

# Optical Power Meter

RS232C/Data Print

## MODEL 208/218

## Instruction Manual

**photon**

Graytechnos Co.,Ltd.

HR1092-13E-09/20230727

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## **【 WARNING 】**

1. Do not use batteries other than those specified.
2. Do not use AC adapters other than those specified.
3. Do not dismantle or alter the unit in any way.
4. Do not put or soak the unit in water.
5. Do not insert metal items such as pins into the unit.
6. Use the unit within the ranges of operating temperature and humidity.
7. Store the unit within the ranges of storage temperature and humidity.
8. After use or when not in use, make sure to turn the unit power off.
9. When not in use for a long time, make sure to remove the batteries from the unit.
10. Do not drop or cause a shock to the unit.
11. If any malfunction occurs, contact an agent or a sales branch of Graytechnos Co., Ltd.



## 【 CAUTION 】

1. The surface of the sensor built in the input port should be kept away from dust or other impurities, in particular, be careful removing and fitting connectors or adapters. When not in use, always cover the input/output port with blind caps.
2. Before use, clean the Sensor-port with canned air or a new cotton swab according to "4-8. Cleaning of the sensor".
3. Do not insert anything other than the optical fiber connector into the connector adapter.
4. Use a standard optical fiber connector. When using a nonstandard optical fiber connector or a bare fiber adapter, connect a optical patch code to the connector adapter or limit the protruding length of the optical fiber ferrule to 0.5 mm. When using a standard optical fiber connector, the length is less than 0.5 mm. The protruding length is defined as below.

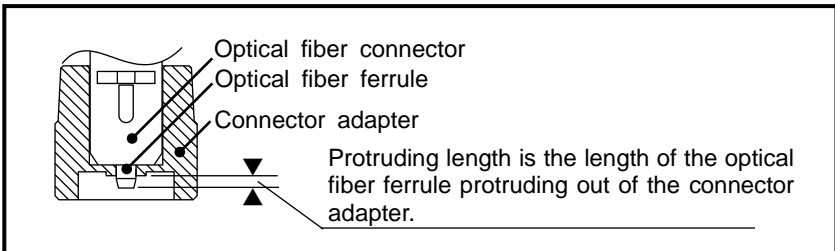


Figure showing the connection of an optical fiber connector to a connector adapter

5. When using a bare fiber adapter, insert the fiber such that it does not protrude out of the ferrule end-face.
6. Do not input optical power greatly beyond the maximum measuring range, or the photo diode will be damaged.
7. Excessive ambient noise may affect the normal operation. In that case, first turn the unit off and then turn it on. Nevertheless in case of not removing, take the battery off and put in again, then turn the power "ON" pushing and holding down the W/dBm and REL button together. (See 4-4(13))

8. Do not drop or swing the instrument with the strap.
9. When measuring in a bright place, do not allow ambient light to enter the sensor.
10. Do not input signals to the ANALOG jack. A recorder should be the one of high impedance (more than 100k $\Omega$ ).
11. When using an AC adapter, make sure that it is a specialized one designated by Graytechnos Co.,Ltd. Using another AC adapter may damage the unit.



12. When mounting AA batteries in the battery compartment, make sure to turn off the recharge selector switch in the battery compartment beforehand. If the switch is left turned on, the battery performance may be damaged.
13. Before recharging, make sure to check whether the batteries are rechargeable or dry. Mount the specified rechargeable batteries. Never use rechargeable and dry batteries together.

## 1. GENERAL

This unit is a hand-held optical power meter, which measures the optical power and optical attenuation of communications using optical fiber cables.

It can perform operations and measurements on a personal computer through its RS232C input/output port. It can also print out measured data directly to an external printer.

Equipped with an analog output jack, the unit can also be connected to a recorder.

The measurement wavelength sensitivity is calibrated with 660, 780, 820 and 850 nm on model 208, which is for short wavelengths; and with 820, 850, 1310 and 1550 nm on model 218, which is for long wavelengths. Measured values at these wavelengths can be read directly.

The unit, which can be connected to various connectors by replacing the adapter at its front end, can be used not only for silica fiber but also for plastic fiber cables.

By internally connecting a light source unit (optional), the unit can measure the optical loss without requiring an external light source.

The memory backup function is used to save the operation status, the measured value and the calendar data in the memory even when the power is turned off.

AA batteries, rechargeable batteries and AC adapters can be used. It is possible to use AC adapters to charge AA rechargeable batteries (NiMH).

## 2. CONFIGURATIONS

This model consists of the unit and connector adapter (optional) for various optical connectors.

For information on connector adapter, refer to Section “5. OPTIONAL ACCESSORIES”.

## 3. SPECIFICATIONS

### 3-1. Specifications by model

MODEL	208	218
Calibration wavelength	660/780/820/850nm	820/850/1310/1550nm
Measuring wavelength	450nm to 1100nm	800nm to 1650nm
Display range	-75dBm to +10dBm	-75dBm to +5dBm (1310,1550nm) -70dBm to +5dBm (820, 850nm)
Uncertainty *1	+/- 3%(+/- 0.13dB) (850nm, -20dBm)	+/- 3%(+/- 0.13dB) (1310nm, -10dBm)
Ranging	Auto/Manual 7 ranges	Auto/Manual 6 ranges
Detector	Si photodiode	InGaAs photodiode
Detector dia.	8.0 mm dia.	1.0 mm dia.
Maximum input power	+15dBm	+10dBm
Fiber	GI, POF	GI, SM
Maximum fiber dia.	1.0 mm	62.5/125 NA0.3

\*1: Coverage factor;  $k=2$ ,  $23\pm 5^{\circ}\text{C}$

### 3-2. Common specifications

Resolution	0.01dB
Measuring period	0.35 sec.
A/D conversion	Multi slope integration
Analog output	30000counts / 3.0VDC connector : 2P-miniature jack 3.5mmdia.
Interface (RS-232C)	connector : 3P-miniature jack 2.5mmdia. baud rate : 9600bps output : measuring data, stored data input : remote operation commands
Data storage	64 data with measuring date
Functions	Absolute value(W, dBm), Relative value(dB, REL), Data hold, Auto zeroing, Memory, Blanking out the least significant digit, Averaging, Calendar, Data storage
Display	display: 5digit LCD (max. display: 30000) polarity: auto overflow: "Hi" indicator low battery: "BT" indicator light source: "LED" blinking during emission
Power supply	AA(UM-3) battery x 4pcs NiMH battery x 4 pcs AC adapter (optional)
Power consumption	Approx. 150mW (light source OFF)
Battery life	100 hours / alkaline(light source OFF)
Memory backup	Unlimited
Calendar backup	Approx. 5000 hours
Calendar battery charge time	Approx. 20 hours (Charged during power "ON")
Connector adapter	SC standard , others (optional)
Dimension	90(W) x 160(H) x 40(D) mm
Weight	Approx. 430g (including batteries)
Light source (Optional)	See specs of the light source unit



