.
Thecontentsoftheregistercanbereadusingserialpollingorthe*STB?query command.
Whenusing*STB,writethecontentsintheoutput queue.
Bit6assumestheRQSbitwhenreadingtheSBRusingserial polling, or theMSS bit whenreadingitusing*STB.

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
-	RQS MSS	ESB	MAV	×	×	×	×

Table 5-13 FunctionsofSBR

Bit	Operationofsetbit
7BIT	Notused
6BIT	RQS (servicerequest) Readable using serial polling. Indicates thatthissystemisrequestingservicetothe GP-IBcontroller.
	MSS (master statussummary) Readable using the *STBquerycommand. Set after theESBoftheSBRortheMWAbitisset.
5BIT	ESB (eventstatusbit) Indicates thatthestatus is "enable" and someevent(s) exist(s) in theESR.
4BIT	MAV (message available) Indicates that information isavailableintheoutputqueue.
3BIT	Notused
2BIT	Notused
1BIT	Notused
0BIT	Notused

(3)Endeventstatus register (EESR)

The end eventstatusregistersaveswhetheranexecutioncommand toamodule, especially whichrequireslong time, has been completed or not.

After operation iscompleted, operation completeinformationonthat module isset in an appropriate bit.

The contents of the end eventstatusregistercanbereadusingtheEND?query command.

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
×	×	×	×	×	MODULE 3 END	MODULE 2 END	MODULE 1 END

BIT15	BIT14	BT13	BIT12	BIT11	BIT10	BIT9	BIT8
×	×	×	×	×	×	×	×

Table5-14 Functions of EESR Bits

Bit	Operationofsetbit
15BIT	Not used
14BIT	Not used
13BIT	Not used
12BIT	Not used
11BIT	Not used
10BIT	Not used
9 BIT	Module 10retentioncompleted
8 BIT	Module9retentioncompleted
7 BIT	Module8retentioncompleted
6 BIT	Module7retentioncompleted
5 BIT	Module6retentioncompleted
4 BIT	Module5retentioncompleted
3 BIT	Module4retentioncompleted
2 BIT	Module3retentioncompleted
1 BIT	Module2retentioncompleted
0 BIT	Module1retentioncompleted

(4) Conditions for clearingeachregister
Each status iscleared according tothefollowingconditions.

Table 5-15 Conditions for Clearing Register

Register	Clearingcondition
SBR	•After the power is turned off. •After *RET isexecuted. •After status information is fetchedusing serial polling.
ESR	•After the power is turned off. •After *RST is executed. •After status information is written to the output queue using*ESR. •After the masking condition of the6bitof theSBR ischangedby*ERE(NRf).
EESR	•After the power is turned off. •After *RST is executed. •After next command is executed. END?,ENDMASK(NRf) •After the masking condition of the0bitof theESR ischangedby*ESE.

(5) Eventprocessingsequence

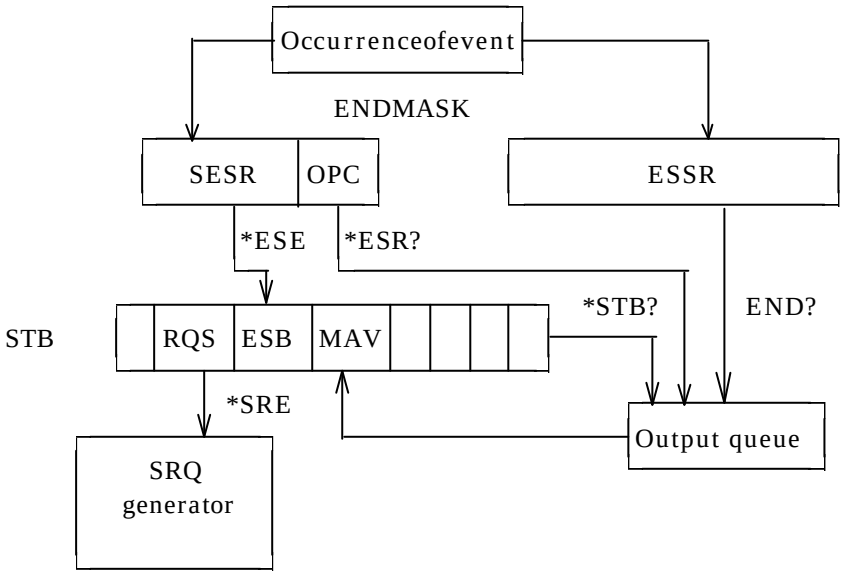


Figure 5-20 Event Processing Sequence

NOTE

BesuretoreadthestatusoftheESRbeforeusingtheESBbit.

6. Circuits and Structure

Thischapteroutlinesthebasiccircuit configurationandstructureofthissystem.

6.1 RACK-MOUNTMAIN FRAME (AQ8201A)

6.1.1Circuit

(1) Functional Block Diagram

Figure 6-1 shows a functionalblock diagramoftheAQ8201A.
This frame controls thekeyoperationsandGP-IBcommandtransmissiontoeachmodule.Also, it receivesdigital datafromeachmodule,processthemby variousarithmeticoperations anddisplaysthe results on thedisplay.

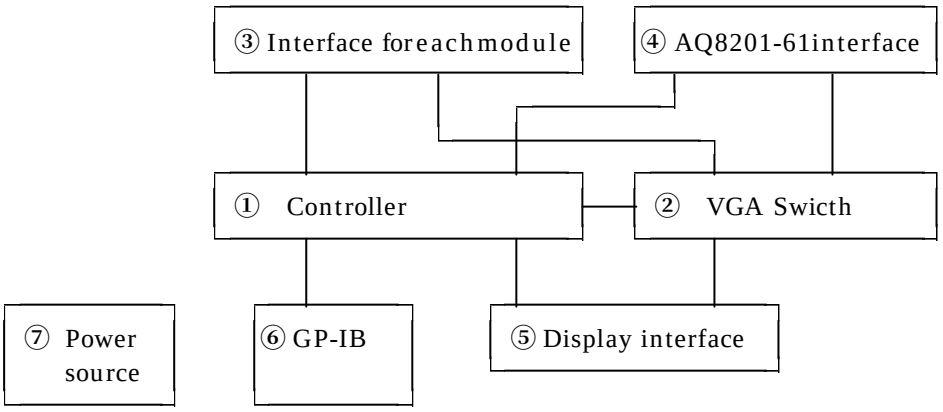


Figure 6-1 Functional Block Diagram of AQ8201A

(2) Explanation ofeachsection

① Controller
Collects instructions and information for allinterfacesrelatingtomoduleand display control.

② VGAswitch
Switches the VGAsignaltotheAQ8201-61ortheeachmodulebasedonasignal from thecontroller.

③ Interface for each module
Connects theeachmodule(upto10unitscanbemounted).

④ AQ8201-61 interface
Connects theAQ8201-61 (upto2unitscanbemounted).

⑤ Display interface
InterfacewiththeAQ8201-02 .
Transmits andreceivesdisplayand controlsignalsto/fromthe display with two VGA interfaces,a key interfaceand an LEDcontrol + DC interface.

⑥ GP-IB
Signalsaretransmittedorreceivedvia this GP-IB.

⑦ Power source
Turns the power on andoffusinganACpowersourceswitch.

6.1.2 Structure

TheoutsideviewoftheAQ8201Aisattachedattheendofthismanual.

6.2 DISPLAY CONTROLLER (AQ8201-02)

6.2.1 Circuit

(1) Functional Block Diagram

Figure 6-2 shows the functionalblock diagramoftheAQ8201-02.

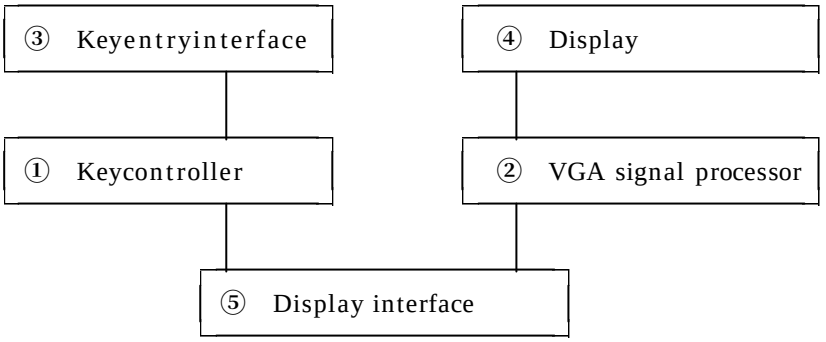


Figure 6-2 FunctionalBlockDiagramofAQ8201-02

(2) Explanation ofeachsection

① Keycontroller
Codessignalsfromthekeyentrysectionandtransmitsthemtothe AQ8201Avia thedisplayinterface.

② VGAsignalprocessor
Converts VGAsignalstothosefortheLCD.

③ Keyentryinterface
Used formanuallyoperate modules.

④ Display
Displays information frommodulesandtheirmeasurementsforeachmodule.
Equippedwithtwo 6.5-inchTFTmonitors.

⑤ Display interface
InterfacewiththeAQ8201A.
Transmits andreceivesdisplayand controlsignalsto/fromthe frame with two VGA interfaces,a key interfaceand an LEDcontrol + DC interface.

6.2.2 Structure

TheoutsideviewoftheAQ8201-02isattachedattheendofthismanual.

6.3 DISPLAY CONTROLLER MODULE (AQ8201-03)

6.3.1Circuit

(1) Functional Block Diagram

Figure 6-3 shows the functionalblock diagramoftheAQ8201-03.

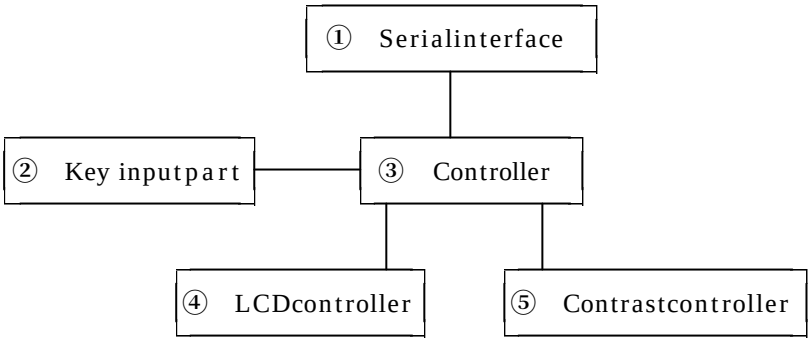


Figure6-2 Functional Block DiagramofAQ8201-03

(2) Explanation ofeachsection

① Serialinterface
SerialcommunicationswithAQ8201Aare done.

② Keyinputpart
Thekeyoperationoftheuserisscanned.

③ Controller
Each blockis controlledaccordingto the instruction from AQ8201A andthekey operation of the user.

④ LCDController
ThedisplayofLCDiscontrolled.

⑤ Contrast controller
Thecontrastof LCDiscontrolled.

6.3.2 Structure

TheoutsideviewoftheAQ8201-03isattachedattheendofthismanual.

6.4 WDM DFB-LD MODULE (AQ8201-11/11A/11B)

6.4.1Circuit

(1) Functional Block Diagram

Figure 6-4 shows thefunctional block diagram of AQ8201-11/11A/11B, whichoperatesaccording to key operation andcommandstransmitted from the frame.

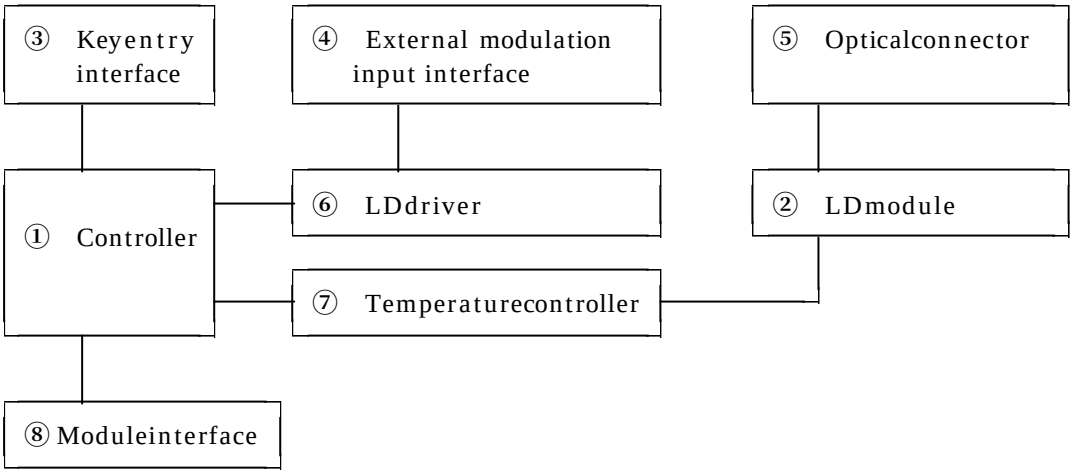


Figure 6-4 Functional BlockDiagramofAQ8201-11/11A/11B

(2) Explanation ofeachsection

① Controller
Controls each block according tosignalsfromtheframe.

② LDmodule
DFB-LD module

③ Keyentryinterface
Turns the LDonandoffaccordingtoswitchoperation.

④ External modulation input interface
SMAconnector forinputtingmodulationsignals.

⑤ Optical connector
User interface for outputting light.

⑥ LDdriver
Circuit for driving the LDmodule.

⑦ Temperaturecontroller
Circuit for controlling the LDmoduletemperature.

⑧ Module interface
Communicates datawiththeframe.

6.4.2Structure

TheoutsideviewoftheAQ8201-11/11A/11Bisattached attheendofthismanual.

6.5 ASE MODULE (AQ8201-12)

6.5.1Circuit

(1) Functional Block Diagram

Figure 6-5 shows the functionalblock diagramofAQ8201-12, whichoperatesaccordingto key operation andcommandstransmitted from the frame.

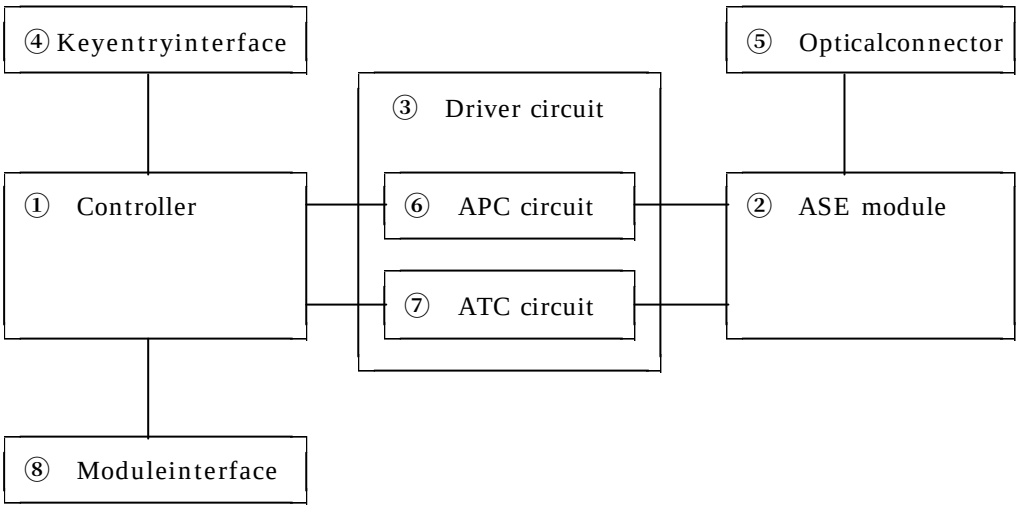


Figure 6-5 Functional Block Diagram of AQ8201-12

(2) Explanation ofeachsection

① Controller
It isusedforcontrollingeachblockaccordingtothesignalsfromframe.

