

Measurement Microphone **MI Series**

Types to suit your needs include high sensitivity and wide frequency range models.
High degree of environmental stability against temperature and humidity.



ONO SOKKI

Condenser-type microphone with high reliability and measurement accuracy



From the sound of an air conditioner in quiet living room to the engine sound coming from a jet airplane, measurement for sound requires a high degree of accuracy as well as wide range of sound pressure levels and frequencies. To satisfy these requirements, condenser-type microphones are popularly used in sound and vibration measurement.

Our condenser microphones are equipped with a titanium diaphragm, which is infixed by laser welding. And also, our microphones keep extremely high stability performance owing to all of our accumulated technology. Several types of microphones with various sensitivity ranges are provided according to sound pressure or the frequency of the object to be measured.

Measurement microphone

Condenser-type microphones are small and have flat frequency responses over a wide range of frequencies, and moreover provide markedly high stability. Thus they are popularly used as measurement microphones. There are a wide variety of sizes (expressed in nominal diameter) such as 1-inch, 1/2-inch, and 1/4-inch. These are available depending on your requirements including measurement range of sound pressure or frequencies. The larger the diameter, the higher the sensitivity, and the smaller the diameter, sound can be measured at a higher frequency.

The structure of condenser-type microphone

Condenser-type microphones consist of a backplate and a diaphragm which convert air vibrations to electric signals. Vibrations of the diaphragm by pressure fluctuation (sound) make change of capacitance which is formed between the backplate and the diaphragm. Applying voltage between the diaphragm and the backplate, the change of capacitance is received as voltage signals, and sound pressure is measured.

Condenser-type microphones are available in two types: bias-type and back electret-type. The difference is the way to apply the DC voltage.

● Bias-type

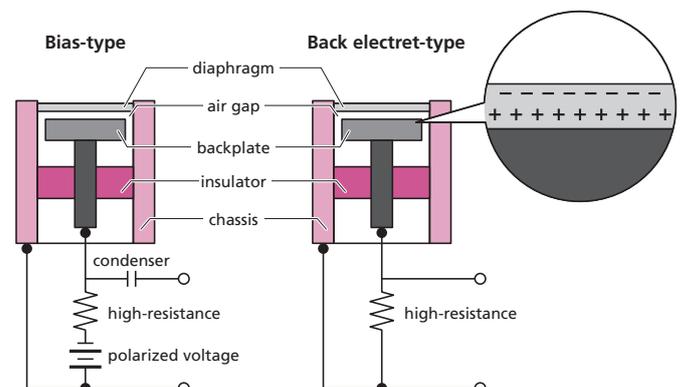
High voltage, generally DC voltage at 200V is supplied from external.

