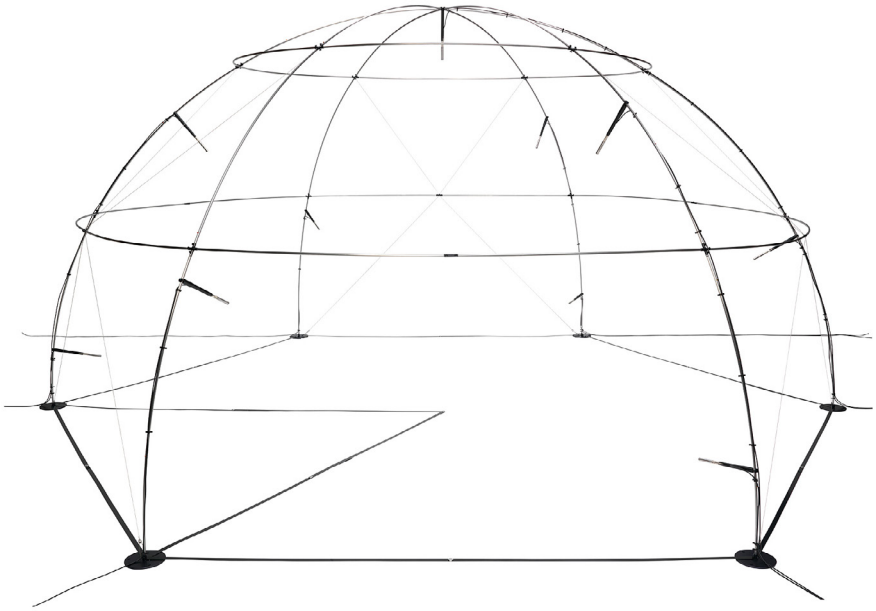
An Axiometrix Solutions Brand

Instruction Manual

GRAS 67HB 2 m Sound Power Hemisphere Kits



Revision History

Any feedback or questions about this document are welcome at **gras@gras.dk**.

Revision	Date	Description
1	08 November 2013	First publication
2	10 February 2014	Optional flight cases added
3	28 October 2015	Caution about the use of non-GRAS cables added to the section “Mounting Microphone Sets and Cables”
4	10 December 2015	Number of cable clips included in the delivery corrected.
5	16 June 2017	Color coding for 4 and 10 channel versions updated
6	5 July 2017	42AG substituted for the obsolete 42AB
7	1 October 2024	GR1681 - New Wire Corrected product name GR1675 to GR1680

Contents

Introduction

If you have ever tried to configure and use a sound power setup based on microphones mounted on single tripods around your DUT, you will surely appreciate GRAS' new sound power hemisphere. The hemisphere will hold and position the measurement microphones according to the standards and has been designed with focus on your workflow; it is very easy to assemble and it is easy to position and access the DUT. Furthermore, in best GRAS tradition it is optimized acoustically for correct and repeatable measurement data.

The structure is made portable to achieve a high degree of freedom of location. This, combined with the easy, tool-less assembly in minutes, enables you to save expensive hemi-anechoic chamber time and to offer on-site sound power diagnostics.

Standards

The GRAS 67HB 2 m Sound Power Hemisphere is compliant with the ISO 3744, 3745 and 3746 (ANSI S12.54, S12.55, S12.56) standards and accommodates for 4, 10 and 20 positions. These are clearly marked to ease the mounting and maintain measurement repeatability.

Applications

Depending on the size and the emitted acoustic level of the DUT, the hemisphere will allow sound power measurements on everything from small sized personal electronics to office machines and IT products, household appliances, power tools and smaller engines. The only restriction is that the characteristic dimension of the DUT may be no more than half the measurement radius. See the aforementioned standards for further details.

Plug & Play

The microphone sets can be connected directly to all professional measurement systems and are as indicated available for both CCP and 7-pin LEMO inputs. If your system platform supports intelligent transducers according to IEEE 1451.4 (TEDS), the system can be set up to identify the microphone properties and position in the array.

Holders and Cables

The pre-configured hemispheres are delivered with microphone set holders that will fit all 3 micro-phone types. Respective cables and cable clips are included.

Delivered Items for 2 m Hemisphere

The GRAS 67HB 2 m Hemisphere is delivered in two separate cardboard cases, one containing the parts for the structure, microphone holders, and cable clips, the other containing the parts for configuring the hemisphere with microphone sets and cables.

An optional pair of flight cases is available, RA0276. The flight cases have the same inner dimensions as the cardbox cases, and come with the same foam inserts. If you specify the RA0276 in your order, the hemisphere will be delivered in these flight cases.

The Hemisphere Kits Packaging

The hemisphere kit is delivered in two cases:

1) A case containing the parts for the structure, microphone holders and cable clips.

2) A case containing the microphone sets and cables.

The kits are delivered in cardboard cases, unless the optional flight cases (RA0276) are ordered.

Fig. 1. *Two optional flight cases are available.*

The contents of case 1 with the structural parts are shown below. The case is divided into four separate layers. Layer 1 is the top layer and layer 4 is the bottom layer.

