

CMA5 Series

Fiber Optic Power Meters



Anritsu
Discover What's Possible™

October 2013 (Seventh Edition)

Copyright © 2010-2013, ANRITSU CORPORATION.

All rights reserved. No part of this manual may be reproduced without the prior written permission of the publisher.

This document and the product to which it relates are protected by copyright law from unauthorized reproduction.

Notice to U.S. Government End Users

The Software and Documentation are "Commercial Items," as that term is defined at 48 C.F.R. 2.101, consisting of "Commercial Computer Software" and "Commercial Computer Software Documentation," as such terms are used in 48 C.F.R. 12.212 or 48 C.F.R. 227.7202, as applicable. Consistent with 48 C.F.R. 12.212 or 48 C.F.R. 227.7202-1 through 227.7202-4, as applicable, the Commercial Computer Software and Commercial Computer Software Documentation are being licensed to the U.S. Government end users (a) only as Commercial Items and (b) with only those rights as are granted to all other end users pursuant to the terms and conditions herein. Unpublished rights reserved under the copyright laws of the United States.

Anritsu Instruments Company SHALL NOT BE LIABLE FOR DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF USE, REVENUE, OR PROSPECTIVE PROFITS RESULTING FROM THE USE OF THIS DOCUMENT OR THE PRODUCT TO WHICH IT RELATES. ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

The information in this manual may be subject to change without notice.

Anritsu Corporation
5-1-1 Onna, Atsugi-shi, Kanagawa,
243-8555, Japan

■ General

Thank you for purchasing a CMA5 Series Fiber Optic Power Meter. These lightweight, hand held units are precision meters designed to meet many testing applications.

The CMA5 Series Fiber Optic Power Meters have calibrated wavelengths at 850, 1300, 1310, 1490, 1550 and 1625 nm. These units can measure absolute power in dBm, and microwatts (μW) along with attenuation (relative power) as dB. The general purpose 5P100 and 5P200 have a range of +10 to -60 dBm, while the 5P100C and 5P200C have a range of +23 to -50 dBm, which is ideal for CATV testing. All models have the ability to store the currently displayed dBm power level reading as a reference for subsequent measurements.

■ Features

- +10 to -60 dBm range
(5P100 and 5P200 - standard models)
- +23 to -50 dBm range
(5P100C and 5P200C - high power models)
- Calibrated wavelengths at 850, 1300, 1310, 1490, 1550, and 1625 nm
- 2 kHz Modulation detection
- dB Reference store facility
- Measurements in dBm, dB, and microwatts
- 40 hours minimum of battery life, continuous use

■ Applications

- Cable Acceptance Testing
- Bi-Directional Testing
- Pass Fail Testing
- Splice and Connectorization Optimization
- Fiber Identification

■ Precautions

Use care when working with any optical transmission equipment. Avoid looking directly at any optical fibers or optical sources. Refer to your company's safety procedures when working with optical systems and components.

It is important to keep all optical connections and surfaces free from dirt, oils or other contamination to ensure proper operation. This applies to all connectors that are connected to the unit's optical port. Scratched or contaminated connectors can reduce system performance. Refer to your company practices for cleaning optical connectors. Always replace the protective dust cap when not in use.

Location of Hazard symbol

The following labels are located on the backside.

Replacing Battery



Battery Fluid

When replacing the battery, use the specified battery and insert it with the correct polarity. If the wrong battery is used, or if the battery is inserted with reversed polarity, there is a risk of explosion causing severe injury or death.

DO NOT short the battery terminals and never attempt to disassemble the battery or dispose of it in a fire. If the battery is damaged by any of these actions, the battery fluid may leak. This fluid is poisonous.

DO NOT touch the battery fluid, ingest it, or get in your eyes. If it is accidentally ingested, spit it out immediately, rinse your mouth with water and seek medical help. If it enters your eyes accidentally, do not rub your eyes, rinse them with clean running water and seek medical help. If the liquid gets on your skin or clothes, wash it off carefully and thoroughly.

Battery Disposal

DO NOT expose batteries to heat or fire. Do not expose batteries to fire. This is dangerous and can result in explosions or fire. Heating batteries may cause them to leak or explode.

