

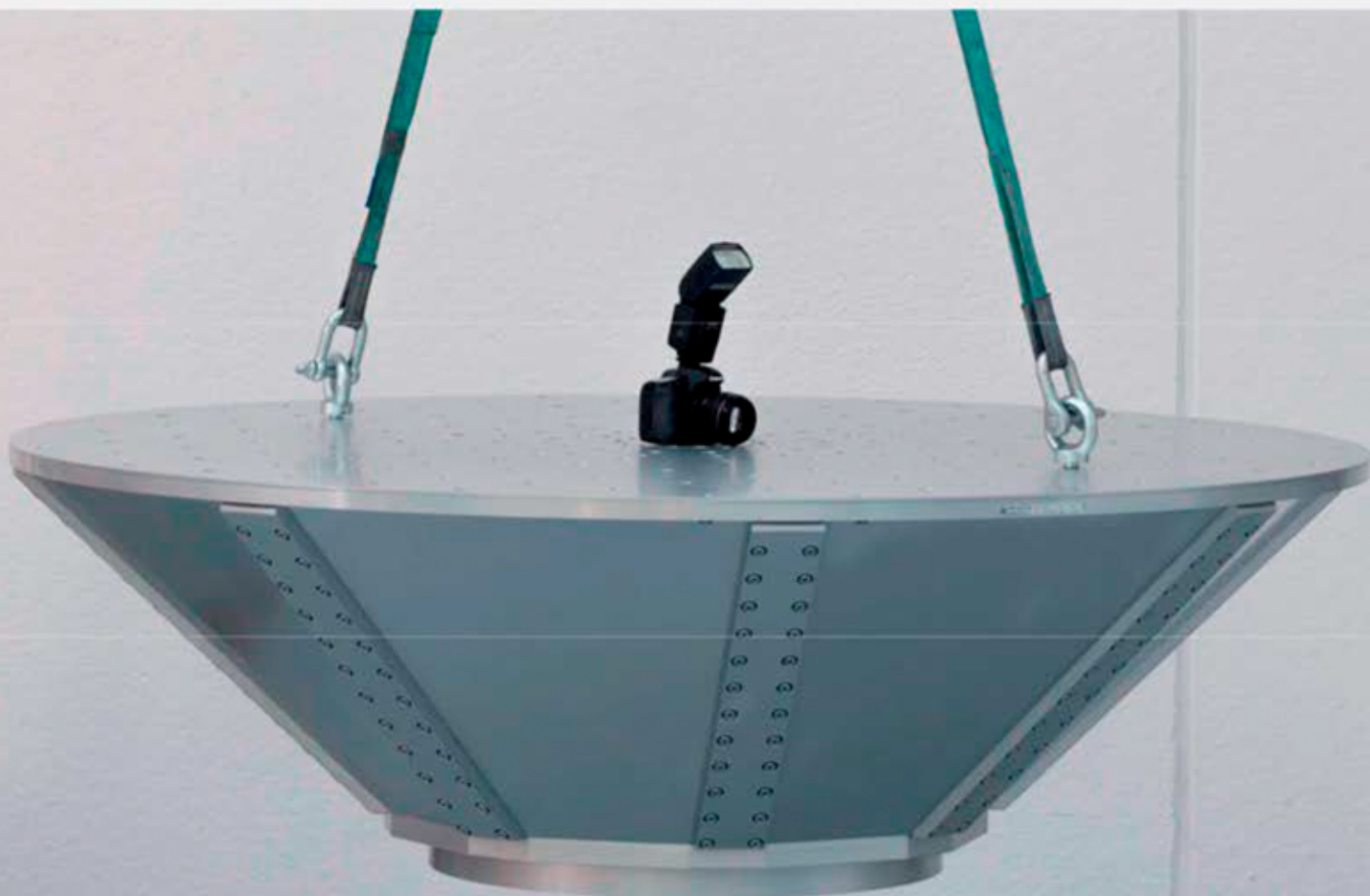


↘ HEAD EXPANDERS

Purpose : to enlarge the mounting area of the shaker armature, in order to test bigger payloads or many items in a single test run.

Key features:

- Innovative geometry to optimized the dynamic behaviour
- Machined, boxed and casted solutions, with a lightened design to save mass
- Material = aluminium or magnesium alloy or composite solution
- Customized hole insert patterns and thread sizes available upon request





CASTED HEAD EXPANDERS

The best solution to increase the armature surface is a pyramidal-conic shape. Casted head expanders are studied and optimized to be light but rigid.