- Features**
- High sensitivity
 - High stability

● Back electret-type

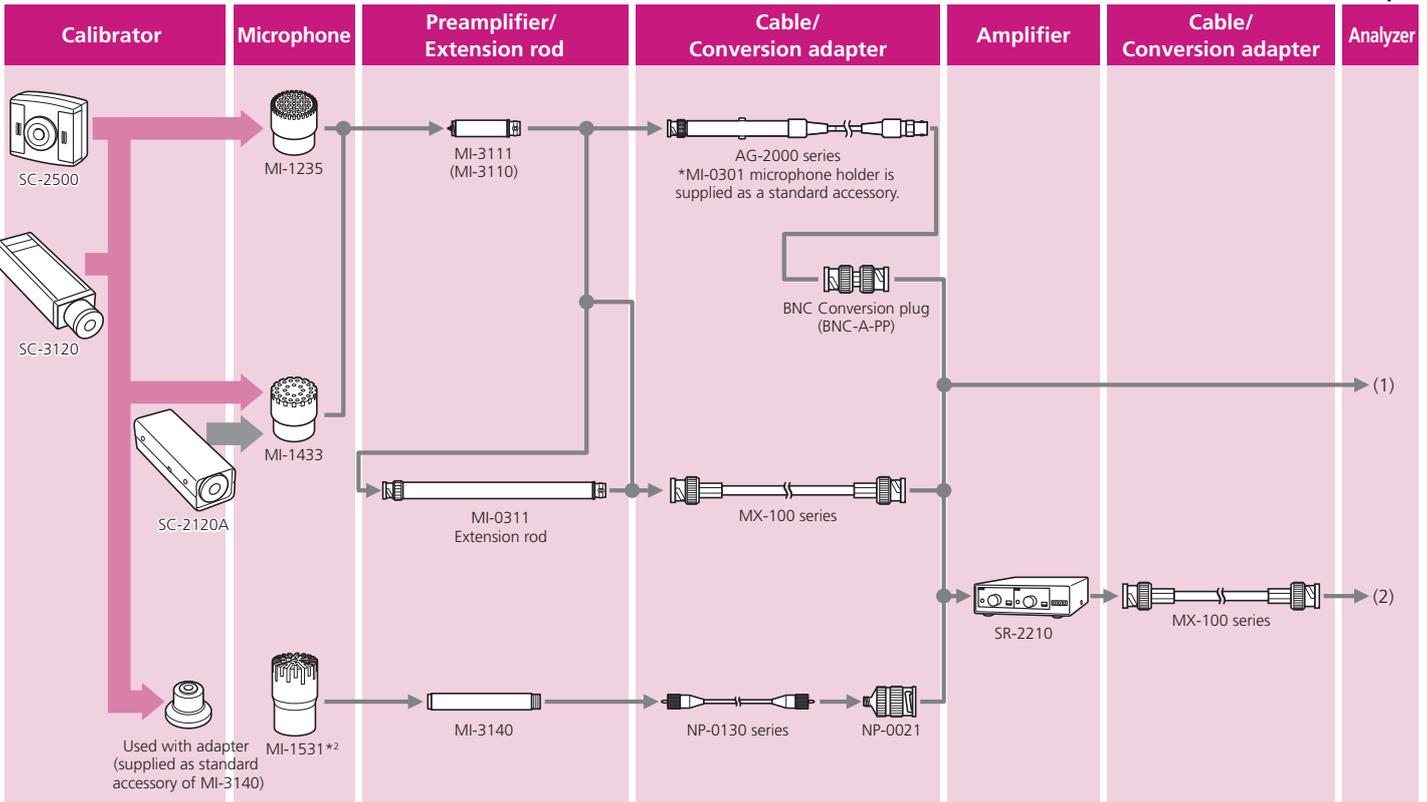
External voltage does not need since permanently electrically polarized polymer film is affixed to the surface of backplate in place of applying voltage.

- Features**
- No need for applying bias voltage.
 - Amplifier with lower price can be used compared with bias-type.



System configurations

*1



*1: Analyzer

- (1): CCLD (BNC connector)
- (2): Voltage input (BNC connector)



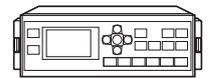
DS-3000 series



CF-9200/9400



CF-4700



DR-7100

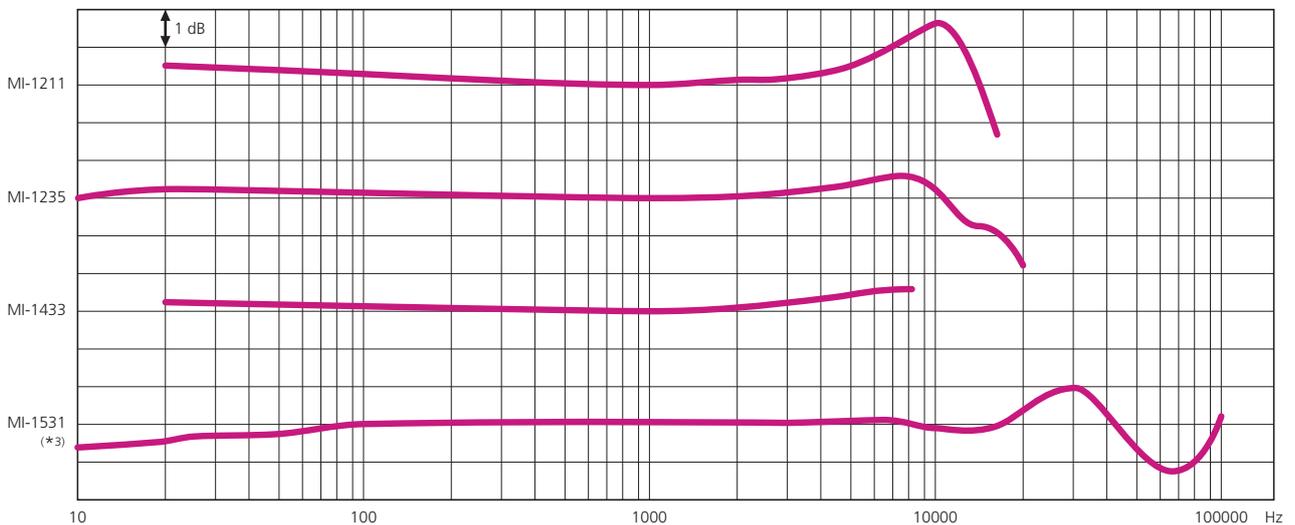
*2: Select connection (1) when the measurement of 20 kHz or more is performed with the MI-1531.

