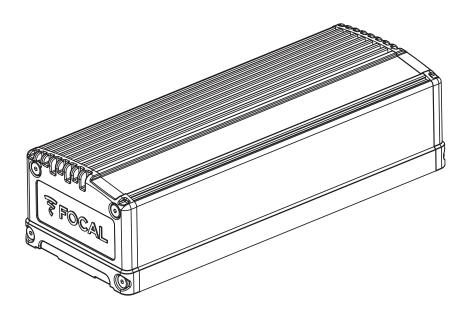
# IMPULSE 4.320 Ultra-compact D-class amplifier

User manual / Manuel d'utilisation



English page 3 Français page 15 Deutch seite 27



User manual

English version

Thank you for choosing Focal amplifiers for your Car Audio system and for sharing our philosophy: "the Spirit of Sound". This product offers the best of Focal technology in terms of compact D-class amplifiers.

In order to obtain the best results, we highly recommend you have your IMPULSE 4.320 amplifier installed by your local Focal dealer. To maximise the use of all the functionalities of your amplifier and to fully enjoy its performance, we recommend you thoroughly read all the instructions in this manual and keep it for future reference. Any problems due to the non-compliance of these rules may void the warranty.

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





#### **CAUTION**

This symbol indicates important instructions. Failure to comply with these instructions may result in injury or material damage.

#### **Contents**

- IMPULSE 4.320 amplifier
- User manual
- Set of accessories

#### Accessory available (sold separately):

- 1 ISO Plug and Play cable for connecting up to compatible head units



## CAUTION

- Do not operate any functions which may distract you while driving. Functions or settings requiring sustained attention must only be used when the vehicle is at a complete standstill. Always make sure to stop your vehicle in a safe place before operating these functions. Failure to do so may cause an accident.
- Keep the volume at a low level to be able to hear outside noises while driving the vehicle. Failure to do so may cause an accident.
- Never open your IMPULSE 4.320 amplifier and never make any modifications to the product. Failure to do so may cause an accident, a fire or an electric shock.



Your Focal-JMlab product was developed and manufactured with high-quality materials and components which can be recycled and/or re-used. This symbol indicates that electrical and electronic equipment must be disposed of separately from normal garbage at the end of its operational lifetime. Please dispose of this product by bringing it to your local collection point or recycling centre for such equipment. This will help to protect the environment in which we all live.

User manual

4



## CAUTION

- Only use your IMPULSE 4.320 amplifier with 12V mobile applications. Any use other than the intended use may cause a fire, an electric shock or injury.
- Use fuses with the adequate amperage. Failure to do so may cause a fire or an electric shock.
- Do not obstruct the heat sink on your IMPULSE 4.320 amplifier. Internal overheating may occur and cause a fire.
- Wire the connections correctly. Make sure you use the appropriate wire gauge and type of cable. Failure to do so may cause a fire, injury and/or material damage.
- Do not use nuts or bolts on steering or breaking systems, tanks, seat-belt anchor points or other safety elements for connecting the ground. Use of these parts as ground may deactivate the vehicle's control system and cause a fire or other technical problems.
- Keep all small objects which could be swallowed, such as fasteners, screws and accessories, out of the reach of children. Swallowing such objects may cause serious injuries. If swallowed, seek medical advice.
- Before beginning installation, disconnect the negative terminal of the battery to avoid any risk of injury, fire or material damage (fig. 1).

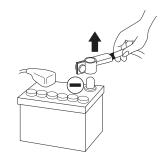


fig. 1



#### WARNING

Prolonged listening at high volumes, over 110dB, can cause long-term damage to your hearing. Listening at volumes over 130dB, even for short periods of time, can cause permanent damage to your hearing.

**Stop operation in the event of a problem.** Failure to comply with this precaution may cause injury or material damage. If a malfunction persists, return the equipment to your Focal dealer for repair.

Use the specified accessories and be sure to install them correctly. Only use the accessories specified in the user manual and those which are supplied in the packaging. The use of other components could cause internal damage to the equipment, or it may not be correctly installed. The parts used may become loose and cause damage or a technical malfunction of the equipment. Failure to do so may cause an accident, a fire or an electric shock.

