Polyglass Subwoofers Manual

We congratulate you on purchasing a Focal subwoofer, from the Polyglass range. This product has been designed using the very latest technologies available; to ensure the quality performance is to a very high standard. To gain the best results from your subwoofer, please ensure you follow these recommendations. If not followed correctly any fault observed, may not be covered by the guarantee.

Cables

For optimum performance the use of OFC cable (Oxygen Free Cable), to a sufficient thickness (2.5mm²) is highly recommended. This is particularly important in the case of long cable lengths being used in the installation. We recommend the use of Focal cables FC500 or FC700. Check with your local Focal dealer for further advice.

Connecting up

Always check the polarity to the subwoofer, and that of the other speakers used in your installation. The polarity is important to ensure the phase characteristics remain correct, otherwise a "loss" of performance can result. The spring action input terminals are clearly marked red spot = positive (+) and black spot = negative (-).
These subwoofers can be mounted in the traditional sense with the membrane on view externally, or inverted mounting with the motor unit and its chrome back plate on display. Inverted mounting helps increasing the volume for the given space available. When choosing inverted mounting the phase must be inverted (thus swap the positive / to negative connections) so that the polarity is correctly observed.

Multi-subwoofer installations

To obtain a more powerful acoustic presence, we recommend the introduction of multiple subwoofers for your chosen installation. Using multiple subwoofers, various series or parallel or combinations of both can be used, but always check the specifications of the power source (amplifier) before attempting any installation. It is worth remembering if low impedance of 2 or even 1 ohm is chosen an amplifier of high quality should always be used for such installation.

Connections in parallel

Normally the terminal positive (+) on the subwoofer will be connected to the equally marked positive (+) on the amplifier, and the terminal negative (-) on the subwoofer to the equally marked negative (-) on the amplifier.

Only on an inverted subwoofer installation is it normally necessary to invert the connections (-) and (+).
Calculation of the impedance is (Z), for the given impedance value nominal (R), is 4 ohms.

- 2 subwoofers : 1/Z = 1/R1 + 1/R2 1/Z = 1/4 + 1/4 Z= 2 Ω
- 3 subwoofers : 1/Z = 1/R1 + 1/R2 + 1/R3 Z = 1,33 Ω

Connections in series

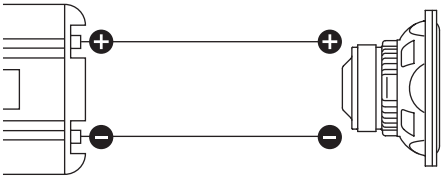
Using multiples of subwoofers for such comprehensive installations, it is sometimes better to connect them together in a series circuit. Using a low impedance load to the amplifier effectively ensures it will work less hard. For connecting the subwoofers, they are effectively looped together in any series circuit.
Thus the positive (+) of 1st subwoofer will be connected to the positive (+) of the amplifier.
The negative (-) of the 1st subwoofer will be connected to the positive (+) of the 2nd subwoofer.
Then depending on how many subwoofers are to be included this looping will continue, until the last (in this basic case the 2nd subwoofer), will have its negative (-) connected to the negative (-) of the amplifier.
Calculation of the impedance is (Z), for the given impedance value nominal (R), is 4 ohms.

- 2 subwoofers : Z = R1 +R2 Z = 4 Ω + 4 Ω Z = 8 Ω

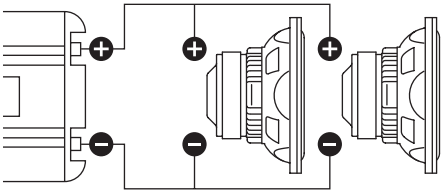
Connections series and parallel, combined

Depending on your installation amplifier(s), subwoofer(s), various combinations of series and parallel circuits can be used. The real advantage of doing this is to have a system with available power, but at the same time to ensure the system impedance load is optimum for the amplifier(s) used.

