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Neumann TLM 102

**Neumanns preisgünstigstes
Studiomikrofon aller Zeiten**



71099



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Large-Diaphragm
Condenser Microphone

Neumann TLM 102

Until now, the Berlin brand's least expensive large-diaphragm condenser microphone has cost around 1000 euros. With the brand new TLM 102, Neumann roughly halves the admission price for its studio class of microphones. Does the product still live up to the name and fame of the Neumann brand?



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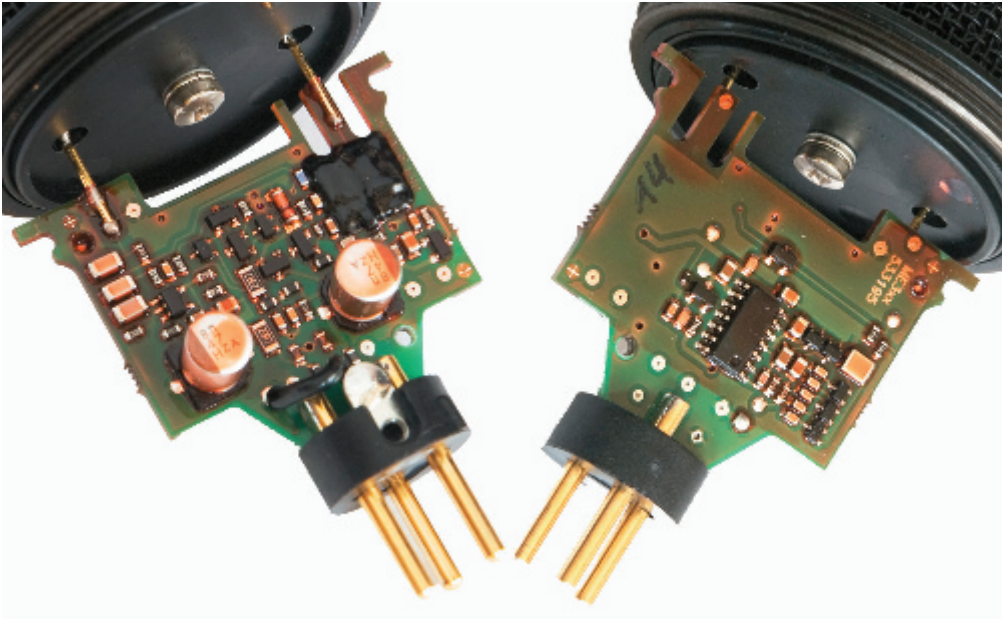
You hear the TLM 102 compared with the proven TLM 103. Recordings of a Lakewood D-18 acoustic guitar illustrate the spectral balance, and a rap track with backing in a separate file demonstrates the suitability for the human voice and the mixability of the microphone signal.

Neumann – the father of condenser microphones. As a seasoned reviewer, I still look forward to a new Neumann model, since as the saying goes: Father knows best! Browsing through our September issue, I was therefore struck, as you probably were as well, by Neumann's ad for the TLM 102. However, if you didn't look closely, you might easily have mistaken the newcomer for the trusty TLM 103 after a slight cosmetic makeover. This would be wide of the mark:

The TLM 102 is considerably smaller, and, above all, considerably less expensive! Its list price is 630 euros; the street price may be around 50 euros lower. Never before has a genuine Neumann large-diaphragm microphone been this affordable! Which prompts the question: Is it a genuine Neumann mic?

Le petit noir

Yes, it is! Like all Neumann microphones, the TLM 102 is made in Germany. It is



Modern circuit technology in a small space: Discrete transistor circuitry on the front and a DC/DC converter for proper capsule polarization on the back.

supplied in a cardboard box with a mold insert made of (lintfree) foam rubber. A stand mount is included – a spider suspension mount would certainly have exceeded the budget. The EA 1 shock mount is roughly 200 euros, but the manufacturer has already indicated that a more affordable elastic suspension will be available soon.

