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We congratulate you on purchasing a Focal subwoofer, from the new 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 (-).
The 21 V2 uses a single coil; thus, there is one set of input terminals. For the 27 V2, 33 V2 and 40 V2, these all use a double coil system, thus have 2 x 2 input terminals incorporated.
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

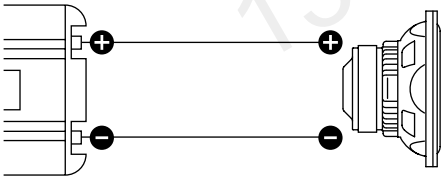
Using multiples of subwoofers for such comprehensive installations, it is sometimes better to connect them together in a series circuit. Using a low impedance load to the amplifier effectively ensures it will work less hard. For connecting the subwoofers, they are effectively looped together in any series 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

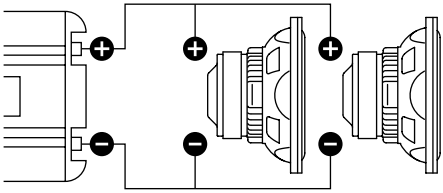
Connections series and parallel, combined

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.

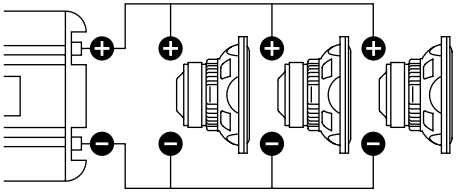
Connection diagrams for the 21 V2



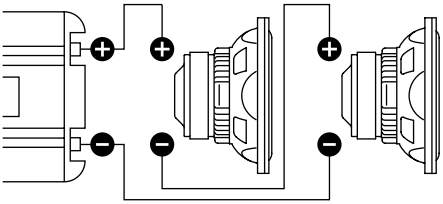
Examples and configurations for various multiples of subwoofers:



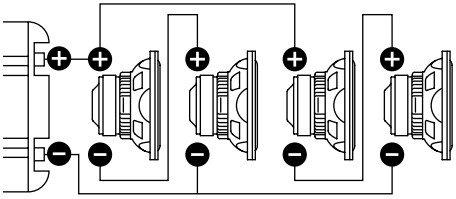
2 subwoofers 21 V2 in parallel. Z = 2 Ω



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



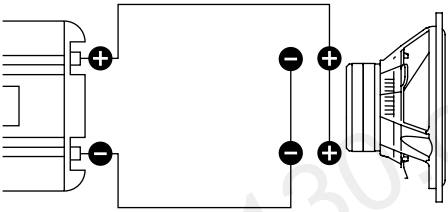
2 subwoofers 21 V2 in series. Z = 8 Ω



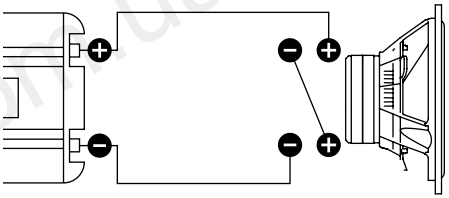
4 subwoofers 21 V2 in series / parallel. Z = 4 Ω

Connection diagrams for the 27 V2, 33 V2 and 40 V2

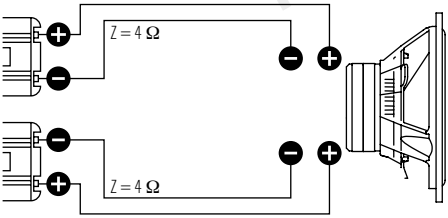
Four examples :



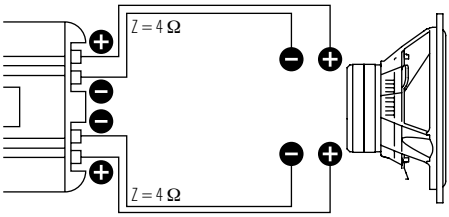
Connect in parallel the 2 voice coils Z = 2 Ω



Connect in series the 2 voice coils Z = 8 Ω

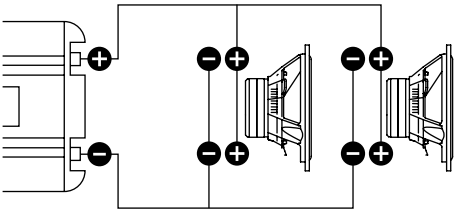


Connection using 2 amplifiers (mono)

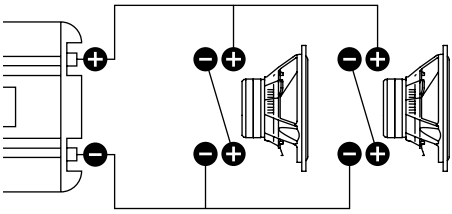


Connection using 1 amplifier (stereo)

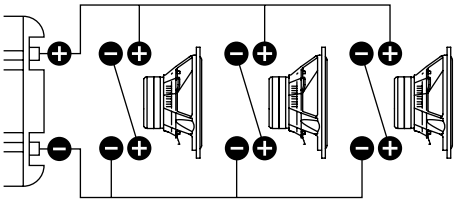
Examples and configurations for various multiples of subwoofers:



2 subwoofers 33 V2 both in parallel. Z = 1 Ω



2 subwoofers connected in series / parallel. Z = 4 Ω



3 subwoofers 33 V2 connected in series / parallel. Z = 2,66 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.