**Do not install this product in very humid or dusty places.** Avoid installing the equipment in places with high levels of humidity or with an excessive presence of dust. Humidity or dust getting inside the product may cause a technical fault.

User manual

# 5

# Installing your IMPULSE 4.320 amplifier

Installation of this product requires technical knowledge and experience. If you are uncertain of your ability to correctly install the amplifier, we strongly recommend you contact your Focal dealer who will install it for you, so that you will be able to take full advantage of the full capabilities of your IMPULSE 4.320 amplifier.

## Wiring your IMPULSE 4.320 amplifier

Only use the wiring harnesses recommended in this manual and the accessories supplied.

Use the ISO cable (sold separately) to facilitate wiring. The speaker driver cable must ONLY be used for connecting the amplifier to the speaker drivers. The wire gauge of power cables must correspond with those indicated in the table (paragraph 3.1) and depends on the power of your amplifier and the length of cable required. Use double or triple shielded RCA cables to avoid any interference of the low-level signal.

## Operating time of your IMPULSE 4.320 amplifier

Avoid using the amplifier for extended periods of time without starting the vehicle. This may cause the battery to run flat prematurely.

## Cooling system

Do not cover the top of your IMPULSE 4.320 amplifier as this may cause overheating.

## Materials required for installation (in addition to accessories supplied)

- 2 sheaths of adequate cross-section (1 sheath for the power cable, 1 sheath for the speaker driver, REMOTE and RCA modulator cables)
- Multimetre (voltage/amperage)
- Soldering iron + solder
- Crimpers
- Wire stripper
- Wire cutter
- Battery terminal spanner
- Hand drill and assorted drill bits
- Heat-shrink tubing of adequate diameter for the different cables
- Power cable of adequate length and wire gauge
- Remote turn-on cable (REM input on amplifier) of adequate length and wire gauge
- Ground cable of suitable length and wire gauge
- Fuse holder and suitable fuse
- Spade terminal for connecting to positive (+) battery terminal
- Spade terminal for connecting to the chassis of the vehicle (-).
- Screw with minimum 015/64" (6mm) screw head and its nut for ground connection to the chassis of the vehicle

## Installation

The following section deals with issues related to the vehicle which must be considered for before installing your amplifier. You will save time by planning the layout of the system and wiring in advance.

During this preparatory time, please ensure that all the settings remain accessible once the installation is complete.

User manual 6

## Before beginning the installation, please follow these rules carefully:

- 1 After thoroughly reading the user manual, make sure you have understood all the instructions before installing your amplifier.
- 2 Disconnect the battery's negative wire before installation (fig. 1).
- 3 To facilitate assembly, we strongly recommend you unwind all the wires before installing your amplifier.
- 4 Route all RCA, speaker driver and REM cables, away from the power cables in order to avoid any signal interference.
- 5 Use quality connectors/splicing or good soldering for connecting the amplifier in order to ensure a reliable installation and to minimise any loss of signal or power.
- 6 Before carrying out any operations, be extremely careful not to cut or drill through the fuel tank, fuel, brake, hydraulic or vacuum lines, any electrical wiring or safety devices.
- 7 Never route a wire under the vehicle. Wiring must be installed inside the vehicle. When routing the cables, make sure they do not impede your driving. Cables obstructing or routing through areas such as the steering wheel, pedals (brake, accelerator and clutch, etc.) may be extremely dangerous.
- 8 Avoid routing wires over or through sharp edges. Any wire routed through metal must be protected with a grommet. Route the cables well away from mobile parts (seat rails,...) and from sharp or pointed edges. This will avoid getting the cables caught or damaging the cables which may cause a short circuit.
- 9 Always protect the battery and electric circuit from potential damage using fuses. Install a fuse holder and adequate fuses on the 12V positive (+) power cable less than 15" (40cm) away from the battery terminal. Ideally, this above-mentioned distance should be as short as possible (fig.10).
- 10 Prepare the chassis ground by scraping off any traces of paint on the metal surface in order to ensure proper grounding. The grounding connections should also be as short as possible and ALWAYS be connected to metal welded to the body or the chassis of the vehicle (*fig.2*). The ground point which is generally chosen is the one connecting the negative terminal of the battery to the chassis of the vehicle.
- 11 NEVER INSTALL this product in the engine compartment of the vehicle. This will void the warranty.

