

Optical Power Meter

ML910B

- Dual Inputs
- 0.001 dB Display Resolution
- Feed-Through Sensor
- Data Storage Function
- Traceable to NBS



The Dual-Input Optical Power Meter With a Large Memory

The ML910B optical power meter provides two independent channels and advanced functions, enabling a variety of sophisticated optical-power measurements. Seven types of optical sensors are available to suit a variety of applications — any two can be connected as required.

The two channels are completely independent, and have separate displays, providing the same versatility that previously required two meters. Processing between channels is also possible. If a feed-through sensor is used, fluctuations in the output level of the optical source can be canceled, enabling exceptionally precise relative measurements with a resolution down to 0.001 dB.

Wavelengths from 0.38 to 1.8 μm can be measured, with sensitivity down to -90 dBm at 1.3 μm . The optical sensors have a built-in ability to respond to any wavelength in their specified range, so direct readout of the absolute optical power is possible simply by specifying the wavelength. A simple change in connections permits uncompensated measurements as well.

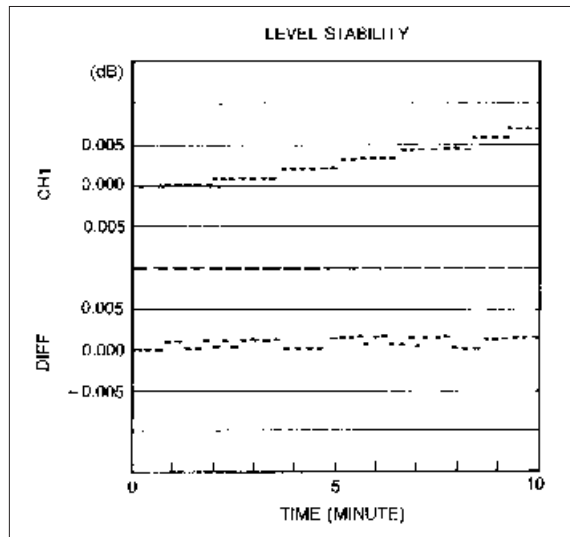
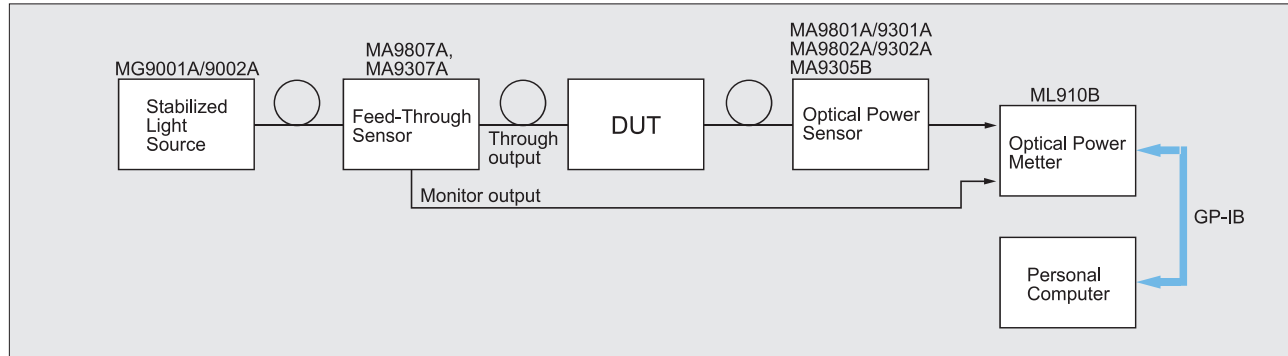
The data-storage function of the ML910B enables up to 3,000 measured values to be stored at the touch of a button, which greatly simplifies work in the field. An internal display calibration circuit is also provided, boosting overall reliability.

