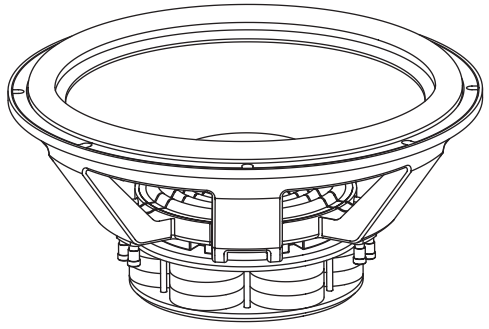
K2 POWER SUBWOOFER MANUAL

Congratulations on purchasing a product from the range, K2 Power. We are happy you share our passion, for "the Spirit of Sound". K2 Power subwoofers contain the very latest enhanced technologies, for high power handling, and unrivalled sound quality. To obtain the best results from this product, we recommend that you follow carefully all the information contained in this manual. If not followed correctly any fault observed, may not be covered by the guarantee.

Warning

Due to the high power handling characteristics employed, subwoofers from the K2 Power range are capable of producing extreme volume levels. Continued listening at high volume levels above 110dB, are regarded not ideal for listening pleasure. Listening above 130dB can permanently damage your hearing. Focal does not accept responsibility, for unlawful playing, in the event of a criminal prosecution. Please exercise restraint.

The Focal guarantee only applies if the enclosed guarantee card is returned to us within 10 days of purchase.



Features

Membrane/cone K2 Power
Reference CKM sandwich composite, comprising of Kevlar®/foam/Kevlar® material structure. Extremely rigid structure, improved power handling, low distortion characteristics.

Multi-ferrite motor unit
Focals renowned multi-ferrite motor continues with increased x3 level stack (33 KX, 40 KX, 46 KX 4). Higher BL sum magnet power. Open access for natural cooling of the voice coil.

Designed for sealed or closed box volumes
Optimised for comparatively small volumes, being sealed. Producing a full deep bass experience, even at high volume levels (27 KX, 33 KX and 40 KX).

Power hi-fi
Designed for bass reflex enclosures. High efficiency SPLs for fast dynamic bass (46 KX 4).

Spider braid sandwich
All output braids whether single double or quadruple connections impregnated into spider, sandwiched to form one complete layer. Zero problem from lead-out wire fatigue. Zero problem from lead-out wire tapping against cone assembly.

Chassis moulded from metal alloy
Non magnetic, and inherently rigid structure.

FOCAL

CE

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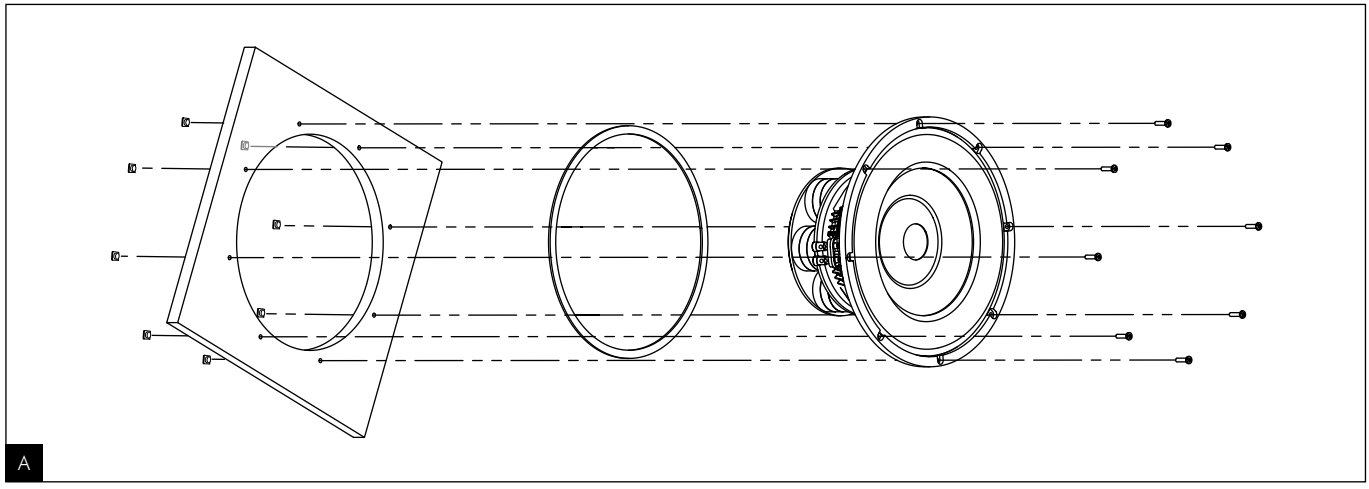
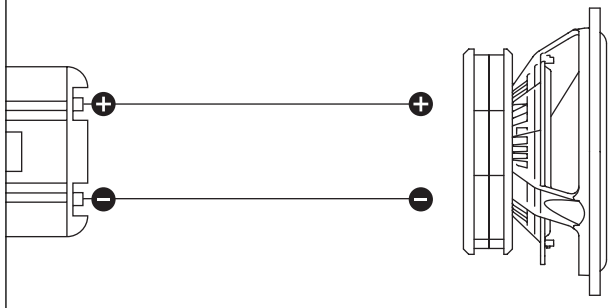