## 1 - Positioning of your IMPULSE 4.320 amplifier

## Where to install your IMPULSE 4.320 amplifier?

Due to the power of the amplifier, heat dissipation is required for correct operation. For this reason, the amplifier, particularly the top, must be installed in a well-ventilated area. Avoid covering or embedding the amplifier in its installed location.

## 2 - Mounting your IMPULSE 4.320 amplifier

Position your amplifier at the desired location and make matchmarks. Locate the attachment points on your support using the mounting bracket supplied. Use screws suitable for your type of support.

## 3 - Wiring your IMPULSE 4.320 amplifier



#### CAUTION

If you are uncertain of your ability to correctly install the amplifier and to wire the system up properly, get a Focal dealer/installer to do it for you.

User manual

7



#### **WARNING**

Avoid routing power cables close to low-level input cables (LOW-LEVEL INPUTS) and high-level input cables (HIGH-LEVEL INPUTS), close to the car aerial or close to sensitive equipment and harnesses. High-current power supply cables can cause static/interference that affects audio signals.



#### **WARNING**

Keep the cables as short as possible to optimise the quality of the installation. This will also limit signal loss.



#### **WARNING**

Before beginning the connection phase, remove the negative (-) terminal from the battery of the vehicle (fig.1).

# 3.1 - What wire gauge should I use for the power cable?

Your IMPULSE 4.320 amplifier requires a power supply of adequate amperage.

The required wire gauge of power cables depends on the length of cabling to the battery. See recommended wire gauge in the table below:

Length of cable to the battery in feet (metres)							
Length	< 3ft (1m)	< 10ft (3m)	< 13ft (4m)				
Cross sectional area in mm²	100	3.3mm²	> 3.3mm²				
AWG	ISO cable recommended	12 AWG	< 12 AWG				

Compliance with these wiring rules is essential for the safety of your electrical installation, and important for maintaining maximum performance of your IMPULSE 4.320 amplifier.

## 3.2 - Wiring the input and output signals on your IMPULSE 4.320 amplifier

#### **3.2.1** – Your head unit is equipped with RCA outputs

Route the modulator cables (RCA), the speaker driver cables and the REM cable together, ensuring to isolate them from other powerful automobile accessories, particularly electric motors (windscreen wipers,...). Keep the whole length of the cables, which will be adjusted later on.

**3.2.2** – Your head unit is only equipped with amplified outputs (speaker driver outputs).

Route the modulator cables coming from the head unit, and the speaker driver cables together, ensuring to isolate them from other powerful automobile accessories, particularly electric motors (windscreen wipers,...). Keep the whole length of the cables, which will be adjusted later on.

# 3.3 – Wiring the power supply to your IMPULSE 4.320 amplifier

**3.3.1** – Route the positive power cable (+) making sure when doing so to route the cable to the opposite side of the cables that you have previously installed to avoid any interference. DO NOT CONNECT THE CABLE YET.

User manual

**3.3.2** – Get the negative power cable (-). This cable should be as short as possible and ideally shouldn't be any longer than 3ft (1m), to ensure a perfect connection between the amplifier and the chassis of the vehicle. The cable and wire gauge must comply with the table in section 3.1. Find a suitable grounding point, then sand it to remove any traces of paint or other coating in order to optimise the quality of the contact point. Drill a hole in the metal that you have previously sanded, making a hole the same diameter as the screw you are using, making sure that there are no fuel

8

lines, cables or any other sensitive vehicle devices nearby. Solder the ground cable to the wiring harness supplied for your IMPULSE 4.320 amplifier and isolate using heat-shrink tubing (fig. 2).