■ Operating Controls

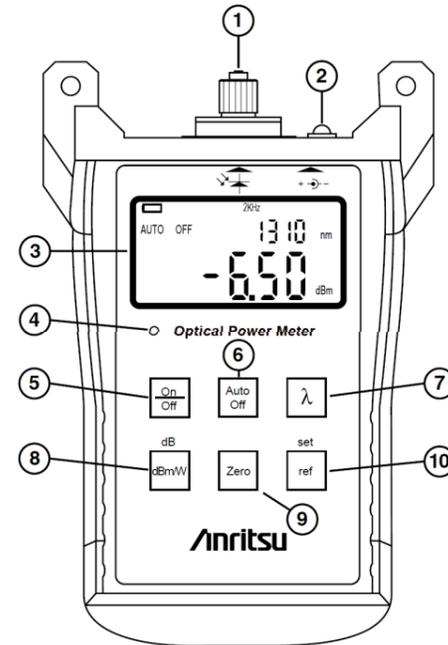


Figure 1 CMA5 Series Power Meter Operating Controls

NOTE: The CMA5 Series Power Meters have the same features and controls. The units differ in dynamic range only. The front panel is identical for all models.

1. Fiber Optic Input

The units are equipped with a universal connector. A variety of adapter caps are available. Units include one adapter cap.

CAUTION: For 5P100 and 5P100C Power Meters, be sure to use adapter caps specifically made for these units. Power Meter adapter caps for these units are marked "OPM" Do not use CMA5 Light Source adapter caps on 5P100 and 5P100C Power Meters.

2. External AC Power Jack

Attach the optional AC Power adapter to this jack.

3. Liquid Crystal Display (LCD)

Measurements are displayed in absolute power (dBm), relative loss (dB), and microwatts (μW). Indicators define wavelength, low battery (), AUTO OFF (when Auto Off is active) and REF (indicates stored reference value). For an optical power measurement less than -60 dBm (5P100/5P200) or less than -50 dBm (5P100C/5P200C), the LCD will display "LO".

4. Ext. Power

The External Power indicator lights up green when you are operating the unit on the optional external AC adapter.

5. On/Off Key

Power the unit on by pressing this key.

6. Auto Off Key

This key enables the Auto Off function, which will power down the unit when no keys have been pressed for 5 minutes.

7. λ(Wavelength) Key

Press this key to cycle through the calibrated wavelengths (850, 1300, 1310, 1490, 1550, and 1625 nm).

8. dBm/W Key

Press the dBm/W key to toggle the unit's measurement mode between dBm (absolute power) and μW (microwatts). Hold the key until "HELD" is displayed (about 2 seconds) to switch to dB (relative power).

9. Zero Key

Press the Zero key to automatically zero the power meter. See "Auto Zeroing" on page 2 for details.

10. Ref Key

Pressing the Ref key momentarily will display the current dBm reference power level for approximately 2 seconds. Holding down the REF key until "HELD" appears in the display (approximately 3 seconds) will store the current dBm reference level. Separate reference values can be saved for each wavelength. These will be retained when power is turned off.

■ Operation

The following procedures use the recommended standards as outlined by the Electronics Industry Association in its publication EIA-445-171.

NOTE: Clean all optical ports and connectors, according to your company's procedures, prior to performing any tests.

Verifying Test Jumpers

Use the following procedure to test all reference jumpers in both directions.

- Use a short jumper to connect the CMA5 Series Power Meter to an optical light source.
- Activate both units.
- Set both units to the same wavelength.
- Set the CMA5 Series Power Meter to dBm mode. The measured level should closely match the output level specified for the optical light source, if not clean the connections again or check for bends in the fiber.
- Press the Ref key on the CMA5 Series Power Meter until the display reads "HELD"
- Reverse the connections and set the CMA5 Series Power Meter to dBm mode. If the loss displayed is 0.5 dB, the jumper is good and will provide a valid test. Otherwise clean the connectors or, if necessary, replace the jumper and repeat steps 4 and 5 until a reading of 0.5 dB or less is achieved.
- Repeat as required for all wavelengths to be tested.