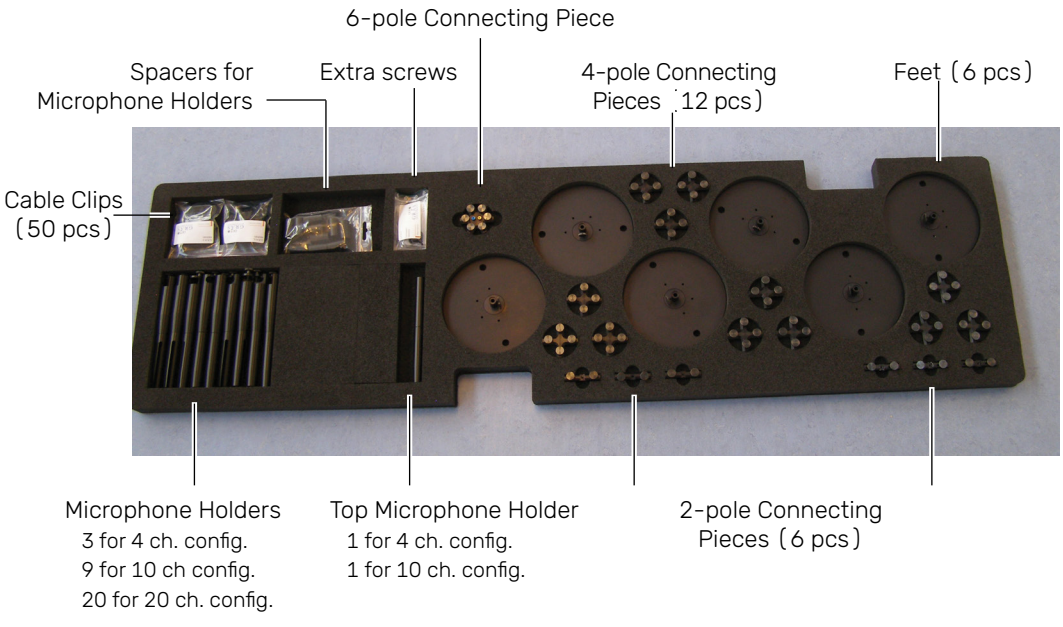


Fig. 2. *Layer 1 with feet, connectors, microphone holders and accessories.*

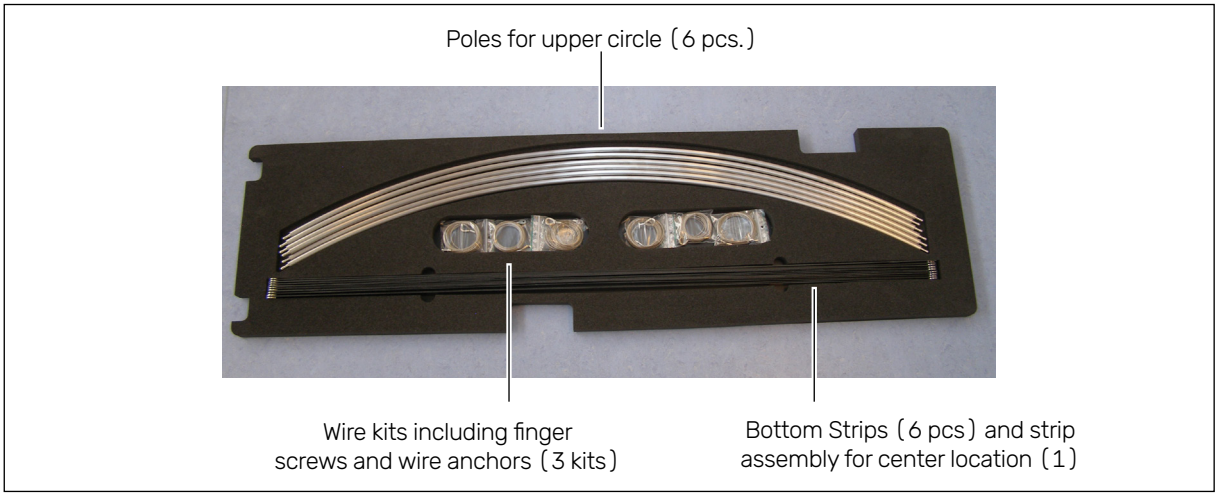


Fig. 3. *Layer 2 with bottom strips, upper horizontal poles and wire kits.*

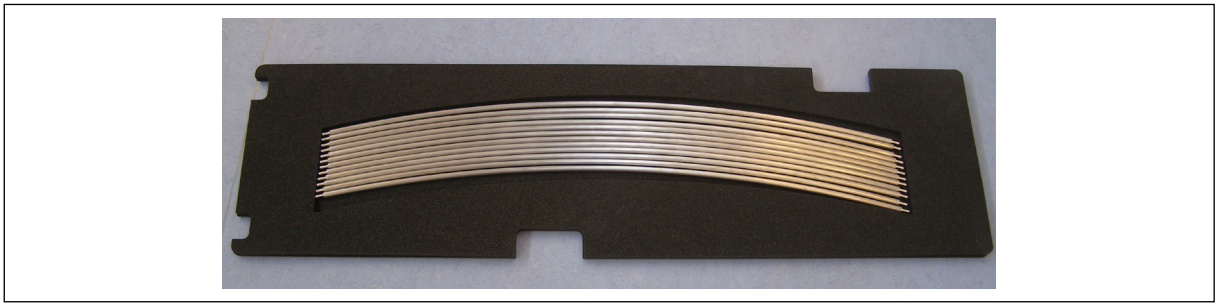


Fig. 4. *Layer 3 containing the poles for the lower horizontal circle.*

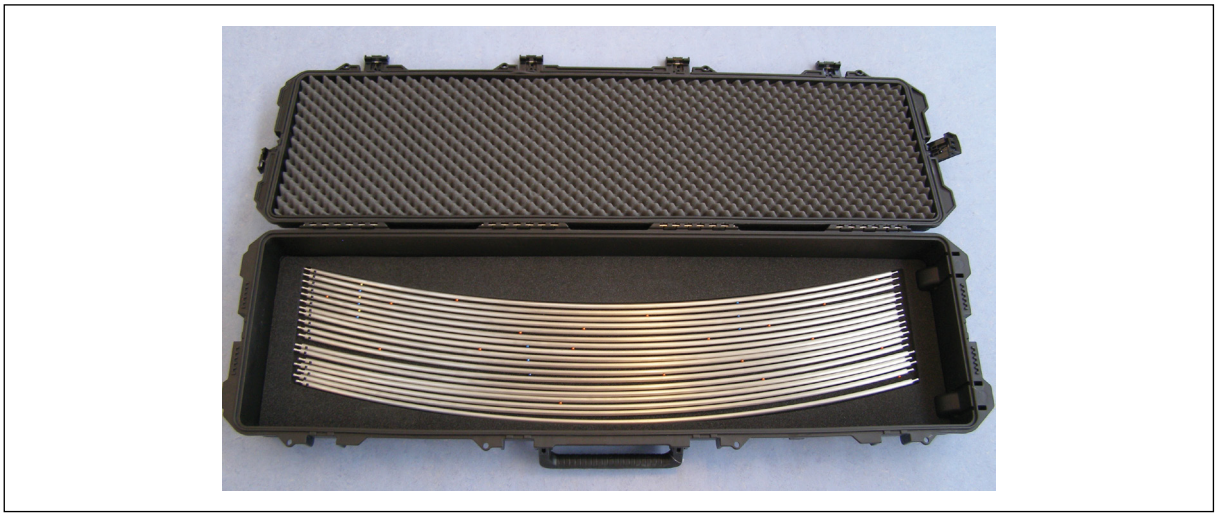
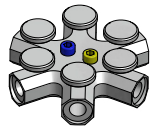
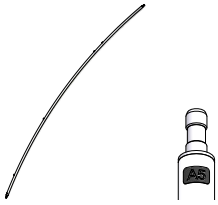
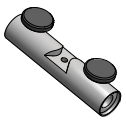
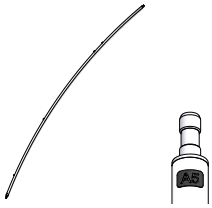
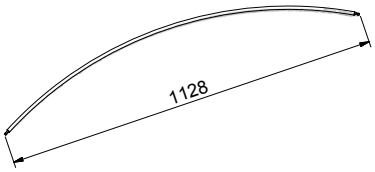
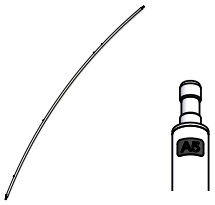
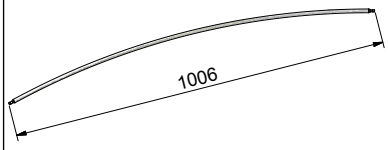
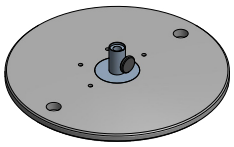
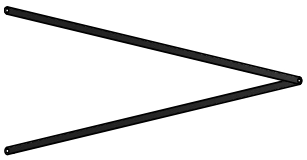
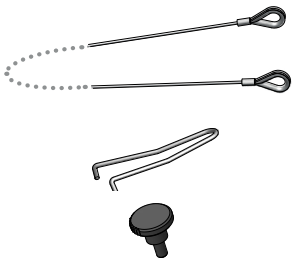


Fig. 5. *Layer 4 containing all the Vertical Poles - here shown in the optional flight case.*

Hemisphere Structure

Common Parts for 2 m Hemisphere Structure			
	**6-pole Top Connecting Piece** 1 x RA0254	**4-pole Connecting Piece** 12 x RA0255	
	**Vertical Poles, A-layer** labeled A1 to A6	**2-pole Connecting Piece for lower circle** 6 x RA0256	
	**Vertical Poles, B-layer** labeled B1 to B6	**Horizontal Pole, upper circle** 6 x GR1579	
	**Vertical Poles, C-layer** labeled C1 to C6	**Horizontal Pole, lower circle** 12 x GR1578	
	**Feet** 6 x RA0253	**Strip Assembly for center location** 1 x RA0257	
	**Wire Kits 3 x RA0260** Each kit contains: *Wire* 2 x GR1681 *Anchor for wire* 2 x GR1680 *Finger Screw* 3 x SK6009	**Bottom Strip** 6 x RA0258	
		Finger Screws (spare, 5 of each) for: *Microphone Holders* *Wires* *Connecting Pieces*	

4-channel Configurations

Delivered Microphones and Accessories for 4-Channel Configuration ISO 3746:2010 / ANSI S12.56			
GRAS 67HB-04 with CCP Microphone Sets			
	**1/2" CCP Microphone Set** 4 x 46AE	**10 m Cable, BNC to BNC** 4 x AA0037	
	**Microphone Holder incl. finger screw** 3 x RA0259	**Spacer for Microphone Holder, 28 mm** 4 x GR1572	
	**Top Microphone Holder** RA0261	**Cable Clip** 50 x KE0130	
GRAS 67HB- 01 with LEMO Microphone Sets			
	**1/2" LEMO Microphone Set** 4 x 46AF	**10 m Cable LEMO to LEMO** 4 x AA0009	
	**Microphone Holder incl. finger screw** 3 x RA0259	**Spacer for Microphone Holder, 18 mm** 4 x GR1571	
	**Top Microphone Holder** RA0261	**Cable Clip** 50 x KE0130	
GRAS 67HB-07 with Low Noise Microphone Sets			
	**1/2" Low-noise Microphone Set** 4 x 40HL	**10 m Cable, LEMO to LEMO** 4 x AA0009	
	**Microphone Holder incl. finger screw** 3 x RA0259	**Cable Clip** 50 x KE0130	
	**Top Microphone Holder** RA0261		

10-channel Configurations

Delivered Microphones and Accessories for 10-Channel Configuration ISO 3744:2010 / ANSI S12.54			
GRAS 67HB-05 with CCP Microphone Sets			
	**1/2" CCP Microphone Set** 10 x 46AE	**10 m Cable, BNC to BNC** 10 x AA0037	
	**Microphone Holder incl. finger screw** 9 x RA0259	**Spacer for Microphone Holder, 28 mm** 10 x GR1572	
	**Top Microphone Holder** RA0261	**Cable Clip** 50 x KE0130	
GRAS 67HB- 02 with LEMO Microphone Sets			
	**1/2" LEMO Microphone Set** 10 x 46AF	**10 m Cable LEMO to LEMO** 10 x AA0009	
	**Microphone Holder incl. finger screw** 9 x RA0259	**Spacer for Microphone Holder, 18 mm** 10 x GR1571	
	**Top Microphone Holder** RA0261	**Cable Clip** 50 x KE0130	
GRAS 67HB-08 with Low Noise Microphone Sets			
	**1/2" Low-noise Microphone Set** 10 x 40HL	**10 m Cable, LEMO to LEMO** 10 x AA0009	
	**Microphone Holder incl. finger screw** 9 x RA0259	**Cable Clip** 50 x KE0130	
	**Top Microphone Holder** RA0261		

20-channel Configurations

Delivered Microphones and Accessories for 20-Channel Configuration ISO 3745:2012 / ANSI S12.55			
GRAS 67HB-06 with CCP Microphone Sets			
	**1/2" CCP Microphone Set** 20 x 46AE	**10 m Cable, BNC to BNC** 20 x AA0037	
	**Microphone Holder incl. finger screw** 20 x RA0259	**Spacer for Microphone Holder, 28 mm** 20 x GR1572	
	**Cable Clip** 50 x KE0130		
GRAS 67HB- 03 with LEMO Microphone Sets			
	**1/2" LEMO Microphone Set** 20 x 46AF	**10 m Cable LEMO to LEMO** 20 x AA0009	
	**Microphone Holder incl. finger screw** 20 x RA0259	**Spacer for Microphone Holder, 18 mm** 4 x GR1571	
	**Cable Clip** 50 x KE0130		
GRAS 67HB-09 with Low Noise Microphone Sets			
	**1/2" Low-noise Microphone Set** 20 x 40HL	**10 m Cable, LEMO to LEMO** 20 x AA0009	
	**Microphone Holder incl. finger screw** 20 x RA0259	**Cable Clip** 50 x KE0130	

Assembling the Hemisphere – Overview

The GRAS 2 m Hemisphere for sound power measurements consists of a basic structure common to all applications. This structure can be configured for 4-channel, 10-channel and 20-channel measurements. Below is shown a quick overview of the assembly of the hemisphere and the mounting of microphones for a 10-channel configuration. A detailed description of the assembly is given in the following sections.

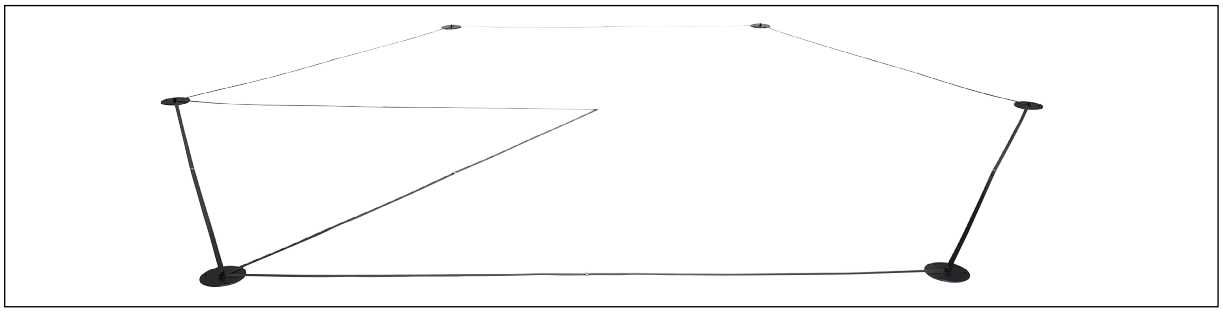


Fig. 6. *The Hemisphere's ground layer's hexagonal grid with center identification.*

