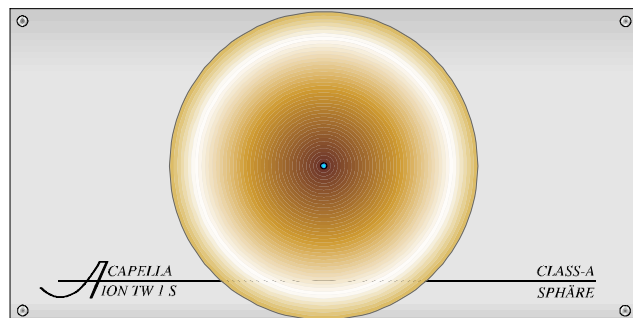


*A* CAPELLA  
ION TW 1 S



Instruction manual

# The idea

Music is an essential element of our emotional quality of life. Playing musical instruments, you can experience music authentically and immediately.

On the other hand, when you are reproducing music, it is often „administered“ by several electronic components.

Administration does not suit to emotions, restriction not to experiences.

To have music at our disposal at any time and everywhere, we cannot do it without some components. It is our business to build a bridge across the musical and the technical world.

In the ideal case, components become instruments, cover and contents are one thing, very close to the human beings, to the senses, to the being.

Best sound quality, highest longevity, combined with an unique function, create the bridge. Products from Acapella are unique combinations of design, function and engineering.

All parts are carefully handcrafted by Acapella. The serial numbers are marked by hand and registered in the production records. Every unit has its own serial number and production trail. On the basis of these recorded datas, all characteristics can be reproduced at any time.

High-quality musical instruments need a play-in time to yield optimum sonic performance. This applies for all Acapella products as well. The play-in time for new devices will be about 14 days. After a longer inactivity just a couple of hours.

# Functional specifications

The Acapella ion tweeter „Ion TW 1 S“ is a perfected and sophisticated loudspeaker chassis, whose exceptional performance and qualities can only be enjoyed completely if used properly.

It was designed to reproduce the harmonics of the music as detailed as possible. To reach this goal, a design with the smallest possible mass had to be developed. Relative to its function the Acapella ion tweeter has no mass! To carry out this project, a very unusual kind of design had to be created.

High voltage within the unit produces a constant arc (which can never be completely silent). This arc is modulated with the musical signal (flame oscillates with the time of the music). This is the reason why the number of electrons within the arc varies. A larger or smaller amount of electrons requires similar space. Due to this variable need of space the surrounding air molecules have to dodge the more or less quickly. This evasive action or bumping of the air molecules generates over-, resp. underpressure and, therefore, sound. In this way, the Acapella ion tweeter is able to reproduce sound without membrane and without mass.

Regarding transient capabilities and phase stiffness, the obtained sound quality cannot be realised by using conventional tweeters. Comparing the ion tweeter with other tweeter systems, its unobstrusive sound image will attract you. This kind of reproduction is to be attributed to the lack of harmonic and transient distortions.

## **Power connection**

Before connecting the loudspeaker for the first time, please check all components in your system for correct polarity of the AC mains. Correct phase is marked on the ACAPELLA ion tweeter. Please keep an eye on the red-marked side of the AC-connector. AC mains phase should be there.

To prevent failures due to condensation, please allow the device to acclimatize to room temperature before attempting to make connections to the AC mains outlet.

This eliminates the opportunity of high voltage surges within the oscillator.

If you have any questions to ask, please contact your dealer or directly us.