Operating conditions	Temperature : -10 to +50 degrees Humidity : RH 80% or less (non condensing)																
Storage conditions	Temperature : -40 to +70 degrees Humidity : RH 90% or less (non condensing)																
Accessories	<table> <tr> <td>Instruction manual</td> <td>1</td> </tr> <tr> <td>Portable hard case</td> <td>1</td> </tr> <tr> <td>Connector adapter 180-SC</td> <td>2</td> </tr> <tr> <td>3P plug 2.5mm (for RS232C)</td> <td>1</td> </tr> <tr> <td>2P plug 3.5mm (for analog output)</td> <td>1</td> </tr> <tr> <td>Battery AA(UM-3)</td> <td>4</td> </tr> <tr> <td>Blank module (built-in)</td> <td>1</td> </tr> <tr> <td>Blind cap (built-in)</td> <td>1</td> </tr> </table>	Instruction manual	1	Portable hard case	1	Connector adapter 180-SC	2	3P plug 2.5mm (for RS232C)	1	2P plug 3.5mm (for analog output)	1	Battery AA(UM-3)	4	Blank module (built-in)	1	Blind cap (built-in)	1
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Blank module (built-in)	1																
Blind cap (built-in)	1																

## 4. OPERATING INSTRUCTIONS

### 4-1. Description of each part

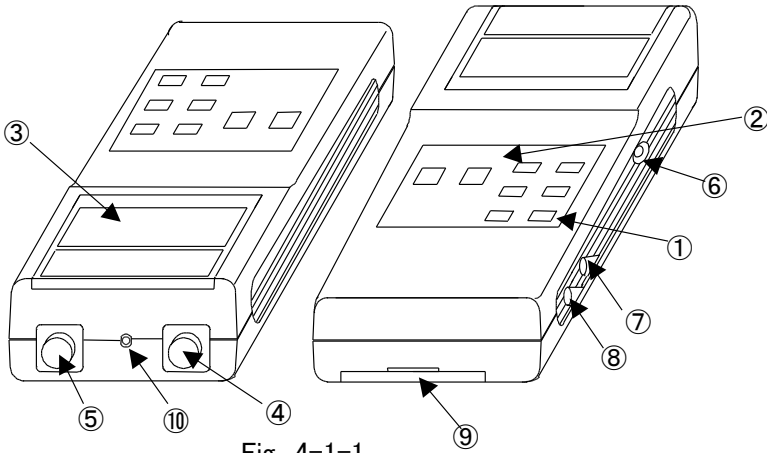


Fig. 4-1-1.

Refer to "4-4. Button Operation Procedure"

① **POWER** ON/OFF button

This button is used to turn on/off the power of the main unit.

② Operation button section

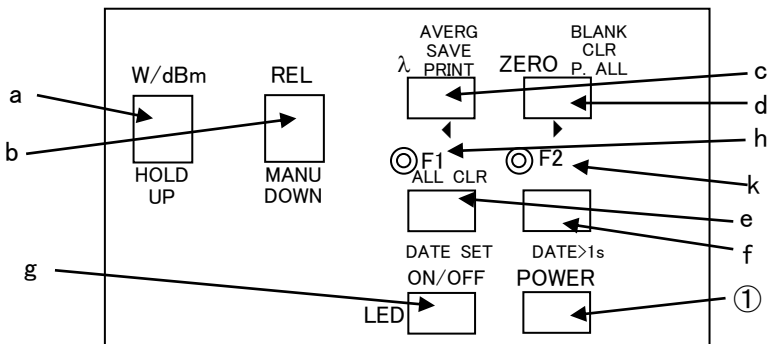


Fig. 4-1-2.

- a : **W/dBm** button (HOLD or UP button)  
This button is used to switch between measured values in W or dBm units.  
During F1 operation, it is used as the **HOLD** button. During F2 operation, it is used as the **UP** button.
- b : **REL** button (MANU or DOWN button)  
This button is used to switch the output display to a relative value (RELative).  
During F1 operation, it is used as the **MANU** button. During F2 operation, it is used as the **DOWN** button.
- c : **λ** button (AVERG, SAVE or PRINT button)  
This button is used to switch the measurement wavelength.  
During F1 operation, it is used as the **AVERG** button. During F2 operation, it is used as the **SAVE** and **PRINT** buttons.
- d : **ZERO** button (BLANK button, CLR or P.ALL button)  
This button is used to automatically compensate the sensor offset.  
During F1 operation, it is used as the **BLANK** button. During F2 operation, it is used as the **CLR** or **P.ALL** button.
- e : **F1** button (ALL CLR or DATE SET button)  
This button is used to switch to the F1 operation (to enable the yellow character button).  
During F2 operation, it is used as the **ALL CLR** button and the **DATE SET** button.
- f : **F2** button (DATE>1s)  
This button is used to switch to the F2 operation (to enable the green character button).  
It is used to register/correct calendar data by being held down for 1 or more seconds.
- g : **LED** button  
This button is used to turn on/off the built-in light source (optional).

h : F1 display LED (yellow)

Indicates that the unit is in the state of F1 operation. When this LED is lit, the respective buttons have the function of F1 operation (indicated in yellow characters).

k : F2 display LED (green)

Indicates that the unit is in the state of F2 operation. When this LED is lit, the respective buttons have the function of F2 operation (indicated in green characters).

③ LCD display section

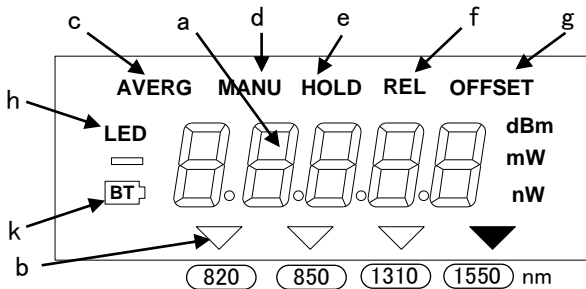


Fig. 4-1-3. LCD

a : 5-digit digital display

The measured value and the measurement unit are displayed digitally.

b : Wavelength display

Displays the measurement wavelength with ▼.

c : AVERG

Indicates that the averaging (AVERAGING) is displayed.

d : MANU

Indicates that the manual range (MANUAL Range) is measured.

e : HOLD

Indicates that the measured value is in hold (Data HOLD).

f : REL

Indicates that the relative value (RELATIVE) is displayed.

g REL OFFSET

Indicates that the relative reference value is displayed.

h : LED

Indicates that the built-in light source, which is optional, is illuminated.

k : BT

Indicates that the battery voltage is low.