High frequency performances are proved by FEM analysis and tested with the best control strategy.

Centrotecnica can supply either rounded and squared upper area expanders, depending on customer request.



MACHINED HEAD EXPANDERS

This type of head expander is machined out from an aluminium or magnesium plate, characterized by inner lightening design, with no mechanical bolted or welded parts.

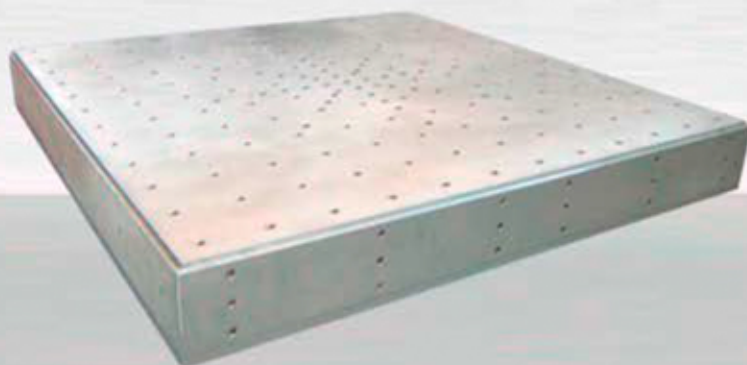
This concept is applied to small and medium size rounded and squared expanders, up to 900mm. Even though these expanders have a lower frequency range, they save mass since lighter and lower than casted ones.



BOXED HEAD EXPANDERS

Boxed head expanders are obtained by assembling aluminium or magnesium plates, with a innovative technique that stiffens the crucial areas.

The boxed type is designed to save as much weight as possible for low-medium frequency range testing. Moreover, this expander requires few space when used in combination to climatic chambers.





FOCUS POINTS

➤ **Inserts designed by Centrotecnica**

Stainless steel inserts are installed in the upper surface of the expanders, applying the appropriate loctite and a tightening torque.

Many sizes and types are available to meet each customer requirement. In case of replacement, an oversize version is supplied to protect the thread of the holes.

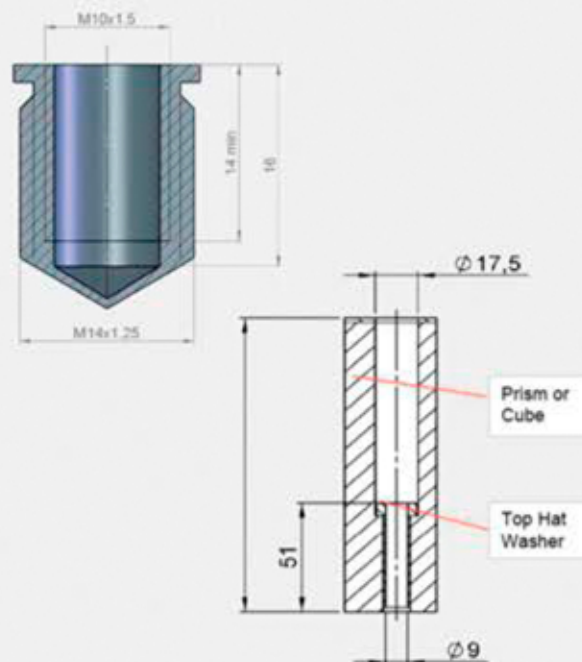
➤ **Top Hat Washers**

Stainless steel Top-Hat-Washers are installed into the counter-bored holes.

This feature prevents deformations of the material due to the fixing screws.

➤ **Finishing treatment**

Scratchproof paint is applied on each expander of Centrotecnica, usable up to 160°C.