Select the CF-9200/9400 or DS-3000 (DS-0366 equipped) as an analyzer when the analysis 100 kHz max. is performed.

•CF-7200, DS-2000 (discontinued product) can be used with.

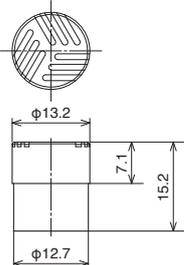
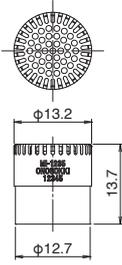
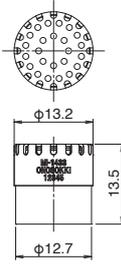
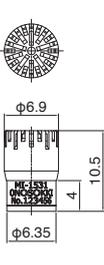
Example of microphone characteristic

Response to a Free Sound Field Incident From the Front of the Microphone



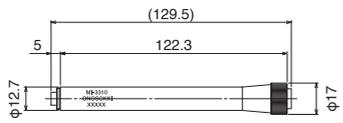
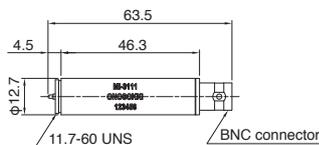
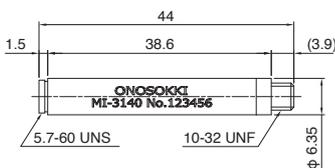
*3: Without a protective grid.

Measurement microphone

Model	MI-1211*	MI-1235	MI-1433	MI-1531
Feature	1/2-inch bias type	1/2-inch back electret type	1/2-inch back electret type	1/4-inch back electret type
	<ul style="list-style-type: none"> Useful for micro sound measurement 	<ul style="list-style-type: none"> Available for measurement of audible range Cost-effective type 	<ul style="list-style-type: none"> Low-cost type Useful for environmental measurement 	<ul style="list-style-type: none"> Wide band measurement (up to 100 kHz) Compact type
Appearance				
Response type	Sound field type	Sound field type	Sound field type	Sound field type
Bias voltage	200 V	0 V	0 V	0 V
Sensitivity	-20 dB \pm 1.5 dB re. 1 V/Pa (1 kHz)	-29 \pm 3 dB re. 1 V/Pa (1 kHz)	-29 \pm 3 dB re. 1 V/Pa (1 kHz)	-48 \pm 3 dB re. 1 V/Pa 4 mV/Pa (250 Hz)
Capacitance	12 pF	13 pF	13 pF	7 pF
Frequency range	20 Hz to 14 kHz	10 Hz to 20 kHz	20 Hz to 8 kHz	10 Hz to 100 kHz
Effective front volume	9.3 mm ³ (250 Hz)	9.4 mm ³ (250 Hz)	9.4 mm ³ (250 Hz)	0.6 mm ³ (250 Hz)
Maximum sound pressure	132 dB (MI-3310 in used)	143 dB (MI-3310 in used) 135 dB (MI-3111 in used)	143 dB (MI-3310 in used) 135 dB (MI-3111 in used)	157 dB (MI-3140 in used)
Intrinsic noise level	12 dB or less (A-weighting)	19 dB or less (A-weighting)	19 dB or less (A-weighting)	30 dB or less (A-weighting)
Static pressure characteristics (at 250 Hz)	–	-0.03 dB/kPa or less	-0.03 dB/kPa or less	-0.0008 dB/kPa or less
Temperature characteristics (at 250 Hz)	+0.007 dB/K or less	+0.009 dB/K or less	+0.009 dB/K or less	+0.01 dB/K or less
Humidity characteristics (at 250 Hz)	-0.003 dB/% or less	-0.001 dB/% or less	-0.001 dB/% or less	–
Operating temperature range	-10 to +50 °C	-10 to +50 °C	-10 to +50 °C	-10 to +50 °C
Operating humidity range	30 to 90 % (with no condensation)	20 to 90 % (with no condensation)	20 to 90 % (with no condensation)	0 to 90 % (with no condensation)
Storage temperature range	-20 to +80 °C	-20 to +60 °C	-20 to +60 °C	-40 to +150 °C
Storage humidity range	0 to 90 % (with no condensation)	10 to 90 % (with no condensation)	10 to 90 % (with no condensation)	0 to 90 % (with no condensation)
Weight	Approx. 5 g	Approx. 6 g	Approx. 6 g	Approx. 1.5 g
Outer dimension	ϕ 13.2 \times 15.2 mm	ϕ 13.2 \times 13.7 mm	ϕ 13.2 \times 13.5 mm	ϕ 6.9 \times 10.5 mm
Dimensional outline drawing (unit: mm)				