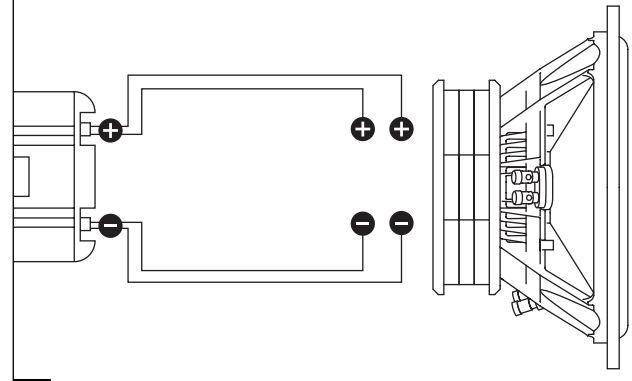
A

27 KX



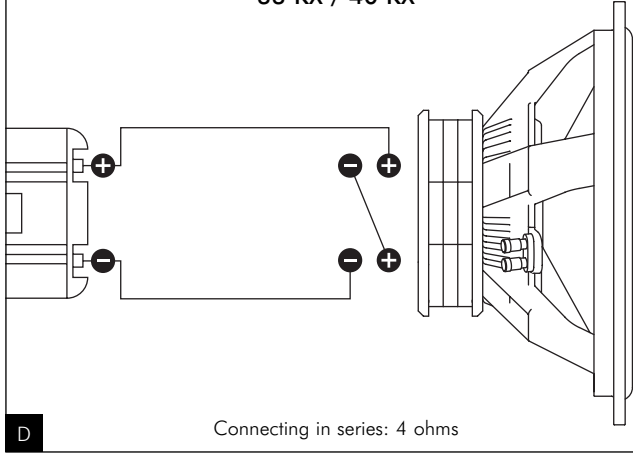
B Simple connection: 4 ohms

33 KX / 40 KX



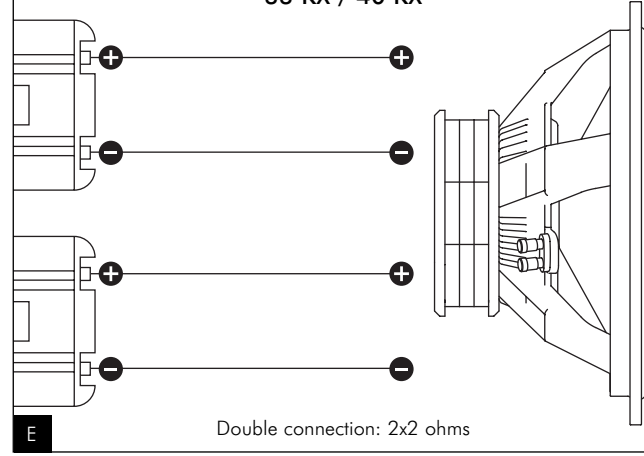
C Connecting in parallel: 1 ohms

33 KX / 40 KX



D Connecting in series: 4 ohms

33 KX / 40 KX



E Double connection: 2x2 ohms

INSTALLATION

Running-in period

K2 Power subwoofers incorporate the very latest components. To ensure such complex mechanical elements work in harmony with the rest of your system, they must be allowed to function correctly in this environment. Such changes in temperature and humidity are regarded as very hostile. For K2 Power subwoofers to benefit, a running-in period must be used to ensure they are prepared for this. We recommend that once the system is ready for listening the subwoofers should be run-in at medium volume setting. The use of audio material that contains good low frequencies is ideal to gain their full potential. We recommend this running period be used for at least one week. After which the excellent performance of your K2 Power subwoofers can be fully appreciated.

Fitting

Each subwoofer kit comes complete with its fixing kit. This consists of self-tapping wood screws, metal inserts and threaded bolts, plus a reel of foam gasket material.
