DENON

MC Phono Cartridges

DL-1000A/305/303/301
DL-300/207/103M/103D
DL-103S/103/160/110

An Incredibly Light Effective Mass of 0.077 mg.!

Contemporary high quality recordings often contain music with a wide frequency range and sharp transients. Because of this, their grooves are extremely erratic, making proper tracing a challenge for even the finest cartridges. Especially in highly percussive or dynamic passages, forces much higher than average are applied against the groove wall by the stylus tip. The degree of this force corresponds to the effective mass of the stylus itself.

Unbelievable Tracing Ability

The fundamental object of disc music reproduction is to accurately trace the groove while protecting it from damage such as abrasion. DENON's DL-series cartridges, including the state-of-the-art DL-1000A, have been created to set new standards for overall performance. In particular, mechanical impedance has been reduced markedly for a dramatic improvement in MC cartridge performance. The cartridges in this series feature cantilevers formed of amorphous boron micro-tubing by an entirely new chemical vapor deposition process. The end result is that by reducing effective mass, and thus mechanical impedance, acoustic as well as tracing performance is better than ever.

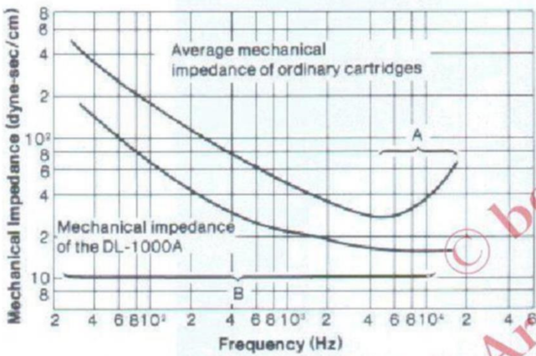


Fig. 1 Mechanical impedance characteristics

Reduction of effective mass reduces mechanical impedance in high frequency region, A.
Higher compliance with optimum damping reduces mechanical impedance in low to mid range, B

Example of the cantilever material and the effective mass of vibration system

Model	Effective mass	Cantilever	Tracking force
DL-1000A	0.077 mg	Amorphous boron pipe	0.8±0.1 g
DL-305	0.168 mg	Amorphous boron pipe	1.2±0.2 g
DL-303	0.18 mg	Aluminum tapered pipe	1.2±0.2 g
DL-301	0.27 mg	Aluminum tapered pipe	1.4±0.2 g
DL-207	0.25 mg	Amorphous boron pipe	1.4±0.2 g

DENON's state-of-the-art DL-1000A has an effective mass of only 0.077 mg, incredibly light for a phono cartridge, and unbelievable for an MC cartridge. And all other DENON MC cartridges feature infinitesimal effective mass specs.