② ASE module
The modulegeneratesopticaloutputaccordingto instructions from thedrive circuit.

③ Drive circuit
ThiscircuitisusedfordrivingtheASEmodule.
Itstabilizesoptical output by feeding back themonitorPD output.

④ Keyentryinterface
It is a user interface allowingyoutoturnonorofftheASEmodulewithitsswitches.

⑤ Opticalconnector
Equipped with the FC-PC connector, this interfaceisused for fetching lightexternally.

⑥ APCcircuit
ThiscircuitcontrolsopticaloutputbyvaryingdrivingcurrentaccordingtothesignalsfromthecontrolunitTheoutsideviewoftheAQ8201-12isattachedattheendofthismanual.

6.5.2Structure

6.6 ECLMODULE (AQ8201-13/13B)

6.6.1Circuit

(1) Functional Block Diagram

Figure 6-6 shows the functionalblock diagramofAQ8201-13/13B, whichoperatesaccordingto key operation andcommandstransmitted from the frame.

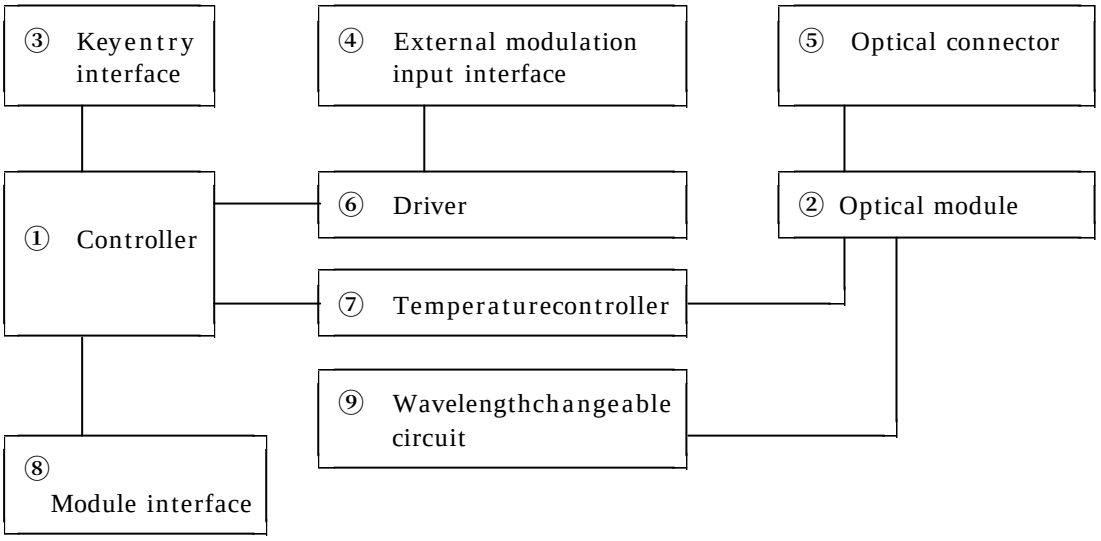


Figure 6-6 Functional BlockDiagramofAQ8201-13/13B

(2) Explanation ofeachsection

① Controller
Controls each block according tosignalsfromtheframe.

② Optical module
Wave changeable length with built-in pulsemotoris a possible module.

③ Keyentryinterface
Turns the OPT on and off according to switchoperation.

④ External modulation input interface
SMAconnector forinputtingmodulationsignals.

⑤ Optical connector
User interface for outputting light.

⑥ Driver
Circuit for driving the opticalmodule.

⑦ Temperaturecontroller
Circuit for controlling the opticalmoduletemperature.

⑧ Module interface
Communicates datawiththeframe.

⑨ Wavelength changeable circuit
It isacircuitwhichdrivesthepulsemotor.
Thewave lengthcanbesetbycontrollingthispulsemotor.

6.6.2 Structure

TheoutsideviewoftheAQ8201-13/13Bisattachedattheendofthismanual.

6.7 OPM MODULE (AQ8201-21)

6.7.1Circuit

(1) Functional Block Diagram

Figure 6-7 shows the functionalblock diagramofAQ8201-21, whichoperatesaccordingto key operation andcommandstransmitted from the frame.

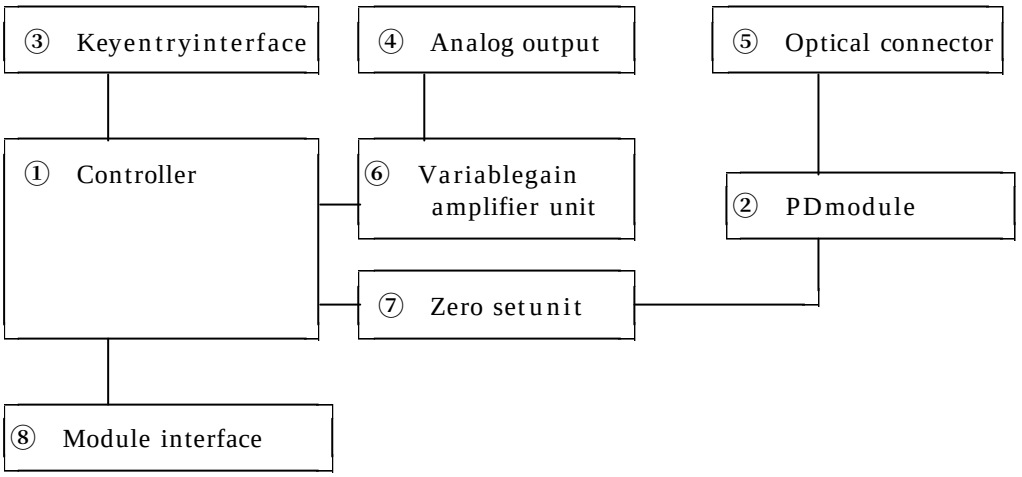


Figure 6-7 Functional Block Diagram of AQ8201-21

(2) Explanation ofeachsection

① Controller
Signalamplified on thevariable gain amplifier is thenconverted todigitalsignal on the A/Dconversioncircuit. Thesignalisthenprocessed (logarithmic conversion andvariouscorrections) ontheCPUcircuitandsenttoframeviatheserialI/O.

② PD module
Using theInGaAsphotodiodeemployed,themoduleoutputselectricsignals proportionaltointensityofincidentlight. Themodule is equipped withPeltier andthermistorto coolthephotodiodetothespecifiedtemperature.

③ Keyentryinterface
It is a user interface employedforturningonoroffthezerosetandswitching theincidentlightbetweenCHOPandCWfromtheswitch.

④ Analogoutput
Linear values within 1 range is output in voltage value.

⑤ Opticalconnector
It is a user interface employedforenteringexternallight.

⑥ Variable gain amplifier unit
Thisunitcomprisestheoperationamplifier,activeLPF,activeBPFanddetection circuit. Itperforms switching ofgainlevelaccordingtointensityofincidentpower.

⑦ Zerosetunit
Using outputfromtheD/Aconversioncircuit,thisunit negates electric offset in thecircuit.
OutputvaluefromtheD/AconversioncircuitisdeterminedwhenyoupresstheZERO SET key toexecute thezero set. Thevaluedeterminedismaintaineduntiltheset ZERO SET key is pressed again.

⑧ Module interface
The interfaceisused forexchangingdatabetweenframeandtheAQ8201-21.

6.7.2Structure

TheoutsideviewoftheAQ8201-21isattachedattheendofthismanual.

6.8 ATTN MODULE (AQ8201-31/32/33)

6.8.1Circuit

(1) Functional Block Diagram

Figure 6-6 shows the functionalblock diagramofAQ8201-31/32/33, which operates according to key operation andcommandstransmitted from the frame.

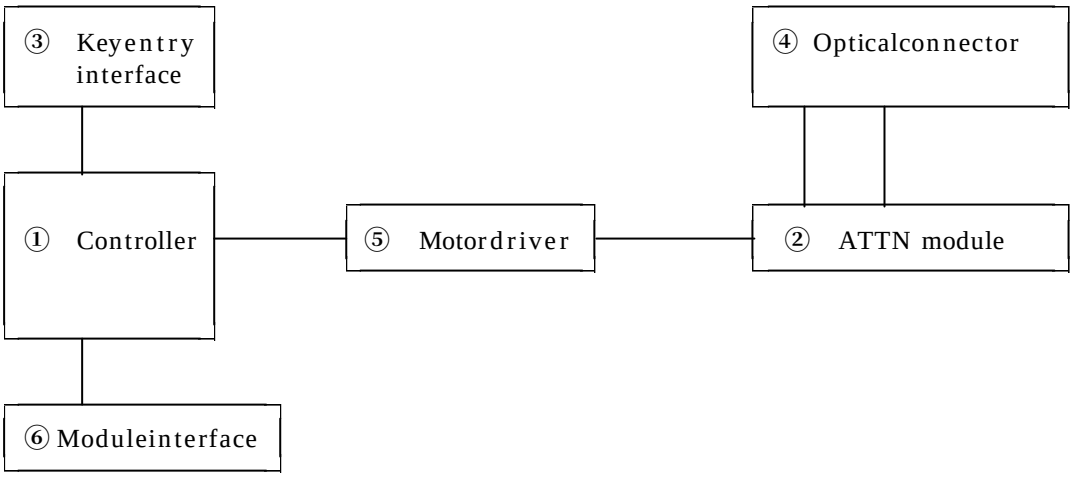


Figure6-8 Functional Block DiagramofAQ8201-31/32/33

(2) Explanation of each section

① Controller
Controls each block according to signals from the frame.

② ATTN module
Optical module equipped with a light attenuating filter connected to the motor.

③ Key entry interface
User interface to which the shutter is opened and shut with the switch.

④ Optical connector
User interface for inputting and outputting light.

⑤ Motor driver
Drives the ATTN MODULE motor according to signals from the controller.

⑥ Module interface
Communicates data with the frame.

6.8.2 Structure

The outside view of the AQ8201-31/32/34 is attached at the end of this manual.

6.9 MWAMODULE (AQ8201-61)

6.9.1Circuit

(1) Functional Block Diagram

Figure 6-9 shows the functionalblock diagramofAQ8201-61, whichoperatesaccordingto key operation andcommandstransmitted from the AQ8201A.

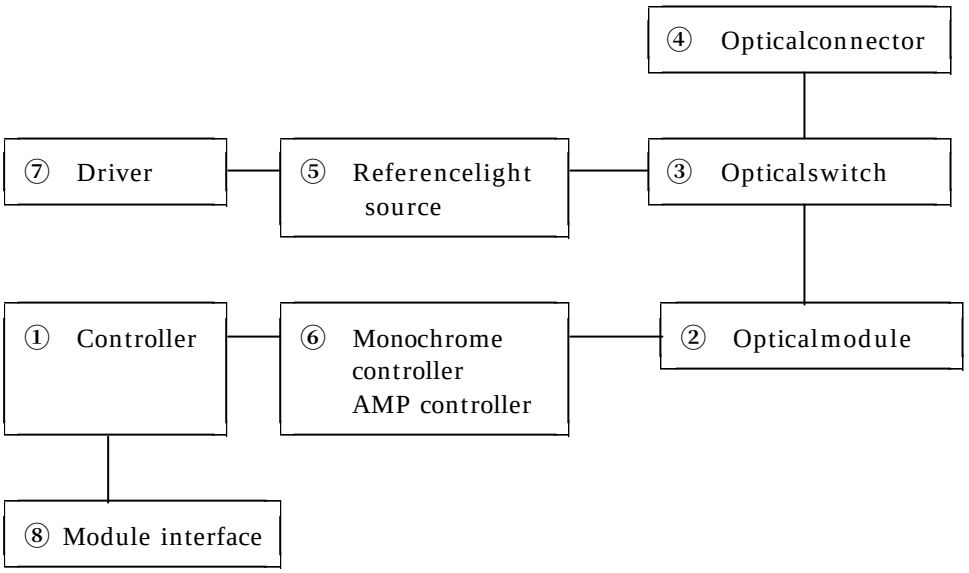


Figure 6-9 Functional Block Diagram of AQ8201-61

(2) Explanation of each section

① Controller
Controls each block according to signals from the frame.

② Optical module
Module consisting of a monochrometer, photo sensor elements, a motor, etc.

③ Optical switch
Selects whether to input the reference or measured light to the optical module.

④ Optical connector
User interface for taking light in.

⑤ Reference light source
Consists of an LED and gas cells and outputs the reference light.

⑥ Monochrome controller/AMP circuit
Controls the optical module according to signals from the controller.
Also, amplifies analog signals output from the optical module.

⑦ Driver
Drives the reference light source.

⑧ Module interface
Communicates data with the frame via the GP-IB bus.

6.9.2 Structure

The outside view of the AQ8201-61 is attached at the end of this manual.

6.10 RLM MODULE (AQ8201-71)

6.10.1 Circuit

(1) Functional Block Diagram

Figure 6-10 shows thefunctionalblockdiagram ofAQ8201-71, which operates according to key operation andcommandstransmitted from the frame.

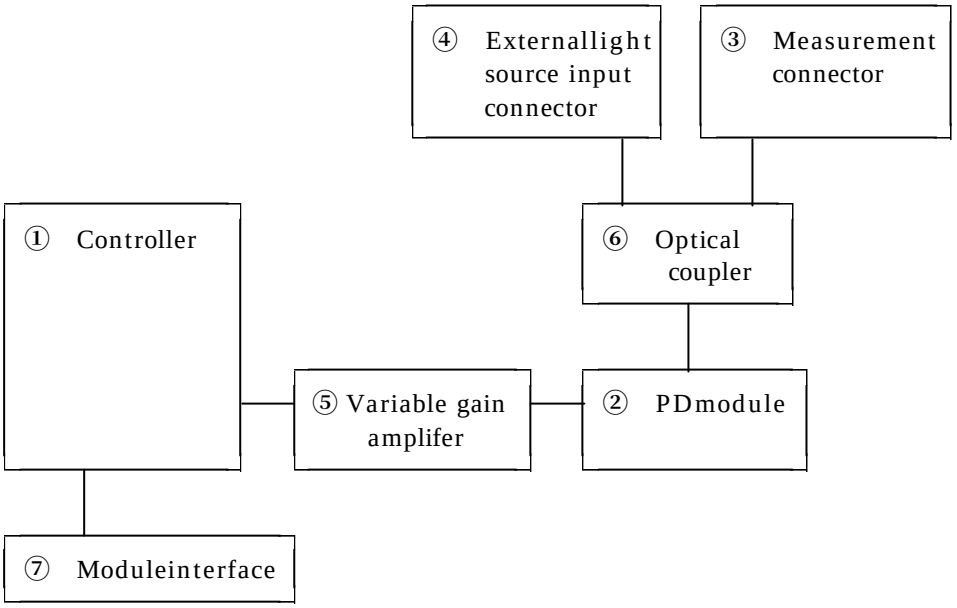


Figure 6-10 Functional Block Diagramof AQ8201-71

(2) Explanation of Each Part

① Controller
Signals amplified with the variable gain amplifier are converted into digital signals with the A/D converter, are processed (for log conversion and various correction) with the CPU circuit and are sent to frame through the serial I/O.

