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AQ8203
HALFSIZE FRAME

Instruction Manual

ANDO ELECTRIC CO., LTD

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AS-62559-2 Rev.1.1

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WARRANTY

All Ando Electric's products have been inspected with our severe quality assurance standards.However, if any defect or trouble occurring during transportation is found, contact to our service agency.Do not repair a defective ANDO's product by yourself in order to avoid any physical damage. A repair of defective ANDO's product must be performed by a service engineer approved by ANDO ELECTRIC CO., LTD.

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

This section explains the meaning of the following items described in this manual and how to use the device.

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

   1) Importance of information
   The most important information is "DANGER", followed by "WARNING", "CAUTION" and "NOTE" in this order based on the meanings written in 2) below.

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

   WARNING: Indicates dangerous situation which may lead to death, serious or non-serious injury or equipment damage.

   CAUTION: Indicates situation which may lead to non-serious injury or interrupted system operation.

   NOTE: Supplementary explanation on "Exception", "Modification" or "Limitation" for the main unit.

   * Definition of serious injury: Injuries like lost sight, burn (high or low temperature), an electric shock, broken bone and toxicity which may lead to an aftereffect or require hospitalization or doctor's attention for a long time.
   * Definition of non-serious injury: Injuries like burn and an electric shock which do not require hospitalization or doctor's attention for a long time.

2. Introduction to Reference
   Indicates the page to he referred to.

   Example: Reference to page 2-1 is indicated as "(→ 2-1)" using an arrow and the page.

3. Expression of Operation Keys in This Manual
   Operation keys are expressed as follows:

   [ ]: Indicates expressions on the front and rear panels.

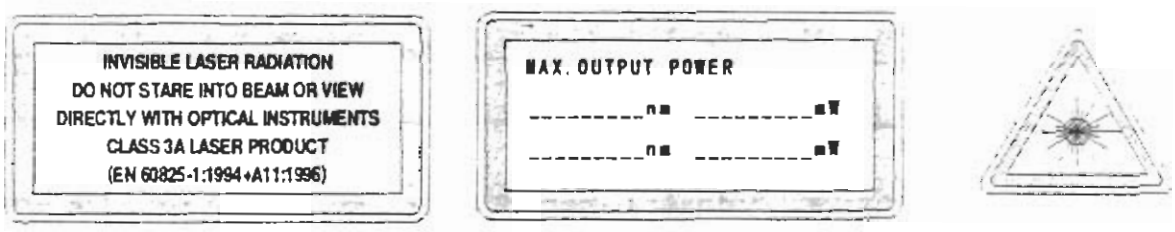
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Initial Safety Information for Laser Source Module

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	AQ8201-13
Laser Type	ASE	DFB-Laser
Laser Class (According to EN60825-1:1994+A11:1996)	3A	3A
Output Power	+10dBm min	+10dBm min
Beam Diameter	10μm	10μm
Numerical Aperture	0.1	0.1
Wavelength	1550 ± 20nm	1460 to 1580 nm



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.

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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.

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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.

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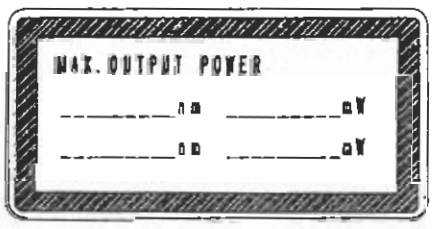
Sicherheitsinformation für Laser Quellen

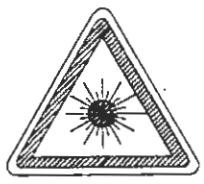
Die Spezifikationen für die Lasereinschübe sind wie folgt:

	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	AQ8201-13	
Laser Typ	ASE	DFB-Laser	
Laser Klasse (Entsprechend EN60825-1:1994+A11:1996)	3A	3A	
Ausgangsleistung	+10dBm min	+10dBm min	
Strahldurchmesser	10µm	10µm	
Numerische Apertur	0.1	0.1	
Wellenlänge	1550 ± 20nm	1460 bis 1580 nm	







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.

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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 qualifiziertem 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.

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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.

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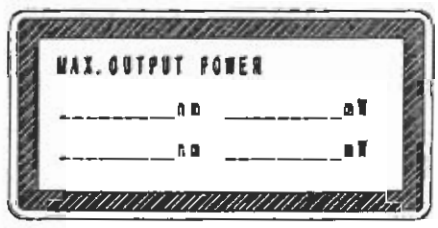
Informations et Consignew de Sécurité Relatives à l'Utilisation des Lasers.

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	AQ8201-13
Type de Laser	ASE	DFB-Laser
Classe du Laser (Conforme au STD EN60825-1:1994+A11:1996)	3A	3A
Puissance de Sortie	+10dBm min	+10dBm min
Diamêtre du Faisceau	10µm	10µm
Ouverture Numériqcue	0.1	0.1
Longueur d'Onde	1550 ± 20nm	1460 à 1580 nm







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.

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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.

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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.

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○ 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.

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◎ 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.

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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.

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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.

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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.

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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.

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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.

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CONTENTS

1.System Overview ---- 1-1
1.1 System Outline ---- 1-1
1.2 System Configuration ---- 1-2
1.3 Specification ---- 1-4
1.3.1 HALFSIZE FRAME(AQ8203) ---- 1-4
1.3.2 WDM DFB-LD MODULE(AQ8201-11) ---- 1-5
1.3.3 WDM DFB-LD MODULE(AQ8201-11A) ---- 1-7
1.3.4 WDM DFB-LD MODULE(AQ8201-11B) ---- 1-10
1.3.5 ASE MODULE(AQ8201-12) ---- 1-13
1.3.6 ECL MODULE(AQ8201-13) ---- 1-14
1.3.7 OPM MODULE(AQ8201-21) ---- 1-15
1.3.8 ATTN MODULE(AQ8201-31/32/33) ---- 1-17
1.3.9 RLM MODULE(AQ8201-71) ---- 1-19

2.Before Starting System Operation ---- 2-1
2.1 Unpacking and Acceptance Inspection ---- 2-1
2.1.1 Mechanical Operation Checkout ---- 2-1
2.1.2 System Operation Test ---- 2-1
2.2 If Any Defect or Trouble is Found ---- 2-1
2.3 Repacking ---- 2-1
2.4 Safety of Electric Systems ---- 2-2
2.4.1 Polarity of Power Cords ---- 2-2
2.4.2 Protective Grounding ---- 2-2
2.4.3 Fuse Replacement ---- 2-3

3.System Operation Notes ---- 3-1
3.1 HALFSIZE FRAME(AQ8203) ---- 3-1
3.1.1 Handling Notes ---- 3-1
3.2 WDM DFB-LD MODULE(AQ8201-11/11A/11B) ---- 3-2
3.2.1 Handling Notes ---- 3-2
3.2.2 Application Notes on Optical System Components ---- 3-2
3.3 ASE MODULE(AQ8201-12) ---- 3-3
3.3.1 Handling Notes ---- 3-3
3.3.2 Application Notes on Optical System Components ---- 3-3
3.4 ECL MODULE(AQ8201-13) ---- 3-4
3.4.1 Handling Notes ---- 3-4
3.4.2 Application Notes on Optical System Components ---- 3-4
3.5 OPM MODULE(AQ8201-21) ---- 3-5
3.5.1 Handling Notes ---- 3-5
3.5.2 Application Notes on Optical System Components ---- 3-5
3.6 ATTN MODULE(AQ8201-31/32/33) ---- 3-6
3.6.1 Handling Notes ---- 3-6
3.6.2 Application Notes on Optical System Components ---- 3-6
3.7 RLM MODULE(AQ8201-71) ---- 3-7
3.7.1 Handling Notes ---- 3-7
3.7.2 Application Notes on Optical System Components ---- 3-7

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4.System Functions ---- 4-1
4.1 HALFSIZE FRAME(AQ8203) ---- 4-1
4.1.1 Explanation of Each Section ---- 4-1
4.2 WDM DFB-LD MODULE(AQ8201-11/11A/11B) ---- 4-3
4.2.1 Explanation of Each Section ---- 4-3
4.3 ASE MODULE(AQ8201-12) ---- 4-5
4.3.1 Explanation of Each Section ---- 4-5
4.4 ECL MODULE(AQ8201-13) ---- 4-6
4.4.1 Explanation of Each Section ---- 4-6
4.5 OPM MODULE(AQ8201-21) ---- 4-7
4.5.1 Explanation of Each Section ---- 4-7
4.6 ATTN MODULE(AQ8201-31/32/33) ---- 4-8
4.6.1 Explanation of Each Section ---- 4-8
4.7 RLM MODULE(AQ8201-71) ---- 4-9
4.7.1 Explanation of Each Section ---- 4-9

5.System Operation ---- 5-1
5.1 Before Turning ON ---- 5-1
5.1.1 Cleaning of Optical Connectors ---- 5-2
5.1.2 Mounting/Dismounting the Blank Panel ---- 5-3
5.1.3 Module Mounting on the Frame ---- 5-4
5.1.4 Mounting/Dismounting the Universal Adaptor ---- 5-6
5.2 Basic Operation ---- 5-7
5.2.1 Overview ---- 5-7
5.2.2 Outline of panel explanation ---- 5-7
5.2.3 Display kind ---- 5-8
5.2.4 Screen transition ---- 5-8
5.2.5 Operation explanation of initialization display ---- 5-9
5.2.6 Operation explanation of system display ---- 5-10
5.2.7 Operation explanation of version display ---- 5-12
5.2.8 Operation explanation of summary display ---- 5-13
5.3 Method of Operating Various Modules(Single display) ---- 5-16
5.3.1 WDM DFB-LD MODULE(AQ8201-11/11A/11B) ---- 5-16
5.3.2 ASE MODULE(AQ8201-12) ---- 5-27
5.3.3 ECL MODULE(AQ8201-13) ---- 5-30
5.3.4 OPM MODULE(AQ8201-21) ---- 5-45
5.3.5 ATTN MODULE(AQ8201-31/32/33) ---- 5-58
5.3.6 RLM MODULE(AQ8201-71) ---- 5-63
5.4 Control via GP-IB(IEEE488 Standards) ---- 5-73
5.4.1 Interface Function ---- 5-73
5.4.2 Explanation of Basic Function ---- 5-74
5.4.3 Interface Message ---- 5-75
5.4.4 Common Command ---- 5-76
5.4.5 Control by Program Code ---- 5-77
5.4.6 Error Output Format ---- 5-88
5.4.7 Register ---- 5-90

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6.Circuit and Structure ---- 6-1
6.1 HALFSIZE FRAME(AQ8203) ---- 6-1
6.1.1 Circuit ---- 6-1
6.1.2 Structure ---- 6-2
6.2 WDM DFB-LD MODULE(AQ8201-11/11A/11B) ---- 6-3
6.2.1 Circuit ---- 6-3
6.2.2 Structure ---- 6-4
6.3 ASE MODULE(AQ8201-12) ---- 6-5
6.3.1 Circuit ---- 6-5
6.3.2 Structure ---- 6-6
6.4 ECL MODULE(AQ8201-13) ---- 6-7
6.4.1 Circuit ---- 6-7
6.4.2 Structure ---- 6-8
6.5 OPM MODULE(AQ8201-21) ---- 6-9
6.5.1 Circuit ---- 6-9
6.5.2 Structure ---- 6-10
6.6 ATTN MODULE(AQ8201-31/32/33) ---- 6-11
6.6.1 Circuit ---- 6-11
6.6.2 Structure ---- 6-12
6.7 RLM MODULE(AQ8201-71) ---- 6-13
6.7.1 Circuit ---- 6-13
6.7.2 Structure ---- 6-14

7.Trouble Shooting Guide ---- 7-1
7.1 HALFSIZE FRAME(AQ8203) ---- 7-1
7.2 WDM DFB-LD MODULE(AQ8201-11/11A/11B) ---- 7-4
7.3 ASE MODULE(AQ8201-12) ---- 7-5
7.4 ECL MODULE(AQ8201-13) ---- 7-6
7.5 OPM MODULE(AQ8201-21) ---- 7-7
7.6 ATTN MODULE(AQ8201-31/32/33) ---- 7-8
7.7 RLM MODULE(AQ8201-71) ---- 7-9

8.Maintenance ---- 8-1
8.1 HALFSIZE FRAME(AQ8203) ---- 8-1
8.2 WDM DFB-LD MODULE(AQ8201-11/11A/11B) ---- 8-1
8.2.1 Tester Units Used for the Test ---- 8-1
8.2.2 Periodic Inspection ---- 8-2
8.2.3 Cleaning ---- 8-2
8.3 ASE MODULE(AQ8201-12) ---- 8-3
8.3.1 Tester Units Used for the Test ---- 8-3
8.3.2 Periodic Inspection ---- 8-4
8.3.3 Cleaning ---- 8-4
8.4 ECL MODULE(AQ8201-13) ---- 8-5
8.4.1 Tester Units Used for the Test ---- 8-5
8.4.2 Periodic Inspection ---- 8-6
8.4.3 Cleaning ---- 8-6
8.5 OPM MODULE(AQ8201-21) ---- 8-7
8.5.1 Tester Units Used for the Test ---- 8-7
8.5.2 Periodic Inspection ---- 8-8
8.5.3 Cleaning ---- 8-9
8.6 ATTN MODULE(AQ8201-31/32/33) ---- 8-10
8.6.1 Tester Units Used for the Test ---- 8-10
8.6.2 Periodic Inspection ---- 8-11
8.6.3 Cleaning ---- 8-11
8.7 RLM MODULE(AQ8201-71) ---- 8-12
8.7.1 Tester Units Used for the Test ---- 8-12
8.7.2 Periodic Inspection ---- 8-13
8.7.3 Cleaning ---- 8-13

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FIGURE & TABLE CONTENTS

Figure 1-1 System Outline Figure ---- 1-1
Figure 1-2 Polarization Maintaining Fiber(PMF) ---- 1-8

Figure 2-1 Three-pole Power Cord (For Japan) ---- 2-2
Figure 2-2 Replacement of Power Fuse ---- 2-3

Figure 4-1 Configuration of AQ8203 ---- 4-1
Figure 4-2 Configuration of AQ8201-11/11A/11B ---- 4-3
Figure 4-3 Configuration of AQ8201-12 ---- 4-5
Figure 4-4 Configuration of AQ8201-13 ---- 4-6
Figure 4-5 Configuration of AQ8201-21 ---- 4-7
Figure 4-6 Configuration of AQ8202-31/32/33 ---- 4-8
Figure 4-7 Configuration of AQ8201-71 ---- 4-9

Figure 5-1-1 Cleaning of Optical Connector Port ---- 5-2
Figure 5-1-2 Mounting/Dismounting the Blank Panel ---- 5-3
Figure 5-1-3 Method of Installing Module ---- 5-4
Figure 5-1-4 Method of Detaching Module ---- 5-4
Figure 5-1-5 Method of Dismounting the Universal Adaptor ---- 5-6
Figure 5-1-6 Method of Mounting the Universal Adaptor ---- 5-6
Figure 5-2-1 AQ8203 operation and display panel ---- 5-7
Figure 5-2-2 Screen transition ---- 5-8
Figure 5-2-3 Initialize display ---- 5-9
Figure 5-2-4 System display ---- 5-10
Figure 5-2-5 Back light adjustment display ---- 5-10
Figure 5-2-6 Contrast adjustment display ---- 5-11
Figure 5-2-7 Buzzer adjustment display ---- 5-11
Figure 5-2-8 GPIB address modification display ---- 5-12
Figure 5-2-9 Version display ---- 5-12
Figure 5-2-10 Summary display ---- 5-13
Figure 5-2-11 Operation method when summary display ---- 5-14
Figure 5-2-12 Summary display of each module ---- 5-15
Figure 5-3-1 Single display of AQ8201-11/11A/11B control ---- 5-16
Figure 5-3-2 Screen to set the optical output ---- 5-18
Figure 5-3-3 Screen to set the optical modulation 1 ---- 5-19
Figure 5-3-4 Screen to set the optical modulation 2 ---- 5-20
Figure 5-3-5 Screen to set the coherence control ---- 5-21
Figure 5-3-6 Screen to set the wavelength/frequency display ---- 5-22
Figure 5-3-7 Screen to set the output wavelength ---- 5-23
Figure 5-3-8 Screen to set the output wavelength offset ---- 5-24
Figure 5-3-9 Screen to set the optical attenuation ---- 5-25
Figure 5-3-10 Screen to set the output power offset ---- 5-26
Figure 5-3-11 Single display of AQ8201-12 control ---- 5-27
Figure 5-3-12 Screen to set the optical output ---- 5-28
Figure 5-3-13 Screen to set the optical attenuation ---- 5-29
Figure 5-3-14 Single display of AQ8201-13 control ---- 5-30
Figure 5-3-15 Screen to set the optical output ---- 5-32
Figure 5-3-16 Screen to set the optical modulation 1 ---- 5-33
Figure 5-3-17 Screen to set the optical modulation 2 ---- 5-34
Figure 5-3-18 Screen to set the coherence control ---- 5-35
Figure 5-3-19 Screen to set the wavelength/frequency display ---- 5-36
Figure 5-3-20 Screen to set the output wavelength ---- 5-37
Figure 5-3-21 Screen to set the output wavelength offset ---- 5-38
Figure 5-3-22 Screen to set the optical attenuation ---- 5-39
Figure 5-3-23 Screen to set the output power offset ---- 5-40

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Figure 5-3-24 Measurement system when wavelength is proofread ---- 5-41
Figure 5-3-25 Screen of wavelength proofreading 1 ---- 5-41
Figure 5-3-26 Screen of wavelength proofreading 2 ---- 5-42
Figure 5-3-27 Screen of wavelength proofreading 3 ---- 5-43
Figure 5-3-28 Screen of wavelength proofreading 4 ---- 5-44
Figure 5-3-29 Single display of AQ8201-21 control ---- 5-45
Figure 5-3-30 Screen to set the measurement wavelength ---- 5-47
Figure 5-3-31 Screen to set the offset value of input power ---- 5-48
Figure 5-3-32 Screen to set the measurement range ---- 5-49
Figure 5-3-33 Screen to set the modulation ---- 5-50
Figure 5-3-34 Screen to set the averaging frequency ---- 5-51
Figure 5-3-35 Screen to set the relative value measurement ---- 5-52
Figure 5-3-36 Screen to set the unit ---- 5-53
Figure 5-3-37 Screen to set the measurement at blank ---- 5-54
Figure 5-3-38 Screen to execute the zero set ---- 5-55
Figure 5-3-39 Screen to execute the MIN value/the MAX value measurement ---- 5-56
Figure 5-3-40 Single display of AQ8201-32 control ---- 5-58
Figure 5-3-41 Screen to set the optical attenuation ---- 5-59
Figure 5-3-42 Screen to set the shutter ---- 5-60
Figure 5-3-43 Screen to set the attenuated wavelength ---- 5-61
Figure 5-3-44 Screen to set the offset value of optical attenuation ---- 5-62
Figure 5-3-45 Single display of AQ8201-71 control ---- 5-63
Figure 5-3-46 Screen to set the measurement wavelength ---- 5-65
Figure 5-3-47 Screen to set the reflection reference ---- 5-66
Figure 5-3-48 Screen to set the relative value measurement ---- 5-67
Figure 5-3-49 Screen to set the MIN value / MAX value measurement ---- 5-68
Figure 5-3-50 Screen to set the averaging frequency ---- 5-69
Figure 5-3-51 Screen to execute the reference measurement ---- 5-70
Figure 5-3-52 Measurement System of Fresnel Reflection Reference ---- 5-71
Figure 5-3-53 Measurement System of Total Reflection Reference ---- 5-71
Figure 5-3-54 Setup of Measuring Object ---- 5-71
Figure 5-4 Event Processing Sequence ---- 5-94

Figure 6-1 Functional Block Diagram of AQ8203 ---- 6-1
Figure 6-2 Functional Block Diagram of AQ8201-11/11A/11B ---- 6-3
Figure 6-3 Functional Block Diagram of AQ8201-12 ---- 6-5
Figure 6-4 Functional Block Diagram of AQ8201-13 ---- 6-7
Figure 6-5 Functional Block Diagram of AQ8201-21 ---- 6-9
Figure 6-6 Functional Block Diagram of AQ8201-31/32/33 ---- 6-11
Figure 6-7 Functional Block Diagram of AQ8201-71 ---- 6-13

Figure 7-1 Error display screen (summary display) ---- 7-1

Figure 8-1 Measurement of Center Wavelength and Stability ---- 8-2
Figure 8-2 Measurement of Optical Output Level and Stability ---- 8-2
Figure 8-3 Measurement of Center Wavelength and Spectrum Width ---- 8-4
Figure 8-4 Measurement of Optical Output Level and Stability ---- 8-4
Figure 8-5 Measurement of Center Wavelength and Stability ---- 8-6
Figure 8-6 Measurement of Optical Output Level and Stability ---- 8-6
Figure 8-7 Performance Test ---- 8-8
Figure 8-8 Insertion Loss Measurement System 1 ---- 8-10
Figure 8-9 Insertion Loss Measurement System 2 ---- 8-10
Figure 8-10 Performance Test ---- 8-12

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Table 1-1 AQ8203 Accessory List ---- 1-2
Table 1-2 AQ8201-11/11A/11B Accessory List ---- 1-2
Table 1-3 AQ8201-12 Accessory List ---- 1-2
Table 1-4 AQ8201-13 Accessory List ---- 1-3
Table 1-5 AQ8201-21 Accessory List ---- 1-3
Table 1-6 AQ8201-31/32/33 Accessory List ---- 1-3
Table 1-7 AQ8201-71 Accessory List ---- 1-3
Table 1-8 AQ8203 Specifications ---- 1-4
Table 1-9 AQ8201-11 Specifications ---- 1-5
Table 1-10 AQ8201-11/11A Specifications ---- 1-7
Table 1-11 AQ8201-11A Specified Wavelength Range ---- 1-9
Table 1-12 AQ8201-11B Specifications ---- 1-10
Table 1-13 AQ8201-11B Specified Wavelength Range ---- 1-12
Table 1-14 AQ8201-12 Specifications ---- 1-13
Table 1-15 AQ8201-13 Specifications ---- 1-14
Table 1-16 AQ8201-21 Specifications ---- 1-15
Table 1-17 AQ8201-31/32 Specifications ---- 1-17
Table 1-18 AQ8201-33 Specifications ---- 1-18
Table 1-19 AQ8201-71 Specifications ---- 1-19

Table 2-1 Power Fuses ---- 2-3

Table 4-1 Name and Functions of AQ8203 ---- 4-2
Table 4-2 Name and Functions of AQ8201-11/11A/11B ---- 4-4
Table 4-3 Name and Functions of AQ8201-12 ---- 4-5
Table 4-4 Name and Functions of AQ8201-13 ---- 4-6
Table 4-5 Name and Functions of AQ8201-21 ---- 4-7
Table 4-6 Name and Functions of AQ8201-31/32/33 ---- 4-8
Table 4-7 Name and Functions of AQ8201-71 ---- 4-9

Table 5-1 GP-IB Interface Functions ---- 5-73
Table 5-2-1 AQ8203 Program Codes ---- 5-77
Table 5-2-2 Program Codes Common to All Modules ---- 5-78
Table 5-2-3 Program Codes Dedicated to AQ8201-11/11A/11B/13 ---- 5-79
Table 5-2-4 Program Codes Dedicated to AQ8201-12 ---- 5-81
Table 5-2-5 Program Codes Dedicated to AQ8201-21 ---- 5-81
Table 5-2-6 Program Codes Dedicated to AQ8201-31/32/33 ---- 5-82
Table 5-2-7 Program Codes Dedicated to AQ8201-71 ---- 5-83
Table 5-3-1 AQ8203 Default Value ---- 5-84
Table 5-3-2 AQ8201-11/11A/11B/13 Default Value ---- 5-84
Table 5-3-3 AQ8201-12 Default Value ---- 5-84
Table 5-3-4 AQ8201-21 Default Value ---- 5-85
Table 5-3-5 AQ8201-31/32 /33 Default Value ---- 5-85
Table 5-3-6 AQ8201-71 Default Value ---- 5-85

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Table 5-4 Data format ---- 5-86
Table 5-5 Error Code ---- 5-88
Table 5-6 Functions of ESR Bits ---- 5-90
Table 5-7 Functions of SBR Bits ---- 5-92
Table 5-8 Functions of EESR Bits ---- 5-93
Table 5-9 Conditions for Clearing Register ---- 5-94

Table 7-1 Error Code ---- 7-2

Table 8-1 Tester Units Used for the Test(AQ8201-11/11A/11B) ---- 8-1
Table 8-2 Tester Units Used for the Test(AQ8201-12) ---- 8-3
Table 8-3 Tester Units Used for the Test(AQ8201-13) ---- 8-5
Table 8-4 Tester Units Used for the Test(AQ8201-21) ---- 8-7
Table 8-5 Tester Units Used for the Test(AQ8201-31/32/33) ---- 8-10
Table 8-6 Tester Units Used for the Test(AQ8201-71) ---- 8-12

DRAWIING CONTENTS

1.ASD-62559-2
Outside View of AQ8203 HALFSIZE FRAME 1/3
Outside View of AQ8203 HALFSIZE FRAME 2/3
Outside View of AQ8203 HALFSIZE FRAME 3/3

2.ASD-62521-11
Outside View of AQ8201-11 WDM DFB-LD MODULE

3.ASD-62521-111
Outside View of AQ8201-11A WDM DFB-LD MODULE

4.ASD-62521-112
Outside View of AQ8201-11B WDM DFB-LD MODULE

5.ASD-62521-12
Outside View of AQ8201-12 ASE MODULE

6.ASD-62521-131
Outside View of AQ8201-13 ECL MODULE

7.ASD-62521-21
Outside View of AQ8201-21 OPM MODULE

8.ASD-62521-31
Outside View of AQ8201-31 ATTN MODULE

9.ASD-62521-32
Outside View of AQ8201-32 ATTN MODULE

10.ASD-62521-33
Outside View of AQ8201-32 ATTN MODULE

11.ASD-62521-71
Outside View of AQ8201-71 RLM MODULE

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1. System Overview

This manual describes the how to operate the AQ8203 HALFSIZE FRAME and various optional modules etc.

1.1 System Outline

This device consists of frame which can be used in desk-top and rack (called "Frame" hereafter) and various modules required for measurement.
Each module can be mounted onto the frame by plugging it in.
Modules connectable to the frame are dedicated to this system and include a light source, an optical attenuator and an optical power meter. The frame functions as a general-purpose controller for these modules.
Various measurement systems can be materialized by assembling multiple frames onto a standard 19-inch rack and externally controlling them using the GP-IB.

The figure below shows the system outline.

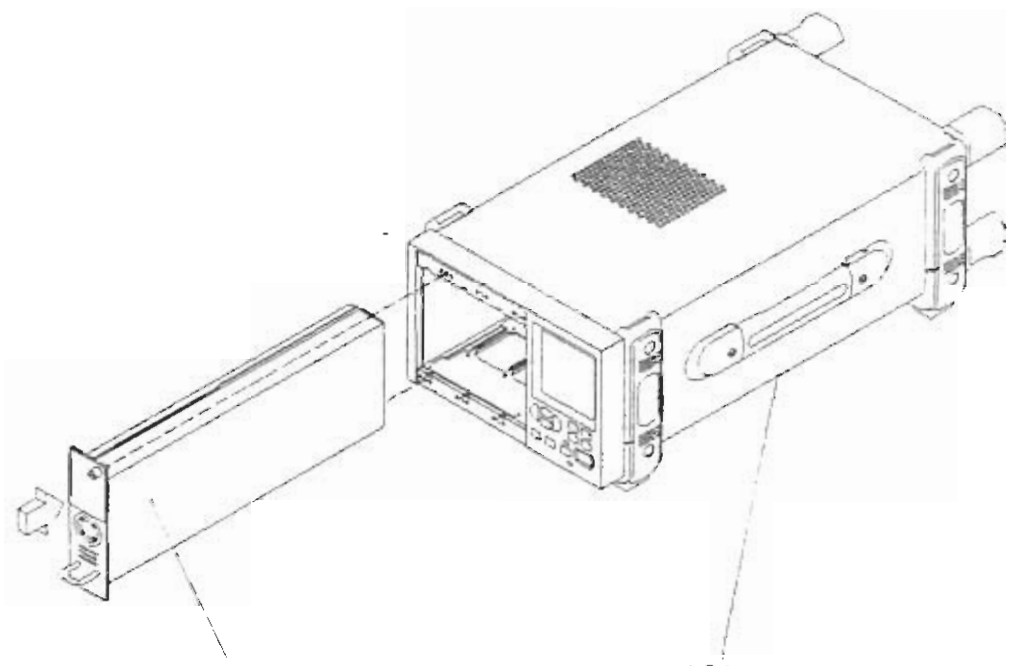


Figure 1-1 System Outline Diagram

16

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1.2 System Configuration

The standard system consists of the AQ8203 frame and the attached goods.
The list of the controlled system module of AQ8203 (frame) is as follows.

- ·AQ8201-11 WDM DFB-LD MODULE (SMF C-Band)
- ·AQ8201-11A WDM DFB-LD MODULE (PMF C-Band)
- ·AQ8201-11B WDM DFB-LD MODULE (SMF L-Band)
- ·AQ8201-12 ASE MODULE
- ·AQ8201-13 ECL MODULE (SMF C-Band)
- ·AQ8201-21 OPM MODULE
- ·AQ8201-31 ATTN MODULE
- ·AQ8201-32 ATTN MODULE(Resolution 0.01 dB step)
- ·AQ8201-33 ATTN MODULE(Resolution 0.001 dB step)
- ·AQ8201-71 RLM MODULE

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).

Table 1-1 AQ8203 Accessory List

No.	Accessory	Qty	Remarks
1	Instruction manual	1	
2	Power cord	1	3 pole (with a three to two pole conversion adapter)
3	Optical output control key	2	
4	Remote interlock connecting plug	1	Red
5	Remote interlock short-circuit plug	1	Black
6	GP-IB connector dust cover	1	Already mounted on the back panel.
7	External connector dust cover	1	Already mounted on the back panel.
8	Blank panel	2	Already mounted on the front panel.

Table 1-2 AQ8201-11/11A/11B Accessory List

No.	Accessory	Qty	Remarks
1	Optical connector cap	1	Mounted on the optical output connector.
2	SMA connector cap	1	Mounted on the external modulation input connector.

Table 1-3 AQ8201-12 Accessory List

No.	Accessory	Qty	Remarks
1	Optical connector cap	1	Mounted on the optical output connector.

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Table 1-4 AQ8201-13 Accessory List

No.	Accessory	Qty	Remarks
1	Optical connector cap	1	Mounted on the optical output connector.
2	SMA connector cap	1	Mounted on the external modulation input connector.

Table 1-5 AQ8201-21 Accessory List

No.	Accessory	Qty	Remarks
1	Optical connector cap	1	Mounted on the optical input connector.
2	Analog out plug	1	

Table 1-6 AQ8201-31/32/33 Accessory List

No.	Accessory	Qty	Remarks
1	Optical connector cap	2	Mounted on the optical I/O connector.

Table 1-7 AQ8201-71 Accessory List

No.	Accessory	Qty	Remarks
1	Optical connector cap (FC)	1	Mounted on the optical input connector.
2	Optical connector cap (SC)	1	Mounted on the measuring connector.

17

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1.3 Specification

1.3.1 HALFSIZE FRAME (AQ8203)

① Over view

This container is a desk-top use type. It is possible to build in 19 inch standard rack by connecting this two containers.
In the frame, there are 3 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.

AQ8201-11	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
AQ8201-21	OPM MODULE	1-SLOT
AQ8201-31	ATTN MODULE	1-SLOT
AQ8201-32	ATTN MODULE	1-SLOT
AQ8201-33	ATTN MODULE	1-SLOT
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

Table 1-8 shows the specifications of this frame.

Table 1-8 AQ8203 Specifications

Number of storage modules	3 pieces max
Display	STN color liquid crystal
Key interface	The parameter of each module can be input with the panel key.
External expansion interface	For external expansion.
PCMCIA interface	For software version up (Flash ATA card use)
Power supply	AC 100 to 120, 200 to 240 V, 50/60 Hz, 190 VA max. (*)
Environmental requirements	Operating temperature: 5 to +40 ℃ Storage temperature: 0 to +50 ℃ Humidity: Up to 85%
Dimensions and weight	212W × 132.6H × 400D mm, approx. 5.4 kg It is possible to build in 19 inch standard rack by connecting this two containers.

(*): The input potential setting changes automatically.

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1.3.2 WDM DFB-LD MODULE (AQ8201-11)

① Overview

This module is a source of light by which DFB-LD which corresponds to the wave length of the WDM channel is installed.
The wave length 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 into Peltier elements and is possible to change 1.6 nm of wavelength by changing temperature.

② Specification

Table 1-9 shows the specifications of this module.

Table 1-9 AQ8201-11 Specifications

Specified wavelength		1524.11 to 1570.01 nm (*1)
Center wavelength		λ p +/-0.15 nm (*2) (*3)
Wavelength accuracy		Within +/-0.05 nm
Spectrum width	Coherence control on	50 MHz typ.
	Coherence control off	5 MHz max.
Optical output level		+10 dBm min. (*2)
SMSR		30 dB min. (*5)
Stability of output level	15 min.	Within +/-0.005 dB (*4)
	24 hr.	Within +/-0.03 dB (*4)
Stability of wavelength	15 min.	Within +/-0.005 nm (*2)
	24 hr.	Within +/-0.01 nm (*2)
Wavelength adjustment width		1.6 nm min. (*2)
Optical connector		FC/Angled PC (*6)
Compatible fiber		SM (9/125 μ m)
Optical attenuation width		10 dB (in 0.01 dB steps)
Optical isolation		55 dB min.
RIN		-145 dB/Hz
Internal modulation		100 Hz to 300 kHz (CHOP)
External modulation		100 Hz to 300 kHz (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) x 130 (H) x 339 (D) mm, approx. 0.7 kg

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(*) Specification condition: After executing warm up for one hour.
(*1). Select the wavelength from Table 1-11.
(*2). Measured at the connecting fiber outgoing point (FC/APC-FC/SPC, 2m, SMF) with CW light, an attenuation of 0.0 dB and coherence control turned off.
(*3). λ p refers to the specified wavelength.
(*4). Measured at an ambient temperature between 20 and 30 ℃ (constant temperature) with CW light, an attenuation of 0.0 dB, fiber (FC/APC-FC/SPC, 2m, SMF) and coherence control turned on.
(*5). Measured at an attenuation of 0.0 dB in center wavelength.
(*6). Seiko Giken's Angled PC with a return loss of 60 dB min.
(*7). Optional

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

① Overview

This module installs DFB-LD which corresponds to the wave length of the WDM channel and is a source of light of fixed polarization maintaining fiber (PMF) correspondence.
The wave length 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 into Peltier elements and is possible to change 1.6 nm of wavelength by changing temperature.

② Specification

Table 1-10 shows the specifications of this module.

Table 1-10 AQ8201-11A Specifications

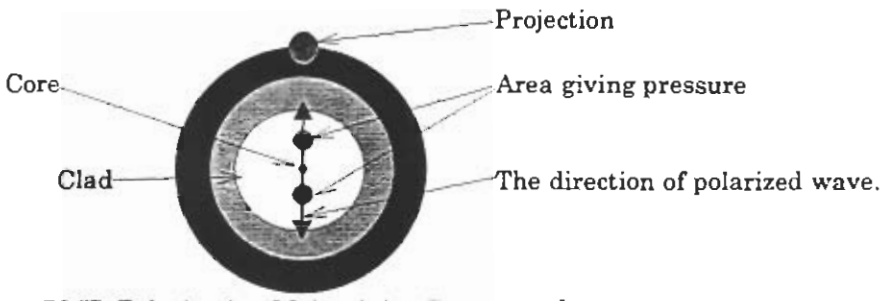
Specified wavelength		1524.11 to 1570.01 nm (*1)
Center wavelength		i p +/-0.15 nm (*2) (*3)
Wavelength accuracy		Within +/-0.05 nm
Spectrum width	Coherence control on	50 MHz typ.
	Coherence control off	5 MHz max.
Optical output level		+13 dBm min. (*8)
Extinct polarization ratio		20 dB (typ.) (*8)
SMSR		30 dB min. (*5)
Stability of output level	15 min.	Within +/-0.005 dB (*4)
	24 hr.	Within +/-0.03 dB (*4)
Stability of wavelength	15 min.	Within +/-0.005 nm (*2)
	24 hr.	Within +/-0.01 nm (*2)
Wavelength adjustment width		1.6 nm min. (*2)
Optical connector		FC/Angled PC (*6)
Compatible fiber		PM (9/125 ; m)
Optical attenuation width		10 dB (in 0.01 dB steps)
Optical isolation		55 dB min.
RIN		-145 dB/Hz
Internal modulation		100 Hz to 300 kHz (CHOP)
External modulation		100 Hz to 300 kHz (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) x 130 (H) x 339 (D) mm, approx. 0.7 kg

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(*) Specification condition: After executing warm up for one hour.
(*1). Select the wavelength from Table 1-11.
(*2). Measured at the connecting fiber outgoing point (FC/APC-FC/SPC, 2m, PMF) with CW light, an attenuation of 0.0 dB and coherence control turned off.
(*3). λ p refers to the specified wavelength.
(*4). Measured at an ambient temperature between 20 and 30 ℃ (constant temperature) with CW light, an attenuation of 0.0 dB, fiber (FC/APC-FC/SPC, 2m, PMF) and coherence control turned on.
(*5). Measured at an attenuation of 0.0 dB in center wavelength.
(*6). Seiko Giken's Angled PC with a return loss of 60 dB min.
(*7). Optional
(*8). Measured at panelled binding wear optical connector power point (FC/APC-FC/SPC, 2m, PMF) with CW light, an attenuation of 0.0 dB and coherence control turned off.

The figure below shows the explanation of fixed polarization maintaining fiber (PMF).



PMF: Polarization Maintaining Fiber

Figure 1-2 Polarization Maintaining Fiber (PMF)

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Table 1-11 AQ8201-11/11A Specified 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			

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

① Overview

This module is a source of light by which DFB-LD which corresponds to L-Band wavelength of ITU-T is installed..
The wave length 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 into Peltier elements and is possible to change 1.6 nm of wavelength by changing temperature.

② Specification

Table 1-12 shows the specifications of this module.

Table 1-12 AQ8201-11B Specifications

Specified wavelength		1570.42 to 1620.50 nm (*1)
Center wavelength		i p +/- 0.15 nm (*2) (*3)
Wavelength accuracy		Within +/-0.05 nm
Spectrum width	Coherence control on	50 MHz typ.
	Coherence control off	5 MHz max.
Optical output level		+10 dBm min. (*2)
SMSR		30 dB min. (*5)
Stability of output level	15 min.	Within +/-0.005 dB (*4)
	24 hr.	Within +/-0.03 dB (*4)
Stability of wavelength	15 min.	Within +/-0.005 nm (*2)
	24 hr.	Within +/-0.01 nm (*2)
Wavelength adjustment width		1.6 nm min. (*2)
Optical connector		FC/Angled PC (*6)
Compatible fiber		SM (9/125 ; m)
Optical attenuation width		10 dB (in 0.01 dB steps)
Optical isolation		55 dB min.
RIN		-145 dB/Hz
Internal modulation		100 Hz to 300 kHz (CHOP)
External modulation		100 Hz to 300 kHz (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) x 130 (H) x 339 (D) mm, approx. 0.7 kg

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(*) Specification condition:After executing warm up for one hour.
(*1). Select the wavelength from Table 1-13.
(*2). Measured at the connecting fiber outgoing point (FC/APC-FC/SPC, 2m, SMF) with CW light, an attenuation of 0.0 dB and coherence control turned off.
(*3). λ p refers to the specified wavelength.
(*4). Measured at an ambient temperature between 20 and 30 ℃ (constant temperature) with CW light, an attenuation of 0.0 dB, fiber (FC/APC-FC/SPC, 2m, SMF) and coherence control turned on.
(*5). Measured at an attenuation of 0.0 dB in center wavelength.
(*6). Seiko Giken's Angled PC with a return loss of 60 dB min.
(*7). Optional

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Table 1-13 AQ8201-11B Specified Wavelength Range

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			

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1.3.5 ASE MODULE (AQ8201-12)

① Overview

This module is a ASE source of light of high stability by which optical isolator is built into. ASE generated from EDF is used and high power more broadband are achieved.

② Specification

Table 1-14 shows the specifications of this module.

Table 1-14 AQ8201-12 Specifications

Spectrum density (-13dBm/nm)		1525 to 1570 nm (typ.) (*1) 1530 to 1565 nm
Integrated output power		+10 dBm min (*1)
Stability of output level	5 min.	Within +/-0.005 dB (*1) (*2)
	1 hr.	Within +/-0.05 dB (*1) (*3)
Polarized wave extinct ratio		0.1 dB (typ.)
Optical Isolation		50 dB or more
Optical connector		FC/PC (Standard) (*4)
Compatible fiber		SM (9/125 μ m)
Optical attenuation width		6.0 dB (in 0.1 dB steps)
Environmental requirements		Operating temperature: 5 to +40 ℃ Storage temperature: 0 to +50 ℃ Humidity: Up to 85%
Dimensions and weight		79.5 (W) x 130 (H) x 339 (D) mm, approx.2 kg

(*) Specification condition: After executing warm up for one hour.

(*1). CW light. Attenuation is 0.0 dB. SM fiber (FC/PC at both ends, 2 meters long). At emission end.

(*2). 5 minutes (with the temperature maintained at a constant level in the range of 20 to 30 ℃).

(*3). 1hour (0 to 40 ℃ +/-1 ℃)

(*4). ST and SC connectors are also supported other than FC.

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1.3.6 ECL MODULE (AQ8201-13)

① Overview
This module is an external resonator laser of the single length mode that wave changeable length is possible. This module can be used for the source of light for the examination of the WDM communication device and the component as an alternative machine of AQ8201-11.

② Specification
Table 1-15 shows the specifications of this module.

Table 1-15 AQ8201-13 Specifications

Specified wavelength		1460 to 1580 nm
Wavelength set resolution		10pm
Wavelength accuracy		Within +/-0.2 nm (*1) (*2) (*3)
Wavelength repeatability		Within +/-50 pm (typ.) (*1) (*2)
Stability of wavelength	15 min.	Within +/- 5 pm (*1) (*2)
	24 hr.	Within +/-10 pm (typ.) (*1) (*2)
Wavelength set time		3 sec (typ.) (*8)
Spectrum width	Coherence control on	100 MHz (typ.) (*1) (*2)
	Coherence control off	5 MHz (typ.) (*1) (*2)
SMSR		45 dB min. (*1) (*2) (*4)
Optical output level		+6 dBm min. (*1) (*2) (*5)
Optical attenuation width		10 dB (in 0.01 dB steps) (*4)
Stability of output level	15 min.	Within +/-0.005 dB (*1) (*2) (*5)
	24 hr.	Within +/-0.01 dB (*1) (*2) (*5)
RIN		-145 dB/Hz (typ.) (*1) (*2)
Internal modulation		100 Hz to 300 kHz (CHOP) (*6)
External modulation		100 Hz to 300 kHz (sine wave)
Optical connector		FC/Angled PC (*9)
Compatible fiber		SM (9/125 μ m)
Environmental requirements		Operating temperature: 23 +/- 5 ℃ (*7) Storage temperature: 0 to +50 ℃ Humidity: Up to 85%
Dimensions and weight		39.5 (W) x 130 (H) x 339 (D) mm, approx. 1.2 kg

(*) Specification condition: After executing warm up for one hour.
(*1) 23 ℃ constant and CW light, 2m fiber output, and single length mode.
(*2). Optical attenuation: 0.0 dB
(*3). After proofreading the wavelength.
(*4). Wavelength: 1550nm
(*5). Spectrum width: coherence control turned on.
(*6). Set resolution 0.1 kHz and accuracy +/-2%
(*7). Surrounding temperature of frame.
(*8). Time of movement in full span (120nm)
(*9). Seiko Giken's Angled PC with a return loss of 60 dB min.

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1.3.7 OPM MODULE (AQ8201-21)

① Overview

This module is an optical power meter which achieved a wide wave length belt region, high precision, and PDL of 0.02dBpp or less.

Because the wave length belt region where 700-1700nm is wide is covered and the precision of ± 2.5% is guaranteed as for optical power under a standard condition, high precision of optical power can be measured.

② Specification

Table 1-16 shows the specifications of this module.

Table 1-16 AQ8201-21 Specifications

Wavelength range		700 to 1700 nm
Optical sensor		Cooled InGaAs
Application		For the light emitted from small diameter quartz fibers (*1)
Optical connector		FC connector adapter (Standard) (*2)
Polarized wave dependency		0.02 dBP-P (typ) (*3)
Power range	CW light	-80 to +27 dBm (*4)
	CHOP light	-80 to +24 dBm (*4)
Uncertainty under the standard conditions		+/- 2.5 % (*5) (at the calibration point of 1310 nm)
Overall measurement accuracy		+/- 5 % (1000 to 1650 nm) (*6)
Linearity (*7)		+/- 0.05 dB (1000 to 1650 nm, -40 to +27 dBm)
Noise	CW light	-73 dBm max (*8)
	CHOP light	
Environmental requirements		Operating temperature: 5 to +40 ℃. Storage temperature: 0 to 50 ℃ Humidity: 85% maximum.
Dimensions and weight		39.5 (W) x 130 (H) x 339 (D) mm, approx. 1.2 kg

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(*) Specification condition: After executing warm up for one hour.
The performance guaranteeing temperature is 23 +/-5 ℃ (constant).
(*1). Applicable fiber </=62.5/125 μm (GI). NA</=0.275.
(*2). ST and SC connectors are also supported other than FC.
(*3). At wavelength 1550 nm and when SM fiber cables are used.
(*4). At wavelength 1310 nm.
(*5). Standard conditions
{1} Power level: -20 dBm (10 μW) and CW light.
{2} SM fiber: SM fiber and master FC connector.
{3} Ambient temperature: 23 +/-5 ℃.
{4} Calibration is done with the AQ9389B (FC) connector adapter being attached. (Accuracy promised in the specification may not be met if the connector adapter is removed. When you have replaced a connector adapter, contact us for the calibration.)
(*6). Operating conditions
{1} Power level: -20 dBm (10 μW) and CW light.
{2} Applicable optical fiber </=50 um. NA</=0.2.
{3} Ambient temperature: 23 +/-5 ℃.
{4} With the AQ9389B connector adapter being attached.
(*7). {1} It is linearity measured at an optional wavelength selected within the wavelength range specified in the overall measuring accuracy.
{2} With CW light and the ambient temperature being maintained at 23℃ +/-5 ℃.
(*8). {1} After 10 times of averaging in one second.
{2} At the wavelength 1200 to 1600 nm.
{3} CW or CHOP light (270 Hz).

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

① Overview

This module is a high performance and light changeable attenuators to be able to do the switch of no interception in 0.05 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 the fiber amplifiers are also possible because of (+23dBm)/an optical high return loss.

② Specification

Table 1-17,18 shows the specifications of this module.

Table 1-17 AQ8201-31/32 Specifications

Wavelength range	1200 to 1600 nm
Insertion loss	2.5 dB max. (1310/1550 nm)
Maximum attenuation	60 dB
Attenuation accuracy	Within +/-0.1 dB (1310/1550 nm)
Repeatability	Within +/-0.02 dB
Minimum attenuation step	0.05 dB (-32:0.01 dB)
Switching time	500 ms max. (minimum attenuation step)
Return loss	60 dB min. (1310/1550 nm) (*1)
Polarization dependency	0.05 dBp-p max. (typ.) (1550 nm)
Maximum input power	+23 dBm
Shutter isolation	100 dB min.
Applicable optical fiber	SM (9/125 ; m)
Optical connector	FC/APC (*2)
Environmental requirements	Operating temperature: 5 to +40℃ Storage temperature: 0 to +50 ℃ Humidity: Up to 85%
Dimensions and weight	39.5 (W) x 130 (H) x 339 (D) mm,approx. 1 kg

(*) Specification condition: After executing warm up for one hour.
Performance guaranteed temperature: 25 +/-3 ℃

(*1). When FC/APC connector (optical attenuation: 63 dB min.) is used.

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

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Table 1-18 AQ8201-33 Specifications

Wavelength range	1480 to 1650 nm
Insertion loss	2.5 dB max. (1550 nm) (*3)
Maximum attenuation	60 dB
Attenuation accuracy	Within +/-0.1 dB (1520 to1620 nm)
Repeatability	+/-0.005 dB (typ.) (*3)
Minimum attenuation step	0.001 dB
Return loss	60 dB min. (1550 nm) (*1) (*3)
Polarization dependency	0.05 dBp-p . (typ.) (1550 nm) (*3)
Maximum input power	+23 dBm
Shutter isolation	100 dB min.
Applicable optical fiber	SM (9/125 μ m)
Optical connector	FC/APC (*2)
Environmental requirements	Operating temperature: 5 to +40 ℃ Storage temperature: 0 to +50 ℃ Humidity: Up to 85%
Dimensions and weight	39.5 (W) x 130 (H) x 339 (D) mm,approx. 1 kg

(*) Specification condition: After executing warm.up for one hour.
. Performance guaranteed temperature: 25 +/-3 ℃
(*1). When FC/APC connector (optical attenuation: 63 dB min.) is used.
(*2). FC/APC: FC/Angled PC (made by Seiko Giken)
(*3). At constant temperture

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1.3.8 RLM MODULE (AQ8201-71)

① Overview

This module is an optical return loss measurement meter with the dynamic range of 65 dB or more. When the optical return loss of 0-50 dB is measured, high precision of relative measurement precision ± 0.4 dB or less can be measured.
When the optical return loss of 50-60 dB is measured, high precision of relative measurement precision ± 0.7 dB or less can be measured.

② Specification

Table 1-19 shows the specifications of this module.

Table 1-19 AQ8201-71 Specifications

Measure wavelength	1280 to 1600 nm
Dynamic range	65 dB (*1)
Relative measurement accuracy	+/-0.4 dB max (0 to 50 dB) (*2) +/-0.7 dB max (50 to 60 dB)
Measurement stability	+/-0.02 dB max (*3)
Input connector	FC-PC
Output connector	SC-Angled PC (*4)
Applicable optical fiber	SM (9/125 , m)
Ambient conditions	Operating temperature: 5 to +45 ℃ Storage temperature: 0 to +50 ℃ Humidity: Up to 85%
Dimensions and weight	39.5 (W) x 130 (H) x 339 (D) mm, approx. 1.2 kg

(*) Specification condition: After executing warm up for one hour.
Temperature for performance guarantee 23 +/-1 ℃.
When CHOP (270 Hz) source of light of wavelength 1550nm and output level 0 to -5 dBm is used.