④ Optical input port (INPUT side)

Refers to the light detection port for inputting the optical power. Attach a connector adapter and connect an optical fiber cable to take measurements. It is possible to connect various connectors by replacing the connector adapter.

The performance and accuracy decrease remarkably due to dust or dirt. Clean the sensor before use. (Refer to "4-8. Cleaning of the sensor".)

⑤ Optical output port (OUTPUT side)

Refers to the light source output port. Attach a connector adapter and connect an optical fiber cable to take measurements. It is possible to connect various connectors by replacing the connector adapter.

⑥ RS232C jack

For external control on a personal computer, insert a 3P miniature plug for a RS232C cable into this jack and connect it into the RS232C serial port of the computer.

⑦ Analog output jack

Refers to the output jack for connection to recorders, etc. Connect a 2P miniature plug. The DC voltage proportional to the W unit display value is output.

For preventing electromagnetic interference, insert a ferrite core to the plug-end of the cable. (Ferrite core: Seiwa Electric MFG type E04SR130525A or a equivalent)

**CAUTION: Do not apply signals from outside**



⑧ DC jack

When supplying power from AC line, plug the AC adapter (optional) in this jack. Do not use an unspecified AC adapter.

For preventing electromagnetic interference, insert a ferrite core to the dc-plug-end of the cable. (Ferrite core: Seiwa Electric MFG type E04SR130525A or a equivalent)



**CAUTION:**

**When using an AC adapter, make sure that it is a specialized one designated by Graytechnos Co.,Ltd. Using another AC adapter may damage the unit.**

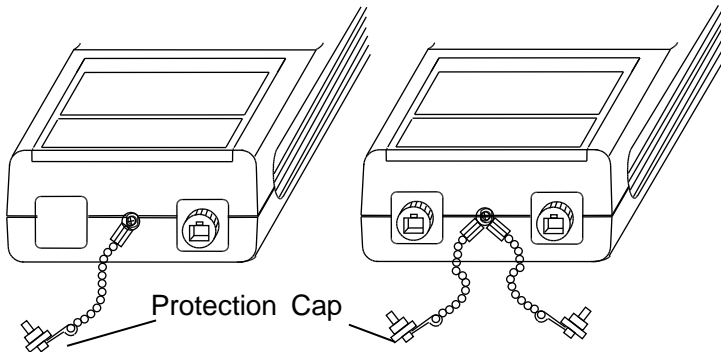


⑨ Battery compartment

Install four UM-3 (AA) batteries here. To open the compartment, insert a coin or something similar in the gap under the lid and push it down. If “BT” appears on the LCD display, promptly replace UM-3 (AA) batteries or charge rechargeable batteries at once. Change all four batteries at the same time and do not mix old batteries with new ones.

⑩ Screw nut for protection cap

The protection cap (optional) is fixed here with an M3 screw. When not taking measurements, this protection cap can be put on the connector adapter.



## 4-2. Preparation

### (1). Attaching power supply

When mounting batteries, turn off the power switch of the unit. Make sure to comply with the following precautions.

#### (1-1). Using manganese or alkaline batteries

(Four AA 1.5V batteries)

Mount four AA batteries in the battery compartment simultaneously in accordance with the polarity mark (+) inside and then put the battery cover on.

#### **CAUTION:**

**When mounting AA manganese or alkaline batteries in the battery compartment, make sure to turn OFF the recharge selector switch in the battery compartment. Leaving this switch ON may damage the performance of the batteries.**



#### (1-2). Using NiMH batteries

(Four AA rechargeable 1.2V batteries)

Mount four AA rechargeable batteries in the battery compartment simultaneously in accordance with the polarity mark (+) inside and then put the battery cover on.

#### (1-3). Using a specified AC adapter (optional)

Connect the connector of the specified AC adapter (optional) to the DC jack and then insert the plug into an appropriate power outlet. You must not use an unspecified AC adapter. Using an unspecified AC adapter may cause damage.



For preventing electromagnetic interference, insert a ferrite core to the dc-plug-end of the cable. (Ferrite core: Seiwa Electric MFG type E04SR130525A or a equivalent)

#### **CAUTION:**

**When using an AC adapter, make sure that it is a specialized one designated by Graytechnos Co.,Ltd. Using another AC adapter may damage the unit.**



(1-4). Recharging NiMH batteries  
(Four AA rechargeable 1.2V batteries)

It is possible to recharge AA rechargeable batteries with the unit power turned OFF.

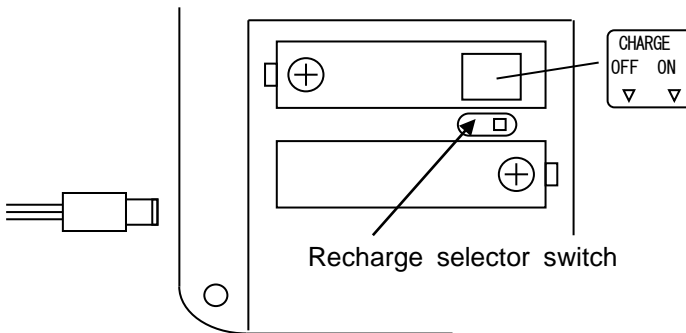
**CAUTION:**

**Before recharging the batteries, check if they are rechargeable and make sure to mount the specified rechargeable batteries.**



**DANGER ! : Never charge dry batteries.**

- a. Leave the unit power turned OFF.
- b. Set the recharge selector switch in the battery compartment to ON. (Recharging is impossible when the recharge selector switch is OFF.)

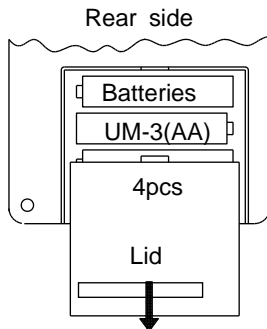


- c. Mount four AA rechargeable batteries in the battery compartment simultaneously in accordance with the polarity mark (+) inside and then put the battery cover on.
- d. Connect the connector of the specified AC adapter (optional) to the DC jack and then insert the plug into an appropriate power outlet. Recharging will start as a result.
- e. Recharging will stop automatically when finished. (It takes about 16 hours to recharge NiMH batteries 1.2V/1600mAh.)