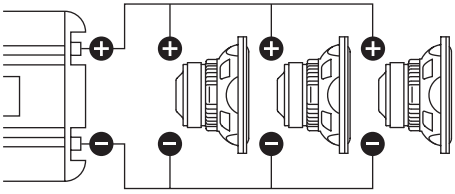
Connection diagrams



Examples and configurations for various multiples of subwoofers:



2 subwoofers 21 V2 in parallel. Z = 2 Ω



3 subwoofers 21 V2 in parallel. Z = 1,33 Ω

Adjustment of low cut off frequency

The cut off frequency of a subwoofer is normally in the region of 60 to 100Hz. This is always dependent on the particular installation and listening position. A frequency of 80Hz is a good compromise for effective bass compared to listening quality.

Enclosures

Focal offers 4 ready-to-use optimized enclosures. If you decide to 'brew your own', it is safest to go for a bass-reflex type. This classic simple alignment usually give the best and most consistent results.

See page 12 regarding our proposals for the various volumes available per subwoofer.

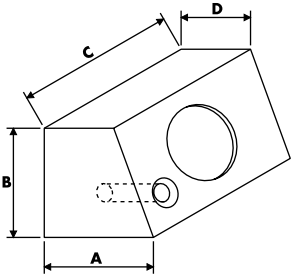
Bass-reflex boxes

A bass-reflex system is more efficient than the closed box since some of the energy from the rear of the cone is converted via the reflex port to add in phase with the main output. There is also a reduction of cone travel at the tuning frequency, so this system can also give higher power handling. However, at very low frequencies bass rolls off faster (24dB/octave). In simple terms, bass is louder, but not quite as deep. You can make a reflex port from a piece of plastic pipe, or there are many flared ports custom designed for loudspeakers that minimize turbulence (prevents what's commonly referred to as chuffing).

Building an enclosure

The construction should always remain strong and rigid, to eliminate any unwanted resonances.
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. Any loose components such as the internal connections and cables should always be fixed securely inside. Damping material (foam etc) covering all the internal walls of the enclosure, will further ensure it is free from unwanted resonances. It is imperative that your custom designed subwoofer enclosure remains securely mounted at all times to the vehicle.

Calculating the internal volume



Volume interne[1]	15 L 0.53cu.ft.	20 L 0.71cu.ft.	30 L 1.06cu.ft.	40 L 1.41cu.ft.	50 L 1.77cu.ft.	60 L 2.12cu.ft.
A	11" 280	11 3/4 300	14 9/16" 370	14 9/16" 370	17 11/16" 450	17 11/16" 450
B	11" 280	11 3/4 300	14 9/16" 370	14 9/16" 370	17 5/16" 440	17 5/16" 440
C	14 3/16" 360	16 1/8 410	14 15/16" 380	19 1/4" 490	17 5/16" 440	20 7/8" 530
D	7 1/16" 180	7 7/16" 190	9 5/16" 237	9 5/16" 237	10 1/4" 260	10 1/4" 260
Events[2] 27 V1	2 3/4"x9 13/16" 7 x 25	2 3/4"x9 13/16" 7 x 25	2 3/4"x9 13/16" 7 x 25			
Events 33 V1			2 3/4"x9 1/16" 7 x 23	2 3/4"x9 1/16" 7 x 23		
Events 40 V1					2 3/4"x15 3/4" 7 x 40	2 3/4"x15 3/4" 7 x 40

Internal volume calculation: Vb = B x C x {D+(A-D)/2}
1 - External sizes in inches and millimetres with sides of 19 mm thickness
2 - (Ø x L) in cm

Recommended power ratings

Polyglass subwoofers are already highly efficient, with improved sensitivity. Therefore, their use with amplifiers will produce comfortable listening pleasure.
However used in a more high-end system, with more powerful amplification, the audio quality will be greatly improved. It is very important to check that rated power of the amplifier is suitable to the subwoofers. Otherwise they may distort, or possible damage could occur.
Always consult the owners manual of the principal source (head unit/amplifier), to ensure the power rating is compatible. A safe guide is to ensure the maximum power of the amplifier is not greater than the nominal power of the speakers.

Warning!