(*1). Depends on master cord to be used.

(*2). Depends on stability of light source to be used, linearity of photo receiver and isolation of optical directional coupler.

(*3). Display stability in case of Fresnel reflection standard (for 5 minutes)

(*4). Do not connect any master cord other than our designated ones to the output connector.

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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)

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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.

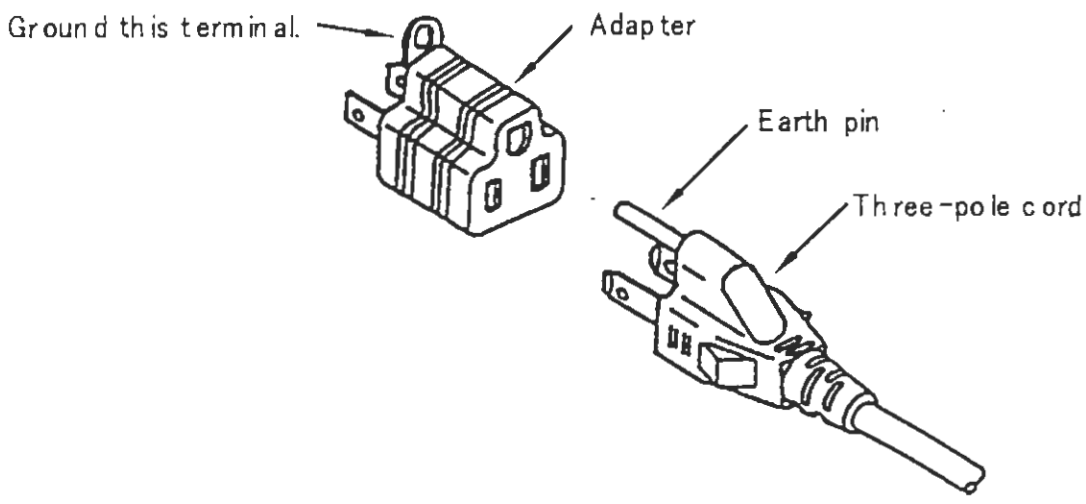


Figure 2-1 Three-pole Power Cord (For Japan)

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.

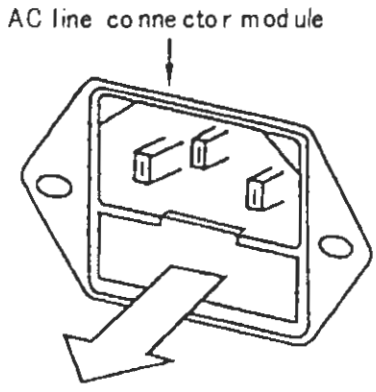
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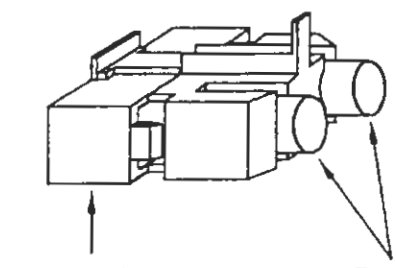
2.4.3 Fuse Replacement

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 3.15A 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.

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3.System Operation Notes

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

3.1 HALFSIZE FRAME (AQ8203)

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 connecting 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 damaged due to abnormal temperature rise if used with the ventilation hole closed.
8) 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.
9) Only service personnel is allowed to remove covers of this frame.
10) 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 30 ℃ 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.

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

3.2.1 Handling Notes

1) Avoid applying an excessive impact to this module.
2) Do not leave this module in a high-temperature or high-humidity place for a long period.
3) Keep this module 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 frame off before connecting or disconnecting this module to it. Otherwise, this module and the frame may be damaged.
6) Do not use or store this module in a place subject to static electricity. Otherwise, the module may be damaged.

3.2.2 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-APC connector for this module. This module may be damaged if a normal FC-PC connector is connected.

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3.3 ASE MODULE (AQ8201-12)

3.3.1 Handling Notes

1) Avoid applying an excessive impact to this module.
2) Do not leave this module in a high-temperature or high-humidity place for a long period.
3) Keep this module 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 frame off before connecting or disconnecting this module to it. Otherwise, this module and the frame may be damaged.
6) Do not use or store this module in a place subject to static electricity. Otherwise, the module may be damaged.

3.3.2 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.

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3.4 ECL MODULE (AQ8201-13)

3.4.1 Handling Notes

1) Avoid applying an excessive impact to this module.
2) Do not leave this module in a high-temperature or high-humidity place for a long period.
3) Keep this module 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 frame off before connecting or disconnecting this module to it. Otherwise, this module and the frame may be damaged.
6) Do not use or store this module in a place subject to static electricity. Otherwise, the module may be damaged.

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-APC connector for this module. This module may be damaged if a normal FC-PC connector is connected.

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3.5 OPM MODULE (AQ8201-21)

3.5.1 Handling Notes

1) Avoid applying an excessive impact to this module.
2) Do not leave this module in a high-temperature or high-humidity place for a long period.
3) Keep this module 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 frame off before connecting or disconnecting this module to it. Otherwise, this module and the frame may be damaged.
6) Do not use or store this module 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 module may malfunction due to static electricity.

3.5.2 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 to 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 from 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.

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

3.6.1 Handling Notes

1) Avoid applying an excessive impact to this module.
2) Do not leave this module in a high-temperature or high-humidity place for a long period.
3) Keep this module 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 frame off before connecting or disconnecting this module to it. Otherwise, this module and the frame may be damaged.
6) Do not use or store this module 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 module may malfunction due to static electricity.

3.6.2 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-APC 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.

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3.7 RLM MODULE (AQ8201-71)

3.7.1 Handling Notes

1) Avoid applying an excessive impact to this module.
2) Do not leave this module in a high-temperature or high-humidity place for a long period.
3) Keep this module 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 frame off before connecting or disconnecting this module to it. Otherwise, this module and the frame may be damaged.
6) Do not use or store this module 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 module 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 to 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.

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4. System Functions

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

4.1 HALFSIZE FRAME (AQ8203)

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.

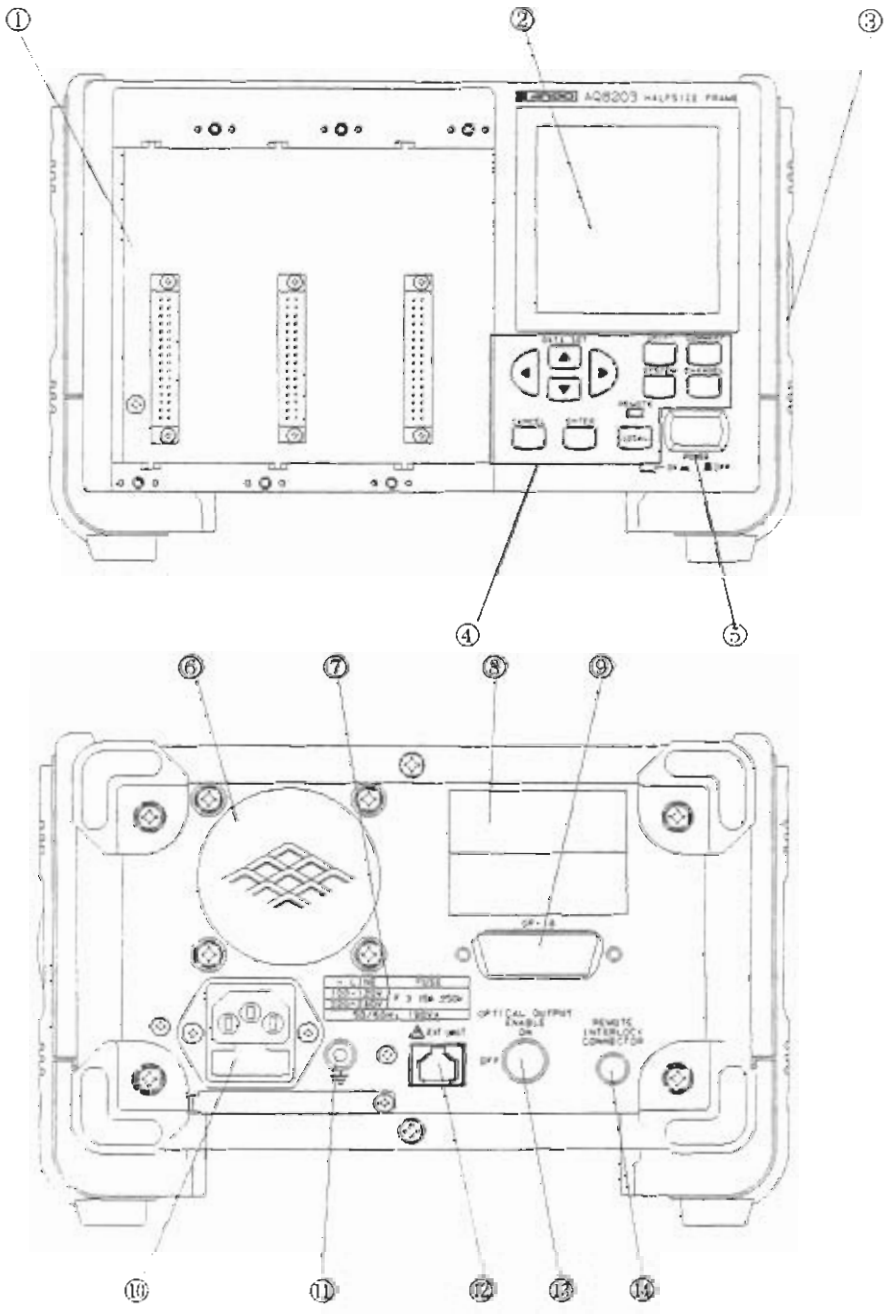


Figure 4-1 Configuration of AQ8203

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Table 4-1 Name and Functions of AQ8203.

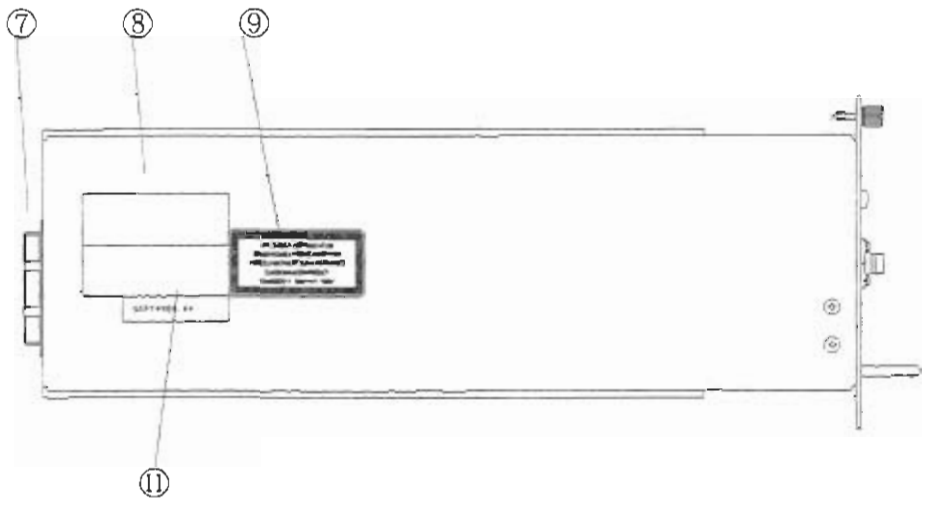
No.	Name	Unit display	Functions
①	Module housing		Accommodates modules. Turn the power off before connecting or disconnecting modules.
②	Display		The measurement value and the set value are displayed.
③	Handle		When this container is carried, this is used.
④	Key switch		It is a key to control this container.
⑤	Power switch	[POWER] [▬ ON] [▮ OFF]	Turns the power on and off.
⑥	Fan		Fan for radiating heat. Note that it turns hot.
⑦	Power supply ratings display		The power supply fuse used is displayed.
⑧	Name plate		Shows the serial number.
⑨	GP-IB connector	[GP-IB]	Twenty four-pole connector for GP-IB interfacing.
⑩	Power supply plug socket		Socket with built-in fuses for receiving the power supply plug.
⑪	GND terminal		Grounding
⑫	External connector	[⚠EXT UNIT]	It is a terminal for the expansion.
⑬	Optical output control key	[OPTICAL OUTPUT ENABLE]	When the key is turned off, light is not output.
⑭	Remote Interlock	[REMOTE INTERLOCK CONNECTOR]	When opening, light is not output.

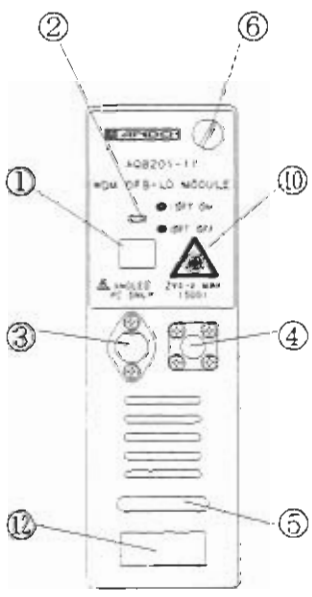
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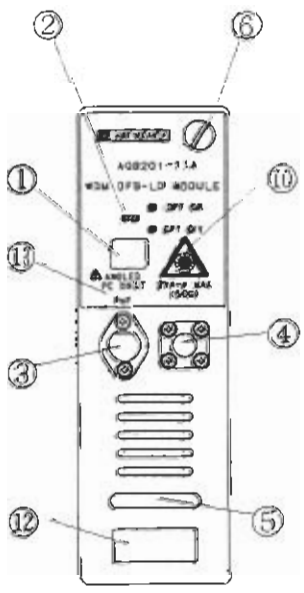
4.2 WDM DFB-LD MODULE (AQ8201-11/11A/11B)

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.







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

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

Figure 4-2 Configuration of AQ8201-11/11A/11B

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Table 4-2 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.

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4.3 ASE MODULE (AQ8201-12)

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.

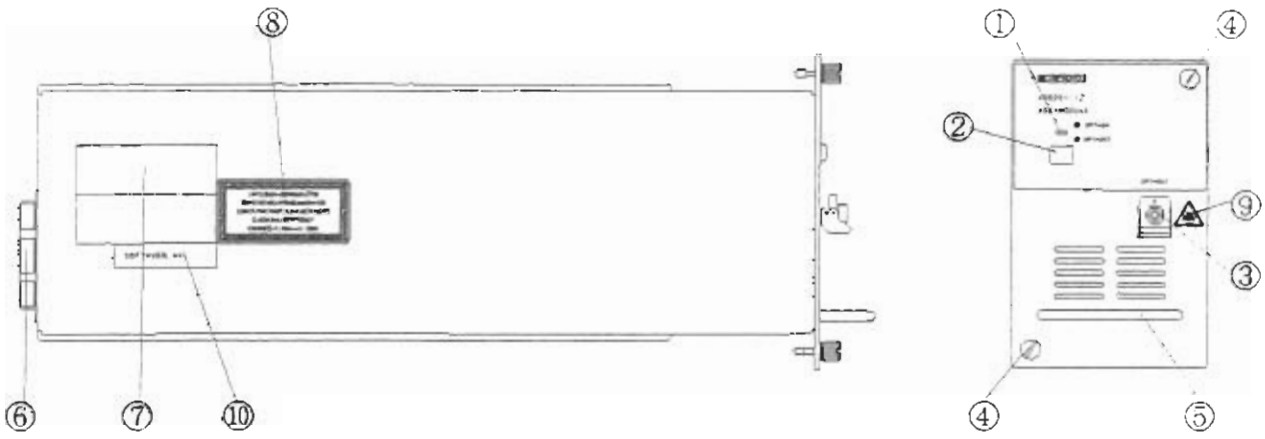


Figure 4-3 Configuration of AQ8201-12

Table 4-3 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.

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4.4 ECL MODULE (AQ8201-13)

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.

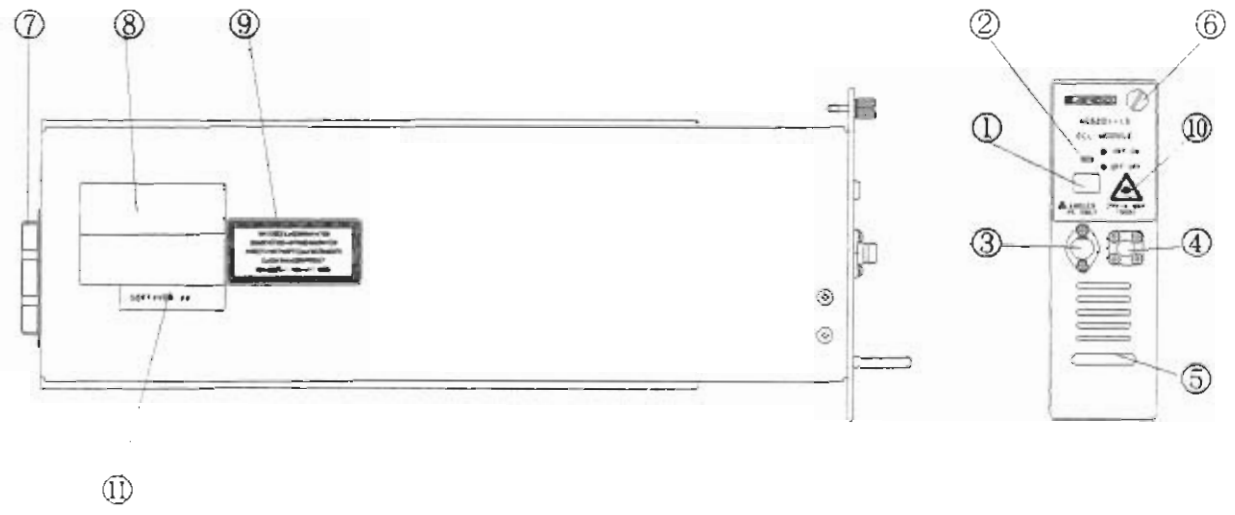


Figure 4-4 Configuration of AQ8201-13

Table 4-4 Name and Functions of AQ8201-13

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 from the frame.
⑥	Mounting screw		Fixes the AQ8201-13 and the frame.
⑦	Main unit connector		Used for mounting the AQ8201-13 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.

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4.5 OPM MODULE (AQ8201-21)

4.5.1 Explanation of Each Section

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

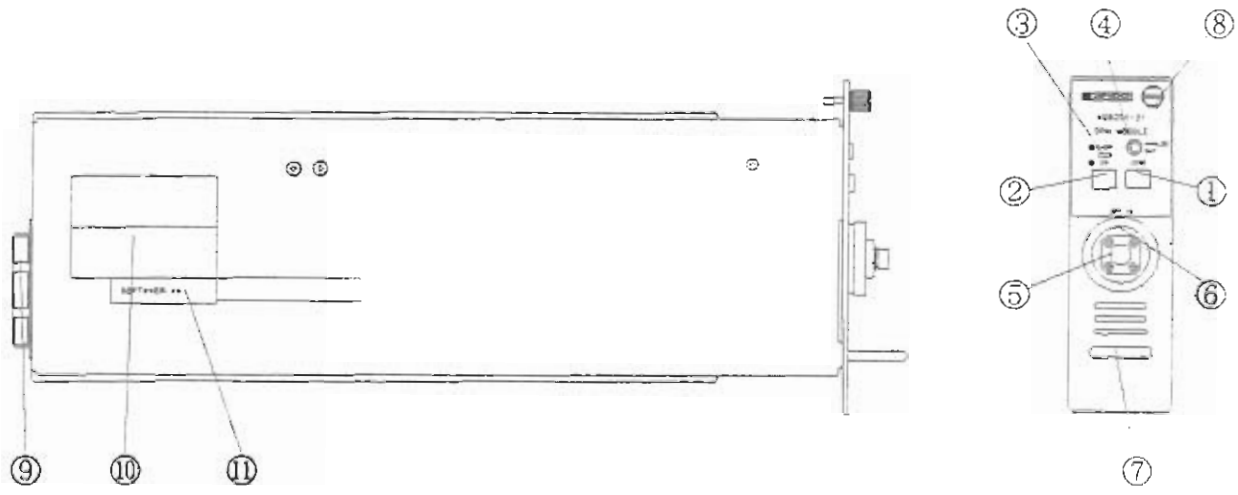


Figure 4-5 Configuration of AQ8201-21

Table 4-5 Name and Functions of AQ8201-21

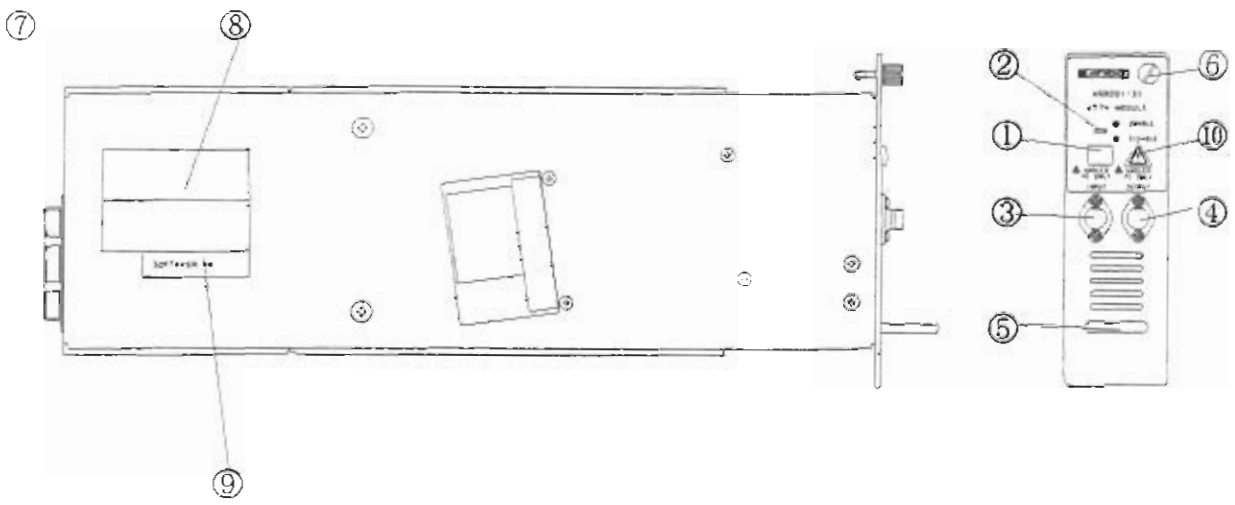
No.	Name	Unit display	Functions
①	ZERO SET switch	[ZERO]	Used for turning on the ZERO SET.
②	CW/CHOP switch		Used for switching the optical modulation mode (CHOP frequency is selected from the frame).
③	CW/CHOP indicator lamp	[○ CHOP] [● CW]	It comes on when CHOP light is selected.
④	Analog output terminal	[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.

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

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.



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

Figure 4-6 Configuration of AQ8201-31/32/33

Table 4-6 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.

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4.7 RLM MODULE (AQ8201-71)

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.

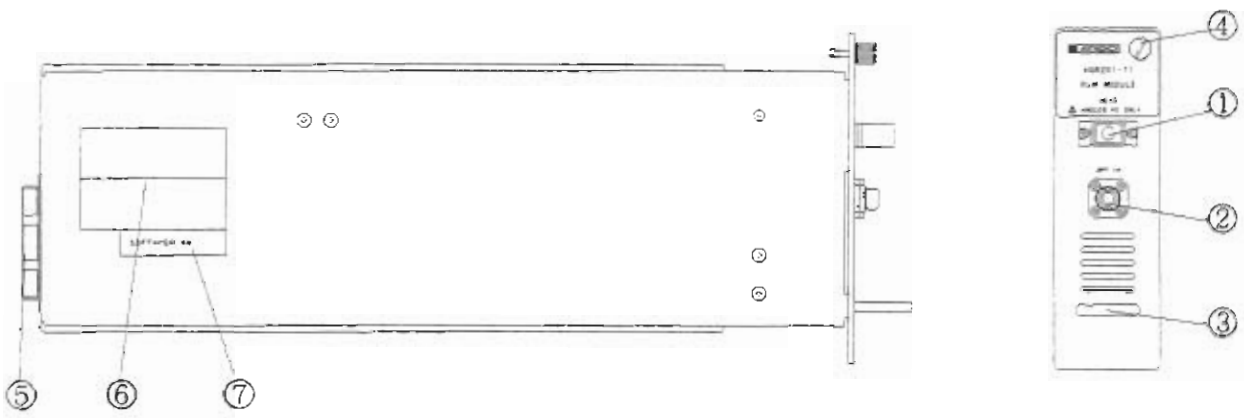


Figure 4-7 Configuration of AQ8201-71

Table 4-7 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 lahel		Indicates version of the software.

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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.

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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 AQ8201-12 has a universal adapter, remove it and wipe and clean it using absolute alcohol.)
Figure 5-1-1 shows how to clean the optical connector port.

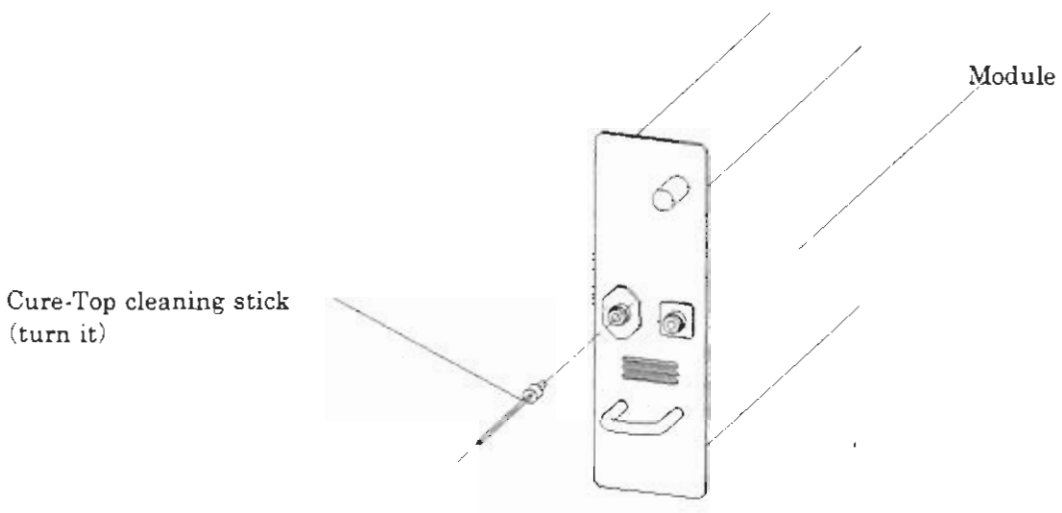


Figure 5-1-1 Cleaning of Optical Connector Port

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.

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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 5-1-2.

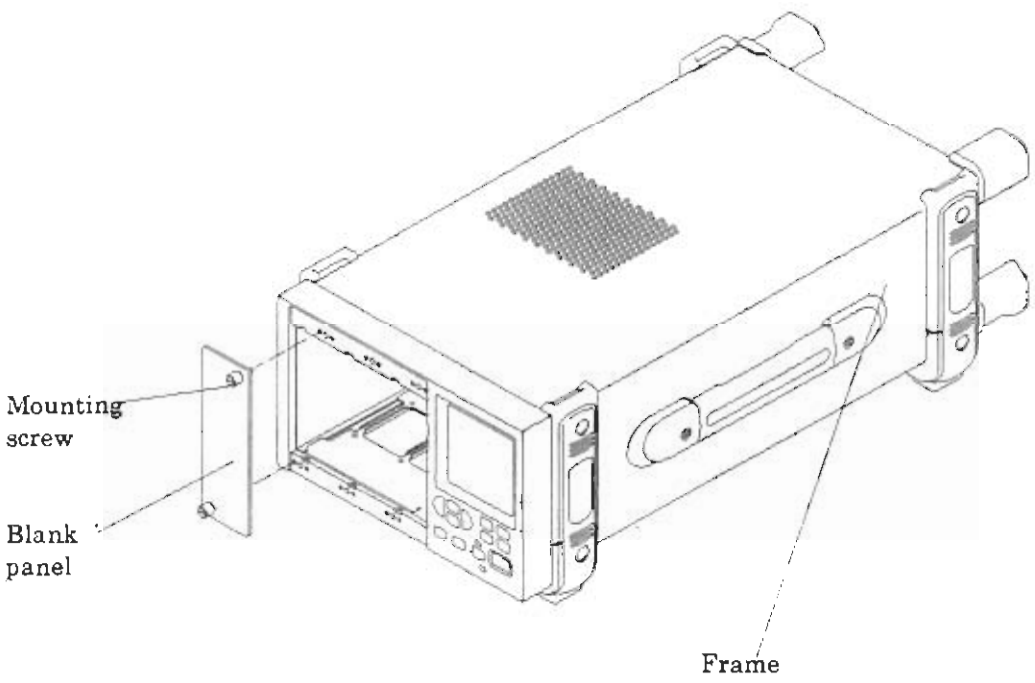


Figure 5-1-2 Mounting/Dismounting the Blank Panel

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5.1.3 Module Mounting on the frame

1) Make sure that the power supply of the frame is turned off.
2) The module is matched to the rail in the part of the storage of the module of frame and the module inserts frame, and the installation screw in the upper part of the module is stopped and is fixed.

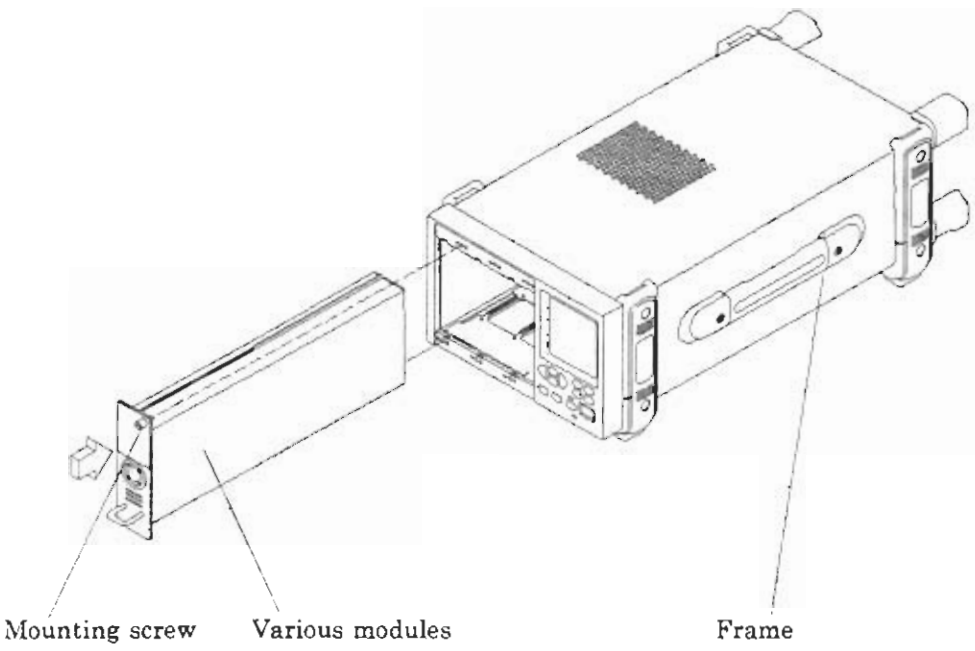


Figure 5-1-3 Method of installing module

3) After the installation screw in the upper part of the module is removed, the pull- out lever is pulled when the module is detached.

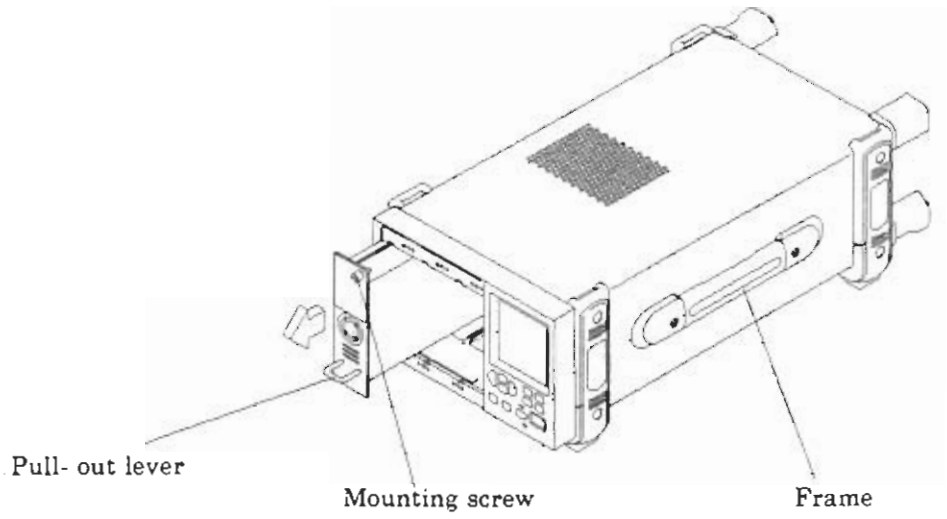


Figure 5-1-4 Method of detaching module

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CAUTION

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

CAUTION

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

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

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.

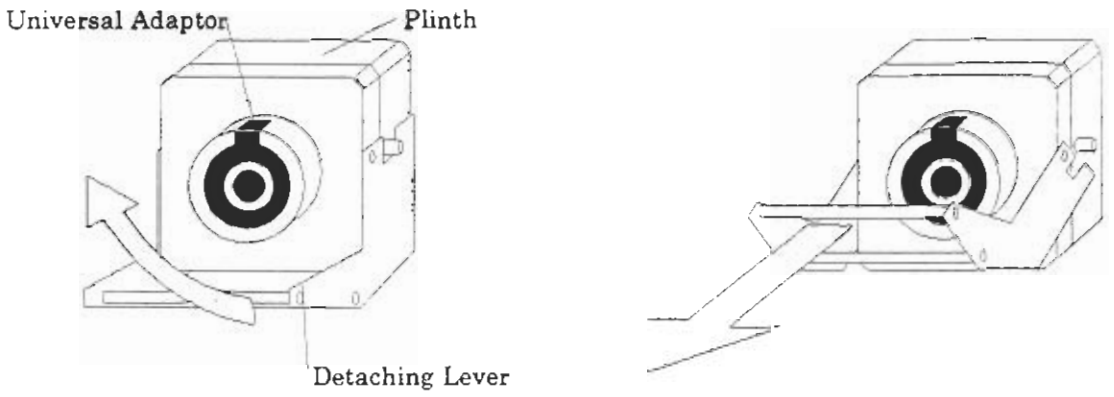


Figure 5-1-5 Method of Dismounting the Universal Adaptor

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.

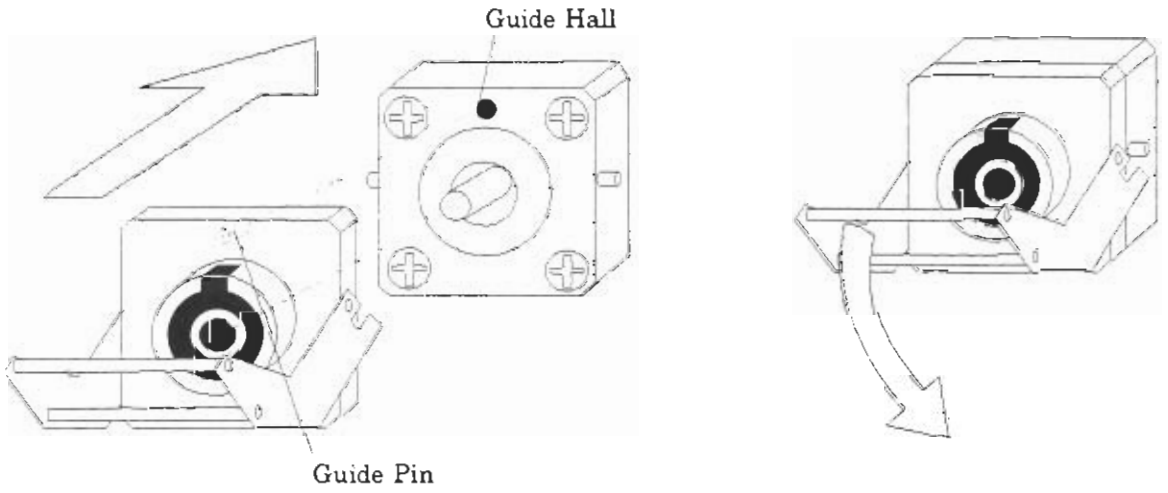


Figure 5-1-6 Method of Mounting the Universal Adaptor

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5.2 Basic Operation

5.2.1 Over view

The arbitrary screen is called with the panel key, and the parameter is set and can be displayed in this device, there are four screen modes.

5.2.2 Outline of panel explanation

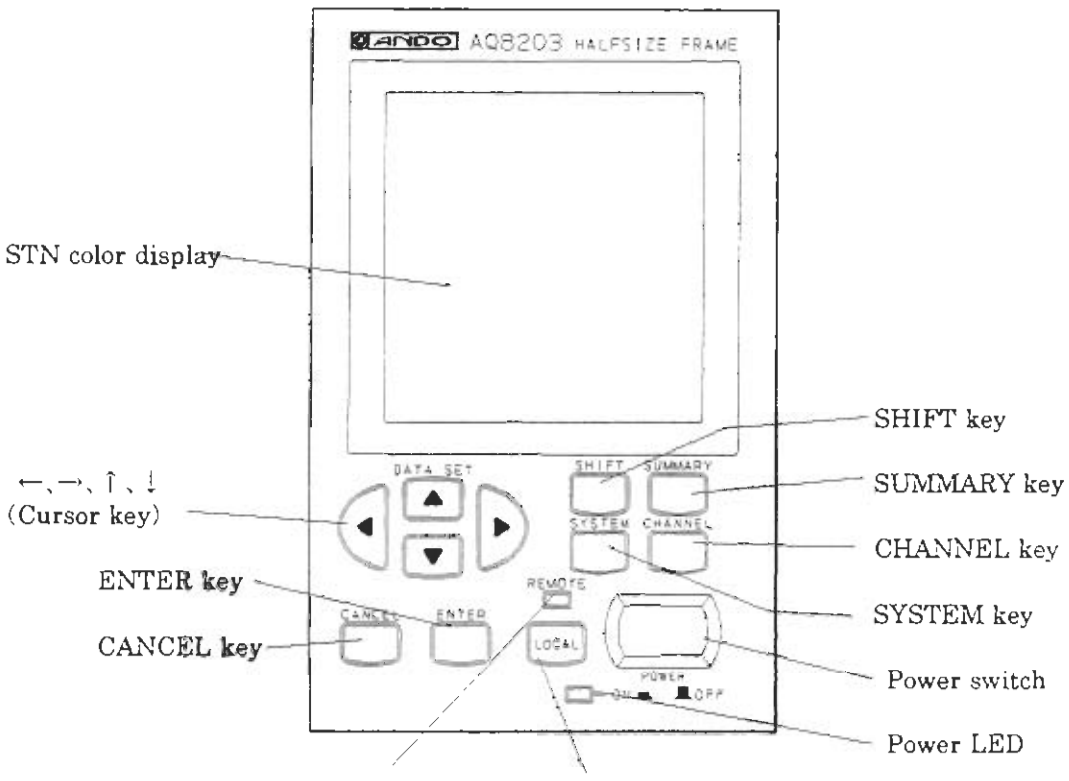


Figure 5-2-1 AQ8203 operation and display panel

STN color display :A present measurement value and the state are displayed.

←、→、↑、↓ key (Cursor key) : ↑ and ↓ are used to change to the change in the numerical value in the item.
← and → are used to change in numeric input column number.

CANCEL key :It returns to the screen displayed last time. Moreover, when a set content is canceled, It is used.

ENTER key :The content selected with the cursor is taken.

SYSTEM key :It is used to display the system.

CHANNEL key :When the display module is changed on a single screen, It is used.

SUMMARY key :It is used to display the summary.

SHIFT key :Various operations can be done by pushing simultaneously with the cursor key.

LOCAL key (Remote LED) :When remotely and changing in the local, It is used. Moreover, LED lights remotely.

Power switch (Power LED) :To push power supply SW, the power supply is turned on. The state of ON/OFF of the power supply can be confirmed with LED.

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5.2.3 Display kind

① Initialization screen
After the power supply is turned on, It is initialized. When the error is caused in initialization, the content of the error is displayed.

② System screen
It switches to the version display screen, back light intensity control, the buzzer volume , and the GPIB address can be changed by this screen.

③ Version display screen
The software version of the main body and the insertion module can be displayed by this screen.

④ Summary screen (default)
The inserted present state of three modules (When an extended unit is used, three modules are displayed according to the switch) can be displayed by this screen.

⑤ Single screen
A display of the module selected by this screen and a set parameter are confirmed and can be changed.

5.2.4 Screen transition

Figure 5-2-2 shows the screen transition of this container.
After the power supply is turned on, It is initialized.
After initialization is completed, It becomes a summary display.

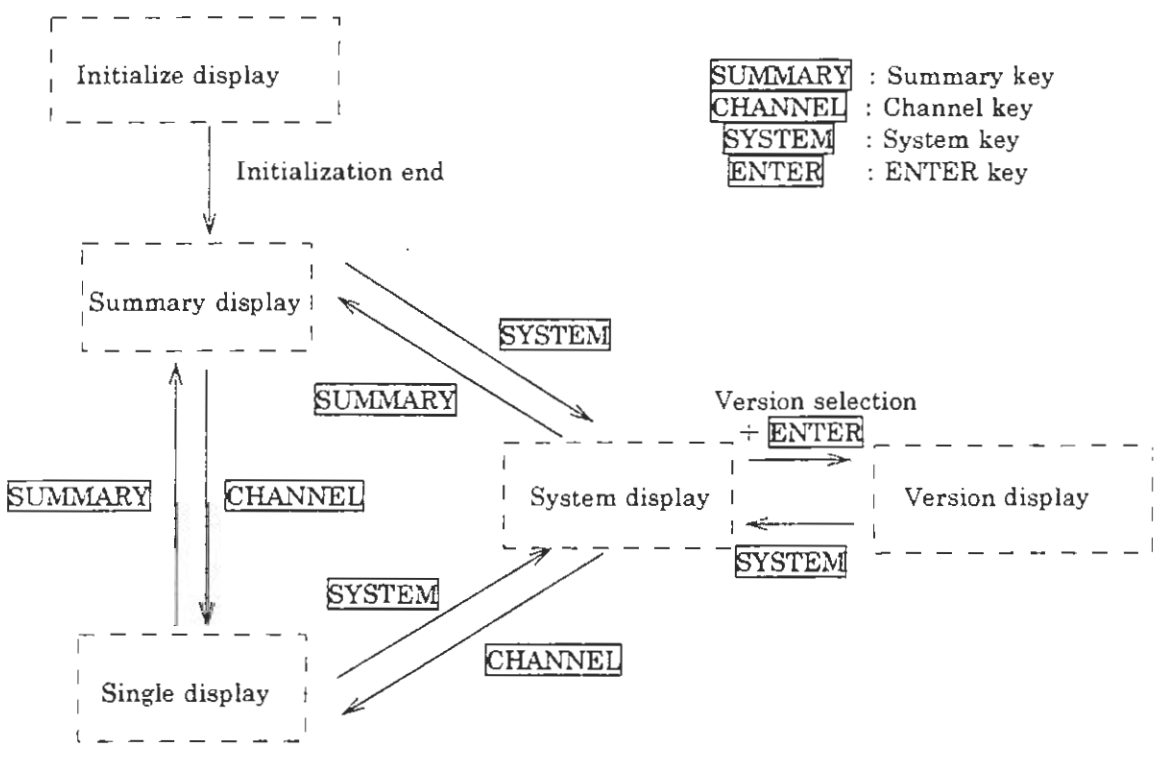


Figure 5-2-2 Screen transition

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5.2.5 Operation explanation of initialization display

After initialization ends, It becomes a summary screen.
The content of the error is displayed for 10 seconds repeating BEEP ON and BEEP OFF when the error occurs when initializing . Afterwards, It becomes a summary display.

① Display
The figure below shows the initialize display.

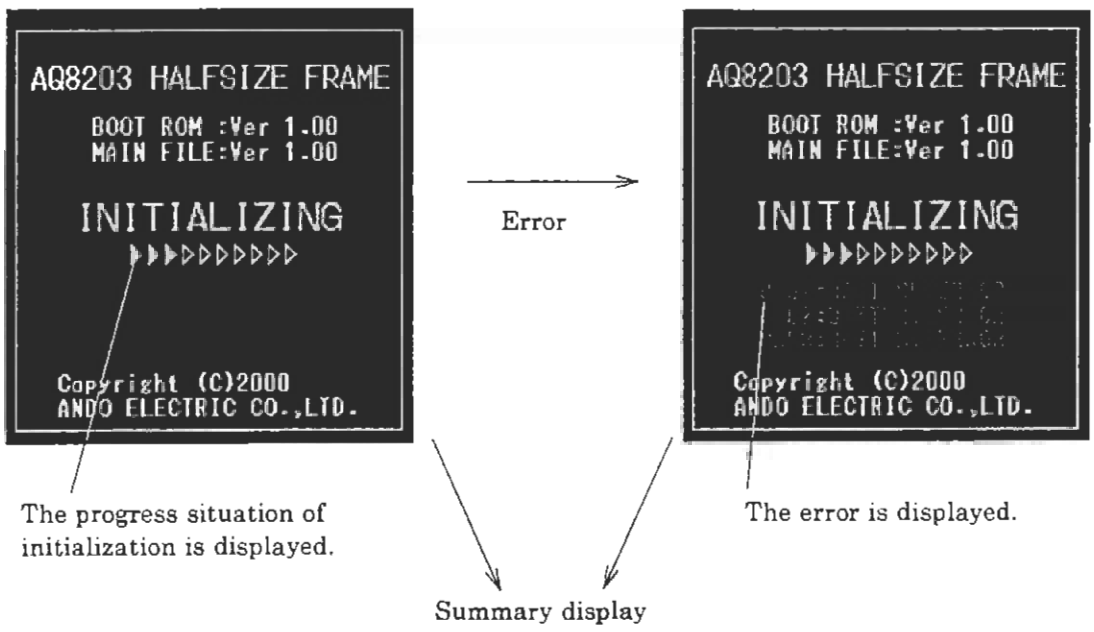


Figure 5-2-3 Initialize display

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5.2.6 Operation explanation of system display

It switches to the version display, back light intensity control, contrast adjustment, the buzzer volume, and the GPIB address can be changed by this screen.

① Display

The figure below shows the system display .

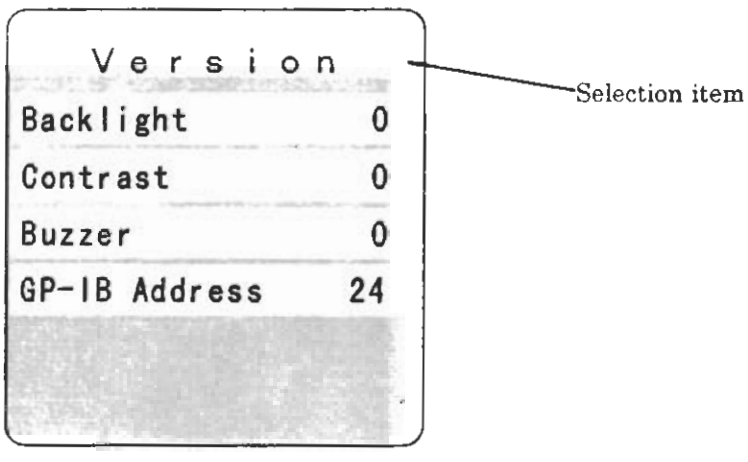


Figure 5-2-4 System display

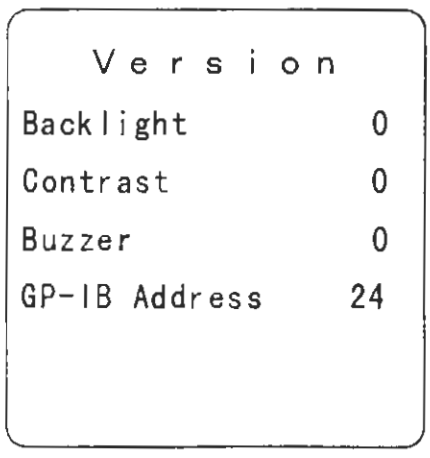
② Operation

It changes the selection item with [↑]、[↓] key.
Selection item is fixed with [ENTER] key the selection item.
- ·Version: It becomes a version display screen.
- ·Backlight: Can do intensity control of back light.
- ·Contrast: The contrast can be adjusted.
- ·Buzzer: The buzzer volume can be adjusted.
- ·GPIB Address: The GPIB address can be changed.

* Even if the power supply can be turned off, Backlight 、 Contrast 、 Buzzer 、 GPIB Address a maintains the value.

(1) Intensity control of back light

Because Backlight is selected, It becomes a screen like the under. Can intensity control by changing the numerical value.



[↑]、[↓] :The numerical value can be changed from 0 to 99. 0 is the darkest and 99 is the lightest.

[ENTER] :The input value is assumed to be a set value.

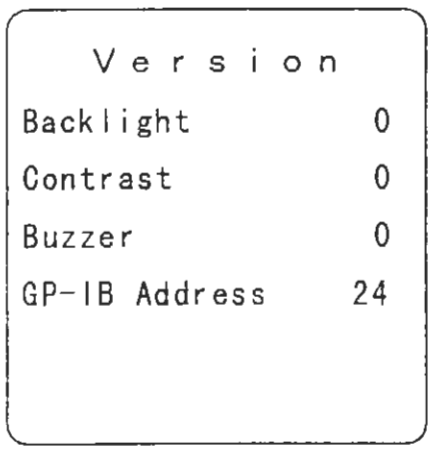
[CANCEL] :The selection of the menu of the system display becomes possible. The value not set with [ENTER] key becomes invalid.

0 ——————→99
Dark ——————→ Light

Figure 5-2-5 Back light adjustment display

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(2) Contrast adjustment
Because Contrast is selected, It becomes a screen like the under. Can intensity control by changing the numerical value.



[↑],[↓] : The numerical value can be changed from 0 to 99. 0 becomes and a low contrast and 99 become high contrasts most.

[ENTER] :The input value is assumed to be a set value.

[CANCEL] :The selection of the menu of the system screen becomes possible.
The value not set with [ENTER] key becomes invalid.

0 ⟶ 99
Low contrast ⟶ High contrast

Figure 5-2-6 Contrast adjustment display

(3) Volume adjustment of buzzer
Because Buzzer is selected, It becomes a screen like the under. The volume can be adjusted by changing the numerical value.

[↑],[↓] : The numerical value can be changed from 0 to 9. The sound is extinguished in case of 0.
One grows, and the sound is the smallest, nine grows, and the sounds grow most.

