

MS9020D

Optical Loss Test Set



The MS9020D is a handy optical measuring instrument which incorporates an LED and an LD light sources and an optical power meter. It can also be used for fiber break point and return loss measurement. Every unit of the LED source, the LD source, the sensors and the return loss measurement unit is a plug-in type, for easy exchange and highest suitability for field use.

The MS9020D covers 0.66 μm , 0.85 μm , 1.3 μm and 1.55 μm bands for optical loss measurement. In addition to the CW

mode, it provides a modulated light mode with 270 Hz, 1 kHz and 2 kHz modulation signals. Therefore, it is possible to measure optical loss over a wide dynamic range without stray light effect. For return loss, 1.3 μm band single mode fibers can be measured in 0 to 40 dB range. As a power meter, every sensor has a wavelength calibration function of 5 nm steps at three wavelengths, so absolute values can be read directly.

Major Features

- **Measures CW and modulated light**

In addition to CW light mode the MS9020D provides modulated light functions with modulation signal frequencies of 270 kHz, 1 kHz, 2 kHz, so a wide range measurement is possible without stray light.

- **Light source with switchable wavelength**

One each of two wavelengths 0.85/1.3 μm and 1.3/1.55 μm can be switched easily (LD and LED).

- **Provides calibration function of 5 nm steps at three wavelengths**

- **Also measures optical return loss (0 to 40 dB)**

In combination with the MS0907A unit, optical return loss of SM fiber connector and optical parts can be measured easily.

- **High power input and return loss, and low polarization dependency**

The MA9622A Optical Sensor can handle optical inputs of up to +23 dBm in the 1.55 μm band, and has a return loss

of better than 40 dB as well as a polarization dependency of only 0.1 dB. It is ideal for measure in the optical output of repeaters using EDFAs. Furthermore, the removable input connector makes cleaning easy.

- **Visible light source for fiber identification in SM fibers**

Fiber identification and break point by naked eye in fibers up to 5 km long can be easily detected using the 0.635 μm visible light source. In addition, the optical output has a flickering light function to make visual fiber identification more easier.

- **Operates in three modes**

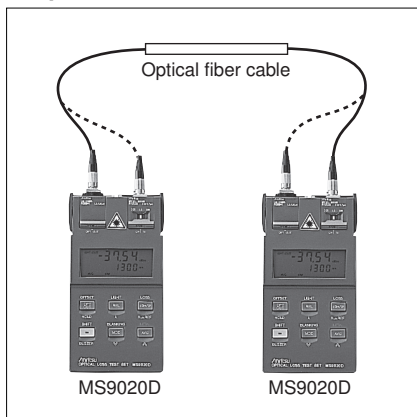
Operates using AC, Ni-Cd rechargeable battery and Alkali/Manganese cells

- **Various connectors**

The MS9020D can be connected quickly to FC, ST, DIN, HMS-10/A, and SC connectors just by changing the connector adaptor.

Applications

- **Optical fiber loss measurement**



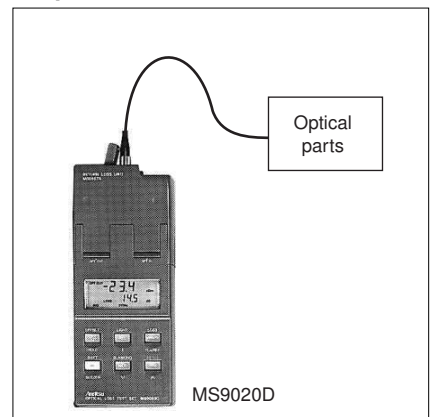
Two MS9020Ds can be used to measure the loss of an installed optical fiber. Loss measurement at 1.3 μm and 1.55 μm is a one-touch operation when the MS0904A/0909A (1.3/1.55 μm Switchable LED/LD Source) is used. When the LD light source is used, a loss of up to 67 dB can be measured.

