

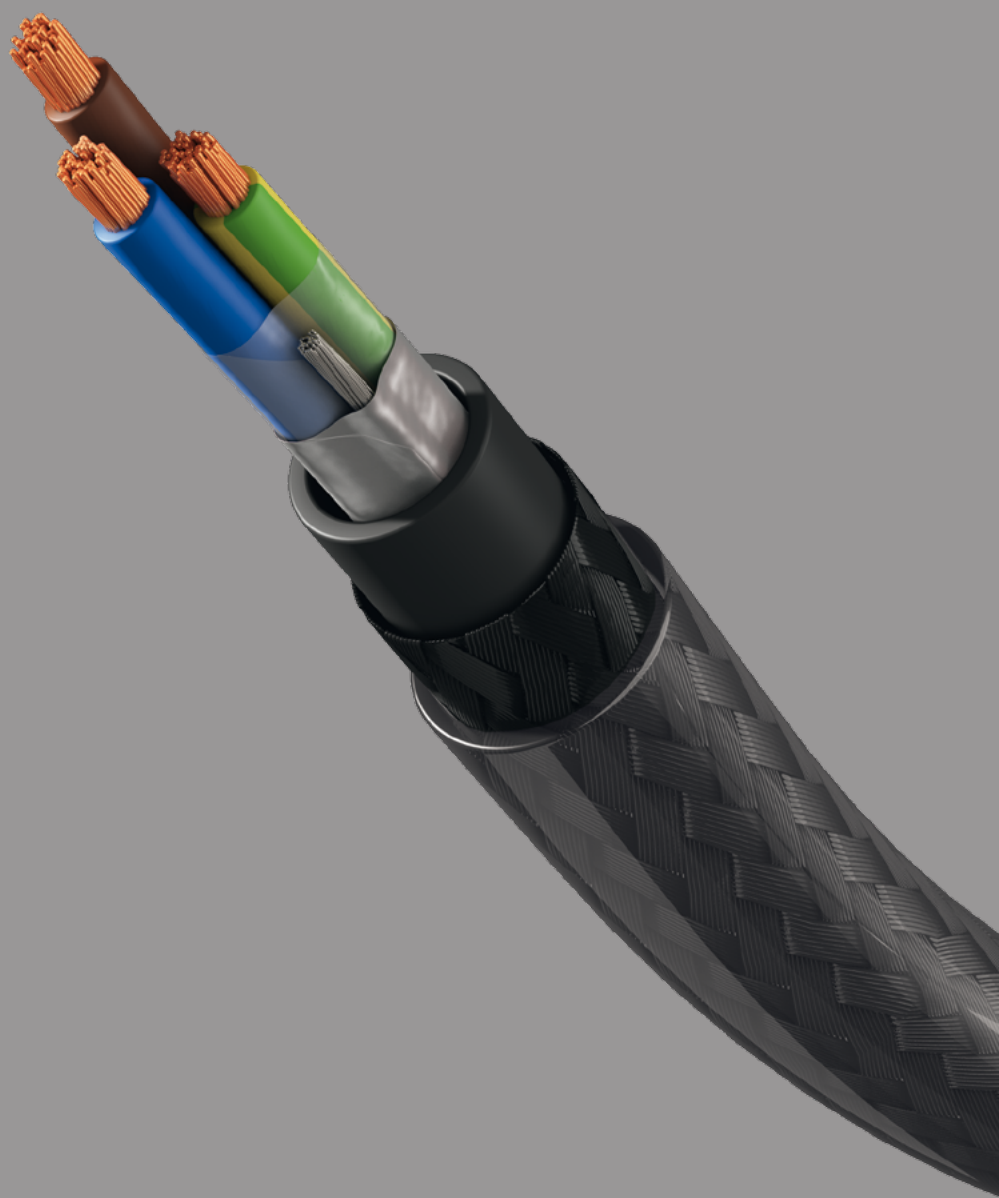
Cable range

Audio, loudspeaker, mains

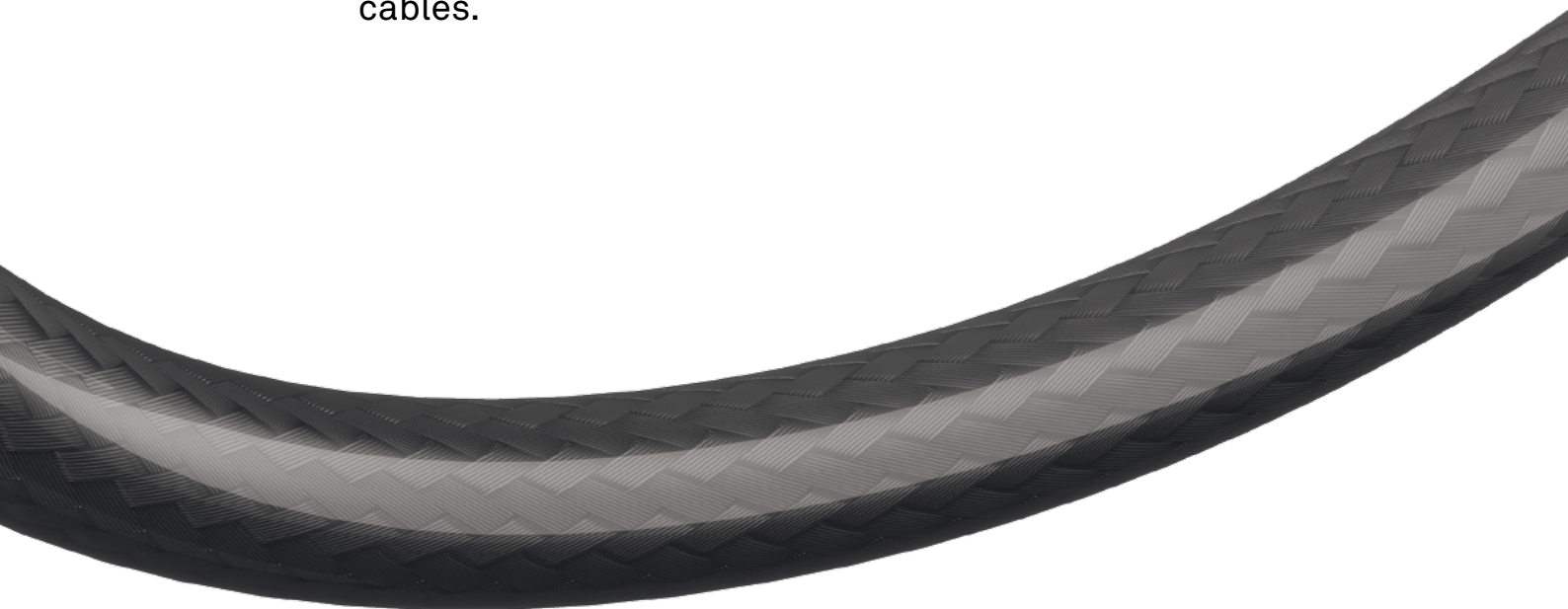


T+A

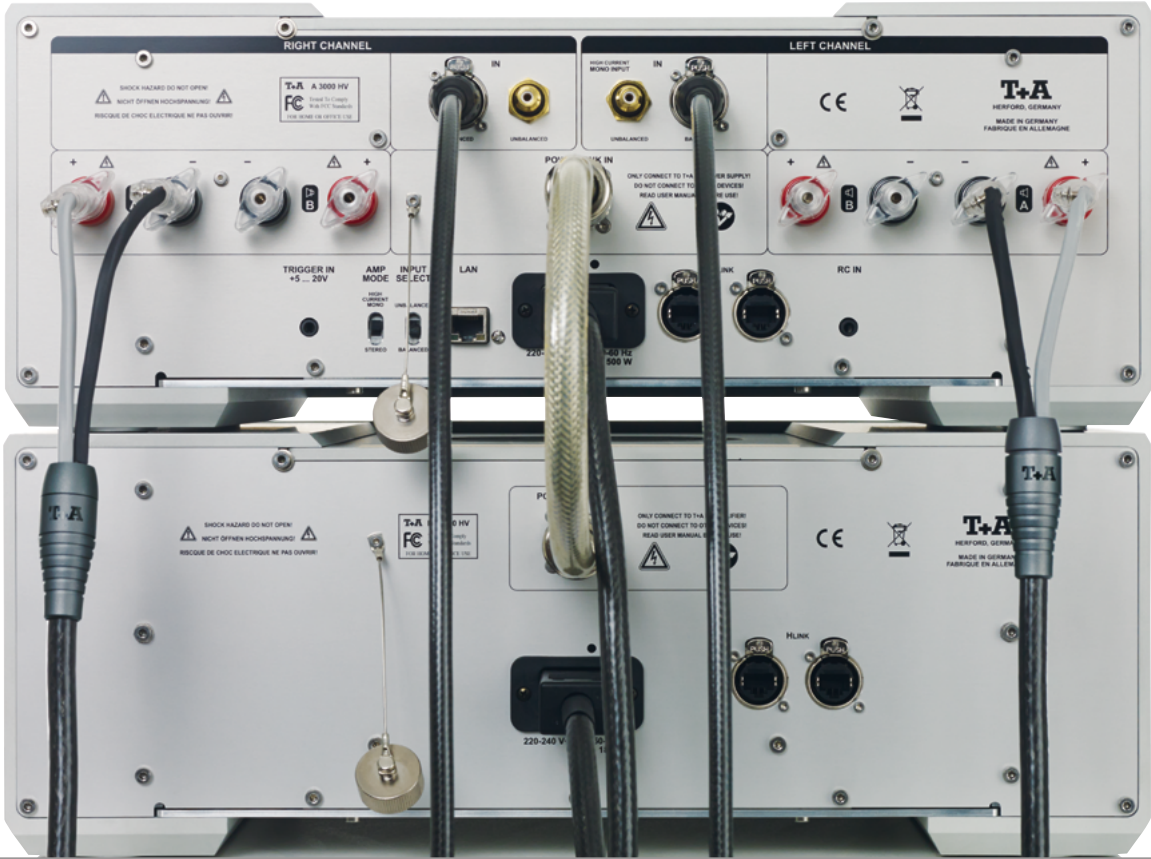
Cables for perfect sound

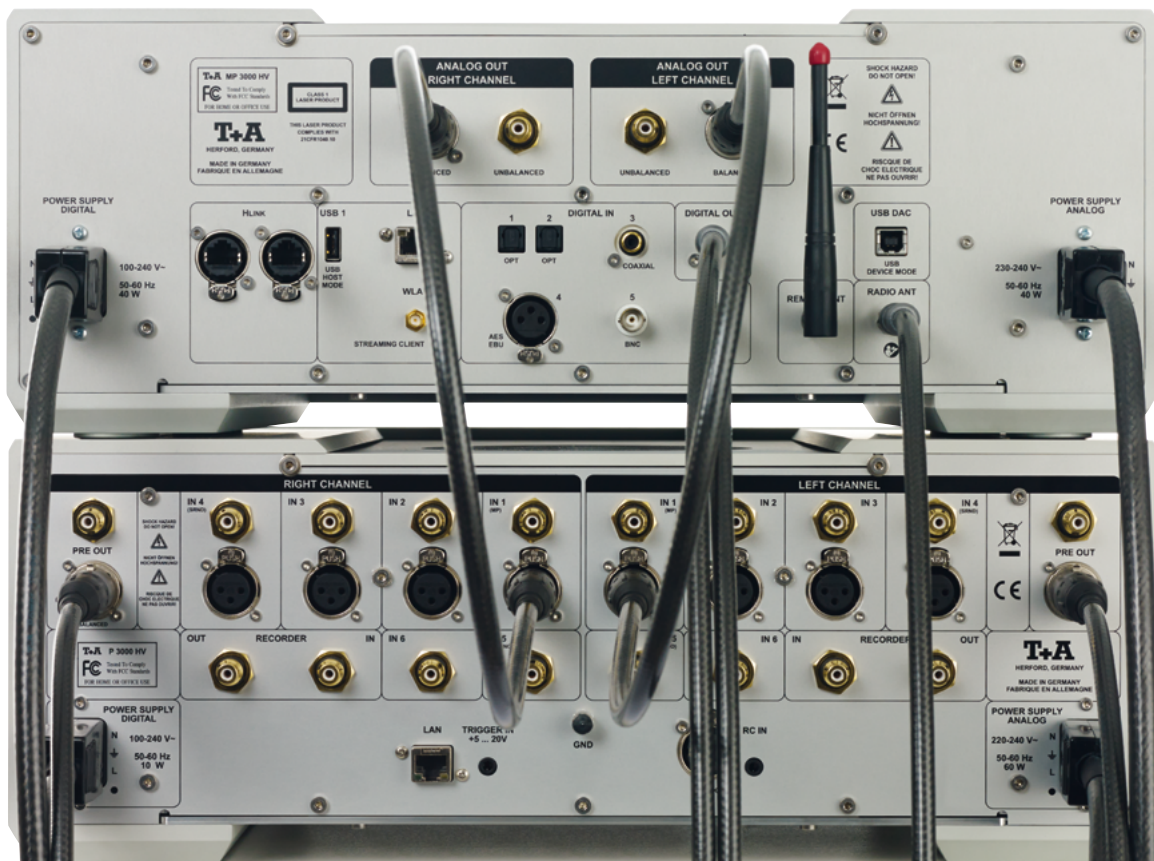


The higher the quality of top-class Hi-Fi components, the more pronounced the effects of the weak links in the system chain. This means that cables become more and more important as the performance of the equipment improves. At T+A we decided many years ago to concentrate on this subject, and today we are proud to present to you our latest generation of cables, which are