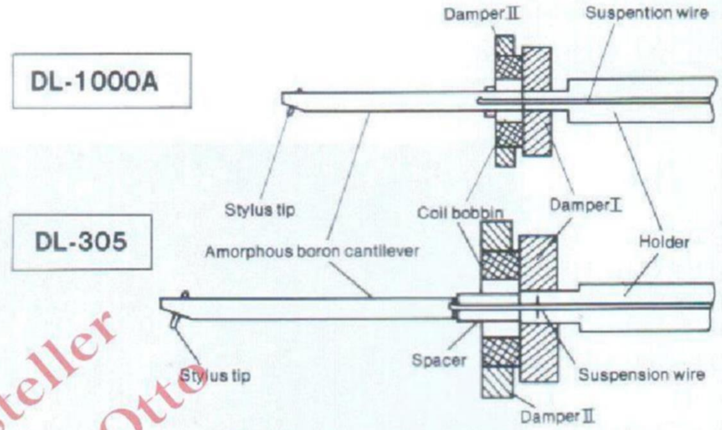


Fig. 2 Miniaturized vibration system

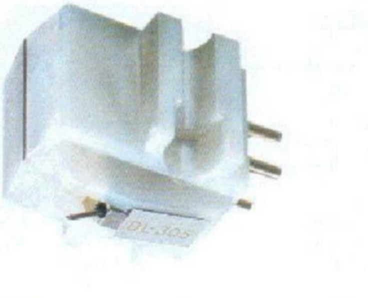
Wide Frequency Generation System

It is DENON's unique armature design that contributes to accurate tracing over a wide frequency range. For accurate tracing, especially in the high frequency region, mechanical impedance must be reduced to allow a high compliance suspension system. As well, the effective mass at the stylus tip must also be reduced. With a heavy armature, the stylus is not as sensitive to the extremely fine groove pattern of high frequency signals, and therefore is not able to trace the groove smoothly and accurately. Because of this, the delicate record groove can be temporarily deformed. In some cases, it is permanently damaged, with some high frequency content wiped away forever. Therefore, cartridges with lower effective mass not only help afford improved frequency response, but also preserve record quality.

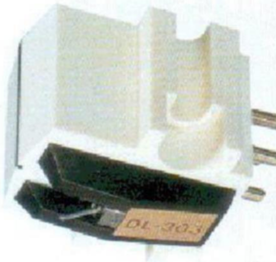
Example of the cantilever material and the tracking force

Model	Cantilever	Tracking force
DL-300	Special aluminum pipe	1.8±0.3 g
DL-103M	Amorphous boron pipe	1.4±0.2 g
DL-103D	Aluminum tapered pipe	1.5±0.2 g
DL-103S	Special aluminum pipe	1.8±0.3 g
DL-103	Special aluminum pipe	2.5±0.3 g
DL-160	Aluminum tapered pipe	1.6±0.3 g
DL-110	Special aluminum pipe	1.8±0.3 g

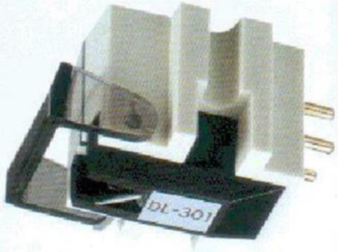
By reducing the weight of the armature assembly, and minimizing mechanical impedance, the DL-1000A boasts of frequency response up to 110 kHz.
And for corresponding improvements in performance, other cartridges in the DL-series feature remarkable specifications.



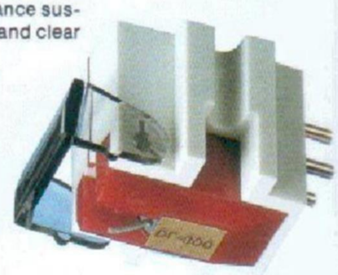
DL-305 Moving Coil Stereo Cartridge
Amorphous Boron, the ideal cantilever material, has been adopted. With a wall thickness of 25 microns, an effective mass of 0.168 mg has been achieved to extend frequency response to 75 kHz for wide frequency performance. The one-point suspension system reduces noise, with the cross-pattern armature coils and samarium cobalt magnets providing improved sensitivity.



DL-303 Moving Coil Stereo Cartridge
Using specially-formed aluminum micro-tubing in the tapered cantilever and non-ferrous core type generating coils, the effective mass has been reduced, allowing a higher compliance suspension to be used. The result is sharp and clear tracing performance.



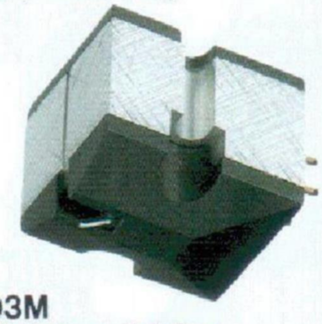
DL-301 Moving Coil Stereo Cartridge
The cantilever is made of specially-formed aluminum micro-tubing tapered towards the stylus tip. By adopting a newly-developed two-way damping system and a direct linear-flux generation system, flat and stable response throughout the entire audio frequency spectrum is assured.