(1-5). Replacing Batteries

If " BT " appears in the display, replace the batteries to new ones. Change all four batteries at the same time and avoid using old batteries mixed with new ones.



(2). Cleaning up the optical input/output ports

A dirty or dusty optical input/output ports cannot take correct measurements. The optical input/output ports may even be damaged by dirt or dust. Therefore, when not in use, make sure to put protection caps on the optical input/output ports and connector adapters. Furthermore, before using them, check the sensor surfaces of the optical input/output ports with a magnifier, etc. to make sure that they are free from dirt or dust.

If there is any dirt or dust on the sensor surface, blow it away with canned air. (Refer to "4-8. Cleaning of the sensor". )

**CAUTION:**

**Do not clean the sensor surface of MODEL208 with an organic solvent such as ethanol. If you do, the solvent may damage the sensor surface.**



(3). Attaching the connector adapter

Attach a connector adapter appropriate to the type of the connected optical fiber cable to the optical input/output ports.

(4). Connecting the optical fiber cable to the unit

Connect the connector of the optical fiber cable to the connector adapter of the optical input/output ports.

With its diameter as small as 10 to 50 $\mu$ m, a dirty or dusty optical fiber cable cannot take correct measurements. The optical fiber cable may even be damaged by dirt or dust. Therefore, when not in use, make sure to put protection caps on the optical input/output ports and the connectors. Furthermore, before using the cable, clean the connector's end face in accordance with the following procedure.

- 1). Wipe the end face of the optical fiber connector with a swab dipped in ethanol or isopropanol.
- 2). Wipe the end face once again with a dry swab.
- 3). Blow the end face with canned air.

### 4-3. Operation Procedure

(1). Turn on the power.

Hold the **POWER** button down for one or more seconds to be able to turn the unit's power on.

Caution: Holding down the button for less than one second does not result in power ON. This is to prevent erroneous operation.

“A-OFF” or “P-on” blinks on the LCD display for several seconds. After this, the output value is displayed thus placing the unit in its usual state of operation. “A-OFF” indicates that auto-power-OFF is set. “P-on” indicates that continuous operation is set (auto-power-OFF released). For information on auto-power-OFF, refer to 4-3 (6).

Turn on the power, remove the blind cap of the input port, and then check the display to make sure that it changes in accordance with the ambient brightness.

(2). Automatic offset compensation

Displays the measured value in W units by using the **W/dBm** button. Attach the blind cap and then hold down the **ZERO** button for one or more seconds to start the automatic offset compensation.

During automatic offset compensation, the countdown numeric value is displayed in terms of each wavelength. Pressing the **ZERO** button once again during countdown cancels the automatic offset compensation.

(3). Selecting the waveform

Use the **λ** button to adjust the wavelength display to the wavelength to be measured.

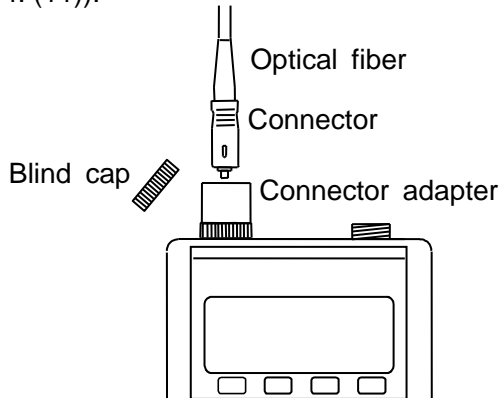
(4). Measurement

Remove the blind cap and then firmly attach a connector adapter suitable to the optical fiber cable to be used.

Measurement of the optical power affects the measured value, depending on the state of the fiber and/or the type of connector. With measurements in the weak power area in particular, keep the state of the optical fiber cable the same and firmly tighten the

connector and the connector adapter so that the ambient light does not leak into the sensor. Always be careful to prevent dirt, dust, etc. from being deposited on the sensor's light detection surface. (Refer to "4-8. Cleaning of the sensor".)

If necessary, use the functions of the data hold (4-4. (8)), manual range (4-4. (9)), averaging measurement (4-4. (10)) and lowest digit blank (4-4. (11)).



Entering the power beyond the display range of the unit during optical power measurement will result in over/under-displays as follows.

in W	manual ranging: "Hi" at >30000 counts auto ranging: "Hi" at >maximum display range
in dBm or REL	"Hi" at >maximum display range "Lo" at <minimum display range

(a). Absolute value measurement

Make the settings in W or dBm units. Normally, the range is automatic. If necessary, the range is switched to manual to take measurements in the optimal range (when in W units only). Read the measured data after the display value is stabilized.

(b). Relative value measurement

This function is used when measuring the difference of the input. First of all, enter the pre-change power in W or dBm units. Press the **REL** button and the current input power will be set as the reference value.

If the input changes in this state, only the portion of change with regard to the reference value is converted to dB and displayed.

Pressing the **W/dBm** button returns the absolute value measurement.

(5). Turning off the power

Pressing the **POWER** button turns off the power of the unit.

Even when the power is turned off, the following particulars are stored in the backup memory. Measurement can be continued on in the same condition simply by turning ON the power.

1. Selected measurement wavelength
2. Relative value operation and relative reference value
3. Setting/releasing Auto-power-OFF
4. Setting statuses of various functions

In W/dBm units; MANUAl range; AVERAGing; data-HOLD; lowest-digit-BLANK

(6). Setting / releasing auto-power-OFF

When power is ON, "A-OFF" or "P-on" blinks on the LCD display for several seconds.

After this, the output value is displayed placing the unit in the usual operation status. "A-OFF" indicates that auto-power-OFF is set. "P-on" indicates that the "Permanent-on" operation is set (release of auto-power-OFF).

"P-on" displayed on the LCD display while power is ON indicates that auto-power-OFF is released. To set auto-power-OFF, it is necessary to press the **POWER** button once to turn off the power of the unit and then hold down this button for about three seconds until "A-OFF" blinks. If "A-OFF" blinks, release the button.

If no operation is performed on the unit in this state for about ten minutes, power will be turned off automatically. To turn the power back on, press the **POWER** button.

To release auto-power-OFF and set the "Permanent-on" operation, it is necessary to press the **POWER** button once to turn off the power of the unit and then hold down this button for about three seconds until "P-on" blinks. If "P-on" blinks, release the button.