Depending on whether the subwoofer is to be installed standard recessed flush-fit or inverted, requires careful examination before any cutting is attempted for example a rear panel installation **(fig. A)**. The desired baffle location or custom made enclosure must be rigid and strong enough to hold the weight of the driver. We recommend the sealing gasket is attached to the driver, then the driver placed into position and attached securely in place.

Connecting-up (general)

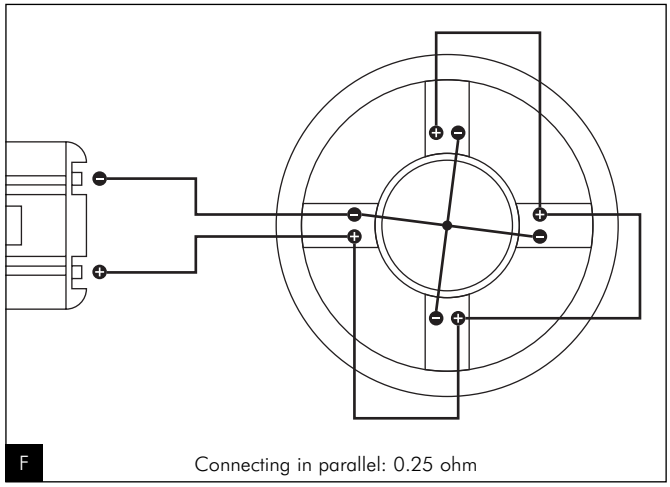
It is imperative the correct connection is always maintained to the subwoofer. The correct phase is important, especially when integrating it into a broad-bandwidth or component speaker system; such in the case of a 2 or 3 way set up. Not doing so will drastically reduce the overall performance.
Connection to the subwoofer use the standardised system of, RED = positive +, and BLACK = negative -.
This must be followed and inverted if the driver is installed in the reverse (inverted install).
For those subwoofers with twin (33 KX and 40 KX) or quadruple connection (46 KX 4), careful understanding of the various parallel and series circuits must be determined first, by verifying compatibility with the amplifier load characteristics, and overall system integration.

