

# FOCUS-SERIES

## FOCUS MODULAR

MODULAR BEAM STEERING SYSTEMS

FMI-100 / FMI-110 / FMI-400

FM-100 / FM-110 / FM-400



Please read this user manual through carefully before putting the system into operation and keep it for future reference.

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# 1. Introduction and General Instructions

Congratulations on the purchase of your **Fohhn® Focus Modular** system. As with all our **Focus-Series** systems, **Focus Modular** loudspeakers are equipped with the very latest **Fohhn Beam Steering technology**. This allows users to adjust the system's vertical beam dispersion characteristics in real time, enabling optimum sound coverage – even in the most acoustically challenging venues.

All the functions of a **Focus Modular** system can be controlled using a single piece of software, **Fohhn Audio Soft**. All **Focus Modular** systems are available in both mobile and fixed installation variants.

**In order to benefit from all the advantages of your Focus Modular system and to guarantee smooth operation, please read the following user instructions carefully before putting the system into operation and keep this manual for future reference!**

## 1.1 Important Safety Instructions

Please read the following safety instructions in their entirety before putting this device into operation. Keep these instructions near the device at all times. Reading the user manual does not replace the need for awareness of and compliance with currently applicable national safety regulations and standards, or the observance of safe on-site working methods.

All information and technical specifications published here are based on data that was available at the time of publication. We expressly reserve the right to make any changes.

### 1.1.1 Explanation of Terms

#### **Danger**

This signal word indicates a hazard with a high risk level, which, if not avoided, could result in death or serious injury.

#### **Warning**

This signal word indicates a hazard with a high risk level, which, if not avoided, could result in death or serious injury.

#### **Caution**

This signal word indicates a hazard with a medium risk level, which, if not avoided, could result in death or serious injury.

### 1.1.2 General Safety Instructions

**Danger:**

To avoid danger to life or limb, please ensure that all personnel involved in installing or dismantling such a system have read and understood the contents of this manual.

The information presented here should, however, be regarded as accompanying advice and it does **not** affect the ultimate responsibility of the user to ensure safe on-site operation of a **Focus Modular** system.

**Warning:**

To prevent injury caused by a fallen system,

- ⚠ this device must be securely mounted in accordance with the assembly instructions and current safety guidelines. Only use the specially designed **Fohhn®** mounting accessories or components, which are explicitly specified in the assembly instructions.
- ⚠ this device must be regularly inspected for any signs of wear or loosening of the load-bearing connections.
- ⚠ it is necessary to ensure that the mounting points on a building or structure have sufficient load-bearing capacity and are structurally viable.
- ⚠ all components of a hung (i.e. “flown”) device must be visually inspected before installation. Any part showing signs of deformity, cracks, rust, fractured welds or other signs of wear must not be used under any circumstances.
- ⚠ the load limit of any component that will be used for system suspension (including shackles, chains and hoists) must not be exceeded. In order to comply with local safety regulations, these load limits may, in certain circumstances due to underlying safety factors (operating ratios), need to be recalculated and, if necessary, reduced.

All components required for the mounting or suspension of a **Focus Modular** system have been designed and constructed in accordance and compliance with the following regulations that are applicable in Germany: BGV-C1, BGI 810-3, DIN EN 1993-1-1, DIN EN 1999-1-1 and DIN 18032-2. The safety factor (operating ratio) is therefore equal to or better than 10:1. If the system is to be used in countries that have stricter requirements, the permissible load capacity must be reduced accordingly.

To avoid injury,

- ⚠ the device must be stored, installed and operated well away from children.

To avoid injuries, this device must be taken out of operation, marked appropriately and protected against accidental use if it

- ⚠ shows visible signs of damage
- ⚠ appears to contain loose parts
- ⚠ is not working correctly
- ⚠ has been subjected to unfavourable conditions (e.g. moisture) for a prolonged period
- ⚠ has been subjected to poor transportation conditions (e.g. with unsuitable packaging or damp/humidity).

If necessary, please contact your Fohhn® dealer and the transportation company immediately. Contact details can be found in the appendix to this user manual.

### 1.1.3 Electrical Safety Information

**Focus Modular** systems are Protection Class 1 appliances. They are built and certified in accordance with the VDE safety measures for electronic devices and, safety-wise, leave our factory in perfect condition. The devices comply with all currently applicable EMC directives: Confirmed by the attached CE marking.

**The relevant guidelines can be found in the appendix to this user manual!**

**Warning:**

To minimize the risk of electric shock

- ⚠ the mains plug grounding pin must never be separated and under no circumstances should the plug be taped up.
- ⚠ the device must **only** be connected to a professionally tested shockproof socket.
- ⚠ the device housing must never be opened. The device does not contain any components that can be repaired by the user. In the unlikely case of a defect, please consult qualified service personnel and/or the dealer from whom you purchased the system.

Please also ensure that the local mains supply voltage matches the power supply voltage specified on the device.

To minimize the risk of an electric shock or fire,

- ⚠ the device must not be subjected to moisture / wet conditions.
- ⚠ containers filled with liquid (e.g. beverage containers) must not be placed on the device.
- ⚠ ventilation slots must not be covered with objects (e.g. protective rain covers).
- ⚠ the device must not be subjected to excessive heat, sunshine, fire or similar.
- ⚠ no open sources of flame (e.g. pyrotechnics) must be placed on the device.

**Caution:**

To avoid damaging the device

- ⚠ do not leave the power cable plugged in if the device is not going to be used for a while.  
(Remove the plug from the mains socket in order to completely disconnect the device!)

### 1.1.4 Acoustic Safety Information

Focus Modular loudspeaker systems are capable of generating very high sound pressure levels, which can cause irreparable damage to hearing.

**Warning:**

To avoid potential hearing impairment,

- ⚠ never stand in close proximity (1 metre or less) to a device while it is in operation.

To prevent both hearing impairment and damage to the device, avoid the following while the device is in operation:

- ⚠ acoustic feedback
- ⚠ high powered, permanently distorted signals
- ⚠ impulse noises, which can occur when a device is switched on or off, connected or disconnected from the system.

### 1.1.5 Connections and Cabling

**Focus Modular** loudspeaker systems have the following connectors:

- Audio In/Out
- Control data In/Out
- Power supply In/Out

**For further details, please refer to the section on cabling in this user manual (see Chapter 3)!**

Please note the following when wiring up your system:

- ⚠ Check that your cable is working faultlessly and only use cables with a sufficient cross section.
- ⚠ Only use cabling- and connector materials that meet professional standards.
- ⚠ Only use properly shielded cables and plugs for the audio and data connections.
- ⚠ Only use power cables with a fully intact grounding pin and make sure that the device's mains plug is accessible at all times so that it can be quickly removed from the mains supply in the event of a malfunction.
- ⚠ Lay and secure the cabling so that it cannot be damaged by tools, or through being trapped by the device or by a fixing bracket.
- ⚠ Protect any laid cables from mechanical damage, or unnecessary traction.
- ⚠ Avoid excessive tightening of the screws on connection terminals! (This only applies to fixed installation variants.)

**The wiring up of loudspeakers should only be carried out by suitably qualified personnel!**

**Important:** To enable communication between a Windows PC with **Fohhn Audio Soft** installed and the **Focus Modular** loudspeaker system, a **Fohhn®** network adapter (e.g. **NA-11 Fohhn-Net USB Adapter** or **NA-3 Fohhn-Net Ethernet Adapter**) is required.

**More information can be found in Chapter 3 of this user manual!**

## 1.2 Operating Conditions

Please note the following when operating your **Focus Modular** system:

- ⚠ The permitted ambient temperature of the device during operation ranges from 0 °C to +40 °C. A short period of use outside this temperature range is possible, but not advisable.

- ⚠ The device is intended for use in a dry environment with normal levels of dust and humidity in the air.
- ⚠ Never expose the device to any aggressive chemical fluids or vapours.
- ⚠ Always make sure that heat can be dissipated via the outer surface of the device enclosure.
- ⚠ Always make sure that the device is well ventilated. In order to ensure adequate cooling, the device must not be covered with towels or cloths. Avoid letting the enclosure become hot through exposure to sunlight or strong spotlights.
- ⚠ In order to guarantee sufficient cooling for the device, the following minimum gaps must be maintained: left/right side >5 cm, back >10 cm, top >10 cm.
- ⚠ Never expose the device to strong vibration.

### 1.2.1 Information on Abnormal Operation

If the permissible operating temperature is too high (over 75 °C), the device will shut down. As soon as the temperature returns to within the normal operating range, the device will automatically power up again.

The temperature of the **Focus Modular** loudspeaker system will be displayed in **Fohhn Audio Soft**. Shutdown can also occur if the product is exposed to direct sunlight or very high environmental temperatures. Reliable operation is only guaranteed in compliance with the permissible ambient temperature range.

The device should be immediately inspected by a **Fohhn Audio AG** approved service partner if

- ⚠ the mains cable or power socket is damaged,
- ⚠ a foreign body or liquid has got into the interior of the device,
- ⚠ the device has been exposed to rain,
- ⚠ the device is not working normally i.e. it is showing marked differences in performance,
- ⚠ the device is damaged (e.g. after a fall).

## 1.3 Storage and Transportation

Please note the following:

- ⚠ The device should only be transported in its original packaging.
- ⚠ Store the device in a dry environment, with a constant ambient temperature, in order to avoid condensation.
- ⚠ The permitted ambient temperature range for storing the device is -10 °C to +70 °C.
- ⚠ Due to fluctuations in temperature during transportation and storage, condensation may start to build up on the surface of the device. Before operating the device, examine its surface for any signs of moisture. If this is the case, allow the unpacked device to acclimatise for two hours in the environmental temperature before using it.

## 2. The Product

### 2.1 Product Description

**Fohhn® Focus Modular** loudspeaker systems, which form part of the **Focus-Series**, are active, modular loudspeaker systems designed both for fixed installation use and for mobile applications.

The special feature of these systems is their integrated **Beam Steering Technology**: Using dedicated control software, **Fohhn Audio Soft**, the systems' beam dispersion characteristics can be intuitively controlled in real time and thereby optimally adjusted to suit the particular application. Conventional mechanical tilting, i.e. the physical adjustment of the loudspeaker at the venue, is therefore no longer necessary.

The current version of the required Fohhn Audio Soft software can be downloaded free of charge from [www.fohhn.com](http://www.fohhn.com)

The following modules are available:

- **FMI-100 / FM-100:** High frequency module
- **FMI-110 / FM-110:** High frequency module
- **FMI-400 / FM-400:** Low-mid module / Full range module



Left to right: FMI-100/FM-100, FMI-110/FM-110, FMI-400/FM-400

The high frequency modules are equipped with 8 or 16 1" compression drivers respectively, and a preceding **Fohhn®** Waveguide system. Each high frequency driver is separately powered by a Class-D amplifier channel. The high frequency modules have a frequency range of 1 kHz to 20 kHz and can only be used in combination with one or more low-mid modules.

The low-mid / full range module is equipped with 32 long excursion cone speakers. The chassis are driven in pairs by 16 Class-D amplifier channels. The frequency range here is 60 Hz to 17 kHz.

***Brief overview of the modules:***

Module	FMI-100 / FM-100	FMI-110 / FM-110	FMI-400 / FM-400
Components	8 x 1" drivers	16 x 1" drivers	32 x 4" chassis
Amplifier channels	8 x 120 W, Class-D	16 x 120 W, Class-D	16 x 120 W, Class-D
Frequency range	1 kHz – 20 kHz	1 kHz – 20 kHz	60 Hz – 17 kHz
Full range use	no	no	Yes

The modules can be acoustically and mechanically combined as required, in order to suit the particular application and space situation. Long reach and optimal sound results can be achieved even in acoustically difficult situations.

## 2.2 Product Identification

The **Focus Modular** module's type designation can be found on the side of the speaker enclosure. The individual modules can also be identified by their respective sizes:

- **FMI-100 / FM-100:** 70 cm
- **FMI-110 / FM-110:** 128 cm
- **FMI-400 / FM-400:** 163 cm

**Focus Modular** loudspeaker systems are available in variants for fixed installation and for mobile applications. The installation variants can be identified by the additional letter "I" in their type designation:

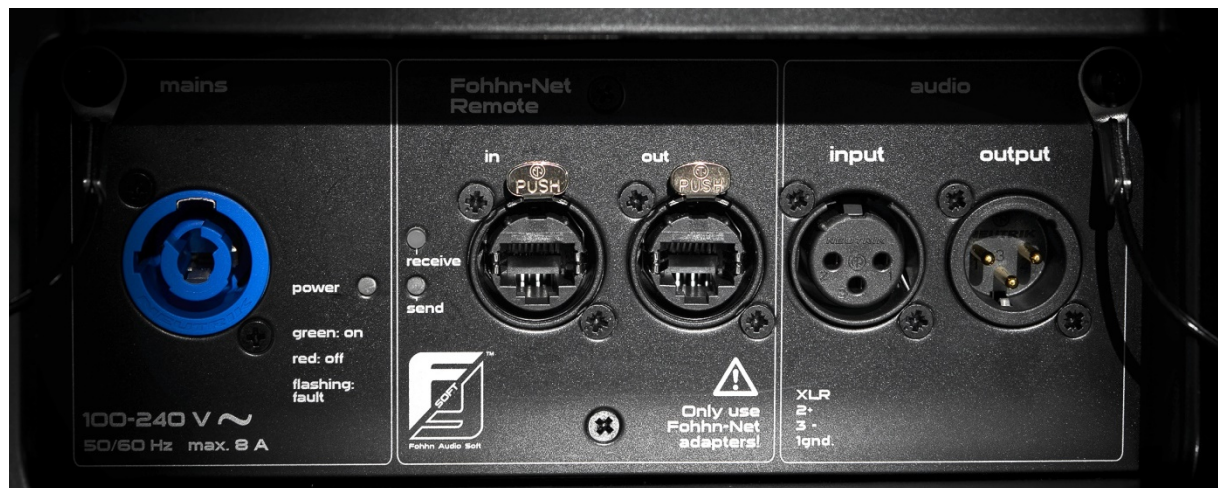
- **FMI-XXX:** Variants for fixed installation
- **FM-XXX:** Variants for mobile applications



Laterally attached plate with type designation

Both variants can be additionally identified via their connector panels:

- On **FMI-XXX** modules, the connection panels are located behind a cover in the speaker enclosure.
- On **FM-XXX** modules, the rear connector panels allow direct access to the connections.



FM-XXX upper connector panel

## 2.3 Delivery and Accessories

Every product is examined in accordance with the highest quality and safety standards prior to despatch.

Please check your product carefully for any signs of transport damage and, in the event of any damage having occurred, inform your dealer and the transportation company immediately. Please also check that the packaging contains all the components belonging to the device.

Your **Focus Modular** system is delivered with the following:

### *Installation variants:*

- **1 x FMI-100, FMI-110 or FMI-400**
- **1 x Quick Start Guide**
- **1 x three-part cable set** for the electrical connection of two adjacent **FMI** modules (supply voltage, audio signal, **Fohhn-Net** network)
- **1 x PowerCON mains cable**
- **2 x ball lock pins**

### *Mobile variants:*

- **1 x FM-100, FM-110 or FM-400**
- **1 x Quick Start Guide**
- **1 x three-part cable set** for the electrical connection of two adjacent **FMI** modules (supply voltage, audio signal, **Fohhn-Net** network)
- **1 x PowerCON mains cable**

**If the delivery does not appear to be complete, please contact your Fohhn® dealer!**

Setting up a **Focus Modular** module requires a Windows PC (Windows 7 or higher) with **Fohhn Audio Soft** installed and one of the two following **Fohhn®** network adapters:

Product ID	Article number	Description
<b>NA-11</b>	6115-00000	Fohhn-Net USB Adapter
<b>NA-3</b>	6104-00000	Fohhn-Net Ethernet Adapter

The following accessories are available:

Product ID	Article number	Description
<b>WFM-100</b>	8441-B0000	Wall-mounting bracket for <b>FMI-100</b> , black
<b>WFM-110</b>	8442-B0000	Wall-mounting bracket for <b>FMI-110</b> , black
<b>WFM-400</b>	8443-B0000	Wall-mounting bracket for <b>FMI-400</b> , black
<b>VFM-1</b>	8444-B0000	Flying adapter, black, including: - 2 x shackles with 1000 kg WLL (Working Load Limit) - 1 x shackle with 2000 kg WLL
<b>CC-300</b>	8320-B0000	Cardan Clamp, black, with rotation brake, for use with <b>VFM-1</b> , 300 kg SWL (Safe Working Load)
<b>RC-FM-400</b>	8149-00000	Rain cover for <b>FM-400 / FMI-400</b> , sound permeable, extendable via zip fastener
<b>RC-FM-110</b>	8148-00000	Rain cover for <b>FM-110 / FMI-110</b> , sound permeable, extendable via zip fastener
<b>RC-FM-100</b>	8147-00000	Rain cover for <b>FM-100 / FMI-100</b> , sound permeable, extendable via zip fastener
<b>RC-FM-LID1</b>	8150-00000	Lid for <b>FM-/FMI</b> rain cover, closed
<b>RC-FM-LID2</b>	8151-00000	Lid for <b>FM-/FMI</b> rain cover, open for use with <b>VFM-1</b>
<b>FM-CASE</b>	8156-00000	System flightcase for any two modules



**Flying Adapter VFM-1**



**Cardan Clamp CC-300**

## 2.4 Unpacking

When unpacking the system, we recommend the following procedure:

1. Open the packaging and take out the product.
2. Examine the product for any visible signs of transport damage.
3. If the product has been damaged, inform the transportation company immediately. A claim for transport damage can only be made by the recipient (that is to say, you). Keep the packaging for examination by the transportation company.
4. As a general rule, always retain the packaging. Despatch the product in appropriate outer packaging or in a suitable flightcase.

## 3. Installation

### 3.1 The Focus Modular Load-Bearing System

Each **Focus Modular** module has two aluminium supporting tubes integrated into its enclosure. These are located behind the right and left side panels respectively, and can be accessed via openings in the aluminium covers that form the top and bottom ends of the enclosure. The two tubes carry the entire weight of the system – **both** must therefore always be used during installation!



At the lower end of the supporting tube is a steel slider. This can be extended, enabling the **Focus Modular** module to be joined to another module. A knurled-head screw acts as a handle when moving the slider and also keeps the slider locked within the enclosure during transportation, or when the system is not in use.



To connect the **Focus Modular** modules to one another, or to flying adapters, two ball lock pins are used. In the case of **FMI** modules, these are supplied loose, whereas with **FM** modules they are attached to the upper connector panel via safety cables.

During transportation, these ball lock pins can be securely housed in two pilot holes on the connector panel.



On the back of each **Focus Modular** module, two M8 threaded inserts can be found at both the top and bottom. These are solely intended for attaching **WFM** wall brackets.