#### 4-4. Button Operation Procedure

(1). **POWER** (power switch) : Figure 4-1-2①

Press this button for one or more seconds to be able to turn on the power. When turning on the power, the “A-OFF” or “P-on” blinks on the LCD display for several seconds. Afterwards, the output value is displayed thus placing the unit in the usual operation state.

Pressing this button while in use can turn off the power of the unit.

(2). **F1** (Function 1) : Figure 4-1-2e

1). Pressing this button once places the unit in the F1 operation mode. The F1 LED is turned on.

2). Pressing **F1** once again or not performing any operation for 10 seconds returns the unit to the normal operation mode. The F1 LED goes out.

(3). **F2** (Function 2) : Figure 4-1-2f

1). Pressing this button once in the usual operation mode places the unit in the data save mode. The F2 LED is turned on.

Not performing any operation for 10 seconds (thus exceeding the time limit) returns the unit to the normal operation mode. The F2 LED goes out.

2). Pressing this button once again in the data save mode places the unit in the print mode. The F2 LED remains turned on.

Pressing this button once again or not performing any operation for 10 seconds returns the unit to its usual operation. The F2 LED goes out.

For information on printing, refer to 4-5(2).

3). Holding down this button for one or more seconds in normal operation mode changes the unit to the calendar mode. The F2 LED is turned on.

Pressing this button once again or writing to the calendar returns the unit to its normal operation. Not performing any operation for 10 or more seconds returns the unit to its normal operation. The F2 LED goes out.

For information on the calendar mode, refer to 4-5(3).

- (4). **W/dBm** : Figure 4-1-2a
- 1). Each time this button is pressed, the display unit is alternated between W and dBm (except during REL measurement).
  - 2). The initial state is in W units.
  - 3). During relative-value measurement (during REL measurement), pressing the **W/dBm** button makes the unit exit from the REL state (the W/dBm state remains unchanged).
  - 4). While in the dBm state, the unit is in auto range operation, and the MANU button is ignored.
- (5). **REL** : Figure 4-1-2b
- 1). Changes the display of the relative value based on the value (called the relative reference value) displayed when pressing this button to that of the dB value. When the unit is in this status, "REL" is displayed.
  - 2). Pressing the **REL** button displays the relative reference value. At this time, "REL OFFSET" is displayed. Pressing the **REL** button again changes the display of the relative value to that of the dB value, thus displaying "REL".
  - 3). Pressing the **W/dBm** button during relative value display returns the display to the usual absolute value display.
  - 4). During relative value display, the **ZEROSSET** and **MANU** buttons are ignored.
  - 5). When the measured data is equivalent to less than -70dBm, or Hi or Lo, the REL button is ignored.
- (6).  **$\lambda$**  : Figure 4-1-2c
- 1). Each time this button is pressed, the calibration wavelength is changed to another one. (Example 208: 660nm  $\rightarrow$  780nm  $\rightarrow$  820nm  $\rightarrow$  850nm  $\rightarrow$  660 nm  $\rightarrow$  ...)
  - 2). When the unit is in REL mode and HOLD, this button is ignored.
  - 3). After power on, pressing this button while the wavelength display is blinking ends the wavelength blinking and immediately moves the unit to the next status.
  - 4). If this button is pressed and thus the wavelength is changed, MANU is released.

(7). **ZERO** : Figure 4-1-2d

- 1). Holding down this button for one or more seconds while the sensor is blinded enters the unit into the automatic offset compensation operation.
- 2). In the event that the sensor is not blinded or the offset value is unusually large, "ERR" is displayed halting the operation.
- 3). Pressing the **ZERO** button again during "ERR" display cancels the "ERR" display and returns the unit to its normal operation.
- 4). Pressing the **ZERO** button during count-down cancels the entire automatic offset compensation and returns the unit to its normal operation.
- 5). When the unit is returned to its normal operation, the wavelength and the range are returned to their states before pressing the **ZERO** button.
- 6). Once the operation is normally completed, the offset compensation is maintained even during power OFF until the next **ZERO** button is pressed.

(8). **HOLD** (**W/dBm** during F1 operation) : Figure 4-1-2a

- 1). Pressing this button holds the display data at the time (W, dBm, REL). At this time, "HOLD" is displayed.
- 2). Pressing this button once again cancels HOLD, deleting the "HOLD" display.
- 3). During HOLD, buttons other than **HOLD**, **W/dBm** and **REL** are ignored.
- 4). Pressing the **W/dBm** or **REL** button during HOLD switches the data in hold to the W/dBm/REL display.

(9). **MANU** (**REL** during F1 operation) : Figure 4-1-2b

- 1). Pressing this button puts the range at the time on hold and displays "MANU".
- 2). Pressing this button once again moves up the range by one. For example, if R0 (range 0) is the lowest range,  
208: R0→R1→R2→R3→R4→R5→R6→R0 ...  
218: R0→R1→R2→R3→R4→R5→R0→R1 ...
- 3). Holding down the **MANU** button for one or more seconds returns the unit to the auto range operation, causing the "MANU" display to disappear.
- 4). During dBm, the **MANU** button is ignored.



- (10). **AVERG** (  $\lambda$  at F1 operation) : Figure 4-1-2c
- 1). Pressing this button places the unit in the AVERG state, displaying the moving average value of the display data at the time. "AVERG" is displayed at this time. The moving average value results from averaging the latest ten measurements.
  - 2). Pressing this button again cancels the AVERG state, causing the "AVERG" display to disappear.
- (11). **BLANK** (**Zeroset** at F1 operation) : Figure 4-1-2d
- 1). Pressing this button blanks out the last digit of the display data (W, dBm, REL) at the time. The last digit at this time is rounded off.
  - 2). Pressing this button again cancels the blank state.
- (12). **LED** : Figure 4-1-2g
- 1). Pressing this button turns on the light source unit (optional). When the light source unit is turned on, the "LED" display blinks on the LCD screen.
  - 2). Pressing this button again turns off the light source unit, thus causing the LCD's "LED" display to disappear.
- (13). Deleting the backup memory data
- 1). Turn off the power.
  - 2). While pressing the **W/dBm** and the **REL** button simultaneously, press the **POWER** button to turn on the power.

As a result, the data is deleted and then the unit is placed in the initial state. The initial state refers to the state when the power of the unit is initially turned on. In other words, this refers to the state of auto range in which all the other settings are cancelled and all the saved data are deleted.