[ENTER] :The input value is assumed to be a set value.

[CANCEL] :The selection of the menu of the system screen becomes possible.
The value not set with [ENTER] key becomes invalid.

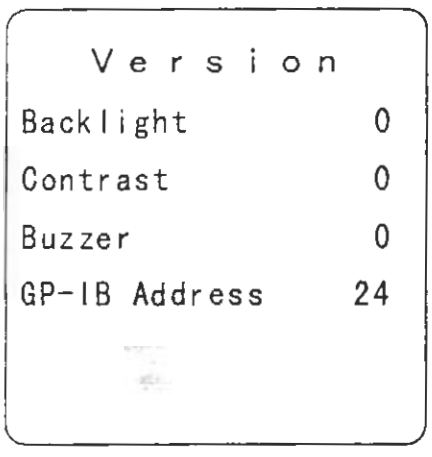
0 1 ⟶ 9
OFF Small ⟶ Big

Figure 5-2-7 Buzzer adjustment display

42

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(4) Change in GPIB address
Because GPIB Address is selected, It becomes a screen like the under. The GPIB address can be done by changing the numerical value.



↑、↓ : The numerical value can be changed from 0 to 30.
←、→ :The input digit can be changed.
When the first digit is changed, the digit going up and the digit fall are automatically done.
ENTER :The input value is assumed to be a set value.
CANCEL :The selection of the menu of the system screen becomes possible.
The value not set with ENTER key becomes invalid.

Figure 5-2-8 GPIB address modification display

5.2.6 Operation explanation of Version display

The software version of the main body and the insertion module can be displayed by this screen.

① Display
The figure below shows the version display .

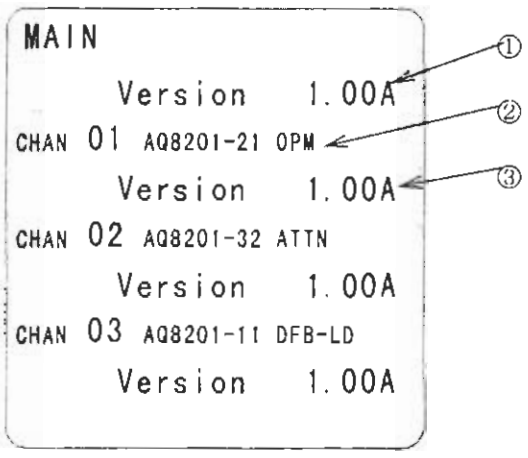


Figure 5-2-9 Version display

① AQ8203 main software version
② Module name mounted on CHAN1
③ Software version of module mounted on CHAN1

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5.2.8 Operation explanation of summary display

The inserted present state of three modules can be displayed by this screen.

① Display

The figure below shows the summary display .

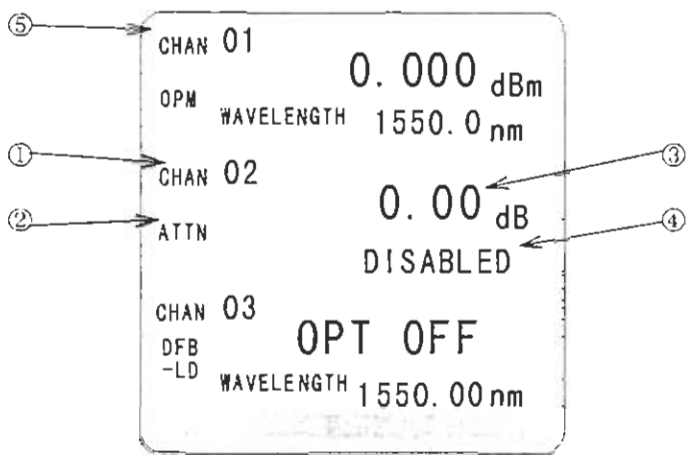


Figure 5-2-10 Summary display

①: CH display The position where the module is inserted is shown.
②: Module name being mounted now is shown.
③: Parameter 1(presentation item fixation) according to the module is shown.
④: Parameter 2(Presentation item can change) according to the module is shown.
⑤: It is a cursor which selects the controlled system module.

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② Operation

1. The item of parameter 2 is changed with ← → key. (→ ① ②)
2. The controlled system module is changed with ↑、↓ key. (→ ② ③)
3. Only the ATTN module can set parameter 1 (attenuation value) with ENTER key. (→ ④)
4. It becomes a single screen of the controlled system module with CHANNEL key.

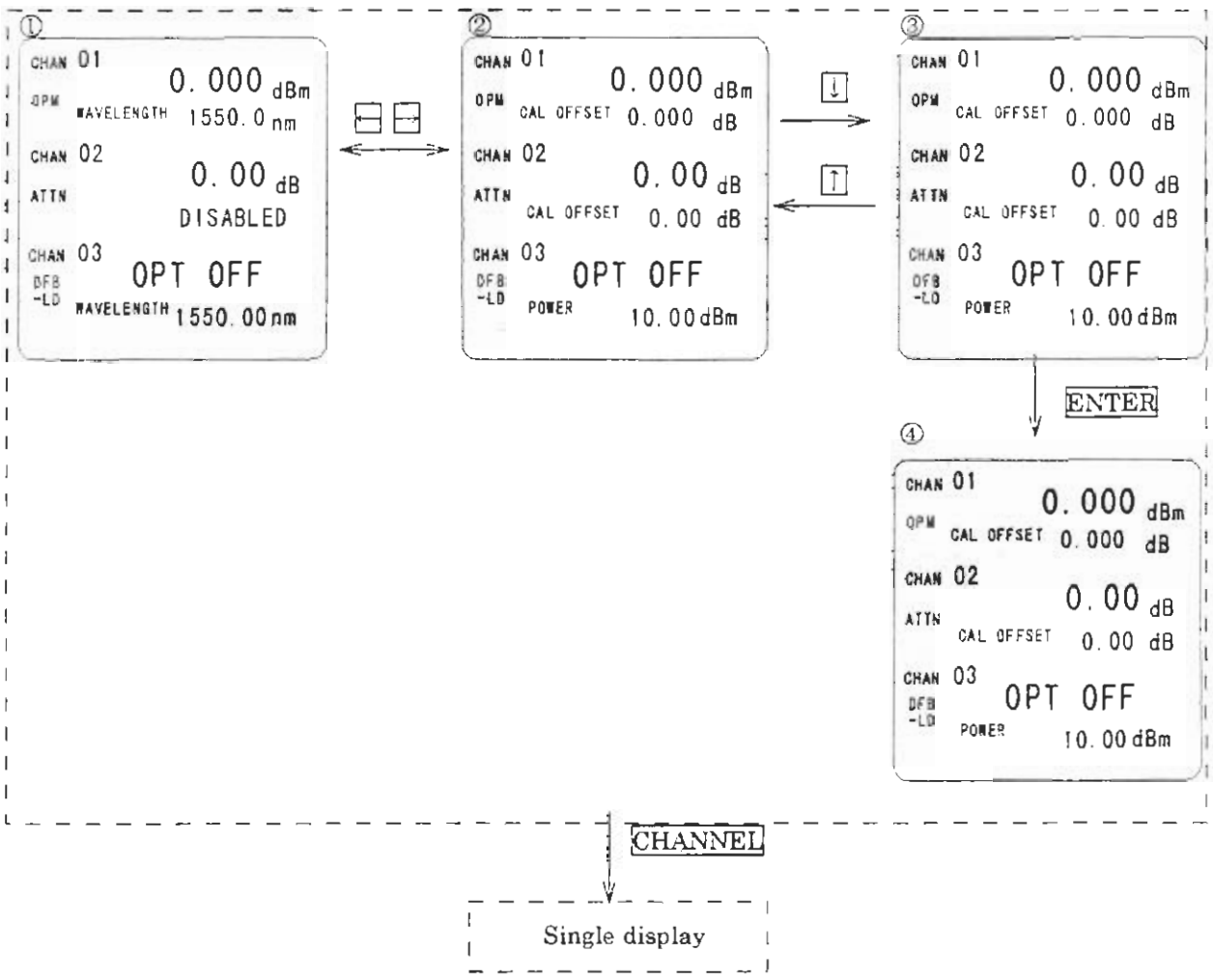


Figure 5-2-11 Operation method when summary display

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The figure below shows the change in the item of parameter 2 of each module.
* The item of parameter 2 of ASE and the RLM module is not changed.

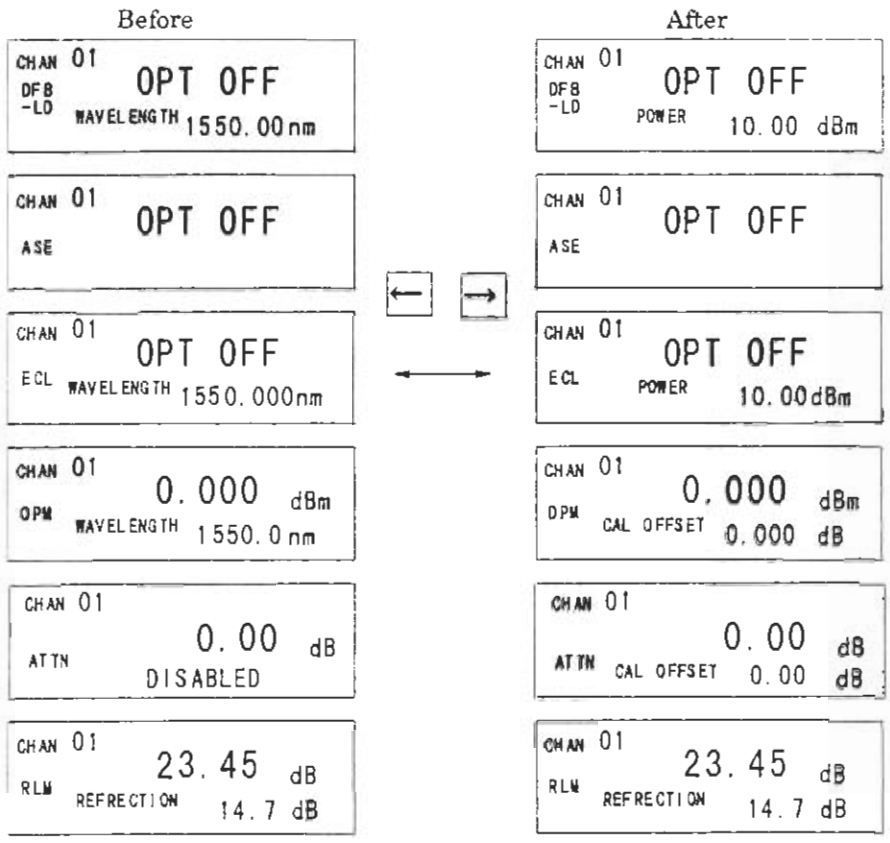


Figure 5-2-12 Summary display of each module

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5.3 Method of Operating Various Modules(Single display)

Display, the operation, and the measurement method when various modules are mounted on AQ8203 are shown in the following.

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

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

(1) Display

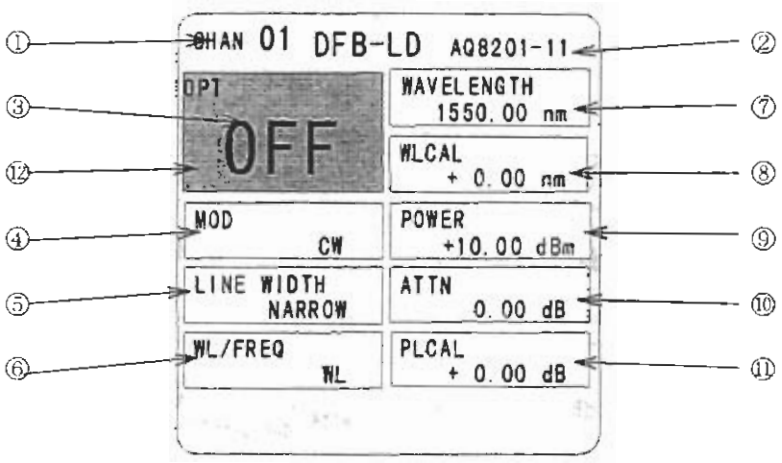


Figure 5-3-1 Single display of AQ8201-11/11A/11B control

①: The module insertion position is shown.
②: Module name under the control is shown.
③: ON/OFF of an optical output is shown.
④: Internal/External modulation is shown.
⑤: ON/OFF of the coherence control is shown.
⑥: The wavelength/the frequency display is shown.
⑦: The output wavelength is shown.
⑧: The offset value of the output wavelength is indicated.
⑨: The output power level is shown.
⑩: An optical attenuation is shown.
⑪: The offset value at the output power level is indicated.
⑫: It is a set item selection cursor.

·When the frequency display is selected, the wavelength is converted with the frequency and is displayed.
This format is "FREQUENCY***.**THz.

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(2) Kind of parameter

The display parameter is changed by [↑] [↓] key in undermentioned the order. Moreover, the parameter is selected by pushing the [ENTER] key.
Each parameter can be changed by the manual operation or the GPIB command.

① OPT · · · · · · · · · · · Setting of optical output (Default)

② MOD · · · · · · · · · · · Setting of optical modulation
"Selection of CW light and CHOP light (0.27KHz,1KHz,···)"

③ LINE WIDTH · · · · · Setting of coherence control

④ WL/FREQ · · · · · · · Setting of wavelength/frequency display

⑤ WAVELENGTH · · · · Setting of output wavelength

⑥ WLCAL · · · · · · · · · Setting of output wavelength offset

⑦ ATTN · · · · · · · · · · Setting of optical attenuation

⑧ PLCAL · · · · · · · · · Setting of output power offset

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(3) Change in parameter

① Setting of optical output
This parameter sets the optical output.
1. The parameter item is made "OPT" with ↑, ↓ key. (→ ①)
2. It becomes ON/OFF selection screen with ENTER key. (→ ②)
3. OPT is switched to ON or OFF by ↑, ↓ key. (→ ② ③)
4. It decides with ENTER key. (→ ④)

Selection item
ON ··· An optical output is turned on.
OFF ·· An optical output is turned off.

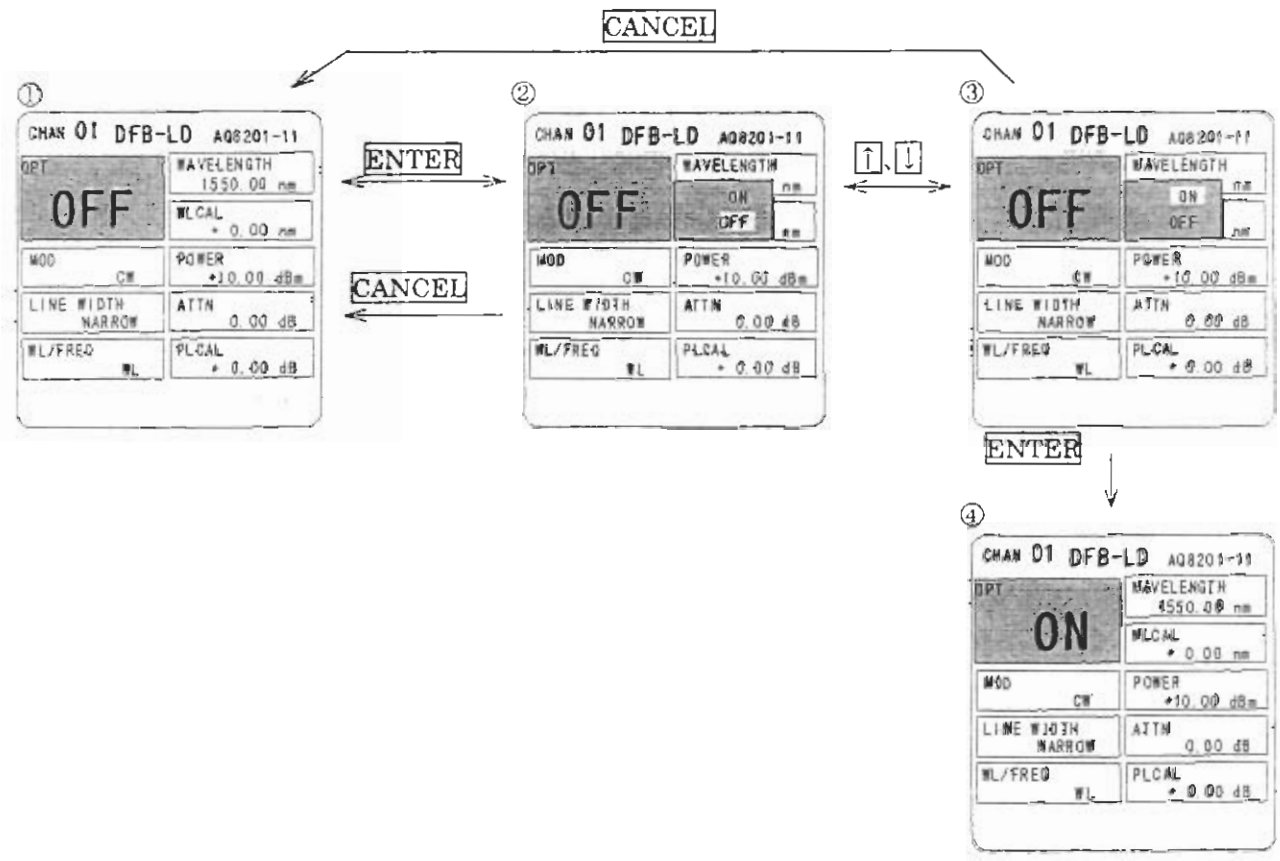


Figure 5-3-2 Screen to set the optical output

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② Setting of optical modulation

This parameter sets the optical modulation.

1. The parameter item is made "MOD" with ↑、↓ key. (→ ①)
2. It becomes an optical modulation set screen with ENTER key. (→ ②)
3. The modulation mode is changed with ↑、↓ key. (→ ② ③ ④)
4. It decides with ENTER key. (→ ⑤)
5. When CHOP-F is selected, It becomes an arbitrary value input screen. (→ ⑥)
6. The digit is changed with ←、→ key and the numerical value is changed with ↑、↓ key. (→ ⑥ ⑦ ⑧)
7. It decides with ENTER key. (→ ⑨)

Selection item

EXT····· external modulation is turned on.
CW····· An internal modulation is made CW.
0.27 kHz ···An internal modulation is adjusted to 0.27 kHz.
1 kHz ····· An internal modulation is adjusted to 1 kHz.
2 kHz ····· An internal modulation is adjusted to 2 kHz.
CHOP-F····An internal modulation can be arbitrarily set from 0.1 kHz to 300.0 kHz. (0.1 kHz step)

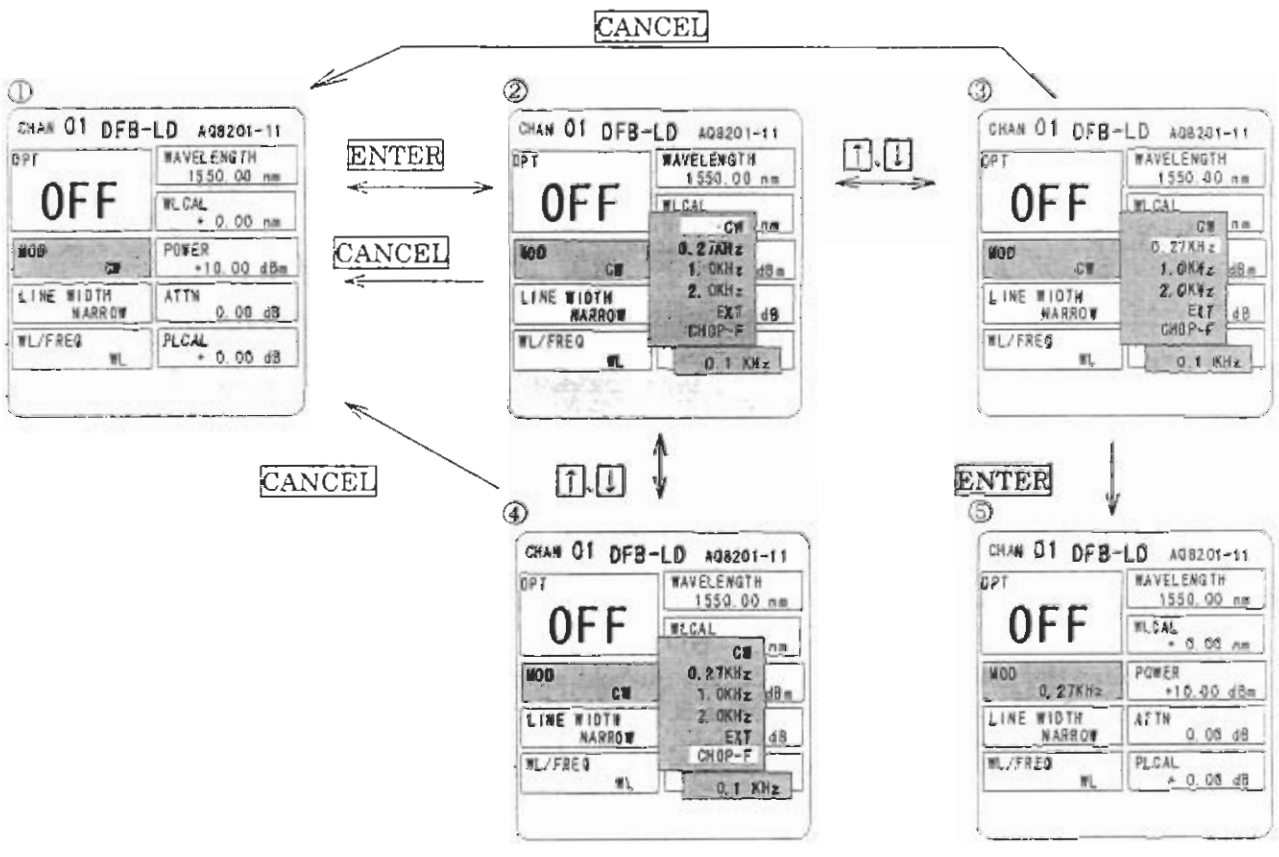


Figure 5-3-3 Screen to set the optical modulation 1

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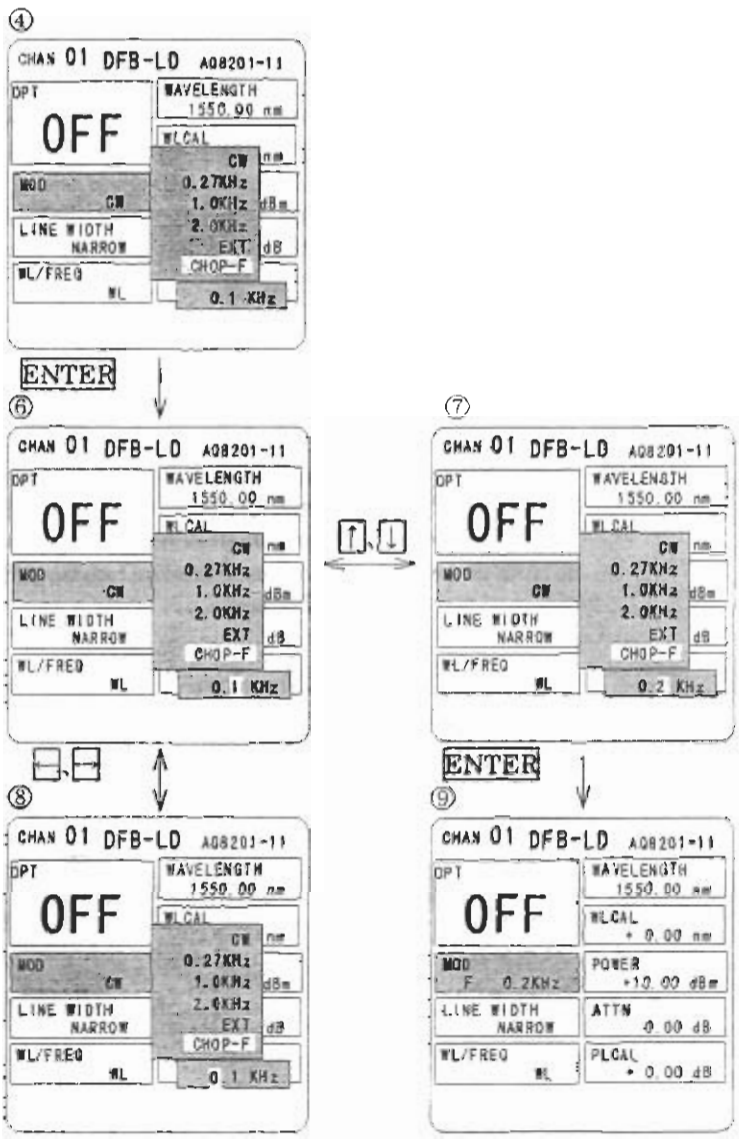


Figure 5-3-4 Screen to set the optical modulation 2

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.

CAUTION

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

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③ Setting of coherence control

This parameter sets the coherence control.

1. The parameter item is made "LINE WIDTH" with [↑], [↓] key. (→ ①)
2. It becomes a coherence control set screen with [ENTER] key. (→ ②)
3. LINE WIDTH is switched to WIDE or NARROW by [↑], [↓] key. (→ ③)
4. It decides with the [ENTER] key. (→ ④)

Selection item

WIDE····· The coherence control is turned on.
NARROW ·· The coherence control is turned off.

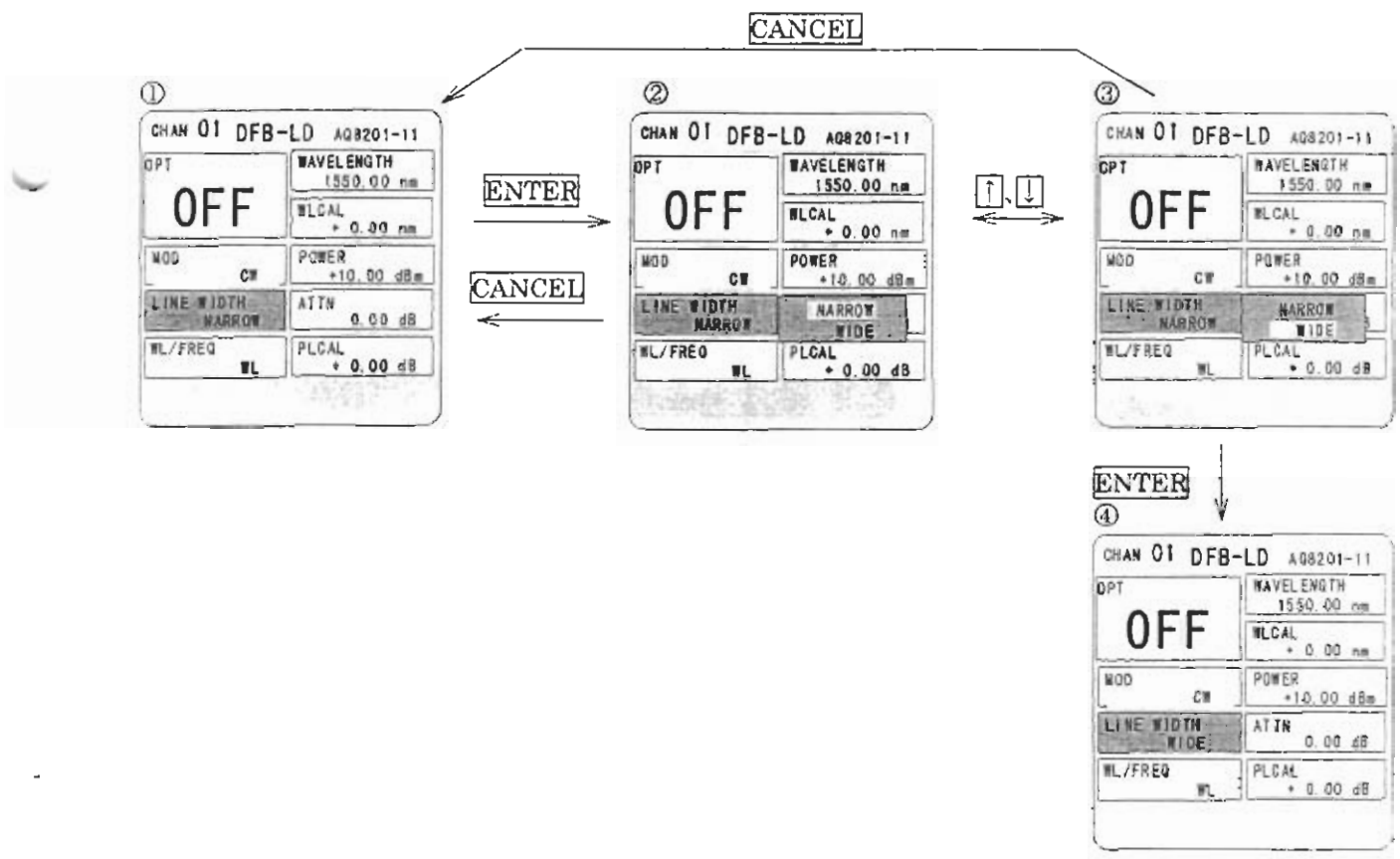


Figure 5-3-5 Screen to set the coherence control

NOTE

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.

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④ Setting of wavelength/frequency display
This parameter sets the wavelength/frequency display.
1. The parameter item is made "WL/FREQ" with [↑],[↓] key. (→ ①)
2. It becomes a set screen of the switch of the wavelength and the frequency display with [ENTER] key. (→ ②)
3. WL/FREQ is switched to WL or FREQ by [↑],[↓] key. (→ ② ③)
4. It decides with [ENTER] key. (→ ④)

Selection item
WL ···· The wavelength is displayed.
FREQ ··· The frequency is displayed.

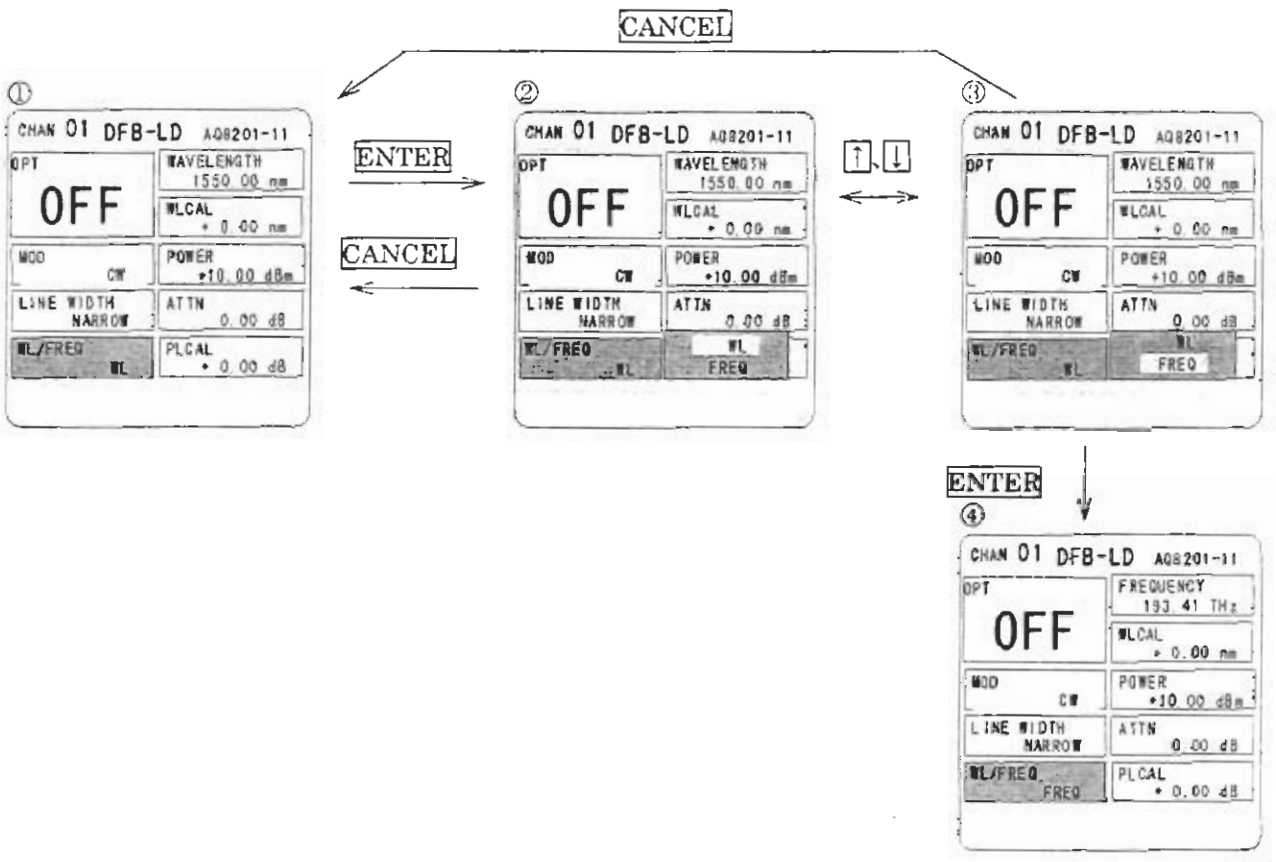


Figure 5-3-6 Screen to set the wavelength/frequency display

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⑤ Setting of output wavelength

This parameter sets the output wavelength.

1. The parameter item is made "WAVELENGTH" with ↑、↓ key. (→ ①)
2. It becomes output wavelength set screen with the ENTER key. (→ ②)
3. The digit is changed with ←、→ key and the numerical value is changed with ↑、↓ key. (→ ② ③ ④)
4. It decides with the ENTER key. (→ ⑤)

* The display setting is done by not the wavelength but the frequency at the FREQ display.

Range which can be set: It differs depending on the specification of the module.
(0.01nm step)

The set value and the indicated value contain the value set by WLCAL.
Moreover, the range of setting changes according to the WLCAL value.

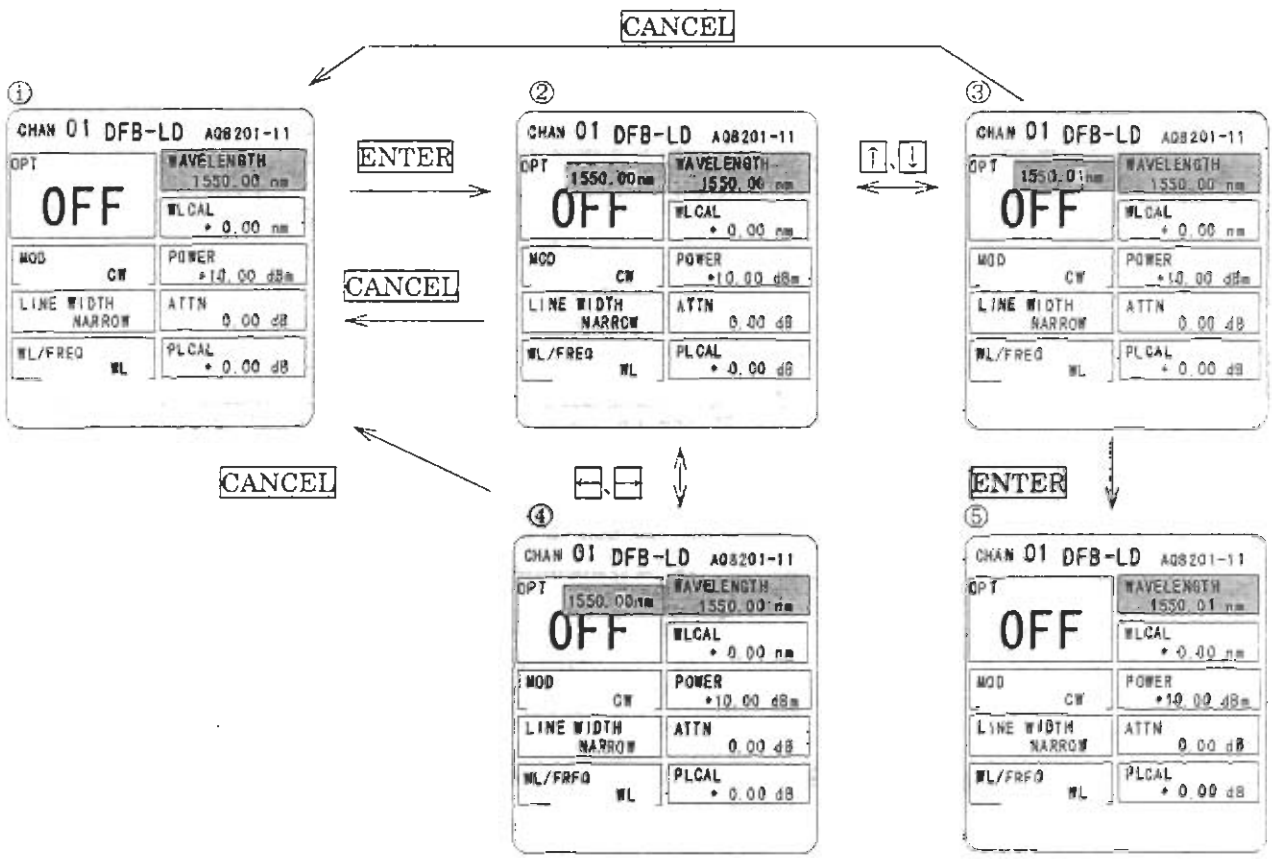


Figure 5-3-7 Screen to set the output wavelength

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.

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

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⑥ Setting of output wavelength offset

This parameter sets the output wavelength offset.

1. The parameter item is made "WLCAL" with [↑]、[↓] key. (→ ①)
2. It becomes an output wavelength offset set screen with [ENTER] key. (→ ②)
3. The digit is changed with [←]、[→] key and the numerical value is changed with [↑]、[↓] key. (→ ② ③ ④)
4. It decides with [ENTER] key. (→ ⑤)

Range which can be set: -10.00 to +10.00 nm (0.01 nm step)

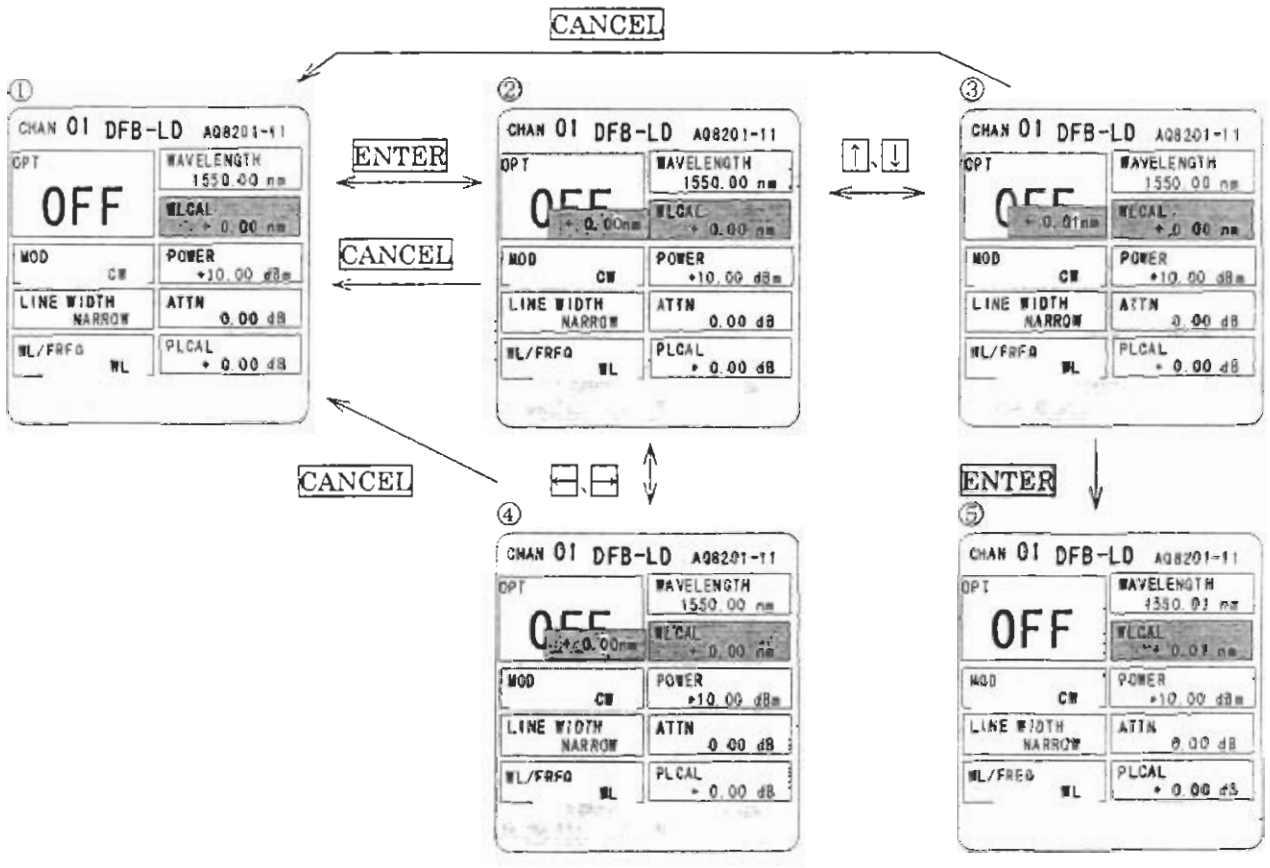


Figure 5-3-8 Screen to set the output wavelength offset

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⑦ Setting of optical attenuation
This parameter sets an optical attenuation.

1. The parameter item is made "ATTN" with [↑],[↓] key. (→ ①)
2. It becomes a set screen of an optical attenuation with the [ENTER] key. (→ ②)
3. The digit is changed with [←],[→] key and the numerical value is changed with [↑],[↓] key. (→ ② ③ ④)
4. It decides with the [ENTER] key. (→ ⑤)

Range which can be set: 0.00 to +10.00 dB (0.01 dB step)

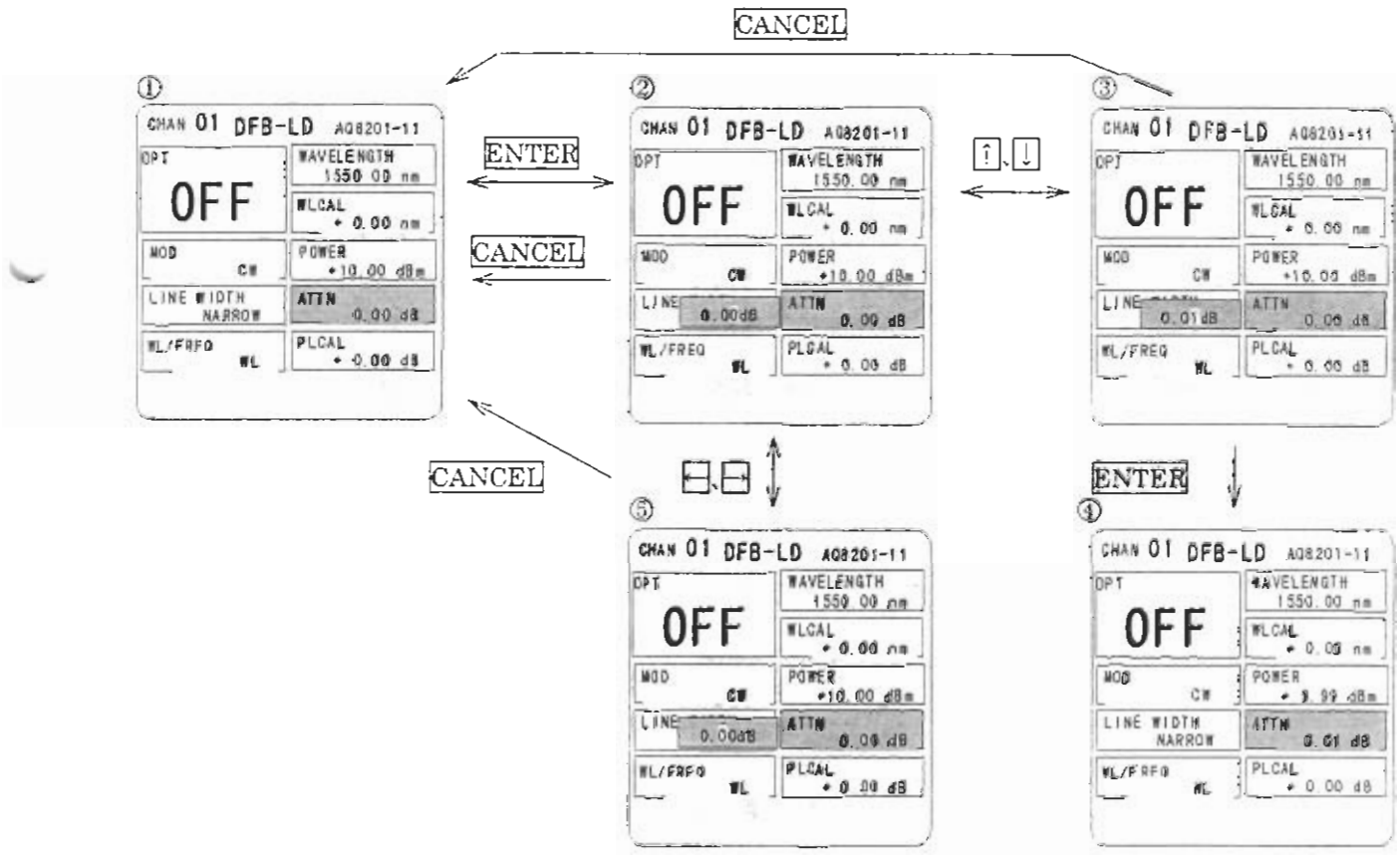


Figure 5-3-9 Screen to set the optical attenuation

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

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⑧ Setting of output power offset

This parameter sets the output power offset value.

1. The parameter item is made "PLCAL" with [↑], [↓] key. (→ ①)
2. It becomes an output power offset value set screen with [ENTER] key. (→ ②)
3. The digit is changed with [←], [→] key and the numerical value is changed with [↑], [↓] key. (→ ② ③ ④)
4. It decides with [ENTER] key. (→ ⑤)

Range which can be set: -80.00 to +80.00 dB (0.01 dB step)

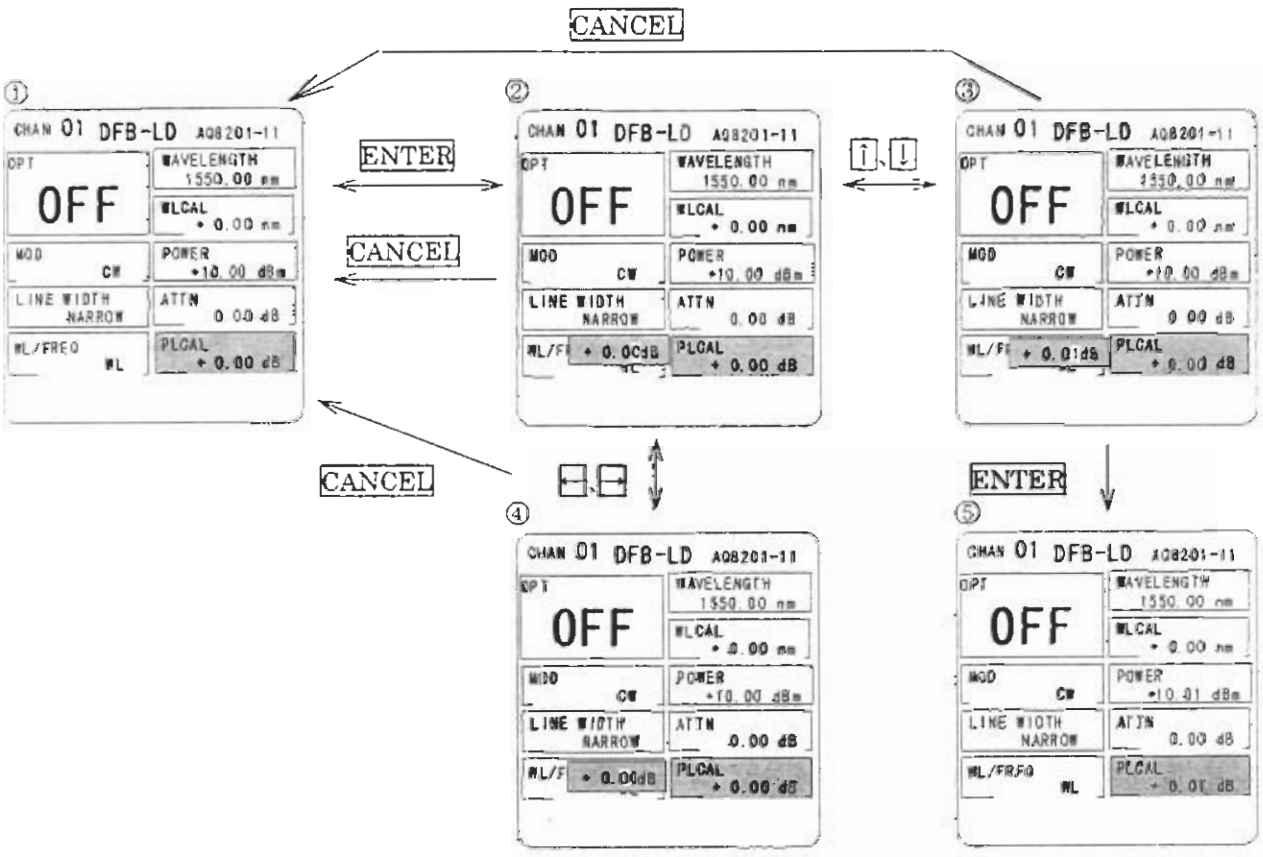


Figure 5-3-10 Screen to set the output power offset

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5.3.2 ASE MODULE (AQ8201-12)

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

(1) Display



Figure 5-3-11 Single display of AQ8201-12 control

①: The module insertion position is shown.
②: Module name under the control is shown.
③: ON/OFF of an optical output is shown.
④: An optical attenuation is shown.
⑤: It is a set item selection cursor.

(2) Kind of parameter
The display parameter is changed by [↑] [↓] key in undermentioned the order. Moreover, the parameter is selected by pushing the [ENTER] key.
Each parameter can be changed by the manual operation or the GPIB command.

① OPT · · · · · · · · · · · Setting of optical output (Default)

② ATTN · · · · · · · · · · Setting of optical attenuation

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(3) Change in parameter

① Switch of optical output
This parameter sets the optical output.
1. The parameter item is made "OPT" with ↑、↓ key. (→ ①)
2. It becomes ON/OFF selection screen with ENTER key. (→ ②)
3. OPT is switched to ON or OFF by ↑、↓ key. (→ ② ③)
4. It decides with ENTER key. (→ ④)

Selection item
ON ··· An optical output is turned on.
OFF ·· An optical output is turned off.