- **Fiber identification for SM fiber**

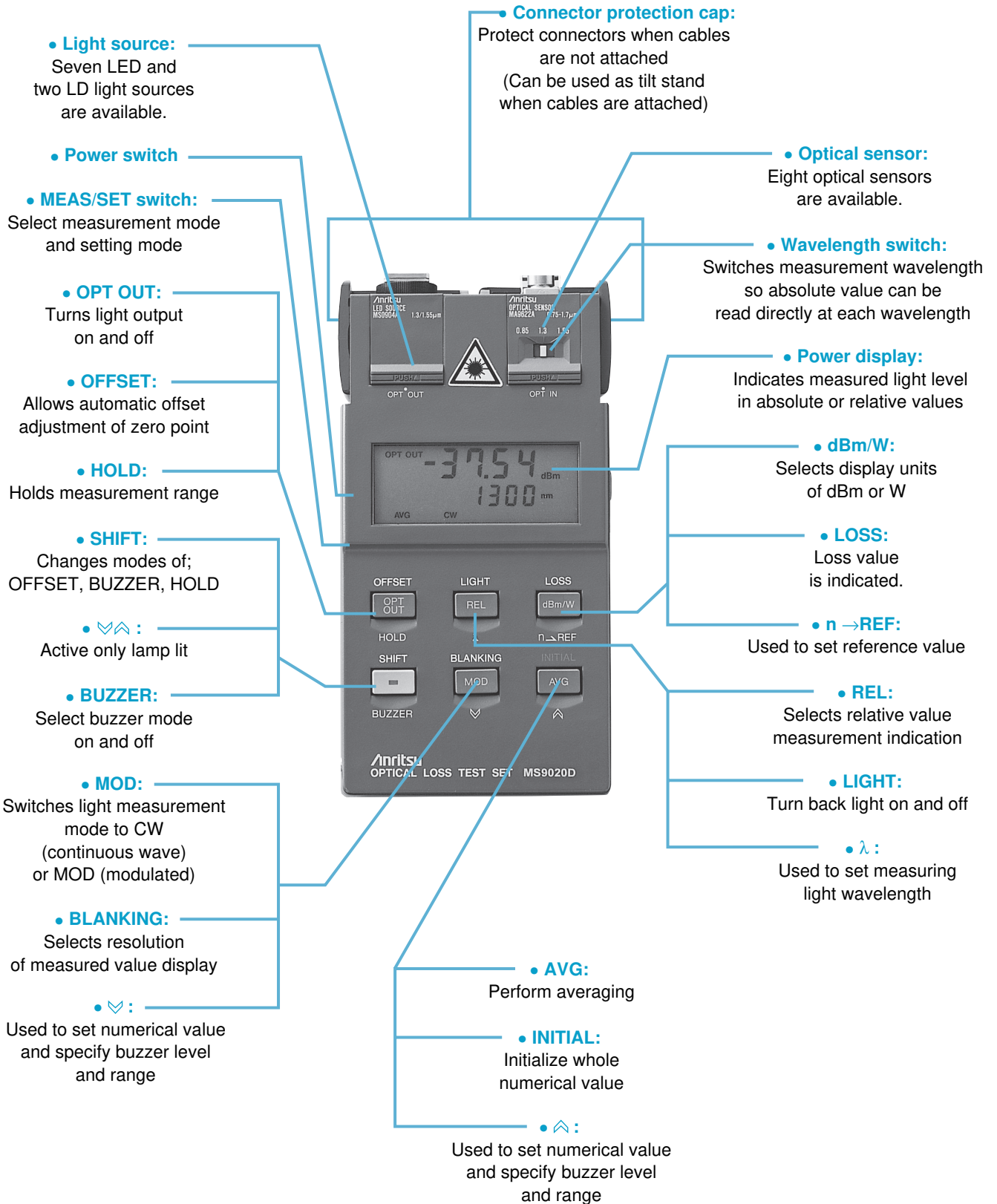


When the MS0908A Light Source Unit (visible LD) is installed, breaks in SM fibers up to 5 km long can be detected by eye.

- **Optical return loss measurement**



In combination with the MS0907A, optical return loss of SM fiber connector and optical parts can be measured easily.