## 3.2 Assembling and dismantling a mobile Focus Modular system

### 3.2.1 General rules on assembly

#### *Number of individual modules*

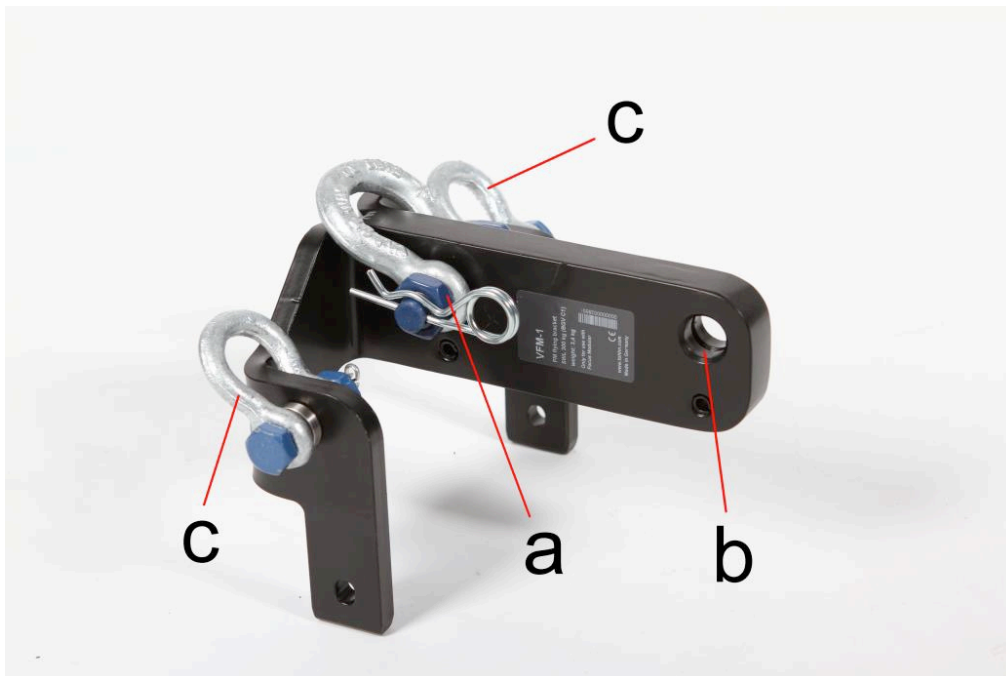
The maximum number of modules in a **Focus Modular** stack is limited to **six**.

#### **VFM-1 flying adapter**

To safely fly one or more **Focus Modular** modules, a **VFM-1** flying adapter is required.

**Using any other form of suspension is expressly forbidden!**

The **VFM-1** has three suspension points for different purposes:



#### **(a) Drilled hole with 17 mm diameter, centre**

If one or more modules are attached here, the module(s) will hang vertically without any degree of tilt.

In this instance, use the supplied 2000 kg shackle in accordance with DIN 13889. If other shackles are used, these must guarantee a Working Load Limit (WLL) of at least 2000 kg with an operating ratio (safety factor) of at least 6. The pin diameter of the shackle must be no less than 16 mm.

If using **(b)** as an attachment point, **(a)** can then be used for a safety cable, provided that any potential outward swing of the module is also prevented in the event of a failure.

**(b) Drilled hole with 17 mm diameter, rear**

**(b)** can primarily be attached to elements that enable horizontal alignment of the **Focus Modular** system, if point **(a)** is being used for flying. If cables are being used for this purpose, the tensile direction should, ideally, be approximately horizontal, in order to prevent the modules from tilting.

If **(b)** is used as an attachment point, a slight forward tilt of one or more modules can easily be achieved without the need for a second attachment point to be used.

**The resulting inclination angles are listed in the following section “Forward inclination of a Focus Modular system”.**

For attachment, use the supplied 2000 kg shackle in accordance with DIN 13889. If other shackles are used, these must guarantee a Working Load Limit (WLL) of at least 2000 kg with an operating ratio (safety factor) of at least 6. The pin diameter of the shackle must be no less than 16 mm.

**(c) Two 1000 kg shackles, permanently attached to the VFM-100**

These shackles are exclusively used for the attachment of safety cables or chains.

**Please refer to the “Secondary Safety Cables” section (page 21)!**

***Forward inclination of a Focus Modular system***

**Focus Modular** is a **modular Beam Steering system**. In its main mode of application, it is usually flown or suspended in a vertical, linear format. However, in some cases it can be advantageous – on acoustic or optical grounds – to carry out a mechanical inclination.

The scope of mechanical inclination is **limited**, as follows:

1. Under no circumstances must a **Focus Modular** stack be tilted or inclined sideways – either during use, or during assembly or dismantling! This could cause structural overload and damage to the internal and/or external flying hardware. Viewed from the front, every **Focus Modular** system must hang vertically!

The use of a **CC-300** Cardan Clamp guarantees vertical suspension, regardless of the installation situation, and is therefore mandatory in this particular case.

Only single modules may be laterally inclined – through to a horizontal position.



2. The **VFM-1's** rear attachment point **(b)** can be used for mechanically tilting a **Focus Modular** system (see above). This enables a slight forward inclination of individual modules, or short stacks containing several **Focus Modular** modules, without using a second suspension point.

For individual modules, the following inclination angles are possible from vertical:

- **FM-100:** 14° inclination
- **FM-110:** 9° inclination
- **FM-400:** 8° inclination

For stacks involving several modules, the following inclination angles are possible (the columns correspond with variously assembled systems):

<b>Upper</b>	FM-400	FM-400	FM-400	FM-400	FM-100	FM-110	FM-100	FM-110	FM-400
<b>Middle</b>			FM-400	FM-400			FM-400	FM-400	
<b>Lower</b>	FM-100	FM-110	FM-100	FM-110	FM-400	FM-400	FM-400	FM-400	FM-400
<b>inclination</b>	5°	4,5°	3,5°	3,5°	6°	4,5°	4,5°	3,5°	4,5°



### ***Secondary safety cables***

The **Focus Modular VFM-1 flying adapter** is designed with an operating ratio of 10:1. However, despite all checks and worst-case scenario considerations, any component could fail during the flow of force between load and suspension point: This could either be a shackle or a motorized chain, or even the load bearing point in the ceiling itself.

To guarantee the best possible degree of safety for staff, performers and public, we strongly recommend the use of safety cables or chains as a secondary safety component at all times – even in the kind of situation where it should not normally be required.

This is even more important since **Focus Modular** has been designed as a “single-point-suspension” system.

When selecting safety cables or chains, their load-bearing capacity must be such that they can resist the entire weight of the system (loudspeaker modules, flying adapter, cables, motors etc.) while complying with all local regulations. They should also be attached to a secure point that is structurally separate from the actual system suspension point.

Once the **Focus Modular** system has reached its final working height, all safety cables or chains should be fastened in such a way that they are almost “strained”. This should only lead to a minimal drop in height in the event of a failure.

With flown systems that involve a **CC-300** Cardan Clamp, it is important to ensure that rotation and alignment of the system still remains possible.

Whatever the case, the drop distance should be no more than 10 cm!

It is also necessary to ensure that the system being secured cannot (or can only marginally) rotate or swing upwards when dropping into the safety cables, in order to keep the dynamic force as low as possible.

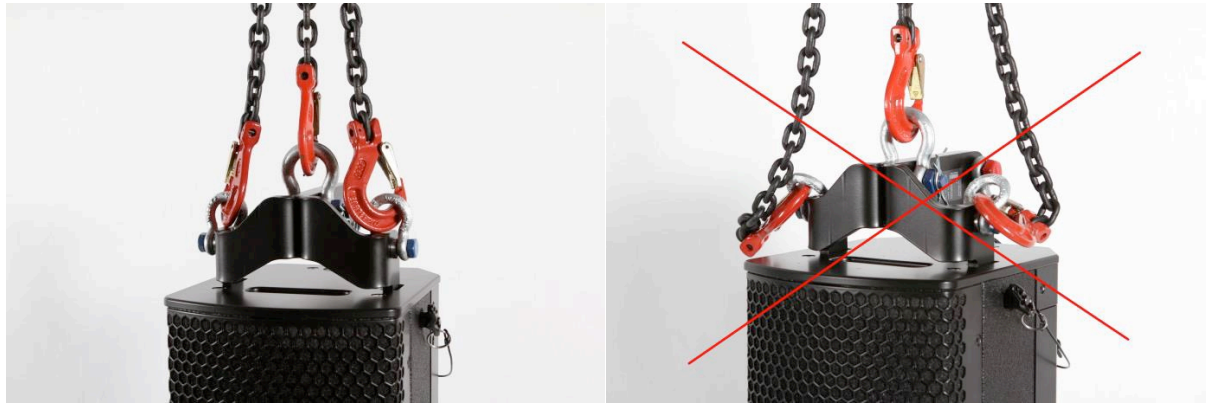
For safety purposes therefore, two 1000 kg shackles are permanently attached to the **VFM-1** (see above).

Here, the best method of securement is via a cable- or chain bridle, which can be attached to the two shackles.

**Never** just use one of these two suspension points!

When using point **(b)** as a suspension point for the system, point **(a)** can also be used as a safeguard, provided that any potential outward swing of the module can also be prevented in the event of a failure.

In this instance, use the supplied 2000 kg shackle in accordance with DIN 13889. If other shackles are used, these must guarantee a Working Load Limit (WLL) of at least 2000 kg with an operating ratio (safety factor) of at least 6. The pin diameter of the shackle must be no less than 16 mm.



It is recommended that you do **not** use both of these points for flying a **Focus Modular** system, since this is virtually impossible without some lateral inclination occurring, which is forbidden.



### 3.2.2 Flying from the hook of a crane or chain hoist

Due to its slimline construction, a **Focus Modular** system cannot be horizontally pre-assembled on the ground and hoisted as a complete unit. Assembly requires that each individual module is first hoisted and then (by slightly lowering the rig/motor) placed on top of the next lowest, upright module.

*Proceed as follows:*

1.) Start by connecting each **Focus Modular** module to **Fohhn Audio Soft** and check its **Fohhn-Net ID**.

To avoid any confusion during assembly, mark each module, e.g. with a sticker on its front grille that shows the **Fohhn-Net ID**. This can be removed before the system is actually flown.

**Further information on allocating and changing ID numbers can be found in the “Fohhn-Net Cabling and ID Allocation” section (page 47), as well as in the Fohhn Audio Soft user manual. This can be downloaded free of charge from our website: [www.fohhn.com](http://www.fohhn.com)**

It may also be helpful to put together a brief overview of all integrated **Fohhn-Net** devices, along with their respective ID numbers.

2.) Connect the top module to the **VFM-1**. Only use the ball lock pins which are located in their pilot holes in the connector panel.

The **VFM-1** must be slightly raised in order to do this.

**Make sure that both pins are fully inserted and that their collars are fastened to the metal of the supporting tube.**

**The distance between the T-handle on the pin and the speaker enclosure should be no more than ca. 10 mm!**



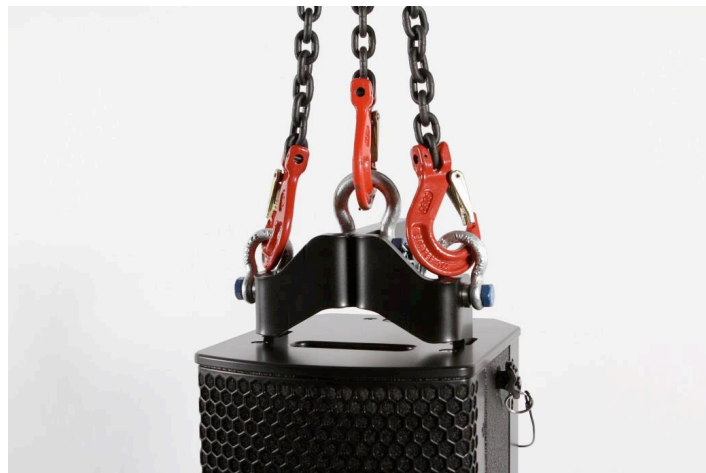
3.) Attach the **VFM-1** to the hook on the motor or crane. Use the supplied 2000 kg shackle for this, in accordance with DIN 13889. If other shackles are used, these must guarantee a Working Load Limit (WLL) of at least 2000 kg with an operating ratio (safety factor) of at least 6. The pin diameter of the shackle must be no less than 16 mm.

It is imperative that you read and observe all instructions in the “General Rules on Assembly” section (page 18).



4.) Fasten the safety bridle to both of the 1000 kg shackles. If using separate cables or chains for both points, make sure that these are exactly the same length and that they are attached to the same point.

To correctly secure the system, please pay careful attention to the “Secondary Safety Cables” section (page 21).



5.) Connect the system to its supply cables for power, network (**Fohhn-Net**) and audio signal. (**For details on this, please refer to the “Cabling”, section on page 39.**)

“Ease” the cables to prevent them from dragging on the **VFM-1**.



6.) Raise the currently suspended module to a height that enables you to position the next module directly underneath it.



7.) Carefully lower the suspended module until it sits on top of the standing module. Then align both modules horizontally with one another.

Stop the motor as soon as the chain loses its tension! Never put your hands in between the two modules!



8.) Loosen the knurled-head screws on the upper module's connecting bar and slide this into the lower module's supporting tube. Keep the knurled-head screws loosened for the moment.



9.) Connect the two modules. Only use the ball lock pins which are located in their pilot holes in the connector panel.

**Make sure that both pins are fully inserted and that their collars are fastened to the metal of the supporting tube.**

**The distance between the T-handle on the pin and the speaker enclosure should be no more than ca. 10 mm!**



10.) Connect the lower module to its supply cables for power, network (**Fohhn-Net**) and audio signal. (For details on this, please refer to the “Cabling”, section on page 39.)

Use the supplied cable set for connecting the modules.

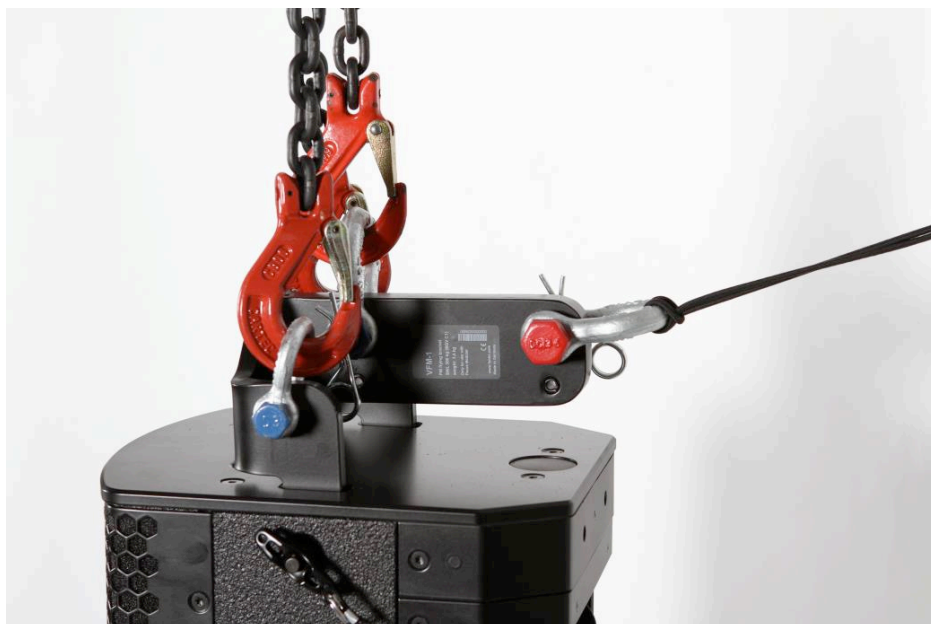


11.) Repeat steps 6 to 10 for each module in the stack.

12.) Hoist the completed **Focus Modular** system to its final working height.

Fasten the safety bridle to the relevant points (see “**Secondary Safety Cables**” section on page 21).

The **VFM-1**’s rear attachment point **(b)** can be used for horizontal alignment of the system (see above).



13.) Dismantling the system is done in reverse order. Therefore, please observe the following:

- Make sure that the surface onto which the system will be lowered can take the corresponding load, and is also level.
- After the system has been lowered to the ground, the rigging motor must immediately be switched off!  
The chain should lose its tension, yet it must not be allowed to noticeably sag. Otherwise the system could tip over.
- Never attempt to remove ball lock pins that are under load!  
**This leads to risk of injury!**
- Make sure that all cable connections have been removed before two modules are separated from one another.

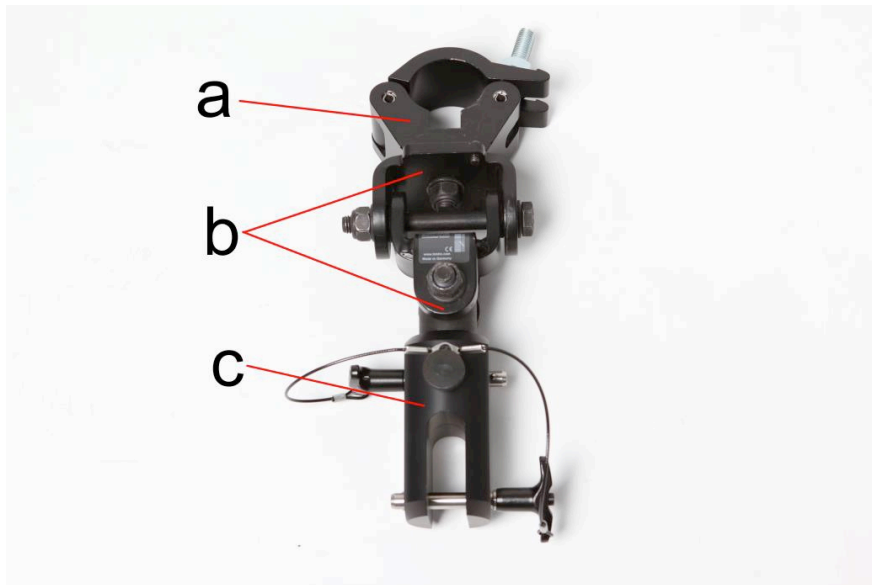
### 3.2.3 Flying from traverses or bars

#### **Cardan Clamp CC-300**

To safely fly either a single module, or a stack consisting of several **Focus Modular** modules from traverses or bars, round slings and safety chains can be used as described in the previous section – unless a **CC-300 Cardan Clamp** is available.

Using a **CC-300** has greater advantages with regard to ease of use and horizontal orientation.

The **CC-300** consists of three components:



#### **(a) Half Coupler**

The Half Coupler used here is a fixed system component, which should not be removed or substituted for other components that may appear identical in construction.

Following assembly, the coupler's clamping screw should always be secured to a bar via use of lock nuts.

#### **(b) Gimbal suspension**

This suspension ensures that, under all operating conditions, no load bending can affect the connection between the traverse/bar and the **Focus Modular** system and that, even in the case of vertically slanting traverses, the system can hang unhindered in its central position of gravity.

#### **(c) Y-branch with rotation brake**

By removing the ball lock pins, this part can also be separated from the cardan joint.

If used with **Focus Modular** however, this is not necessary.

In addition to the **CC-300**, a **VFM-1** flying adapter will also be required.

**When using the VFM-1, please pay careful attention to the information in the “General Rules on Assembly” section (page 18).**

### ***Assembly***

Due to its slimline construction, a **Focus Modular** system cannot be horizontally pre-assembled on the ground and hoisted as a complete unit. Assembly requires that each individual module is first hoisted and then (by slightly lowering the rig/motor) placed on top of the next lowest, upright module.

*Proceed as follows:*

1.) Start by connecting each **Focus Modular** module to **Fohhn Audio Soft** and check its **Fohhn-Net ID**.

To avoid any confusion during assembly, mark each module, e.g. with a sticker on its front grille that shows the **Fohhn-Net ID**. This can be removed before the system is actually flown.

**Further information on allocating and changing ID numbers can be found in the “Fohhn-Net Cabling and ID Allocation” section (page 48), as well as in the Fohhn Audio Soft user manual. This can be downloaded free of charge from our website: [www.fohhn.com](http://www.fohhn.com)**

It may also be helpful to put together a brief overview of all integrated **Fohhn-Net** devices, along with their respective ID numbers.

2.) Connect the top module to the **VFM-1**. Only use the ball lock pins which are located in their pilot holes in the connector panel.

The **VFM-1** must be slightly raised in order to do this.

**Make sure that both pins are fully inserted and that their collars are fastened to the metal of the supporting tube.**

**The distance between the T-handle on the pin and the speaker enclosure should be no more than ca. 10 mm!**



3.) Connect the **VFM-1** to the **CC-300**.

This is done by pushing the **CC-300**'s Y-branch onto the **VFM-1**. The ball lock pin will then be fully inserted. The retaining ball must unlock without obstruction on the other side.

This must only be done using the 10x50 ball lock pin that is fixed to the **CC-300**'s Y-branch.

Loosen the rotation brake's knurled-head screw.



4.) Lower the traverse from which the system is to be flown until the **CC-300**'s half coupler can be attached. Manually tighten the clamp in the first instance.