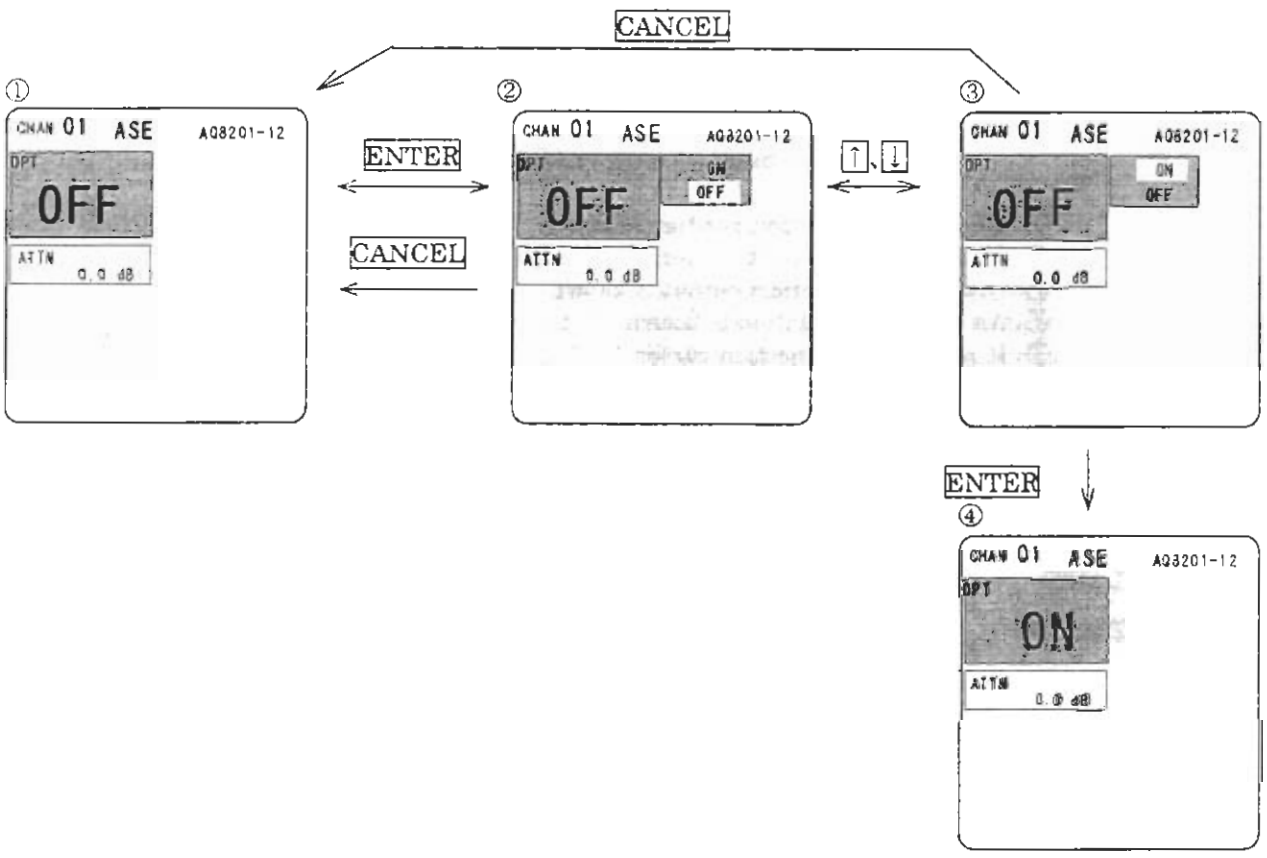


Figure 5-3-12 Screen to set the optical output

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⑦ Setting of optical attenuation
This parameter sets an optical attenuation.

1. The parameter item is made "ATTN" with [↑]、[↓] key. (→ ①)
2. It becomes a set screen of an optical attenuation with the [ENTER] key. (→ ②)
3. The digit is changed with [←]、[→] key and the numerical value is changed with [↑]、[↓] key. (→ ② ③ ④)
4. It decides with the [ENTER] key. (→ ⑤)

Range which can be set: 0.0 to 6.0 dB (0.1 dB step)

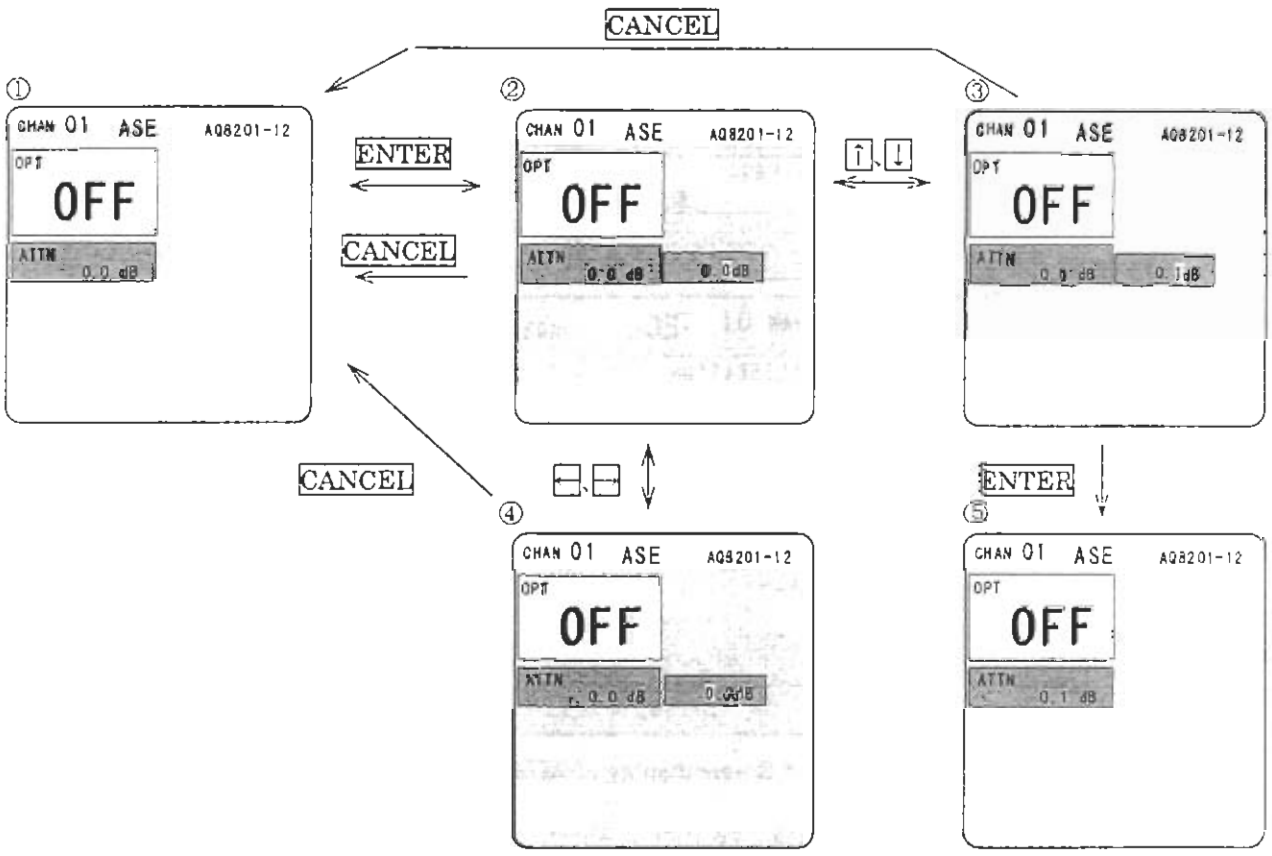


Figure 5-3-13 Screen to set the optical attenuation

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

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5.3.3 ECL MODULE (AQ8201-13)

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

(1) Display

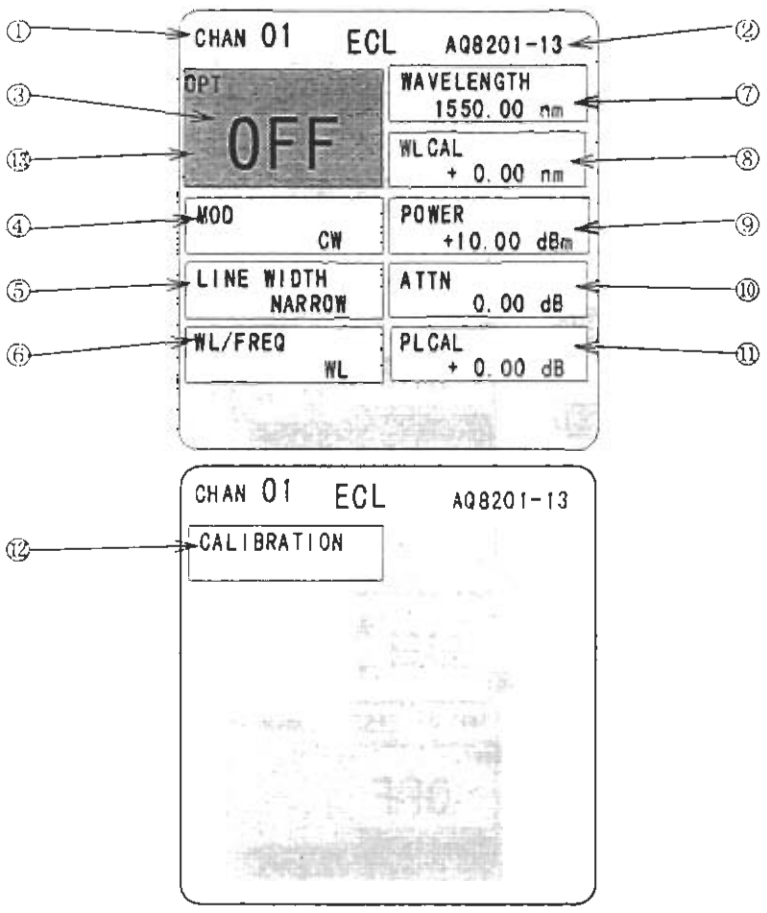


Figure 5-3-14 Single display of AQ8201-13 control

①: The module insertion position is shown.
②: Module name under the control is shown.
③: ON/OFF of an optical output is shown.
④: Internal/External modulation is shown.
⑤: ON/OFF of the coherence control is shown.
⑥: The wavelength/the frequency display is shown.
⑦: The output wavelength is shown.
⑧: The offset value of the output wavelength is indicated.
⑨: The output power level is shown.
⑩: An optical attenuation is shown.
⑪: The offset value at the output power level is indicated.
⑫: When this item is selected, It becomes a wave length proofreading mode.
⑬: It is a set item selection cursor.

・When the frequency display is selected, the wavelength is converted with the frequency and is displayed.
This format is "FREQUENCY***.**THz.

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(2) Kind of parameter

The display parameter is changed by [↑] [↓] key in undermentioned the order. Moreover, the parameter is selected by pushing the [ENTER] key.
Each parameter can be changed by the manual operation or the GPIB command.

① OPT · · · · · · · · · · · Setting of optical output (Default)

② MOD · · · · · · · · · · Setting of optical modulation
"Selection of CW light and CHOP light (0.27KHz,1KHz,···)"

③ LINE WIDTH · · · · · Setting of coherence control

④ WL/FREQ · · · · · · · Setting of wavelength/frequency display

⑤ WAVELENGTH · · · · Setting of output wavelength

⑥ WLCAL · · · · · · · · · Setting of output wavelength offset

⑦ ATTN · · · · · · · · · · Setting of optical attenuation

⑧ PLCAL · · · · · · · · · Setting of output power offset

⑨ CALIBRATION · · · Proofreading of wavelength

52

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(3) Change in parameter

① Setting of optical output

This parameter sets the optical output.

1. The parameter item is made "OPT" with ↑、↓ key. (→ ①)
2. It becomes ON/OFF selection screen with ENTER key. (→ ②)
3. OPT is switched to ON or OFF by ↑、↓ key. (→ ② ③)
4. It decides with ENTER key. (→ ④)

Selection item

ON ··· An optical output is turned on.

OFF ·· An optical output is turned off.

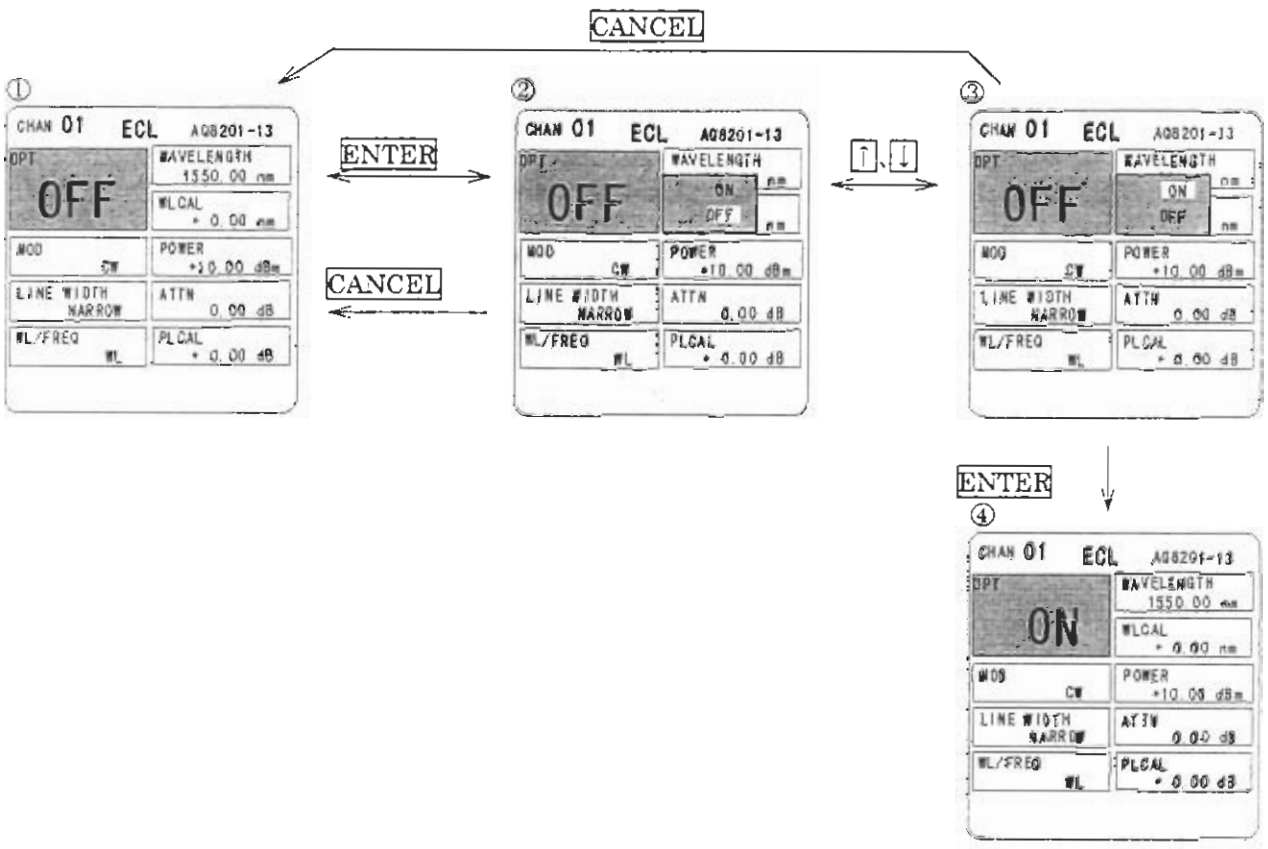


Figure 5-3-15 Screen to set the optical output

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② Setting of optical modulation

This parameter sets the optical modulation.

1. The parameter item is made "MOD" with [↑],[↓] key. (→ ①)
2. It becomes an optical modulation set screen with [ENTER] key. (→ ②)
3. The modulation mode is changed with [↑],[↓] key. (→ ② ③ ④)
4. It decides with [ENTER] key. (→ ⑤)
5. When CHOP-F is selected, It becomes an arbitrary value input screen. (→ ⑥)
6. The digit is changed with [←],[→] key and the numerical value is changed with [↑],[↓] key. (→ ⑥ ⑦ ⑧)
7. It decides with [ENTER] key. (→ ⑨)

Selection item

EXT····· external modulation is turned on.
CW····· An internal modulation is made CW.
0.27 kHz ···An internal modulation is adjusted to 0.27 kHz.
1 kHz ····· An internal modulation is adjusted to 1 kHz.
2 kHz ····· An internal modulation is adjusted to 2 kHz.
CHOP-F····An internal modulation can be arbitrarily set from 0.1 kHz to 300.0 kHz. (0.1 kHz step)

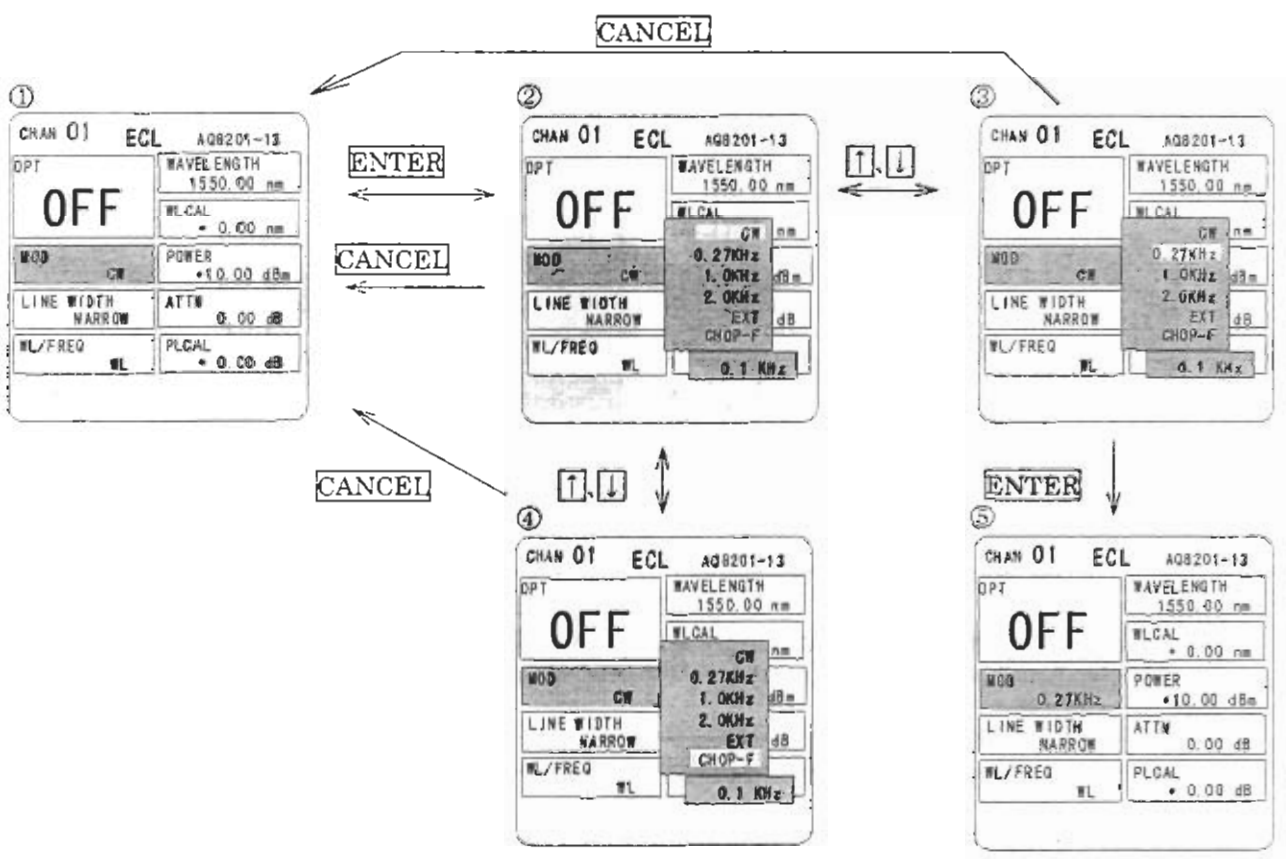


Figure 5-3-16 Screen to set the optical modulation 1

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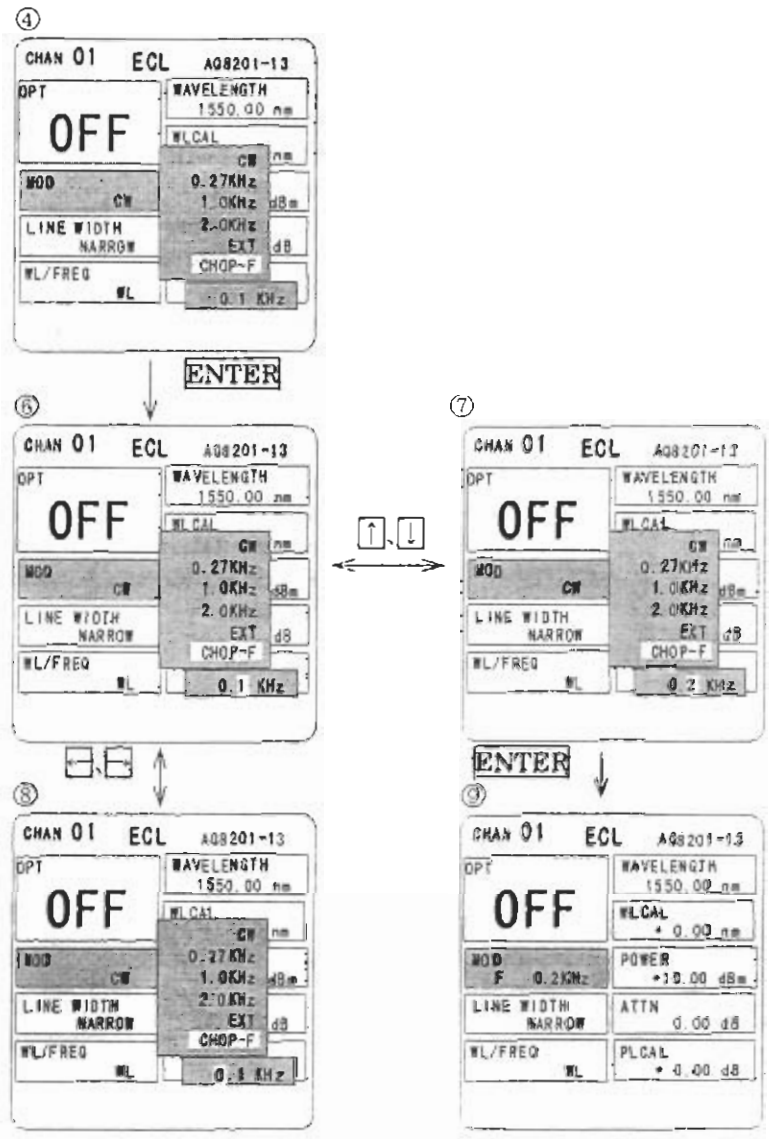


Figure 5-3-17 Screen to set the optical modulation 2

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.

CAUTION

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

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③ Setting of coherence control

This parameter sets the coherence control.

1. The parameter item is made "LINE WIDTH" with [↑], [↓] key. (→ ①)
2. It becomes a coherence control set screen with [ENTER] key. (→ ②)
3. LINE WIDTH is switched to WIDE or NARROW by [↑], [↓] key. (→ ③)
4. It decides with the [ENTER] key. (→ ④)

Selection item

WIDE····· The coherence control is turned on.
NARROW ·· The coherence control is turned off.

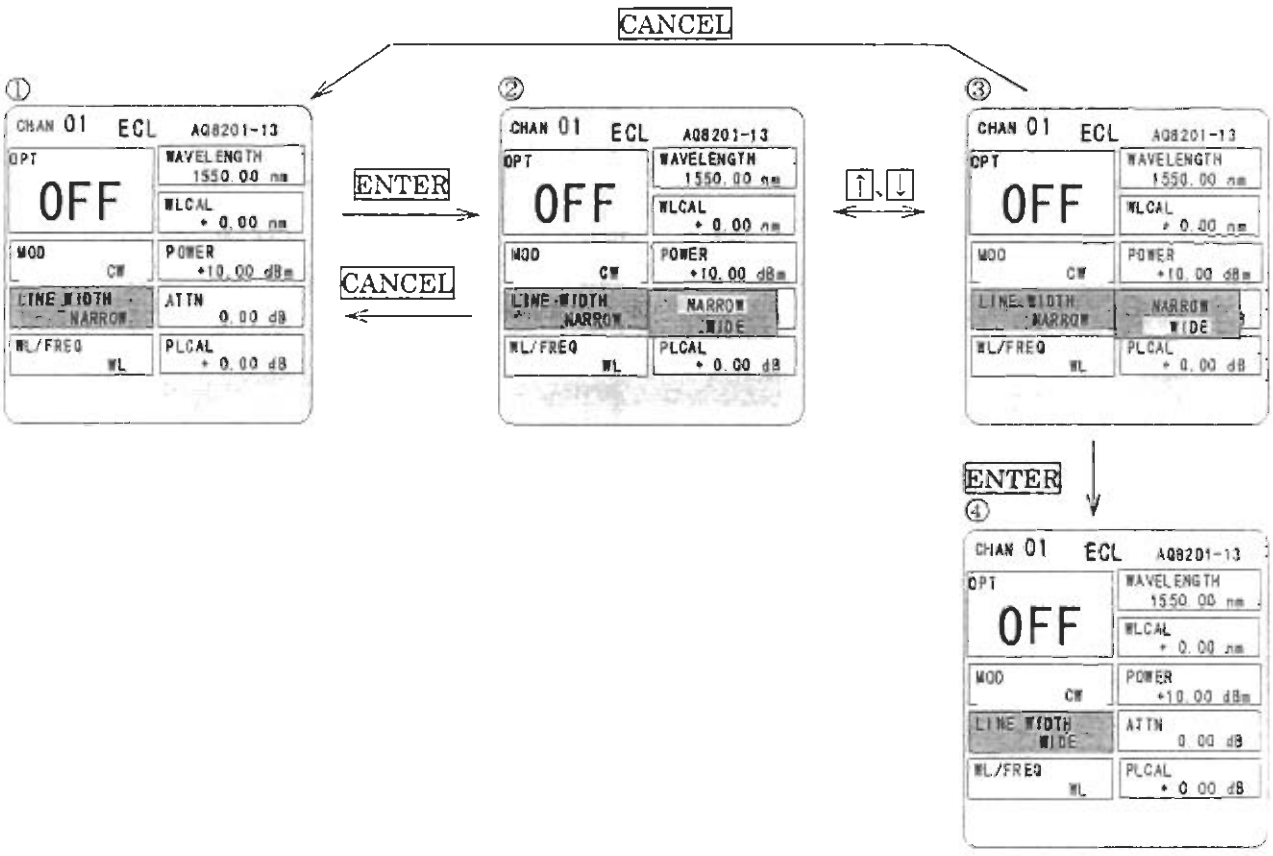


Figure 5-3-18 Screen to set the coherence control

NOTE

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.

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④ Setting of wavelength/frequency display

This parameter sets the wavelength/frequency display.

1. The parameter item is made "WL/FREQ" with [↑],[↓] key. (→ ①)
2. It becomes a set screen of the switch of the wavelength and the frequency display with [ENTER] key. (→ ②)
3. WL/FREQ is switched to WL or FREQ by [↑],[↓] key. (→ ② ③)
4. It decides with [ENTER] key. (→ ④)

Selection item

WL ···· The wavelength is displayed.

FREQ ··· The frequency is displayed.

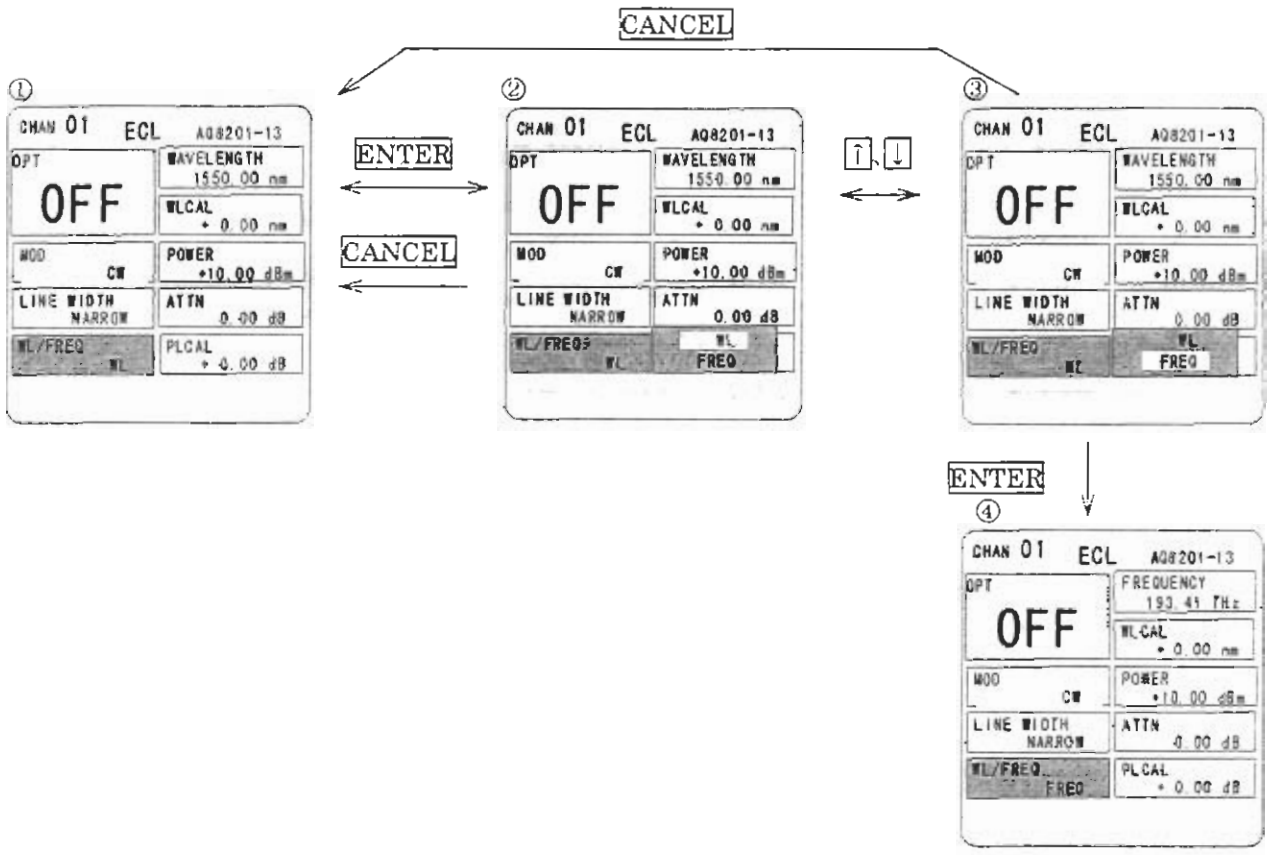


Figure 5-3-19 Screen to set the wavelength/frequency display

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⑤ Setting of output wavelength
This parameter sets the output wavelength.
1. The parameter item is made "WAVELENGTH" with [↑], [↓] key. (→ ①)
2. It becomes output wavelength set screen with the [ENTER] key. (→ ②)
3. The digit is changed with [←], [→] key and the numerical value is changed with [↑], [↓] key. (→ ② ③ ④)
4. It decides with the [ENTER] key. (→ ⑤)

* The display setting is done by not the wavelength but the frequency at the FREQ display.

Range which can be set: 1460.00 to 1580.00 nm (0.01 nm step)
The set value and the indicated value contain the value set by WLCAL.
Moreover, the range of setting changes according to the WLCAL value.

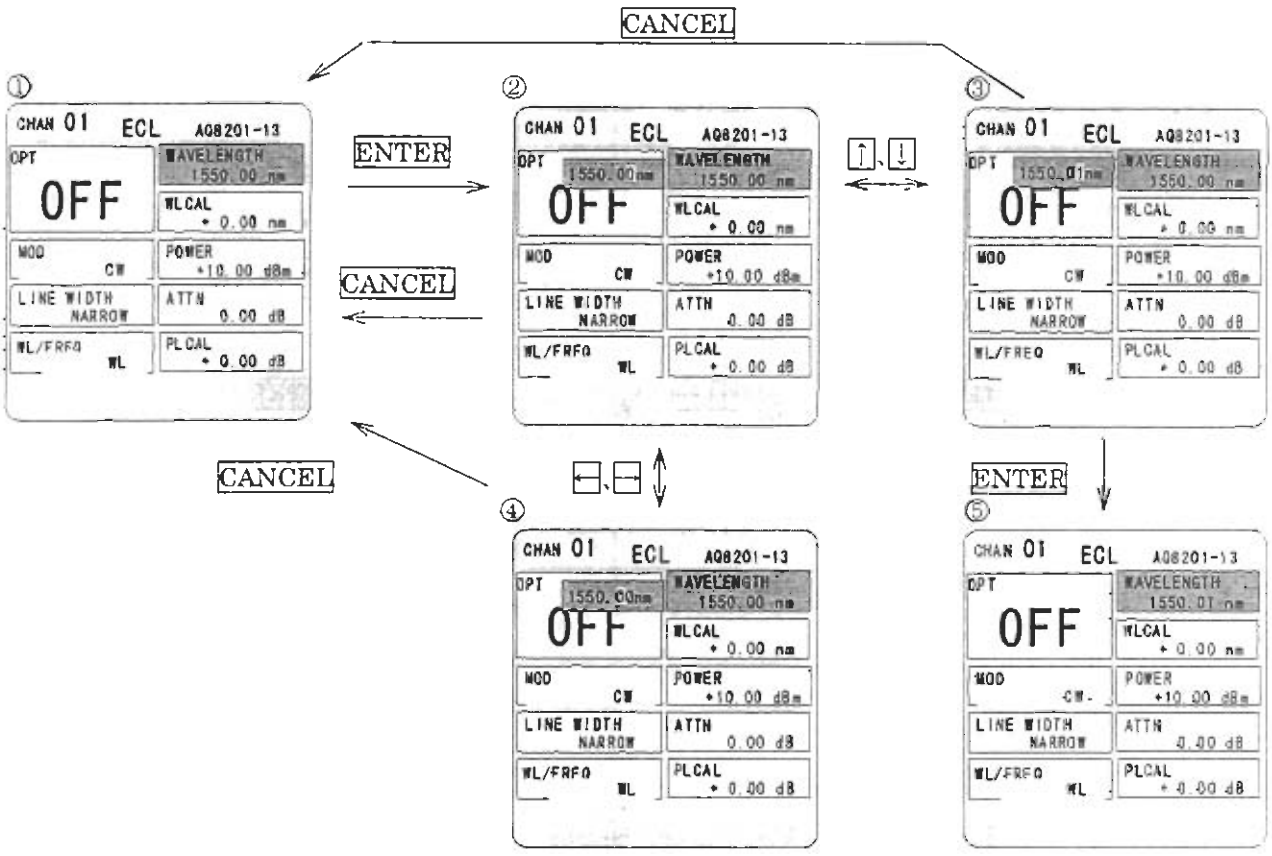


Figure 5-3-20 Screen to set the output wavelength

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.

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

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⑥ Setting of output wavelength offset

This parameter sets the output wavelength offset.

1. The parameter item is made "WLCAL" with ↑, ↓ key. (→ ①)
2. It becomes an output wavelength offset set screen with ENTER key. (→ ②)
3. The digit is changed with ←, → key and the numerical value is changed with ↑, ↓ key. (→ ② ③ ④)
4. It decides with ENTER key. (→ ⑤)

Range which can be set: -10.00 to +10.00 nm (0.01 nm step)

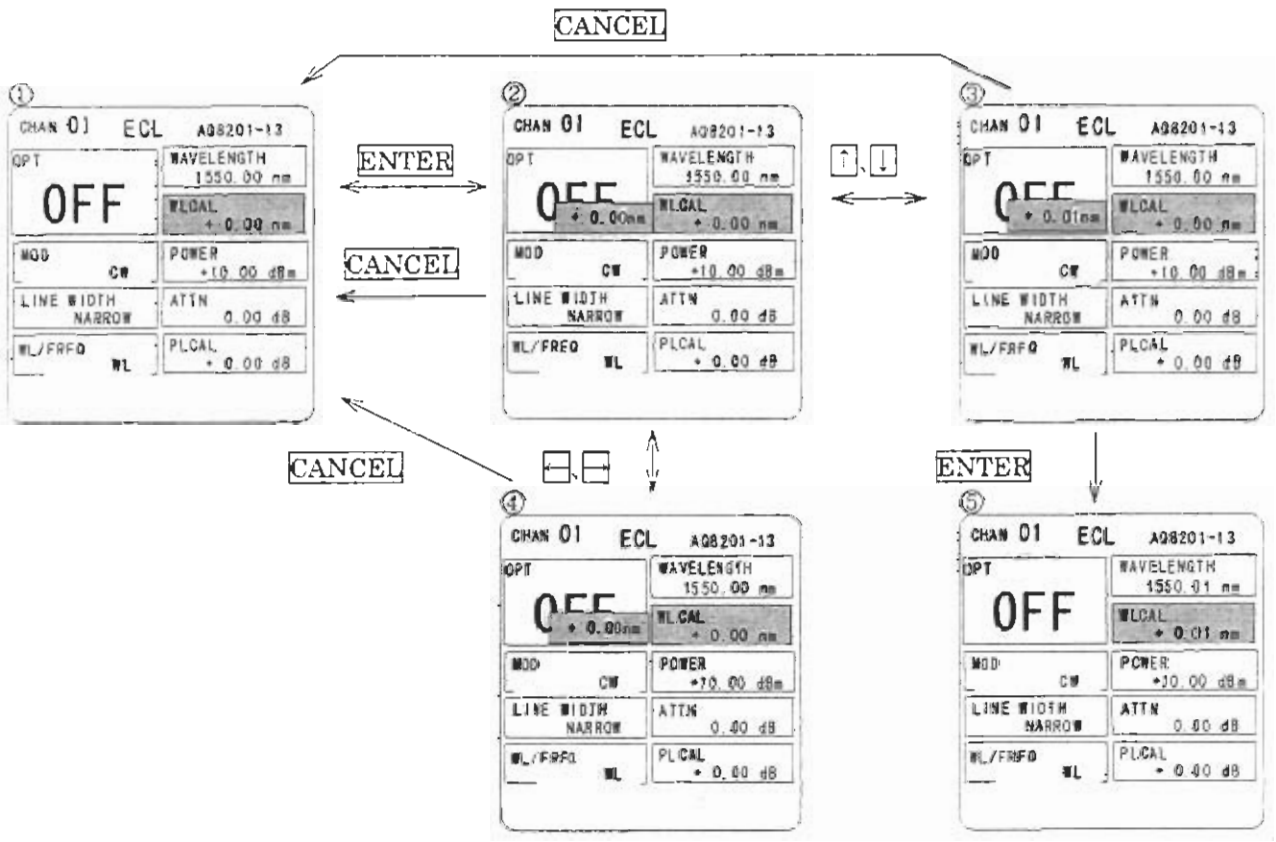


Figure 5-3-21 Screen to set the output wavelength offset

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⑦ Setting of optical attenuation
This parameter sets an optical attenuation.

1. The parameter item is made "ATTN" with [↑], [↓] key. (→ ①)
2. It becomes a set screen of an optical attenuation with the [ENTER] key. (→ ②)
3. The digit is changed with [←], [→] key and the numerical value is changed with [↑], [↓] key. (→ ② ③ ④)
4. It decides with the [ENTER] key. (→ ⑤)

Range which can be set: 0.00 to 10.00 dB (0.01 dB step)

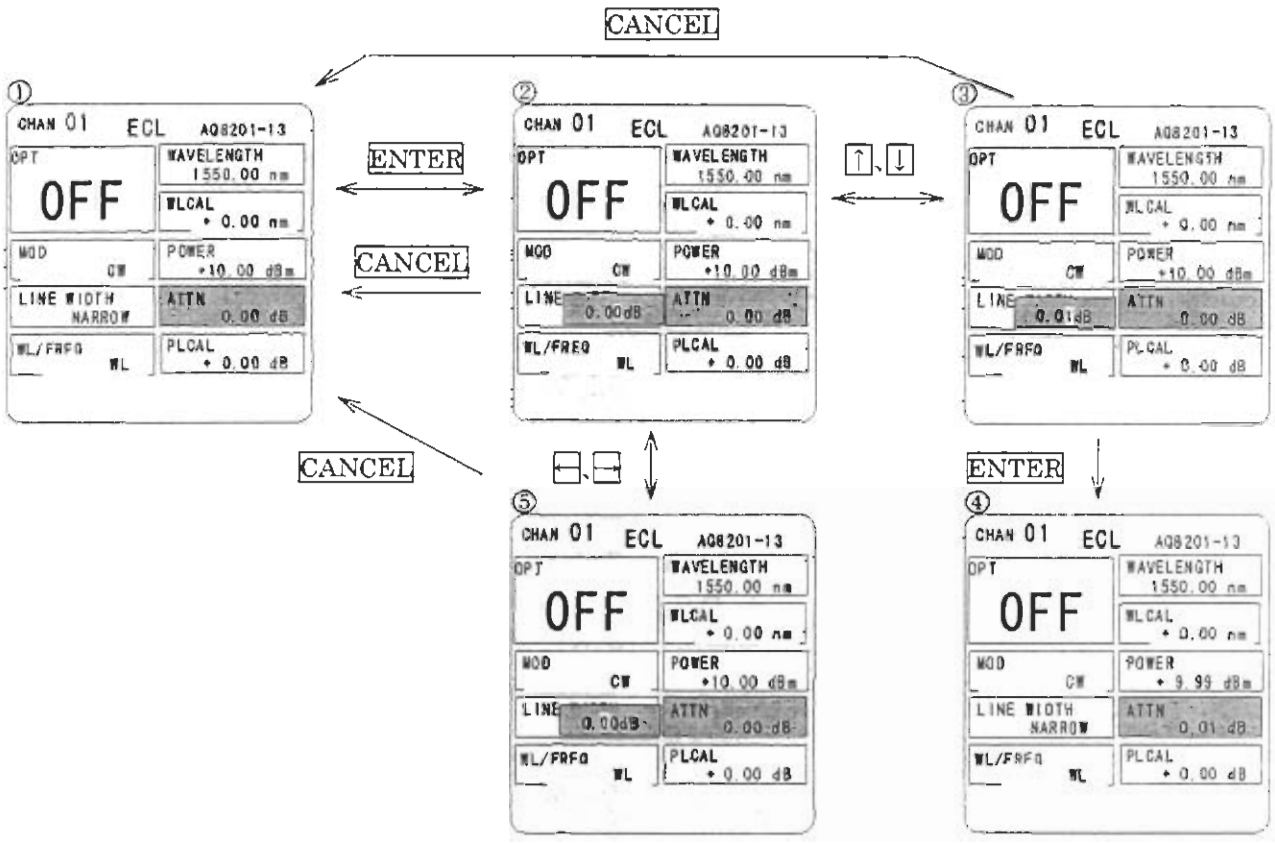


Figure 5-3-22 Screen to set the optical attenuation

NOTE

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

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⑧ Setting of output power offset

This parameter sets the output power offset value.

1. The parameter item is made "PLCAL" with [↑], [↓] key. (→ ①)
2. It becomes an output power offset value set screen with [ENTER] key. (→ ②)
3. The digit is changed with [←], [→] key and the numerical value is changed with [↑], [↓] key. (→ ② ③ ④)
4. It decides with [ENTER] key. (→ ⑤)

Range which can be set: -80.00 to +80.00 dB (0.01 dB step)

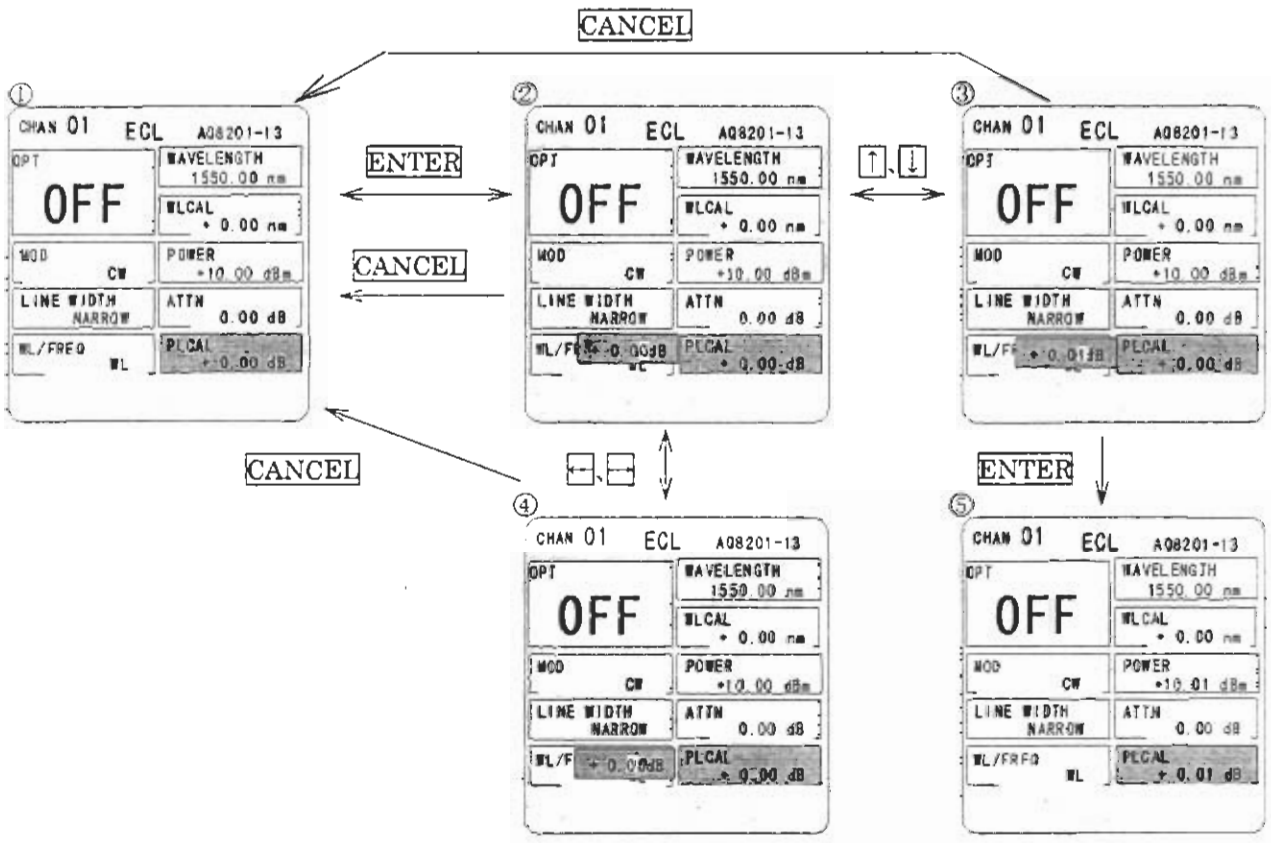


Figure 5-3-23 Screen to set the output power offset

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⑨ Execution of wave length proofreading
This parameter proofreads the wavelength.
The wavelength is proofread by two points (1480.000nm and 1520.000nm).
The wavelength proofreading is done in the measurement system like the figure below.