Expander Kit includes:

- inserts installed on the upper surface
- full mounting kit with screws and tools
- lifting eyebolt
- technical user manual
- certification document
- wooden box

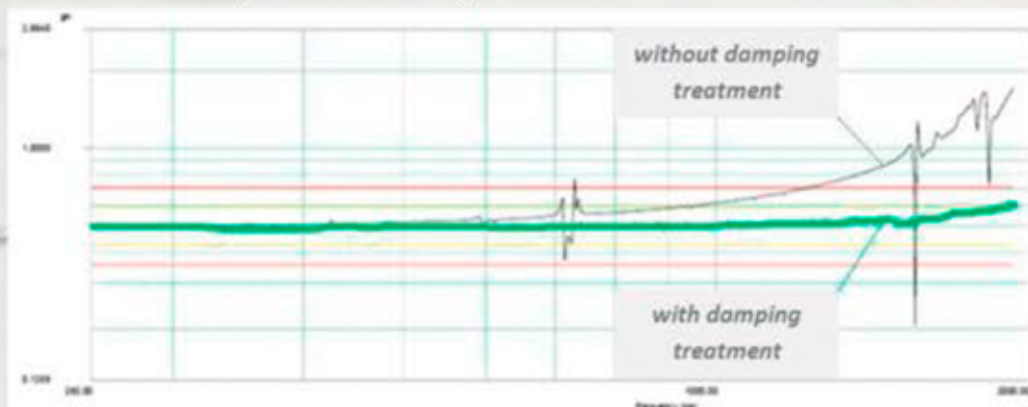




➤ **The importance of a damping treatment**

Expanders can be provided with the innovative “ultra damp” treatment that gives the expander a very high damping factor to kill unwanted resonances. A thin aluminium layer is designed and applied on the upper face. It exploits the principle of constrained layer damping.

The damping treatment reduces the energy of the excited resonances, improving the dynamical behaviour of the expander and leading to a better control.

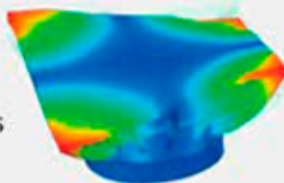


➤ **Dynamic Behaviour**

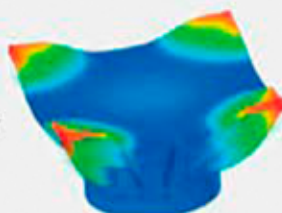
Centrotecnica expanders are studied with FEM analysis to achieve the best compromise between weight and first resonance.

Before delivering the expander, a sine vibration test is performed on the shaker or with an instrumented hammer, in order to identify the main vibration shapes and to find out the best control strategy.

SADDLE MODE
excited only with
unbalanced payloads



UMBRELLA MODE
excited by the shaker
(main resonance)





ADVANCED CONFIGURATIONS

Our design department can study the best technical solution for special customers applications by upgrading the already existing test-benches of all shaker types, thanks to the drawings available in our database.

A guidance system, load support and night locking system can be provided with the big sizes expanders.

➤ **Guidance system**

The guidance system is composed by a steel frame and roller elements to increase the capability of the expander to withstand the overturning moments.

The mass of the frame improves shaker seismic mass and global moments of inertia.

Centrotecnica's guidance system exploits the kinetic schema consisting in the expander rigidly guided by the direct connection between its guidance frame and the shaker body.

There is a perfect alignment between shaker armature motion and expander motion.

The guidance is mounted and aligned on the machined frame, assuring precision and locking lateral and rotational expander modes. The guidance is completely mechanical, without oil or additional equipment, very low maintenance is therefore needed.



ø1800 guided expander example:

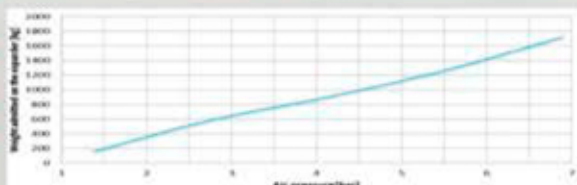
- installed on shaker armature ø640mm
- aluminium material