## **Operation**

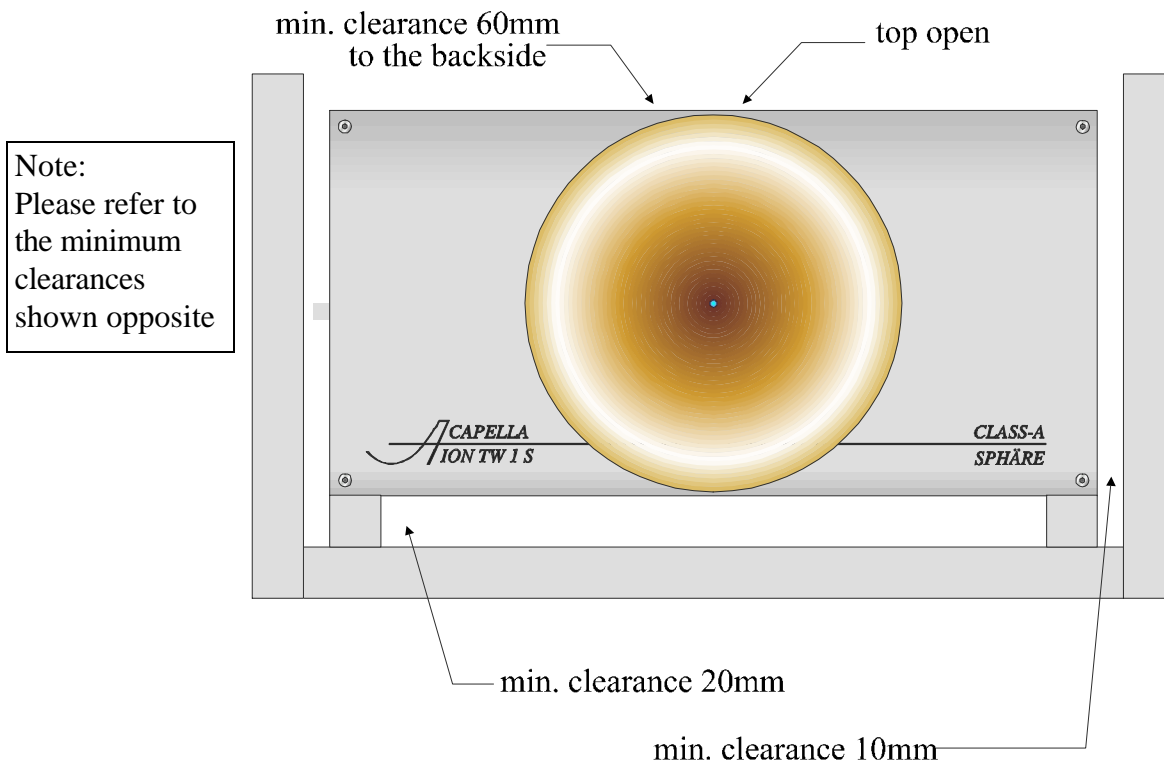
During normal operation the ion tweeter does not require special service. It starts automatically after the first incoming musical signals.

The device will start working as follows: The signal at the input exceeds the preset voltage value (30mV/11Hz). An internal generator begins to oscillate and a built-in frequency counter in the input stage is collecting the number of the waves. If this number exceeds the preset value, the ion tweeter will be activated. This procedure is essential to minimize sensitivity to interference pulses in the power supply mains caused by electrical appliances such as refrigerators etc. During the start-up procedure of the ion tweeter, power supply to the arc will be doubled for approx. 2 seconds to enable the combustion chamber to warm up quickly and to burn dust particles which were eventually penetrating. This process is bound to produce more attrition and should not unnecessarily be performed.

A shut-off delay of approx. 20 minutes provides continuous operation during short pauses (resp. when going below the minimum level). After longer pauses (more than 20 minutes) or at very low levels, you should bring the ion tweeter into the „manual“ mode by using the „automatic - manual“ switch.

