MU931422A
Optical Sensor
Operation Manual

Fourth Edition

Read this manual before using the equipment.
Keep this manual with the equipment.

ANRITSU CORPORATION

Document No.: M-W1624AE-4.0

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Insure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following five symbols may not be used on all Anritsu equipment. In addition, there may be other labels attached to products which are not shown in the diagrams in this manual.

Safety Symbols Used in Manual

DANGER ⚠ This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

WARNING ⚠ This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

CAUTION ⚠ This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and/or in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Insure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.

These indicate that the marked part should be recycled.

MU931422A
Optical Sensor
Operation Manual

31 May 1999 (First Edition)
1 January 2004 (Fourth Edition)

For Safety

WARNING ⚠

1. ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.
   Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

2. Measurement Categories
   This instrument is designed for Measurement category I (CAT I). Don't use this instrument at the locations of measurement categories from CAT II to CAT IV.
   In order to secure the safety of the user making measurements, IEC 61010 clarifies the range of use of instruments by classifying the location of measurement into measurement categories from I to IV.
   The category outline is as follows:
   Measurement category I (CAT I):
   Secondary circuits of a device connected to an outlet via a power transformer etc.
   Measurement category II (CAT II):
   Primary circuits of a device with a power cord (portable tools, home appliance etc.) connected to an outlet.
   Measurement category III (CAT III):
   Primary circuits of a device (fixed equipment) to which power is directly supplied from the power distribution panel, and circuits from the distribution panel to outlets.
   Measurement category IV (CAT IV):
   All building service-line entrance circuits through the integrating wattmeter and primary circuit breaker (power distribution panel).

For Safety

WARNING ⚠

Repair

WARNING ⚠

3. This equipment cannot be repaired by the user. DO NOT attempt to open the cabinet or to disassemble internal parts. Only Anritsu-trained service personnel or staff from your sales representative with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision parts.

Falling Over

4. This equipment should be used in the correct position. If the cabinet is turned on its side, etc., it will be unstable and may be damaged if it falls over as a result of receiving a slight mechanical shock.

Equipment Certificate

Anritsu Corporation certifies that this equipment was tested before shipment using calibrated measuring instruments with direct traceability to public testing organizations recognized by national research laboratories including the National Institute of Advanced Industrial Science and Technology, and the Communications Research Laboratory, and was found to meet the published specifications.

Anritsu Warranty

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within 1 year after shipment due to a manufacturing fault, provided that this warranty is rendered void under any or all of the following conditions.

- The fault is outside the scope of the warranty conditions described in the operation manual.
- The fault is due to mishandling, misuse, or unauthorized modification or repair of the equipment by the customer.
- The fault is due to severe usage clearly exceeding normal usage.
- The fault is due to improper or insufficient maintenance by the customer.
- The fault is due to natural disaster including fire, flooding, earthquake, etc.
- The fault is due to use of non-specified peripheral equipment, peripheral parts, consumables, etc.
- The fault is due to use of a non-specified power supply or in a non-specified installation location.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation will not accept liability for equipment faults due to unforeseen and unusual circumstances, nor for faults due to mishandling by the customer.

Anritsu Corporation Contact

If this equipment develops a fault, contact Anritsu Service and Sales offices at the address at the end of paper-edition manual or the separate file of CD-edition manual.

Notes On Export Management

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.

Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.

When you dispose of export-controlled items, the products/manuals are needed to be broken/shredded so as not to be unlawfully used for military purpose.

CE Conformity marking

Anritsu affixes the CE Conformity marking on the following product (s) in accordance with the Council Directive 93/68/EEC to indicate that they conform with the EMC and LVD directive of the European Union (EU).

CE Marking

1. Product Model

Plug in Unit: MU931422A Optical sensor

2. Applied Directive and Standards

When the MU931422A Optical sensor is installed in the MT9810A/B and MT9812B, the applied directive and standards of this Unit are conformed to those of the Mt9810A/B and MT9812B main frame.