The improved power handling has allowed Focal subwoofers to play at very loud sound volumes. For this reason, we recommend caution be wisely applied, especially during long listening periods. Excessive volume levels of more than 110dB can cause permanent hearing damage.

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.

Technical characteristics

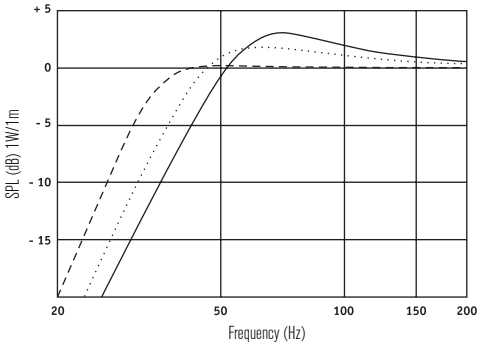
	27 V1	33 V1	40 V1
Cone	20.5cm	26cm	33,5cm
Sd	330.06cm^2	530.93cm^2	881.41cm^2
Xmax	6mm	7.5mm	7.5mm
Fs	39.01Hz	25.25Hz	26.84Hz
Qes	0.510	0.360	0.510
Qms	3.470	3.440	4.620
Qts	0.445	0.326	0.459
Vas	21.43 liters	91.79 liters	165.66 liters
Res	19.73 ohms	31.92 ohms	29.89 ohms
Mms	118.87g	171.36g	231.60g
Bl	12.87N/A	15.88N/A	15.90N/A
Le	23.20mH	58.48mH	38.37mH
Re	2.9 ohms	3.34 ohms	3.3 ohms

Parameters

	27 V1	33 V1	40 V1
Impedance	4 ohms	4 ohms	4 ohms
Max. Power	500W	800W	800W
Nom. Power	250W	400W	400W
Sensitivity (2.83V X 1m)	90dB	92dB	93,5dB
Fitting diameter	9-3/16" (233mm)	11-5/16" (287mm)	13-5/16" (351mm)
Fitting depth	5-1/8" (130mm)	6-1/4" (158mm)	7-5/16" (185mm)

Frequency response

27 V1
Vented enclosure

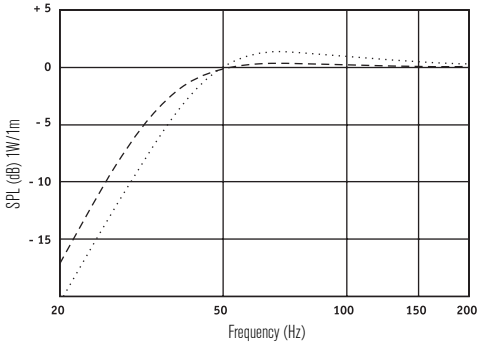


——— 15 liters (0.53 cu. ft)
F - 3 = 46Hz / ***Fast and tight bass***

..... 20 liters (0.71 cu. ft)
F - 3 = 40Hz / ***Punchy and dynamic bass***

- - - - - - 30 liters (1.06 cu. ft)
F - 3 = 33Hz / ***Deep and articulate bass***

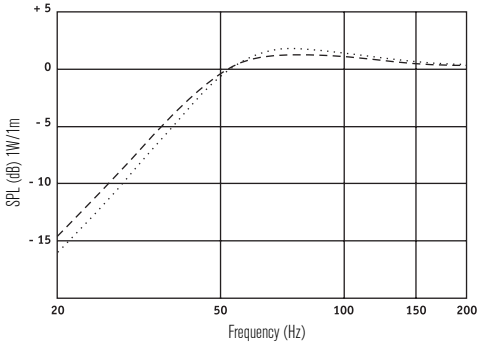
33 V1
Vented enclosure



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

- - - - - - 40 liters (1.77 cu. ft)
F - 3 = 36Hz / ***Deep and articulate bass***

40 V1
Vented enclosure



..... 50 liters (2.12 cu. ft)
F - 3 = 43Hz / ***Punchy and dynamic bass***

- - - - - - 60 liters (2.83 cu. ft)
F - 3 = 40Hz / ***Deep and articulate bass***

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