5) Raise the traverse until the first module is hanging freely above the floor. The **CC-300** will have now aligned itself vertically.

Firmly tighten the nut on the half coupler and secure it with the lock nut.



6.) Fasten the safety bridle to the 1000 kg shackles, as necessary.

If using separate cables or chains for both points, make sure that these are exactly the same length and that they are attached to the same point.

**To correctly secure the system, please pay careful attention to the “Secondary Safety Cables” section (page 21).**



7.) Connect the system to its supply cables for power, network (**Fohhn-Net**) and audio signal. (**For details on this, please refer to the “Cabling” section on page 39.**)

“Ease” the cables to prevent them from dragging on the **VFM-1**.



8.) Turn the module around the axis of the **CC-300** and align it horizontally.

As the alignment may need further adjustment following assembly, only slightly tighten the knurled-head screw on the rotation brake. Otherwise this can be manually tightened in order to prevent unwanted rotation.



9.) Raise the traverse with the first module to a height that enables you to position the next module directly underneath it.



10.) Carefully lower the suspended module until it sits on top of the standing module. Then align both modules horizontally with one another.

Stop the motor as soon as the chain loses its tension! Never put your hands in between the two modules!



11.) Loosen the knurled-head screws on the upper module's connecting bar and slide this into the lower module's supporting tube. Keep the knurled-head screws loosened for the moment.



12.) Connect the two modules. Only use the ball lock pins which are located in their pilot holes in the connector panel.

**Make sure that both pins are fully inserted and that their collars are fastened to the metal of the supporting tube.**

**The distance between the T-handle on the pin and the speaker enclosure should be no more than ca. 10 mm!**



13.) Connect the lower system to its supply cables for power, network (**Fohhn-Net**) and audio signal. **(For details on this, please refer to the "Cabling", section on page 39.)**

Use the supplied cable set for connecting the modules.



14.) Repeat steps 9 to 13 for each module in the stack.

15.) If the horizontal alignment of the completed system needs readjusting, raise the system to an accessible height and adjust it by turning the lowest module.

16.) Dismantling the system is done in reverse order. Therefore, please observe the following:

- Make sure that the surface onto which the system will be lowered can take the corresponding load, and is also level.
- After the system has been lowered to the floor, the rigging motor must immediately be switched off!  
Part of the weight may otherwise fall on the **Focus Modular** system: **This can lead to both component damage and risk of injury to personnel!**
- Never attempt to remove ball lock pins that are under load!  
**This leads to risk of injury!**
- Make sure that all cable connections have been removed before two modules are separated from one another.

### 3.2.4 Rain covers for mobile operation

Every **Focus Modular** module is fully active, containing not only the Class-D amplifiers for the various drivers and the switching power supplies, but also all the necessary DSPs for signal processing. In order to protect these electronics from moisture, a rain cover is essential if using a **Focus Modular** system out of doors.

**Never** use a **Focus Modular** module in the rain without its original **Fohhn®** rain cover.

Water ingress can cause danger to life through electric shock. The system itself can also be ruined.

Only use original rain covers, otherwise the operational cooling process may be impaired. This can lead to the module overheating and shutting down.

Fit the rain cover as follows:

- 1.) Guide both of the **VFM-1**'s mounting brackets through the slit in the lid of the rain cover. The fabric surface should now be facing upwards.



- 2.) Connect the **VFM-1** to the **Focus Modular** as described in the previous section.

The **VFM-1** must be completely flush with the **Focus Modular** system's end cover to guarantee impermeability. Turn the rain cover lid's protruding collar upwards.



3.) Join the lid to the sides of the cover using the zipper. The actual positioning of the rain cover on the loudspeaker enclosure is determined by the sewn-in magnets, which adhere to the front grille.

Move the magnets and pull the cover tightly forwards and downwards simultaneously.



4.) Close the rain cover by pulling the zipper that runs the length of its side.

The remaining opening above the connector panel will then be covered by the two flaps, which are pressed together and connected to the rain cover using Velcro strips. Keep these on the inside.

Die verbleibende Öffnung oberhalb des Anschlussfelds wird danach mit den beiden Laschen abgedichtet, indem diese mit Klettband aufeinander gedrückt und mit dem Regenschutzdeckel verbunden werden. Halten Sie dazu von innen dagegen.



5.) The closed rain cover is kept away from the module's rear panel by clamping elements.

The two connector panels through which the **Focus Modular** system maintains its air supply and extraction are also equipped with clamping elements. In order not to affect their functionality, never shut these openings and never press the rain cover flat against the loudspeaker.

Further rain covers can be added to relevant modules during the flying process. These are fitted as described above, and joined via zipper to the top cover.

## 3.3 Cabling

### 3.3.1 Connecting mobile variants (FM)

The line of supply runs from the top module to all the other connected **Focus Modular** modules. Mains power, analogue audio signal and network (**Fohhn-Net**) cables are all connected to the upper connection panel.



FM-XXX upper connection panel

**Focus Modular**'s mobile variants have the following connectors on the upper connection panel:

#### 1. Mains

The mains power supply cable is connected to the PowerCON socket. The related **power** LED shows the current mains supply status. The universal power supply permits a supply voltage of 100 – 240 V / 16 A / 50/60 Hz.

#### 2. Fohhn-Net Remote IN

The **Focus Modular** module is connected to the **Fohhn-Net** via this EtherCON socket. The **receive** and **send** LEDs flash when **Fohhn-Net** control data is received and sent.

#### 3. Fohhn-Net Remote OUT

**Fohhn-Net** control signals can be looped through via the parallel Link-Out socket.

#### 4. Audio Input

The audio input signal is fed in via the analogue XLR input socket. This input is transformer-balanced and designed for +4 dBu signal level(s).

#### 5. Audio Output

The audio signal is looped through via the analogue output socket.



FM-XXX lower connection panel

The lower connection panel has:

#### 1. Mains Link

The PowerCON socket enables the mains supply voltage to be looped through to a subsequent module.

#### 2. Fohhn-Net Remote Out

The parallel Link-Out socket enables **Fohhn-Net** control signals to be looped through.

#### 3. Audio Output

The analogue XLR output socket allows the audio signal to be looped through.

Use the supplied cable sets for looping all signals through to a subsequent module. Link-Out sockets are found on the upper connection panel.

### 3.3.2 Connecting installation variants (FMI)

The line of supply runs from the top module to all the other connected **Focus Modular** modules. Mains power supply, analogue audio signal and network (**Fohhn-Net**) cables are all connected to the upper connection panel.

**Focus Modular**'s installation variants have recessed connection panels, fitted with the following connectors:

#### 1. Mains

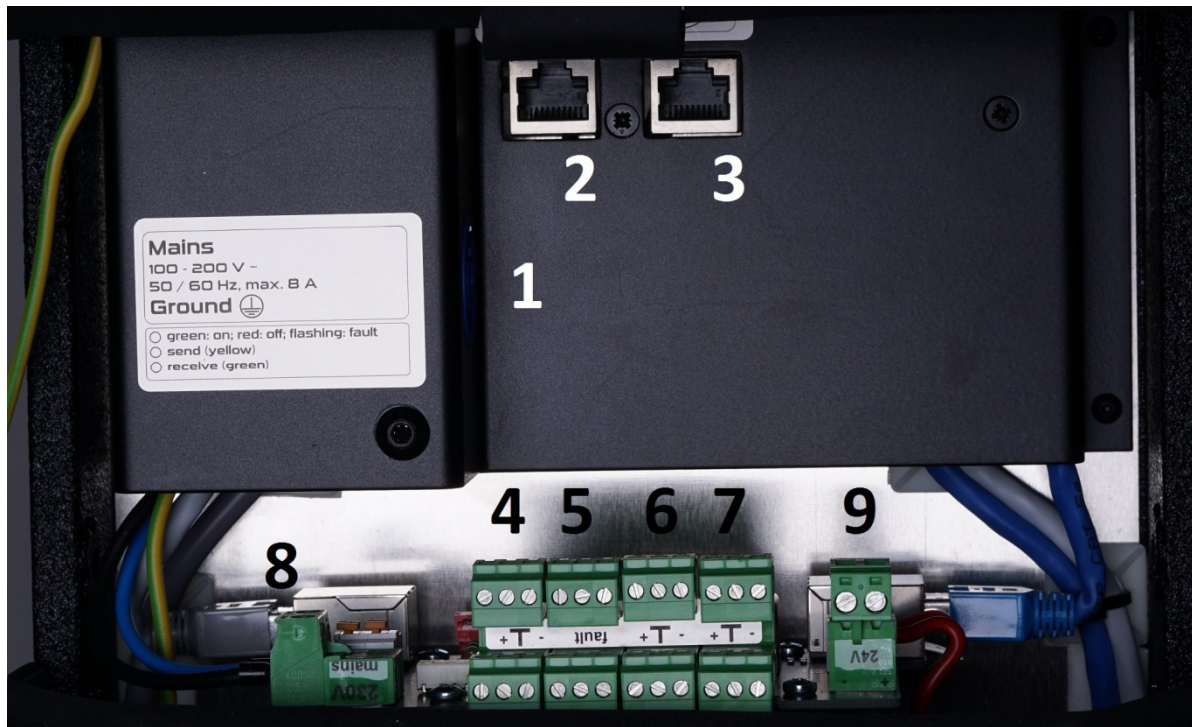
The mains supply cable is connected to the PowerCON socket. The related **power** LED shows the current mains supply status. The universal power supply permits a supply voltage of 100 – 240 V / 16 A / 50/60 Hz.

After fitting the cover, the power LED will no longer be visible during operation. However, the mains supply status will be displayed in Fohhn Audio Soft.

## 2. DATA Stack Link Input

This RJ-45 socket is exclusively intended for the connection of **Focus Modular** modules within a stack.

Please note that this socket is **NOT** suitable for the connection of further stacks, or other Fohhn® devices!



FMI-XXX upper connection panel

## 3. AUDIO Stack Link Input

This RJ-45 socket is exclusively intended for the connection of **Focus Modular** modules within a stack.

## 4. Net

These Phoenix terminal blocks are used for connecting the module to the **Fohhn-Net**.

**Connecting a Focus Modular stack to the Fohhn-Net can only be done using these Phoenix terminal blocks.**

## 5. Fault

This potential-free open/close contact is used for fault notification. The fault contact relay can be operated with a maximum of 50 V and 1 A.

## 6. In 2 (Input for pilot tone monitoring)

This Phoenix terminal block enables an analogue audio signal as well as a pilot tone to be fed in. The pilot tone can be detected in the loudspeaker and used for priority switching: When a pilot tone is detected, the **In 2** signal has priority over the audio signal at the **In 1** terminal block.

This connection is transformer-balanced, potential-free and designed for +4 dBu signal levels.

**Pilot tone monitoring can be (de-)activated in Fohhn Audio Soft. Further information on this can be found in the separate Fohhn Audio Soft user manual.**

#### **7. In 1**

This is the audio input for installation variants (**FMI**). It takes the form of a Phoenix terminal block. The connection is transformer-balanced, potential-free and designed for +4 dBu signal levels.

#### **8. 230 V Mains**

This connector is exclusively intended for service purposes.

#### **9. 24 V**

This is an internal test connection, which is exclusively intended for service purposes. Emergency power may not be plugged into this.

**The Net, Fault, In 1 and 2 connections are duplicated.**

The lower part of the module has a second connection panel with the following connectors:



**FMI-XXX lower connection panel**

#### **1. Mains Link**

The PowerCON socket enables the mains supply voltage to be looped through to a subsequent module.

#### **2. DATA Stack Link Output**

This RJ-45 socket is exclusively intended for the connection of **Focus Modular** modules within a stack.

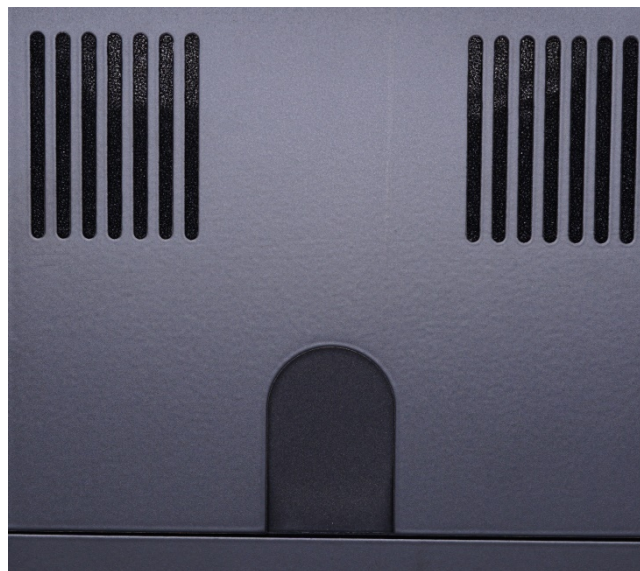
#### **3. AUDIO Stack Link**

This RJ-45 socket is exclusively intended for the connection of **Focus Modular** modules within a stack.

### **Connection**

1. Plug the PowerCON connector into the upper connection panel's blue PowerCON-**Mains** socket.
2. Screw the wire ends of the audio supply cable to the corresponding **+**, **–** and **⊥** pins of the relevant **In 1** Phoenix plug, then plug this into the upper connection panel's **In 1** Phoenix terminal block. Proceed in the same way when using **In 2**.
3. Screw the wire ends of the **Fohhn-Net** supply cable to the corresponding **+**, **–** and **⊥** pins of the relevant **Net** Phoenix plug, then plug this into the **Net** terminal block on the loudspeaker.

Use the supplied cable set for looping through all signals to a subsequent module. The Link-Out connectors are on the lower connection panel. Cable routing is via an outlet in the enclosure lid. The round plastic covers must therefore be removed beforehand by pushing them, from inside, through the holes in the enclosure lids.



FMI-XXX cable slot in the system enclosure (with plastic covering)

### **3.3.3 Status messages for both variants**

#### ***Mains Power Status***

Mains power status is displayed via an LED:

The **power** LED on mobile variants (**FM**) is situated directly adjacent to the PowerCON socket.

On installation variants, the LED is located under the removable cover plate and is therefore only visible without the cover.

Status conditions are shown as follows:

- *The LED glows green:* Supply voltage is present.
- *The LED glows red:* The module is connected to the mains power supply, but is in Standby mode.
- *The LED flashes red and green alternately:* There is a hardware fault. In this situation, contact the service department at **Fohhn Audio AG**.

### **Network Connection Status**

**Focus Modular** systems inform of **Fohhn-Net** data exchange with the help of two LEDs.

On mobile variants (**FM**), these LEDs are located immediately to the left of the **Fohhn-Net Remote IN** socket.

On installation variants (**FMI**), these LEDs are under the cover plate in the Phoenix terminal area and can therefore only be seen during installation.

Status conditions are shown as follows:

- *The **send** LED flashes:* The **Focus Modular** system is supplying data in response to **Fohhn Audio Soft**, or rather, the control computer.
- *The **receive** LED flashes:* The **Focus Modular** system is receiving data from **Fohhn Audio Soft**, or rather, from the control computer.

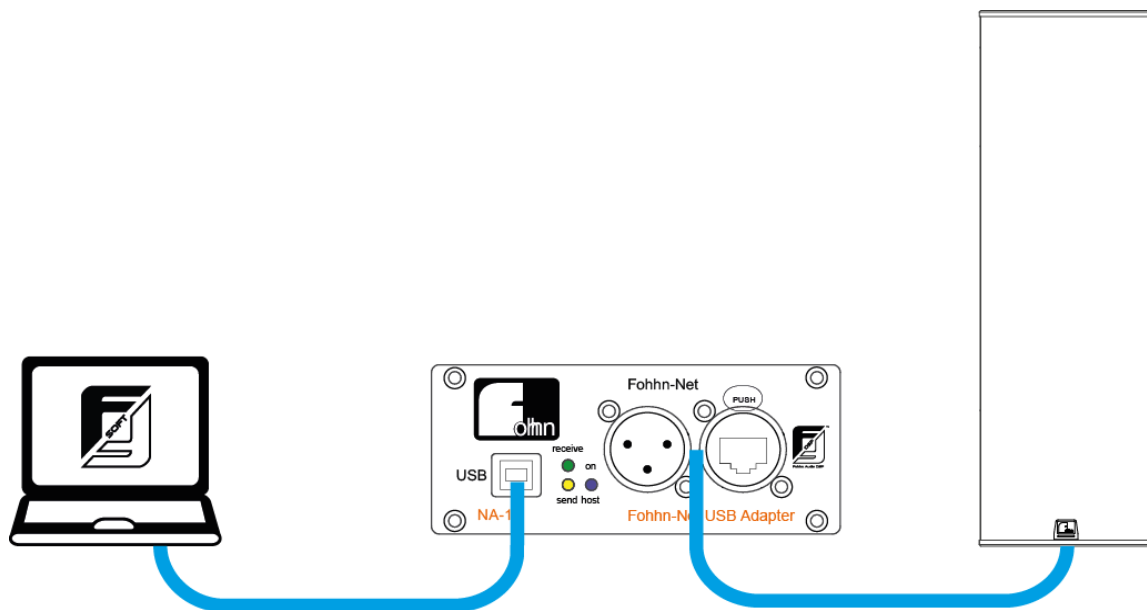
## 3.4 Setting up

**Focus Modular** systems have no on/off switches, however, connection to the mains supply via the PowerCON power cable makes them ready for immediate operation. To avoid any circuit overload when switching on, the systems are equipped with a switch-on delay (or Soft start function).

⚠ **Only connect the systems with the mains power supply AFTER all the other system components (mixing desk, playback devices etc.) have been switched on. Switch off in reverse order, disconnecting the Focus Modular systems from the mains power BEFORE switching off all the other components! Otherwise this could result in hearing damage due to loud signals! Nobody should stand directly in front of the loudspeaker systems for any length of time!**

### 3.4.1 Configuration

To control your **Focus Modular** systems, you will need a computer with **Fohhn Audio Soft** software (Version 4.0 or later) installed and an appropriate **Fohhn-Net** Adapter: **NA-11 Fohhn-Net USB Adapter** or **NA-3 Fohhn-Net Ethernet Adapter**.



Example: Controlling Focus Modular via a computer and NA-11 Fohhn-Net USB Adapter

### 3.4.2 System Requirements for the Computer

To use **Fohhn Audio Soft**, you will need a commercially available computer with the following:

- Windows 7 SP1, Windows 8.1 or Windows 10 (32- and 64-Bit versions respectively)
- Dual Core Processor
- 4 GB RAM
- Graphic resolution of 1.600 x 900 Pixels recommended (minimum 1.366 x 768)

- Microsoft .NET Framework 4.5.1 (unless unavailable, this extension is automatically installed – an internet connection is required for this)
- a free USB port (for **NA-11**) or a free Ethernet port (for **NA-3**)

**Further tips for running under Windows 10 can be found in the separate Fohhn Audio Soft user manual. This can be downloaded free of charge from the Fohhn website:**

[www.fohhn.com/downloads](http://www.fohhn.com/downloads)

The **Fohhn-Net** connection is used for controlling the integrated digital signal processors (DSP).

### 3.4.3 Downloading and Installing Fohhn Audio Soft

**Fohhn Audio Soft** is directly compatible with all **Fohhn®** active DSP systems, therefore, no special “Focus Modular series” version of this software is required. Regardless of the loudspeaker systems, you can always work with the same software and within the same user interface.

**The current version of Fohhn Audio Soft can be downloaded free of charge from:** [www.fohhn.com](http://www.fohhn.com)

If a new version becomes available, proceed as follows to install **Fohhn Audio Soft** on your computer:

1. Download the latest version of **Fohhn Audio Soft** to your computer.
2. Locate the *Fohhn\_Audio\_Soft\_X.X.X\_Setup.exe* file on your computer (X.X.X represents the respective version number).
3. Start the installation program by double-clicking on the file: Follow the on-screen instructions.
4. Click on *Install* to install the program on your computer. Also confirm in the *User Account Control* dialog if this appears.
5. Click on *Finish* to complete the installation.

