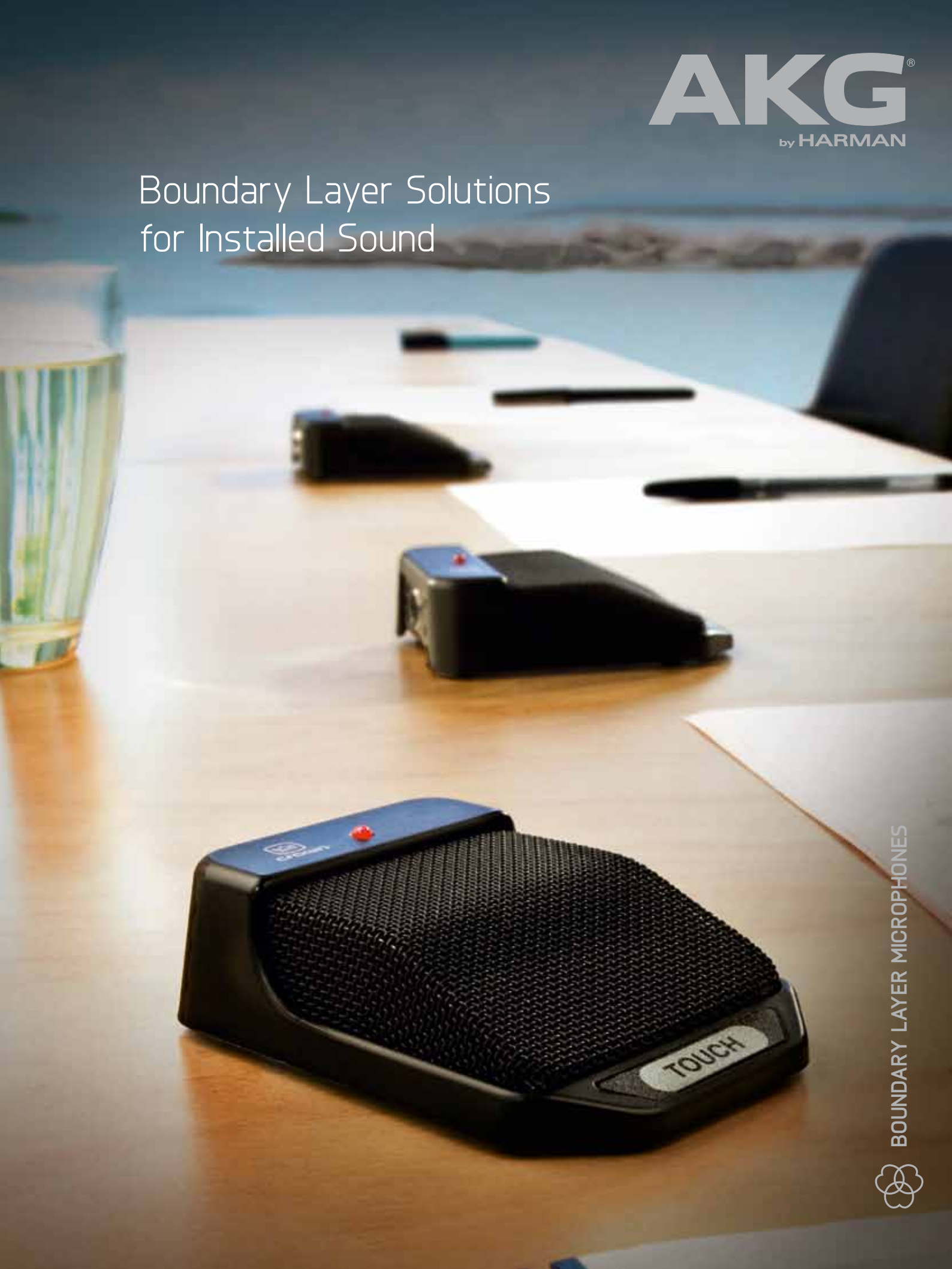
AKG
by HARMAN

Boundary Layer Solutions for Installed Sound



BOUNDARY LAYER MICROPHONES

AKG AND CROWN® – A WINNING COMBINATION

World-renowned audio brands AKG and Crown both began in 1947 after World War II. These companies were founded by visionary leaders and engineers, who discovered a growing need for communication tools to reach a broader audience and expanded their brands from humble beginnings. While AKG began its business manufacturing film projectors and loudspeakers for movie theatres in Vienna, Austria, Crown focused on quality electronic products for the radio industry from Elkhart, Indiana in the central U.S.

In early 1950, AKG achieved its breakthroughs with patents for moving-coil technology and the principle of the mass-loaded diaphragm. This was the beginning of AKG as a legendary brand known for superb microphones the world over.

At the same time, Crown gained an international reputation for its family of rugged open-reel tape recorders that were designed and built to operate reliably in difficult conditions. Crown obtained a patent for the world's first tape recorder with a built-in 15-watt power amplifier (considered a large amplifier at that time).

Together, AKG and Crown have produced a huge range of electro-acoustic and electronic products for professional audio engineers and enthusiasts for more than 120 years! Both companies have made major contributions to the art and science of audio and can lay claim to a huge list of groundbreaking products that have become milestones in microphones, headphones, amplifiers and wireless systems.

In the 1993, Harman International, the world's largest professional audio company, acquired AKG and in 2000 purchased Crown to gain a foothold in the microphone market.

As microphone experts for more than 6 decades, AKG now manages the worldwide distribution of Crown microphones. For the audio professional, this new distribution is noteworthy: Crown microphones are among the elite, top-line products and are very well known for their outstanding performance. The diversity of the Crown microphone line is a perfect match to the breadth of AKG's own quality product line. With the AKG's expertise in microphone distribution the world over, the new partnership of AKG and Crown is not only logical; its true synergism is certainly greater than the sum of the parts.

	C547 BL	PCC160	PZM30 D	PZM6 D	PCC170/ 170 SW	PCC130/ PCC130 SW	MB3	MB4	CBL410 PCC	CBL99	C562 CM	PZM10 / PZM10 LL	PZM11	PZM11LLWR
Theater	+	+					+	+						
House of Worship	+		+		+	+								
Recording Studio	+		+	+										
On stage	+	+	+	+										
Broadcast Studio	+			+	+	+								
Conference-Room										+				
Court-Room					+	+	+	+						
MeetingsRoom					+	+	+	+			+	+		
VoIP									+					
Teleconferencing						+		+	+					
Distance-Learning						+			+	+				
Restaurants						+								
Ticket-Window												+	+	+
Security & Survillance							+			+	+	+	+	+
Outdoor Intercom														+
Toll Booth														+
SOS Telephone														+

TECH MADE SIMPLE

Microphones often must be placed near hard reflective surfaces. Two situations where this occurs are (Fig. 1) picking up/recording a drama or opera with microphones near the stage floor, (Fig. 2) picking up/recording participants at a conference with microphones on desk stands on the conference table or (Fig. 3) recording a piano with the mics near the open lid, or recording an instrument surrounded by reflective baffles.