DL-300 Moving Coil Stereo Cartridge
By adopting a newly-developed two-way damping system, direct flux generation system and a aluminum micro-tubing in the tapered cantilever, flat and stable response. The one-point suspension system reduces noise, with the cross pattern amature coils and samarium cobalt magnets providing improved sensitivity.

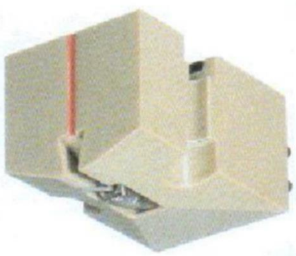
DL-160 Moving Coil Stereo Cartridge
High output voltage MC cartridge requring no head amp or step-up transformer. With the employment of the double construction aluminum tapered cantilever and one-point suspension system, greatly expanded dynamic range, wide frequency range and high tracing ability have been achieved.

DL-207 Moving Coil Stereo Cartridge
Featuring the same amorphous boron cantilever as found in the DL-305, the DL-207 has a two-way damping system. And in the generation system, samarium cobalt magnets are adopted. Working together, these features deliver super-responsive performance for today's music.

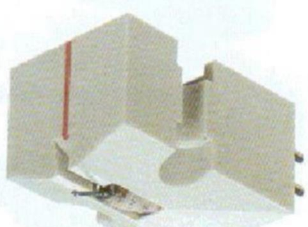


DL-103M
Moving Coil Stereo Cartridge
DENON's exclusive amorphous boron micro-tubing is used for its high stiffness and microscopic tube wall thickness. The result is flat and wide frequency response with improved tracing properties at low stylus forces. The one-point suspension system has been employed for perfect balance and stereo imaging.

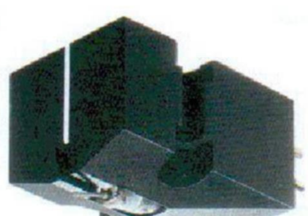
DL-110 Moving Coil Stereo Cartridge
High output voltage MC cartridge requiring no head amp or step-up transformer. DENON's unique one point suspension, light weight armature assembly affixed on the double construction cantilever offer pure MC sound at a popular price.



DL-103D
Moving Coil Stereo Cartridge
The greatly improved model in the 103 series, taking performance to the limit of the original 103 design. The double-construction tapered cantilever has excellent stiffness properties while mass has been reduced. And by improving tracing performance at low tracking force, wide frequency response is delivered, giving you the power and dynamics of today's recordings at a scale you never thought possible.

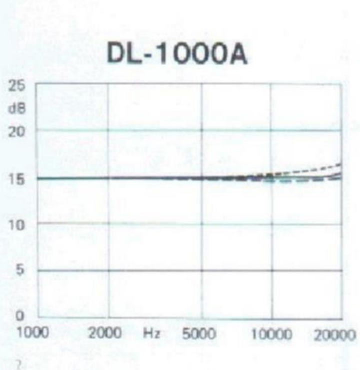


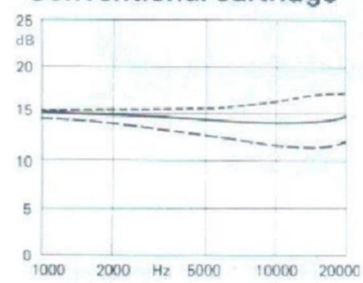
DL-103S
Moving Coil Stereo Cartridge
An improvement on the basic design of the famous DL-103. A cantilever, suspension, damping system of superior materials and a finely finished diamond stylus all work together to lower the weight of the entire assembly so that higher compliance is possible. At low tracking forces, tracing is clearer and sharper, with response all the way up to 60 kHz for true high-fidelity playback.



DL-103 Moving Coil Stereo Cartridge
The basic model of the 103 series that started the boom in MC cartridges. It faithfully reproduces the program source with superior stability. First used in radio stations all over Japan, it was created under DENON's design policy of quality without compromise. A universal reference model.