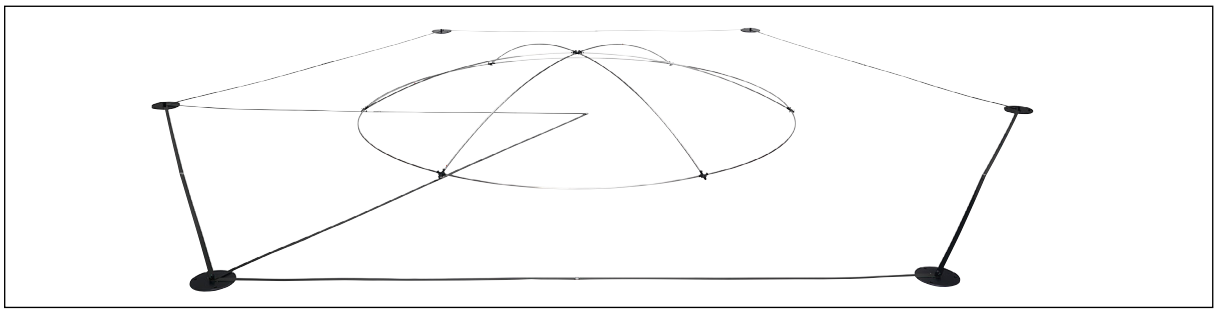


Fig. 7. *The ground layer and the assembled top layer.*

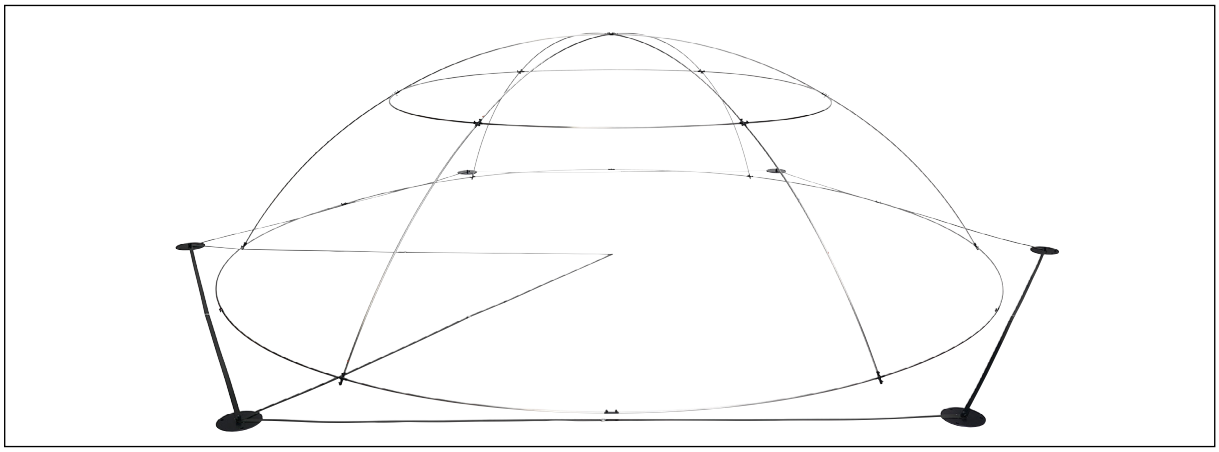


Fig. 8. *The ground layer and the two top layers.*

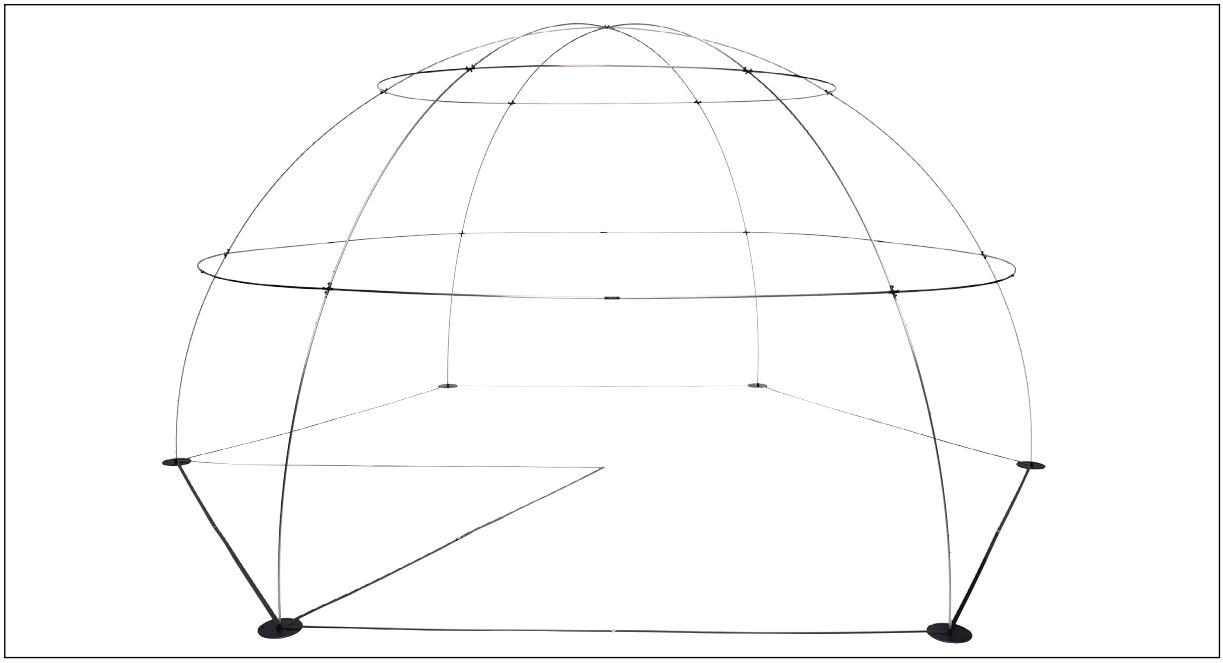


Fig. 9. *The structure ready for configuration, here shown without stabilizing wires.*

Fig. 10. *The structure being mounted with microphones and cables for a 10-channel setup.*

Assembling the Hemisphere Structure

Introduction

The Hemisphere consists of four layers:

- The C-layer (top layer) consisting of a horizontal circle, vertical poles labeled C1 to C6 and a top 6-pole connecting piece. The horizontal circle consists of six poles and six 4-pole connecting pieces.
- The B layer (middle layer) consisting of a horizontal circle and six vertical poles labeled B1 to B6. The horizontal circle consists of 12 poles, six 2-pole connecting pieces and six 4-pole connecting pieces.
- The A layer (lower layer) consisting of six vertical poles labeled A1 to A6.
- The Ground layer consisting of six feet, six connecting strips, and an additional assembly of strips for locating the center of the hemisphere.

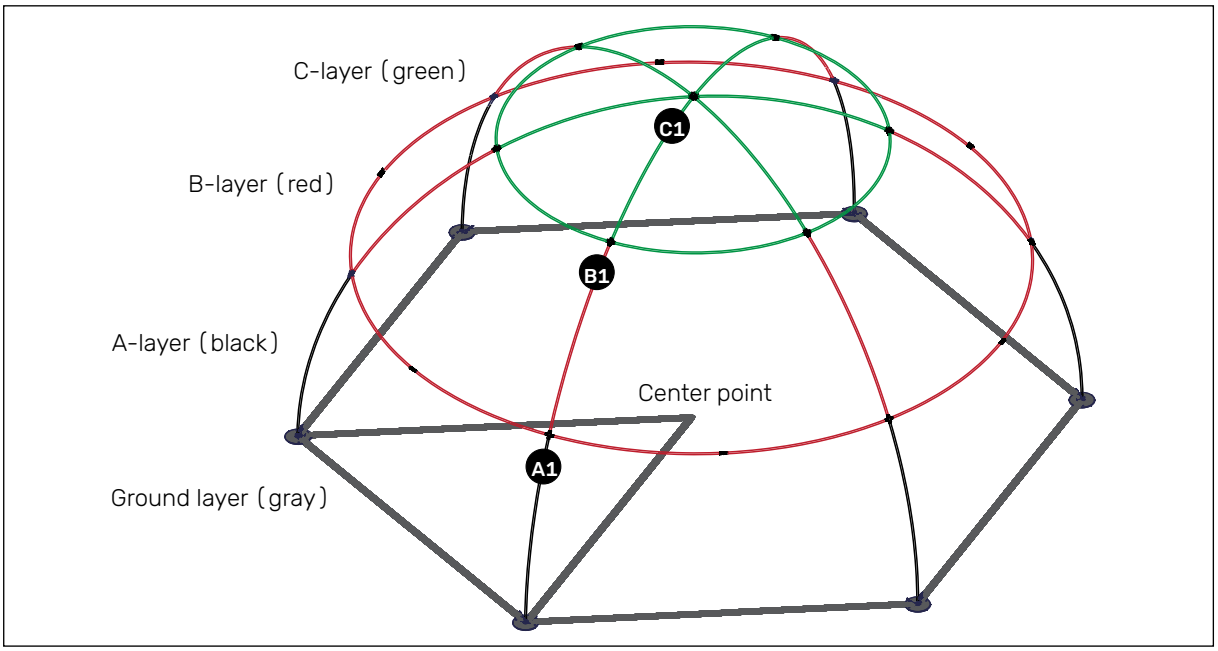


Fig. 11. *The hemisphere structure with its three layers.*

The Hemisphere can be assembled without tools. All screws are finger screws, and all connections of poles and connecting pieces are made by sliding the poles into the connecting pieces and tightening finger screws. **The vertical poles 1-6 must be sequenced counterclockwise, and the three layers must be aligned, i.e. A1, B1 and C1 must be aligned vertically, and so on.** This ensures that the colored bolts on the vertical poles will be correctly positioned with respect to the ISO and ANSI standards for sound power measurements. The yellow bolts indicate the microphone positions for 4-channel measurements, the blue for 10-channels and the red for 20 channels. When the structure's major parts are assembled, the structure can be further stabilized with wires. Three persons are needed to assemble the structure. We recommend that you assemble the ground layer and then build the structure from top to bottom as described on the following pages.

Assembling the Ground Layer

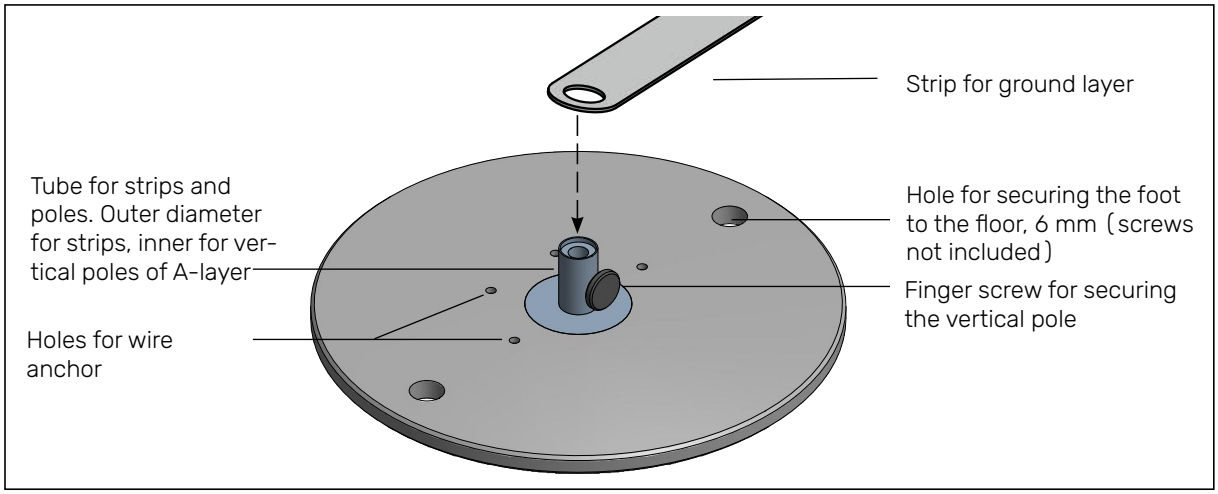


Fig. 12. *A Hemisphere foot showing the details for connections to vertical poles, wires and strips.*

1. Remove the finger screw.
2. Slide two strips down over the tube.
3. Slide the strip assembly for center location over two of the feet as shown in Fig. 13.
4. Mount the screw again (to avoid misplacing it). Do not tighten it, but leave room for a vertical pole to slide into the hole.

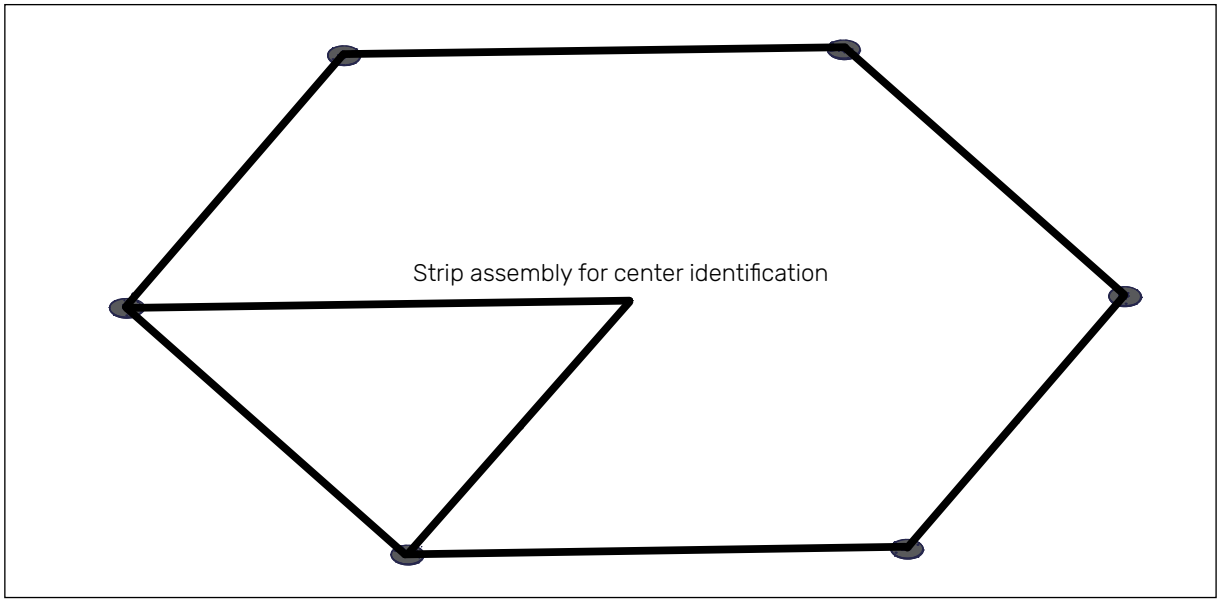


Fig. 13. *The finished ground layer.*

Assembling the C-Layer (Top)

1. Assembling the Circle

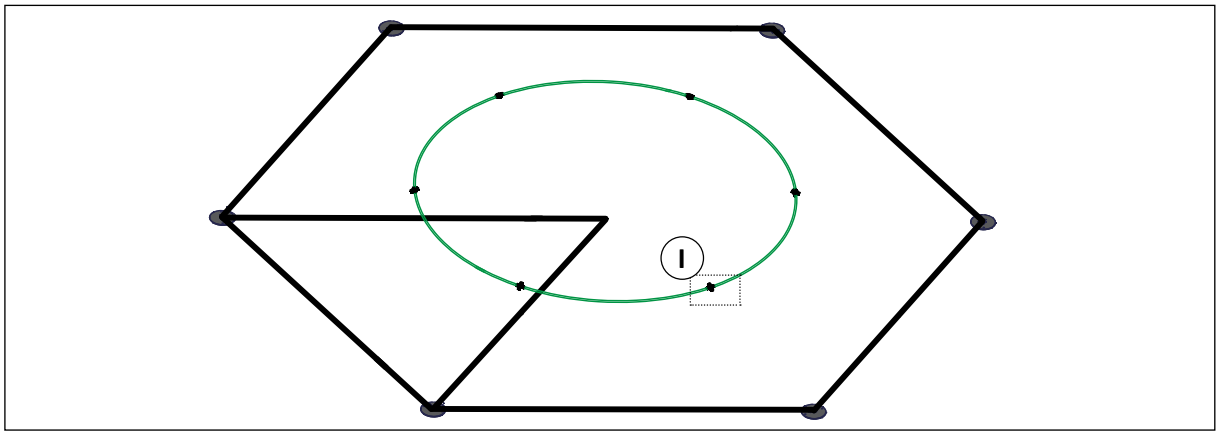


Fig. 14. *The C-layer's horizontal circle consisting of six poles and six 4-pole connecting pieces.*

1. Connect the six long horizontal poles (1128 mm, GR1579 – also shown on page 8) and tighten the finger screws loosely: Free play is needed for angular adjustment of poles and connectors in the next steps.