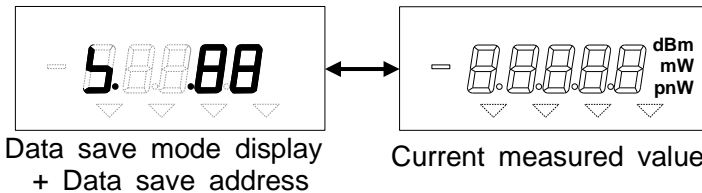
Backup memory data to be deleted	Condition after deletion
Selected wavelength Relative reference value Auto-power-OFF/Permanent-ON MANU/HOLD/AVERG/BLANK Saved measured data	The right end wavelength Absolute value display in W Auto-power-OFF Auto ranging

#### 4-5. Data Saving, Printing, and Calendar Setting

It is possible to save the measured data and time in the built-in memory. It is also possible to print the saved data onto a printer. The current day and time can be set.

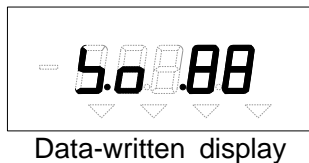
##### (1). Measured data save

- 1). Press the **F2** button once to enter into the data save mode.
- 2). The display is changed to the data save mode, thus displaying the "data save mode display + data save address" and the "current measured value" alternately.



The initial value of the save address is "01". Normally, this indicates the next of the previously saved address. When the final address has been written, it indicates the final address.

- 3). The **UP** (W/dBm) button and the **DOWN** (REL) button can be used to scroll up/down the saved addresses in terms of each address. When the data-written address is specified, the "data-written display" and the "save data and wavelength" are displayed alternately.



- 4). Use the **SAVE** ( $\lambda$ ) button to write the currently displayed data and the current yy-mm-dd hh:mm:ss to the relevant address. As a result, the data save address display will be incremented by +1.

- 5). The **CLR** (ZERO) button can be used to clear the data of the address. Once the data is cleared, the "data cleared display" and the "current measured value" will be displayed alternately.



Data cleared display

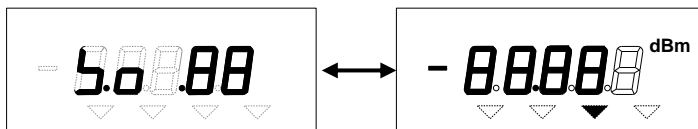
- 6). When saving data in hold, the yy-mm-dd and hh:mm:ss of the holding data is saved as the measurement date and time.
- 7). Overwrite saving is possible even for the address to which data is already written.
- 8). The **ALL CLR** (F1) button can be used to clear all the save data (all clear). When all the data are cleared, the "data memory cleared display, data save address = 00" and the "current measured value" are displayed alternately.
- 9). Pressing the **F2** button twice or not performing any operation for 10 or more seconds returns the unit from the data save mode to the normal mode.

(2). Checking the save data

- 1). When not in data save mode, press the **F2** button to enter into the data save mode.
- 2). The contents of the save data can be displayed by specifying the data written address with the **UP** (W/dBm) button and **DOWN** (REL) buttons.

The "data written display" and the "save data and wavelength" are displayed alternately. The "save data" is displayed in dBm units.

When an address for which data writing is not completed is specified, the "current measured value" is displayed.



Data-written display

Save data and wavelength

(3). Printing the save data

1). Preparation

i. Selecting a printer

Use a printer that meets the following conditions.

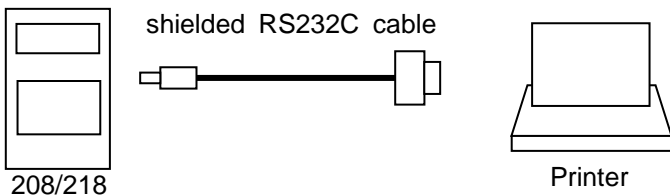
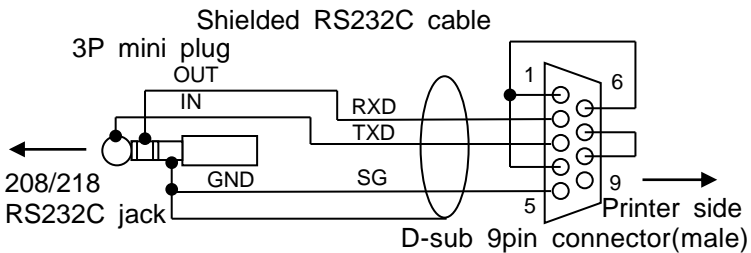
- \* Equipped with the D-sub 9-pin connector's RS232C serial port
- \* Capable of printing ASCII alphanumeric characters
- \* Communication conditions shown in the following subsection can be set.

EX. Seiko Instruments Inc. Model DPU-3445-20

CITIZEN Japan CBM Corp. Model PD-04

ii. Connecting the RS232C cable

Prepare the following connection cable, connect the D-sub connector (male) to the printer-side RS232C serial port and then connect the accompanying 3-pole miniature plug to the unit's RS232C jack.

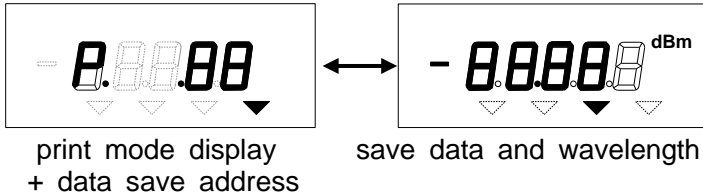


Transmission condition

Baud rate:	9600bps
Data bits:	8-bit
Parity:	None
Stop bits:	1-bit
X-on/off:	None

- 2). Press the **F2** button twice to enter into the print mode.

The "print mode display + data save address" and "save data and wavelength" will be displayed alternately. As the save address, the address of the latest data is displayed. If the latest data is printed out, the next save address is displayed.



- 3). The **UP** (W/dBm) and **DOWN** (REL) buttons can be used to scroll UP/DOWN the save addresses in terms of each address.
- 4). Use the **PRINT** ( $\lambda$ ) button to print out the save data and the save yy-mm-dd hh:mm:ss of the relevant address. After printing, the next data save address is displayed.
- 5). Pressing the **P. ALL** (ZERO) button prints out all the saved data.
- 6). Pressing the **F2** button or not performing any operation for 10 or more seconds returns the unit from the print mode to its normal mode.
- 7). In the event of immediately printing out the data being measured during normal measurement, press the buttons five times in the following sequence:  
**F2** → **SAVE** ( $\lambda$ ) → **F2** → **PRINT** ( $\lambda$ ) → **F2**  
The measured data is saved and printed out.