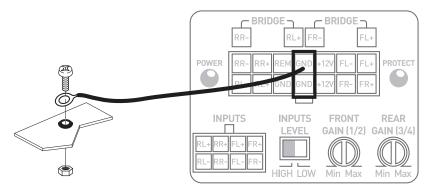


fig. 2

## 3.4 - Connecting the input signals to your IMPULSE 4.320 amplifier

You can now start connecting the input/output cables.

**3.4.1 –** Your head unit is equipped with RCA outputs

Connect the RCAs to the RCA adapter cable supplied *(fig. 3)*. Be careful to respect the polarities (INPUT Left = red, INPUT Right = black or white) and distribution (F=FRONT, R=REAR). Connect the other end to the amplifier's INPUTS panel.

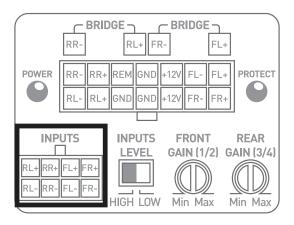


fig. 3

Switch the INPUTS LEVEL to LOW (fig. 4).



User manual

9

**3.4.2 –** Your head unit is only equipped with amplified outputs (speaker driver outputs).

Connect the speaker driver outputs of the head unit directly to the adapter cable supplied (fig. 5) ensuring the polarities are respected. Connect the other end to the amplifier's INPUTS panel.

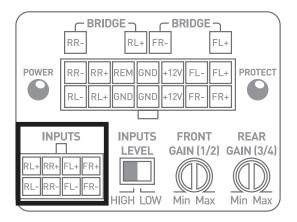


fig. 5

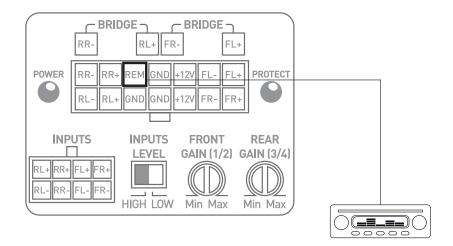
Switch the INPUTS LEVEL to HIGH (fig. 6).



fig. 6

## 3.5 - Connecting the speaker drivers and remote to your IMPULSE 4.320 amplifier

Solder the REMOTE cable to the wiring harness supplied and isolate using heat-shrink tubing (fig. 7). Connect the other end of the REMOTE cable to the car radio REMOTE terminal.



User manual

10

Finally, connect the speaker driver cables to the amplifier, making sure the polarities on the wiring harness supplied are respected (+ with +; - with -) (fig. 8).

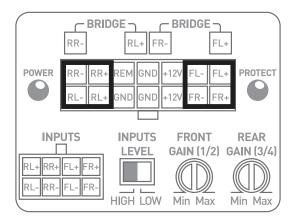


fig. 8



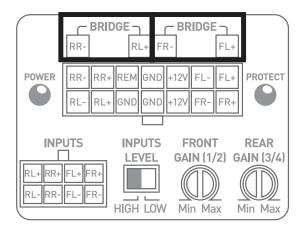
The speaker drivers or speaker driver kits wired to your IMPULSE 4.320 amplifier must systematically have a minimum impedance of 2 Ohms.



In bridged mode, the speaker drivers or speaker driver kits wired to your IMPULSE 4.320 amplifier must systematically have a minimum impedance of 4 Ohms.

The use of equipment with a lower impedance will void the warranty.

To use the IMPULSE 4.320 in bridged mode, and thus double the power available, make sure that connections and polarities are respected as shown below (fig. 9)



User manual and the state of th



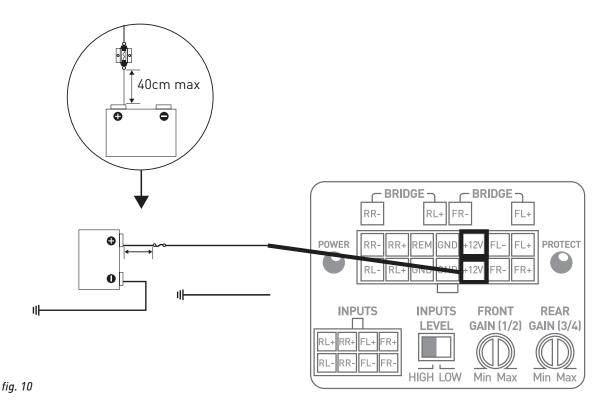
The cable connecting the positive (+) terminal of the battery to the "+ BATT" terminal on the amplifier MUST be fused (ampere rating: 25 amperes) at less than 15" (40cm) away from the battery of the vehicle.