In these situations, sound travels from the sound source to the microphone via two paths: directly from the source to the microphone, and reflected off the surface (Fig. 1). Note that the reflected sound travels a longer distance than the direct sound, so the reflected sound is delayed relative to the direct sound. When the direct and delayed sounds combine at the microphone diaphragm, this results in phase cancellations of various frequencies. A series of peaks and dips is created in the net frequency response. This is called a comb-filter effect. It colors the tone quality and gives an unnatural sound.

To solve this problem, we need to shorten the delay of the reflected sound so that it arrives at the mic at the same time as the direct sound.

THE PZM® SOLUTION

In a PZM®, the diaphragm can be placed as close to the surface as desired. Then the direct and reflected waves arrive at the microphone at the same time, in phase (Fig. 3). This eliminates phase cancellations and results in a smooth frequency response. The diaphragm is mounted in the “pressure zone” just above the plate, a region where the direct and reflected waves are effectively in-phase. This special microphone was designed to be used on surfaces such

as floors, walls, tables, or even piano lids. It includes a miniature omnidirectional condensermic capsule, which is mounted face-down next to a soundreflecting plate. The microphone diaphragm is parallel with and very close to the reflecting surface.

THE BOUNDARY LAYER SOLUTION

In the Phase Coherent Cardioid or Boundary Layer Solution, the microphone diaphragm is small enough so that any phase cancellations are above the audible range (Fig. 2). This results in a wide, smooth frequency response free of phase interference. Unlike the PZM® which uses an omnidirectional mic capsule facing down, the Boundary Layer uses a supercardioid mic capsule facing horizontally across the surface. Its directional polar pattern improves gain-before-feedback, reduces unwanted room noise and acoustics, and rejects sound from the rear. Figure 4 shows the difference in construction and polar patterns of the PZM® and Boundary Layer.

Fig.1

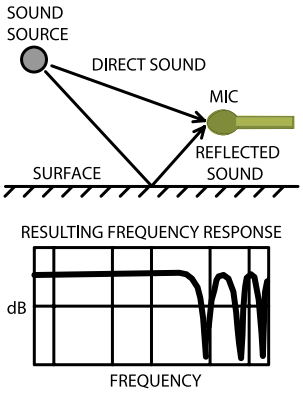


Fig.2

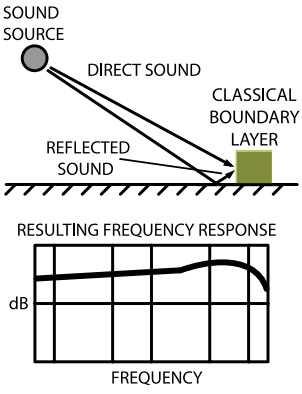


Fig.3

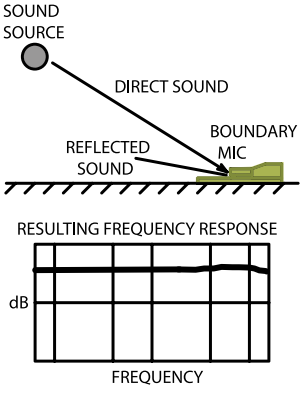
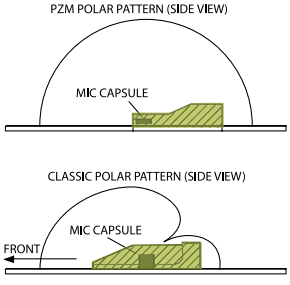


Fig.4



C547 BL

REFERENCE BOUNDARY
LAYER MICROPHONE

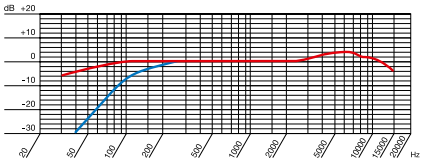
HOUSES OF WORSHIP
THEATER
BASS DRUM RECORDING

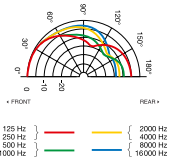
The C547 is a hypercardioid reference boundary layer microphone. The rugged, non-crush case and a switchable bass-cut filter make the C547 an ideal choice for tough on-stage assignments. Using PCC® (Phase Coherent Cardioid®) technology with hypercardioid polar pattern, the microphone provides high directivity and neutral sound. The C547 is built on the same acoustical components as the legendary C747 V11.

Primarily designed for use in houses of worship, theaters and conferencing, the C547 BL is also a good choice for miking kick drums and other instruments. The highly efficient RFi-Shield technology substantially reduces interference noise due to electromagnetic pollution.

- **Hypercardioid polar pattern**
  for maximum rejection of disturbing signals
- **Acoustics based on C747 V11**
  for wide, smooth frequency response
- **RFi-Shield technology**
  reduces interference noise due to electromagnetic pollution
- **Rugged, low profile housing**
  withstands the rigors of the stage
- **Paintable grille assembly**
  to blend in with stage decoration

Item number:
C547 BL 2447Z00010





PCC160

REFERENCE BOUNDARY LAYER MICROPHONE

THEATER ON STAGE

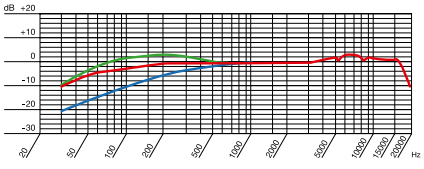
The PCC160 is a reference boundary layer microphone and an industry standard stage floor microphone. It´s capable of withstanding up to 120dB SPL without distortion. A bass-tilt switch allows the user to tailor the low-end response for particular applications.

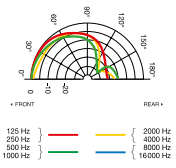
PCC® (Phase Coherent Cardioid®) technology uses diaphragms so small that any phase cancellations are above the audible range. This results in a wide, smooth frequency response free of phase interference. The PCC160 uses a supercardioid polar pattern that improves gain before feedback and reduces unwanted room noise from the rear.

- **Supercardioid polar pattern**
  for impressive gain before feedback
- **PCC® (Phase Coherent Cardioid®) technology**
  for a wide, smooth frequency response
- **Three-position bass-tilt switch**
  for optimized body noise suppression
- **Extremely low profile**
  for inconspicuous placement on the stage floor
- **Finely crafted, rugged housing**
  to withstand the rigors of the stage

Item number:

PCC160	6000H50110





PZM30 D

PREMIUM HEMISPHERICAL BOUNDARY LAYER MICROPHONE

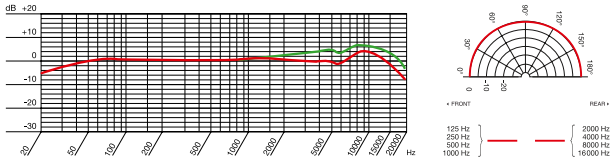
HOUSES OF WORSHIP
ON STAGE RECORDING
BROADCAST

The PZM30D is a Pressure Zone Microphone® designed for professional recording, sound reinforcement and broadcasting. The capsule is mounted in the “pressure zone,” an area where direct sound and reflected sound are in phase, which provides a 6dbB higher sensitivity.