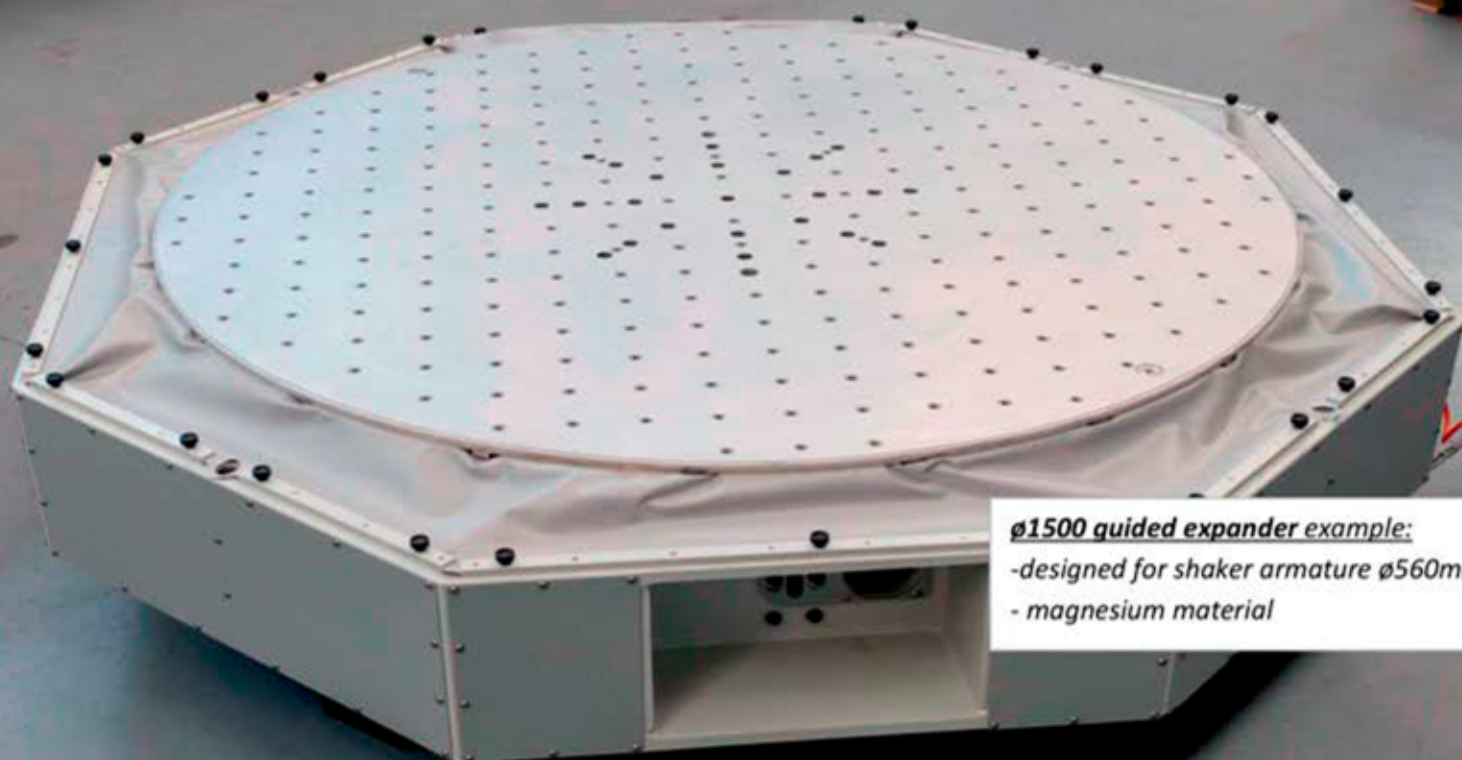
➤ **Load support & night locking system**

Air-springs are placed under the expander in order to increase the load support capability of the system. During the night, without air, a locking system turns on to keep up the load and a safety switch is provided to prevent any shaker start-ups.



➤ **Special design**

Upon request, reinforced walls can be applied to the sides of the casted expanders to improve the dynamic behaviour, increasing the frequency of the first resonance.



ø1500 guided expander example:

- designed for shaker armature ø560mm
- magnesium material



**TECHNICAL SPECIFICATIONS - ALUMINIUM EXPANDERS**

Armature	Upper size	Height	Weight \pm 5% Aluminium version	Manufacturing	First resonance	Usable range
Ø 110 mm	300 x 300 mm	110 mm	10 kg	C	4500 Hz	3287 Hz
Ø 156 mm	Ø 254 mm	55 mm	3.5 kg	M	> 2000 Hz	2000 Hz
Ø 180 mm	Ø 305 mm	55 mm	5 kg	M	> 2000 Hz	2000 Hz
Ø 180 mm	250 x 250 mm	68 mm	6 kg	M	4265 Hz	3000 Hz
Ø 180 mm	330 x 330 mm	132 mm	12.5 kg	C	2290 Hz	3000 Hz
Ø 180 mm	350 x 350 mm	132 mm	13.5 kg	C	2260 Hz	3000 Hz
Ø 180 mm	700 x 300 mm	100 mm	23 kg	M	853 Hz	1000 Hz
Ø 240 mm	400 x 400 mm	137 mm	20.5 kg	C	1840 Hz	2000 Hz
Ø 240 mm	500 x 500 mm	165 mm	32.5 kg	C	1625 Hz	2000 Hz
Ø 240 mm	750 x 750 mm	322 mm	102 kg	C	1600 Hz	2000 Hz
Ø 335 mm	Ø 610 mm	177 mm	46 kg	C	2480 Hz	2000 Hz
Ø 335 mm	Ø 700 mm	187 mm	60 kg	C	2060 Hz	2500 Hz
Ø 335 mm	500 x 500 mm	162 mm	38 kg	C	2400 Hz	2000 Hz
Ø 335 mm	500 x 500 mm	87 mm	24 kg	M	1460 Hz	2000 Hz
Ø 335 mm	600 x 600 mm	252 mm	74 kg	C	2330 Hz	2000 Hz
Ø 335 mm	600 x 600 mm	100 mm	41 kg	M	1000 Hz	1000 Hz
Ø 335 mm	800 x 800 mm	122 mm	90 kg	M	610 Hz	500 Hz
Ø 370 mm	Ø 700 mm	187 mm	59 kg	C	2060 Hz	2000 Hz
Ø 440 mm	Ø 610 mm	112 mm	42 kg	C	2900 Hz	2000 Hz
Ø 440 mm	Ø 812 mm	252 mm	101 kg	C	2260 Hz	2000 Hz
Ø 440 mm	Ø 812 mm	252 mm	101 kg	C	2260 Hz	2000 Hz
Ø 440 mm	Ø 900 mm	247 mm	110 kg	C	1890 Hz	2000 Hz
Ø 440 mm	Ø 1000 mm	307 mm	168 kg	C	1370 Hz	2000 Hz
Ø 440 mm	500 x 500 mm	127 mm	38 kg	C	2764 Hz	2000 Hz
Ø 440 mm	600 x 600 mm	200 mm	73 kg	C	1838 Hz	2000 Hz
Ø 440 mm	600 x 600 mm	100 mm	43 kg	M	1185 Hz	1000 Hz
Ø 440 mm	750 x 750 mm	255 mm	98 kg	C	1420 Hz	2000 Hz
Ø 440 mm	812 x 812 mm	280 mm	120 kg	C	1257 Hz	2000 Hz
Ø 440 mm	905 x 300 mm	152 mm	36 kg	B	957 Hz	1000 Hz
Ø 440 mm	925 x 600 mm	230 mm	91 kg	C	1097 Hz	2000 Hz
Ø 440 mm	1000 x 1000 mm	320 mm	187 kg	C	1060 Hz	1000 Hz
Ø 440 mm	1000 x 1000 mm	205 mm	160 kg	B	730 Hz	500 Hz
Ø 440 mm	1000 x 1200 mm	387 mm	285 kg	C	927 Hz	2000 Hz
Ø 440 mm	1200 x 1200 mm	392 mm	282 kg	C	770 Hz	900 Hz
Ø 440 mm	1600 x 900 mm	346 mm	199 kg	C	> 200 Hz	200 Hz
Ø 440 mm	1800 x 440 mm	206 mm	130 kg	B	292 Hz	200 Hz
Ø 640 mm	Ø 812 mm	194 mm	103 kg	C	1600 Hz	2000 Hz
Ø 640 mm	Ø 910 mm	195 mm	118 kg	C	1490 Hz	2000 Hz
Ø 640 mm	750 x 750 mm	157 mm	74 kg	C	1550 Hz	2000 Hz
Ø 640 mm	812 x 812 mm	157 mm	98 kg	C	1130 Hz	2000 Hz
Ø 640 mm	1000 x 1000 mm	322 mm	248 kg	C	1100 Hz	1000 Hz
Ø 640 mm	1000 x 1000 mm	322 mm	248 kg	C	1100 Hz	1000 Hz
Ø 640 mm	1200 x 1200 mm	362 mm	290 kg	C	800 Hz	1000 Hz
Ø 640 mm	1500 x 1500 mm	360 mm	318 kg	C	560 Hz	500 Hz
Ø 640 mm	1600 x 900 mm	302 mm	296 kg	C	659 Hz	700 Hz