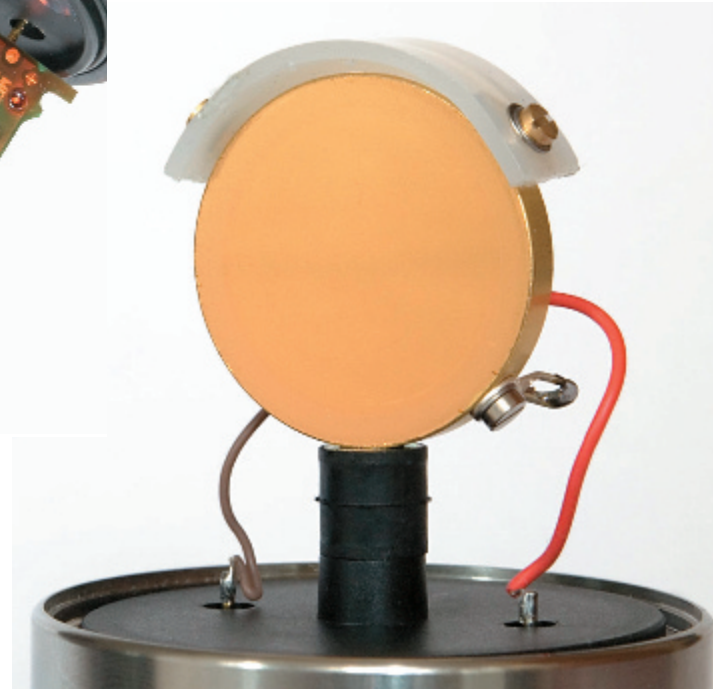
Like most Neumann models, the TLM 102 is available in matte nickel or black. The review model we received was the black version. Our first impression: Cute! With a height of 115 mm, a ring diameter of 51 mm and a body diameter of 43 mm, it is truly petite for a large-diaphragm microphone. And at 260 grams it weighs less than Carla Bruni's handbag. There is nothing to fault in the manufacturing quality: The lower part is made of solid metal, and the head has the typical Neumann shape; its slanting sides prevent the occurrence of standing waves in the headgrille. A gleaming chrome ring accentuates the visual appearance and gives the TLM 102 an air of solid workmanship. Shall we look inside?

Internal Matters

The first thing we notice is that the double-layered microphone headgrille is lined inside with foam material. The explanation may be

that such an economical microphone could easily fall into the hands of studio novices who are used to sturdy stage mics. The foam gives the delicate diaphragm a certain degree of protection from beatbox experiments. Another factor is that pop sounds are not hindered as effectively by small microphone headgrilles as by large ones; the foam insert compensates for this to some degree.

As one would expect, the TLM 102 uses ultra-modern transformerless transistor electronics. To protect it from moisture and curious glances, part of the circuit board has been coated with a black plastic material. The visible part of the board reveals discrete FET electronics with SMD construction, suggesting considerable complexity despite the small physical size. The back of the circuit board is equipped with an IC and various other components. Purists will be relieved that this IC is not in the signal path: It is a DC converter with CMOS technology, which generates the polarization voltage for the capsule. The circuitry does not include tube simulation as found in the TLM 67 or TLM 49. As with the other three-digit TLM models (103, 150, 170 and 193), the circuitry is optimized for maximum transparency and dynamic range.



The TLM 102 operates with a newly developed edge-terminated large-diaphragm capsule.

Capsule Philosophy

The TLM 102 operates with a newly designed capsule. Unlike typical Neumann capsules, such as the K 67 in the U 87 A and TLM 67, or the related single-diaphragm K 103 capsule in the TLM 103, the brand new K 102 capsule in the TLM 102 has no center terminal. Historically speaking, edge-

Profil

Manufacturer/Distribution:

Georg Neumann GmbH

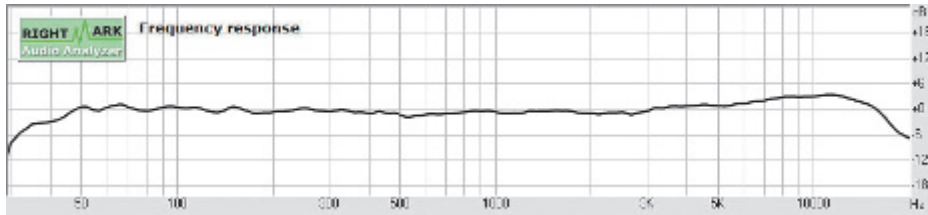
Internet:

www.neumann.com

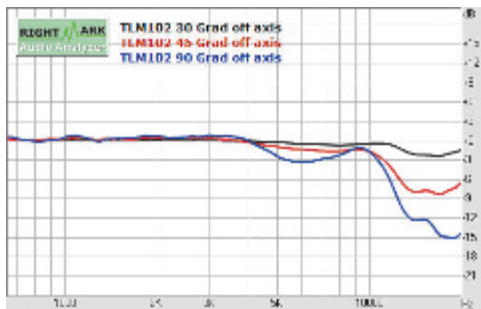
MSRP/Street price:

€ 630/approx. € 575

- + Natural, transparent sound
- + Low self-noise
- + Extremely high maximum sound pressure level
- + Well-suited to the human voice
- + Affordable price



Measured under real-life conditions, the frequency plot shows a very balanced response



Very little off-axis coloration for a large-diaphragm microphone (levels adjusted; the 0-dB line represents the on-axis response)

terminated capsules with large diaphragms are a development of the Austrian competitor AKG. Neumann connoisseurs, however, will know that the Berlin company, too, has been making such capsules for quite some time. The oldest Neumann design of this type is the K 89 capsule used in the U89 and TLM 170. The digital microphone D 01, the most technologically advanced model, also uses an edge-terminated capsule, as does the BCM 104 broadcast mic.

Generally speaking, a great advantage of edge-terminated capsules is that they are less affected by dirt and moisture. In traditional capsules with a center terminal, dust and dirt can accumulate between the gold-plated part of the diaphragm and the outer ring. Gradually leakage currents between the diaphragm and the backplate may lead to a depletion of the polarization voltage. This is indicated first by crackling background noises, and eventually the capsule becomes completely silent.

Edge-terminated capsules, by contrast, are constructed so that the entire exterior of the capsule is at ground potential. For one thing, this prevents the electrostatic attraction of dust particles, and for another, the counter

electrode is located in the inaccessible interior of the capsule, so that adverse leakage currents can almost be ruled out. Moreover, an edge-terminated diaphragm can also vibrate more freely, at least in theory. That said, we know and value the sound of many traditionally constructed capsules, so these aren't likely to disappear anytime soon. However, it certainly makes sense to design a new capsule according to a modern functional principle that is less susceptible to outside influences.

Since the capsule is by far the most costly part of a condenser microphone, it offers the greatest savings potential – provided the designers find ways to simplify manufacture without compromising the sound. The K 102 is designed without an outer ring, which is unusual for a large-diaphragm capsule. The diaphragm is glued in place. However, the attachment should be secure nonetheless; in many capsules the diaphragm is de facto attached only with glue, and the additional screwed ring often contributes only to the visual appearance or is required for production.

The K 102 design is also clever in other ways. For instance, the backplate has no blind holes (which should considerably simplify production); instead, acoustic damping is effected by a separate attenuator on the back. This principle has already been successfully employed in the BCM 104 capsule. However, the K 102's smaller size with an outside diameter of 28 mm and a freely vibrating diaphragm measuring 22 mm more closely corresponds to the K 89 capsule. Thus, although it is a novel design, the brand new K 102 capsule is based on a sound foundation.

Technical Considerations

The TLM 102 differs from the TLM 103 through its lower sensitivity of 11 mV/Pa and its somewhat higher self-noise figure of 12 dB-A. For the review model, both of these values were found to be a little better than

the manufacturer's specifications. The measured sensitivity was 13.2 mV/Pa – around 5 dB less than that of my trusty TLM 103 (which you've heard as a reference mic in all previous sound comparison files). The self-noise of the newcomer was found to be approximately 11 dB-A, about 5 dB higher than that of the TLM 103. This may sound like a lot, but it is next to nothing in practice. As you probably know, the TLM 103 is one of the quietest studio microphones of all time with an impressive self-noise figure of only 7 dB-A, so the 12 dB-A specified for the TLM 102 is still a very good value when considered in absolute terms. In other words, while this difference is detectable in a special measuring chamber ("Rauschbombe"), you'd be hard pressed to find a recording room that is quiet enough for you to actually hear the difference. Incidentally, the lower sensitivity and somewhat higher self-noise in comparison to the TLM 103 are due to the less sensitive capsule design. The somewhat smaller capsule in the TLM 102 in itself produces a quieter electrical signal, and with a similar configuration of the impedance converter, i.e. with constant electronic noise, the output level and signal-to-noise ratio both shift by five to six decibels.

However, it can also be said that less sensitive capsules tend to respond with greater fidelity than those which are optimized for a high output level. The capsule diameter itself is a contributing factor: Smaller diaphragms produce less off-axis coloration. In fact, outside of the recording axis the sound of the TLM 102 remains remarkably constant. Up to approximately 30 degrees off-axis, there is almost no effect; only at 45 degrees does the sound become a little duller in the highest octave. This is an excellent result! In terms of unwanted off-axis coloration, the TLM 102 performs better than the more expensive TLM 103 and many other large-diaphragm mics.