Two selectable frequency responses (flat/rising) provide greater flexibility in mic placement and sonic character. The rising position of the frequency switch adds brilliance and a crisp attack on percussion, drums, or piano. The PZM30D comes in a very rugged, low-profile, metal housing with detachable cable that makes it sturdy and reliable for heavy duty applications.

- **Hemispherical polar pattern,**
  for intelligible pickup of sound from any direction
- **PZM® (Pressure Zone Microphone®) technology**
  prevents sound coloration from surface reflections
- **Switchable dual-frequency response**
  for greater flexibility in mic placement and sonic character
- **Rugged, low-profile housing**
  withstands the rigors of the stage
- **Detachable cable**
  easy to install and service

Item number:
PZM30 D 6000H50020



PZM6 D

PREMIUM HEMISPHERICAL BOUNDARY LAYER MICROPHONE

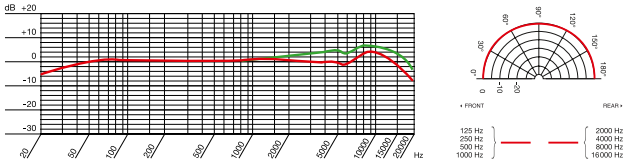
RECORDING
ON STAGE
BROADCAST

The PZM6D premium hemispherical boundary layer microphone is designed for many applications, from miking full orchestras or individual musical instruments to security or teleconferencing, as well as film and video productions. A very small metal housing makes the PZM6D even more inconspicuous than the PZM30D.

Two selectable frequency responses (flat/rising) provide greater flexibility in mic placement and sonic character. The rising position delivers bright sound without boosting high frequencies on the recording console. The flat position provides a smooth, flat, high-frequency response for natural sound reproduction. The PZM6D provides a professional XLR connector on a fixed cable.

- **Hemispherical polar pattern,**
  for intelligible pickup of sound from any direction
- **PZM® (Pressure Zone Microphone®) technology**
  prevents sound coloration from surface reflections
- **Switchable dual-frequency response**
  for enhanced flexibility in mic placement and sonic character
- **Small, lightweight metal housing**
  for mobile and studio applications
- **Fixed cable with XLR connector**
  for easy handling

Item number:
PZM6 D 600H50010



CBL99

HIGH-PERFORMANCE HEMISPHERICAL
BOUNDARY LAYER MICROPHONE

RECORDING

The CBL99 is a high-performance hemispherical boundary layer microphone designed to deliver superior results for a multitude of recording applications.

The CBL99 is small, lightweight and easy to place. Since the transducer sits in a metal plate only 5mm (0.2 in) thick, the plate doesn't interfere with or color the sound. Frequency response is very uniform within its hemisphere, and it captures the "room sound" of an instrument very accurately.

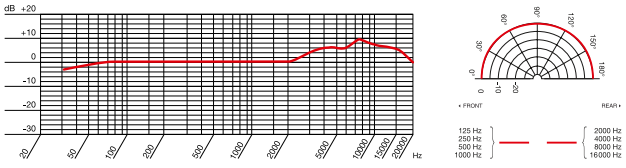
The CBL99 requires 9V – 52V phantom power. Its output is unbalanced via a professional XLR connector with switchable bass-cut filter.

- **Studio-quality microphone capsule**
  offers a sensational price/performance ratio
- **High sensitivity and low self-noise**
  to ensure generous headroom in critical situations
- **Extremely small and inconspicuous**
  for mobile and installed solutions

Standard accessories: adhesive compound

Optional accessories: B 18

Item number:
ZBL99 2762X00110



CBL410 PCC

HIGH PERFORMANCE
VOIP MICROPHONE

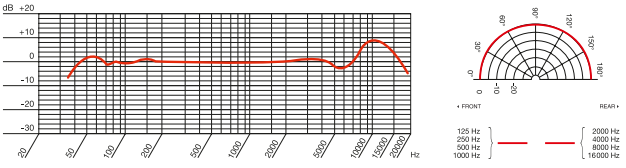
VOIP TELECONFERENCING

The CBL410 PCC is a high performance VoIP microphone for use with any PC or Laptop. It improves audio quality incredibly when making a conference via VoIP. The microphone reproduces the voice with a clear and natural sound. With its 3,5 mm stereo jack it is a real plug and play device. No drivers are needed.

Its cascading ability makes the CBL410 PCC the perfect tool for modern communication for both single person use in the office and/or multi-person use in a modern meeting room. This microphone provides optimum intelligibility and audio quality for your meetings.

- **Cascadable**
  for multi person use
- **Plug and Play**
  3,5 mm jack connector, no software drivers needed
- **Universal power concept**
  works with power from PC´s mic input

Item number:
CBL410 PCC black 3177H00010
CBL410 PCC white 3177H00020



PCC170

PREMIUM BOUNDARY
LAYER MICROPHONE

CONFERENCE
HOUSE OF WORSHIP

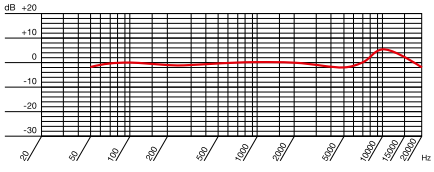
The PCC170 and the PCC170SW are premium boundary layer microphones with supercardioid polar pattern to minimize background noise and feedback. The microphones are designed for use on boardroom tables or lecterns. Both microphones provide a bass-tilt switch, allowing the user to tailor the low-end response and to reduce subsonic noise. The included RFI suppression ensures trouble-free operation even with active cell phones nearby.

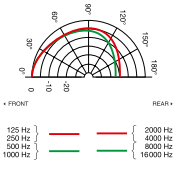
The PCC170SW has a silent-operating programmable membrane switch that can be configured for touch on/off, momentary on or momentary off. For easy installation, both microphones offer an XLR connector and a detachable cable..

- **Supercardioid polar pattern**
  offers high gain before feedback
- **PCC® (Phase Coherent Cardioid®) technology**
  for optimum speech intelligibility
- **Three-position bass-tilt switch**
  for optimized suppression of subsonic noise
- **Silent-operating on/off switch (PCC170SW only)**
  to reduce the number of simultaneously open mics
- **Detachable cable**
  easy to install and service

Item number:

PCC170	6000H50100
PCC170 SW	6000H50090





PCC130

HIGH-PERFORMANCE BOUNDARY
LAYER MICROPHONE

CONFERENCE
COURTROOM
DISTANCE LEARNING

The PCC130 and the PCC130SW are cardioid boundary layer microphones of professional quality that, due to their small size, fit perfectly on small tables. Thanks to a low self-noise and very high sensitivity, the microphone reproduces even distant voices clearly and naturally. A bass-tilt switch allows the user to tailor the low-end response and to reduce subsonic noise.