even better, even more mature and even more audiophile in nature; in short, they are designed to fulfil today's requirements in full. This catalogue also contains background information which helps to explain the reasoning behind the unique overall design and construction of our cables.



Cables for perfect sound





Cables for perfect sound

Beacons shining through the electro-smog. The result of the increasing use of digital or processor-controlled devices in every conceivable sphere of life (radio, television, mobile radio systems, mobile phones, PCs, WLAN routers, radio links, wireless devices, domestic appliances, etc.) is that a fog of high-frequency interference - sometimes known as electro-smog - has developed which permeates everything in the home. Connecting leads act as aerials, and naturally pick up an enormous level of potential interference which can induce static charge in those cables. If the intention is to exploit the full potential of a good-quality Hi-Fi system, it is absolutely essential to prevent these effects by employing cables expressly designed to counter them. Without good cables even the best system cannot possibly achieve the quality of sound of which it is capable; on the other hand it also goes without saying that the very finest cables cannot transform a poor system into one which sounds good. The mains power supply is another critical area, as its quality is - to say the least - variable.

The mains supply should actually take the form of a sine-wave voltage, but in the real world our Hi-Fi equipment has to cope with distorted, asymmetrical phases (caused by dimmers, hair-dryers, step switches, etc.). Thermostats and switches add noise and other interference to the supply. Almost all transformers installed in Hi-Fi devices are very sensitive to such mains-borne interference.