Connections (27 KX)

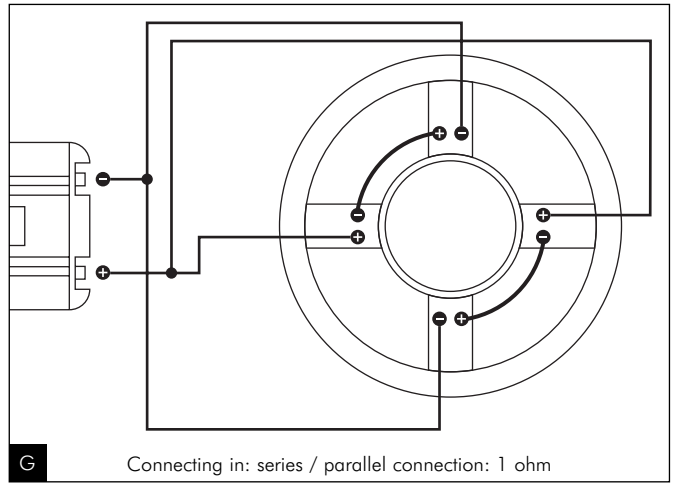
The 27 KX subwoofer uses a single 4 ohms voice coil, thus consists of a single input terminal **(fig. B)**. Verify the output stage and if your amplifier has a bridging function, to gain further benefit, use it. Ensure it is compatible with a 4 ohms impedance load.

Connections (33 KX and 40 KX)

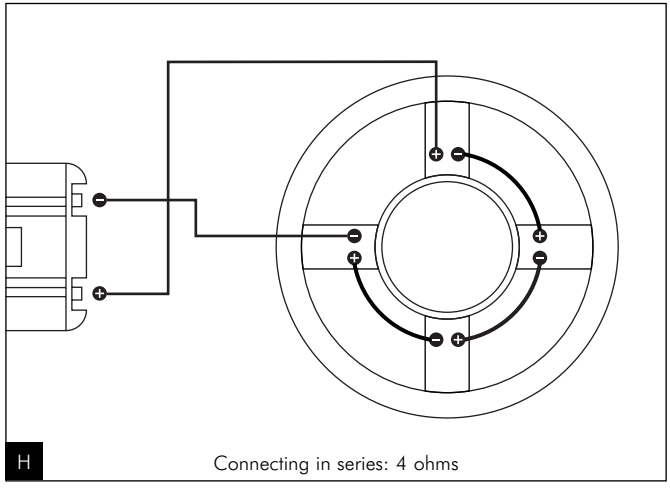
Both 33 KX and 40 KX subwoofers, use a dual voice coil, thus each consist of two input connectors. To achieve high power integration to your system, we recommend the two connectors, are connected in a parallel circuit formation **(fig. C)**. In this situation, an impedance load of approximately 1 ohms will be present. For connection to the amplifier, it is important to ensure such low load is compatible. It is also possible to connect the voice coil into a series type circuit, producing an impedance load of approximately 4 ohms **(fig. D)**. This is generally recommended if your amplifier is not compatible to low load impedances of less that 1 ohms. The 33 KX and 40 KX can also benefit from "Bi-amping" configurations **(fig. E)**. It is important to ensure both amplifiers are of the same specification and power rating. Also a traditional 2 channel stereo amplifier (high power recommended) can also be used, allowing further installation flexibility.