The connections on the fuse-holder must be fully insulated.

Open the fuse holder, removing the fuse with care. Fix the fuse holder's base.

Cut a length of power cable measuring between 4" and 15" maximum (10 and 40cm). Strip 0<sup>25/64</sup>" (1cm), then tin. Screw the cable to the terminal of the fuse holder (battery side). Crimp the power cable to the intended spade terminal and screw to battery terminal.

Strip 025/64" (1cm) from the remaining length of cable, then tin. Screw the cable to the other fuse holder terminal.



Solder the positive (+) power cable to the wiring harness supplied for your IMPULSE 4.320 amplifier (fig. 10)

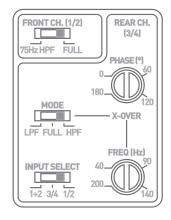
# 3.6 - Start-up and checks.

The connection phase is now complete. You must now check that the power supply is correct and that everything is working correctly (head unit/amplifier/speaker drivers). Set the source gain to its minimum. Set the gain on your amplifier to 1/3 of the way. Turn on the various devices. Once all the devices have been turned on, test your installation at low volume.

.

User manual 2

# 4 - Control panel and connections



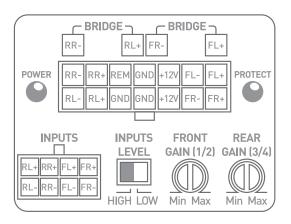


fig. 11

INPUTS: These connectors are dedicated to the low-level and high-level signal inputs.

GAIN (FRONT AND REAR): The GAIN knob allows you to adjust the incoming signal to the amplifier. The voltage gain varies between 0.2V and 5V. To optimise the performance of your sound system, you need to apply a maximum of gain as early as possible in the stereo system, and then a minimum of gain afterwards.

This knob must be set according to the source volume (line output level).

Start by setting the amplifier gain to its lowest level. Gradually increase the level of the source volume up to 3/4 of the way. Then increase the amplifier gain to the desired maximum listening volume. Turn the volume down if distortion occurs. The FRONT knob controls the front speaker drivers. The REAR knob controls the rear speaker drivers.

+12V: the "+BATT" power connector is dedicated to the power cable connecting the amplifier to the positive (+) terminal of the battery.

GND: the GND (ground) power connector is dedicated to the negative (-) power cable connecting the amplifier and the vehicle's chassis.

REM: the REM connector connects the amplifier to the source (head unit) via a REM or REMOTE output on the head unit. This enables the amplifier's automatic power on function when the source (head unit) is turned on.

POWER and PROTECT: these LEDs enable you to check if the amplifier is working correctly. A continuously lit POWER LED means the equipment is working correctly.

If the PROTECT LED is continuously or intermittently lit, the equipment is not working correctly. See troubleshooting section paragraph 5.

INPUTS LEVEL: this switch selects the type of input level (HIGH: high-level / LOW: low-level RCA)

User manual

13

INPUT SELECT: this switch enables channels 1 and 2 to be played through channels 3 and 4. If you only have one output (one right and one left), you can still amplify the four channels by activating the 1/2 mode. If you want to use the IMPULSE 4.320 with its independent 4-channel input configuration, select mode 3/4. If you want to use the IMPULSE 4.320 with a 3-channel configuration, select mode 1+2. Channels 3/4 will then receive the mono signal from channels 1 and 2 to drive your subwoofer.

PHASE (°): the PHASE knob enables you to adjust the channel phase according to the rest of the installation. Adjusting the phase of the subwoofer enables the subwoofer output to be in phase with the other speaker drivers. On a theoretical period of a signal, one of the sources can be delayed slightly so that the phase will be perfectly balanced at the listening point.