② PD module
This module is provided with InGaAs photodiode and outputs electric signals proportional to incident light.

③ Measurement connector
This connector is used to measure return losses of measuring objects.

④ External light source input connector
This is an interface for inputting lights from outside.

⑤ Variable gain amplifier
This amplifier consists of an operational amplifier, an active LPF, an active BPF and a wave detector and changes gain depending on incident power.

⑥ Optical coupler
This couplers is for outputting lights, that are input from the external light source input connector, through the measurement connector and for sending reflected lights from the measuring object to the PD module.

⑦ Module interface
This interface is used to exchange data with frame.

6.10.2 Structure

The outside view of the AQ8201-71 is attached at the end of this manual.

7. Trouble shooting Guide

This chapter lists basic checkpoints to be referred to when this system has failed.

7.1 RACK-MOUNT MAIN FRAME (AQ8201A)

1) Not operates even after the power is turned on.
・Check the fuses inside the power supply plug socket (refer to 2.4.3).

2) Not recognizes any module.
・Check the connection between the module and this system.

3) An error displayed on the screen.
・Refer to the error code table (table 7-1).

Table 7-1 Error Code Table

Error code	Contents
E0001	"SUB CPU SEND DATA ERROR " Data cannot be sent to the sub-CPU.
E0002	"SUB CPU RECEIVE ERROR " Data from the sub-CPU cannot be received.
E0003	"UNIT TYPE MISS MATH ERROR " Data from a different unit has been received.
E0004	"486B CPU SEND DATA ERROR " Data cannot be sent to the 486B CPU.
E0005	"486B CPU RECEIVE ERROR " Data from the 486B CPU cannot be received.
E0050	"GP-IB COMMAND SYNTAX ERROR " GP-IB: The command syntax is wrong.
E0051	"GP-IB COMMAND EXECUTE ERROR " GP-IB: Command execution has failed.
E0053	"GP-IB BUFFER OVERFLOW " GP-IB: The receiving buffer has overflowed.
E0054	"GP-IB MWA1&2 COMMUNICATION BUFFER OVERFLOW " GP-IB: The receiving buffers of the MWA1&2 units have over flowed
E0055	"GP-IB CAN'T SEND MESSAGE TO HOST " GP-IB: No message can be sent to the host PC.
E0056	"GP-IB MWA1 UNIT COMMUNICATION ERROR " GP-IB: Communication with the MWA1 unit is disabled.
E0057	"GP-IB MWA2 UNIT COMMUNICATION ERROR " GP-IB: Communication with the MWA2 unit is disabled.
E0058	"GP-IB INPUT QUE OVERFLOW " GP-IB: The input queue has overflowed.
E0059	"GP-IB OUTPUT QUE OVERFLOW " GP-IB: The output queue has overflowed.
E0101	"[01]UNIT SEND COMMAND ERROR " (Error common to all units) The command is wrong.
E0102	"[02]UNIT SEND DATA OVER ERROR " (Error common to all units) The input data has exceeded the limit
E0103	"[03]UNIT RAM WRITE ERROR " (Error common to all units) No data can be written to the RAM.
E0104	"[04]UNIT SERIAL-BUS COMMUNICATION ERROR " (Error common to all units) Serial communication is disabled.

E0117	"[11]UNIT LIGHT OUTPUT LIMIT OPERATION " (Error unique to AQ8201-11/11A/11B/12/13/13B) The light output limiter is activated.
E0133	"[21]OPM ERROR " (Error unique to AQ8201-21) Operation is disabled.
E0135	"[23]OPM ZERO SET ERROR " (Error unique to AQ8201-21) Zero set error
E0136	"[23]OPM ERROR (Error unique to AQ8201-21) The input frequency is different from the set CHOP frequency.
E0149	"[31]ATTN-UNIT " (Error unique to AQ8201-31/32/33) Operation is disabled.
E0213	"[71]RLM ERROR " (Error unique to AQ8201-71) Operation is disabled.
E0216	"[74]RLM MODE ERROR " (Error unique to AQ8201-71) The input frequency is not the 270 Hz.
E0217	"[75]RLM RREF ERROR " (Error unique to AQ8201-71) Ref set error.

7.2 DISPLAY CONTROLLER(AQ8201-02)

1）Not operates even after the power is turned on.
・Check that the DC + LED plug is connected to the AQ8201A.

2）No display
・Check that the VGA1, VGA2 or DC + LED plug is connected to the AQ8201A.

3）Dark display
・Adjust the brightness using the light adjusting volume on the rear.

4）Key operation disabled
・Check that the AQ8201A is not in the remote state（GP-IB state).
・Check that the keyboard plug is connected to the AQ8201A.

7.3 DISPLAY CONTROLLER MODULE(AQ8201-03)

1) The LCD display is dark.

- Check that the back light is turning on.
- Adjust the contrast.

2) The key cannot be operated.

- Check that the AQ8201A is released remotely (state of GP-IB).

7.4 WDM DFB-LD MODULE (AQ8201-11/11A/11B)

1) No optical output
- Check that the OPT switch is turned on.
- Check that an optical fiber is connected.

2) Optical output level lower than the specifications
- Check that no stain or dirt adheres to the optical output port of the module or the connected optical fiber.
  (Before checking, turn the frame off and make sure that no light is output.)
- Check that the CW output is set.
- Check that the attenuation is set at 0.0 dB on the frame.
- Check that the optical fiber is connected properly.
- Check that the connected optical fiber is not disconnected.

3) Unstable optical output level
- Check that no stain or dirt adheres to the optical connector of the module or the connected optical fiber using a microscope.
  (Before checking, turn the frame off and make sure that no light is output.)
- Check the type of the connected optical connector.

4) Optical output cannot be turned on or off
- Check that the frame is not in the remote state (GP-IB state).

5) Wavelength different from the setting
- Measure it again after setting the output light to CW and turning the coherence control off.
  A wave meter may not be able to measure the wavelength accurately when the output light is modulated or the coherence control is turned on.

7.5 ASE MODULE (AQ8201-12)

1) Optical output is not available
- Check that the OPT switch is turned on.

2) Optical output level promised in the specification is not available
- Check that the module optical connector and end faces of the optical fiber connected for stains or settlement of dusts.
  (Before checking, turn the frame off and make sure that no light is output.)
- Check that the ATT on the frame is set to 0.0 dB.
- Check that the optical fiber is correctly connected.
- Check that connected optical fiber is broken.
- Check the insertion loss of the optical fiber.

3) Optical output level is unstable
- Using a microscope, check that the module optical connector and end faces of the optical fiber for scratches or stains. (Before starting the check, turn off the frame power and make sure that optical output is not present.)
- Check whether or not a correct optical fiber is used.

4) Turning on or off of optical output is unavailable
- Check that the frame is not in the remote mode (GP-IB controlled status)

7.6 ECL MODULE (AQ8201-13/13B)

1) No optical output
・Check that the OPT switch is turned on.
・Check that an optical fiber is connected.

2) Optical output level lower than the specifications
・Check that no stain or dirt adheres to the optical output port of the module or the connected optical fiber.
(Before checking, turn the frame off and make sure that no light is output.)
・Check that the CW output is set.
・Check that the attenuation is set at 0.0 dB on the frame.
・Check that the optical fiber is connected properly.
・Check that the connected optical fiber is not disconnected.

3) Unstable optical output level
・Check that no stain or dirt adheres to the optical connector of the module or the connected optical fiber using a microscope.
(Before checking, turn the frame off and make sure that no light is output.)
・Check the type of the connected optical connector.

4) Optical output cannot be turned on or off
・Check that the frame is not in the remote state (GP-IB state).

5) Wavelength different from the setting
・Measure it again after setting the output light to CW and turning the coherence control off.
A wave meter may not be able to measure the wavelength accurately when the output light is modulated or the coherence control is turned on.

-・Please proofread the wave length according to the procedure because the wavelength proofreading function is installed in this module.

7.7 OPM MODULE (AQ8201-21)

1) An incorrect absolute value is indicated:
・Check that the calibration wavelength is correct.
・Check that the offset value is correct.
・Check the optical modulation mode employed for the light source and this module.
・Check that the connector adapter is correctly attached.
・Clean the end of the connected fiber.

2) Zero set is not available:
・Check that the optical sensor is appropriately shielded.
・Reset the remote mode (GP-IB controlled state) set on the frame.

3) Switching between the optical modulation mode is not available:
・ Reset the remote mode (GP-IB controlled state) set on the frame.

7.8 ATTN MODULE (AQ8201-31/32/33)

1) Optical attenuation different from the setting
・Check that the input light wavelength corresponds to the set wavelength.
・Clean the end of the connected fiber.

2) Large insertion loss
・Clean the I/O plug and the connected fiber.
・Check that the connected fiber is the FC-APC (angled) type.

3) Large return loss
・Clean the I/O plug and the connected fiber.
・Check that the connected fiber is the FC-APC (angled) type.

7.9 MWA MODULE (AQ8201-61)

1) No wave form displayed
- Check that light is input.
- Check the module optical connector and end faces of the optical fiber connected for stains or settlement of dusts.
- Check that the calibration wavelength is correct.
- Check that the connector adapter is correctly attached.
- Check that connected optical fiber is broken.

2) Wave form is unstable
- Check the module optical connector and end faces of the optical fiber connected for stains or settlement of dusts.
- Check whether or not a correct optical fiber is used.

7.10 RLM MODULE (AQ8201-71)

1) Measured values of the measuring object are not stable.
- Check the module optical connector and end faces of the optical fiber connected for stains or settlement of dusts.
- Check whether or not a correct optical fiber is used.
- Check that connected optical fiber is broken.

2) Measured values of reference reflection are not stable.
- The LD light source is AQ4211 or equivalent, and unstable measured values are attributed to fluctuation of reflected lights from the measuring object if they fluctuate within the range of +/-0.02 dB when reference reflection is measured, and the AQ8201-71 is in order.

- If the reflected lights fluctuate more than 0.02 dB, the master cord connection, light input section the connector of the optical fiber to be connected are considered to be soiled. When measured values do not become stable even after cleaning the optical fiber and master cord connectors and the master cord connector of the light input section by using alcohol, the AQ8201-71 is considered to be out of order. In this case, contact our Service Department, the Sales Department of our head office, our branch or sales office in your area.

8. Maintenance

This chapter describes standard system maintenance and service procedure.

8.1 RACK-MOUNT MAIN FRAME(AQ8201A)

Since this system is designed to control the dedicated system modules, no separate maintenance is required for it. Refer to section 8.2 and after for how to maintain modules since actual procedure varies depending on each module.

8.2 DISPLAY CONTROLLER(AQ8201-02)

This controller is dedicated to the AQ8201A. No separate maintenance is required for it.

8.3 DISPLAY CONTROLLER MODULE(AQ8201-03)

This module is dedicated to the AQ8201A. No separate maintenance is required for it.

8.4 WDM DFB-LD MODULE(AQ8201-11/11A/11B)

8.4.1 Tester Units Used for the Test

Table 8-1 shows the tester units required for the maintenance.

Table 8-1 Tester Units Used for the Test (AQ8201-11/11A/11B)
Names in parentheses refer to our products.

Tester	Major performance
AQ8201A	
Optical power meter (AQ2140 + AQ2735)	Power measurement range: -80 to +27 dBm Wavelength range: 700 to 1700 nm
Optical spectrum analyzer or wave meter (AQ6315/AQ6317)	Wavelength range: 0.35 to 1.75 μm Resolution: 0.05 nm
Optical fiber cord	Single-mode optical fiber cord (short) FC/APC-FC/PC

8.4.2 Periodic Inspection

Periodic inspection at six-month interval is recommended for the AQ8201-11/11A/11B since its design ensures higher stability and reliability. The items to be inspected are as follows:

1) Center wavelength and stability
Set the optical modulation mode of the module to CW and measure the center wavelength and the spectrum width using an optical spectrum analyzer or a wave meter.

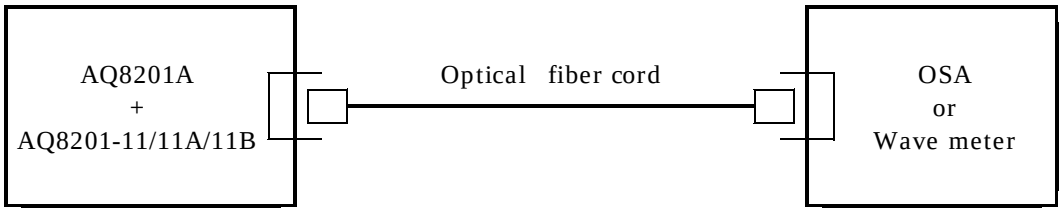


Figure 8-1 Measurement of Center Wavelength and Stability

2) Optical output level and stability
Set the output wave form of each module to CW and measure the optical output level by connecting it to an optical power meter using a short (2 m) fiber.

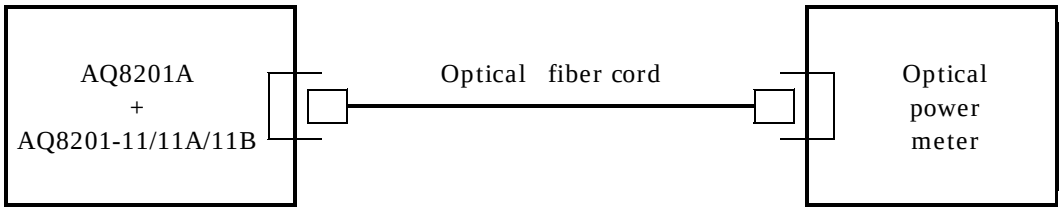


Figure 8-2 Measurement of Optical Output Level and Stability

8.4.3 Cleaning

Dusts or dirt on the module optical output connector can adversely affect the optical output level and stability. Before connecting an optical fiber, clean it with alcohol or the like.
The NTT International's Cure-Top Cleaning Sticks are recommended to be used for cleaning the module optical output port.

CAUTION

Don't try to touch inside of this AQ8201-11/11A/11B.

8.5 ASE MODULE(AQ8201-12)

8.5.1 Tester Units Used for the Test

Table 8-2 shows the tester units required for the maintenance.

Table 8-2 Tester Units Used for the Test (AQ8201-12)
Names in parentheses refer to our products.

Tester	Major performance
AQ8201A	
Optical power meter (AQ2140 + AQ2733)	Power measurement range: -110 to +10 dBm Wavelength range: 700 to 1700 nm
Optical spectrum analyzer or wave meter (AQ6315/AQ6317)	Wavelength range: 0.35 to 1.75 μm Resolution: 0.05 nm
Optical fiber cord	Single-mode optical fiber cord (short) FC/PC-FC/PC

8.5.2 Periodic Inspection

Stability and reliability are the two major design objectives of the AQ8201-12. Thus, periodic check of once every six months is normally sufficient for maintaining the module in an optimum condition. The following describes the check items.

1) Center wavelength and spectrum width
Select CW for the unit optical modulation mode, then measure center wavelength and spectrum width using the optical spectrum analyzer.