Features

- Two input channels with simultaneous data display
- Relative measurements with a resolution of 0.001 dB
- Feed-through sensor permits highly stable optical-loss measurements
- -90 dBm measurement sensitivity at 1.3 μm
- Wavelength selection function enables direct readout of absolute optical power
- Relative data recall allows a full range of relative functions
- Auxillary analog display using bar graph
- External control of averaging via GP-IB

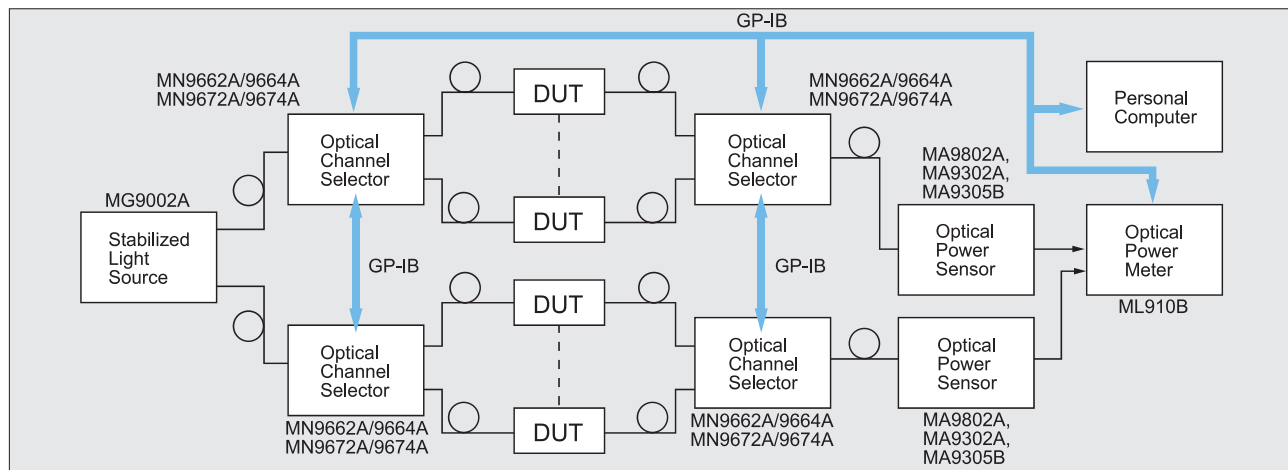
Application Example

(1) Super-High-Stability Optical Loss Measuring System Setup



Super-High Sensitivity Optical Loss Measuring System
 Even stable light sources such as LEDs are subject to fluctuations in output level (0.02 dB per minute for LEDs used by Anritsu) that limit the accuracy of optical loss measurements to about 0.05 dB. The feed-through sensor configuration shown above cancels the effect of these fluctuations. The ML910B, set to the DIFF mode, displays the difference between reference and measured values (CH1—CH2), to provide a measurement resolution of 0.001 dB. By connecting the ML910B to the Personal Technical Computer, these measurements can be performed automatically. The graph on the left produced by this automated configuration, shows typical measurement results.