* It requires AU-2200 (discontinued product) for the use.

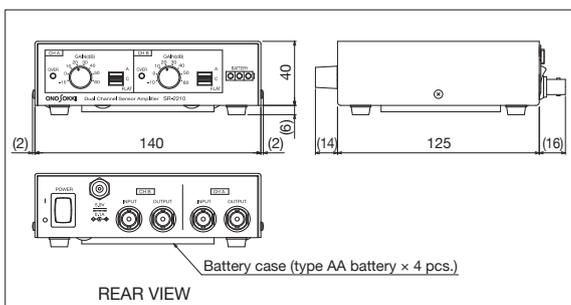
Microphone preamplifier

Model	MI-3310*2	MI-3111	MI-3140
Feature	for 1/2-inch bias/back electret type microphone	for 1/2-inch back electret type microphone	for 1/4-inch back electret type microphone
	<ul style="list-style-type: none"> Requires microphone amplifier 	<ul style="list-style-type: none"> CCLD*1 type Smart connection with BNC connector Cost-effective and useful for multi-channel measurement 	<ul style="list-style-type: none"> CCLD*1 type Useful for measurement in a limited space Supports wide frequency range Supports large sound pressure
Appearance			
Applicable microphone	MI-1211*2/1235/1433 (old model: MI-1233/1234/1431/1432)	MI-1235/1433 (old model: MI-1233/1234/1431/1432)	MI-1531
Insertion loss	2.4 ±1.0 dB (at 1 kHz)	1.5 dB or less (at 1 kHz), 1.0 dB (Typical)	0.25 dB (Typical)
Frequency range	10 Hz to 100 kHz (reference: ±1.0 dB, 1 kHz)	10 Hz to 20 kHz (reference: ±1.0 dB, 1 kHz) 20 Hz to 20 kHz (reference: ±0.6 dB, 1 kHz)	10 Hz to 100 kHz (reference: ±0.5 dB or less)
Input resistance	5 GΩ	5 GΩ	20 GΩ
Intrinsic noise level (Effective voltage) (Z-weighting)	31.6 μV or less	22.3 μV or less	6.0 μV or less (20 Hz to 20 kHz)
Harmonic distortion (at 1 kHz)	0.5 % or less (Input effective voltage 7 V)	1 % or less (Input effective voltage 3 V)	3 % or less (Input effective voltage 8 V)
Maximum output voltage	7 V (effective voltage, at power source ±18 V)	3 V (effective voltage, at power source 15 VDC)	8 Vp (at power source 24 VDC)
Output resistance (at 1 kHz)	60 Ω	approx. 200 Ω	50 Ω
Operating temperature range	-10 to +50 °C	-10 to +50 °C	-30 to +60 °C
Operating humidity range	25 to 90 % (with no condensation)	25 to 90 % (with no condensation)	0 to 90 % (with no condensation)
Storage temperature range	-20 to +60 °C	-20 to +60 °C	-30 to +80 °C
Storage humidity range	10 to 90 % (with no condensation)	10 to 90 % (with no condensation)	0 to 95 % (with no condensation)
Power supply	±15 to 18 V ±5 %	CCLD* 0.5 to 5 mA, 15 to 25 VDC	CCLD* 2 to 20 mA, 15 to 25 VDC
Applicable connector	R04R6F (Tajimi electronics)	C02 (BNC)	10-32 UNF
Weight	Approx. 60 g (not including the microphone)	Approx. 25 g (not including the microphone)	Approx. 5.5 g (not including the microphone)
Outer dimension	φ12.7 × 129.5 mm	φ12.7 × 63.5 mm	φ 6.35 × 44 mm
Accessory	Input protection cap × 1	Input protection cap × 1 MI-0301 Microphone holder × 1	Input protection cap × 1 SC-0313 1/4-inch conversion adapter × 1
Signal cable	AG-3400 series (recommend) AG-3300 series	AG-2000 series (recommend) MX-100 series	NP-0130 series (recommend)
Dimensional outline drawing (unit: mm)			

*1: CCLD= Constant Current Line Drive

*2: The MI-1211 and MI-3310 require AU-2200 (discontinued product) for the use.