Specifications

• MS9020D (mainframe)

Unit display	W, W (REL), dBm, dB (REL) selectable, 4 digits
Measurement resolution	W/W (REL) display: 0.1 to 1%, dBm/dB (REL) display: 0.01/0.1 dB, Blanking is possible.
Auto power off	Power turns off automatically after 5 minutes of no adjustment
Recorder output	1 V (on full-scale display), 0.316 V (on -5 dB from full-scale)
Battery alarm	Down-side part flickers when battery voltage goes down.
Auto offset	Sensor zero point is adjusted automatically.
Back light	Display section back light can be set on and off.
Averaging	On and off selectable
Range hold	Range can be specified and set to be on and off.
Reference value input	Used to input the loss point reference value
Buzzer	Sound when input level is higher than set reference level in 1 dB steps
Wavelength sensitivity characteristics compensation	Deviation of optical power sensor is compensated automatically in 5 nm steps.
Resume function	At power on, the state when the power is just turned off is restored.
Backup	Setting condition is backed up for 30 minutes, when the line voltage is zero at exchanging batteries for example.
Modulation	CW, 270 Hz, 1 kHz, 2 kHz (2 kHz is for MA9621A only)
Power	Operation is possible using AC adaptor, Ni-Cd battery [Operation hour: 4-hour for outputting light, No operation hour: 9-hour for light is turned off (when fully charged after new battery fully discharged), Charge time: 6-hour], UM-3 Alkali/Manganese battery *1 (Require 4 pcs. Operation hour is equivalent with Ni-Cd battery at 25°C.)
Temperature range	0° to +50°C (use), +10° to +45°C (at charging), -30° to +50°C (storage)
Dimensions and mass	90 (W) × 190 (H) × 38 (D) mm, ≤700 g
EMC	EN61326: 1997/A2: 2001 (Class A), EN61000-3-2: 2000 (Class A), EN61326: 1997/A2: 2001 (Annex A)
LVD	EN61010-1: 2001 (Pollution Degree 2)

*1: Optional accessories

• Light Sources

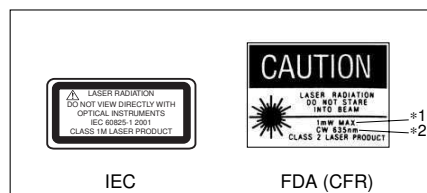
Model	MS0901A	MS0902A	MS0903A	MS0904A
Applicable fiber	GI		SM, GI	
Element	LED			
Wavelength (μm) *1	0.85 ±0.03	1.3 ±0.03	1.55 ±0.035	1.3 ±0.03 1.55 ±0.035
Spectral half-width (nm) *1	≤60	≤140	≤210	≤140 (1.3 μm) ≤210 (1.55 μm)
Optical output level: CW mode (dBm) *2	≥-20 *3	≥-20 *3 ≥-40 *4	≥-25 *3 ≥-45 *4	≥-22 (1.3 μm) *3 ≥-27 (1.55 μm) *3 ≥-42 (1.3 μm) *4 ≥-47 (1.55 μm) *4
Stability *2, *5	≤0.3 dB			
Short-term stability *2, *6	≤0.04 dB			
Internal modulation	Frequency: 270 Hz/1 kHz/2 kHz ±1.5%, Square wave (duty factor: 45 to 55%)			
Optical connector *7	FC, ST, DIN, HMS-10/A, SC type connector adaptor			
Temperature range	0° to +50°C (use), -40° to +70°C (storage)			
Dimensions and mass	30 (W) × 30 (H) × 37 (D) mm, ≤200 g			