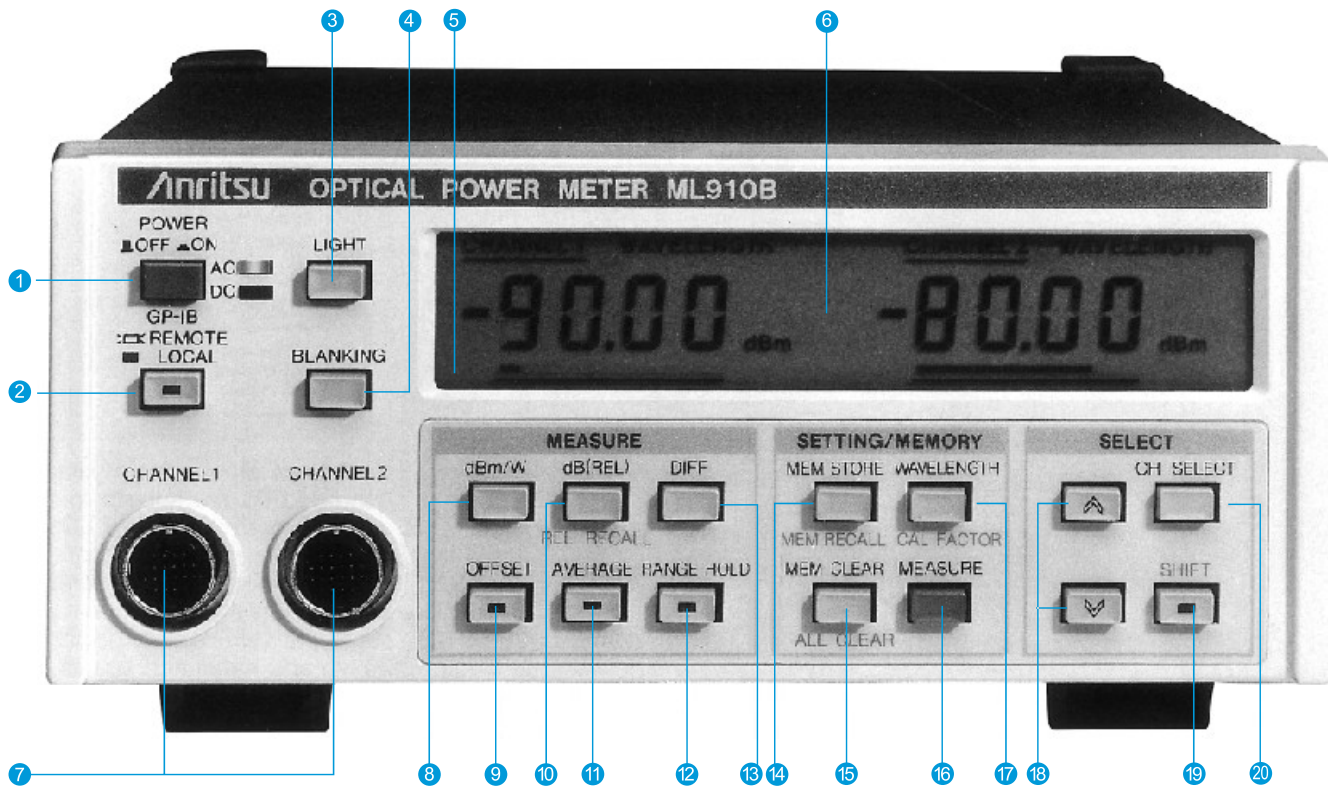
(2) Optical Loss Measuring System for Optical Devices



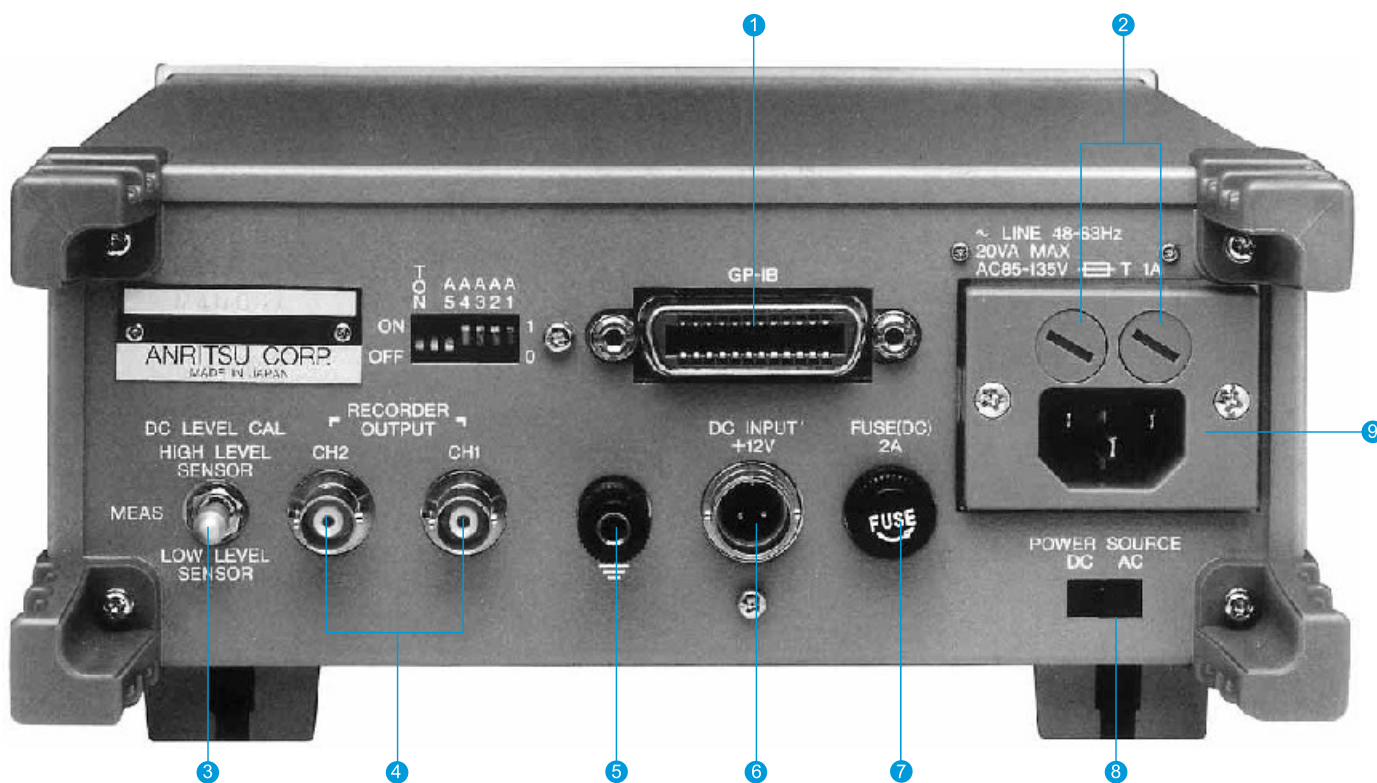
Configuration of Optical Power Measuring System Using Multi Channel Selectors