PS: About main frame
The kind of main frame (a measuring apparatus) will be to increase.
Please, contact us about the newest information of the main frame.

C-tick Conformity marking

Anritsu affixes the C-tick marking on the following product (s) in accordance with the regulation to indicate that they conform with the EMC framework of Australia/New Zealand.

C-tick marking

1. Product Model

Plug in Unit: MU931422A Optical sensor

2. Applied Directive and Standards

When the MU931422A Optical sensor is installed in the MT9810A/B and MT9812B, the applied directive and standards of this Unit are conformed to those of the Mt9810A/B and MT9812B main frame.

PS: About main frame
The kind of main frame (a measuring apparatus) will be to increase.
Please, contact us about the newest information of the main frame.

About This Manual

This manual describes the operation, calibration, and maintenance method of the MU931422A Optical Sensor, which is a plug-in unit used by being installed to the MT9810A Optical Test Set and the MT9812B Multi Channel Box.
See the MT9810A and the MT9812B Operation Manuals for the operation of the MU931422A by the MT9810A and the MT9812B.

MT9810A Optical Test Set operation manual (M-W1482AE)
MT9812B Multi Channel Box operation manual (M-W1555AE)

Table of Contents

The MU931422A Optical Sensor is a plug-in unit used by being installed to the MT9810A Optical Test Set and the MT9812B Multi Channel Box.

The MU931422A can use the GI fiber (9/125 µm to 62.5/125 µm, NA ≤ 0.29) as well as SM fiber.
The MU931422A can use the APC (Angled PC) connector as well as PC connector. Since the connector adapter is the exchangeable type, the exchange is easy for any user.
Moreover, the bare fiber measurement can also be performed.

Section 2 Panel Layout and Function

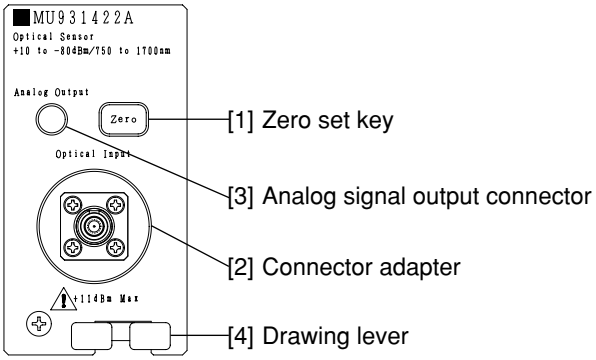
This section describes the standard composition, panel layout and the function.

2.1 Standard Composition

Standard Composition

Name	Qty.	Model Name/Ordering No.
– Main unit –		
Optical Sensor	1	MU931422A
– Standard accessories –		
Connector adapter	1	MA9005A
Operation manual	1	M-W1624AE

2.2 Panel Layout and Function



[1] Zero set key — Used to remove the electrical offset of the light intercepting circuit.

[2] Connector adapter — Connects the optical fiber cable to input measuring beam.
The connector adapter is a screw type for easy exchange.
The connector adapter is equipped with a metallic cap for light shade. The cap is used at zero setting and storage. Pay attention not to lose it.
The connector adapter for other than FC connector is also available, sold separately. See the ordering information at Appendix B.

Caution ⚠

Do not input light of intensity exceeding +11 dBm by all means. This may cause permanent damage to the equipment such as burnout of the optical receiver.

[3] Analog signal output connector — An SMA connector for analog output with an output range between 0 and 2 V and output impedance of approximately 1 kΩ. This connector outputs a voltage proportionate to the optical input. The connector outputs a voltage of approximately 2 V when light at the full scale level of each measurement range is intercepted.*

* For example, this means optical input of –10 dBm when the range is set at –10 dBm.