Model	MS0906A	MS0902D *8	MS0903D *8	MS0908A *9	MS0909A *8
Applicable fiber	GI, SM	SM		SM (ITU-T G.652)	
Element	LED	LD		FP-LD	
Wavelength (μm)*1	0.85 ±0.03 1.30 ±0.03	1.31 ±0.025	1.55 ±0.025	0.635 ±0.010	1.31 ±0.02 1.55 ±0.02
Spectral half-width (nm) *1	≤60 (0.85 μm) ≤140 (1.30 μm)	≤5	≤10	≤5	≤5 (1.31 μm) ≤10 (1.55 μm)
Optical output level: CW mode (dBm) *2	≥ -22 (0.85/1.3 μm) *3 ≥ -42 (1.3 μm) *4	-3 ±1 *1, *4		-3 ±1 *1, *10	≥ -3 *1, *10
Stability *2, *5	≤0.3 dB	±0.5 dB *4		±2 dB *2, *10, *11	±0.5 dB *2, *5, *10
Short-term stability *2, *6	≤0.04 dB	±0.05 dB *4		-	±0.05 dB *2, *6, *10
Internal modulation	Frequency: 270 Hz/1 kHz/2 kHz ±1.5%, Square wave (duty factor: 45 to 55%)			Flickering light function (3 steps)	Frequency: 270 Hz/1 kHz/2 kHz ±1.5% Duty: 45 to 55%
Optical connector *7	FC, ST, DIN, HMS-10/A, SC type connector adaptor	FC or SC type integrated with connector *12		Replaceable connector, PC polish (FC, ST, DIN, HMS-10A, SC)	
Temperature range	0° to +50°C (use), -40° to +70°C (storage)			0° to +40°C (use), -40° to +70°C (storage)	0° to +50°C (use), -40° to +70°C (storage)
Dimensions and mass	30 (W) × 30 (H) × 37 (D) mm, <200 g			90 (W) × 133 (H) × 38 (D) mm, ≤300 g	90 (W) × 133 (H) × 38 (D) mm, ≤500 g

- * 1: CW, 25°C
- * 2: Used with FC-type connectors
- * 3: When connected with Anritsu GI fiber (50/125 μm, NA 0.2, 2 m)
- * 4: When connected with Anritsu SM fiber (10/125 μm, NA 0.1, 2 m)
- * 5: CW, 0° to 50°C (5 hour)
- * 6: CW, at ±1°C (1 minute) within 0° to +50°C
- * 7: Specify one connector among those shown in the specification table.
When no connector and manufacturer's name are specified, FC-type will be mounted and supplied.
Other than the connectors indicated in the table are dealt in special connectors of custom-made. The ordering method of optical connectors are indicated in the table on page 8.
- * 8: Laser Product Safety Standards: (IEC 60825-1 Class-1, FDA 21CFR Class-1)
- * 9: Laser Product Safety Standards: (IEC 60825-1 Class-1M, FDA 21CFR Class-2)
- *10: Connected with SM fiber (ITU-T G.652), 2 m
- *11: CW, at 0° to 40°C ambient temperature, 5 hour
- *12: Use the conversion cord (see ordering information) for other optical connectors

Safety measures for laser products

MS0908A complies with the optical safety standards in Class 1M of the IEC 60825-1 and the FDA (21CFR 1040.10, USA) in Class 2; the following descriptive labels are affixed to the product (FDA label is only affixed to product for export to the USA).



The maximum output is indicated under *1, and the wavelength under *2.

• Optical Sensors

Model		MA9421A	MA9422A	MA9423A	MA9621A	MA9622A ^{*1}
Wavelength range		0.38 to 1.15 μm			0.75 to 1.7 μm	1.2 to 1.7 μm
Element		Si diode			InGaAs diode	
Active area diameter		ϕ 9.5 mm	ϕ 9 mm	ϕ 9.5 mm	ϕ 1 mm	–
Input		Direct			FC, ST, DIN, HMS-10/A, SC type connector adaptor ^{*2}	FC, SC, ST, DIN, HMS-10/A, replaceable connector, PC polish
Measurement range	CW (dBm)	–60 to +20 (0.85 μm)	–50 to +20 (0.85 μm)	–70 to +10 (0.85 μm)	–70 to +3 (1.3 μm)	–50 to +23 (1.3/1.55 μm)
	MOD (dBm)	–65 to +17 (0.85 μm)	–50 to +17 (0.85 μm)	–75 to +7 (0.85 μm)	–75 to 0 (1.3 μm)	–55 to +20 (1.3/1.55 μm)
Measurement accuracy ^{*3}		$\pm 5\%$ ^{*4}		$\pm 5\%$ ^{*5}	$\pm 5\%$ ^{*6}	$\pm 5\%$ ^{*7}
Temperature range		0° to +50°C (use), –40° to +70°C (storage)				
Dimensions and mass		30 (W) \times 30 (H) \times 37 (D) mm, \leq 100 g	15 (W) \times 16 (H) \times 140 (D) mm, \leq 200 g	30 (W) \times 30 (H) \times 37 (D) mm, \leq 100 g		