The software is immediately ready for use following installation and can either be opened via the program symbol on the desktop, or via the *Start > All Programs > Fohhn Audio AG > Fohhn Audio Soft* path.

### 3.4.4 Fohhn-Net Cabling and ID Allocation

For the control of **Focus Modular** systems, each module in the **Fohhn-Net** must be allocated its own specific ID. Using this ID, each individual **Focus Modular** module can be clearly identified and controlled from within **Fohhn Audio Soft**.

- ⚠ **All modules have a factory setting of ID 1.**
- ⚠ **Duplicated IDs lead to ID conflict. In such a situation, it will no longer be possible to control the modules concerned.**

#### *ID allocation for individual modules:*

In order for an ID to be allocated, each **Focus Modular** module must first be individually connected to **Fohhn Audio Soft**.

Proceed as follows for each individual module:

1. Connect the **Focus Modular** module to the mains power (see section 3.3 “Cabling”).
2. Connect the **NA-11** or **NA-3 Fohhn-Net Adapter** to the computer.
3. Link the **Fohhn-Net** Adapter to the **Focus Modular** module using the appropriate CAT cable.
4. Start **Fohhn Audio Soft**. The selected **Fohhn-Net** Adapter will be automatically recognised.
5. When **Fohhn Audio Soft** opens, an automatic search starts that results in the listing of all correctly connected **Focus Modular** modules.

If any module is not shown, check all the connections and re-run the search. When doing so, please also note the ID search range.

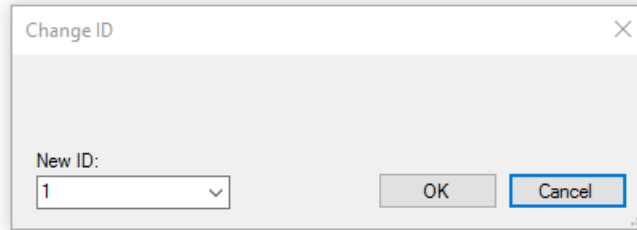
Proceed as follows:

1. In the *Devices* menu, click on the *Search Device / Network Scan* dialog.
2. If the module still isn't shown, check the mains power supply and/or the network cabling in your system. Then repeat step 1.

If a **Focus Modular** module is recognised, this appears with ID 1 (factory setting).

To change the ID directly in the *Find devices* dialog, proceed as follows:

1. Click with the right mouse button on a module in the dialog's list view.
2. In the context menu select *Change Fohhn-Net ID*.
3. In the dialog with the same name, enter a new ID for the component. Make sure that this ID is not already in use.
4. Confirm this entry by clicking *OK*: The module will now have a newly assigned ID.



You can also change the ID of a **Focus Modular** module at any time while it is actually in use. To do this, the module must be in the **Fohhn-Net**. Proceed as follows:

1. Open the *Device List* view, either via the *View* menu, or via the corresponding button on the Toolbar.
2. Click with the right mouse button on a module in the *Device List* display.
3. In the context menu select *Change Fohhn-Net ID*.
4. In the same dialog, give the **Focus Modular** module a new ID.
5. Confirm this entry by clicking *OK*: The module will now have a newly assigned ID.

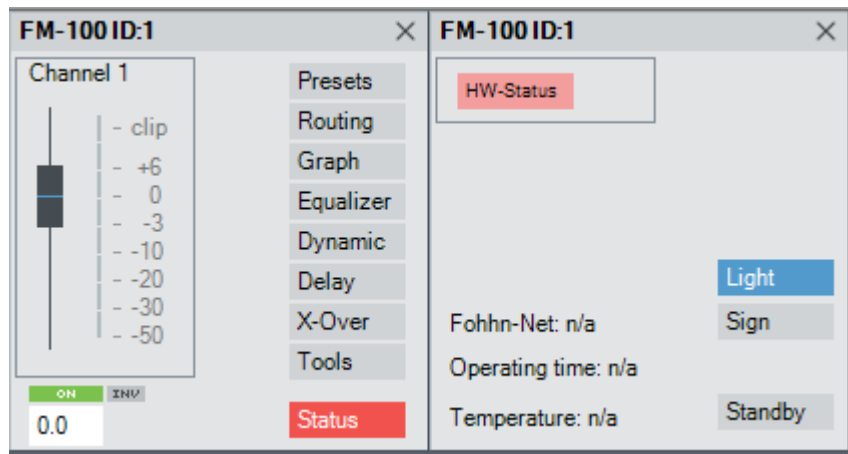
Further information on setting up a Fohhn-Net and on Fohhn-Net ID allocation can be found in Chapter 4.1 “Fohhn-Net Setup” of the Fohhn Audio Soft user manual.

### 3.4.5 Identifying Connected Systems

#### **Visual identification**

On the front of every **Focus Modular** module is a function display with a blue LED. You can switch this LED on or off, or let it flash in order to visually identify the module.

1. In **Fohhn Audio Soft**, click on the *Status* button in the *Devices* view to reveal a window with information on the **Fohhn-Net** status, the operating time and the temperature of the connected devices.
2. Here, click on the *Sign* button: The blue LED on the front of the selected Focus Modular module will begin to flash.
3. Deactivate the button once the module has been identified.



Using the *Light* button, you can switch off the blue LED on the front of the module as required.

Alternatively, you can carry out this identification process via the *Speakers* view:

1. Open the *Speakers* view and click with the right mouse button on the desired **Focus Modular** module.
2. Click on *Sign* in the opened context menu: The blue LED on the front of the selected **Focus Modular** module will begin to flash.
3. When you reset the selection for the module, the LED will revert to its normal mode.

### **Acoustic identification**

Using **Fohhn Audio Soft** you can allocate either a sinus tone or pink noise to each loudspeaker system in the **Fohhn-Net**.

1. Open the *Devices* view.
2. Click in the respective module on *Tools*.
3. In the *Tools* window, click on either the *Sine* or *Noise* button: The appropriate button will now be highlighted green and a sinus tone or pink noise will be output.  
The level of the test signal can be adjusted using the fader and the frequency set using the rotary control (if you have selected *Sine*).  
On multi-channel devices, select which channel should output the test signal.
4. Stop the test signal either by clicking again on the *Sine* or *Noise* buttons, or by closing the window. Alternatively, you can click on the *Tools* button.

### **When activating the test signal, pay careful attention to the set signal level!**

Under certain circumstances, the test signal may be reproduced at a level which is potentially harmful, putting not only you at risk, but also any other people who are in the same room as your loudspeaker.

**Should you find that the ID needs to be changed, either during identification or at a later date, proceed as described in section 3.4.4 “Fohhn-Net Cabling and ID Allocation” (page 48).**

### 3.4.6 Renaming Devices / Channels

For better identification within **Fohhn Audio Soft**, it is recommended that the individual **Focus Modular** modules are given separate names. Proceed as follows:

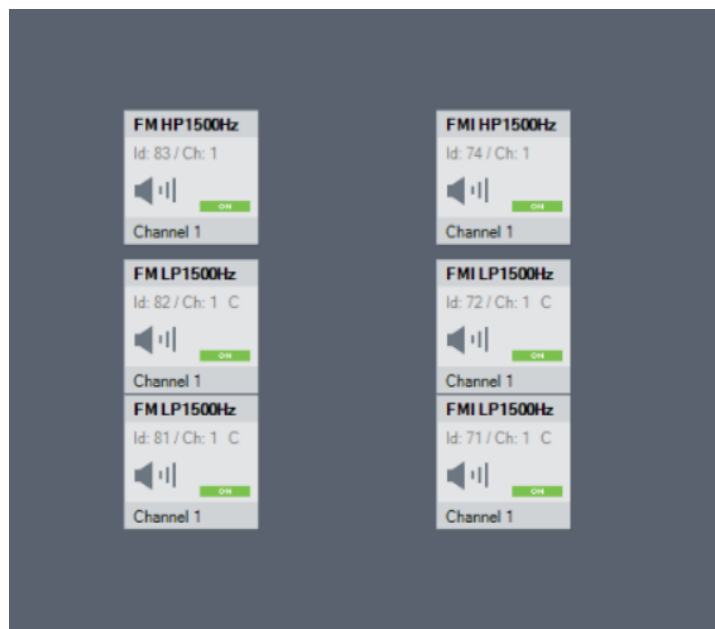
1. Open the *Device List* or *Devices* view, either via the corresponding entry in the Menu view, or via the respective button on the Toolbar.
2. Click with the right mouse button on the required module in the list (*Device List*) or in the work space (*Devices*).
3. In the context menu, select the *Rename Device* option.
4. Enter a new name for the device in the *Rename* dialog, then close this by clicking OK.

The new name will now appear in the *Device List*, *Devices* and *Channels* views.

### 3.4.7 Graphically Arranging the Loudspeaker Systems

To make the **Fohhn Audio Soft** display easier to manage, all the loudspeakers and devices that are in use can be graphically arranged on the software interface, as desired. With complex applications and/or in the case of fixed installations, it is particularly recommended that the arrangement of devices on the user interface corresponds with their physical positions in the room.

The name shown in the loudspeaker pictogram refers to the currently loaded loudspeaker preset. If a question mark is shown here, the loading process is not yet completed and the loudspeaker preset is not active!



Example: Focus Modular system pictograms in Fohhn Audio Soft

Proceed as follows to arrange your **Focus Modular** systems:

1. Open the *Devices* or *Speakers* view, either via the corresponding entry in the Menu view, or via the respective button on the Toolbar.
2. Arrange the individual loudspeaker pictograms and/or devices according to the physical positions of the actual loudspeaker systems and/or devices.

The arrangement will be saved in **Fohhn Audio Soft** and will remain until you change the configuration or arrangement.

### ***Combining loudspeaker systems***

In **Fohhn Audio Soft**, **Focus Modular** low-mid modules can be combined into one unit. These modules will jointly behave like a single, longer loudspeaker module. To link these modules via *Combine speakers*, proceed as follows:

1. Open the *Speakers* view, either via the corresponding entry in the Menu view, or via the respective button on the Toolbar.
2. Arrange the individual module pictograms on top of one another, according to their physical arrangement, **so that they touch one another on the screen!**
3. Select the pictograms collectively using the mouse.
4. Click with the right mouse button on one of the selected modules to open the context menu.
5. In here, select *Combine speakers*.

At this point, in addition to the **Fohhn-Net ID** and the channel, the letter *C* will also have been added to the loudspeaker pictograms: This means that two or more modules have been linked together to form a “Combined Speaker”.

### **3.4.8 Loading Loudspeaker Presets**

**Fohhn Audio Soft** enables factory-made presets to be loaded into a **Focus Modular** system. These presets offer different crossover frequencies between the high frequency and low-mid modules. When using **FMI-400** or **FM-400** modules without a high-frequency module, the “full-range” preset can be used.

To load loudspeaker presets, proceed as follows:

1. Select the appropriate **Focus Modular** module in the *Output Channels* view.
2. Click with the right mouse button on the chosen module to open the context menu.
3. In here, select either *Select speaker preset from list* or *Select speaker preset from database*.
4. Select a preset from one of these lists.
5. Confirm your choice by clicking *OK*.

Your loudspeaker preset is now loaded. Repeat the process for all **Focus Modular** modules.

### 3.4.9 Adjusting the Volume Level

Now set the volume levels for your individual **Focus Modular** modules:

1. Open the *Devices* view.
2. Set the level directly (-80 to +12 dB) using the fader or corresponding text box.

The *ON/OFF* button will switch the relevant channel on or off.

The level of an **FM-110/FMI-110** module has been designed for operation in a stack with four **FM-400/FMI-400** modules. If a different quantity of **FM-400/FMI-400** modules is to be used, the level(s) must be adjusted accordingly.

#### *Recommended level adjustments*

##### **Loudspeaker stack:**

1x **FM-400** + 1x **FM-100**

2x **FM-400** + 1x **FM-110**

1x **FM-110** + 2x **FM-400** + 1x **FM-100**

1x **FM-110** + 2x **FM-400** + 1x **FM-110**

1x **FM-110** + 3x **FM-400** + 1x **FM-110**

##### **Input level adjustment:**

**FM-100:** -8 dB

**FM-110:** -14 dB / -8 dB\*


**FM-110:** - 8dB

**FM-100:** -10 dB

**FM-110:** - 8 dB (both modules)

**FM-110:** - 6 dB (both modules)

\*for rising or two audience levels

 **For consistent behaviour of the limiter within the system as a whole, it is important that level adjustments are carried out on input (gain structure).**

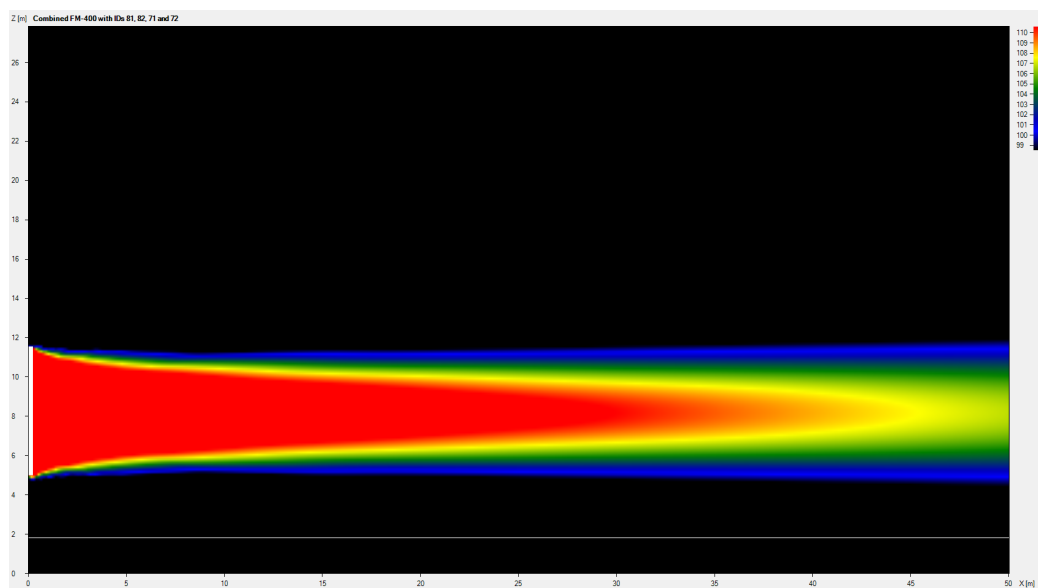
## 4. Control via Fohhn Audio Soft

The complete control of your **Focus Modular** systems can be exclusively carried out via **Fohhn Audio Soft**.

A comprehensive description of the software and all its functions can be found in the separate **Fohhn Audio Soft** user manual. You can download this free of charge from our website: [www.fohhn.com/downloads](http://www.fohhn.com/downloads)

### 4.1 Beam Steering – the functional principle

In the audio processing world, the term “Beam Steering” refers to the process of controlling the beam dispersion characteristics of loudspeaker systems using electronics and software. Through specific manipulation of signal sources that are tightly positioned in close proximity to one another, it is possible to control the vertical beam width and inclination angle of the loudspeaker system over a wide frequency range precisely. In general: the longer the loudspeaker, the lower the frequencies that can be included in the “bundle”. Because each speaker driver can be individually controlled and adjusted, via use of a dedicated algorithm or DSP, this in turn influences the sound dispersion capability of the entire loudspeaker.



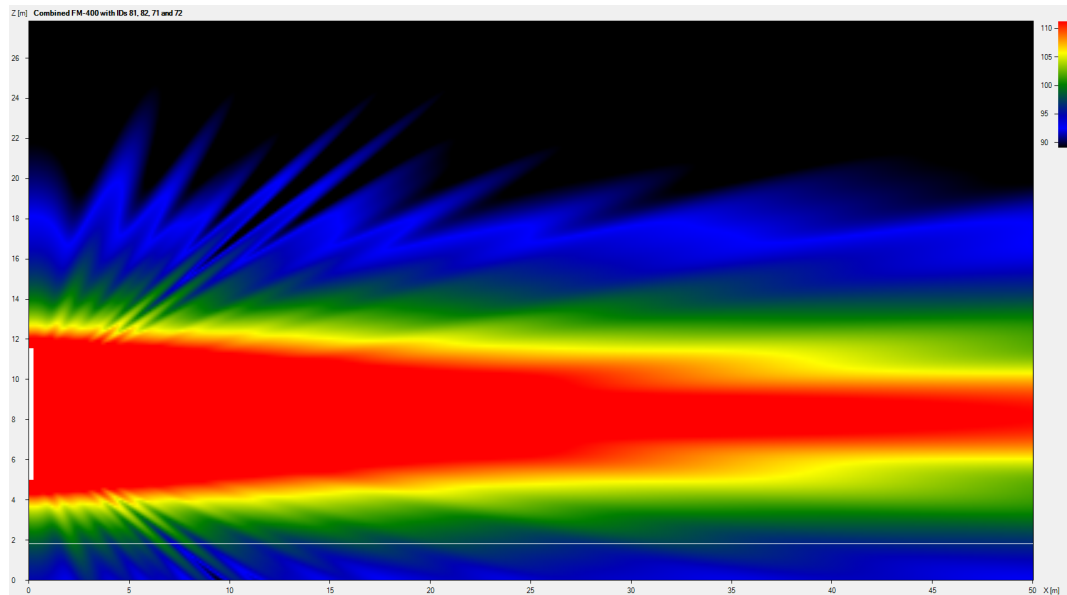
Graphic representation of a beam in the Fohhn Audio Soft Focus Simulation

All **Fohhn® Focus-Series** loudspeaker systems work with **Beam Steering Technology**. Combining the DSPs with **Fohhn Audio Soft** makes it possible to electronically control the loudspeaker system’s vertical inclination angle and vertical beam width – in real time!

**Fohhn Audio Soft** enables the entire audio system to be configured in advance, before the systems themselves are put into operation at the venue.

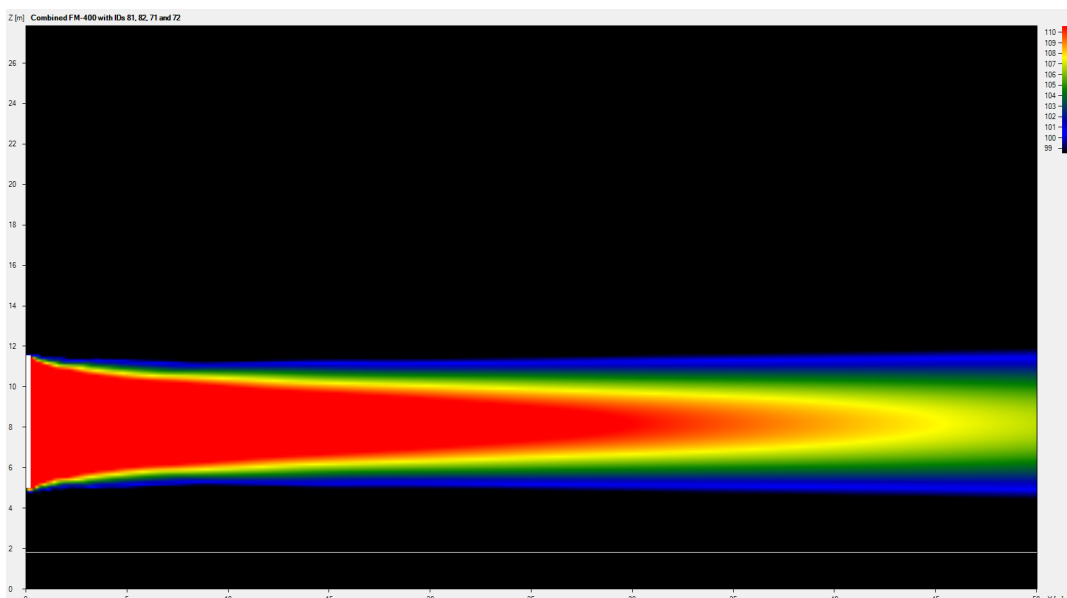
### 4.1.1 Side Lobe Free Technology

Due to their construction, line source and line-array speakers generate unwanted Side Lobes in their vertical axes. These result from the distances between the individual loudspeaker chassis and the finite length of an array.