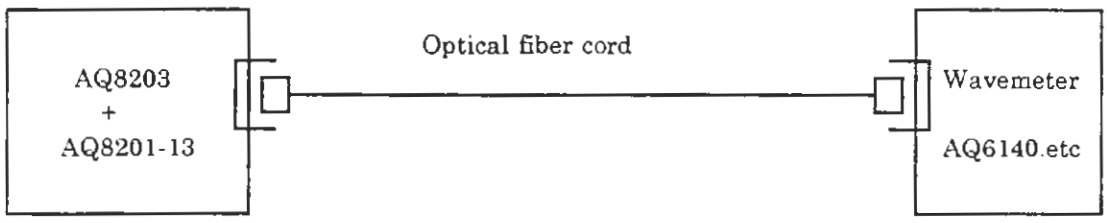


Figure 5-3-24 Measurement system when wavelength is proofread

1. AQ8201-13 is connected as shown in the above figure.
2. The parameter item is made "CALIBRATION" with [↑], [↓] key. (→ ①)
3. It becomes a wavelength proofreading start screen with the [ENTER] key and the wavelength proofreading is executed with the [ENTER] key. (→ ② ③)

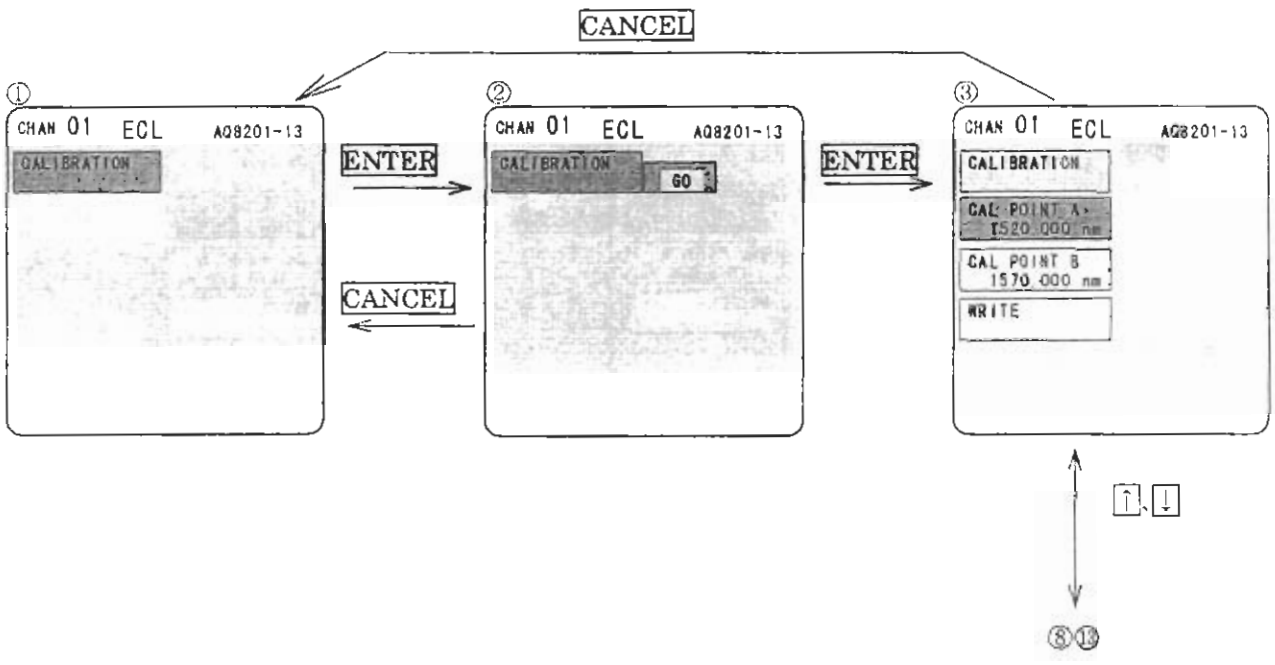


Figure 5-3-25 Screen of wave length proofreading 1

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4. "CAL POINT A" is selected with ↑、↓ key and It decides with ENTER key. (→ ④)
5. At this time, the value displayed in wavemeter is input to "CAL POINT A". (→ ④ ⑤ ⑥)
6. The digit is changed with ←、→ key and the numerical value is changed with ↑、↓ key. (→ ④ ⑤ ⑥)
7. It decides with ENTER key. (→ ⑦)

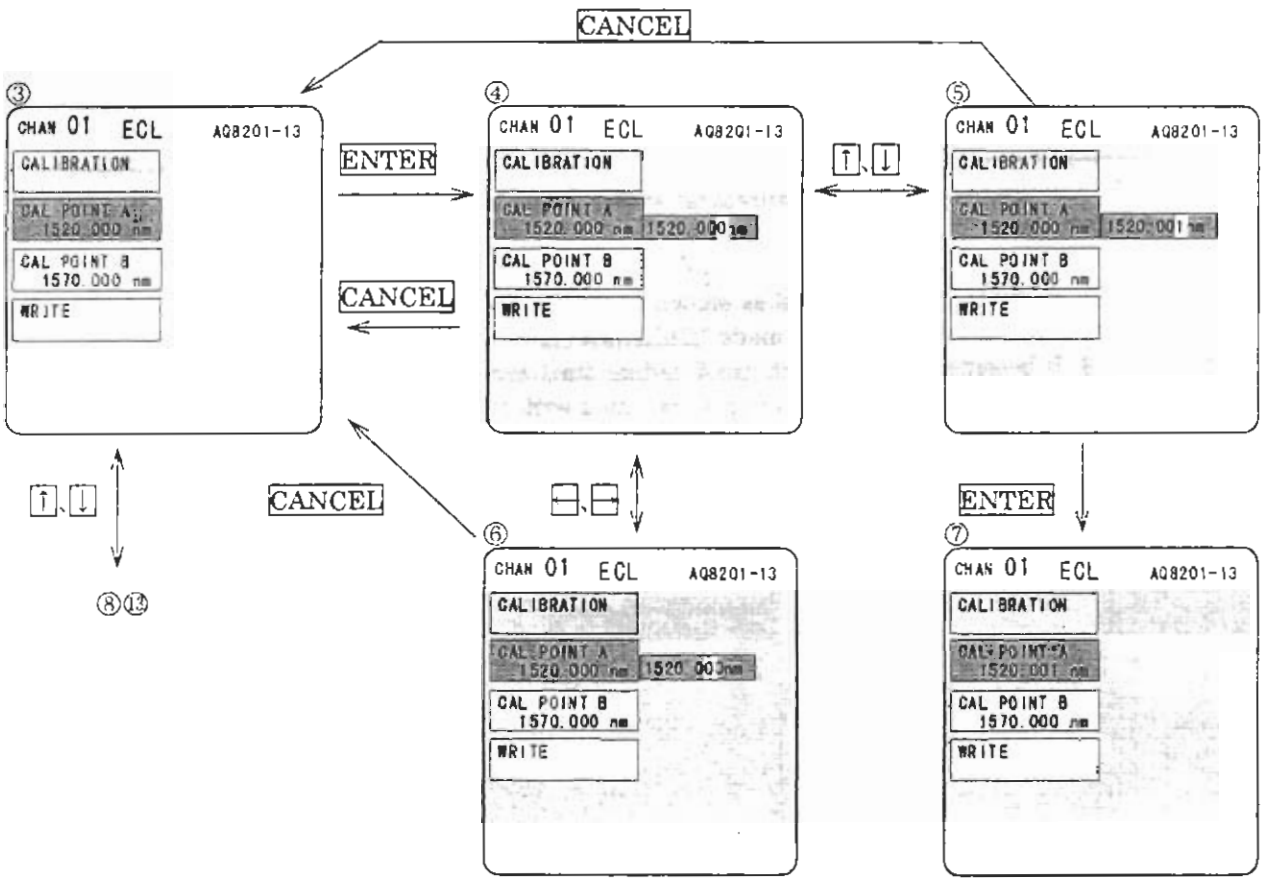


Figure 5-3-26 Screen of wave length proofreading 2

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8. "CAL POINT B" is selected with ↑、↓ key and It decides with ENTER key. (→ ⑧)
9. At this time, the value displayed in wavemeter is input to "CAL POINT B". (→ ⑨ ⑩ ⑪)
10. The digit is changed with ←、→ key and the numerical value is changed with ↑、↓ key. (→ ⑨ ⑩ ⑪)
11. It decides with ENTER key. (→ ⑫)

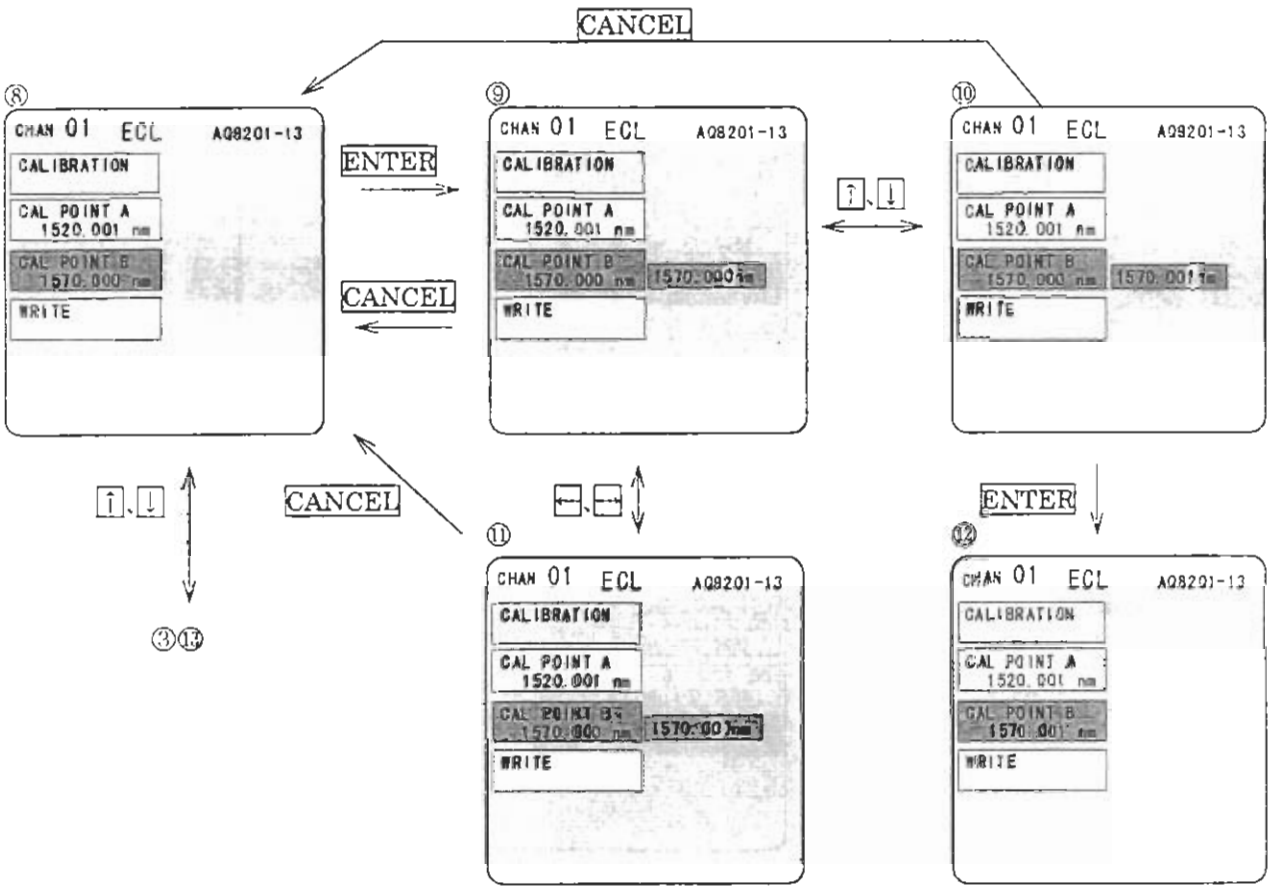


Figure 5-3-27 Screen of wave length proofreading 3

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12. "WRITE" is selected with ↑、↓ key and It decides with ENTER key. (→ ⑬)
13. SET/RESET is selected with ↑、↓ key. (→ ⑭ ⑯)
14. "SET" is selected and the point set with ENTER key is written in the module. (→ ⑮ ⑱)
15. "RESET" is selected and POINT A and B are returned to default value with ENTER key. (→ ⑯ ⑱)

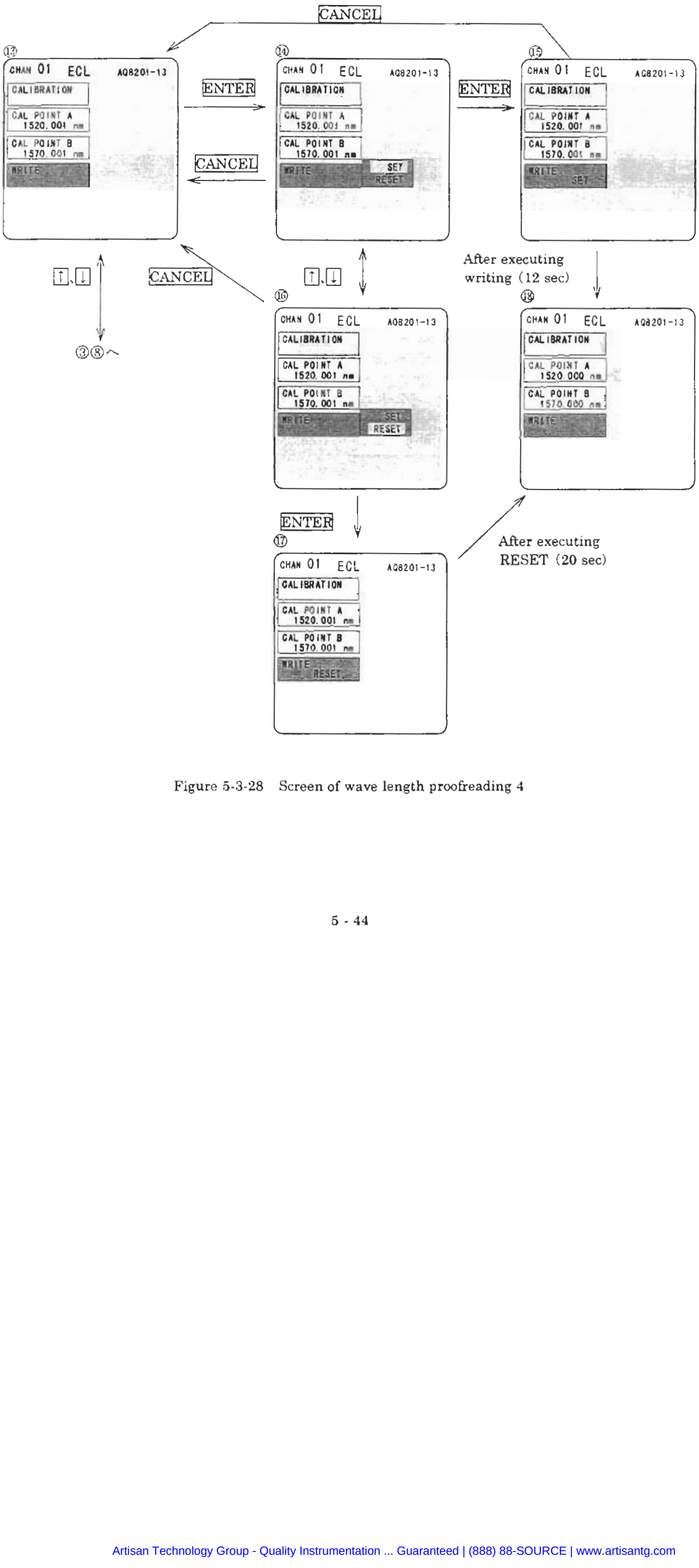


Figure 5-3-28 Screen of wave length proofreading 4

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5.3.4 OPM MODULE (AQ8201-21)

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

(1) Display

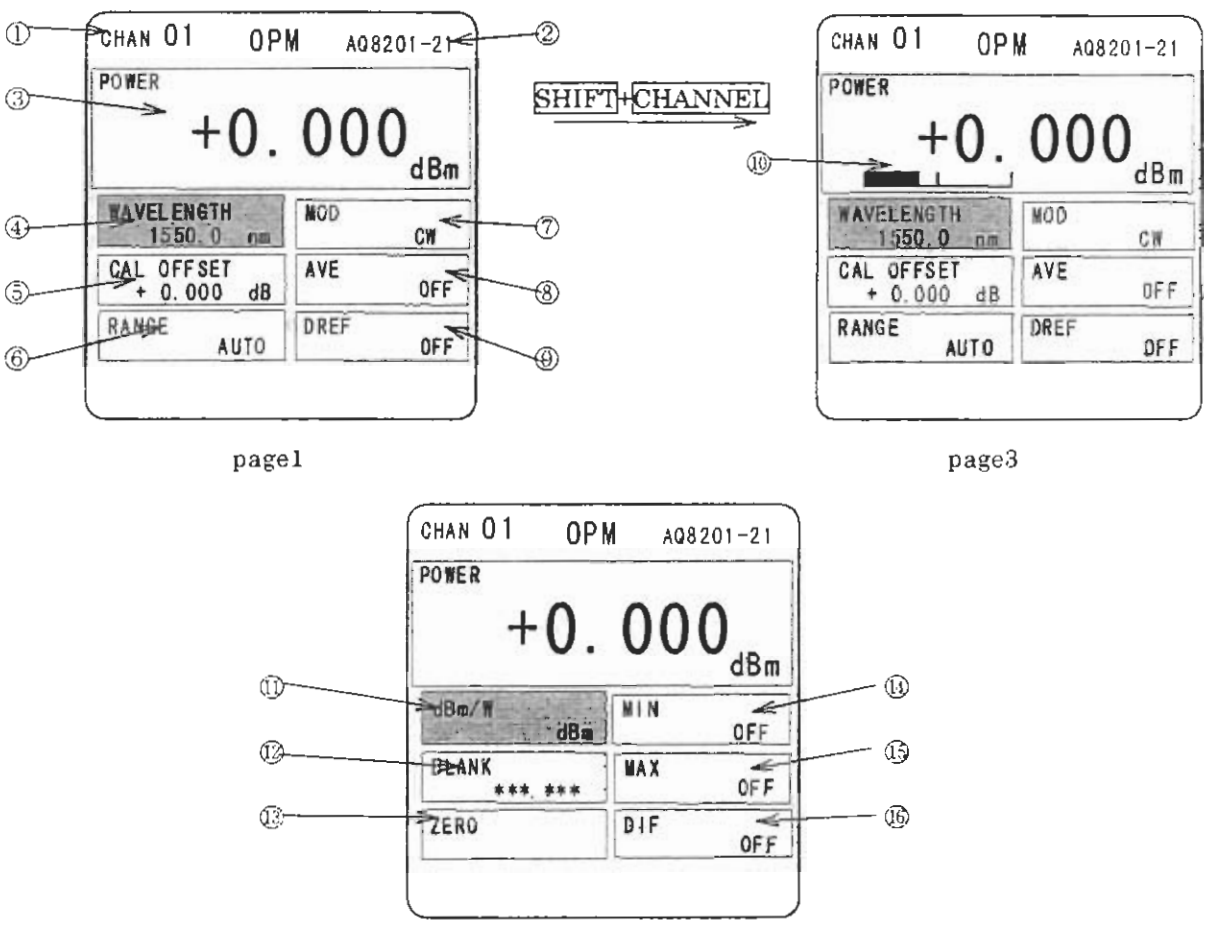


Figure 5-3-29 Single display of AQ8201-21 control

①: The module insertion position is shown.
②: Module name under the control is shown.
③: The input power level is shown.
④: The measurement wavelength is shown.
⑤: The offset value at the input power level is indicated.
⑥: The measurement range is shown.
⑦: The measurement modulation is shown.
⑧: The averaging frequency is shown.
⑨: The reference value when a relative value is measured is shown.
⑩: The bar graph meter is shown.
⑪: The dBm/W display is shown.
⑫: Setting when blank measuring is shown.
⑬: Zero sets are executed.
⑭: The value when a minimum value is measured is shown.
⑮: The value when the maximum value is measured is shown.
⑯: The value when a minimum value - maximum value is measured is shown.

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(2) Kind of parameter

The display parameter is changed by [↑] [↓] key in undermentioned the order. Moreover, the parameter is selected by pushing the [ENTER] key.
Each parameter can be changed by the manual operation or the GPIB command.

① WAVELENGTH ・・・・Setting of measurement wavelength (default)

② CAL OFFSET ・・・・・Setting of offset value of input power

③ RANGE ・・・・・・・・Setting of measurement range

④ MOD ・・・・・・・・・Setting of measurement modulation
"Selection of CW light and CHOP light (0.27KHz,1KHz,・・・)"

⑤ AVE ・・・・・・・・・Setting of averaging frequency

⑥ DREF ・・・・・・・・・Setting of relative value measurement

⑦ dBm/W ・・・・・・・・Setting of unit

⑧ BLANK ・・・・・・・・Setting of measurement at blank

⑨ ZERO ・・・・・・・・ Execution of zero sets

⑩ MIN ・・・・・・・・・・Execution of minimum value/the maximum value measurement

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(3) Change in parameter

① Setting of measurement wavelength
This parameter sets the measurement wavelength.

1. The parameter item is made "WAVELENGTH" with ↑、↓ key. (→ ①)
2. It becomes measurement wavelength set screen with ENTER key. (→ ②)
3. The digit is changed with ←、→ key and the numerical value is changed with ↑、↓ key. (→ ② ③ ④)
4. It decides with ENTER key. (→ ⑤)

Range which can be set: 700.0 to 1700.0 nm (0.1 nm step)

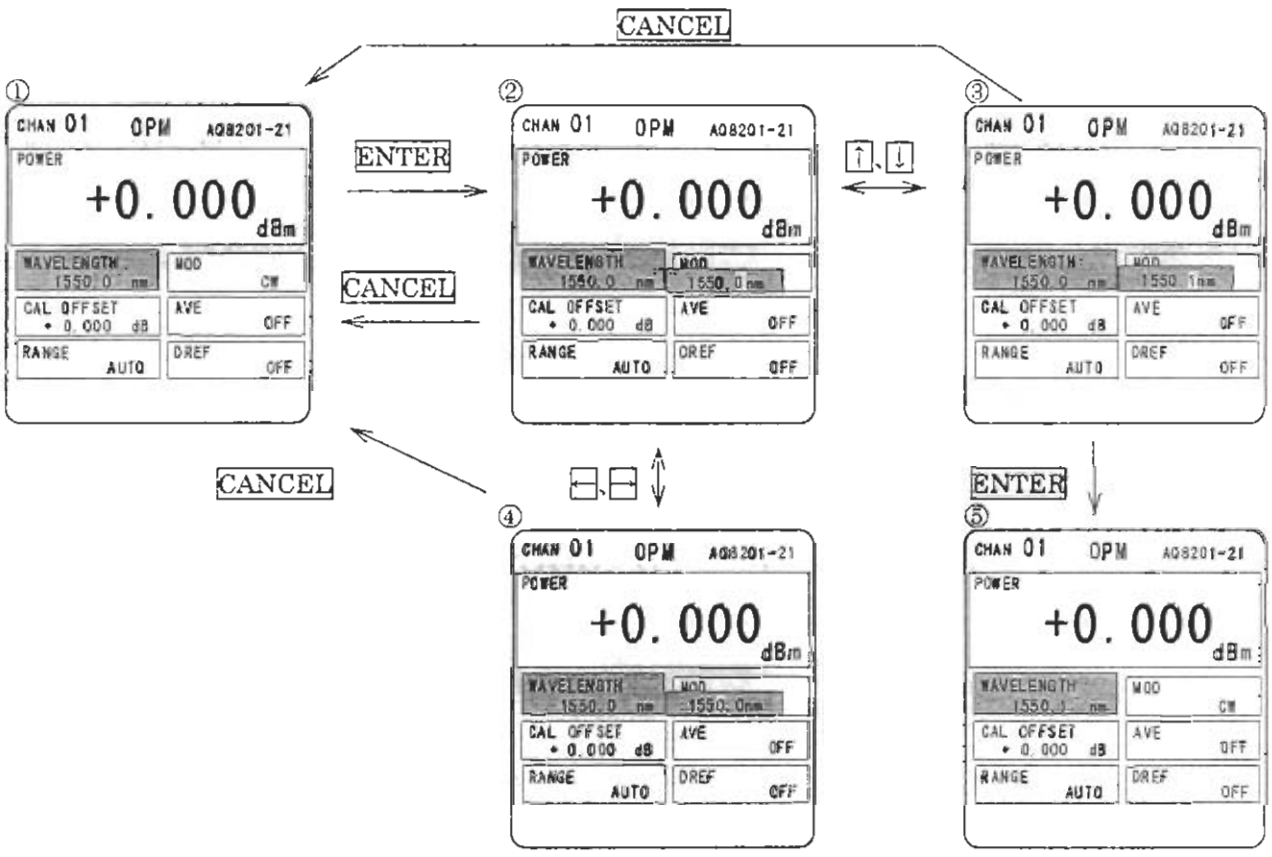


Figure 5-3-30 Screen to set the measurement wavelength

60

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② Setting of offset value of input power
This parameter sets the offset value of the input power.

1. The parameter item is made "CAL OFFSET" with [↑],[↓] key. (→ ①)
2. It becomes a power offset value set screen with [ENTER] key. (→ ②)
3. The digit is changed with [←],[→] key and the numerical value is changed with [↑],[↓] key. (→ ② ③ ④)
4. It decides with [ENTER] key. (→ ⑤)

Range which can be set: -80.000 to +80.000 dB (0.001 dB step)

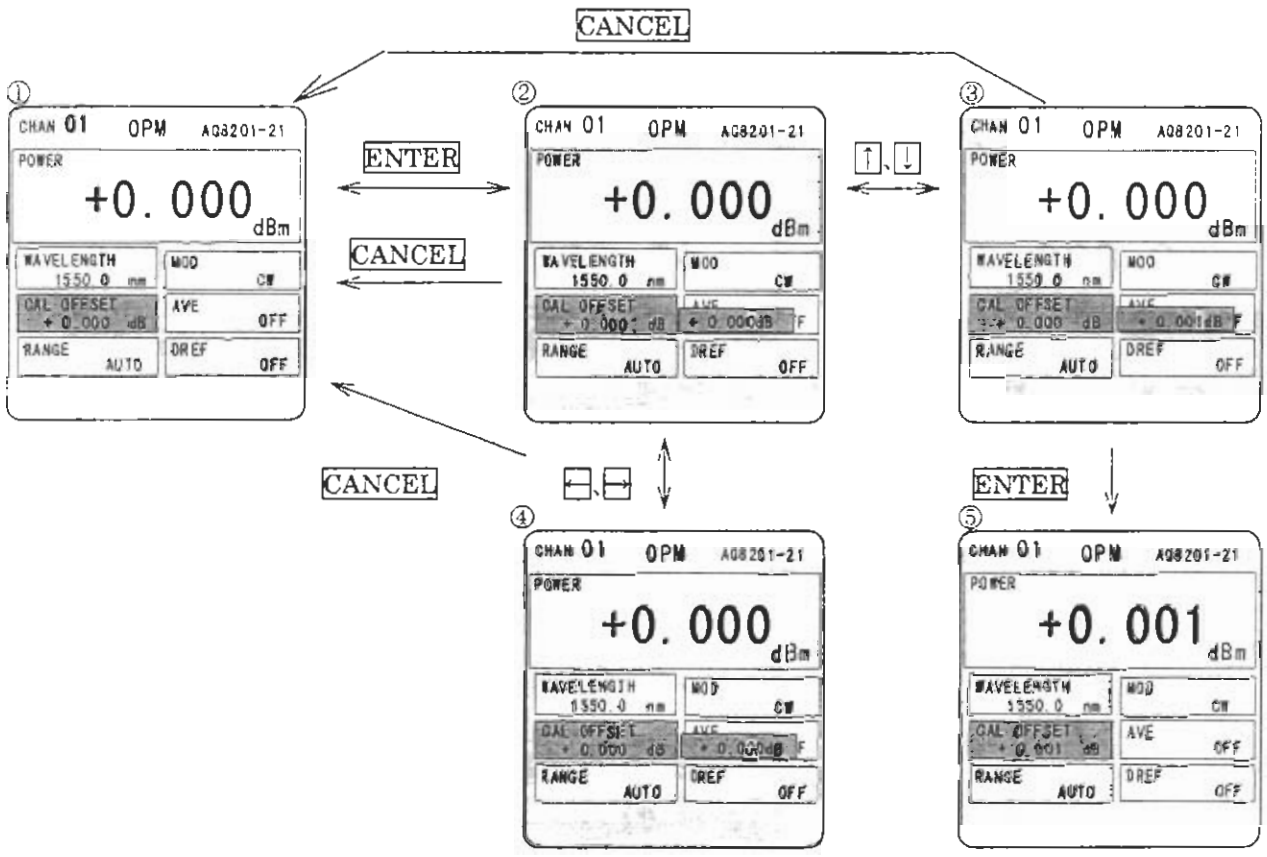


Figure 5-3-31 Screen to set the offset value of input power

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③ Setting of measurement range
This parameter sets the measurement range.
1. The parameter item is made "RANGE" with ↑、↓ key. (→ ①)
2. It becomes measurement range set screen with ENTER key. (→ ②)
3. The measurement range is changed with ↑、↓ key (→ ② ③).
4. It decides with the ENTER key. (→ ④)

Selection item
AUTO·····It is switched automatically to the best measurement range and is measured.
HOLD·····It is fixed to present range and is measured.
+30 to -60 dBm··It is fixed to "+30 to -60 dBm" range and is measured.

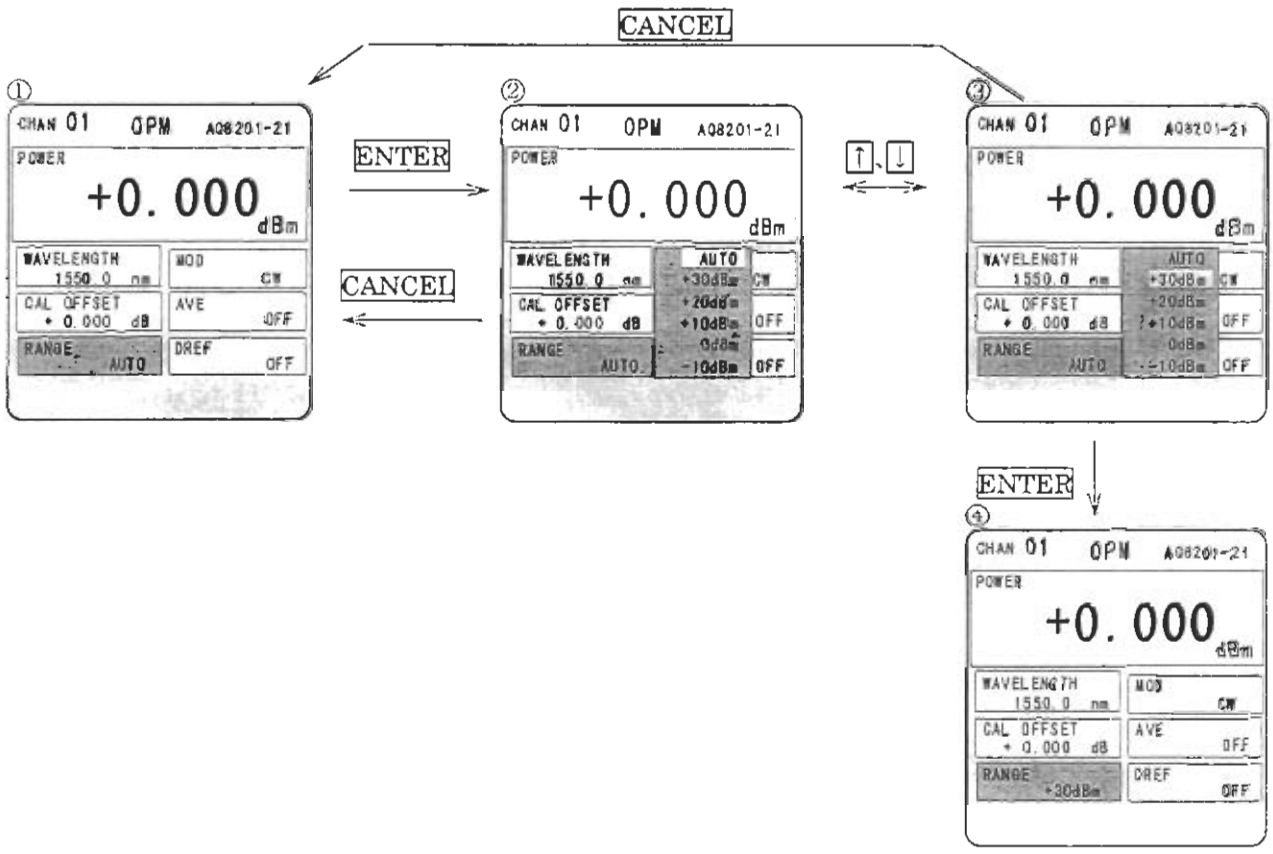


Figure 5-3-32 Screen to set the measurement range

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④ Change in modulation

This parameter sets the modulation.

1. The parameter item is selected with [↑], [↓] key and "MOD" is selected. (→ ①)
2. It becomes a modulation set screen with [ENTER] key. (→ ②)
3. The modulation mode is changed with [↑], [↓] key. (→ ② ③)
4. It decides with [ENTER] key. (→ ④)

Selection item

CW····· An internal modulation is made CW.
0.27 kHz ···An internal modulation is adjusted to 0.27 kHz.
1 kHz ····· An internal modulation is adjusted to 1 kHz.
2 kHz ····· An internal modulation is adjusted to 2 kHz.
EXT····· external modulation is turned on.
(An optical modulation is made other CHOP light (0.1kHz or more).)

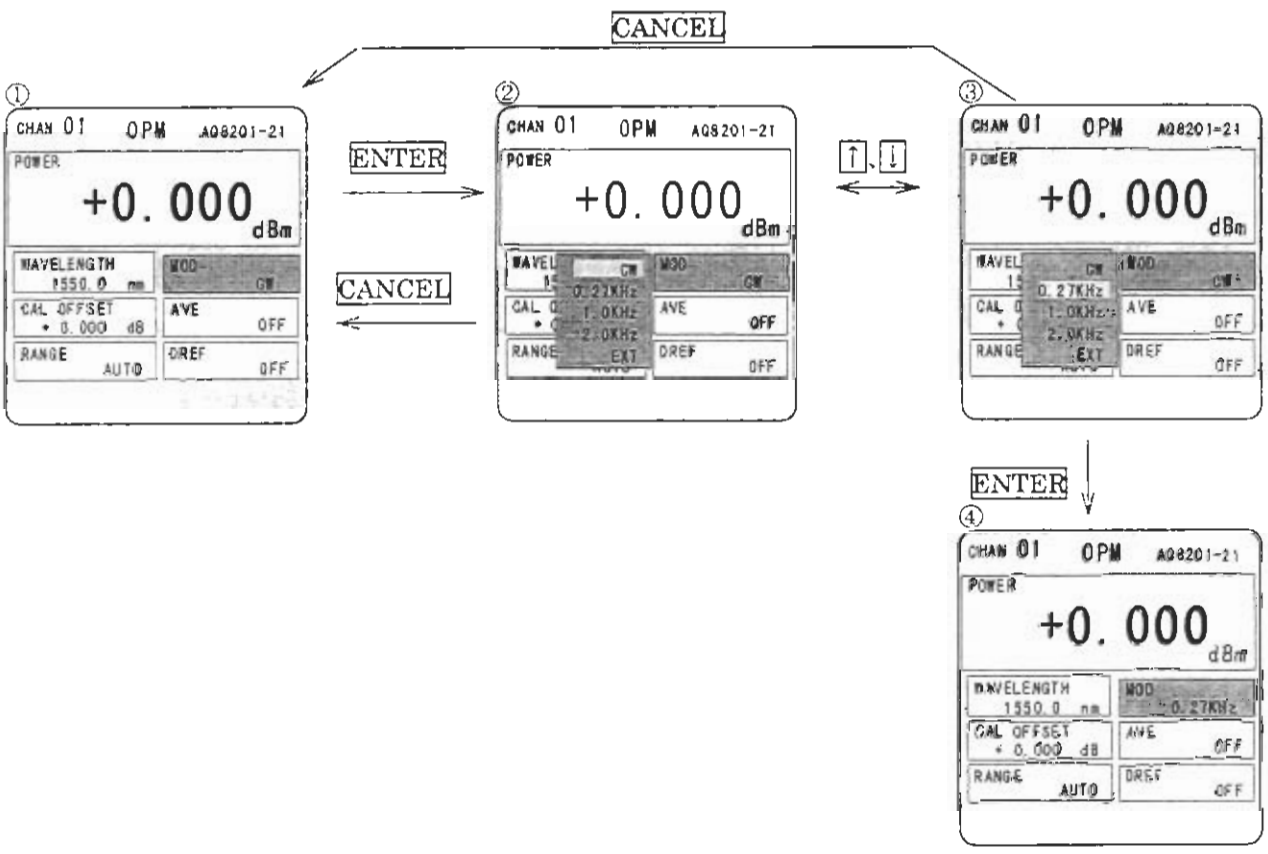


Figure 5-3-33 Screen to set the modulation

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⑤ Setting of averaging frequency
This parameter sets the averaging frequency.
1. The parameter item is made "AVERAGE" with ↑、↓ key. (→ ①)
2. It becomes a averaging frequency set screen with ENTER key. (→ ②)
3. The averaging frequency is changed with ↑、↓ key. (→ ② ③)
4. It decides with ENTER key. (→ ④)

Selection item
OFF····· averaging frequency is not done.
2 to 200·· 2 to 200 averaging frequency is done.
(Either of 2, 5,10, 20,50,100 and 200 times)

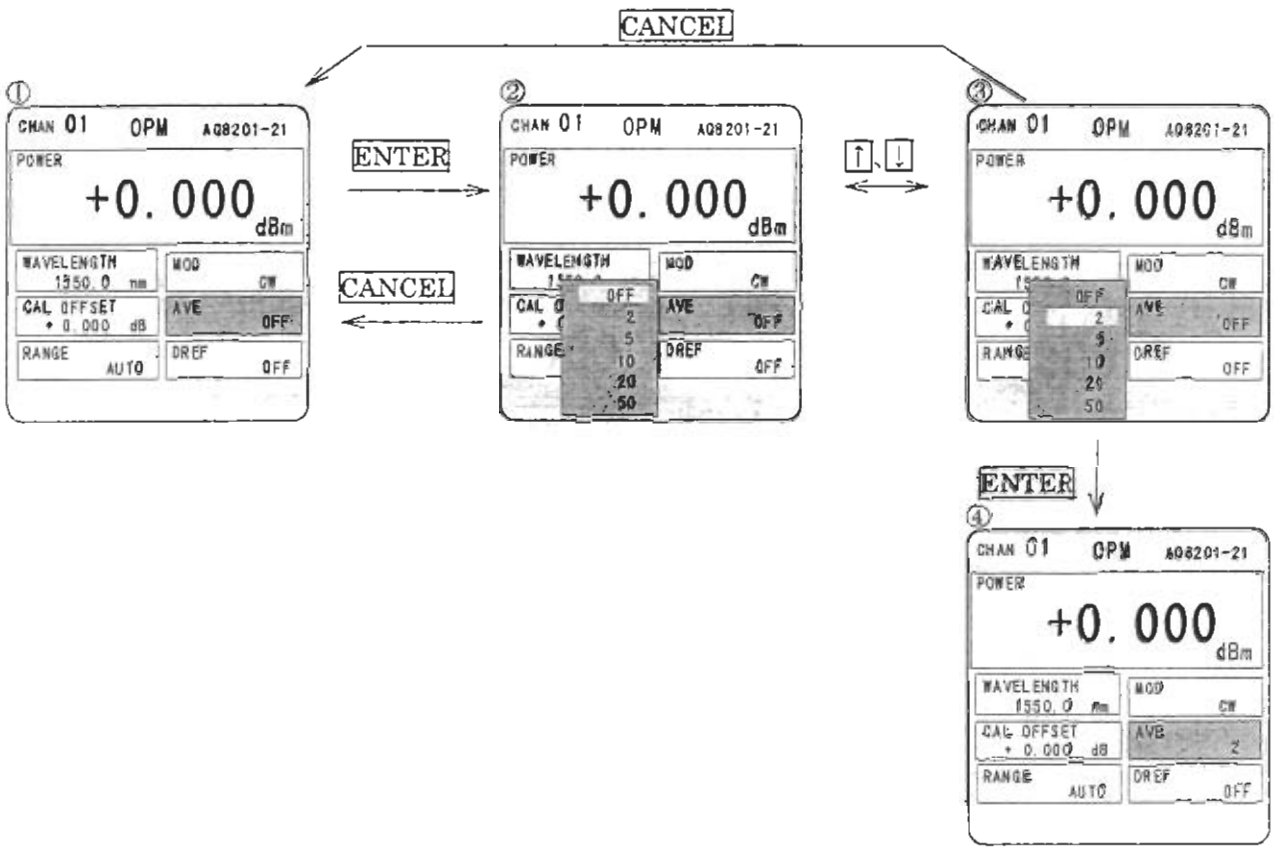


Figure 5-3-34 Screen to set the averaging frequency

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④ Setting of relative value measurement
This parameter sets the relative value measurement.

1. The parameter item is made "DREF" with [↑]、[↓] key. (→ ①)
2. It becomes a relative value measurement set screen with [ENTER] key. (→ ②)
3. DREF is switched to ON or OFF by [↑]、[↓] key. (→ ② ③)
4. It decides with [ENTER] key. (→ ④)

Selection item
ON・・・・A relative value based on the measurement value when it is set is measured.
The reference value is displayed in display panel of "DREF".
OFF・・・ It is usually measured.

< attention >
The numerical value is displayed in orange when becoming a numerical value which exceeds the display area. (Return automatically when becoming normal)
dB shows the ratio compared with the reference value. Therefore, It becomes a ratio display at W system display.

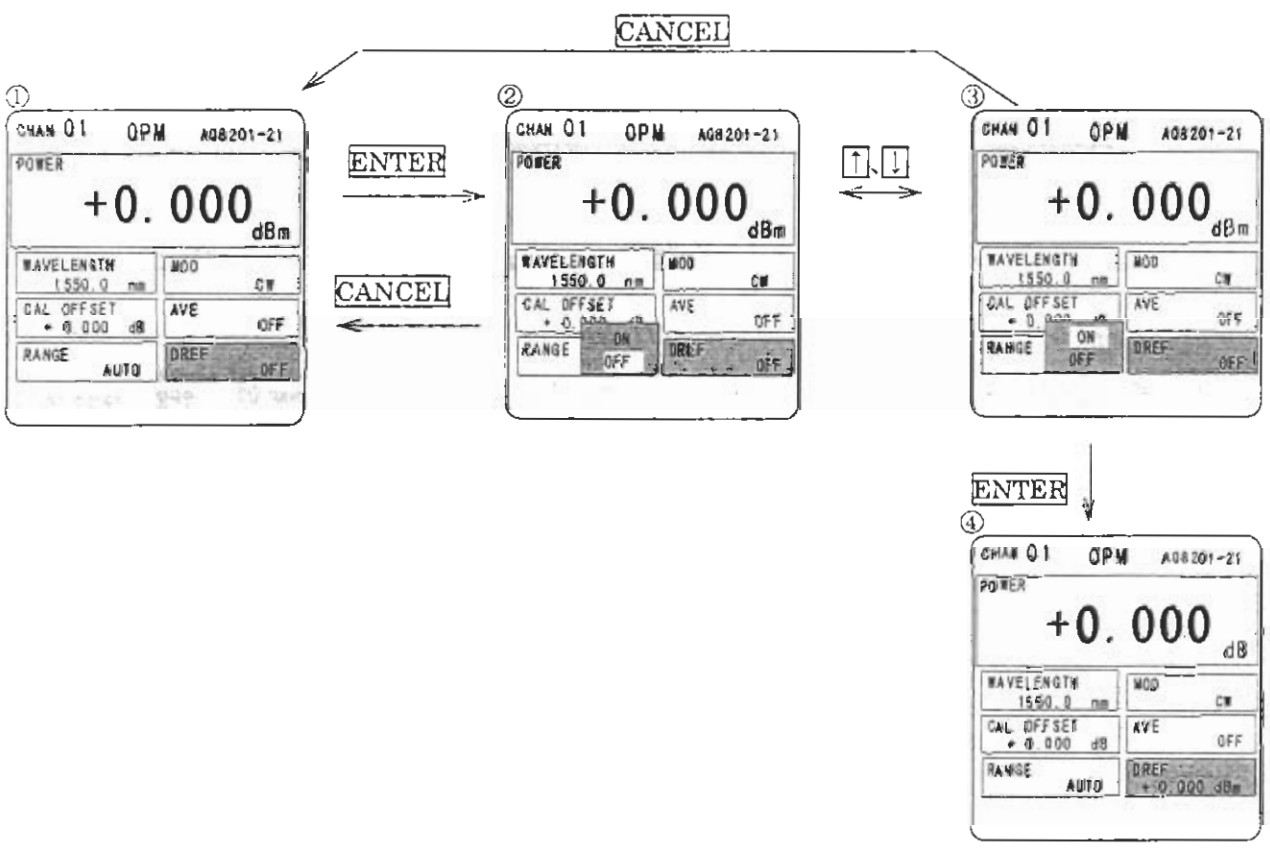


Figure 5-3-35 Screen to set the relative value measurement

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⑤ Setting of unit

This parameter sets the unit.

1. The parameter item is made "dBm/W" with [↑],[↓] key. (→ ①)
2. It becomes a unit set screen with [ENTER] key. (→ ②)
3. dBm/W is switched to dBm or W by [↑],[↓] key. (→ ② ③)
4. It decides with [ENTER] key. (→ ④)

Selection item

dBm ··· The input power level is displayed in dBm.
W ··· The input power level is displayed in W.

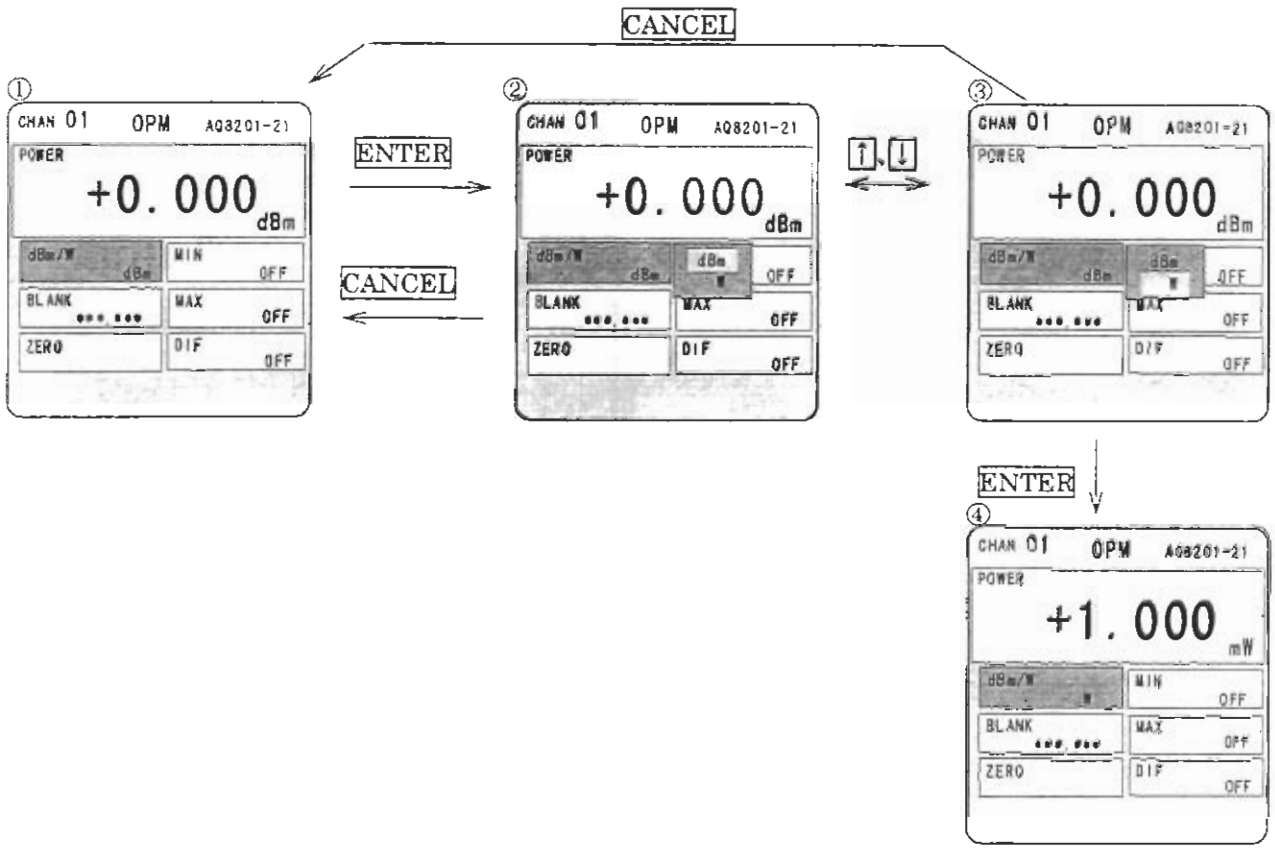


Figure 5-3-36 Screen to set the unit

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⑥ Setting of measurement at blank
This parameter sets the blank measurement.

1. The parameter item is made "BLANK" with [↑],[↓] key. (→ ①)
2. It becomes a blank screen of the measurement setting with [ENTER] key. (→ ②)
3. Display column is changed with [↑],[↓] key. (→ ② ③)
4. It decides with [ENTER] key. (→ ④)

Selection item
When dBm is displayed···· ***,***.*,***.**,***.***
When W is displayed ···· ***,***.*,***.**,***.***,***.****
The figure below the end is rounded off.

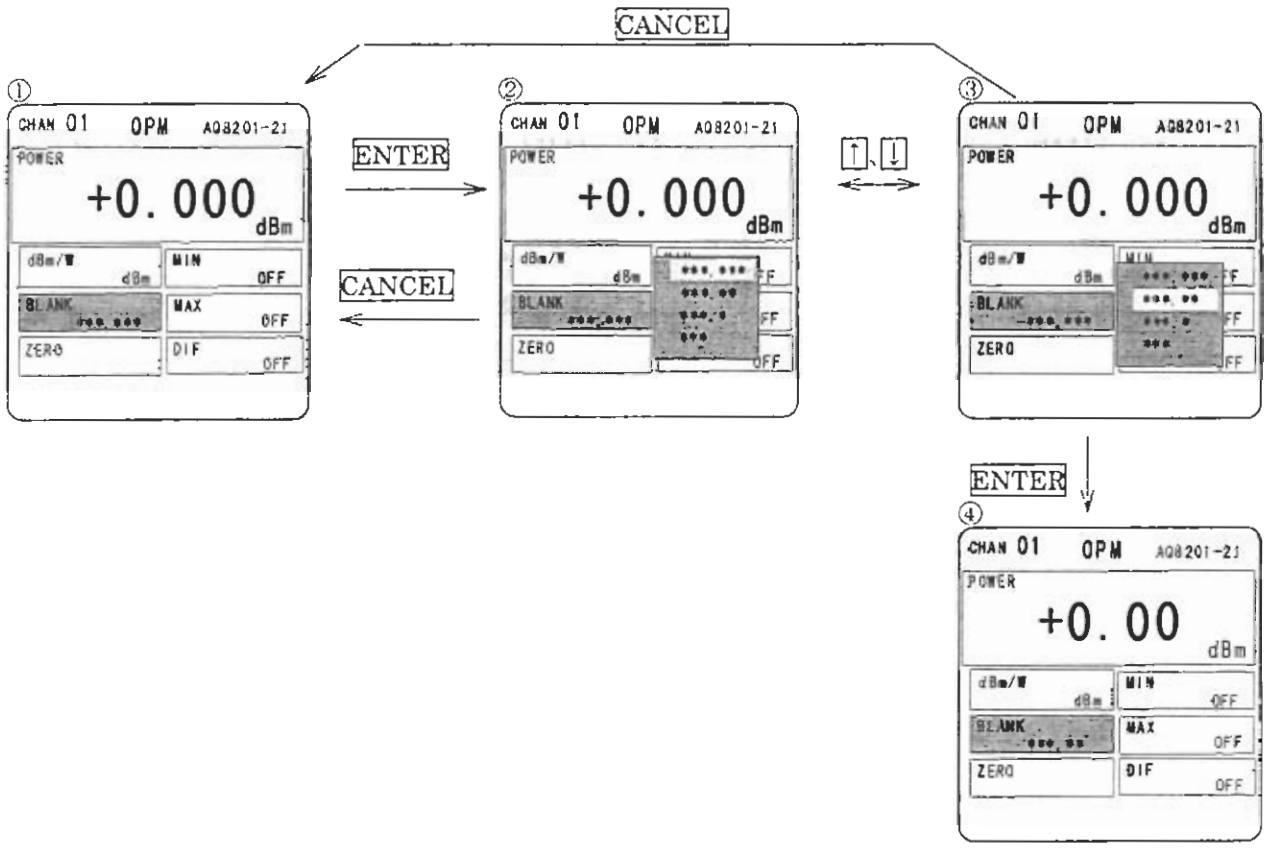


Figure 5-3-37 Screen to set the measurement at blank

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⑩ Execution of zero sets
This parameter executes the zero sets.
1. It shades <receiving of light part AQ8201-21>.
2. The parameter item is made "ZERO SET" with [↑], [↓] key. (→ ①)
3. It becomes execution screen of zero sets with [ENTER] key. (→ ②)
4. It decides with [ENTER] key. (→ ③)

* The display when zero sets are executed is orange.
(Return automatically after ending zero sets)

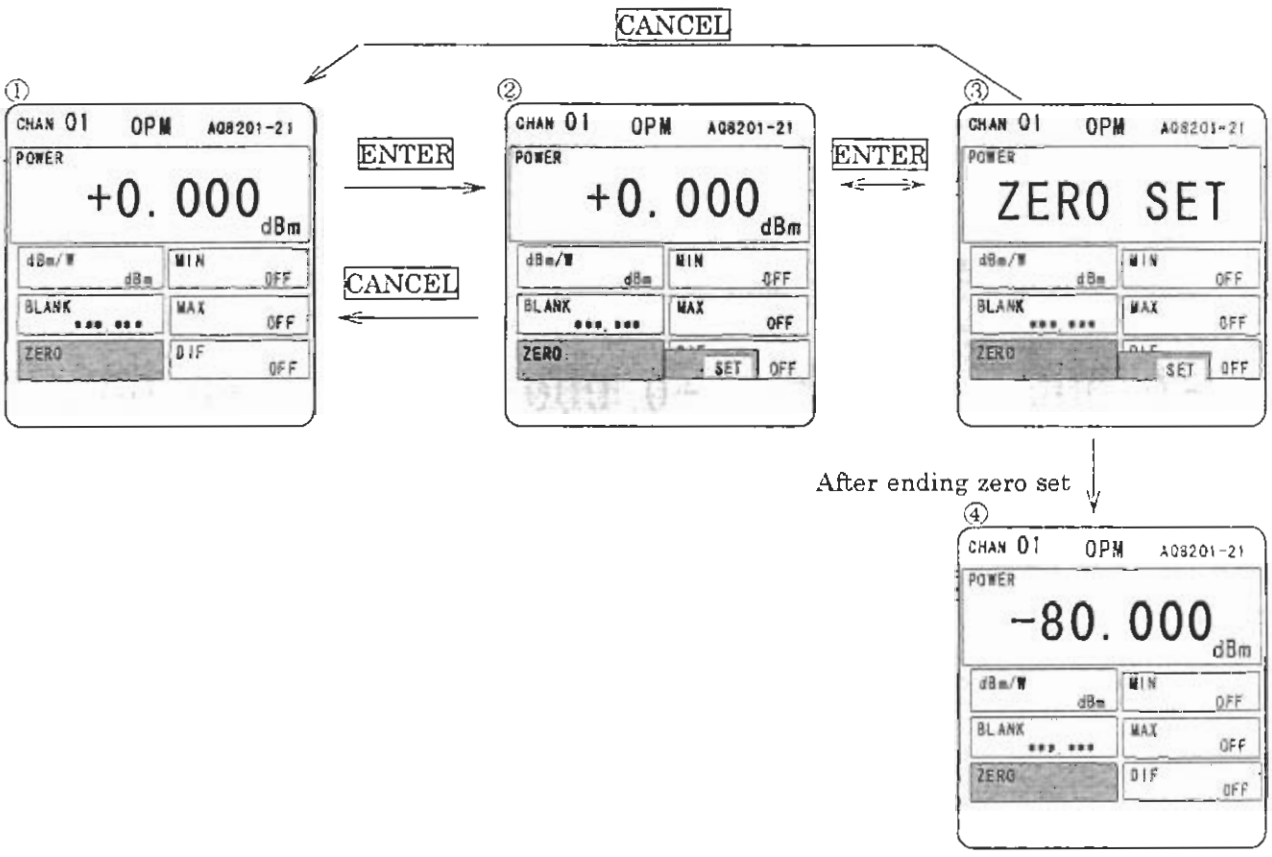


Figure 5-3-38 Screen to execute the zero sets

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⑪ Execution of MIN value/MAX value measurement
This parameter executes a MIN value/MAX value measurement.