(4). Calendar setting

- 1). Press the **F2** button for one or more seconds to enter into the calendar mode.

The "yy-mm-dd hh:mm:ss discrimination characters + 2-digit numeric values" are displayed. Initially, the Christian year is displayed in two digits.



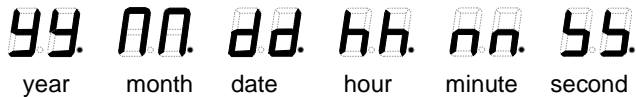
Calendar display: Year

- 2). Use the **UP** (W/dBm) and **DOWN** (REL) buttons to scroll UP/DOWN the displayed numeric values in terms of 1.

- 3) Pressing the **LEFT** ( $\lambda$ ) or **RIGHT** (ZERO) button to select a yy-mm-dd hh:mm:ss.

Use the **RIGHT** button to move in the direction of yy  $\rightarrow$  mm  $\rightarrow$  dd  $\rightarrow$  hh  $\rightarrow$  mm  $\rightarrow$  ss  $\rightarrow$  yy.

Use the **LEFT** button to move in the direction of yy  $\leftarrow$  mm  $\leftarrow$  dd  $\leftarrow$  hh  $\leftarrow$  mm  $\leftarrow$  ss  $\leftarrow$  yy.



- 4) At the point when the yy-mm-dd hh:mm:ss is displayed, the calendar is set thus starting to count the time. Pressing the **DATE SET** (F1) button returns the unit to its normal mode.

- 5) Even when the **DATE SET** button is not pressed, the unit is returned to its normal mode by pressing the F2 button or by being left idle for 10 or more seconds. In this case, the built-in calendar continues counting with the yy-mm-dd hh:mm:ss as displayed.

The unit has a built-in backup battery for the calendar. The backup battery is charged while the power of the unit is "ON". (Charging time of the backup battery; About 20 hours)

#### 4-6. Remotely controlling from a personal computer

Remote control can be executed by connecting a RS232C cable and then sending programming commands from the computer.

##### (1). Installing "Control Software"

This program operates in Microsoft Windows environments. Before using the program, it is necessary for Windows 95, 98, ME, XP or Windows NT to be installed in the PC. For information on installing and operating Windows, refer to the relevant instruction manuals. Make sure that the computer is in the following environment.

Microsoft Windows 95, 98, ME, XP, NT4.0 or later

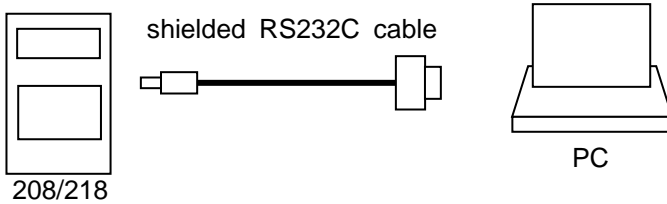
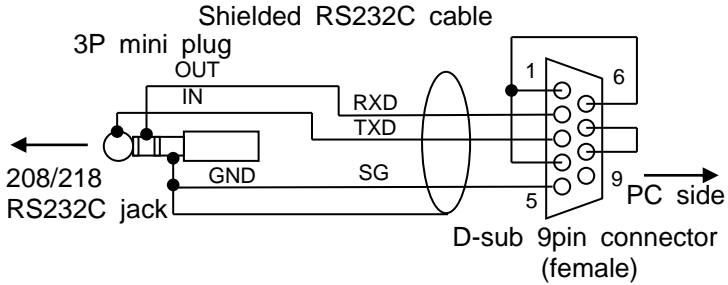
Minimum 8MB of RAM

Minimum 2MB hard disk space

- a. Download "RS232C control program" from our Homepage [www.graytechnos.com](http://www.graytechnos.com).
- b. Execute "SETUP.exe", and "RS232C Test Setup" appears. Then, click on OK.
- c. If the directory is not going to be changed, click on the Installer-pattern mark on the upper level, and the install starts.

(2). Connecting RS232C cable

Prepare the following connection cable, connect the D-sub connector (female) to the PC-side RS232C serial port and then connect the accompanying 3-pole miniature plug to the unit's RS232C jack.



Transmission condition

Baud rate:	9600bps
Data bits:	8-bit
Parity:	None
Stop bits:	1-bit
X-on/off:	None



- (3). Starting up the program
  - a. Start up the program "Rs232cTest".
  - b. Open "Properties" of "Comm Port" to check the following transmission conditions.
    - Maximum Speed : 9600bps
    - Data Bits : 8
    - Parity : None
    - Stop Bits : 1
    - Flow Control : None
  - c. After checking and setting, click on "OK".
  - d. Open "Port Open" of "Comm Port". (Counting starts at lower right.)
  
- (4). Entering programming commands
  - a. Turn ON the Power meter power.
  - b. Enter programming commands into the command input area.
  - c. After input, press the "Enter" key. For prevention of incorrect recognition, data are sent twice in a row.

For information on programming commands, refer to 4-6. (5).  
For output data, refer to 4-6. (6).

(5). Programming commands

ASCII code, 8 bytes or less, capital letters

Command	Description
Rn, R7	fixed range (n=0 to 6), auto ranging (n=7)
D1, D0	W unit, dBm unit
Wn	Wavelength (n=0 to 3) W0, W1, W2, W3 (right, 2nd, 3rd, left)
C1, C0	Relative measuring(REL), Absolute measuring
A1, A0	Averaging(AVERG), cancel
H1, H0	Data hold(HOLD), cancel
B1, B0	Blanking(BLANK), cancel
Z1, Z0	Auto offset(ZERO), cancel
E1, E0	Light source (LED) ON, OFF
T1	reads W data
T2	reads dBm data
T3	reads yy-mm-dd data
T4	reads hh:mm:ss data
T5nn	reads dBm value of the data saved in address "nn", (nn = 01 to 64)
T6nn	reads dB value of the data saved in address "nn" (nn = 01 to 64)
T7nn	reads yy-mm-dd value of the data saved in address "nn", (nn = 01 to 64)
T8nn	reads hh:mm:ss value of the data saved in address "nn", (nn = 01 to 64)n
Yymmdd	sets calendar date to yy-mm-dd
Hhmmss	sets calendar time to hh:mm:ss
Snn,	saves/overwrites the current data and date to address "nn", (nn=01 to 64)
S99	clears all the saved data
Pnn	reads the data saved in address "nn", (nn=01 to 64)
P99	reads all the saved data