The configuration shown above permits the optical power or optical loss of multiple devices to be measured simultaneously. The two independent

channels and interchannel data processing functions of the ML910B let you configure simple, powerful and compact multichannel systems, whose functions can be automated by adding a personal computer.



- 1 POWER:**
Turns power on and off
- 2 LOCAL:**
Releases remote control
- 3 LIGHT:**
Back lights LCD
- 4 BLANKING:**
Used when least-significant digit display unnecessary
- 5 BAR GRAPH:**
For monitoring
- 6 POWER DISPLAY:**
Displays measurement value and unit
- 7 INPUT CONNECTOR:**
For connecting optical sensor
- 8 dBm/W:**
Switches between display in dBm and watts
- 9 OFFSET:**
Allows automatic offset adjustment of zero point
- 10 dB (REL):**
When pressed, establishes reference value and displays difference between reference and measured values.
- REL RECALL:**
With SHIFT, recalls reference for 0 dB (REL)
- 11 AVERAGE:**
Pressing AVERAGE key averages internally averaged data a further 10 times
- 12 RANGE HOLD:**
Fixes measuring range
- 13 DIFF:**
Display level difference (dB) between CH 1 and CH 2 on CH 1
- 14 MEM STORE:**
Memorizes data (in dBm)
- MEM RECALL:**
With SHIFT, for checking data contained in memory
- 15 MEM CLEAR:**
Erases newest data
- ALL CLEAR:**
With SHIFT, clears all data
- 16 MEASURE:**
Changes SETTING/MEMORY mode to MEASURE
- 17 WAVELENGTH:**
Sets wavelength
- CAL FACTOR:**
With SHIFT, for inputting correction value
- 18 SETTING KEY:**
Sets calibration factor and wavelength
- 19 SHIFT:**
Changes modes of: MEM RECALL, CAL FACTOR, REL RECALL, ALL CLEAR
Active only when key lamp lit
- 20 CHANNEL SELECT:**
Selects CH 1, CH 2 or both CH 1, 2