Beam with Side Lobes

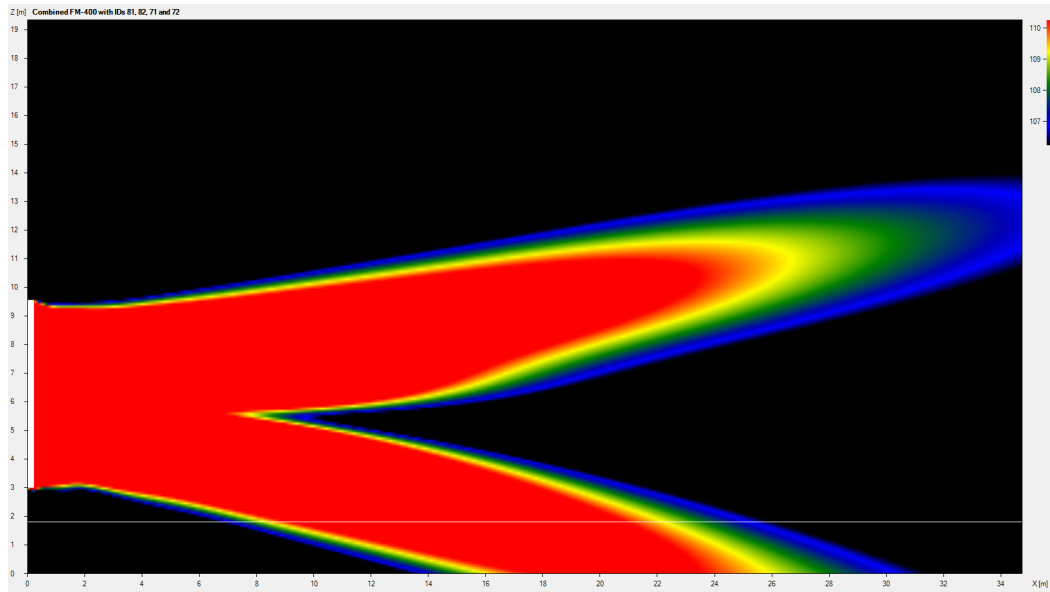
**Focus Modular** systems are equipped with **Fohhn Side Lobe Free Technology**: A specially developed algorithm effectively reduces the side lobes. This results in fewer unwanted sound reflections in the room. Consequently, levels of speech intelligibility are improved and feedback prevention is increased.



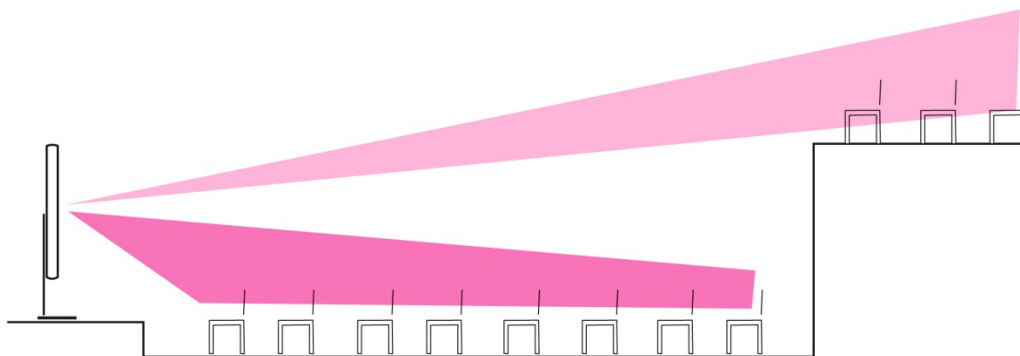
Optimized beam with Fohhn Side Lobe Free Technology

### 4.1.2 Two Beam Technology (Two Beam Mode)

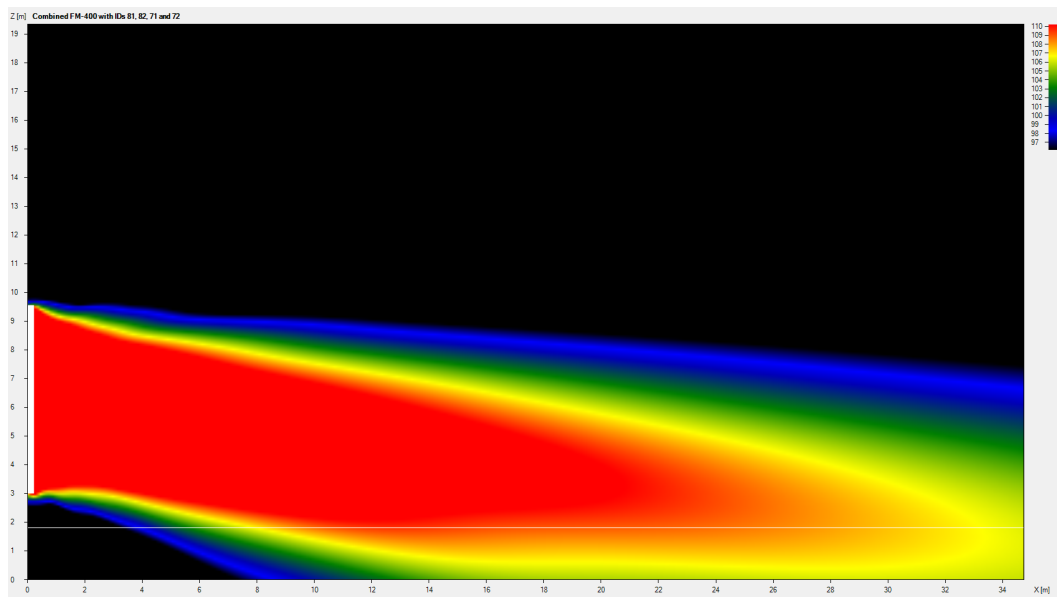
**Fohhn's** in-house developed **Two Beam Technology** enables the production of two independent beams with separately configurable parameters. In each case, the entire speaker line length is used for reproduction. So when activating the second beam, the sound dispersion still covers the entire frequency bandwidth. All parameters such as the vertical inclination angle and vertical beam width, the acoustic centre position, level and high pass filtering can be separately configured for each beam. This enables an asymmetric beam dispersion to be created for precise sound coverage of two separate listening areas (e.g. stalls and balcony).



**Two Beam Mode: The production of two separate beams**



**Simultaneous sound coverage of stalls and balcony using two beams from a single Fohhn Focus-Series system**

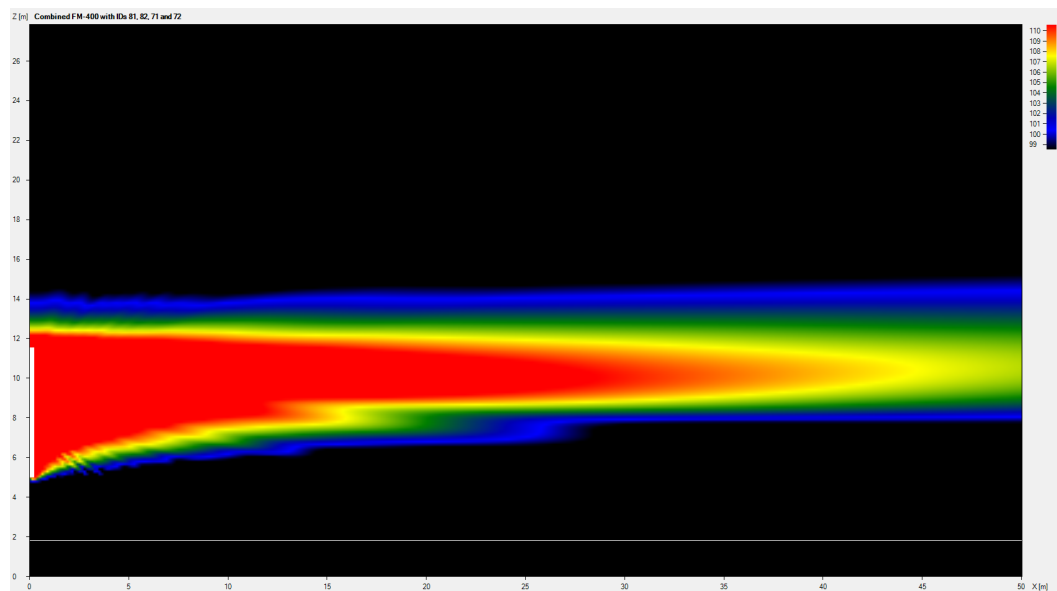


Example of an asymmetric beam

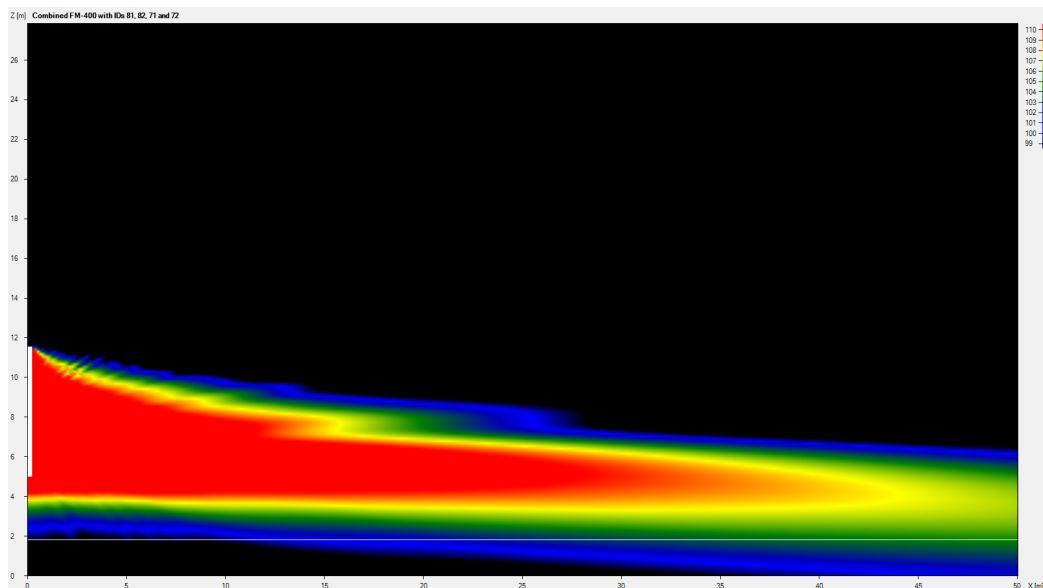
Further information on beam configuration and its associated parameters can be found in section 4.7.3 “System Setup (Focus-Series)” of the Fohhn Audio Soft user manual.

### 4.1.3 Acoustic Centre

This function allows you to move the vertical position of a beam’s acoustic centre:



Acoustic centre at the top



Acoustic centre at the bottom

Further information on setting the acoustic centre can be found in section 4.7.3 “System Setup (Focus-Series)” of the Fohhn Audio Soft user manual.

## 4.2 Setup in the Beam Steering View

To adjust your **Focus Modular** system to the venue and the particular application, open the *Beam Steering* view in **Fohhn Audio Soft**: This display lets you set all the parameters that are relevant to Beam Steering.

Its depiction and management are covered in the following sections:

### ***The Device Selection***

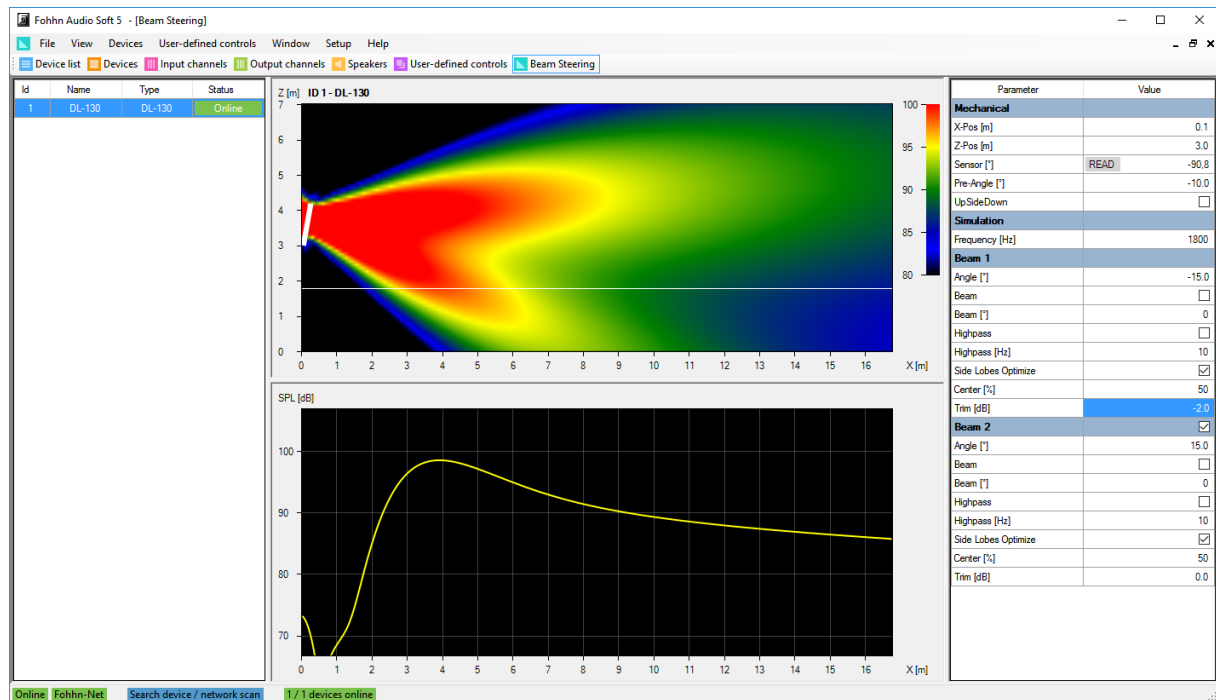
This shows all the **Focus-Series** devices that are in the system, along with their IDs, names, type/model classifications and current operating status.

### ***The Parameter Field***

This lets you configure the beam dispersion characteristics of the chosen module in the Device Selection.

### ***The Focus Simulation***

This shows a graphic representation of your selected module’s beam dispersion characteristics, based on the settings made in the Parameter Field.



The Device Selection (left), Focus Simulation (centre) and Parameter Field (right)

### Beam Steering settings in the Parameter Field:

- X-Pos (m)**  
 This defines the distance of the selected speaker (in metres) in relation to the vertical back wall.
- Z-Pos (m)**  
 Defines the height of the selected speaker's lower edge (in metres) in relation to the floor.
- Pre-Angle (°)**  
 Here you can enter the mechanical inclination of the loudspeaker. This value only influences the display in the Focus Simulation.
- Freq. (Hz)**  
 Here you can input the reference frequency for calculation and display in the neighbouring Focus Simulation. The frequency you input here will have no effect whatsoever on the sound being reproduced by your loudspeaker!
- Upside Down**  
 Adding a check mark to this field means that the loudspeaker effectively turns upside down. This can be useful if your **Focus-Series** loudspeakers have to be installed head first.
- Beam 2 (previously: Split)**  
 Adding a check mark to this field creates a second beam for the loudspeaker in question. The following parameters can then be set for both beams, individually and independently from each other.
- Angle (°)**  
 Here you can enter the beam's vertical inclination angle – in 0.1° increments - within a range of +/-40°.

- **Beam (°)**  
Adding a check mark to this field lets you set the vertical width of the beam – in 0.1° increments - within a range of +/-90°.
- **High-pass (Hz)**  
Adding a check mark to this field lets you enter the frequency threshold (10 Hz to 10 kHz): The fundamental tone below this frequency will be attenuated by 24 dB / Octave (fourth order). The high-pass is recommended for effective masking of the fundamental tone.
- **Side Lobes > Optimize**  
When adding a check mark to this field, Side lobes will be removed, as far as is possible, by means of a dedicated **Fohhn** algorithm. Because this makes the room less “excited”, levels of speech intelligibility will be significantly improved. With the overall volume level of the system now somewhat lower as a result, you can use the volume control in **Fohhn Audio Soft** to compensate for this.
- **Center (%)**  
When *Optimize* is active, you can change the acoustic centre of the loudspeaker. 0 % means that the acoustic centre moves to what is virtually the bottom end of the speaker, whereas 100 % takes it to the top end. In its default setting of 50 % (or if *Optimize* is not active) the acoustic centre sits at what is basically the optical centre of the speaker.
- **Trim (dB)**  
Here you can attenuate the level of the selected beam over a range of 0 to -90 dB. If two beams are active, you can use these fields to set the relative levels of both in parallel.

Detailed descriptions of the individual fields can be found in section 4.7.3 “System Setup (Focus-Series)” of the **Fohhn Audio Soft** user manual.

## 4.3 Adjustment of DSP Functions

In addition to configuring the vertical beam dispersion characteristics of your **Focus Modular** systems, **Fohhn Audio Soft** also give you direct access to the parameters of the **Fohhn Audio DSP** (digital signal processor).

The following DSP functions are available:

- **Input level**
- **Output level**
- **Routing**
- **Delay**
- **High-pass- and Low-pass filter**
- **Equalizer**
- **Dynamics**
- **Signal Generator**

Further information on the individual functions can be found in section 4.5 “DSP Functions” of the **Fohhn Audio Soft** user manual.

## 4.4 Saving Projects

To save the settings on the computer as a Fohhn Audio Soft Projekt (.fap), proceed as follows:

1. In the *File* menu, select *Save Project As*.
2. Select the location in which you want to save your project. Click on *Save* to confirm your choice.

## 5. Application Examples

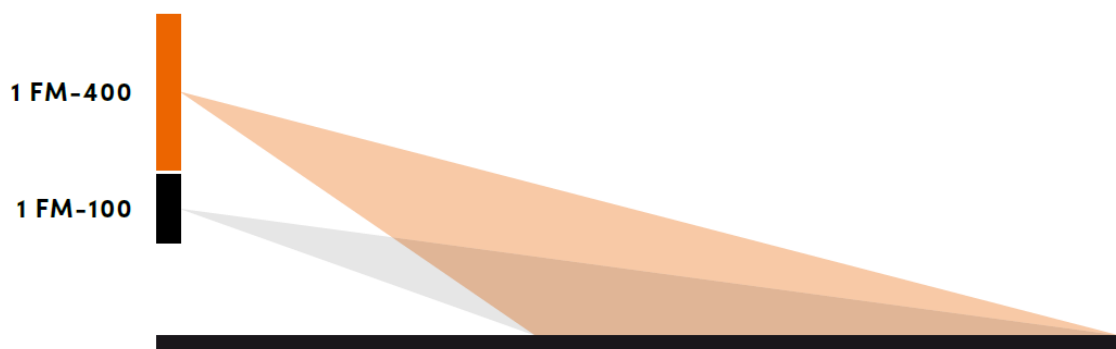
The following examples show possible and useful combinations of the various **Focus Modular** modules in typical sound reinforcement scenarios. Individual parameter settings (e.g. vertical dispersion characteristics and inclination angles, acoustic centre etc.) are intentionally not shown here in detail.

⚠ **Level reductions are generally dependent on room depth, the opening angle of the beam and the room acoustic. Therefore, this information is only intended for rough guidance.**

For planning, use the *Focus Simulation* in the *Beam Steering* view. Here you can simulate the direct sound dispersion of a system.

### 5.1 Smaller venues with a single audience level

**Example 1a:** The venue has a maximum room depth of ca. 30 metres and a single audience level. In this example, an **FM-400** module is combined with an **FM-100** module.



1a: 1 x FM-400 and 1 x FM-100 with a maximum room depth of 30 m.

Load a loudspeaker preset for your **FM-100** with a high-pass filter of 1500 or 2000 Hz (Presets: FM HP1500Hz or FM HP2000Hz).

For your **FM-400**, load a loudspeaker preset with a corresponding low-pass filter of 1500 Hz or 2000 Hz (Presets: FM LP1500Hz or FM LP2000Hz).