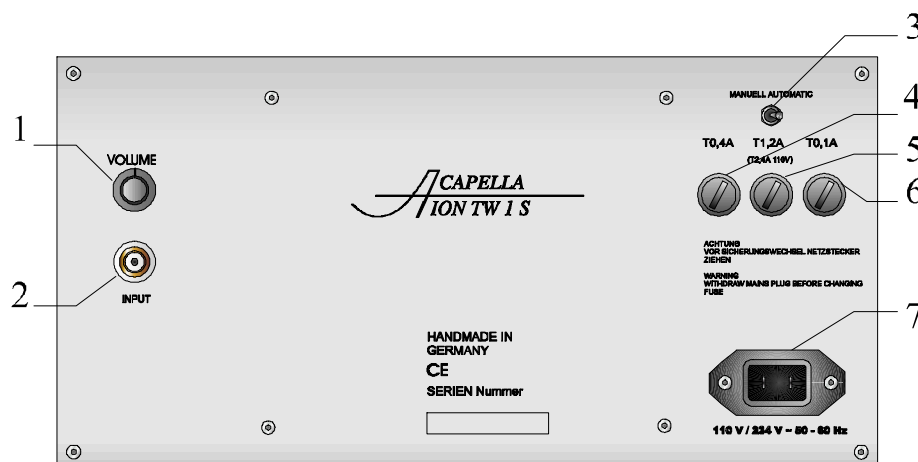
# Placement

Because of the built-in Class-A amplifier and its valve oscillator, the Acapella ion tweeter requires sufficient ventilation. When used together with Acapella loudspeakers, minimum clearances have constructionally been taken into consideration. Should you have purchased the ion tweeter for use with other loudspeakers, be sure to allow the following minimum clearances. Damage to the unit due to overheating will void the warranty.



During installation in a cabinet, the above mentioned minimum clearances must be observed. Be sure to allow perfect heat dissipation through vertical air circulation. Besides, the rear side of the cabinet must have an air inlet corresponding to the width of the tweeter. No objects which could hinder free air circulation should be fitted above the tweeter. As a freestanding unit, a 10 mm minimum clearance between the bottom-panel of the unit and the base will be sufficient.

## Control panel



1. Level control
2. Input RCA jack
3. Mode switch (manual/automatic)
4. Fuse F1 0,4A slo-blo
5. Fuse F2 1,2A slo-blo
6. Fuse F3 0,1A slo-blo
7. AC connector with phase identification
8. Hand marked serial number

## Getting started

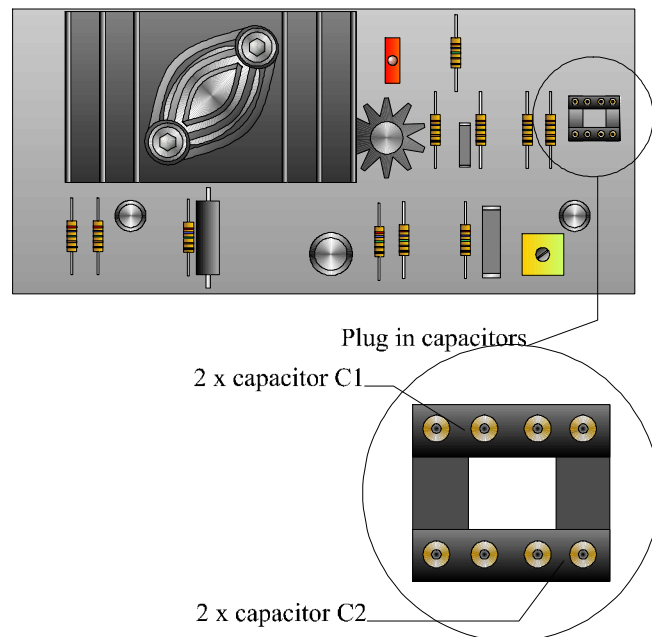
Bring the mode switch on the rear panel of the unit to the „automatic“ position. Connect the AC cord to the ion tweeter first and then to the electrical outlet. Now you can hear the soft switch-on sound of a relay. Move the mode switch quickly into the „manual“ mode and bring it immediately back to its original position. The „reset“ function has now been initialized. This gives time to the oscillator's valve for a warm-up. The „reset“ function can also be used for future switch off of the ion tweeter (only with no incoming signal).

After an approx. 60 seconds warm-up tip the switch over into the „manual“ position. 3 seconds later you can hear the switch-on sound of the relay and a short period later a second „klick“, which indicates the beginning of the quick warm-up of the combustion chamber. After another 5 seconds period you hear a third „klick“, announcing the end of the combustion chamber's warm up phase. The ion tweeter is now ready for operation.

## Adjustment of the turnover frequency

The ion tweeter's turnover frequency has been factory set for the use with Acapella loudspeakers. These settings can easily be modified by your dealer or by yourself in order to use the ion tweeter with other loudspeakers. It will enhance their performance. You will find a list with the necessary information at the end of this manual. This list shows a series of possible turnover frequencies and the appropriate plug-in capacitors. To form a new value, you can plug in 2 capacitors at a time in a parallel line.

