

M-Force 301P02

Moving magnet transducer for High SPL / High Dynamics Low-Frequency applications

Based on our patent moving magnet linear motor, the M-Force 301P02 squeezes out all the available power granted by switching mode amplifiers, exploiting all the potential of this kind of amplification.

The motor is deliberately designed with a very reactive behavior in order to take the best from the recycling energy capability of a specifically designed switchmode power supply and output stage combination. At the same time, the little fixed coil resistance avoids the power compression effect and increases the motor strength factor.

Unbelievable performance in terms of power handling, robustness, efficiency, and maximum SPL are a few of the advantages and improvements with respect to conventional moving coil arrangement.

The linear motor is matched to a purposely built 3 mm thickness, 30" diaphragm, through a newly designed coupling and a lightweight basket, that also improves thermal dissipation.

The new front shell houses a large diameter spider which improves the 30" diaphragm linearity even under the worst acoustical load conditions. M-Force 301P02 comes equipped with high voltage and high current connectors, and a whole range of internal electromechanical improvements.

Powersoft's DPC – Differential Pressure Control – integrated into the M-Drive amplifier's DSP, has to be considered as a complementary active control and performance-enhancing method.



- ▶ Very high power, high dynamics, and energy efficient subwoofers
- ▶ Low distortion applications
- ▶ Steerable low frequency arrays
- ▶ Cinema LFE channel applications
- ▶ Electronic dance music and live music applications
- ▶ Suitable for any kind of acoustical loads

- ▶ Extremely low distortion levels by design
 - ✓ Perfectly symmetrical BL and magnetic compliance for no DC distortion
 - ✓ Zero Power Compression
 - ✓ Perfect diaphragm's pistonic behaviour until 150 Hz
 - ✓ Ideal match with the DPC – Differential Pressure Control technology
- ▶ Extremely reliable and robust
 - ✓ Age – Usage independent Magnetic Compliance
 - ✓ No electrical connections in between the moving parts and the stationary parts
 - ✓ Insensitive to forces acting outside displacement axis (rocking modes)
- ▶ Extremely High SPL and efficiency
 - ✓ Premium Motor Strength (20 times higher than any conventional design)
 - ✓ Up to 12 dB higher max SPL output when compared to a double 18" high performance subwoofer
 - ✓ Outstanding acceleration performances: up to 1725 m/s²
- ▶ Environmental Friendly
 - ✓ 1/20 of Neodymium usage for the same SPL in comparison to conventional design.
- ▶ Simple implementation
 - ✓ Factory assembled package, conventional-speaker-like
 - ✓ Improved thermal dissipation
 - ✓ High-voltage and high-current quick connectors

M-Force 301P02

Moving magnet transducer for High SPL / High Dynamics Low-Frequency applications

General Specifications

Type	Moving Magnet linear motor drive
Nominal diameter	762 mm / 30"
Nominal impedance	0.7 Ω
Minimum impedance	0.56 Ω
Impedance at Fs (free air)	15 Ω
Peak Current Handling	200 A
Peak Voltage Handling	600 V
Nominal Power Handling ¹	5000 W
Continuous Power Handling ²	10000 W
Peak Power Handling ³	20000 W
Frequency range ⁴	15-125 Hz
Fixed coils material	Copper ribbon
Magnetic material	Neodymium
Nominal Flux density	0.9 T
Thermal Resistance (pink noise)	0.1 °C/W
Thermal Capacity	34000 J/°C
Motor Strength (BL) ² /Re	1569.4 (N/A) ² /Ω
Maximum acceleration	1725 m/s ²
Diaphragm material	3 mm Custom Polyolefin Blend
Suspension material	Custom Polyolefin Blend
Suspension type	Progressive, 3 rolls
Spider material	Treated polycotton
Spider type	Progressive

T/S Parameters⁵

Fs	26 Hz
Re	0.26 Ω
Qes ⁶	0.23
Qms	14.42
Qts ⁷	0.23
Sd	0.321 m ²
Vas	0.222 m ³
Mms	2.436 kg
Mmd	2.273 kg
Cms	0.000015 m/N
Rms	27.6 Ns/m
Bl	21 N/A
Le 1kHz	4.3 mH
L1 (LR-2 model)	4.3 mH
L2 (LR-2 model)	1.9 mH
R2 (LR-2 model)	1.1 Ω
X _{max} ⁸	18 mm
X _{damage}	35 mm
Reference Mass Controlled Efficiency ⁹	1.61 %
Effective Mass/Spring Controlled Efficiency ¹⁰	20% - 40%
Sensitivity ¹¹	94.2 dB
Reference Effective Sensitivity ¹²	106 dB

¹As per AES 2-2012.