1. The parameter item is made "MIN" with [↑],[↓] key. (→ ①)
2. It becomes a MIN value/MAX value measurement screen with [ENTER] key. (→ ②)
3. ON/OFF/STOP is changed with [↑],[↓] key. (→ ③)
4. It decides with [ENTER] key. (→ ④)

Selection item
ON····· MIN value/MAX value/MIN value-MAX value is displayed.
OFF···· MIN value/MAX value/MIN value-MAX value display is reset.
STOP ··· MIN value/MAX value/MIN value-MAX value is stopped.

< attention >
Even if the content selected on this screen moves to another screen, the data update is continuously done.

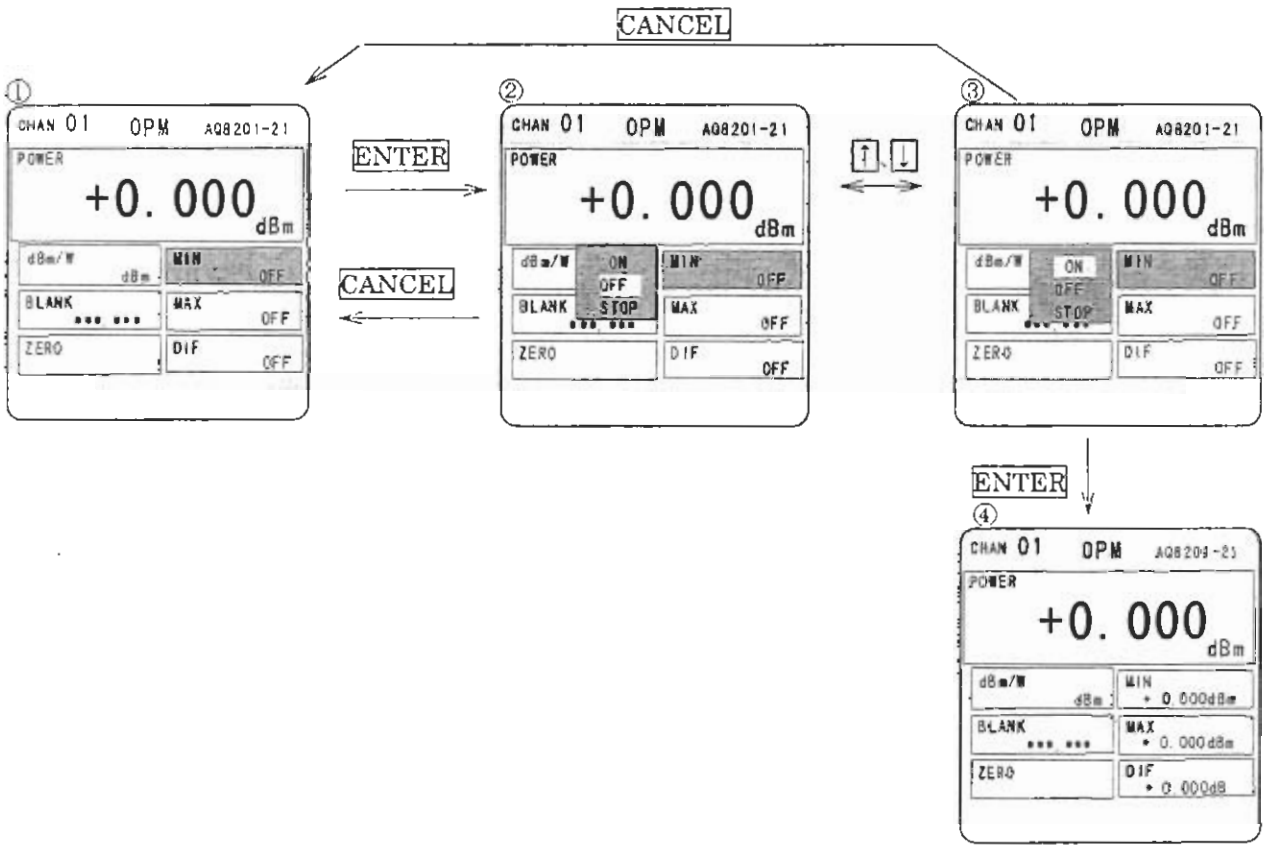


Figure 5-3-39 Screen to execute the MIN value/the MAX value measurement

NOTE

When the unit is W, the display of the DIF value displays the value of 999.9999 or more as ***.****

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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.

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

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

(1) Display

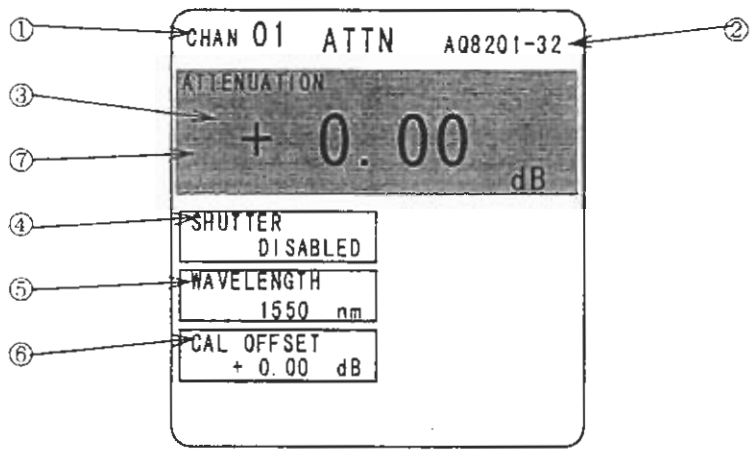


Figure 5-3-40 Single display of AQ8201-31/32/33 control

①: The module insertion position is shown.
②: Module name under the control is shown.
③: An optical attenuation is shown.
④: The opening and shutting of the shutter is shown.
⑤: The attenuated wavelength is shown.
⑥: The offset value of an optical attenuation is indicated.
⑦: It is a set item selection cursor.

(2) Kind of parameter

The display parameter is changed by [↑] [↓] key in undermentioned the order. Moreover, the parameter is selected by pushing the [ENTER] key.
Each parameter can be changed by the manual operation or the GPIB command.

① ATTENUATION · · · · Setting of optical attenuation (default)

② SHUTTER · · · · · · · Setting of shutter

③ WAVELENGTH · · · · Setting of attenuated wavelength

④ CAL OFFSET · · · · · Setting of offset value of optical attenuation

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(3) Change in parameter

① Setting of optical attenuation
This parameter sets an optical attenuation.

1. The parameter item is made "ATTENUATION" with [↑]、[↓] key. (→ ①)
2. It becomes an optical attenuation set screen with [ENTER] key. (→ ②)
3. The digit is changed with [←]、[→] key and the numerical value is changed with [↑]、[↓] key. (→ ② ③ ④)
4. It decides with [ENTER] key. (→ ⑤)

Range which can be set: 0 to 60 dB
AQ8201-31: 0.05 dB step
AQ8201-32: 0.01 dB step
AQ8201-33: 0.001 dB step
The set value and the indicated value contain the value set by CAL OFFSET.
Moreover, the range of setting changes according to the CAL OFFSET value.

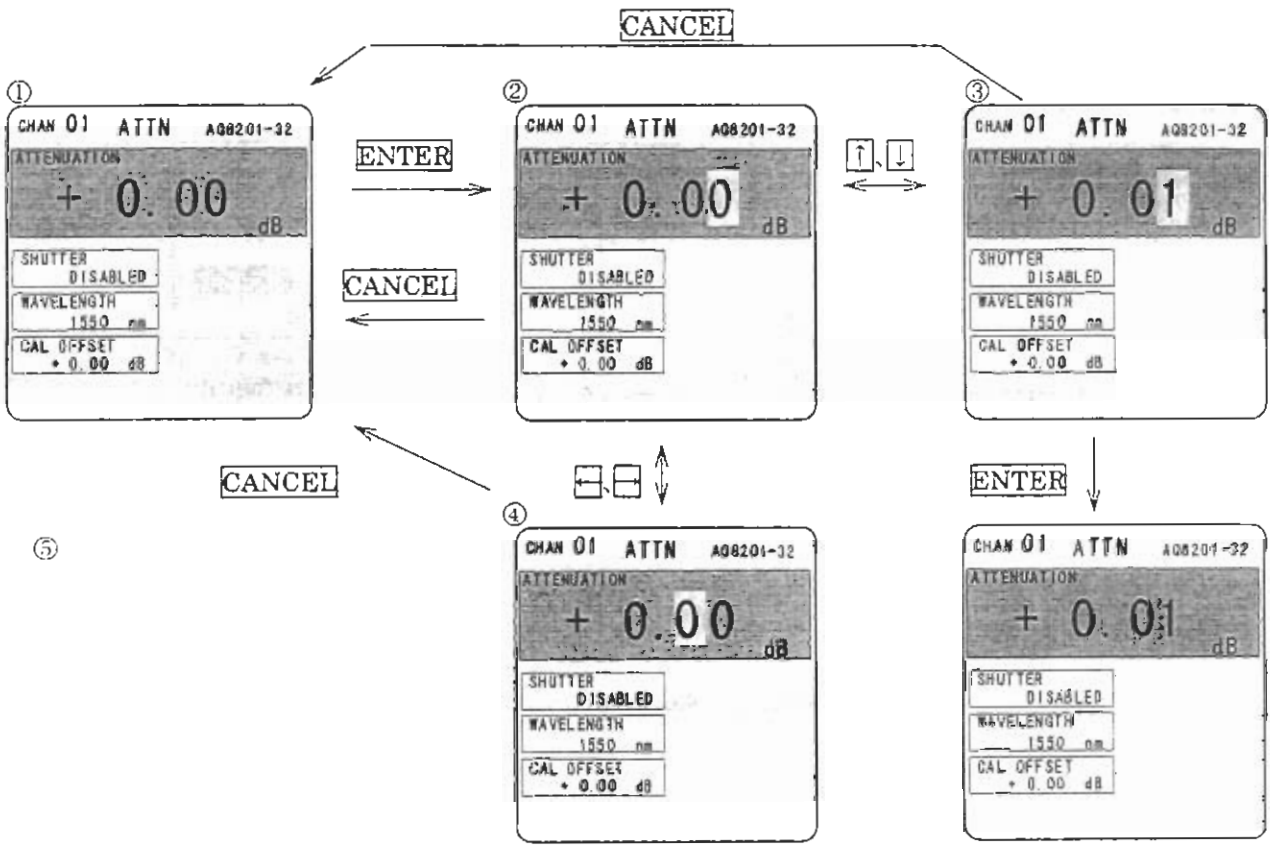


Figure 5-3-41 Screen to set the optical attenuation

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

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② Setting of shutter

This parameter sets the shutter.

1. The parameter item is made "SHUTTER" with [↑],[↓] key. (→ ①)
2. It becomes shuttering a set screen with [ENTER] key. (→ ②)
3. SHUTTER is switched to ENABLED or DISABLED by [↑],[↓] key. (→ ② ③)
4. It decides with [ENTER] key. (→ ④)

Selection item

ENABLED···· The shutter is opened.

DISABLED ··· The shutter is shut.

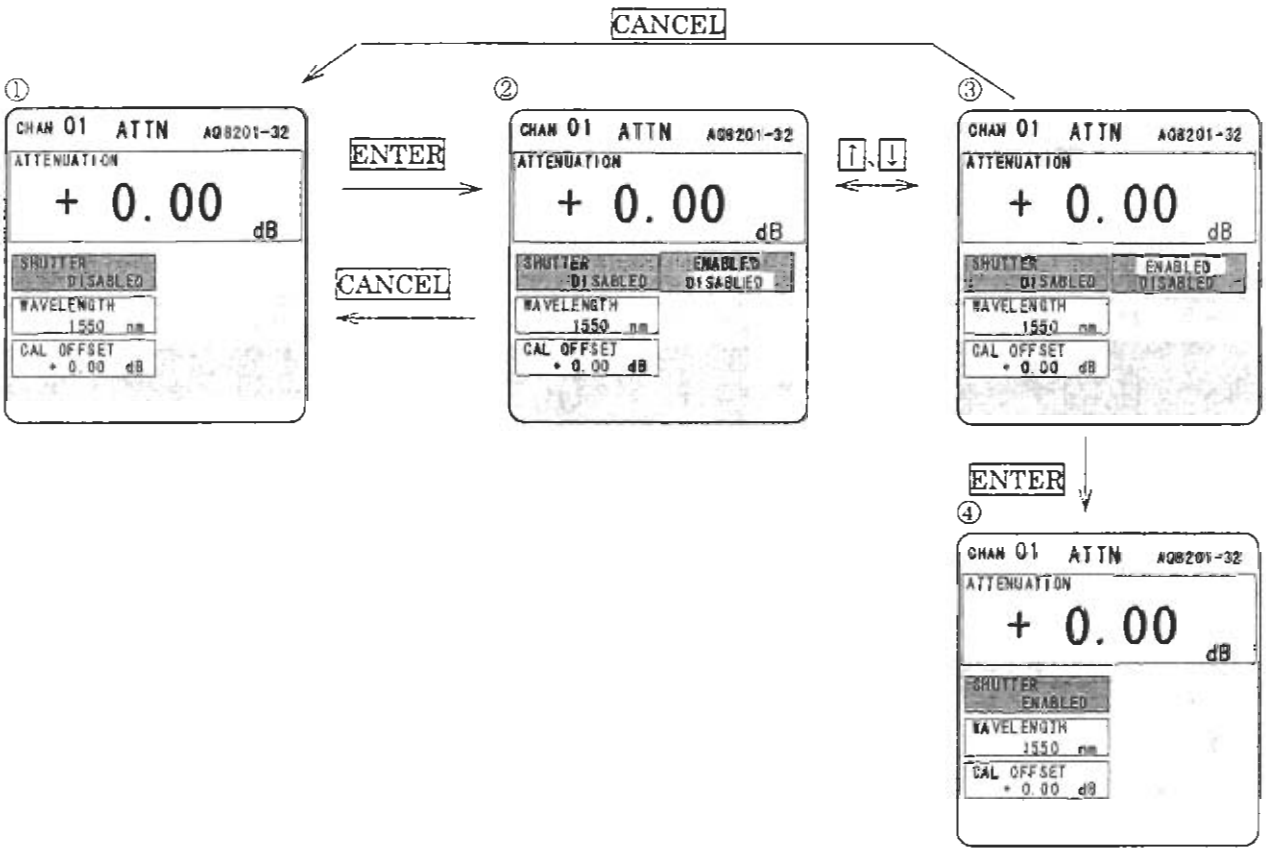


Figure 5-3-42 Screen to set the shutter

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③ Setting of attenuated wavelength
This parameter sets the attenuated wavelength.

1. The parameter item is made "WAVELENGTH" with [↑]、[↓] key. (→ ①)
2. It becomes attenuated wavelength set screen with [ENTER] key. (→ ②)
3. The digit is changed with [←]、[→] key and the numerical value is changed with [↑]、[↓] key. (→ ② ③ ④)
4. It decides with [ENTER] key. (→ ⑤)

Range which can be set: AQ8201-31/32: 1200 to 1600 nm (1 nm step)
AQ8201-33: 1480 to 1650 nm (1 nm step)

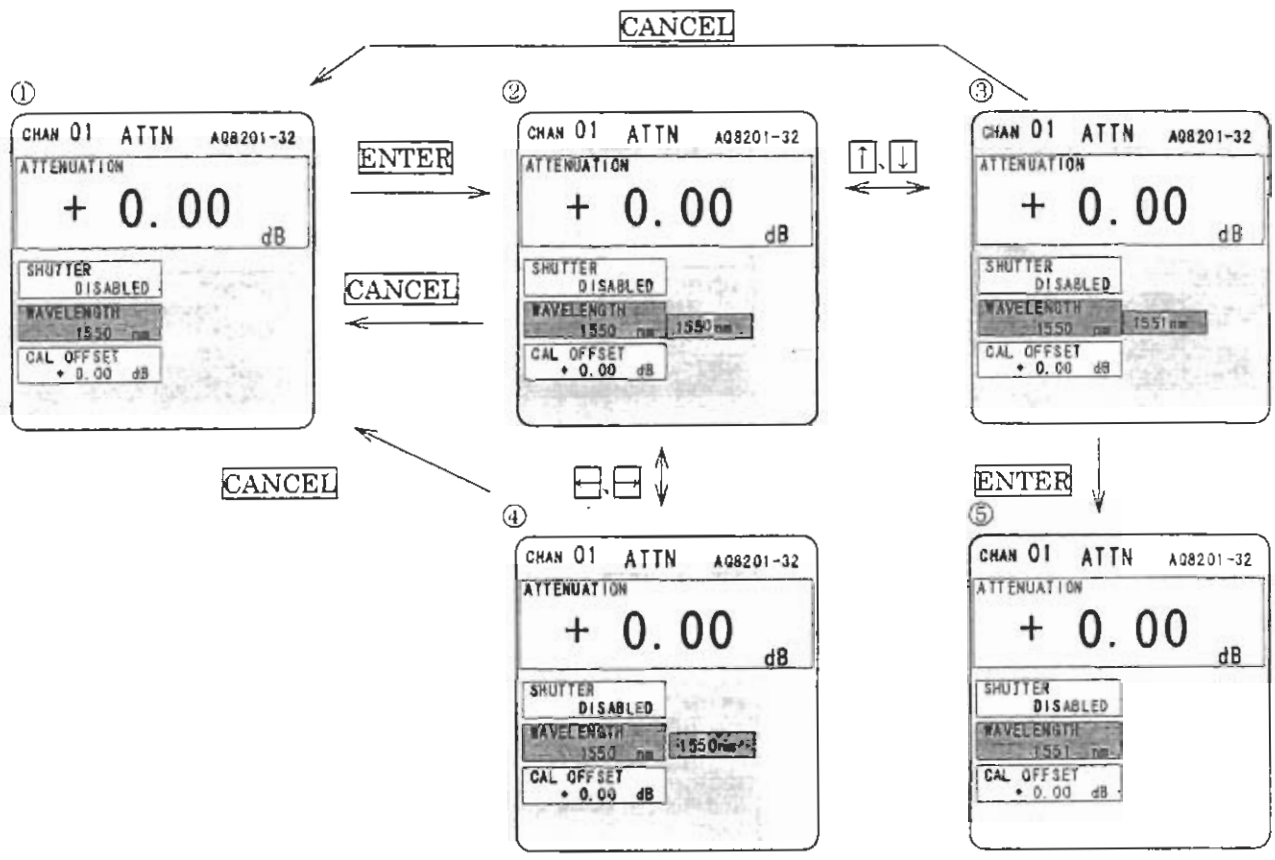


Figure 5-3-43 Screen to set the attenuated wavelength

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④ Setting of offset value of optical attenuation
This parameter sets the offset value of an optical attenuation.

1. The parameter item is made "CAL OFFSET" with [↑]、[↓] key. (→ ①)
2. It becomes the offset value set screen of an optical attenuation with [ENTER] key. (→ ②)
3. The digit is changed with [←]、[→] key and the numerical value is changed with [↑]、[↓] key. (→ ② ③ ④)
4. It decides with [ENTER] key. (→ ⑤)

Range which can be set: -80 to +80 dB
AQ8201-31: 0.05 dB step
AQ8201-32: 0.01 dB step
AQ8201-33: 0.001 dB step

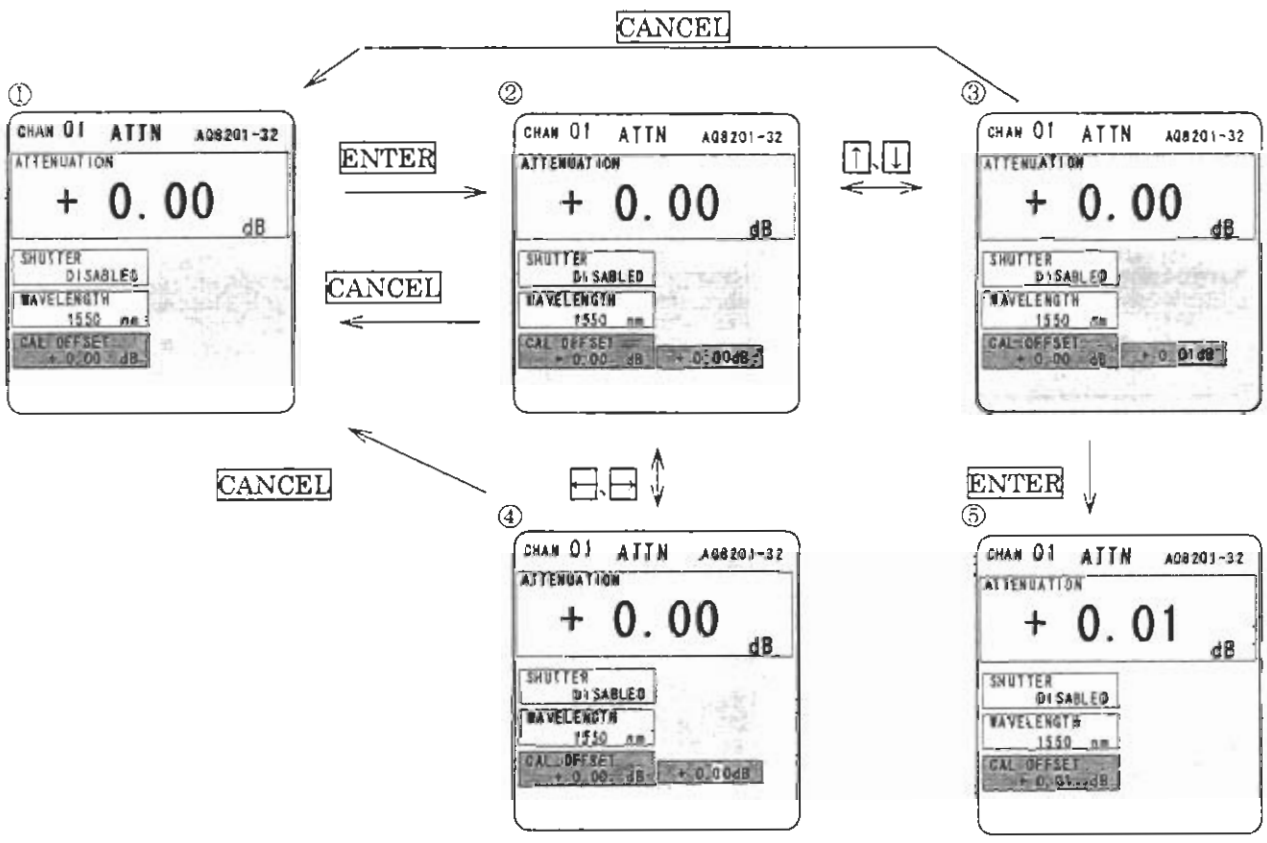


Figure 5-3-44 Screen to set the offset value of optical attenuation

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5.3.6 RLM MODULE (AQ8201-71)

This section explains operation when the AQ8201-71 is mounted.

(1) Display

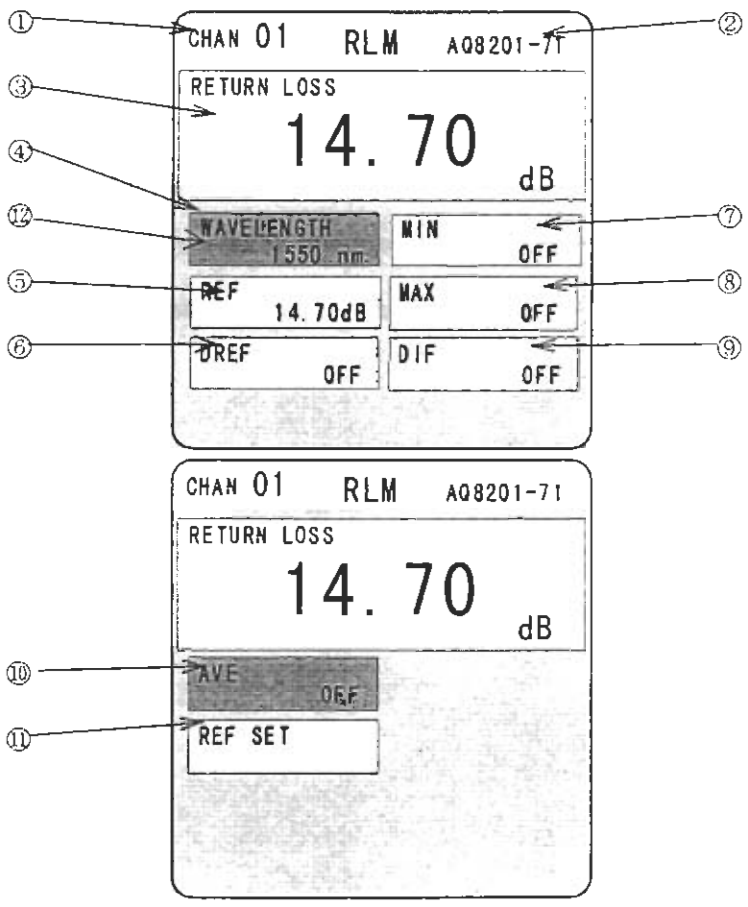


Figure 5-3-45 Single display of AQ8201-71 control

①: The module insertion position is shown.
②: Module name under the control is shown.
③: The return loss is shown.
④: The measurement wavelength is shown.
⑤: The reflection reference is shown.
⑥: The reference value when a relative value is measured is shown.
⑦: The value when a minimum value is measured is shown.
⑧: The value when the maximum value is measured is shown.
⑨: The value when a minimum value - maximum value is measured is shown.
⑩: The averaging frequency is shown.
⑪: The reference reflection measurement is executed.
⑫: It is a set item selection cursor.

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(2) Kind of parameter

The display parameter is changed by [↑] [↓] key in undermentioned the order. Moreover, the parameter is selected by pushing the [ENTER] key.
Each parameter can be changed by the manual operation or the GPIB command.

① WAVELENGTH ・・・・Setting of measurement wavelength (default)

② REF ・・・・・・・・・Setting of reflection reference

③ DREF・・・・・・・・・Setting of relative value measurement

④ MIN・・・・・・・・・Execution of minimum value/the maximum value measurement

⑤ AVERAGE・・・・・・Setting of averaging frequency

⑥ REF SET ・・・・・・・Setting of reference measurement

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(3) Change in parameter

① Setting of measurement wavelength
This parameter sets the measurement wavelength.
1. The parameter item is made "WAVELENGTH" with [↑], [↓] key. (→ ①)
2. It becomes measurement wavelength set screen with [ENTER] key. (→ ②)
3. The digit is changed with [←], [→] key and the numerical value is changed with [↑], [↓] key. (→ ② ③ ④)
4. It decides with [ENTER] key. (→ ⑤)

Range which can be set: 1280 to 1600 nm (1 nm step)

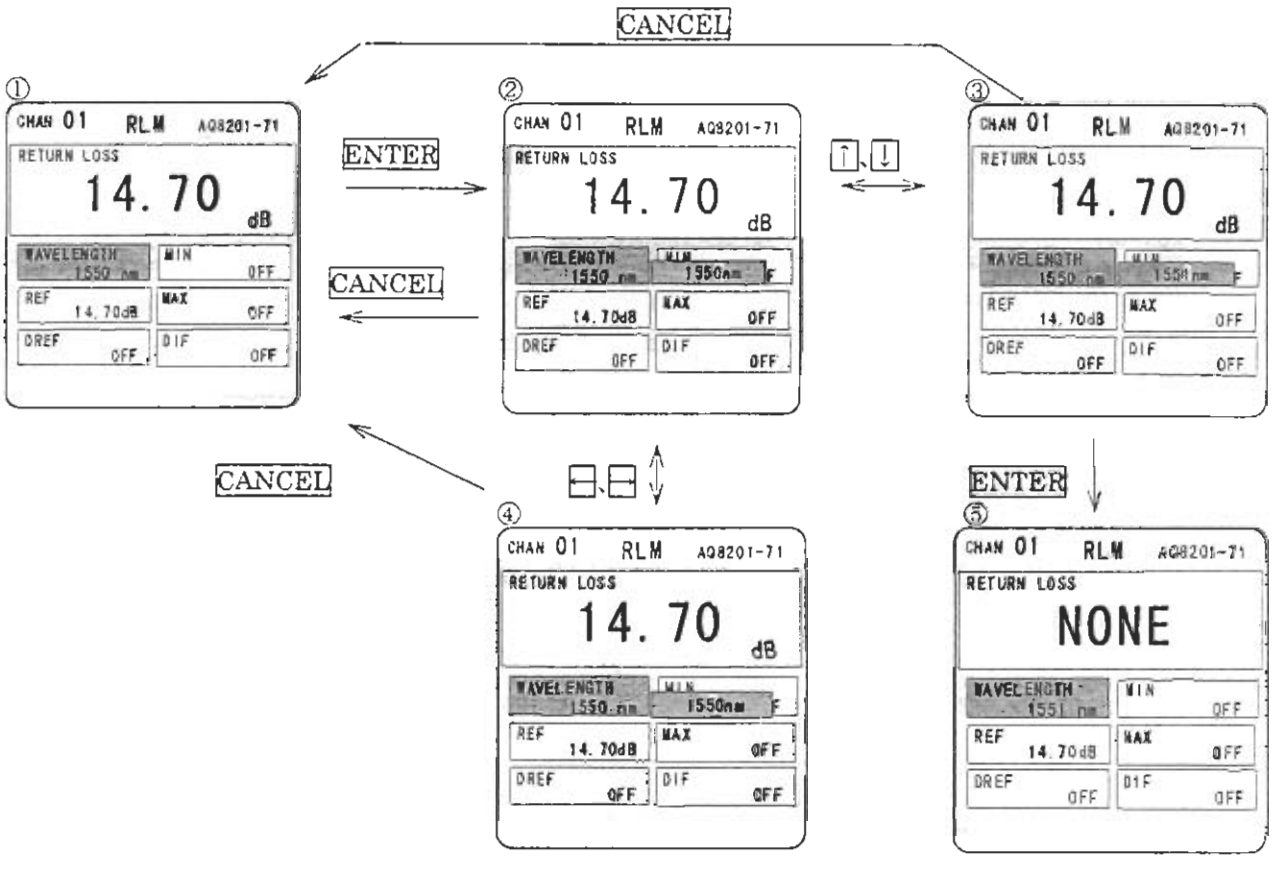


Figure 5-3-46 Screen to set the measurement wavelength

NOTE

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

NOTE

Be sure to set WAVELENGTH and REFLECTION before REF SET. If they are set during the measurement of return loss, the measurement will be interrupted.

69

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② Setting of reflection reference
This parameter sets the reflection reference.

1. The parameter item is made "REF" with [↑],[↓] key. (→ ①)
2. It becomes reflection reference set screen with [ENTER] key. (→ ②)
3. The reflection reference is changed with [↑],[↓] key. (→ ② ③)
4. It decides with [ENTER] key. (→ ④)

Selection item
0.20 dB···· The reflection reference is set in total reflection reference (0.20 dB).
14.70 dB ··· The reflection reference is set in Fresnel reflection reference (14.70 dB).



Figure 5-3-47 Screen to set the reflection reference

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③ Setting of relative value measurement
This parameter sets the relative value measurement.

1. The parameter item is made "DREF" with [↑],[↓] key. (→ ①)
2. It becomes a relative value measurement set screen with [ENTER] key. (→ ②)
3. DREF is switched to ON or OFF by [↑],[↓] key. (→ ② ③)
4. It decides with [ENTER] key. (→ ④)

Selection item
ON····A relative value based on the measurement value when it is set is measured.
The reference value is displayed in display panel of "DREF".
OFF··· It is usually measured.

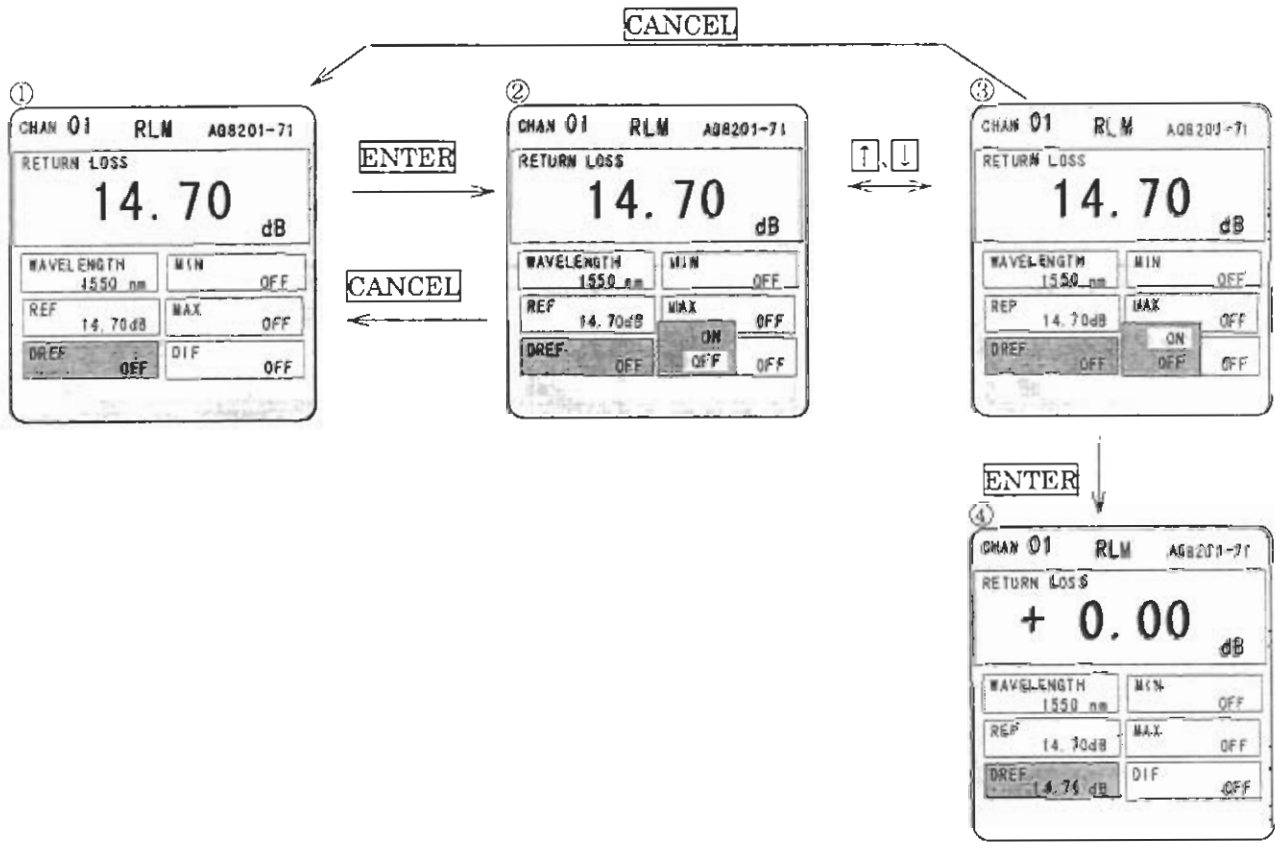


Figure 5-3-48 Screen to set the relative value measurement

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④ Execution of MIN value/MAX value measurement
This parameter executes a minimum value/the maximum value measurement.

1. The parameter item is made "MIN" with [↑],[↓] key. (→ ①)
2. It becomes a MIN value/MAX value measurement screen with [ENTER] key. (→ ②)
3. ON/OFF/STOP is changed with [↑],[↓] key. (→ ③)
4. It decides with [ENTER] key. (→ ④)

Selection item
ON····· MIN value/MAX value/MIN value-MAX value is displayed.
OFF···· MIN value/MAX value/MIN value-MAX value display is reset.
STOP ··· MIN value/MAX value/MIN value-MAX value is stopped.

< attention >
Even if the content selected on this screen moves to another screen, the data update is continuously done.

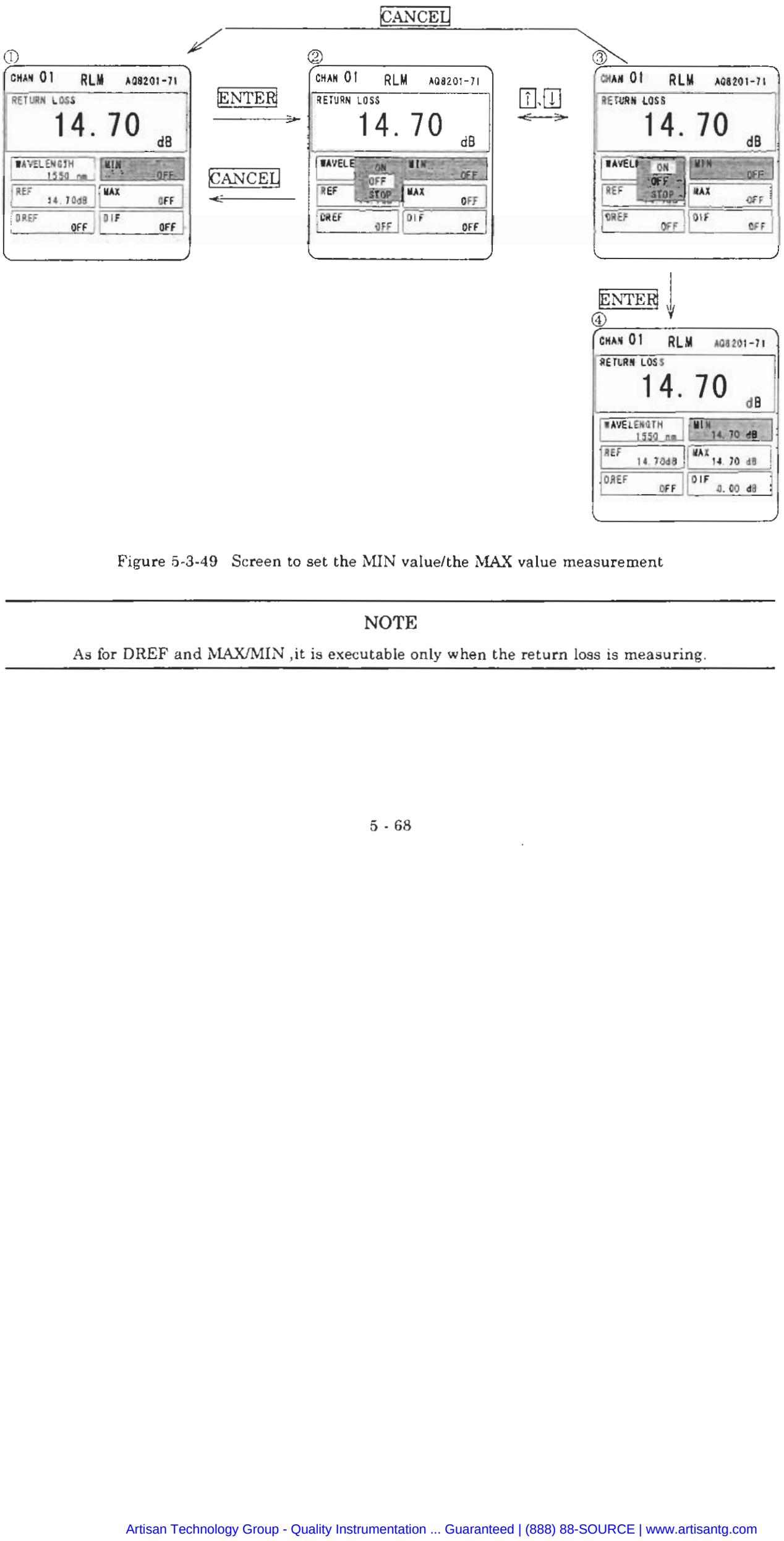


Figure 5-3-49 Screen to set the MIN value/the MAX value measurement

NOTE

As for DREF and MAX/MIN ,it is executable only when the return loss is measuring.

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⑤ Setting of averaging frequency
This parameter sets the averaging frequency.

1. The parameter item is made "AVERAGE" with [↑],[↓] key. (→ ①)
2. It becomes a averaging frequency set screen with [ENTER] key. (→ ②)
3. The averaging frequency is changed with [↑],[↓] key. (→ ② ③)
4. It decides with [ENTER] key. (→ ④)

Selection item
OFF····· averaging frequency is not done.
2 to 200·· 2 to 200 averaging frequency is done.
(Either of 2, 5,10, 20,50,100 and 200 times)

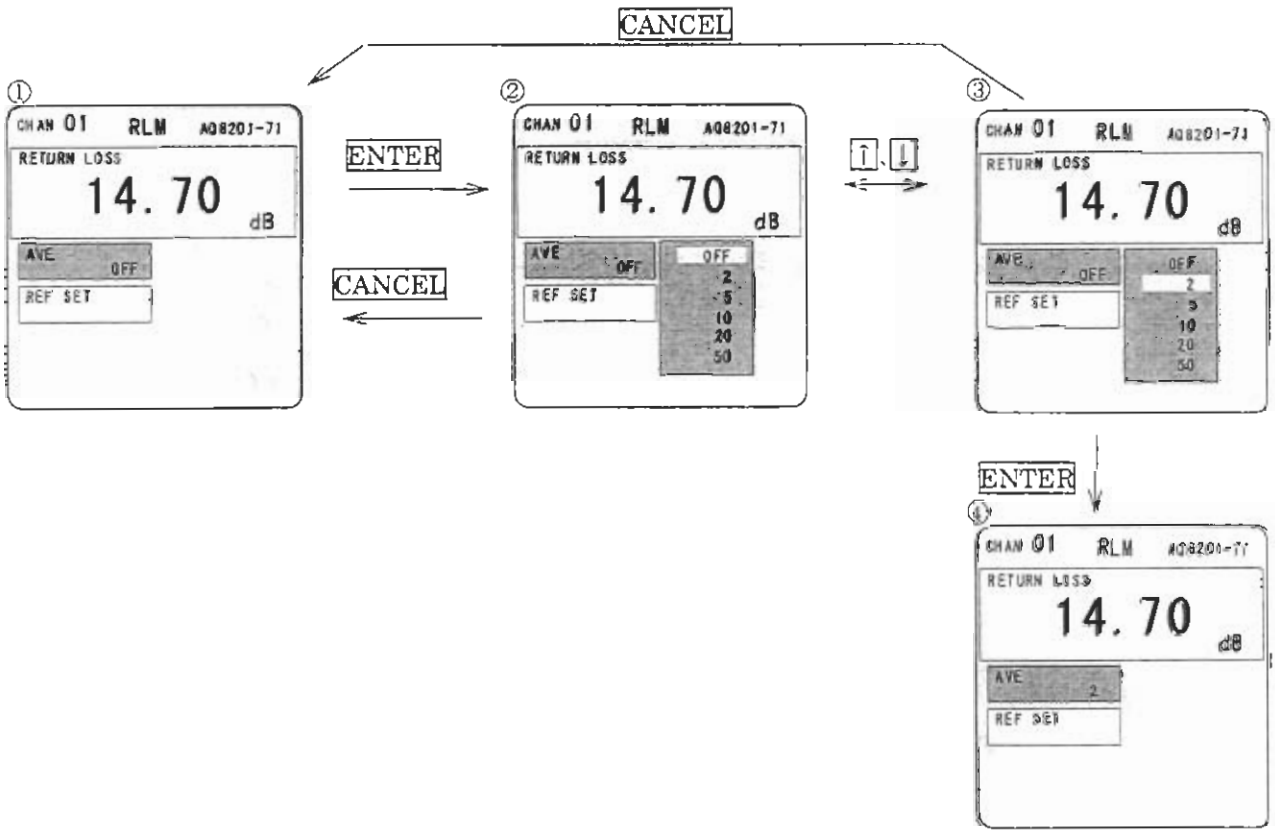


Figure 5-3-50 Screen to set the averaging frequency

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⑥ Execution of reference measurement
This parameter executes a reference measurement.
1. The parameter item is made "REF SET" with [↑]、[↓] key. (→ ①)
2. It becomes execution screen of a reference measurement with [ENTER] key. (→ ②)
3. It decides with [ENTER] key. (→ ③)

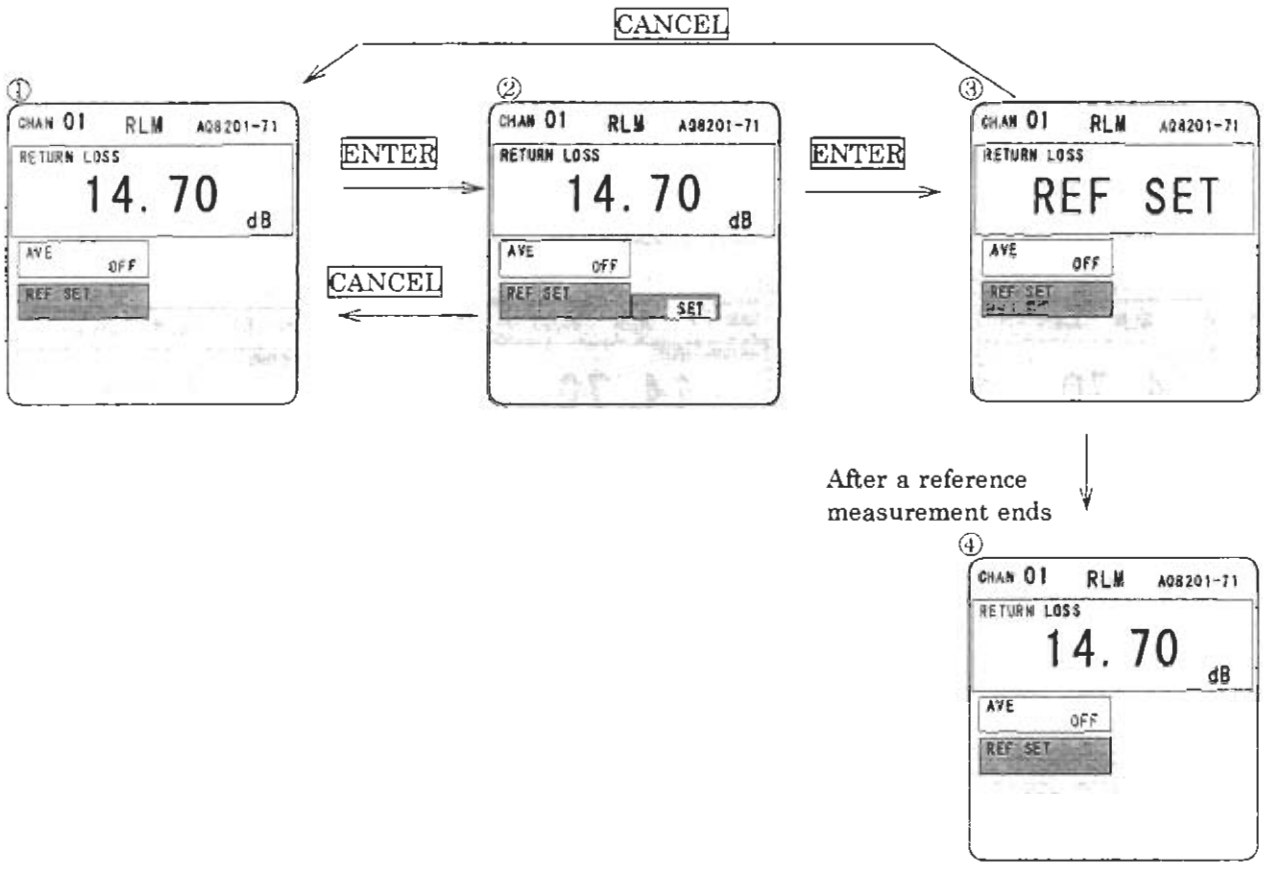


Figure 5-3-51 Screen to execute the reference measurement.