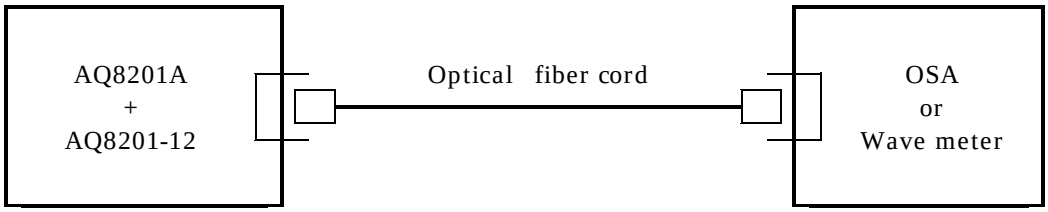


Figure 8-3 Measurement of Center Wavelength and spectrum width

2) Optical output level and stability

Select CW for output wave form of each unit, connect the units to the optical power meter using a short-length fiber (2 meters long), then measure optical output level.

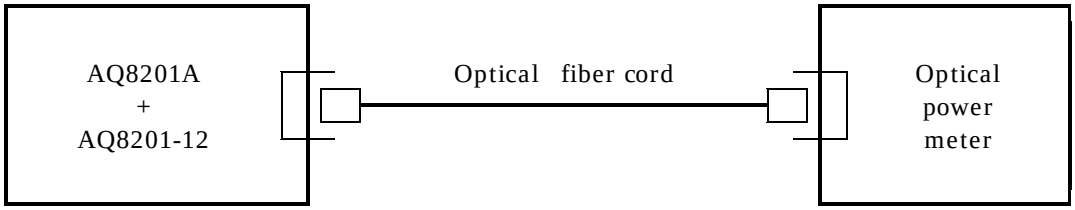


Figure 8-4 Measurement of Optical Output Level and Stability

8.5.3 Cleaning

Dusts settled on the optical output connector of the unit can degrade optical output level and its stability. An optical fiber used must be cleaned with alcohol prior to connection.
For cleaning of the module photo-emitter, Cure-Top Stick Type (from NTT International) is recommended.

CAUTION

Don't try to touch inside of this AQ8201-12.

8.6 ECL MODULE(AQ8201-13)

8.6.1 Tester Units Used for the Test

Table 8-3 shows the tester units required for the maintenance.

Table 8-3 Tester Units Used for the Test (AQ8201-13)
Names in parentheses refer to our products.

Tester	Major performance
AQ8201A	
Optical power meter (AQ2140 + AQ2735)	Power measurement range: -80 to +27 dBm Wavelength range: 700 to 1700 nm
Optical spectrum analyzer or wave meter (AQ6315/AQ6317)	Wavelength range: 0.35 to 1.75 μm Resolution: 0.05 nm
Optical fiber cord	Single-mode optical fiber cord (short) FC/APC-FC/PC

8.6.2 Periodic Inspection

Periodic inspection at six-month interval is recommended for the AQ8201-13 since its design ensures higher stability and reliability. The items to be inspected are as follows:

1) Center wavelength and stability
Set the optical modulation mode of the module to CW and measure the center wavelength and the spectrum width using an optical spectrum analyzer or a wave meter.

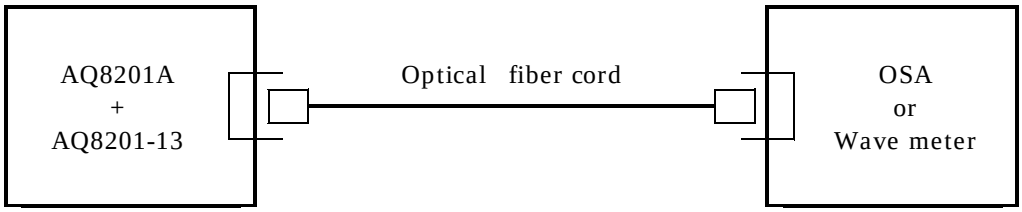


Figure 8-5 Measurement of Center Wavelength and Stability

2) Optical output level and stability
Set the output wave form of each module to CW and measure the optical output level by connecting it to an optical power meter using a short (2 m) fiber.

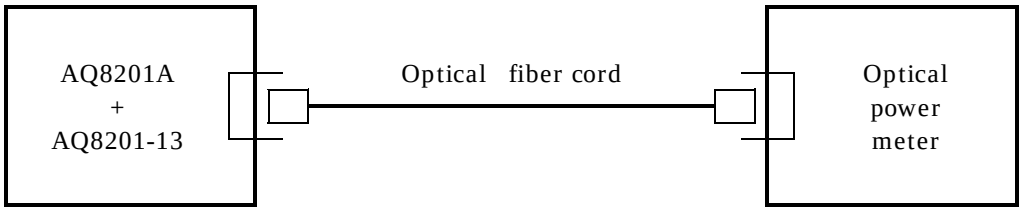


Figure 8-6 Measurement of Optical Output Level and Stability

8.6.3 Cleaning

Dusts or dirt on the module optical output connector can adversely affect the optical output level and stability. Before connecting an optical fiber, clean it with alcohol or the like.
The NTT International's Cure-Top Cleaning Sticks are recommended to be used for cleaning the module optical output port.

CAUTION

Don't try to touch inside of this AQ8201-13.

8.7 OPM MODULE(AQ8201-21)

8.7.1 Tester Units Used for the Test

Table 8-4 lists testers required for the maintenance.

Table 8-4 Tester Units Used for the Test (AQ8201-21)
Names in parentheses refer to our products.

Tester	Major performance
AQ8201A	
Optical power meter	Power measurement range: -90 to +13 dBm Wavelength range: 700 to 1700 nm Measuring accuracy/resolution: Within +/-2% maximum, 0.01 dB.
Optical attenuator (AQ3150)	Attenuation: 0 to 60 dB or more.
Light source (AQ2140+AQ4213)	Emission wavelength: 1310 +/-20 nm. Output level: -3 dBm minimum.
Optical fiber cord	Single-mode optical fiber cord (short) FC/PC-FC/PC

8.5.2 Periodic Inspection

Periodic inspection is an effective means for maintaining normal performance of the module over a long period of time as well as for finding troubles at an earlier stage. Its cycle and check items should be determined taking into consideration of the storage conditions and frequency of use of the module.
Periodic inspection comprises mechanical check, performance test, adjustment and calibration. The AQ8201-21 is designed with priority being placed on its stability and reliability, thus it is recommended to implement its periodic inspection once for every six months.

1) Mechanical check
In this check, appearance and mechanical actions of the AQ8201-21 are externally inspected. Check the module appearance for damages or deformation using your eyes. Also, check the assembled parts for looseness, and the switches and plugs for smooth move.

2) Basic operation test
This test compares performance of the AQ8201-21 against its specifications. The following describes the procedure to be followed when the test is employed for the acceptance test, periodic inspection or after repair.
AQ8201-21 basic operation test procedure:

① Connect the module to the frame, then turn power on. If there is any trouble, the frame indicator will display contents of the error. For details of the error indications, refer to Chapter 5 of this Instruction Manual.

② Connect the module as shown in Figure 8-5, then check if its display varies reflecting move of the variable optical attenuator.

3) Performance test

① Connect the AQ8201-21 and calibrated power meter as shown in Figure 8-7, then compare the measurements obtained the module against with that of the power meter.

② You can also check performance of the module by varying power level and wavelength of incident light.

4) Calibration

The AQ8201-21 is not equipped with the control knob or thumbscrew. Contact us if an incorrect absolute value is indicated at the reference wavelength.

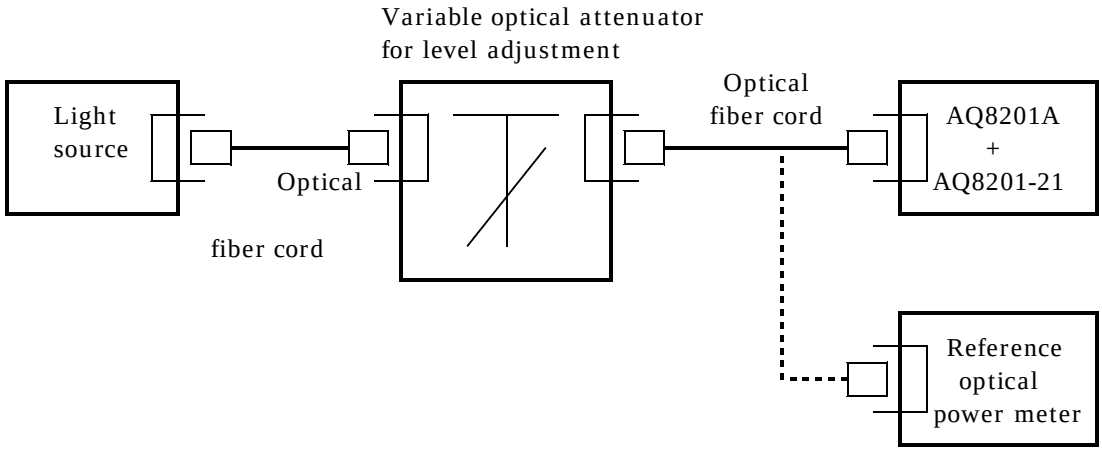


Figure 8-7 Performance Test

8.7.3 Cleaning

If dusts or dirt settles on the optical sensor of the AQ8201-21, its measurement accuracy become unpredictable. Be sure to clean off foreign substance whenever replacing a connector adapter, an incorrect absolute value is indicated or implementing a periodic inspection.

CAUTION

Don't try to touch inside of this AQ8201-21.

8.8 ATTN MODULE(AQ8201-31/32/33)

8.8.1 Tester Units Used for the Test

Table 8-5 shows the tester units required for the maintenance.

Table 8-5 Tester Units Used for the Test (AQ8201-31/32/33)
Names in parentheses refer to our products.

Tester	Major performance
AQ8201A	
Optical power meter (AQ2140 + AQ2733)	Power measurement range: -110 to +10 dBm Wavelength range: 700 to 1700 nm Display resolution: 0.001 nm
Light source (AQ2140+AQ4213)	Emission wavelength: 1310 +/-20 nm, 1550+/- 20nm. Output level: -3+/-1 dBm. Stability: Within +/-0.005 dBm
Optical fiber cord	Single-mode optical fiber cord (short) FC/APC-FC/PC

8.8.2 Periodic Inspection

Periodic inspection is an effective measure for maintaining the system in normal condition over a long period of time, as well as for detecting a failure on the system at its early stage. The inspection interval is determined according to the system storage and its use frequency.
The periodic inspection comprises the mechanical inspection, performance test, adjustment and calibration.
Periodic inspection at six-month interval is recommended for this AQ8201-31/32/33 since its design ensures higher stability and reliability.

1) Mechanical inspection
This inspection checks the appearance and mechanical action of the AQ8201-31/32/33. The appearance is checked visually for damage or deformation. Also, the assembled parts are checked for looseness, and switches and stoppers are checked for smooth action.

2) Insertion loss
Figures 8-8 and 8-9 show the systems for measuring insertion loss.

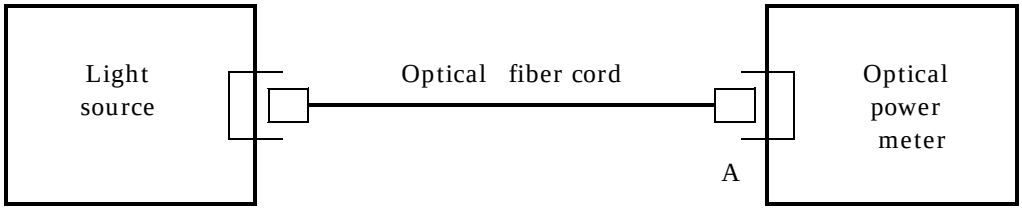


Figure 8-8 Insertion Loss Measurement System 1

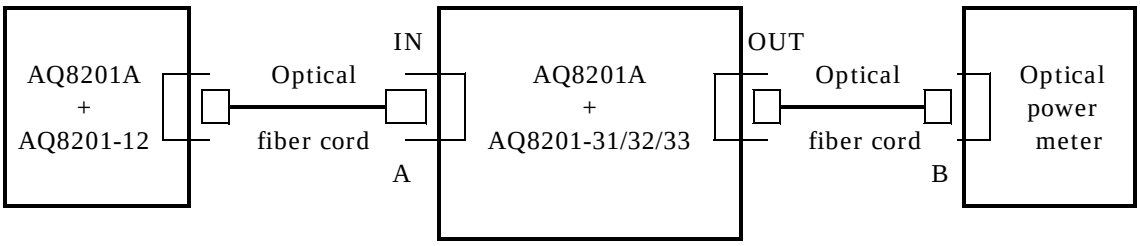


Figure 8-9 Insertion Loss Measurement System 2

① Set the attenuation of the module at 0 dB and open the shutter.

② Connect it as shown in Figure 8-8 and refer the optical power at A (0 dB). Then, measure the optical power at B after connecting the module as shown in Figure 8-9. This measurement indicates insertion loss.

8.8.3 Cleaning

Dusts or dirt on the module photo sensor or connector adapter can adversely affect the measurement accuracy. Clean the sensor and the adapter when the absolute value is wrong or before periodic inspection.

CAUTION

Don't try to touch inside of this AQ8201-31/32/33.

8.9 MWA MODULE(AQ8201-61)

8.9.1 Tester Units Used for the Test

Table 8-6 shows the tester units required for the maintenance.

Table 8-6 Tester Units Used for the Test (AQ8201-61)
Names in parentheses refer to our products.

Tester	Major performance
AQ8201A	
Optical power meter (AQ2140 + AQ2733)	Power measurement range: -110 to +10 dBm Wavelength range: 700 to 1700 nm Measurement Accuracy: Within +/-5 % Display resolution: 0.001 nm
Light source (AQ2140+AQ4213)	Emission wavelength: 1310 +/-20 nm, 1550+/-20 nm. Output level: -1 dBm minimum.
Optical fiber cord	Single-mode optical fiber cord (short) FC/PC on both ends.

8.9.2 Periodic Inspection

Periodic inspection is an effective measure for maintaining the system in normal condition over a long period of time, as well as for detecting a failure on the system at its early stage. The inspection interval is determined according to the system storage and its use frequency.
The periodic inspection comprises the mechanical inspection, performance test, adjustment and calibration.
Periodic inspection at six-month interval is recommended for this AQ8201-61 since its design ensures higher stability and reliability.

1) Mechanical inspection
This inspection checks the appearance and mechanical action of the AQ8201-61.
The appearance is checked visually for damage or deformation. Also, the assembled parts are checked for looseness, and switches and stoppers are checked for smooth action.

2) Basic performance test
This test compares performance of the AQ8201-61 against its specifications. The following describes procedure of the performance test which takes place succeeding the acceptance inspection, periodic inspection and repair work.
Basic performance of the module is tested in the following procedure.

Connect the module to the AQ8201A and turn the power on. If there is failure on the module, an error message appears on the AQ8201A display. Refer to Chapter 5 of this manual for the meanings of respective error messages.

① Checking the wavelength accuracy
Check the wavelength accuracy using the following measurement system.