SR-2210 Amplifier



Features

- Two channels input
- Dual power source: battery or AC adapter (PB-7090: option)
- Providing following weighting: Flat, A and C (filter for measurement of sound pressure level)
- Stackable for multiple channels
- Enables to connect with microphone amplifier or accelerometer with CCLD technology.

The SR-2210 sensor amplifier accepts constant-current line drive sensors. With compact, light-weight, both AC adapter and battery operation, it can be used in any place. It enables simultaneous processing such as stereo recording, sound and vibration measurement with two-channel input.

Specification

Input Section	Constant current power supply	Current 2.4 mA ($\pm 20\%$) / applied voltage: approx. 18 V
	Number of channels	2
	Operating frequency range	1 Hz to 20 kHz (± 0.5 dB), load impedance 100 k Ω or more
	Input impedance	1 M Ω $\pm 0.5\%$
	Input cutoff frequency	Approx. 0.16 Hz
	Input voltage range	12.5 dBVrms or less (± 6 V)
	Gain	-10, 0, 10, 20, 30, 40, 50, 60 dB (8 stages selectable in 10 dB step, ± 0.2 dB)
	Frequency weighting	A/C/FLAT (Z) (conforming standards: IEC 61672:2002 Class1, JIS C 1509: 2005 Class1)
	Output cutoff frequency	approx. 0.2 Hz (load impedance : 100 k Ω or more) approx. 0.4 Hz (load impedance : 50 k Ω or more)
	Input-converted intrinsic noise	A -105 dBVrms or less C -100 dBVrms or less FLAT -95 dBVrms or less
Input / output connectors	BNC (CO2 type)	
Output Section	Output voltage	12.6 dBVrms or less (± 6 V)
	Max. output cable length	30 m or less
General	Power supply	Type AA battery \times 4 pcs. External power supply: PB-7090 * AC adapter (option)
	Battery life	Approx. 20 hours or more (with alkaline battery \times 4 pcs.)
	Operating temperature range	-10 to +50 $^{\circ}$ C
	Operating humidity range	30 to 90 % (with no condensation)
	Storage temperature range	-20 to +60 $^{\circ}$ C
	Storage humidity range	10 to 90 % (with no condensation)
	Outer dimensions	140 (W) \times 40 (H) \times 125 (D) mm (not including protruded section)
	Weight	Approx. 500 g (including batteries)
Accessory	Instruction manual \times 1 copy, battery (LR6) \times 4 pcs.	

*Sold separately: 100 VAC input

MI-8100 Directional Microphone



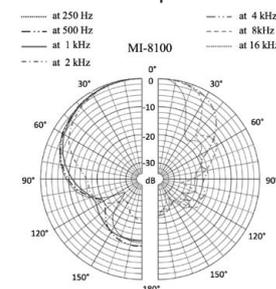
*MI-8100 is not recommended as a measurement microphone including sound pressure measurement. Please use it to obtain a sound for the purpose of hearing the directional feature of the sound.

MI-8100 is a shotgun type directional microphone which sharply catches the intended sound. Flat frequency characteristic from 50 Hz to 20 kHz and sharp detection with high S/N ratio provide high sensitive detection of various sound coming from the specific direction.

Specification

Sensitivity	-30 dB \pm 3 dB re. 1 V/Pa
Frequency band	50 Hz to 20 kHz
Directivity	Narrow angle directivity
Input equivalent noise	26 dB (A) or less
Maximum sound pressure	137 dB (driven voltage 24 V)
Drive side format	Constant current line drive
Power requirement	Constant current: 2 to 4 mA Voltage: 18 to 24 V
Operating temperature range	-10 to +40 $^{\circ}$ C
Storage temperature range	-20 to +50 $^{\circ}$ C
External dimensions	ϕ 19 \times 197 mm
Weight	Approx. 125 g
Standard accessory	Windscreen

MI-8100 Polar pattern



BL-1100 Acoustic Vibration Monitor



By combining the directional microphone MI-8100, you can filter the sound to catch only the intended sound more effectively. It also is helpful for removal of background noise in abnormal sound detection.