²Defined as 3dB greater than the AES rating.

³Tested with M-Drive amplifier.

⁴Considering a proper acoustical load and a proper EQ.

⁵T/S parameters are thought for conventional speakers, and they aren't fully appropriate for characterizing a transducer deliberately built with a very high reactance.

⁶Definition of Qes doesn't take into consideration the high inductance of the M-Force, affecting the theoretical calculation of the efficiency and the damping behavior.

⁷Take note ⁵ into consideration.

⁸50% Bl.

⁹Calculated on the basis of the Re and T/S parameters, doesn't take in consideration the high reactance of the motor.

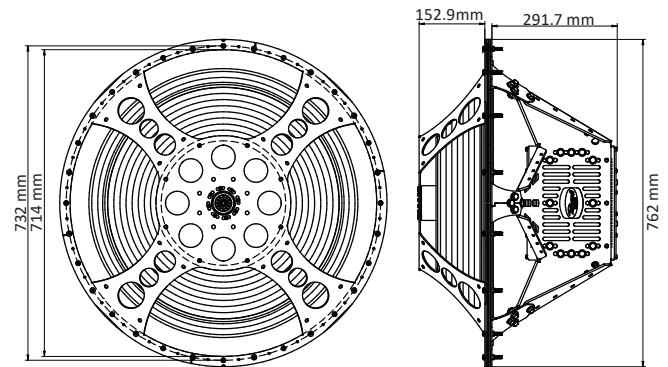
¹⁰Measured, including the Energy Recycling effect.

¹¹Calculated on the basis of the mass controlled efficiency, with 0.51V on 0.26 Ohm DC.

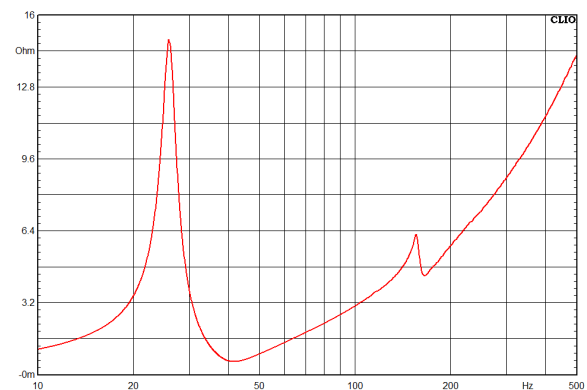
¹²Based on the Effective Efficiency which includes the effect of energy recycling.

Mounting and shipping info

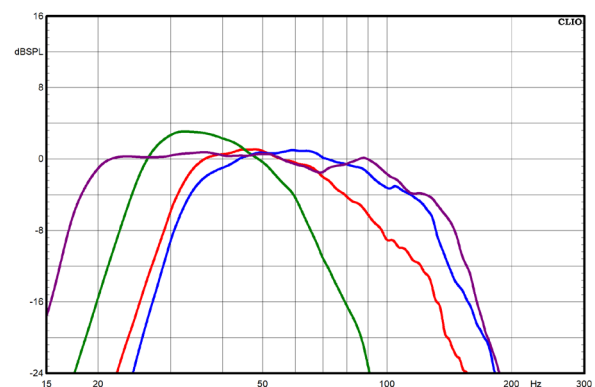
Overall Diameter	762 mm
Back Depth (Excl. Flange)	291.7 mm
Flange Height	16.6 mm
Front Depth (Excl. Flange)	152.9 mm
Baffle Cutout diameter	714 mm
Bolt Circle Diameter	732 mm
Net Weight	32.8 kg
Shipping Box	800 x 570 x 720 mm
Shipping Weight	41 kg



Impedance (free air)



Frequency response examples using different boxes, half space.



Blue: DV Sub Design – 600 liters box, "PUNCH" preset

Red: DV Sub Design – 600 liters box, "STANDARD" preset

Green: M Sub Design – 850 liters box, "INFRA" preset

Purple: Cinesub Design – 885 liters box, "SINGLE" preset