2. Repeat to complete all six connections.

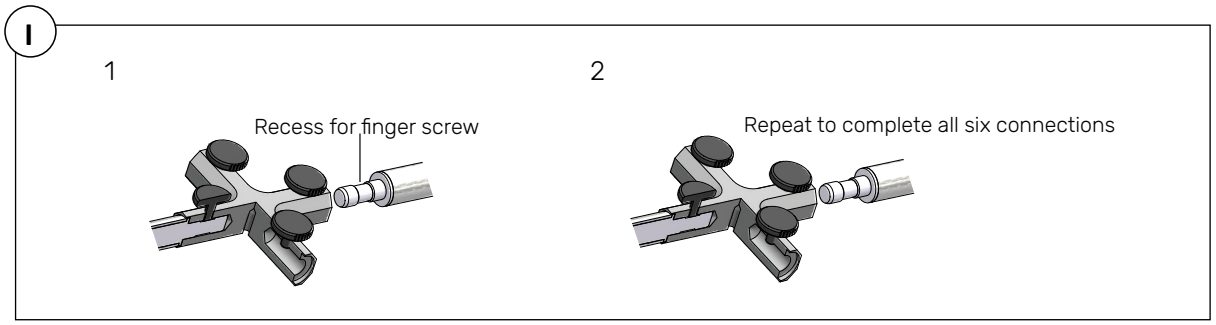


Fig. 15. *Mounting the horizontal poles of the A-layer.*

2. Mounting the Vertical Poles C1 to C6

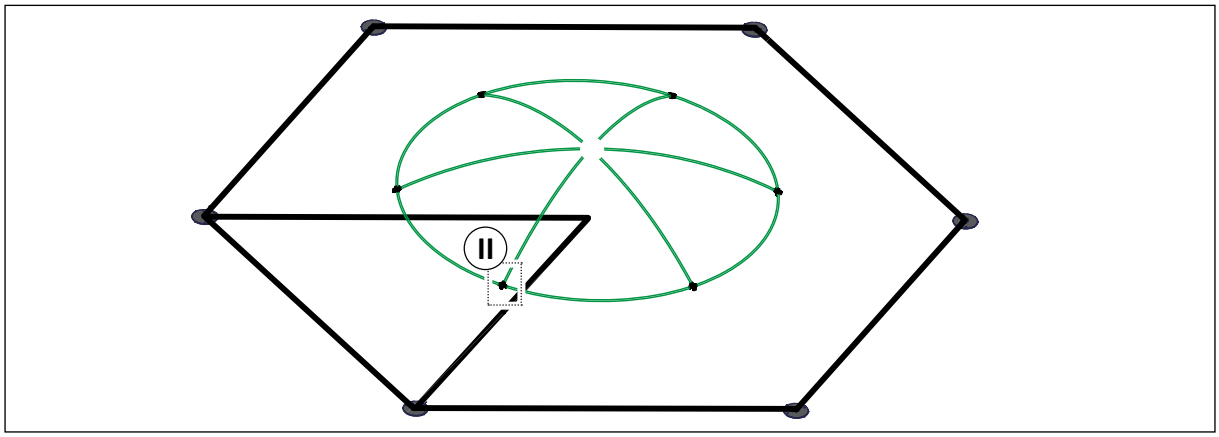


Fig. 16. *The A-layer with its vertical poles.*

1. Slide the six vertical poles labeled C1 to C6 into the connecting pieces, with the labeled end closest to the top center, and tighten the finger screws loosely, but sufficiently to hold the parts together.

   Important: The sequence C1 to C6 MUST be counterclockwise.

2. Repeat to complete all six connections

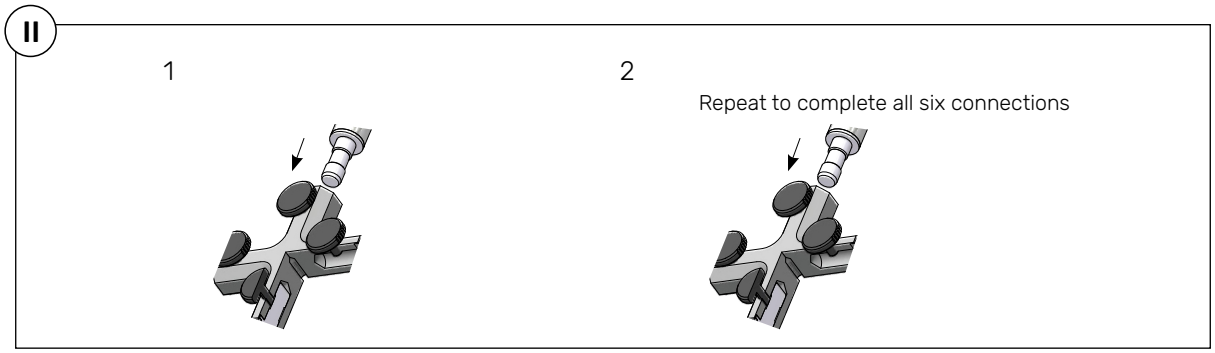


Fig. 17. *Mounting the vertical poles.*

3. Mounting the Top Center Connector

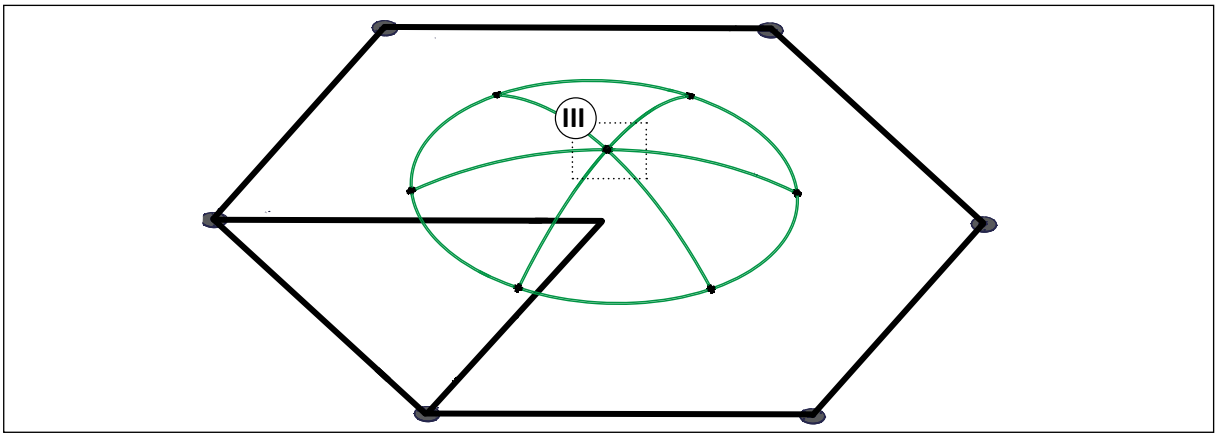


Fig. 18. *Mounting the top connecting piece.*

1. Finish the top structure by mounting the top connecting piece.

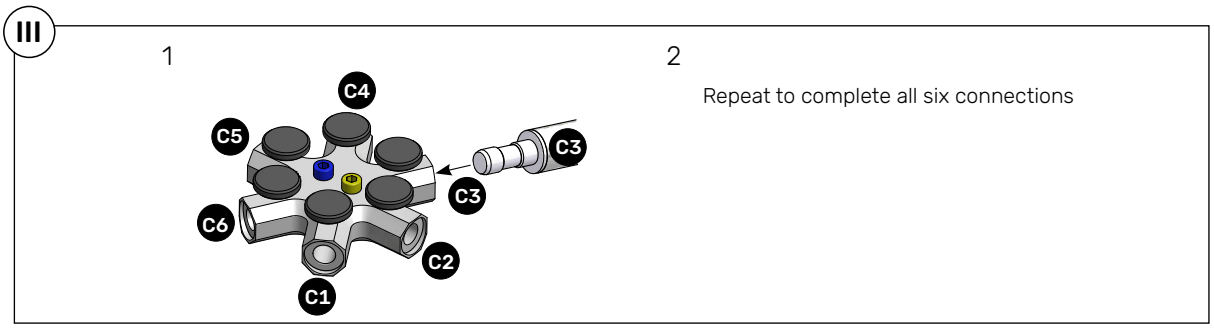


Fig. 19. *Detailed view of how to mount the top connecting piece.*

2. Repeat to complete all six connections and tighten all six finger screws.

At this point, when all poles and connecting pieces are assembled, poles and connecting pieces should be fine adjusted and fastened to the correct angles with respect to one another.

The C-layer is now complete.

Assembling the B-Layer (Middle)

1. Assembling the Circle

The lower circle consists of 12 poles, connected with six straight 2-pole connecting pieces and six 4-pole connecting pieces.

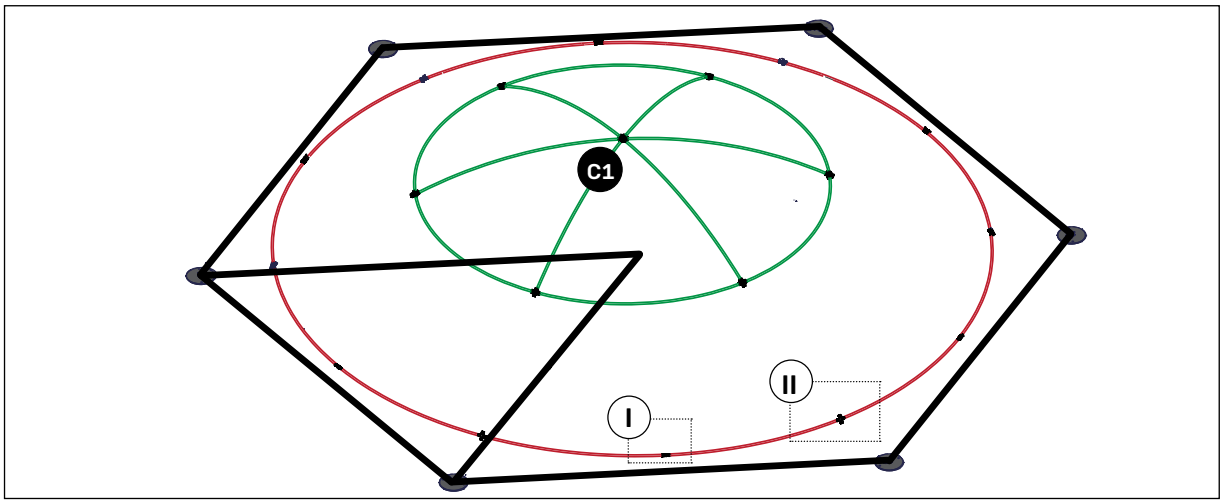


Fig. 20. *First step of the assembly of the B-layer: Connecting poles, 2-pole and 4-pole connecting pieces into a complete circle.*

1. Slide the poles (1006 mm long, GR1578 – also shown on page 8) into the 2-pole connecting pieces.
2. Tighten the finger screws loosely: Some free play is needed for angular adjustment of poles and connecting pieces in the next steps.