Frequency response by the temperature change

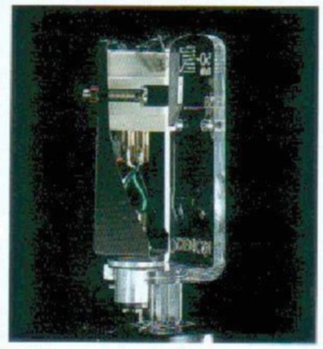




Record groove is damaged by large tracing force

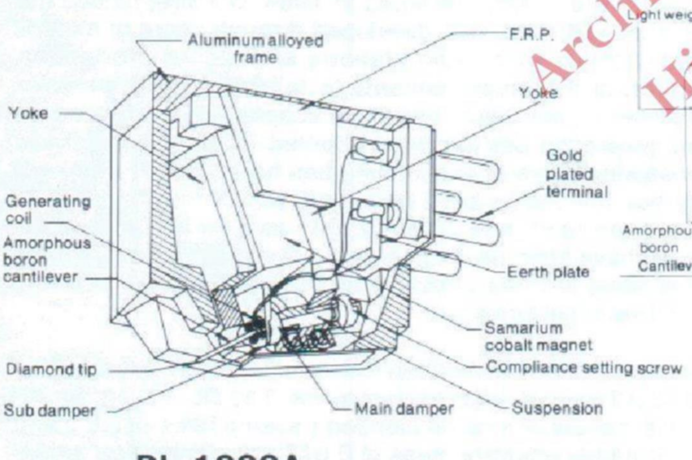
The DL-1000A comes complete with a velvet-lined case. Up to five headshell-mounted cartridges can be stored inside. And the mounting base inside can be used as a disc stabilizer after the cartridge has been fitted to a tonearm.

DL-300/T has an exclusive transformer for the wide frequency range.

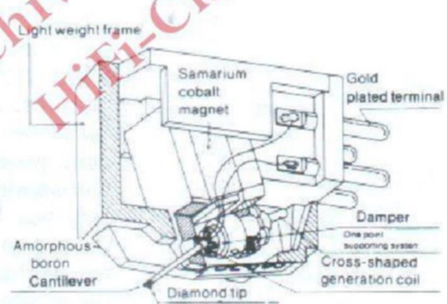


Cartridge holder for easy over hanging adjustment.