Many Hi-Fi components, especially machines which include digital signal processing, or are fitted with control or signal processors, themselves generate a spectrum of interference which cannot be disregarded; interference which they either induce in the connecting leads, or radiate in the form of radio-frequency signals. Very large power amplifiers inevitably draw high currents, and this also has an adverse effect on the quality of the mains power supply. High-performance output stages are capable of delivering very high currents to the loudspeakers. These currents not only generate powerful magnetic fields, they can even inflict mechanical stress on the loudspeaker cables.



We can distinguish five main sources of interference and signal falsification:

- Electro-magnetic interference fields in the radio-frequency range, affecting the various connecting leads in the audio system in different ways.
- Electro-static charges in cables.
- Asymmetry in the mains voltage, adversely affecting the machines' mains power supply units; the influence of mains-borne interference extends right into the RF range.
- The system's components themselves radiate interference, or pass it into the connecting leads.
- At high power levels the loudspeaker leads are subject to severe mechanical and electro-magnetic stress.

Enhancing the chain. We have amassed thirty years of experience in developing and building top-quality high-end audio components, and this has enabled us to develop a range of cables and high-quality mains distribution panels based on a real understanding of physics, with the aim of providing our customers with solutions for optimising the sound quality of their Hi-Fi systems which make sense in terms both of price and technology. Please note our emphasis on the word "sensible". For reasons of courtesy, the audacious idea that devices costing 3000 Euro should be connected using cables costing several times that amount - as promulgated by many cable manufacturers - does not deserve comment on our part.

Over the last few years important findings have been gained concerning the various basic types of application: loudspeaker, LF, digital and mains cable, mains distribution panels.

We have now applied this knowledge to the design and construction of our cables. During this process we have always focussed on solid solutions with a genuine technical basis, and deliberately avoided the sometimes nebulous and almost mystical approaches of many suppliers, most of which do not stand up to scientific examination. Not without reason does the name **T+A** stand for Theory and Application, so our developments are always fundamentally based on the laws of physics. It is certainly possible to understand the sound qualities of cables in scientifically plausible ways; if the reasons are properly interpreted, then development can proceed under technically justified aspects, ensuring that the work continues in the appropriate direction. In our view it makes little sense to argue about the last millionth of contamination in the copper, or the use of "obscure" materials, as do many manufacturers who appear to enjoy the pastime of splitting hairs. We ignore these ideas, in the firm belief that the mechanical construction of the conductors and insulators, and the mix of materials involved, have a much greater influence. Like all **T+A** equipment our cables undergo consistent development with the overall aim of obtaining totally neutral, uncoloured sound quality; we want our cables to effect absolutely no changes to the output signals of the source device or the amplifier. In an ideal world cables should behave as if they were not present at all.

We are certain that you, as an audiophile music-lover, will very quickly appreciate the significant potential for sonic improvement which our cables provide. We hope that you will find the optimum configuration for your system with the help of the following descriptions of the individual cable types.

Speaker Hex (Carbon). Loudspeaker cable



Speaker cables have the exacting task of carrying high power levels from the power amplifier to the loudspeaker over relatively long distances. Even when the audio system is relatively small, currents of several Ampere can flow. These substantial currents generate significant electro-magnetic fields around the cables, which can cause interaction between them. It is also true that considerable mechanical forces of attraction and repulsion can occur between the individual cable strands; this can cause vibration in the cable, which in turn modulates the signal.

A phenomenon from the field of RF technology is known as the skin effect, and it is also important not to neglect this. It describes the habit of electrons of travelling in a different manner depending on frequency (including audio frequencies at the treble end of the range), i.e. of moving to a greater or lesser extent along the surface of a conductor. In physical terms the low terminal impedance (in the range 2 to 20 Ω), which loudspeakers present to the cables, constitutes a serious problem because

the classic parameters of capacitance C, inductivity L, resistance R and leakage resistance G have a much more pronounced frequency-dependent effect on loudspeaker cables than on audio leads. This means that there are many inter-connected parameters which determine the final sound qualities of a cable. It also means that it is not possible to design a cable which perfectly fulfils all the requirements. In fact, there is a series of basic technical requirements which must be met, and specific cable types have to be developed in order to achieve particular results.