1 GP-IB CONNECTOR:

2 FUSE:
AC power supply fuse

3 DC LEVEL CAL:
Used to calibrate optical power indication

4 RECORDER OUTPUT:
1 V full-scale linear output proportional to power level in watts

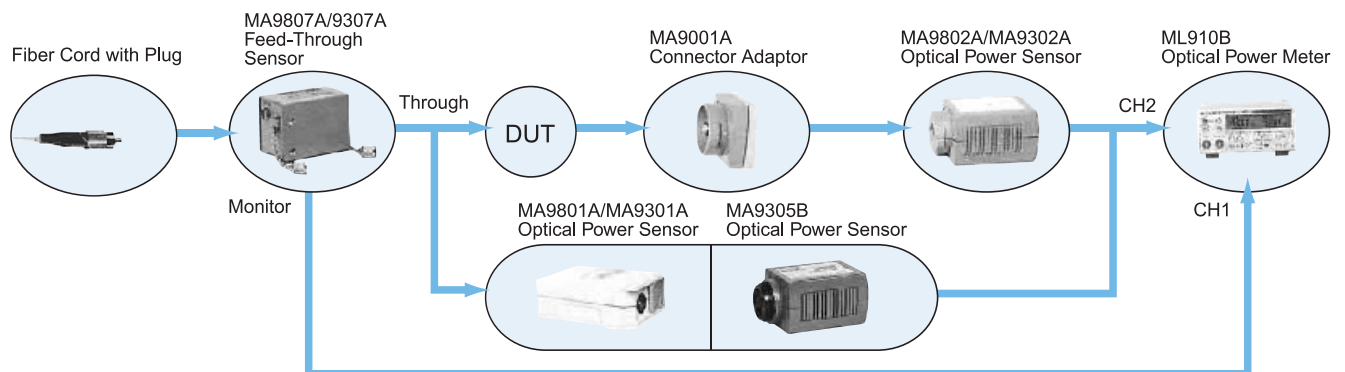
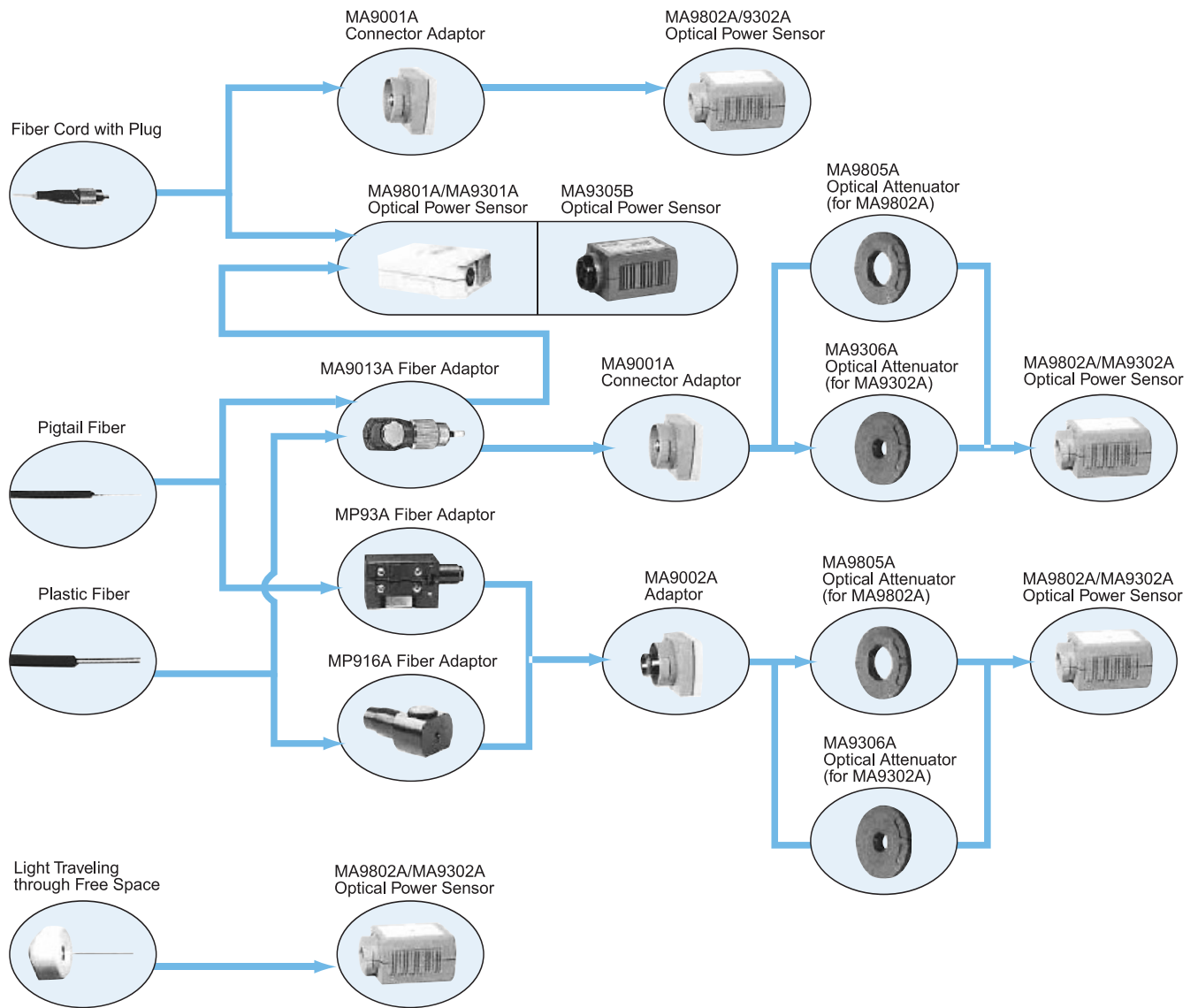
5 EARTH TERMINAL:
Grounds equipment