Specification

Frequency range	20 Hz to 20 kHz
Equalizer center frequency	5 bands (100 Hz, 340 Hz, 1 kHz, 3.4 kHz, 10 kHz)
Equalizer range	± 20 dB
Input connector	Microphone input: ϕ 6.3 mm pin-jack plug-in-power supported BNC input: CCLD type preamplifier (4 mA/24 V)
Headphone output	ϕ 6.3 mm pin-jack output (monaural output, stereo headphone supported)
Power requirement	6F22 or 6LR61 (9 V) \times 1 or AC adapter (TA2096, sold separately)
Battery life	Approx. 8 hours or more (alkaline batteries used at room temperature)
Outer dimensions	90 (W) \times 35 (D) \times 135 (H) mm (not including protruded section)
Weight	Approx. 200 g (not including battery cells)

Sound Calibrator

SC-3120 **Class 1**



Precise standard sound source of pistonphone-type for use in calibration of measurement microphone. It enables to calibrate for high sound pressure level.

SC-2500 **Class 1**



SC-2500 uses a sound pressure feedback control method to control fluctuations in sound pressure caused by static pressure. It generates a stable sound pressure even if the operating environment is changed. Useful for inspection and maintenance of sound level meters. Cost-effective model.

SC-2120A **Class 2**



Dynamic speaker-type simplified sound calibrator for 1/2-inch microphone only which is used in operational checking. Adapting dynamic speaker method enables long time operation (up to twenty hours of continuous operation) and low price.

Specification

Model	SC-3120	SC-2500	SC-2120A
Applicable standard	JIS C 1515: 2004 Class 1/C IEC 60942: 2003 Class 1/C	JIS C 1515: 2004 Class 1 IEC 60942: 2003 Class 1 ANSI S1.40-2006 (R2011)	JIS C 1515: 2004 Class 2 IEC 60942: 2003 Class 2
Method	Piston-phone	Dynamic speaker	Dynamic speaker
Applicable microphone	1/2-inch microphone: MI-1211* ³ /1235/1433 1/4-inch microphone: MI-1531* ¹ (old model: MI-1233/1234/1431/1432)		1/2-inch microphone: MI-1211* ³ /1433 (old model: MI-1233/1234/1431/1432)
Sound pressure level			
Nominal sound pressure level	114 dB	114 dB	94 dB
Sound pressure deviation	±0.4 dB or less* ²	±0.25 dB or less* ²	±0.5 dB or less* ²
Total distortion	2.5 % or less	0.5 % or less	0.5 % or less
Frequency			
Nominal frequency	250 Hz	1000 Hz	1000 Hz
Frequency deviation	±0.4 % or less* ²	±0.5 % or less* ²	±1 % or less* ²
Operating environment	Ambient temperature: -10 to 50 °C (with no condensation) Static pressure: 65 to 108 kPa Relative humidity : 25 to 90 % *excluding ambient temperature and humidity that exceeds 39 °C or more.		
Power supply	Type AA battery (R6P or LR6) × 3 pcs.	Type AA battery (LR6 or HR6) × 2 pcs.	9 V flat battery (6F22 or 6LR61) × 1 pcs.
Battery life	2.5 hours or more continuous operation (when using R6P)	4 hours or more continuous operation (when using LR6)	20 hours or more continuous operation (when using 6F22)
Outer dimension	60 (W) × 38 (H) × 200 (D) mm	84 (W) × 53 (H) × 76 (D) mm	52 (W) × 45 (H) × 130 (D) mm
Weight	Approx. 600 g (not including batteries)	Approx. 200 g (not including batteries)	Approx. 300 g (not including a battery)
Accessory	Instruction manual × 1 copy, Barometer × 1 set, Type AA battery (R6P) × 3 pcs., Storage case × 1, SC-0312 (1/2-inch adapter) × 1 (attached to main unit)	Instruction manual × 1 copy, Type AA battery (LR6) × 2 pcs.	Instruction manual × 1 copy, 9V fiat battery (6F22) × 1 pcs.

*1: The SC-0313 adapter is required (provided as a standard accessory of the MI-3140).

*2: The value under the standard environment. (Standard environment condition: air temperature 23 °C, static pressure 101.325 kPa, relative humidity 50 %)

*3: It requires AU-2200 (discontinued product) for its use.