Caution ⚠

The analog signal output connector is exclusively for output. When signals are input by mistake, this may cause damage to the Device or the signal source connected.
Do not pull the cord while the cord remains inserted to the analog signal output connector. This may cause damage to the connector or the internal circuit.

Point

Analog signals are directly output without correction of the wavelength sensitivity of the signals from the light intercepting circuit of the optical sensor. For this reason, the relationship between the level indication and the voltage output merely serves as a guideline and they do not necessary match each other. However, this function will prove useful to observe changes that take place more quickly than the display of numerical values on the main unit.

[4] Drawing lever — Incorporates a locking mechanism to be used when units are mounted on the main unit. Pinch the lever and draw it out to remove the lever.

This section describes the operation method, which can be performed by the MU931422A. Almost the operation can be performed by the MT9810A and MT9812B. See the MT9810A and the MT9812B Operation Manuals for the operation of the MU931422A by the MT9810A and the MT9812B.

3.1 Zero Set

The zero set is the function to remove the electrical offset of the light intercepting circuit located within the optical sensor. The illuminated key is located in the front panel.

<Execution Procedure >

1. Affix the supplied metallic cap to the connector adapter to shade the light.
2. Press the Zero key to execute zero setting. The key is lit during execution.

It normally takes approximately 30 seconds to execute the zero setting.

Section 4 Performance Test and Calibration

This section describes the method to check the performance of the MU931422A as well as the method to calibrate the MU931422A.

4.1 Performance Test

Perform the three tests indicated below in order to check the performance of the optical sensor.

- Linearity between ranges
- Polarization dependability
- Noise level

Perform measurement after a sufficient time for warming up following power activation.

Point

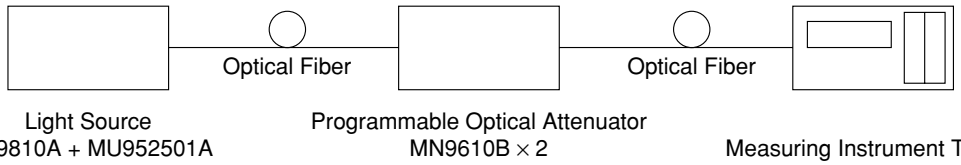
To record results of measurement, it is advised to copy the list of performance test result record of Appendix C at the end of this document or prepare a similar list to ensure convenience of recording.

Measuring instruments necessary for the test

Instrument	Required Performance		Remarks
Optical attenuator	Wavelength	: 1.1 to 1.65 mm	MN9610B
	Maximum magnitude of attenuation	: 60 dB (Min.)	
	Maximum optical input level	: +23 dBm (Mini.)	
Light source	Optical output	: +10 dBm	MT9810A + MU952501A
	Stability	: 0.005 dB (Max.)	
PDL meter			PDL9412 (Oyo-Kodensha Co. Ltd., in Japan)

4.1.1 Measurement of Linearity between Ranges

<Measurement system>

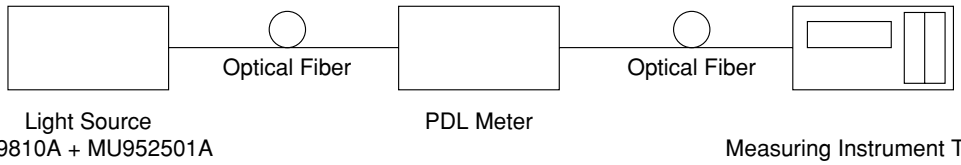


<Measurement procedure>

1. Set up a measurement system like that shown above.
2. Shade light and perform zero setting.
3. Set the range of the measuring instrument to be tested to 10 dBm.
4. Adjust the optical attenuator so that the display of the measuring instrument to be tested comes to 0 dBm.
5. Record the value measured (Measured value 1).
6. Lower the range of the measuring instrument being tested by a single step, and record the value measured (Measured value 2).
7. The value calculated by subtracting Measured value 2 from Measured value 1 is the error between the ranges.
8. Add another +10 dB to the optical attenuator and perform measurement procedures 5 to 7 until the range of the measuring instrument being tested reaches the minimum range.