*1: Applicable connector: SM fiber (ITU-T G.652)

Return loss: \geq 40 dB (1.55 \pm 0.2 μm , only when return loss of optical connector: \geq 45 dB)

Polarization dependency: \leq 0.1 dB (1.55 \pm 0.02 μm)

*2: Specify one connector among those shown in the specification table.

When no connector and manufacturer's name are specified, FC-type will be mounted and supplied.

Other than the connectors indicated in the table are dealt in special connectors of custom-made.

The ordering method of optical connectors are indicated in the table on page 8.

*3: Used with FC-type connectors

*4: At –10 dBm, 0.633/0.78/0.85 μm CW light mode

*5: At –10 dBm, 0.66/0.78/0.85 μm CW light mode

*6: At –10 dBm, 0.85/1.3/1.55 μm CW light mode

*7: At –10 dBm, 1.3/1.55 μm CW light mode

• MS0907A Return Loss Measurement Unit^{*1}

Applicable fiber	SM (10/125 μm , NA0.1)
Wavelength	1.31 \pm 0.03 μm (25°C)
Measurement range	0 to 40 dB (relative to total internal reflection cord, including output connector reflection)
Measured data display range	0 to 60 dB (relative to total internal reflection cord, excluding output connector reflection)
Measurement accuracy	\pm 1 dB (relative to the reflection, constant temperature)
Optical output connector ^{*2}	FC, ST, DIN, HMS-10/A, SC: PC-type
Temperature range	0° to +50°C (use), –40° to +70°C (storage)
Dimensions and mass	90 (W) \times 93 (H) \times 36 (D) mm, \leq 300 g

*1: Laser Product Safety Standards: IEC 60825-1 Class-1, FDA 21CFR Class-1

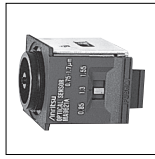
*2: Specify one connector among those shown in the specification table.

When no connector and manufacturer's name are specified, FC-type will be mounted and supplied.

Other than the connectors indicated in the table are dealt in special connectors of custom-made.

The ordering method of optical connectors are indicated in the table on page 8.

Optical Sensor
(MA9421A/9423A/9621A/
9622A)



LED Source
(MS0901A/0902A/0903A/
0904A/0906A)



LD Source
(MS0902D/0903D)



MA9422A Optical Sensor

MS9020D



LD Source
(MS0908A/0909A)

Fiber cord with plug



Bare fiber



Bare fiber



Fiber cord with plug



MA9014A
Bare Fiber Connector



Pigtail fiber



MA9013A Fiber Adaptor



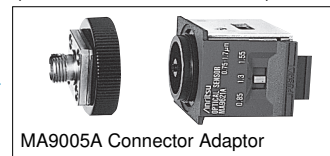
MA9004A Connector Adaptor attached

LED Source
(MS0901A/0902A/0903A/0904A/
0906A)