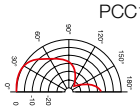
The PCC130SW has a silent-operating programmable membrane switch that can be configured for touch on/off, momentary on or momentary off. A high-intensity LED lights when the unit is on. For easy installation, both microphones offer an XLR connector and a detachable cable.

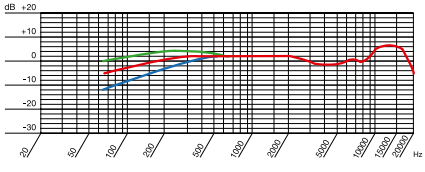
- **Cardioid polar pattern**
  reduces background noise and feedback
- **PCC® (Phase Coherent Cardioid®) technology**
  for optimum speech intelligibility
- **Three-position bass-tilt switch**
  for optimized suppression of subsonic noise
- **Silent-operating on/off switch (PCC130 SW only)**
  to reduce the number of simultaneously open mics
- **Detachable cable**
  easy to install and service

Item number:

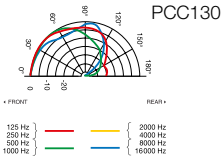
PCC130	6000H50130
PCC130 SW	6000H50130

PCC130 SW





PCC130



MB3

HIGH-PERFORMANCE, FLUSH-MOUNT
BOUNDARY LAYER MICROPHONE

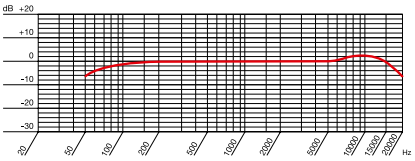
CONFERENCE
MEETING ROOM
SECURITY

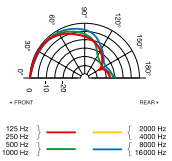
The MB3 is a high-performance, miniature boundary microphone for flush-mount installation. Thanks to its supercardioid pickup pattern, the MB3 greatly reduces ambient noise and pickup of room reverberation. The result is a clearer, more intelligible sound for applications such as teleconferencing, distance learning, boardrooms, courtrooms and security.

The MB3 provides a three-pin XLR-type, low-impedance, balanced mic-level output and is powered by 12V – 48V phantom power.

- **Supercardioid polar pattern**
  offers high gain before feedback
- **PCC® (Phase Coherent Cardioid®) technology**
  for optimum speech intelligibility
- **Miniature design**
  virtually disappears when installed
- **LED indicator**
  for clear mic on/off notification
- **Mounts easily into tabletops, walls and ceilings**
  for fixed applications

Item number:
MB3 6000H50150





MB4

HIGH-PERFORMANCE, MINIATURE
BOUNDARY LAYER MICROPHONE

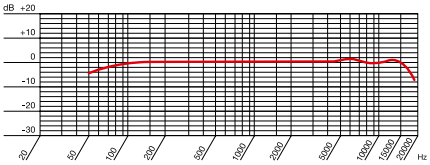
HOUSE OF WORSHIP
CONFERENCE
TICKET WINDOW

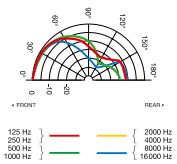
The MB4 is a high-performance, miniature boundary microphone for table-top installation. Thanks to its supercardioid pickup pattern, the MB4 greatly reduces ambient noise and pickup of room reverberation. The result is a clearer, more intelligible sound for applications such as teleconferencing, distance learning, boardrooms and courtrooms.

The MB4 has an attached cable leading to an XLR- type output connector with built-in mic electronics. It is powered by 12V – 48V phantom power and is low-impedance balanced.

- **Supercardioid polar pattern**
  offers high gain before feedback
- **PCC® (Phase Coherent Cardioid®) technology**
  for optimum speech intelligibility
- **Removable grille assembly**
  can be painted to blend in with the furniture
- **LED indicator**
  for clear mic on/off notification
- **Balanced, low-Z output**
  prevents hum and high-frequency loss

Item number:
MB4 6000H50140





C562 CM

PREMIUM FLUSH-MOUNT
BOUNDARY LAYER MICROPHONE

RECORDING
COURTROOM
SURVEILLANCE
SECURITY

The C562 CM is a premium flush-mount boundary microphone, designed for permanent, “invisible” mounting in ceilings, walls, tables and stages. Owing to its high sensitivity, the C562 CM is characterized by excellent clarity and a consistent pickup anywhere around the mic.

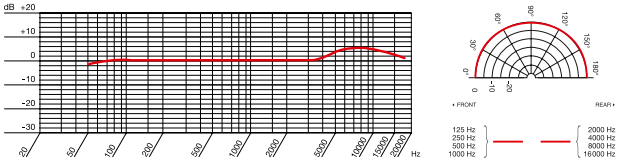
The C562 CM is a perfect tool for surveillance or live recording. The included XLR phantom power adapter connects to the microphone cable through a miniature connector, so installation holes can be smaller than the diameter of the phantom power adapter.

- **Hemispherical polar pattern**
  for clear, intelligible pickup of speech
- **High sensitivity**
  for a great pickup area
- **Low-profile, cylindrical design,**
  perfect for wall or tabletop installation

Optional accessories: B18

Item number:

C562 CM	2262X00030



PZM10 / PZM10 LL

HIGH-PERFORMANCE FLUSH-MOUNT
BOUNDARY LAYER MICROPHONE

TICKET WINDOW
COURTROOM
SECURITY

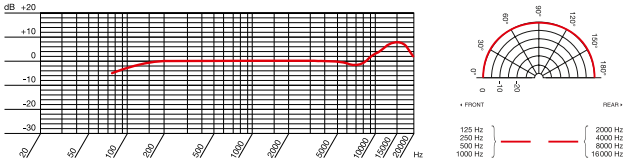
The PZM10 and PZM10LL, part of the Pressure Zone Microphone® line, are designed for security, surveillance, and conference-table use. The special housing design allows the microphones to be mounted into tables, walls or ceilings easily and inconspicuously.

Using Pressure Zone Microphone® technology, the PZM10 and PZM10LL are highly sensitive and deliver a wide and smooth frequency response. Thus, the PZM10 and PZM10LL are characterized by excellent clarity and a consistent pickup anywhere around the mic.