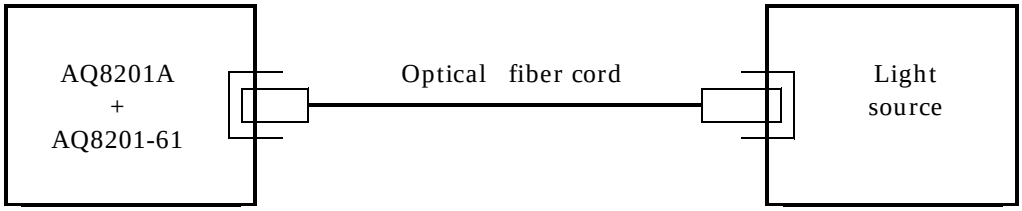


Figure 8-10 Measurement of Wavelength

1. Measure a light source for calibration like gas laser whose wavelength is known accurately using this module to check that the peak wavelength of the displayed wave form corresponds to that of the light source for calibration (within the wavelength accuracy). The wavelength accuracy of this module is +/-0.05 nm for 1500 to 1570 nm or +/-0.3 nm for 1200 to 1700 nm.

2. When the wavelength error is large, calibrate the wavelength as follows:
Select "WAVELENGTH CALIBRATION" on the calibration menu in the MISC mode and adjust the wavelength so that it becomes equal to that of the light source for calibration using the displayed software key menu.
Set the wavelength of the light source for calibration using the rotary knob.
Then press the <ENTER> software key to start wavelength calibration.

3. If the wavelength calibration function is not available since the wavelength error exceeds +/-5 nm or an error occurs for another wavelength even after calibration, the monochrometer is required to be readjusted. In this case, please contact us.

② Checking the level accuracy
Check the level accuracy using the following measurement system.

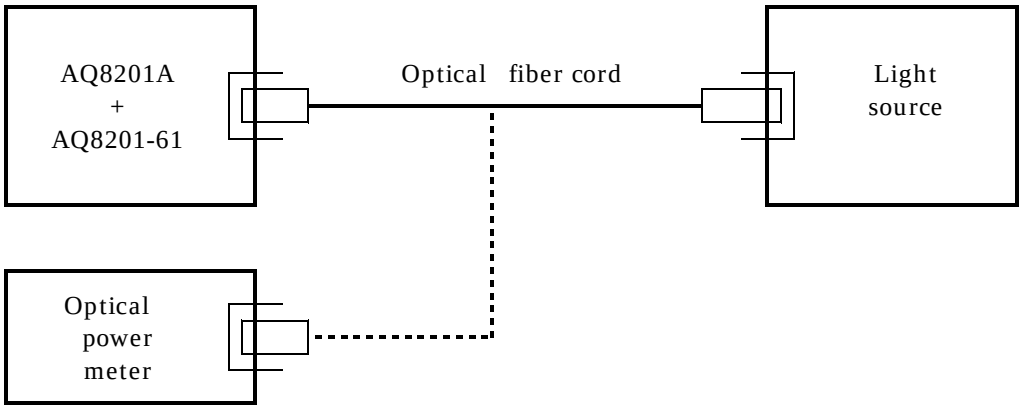


Figure 8-11 Measurement of Level

1. Prepare either a 1310- or 1550-nm light source with a narrow spectrum width so that all spectra are within 10 nm (e.g. gas laser and DFB-LD).

2. Connect the light source and the module using an SM optical fiber cord and set the resolution of the unit at 10 nm. Then, measure the level to obtain the peak level.

3. Remove the SM optical fiber cord from the module and connect it to an optical power meter to obtain the power value.

4. Check that the peak level value obtained by the module corresponds to the power value obtained by the optical power meter (within the level accuracy).
The accuracy of this module is +/-0.3 dB.

3) Calibration
No calibrating volume control or knob is provided to this module. When the absolute value is found to be incorrect in the reference wavelength, please contact us.

8.9.3 Cleaning

Dusts or dirt on the module photo sensor or connector adapter can adversely affect the measurement accuracy. Clean the sensor and the adapter when the absolute value is wrong or before replacing the adapter or periodic inspection.

CAUTION

Don't try to touch inside of this AQ8201-61.

8.10 RLM MODULE(AQ8201-71)

8.10.1 Tester Units Used for the Test

Table 8-7 shows the tester units required for the maintenance.

Table 8-7 Tester Units Used for the Test (AQ8201-71)
Names in parentheses refer to our products.

Tester	Major performance
AQ8201A	
Light source (AQ2140+AQ4211)	Emission wavelength: 1550 +/-20 nm. Output level: 0 to -5 dBm Optical modulation mode : CHOP 270 Hz
Optical fiber cord	Single-mode optical fiber cord (short) FC/PC on both ends.
Matched termination	Return loss : 65 dB min.
Master cord	SC/APC-FC/PC

8.10.2 Periodic Inspection

Periodic inspection is a useful means to maintain the performance of the device in normal condition for a long time and to find troubles early, and the timing is determined in view of the storage condition and operation frequency.
For the periodic inspection, mechanical check, performance test, adjustment and calibration are conducted.
Since the AQ8201-71 has been designed to high stability and reliability, we recommend you to conduct the periodic inspection every six months.

1) Check of dynamic range
Connect these instruments to the AQ8201-71 as shown in Figure 8-10 and measure reference reflection. Disconnect the master cord and connect the matched termination instead. Then, make sure that the indicated value is more than 65 dB.

2) Check of indication stability
Connect these instruments to the AQ8201-71 as shown in Figure 8-10 and check that the indication stability is less than +/-0.02 dB for five minutes when measuring reference reflection. (An optical output of the light source is 0 to 5dBm.)

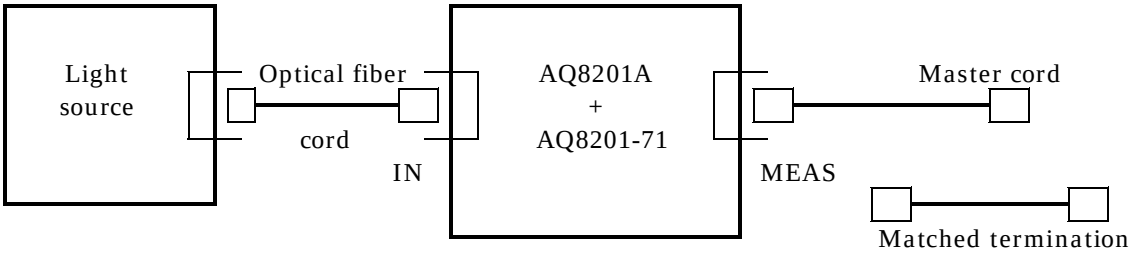


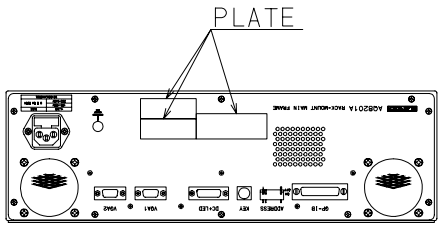
Figure 8-12 Performance Test

8.10.3 Cleaning

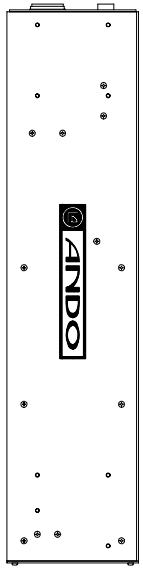
When dusts and dirts gather on the AQ8201-71 photo receiver and the master cord connection, the dynamic range, the relative measurement accuracy and the measurement stability come not to be assured. So, be sure to clean the AQ8201-71 photo receiver, the master cord connection and the connector of the optical fiber to be connected by using alcohol before starting the measurement. For cleaning the AQ8201-71 photo receiver and the master cord connection, we recommend you to use Cure-Top Stick Type (NTT International Co., Ltd.).

CAUTION

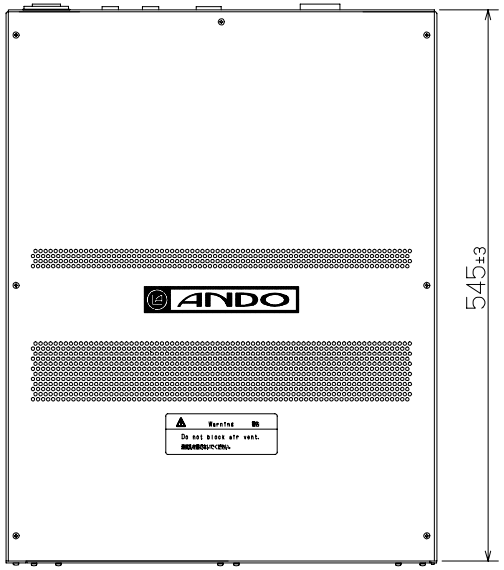
Don't try to touch inside of this AQ8201-71.



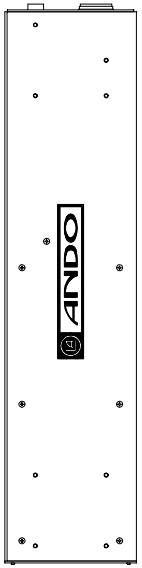
REAR VIEW



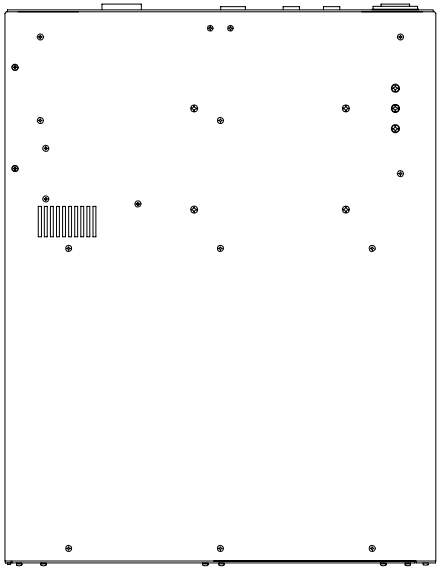
LEFT SIDE VIEW



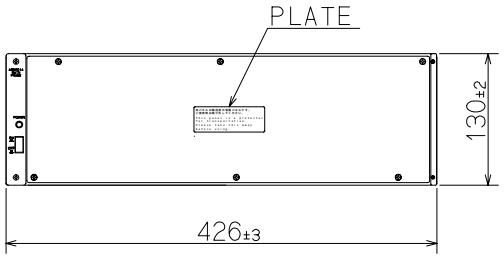
TOP VIEW



RIGHT SIDE VIEW



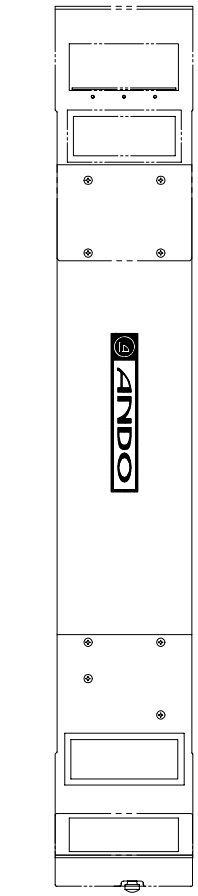
BOTTOM VIEW



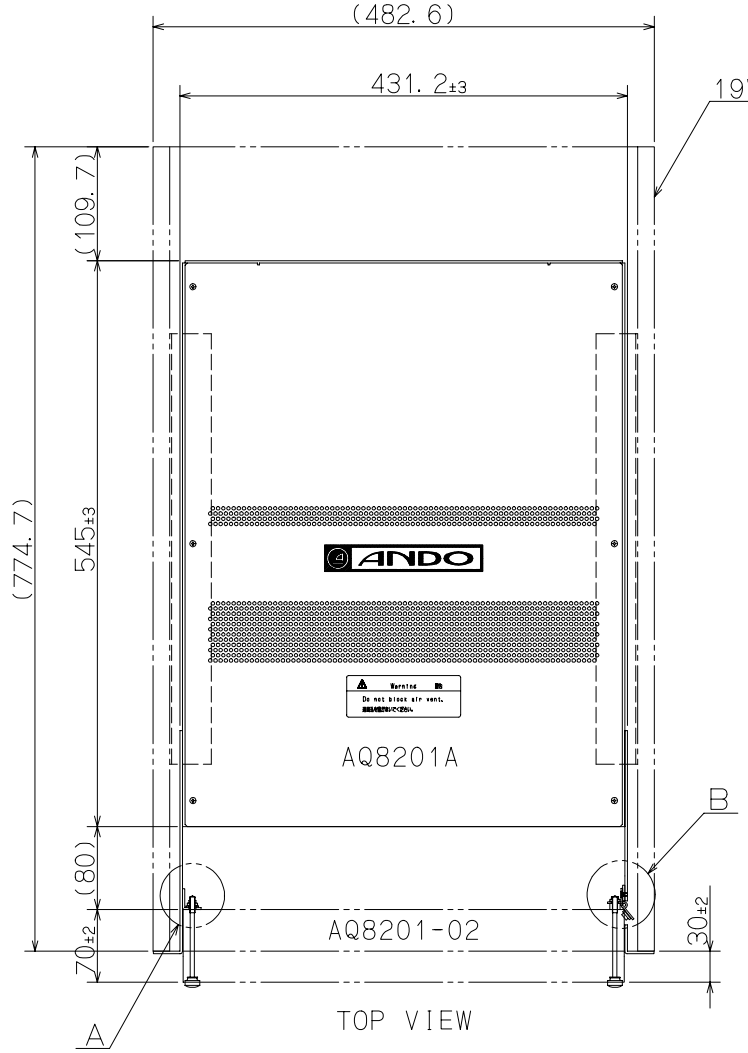
FRONT VIEW

DIMENSION SHOWN IN mm

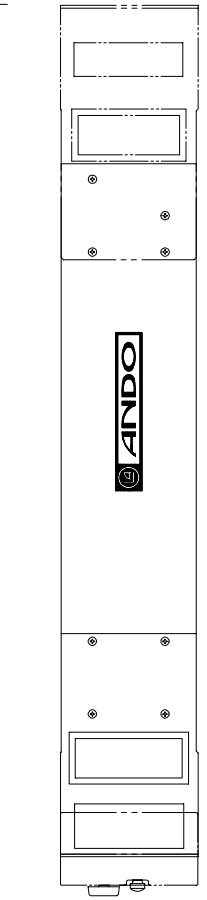
OUTSIDE VIEW OF AQ8201A RACK-MOUNT MAIN FRAME