To align the level of the two modules, reduce the **FM-100**'s input level by ca. 8 dB.

⚠ **For consistent behaviour of the limiter within the system as a whole, it is important that level adjustments are carried out on input (gain structure).**

**Example 1b:** You can use the lower of two connected modules (in this case, the **FM-100**) in Two Beam mode and adjust one of those beams (*Beam 2*) to provide nearfield coverage.

To align the level of the two modules, reduce the **FM-100**'s input level by ca. 8 dB. In the parameter field of the *Beam Steering* view, use the *Trim* parameter to separately reduce the level of *Beam 2*.

⚠ For consistent behaviour of the limiter within the system as a whole, it is important that level adjustments are carried out on input (gain structure).



1b: 1 x FM-400 and 1 x FM-100 with a maximum room depth of 30 m.  
A second beam from the FM-100 covers the nearfield area.

## 5.2 Larger venues with a single audience level

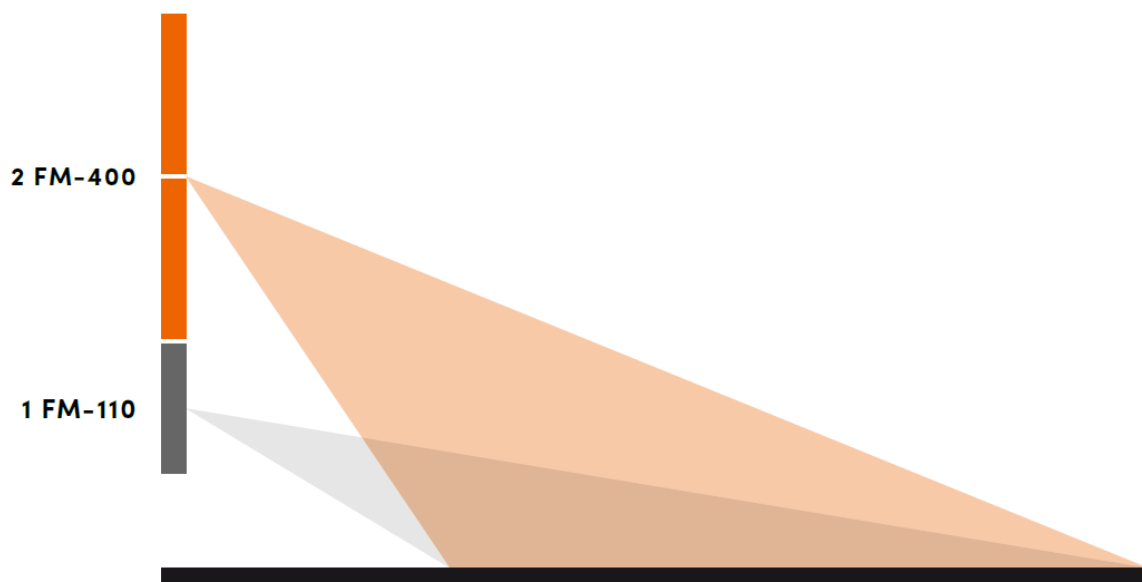
**Example 2a:** The venue has a room depth of more than 30 metres and a single audience level; here it is equipped with a “Combined Speaker” (consisting of two **FM-400s**) and an **FM-110**.

⚠ If a Focus Modular loudspeaker stack has several **FM-400** modules, it must always be operated as a “Combined Speaker”!

You can find more information on this in section 3.4.7 “Graphically arranging the loudspeaker systems” (page 51) of this manual.

Due to the larger room size, an **FM-110** module should be used for the high frequency range. To align the level of the two modules, reduce the **FM-110**’s input level by ca. 14 dB

⚠ For consistent behaviour of the limiter within the system as a whole, it is important that level adjustments are carried out on input (gain structure).

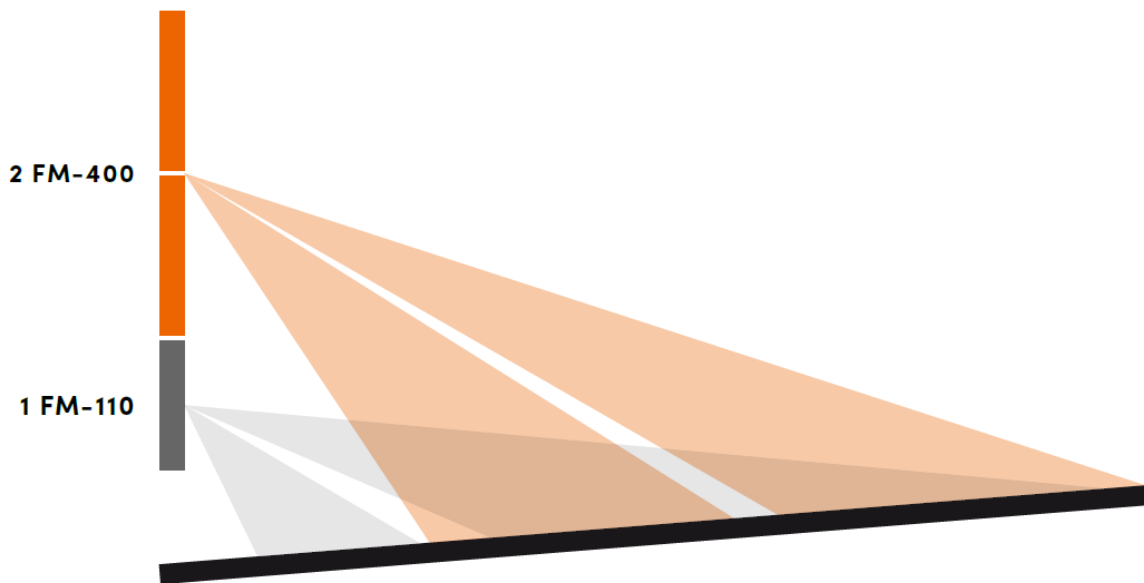


2a: 2 x FM-400 and 1 x FM-110 with a room depth of more than 30 m.

**Example 2b:** Depending on the application, it can make sense to use both the “Combined Speaker” (with the linked **FM-400** modules) and the **FM-110** in Two Beam mode to achieve a more even coverage of the listening area. The same applies with rising audience seating.

To align the levels of the modules, reduce the **FM-110**’s input level by ca 8 dB. In the parameter field of the *Beam Steering* view, use the *Trim* parameter to separately reduce the level of *Beam 2*.

⚠ **For consistent behaviour of the limiter within the system as a whole, it is important that level adjustments are carried out on input (gain structure).**



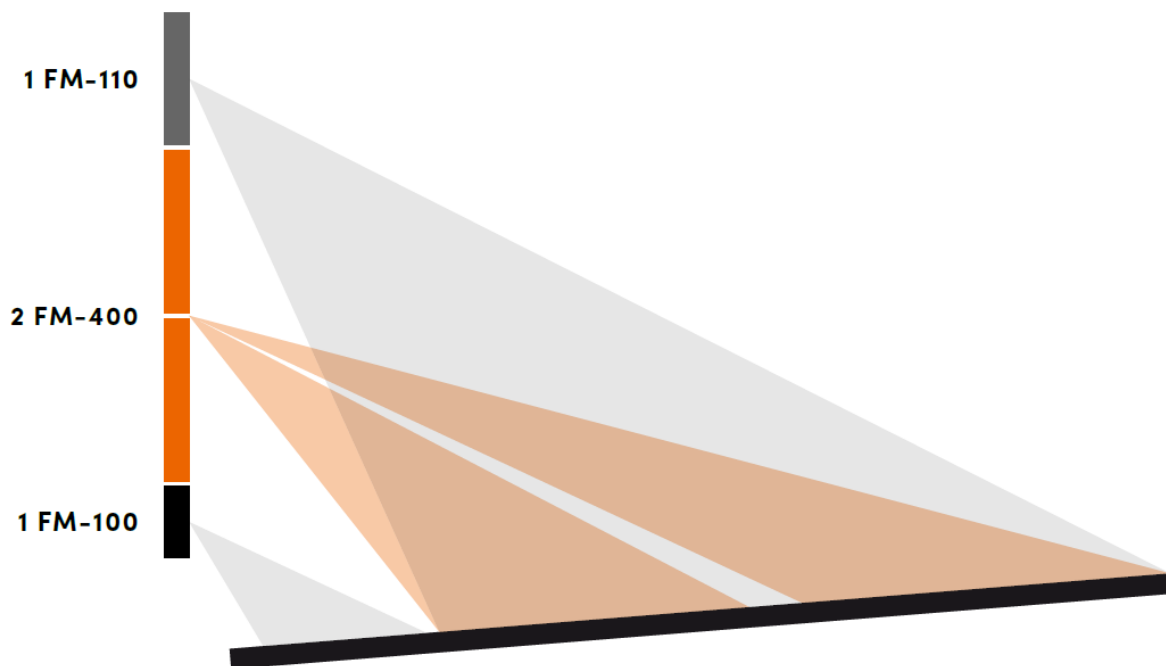
2b: 2 x FM-400 and 1 x FM-110 with a room depth of more than 30 m and rising audience seating.  
A second beam from the FM-110 covers the nearfield area.

**Example 2c:** In the following example, intended for venues with an even greater room depth (e.g. 50 metres or more), we have used at least two **FM-400s** as a “Combined Speaker”, in Two Beam mode, for the mid- and low-mid ranges, plus an **FM-100** and an **FM-110** for the high frequency range.

For this more distant coverage, you can install an **FM-110** above both **FM-400** modules – with an **FM-100** at the bottom of the stack to cover the nearfield area.

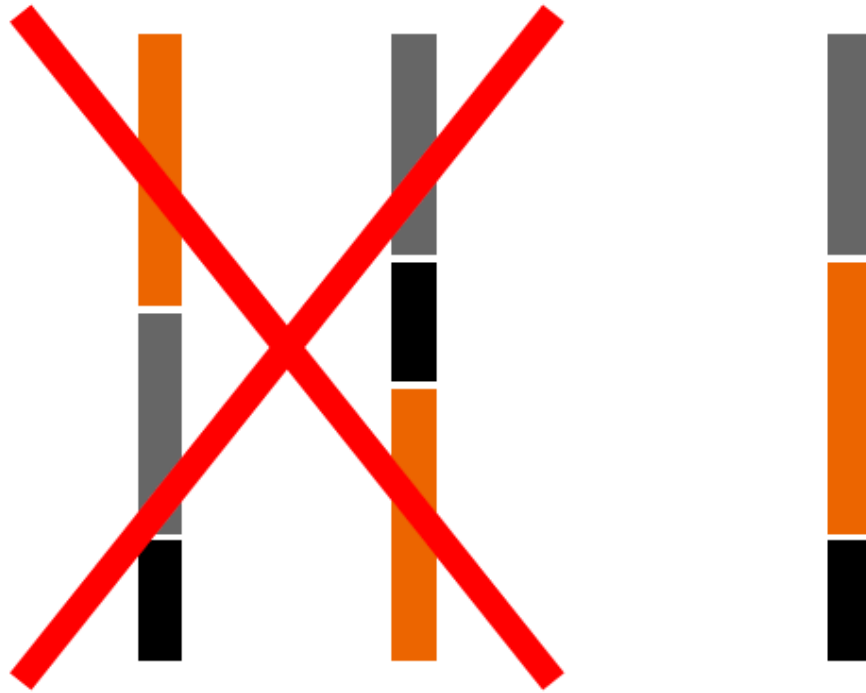
To align the levels of the modules, reduce the **FM-100**’s input level by ca. 10 dB and the **FM-110**’s by ca. 8 dB. In the parameter field of the *Beam Steering* view, use the *Trim* parameter to separately reduce the *Beam 2* level of the “Combined Speaker”(consisting of the two **FM-400s**).

⚠ **For consistent behaviour of the limiter within the system as a whole, it is important that level adjustments are carried out on input (gain structure).**



2c: 1x FM-110, 2 x FM-400 and 1 x FM-100 with a room depth of more than 50 m and rising audience seating.

- ⚠ Focus Modular high frequency modules (FM-100 or FM-110) cannot be linked to form a “Combined Speaker”. They will be displayed as separate modules in the *Beam Steering* view. Always install the high frequency modules at the upper or lower end of a Focus Modular stack!



Incorrect combinations: FM-400 above an FM-110 and FM-100 / FM-110 above an FM-100 and FM-400 (left)

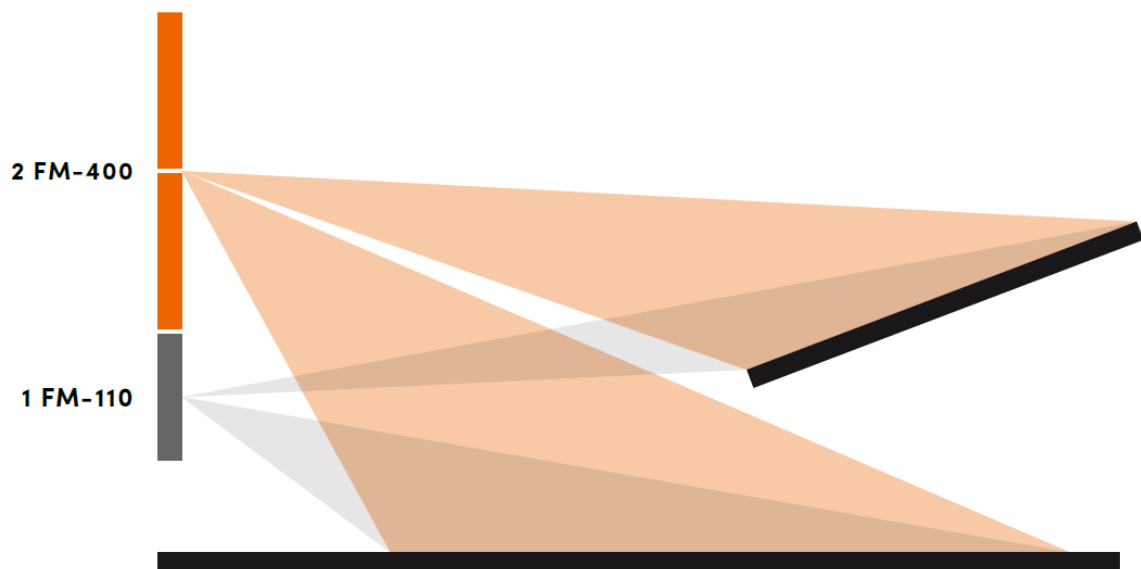
Correct combination: FM-110 above an FM-400 and FM-100 (right)

### 5.3 Larger venues with two audience levels

**Example 3a:** The venue has a room depth of more than 30 metres and two audience levels – for example a theatre with stalls and a circle, or a town hall with stalls and a gallery; covered here by two **FM-400s** as a “Combined Speaker” and an **FM-110** installed below. Both the “Combined Speaker” and the single **FM-110** module are used in Two Beam mode. This provides each audience level with two completely independent beams, which can be adjusted to the acoustic conditions of the two levels. Moreover, one beam from the **FM-110** can be directed, from below, onto the upper audience level.

To align the level of the modules, reduce the **FM-110**’s input level by ca. 8 dB. In the parameter field of the *Beam Steering* view, *Beam 2* levels for all modules can be separately reduced using the *Trim* parameter.

⚠ For consistent behaviour of the limiter within the system as a whole, it is important that level adjustments are carried out on input (gain structure).

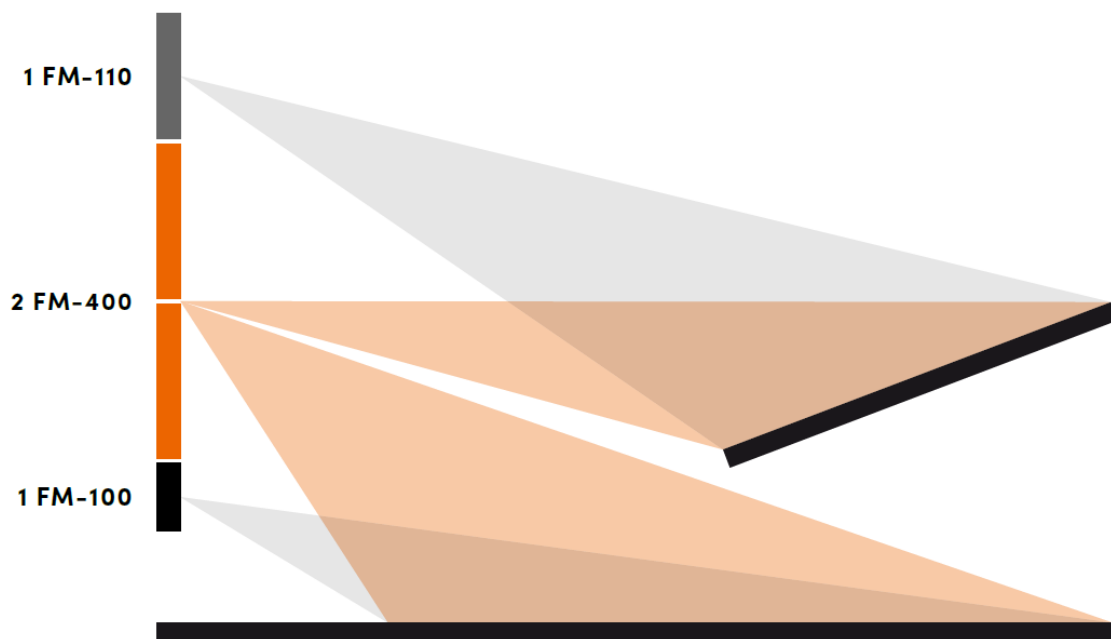


3a: 2 x FM-400 and 1 x FM-110 with a room depth of more than 30 m and two audience levels.

**Example 3b:** If an additional **FM-100** module is available, you can install this at the lower end of the **Focus Modular** stack: The **FM-100** is well suited to the lower audience area. Both high frequency modules can then be used without Two Beam mode. Each high frequency module covers one audience level respectively.

To align the level of the modules, reduce the **FM-100**'s input level by ca. 10 dB and that of the **FM-110** by ca. 8 dB. In the parameter field of the *Beam Steering* view, use the *Trim* parameter to separately reduce the *Beam 2* level of the "Combined Speaker" (consisting of two **FM-400s**).

⚠ **For consistent behaviour of the limiter within the system as a whole, it is important that level adjustments are carried out on input (gain structure).**



3b: 1x FM-110, 2 x FM-400 and 1 x FM-100 with a room depth of more than 30 m and two audience levels.

**Example 3c:** If required, the **FM-110** and **FM-100** can be used in Two Beam mode and the beams directed accordingly: Here, the **FM-110**'s two beams only cover the upper audience level, while those of the **FM-100** only cover the lower. The "Combined Speaker", consisting of two **FM-400s**, covers both audience levels, each with one beam.

To align the level of the modules, reduce the **FM-100**'s input level by ca. 10 dB and that of the **FM-110** by ca. 8 dB. In the parameter field of the *Beam Steering* view, use the *Trim* parameter to separately reduce the *Beam 2* levels of all modules.

⚠ For consistent behaviour of the limiter within the system as a whole, it is important that level adjustments are carried out on input (gain structure).



3c: 1x FM-110, 2 x FM-400 and 1 x FM-100 with a room depth of more than 30 m and two audience levels.

All Focus Modular modules are used in Two Beam mode.

## 5.4 Larger venues with three or four audience levels

**Example 4a:** The venue has a room depth of more than 30 metres and und several audience levels – for example, a theatre with stalls and several balconies; here, a “Combined Speaker” is used, consisting of two **FM-400s**, along with a high frequency module (**FM-100** or **FM-110**) at each end of the stack. By using the modules in Two Beam mode, different levels can be individually covered.

To align the levels of the modules, reduce the input level of both **FM-110s** by ca. 8 dB. In the parameter field of the *Beam Steering* view, use the *Trim* parameter to separately reduce the *Beam 2* levels of all modules.