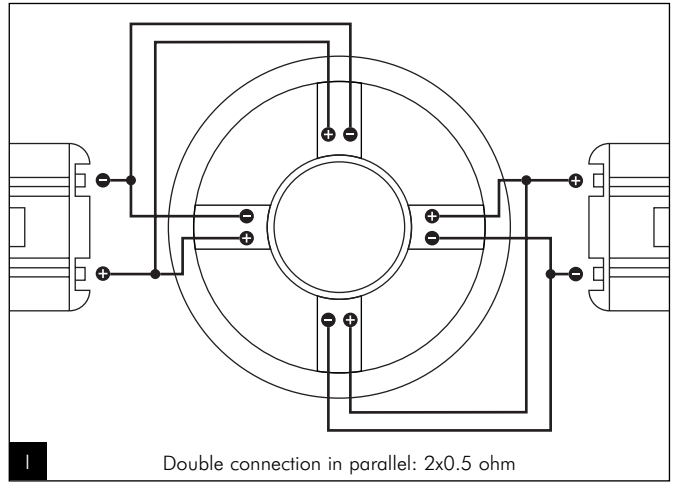
F Connecting in parallel: 0.25 ohm



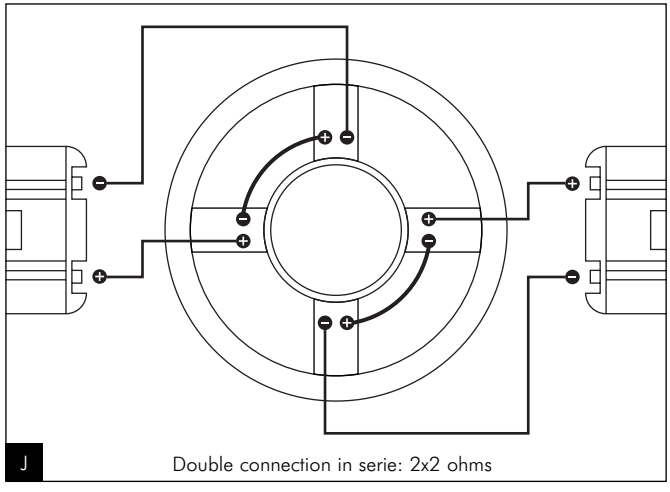
G Connecting in: series / parallel connection: 1 ohm



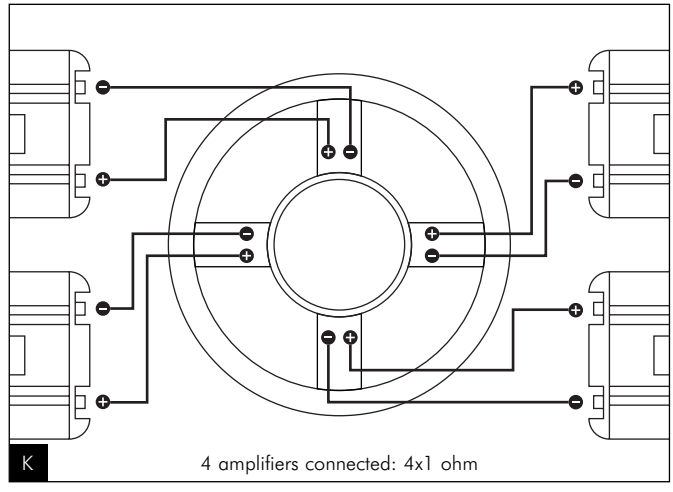
H Connecting in series: 4 ohms



I Double connection in parallel: 2x0.5 ohm



J Double connection in serie: 2x2 ohms



K 4 amplifiers connected: 4x1 ohm

INSTALLATION

Connections 46 KX 4

The mighty 46 KX 4 subwoofer incorporates a unique feature, consisting of 4 individual wound voice coils, intertwined together on the same vented aluminium former. Each voice coil winding has an impedance of 1 ohm, giving greater flexibility. Note that core section of connecting cables and complete amplifier compatibility must be verified before, for load ratings from 0.25, 1 or 4ohms **(fig. F, G, H)**.
"Bi-amping" can also be included for the 46 KX 4. Thus load impedance's of 2x0.5 ohms and 2x2 ohms, can be included for parallel or series circuits **(fig. I, J)**.
"Quad amping" can be included, with 4x separate amplifiers, offering identical specifications. The impedance load will be approximately 1 ohms **(fig. K)**. Again, each amplifier power and load rating must be compatible for 1 ohms nominal impedance.

Cut-off frequency

Generally, it is accepted the frequency scale is from 60 to 100Hz, depending on many parameters (cabinet loading, exterior load of vehicle interior etc, etc). If in doubt, we recommend a cut-off frequency of approximately 80Hz be selected. Too high a cut off frequency and the "staging" will be uneven. The bass frequencies will become directional. Too low a cut-off frequency and the general performance maybe reduced.
Finally a process of "trial and error" can be used to define this aspect, for maximum enjoyment of your K2 Power KX series subwoofers.