■ Optical Loss Measurement

Patch Panel to Patch Panel Test Method

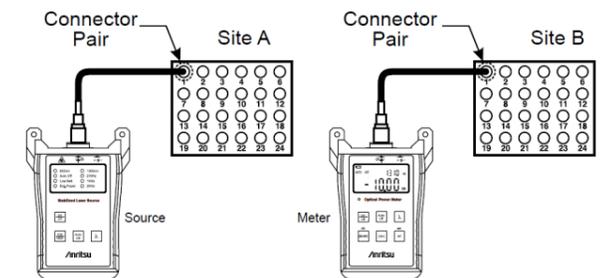


Figure 2 Patch Panel to Patch Panel

- Use the procedure in "Verifying Test Jumpers" to verify two test jumpers.
- Use one of the verified jumpers to connect the CMA5 Series Power Meter to an optical light source.
- Activate both units and set both to the desired test wavelength.
- Set the CMA5 Series Power Meter to dBm mode. The measured level should closely match the output level specified for the optical light source, if not clean the connections again or check for bends in the fiber.
- Press the Ref key on the CMA5 Series Power Meter until the display reads "HELD". This eliminates the loss in the lead-in jumper.
- Repeat as required for all wavelengths to be tested.
- Disconnect the end of the test jumper connected to the CMA5 Series Power Meter. Leave the other end connected to the light source.
- Connect the light source to one end of the system to be tested.
- Use the second test jumper to connect the CMA5 Series Power Meter to the opposite end of the system to be tested. Power Meter readings will be in dB (hold the dBm/W key for 2 seconds to set the unit to dB mode) and include two connector pairs and loss across the fiber.

NOTE: The system under test has two connector pairs. The referencing steps above do not eliminate either connector pair.

Patch Panel to Connector Test Method

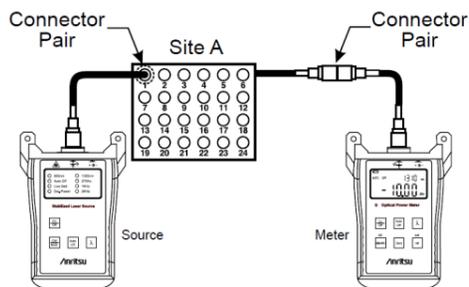


Figure 3 Patch Panel to Connector

1. Verify two test jumpers.
2. Connect the CMA5 Series Power Meter to the optical light source using the two jumpers and an in-line adapter (use the in-line adapter to connect the two jumpers).
3. Activate both units and set both to the desired test wavelength.
4. Set the CMA5 Series Power Meter to dBm mode and press the **Ref** key until the display reads "HELD" This eliminates the loss of the lead-in jumper and references out one connector pair.
5. Repeat as required for all wavelengths to be tested.
6. Disconnect the test setup at the in-line adapter. Leave the jumpers connected at both the Power Meter and light source, leaving the in-line adapter attached to the jumper that will be attached at the connector end of the fiber under test.
7. Connect the light source to one end of the system to be tested. Connect the Power Meter to the opposite end of the system to be tested. Power Meter readings will be in dB (hold the **dBm/W** key for 2 seconds to set the unit to dB mode) and include one connector pair and loss across the fiber.

NOTE: The system under test has one connector pair only. One of the two pairs is referenced out.

Connector to Connector Test Method

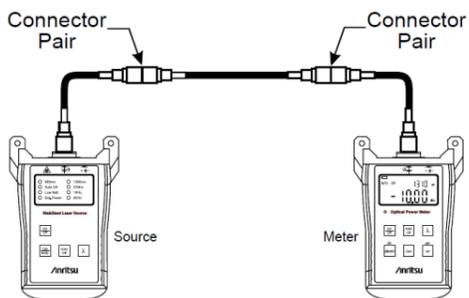


Figure 4 Connector to Connector

1. Verify three test jumpers.
2. Use two in-line adapters to connect the three jumpers.
3. Use the three connected jumpers to connect the CMA5 Series Power Meter to the optical light source.
4. Activate both units and set both to the desired test wavelength.
5. Set the CMA5 Series Power Meter to dBm mode and press the **Ref** key until the display reads "HELD" This eliminates the loss of the lead-in jumper and references out two connector pairs.
6. Repeat as required for all wavelengths to be tested.
7. Remove the middle jumper, leaving the in-line adapters attached to the jumpers connected to the Power Meter and the light source. Leave the jumpers connected to the Power Meter and light source in place.
8. Connect the light source to one end of the system to be tested. Connect the Power Meter to the opposite end of the system to be tested. Power readings will be in dB and include only the loss across the fiber.

Modulation Detection

When the instrument is connected to a fiber which has a 2 kHz modulated signal (as is often used in Fiber Identification), the "2 kHz" indicator on the CMA5 Series Power Meter will be on.

NOTE: The power readings at a modulated signal will reflect the average power, not the peak power.

Assuming that the modulation has a 50% duty cycle and is fully modulated (full on

and full off cycles), the meter reading will be approximately 3dB less than peak (full on) value.