NOTE

When several measured values of reference reflection do not satisfy the tolerance of +/-0.02 dB, 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 +/-0.02 dB 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.

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(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 (14.70 dB),
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.

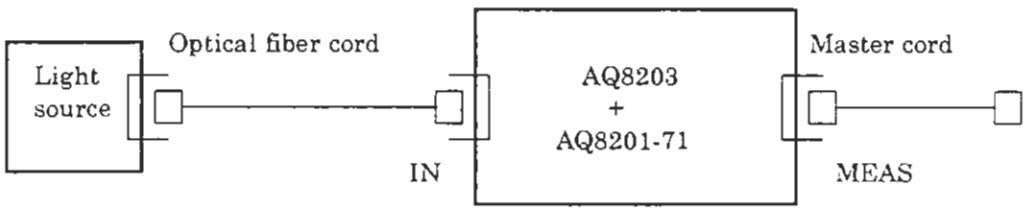


Figure. 5-3-52 Measurement System of Fresnel Reflection Reference

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

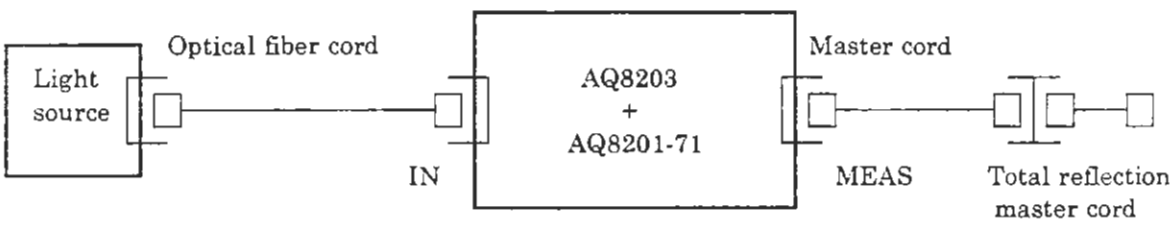


Figure. 5-3-53 Measurement System of Total Reflection Reference

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2) Measurement of Return Loss
After measuring reference reflection, connect the measuring object to the master cord, and a return loss will appear on the display.

2-1. In case of Fresnel Reflection Standard,
Connect a measuring object to the master connector side of our designated master cord connected to the AQ8201-71 connector by using an adapter. Make the other end of the measuring connector of the measuring object the reflection less termination.

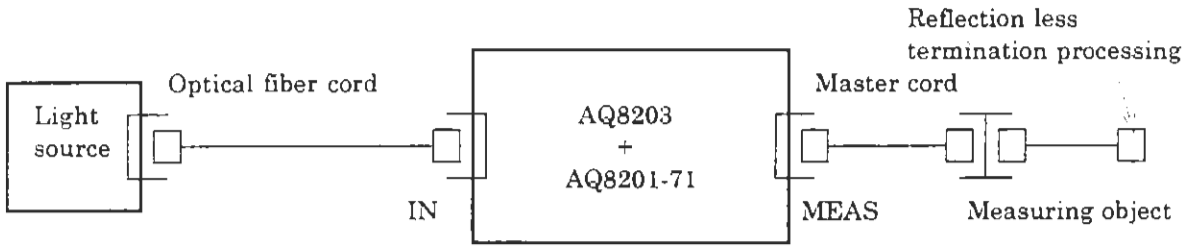


Figure. 5-3-54 Setup of Measuring Object

2-2. In case of Total Reflection Reference
Disconnect our designated master cord connected to the master cord connection of the AQ8201-71 and the total reflection master cord (or the total reflection master cord only when the measuring connector is the same type with the master connector of the master cord), and connect the measuring object as shown in Figure. 5-3-53.

NOTE

Please make output level the one of 0 to -5 dBm about the source of light used for the measurement.
When AQ8201-11 is used, it is necessary to attenuate output level with attenuator etc.

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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 5-1 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

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5.4.2 Explanation of Basic Functions

(1) Local mode

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

(2) 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 panel key are disabled. In this mode, the LED lamp on the local switch remains on.

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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.

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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)
- 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)

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5.4.5 Control by Program Code

(1) Program code

Tables 5-2-1 to 5-2-8 show the program codes of this system.

Table 5-2-1 AQ8203 Program Codes

Program code	Setting contents	System operation	Request code
CDSPSYS		It changes into system display.	
CDSPVER1		It changes into version display.	
CDSPMLT1		It changes into summary display.	
CDSPCH*	1 to 3	It changes into single display. Display channel No.: 1 to 3	
CDSP?		The kind of the screen being displayed now is shown.	Data format [CDSP****]
CLGT*	0 to 99	Back light is set. 0 (dark) to 99 (bright)	CLGT? Data format [CLGT*]
CCNT	0 to 99	Contrast is set. 0 (low) to 99 (high)	CCNT? Data format [CCNT*]
CBZR*	0 to 9	Buzzer is set. 0 (small) to 9 (big)	CBZR? Data format [CBZR*]
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]

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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 5-5 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 5-4.

(*1) An error occurs if a channel with no module mounted is specified.
(*2) Refer to clause 5.4.7 for details.

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

Program code	Setting contents	System operation	Request code
RESET		Resets the module settings to the default values. AQ8201-31/32/33 is returned to the home position.	
MBATT?		Checks the module battery and writes the results in the output queue.	Data format [MBATT*] 1:OK 0:LO
MODEL?		Fetches module information.	Refer to Table 5-4.

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Table 5-2-3 Program Codes Dedicated to AQ8201-11/11A/11B/13
(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

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LD? *1)		Writes LD information in the output queue in the specified data format.	Refer to Table 5-4.
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) *3)	0,1	The wavelength proofreading is executed. 0:ON 1:OFF	LUCAL? Data format [LUCAL*]
LUCWL* (Only -13) *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) *3)		The proofreading wavelength of each point is set.	LUCALD? Data format [LUCALD/ ****.***/****.***]
LUDSET (Only -13) *3)		The set proofreading wavelength of each point is written in the module.	
LUCRST (Only -13) *3)		It becomes a default value when this is shipped.	

*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.

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Table 5-2-4 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 5-4.

Table 5-2-5 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*]

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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 5-4.
PFR? *)		Requests output of reference value in the specified output format.	Refer to Table 5-4.
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 5-4.
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 5-2-6 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 5-4.
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.

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Table 5-2-7 Program Codes Dedicated to AQ8201-71
(Module to be controlled is required to be specified)

Program code	Setting contents	System operation	Request code
RW****	1280 to 1600 Step: 1 (Unit: nm)	Sets the wavelength.	RW? Data format [RW****]
RDR*	0,1	Selects a display difference. 1:Using the current power value as the reference, the return loss displays its relative value. 0:Restores the original display.	RDR? Data format [PDR*]
RH*	0 to 4	Selects the maximum/minimum value measurement. 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	Selects reflection reference. A: Fresnel reflection reference B: Total reflection reference	RFL? Data format [RFL*]
RREF		Measures reference reflections.	
RREF?	0 to 2	Checks measurement of reference reflections. 2: Being measured 1: Already measured 0: Not measured yet	Data format [RREF*]
RD?		Requests output of measured data in the specified output format.	Refer to Table 5-4.
RHD/MAX? RHD/MAX? RHD/DIF?		Requests output of measured data in the specified output format.	Refer to Table 5-4.

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(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.

Table 5-3-1 AQ8203 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)
CDSP	MLT(Summary display)

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 5-3-2 AQ8201-11/11A/11B/13 Default Values

Program code	Default value	
LOPT	0	(OFF)
LATL	0	(0.00 dB)
LEMO	0	(OFF)
LIMO	0	(CW)
LW , LF	Values of LWC or LFC	
LCOHR	0	(OFF)
LWLCAL	0	(+0.00 nm)
LPLCAL	0	(+0.00 dB)
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 5-3-3 AQ8201-12 Default Values

Program code	Default value	
EOPT	0	(OFF)
EATL	0	(0.0 dB)

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

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Table 5-3-4 AQ8201-21 Default Values

Program code	Default value	
PW	1310	(1310.0 nm)
PR	A	(AUTO)
PMO	0	(CW)
PDR	0	(OFF)
PH	0	(OFF)
PA	A	(OFF)
PCAL	0	(+0.000 nm)

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

Table 5-3-5 AQ8201-31/32/33 Default Values

Program code	Default value	
AAV	0	(0.000 dB)
AW	1550	(1550 nm)
ASHTR	0	(DISABLE)
ACAL	0	(+0.00 dB)

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

Table 5-3-6 AQ8201-71 Default Values

Program code	Default value	
RW	1550	(1550 nm)
RDR	0	(OFF)
RH	0	(OFF)
RA	A	(OFF)
RFL	A	(+14.70 dB)
RREF	0	(None)

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

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(3) Data format
Table 5-4 shows the data format.

Table 5-4 Data format.

Command	Output data format
*IDN?	[ANDO-ELECTRIC,AQ8203,serial No., software version]
MODEL?	[AQ8201-**/serial No./software version/option No.]
MOD?	[AQ8201-**,AQ8201-**,.....]
LD?	[LD**◇○○. ○○□□□□. □□] **:Channel No.(01 to 10) ◇: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 to 09) ◇:Status (0:LD_OFF,1:LD_ON) ○○. ○:Set optical attenuation
POD? PFR? PHD/MAX? PHD/MIN? PHD/DIF?	[@@@**◇△○◎□□□□□□□□] @@@:Header **:Channel No.(01 to 10) ◇:Status Z:Zero set,I:In range,U:Under range,O:Over range, R:During the switch of range,A:Averaging △:Function information 1:Measurement data,3:Max value,4:Min value, 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 C to L:+30 to -60 dBm □□□□□□□□:Data Eight digits with sign(Decimal data) (The output value includes the value set by PCAL)
AD?	[AD**◇○□□□□△△. △△△] **:Channel No.(01 to 10) ◇: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 to 10) ◇:Status F:Measuring reference reflection,R:Measruing return loss, A:Averaging,N:Before measuring ○:Function information 1:Measurement data,3:Max value,4:Min value, 5:Max - Min value △:Reflection reference 1:Fresnel reflection reference,2:Total reflection reference □□□□□□□□:Data Eight digits with sign (Decimal data)

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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 place since it is neglected.

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

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5.4.6 Error Output Format

(1) ERR?

Output format: E □□□□

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

Table 5-5 Error Code

Error cord	内　　容
E0003	MAIN TYPE ERR The data of a different module was received.
E0006	FAN ERR FAN is abnormal. Please turn off the power supply at once.
E0040	UNIT EX.UNIT ERR The module is not installed in an extended unit unconnection or an extended unit.
E0041	CH ΔΔ NO MODULE The module is not installed in the object channel.
E0050	GPIB SYNTAX ERR GP-IB:The format of the command is wrong.
E0051	GPIB EXECUTE ERR GP-IB:It failed in the execution of the command.
E0053	GPIB BUF OVER GP-IB:The reception buffer became over.
E0055	GPIB SEND ERR GP-IB:The message cannot be sent to host PC.
E0058	GPIB I-QUE OVER GP-IB:Input queue became over.
E0059	GPIB O-QUE OVER GP-IB:Output queue became over.
E0060	GPIB LD-ROCK ERR GP-IB:A remote key or the key cannot output light because of the Off state.
E0061	GPIB COM MOD ERR GP-IB:In a present operation mode, this command is invalid.
E0101	CH ΔΔ [01]COM ERR (Error common to all units) The command is wrong.
E0102	CH ΔΔ [02]DAT ERR (Error common to all units) The input data has exceeded the limit

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E0103	CH ΔΔ [03]RAM ERR (Error common to all units) No data can be written to the RAM.
E0104	CH ΔΔ [04]SER ERR (Error common to all units) Serial communication is disabled.
E0117	CH ΔΔ [11]LIM ERR (Optical light source module commonness error) The optical output limiting circuit operated.
E0118	CH ΔΔ [11]MT INIT ERR (ECL module commonness error) The motor returns and the starting point cannot return.
E0119	CH ΔΔ [11]COM MOD ERR (ECL module commonness error) In a present operation mode, this command is invalid.
E0133	CH ΔΔ [21]OPM ERR (Error unique to AQ8201-21) Operation is disabled.
E0135	CH ΔΔ [23]ZER ERR (Error unique to AQ8201-21) Zero set error
E0136	CH ΔΔ [24]CHP ERR (Error unique to AQ8201-21) The input frequency is different from the set CHOP frequency.
E0149	CH ΔΔ [31]ATT ERR (Error unique to AQ8201-31/32/33) Operation is disabled.
E0213	CH ΔΔ [71]RLM ERR (Error unique to AQ8201-71) Operation is disabled.
E0216	CH ΔΔ [74]MOD ERR (Error unique to AQ8201-71) The input frequency is not the 270 Hz.
E0217	CH ΔΔ [75]REF ERR (Error unique to AQ8201-71) Ref set error.

8/

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5.4.6 Register

Event processing registers of this system are classified into three function groups.
The standard event status register (ESR) and the status byte register (SBR) are used to save the specified-type events occurring during system operation.
These registers are defined in the IEEE-488.2-1987 standard.
This system is also equipped with the end event status register (EESR), which saves whether each module has completed its operation.

(1) Standard event status register
The ESR saves 8-type events occurring inside the system.
The contents of the register can be read using the *ESR? query command.

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

Table 5-6 Functions of ESR Bits

Bit	Operation of set bit
7 BIT	PON (power on) Set after this system is turned on.
6 BIT	URQ (user request) Not used
5 BIT	CME (command error) Set after a syntax error occurs, a command does not conform to the receivable format, a unique command inapplicable to the specified module is received, etc.
4 BIT	EXE (execution error) Set after an error occurs due to inappropriate set data or limitation on setting/query contents during module operation.
3 BIT	DDE (device error) Set after an error occurs due to module hardware and the error command is unreceivable.

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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.

82

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(2) Status byte register
Each bit of the SBR saves whether data is ready in the output queue, this system requests service or any event has been saved in the ESR.
The contents of the register can be read using serial polling or the *STB? query command.
When using *STB, write the contents in the output queue.
Bit 6 assumes the RQS bit when reading the SBR using serial polling, or the MSS bit when reading it using *STB.

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

Table 5-7 Functions of SBR Bits

Bit	Operation of set bit
7BIT	Not used
6BIT	RQS (service request) Readable using serial polling. Indicates that this system is requesting service to the GP-IB controller.
	MSS (master status summary) Readable using the *STB query command. Set after the ESB of the SBR or the MWA bit is set.
5BIT	ESB (event status bit) Indicates that the status is "enable" and some event(s) exist(s) in the ESR.
4BIT	MAV (message available) Indicates that information is available in the output queue.
3BIT	Not used
2BIT	Not used
1BIT	Not used
0BIT	OPT LOCK(Optical output lock bit) BIT is set when there is a change in the state of ON/OFF of remote interlock and ON/OFF of the key.

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(3) End event status register (EESR)

The end event status register saves whether an execution command to a module, especially which requires long time, has been completed or not.
After operation is completed, operation complete information on that module is set in an appropriate bit.
The contents of the end event status register can be read using the END? 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
×	×	×	×	×	×	×	×

Table 5-8 Functions of EESR Bits

Bit	Operation of set bit
15BIT	Not used
14BIT	Not used
13BIT	Not used
12BIT	Not used
11BIT	Not used
10BIT	Not used
9 BIT	Not used
8 BIT	Not used
7 BIT	Not used
6 BIT	Not used
5 BIT	Not used
4 BIT	Not used
3 BIT	Not used
2 BIT	Module 3 retention completed
1 BIT	Module 2 retention completed
0 BIT	Module 1 retention completed

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(4) Conditions for clearing each register
Each status is cleared according to the following conditions.

Table 5-9 Conditions for Clearing Register

Register	Clearing condition
SBR	·After the power is turned off. ·After *RET is executed. ·After status information is fetched using 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 the 6 bit of the SBR is changed by *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 the 0 bit of the ESR is changed by *ESE.

(5) Event processing sequence

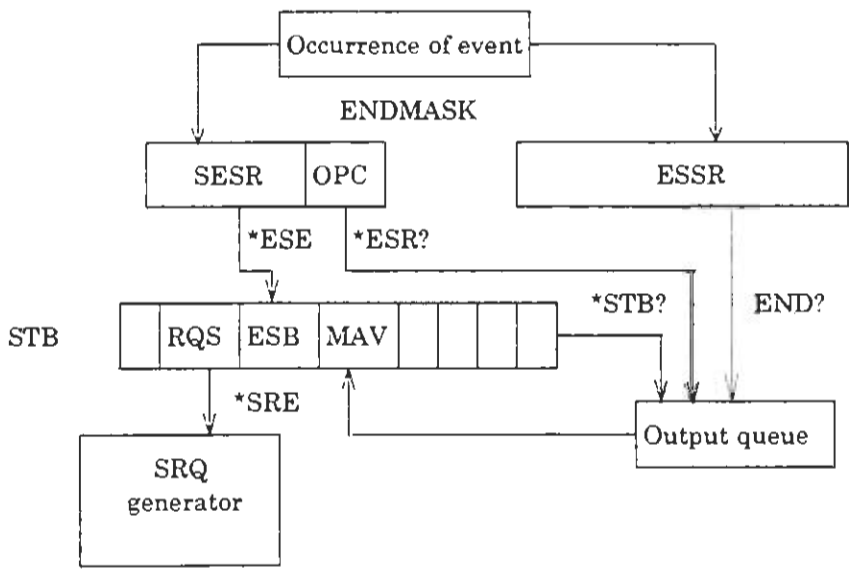


Figure 5-4 Event Processing Sequence

NOTE

Be sure to read the status of the ESR before using the ESB bit.

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6. Circuits and Structure

This chapter outlines the basic circuit configuration and structure of this system.

6.1 HALFSIZE FRAME (AQ8203)

6.1.1 Circuit

(1) Functional Block Diagram

Figure 6-1 shows a functional block diagram of the AQ8203.
This frame controls the key operations and GP-IB command transmission to each module.Also, it receives digital data from each module, process them by various arithmetic operations and displays the results on the display.

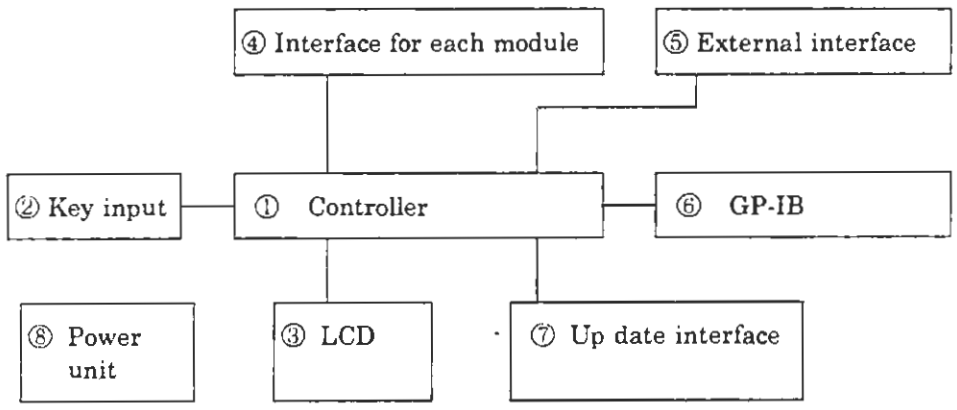


Figure 6-1 Functional Block Diagram of AQ8203

89

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(2) Explanation of each section

① Controller
Collects instructions and information for all interfaces relating to module and display control.

② Key input
It is a user interface for the manual operation of each module.

③ LCD
Information/the measurement value of each module from the module is displayed.
Color STN monitor

④ Interface for each module
It is an interface (Three modules can be installed in the frame) by which each module is connected.

⑤ External interface
It is an interface for an external expansion.

⑥ GP-IB
Signals are transmitted or received via this GP-IB.

⑧ Up date interface
The update which uses flash ATA card is possible.

⑧ Power unit
Turns the power on and off using an AC power source switch.

6.1.2 Structure

The outside view of the AQ8203 is attached at the end of this manual.

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

6.2.1 Circuit

(1) Functional Block Diagram

Figure 6-2 shows the functional block diagram of AQ8201-11/11A/11B, which operates according to key operation and commands transmitted from the frame.

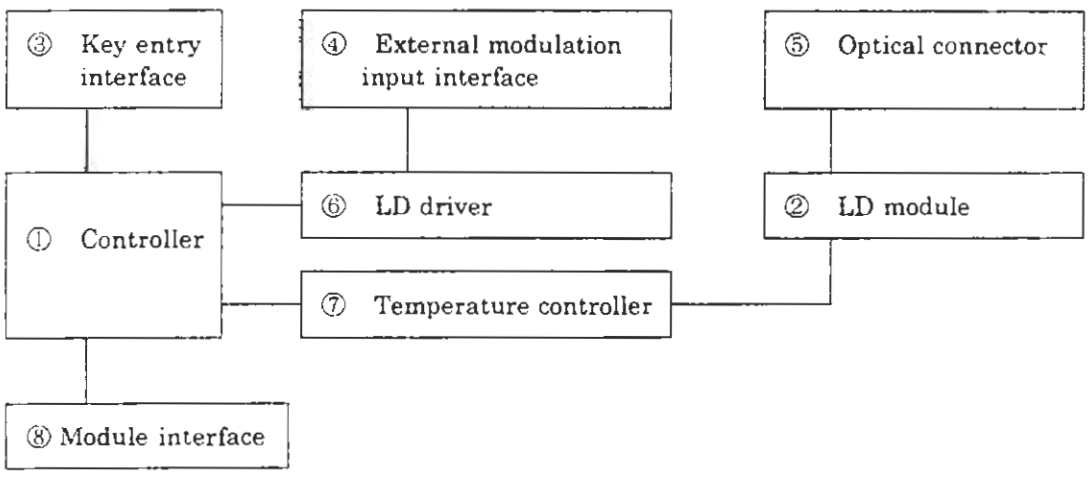


Figure 6-2 Functional Block Diagram of AQ8201-11/11A/11B

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(2) Explanation of each section

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

② LD module
DFB-LD module

③ Key entry interface
Turns the LD on and off according to switch operation.

④ External modulation input interface
SMA connector for inputting modulation signals.

⑤ Optical connector
User interface for outputting light.

⑥ LD driver
Circuit for driving the LD module.

⑦ Temperature controller
Circuit for controlling the LD module temperature.

⑧ Module interface
Communicates data with the frame.

6.2.2 Structure

The outside view of the AQ8201-11/11A/11B is attached at the end of this manual.

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6.3 ASE MODULE (AQ8201-12)

6.3.1 Circuit

(1) Functional Block Diagram

Figure 6-3 shows the functional block diagram of AQ8201-12, which operates according to key operation and commands transmitted from the frame.

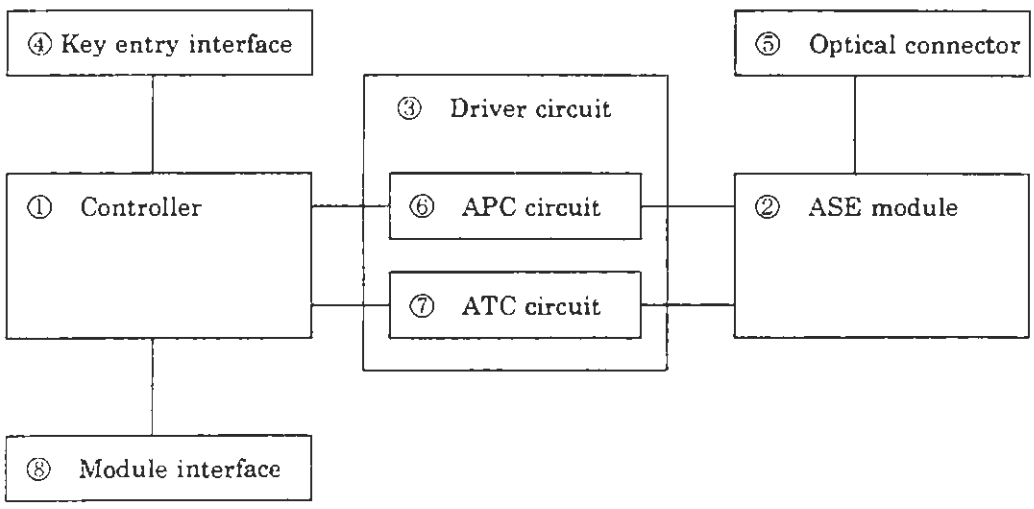


Figure 6-3 Functional Block Diagram of AQ8201-12

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(2) Explanation of each section

① Controller
It is used for controlling each block according to the signals from frame.

② ASE module
The module generates optical output according to instructions from the drive circuit.

③ Drive circuit
This circuit is used for driving the ASE module.
It stabilizes optical output by feeding back the monitor PD output.

④ Key entry interface
It is a user interface allowing you to turn on or off the ASE module with its switches.

⑤ Optical connector
Equipped with the FC-PC connector, this interface is used for fetching light externally.

⑥ APC circuit
This circuit controls optical output by varying driving current according to the signals from the control unit.

⑦ ATC circuit
This circuit is used for controlling temperature on the ASE module.

⑧ Module interface
It is used for exchanging data between the ASE module and frame.
DC input.

6.3.2 Structure

The outside view of the AQ8201-12 is attached at the end of this manual.

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6.4 ECL MODULE (AQ8201-13)

6.4.1 Circuit

(1) Functional Block Diagram

Figure 6-4 shows the functional block diagram of AQ8201-13, which operates according to key operation and commands transmitted from the frame.

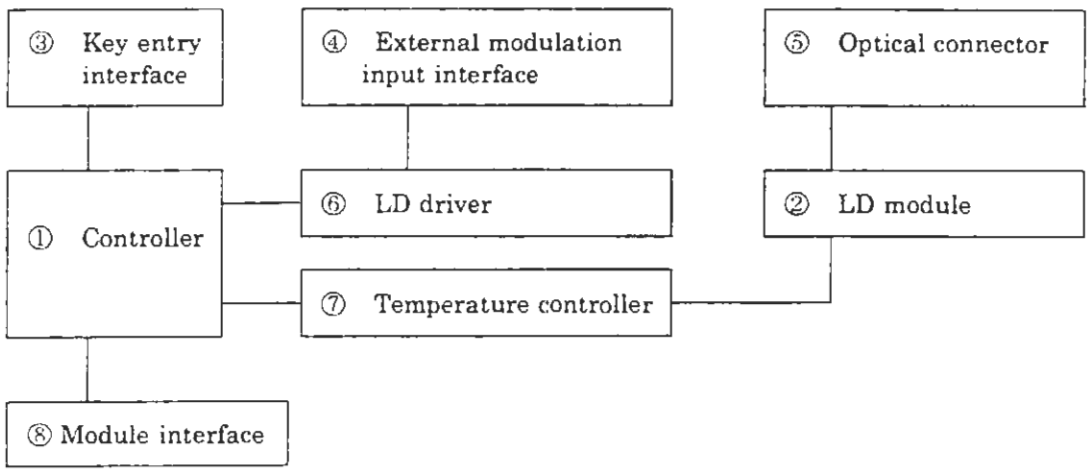


Figure 6-4 Functional Block Diagram of AQ8201-13

87

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(2) Explanation of each section

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

② LD module
DFB-LD module

③ Key entry interface
Turns the LD on and off according to switch operation.

④ External modulation input interface
SMA connector for inputting modulation signals.

⑤ Optical connector
User interface for outputting light.

⑥ LD driver
Circuit for driving the LD module.

⑦ Temperature controller
Circuit for controlling the LD module temperature.

⑧ Module interface
Communicates data with the frame.

6.4.2 Structure

The outside view of the AQ8201-13 is attached at the end of this manual.

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6.5 OPM MODULE (AQ8201-21)

6.5.1 Circuit

(1) Functional Block Diagram

Figure 6-5 shows the functional block diagram of AQ8201-21, which operates according to key operation and commands transmitted from the frame.

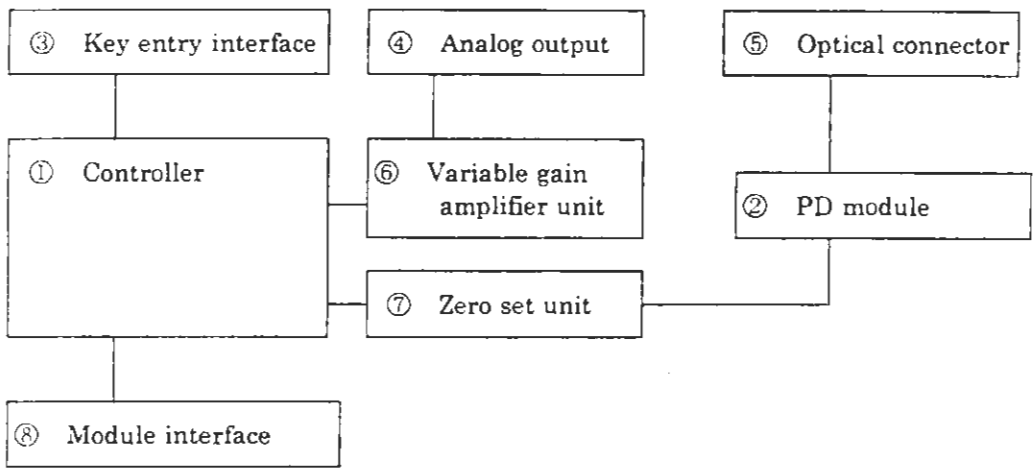


Figure 6-5 Functional Block Diagram of AQ8201-21

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(2) Explanation of each section

① Controller
Signal amplified on the variable gain amplifier is then converted to digital signal on the A/D conversion circuit. The signal is then processed (logarithmic conversion and various corrections) on the CPU circuit and sent to frame via the serial I/O.

② PD module
Using the InGaAs photo diode employed, the module outputs electric signals proportional to intensity of incident light. The module is equipped with Peltier and thermistor to cool the photo diode to the specified temperature.

③ Key entry interface
It is a user interface employed for turning on or off the zero set and switching the incident light between CHOP and CW from the switch.

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

⑤ Optical connector
It is a user interface employed for entering external light.

⑥ Variable gain amplifier unit
This unit comprises the operation amplifier, active LPF, active BPF and detection circuit. It performs switching of gain level according to intensity of incident power.

⑦ Zero set unit
Using output from the D/A conversion circuit, this unit negates electric offset in the circuit.
Output value from the D/A conversion circuit is determined when you press the ZERO SET key to execute the zero set. The value determined is maintained until the ZERO SET key is pressed again.

⑧ Module interface
The interface is used for exchanging data between frame and the AQ8201-21.

6.5.2 Structure

The outside view of the AQ8201-21 is attached at the end of this manual.

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

6.6.1 Circuit

(1) Functional Block Diagram

Figure 6-6 shows the functional block diagram of AQ8201-31/32/33, which operates according to key operation and commands transmitted from the frame.

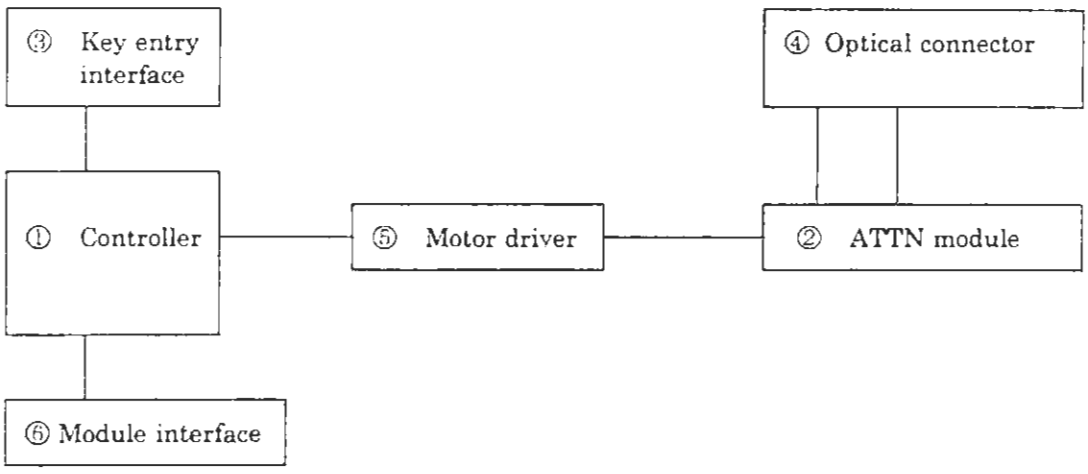


Figure 6-6 Functional Block Diagram of AQ8201-31/32/33

89

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(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.

6.6.2 Structure

The outside view of the AQ8201-31/32/33 is attached at the end of this manual.

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6.7 RLM MODULE (AQ8201-71)

6.7.1 Circuit

(1) Functional Block Diagram

Figure 6-7 shows the functional block diagram of AQ8201-71, which operates according to key operation and commands transmitted from the frame.

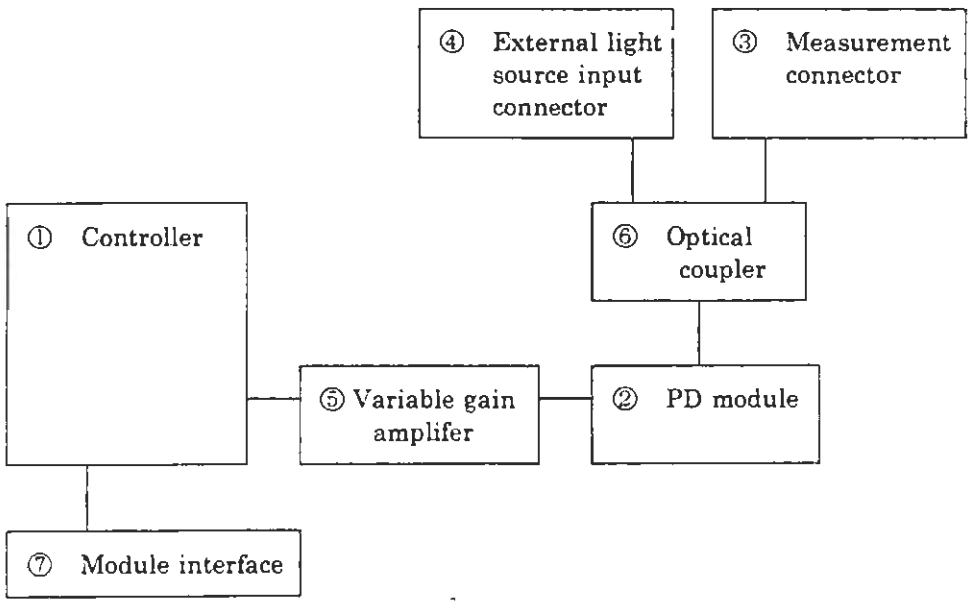


Figure 6-7 Functional Block Diagram of AQ8201-71

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(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 photo diode and output 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 coupler 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.

6.7.2 Structure

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

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7. Trouble shooting Guide

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

7.1 HALFSIZE FRAME (AQ8203)

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).

When the error is caused, the content of the error is displayed the under the display screen according to an undermentioned format.

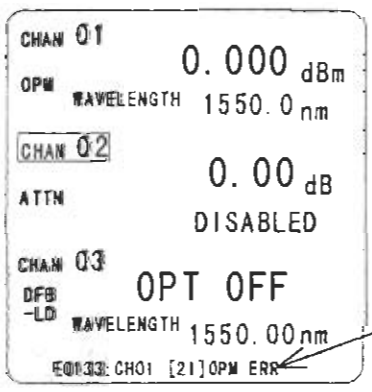


Figure 7-1 Error display (summary display)

91

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Table 7-1 Error Code

Error cord	内　　容
E0003	MAIN TYPE ERR The data of a different module was received.
E0006	FAN ERR FAN is abnormal. Please turn off the power supply at once.
E0040	UNIT EX.UNIT ERR The module is not installed in an extended unit unconnection or an extended unit.
E0041	CH ΔΔ NO MODULE The module is not installed in the object channel.
E0050	GPIB SYNTAX ERR GP-IB:The format of the command is wrong.
E0051	GPIB EXECUTE ERR GP-IB:It failed in the execution of the command.
E0053	GPIB BUF OVER GP-IB:The reception buffer became over.
E0055	GPIB SEND ERR GP-IB:The message cannot be sent to host PC.
E0058	GPIB I-QUE OVER GP-IB:Input queue became over.
E0059	GPIB O-QUE OVER GP-IB:Output queue became over.
E0060	GPIB LD-ROCK ERR GP-IB:A remote key or the key cannot output light because of the Off state.
E0061	GPIB COM MOD ERR GP-IB:In a present operation mode, this command is invalid.
E0101	CH ΔΔ [01]COM ERR (Error common to all units) The command is wrong.
E0102	CH ΔΔ [02]DAT ERR (Error common to all units) The input data has exceeded the limit

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E0103	CH ΔΔ [03]RAM ERR (Error common to all units) No data can be written to the RAM.
E0104	CH ΔΔ [04]SER ERR (Error common to all units) Serial communication is disabled.
E0117	CH ΔΔ [11]LIM ERR (Optical light source module commonness error) The optical output limiting circuit operated.
E0118	CH ΔΔ [11]MT INIT ERR (ECL module commonness error) The motor returns and the starting point cannot return.
E0119	CH ΔΔ [11]COM MOD ERR (ECL module commonness error) In a present operation mode, this command is invalid.
E0133	CH ΔΔ [21]OPM ERR (Error unique to AQ8201-21) Operation is disabled.
E0135	CH ΔΔ [23]ZER ERR (Error unique to AQ8201-21) Zero set error
E0136	CH ΔΔ [24]CHP ERR (Error unique to AQ8201-21) The input frequency is different from the set CHOP frequency.
E0149	CH ΔΔ [31]ATT ERR (Error unique to AQ8201-31/32/33) Operation is disabled.
E0213	CH ΔΔ [71]RLM ERR (Error unique to AQ8201-71) Operation is disabled.
E0216	CH ΔΔ [74]MOD ERR (Error unique to AQ8201-71) The input frequency is not the 270 Hz.
E0217	CH ΔΔ [75]REF ERR (Error unique to AQ8201-71) Ref set error.

92.

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7.2 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.

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7.3 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)

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7.4 ECL MODULE (AQ8201-13)

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.

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7.5 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.

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7.6 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.

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7.7 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.

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8. Maintenance

This chapter describes standard system maintenance and service procedure.

8.1 HALFSIZE FRAME (AQ8203)

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

8.2.1 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
AQ8203	
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

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8.2.2 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.

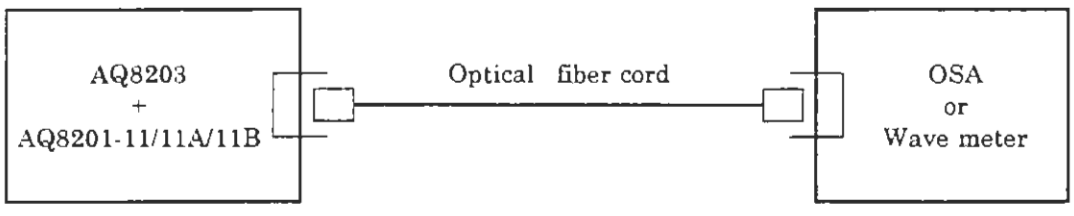


Figure 8-1 Measurement of Center Wavelength and Stability

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.

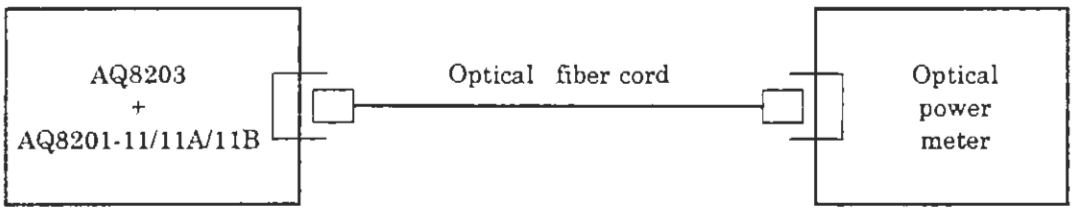


Figure 8-2 Measurement of Optical Output Level and Stability

8.2.3 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 AQ8201-11/11*.

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8.3 ASE MODULE (AQ8201-12)

8.3.1 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
AQ8203	
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

8.3.2 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.

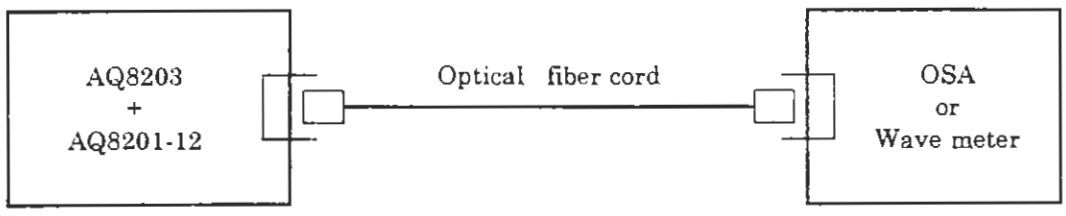


Figure 8-3 Measurement of Center Wavelength and spectrum width

97

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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.

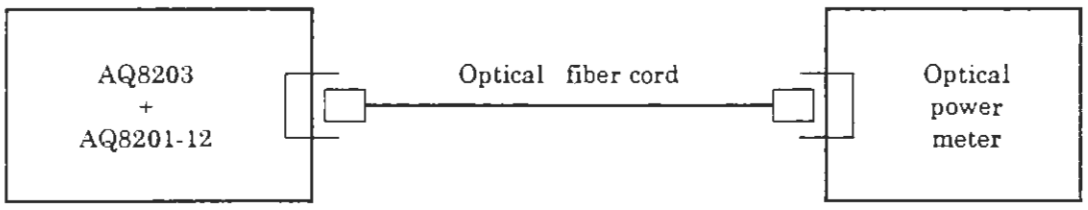


Figure 8-4 Measurement of Optical Output Level and Stability

8.3.3 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

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8.4 ECL MODULE (AQ8201-13)

8.4.1 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
AQ8203	
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

98

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8.4.2 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.

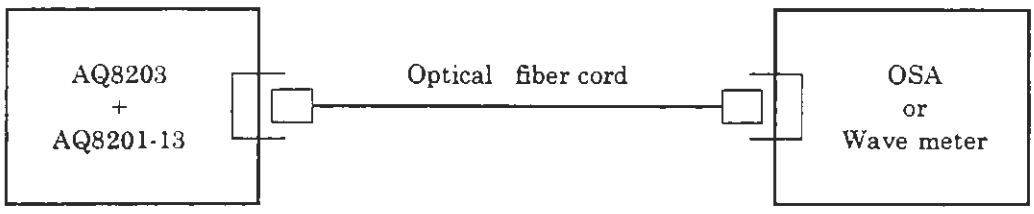


Figure 8-5 Measurement of Center Wavelength and Stability

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.

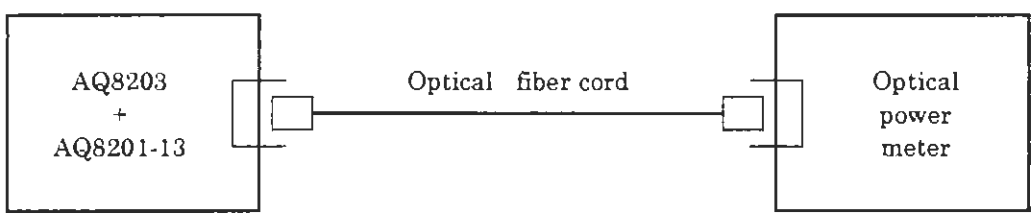


Figure 8-6 Measurement of Optical Output Level and Stability

8.4.3 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

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8.5 OPM MODULE (AQ8201-21)

8.5.1 Tester Units Used for the Test

Table 8-5 lists testers required for the maintenance.

Table 8-5 Tester Units Used for the Test (AQ8201-21)
Names in parentheses refer to our products.

Tester	Major performance
AQ8203	
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.

99

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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.

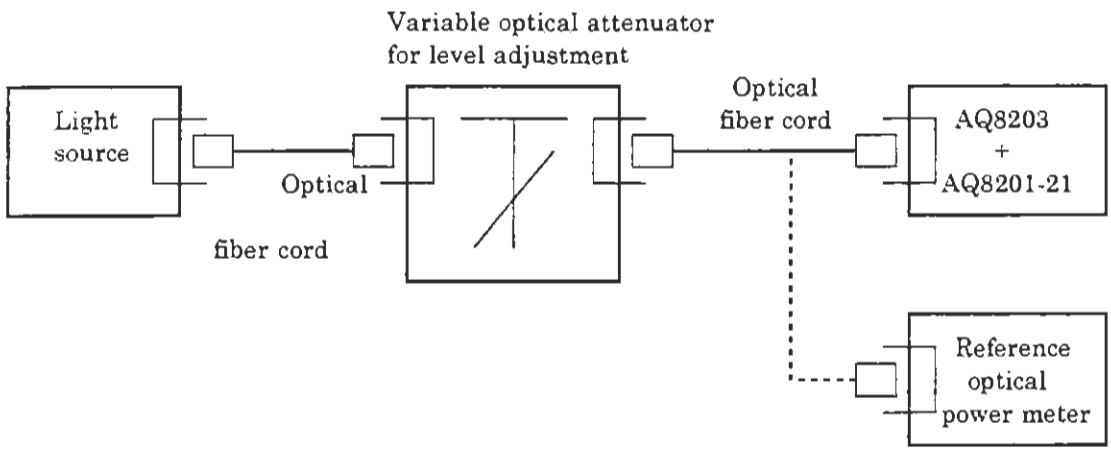


Figure 8-7 Performance Test

8.5.3 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

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

8.6.1 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
AQ8203	
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

8.6.2 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.

100

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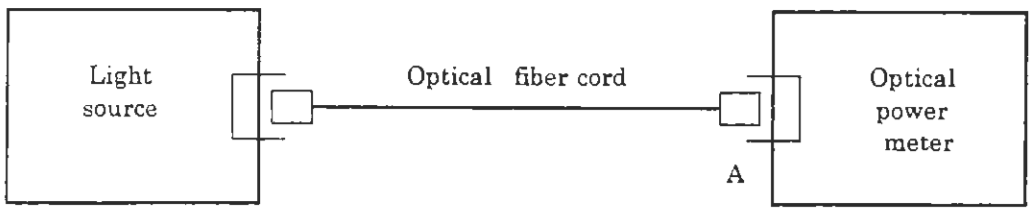


Figure 8-8 Insertion Loss Measurement System 1

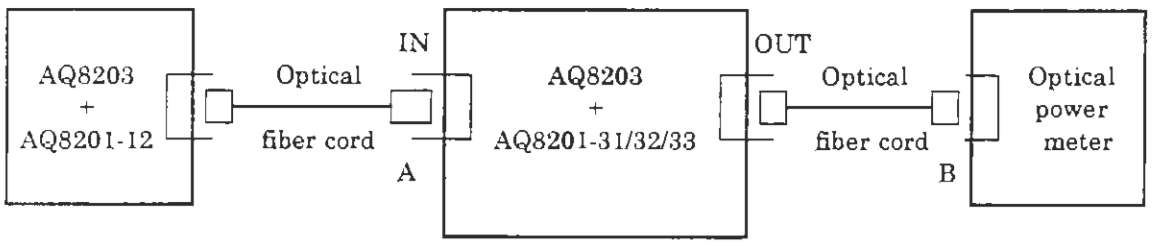


Figure 8-9 Insertion Loss Measurement System 2

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.

8.6.3 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.

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8.7 RLM MODULE (AQ8201-71)

8.7.1 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 (AQ8201-71)
Names in parentheses refer to our products.

Tester	Major performance
AQ8203	
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

8.7.2 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.)