The measured frequency response, too, appears exceptionally smooth. Remember: Following current recording practices, measurements made at Sound & Recording differ from those made by microphone manufacturers. In order to capture some of the proximity effect we take measurements at a distance of only 33 cm rather than one meter, and we also use a moderately acousti-

cally treated studio room rather than an anechoic chamber. Our frequency plots therefore are never as ripple-free as the ones published by the manufacturer. The TLM 102's impressively smooth curve thus illustrates that the mic performs with great fidelity not only under laboratory conditions, but also in an actual recording situation, where the direct signal is overlaid with sound reflections. It is here that the effect of the uniform, largely frequency-independent cardioid directional characteristic becomes evident, as it ensures that the reflected sound does not receive any unwanted coloration.

Practical Applications

The small size of the TLM 102 offers many advantages. The microphone can be positioned easily, and due to its light weight is very stable when hung from a stand. In broadcast and voiceover applications, speakers will welcome the fact that the TLM 102 allows a better view of one's notes than is the case with conventional large-diaphragm mics. For hyperactive singers or for rappers who occasionally glance at their latest lyrics, it is certainly convenient that head movements scarcely change the sound. By contrast, with many cheaper large-diaphragm mics, the sound quickly becomes dull outside of the main recording axis. As was already mentioned, however, the small size has disadvantages in terms of pop noises. Despite the foam insert in its headgrille, the little TLM 102 is scarcely less sensitive to pops than the larger foam-free TLM 103. An external pop screen is therefore recommended except in the case of very experienced speakers and singers.

My initial impression is that the new TLM 102 sounds quite similar to the proven TLM 103. Both mics are very linear up to the mid range, while the upper frequencies have a very moderate boost that lends voices some "air". A more careful comparison and testing of both signals in the mix (as you can hear for yourself in the sample rap recording), shows that the 102 has a somewhat softer presence. The highs appear a little sweeter and more self-contained. In the lows the newcomer seems a bit more defensive than the TLM 103, which is known for its unusually full bass. In comparison, the TLM 102 appears more controlled; although the bass is not quite as powerful, it is also less

likely to sound boomy. Overall, when compared to the TLM 103, the TLM 102 seems more specifically adapted to the human voice. It has been reported that the TLM 103 can sound a little edgy with certain voices. Neumann appears to have taken this criticism seriously; the new TLM 102 should be able to handle even somewhat problematic voices.

On acoustic guitar, the differences in sound are similar: The TLM 102 seems slightly softer and more self-contained than the very gutsy, open-sounding TLM 103. As can be clearly heard in the strumming guitar sound sample, the TLM 103 emphasizes the strokes of the pick more strongly than the TLM 102. Which is preferable depends on the musical context. For solos, the TLM 103 certainly sounds more impressive, whereas with the TLM 102 the guitar fits in less obtrusively as an accompanying instrument. For finger-picking guitar style, I would prefer the TLM 103. The bass carries better, and complex picking patterns are more clearly delineated. However, here too the TLM 102 could be the smoother alternative, if the guitar accompaniment is to remain in the background.

If you listen to the sound samples very closely, in particular to the passage when the guitar fades away, you'll find that under real-life conditions the TLM 102 is just as noise-free as the TLM 103. Even in a quiet recording room, the background noise is louder than the self-noise of the TLM 102. Its outstanding SPL capability is also a big plus. TLM 102's maximum sound pressure level is specified as 144 dB, a couple of decibels higher than even the TLM 103. Although such loud levels are very unlikely to occur in practice, it is reassuring to know that the TLM 102 can be practically ruled out as a source of distortion. Even a Meinl tambourine struck hard at a distance of 10 cm made no impression on the TLM 102 – this exceptionally loud tambourine overloads most condenser microphones at a distance of half a meter. Congratulations!

Conclusion

The TLM 102 is a thoroughly well-designed microphone. Despite the unprecedented low price for a Neumann microphone, this mic provides the high quality traditionally associated with the Berlin brand. Don't expect vintage sound coloration; the TLM 102 is a



Honey, I shrunk your favorite mic! The new TLM 102 and its Neumann relatives (from the left): The U 47, TLM 103 and TLM 102

modern, relatively neutral microphone, without being lifeless or unsensual. Its sound image is transparent and very well-balanced; fresh, but not harsh. Bass response and the proximity effect are well-proportioned, and the mid range is free of coloration. Its technical specs are impressive as well: The TLM 102 has very low self-noise and its extreme SPL handling capabilities make a pad switch seem superfluous. As unimposing as it may appear visually, given its small size, whoever uses it will soon discover that it doesn't bear the Neumann badge for nothing: It is a carefully constructed microphone made in Germany. →

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