Choosing the correct enclosure or acoustic load (general)

The correct acoustic load, normally the type of enclosure and volume made available to the subwoofer, is of prime importance for maximum performance. All pistonic acoustic devices (in this case subwoofers) require a defined acoustic load to work correctly. This means the type of charge (sealed or bass reflex) and volume (litres / cubic ft) must be chosen wisely, to gain maximum performance. Never choose "any" ready prepared subwoofer enclosure. They may accept your subwoofer, concerning the hole cut-out size for chassis, but do they match the volume or type of charge as defined in the subwoofer parameters?

Sealed / closed box enclosure

All K2 Power subwoofers (except the 46 KX 4) have been carefully optimised to work in sealed or closed box enclosures. This type of enclosure ensures sub bass frequencies remain full and controlled. The available excursion of the sub is far more stable, for controlled linearity limiting distortion, ensuring maximum performance is maintained. The added benefit of a properly defined sealed enclosure, is that it remains comparatively small in size. Compared to a defined bass reflex enclosure, which normally has a slight increase in the sound pressure level, K2 Power subwoofers have improved power handling characteristics. Therefore this slight reduction of level can be compensated, with increased amplification.

Bass-reflex enclosure

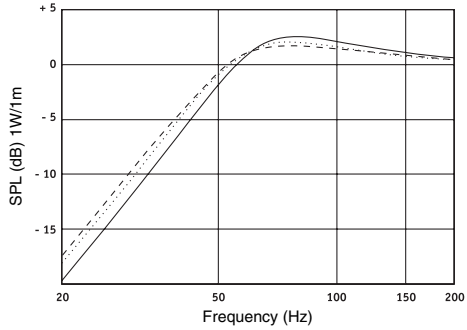
The 46 KX 4 subwoofer has been developed exclusively to work in bass reflex enclosures. Due to the large surface area available, with high strength multi-ferrite motor structure, together producing high efficiency necessary for dynamic power SPL installations.
Any bass reflex enclosure uses an acoustic suspension or spring, in the form of a port. The port whether a tube, or slot must be correctly calculated, concerning area and length to the volume chosen. The air that passes through the port is effectively the spring and pressure load on the subwoofer diaphragm. To reduce air whistling, the port should remain smooth internally, with maximum aerodynamic characteristics applied throughout. For a port-tube application, it is advised to use the maximum diameter possible corresponding to the appropriate length; this will further reduce wind turbulence.
The enclosure structure should be strong and rigid throughout, not only due to the weight of the 46 KX 4, but notably for the amount of air pressure displacement produced from the diaphragm movement.