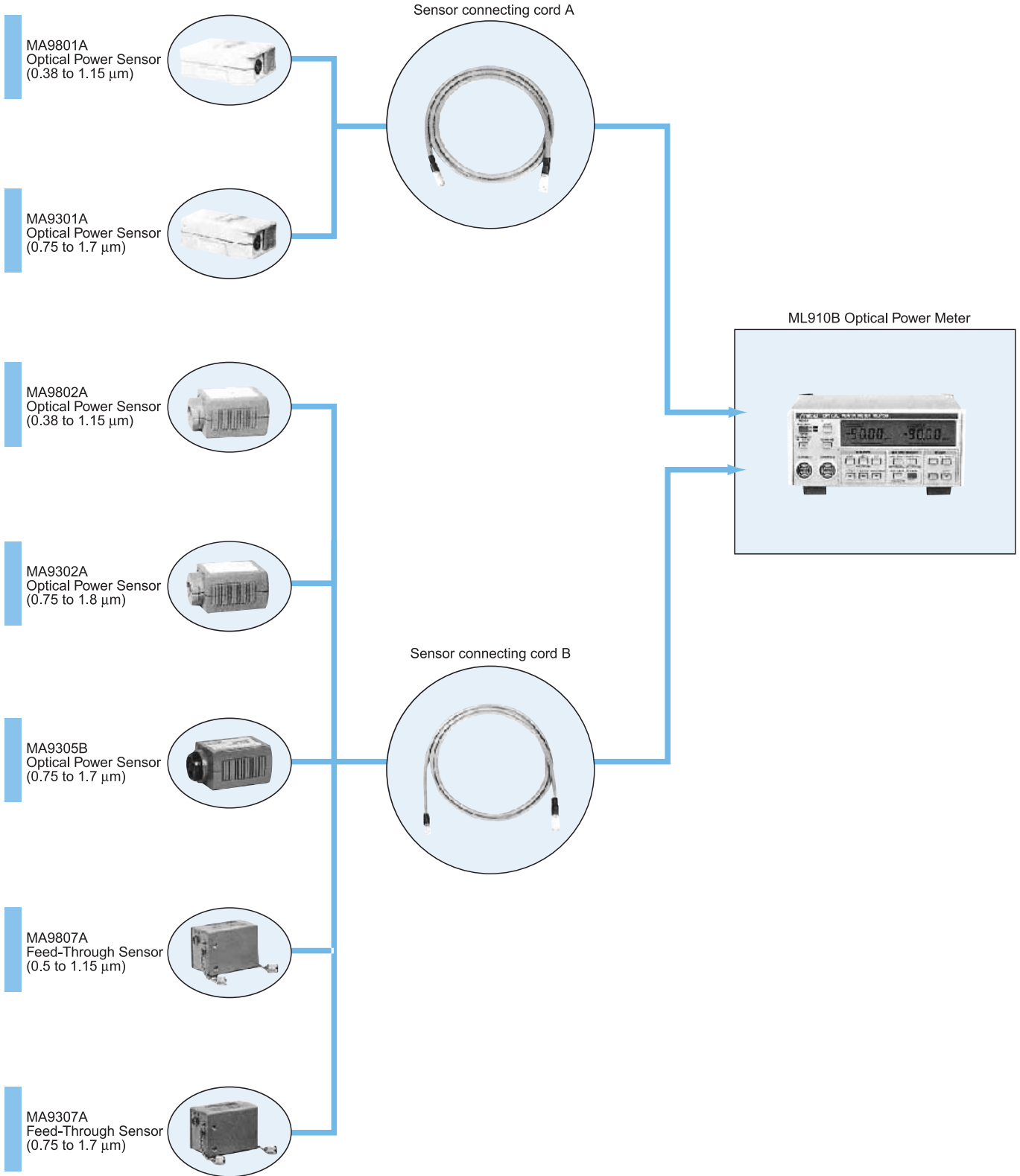
6 DC POWER INPUT:
For operation on DC power source (+10.5 to +15 V)