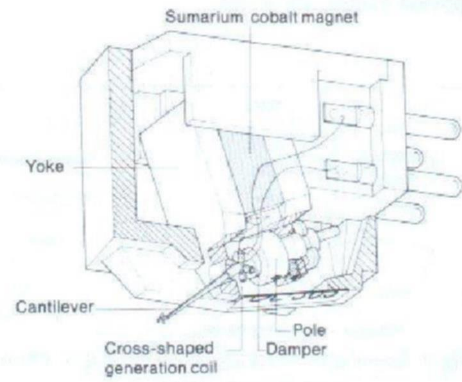
Constructional illustration



DL-1000A

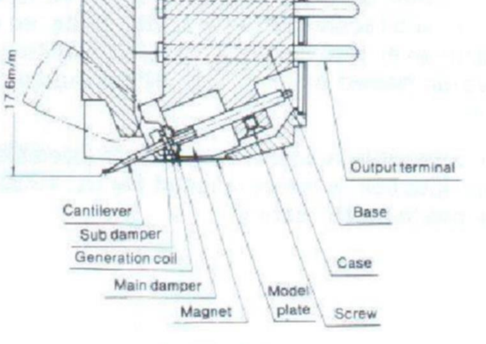


DL-305



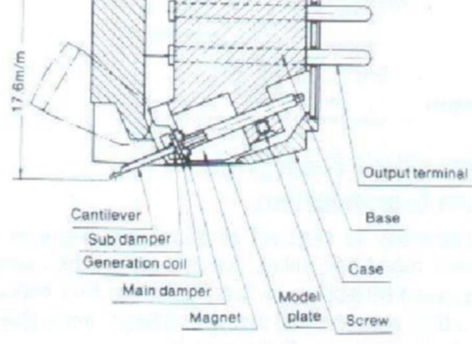
Vibration system

DL-303



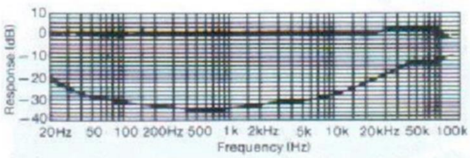
Vibration system

DL-301

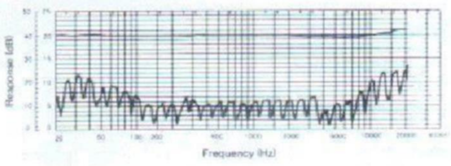


DL-300

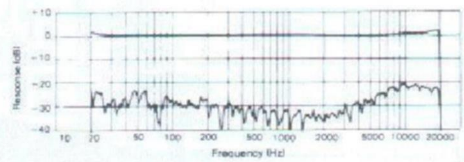
Frequency Response (Output Voltage and Crosstalk)



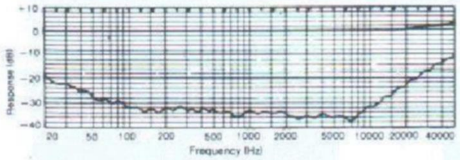
DL-1000A



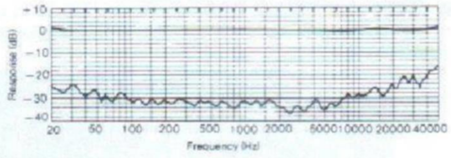
DL-305



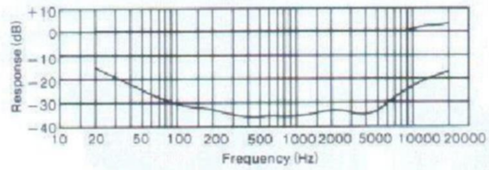
DL-303



DL-301



DL-300



DL-207

Construction of the DL-Series

Figures 3 and 4 show both the armature construction and the generator coil design. All the DL-series uses a one-point support to prevent resonance parallel to the cantilever, yet allowing equal movement in both the horizontal and vertical planes. DENON's ultra-light armature assembly, cantilever, and diamond stylus tip affords very low effective mass. As well, independent generating coils wrapped around the cross-pattern armature results in excellent separation with reduced left/right level differences and uniform frequency response characteristics.

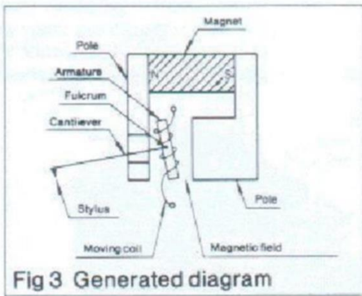


Fig 3 Generated diagram

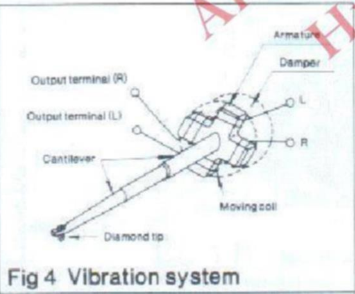


Fig 4 Vibration system

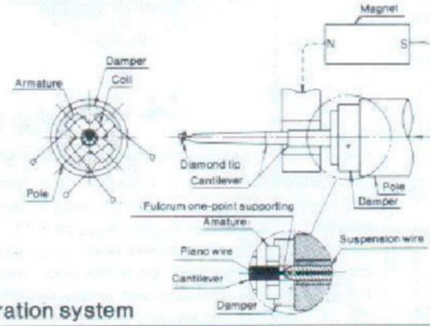


Fig 5 Vibration system

A Rational Armature Design for Low-distortion Generation

The armature assembly is placed at the right angle in the parallel and uniform magnetic field. As the stylus tip moves, the relative density and direction of the magnetic flux through the armature will vary, generating output voltage from the respective coils for the right and left channels.