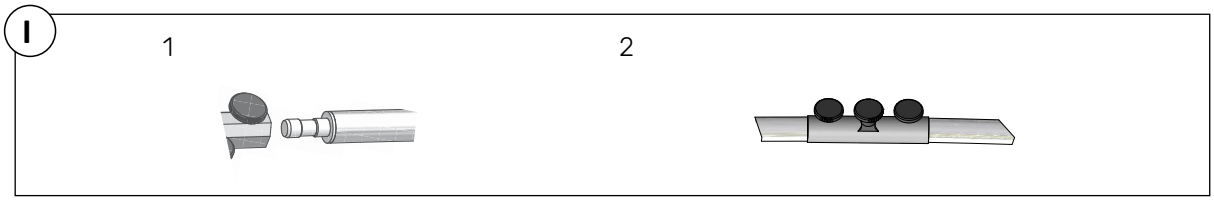


Fig. 21. *Assembling the circle: Poles and straight connecting pieces.*

1. Slide the poles into the 4-pole connecting pieces.
2. Tighten the finger screws loosely.

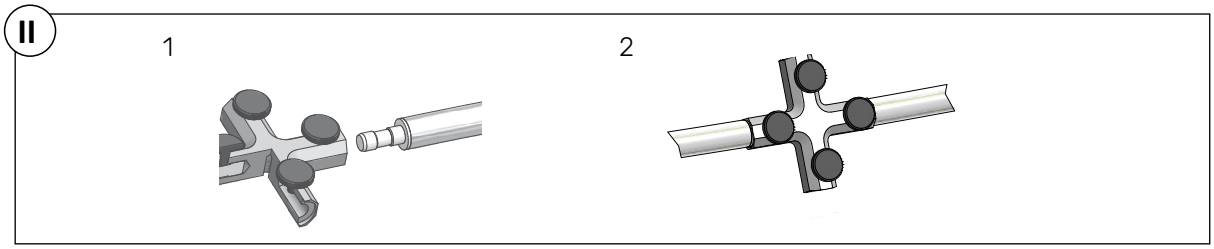


Fig. 22. *Assembling the circle: Poles and 4-pole connecting pieces.*

2. Mounting the Vertical Poles

Each B-layer pole must be positioned next to the corresponding C layer-pole, i.e. B1 must be connected to C1, B2 to C2, B3 to C3, and so on. In this way you ensure that the colored bolts marking positioning points for the microphone sets are correctly positioned according to the ISO/ANSI standards for 4-microphone, 10-microphone and 20-microphone setups.
As shown in the illustration below, you begin with mounting every second vertical pole – in this way the C-layer will be in perfect balance when lifted from the floor and mounted onto the (not yet fully assembled) B-layer.

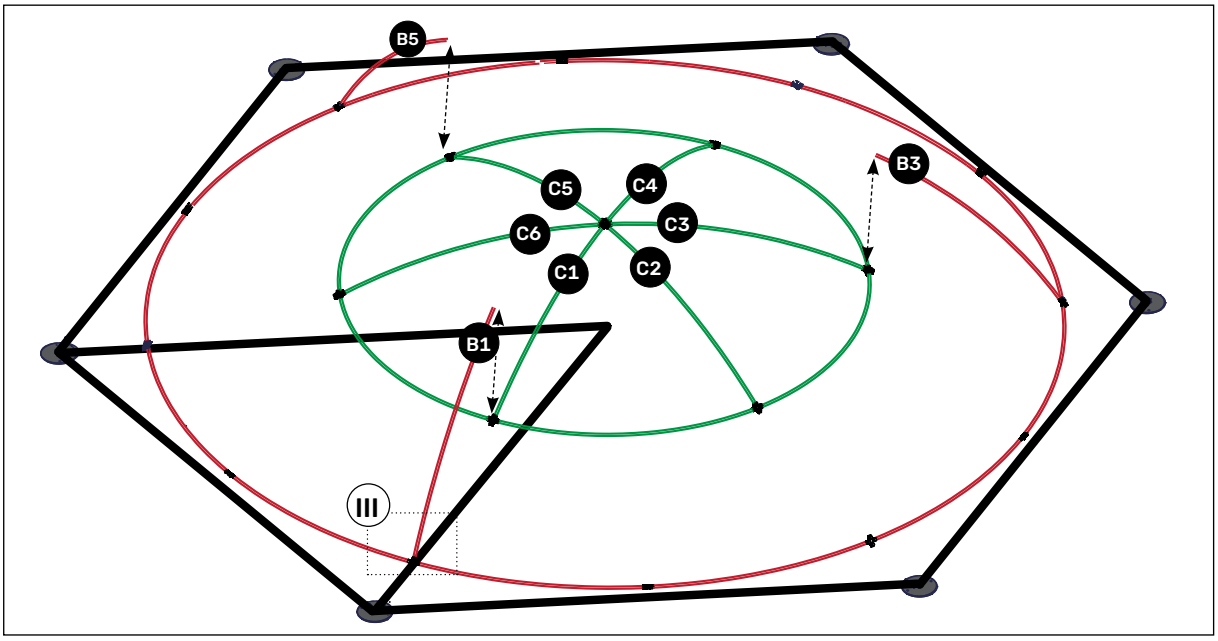


Fig. 23. *Second step of the assembly of the B-layer: Attaching three of the six vertical poles that will be connected to the A-layer.*

1. Slide the poles B1, B3 and B5 into the corresponding three 4-pole connectors in the lower circle of the C-layer.
2. Secure the poles in the connecting pieces by loosely tightening the finger screws. Some free play is needed to adjust the poles to fit into the connecting pieces of the C-layer's circle.

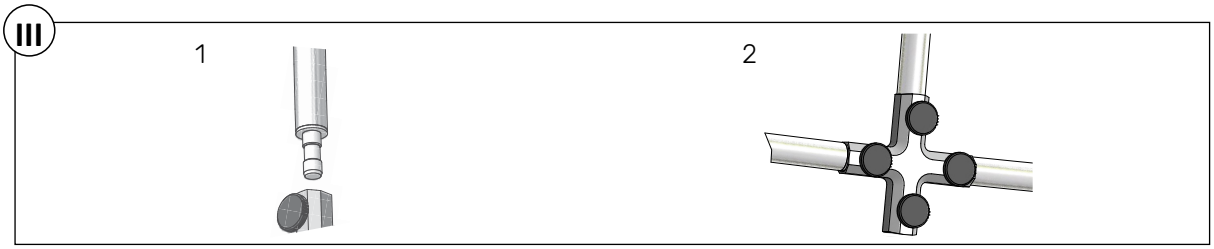


Fig. 24. *Attaching vertical poles to the B-layer circle.*

3. Connecting and Completing the B-layer

At this point, three persons are needed to simultaneously lift the C-layer and attach it to the B-layer.

1. Lift the C-layer (green) and attach it to the three B-layer poles (red) at the same time.
2. Tighten the finger screws loosely.

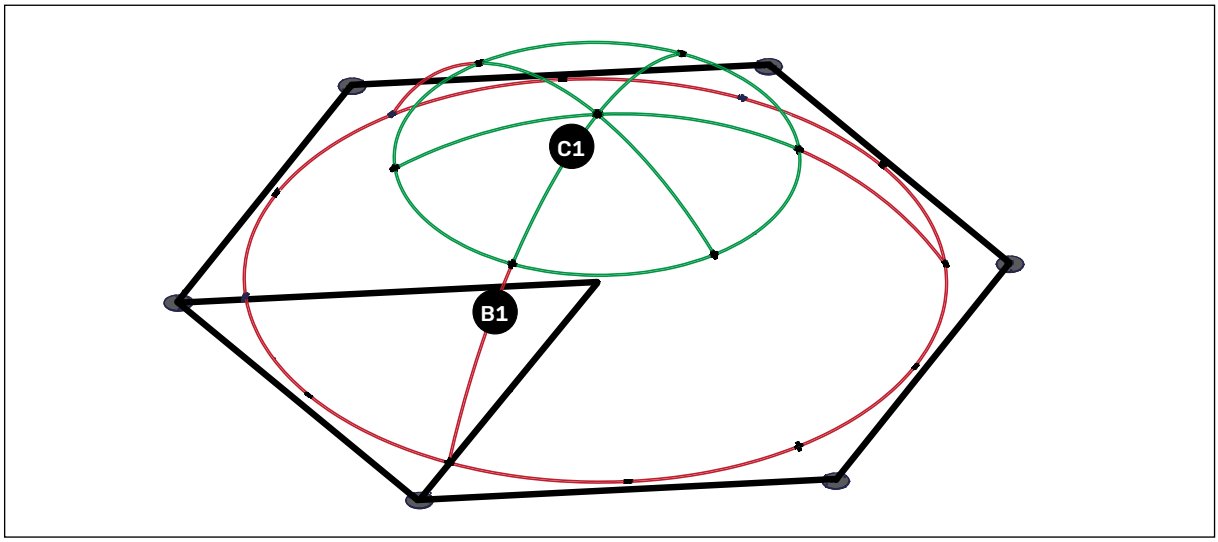


Fig. 25. *Third step of the assembly of the B-layer: Connecting the vertical poles to the C-layer.*

3. Mount the three missing B-layer poles and tighten the finger screws loosely.

Note. At this point, the finger screws holding the center connecting piece need to be retightened.

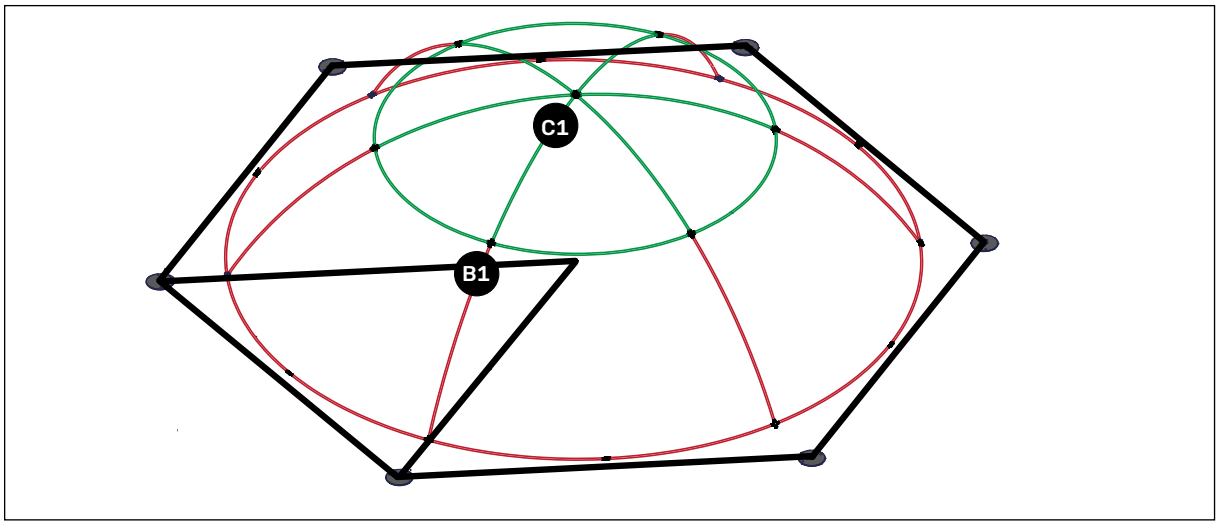


Fig. 26. *The final step of completing the B-layer: Mounting the remaining three poles and retightening the finger screws of the top connecting piece.*

Assembling the A-Layer (Lower)

1. Mounting the Vertical Poles

The assembly of the A-layer connects the structure to the ground layer.