27 KX
Sealed enclosure

20 liters (0.71 cu. ft.)
F - 3 = 48Hz / **Fast and tight bass**

30 liters (1.06 cu. ft.)
F - 3 = 45Hz / **Punchy and dynamic bass**

40 liters (1.41 cu. ft.)
F - 3 = 44Hz / **Deep and articulate bass**



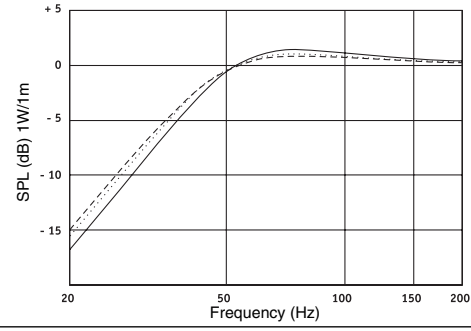
L

33 KX
Sealed enclosure

30 liters (1.06 cu. ft.)
F - 3 = 42Hz / **Fast and tight bass**

40 liters (1.41 cu. ft.)
F - 3 = 41Hz / **Punchy and dynamic bass**

50 liters (1.77 cu. ft.)
F - 3 = 40Hz / **Deep and articulate bass**



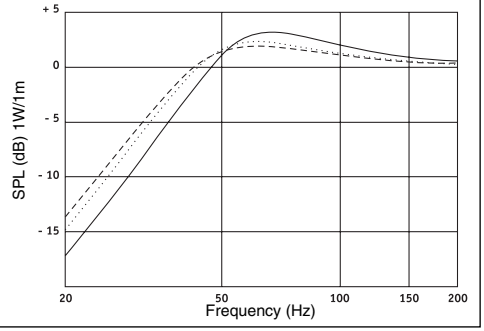
M

40 KX
Sealed enclosure

40 liters (1.41 cu. ft.)
F - 3 = 41Hz / **Fast and tight bass**

60 liters (2.19 cu. ft.)
F - 3 = 37Hz / **Punchy and dynamic bass**

80 liters (2.82 cu. ft.)
F - 3 = 36Hz / **Deep and articulate bass**



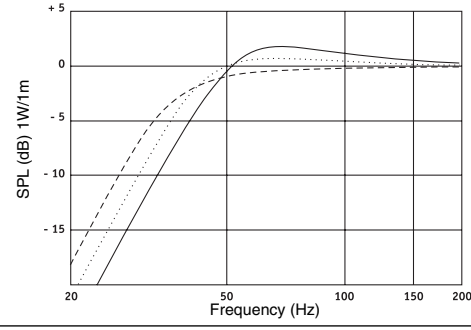
N

46 KX 4
Vented enclosure

80 liters (2.82 cu. ft.)
F - 3 = 45Hz / **Fast and tight bass**

100 liters (3.53 cu. ft.)
F - 3 = 40Hz / **Punchy and dynamic bass**

120 liters (4.24 cu. ft.)
F - 3 = 37Hz / **Deep and articulate bass**



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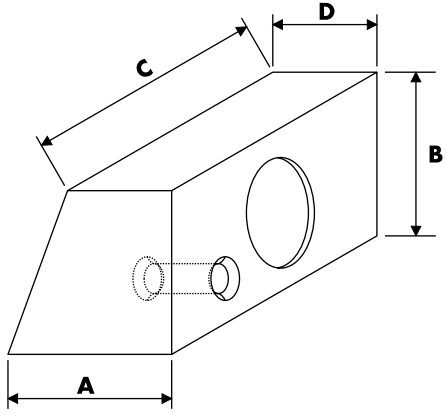

P

	27 KX 20l	27 KX 30l	27 KX 40l	33 KX 50l	33 KX 60l	40 KX 80l	40 KX 100l	46 KX 4 120l
								Port dimensions (46 KX 4)
Ø						10	10	10
L						8	9	11
A	300	370	370	370	400	450	500	500
B	300	370	370	370	400	450	500	500
C	410	380	490	605	720	730	730	850
D	190	237	237	237	170	190	190	190

BUILDING THE ENCLOSURE

Recommendations

Building your chosen enclosure, whether sealed or bass reflex, shouldn't be regarded as a "complex job". Important observations should never be neglected, such as correct volumes, thick enough board material, with added bracing, correct sealing especially for sealed enclosures. See image attached for further understanding **(fig. P)**.

Inverse mounting of subwoofer (beauty box application)

Because all K2 Power KX subwoofers use such large impressive multi-ferrite motor units, why hide them inside? Why not build a "beauty box", invert the subwoofer, and make a feature of their specialist design.

When choosing inverted mounting the phase must be inverted, so that the polarity is observed.

More importantly, inverting the subwoofer has inherent advantages for the general performance. Primarily for sealed enclosures, the overall external dimensions can be significantly reduced, due to the saving of wasted volume displacement otherwise lost in traditional subwoofer installations. For example, up to 3 litres can be saved due to the same displacement lost by the array of multiferrites and large front and back plate assemblies and chassis. For the 46 KX 4, around 4 litres can be saved for it's bass reflex enclosure.