- **Hemispherical polar pattern**
  for clear, intelligible pickup of speech
- **Low-profile, cylindrical design,**
  perfect for wall or tabletop installation
- **Choice of mic level output or line-level output (PZM10LL)**
  for optimized level matching
- **PZM10 powered by 12V – 48V phantom power, XLR connector**
  connects to all standard mixers with phantom power out
- **PZM10LL powered by 12V – 24V/DC, unterminated wires**
  for the most flexible connectivity

Item number:

PZM10	6000H50070
PZM10 LL	6000H50060



PZM11

HIGH-PERFORMANCE FLUSH-MOUNT
BOUNDARY LAYER MICROPHONE

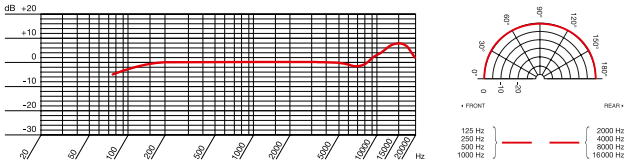
TICKET WINDOW
SECURITY

The PZM11 premium boundary layer microphone is designed for security and surveillance applications. The PZM11 is characterized by a consistent pickup anywhere around the mic. Low frequencies below the voice range are rolled off to reduce the pickup of heating, ventilation or air-conditioning rumble (HVAC noise). The high-frequency response is boosted slightly to aid clarity and articulation.

The PZM11 has a mic-level output and is powered by 12V – 48V phantom power. Electronics on the rear of the plate offer screw terminals, eliminating the need for connectors.

- **Hemispherical polar pattern,**
  for clear, intelligible pickup of speech
- **Low-frequency rolloff**
  effectively reduces HVAC rumble
- **Screw terminal**
  no need for connectors

Item number:
PZM11 6000H50050



PZM11 LL WR

WATER-RESISTANT HEMISPHERICAL
BOUNDARY LAYER MICROPHONE

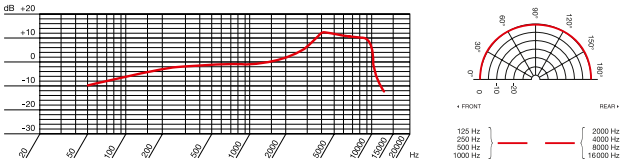
OUTDOOR INTERCOMS
TOLL BOOTHS
SOS TELEPHONES

The PZM- 11LLWR is a weather- resistant boundary layer microphone designed for fast-food restaurants, outdoor intercoms, toll booths, SOS telephones, theme-park security and the like. A plastic membrane inside the microphone protects the mic capsule from water damage. The PZM11LLWR will work during and after rainfall. If water freezes on the membrane, the mic's frequency response will change, but will return to normal when the ice melts and the membrane dries.

The PZM11LLWR is powered by 12V – 24V DC, provides line-level output and can be plugged directly into a VCR line input without the need for a costly mic preamp.

- **Hemispherical polar pattern**
  for clear, intelligible pickup of speech
- **Weather-resistant model**
  for outdoor use
- **Line-level output**
  connects directly to video recorders

Item number:
PZM11LLWR 6000H50040



MICROPHONE
APPLICATION GUIDE

BOUNDARY LAYER MICROPHONES IN THEATERS

Thanks to their low profile and high efficiency, boundary layer microphones are especially appreciated on theater stages.

They are either mounted close to the stage´s edge, for directional microphones like the PCC160 or C547, or directly into the scenery, for very small products like the C562 CM or MB 4.

As a rule, microphones should be placed to minimize the distance to the actors in order to improve sound quality and to prevent feedback. Knowing the placement, the actors can optimize their positions on stage and make full use of the microphones.

The use of automatic microphone mixers is strongly recommended when there are several microphones on one stage. An automatic mixer will open only the channels of the active microphones (normally the mics with the loudest signal). All other microphone channels will be attenuated to prevent feedback and improve the overall sound quality. An automatic microphone mixer is also valuable in a complicated production as it can open and close channels quickly.

BOUNDARY LAYER MICROPHONES IN MEETING ROOMS

In conferences, courtrooms and meeting rooms, varying applications apply. Applications without sound reinforcement, such as recording, are rather simple and uncritical from an acoustical point of view as there is no risk of feedback. On the other hand, applications with sound reinforcement always carry the risk of feedback as the microphone´s signal is amplified and reproduced by loudspeakers in that room. Boundary layer microphones are generally more susceptible to feedback, simply because they are farther away from the speaker's mouth, compared to gooseneck microphones, for example.

The easiest way to prevent feedback and optimize speech intelligibility is to reduce the distance between the microphone and the speaker and to minimize the number of open mics. The latter is best achieved with the help of a good automatic microphone mixer, such as the AKG DMM 4/2/4.

In any case, make sure that the microphones are not covered with documents. The best microphone does not work if it is obstructed.

1) RECORDING IN MEETING ROOMS AND COURTROOMS

Depending on the number of participants, the microphones should be distributed evenly on the meeting table or in the room at equal distances between the participants and the microphones. This will reduce volume fluctuations between the individual users and increase the intelligibility of the recorded signal.

The shorter the distance to the speaker, the less room reverberation will be picked up, and the better the quality of the recorded signal will be. To achieve optimum results, no person should be more than 1m (3 ft) away from the nearest microphone.

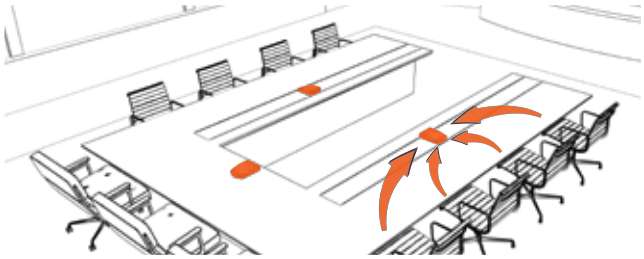
On a small meeting table, it is often enough to place one omnidirectional microphone, such as the CBL 99, in the middle of the table.

Whenever more than one microphone is used, directional microphones are a good idea. Due to its relatively wide pickup pattern, the PCC130 is a perfect choice if several persons share one mic. The PCC170 picks up one speaker in front of a lectern or from a wider distance, thanks to its supercardioid characteristic.

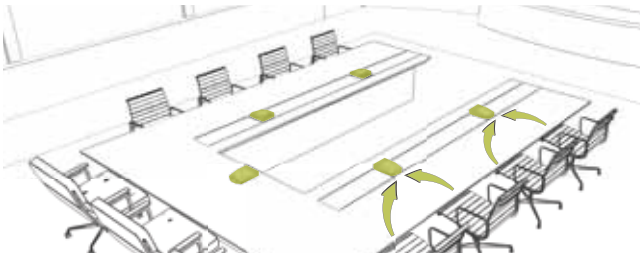
2.1) SOUND REINFORCEMENT IN MEETING ROOMS AND COURTROOMS

Suppose you need to reinforce speech at a conference table or in a courtroom. You would use several microphones fed into a mixer (either standard or automatic mixer). If you use a standard mixer, each user needs to manually switch his or her mic on or off to prevent feedback problems. In this case, one of these switchable microphone models would be suitable: PCC130SW or PCC170SW. The switches on these microphones can be configured to work three ways: on/off switch, momentary on and momentary off. If you want to use an automatic mixer, one of these non-switch mics will do a perfect job: PCC130, PCC170, MB3 or MB4. In this case, the automatic microphone mixer will switch on channels with active mics and deactivate all others. At the same time, most mixers provide a gain sharing function, to prevent feedback, even with multiple open mics.