4.1.2 Measurement of Polarization Dependency

<Measurement system>

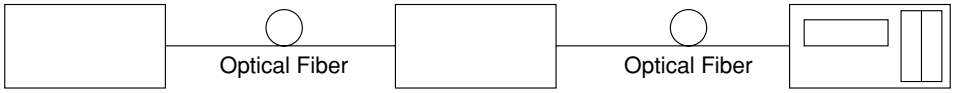


<Measurement procedure>

1. Set up a measurement system like that shown above.
2. Shade light and perform zero setting.
3. Set the measuring instrument to be tested to the (difference of maximum value and minimum value) measurement mode.
4. Rotate the plane of polarization at least by 360 degrees (a minimum of 30 seconds) and perform measurement by the PDL meter.
5. The difference (maximum value – minimum value) after the completion of the measurement is the value of polarization dependency measured.

4.1.3 Measurement of Noise Level

<Measurement system>



Light Source
MT9810A + MU952501A

Programmable Optical Attenuator
MN9610B × 2

Measuring Instrument Tested

<Measurement procedure>

1. Set up a measurement system like that shown above.
2. Set the bandwidth and averaging times of the measuring instrument to be tested to 1 Hz and 10 times, respectively.
3. Shade the light and perform zero setting.
4. Adjust the optical attenuator so that the display of the measuring instrument indicates –80 dBm.
5. Set the measuring instrument to be tested to the (difference of maximum value and minimum value) measurement mode (% representation) and perform measurement for approximately 30 minutes.
6. The noise level can be calculated from the following formula, using the measured value when the measurement is completed.

Formula : Noise level (dBm) = $-80 + \log_{10}\{(100 - \text{measured value})/100\}$

4.2 Comments on Performance Test Results

4.2.1 Relation between Specification value and Guard Band

The guard band is based on the concept that the calibration value is insufficient even if it is within the specification value for judging the satisfaction of specification. Since the calibrated value always involves the measurement uncertainty, the specification value must involve the calibration uncertainty.
So, it is required to set the guard band to the more severe value than the specification value by the uncertainty, and to make it the comparison standard with the calibrated value.

4.2.2 Calculating uncertainty of measurement

There are two types of uncertainties.

(1) Uncertainty of type A (ua): This is evaluated by a statistical method.

(2) Uncertainty of type B (ub): This is evaluated by a method other than a statistical one.

List up all the uncertainties to be considered in the measurement, and judge the type A or B, then evaluate it, as described below.

Evaluating uncertainty of type A:

A set of measured values is substituted into the following formula for evaluating the uncertainty of the object.
The results are used to evaluate the data variation in the measurement system.
The measurement is repeated by n times, and all the measured values (n pieces) are substituted into formula (1) for obtaining ua: uncertainty of type A.

$$u_a = \frac{1}{n}\sqrt{\frac{\sum_{i=1}^{n}(Xi - Xm)^2}{n-1}} \qquad (1)$$

n: The number of measurement times

Xi: The i-th measurement value

Xm: The mean value of the measurement values

The ua denotes the standard deviation of the difference between Xm and the actual value. The larger the number of measurement times (n) is, the smaller the uncertainty (ua) is.

Evaluating uncertainty of type B:

If the uncertainty cannot be evaluated by a statistical method like the uncertainty of type A, individual uncertainty terms are substituted into formula (2) to evaluate the uncertainty as type B.

$$u_b = \sqrt{u_1^2 + u_2^2 + \cdots + u_n^2} \qquad (2)$$

u_i: Terms to be evaluated as the uncertainty of type B by a non-statistical method

In the performance test of the MU931422A, uncertainty of type B is applied to the optical output stability of light source.