Signal Cable

Applicable signal cable	For MI-3310		For MI-3111				For MI-3140	
	AG-3400 series* ¹		AG-2000 series* ¹ * ³ (recommend)		MX-100 series		NP-0130 series* ⁴	
	Model	Length	Model	Length	Model	Length	Model	Length
	AG-3401	5 m	AG-2010	10 m	MX-101	1.5 m	NP-0131	1.5 m
	AG-3402	10 m	AG-2030	30 m	MX-105	5 m	NP-0132	3 m
	AG-3403	20 m	AG-2050	50 m* ²	MX-110	10 m	NP-0133	5 m
	AG-3404	30 m	AG-2100	100 m* ²	MX-115	15 m	NP-0134	10 m
					MX-120	20 m		

*1: The MI-0301 Microphone holder is attached as a standard.

*2: With a code reel.

*3: The BNC-A-PP BNC conversion plug is necessary (option).

*4: The NP-0021 BNC conversion plug is necessary (option).

Options

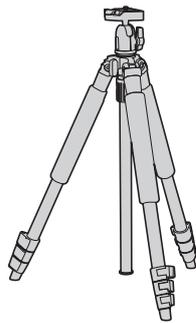
Product name	Model name	Description
Microphone holder	MI-0301	Microphone holder for 1/2-inch microphone and tripod (provided as a standard accessory of the MI-3111/3110, AG-2000/3300/3400 series)
Extension rod	MI-0311	Extension rod for MI-3111/3110 preamplifier
Signal cable	AG-3400 series	Signal cable for MI-3310 (5 m, 10 m, 20 m, 30 m)
	AG-2000 series	Signal cable for MI-3111/3110 (10 m, 30 m, 50 m: with code reel, 100 m: with code reel) BNC conversion plug (BNC-A-PP) is sold separately.
	MX-100 series	Signal cable for MI-3111/3110 (1.5 m, 5 m, 10 m, 15 m, 20 m)
	NP-0130 series	Signal cable for MI-3140 (1.5 m, 3 m, 5 m, 10 m)
Miniature/BNC conversion adapter	NP-0021	Conversion adapter (converts micro-dot connector to BNC)
Microphone holder adapter	MI-0302	Screw conversion adapter for MI-0301 (converts 1/4-inch screw to 3/8 inch screw.)
Microphone holder for MI-8100	–	With 3/8-inch female screw (made by SANKEN Microphone.co.jp) SH-1
Hand grip for MI-8100	–	Used in combination with a holder. With 3/8-inch female screw (made by SANKEN Microphone co.jp) HG-1
Screw conversion adapter for MI-8100	–	Converts 3/8-inch female screw to 1/4-inch (made by SANKEN Microphone co.jp) 1/4 (stand side/camera) ↔ 3/8 (holder side, AKG) screw adapter
AC adapter	TA2096	AC adapter for BL-1100 (100 VAC)
	PB-7090	AC adapter for SR-2210 (100 VAC) (made by AIKOH ELECTRONICS CORP. and HIRAKAWA HEWTECH CORP.) *Not used with SR-2200.

● Windscreen $\phi 70\text{mm}$



*Supports MI-3111/3310.
(Not supported MI-3140)

● Tripod LA-0203C



(Made by SLIK Corporation)

● Microphone holder MI-0301



*Provided as a standard of AG-2000/3000 series and MI-3111

● All-weather Windscreen $\phi 200\text{mm}$



LA-0207 + LA-0208
Cable: AG-2000 series

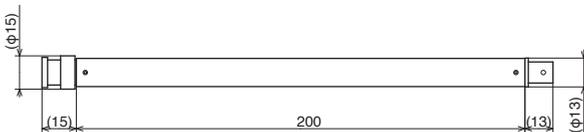
LA-0207
Cable: AG-3000 series, MX-100 series

*Supports MI-3111 (Not supported MI-3310 /3140)

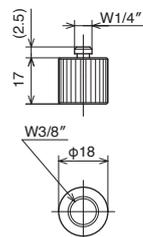
*LA-0203C is required.

● Extension rod (for MI-3111) MI-0311

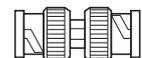
Useful for distance adjustment to a measurement object. It reduces the sound diffraction from a fixing stand.



● Conversion screw (1/4" → 3/8") MI-0302



● BNC conversion plug (for AG-2000 series) BNC-A-PP



ONOSOKKI

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