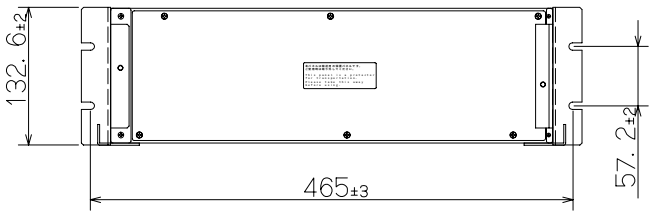
LEFT SIDE VIEW



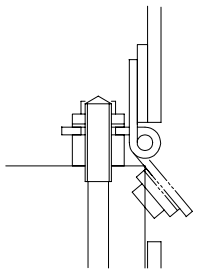
TOP VIEW



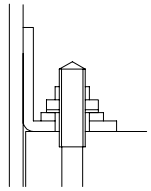
RIGHT SIDE VIEW



FRONT VIEW



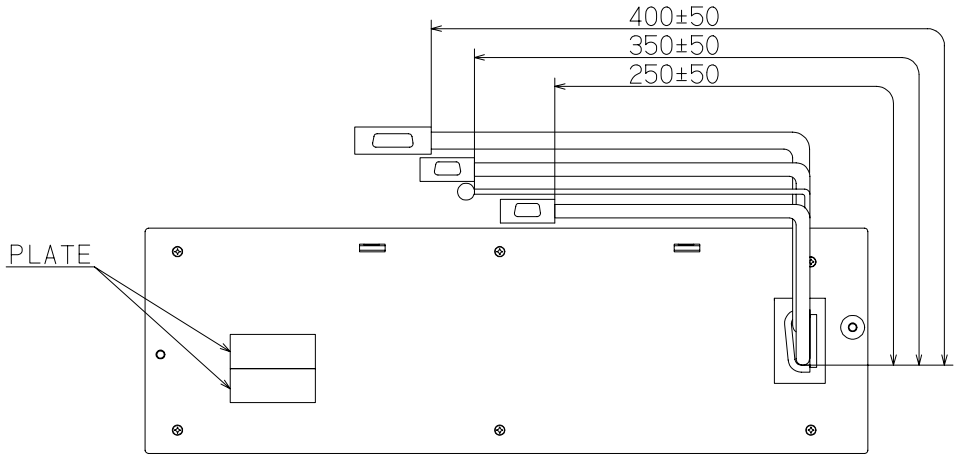
DETAIL OF B



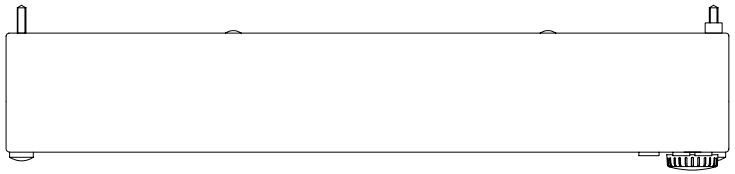
DETAIL OF A

OUTSIDE VIEW OF AQ8201A RACK-MOUNT MAIN FRAME

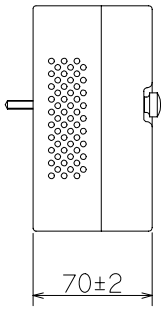
DIMENSION SHOWN IN mm



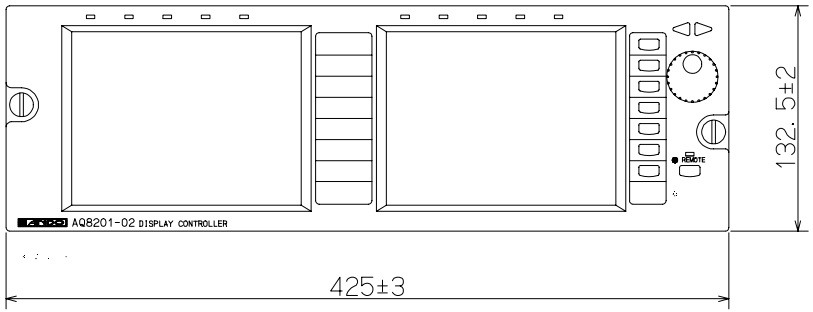
REAR VIEW



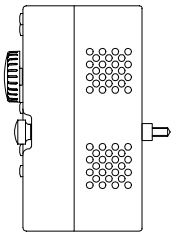
TOP VIEW



LEFT SIDE VIEW



FRONT VIEW

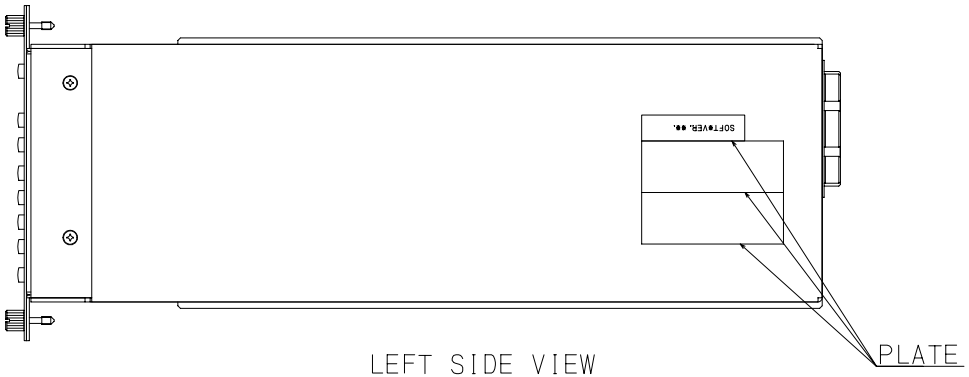


RIGHT SIDE VIEW

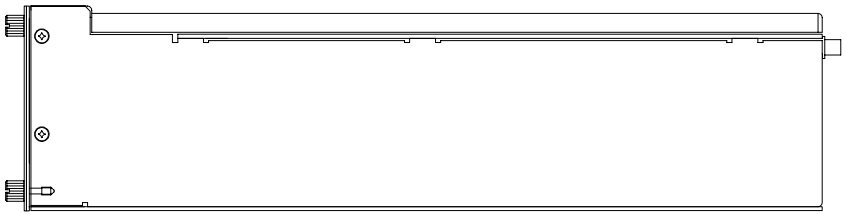
OUTSIDE VIEW OF AQ8201-02 DISPLAY CONTROLLER

DIMENSION SHOWN IN mm

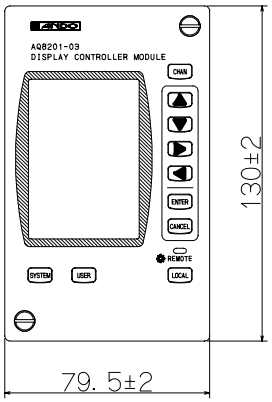
ASD-62521-02



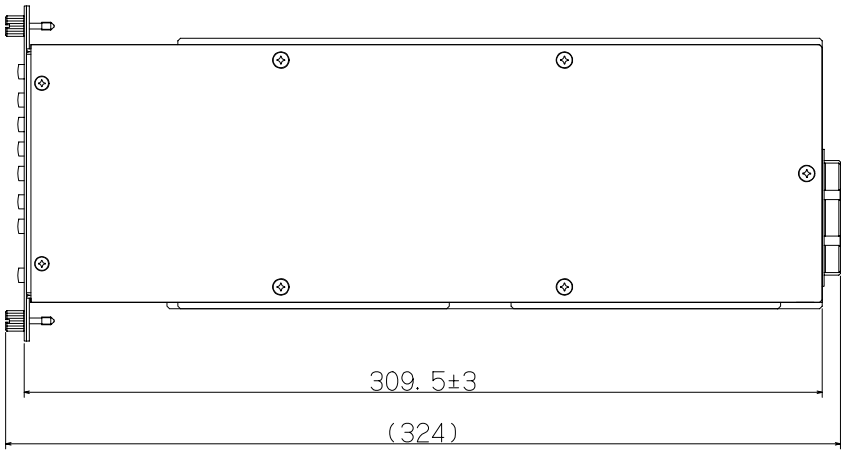
LEFT SIDE VIEW



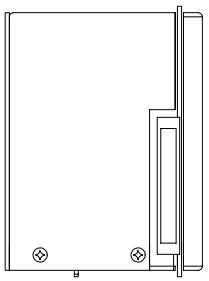
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

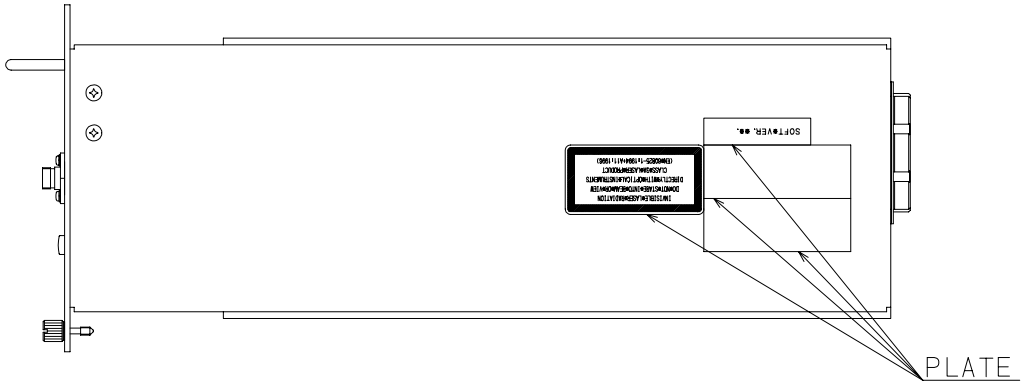


REAR VIEW

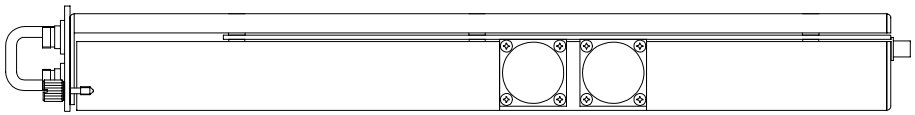
OUTSIDE VIEW OF AQ8201-03 DISPLAY CONTROLLER MODULE

DIMENSION SHOWN IN mm

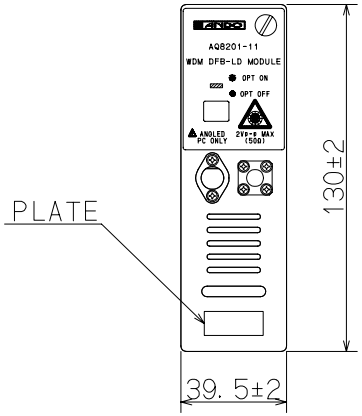
ASD-62521-03



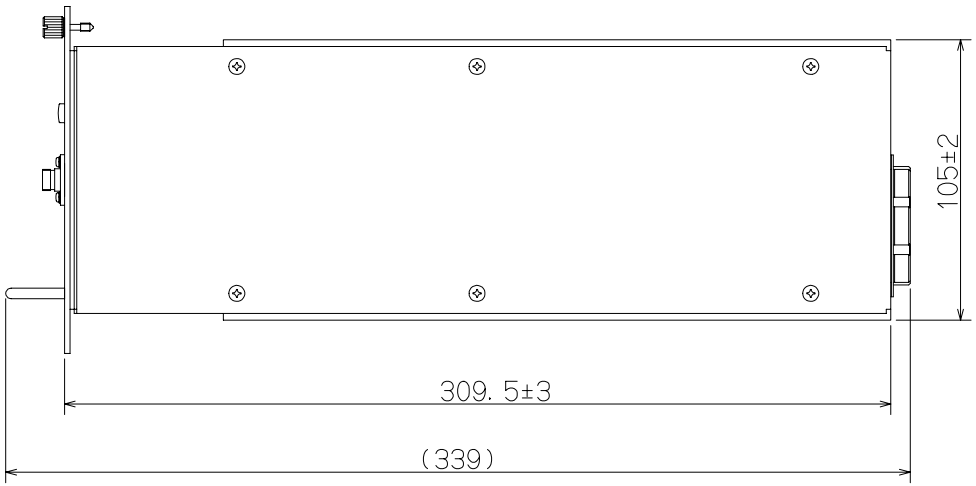
LEFT SIDE VIEW



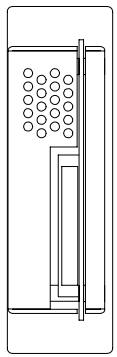
TOP VIEW



FRONT VIEW



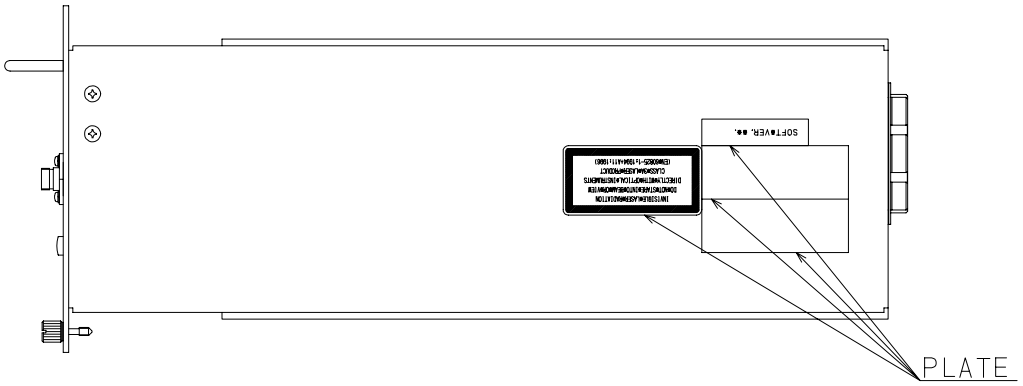
RIGHT SIDE VIEW



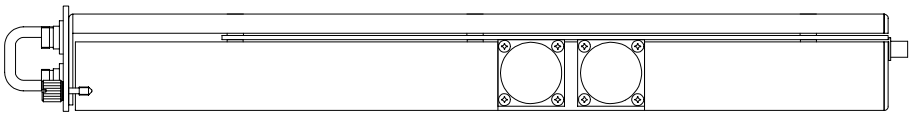
REAR VIEW

DIMENSION SHOWN IN mm

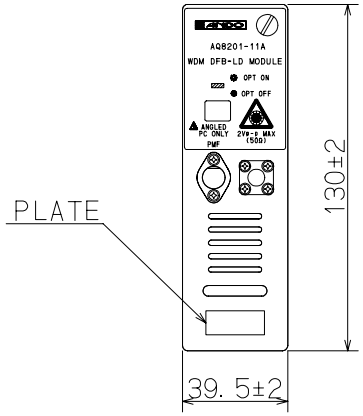
OUTSIDE VIEW OF AQ8201-11 WDM DFB-LD MODULE