Typical placement for each microphone is at arm's length from the user. As mentioned above, the microphones need to be placed evenly on the table at the same distance to the participants. It is best to place one microphone in front of each person or one between every two people.



DISADVANTAGEOUS PLACEMENT:
Different distances between the speakers and microphone. The speakers' voices will be recorded at different levels.

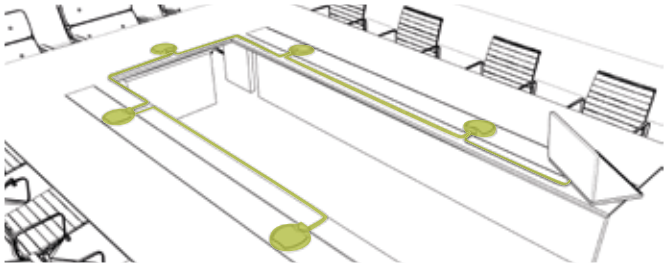


PROFESSIONAL PLACEMENT:
Uniform distribution of the microphones achieves the best result. The distances between speakers and microphones are equal.

2.2) TELECONFERENCING AND VOIP

Similar to meeting room applications with sound reinforcement, teleconferencing and VoIP applications include amplification and the risk of feedback. Please follow the guide for microphone selection and microphone placement as described in section 2.1. The use of an automatic microphone mixer is strongly recommended in teleconferencing systems.

For smaller setups using voice-over Internet services (VoIP), AKG offers a brand-new system. Several CBL410 microphones can be cascaded easily and connected directly to a computer's audio input with a 1/4" jack connector.



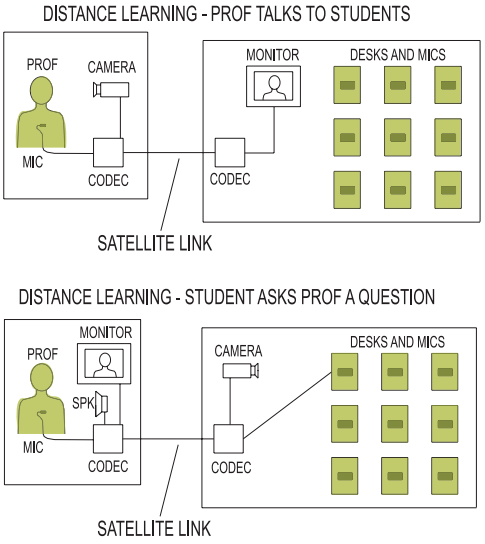
Cascaded arrangement of CBL410 PCC in a meeting room.

MICROPHONE
APPLICATION GUIDE

DISTANCE LEARNING AND TELECONFERENCING SYSTEM

Typically, students will be in one or more classrooms, and a professor will be in another location. The professor talks to the students through a clip-on or lavalier microphone. The mic signal is sent by phone lines or satellite to the classrooms. There, several loudspeakers play the professor's voice to the students. The students can see the professor over a TV monitor.

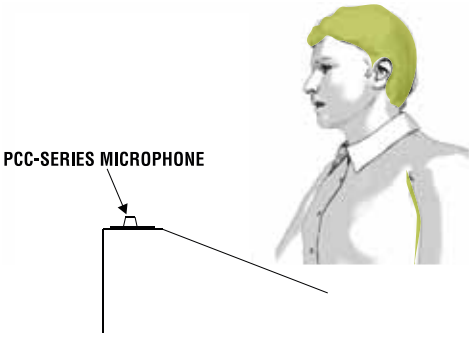
In the classroom, each student or pair of students has a desk mic. Students can switch on the mic when they want to ask the teacher a question. The mic signals are sent by phone lines or satellite to the teacher. The teacher and student can talk back and forth, almost as if they were in the same room. The parts of a distance learning system are the same as in a teleconference system.



LECTERN

One microphone at the pulpit/lectern gives a more consistent tone quality than two, so install only one.

Place a unidirectional boundary mic such as the Crown® (PCC®-130, PCC®-160, PCC®-170) on top of the pulpit/lectern, near the edge furthest from the person speaking.

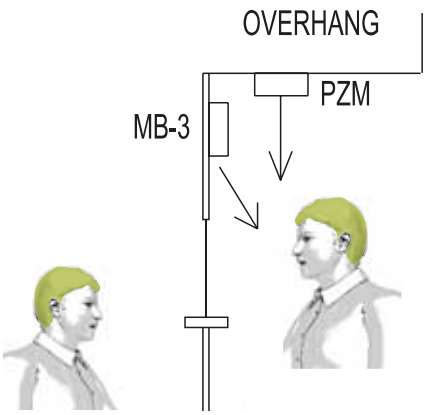


TICKET WINDOW

Mount a PZM®-10 in an overhang, or mount an MB-3 aiming down over the window. It is best not to expose the microphone to rainfall.

If you need a weather resistant microphone, the PZM®-11LLWR is the microphone of your choice.

By following the suggestions, you should be able to discreetly pick up speech and other sounds with clarity.



BOUNDARY LAYER MICROPHONES FOR INSTRUMENT RECORDING

Boundary layer microphones can be used in a wide range of recording applications, from orchestra recordings to stereo ambience pickup. In live situations where you may have to fight spillover from other instruments or feedback problems, you can use boundary layer microphones to get rid of these effects. Boundary layer microphones are often used to pick up kick drums and pianos on loud stages.

1.) GRAND PIANO:

Tape a CBL99 or C547 to the underside of the lid, at a place in the middle for mono recordings. You can put the lid on short stick or even close it completely if you still face a problem with signal bleeding or feedback. For stereo, use two similar microphones, one over the treble strings near the hammer, one over the bass strings well away from the hammer. Microphone placement close to the hammers emphasizes attack; placement far from the hammers yields more tone. Please note that closing the lid will change the sound of the instrument. Take some time to experiment with the mic´s position to get the optimum result.

2.) BASS DRUM:

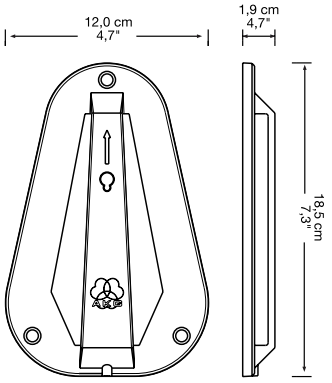
Boundary layer microphones are not only a big help when you face a problem with signal bleeding from other instruments on the stage. They sometimes can be a quick fix during setup, for example when picking up a kick drum with a PCC160 or C547. Simply lay it on a blanket or pillow inside the drum. That´s all you need to do to get an amazing, rich and clear kick drum sound.