Building an enclosure

K2 Power subwoofers are able of reproducing very high sound pressure levels. The construction should always remain strong and rigid, to eliminate any unwanted vibrations. A good material such as MDF (Medium Density Fibreboard) will effectively ensure this is possible. Choosing the correct thickness of MDF compared to the surface area decided, is also critical to ensure the enclosure does not vibrate. For this reason the general thickness recommended is 19mm MDF. The volume of the enclosure depends on the type of music your are listening to (hi-fi, dynamic bass...) **(fig. L, M, N, O)**.
If you decide to build your enclosure, pay attention to the following recommendations:

- Ensure that there are no air leaks at corners and fixings.
- We recommend the use of clamps for perfect assembly of the panels. The drying time of the glue must be respected.
- When using the 46 KX 4, we advise the use of a profiled port so that air noises are prevented.
- Add damping material (foam) inside the enclosure (do not use fiberglass) to cancel possible resonances.

If the sound is "closed-in" then remove some at the damping material.

Conditions of guarantee

All Focal loudspeakers are covered by guarantee drawn up by the official Focal distributor in your country.
Your distributor can provide all details concerning the conditions of guarantee. Guarantee cover extends at least to that granted by the legal guarantee in force in the country where the original purchase invoice was issued.

SPECIFICATIONS

	27 KX	33 KX	40 KX	46 KX 4
Nominal power	300W	400W	500W	1000W
Maximum power	600W	800W	1000W	2000W
Sensitivity	88dB	90dB	92.5dB	96.5dB
Cone	K2 Composite Sandwich®	K2 Composite Sandwich®	K2 Composite Sandwich®	K2 Composite Sandwich®
Surround	Butyl	Butyl	Butyl	High density foam
Nom. impedance	4 ohms	4 ohms (2x2)	4ohms (2x2)	4 ohms (4x1)
VC diameter	65mm - 2.55in	65mm - 2.55in	65mm - 2.55in	77mm - 3.03in
VC height	26mm - 1.02in	32mm - 1.26in	32mm - 1.25in	30mm - 1.18in
Xmax	9mm - 0.35in	11mm - 0.43in	11mm - 0.43in	10mm - 0.39in
Magnet d x h	60x14mm - 2.36x0.55in	60x 14 mm - 2.36x0.55in	60x14mm - 2.36x0.55in	75x15mm - 2.95x0.59in
Magnet weight	2106g - 4.66lb	2916g - 6.42lb	2916g - 6.42lb	8100g - 17.86lb
Gap height	8mm - 0.3in	10mm - 0.39in	10mm - 0.39in	10mm - 0.039in
Net weight	7.2kg - 15.87lb	9.8kg - 21.6lb	10.7kg - 23.58lb	17kg - 37.47lb
Fs	48Hz	39Hz	34.6Hz	29.4Hz
Vas	14.92l - 0.53Ft^3	24.59l - 0.86Ft^3	64.83l - 2.28Ft^3	206.31l - 7.66 Ft^3
Qts	0.908	0.733	0.82	0.345
Qes	0.97	0.84	0.97	0.37
Qms	14.19	5.77	5.3	5.05
Re	4.6 ohms	4.2 ohms (in series)	4.2 ohms (in series)	4.2 ohms (in series)
Sd	314.16cm^2 - 48.7in^2	490.87cm^2 - 7.6in^2	804.25cm^2 - 124.65in^2	1320.25cm^2 - 204.63in^2
Mms	100.9g - 0.22lb	229.2g - 0.5lb	296.5g - 0.65lb	347.75g - 0.76lb
Le	1.9mH	4.3mH (in series)	4.2mH (in series)	3mH (in series)
Les	15.63mH	20.4mH	19.92mH	61.45mH
Res	67.29 ohms	28.85 ohms	22.95 ohms	57.32 ohms
Bl	12.05N/A	16.76N/A (in series)	16.71N/A (in series)	27N/A (in series)