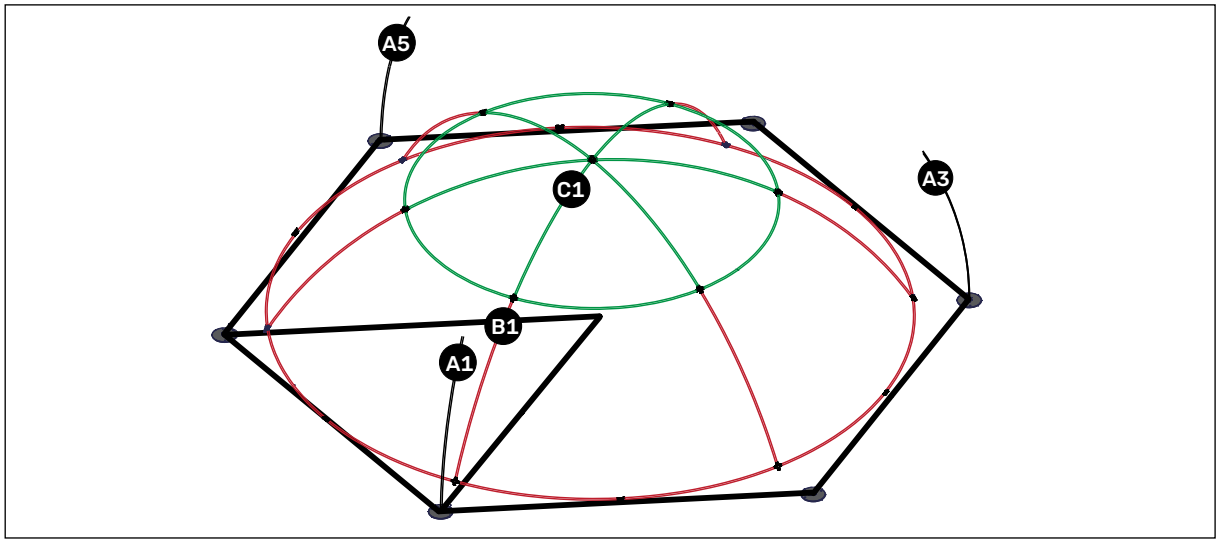


Fig. 27. *The first step of assembling the C-layer: Attaching three vertical poles to the feet of the ground structure.*

Except for attaching the poles to the feet, the method for assembling the A-layer is similar to that previously described for the B-layer:

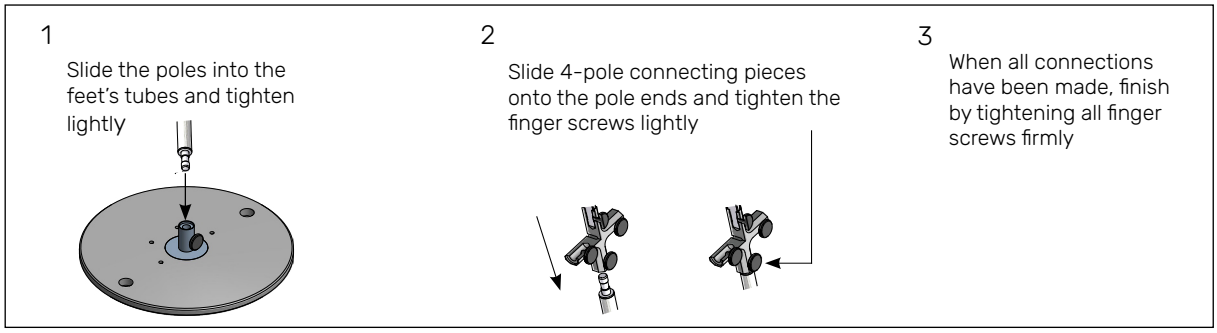


Fig. 28. *Mounting the vertical poles into the feet and connecting them to the upper structure.*

1. Slide the three A-poles labeled A1, A3 and A5 with the labeled end upwards into the feet's tubes and tighten the finger screws lightly. Ensure that you position the poles corresponding to those already in place as shown in Fig. 27 and Fig. 29

2. Lift the previously assembled C-B-layer and attach it to the A1, A3 and A5 poles of the A-layer by sliding the 4-pole connecting pieces over the pole ends.

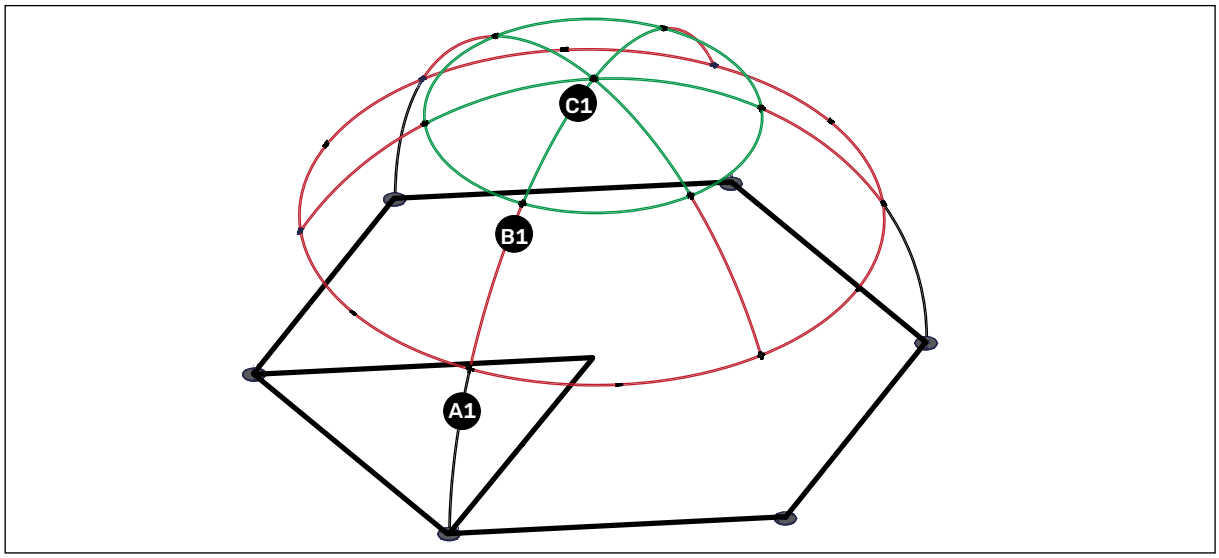


Fig. 29. *Attaching the upper structure to the three A-layer poles.*

3. Attach the remaining poles and connecting pieces. Fasten them by tightening the finger screws.

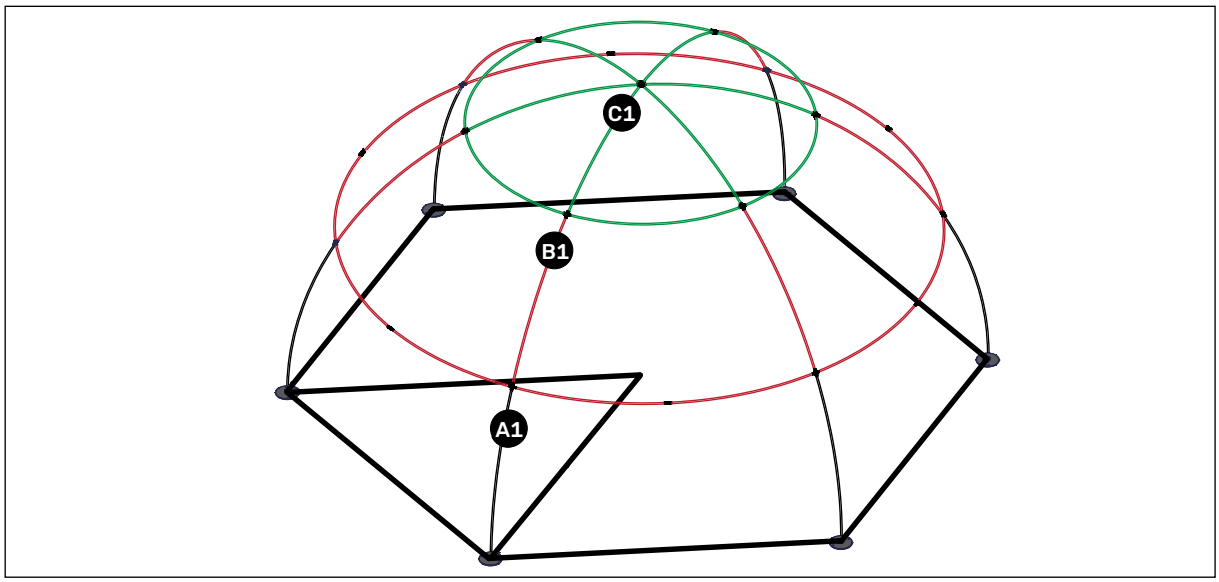


Fig. 30. *The finished hemisphere structure – without wires and microphone holders.*

Adjusting and Securing the Structure

When you have completed the assembly, you need to adjust the orientation of all poles and tighten all finger screws. Previously tightened finger screws need to be retightened as the further mounting of poles and connecting pieces may have caused them to loosen. When finished the hemisphere is a smooth structure with level circles and smooth vertical curves. However, as all connecting pieces are straight, minor deviations from perfect circles must be expected.

Mounting Stabilizing Wires

To further stabilize the structure, wires can be mounted between the feet and the top layer as shown in Fig. 31. Note that the wires are attached to the outside of the (red) B-layer circle. The three pair of wires that are part of the delivery are sufficient to stabilize the structure when mounted between every second sets of feet (e.g. 1-2, 3-4, 5-6). Three more sets of wires can be mounted (must be ordered separately), but this will make access to the inside of the hemisphere difficult.

1. Mounting the Wires on the A-layer Connecting Pieces

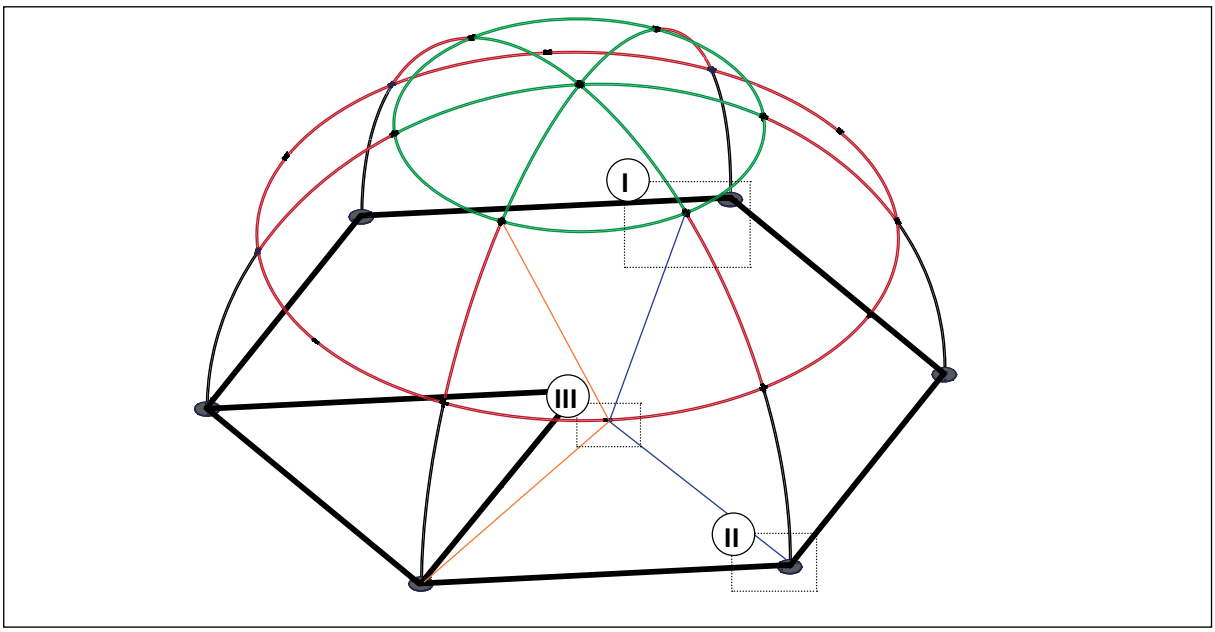


Fig. 31. *One set of stabilizing wires attached to the structure. Three set of wires are standard.*

1. Remove the finger screw from the rear side of connecting piece.
2. Slide the screw through the lug at the end of the wire.
3. Tighten the screw loosely to allow the wire to self-adjust to the right angle.