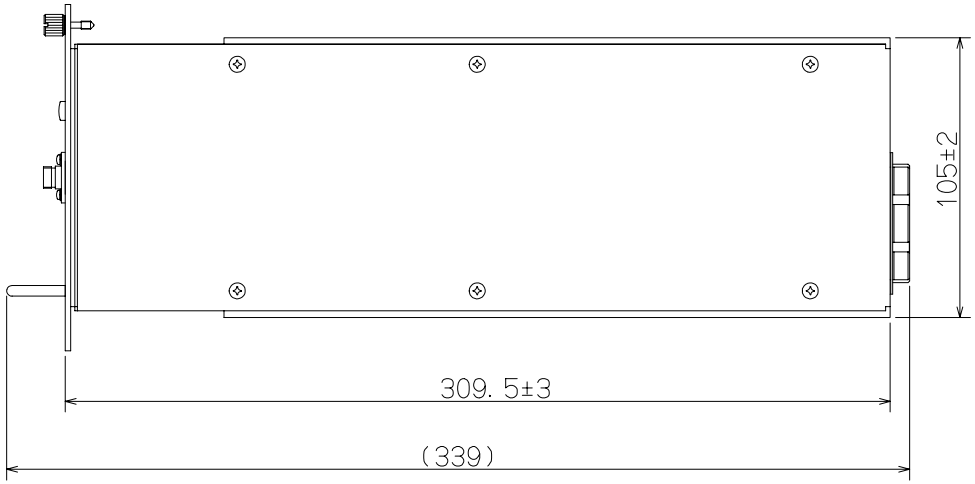
LEFT SIDE VIEW



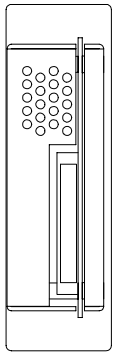
TOP VIEW



FRONT VIEW



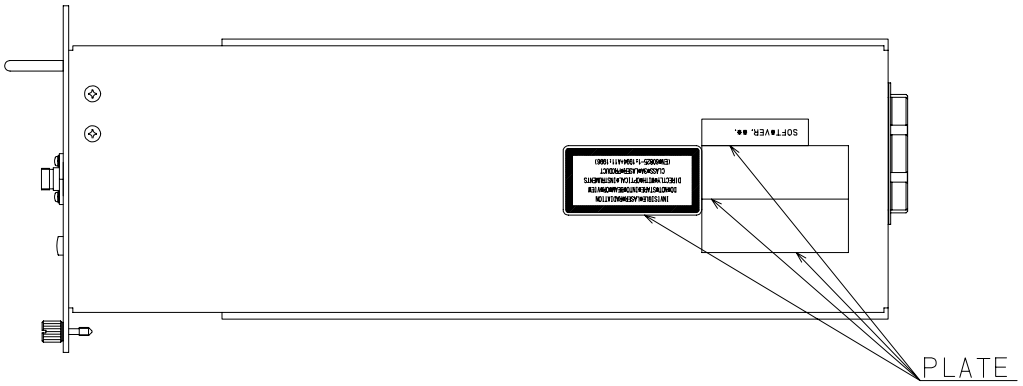
RIGHT SIDE VIEW



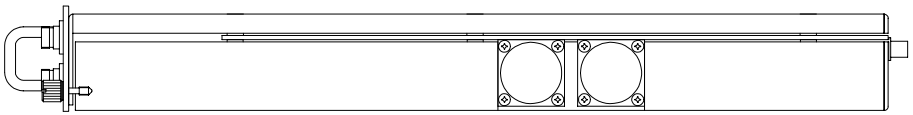
REAR VIEW

DIMENSION SHOWN IN mm

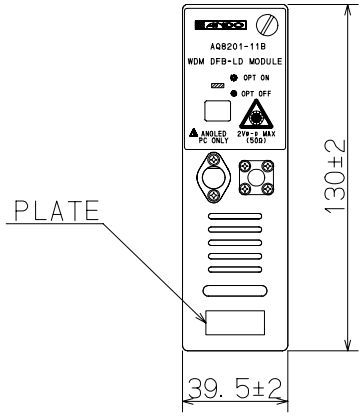
OUTSIDE VIEW OF AQ8201-11A WDM DFB-LD MODULE



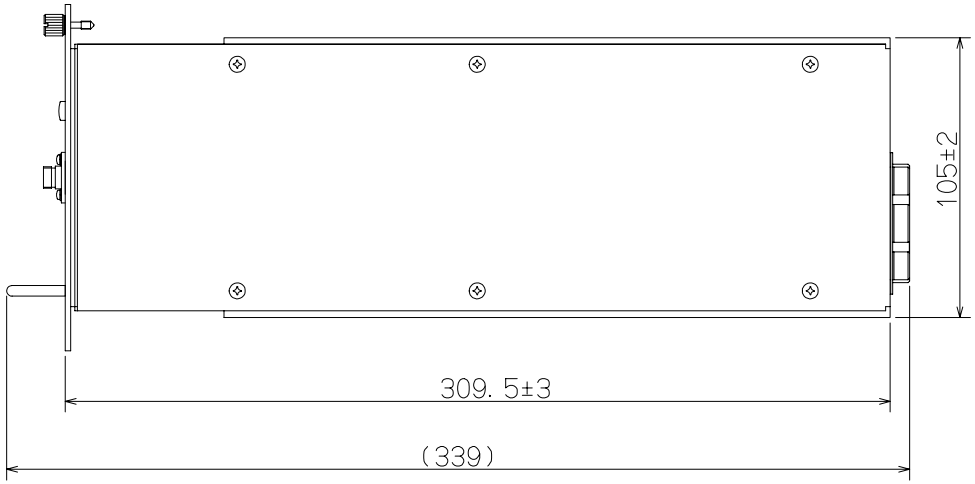
LEFT SIDE VIEW



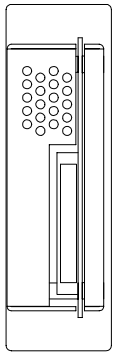
TOP VIEW



FRONT VIEW



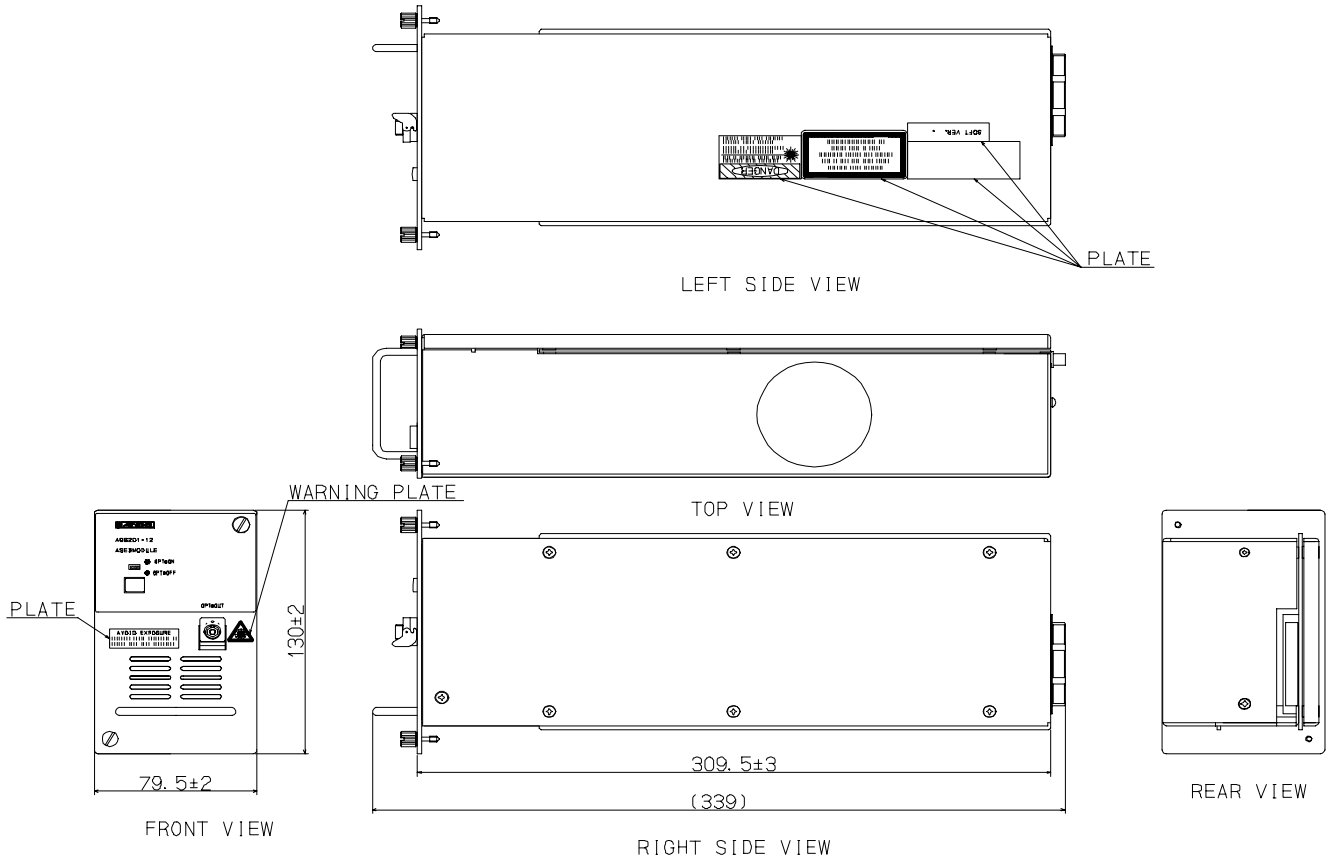
RIGHT SIDE VIEW



REAR VIEW

DIMENSION SHOWN IN mm

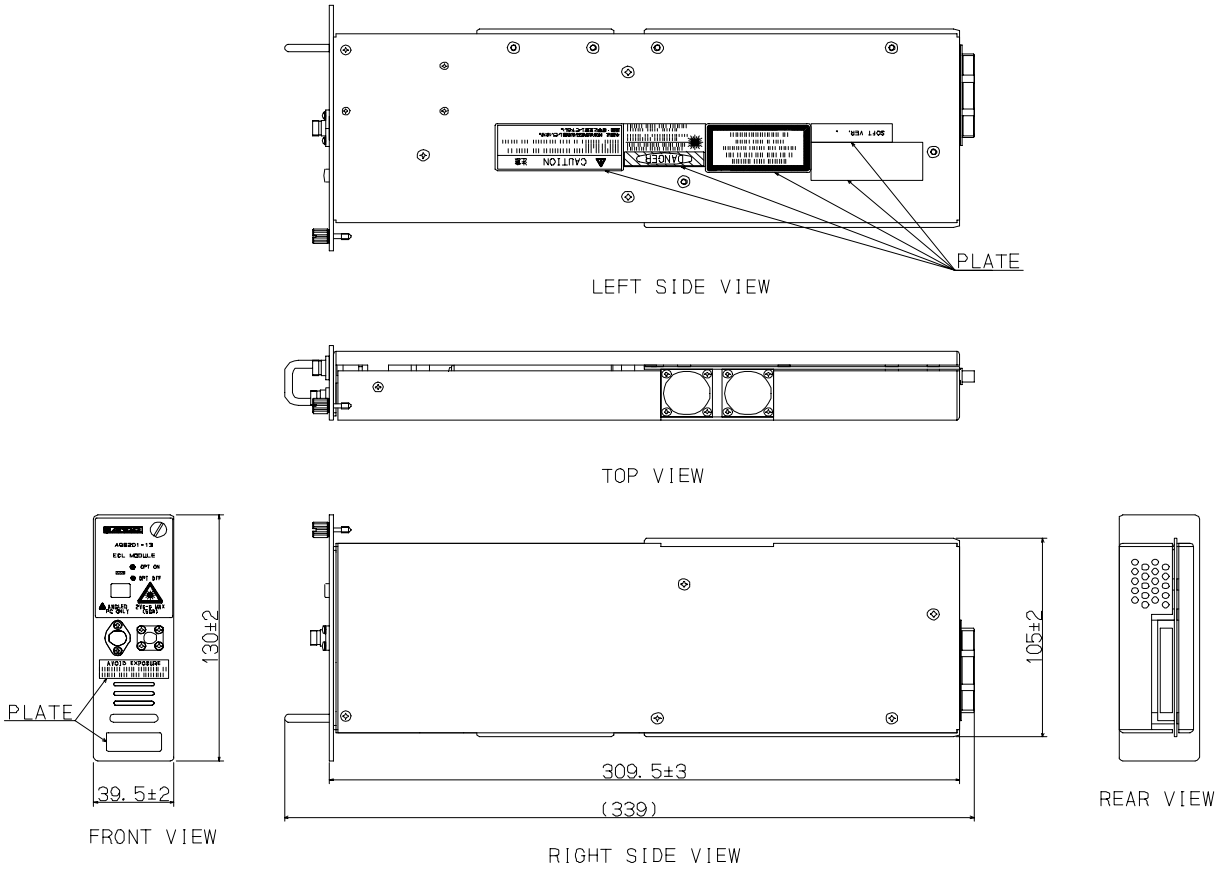
OUTSIDE VIEW OF AQ8201-11B WDM DFB-LD MODULE



OUTSIDE VIEW OF AQ8201-12 ASE MODULE

DIMENSION SHOWN IN mm

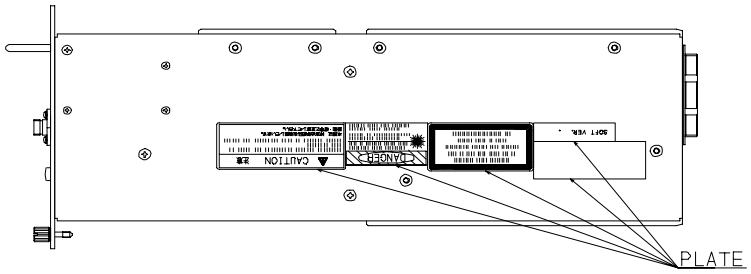
ASD-62521-12



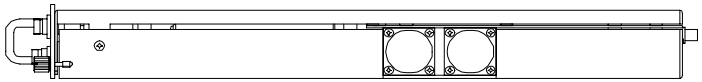
OUTSIDE VIEW OF AQ8201-13 ECL MODULE

DIMENSION SHOWN IN mm

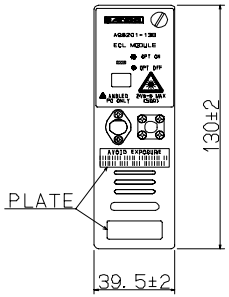
ASD-62521-131



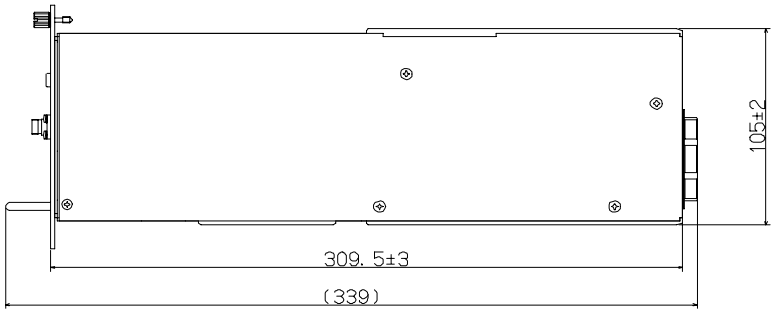
LEFT SIDE VIEW



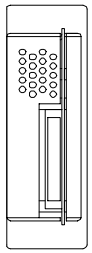
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

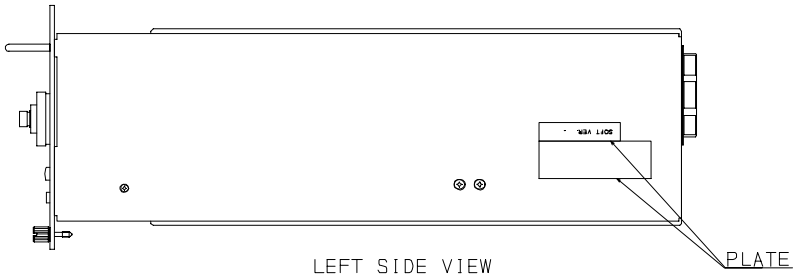


REAR VIEW

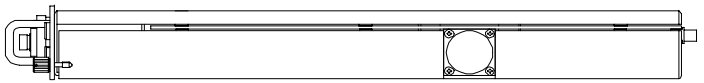
OUTSIDE VIEW OF AQ8201-13B ECL MODULE

DIMENSION SHOWN IN mm

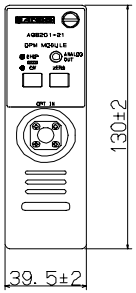
ASD-62521-133



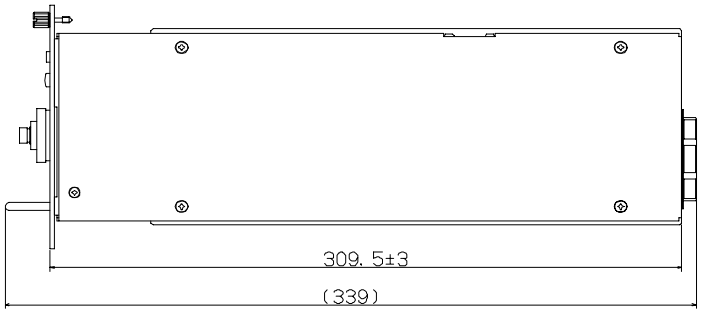
LEFT SIDE VIEW



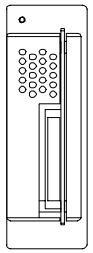
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