Even when the angle of the armature varies as the stylus force changes, the center of this movement remains the same. This prevents dynamic imbalance in the generation system. Distortion caused by force variations as well as dynamic imbalance are prevented for stable output and low distortion.

Broadcast-proven, Reliability from Years of R & D and Field Tests

After years of development in co-operation with NHK, Japan's national broadcasting network, DENON MC cartridges were finally marketed in 1964. Our first model, the legendary DL-103, was developed through years of experimentation in both radio stations and record production monitoring. For improvements in reliability, a double-layer cantilever construction, one-point suspension, and independant generation designs were adopted. The results of these painstaking years of experimentation have paid off well—not only has the design been perfected, but all the components have been lightened considerably as new material techniques have been developed. And not surprisingly, these improvements are now affecting MM cartridges as well, raising their level of performance.

This new DENON technology has resulted in an amazing new standard of cartridge performance. The DL-1000A, for instance, boasts of a recommended tracking force of 0.8 g and an incredible effective mass of 0.077 mg, allowing for an extremely high compliance of 20×10^{-6} cm/dyne (static 50×10^{-6}). And frequency response of 20 Hz all the way up to 110 kHz is delivered. Ideal tracing capability is assured by the DL-1000A because it has one of the world's lightest effective mass and recommended tracking force, an amorphous boron cantilever that exhibits ideal stiffness properties, and a design based on the DENON's concept of "Sound Quality First."

Unbelievable realism never before possible with disc music reproduction is the promise of the DL-1000A and all the cartridges in the DL-series.

DENON

Specifications

	DL-1000A	DL-305	DL-303	DL-301
Type	Moving coil	Moving coil	Moving coil	Moving coil
Output voltage	0.12 mV (1 kHz, 50 mm/sec)	0.2 mV (1 kHz, 50 mm/sec)	0.2 mV (1 kHz, 50 mm/sec)	0.3 mV (1 kHz, 50 mm/sec)
Frequency response	20 Hz—110 kHz	20 Hz—75 kHz	20 Hz—70 kHz	20 Hz—60 kHz
Output impedance	33 Ω	40 Ω	40 Ω	40 Ω
Load impedance	More than 100 Ω	More than 100 Ω	More than 100 Ω	More than 100 Ω
Channel separation	More than 30 dB (1 kHz)	More than 28 dB (1 kHz)	More than 28 dB (1 kHz)	More than 28 dB (1 kHz)
Channel sensitivity difference	1 dB or less (1 kHz)	1 dB or less (1 kHz)	1 dB or less (1 kHz)	1 dB or less (1 kHz)
Stylus tip	0.06 mm special elliptical solid diamond	Sepcial elliptical solid diamond stylus (0.05 × 0.1 mm)	Special elliptical solid diamond stylus (0.05 × 0.1 mm)	Special elliptical solid diamond stylus (0.14 × 0.07 mm)
Dynamic compliance	20 × 10⁻⁶ cm/dyne (100 Hz)	14 × 10⁻⁶ cm/dyne (100 Hz)	13 × 10⁻⁶ cm/dyne (100 Hz)	13 × 10⁻⁶ cm/dyne (100 Hz)
Static compliance	50 × 10⁻⁶ cm/dyne	35 × 10⁻⁶ cm/dyne	35 × 10⁻⁶ cm/dyne	35 × 10⁻⁶ cm/dyne
Tracking force	0.8 g ± 0.1 g	1.2 g ± 0.2 g	1.2 g ± 0.2 g	1.4 g ± 0.2 g
Weight	6.0 g	5.8 g	5.8 g	4.7 g