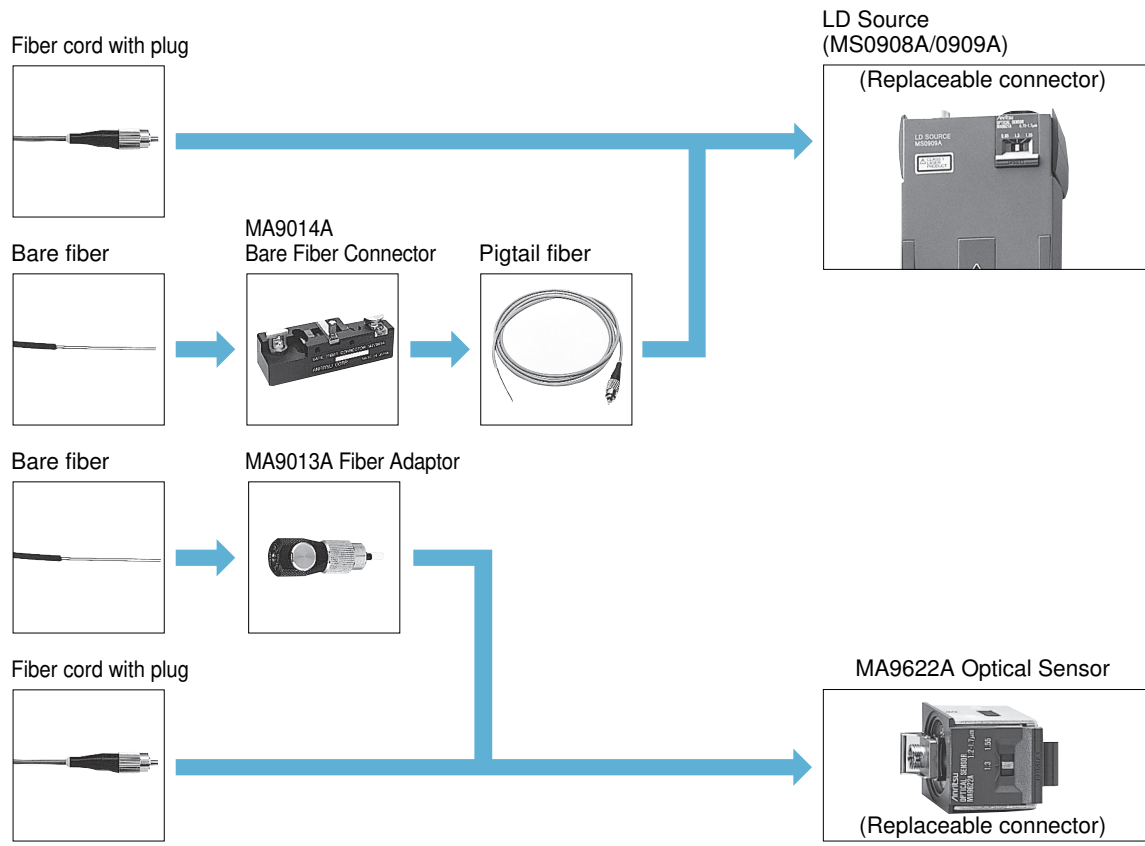
LD Source
(MS0902D/0903D)

FC or SC type integrated

Optical Sensor
(MA9421A/9423A/9621A)



MA9005A Connector Adaptor



Optical Connector Options Table

Model		Connector option number								
		32	33	37	38	39	40	41	42	43
		MU*1	LC*1	FC	ST	DIN47256	SC	TOCP172*2	HFS-13/A (GI)*2	HMS-10/A (SM)*1
LED sources	MS0901A			√	√	√	√	√	√	√
	MS0902A			√	√	√	√	√	√	√
	MS0903A			√	√	√	√	√	√	√
	MS0904A			√	√	√	√	√	√	√
	MS0906A			√	√	√	√	√	√	√
LD sources	MS0902D			√			√			
	MS0903D			√			√			
	MS0908A			√*3	√*3	√*3	√*3			√*3
	MS0909A			√*3	√*3	√*3	√*3			√*3
Optical power sensors	MA9421A	√	√	√	√	√	√	√	√	√
	MA9422A	√	√	√	√	√	√	√	√	√
	MA9423A	√	√	√	√	√	√	√	√	√
	MA9621A	√	√	√	√	√	√	√	√	√
	MA9622A			√*3	√*3	√*3	√*3			√*3
Optical return loss measuring unit	MS0907A			√*1	√*1	√*1	√*1			√

*1: Ferrule type; PC

*2: Ferrule type; Flat

*3: Ferrule type; PC (user replaceable and cleanable)

No marking: Ferrule type; Flat and PC.