**TECHNICAL SPECIFICATIONS - MAGNESIUM EXPANDERS**

Armature	Upper size	Height	Weight \pm 5% Magnesium version	Manufacturing	First resonance	Usable range
Ø 110 mm	300 x 300 mm	110 mm	5.5 kg	C	4500 Hz	3287 Hz
Ø 156 mm	Ø 254 mm	55 mm	2.4 kg	M	> 2000 Hz	2000 Hz
Ø 180 mm	Ø 305 mm	55 mm	3.3 kg	M	> 2000 Hz	2000 Hz
Ø 180 mm	250 x 250 mm	68 mm	4 kg	M	4265 Hz	3000 Hz
Ø 180 mm	330 x 330 mm	132 mm	8.3 kg	C	2290 Hz	3000 Hz
Ø 180 mm	350 x 350 mm	132 mm	8.3 kg	C	2260 Hz	3000 Hz
Ø 240 mm	400 x 400 mm	137 mm	13.5 kg	C	1840 Hz	2000 Hz
Ø 240 mm	500 x 500 mm	157 mm	19 kg	C	1625 Hz	2000 Hz
Ø 240 mm	750 x 750 mm	322 mm	68 kg	C	1600 Hz	2000 Hz
Ø 335 mm	Ø 610 mm	185 mm	30 kg	C	2480 Hz	2000 Hz
Ø 335 mm	Ø 700 mm	187 mm	40 kg	C	2060 Hz	2500 Hz
Ø 335 mm	500 x 500 mm	162 mm	25 kg	C	2400 Hz	2000 Hz
Ø 335 mm	600 x 600 mm	252 mm	52 kg	C	2330 Hz	2000 Hz
Ø 370 mm	Ø 700 mm	187 mm	39 kg	C	2060 Hz	2000 Hz
Ø 440 mm	Ø 610 mm	112 mm	28 kg	C	2900 Hz	2000 Hz
Ø 440 mm	Ø 812 mm	252 mm	73 kg	C	2260 Hz	2000 Hz
Ø 440 mm	Ø 812 mm	260 mm	73 kg	C	2260 Hz	2000 Hz
Ø 440 mm	Ø 900 mm	247 mm	74 kg	C	1890 Hz	2000 Hz
Ø 440 mm	Ø 1000 mm	307 mm	115 kg	C	1370 Hz	2000 Hz
Ø 440 mm	500 x 500 mm	170 mm	25 kg	C	2764 Hz	2000 Hz
Ø 440 mm	600 x 600 mm	192 mm	47 kg	C	1838 Hz	2000 Hz
Ø 440 mm	750 x 750 mm	255 mm	67 kg	C	1420 Hz	2000 Hz
Ø 440 mm	812 x 812 mm	282 mm	82 kg	C	1257 Hz	2000 Hz
Ø 440 mm	925 x 600 mm	230 mm	60 kg	C	1097 Hz	2000 Hz
Ø 440 mm	1000 x 1000 mm	320 mm	120 kg	C	1060 Hz	1000 Hz
Ø 440 mm	1000 x 1000 mm	205 mm	105 kg	B	730 Hz	500 Hz
Ø 440 mm	1000 x 1200 mm	387 mm	190 kg	C	927 Hz	2000 Hz
Ø 440 mm	1200 x 1200 mm	392 mm	190 kg	C	770 Hz	900 Hz
Ø 440 mm	1800 x 440 mm	206 mm	90 kg	B	292 Hz	200 Hz
Ø 640 mm	Ø 812 mm	194 mm	68 kg	C	1600 Hz	2000 Hz
Ø 640 mm	Ø 910 mm	195 mm	83 kg	C	1490 Hz	2000 Hz
Ø 640 mm	750 x 750 mm	157 mm	53 kg	C	1550 Hz	2000 Hz
Ø 640 mm	812 x 812 mm	157 mm	59 kg	C	1130 Hz	2000 Hz
Ø 640 mm	1000 x 1000 mm	322 mm	161 kg	C	1100 Hz	1000 Hz
Ø 640 mm	1000 x 1000 mm	322 mm	161 kg	C	1100 Hz	1000 Hz
Ø 640 mm	1200 x 1200 mm	354 mm	197 kg	C	800 Hz	1000 Hz

An approval design is shared with the customer before the production starting.

Please always ask for technical feasibility:

compatibility between armature and our casting model has to be checked.