	DL-300	DL-207	DL-103M	DL-103D
Type	Moving coil	Moving coil	Moving coil	Moving coil
Output voltage	0.3 mV (1 kHz, 50 mm/sec)	0.2 mV (1 kHz, 50 mm/sec)	0.12 mV (1 kHz, 50 mm/sec)	0.25 mV (1 kHz, 50 mm/sec)
Frequency response	20 Hz—40 kHz	20 Hz—60 kHz	20 Hz—60 kHz	20 Hz—65 kHz
Output impedance	40 Ω	40 Ω	40 Ω	33 Ω
Load impedance	More than 100 Ω	More than 100 Ω	More than 100 Ω	More than 100 Ω
Channel separation	More than 25 dB (1 kHz)	More than 28 dB (1 kHz)	More than 25 dB (1 kHz)	More than 28 dB (1 kHz)
Channel sensitivity difference	1.5 dB or less (1 kHz)	1 dB or less (1 kHz)	1 dB or less (1 kHz)	Less than 1 dB (1 kHz)
Stylus tip	Special elliptical stylus	0.07 × 0.14 mm special elliptical solid diamond	0.07 × 0.14 mm sepcial elliptical solid diamond	0.1 mm special elliptical solid diamond
Dynamic compliance	8 × 10⁻⁶ cm/dyne (100 Hz)	13 × 10⁻⁶ cm/dyne	13 × 10⁻⁶ cm/dyne	12 × 10⁻⁶ cm/dyne (100 Hz)
Static compliance		35 × 10⁻⁶ cm/dyne	35 × 10⁻⁶ cm/dyne	
Tracking force	1.8 g ± 0.3 g	1.4 g ± 0.2 g	1.4 g ± 0.2 g	1.5 g ± 0.2 g
Weight	4.2 g	4.7 g	5.6 g	7.5 g

	DL-103S	DL-103	DL-160	DL-110
Type	Moving coil	Moving coil	Moving coil	Moving coil
Output voltage	0.3 mV (1 kHz, 50 mm/sec)	0.3 mV (1 kHz, 50 mm/sec)	1.6 mV (1 kHz, 50 mm/sec)	1.6 mV (1 kHz, 50 mm/sec)
Frequency response	20 Hz—60 kHz	20 Hz—45 kHz	20 Hz—50 kHz	20 Hz—45 kHz
Output impedance	40 Ω	40 Ω	160 Ω	160 Ω
Load impedance	More than 100 Ω	More than 100 Ω		
Channel separation	More than 25 dB (1 kHz)	More than 25 dB (1 kHz)	More than 28 dB (1 kHz)	More than 25 dB (1 kHz)
Channel sensitivity difference	1 dB or less (1 kHz)	1 dB or less (1 kHz)	1 dB or less (1 kHz)	1 dB or less (1 kHz)
Tracking tip	0.15 mm special elliptical solid diamond	0.2 mm special round solid diamond	0.07 × 0.14 mm special elliptical solid diamond	0.1 × 0.2 mm special elliptical solid diamond
Compliance	8 × 10⁻⁶ cm/dyne (100 Hz)	5 × 10⁻⁶ cm/dyne (100 Hz)	10 × 10⁻⁶ cm/dyne (100 Hz)	8 × 10⁻⁶ cm/dyne (100 Hz)
Tracking force	1.8 g ± 0.3 g	2.5 g ± 0.3 g	1.6 ± 0.3 g	1.8 ± 0.3 g
Weight	7.8 g	8.5 g	4.8 g	4.8 g

* Specifications are subject to change without notice.

AU-1000 High performance MC step-up transformer

HA-1000 Input signal-to-noise level—157 dB MC head amplifier

HA-500 Input signal-to-noise level—157 dB MC head amplifier

AU-340 Super permalloy core MC step-up transformer
AU-320 High signal-to-noise ratio MC step-up transformer
AU-310 High signal-to-noise ratio MC step-up transformer

PCL-50/30 Head shell
weight 3.3 g

PCL-7 Magnesium alloy diecast head shell
weight 8.5 g

PCL-5 Aluminum alloy head shell
weight 9 g

AVC-1 Electronic vibration cleaner
AVC-12 Cleaning liquid

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