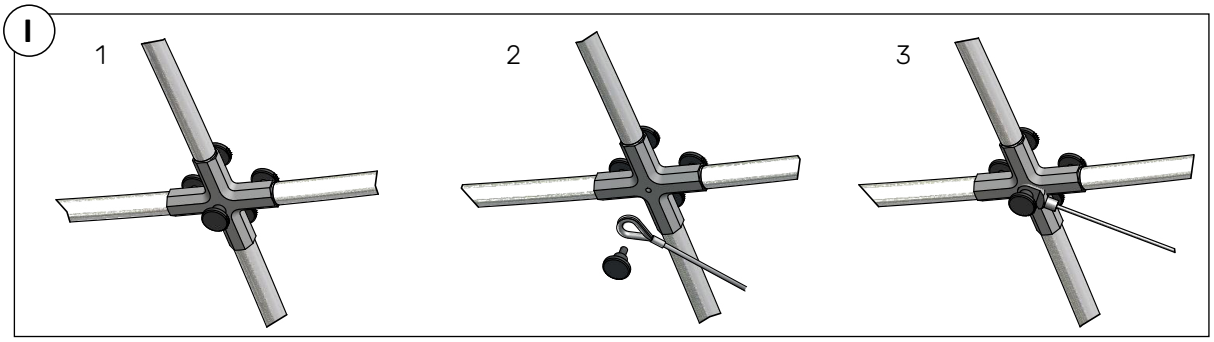


Fig. 32. *Attaching a wire to the inside of a connecting piece.*

2. Attaching the Wires to the Feet

Note that the wires must be routed on the outside of the lower circle. The wires are routed on each side of the center screw of the two-pole connecting piece as shown in Fig. 34.

1. Slide the wire anchor into the eyelet of the wire.
2. Slide the two ends of the wire anchor down into the corresponding holes in the feet.

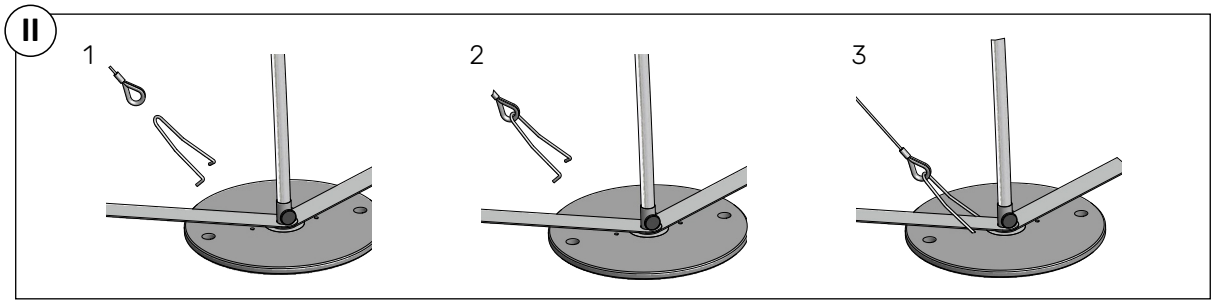


Fig. 33. *The stabilizing wires are attached to the feet with wire anchors.*

3. Securing the Wires to the Straight Connecting Pieces

1. Slide the wires down into the grooves of the 2-pole connecting piece.
2. Mount the finger screw and tighten it loosely.

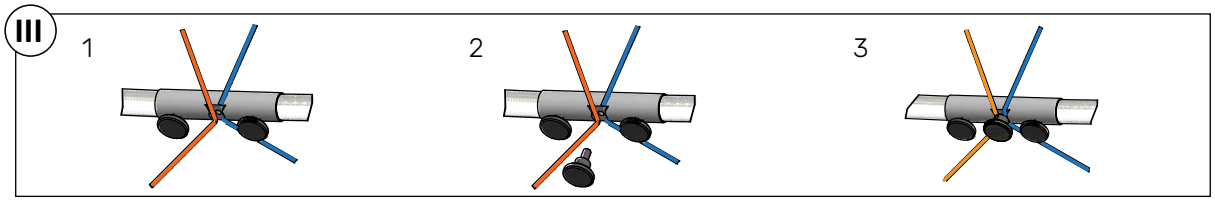


Fig. 34. *The wires are attached to the 2-pole connecting piece in two grooves and a finger screw.*

3. When the wires are attached at correct angles, tighten the finger screw on the 4-pole connecting piece and on the 2-pole connecting piece.

Completing the Assembly

When all three pairs of wires are mounted, the assembly of the Hemisphere Structure is complete. Five extra finger screws for the connecting pieces and for the wires are included in the delivery, so a number of extra screws will be in reserve when the structure has been assembled.

Note. Ensure that all connections are adjusted and secured properly. When you assemble the structure, adding new poles and connecting pieces to the structure will add some strain to the already completed connections and therefore it is necessary to readjust and retighten all connections.

Mounting Microphone Sets and Cables

Mounting the Microphone Holders

The hemisphere is designed for precise and repeatable 4-channel, 10-channel and 20-channel measurements:

- Clearly marked mounting points make it easy to mount the microphone sets in accordance with the ISO and ANSI standards.
- A flexible mounting system with adjustable holders and fixed spacers makes it easy to mount the microphone sets with the correct distance and angle to the hemisphere's center.
- The center of the hemisphere can easily be identified by the set of ground strips shown in Fig. 13 on page 15.

Mounting Points

The mounting points for 4, 10 and 20 channel measurements are identified by colored M3 bolts on the vertical poles, and – for 4 and 10 channel measurements – also on the top connecting piece.

The mounting points for 4 channels are located according to the ISO 3746:2010 (Table B.1)recommendation for microphone positions for a noise source over a reflecting plane. The mounting points for 10 and 20 channels are located according to the ISO 3744:2010 (Table B.2) and ISO 3745:2012 (Table E.2) recommendations for microphone positions for a broadband noise source.

For **4 channels**, positions 4, 5, 6 and 10 are marked with black bolts, the additional positions 14, 15, 16 and 20 are marked with grey bolts.

For **10 channels**, positions 1 to 10 are marked with blue and black positioning bolts, the additional positions 11 to 20 with yellow and grey bolts.

For **20 channels**, the positions 1 to 20 are marked with red bolts.

Channels	Standard	Key microphone positions		Additional positions	
4	ISO 3746:2010 - Table B.1 / ANSI S12.56		–		–
10	ISO 3744:2010 - Table B.2 / ANSI S12.54				
20	ISO 3745:2012 - Table E.2 / ANSI S12.55		–	–	–

Holders and Spacers

For all configurations, the same type of microphone holder is used. Spacers of different lengths are used to ensure that the three types of microphone sets – CCP, LEMO and LEMO Low-noise – are mounted with the same distance to the center.

Microphone Set	Spacer
46AE (CCP)	28 mm spacer
46AF (LEMO)	18 mm spacer
40HL (LEMO, Low Noise)	No spacer

Mounting Microphone Holders on Vertical Poles

1. Remove the finger screw from the end of the microphone holder assembly and slide the holder over the pole.
2. Slide the holder downwards until it is centered over the colored bolt.
3. Mount the finger screw and tighten it loosely.
4. Adjust the direction of the holder to point at the center point of the hemisphere (indicated by the locating strips shown in Fig. 13 on page 15) and tighten the screw firmly.

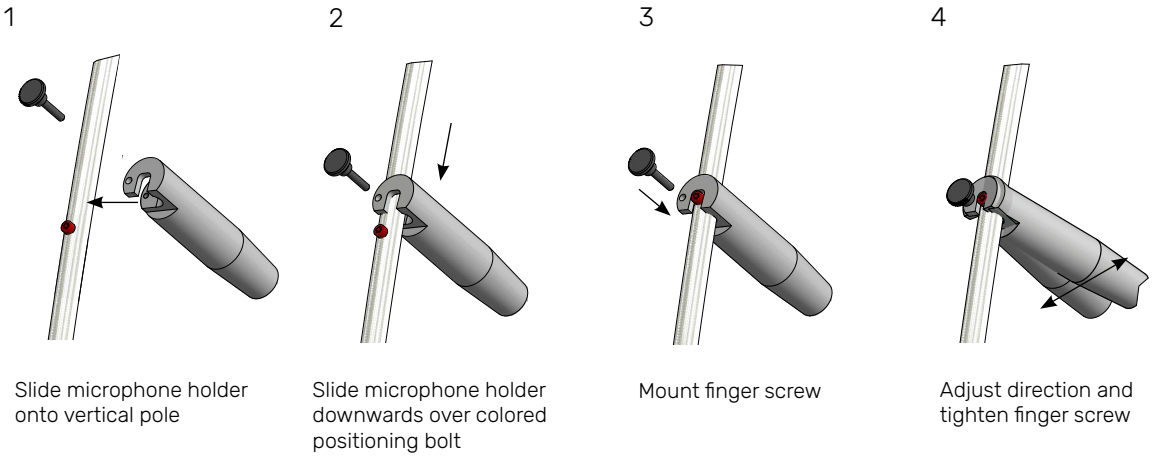


Fig. 35. *Attaching a microphone holder to a vertical pole.*

Mounting a Microphone Holder at the Top Center (4 and 10 Channels Only)

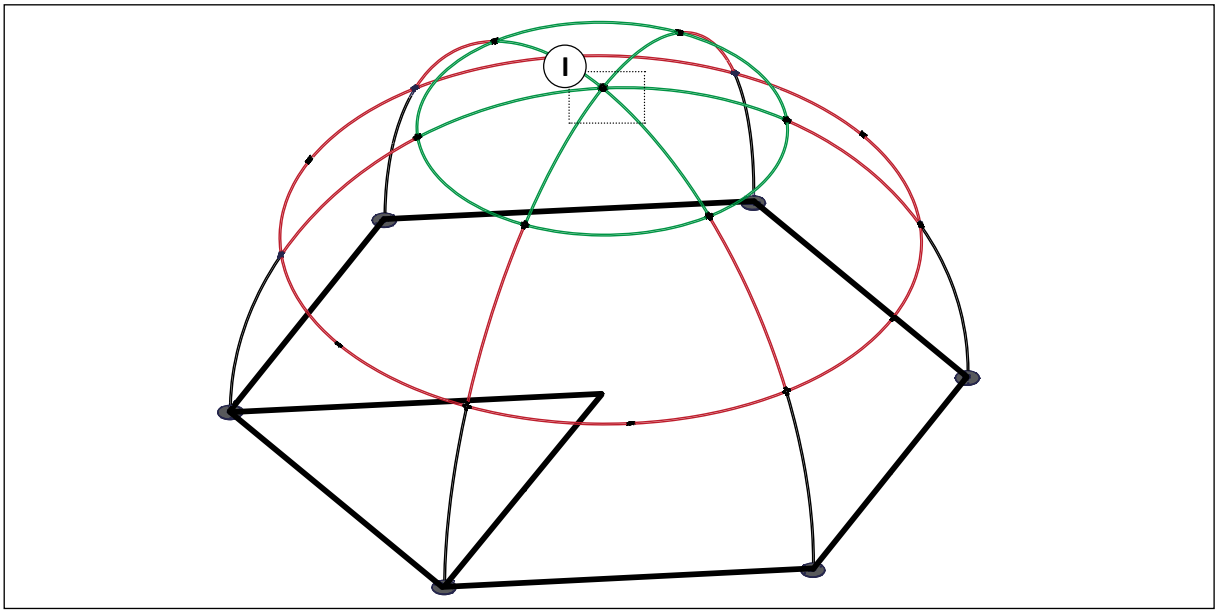


Fig. 36. *For 4 and 10-channel measurements, the top microphone is mounted on the top connecting piece, pointing downwards.*

1. Screw the long top spacer onto the stud screw.
2. Slide a spacer onto the lower part of the Microphone Holder. For CCP Microphone sets, a 28 mm spacer is needed, for LEMO microphone sets an 18 mm spacer is needed. For low-noise sets, no spacer is needed.
3. Screw the lower part into the upper part.