X-OVER MODE: the crossover mode switch enables you to choose to activate the high-pass filter mode (HPF), the low-pass filter mode (LPF) or the full range mode (FULL) for channels 3/4 or rear channels.

X-OVER FREQ (Hz): this knob controls the cut-off frequency by adjusting the low-pass and high-pass filter levels. The selected value determines the frequency up to which or from which the signal will be cut off.

FRONT CH. (1/2): this switch activates a high-pass filter set at 75Hz for the front channels. Use this setting for solving issues related to door vibrations in vehicles not equipped with vibration dampeners.

#### 5 - Troubleshooting

The state of the various LEDs indicates a malfunction or the source of a malfunction. Check the possible causes shown below. If, despite these checks, the equipment is still not working correctly, contact your IMPULSE 4.320 amplifier installer or dealer.

State of LEDs	Presence of sound	Possible cause	Action
PROTECT lit red	NO	Output short circuit	Turn off the sound system. Check the speaker drivers, their minimal impedance, their connections and the speaker driver cables.
Off	NO	No power or poor connection	Turn off the sound system. Check power source is 12V. Check the power cables and their polarity. Check the fuses.
Off	NO	Overheating	Turn off the sound system. Wait for your amplifier to cool down before resuming use.
Off	NO	No REM signal	Turn on the sound system. Check there's power on the REM terminal.
Off	NO	Fuse malfunction	Turn off the sound system. Check and replace the fuses if necessary.
POWER flashing green	YES/NO Or intermittent	Grounding defect	Turn off the sound system. Check the connection from the GND terminal to the chassis of the vehicle.

User manual 44

# 6 - Technical specifications

	IMPULSE 4.320 4/3/2-channel class D amplifier	
High-level input / RCA low-level input	V	
CEA power (4 Ohms)	4 x 55Wrms	
Power max (2 0hms)	4 x 80Wrms	
Power max (4 Ohms bridged)	2 x 160Wrms	
Bandwidth	10Hz – 20KHz (+/- 1dB)	
Total harmonic distortion	THD+N < 0.05 % from 0.5 to 50Wrms 4Ω (1 kHz, 22kHz LPF)	
Total minimum harmonic distortion	0.02 %	
Cross-talk (1KHz)	> 65dB (Ref. 10 Vout)	
SNR (1W/A)	> 80dBA	
High-pass filter	Activatable/deactivatable fixed at 75Hz on channels 1/2	
High-pass/low-pass filter	configurable from 40Hz - 200Hz on channels 3/4	
Phase	Adjustable 0/180° on channels 3/4	
Full range mode	on channels 1/2 and 3/4	
Standby consumption – (Remote ON)	750mA	
Fuse ratings	25A (15A if ISO harness)	
Protection	Short circuit/over-current/reverse polarity/ DC/voltage drop/ heat protection	
Dimensions (LxHxW)	6 <sup>7/8</sup> " x 2 <sup>5/8</sup> " x 1 <sup>7/8</sup> " (175mm x 66.5mm x 47mm)	
Weight	(1.2 lbs) 550g	

# 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.

# Garantie France

Pour validation de la garantie Focal, nous renvoyer cette page dans les 10 jours, à l'adresse suivante :