Note:  
The opposite illustration shows the order of the plug-in capacitors on the A-driver board (behind the right sidewall)



The height of the threshold frequency affects simultaneously the maximum available pulse level of the ion tweeter. It is advisable not to adjust threshold frequencies significantly below 5kHz. The amplitude below 5kHz will unsufficiently be generated by the arc by which harmonic distortions will increase. The sound pressure level at lower threshold frequencies is lower than at higher frequencies. If you won't be using the factory set capacitors, you can match them yourself considering the following relevant information: Size 7,5 mm, voltage stability 200V. The tolerance to these values is not critical, but the selected values for matched pairs should not exceed a tolerance of 1 %. The input filter is a 12 dB/octave high pass filter.

## **Connection to the amplifier**

The Acapella Ion TW 1 S will be connected to your amplifier using a RCA jack (Cinch). Within an Acapella system, all necessary connections are already available. If you need to use the tweeter in different loud-speaker combinations, you will have to fabricate yourself an appropriate interconnecting cable to your loudspeaker terminals or to your amplifier.

To ensure proper phasing connect the red output terminal (positive) to the internal conductor of the RCA jack. Therefore, signal ground (negative) has to be connected to the external ring of the RCA jack.

In case of a connection with inverted polarity, the above mentioned instructions must be followed exactly the other way round.

When connecting the ion tweeters, the proper phasing depends directly on the mid-range unit to be used. If you have no information about the phasing of your mid-range speaker in the turnover frequency area, you should experimentally find out the correct acoustic polarity. To do that, we recommend to listen to very good recordings (especially vocalists).

If the music sounds poor, nasal or tinny, wrong polarity has been discovered.

## **Optimizing imaging accuracy**

### **Control of monophonic reproduction**

The meaning of this control is to optimize placement of the loudspeakers relative to your living room. Without proper adjustment you won't be able to localize voices or instruments precisely in the imaginary room which is reproduced by the loudspeaker. Only a correct mono calibration enables a perfect stereo reproduction. Please do not connect the ion tweeter while making this setting. Avoid eventual short circuits. Switch your amplifier to mono, or still better, use a monophonic CD. Go back to your listening area. When reproducing voices or instruments, attention has to be paid to the direction they are coming from. Supposing that reproduction is out of balance and tending to the left, you can either toe-in the right loudspeaker or toe-out the left one. Please consider that soundstage and imaging can shift to the front or to the back according to the change of the loudspeaker's position. Please try to make changes of the loudspeaker's position symmetrically. Always vary only a few millimetres, and if necessary, to the front or to the back. Optimization is accomplished when the music can be heard right between the loudspeakers. Finally, you can control the loudspeakers with a spirit level and fit them with the base screws. To make these adjustments, loosen the lock nut of the setting screw first. Do not forget to tighten the lock nuts towards the bottom of the cabinet again.

## **Fine adjustment of the ion tweeter**

Switch off your amplifier and connect the ion tweeter. For the following settings use music with a good proportion of higher frequencies (hi-hats, still mono).

Do not alter the position of the loudspeaker anymore!

As described above, pay attention to the direction the music seems to come from. Adjust the level of the ion tweeter (the louder one determines the direction) so that even the softest hi-hats are always coming at you from the centre. Optimum setting has been obtained if you can localize the sound source in the size of a football right between the loudspeakers. Music seems to be reproduced by a Center loudspeaker. In case of a change of the level of the higher frequencies, adjust it synchronously left and right by considering the pencil mark. In this way, you can re-establish the balance between mid and high frequencies.

## **Care and Maintenance**

Note:  
Before cleaning  
the ion tweeter,  
please  
disconnect it  
from the AC  
mains

Ozone will be produced by burning air molecules in the arc. This ozone already disintegrates in the rear part of the horn and leaves a greenish oxide film on the horn's surface. It cannot penetrate into the atmosphere. From time to time you can polish the horn with an appropriate soft cloth. Never attempt to clean the ion tweeter with pointed objects. If you do so, you could destroy the combustion chamber. Do not bring any dust into the combustion chamber, because the noise would considerably increase and last for a long time.

## List of the turnover frequencies

The following list shows possible turnover frequencies for the Acapella ION TW 1 S.

The useful combinations are printed in bold outline.