Evaluating cumulative uncertainty:

To obtain the cumulative uncertainty (uc), uncertainties of type A and type B (obtained by formulae (1) and (2)) are used by RSS (root of square sum) formula, shown below.

$$u_c = \sqrt{u_a^2 + u_b^2} \qquad (3)$$

u_a: uncertainty of type A
u_b: uncertainty of type B
u_c: cumulative uncertainty

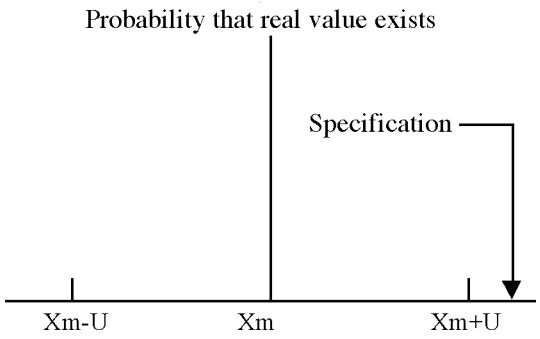
Evaluating total uncertainty:

Total uncertainty (U) is defined as the expected total range which covers the various portions for the measured results, where the derived values from the measuring object are distributed.
It is calculated by multiplying the cumulative uncertainty (uc) by a confidence factor (k), as shown below.

$$U = k \times u_c \qquad (4)$$

k: Confidence factor (If k = 2, confidence ratio = 95 %)

Using the values of Xm and U calculated from the n measured values, the probability of existence of the real value in the range between (Xm – U) and (Xm + U) is 95 %. If the difference between the specification value of a measuring object and Xm is equal to U or more, the probability that the value is not within specification is equal to 2.5 % or less.



4.3 Calibration

Calibration is required to maintain the accuracy of the instrument.
Almost calibration is performed by comparing the measured results of instrument with that of a standard device. Then, the instrument accuracy depends on the quality of the standard device to be used.
The MU931422A is traceable to the national standard for high accuracy.
If the calibration is performed by the user, the accuracy of the MU931422A may be out of the specification, according to the used standard. So, it is recommended to perform the calibration by Anritsu.
If the MU931422A fails to meet the specifications in the performance test in paragraph 4.1, contact your nearest Anritsu service office, shown at the end of this manual.

Section 5 Maintenance and Re-Transportation

This section describes the matters that require attention in regard to daily care and cleaning, and re-transportation.

5.1 Daily Care and Cleaning

Front-panel stains

When front-panel stains have grown conspicuous, when the MU931422A was used in dusty location or before the MU931422A is put to storage for a long time, lightly wipe the MU931422A to remove stains with a cloth soaked with soapy water. Using thinner or benzene may cause damage to the coating.

Caution ⚠

To wipe off stain with a cloth soaked with soapy water, first turn the power source of the MT9810A/MT9812B OFF and pull out the power source cord from the power receptacle. Trying to perform operations without pulling the power source cord off from the power receptacle may cause electric shock.
Since the side panels have holes, do not use a close with soapy water to wipe off the stain on the side panels. Otherwise, the water drop enters in the device, and may cause the damages on the electric circuit at power on.

Cleaning connector adapter

To clean the metallic portion in the connector adapter, where the optical fiber end protrudes; use the adapter cleaner (Z0284).

When the MU931422A not used, affix the supplied metallic cap to the connector adapter to protect the adapter and sensor from the dust.

Cleaning ferrule of the optical fiber cable

To clean the ferrule located at the end of the optical fiber cable, use the ferrule cleaner (Z0282), an application part related to the MU931422A.

Caution ⚠

Cleaning the end face of the optical fiber cable using an applicator dipped with solvent such as alcohol may, after all, leave dust unremoved after the solvent evaporates. It is recommended to use the ferrule cleaner (Z0282) that does not require dipping of solvent such as alcohol to clean the optical fiber.

5.2 Matters Requiring Attention for Storage

Avoid storing the MU931422A in places such as those listed below.