7 FUSE:
DC power supply fuse

8 AC/DC CHANGEOVER SWITCH:
Sets equipment for AC or DC power supply

9 AC POWER INPUT:
For operation on AC power source





Specifications

| | | | | | | | | |
|------------------------|--|--|---|---|--|---|---|---|
| Indicator (Main frame) | Display | Selection among watts/dBm/dB (REL), 4-digit digital display of two signals, bar graph | | | | | | |
| | Calibration coefficient | Front-panel adjustment | | | | | | |
| | Recorder output | Proportional to indicated power with 1 V corresponding to full scale, and 0.316 V to -5dB, in each range | | | | | | |
| | Relative value display | Digital 4 digits | | | | | | |
| | internal averaging ^{*1} | 2 to 10 times (10 times at power on) | | | | | | |
| | Averaging | ON/OFF switchable | | | | | | |
| | Dimensions and mass | 88H × 213M × 250D mm, <3 kg | | | | | | |
| Sensor | Model | MA9801A | MA9301A | MA9802A | MA9302A | MA9807A Feed-through sensor | MA9307A Feed-through sensor | MA9305B |
| | Wavelength range (μm) | 0.38 to 1.15 | 0.75 to 1.7 | 0.38 to 1.15 | 0.75 to 1.8 | 0.5 to 1.15 | 0.75 to 1.7 | 0.75 to 1.7 |
| | Element | Si photodiode | InGaAs photodiode | Si photodiode | Ge photodiode | Si photodiode | InGaAs photodiode | |
| | Active area diameter | — | — | 9.5 mm | 5 mm | — | — | — |
| | Insertion loss | — | — | — | — | ≤10 dB ^{*2} | ≤10 dB ^{*2} ≤25 dB ^{*3} | — |
| | input type | FC connector ^{*4} | | Direct to photodiode | | FC connector ^{*4} | | Connector adapter ^{*4} |
| | Dimensions and mass | 42H × 61W × 110D mm, <700 g | | 31H × 40W × 62D mm, <400 g | | 45H × 37W × 66D mm, <400 g | | 31H × 40W × 65D mm, <400 g |
| Overall | Power measuring range | -90 to 0 dBm (at 0.85 μm) 1 pW to 1 mW | -90 to 0dBm (at 1.3 μm) 1 pW to 1 mW | -65 to + 20 dBm ^{*5} (at 0.85 μm) 0.3 nW to 0.1 W | -40 to + 20 dBm ^{*5} (at 1.3 μm) 100 nW to 0.1 W | -65 to + 10 dBm ^{*6} (at 0.85 μm) 0.3 nW to 10 mW | -60 to +3 dBm ^{*6} (at 1.3 μm) 1 nW to 2 mW | -70 to +3 dBm (at 1.3 μm) 0.1 nW to 2 mW |
| | Accuracy | ±5% (0.85 μm, -23 dBm) | ±5% (1.3 μm, -23 dBm) | ±5% (0.85 μm, -23 dBm) | ±5% (1.3 μm, -23 dBm) | — | — | ±5% (1.3 μm, -23 dBm) |
| | Resolution | Watts display: 0.1 to 1%; dBm display: 0.01 dB; dB (REL) DIFF display: 0.001 dB | | | | | | |
| | Ambient temperature rated range of use | 0° to 45°C | | | | | | |
| | Power | 85 to 250 Vac, 50/60 Hz, <20 VA; 10.5 to 15 Vdc external power source | | | | | | |
| EMC | EN61326: 1997/A1: 1998 (Class A), EN61000-3-2: 1995/A2: 1998 (Class D), EN61326: 1997/A1: 1998 (Annex A) | | | | | | | |
| LVD | EN61010-1: 1993/A2: 1995 (Installation Category II, Pollution degree 2) | | | | | | | |

*1: Averaging can be externally set via GP-IB.

*2: GI fider (50/125 μm, NA0.2; input and output)

*3: GI fider (50/125 μm, NA0.2) input, SM fider (10/125 μm, NA0.1) output (1.3 μm)

*4: The standard optical connector is the FC type; consult us if you need a modification.