COMPARISON CHART

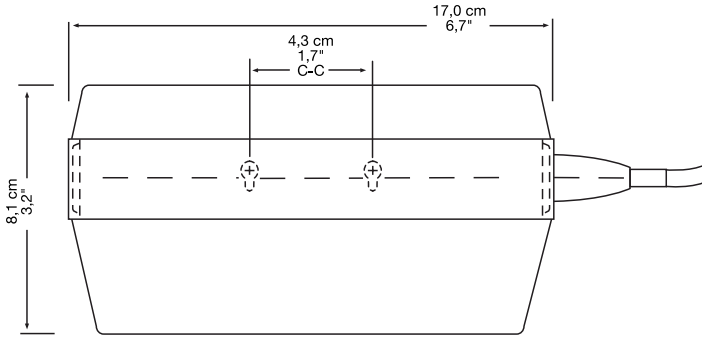
		Polar Pattern	Frequency Range	Sensitivity	Max. SPL for x% THD	Equivalent Noise Level (IEC 60268-4)	Signal/ noise ratio (A-weighted)	Preattenuation Pad	Bass Cut Filter	Impedance	
Installed Microphones	**C547 BL**	hypercardioid	30 to 18,000 Hz	8.5 mV/Pa (-42 dBV)	133 dB	22 dB-A	72 dB (A-weighted)			≤400 ohms	
	PCC160	supercardioid	50 to 18,000 Hz	22 mV/Pa (-30 dBV)	120 dB	22 dB-A	72 dB (A-weighted)			150 ohms	
	PZM30 D	hemispherical	20 to 20,000 Hz	7 mV/Pa (-43 dBV)	150 dB		74 dB (A-weighted)			250 ohms	
	PZM6 D	hemispherical	20 to 20,000 Hz	7 mV/Pa (-43 dBV)	150 dB		74 dB (A-weighted)			240 ohms	
	CBL99	omnidirectional (hemispherical)	20 to 20,000 Hz	20 mV/Pa (-34 dBV)	130 dB	16 dB-A (IEC 60268-4)	78 dB (A-weighted)			≤600 ohms	
	CBL410 PCC	omnidirectional	20 to 20,000 Hz	3,88mVPa (-48dbV)	120 dB		58 dBA			2000 ohms	
	PCC170 PCC170 SW	supercardioid	50 to 20,000 Hz	22 mV/Pa (-30 dBV)	120 dB	22 dB-A (IEC 60268-4)	72 dB (A-weighted)			150 ohms	
	PCC130 / PCC130 SW	cardioid / upercardioid	50 to 20,000 Hz	22 mV/Pa (-30 dBV)	120 dB	22 dB-A (IEC 60268-4)	72 dB (A-weighted)			150 ohms	
	MB3	supercardioid	50 to 15,000 Hz	22 mV/Pa (-33 dBV)	120 dB	22 dB-A (IEC 60268-4)	72 dB (A-weighted)			150 ohms	
	MB4	supercardioid	50 to 15,000 Hz	22 mV/Pa (-33 dBV)	120 dB	22 dB-A (IEC 60268-4)	72 dB (A-weighted)			150 ohms	
	C562 CM	omnidirectional (hemispherical)	20 to 20,000 Hz	25 mV/Pa (-32 dBV)	130 dB	16 dB-A (IEC 60268-4)	78 dB (A-weighted)			≤600 ohms	
	PZM10 / PZM10 LL	hemispherical	80 to 20,000 Hz / 100 to 20,000 Hz	2.5 mV/Pa (-52 dBV) / 1.4 V/ Pa (+3 dBV)	120 dB	26 dB-A (IEC 60268-4)	68 dB (A-weighted)			240 ohms / 75 ohms	
	PZM11	hemispherical	80 to 20,000 Hz	5 mV/Pa (-46 dBV)	120 dB	26 dB-A (IEC 60268-4)	68 dB (A-weighted)			225 ohms	
	PZM11 LL WR	hemispherical	80 to 10,000 Hz	5 mV/Pa (-46 dBV)	100 dB	26 dB-A (IEC 60268-4)	68 dB (A-weighted)			75 ohms	

	Recommended Load Impedance	Powering (IEC 61938)	Current Consumption	Connector	Finish	Dimensions	Net/Shipping Weight	Standard Accessories	Optional Accessories	Cable
	≥1,000 ohms	**9 to 52 V phantom power**	≤2 mA	3-pin XLR	matte dark gray	185 x 120 x 19 mm (7.3 x 4.7 x 0.8 in.)	160 g (5.6 oz.)	**W 547**	**B 18**	3 m (10 ft.)
	≥2,000 ohms			switchcraft TA3F	black	17 x 8 x 2 cm (6.7 x 3.2 x 0.8 in.)	170 g (6 oz.)			4.6 m (15 ft.)
				3-pin XLR	black	15.2 x 12.7 x 1.9 cm (6 x 5 x 0.75 in.)	184 g (6.5 oz.)			use 2-conductor shielded microphone
				XLRM	black	7.62 x 6.35 x 0.95 cm (3 x 2.5 x 0.375 in.)	184 g (6.5 oz.)			1.83 m (6 ft.) cable
	≥2,000 ohms	**9 to 52 V phantom power**	≤2 mA	3-pin XLR	matte black	80 dia. x 5 (10) mm (3.1 x 0.2/0.4 in.)	56 g (2 oz.) (without cable)	adhesive compound	**B 18**	3 m (10 ft.) conn. cable with XLR connector, fixed
				3,5 mm stereo jack, 3,5 mm plug	white / black	114 x 114 x 21 mm (4.5 x 4.5 x 0.8 in.)	159 / 222 g (5.6 / 7.8 oz.)			100 cm (39.4 in.)
		12 to 48 V power to DIN/IEC		Switchcraft TB3M	black	8.6 x 12.3 x 2.3 cm (3.4 x 4.84 x 0.9 in.)	170 g (6 oz.)			
		12 to 48 V power to DIN/IEC		Switchcraft TB3M	satin black	6.4 x 8.9 x 2.5 cm (2.5 x 3.49 x 0.988 in.)	269 g (9.5 oz.) (incl. cable)			
		12 to 48 V power to DIN/IEC		3-pin XLR	satin black	2.74 dia. x 8.4 cm (ø 0.974 x 3.324 in.)	78 g (2.7 oz.)			
		12 to 48 V power to DIN/IEC		3-pin XLR	satin black	3.8 x 1.5 cm (1.5 x 0.5 in.)	Microphone: 19 g (0.7 oz.) Power Module: 78 g (2.8 oz.)			
	≥2,000 ohms	**9 to 52 V phantom power**	≤2 mA	3-pin XLR	matte nickel plated	20 dia. x 28 mm (0.8 dia. x 1.1 in.)	30/195 g (1.1/76.9 oz.)	installation hardware, phantom power adapter	**B 18**	0.5 m (20 in.)
	≥2,000 ohms	**12 to 48 V power to DIN/IEC, inline XLR connector / 12-24 V DC, unterminated wires**		3-pin XLR / stripped and tinned leads	off-white (may be painted any color)	3.9 dia. x 7.2 cm (1.53 dia. x 2.829 in.)	74 g (22.6 oz.) / 93 g (3.3 oz.)			
		12 to 48 V phantom power		screw terminal	off-white (may be painted any color)	11.506 x 7.05 x 2.946 cm (4.53 x 2.7 x 1.16 in.)	71 g (2.5 oz.)			
		12-24 V AC or DC		screw terminal	silver (may be painted any color)	7.061 x 11.506 x 4.374 cm (2.78 x 4.53 x 1.722 in.)	71 g (2.5 oz.)			