Auto Zeroing

Use the following procedure to auto zero the unit:

1. Cover the attached fiber connector cap with its dust cap. This will prevent ambient light from entering the power meter's detector.
2. Power up the unit.
3. Press the **Zero** key until the display reads "SUCC" indicating successful auto zeroing.

NOTE: If the display reads "ERR" the auto zeroing is not successful. Make sure that the dust cap and connector adapter are securely in place, then press and hold the **Zero** key again. If still unsuccessful, contact Anritsu Technical Support (see page 15 for details).

Maintenance

The CMA5 Series Power Meters require no periodic maintenance other than replacing the battery and periodic calibration (once every 3 years).

Battery Replacement

Under normal use one 9 volt alkaline battery will provide a minimum of 40 hours of continuous use.

To replace the battery:

1. Remove the unit from its protective boot by pulling down on the bottom of the boot to release the unit. Then slide the unit out of the boot.
2. Open the battery compartment, located on the lower back side of the unit, by pressing down on the arrow on its cover and sliding the cover off the unit.
3. Replace the battery with a fresh 9 volt alkaline battery.
4. Replace the battery compartment cover.
5. Replace the protective boot.

Calibration

The recommended calibration interval on the CMA5 Series Power Meters is once every 3 years.

General Care

To avoid damage to the CMA5 Series Fiber Optic Power Meters, do not use cable connectors that are dirty or faulty. A dust cap is provided for the optical port, and should be in place when the unit is not in use to prevent foreign material from entering the port.

To clean the optical connector, use only a small diameter non-cotton swab lightly moistened with pure isopropyl alcohol. Be sure to follow your company's procedures if different.

Clean the CMA5 Series Power Meter's body with a damp cloth. Do not use solvents or abrasives.

Warranty Information

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within three year after shipment due to a manufacturing fault.

- The fault is outside the scope of the warranty conditions separately 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, wind, flooding, earthquake, lightning strike, or volcanic ash, etc.
- The fault is due to damage caused by acts of destruction, including civil disturbance, riot, or war, etc.
- The fault is due to explosion, accident, or breakdown of any other machinery, facility, or plant, etc.
- The fault is due to use of non-specified peripheral or applied equipment or parts, or consumables, etc.
- The fault is due to use of a non-specified power supply or in a non-specified installation location.
- The fault is due to use in unusual environments^(Note).
- The fault is due to activities or ingress of living organisms, such as insects, spiders, fungus, pollen, or seeds.

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

Anritsu Corporation shall assume no liability for injury or financial loss of the

customer due to the use of or a failure to be able to use this equipment.

NOTE:

For the purpose of this Warranty, "unusual environments" means use:

- In places of direct sunlight
- In dusty places
- In liquids, such as water, oil, or organic solvents, and medical fluids, or places where these liquids may adhere
- In salty air or in places where chemically active gases (sulfur dioxide, hydrogen sulfide, chlorine, ammonia, nitrogen dioxide, or hydrogen chloride etc.) are present
- In places where high-intensity static electric charges or electromagnetic fields are present
- In places where abnormal power voltages (high or low) or instantaneous power failures occur
- In places where condensation occurs
- In the presence of lubricating oil mists
- In places at an altitude of more than 2,000 m
- In the presence of frequent vibration or mechanical shock, such as in cars, ships, or airplanes

Anritsu Corporation Contact

In the event that this equipment malfunctions, contact an Anritsu Service and Sales office. Contact information can be found in a separate file.

Compliance Information

General:

Units bearing the CE mark have been tested to show compliance to the EMC Directive 2004/108/EC. Copies of compliance documentation are available from an Anritsu Service and Sales office.

Authorized representative

Name: Murray Coleman
Head of Customer Service EMEA
ANRITSU EMEA Ltd.

Address, city: 200 Capability Green, Luton Bedfordshire, LU1 3LU
Country: United Kingdom

Units bearing the C-tick mark have been tested to show compliance to Australia's Framework for EMC. Copies of compliance documentation are available from Anritsu Technical Support.

EMC:

The CMA5 Series Power Meters are Class A products with respect to radiated and conducted emissions. In a domestic environment, it is possible that this product may cause radio interference, in which case the user may be required to take adequate measures. Such measures may include relocation or reorientation of the product.

In order to reproduce EMC compliant operation as tested, the user must:

- Use only the optional AC adapter available from Anritsu for use with this product.

NOTE: EMC and Safety Compliance of this product assumes that the unit is operated from battery power while taking measurements.