(6). Data output

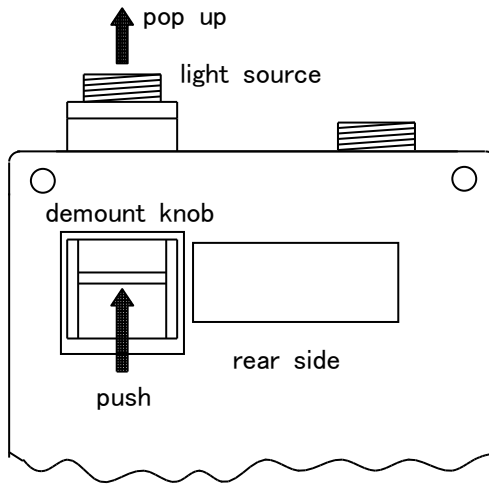
ASCII code, total 8 bytes, capital letters

For prevention of incorrect recognition, data are sent twice in series.

Command	Description
T1	Output message : measured data in W i. [sign]+5digit-data+[index-sign]+1 digit-index+[CR] ex. 10.123uW → +10123-5[CR] 2.3821mW → +23821-3[CR] ii. the original data is output in BLANK or AVERG iii. when UNDER, OVER or ZEROSET, the data are replaced by U, V or Z. ex. LO → +UUUUU-U
T2	Output message : measured data in dBm i. "DBM" + [sign] + 4digit-data + [CR] ex. -23.45dBm → DBM-2345[CR] ii. the original data is output in BLANK or AVERG iii. when UNDER, OVER or ZEROSET, the data are replaced by U, V or Z. ex. LO → +UUUUU-U
T3	Output message : current date (yy-mm-dd) i. "Y" + 6digit-data + [space] + [CR] ex. 2001-05-25 → Y010525 [CR]
T4	Output message : current time (hh:mm:ss) i. "H" + 6digit-data + [space] + [CR] ex. 13:25:39 → H132539 [CR]
T5nn (nn=01 - 64)	Output message : absolute data in address "nn" i. "DBM" + [sign] + 4digit-data + [CR] ex. -23.45dBm → DBM-2345[CR]
T6nn (nn=01 - 64)	Output message : relative value in address "nn" i. "DB" + [sign] + 4digit-data + [space] + [CR] ex. -23.45dBm → DB-2345 [CR]
T7nn (nn=01 - 64)	Output message : yy-mm-ss in adress "nn" i. "Y" + 6digit-data + [space] + [CR] ex. 2001-05-25 → Y010525 [CR]
T8nn (nn=01 - 64)	Output message : hh:mm:dd in adress "nn" i. "H" + 6digit-data + [space] + [CR] ex. 13:25:39 → H132539 [CR]

#### 4-7. Install the Light Source Unit

When installing/replacing the light source unit, make sure to turn off the power beforehand. Slide up the demount knob on the rear side of the main unit to be able to remove the light source unit. When mounting a new light source unit, adjust the convex of the light source unit to the concave of the main unit and insert the light source unit into the main unit until a clicking sound is heard.



#### 4-8. Cleaning of the sensor

**Warning:** The sensor surface of MODEL 218 is the glass of 0.3 mm in thickness. Do not clean the sensor directly with cleaning tools such as "Ferrule-mate", "One-Click-Cleaner" or "CLETOP-stick", with the connector adapter attached. Do not rub the sensor surface strongly, or sensor may be broken or damaged.



**Caution:** Before cleaning the sensor, the connector adapter must be removed.



Remove the connector adapter or the protection cap from the sensor port before use, and confirm if dirt or dust are not on the sensor surface using the magnifying glass. Blow it off with a clean air-blow when the sensor is dirty.

When dirt on the sensor cannot be taken only by the air, rub the sensor gently with the cotton swab. The cotton swab must be unused and dried one. Confirm if dirt is taken off completely with the magnifying glass.

Throw away the used cotton swab without using it again.

When dirt still sticks to the sensor surface of MODEL218, clean it by the following methods.

- ① Drip absolute ethanol to the sensor surface by several drops, and rub gently with the cotton swab.
- ② Immediately wipe and take off the ethanol on the sensor surface with a new, dry cotton swab.

Observe the sensor surface with the magnifying glass. When dirt remains, repeat ①②. Throw away the used cotton swab without using it again.

**Warning:** Do not clean the sensor surface of MODEL 208 with an organic solvent such as ethanol. The solvent may damage the sensor surface.



## 5. OPTIONAL ACCESSORIES

Product Name	Model No.	remarks
Connector adapter	180-SC	SC(NTT)
	180-FC	FC(NTT)
	180-ST	ST(AT&T)
	180-HTL	POF data link
	180-HPP	Agilent HFBR-0501
AC adapter	DP-1005	AC100V 50/60Hz
	DP-1206	AC120V 60Hz
	DP-2206	AC230V 50Hz
Light source unit	310-066LS	660nm、POF
	310-085LS	850nm GI、SM
	310-131LS	1310nm GI、SM
RS232C cable	PC208-PCJC	Dsub9 female-3P plug
Control Software	RS232CTEST	Download from our Homepage
Control Software	PC208A	Download from our Homepage

For more information about accessories, see our Homepage :  
[www.graytechnos.com](http://www.graytechnos.com)

## 6. AFTER-SALES SERVICE INFORMATION

When making requests for repair service, please bring the instrument directly to the dealer. If this is impossible, however, send the instrument directly to our sales office in Tokyo, Japan.

When mailing the instrument, always pack it in its original or equivalent packing material.

To ensure speedy and reliable repair, always include information as to the type of failure and cause. Return accessories with the instrument if required.

— Specifications are subject to change without notice.

## **Warranty**

Graytechnos Co.,Ltd. warrants this product to be free from defects in material and/or workmanship for one full year from date of shipment. During the warranty period, we will, at our option, repair or replace any product that proves to be defective.

For warranty service, send the product prepaid to the distributor or Graytechnos Head Office in Tokyo, Japan. The repaired product will be returned prepaid to Buyer.

## **Limitation of Warranty**

This warranty shall not apply to defects resulting from any misuse, misapplication, unauthorized modification, improper maintenance or operation or storage outside of the environmental specifications.

Graytechnos makes no other warranties, expressed or implied, including without limitation thereof, any implied warranty of merchantability or fitness for a particular purpose.

Graytechnos shall not be responsible for any direct, indirect, special, incidental or consequential damages.

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