Frequency in Hz	Capicitor C1 in nF	Capicitor C2 in nF
8500	22	10
7500	27	10
6800	33	10
6500	33	12
6200	39	10
6000	39	12
5800	47	10
5600	47	12
5400	56	10
5200	39	18
5100	56	12
5000	39	15
4800	68	12
4600	47	18
4400	56	15
4200	68	15
4000	56	18
3800	68	18
3700	56	22
3500	82	18
3300	68	22
3100	68	27
3000	82	22

# Troubleshooting

Malfunction during operation cannot always be attributed to a damage within the device. The following table may help you to find out the reason of a malfunction and to remove it. If none of these suggestions solves the problem, contact your Acapella dealer or us.

Discovered malfunction	Possible reason	Check up, remedy
No function	No mains voltage available, Fuse F2 defective	Look from above through the cover at the oscillator tube. If power is supplied, you can see the filament slightly glowing on the top of the tube. If yes, there is a malfunction, if no, check the electrical outlet and the fuse.
No ignition of the arc or it will go out during operation	Fuse F1 or F3 defective	Disconnect the mains plug. Unscrew the fuses and check them with an ohmmeter. Optical control can be faulty. <b>If you need to replace the fuses, use only those with the same value!</b>
Manual switch-off (reset) impossible	<ol style="list-style-type: none"> <li>1. Input voltage is too high</li> <li>2. Disturbing voltage at the input</li> </ol>	<ol style="list-style-type: none"> <li>1. Turn the volume control to off</li> <li>2. Disconnect the input jack. If „reset“ now operates perfectly, check your Hi-Fi system for interferences (hum, noise).</li> </ol>
With no incoming signal, it does not switch-off in „automatic“ operation	Disturbing voltage at the input or in the power supply mains	Disconnect the input jack. If the device switches off after approx. 20 minutes, check the signal-to-noise ratio in your system (hum etc.). If not, malfunction can be caused by interference pulses in the mains voltage. Try to switch-off with „reset“. If there is no positive result, the switch-on logic is defective. Disconnect the AC mains plug.
With no incoming signal, it switches on without a musical signal	See above	See above. Further possibility of a malfunction: If higher sound pressure levels from other sources are reproduced in your room or if the power supply mains have interference pulses, even though above mentioned checking showed perfect operation of the switch-on logic, you should let increase the threshold value by your Acapella dealer or by us.
Crackling	Dirt particles in the combustion chamber	Bring the unit into the „manual“ continuous operation mode and let it be running up to 48 hours. If there are only slight disturbances, repeated switch-on and -off can remedy these things. The entire starting cycle must be run, because the function „quick warm-up of the combustion chamber“ doubles the energy of the arc. Do not repeat this procedure more than 6 - 8 times with intervals (60 sec.). Usually, the dust particles, causing the disturbances, will be burned.
Chirping and whistling	Dirt particles in the combustion chamber or faulty interconnection	See above. Loose dirt particles can cause an instability in the oscillator frequency which can produce these disturbances. Another possibility are interferences between the oscillators of both the devices. This suggests an insufficient interconnection between the tweeters and the amplifier. Please inspect the cables (earth connection, contacts).
No constant burning or break of the arc after a complete start-up	Control voltage, electrode; oscillator tube	The design of the „Class A“ driver amplifier does also allow higher temperatures without the chance of damage within the devices. It reduces its supplied voltage when heating becomes stronger through which the intensity of the arc will decrease. These „optical“ effects do not harm the sonic quality. On the other hand, the arc of the unit which was running for a longer period (800 - 1000 hours of operation) can show a „loss of strength“, independent of the operational temperature. These is an indication that the oscillator and/or the combustion chamber should be renewed.

# Specifications

Mains voltage	234 Volt / 50 Hz Standard Optional: 110 -, 117 -, 227 Volt / 50 - 60 Hz
Power consumption at 234 Volt	Standby: 0,025 Amperes Starting: 1,2 Amperes Operation: 0,6 Amperes
Frequency response	5kHz - 50kHz (different crossover frequencies available)
Sound pressure level	max. 110 dB - 1 m
Input impedance	600 Ohms
Slope Input filter	approx. 12dB/octave
Threshold value	30mV/1kHz (15 - 100 mV) adjustable)
Principle	Converter ionizing the air through an arc. Amplification by a „Class A“ driver amplifier
Overall dimensions	300x150x230 mm
Weight	approx. 15 kg