⚠ **For consistent behaviour of the limiter within the system as a whole, it is important that level adjustments are carried out on input (gain structure).**

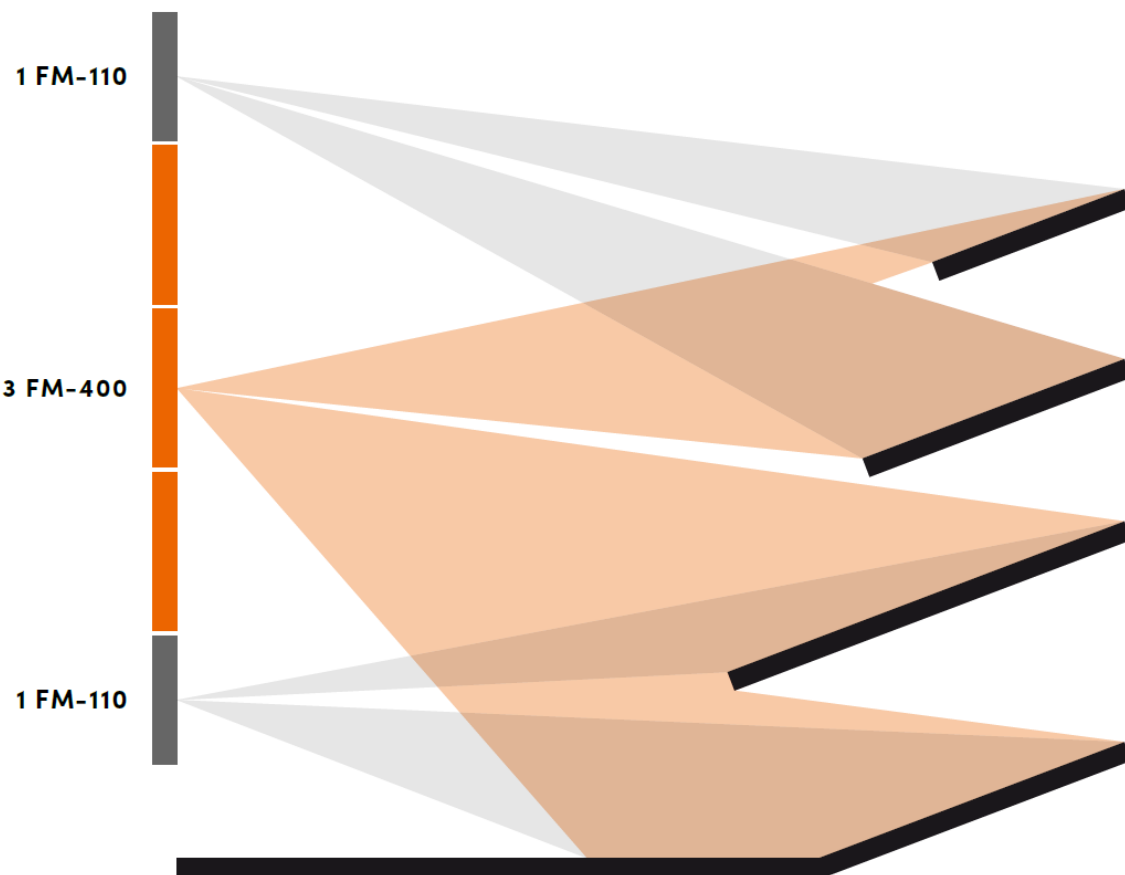


4a: 1x FM-110, 2 x FM-400 and 1 x FM-110 with a room depth of more than 30 m and three audience levels.  
All Focus Modular modules are used in Two-Beam mode.

**Example 4b:** Depending on the size of the venue and the number of audience levels, it may be necessary to use more than two **FM-400** modules in a “Combined Speaker”: A “Combined Speaker” can consist of up to four **FM-400** modules.

To align the levels of the modules, reduce the input level of both **FM-110**s by ca. 6 dB. In the parameter field of the *Beam Steering* view, use the *Trim* parameter to separately reduce the *Beam 2* levels of all modules.

⚠ **For consistent behaviour of the limiter within the system as a whole, it is important that level adjustments are carried out on input (gain structure).**



**4b:** 1x FM-110, 3 x FM-400 and 1 x FM-110 with a room depth of more than 30 m and four audience levels.  
All Focus Modular modules are used in Two-Beam mode.

#### ***Arrangement possibilities for the different modules***

**Focus Modular** high frequency and low-mid modules can be used in a stack, or side by side. However, modules of the same type, or with the same frequency range, should not be used side by side.

## 6. Technical Documentation

### 6.1 Technical Specifications

#### 6.1.1 FMI-100 / FM-100

##### Electroacoustic features

Acoustic design	electronically steerable line array speaker
Components	8 x 1" horn loaded compression driver, neodymium magnet
Operating mode	active, 8-channel DSP amplifier, class D
Maximum SPL [1]	142 dB (102 dB @ 100 m)
Frequency range [2]	1 kHz – 20 kHz
Beam dispersion angle, horizontal [3]	90°
Vertical beam width, digitally controlled [3]	0° - 90° in 0.1° increments
Vertical inclination angle, digitally controlled	-40° - +40° in 0.1° increments
Acoustic centre	both beams movable between 0 % (bottom) to 100 % (top)

##### Loudspeaker features

Enclosure	aluminium / wood cabinet
Protection Grille	steel, ball impact resistant, powder coated
Mounting points	4 x M8 threads, integrated rigging system
Standard colours	Black or white powder coating
Front design	steel grille in enclosure colour, backed by acoustically transparent foam
Dimensions (B x H x T)	approx. 224 x 700 x 274 mm
Weight [4]	approx. 24 kg

##### Optional features

Optional colours [5]	all RAL Classic colours
----------------------	-------------------------

##### Remote control, remote monitoring

Remote control	Fohhn-Net, Fohhn Audio Soft
Remote monitoring	temperature, protect, signals, power supply, Fohhn-Net, Fohhn Audio Soft, Pilot signal monitoring
Fault message contact	relais 2 x changeover for max. 50 V / 1 A

## Electronic features

Amplifier power	8 x 120 W
Amplifier type	Pure Path Digital PWM
Audio inputs	2 independent line inputs with automatic priority, transformer-balanced
Audio outputs	2 x link
DSP channels	Fohhn Audio DSP 16
Amplification	28 dB
Input sensitivity	1.4 V
Frequency response	20 Hz – 20 kHz
Signal/Noise ratio	>105 dB/A
Protective circuit	soft start, temperature monitoring, short-circuit protection, overload
Power supply	100 V - 240 V AC 50/60 Hz, power supply with Power Factor Correction (PFC)
Power consumption	standby 5 W, max. 400 W
Power factor (PFC)	> 90 %
Fault current	< 0.5 mA
Fuse	16 A @ 230 V
Low Power	Green Power Standby Mode
Emergency power operation possible	external USV 230 V / 1000 W 16 A
Temperature range	0 – 40 °C
Cooling	Temperature-controlled fan
Weight electronics	approx. 3 kg

## Controller

Digital signal processors	2
Independent limiters	4
Selective 3-band limiting	bass/mid/high
Band specific time constants	yes
Filter technology	56-bit double precision
AD	24 bit / 96 kHz
FIR	yes
Gain	-80 dB - +12 dB
Volume	-80 dB - +12 dB
EQ	10-band parametric EQ, gain +/-12 dB, frequency range 10 - 20 kHz, Q 0.1 - 100
Limiter Compressor	yes
Noise Gate	yes
X-Over	Linkwitz-Riley 4 <sup>th</sup> order (24 dB /octave), High pass 10 Hz – 20 kHz, Low pass 10 Hz – 20 kHz
Delay	0.01 - 350 ms (3.4 mm - 120 m)
System latency	0.95 ms

CAAD simulation data

EASE

**Connections FMI-100 fixed installations  
(internal)**

Fohhn-Net

2 x Phoenix, 3-pin

Mains connection

1 x PowerCON in, 1 x PowerCON out

Audio inputs

2 independent line inputs (Phoenix, 3-pin)  
with automatic priority, transformer-  
balanced

Audio outputs

2 x link, Phoenix 3-pin

Fault contact

relais 2 x changeover, link

***Display LEDs (internal)***

Power on / off (standby)

green = on, red = standby,  
red flashing = fault

Network control

receive/send remote control LED

**Connections FM-100 mobile applications**

Fohhn-Net

1 x RJ-45 Neutrik in, 2 x RJ-45 Neutrik out

Mains connection

1 x PowerCON in, 1 x PowerCON out

Audio inputs

1 x Line, XLR, transformer-balanced

Audio outputs

2 x XLR, balanced

***Display LEDs***

Power on/ off (standby)

green = on, red = standby,  
red flashing = fault

Network control

receive/send remote control LED

[1] Peak, 20 ms with bandpass filtered pink noise signal according to IEC 60268-2 at one octave above the lower limit of the frequency range.

[2] usable frequency range

[3] horizontal x vertical at -6 dB

[4] net weight without optional equipment

[5] RAL Classic colours available as standard. Other RAL colours or NCS available on request.

## 6.1.2 FMI-110 / FM-110

### Electroacoustic features

Acoustic design	electronically steerable line array speaker
Components	16 x 1" horn loaded compression driver, neodymium magnet
Operating mode	active, 16-channel DSP amplifier, class D
Maximum SPL [1]	148 dB (102 dB @ 100 m)
Frequency range [2]	1 kHz – 20 kHz
Beam dispersion angle, horizontal [3]	90°
Vertical beam width, digitally controlled [3]	0° - 90° in 0.1° increments
Vertical inclination angle, digitally controlled	-40° - +40° in 0.1° increments
Acoustic centre	both beams movable between 0 % (bottom) to 100 % (top)

### Loudspeaker features

Enclosure	aluminium / wood cabinet
Protection Grille	steel, ball impact resistant, powder coated
Mounting points	4 x M8 threads, integrated rigging system
Standard colours	Black or white powder coating
Front design	steel grille in enclosure colour, backed by acoustically transparent foam
Dimensions (B x H x T)	approx. 224 x 1285 x 274 mm
Weight [4]	approx. 39 kg

### Optional features

Optional colours [5]	all RAL Classic colours
----------------------	-------------------------

### Remote control, remote monitoring

Remote control	Fohhn-Net, Fohhn Audio Soft
Remote monitoring	temperature, protect, signals, power supply, Fohhn-Net, Fohhn Audio Soft, Pilot signal monitoring
Fault message contact	relais 2 x changeover for max. 50 V / 1 A

## Electronic features

Amplifier power	16 x 120 W
Amplifier type	Pure Path Digital PWM
Audio inputs	2 independent line inputs with automatic priority, transformer-balanced
Audio outputs	2 x link
DSP channels	Fohhn Audio DSP 16
Amplification	28 dB
Input sensitivity	1.4 V
Frequency response	20 Hz – 20 kHz
Signal/Noise ratio	>105 dB/A
Protective circuit	soft start, temperature monitoring, short-circuit protection, overload
Power supply	100 V - 240 V AC 50/60 Hz, power supply with Power Factor Correction (PFC)
Power consumption	standby 10 W, max. 800 W
Power factor (PFC)	> 90 %
Fault current	< 1.0 mA
Fuse	16 A @ 230 V
Low Power	Green Power Standby Mode
Emergency power operation possible	external USV 230 V / 1000 W 16 A
Temperature range	0 – 40 °C
Cooling	Temperature-controlled fan
Weight electronics	approx. 5.5 kg

## Controller

Digital signal processors	2
Independent limiters	4
Selective 3-band limiting	bass/mid/high
Band specific time constants	yes
Filter technology	56-bit double precision
AD	24 bit / 96 kHz
FIR	yes
Gain	-80 dB - +12 dB
Volume	-80 dB - +12 dB
EQ	10-band parametric EQ, gain +/-12 dB, frequency range 10 - 20 kHz, Q 0.1 - 100
Limiter Compressor	yes
Noise Gate	yes
X-Over	Linkwitz-Riley 4 <sup>th</sup> order (24 dB /octave), High pass 10 Hz – 20 kHz, Low pass 10 Hz – 20 kHz
Delay	0.01 - 350 ms (3.4 mm - 120 m)
System latency	0.95 ms

CAAD simulation data

EASE

**Connections FMI-110 fixed installations  
(internal)**

Fohhn-Net

2 x Phoenix, 3-pin

Mains connection

1 x PowerCON in, 1 x PowerCON out

Audio inputs

2 independent line inputs (Phoenix, 3-pin)  
with automatic priority, transformer-  
balanced

Audio outputs

2 x link, Phoenix 3-pin

Fault contact

relais 2 x changeover, link

***Display LEDs (internal)***

Power on / off (standby)

green = on, red = standby,  
red flashing = fault

Network control

receive/send remote control LED

**Connections FM-110 mobile applications**

Fohhn-Net

1 x RJ-45 Neutrik in, 2 x RJ-45 Neutrik out

Mains connection

1 x PowerCON in, 1 x PowerCON out

Audio inputs

1 x Line, XLR, transformer-balanced

Audio outputs

2 x XLR, balanced

***Display LEDs***

Power on/ off (standby)

green = on, red = standby,  
red flashing = fault

Network control

receive/send remote control LED

[1] Peak, 20 ms with bandpass filtered pink noise signal according to IEC 60268-2 at one octave above the lower limit of the frequency range.

[2] usable frequency range

[3] horizontal x vertical at -6 dB

[4] net weight without optional equipment

[5] RAL Classic colours available as standard. Other RAL colours or NCS available on request.

### 6.1.3 FMI-400 / FM-400

#### Electroacoustic features

Acoustic design	electronically steerable line array speaker
Components	32 x 4" long excursion with treated cones, neodymium magnet
Operating mode	active, 16-channel DSP amplifier, class D
Maximum SPL [1]	134 dB (102 dB @ 100 m)
Frequency range [2]	60 Hz – 17 kHz
Beam dispersion angle, horizontal, low-mid < 1.5 kHz [3]	90°
Beam dispersion angle, horizontal, full range [3]	80°
Vertical beam width, digitally controlled [3]	0° - 90° in 0.1° increments
Vertical inclination angle, digitally controlled	-40° - +40° in 0.1° increments
Acoustic centre	both beams movable between 0 % (bottom) to 100 % (top)

#### Loudspeaker features

Enclosure	aluminium / wood cabinet
Protection Grille	steel, ball impact resistant, powder coated
Mounting points	4 x M8 threads, integrated rigging system
Standard colours	Black or white powder coating
Front design	steel grille in enclosure colour, backed by acoustically transparent foam
Dimensions (B x H x T)	approx. 224 x 1636 x 274 mm
Weight [4]	approx. 41 kg

#### Optional features

Optional colours [5]	all RAL Classic colours
----------------------	-------------------------

#### Remote control, remote monitoring

Remote control	Fohhn-Net, Fohhn Audio Soft
Remote monitoring	temperature, protect, signals, power supply, Fohhn-Net, Fohhn Audio Soft, Pilot signal monitoring
Fault message contact	relais 2 x changeover for max. 50 V / 1 A

## Electronic features

Amplifier power	16 x 120 W
Amplifier type	Pure Path Digital PWM
Audio inputs	2 independent line inputs with automatic priority, transformer-balanced
Audio outputs	2 x link
DSP channels	Fohhn Audio DSP 16
Amplification	28 dB
Input sensitivity	1.4 V
Frequency response	20 Hz – 20 kHz
Signal/Noise ratio	>105 dB/A
Protective circuit	soft start, temperature monitoring, short-circuit protection, overload
Power supply	100 V - 240 V AC 50/60 Hz, power supply with Power Factor Correction (PFC)
Power consumption	standby 10 W, max. 800 W
Power factor (PFC)	> 90 %
Fault current	< 1.0 mA
Fuse	16 A @ 230 V
Low Power	Green Power Standby Mode
Emergency power operation possible	external USV 230 V / 1000 W 16 A
Temperature range	0 – 40 °C
Cooling	Temperature-controlled fan
Weight electronics	approx. 5.5 kg

## Controller

Digital signal processors	2
Independent limiters	4
Selective 3-band limiting	bass/mid/high
Band specific time constants	yes
Filter technology	56-bit double precision
AD	24 bit / 96 kHz
FIR	yes
Gain	-80 dB - +12 dB
Volume	-80 dB - +12 dB
EQ	10-band parametric EQ, gain +/-12 dB, frequency range 10 - 20 kHz, Q 0.1 - 100
Limiter Compressor	yes
Noise Gate	yes
X-Over	Linkwitz-Riley 4 <sup>th</sup> order (24 dB /octave), High pass 10 Hz – 20 kHz, Low pass 10 Hz – 20 kHz
Delay	0.01 - 350 ms (3.4 mm - 120 m)
System latency	0.95 ms

CAAD simulation data

EASE

**Connections FMI-400 fixed installations  
(internal)**

Fohhn-Net

2 x Phoenix, 3-pin

Mains connection

1 x PowerCON in, 1 x PowerCON out

Audio inputs

2 independent line inputs (Phoenix, 3-pin)  
with automatic priority, transformer-  
balanced

Audio outputs

2 x link, Phoenix 3-pin

Fault contact

relais 2 x changeover, link

***Display LEDs (internal)***

Power on / off (standby)

green = on, red = standby,  
red flashing = fault

Network control

receive/send remote control LED

**Connections FM-400 mobile applications**

Fohhn-Net

1 x RJ-45 Neutrik in, 2 x RJ-45 Neutrik out

Mains connection

1 x PowerCON in, 1 x PowerCON out

Audio inputs

1 x Line, XLR, transformer-balanced

Audio outputs

2 x XLR, balanced

***Display LEDs***

Power on/ off (standby)

green = on, red = standby,  
red flashing = fault

Network control

receive/send remote control LED

[1] Peak, 20 ms with bandpass filtered pink noise signal according to IEC 60268-2 at one octave above the lower limit of the frequency range.