Electrical Safety:

To reduce risk of equipment damage, injury or death, adhere to the following warnings:

- Do not use the CMA5 Series Fiber Optic Power Meter or the optional AC adapter if the CMA5 Series Fiber Optic Power Meter or the optional AC adapter's case is cracked or damaged.
- Use the CMA5 Series Fiber Optic Power Meters only with the optional AC adapter available from Anritsu for the CMA5 Series Fiber Optic Power Meters. Anritsu does not guarantee the safety and functionality of other AC adapters.
- The CMA5 Series Fiber Optic Power Meters optional AC adapter is not intended for use in outdoor or wet environments.
- Ensure that the AC input to the optional AC adapter is within the voltage marked on the power supply's case.
- Do not attempt to service the product in any way other than the routine maintenance as described in this manual.

Batteries:

Batteries may contain lead, cadmium, lithium or other toxic substances. Batteries must be disposed of, or recycled, in accordance with their label instructions and local regulations.

Recycling:

After this product has served its purpose, it should be recycled



according to local regulations. In the European Union, the WEEE (Waste Electronic and Electrical Equipment) Directive 2002/96/EC specifies that electronic waste be returned to a recycling center for dismantling and re-use of materials. Please contact your Anritsu representative for directions as to disposal of Anritsu products for your area.

Specifications

Model	CMA5 Optical Power Meter	
	5P100/5P200	5P100C/5P200C
Constitution		
Main Frame	5P100/5P200-YY*1 5P100C/5P200C-YY*1 *1: Specify one of FC, SC or ST connector adaptor for YY.	
Standard Accessories	Operators Manual Rubber Protective Cover 9V Alkaline Battery	
Accessories	GN-3HH-CASE CMA5-POUCH-A CMA5-BAT Z1525A CMA5-AD-PM-FC CMA5-AD-PM-SC CMA5-AD-PM-ST CMA5-AD-PM-ALL3	Hard Case (for two CMA5 series) Carrying Pouch/Shoulder Strap 9V Alkaline Battery AC Adapter (CMA5) FC Connector Adapter (for Power Meter Port) SC Connector Adapter (for Power Meter Port) ST Connector Adapter (for Power Meter Port) Connector Adapter (for Power Meter Port, FC, SC and ST)
Fiber Type	SM/MM	
Detector Type	InGaAs	Filtered InGaAs
Range	+5 dBm to -60 dBm (+10 to -50 dBm @ 850 nm)	+23 dBm to -40 dBm
Calibrated Wavelengths	850, 1300, 1310, 1490, 1550, & 1625nm	
Accuracy ¹	±0.2 dB (±0.5 dB @ 850 nm)	
Linearity ²	1550/1310 nm: ±0.2 dB, between +5 to -60 dBm 850 nm: ±0.5 dB, between +5 to -50 dBm	1550/1310 nm: ±0.2 dB, between +23 to -40 dBm 850 nm: ±0.5 dB, between +23 to -40 dBm
Resolution	0.01 dB	
dB Reference	Yes	
Modulation	2 kHz - visual indicator	
Detection		
Display Indicators	4 digit, 7-segment LCD	
Low Battery Indicator	visual indicator	
Auto Power-Off	AUTO OFF - visual indicator	
Power supply	One 9V Alkaline battery	
Warm Up Time	60s	
Connector Adapters	5P100 and 5P100C: 5P200 and 5P200C:	FC, ST& SC only FC, ST, SC, LC
AC Adapter (Accessory)	Input: 100-240 V, 50-60 Hz ³ Output: 7.5 V	
Battery Life (Alkaline)	40 hours minimum, continuous use	
Auto Shut Off	5 minutes	
Operating Temperature	-10° to 50°C (+14 to +122°F)	
Storage Temperature	-25° to 60°C (-13 to +140°F)	
Relative Humidity	0 to 95% (Non-condensing)	
Mass	250 g (0.56 lbs) or less (Excluding Rubber Protective Cover and 9V Alkaline Battery)	
Dimensions (H×W×T)	145 × 75 × 25 mm (5.70" (H) × 2.95" (W) × .98" (D))	
Warranty	3 years	

Notes:

1. Typical @ -10 dBm and 25°C
2. Typical @ 25°C
3. Operating voltage: within the range of +10% to -10% from the rated voltage

Anritsu Corporation
5-1-1 Onna, Atsugi-shi, Kanagawa,
243-8555, Japan