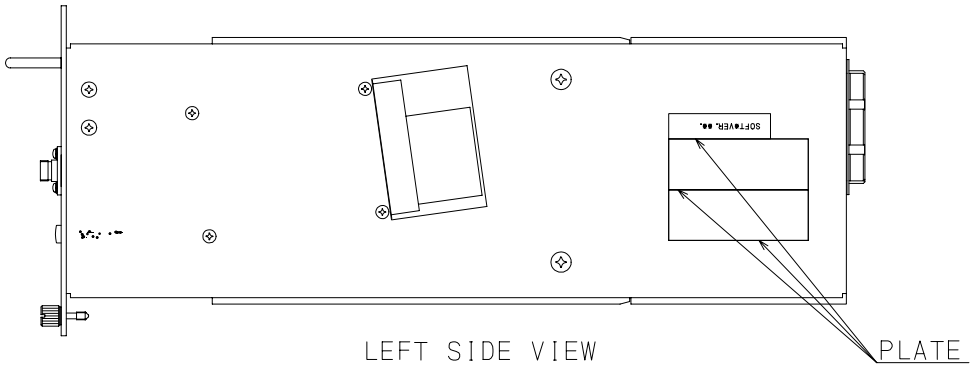


REAR VIEW

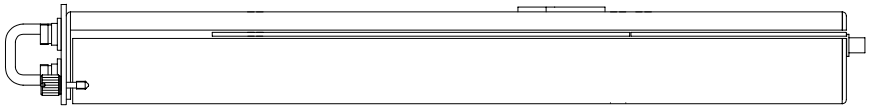
OUTSIDE VIEW OF AQ8201-21 OPM MODULE

DIMENSION SHOWN IN mm

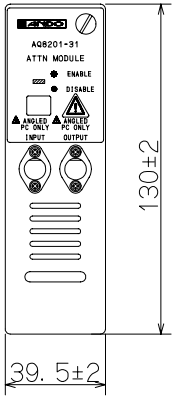
ASD-62521-21



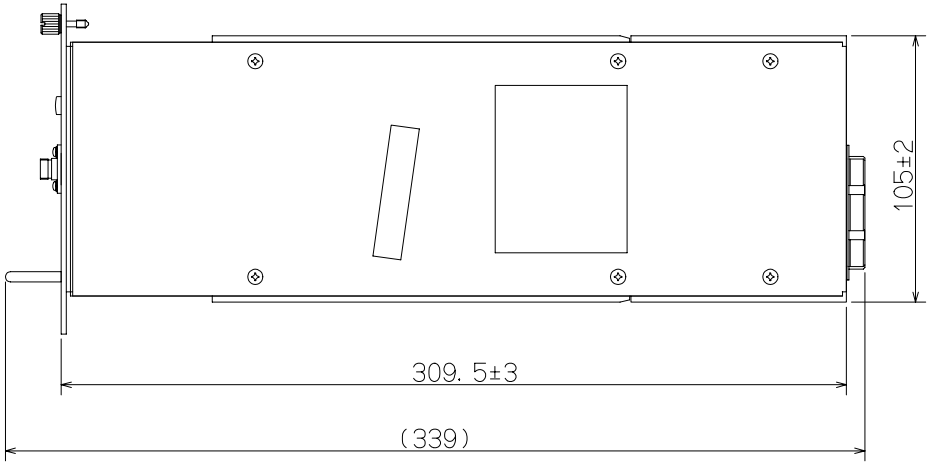
LEFT SIDE VIEW



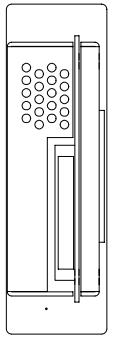
TOP VIEW



FRONT VIEW



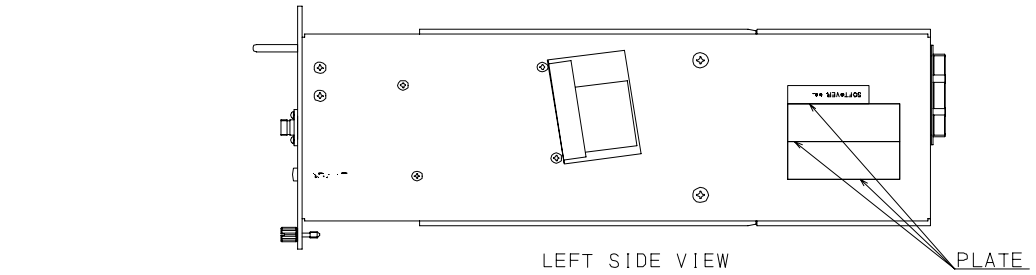
RIGHT SIDE VIEW



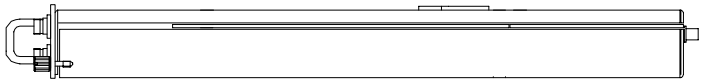
REAR VIEW

OUTSIDE VIEW OF AQ8201-31 ATTN MODULE

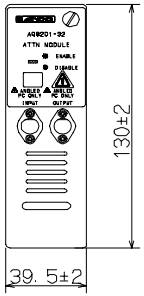
DIMENSION SHOWN IN mm



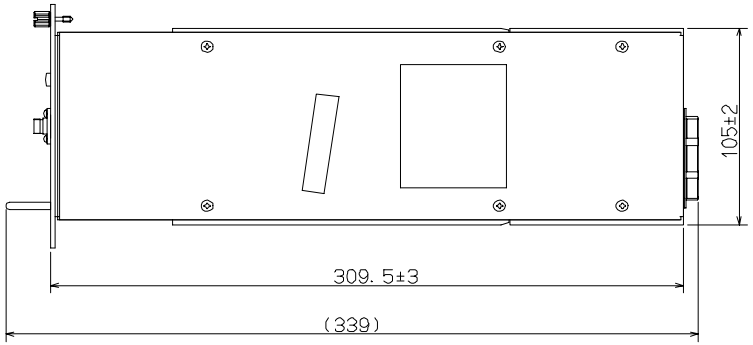
LEFT SIDE VIEW



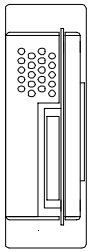
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

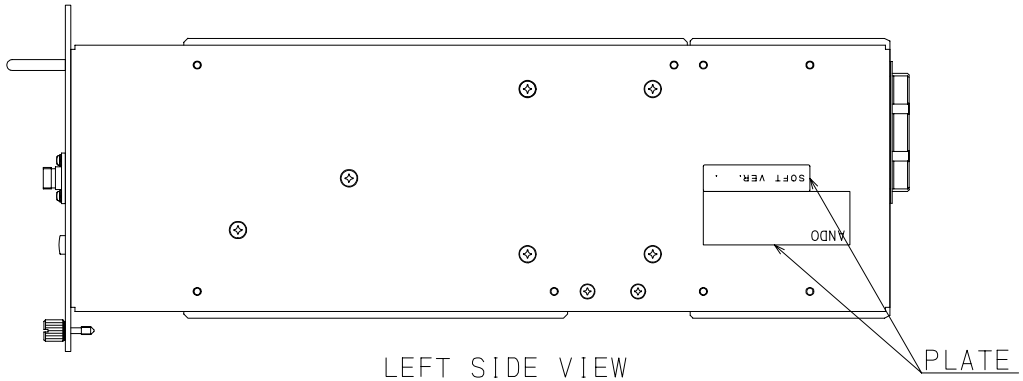


REAR VIEW

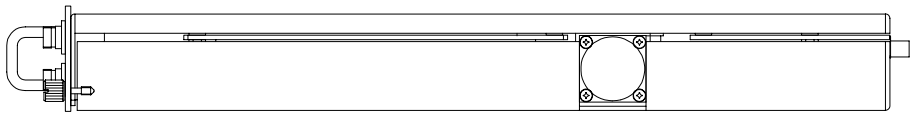
OUTSIDE VIEW OF AQ8201-32 ATTN MODULE

DIMENSION SHOWN IN mm

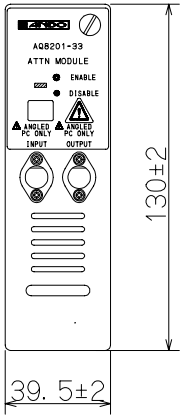
ASD-62521-32



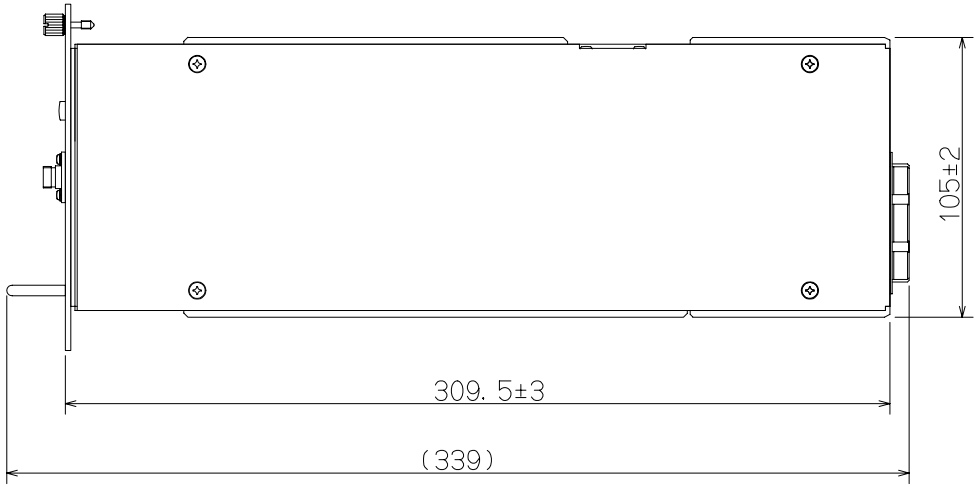
LEFT SIDE VIEW



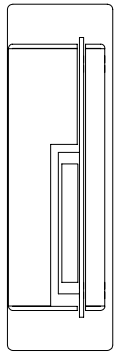
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

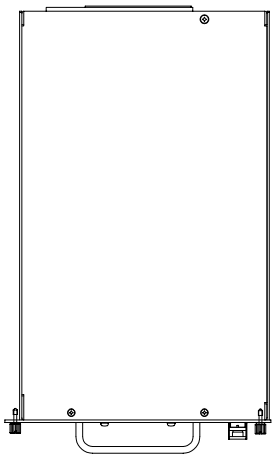


REAR VIEW

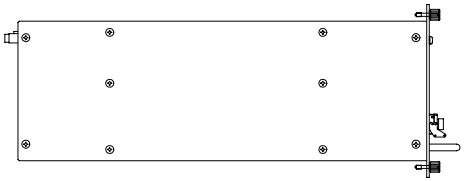
OUTSIDE VIEW OF AQ8201-33 ATTN MODULE

DIMENSION SHOWN IN mm

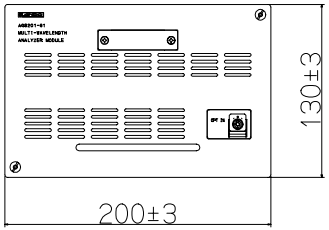
ASD-62521-34



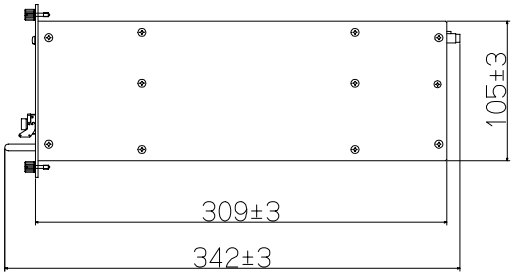
TOP VIEW



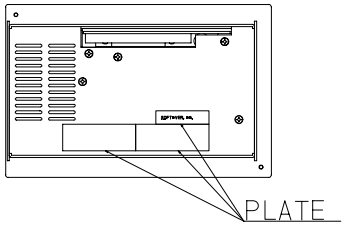
LEFT SIDE VIEW



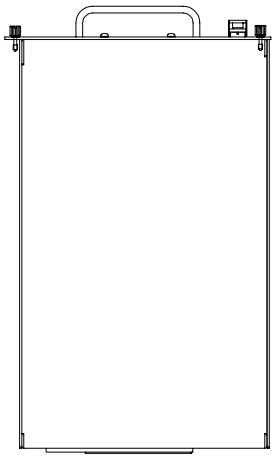
FRONT VIEW



RIGHT SIDE VIEW



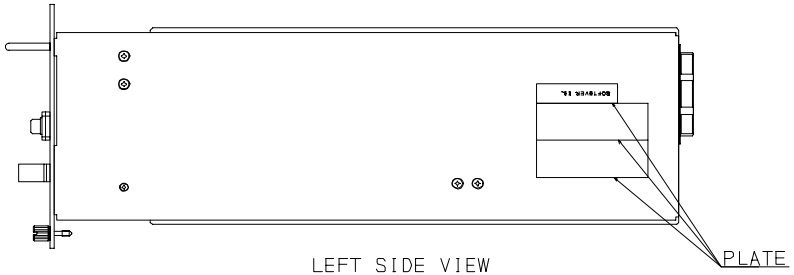
REAR VIEW



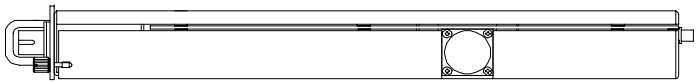
BOTTOM VIEW

DIMENSION SHOWN IN mm

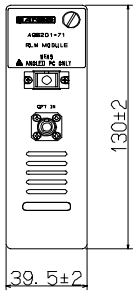
OUTSIDE VIEW OF AQ8201-61 MULTI-WAVELENGTH ANALYZER MODULE



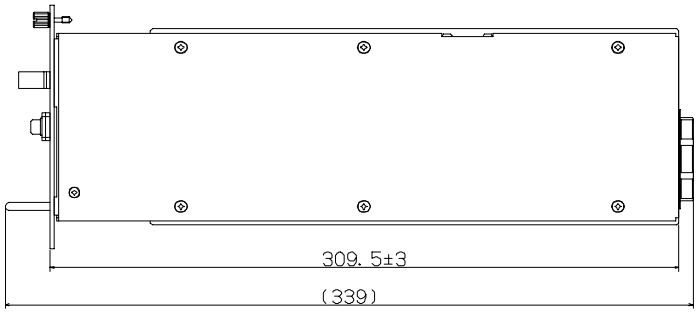
LEFT SIDE VIEW



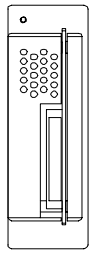
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

OUTSIDE VIEW OF AQ8201-71 RLM MODULE

DIMENSION SHOWN IN mm

ASD-62521-71