Installing the subwoofer into an enclosure

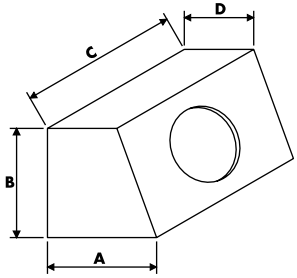
The new Polyglass subwoofers have been designed to work in sealed box enclosures. This system of charge, (easy and convenient for most installations), allows the user to experience a more dynamic extreme bass (12 dB/oct), with the added bonus of easier integration into the rest of the system.

See pages 6, 7 and 8 regarding our proposals for the various volumes available per subwoofer.

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



Internal volume calculation: Vb = B x C x (D+(A-D)/2)

Internal volume		12 L 0,42 cu. ft.	15 L 0,53 cu. ft.	20 L 0,71 cu. ft.	30 L 1,06 cu. ft.	40 L 1,41 cu. ft.	50 L 1,77 cu. ft.	60 L 2,12 cu. ft.	80 L 2,83 cu. ft.
External sizes in inches and millimetres with sides of 19mm thickness (6/8") in medite	A	10 1/4" 260	11" 280	11 3/4" 300	14 9/16" 370	14 9/16" 370	14 9/16" 370	15 3/4" 400	17 11/16" 450
	B	10 1/4" 260	11" 280	11 3/4" 300	14 9/16" 370	14 9/16" 370	14 9/16" 370	15 3/4" 400	17 11/16" 450
	C	13 3/8" 340	14 3/16" 360	16 1/8" 410	14 15/16" 380	19 1/4" 490	23 13/16" 605	28 5/16" 720	28 11/16" 730
	D	7 1/16" 180	7 1/16" 180	7 7/16" 190	9 5/16" 237	9 5/16" 237	9 5/16" 237	6 11/16" 170	7 7/16" 190

"Free air" installation

The 40 V2 has also been designed to work in "free air" installations, for example into the rear parcel shelf. With this type of acoustic charge the subwoofer can work to an optimum level without a huge loss in performance. For such installations it is important to observe these following rules:
- If mounted into the rear parcel shelf it must be strong enough to support such a heavy mass of subwoofer. Thus for this reason it is quite likely that the parcel shelf may have to be reinforced with wooden bracing. Alternatively a custom designed rear parcel shelf made from thick MDF, can be designed to replace the existing one.
- If a weak shelf is used, the acoustic performance of the subwoofer will be dramatically reduced. A weak shelf that emits loud vibrations can in effect create an acoustic short circuit.

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

In the unlikely event of any problem, please contact your Focal Audiomobile retailer.
Outside France, all Focal speakers are covered by the guarantee drawn up by the official Focal distributor in your country. Your distributor can provide all details concerning the conditions of the guarantee. Guarantee cover extends to the minimum legal period, provided in the country where the original purchase invoice was issued.

Technical characteristics

	21 V2	27 V2	33 V2	40 V2
Cone ⌀	15.5cm 6-1/8"	20.7cm 8-1/8"	26cm 10-1/4"	33.2cm 13-1/16"
Sd	188.69cm^2 29.25 in^2	336.4cm^2 52.14 in^2	530.93cm^2 82.29 in^2	865.7cm^2 134.18 in^2
Xmax	9mm 3/8"	11mm 7/16"	11mm 7/16"	11mm 7/16"
Fs	36.5Hz	38.51Hz	28.76Hz	28.1Hz
Qes	0.86	0.71	0.61	0.56
Qms	3.28	5.52	4.51	4.14
Qts	0.68	0.63	0.54	0.49
Vas	15.27 liters 0.54 cu. ft.	21.32 liters 0.75 cu. ft.	75.93 liters 2.68 cu. ft.	153.73 liters 5.43 cu. ft.
Res	13.41 ohms	16.4 ohms	15.6 ohms	15.51 ohms
Mms	62.12g 2.1912oz	127.32g 4.4910oz	159.71g 5.6335oz	219.66g 7.7481oz
Bl	7.64N/A	9.57N/A	9.98N/A	12.05N/A
Re	3.5 ohms	2.1 ohms	2.1 ohms	2.1 ohms