- Places that experience temperatures of 70 ˚C or higher and of –40 ˚C or lower.
- Places exposed to direct sunlight
- Dusty places
- Places of high humidity that may cause condensation
- Places likely to be exposed to activated gases

When not used, affix the supplied metallic cap to the connector adapter, or set the light-shade/storage cap (Cap "R", sold separately).

5.3 Re-Transportation

Pay attention to the matters listed below to re-transport the MU931422A.

- Use the packing materials used at the time of product purchase.
- As the products are classified as the precision electronic equipment, instruct the carrier that “wetting” and “throwing away” of the products is strictly prohibited during transportation.

Take the following actions in case packing materials used at the time of purchase are lost.

1) Make air cell mat (air cap sheet) or sheet with equivalent cushioning effects available.
2) Wrap the entire MU931422A with the sheet.
3) Make available a solid packing carton such as cardboard, wooden and aluminum boxes with between 10 and 15 cm margins in all directions over the size of the product wrapped in sheet, and fill cushioning material between 10 and 15 cm thick at the bottom of the box.
4) Put the MU931422A packed in sheet into the box and fill cushioning material around it.
5) Pack the carton box fast with string, tape or belt.

Item	Specification
Light receiving element	InGaAs-PD
Input system	Fiber input
Adaptive fiber	9/125 µm to 62.5/125 µm, NA ≤0.29
Wavelength range	750 to 1700 nm
Optical power measurement range *1	Continuous light : +10 to –80 dBm Modulated light : +7 to –90 dBm
Noise level *2	≤–73 dBm
Polarization dependability *3	≤0.05 dB
Optical power measurement accuracy at reference condition *4	±2 %
Optical power measurement accuracy at operating condition *5 *6	±3.5 %
Linearity *7	±0.05 dB (0 to +10 dBm) ±0.01 dB ± 30 pW (0 to –70 dBm)
Calibration factor input	–99.999 to +99.999 dB enabled to be input
Wavelength sensitivity characteristic correction	Measuring wavelength enabled to be input by the unit of 0.01 nm
Zero-set operation	Automatic compensation of input zero-level point
Range switching	Auto, manual
Modulated light receiving	CW/MOD switching, MOD: 270 Hz, 1 kHz, 2 kHz
Measurement interval setting *8	1, 10, 20, 50, 100, 200, and 500 ms; and 1 second to 99 hours 59 minutes 59 seconds
Averaging setting	Off, 2, 5, 10, 20, 50, 100, 200, 500, and 1000 times
Analog output *9	Approximately +2 V
Band select *10	Auto, manual Manual setting: 0.1 Hz, 1 Hz, 10 Hz, 100 Hz, 1 kHz, and 10 kHz (CW mode only)
Optical connector	Conforms to FC-PC, ST, DIN, HMS-10A, and SC. *11
Environmental conditions Operating temperature Humidity Storage temperature	 0 to 50 ˚C. < 90 % (Condensation free) –40 to +71 ˚C
Dimensions and mass	78H × 41W × 335D mm, ≤550 g

*1: Wavelength 1300 nm
*2: Measurement interval: 100 ms, Average times: 10, Peak-to-Peak noise, Wavelength: 1300 nm
*3: SM fiber (ITU-T.G.652) used. Reflection loss 45 dB (Min.) Wavelength 1550 nm
*4: Reference conditions: SM fiber (ITU-T.G.652), master FC connector used
Power level 100 µW (–10 dBm), CW light, wavelength 1300 nm
Ambient temperature: 23 ± 2 ˚C
On the day of calibration
Warming up time: 30 minutes
*5: Operating conditions: SM fiber (ITU-T.G.652), master FC connector used
Power level: 100 µW (–10 dBm)
CW light: wavelength 1000 to 1600 nm
Ambient temperature: 23 ± 5 ˚C
Within a year from calibration
Warming up time: 30 minutes