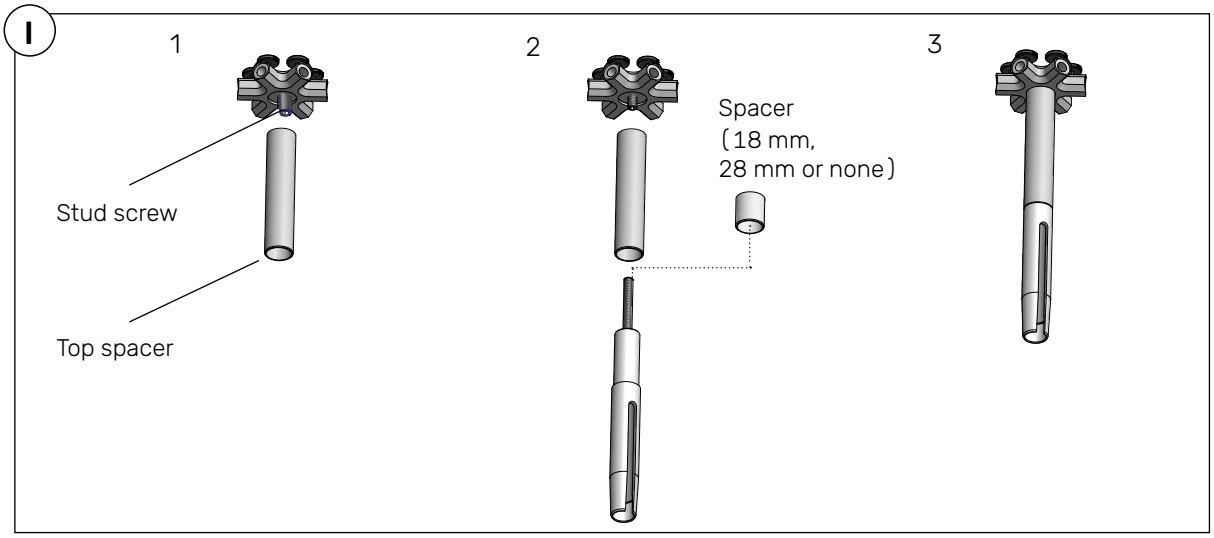


Fig. 37. *Mounting and assembling the Top Microphone Holder.*

Mounting Microphone Sets and Cables

The microphone sets are push fitted into the microphone holders until they bottom out. The slit in the lower part of the holder is used for the cable. The cables are fastened to the hemisphere poles with wire clips.

Caution. The microphone holders are designed specifically for GRAS cables. The cable must fit the slot in the holder, and cables from other vendors may be too thick and therefore cause damage, or may be impossible to position precisely. Therefore, we strongly recommend that only GRAS cables are used.

To mount the microphone sets and cables:

1. Connect a cable to the microphone set.
2. Push the microphone into the microphone holder while aligning the cable with the slit.
3. Guide the cable through the slit and push the assembly into the holder.
4. Secure the cable to the outside of the hemisphere's vertical poles with the cable clips.

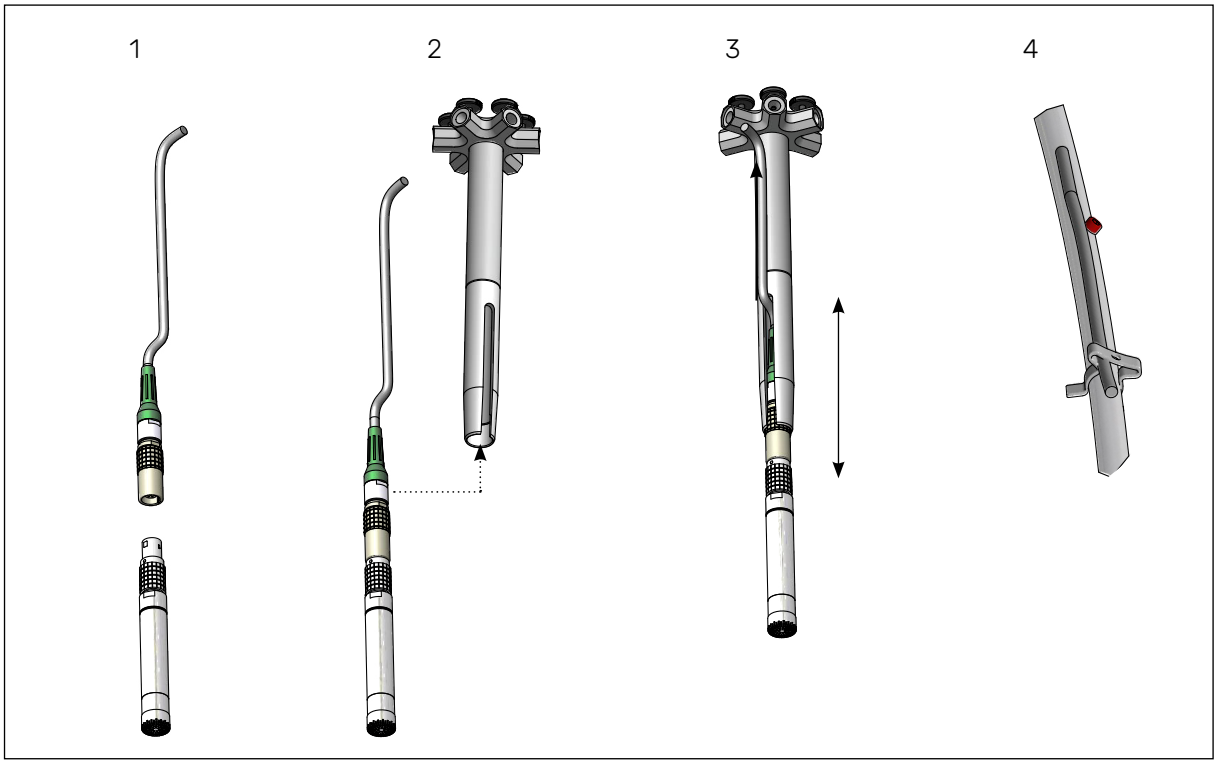


Fig. 38. *Mounting a microphone set into a Microphone Holder.*

This method applies for all three types of microphone sets – only the use of spacer on the microphone holder differs, see "" on page 26.

The microphone's distance to the center can be fine adjusted by how far into the holder you push the microphone set, see Fig. 38, 3.

Technical Specifications

Dimensions incl. Feet	
Diameter	4716 mm
Height	2283 mm

GRAS 46AE 1/2" CCP Standard Microphone Sets	
Frequency Range	3.15 Hz – 20 kHz
Dynamic Range	17 dBA – 138 dB
Sensitivity	50 mV/Pa

GRAS 46AF 1/2" LEMO Standard Microphone Sets	
Frequency Range	3.15 Hz – 20 kHz
Dynamic Range	17 dBA – 154 dB
Sensitivity	50 mV/Pa

GRAS 40HL 1/2" LEMO Low-noise Microphone Sets	
Frequency Range	6 Hz – 20 kHz
Dynamic Range	6,5 dBA – 110 dB
Sensitivity	900 mV/Pa

Ordering Information

4-Channel Hemispheres

(ISO 3746:2010/ANSI S12.56)

GRAS 67HB-04 2 m 4 ch. CCP Sound Power Hemisphere

Included Items		Part Number
2 m Hemisphere Structure	1	AL0025-4
GRAS 1/2" CCP Standard Microphone Set	4	46AE
10 m BNC Cable*	4	AA0037
Microphone Holder	3	RA0259
Microphone Holder Spacer, 28 mm	4	GR1572
Top Microphone Holder	1	RA0261
Cable clips	50	KE0130

*Customer specified cable lengths can be ordered, refer to "Accessories" on page 34.

GRAS 67HB-01 2 m 4 ch. LEMO Sound Power Hemisphere

Included Items		Part Number
2 m Hemisphere Structure	1	AL0025-1
GRAS 1/2" LEMO Standard Microphone Set	4	46AF
10 m LEMO Cable	4	AA0009
Microphone Holder	3	RA0259
Microphone Holder Spacer, 18 mm	4	GR1571
Top Microphone Holder	1	RA0261
Cable clips	50	KE0130

GRAS 67HB-07 2 m 4 ch. Low-Noise Sound Power Hemisphere

Included Items		Part Number
2 m Hemisphere Structure	1	AL0025-7
GRAS 1/2" LEMO Low-noise Microphone Set	4	40HL
10 m LEMO Cable	4	AA0009
Microphone Holder	3	RA0259
Top Microphone Holder	1	RA0261
Cable clips	50	KE0130

10-Channel Hemispheres

(ISO 3744:2010/ANSI S12.54)

GRAS 67HB-05 2 m 10 ch. CCP Sound Power Hemisphere

Included Items		Part Number
2 m Hemisphere Structure	1	AL0025-5
GRAS 1/2" CCP Standard Microphone Set	10	46AE
10 m BNC Cable*	10	AA0037
Microphone Holder	9	RA0259
Microphone Holder Spacer, 28 mm	10	GR1572
Top Microphone Holder	1	RA0261
Cable clips	50	KE0130

*Customer specified cable lengths can be ordered, refer to "Accessories" on page 34.

GRAS 67HB-02 2 m 10 ch. LEMO Sound Power Hemisphere

Included Items		Part Number
2 m Hemisphere Structure	1	AL0025-2
GRAS 1/2" LEMO Standard Microphone Set	10	46AF
10 m LEMO Cable	10	AA0009
Microphone Holder	9	RA0259
Microphone Holder Spacer, 18 mm	10	GR1571
Top Microphone Holder	1	RA0261
Cable clips	50	KE0130

GRAS 67HB-08 2 m 10 ch. Low-Noise Sound Power Hemisphere

Included Items		Part Number
2 m Hemisphere Structure	1	AL0025-8
GRAS 1/2" LEMO Low-noise Microphone Set	10	40HL
10 m LEMO Cable	10	AA0009
Microphone Holder	9	RA0259
Top Microphone Holder	1	RA0261
Cable clips	50	KE0130

20-Channel Hemispheres

(ISO 3745:2012/ANSI S12.55)

GRAS 67HB-06 2 m 20 ch. CCP Sound Power Hemisphere

Included Items		Part Number
2 m Hemisphere Structure	1	AL0025-6
GRAS 1/2" CCP Standard Microphone Set	20	46AE
10 m BNC Cable*	20	AA0037
Microphone Holder	20	RA0259
Microphone Holder Spacer, 28 mm	20	GR1572
Cable clips	50	KE0130

*Customer specified cable lengths can be ordered, refer to "Accessories" on page 34.

GRAS 67HB-03 2 m 20 ch. LEMO Sound Power Hemisphere

Included Items		Part Number
2 m Hemisphere Structure	1	AL0025-3
GRAS 1/2" LEMO Standard Microphone Set	20	46AF
10 m LEMO Cable	20	AA0009
Microphone Holder	20	RA0259
Microphone Holder Spacer, 18 mm	20	GR1571
Cable clips	50	KE0130

GRAS 67HB-09 2 m 20 ch. Low-Noise Sound Power Hemisphere

Included Items		Part Number
2 m Hemisphere Structure	1	AL0025-9
GRAS 1/2" LEMO Low-noise Microphone Set	20	40HL
10 m LEMO Cable	20	AA0009
Microphone Holder	20	RA0259
Cable clips	50	KE0130

Accessories

Item	Part Number
GRAS Multifunction Sound Calibrator (94 dB and 114 dB)	42AG
GRAS Intelligent Pistonphone (114 dB)	42AP
GRAS 94dB Pistonphone Coupler for GRAS 42AP	RA0090
Extension Cable for CCP Microphone Sets, custom length, XXXX = custom length in centimeters	AA0039-CLXXXX
10 m Extension Cable for LEMO Microphone Sets	AA0009
Pair of Flight Cases, with foam inserts	RA0276

Calibration, Warranty and Service

All included microphone sets are delivered with individual calibration charts including sensitivity values and frequency responses. These sensitivity values can be used directly in your system setup.

Verification and calibration

For measurement chain verification a reference sound source will be required. GRAS supplies 114 dB types for the standard microphone sets and a special 94 dB adapter for the low-noise sets.

Depending on the use and your internal quality control requirements we recommend that the sets are re-calibrated at least every second year.

Contact your GRAS Partner for options and services.

Warranty

All GRAS products are made of high-quality materials that will ensure life-long stability and robustness. The Hemisphere is delivered with a 5-year warranty. Damaged diaphragms in microphones can be replaced. The warranty does not cover products that are damaged due to negligent use, an incorrect power supply, or an incorrect connection to the equipment.

The warranty for cables is 6 months.

Service and Repairs

All repairs are made at GRAS International Support Center located in Denmark. Our Support Center is equipped with the newest test equipment and staffed with dedicated and highly skilled engineers. Upon request, we make cost estimates based on fixed repair categories. If a product covered by warranty is sent for service, it is repaired free of charge, unless the damage is the result of negligent use or other violations of the warranty. All repairs are delivered with a service report, as well as an updated calibration chart.

Manufactured to conform with:

CE marking directive:
93/68/EEC

WEEE directive:
2002/96/EC

RoHS directive:
2002/95/EC