Focal-JMlab - BP 374 - 108, rue de l'Avenir - 42353 La Talaudière cedex - FRANCE

X

Il est maintenant possible d'enregistrer son produit en ligne : www.focal.com/garantie Vous: Votre nom : \_\_\_\_\_\_ Âge : \_\_\_\_\_\_ Profession :\_\_\_\_\_\_ Votre adresse complète : \_\_\_\_\_ Votre adresse e-mail : Vos centres d'intérêts : Chez vous, possédez-vous des enceintes haute-fidélité? □ - Oui □ - Non Si oui, précisez la marque : Lisez-vous la presse écrite ? □ - Oui □ - Non Si oui, quel(s) titre(s) : \_\_\_\_\_ Votre équipement audio/vidéo (marques et modèles) avant l'acquisition du produit Focal : Lecteur CD /tuner : \_\_\_\_\_ Lecteur multimédia :\_\_\_\_\_ Système de navigation : \_\_\_\_\_ Amplificateur : \_\_\_\_\_ Kit haut-parleur: \_\_\_\_\_ Caisson de grave / subwoofer:\_\_\_\_\_ Autres éléments :\_\_\_\_\_ Votre choix pour l'achat de ce modèle Focal s'est fait en fonction de : ☐ - Conseil du revendeur ☐ - Conseil d'un ami, relation \_ - Visite d'un salon, d'une exposition 🗌 - Rapport qualité / prix ☐ - Qualité sonore, écoute en auditorium ☐ - Possède déjà des produits Focal ☐ - Fiabilité / qualité de fabrication Catalogues ☐ - Esthétique / finition ☐ - Matériel français ☐ - Article de presse écrite (si oui, précisez le ☐ - Autre : \_\_\_\_\_ titre du magazine) : Votre Produit Focal: Modèle : \_\_\_\_\_ N° de série :\_\_\_\_\_ Nom du revendeur :\_\_\_\_\_\_ Ville : \_\_\_\_\_\_ Date de l'achat : \_\_\_\_\_\_ Prix de l'achat : \_\_\_\_\_ □ - Oui □ - Non Avez-vous confié l'installation du produit à votre revendeur ? Si non, pourquoi : \_\_\_\_\_ Modèle de voiture : \_\_\_\_ Ces informations sont necessaires à notre société pour traiter votre demande. Elles sont enregistrées dans notre fichier de clients et peuvent donner lieu à l'exercice du droit d'accès et de rectification auprès de notre service clientele (04 77 43 57 00). Si vous ne souhaitez pas que vos données soient utilisées par nos partenaires à des fins de prospection, veuillez cocher la case ci-contre. 🔲 Si vous ne souhaitez pas recevoir des propositions commerciales de nos partenaires par voie électronique, merci de cocher la case ci-

Vous êtes susceptibles de recevoir des offers commerciales de notre société pour des produits analogues à ceux que vous avez achetés.

Si vous ne le souhaitez pas, cochez la case ci-contre. Nous garantissons la confidentialité de ces informations.

# International Guarantee

For the validation of the Focal guarantee, send back this sheet within 10 days to the following address:

Focal-JMlab - BP 374 - 108, rue de l'Avenir - 42353 La Talaudière cedex - FRANCE

Now it's possible to register or	n line : www.focal.com/warranty		
About yourself:			
Your name:	Your age: Your job:		
Your full address:			
Your e-mail address:———————————————————————————————————			
Your hobbies:			
At home, do you own Hi-Fi loudspeakers?	🗌 - Yes 🔠 - No		
If yes, specify the brand:			
Do you read the press?	🗌 - Yes 🔠 - No		
If yes, which magazine(s)?			
Your audio/video equipment (brands and mod	els) before the acquisition of Focal products:		
CD player/tuner:	Multimedia player:		
Navigation system:	Amplifier:		
Speakers:	Enclosure/subwoofer:		
Other elements:			
Your choice for the purchase of this Focal m	odel was made according to:		
• □ - Dealer's advice	- Friend's or family's advice		
Visiting an exhibition/a show	Quality-price ratio		
Sound quality/listening room	Already own Focal products		
Reliability/manufacturing quality	🗌 - Catalogues		
Design/Finish	French product		
Article in the press (if yes, specify the title of the magazine)	<del>_</del>		
Your Focal product:			
Model:	Serial number:		
	City:		
	Price of your purchase:		
Did you leave the product installation to your deale			
If not, why?	Car model:		
his information is necessary to our company to deal with your reque coess to and correct the information that concerns you through our you do not wish to have your data used by our partners on commer you do not wish to receive commercial propositions from our partners on many receive commercial offers from our company for products so you do not wish to, tick that box.	rcial purpose, tick this box.   pers by e-mail, please tick this box.   imilar to those you have bought.		