*6: Add 1 % to the specification when using the fiber other than SM fiber (ITU-T G.652) or using APC connector.
*7: Measurement conditions: Constant temperature at 23 ± 5 ˚C, one wavelength in the range between 1000 to 1600 nm, CW light, power level 100 µW (–10 dBm) set as reference, Band AUTO/0.1/1/10 Hz setting, warming up time: 30 minutes
*8: However, the measurement intervals not greater than 100 ms are effective only at the time of recording and measurement.
*9: Based on the full-scale values of each measurement range
*10: Bandwidth of approximately 3 dB
*11: The FC-PC connector (option 37) is supplied as a standard feature.

Appendix B Ordering Information

Please specify the model name, code, item name, and quantity when ordering

Model name/Code	Item Name	Remarks
	–Main unit–	
MU931422A	Optical sensor	
	–Standard accessories–	
MA9005A	Connector adapter 1	FC type
W1624AE	MU931422A Operation manual 1	
	–Application parts–	
MA9005A	Connector adapter	Optional optical connector provided
MA9013A	Fiber adapter	For bare fiber
B0444	Cap R	Cap for shading light and storage
Z0282	Ferrule cleaner	
Z0283	Ferrule cleaner replacement tape	6/set
Z0284	Adapter cleaner	Stick type, 200/set
J0127A	Coaxial cord, 1 m	BNC-P_RG-58A/U_BNC
J0003A	Coaxial cord, 1 m	SMA-P_Special 3D-2W_SMA-P
J0901	Conversion connector	SMA-P_BNC-J
J0902	Conversion connector	SMA-P_BNC-P

connector adapter option

Model name	optical connector
MA9005A-37	FC-PC
MA9005A-38	ST
MA9005A-39	DIN
MA9005A-40	SC
MA9005A-43	HMS-10/A

Optical Sensor List of Performance Test Result Record

Model: MU931422A
Serial No.:
Date:
Temperature: °C
Humidity: %
Atmospheric pressure: hPa
Person in charge:

1. Linearity Test

Range	Power1 (dBm)		Power2 (dBm)		Power1–Power2 (dB)	
+10 dBm → 0 dBm		–		=		= [1]
0 dBm → –10 dBm		–		=		= [2]
–10 dBm → –20 dBm		–		=		= [3]
–20 dBm → –30 dBm		–		=		= [4]
–30 dBm → –40 dBm		–		=		= [5]
–40 dBm → –50 dBm		–		=		= [6]
–50 dBm → –60 dBm		–		=		= [7]
–60 dBm → –70 dBm		–		=		= [8]

Range	Minimum		Calculation		Maximum
+10 dBm (– [1] – [2])	–0.050 dB	≤		≤	0.050 dB
0 dBm (– [2])	–0.010 dB	≤		≤	0.010 dB
–10 dBm			0.000 dB		
–20 dBm ([3])	–0.010 dB	≤		≤	0.010 dB
–30 dBm ([3] + [4])	–0.010 dB	≤		≤	0.010 dB
–40 dBm ([3] + [4] + [5])	–0.011 dB	≤		≤	0.011 dB
–50 dBm ([3] + [4] +···+ [6])	–0.023 dB	≤		≤	0.023 dB
–60 dBm ([3] + [4] +···+ [7])	–0.138 dB	≤		≤	0.138 dB
–70 dBm ([3] + [4] +···+ [8])	–1.149 dB	≤		≤	1.149 dB

2. Polarization Dependence Test

Reading		Maximum
dB	≤	0.05 dB

3. Noise Test

Calculation		Maximum
dB	≤	–73 dBm

Anritsu

MU931422A

Optical Sensor

Operation Manual

■ Read this manual before using the equipment. Keep this manual with the equipment.

Anritsu

R100 Printed on 100% Recycled Paper

Document No.: M–W1624AE
Printed in Japan