[2] usable frequency range

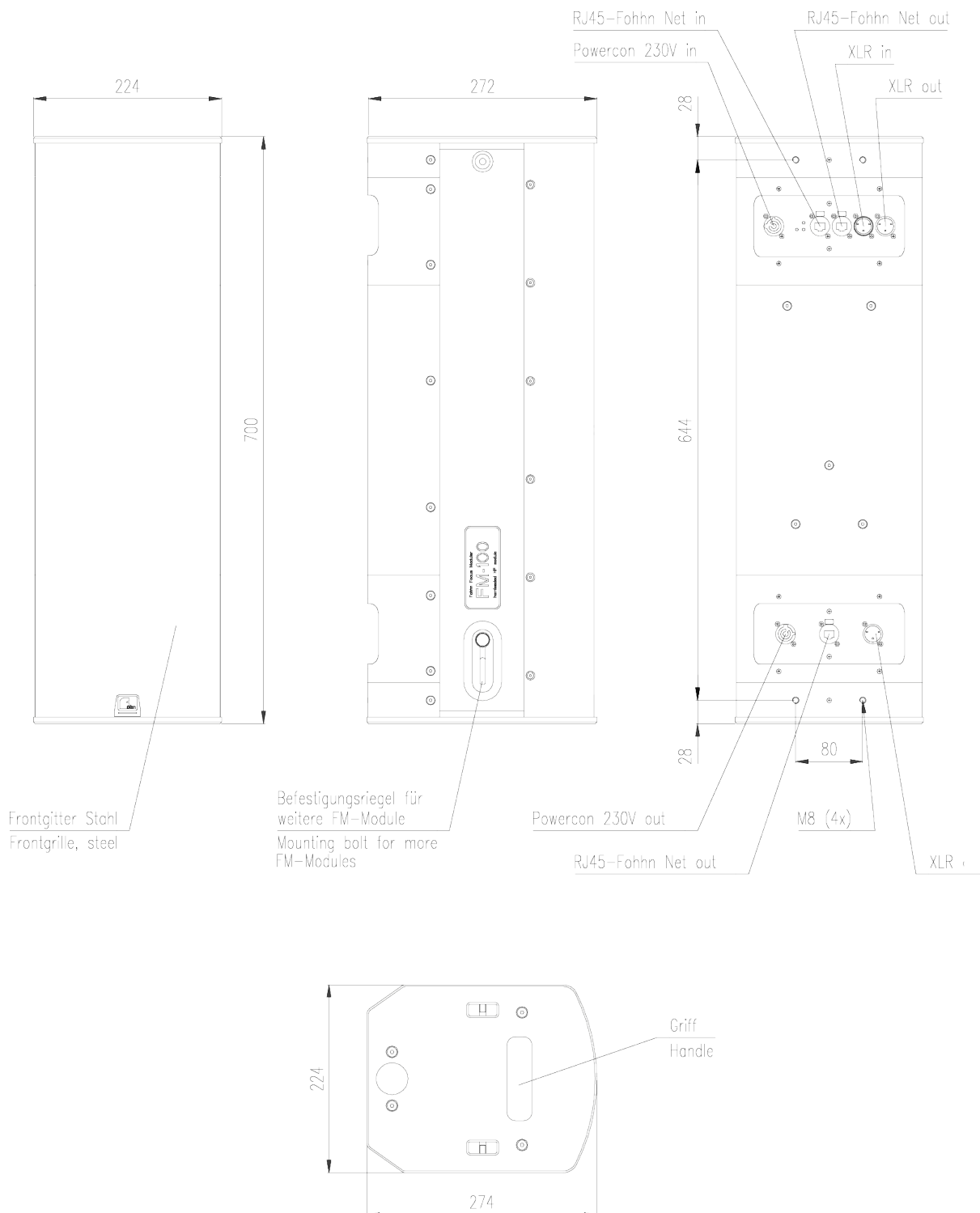
[3] horizontal x vertical at -6 dB

[4] net weight without optional equipment

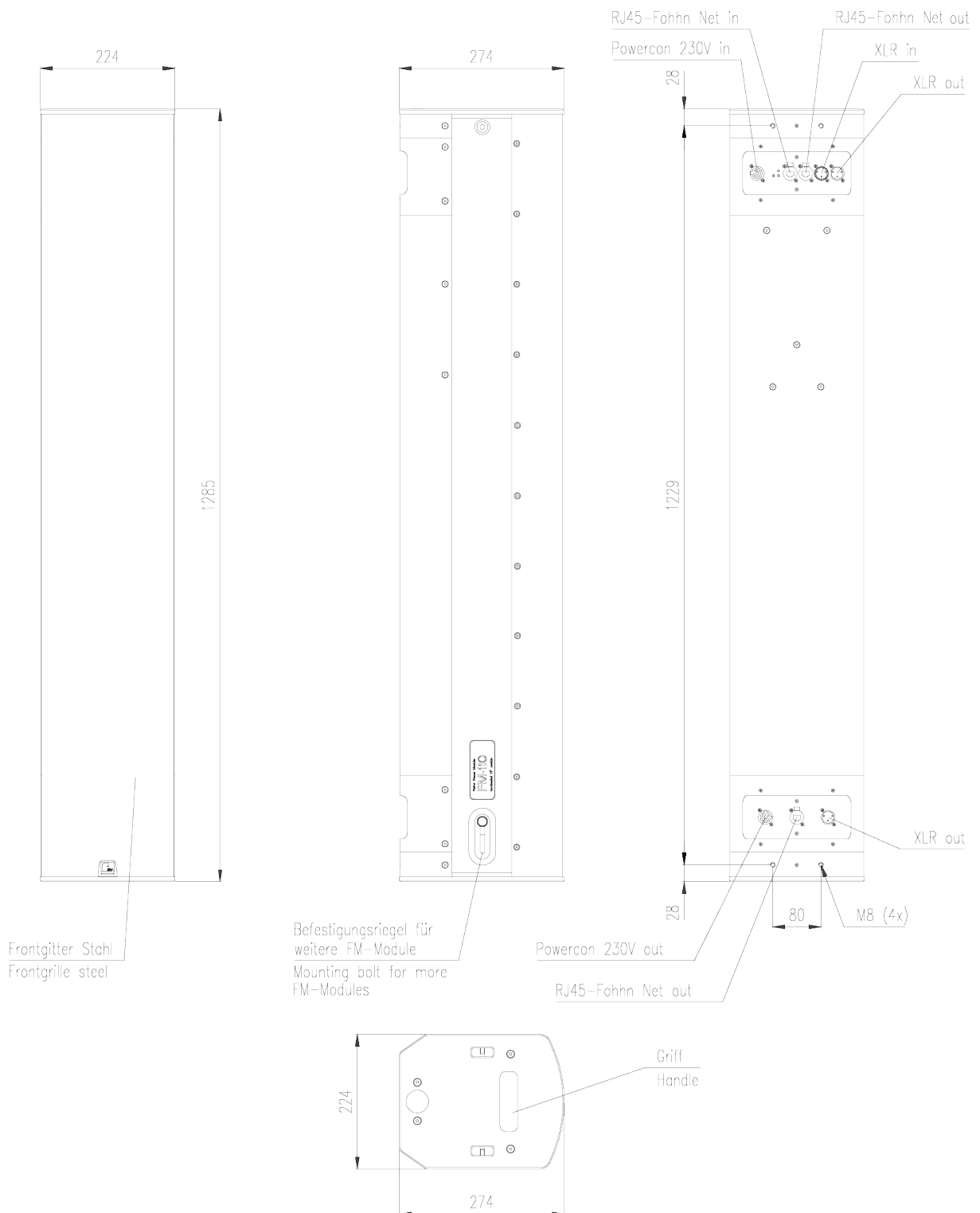
[5] RAL Classic colours available as standard. Other RAL colours or NCS available on request.

## 6.2 Technical Drawings

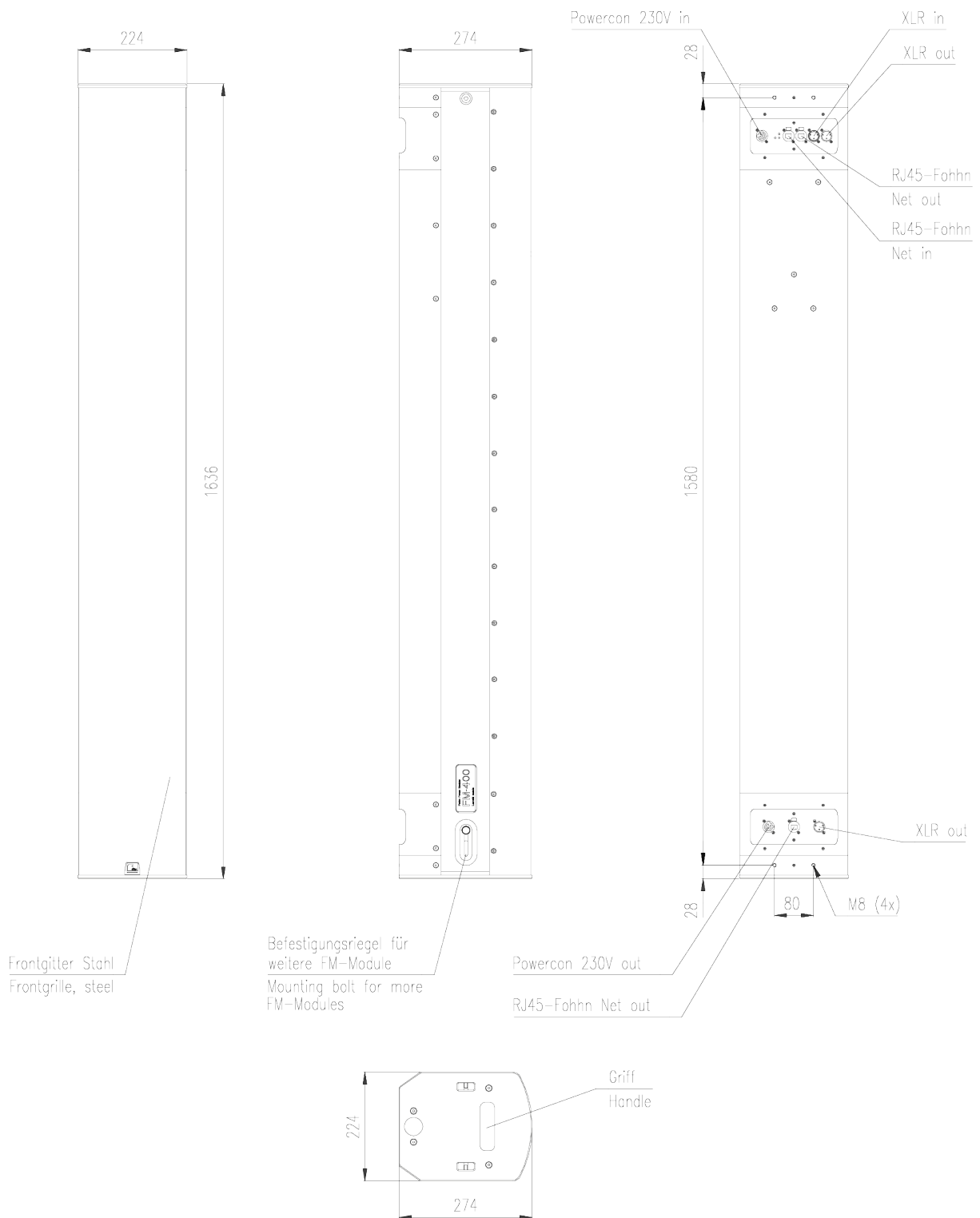
### 6.2.1 FMI-100 / FM-100



## 6.2.2 FMI-110 / FM-110



## 6.2.3 FMI-400 / FM-400



## 6.3 Pin Assignments and Cable Lengths

For correct operation of your **Focus Modular** systems, you should only use properly supported, shielded and continuously intact cables and plugs.

**⚠ Never use audio or CAT cables with defective shielding for example: This can lead to interference signals which, in some cases may also result in damage to the speaker chassis.**

Check the condition of the connection cable at regular intervals and change any damaged cable where necessary.

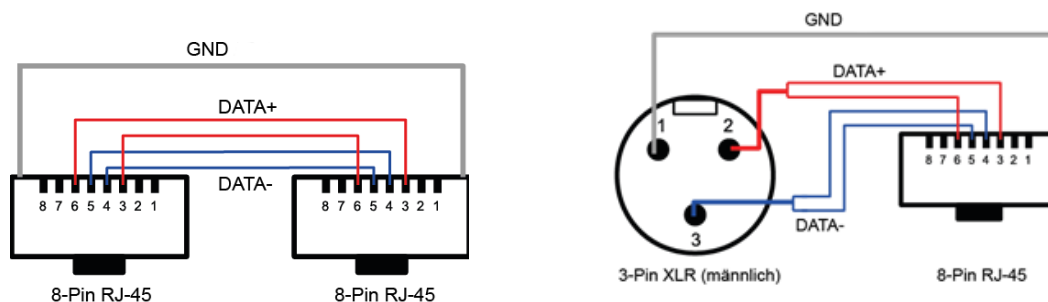
**Important:** Please also note the maximum permitted cable lengths. To ensure correct operation, these should **not** be exceeded!

### 6.3.1 CAT cable

For the plugs and cable used for transmitting data from **Fohhn Audio Soft** or from an **NA-11 Fohhn-Net USB Adapter** or **NA-3 Fohhn-Net Ethernet Adapter** to the **Focus Modular** modules, the following specifications apply:

**Assignment:**

Type	8-pin RJ-45	Type	3-pin XLR (male)	8-pin RJ-45
GND/Screen	Screen	GND/Screen	Pin 1	Screen
DATA+	Pin 3 + Pin 6	DATA+	Pin 2	Pin 3 + Pin 6
DATA -	Pin 4 + Pin 5	DATA -	Pin 3	Pin 4 + Pin 5

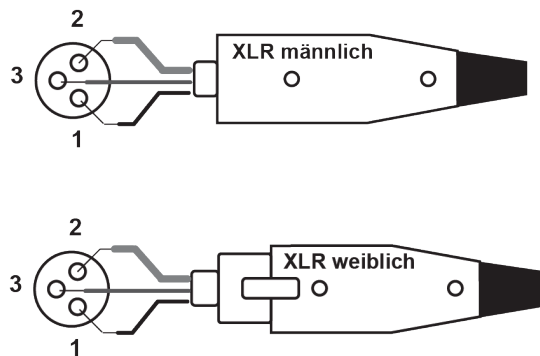


**Cable lengths:** maximum 1 km (depending on cable quality and cross section)

For bridging greater distances, you can use a repeater/amplifier after 400 m. This processes the signal so that it can be newly transmitted over a distance of 1 km.

### 6.3.2 Audio Cable

We generally recommend using high-quality professional cable in order to achieve the best possible audio quality.



#### Assignment:

1: Screen

2: +

3: -

## 7. Troubleshooting

The following table describes how you can determine errors and shows the corrective measures that are recommended.

Problem	Probable Cause	Possible Remedies
No sound is audible. However, there is an audio signal.	The In- and Output routing in the User DSP is not correct.	Check the DSP settings in <b>Fohhn Audio Soft</b> .
The module is not recognized by <b>Fohhn Audio Soft</b> .	Several products have the same <b>Fohhn-Net</b> ID. (An ID conflict will be displayed in <b>Fohhn Audio Soft</b> .)	Change the ID – no ID can appear twice. (See “ <b>3.4.4 Fohhn-Net Cabling and ID-Allocation</b> ”).
	The ID search range is restricted.	Extend the search range from ID 1 to 254.
	The <b>Fohhn-Net</b> plug (see section “ <b>3.3 Cabling</b> ”) is not inserted.	Connect the module to the <b>NA-3</b> or <b>NA-11 Fohhn-Net Adapter</b> .
The <b>Focus Modular</b> module’s <i>power</i> , <i>send</i> and <i>receive</i> LEDs are not lighting up.	There is no supply voltage.	Check whether a supply voltage is present.
	230 V not available. Mains fuse tripped.	Measure the supply voltage at the socket, check the fuse.
	With several modules: The connection cable is not plugged in.	Connect the module to the supplied cable set.
The <i>send</i> and/or <i>receive</i> LEDs are not lighting up.	The cable for the <b>Fohhn-Net</b> connection (see “ <b>3.3 Cabling</b> ”) is defective or not plugged in.	Check the cable or connect the module to the <b>NA-3</b> or <b>NA-11 Fohhn-Net Adapter</b> .
The <i>power</i> LED flashes alternate red and green.	There is a hardware error.	Contact the Service department at <b>Fohhn Audio AG</b> immediately.

If your problem does not appear in the above table, or if the problem is not remedied using the suggested solutions, please contact us at the following address:

### FOHHN AUDIO AG

Hohes Gestade 3-8  
72622 Nürtingen  
Germany

Tel. +49 7022 93323-0  
Fax +49 7022 93324-0

[www.fohhn.com](http://www.fohhn.com)  
[info@fohhn.com](mailto:info@fohhn.com)

## 8. Service and Repair

Servicing and/or repairs should only be undertaken by suitably qualified, **Fohhn®**-trained personnel. Do not carry out any servicing or any repairs to the device beyond what is listed in the “Maintenance Measures” section below.

For details of a **Fohhn®** Service provider in your area, please contact us at the address on the previous page.

Keep the packaging for your device so that, in the event of any problem occurring, it can be returned in its original packaging. This will minimize the risk of any potential damage during transportation.

### 8.1 Maintenance Measures

- To clean your **Focus Modular** systems, only use a dry or slightly damp, well wrung out towel.
- Do not use any aggressive cleaning agents, waxes or solvents (such as cleansing alcohol or paint thinner), as these could spoil the appearance of the device and/or affect the paintwork on the enclosure.
- There are no user-serviceable parts within the device.
- The device must only be repaired by suitably qualified personnel.

## 9. Glossary

Term	Explanation
Beam dispersion	Here, this refers to the directional characteristics of a loudspeaker: <i>Beam dispersion</i> describes the spread of the acoustic waves originating from a loudspeaker (with regard to a particular frequency). The vertical beam dispersion of your <b>Focus Modular</b> systems can be adjusted electronically and in real time.
Acoustic centre	The <i>acoustic centre</i> of the beam can be moved along the full line length – electronically and in real time.
Beam Steering	The term <i>Beam Steering</i> denotes the control of loudspeaker system beam dispersion via electronics and software. Through the precise superimposition of closely positioned sound sources, it is possible to “bundle” the sound over a wide frequency and flexibly adjust a loudspeaker’s beam dispersion angle. <b>More on this in section “4.1 Beam Steering – the Functional Principle”.</b>
Combined Speaker (Combined Loudspeaker System)	Here, this refers to the formation of a single unit from a minimum of two combined <b>Focus Modular</b> low-mid modules. <b>More on this in section “3.4.7 Graphically Arranging the Loudspeaker Systems”.</b>
DSP (Digital Signal Processor)	A <i>DSP</i> serves to process and control digitalized audio signals. Every <b>Focus Modular</b> system has three different areas of DSP functionality (User DSP, Speaker DSP und Beam Control DSP).
Fohhn-Net	Here, this refers to a control network that is based on the RS-485 protocol. <b>More on this in section “3.4.4 Fohhn-Net Cabling and ID Allocation”.</b>
Fohhn-Net Adapter	To communicate with the <b>Focus Modular</b> systems, <b>Fohhn Audio Soft</b> requires an adapter for the <b>Fohhn-Net</b> , which is connected to the control computer and transmits the data generated in <b>Fohhn Audio Soft</b> to the systems – e.g. an <b>NA-3</b> or <b>NA-11</b> . <b>More on this in section “3.4.1 Configuration”.</b>
Listening Area	This term denotes the area in which sound coverage is required for spectators/listeners.
ID (Fohhn-Net)	Here, this refers to the assigned address of an active <b>Fohhn</b> device in the <b>Fohhn-Net</b> . <b>More on this in section “3.4.4 Fohhn-Net Cabling and ID Allocation”.</b>
Side Lobes	Due to their construction, line arrays generate unwanted Side Lobes. These result from the finite distances between the individual loudspeaker chassis and the length of an array.
Side Lobe Free Technology	A specially developed algorithm suppresses the Side Lobes. As a result, relatively little reverberation is generated, as less acoustic energy is dispersed in unwanted directions.
Stack	The term describes a <b>Focus Modular</b> loudspeaker system or array consisting of several high frequency and low-mid modules that are electronically and mechanically connected to one another. (Minimum: one high frequency- and one low-mid module in each case).
Two Beam Mode	see “Two Beam Technology”
Two Beam Technology	Every <b>Focus Modular</b> module can generate two separate, completely independent acoustic beams over its entire line length. All parameters can be separately and individually set for each beam.

## 10. Appendix

### 10.1 Environmental Information

Please note that this product must not be disposed of in general household waste. It must be taken to a disposal centre for electrical/electronic waste. Please also note any applicable national or local regulations. Further information on these and on appropriate waste disposal facilities can be obtained from your city/town council as well as from your local distribution partner.

### 10.2 CE Marking and Declaration of Conformity

This loudspeaker complies with the currently applicable conditions of EMC law and as such, carries the CE marking.



The relevant Declarations of Conformity are available on request from

**Fohhn Audio AG**, 72622 Nürtingen

### 10.3 Trademarks

All trademarks and brand names referred to in this manual, which may be protected by third parties, are subject to the provisions of trademark law and the title rights of their respective owners. All trademarks, trade names or company names appearing here are, or may be, trademarks or registered trademarks of their respective owners. All rights are reserved, with the exception of those specifically granted.

In the absence of an explicitly labelled registered trademark in this manual, it cannot be necessarily concluded that a name is free of third-party rights.

### 10.4 Protection Classes and Protection Types



Protection Class 1: All the equipment's electrical conductive components are connected with low resistance to the protective earth conductor of the installation.

**IP54**

The device's protection type (protection against dust in harmful amounts and protection against water spray)

## 10.5 Disclaimer and Copyright

### 10.5.1 Disclaimer

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## 10.6 Contact Address

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Hohes Gestade 3-8  
72622 Nürtingen  
Germany

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Fax +49 7022 93324-0

[www.fohhn.com](http://www.fohhn.com)

[info@fohhn.com](mailto:info@fohhn.com)

### Fohhn on Social Media

