Principal Characteristics of the Different Microphone Types

Pressure-Gradient Transducers

Note: Usually, any directional microphone is referred to as a "pressure-gradient transducer" even when it has only a limited pressure-gradient component (e.g. a cardioid). This usage is technically not quite correct, since a true pressure gradient transducer always has a bidirectional (figure-8) pattern. Nevertheless, we have adopted this nearly universal practice.

SCHOEPS makes many different types of directional capsules and microphones, each having specific features and a range of typical applications.
What they all have in common, as you can see from their polar response diagrams, is that their sensitivity to any sound depends on the angle of incidence of that sound; they "favor" sound that arrives from particular directions. This allows them to maintain the same balance of direct to diffuse (reverberant) sound when placed at a greater distance from the sound source than an equally sensitive omnidirectional microphone.

The bidirectional MK 8 and CCM 8 are pure pressure-gradient transducers. Our other directional microphones use combinations of the pressure and pressure-gradient principles; their various directional characteristics result from differing proportions of these ingredients.
All our microphones, including the multi-pattern ones, are single-diaphragm – a feature unique to SCHOEPS. This results in polar patterns that are less frequency-dependent than any dual-diaphragm design can offer, a high-frequency response that is distinctly more extended, and low-frequency response (with our single-pattern omnidirectional microphones or in the omnidirectional setting of our multi-pattern microphones) that is essentially perfect.

One advantage of small pressure-gradient transducers such as SCHOEPS microphones is that their directional pattern can be kept constant across a wider frequency range than with a pressure transducer. On the other hand, their low-frequency response in a free sound field is not as extended as that of a pressure transducer. Placement in the near field can compensate for this bass rolloff via proximity effect, but there is also a risk of overcompensation.

Proximity effect may also be used to suppress environmental noise by choosing a microphone type having a large bass rolloff and/or by the use of a corresponding electronic filter. A cardioid microphone at a distance of less than 40 cm, for example, will pick up a speaking voice quite clearly, while environmental noise will be suppressed due to the directivity of the cardioid pattern and its bass rolloff. At the same time, the lower frequencies in a person's voice will be restored to normal by virtue of proximity effect, resulting in a clear and full sound.

By choosing a microphone of high directivity it is also possible to avoid acoustic feedback. If a loudspeaker is set up within the reverberation radius, it should, for obvious reasons, be positioned where the microphone has its minimum sensitivity. If the loudspeaker is beyond the reverberation radius, its radiated sound will reach the microphone after being reflected by the walls, floor and ceiling of the room, arriving as reverberant sound from many directions. The microphone will pick this up less strongly than the direct sound from the source on the main axis.

Off-axis attenuation increases with greater microphone directivity. The greater this is, the less danger there will be of acoustic feedback. This is true only in the direct sound field, however; in a diffuse sound field (beyond the reverberation radius*), a directional microphone will offer no help for this problem.

When dealing with pressure-gradient transducers, their greater sensitivity to wind and vibration should be kept in mind. Suspensions that damp solid-borne noise (elastic suspensions and/or sound-isolated stands) are highly recommended, as well as popscreens and windscreens wherever appropriate.