*5: Using MA9805A or MA9306A Optical Attenuator (sold separately)

*6: Input optical power to sensor

Optical Power Measuring Range

| Indicator | Optical Sensor | Wavelength (μm) | Optical Power Measuring Range (dBm) | | | | | | | | | | | | |
|-----------|----------------|-----------------|-------------------------------------|---------------|-----|-----|-----|-----|-----|-----|-----|---|-----|-----|--|
| | | | -90 | -80 | -70 | -60 | -50 | -40 | -30 | -20 | -10 | 0 | +10 | +20 | |
| ML910B | MA9801A | 0.38~1.15 | ----- | | | | | | | | | | | | |
| | MA9802A | | ----- ---*--- | | | | | | | | | | | | |
| | MA9301A | 0.75~1.7 | ----- | | | | | | | | | | | | |
| | MA9305B | | ----- | | | | | | | | | | | | |
| | MA9302A | | 0.75~1.8 | ----- ---*--- | | | | | | | | | | | |

*: When used with Optical Attenuator (MA9805A/9306A)

Ordering Information

Please specify model/order number, name and quantity when ordering.

| Model / Order number | Name | Remarks |
|----------------------|--|---|
| ML910B | Main frame Optical Power Meter | |
| | Standard accessories | |
| J0313 | Sensor Connecting Cord A, 2 m ^{*1} : 1 pc | With 20-pole connector |
| J0314 | Sensor Connecting Cord B, 2 m ^{*2} : 1 pc | With 12-pole connector |
| | Power cord, 2.5 m: 1 pc | |
| F0008 | Fuse, 1 A: 2 pcs | T1A250V |
| F0045 | Fuse, 2 A: 1 pc | MF51NN250V2ADC01 |
| W0019CE | ML910B Instruction Manual: 1 copy | |
| | Optical sensors | |
| MA9801A | Optical Power Sensor | 0.38 to 1.15 μm , -90 to 0 dBm |
| MA9301A | Optical Power Sensor | 0.75 to 1.7 μm , -90 to 0 dBm |
| MA9802A | Optical Power Sensor | 0.38 to 1.15 μm , -65 to +10 dBm |
| MA9302A | Optical Power Sensor | 0.75 to 1.8 μm , -40 to +10 dBm |
| MA9807A | Feed-Through Power Sensor | 0.5 to 1.15 μm , -65 to +10 dBm, for optical fiber |
| MA9307A | Feed-Through Power Sensor | 0.75 to 1.7 μm , -60 to +3 dBm, for optical fiber |
| MA9305B | Optical Power Sensor | 0.75 to 1.7 μm , -60 to +3 dBm |
| | Optical accessories | |
| MA9001A | Connector Adaptor with FC-type Connector | FC-type, for MA9802A or MA9302A |
| MA9001A-21 | Connector Adaptor with D4-type Connector | D4 type, for MA9802A or MA9302A |
| MA9013A | Fiber Adaptor with FC-type Plug | With FC ³ -type plug, for fibers with 125 μm clad dia. 0.3 to 1 mm jacket dia. |
| MA9013A-21 | Fiber Adaptor with D4-type Plug | With D4-type plug, for fibers with 125 μm clad dia. 0.3 to 1 mm jacket dia. |
| MA9002A | Adaptor | For MA9802A or MA9302A (fits to the MP93A) |
| MP93A | Fiber Adaptor | For fibers with clad diameters of less than 150 μm 0.8 to 1.0 mm jacket dia. |
| MA9805A | Optical Attenuator | Used with MA9802A (attenuation: 10 dB) |
| MA9306A | Optical Attenuator | Used with MA9302A (attenuation: 10 dB) |
| MA9005A-21 | Protective Connector Adaptor | D4-type, for MA9305B |
| J0377 | Sensor Connecting Cord E | For MA912A/B Optical Power Sensor |
| B0268 | Front Cover | |
| J0007 | GPIB Cable, 1 m | |
| J0008 | GPIB Cable, 2 m | |

*1 Sensor connecting cord A: for MA9801A or MA9301A

*2 Sensor connecting cord B: for MA9802A, MA9302A, MA9807A, MA9307A and MA9305B

*3 FC-type to D4-type optical connector modification: specify option 21.



Specifications are subject to change without notice.

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