Parameters

	21 V2	27 V2	33 V2	40 V2
Type	Single coil sub	Double coil sub	Double coil sub	Double coil sub
Impedance	4Ω	2 x 4Ω	2 x 4Ω	2 x 4Ω
Maximum power handling	400W	600W	800W	800W
Nominal power handling	200W	300W	400W	400W
Sensitivity (2,83 V / 1 m)	85dB	88dB	90dB	93dB
Fitting diameter	184mm	232mm	287mm	351mm
Mounting depth	121.5mm	142.5mm	170mm	197mm

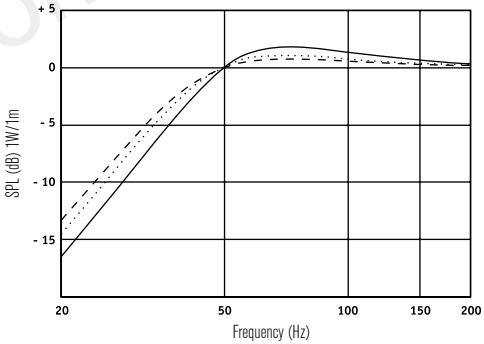
Frequency response

21 V2
Sealed enclosure

——— 10 liters (0.35 cu. ft.)
F - 3 = 43Hz / ***Fast and tight bass***

..... 15 liters (0.53 cu. ft)
F - 3 = 41Hz / ***Punchy and dynamic bass***

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

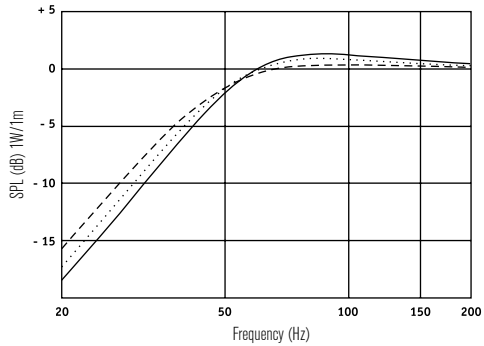


27 V2
Sealed enclosure

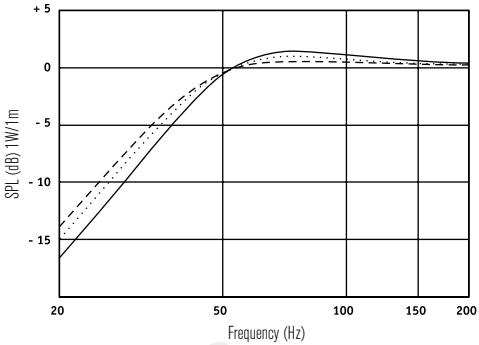
——— 15 liters (0.53 cu. ft)
F - 3 = 47.5Hz / ***Fast and tight bass***

..... 20 liters (0.71 cu. ft)
F - 3 = 45.8Hz / ***Punchy and dynamic bass***

- - - - - - - 30 liters (1.06 cu. ft)
F - 3 = 44Hz / ***Deep and articulate bass***



33 V2
Sealed enclosure

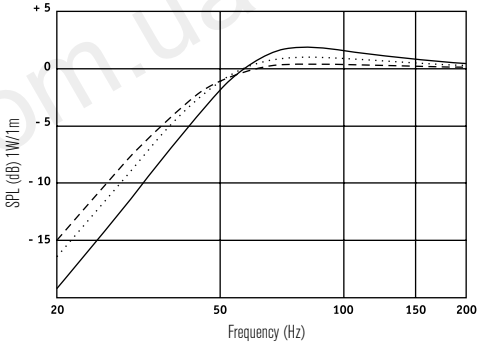


——— 30 liters (1.06 cu. ft)
F - 3 = 42.3Hz / ***Fast and tight bass***

..... 40 liters (1.41 cu. ft)
F - 3 = 40.2Hz / ***Punchy and dynamic bass***

- - - - - - - 50 liters (1.77 cu. ft)
F - 3 = 39.1Hz / ***Deep and articulate bass***

40 V2
Sealed enclosure

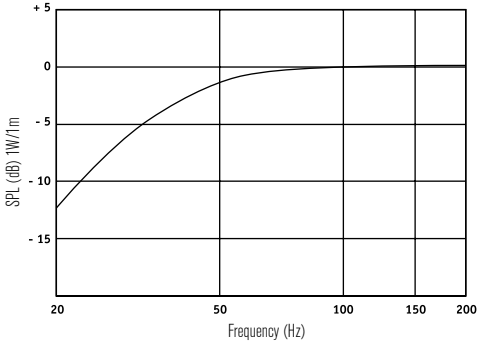


——— 40 liters (1.41 cu. ft)
F - 3 = 46Hz / ***Fast and tight bass***

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

- - - - - - - 80 liters (2.83 cu. ft)
F - 3 = 41Hz / ***Deep and articulate bass***

40 V2
Free-air



——— F - 3 = 40 Hz / ***Deep and articulate bass***

CE

ZI Molina la Chazotte - 108, rue de l'Avenir - BP 74 - 42003 Saint-Etienne cedex 1 - France
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