101

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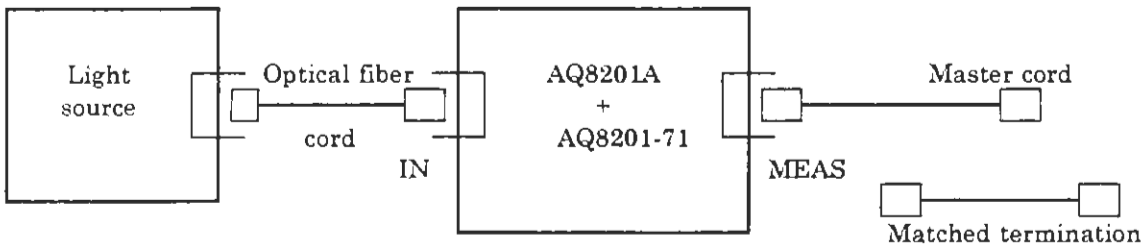


Figure 8-10 Performance Test

8.7.3 Cleaning

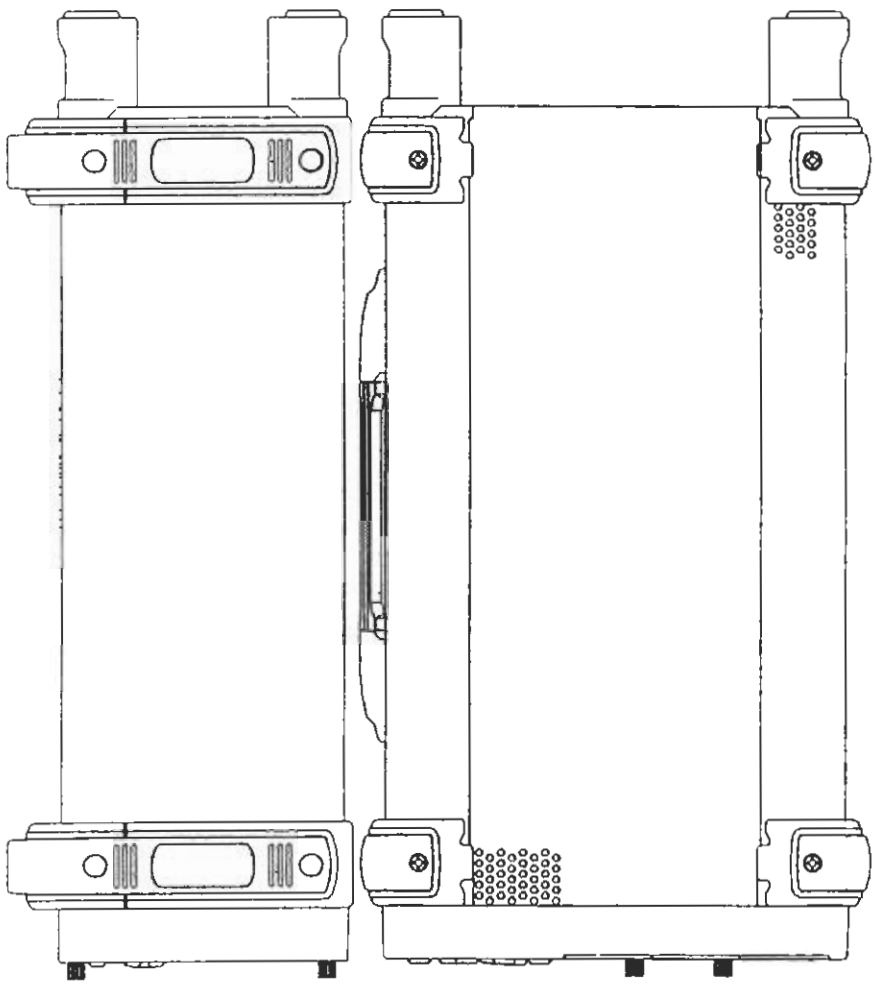
When dusts and dirts gather on the AQ8201-71 photo receiver and the master cord connection, the dynamic range, the relative measurement accuracy and the measurement stability come not to be assured. So, be sure to clean the AQ8201-71 photo receiver, the master cord connection and the connector of the 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

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DETAIL DRAWING IS ASD-62



LEFT SIDE VIEW BOTTOM VIEW

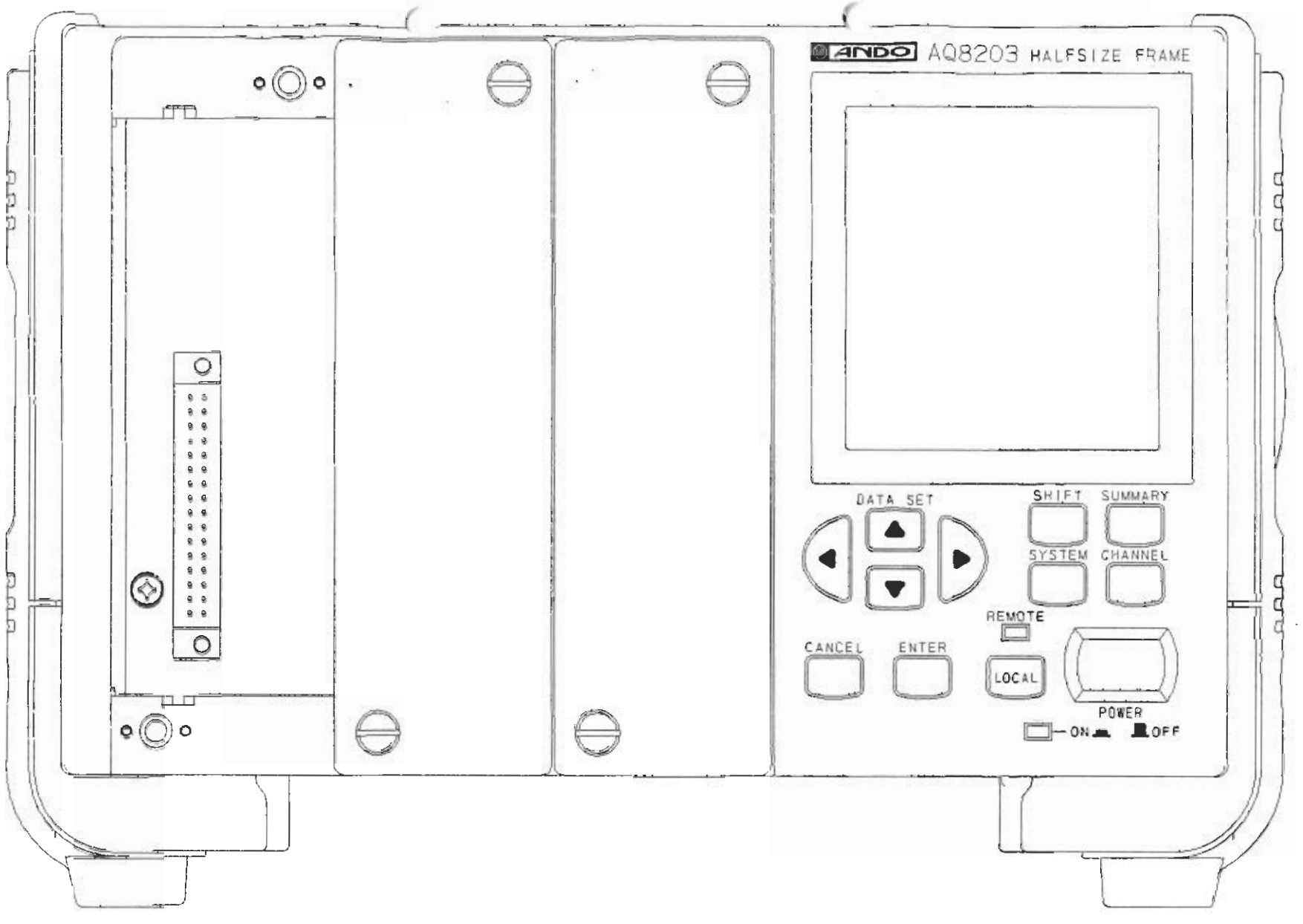
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DIMENSION. SHOWN IN mm

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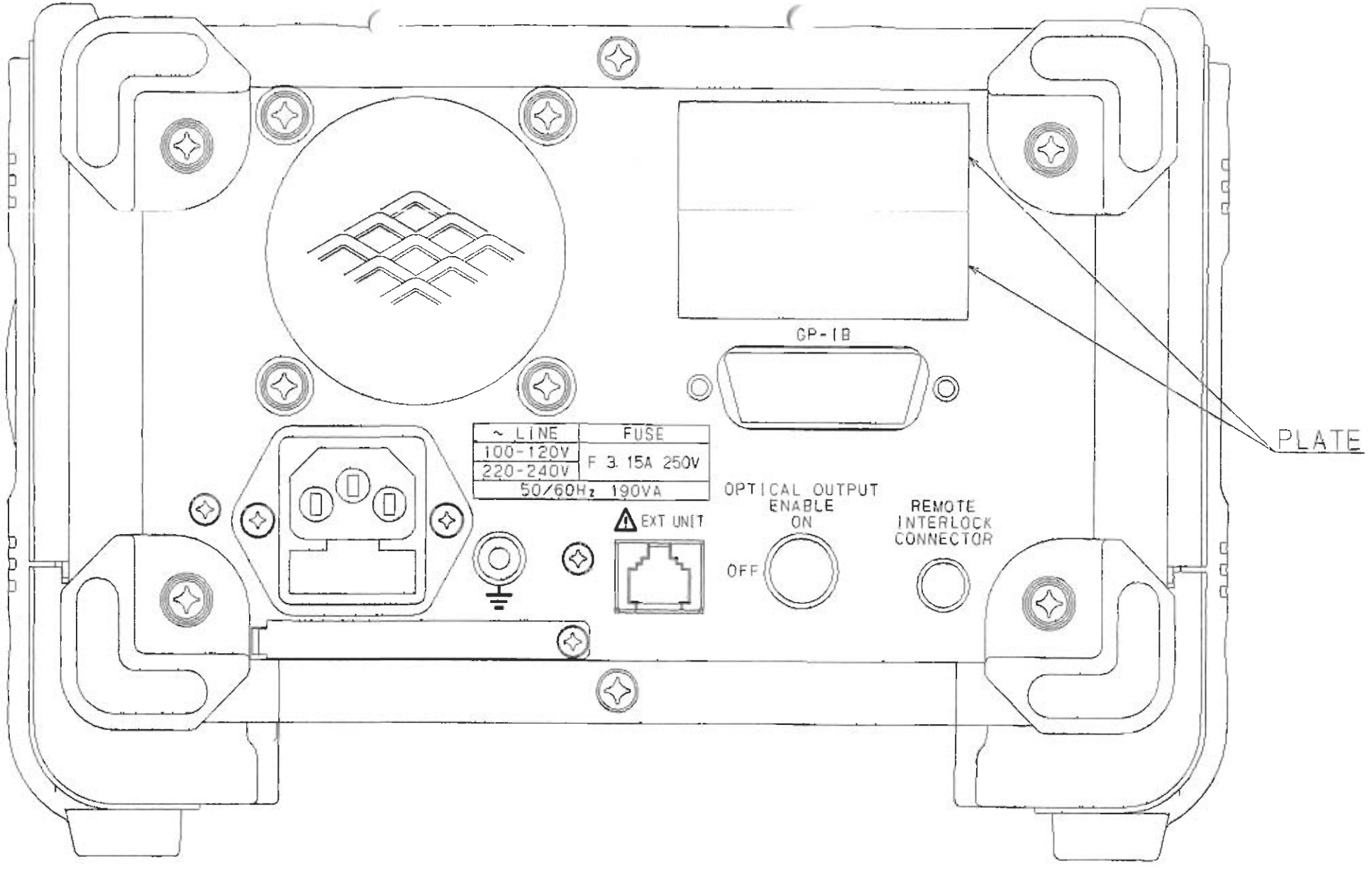
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OUTSIDE VIEW OF AQ8203 HALFSIZE FRAME
(FRONT)

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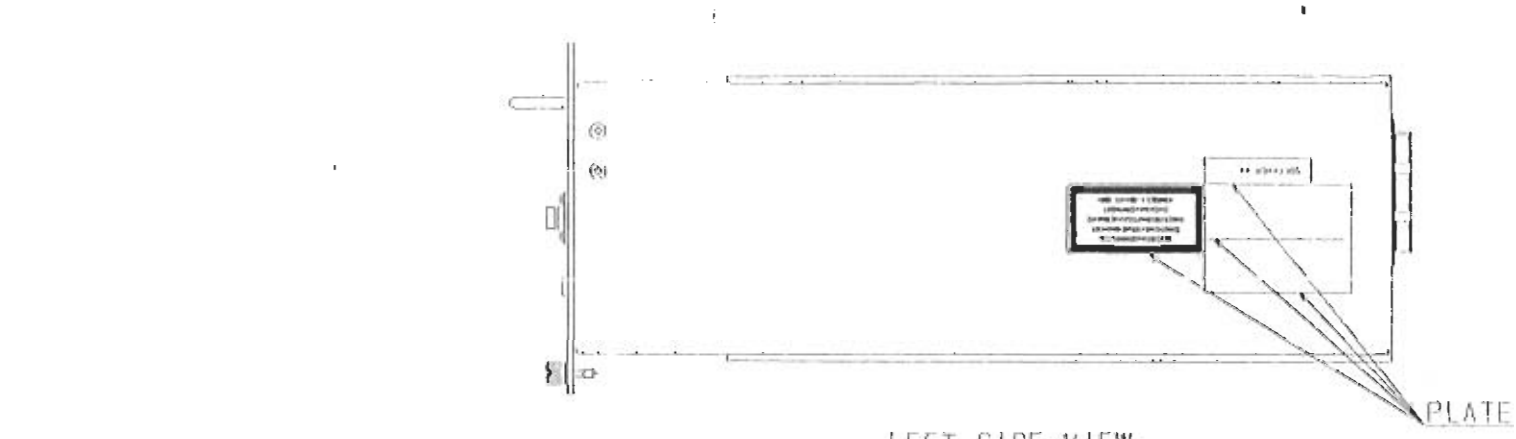


OUTSIDE VIEW OF AQ8203 HALFSIZE FRAME
(REAR)

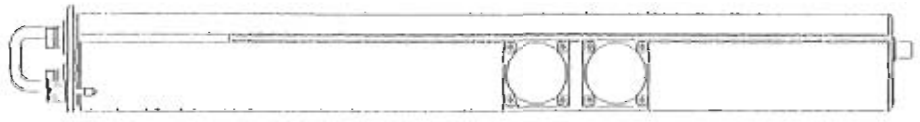
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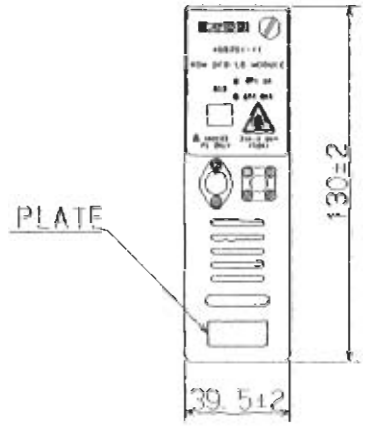
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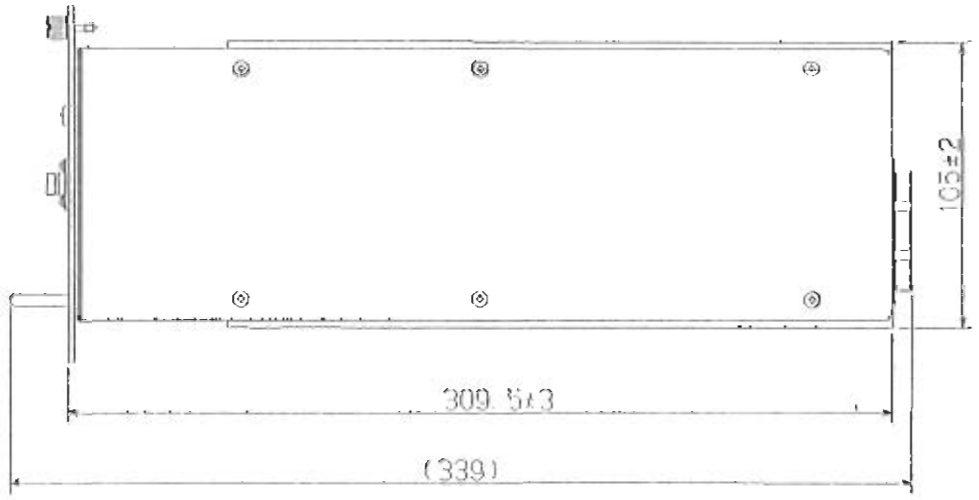
LEFT SIDE VIEW



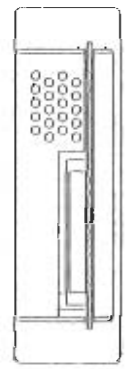
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

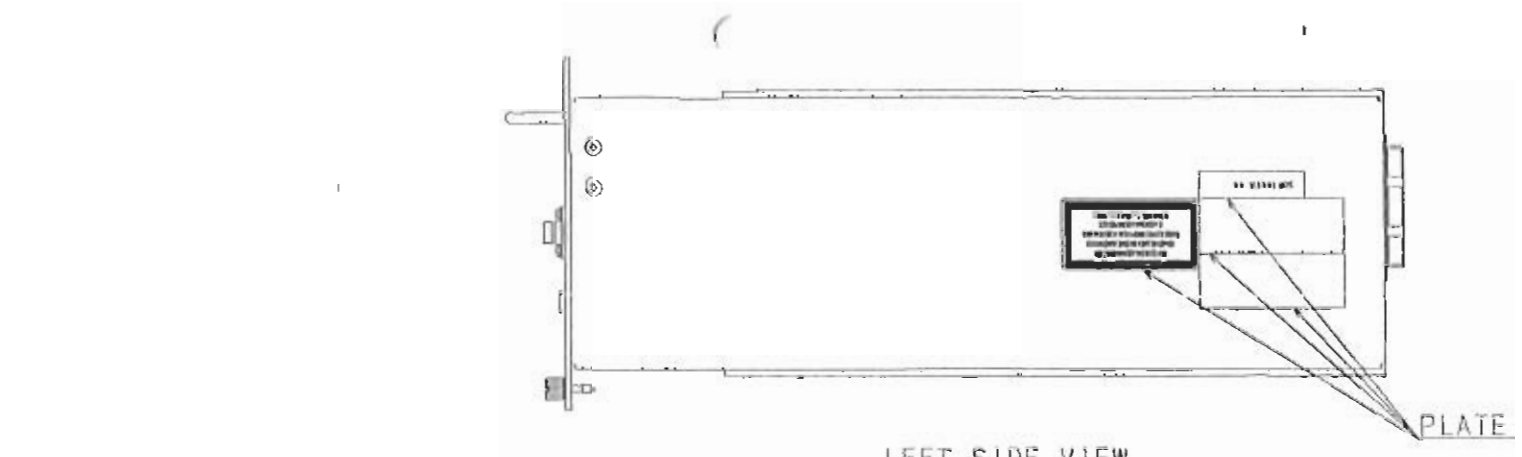
OUTSIDE VIEW OF AQ8201-11 WDM DFB-LD MODULE

DIMENSION SHOWN IN mm

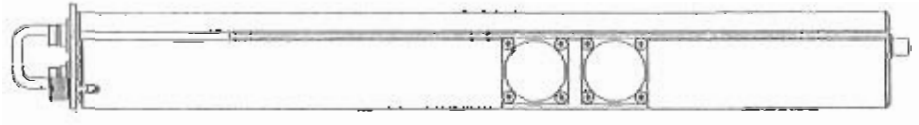
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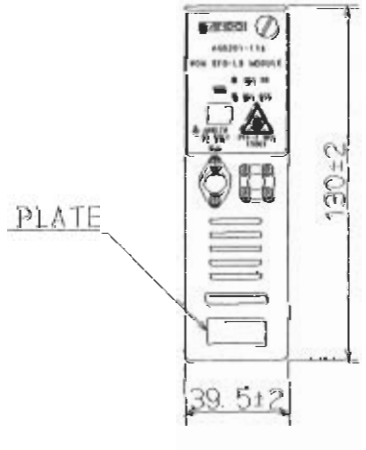
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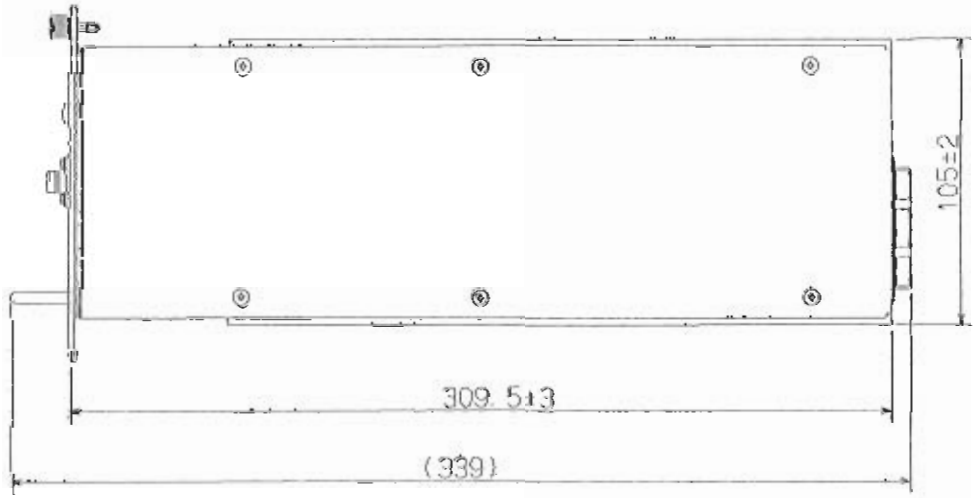
LEFT SIDE VIEW



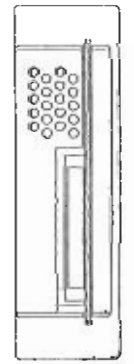
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

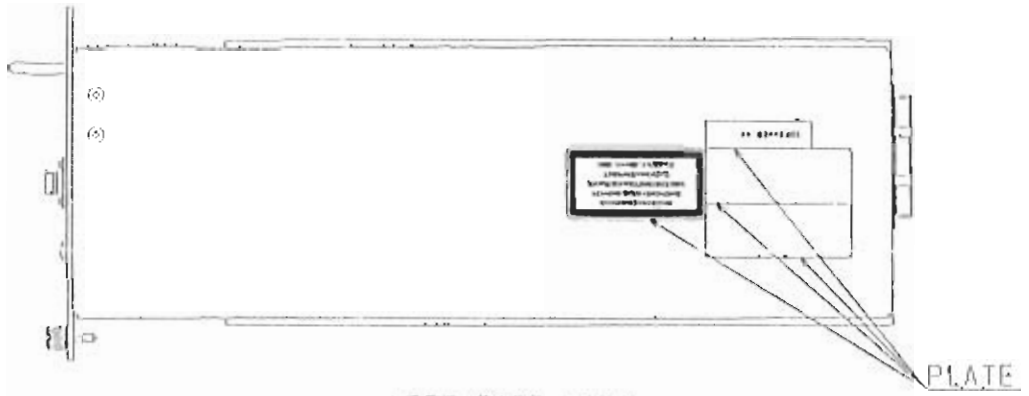
OUTSIDE VIEW OF AQ8201-11A WDM DFB-LD MODULE

DIMENSION SHOWN IN mm

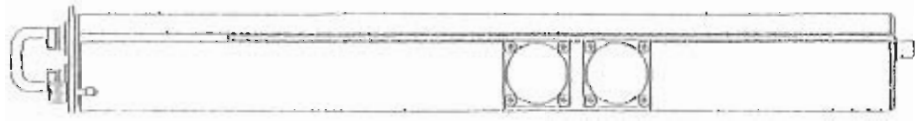
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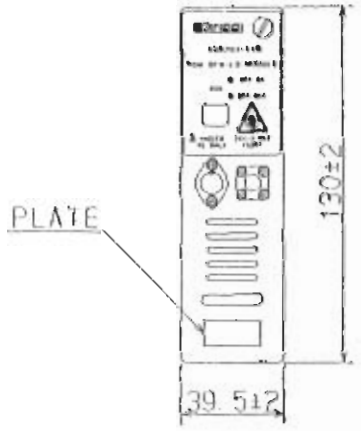
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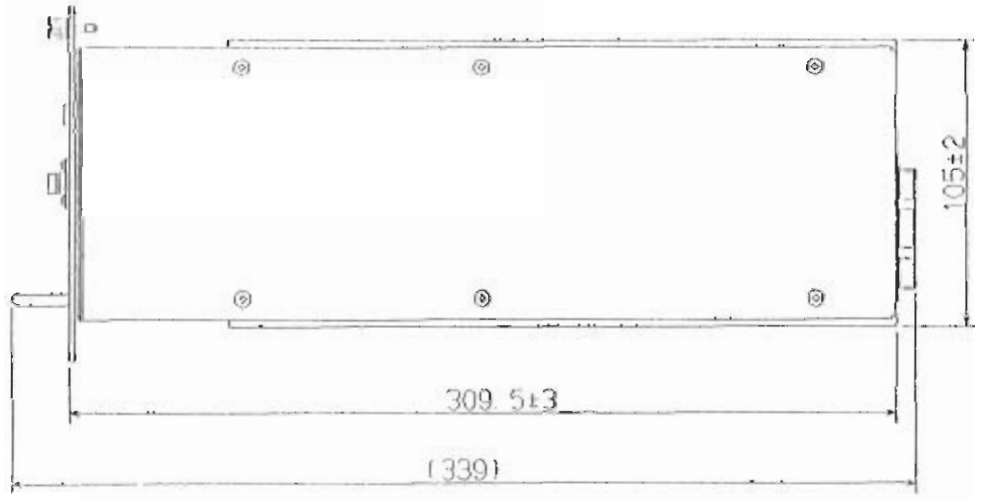
LEFT SIDE VIEW



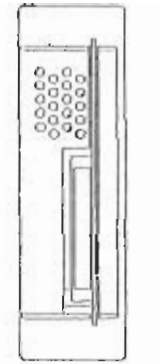
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

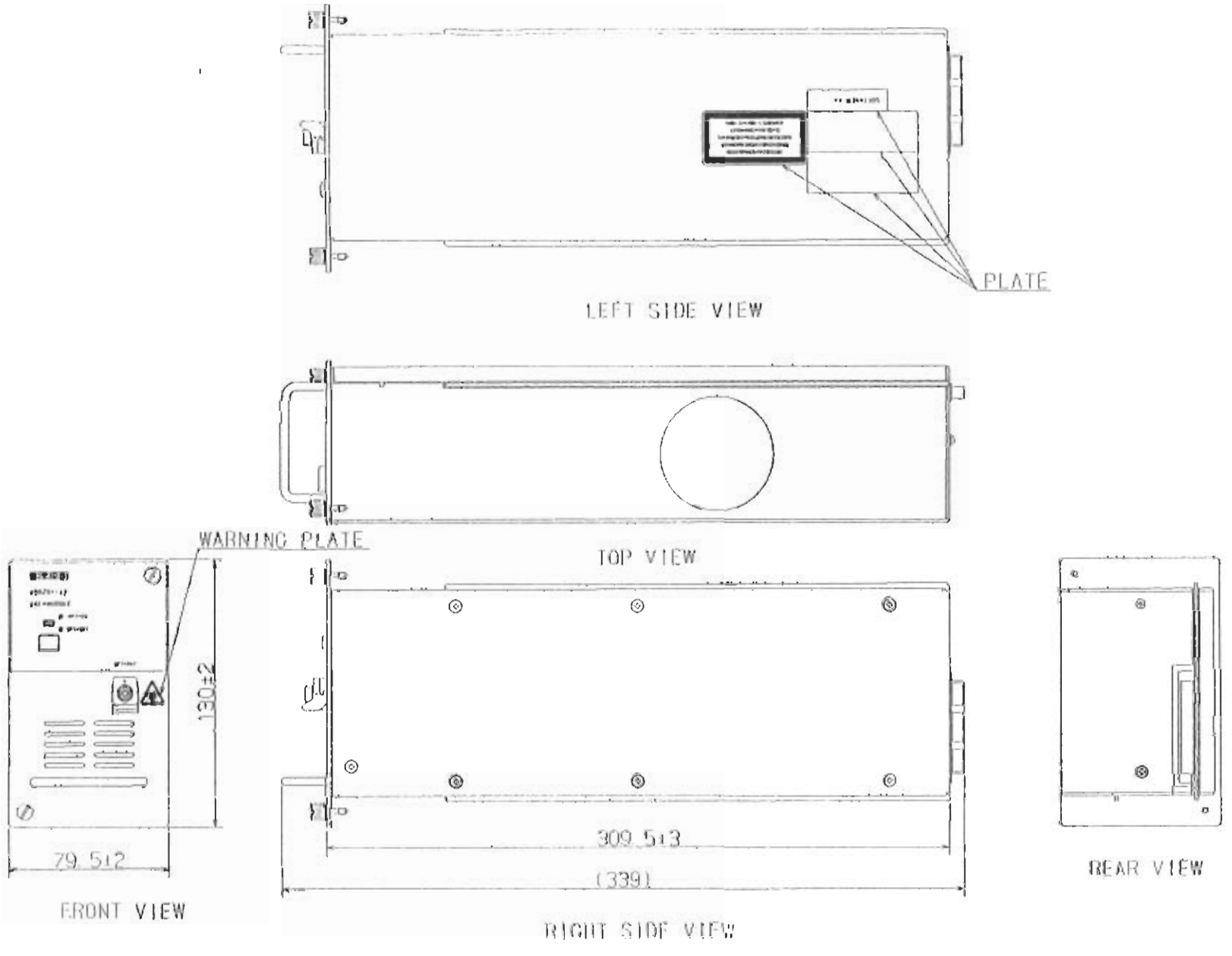
DIMENSION SHOWN IN mm

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

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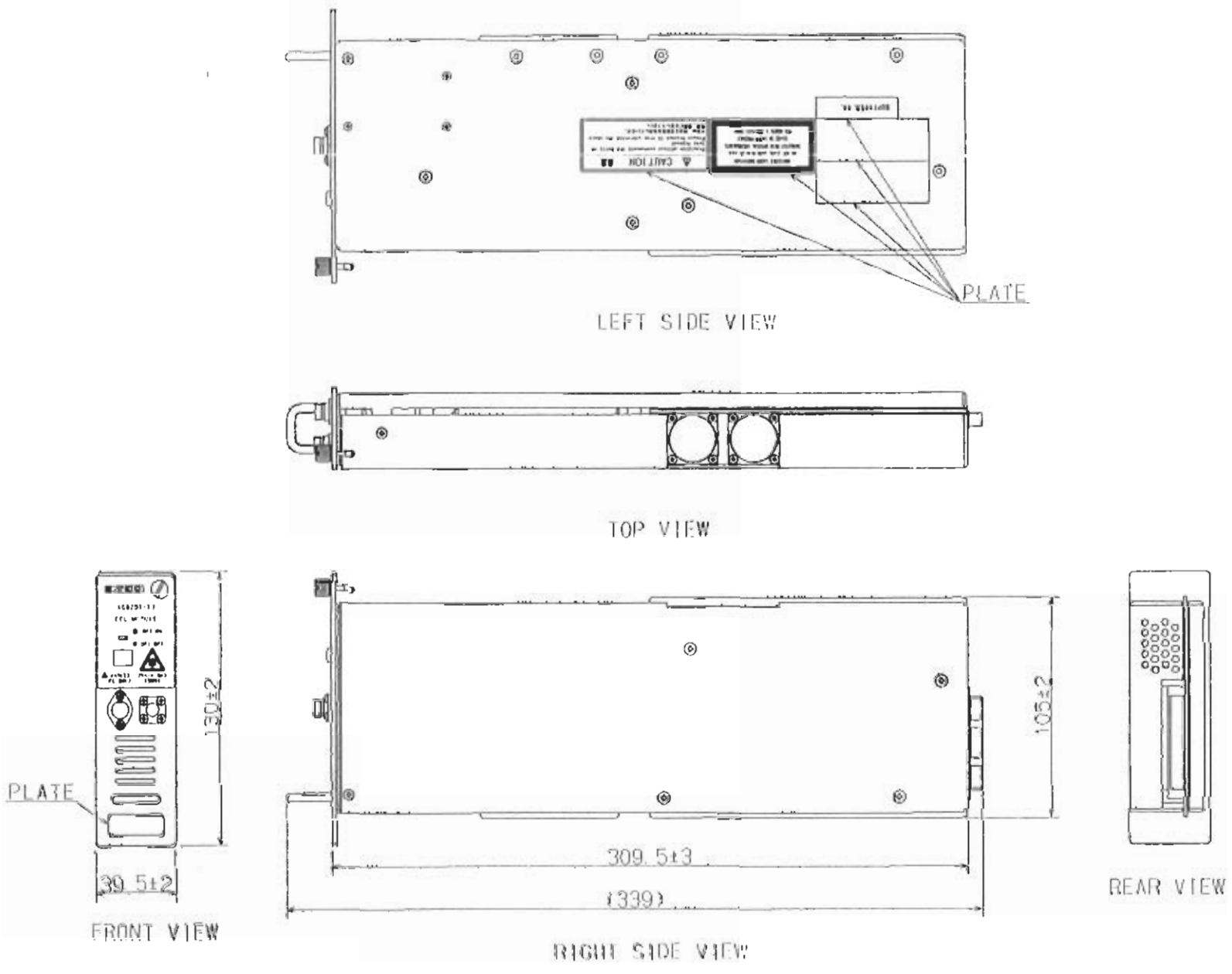
OUTSIDE VIEW OF AQ8201-12 ASE MODULE

DIMENSION SHOWN IN mm

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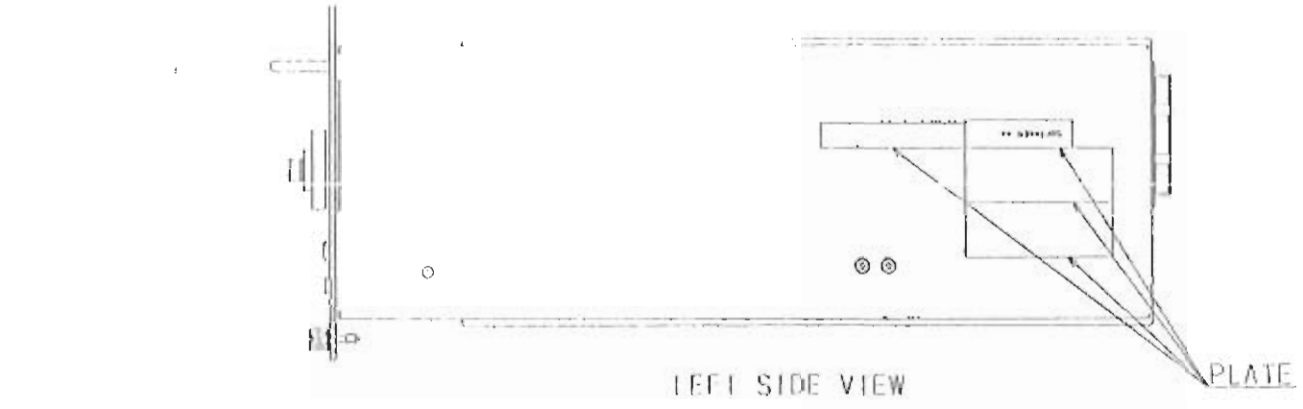
OUTSIDE VIEW OF AQ8201-13 ECL MODULE

DIMENSION SHOWN IN mm

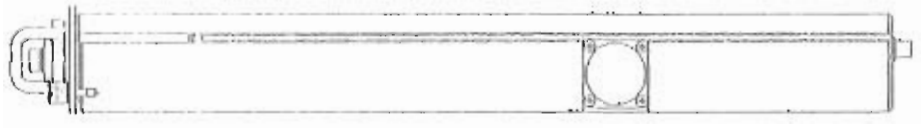
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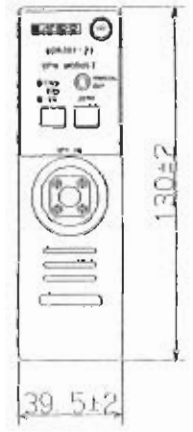
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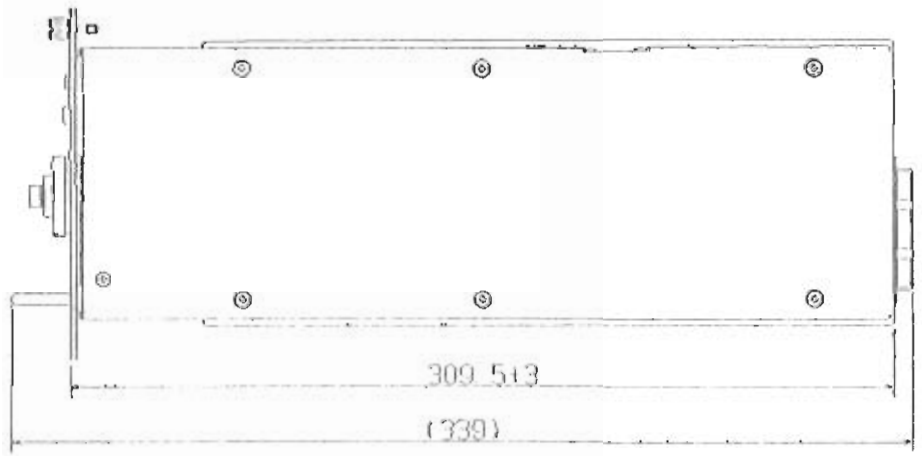
LEFT SIDE VIEW



TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

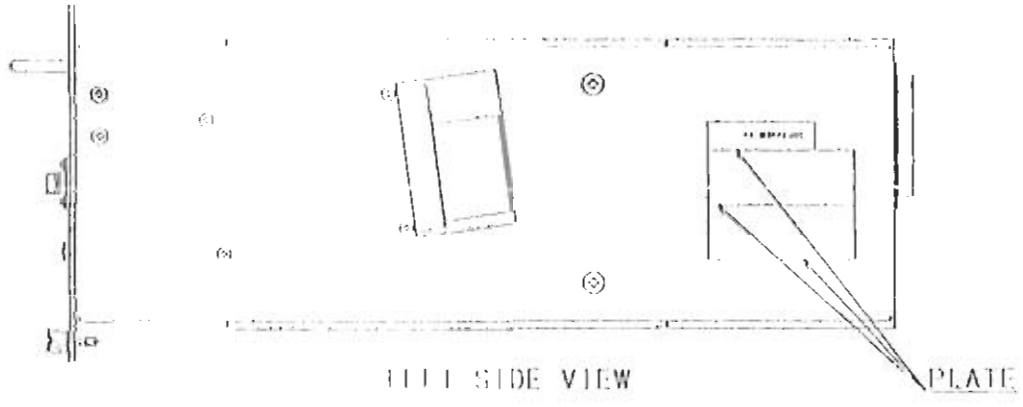
OUTSIDE VIEW OF AQ8201-21 OPM MODULE

DIMENSION SHOWN IN mm

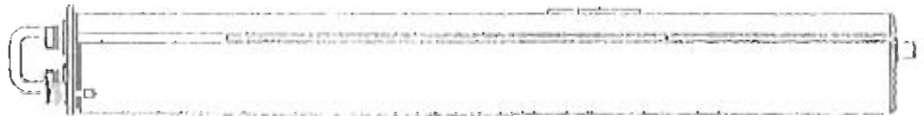
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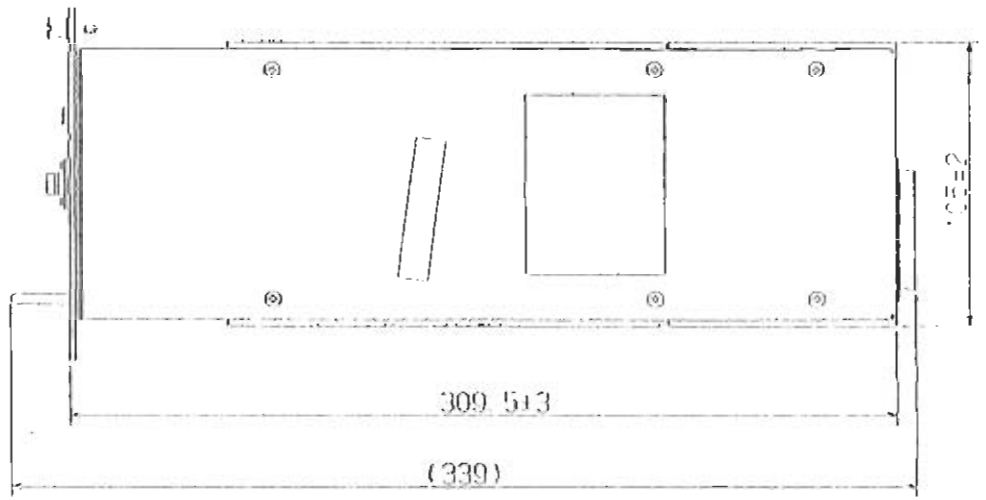
LEFT SIDE VIEW



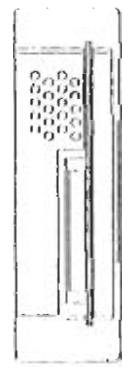
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

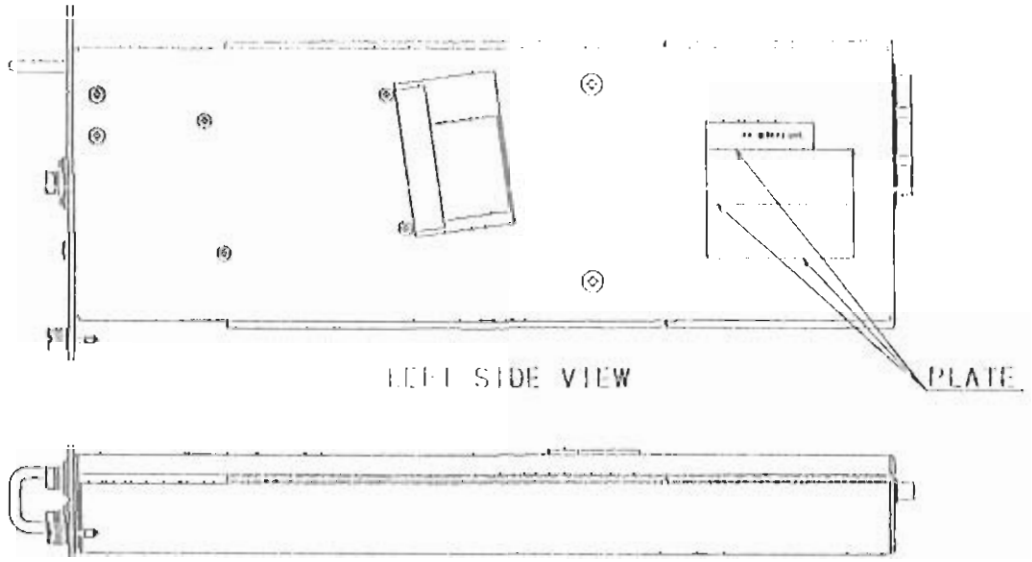
DIMENSION SHOWN IN mm

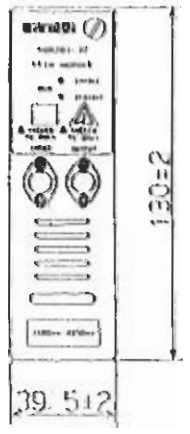
OUTSIDE VIEW OF AQ8201-31 ATTN MODULE

AGD-02521-3

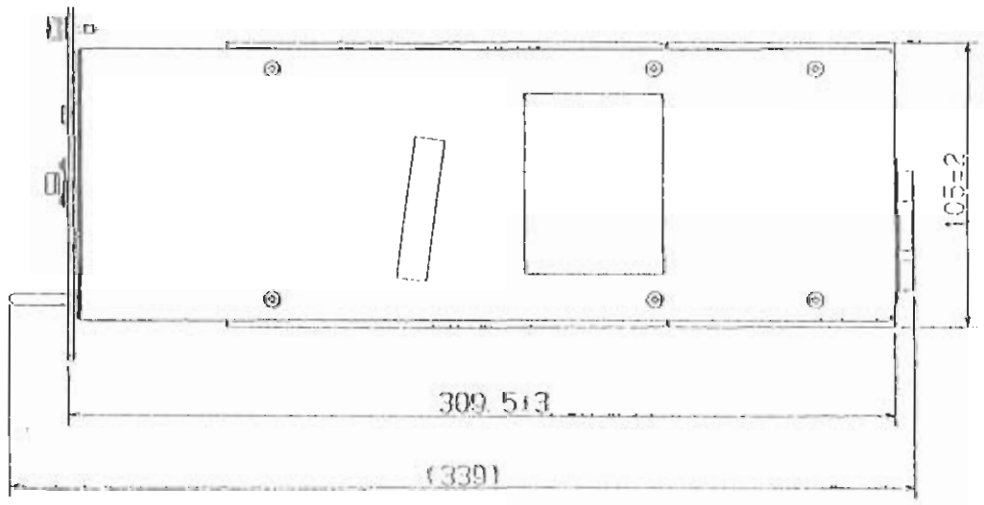
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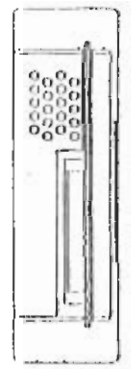




FRONT VIEW



RIGHT SIDE VIEW



REAR VIEW

DIMENSION SHOWN IN mm

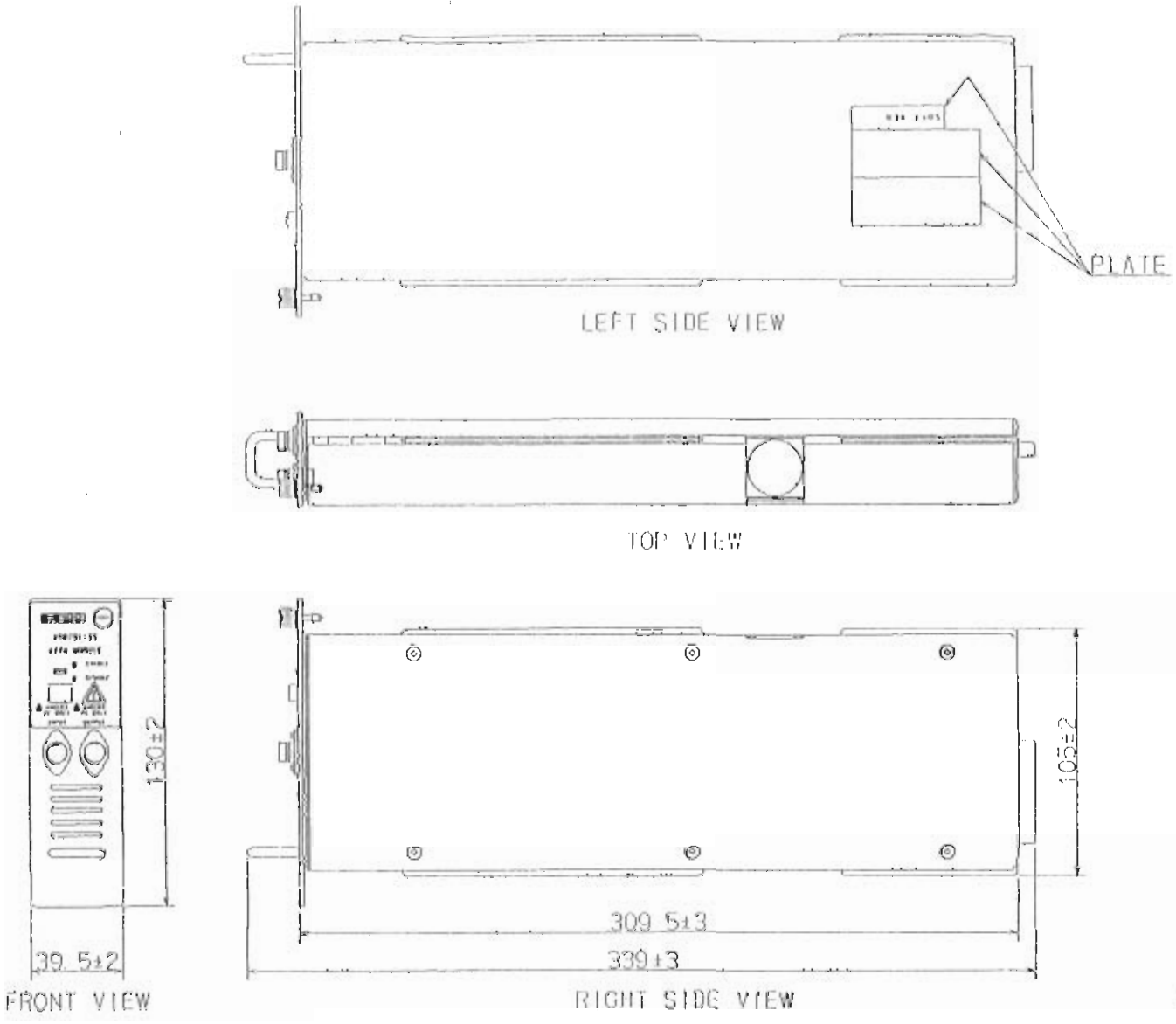
OUTSIDE VIEW OF AQ8201-32 ATTN MODULE

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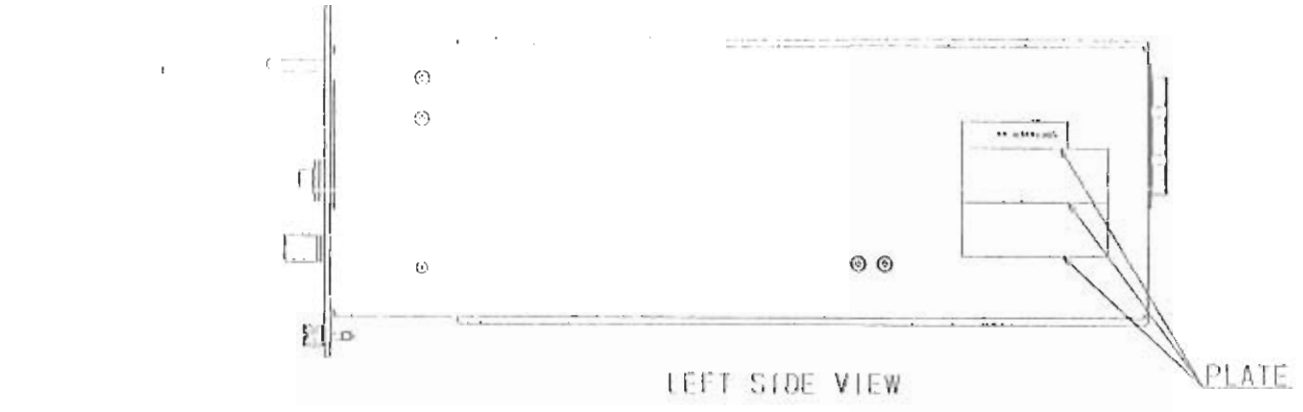
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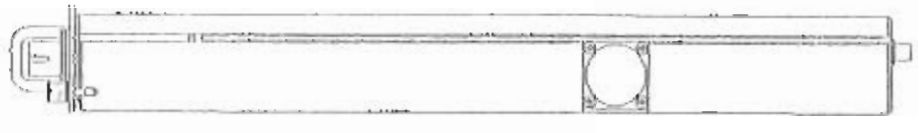


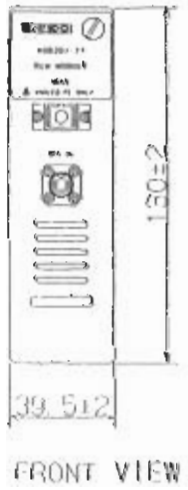
OUTSIDE VIEW OF AQ8201-33 ATTN MODULE

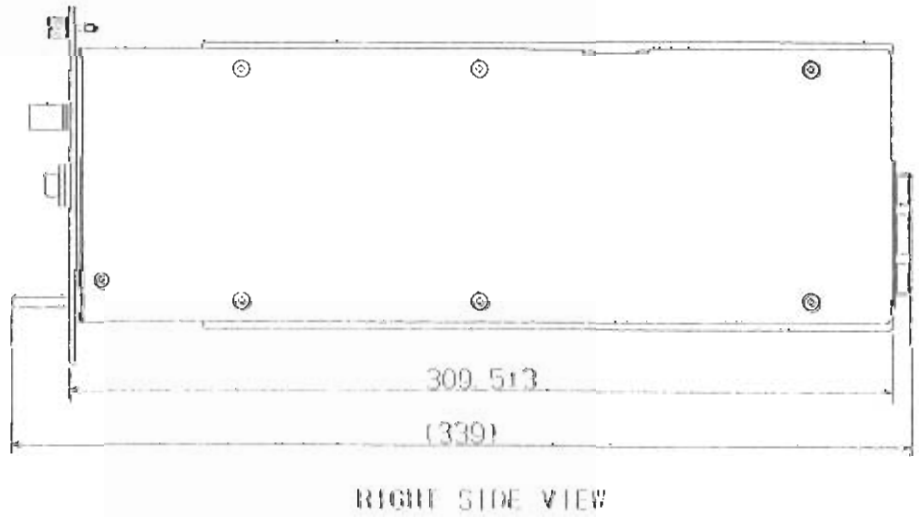
DIMENSION SHOWN IN mm

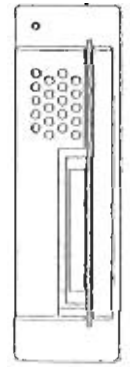
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OUTSIDE VIEW OF AQ8201-71 RLM MODULE

DIMENSION SHOWN IN mm

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