Ordering information

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

Model/Order No.	Name
	– Mainframe –
MS9020D	Optical Loss Test Set (with Ni-Cd batteries)
	– Standard accessories –
Z0178	AC adaptor: 1 pc
J0017	Power cord, 2.5 m: 1 pc
J0599*1	AC operation adaptor: 1 pc
J0477*2	Continuant adaptor: 1 pc
J0597	Total internal reflection cord (for MS0907A only): 1 pc
W1306AE	MS9020D operation manual: 1 copy
	– LED Sources –
MS0901A	LED Source (MA9004A Connector Adaptor attached)
MS0902A	LED Source (MA9004A Connector Adaptor attached)
MS0903A	LED Source (MA9004A Connector Adaptor attached)
MS0904A	LED Source (MA9004A Connector Adaptor attached)
MS0906A	LED Source (MA9004A Connector Adaptor attached)
	– LD Sources –
MS0902D	LD Source (integrated with connector)
MS0903D	LD Source (integrated with connector)
MS0908A	LD Source (replaceable connector attached)
MS0909A	LD Source (replaceable connector attached)
	– Optical sensors –
MA9421A	Optical Sensor
MA9422A	Optical Sensor (thin type)
MA9423A	Optical Sensor
MA9621A	Optical Sensor (MA9005A Connector Adaptor attached)
MA9622A	Optical Sensor (for high power, replaceable optical connector attached)
	– Optical return loss measuring unit –
MS0907A	Optical Return Loss Measuring Unit

*1: It is the short connector, not using battery.

*2: Auto power OFF function is not effective, using battery.

*3: It is connected instead of an optical sensor.

Model/Order No.	Name
	– Optional accessories –
MA9004A	Connector Adaptor (for MS0901A/0902A/0903A/0904A/0906A)
MA9005A	Connector Adaptor (for MA9421A/9423A/9621A)
MA9006A	Sensor Adaptor (for optical sensors)
MA9013A	Fiber Adaptor (Clad diam. 125 μm; Jacket diam. 0.25 to 1 mm)
MA9014A	Bare Fiber Connector
MP93A	Fiber Adaptor (Clad diam. ≤150 μm)
MP94D	Connector Adaptor (used with MP93A)
J0436	Optical sensor cord S (for ML9002A, MS9020A/B/C/D)
J0438	Recorder output cord (mini-jack with clips)
J0598	Plastic fiber cord (φ 1 mm, NA 0.5), 2 m
J0200B	Optical fiber cord (GI fiber, 50/125 μm, NA0.2, FC-type), 2 m
J0056B	Optical fiber cord (SM fiber, 10/125 μm, NA0.1, FC-type), 2 m
Z0179	Carrying case
Z0180	Battery pack (for Alkali/Manganese cell, up to 4 pcs)
Z0181	Ni-Cd battery pack
Z0182	Soft case (MS0908A/0909A can not house)
Z0426	Carrying case (for MS9020D + MS0908A/0909A)
J0206A	FC-Diamond conversion cord, 1 m (for SM)
J0208A	FC-Biconical conversion cord, 1 m (for SM)
J0210A	FC-D4 conversion cord, 1 m (for SM)
J0517A	FC-DIN conversion cord, 1 m (for SM)
J0519A	FC-ST conversion cord, 1 m (for SM)
J0521A	FC-SC conversion cord, 1 m (for SM)
J0617B	Replaceable connector (FC) *For MA9622A, MS0908A/0909A
J0618D	Replaceable connector (ST) *For MA9622A, MS0908A/0909A
J0618E	Replaceable connector (DIN) *For MA9622A, MS0908A/0909A
J0618F	Replaceable connector (HMS-10/A) *For MA9622A, MS0908A/0909A
J0619B	Replaceable connector (SC) *For MA9622A, MS0908A/0909A
Z0333A*3	Wavelength selector *For MS0904A/0906A/0909A



Specifications are subject to change without notice.

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