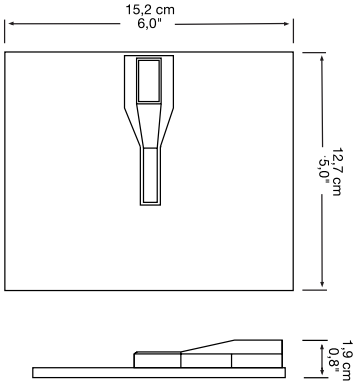
DIMENSIONAL DRAWINGS



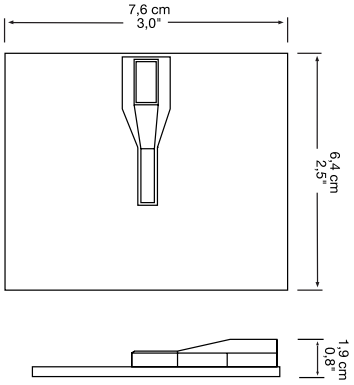
C547 BL



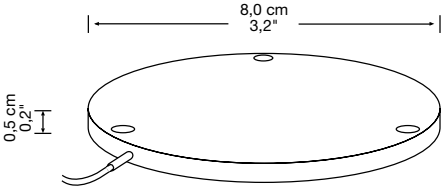
PCC160



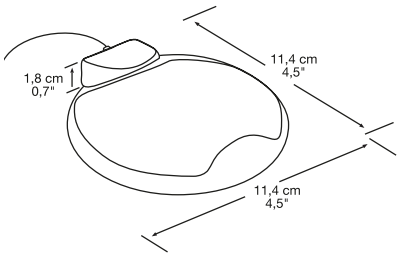
PZM30 D



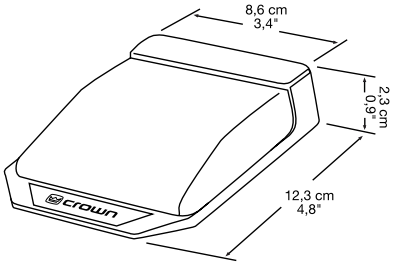
PZM6 D



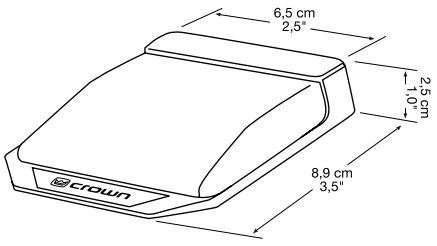
CBL99



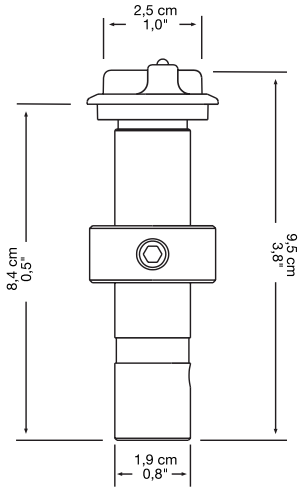
CBL410 PCC



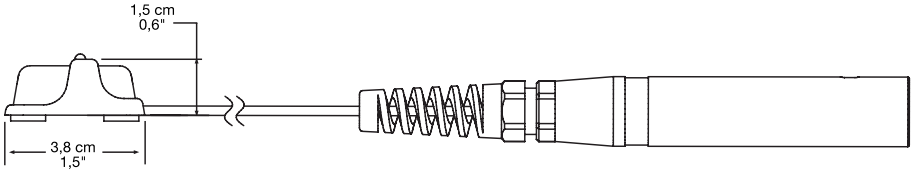
PCC170
PCC170 SW



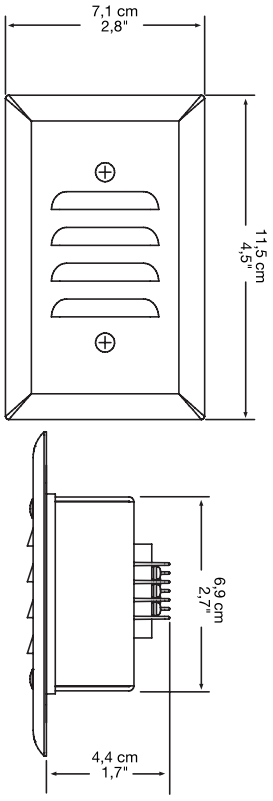
PCC130
PCC130 SW



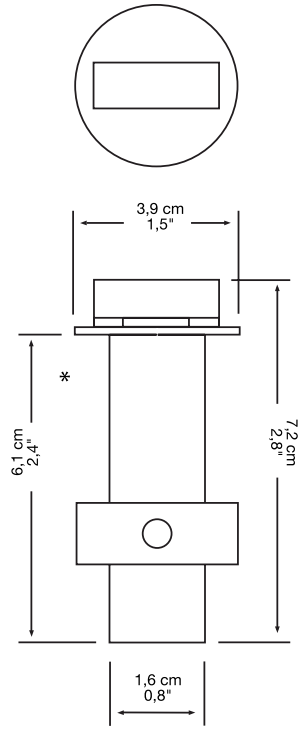
MB3



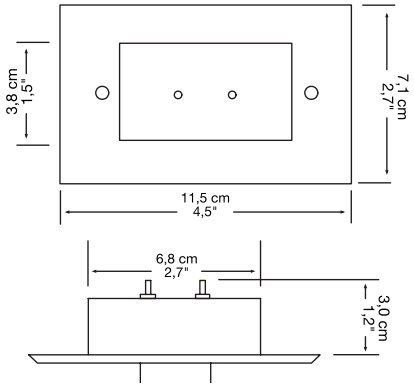
MB4



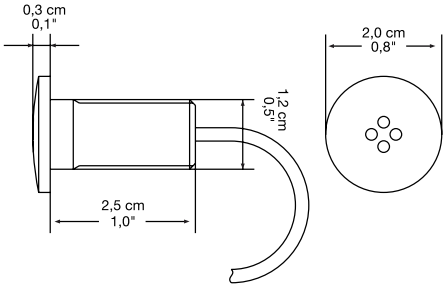
PZM11 LL



PZM10
PZM10 LL



PZM11



C562 CM

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