In concrete terms this means that all our cables are of very strong mechanical construction. The number and cross-section of the individual conductors bears a particular relation to the total cross-sectional area, and these conductors are wound together extremely tightly. The outer jacket is always extremely closely cast around the conductors, and consists of very high-quality insulators selected and optimised for the specific application.

This construction ensures that our cables are prevented mechanically from oscillating or vibrating. The result of this is tight, well-contoured bass. However, by their nature these cables are not very flexible, and they appear to be thinner than many puffed-up cables whose effective cross-sectional area is actually smaller. "The thicker, the better" is a simplistic view, and has no foundation in fact - at least in terms of physics. The conductors we use consist of high-grade, oxygen-free OFC copper of the highest possible purity, in various thicknesses. As many investigations show, it is very important that cable provides consistent quality over the full frequency range. If this were not the case, the cable would exaggerate particular ranges, i.e. would discolour the sound. We would consider it irresponsible to produce such cable for use with any of our Hi-Fi components.

In point of fact, all T+A cables have excellent frequency neutrality, and exhibit low inductivity values. By carefully combining resistance (cable material), inductivity and capacitance (cable construction and insulation) we achieve damping characteristics ranging from very good to ideal, and this is the perfect basis for an accurately balanced overall sound. Speaker Hex features a large total cross-section, and is equipped with six twisted-strand copper conductors. It features a PE monofilament braid, and an anti-static jacket with an admixture of static inhibitor; the latter gives the cable its carbon colouring, and significantly reduces surface resistance. The cable terminates in solid aluminium terminal sleeves with integral ferrite RF ring; in each case three twisted-strand conductors are attached to high-end BFA banana plugs or alternatively to the spades with rhodium-plated surfaces of the finest quality.

Speaker Hex



Audio Triax (Carbon). Audio cable

F-Plug



BNC-Plug



Coax-Plug



RCA-Plug



The requirements of a high-quality audio lead are fundamentally different from those of loudspeaker cable. The signals borne by the cable are in the millivolt region, and the currents which flow are relatively low. And here lies one of the principal problems, because in percentage terms any electro-magnetic interference has a much more pronounced influence on a small signal than on a large one. In consequence the cable shield assumes central importance: it must provide perfect shielding of the internal conductor, and prevent any build-up of static charge in the cable. Until recently no attention has been paid to static charge in these cables, but we have discovered that it has a marked influence; that is why we have fitted our carbon cables with an outer jacket incorporating an effective admixture of static inhibitor. Audio leads are generally much shorter than speaker cables, and the terminal resistance is in the range 10 k Ω to 100 k Ω .

As a result, inductivity is much less of a problem, and in its place parallel capacitance takes on greater significance. This parameter varies according to the geometrical construction of the cable and the insulation employed, and is proportional to the cable's length. In combination with the output impedance of the source device it forms a low-pass filter, which can result in a loss of treble and phase distortion if the cable is particularly long and high in capacitance. This means that the source impedance (output resistance) of a device is directly proportional to the capacitance of the cable: the lower the output impedance, the more the audio leads can safely be longer and higher in capacitance. As a general rule all T+A source devices have an output impedance below 50 Ω , and are therefore ideal for use with our audio leads. All T+A audio leads are classed as low-capacitance types, and this makes them suitable for use with source devices of high output impedance.

As you would expect, they are ideal for use in conjunction with T+A source devices, because their reduced output impedance almost completely eliminates frequency-related and phase problems. Their impedance is also an excellent match to our source devices.

Frequency neutrality of the cable parameters is of great importance, and we achieve this through the use of the highest-quality insulators, extremely pure OFC copper and ingenious cable geometry. The shielding braids are very firm and tight, and, like the internal conductors, consist of high-purity oxygen-free copper. They are also underlaid with laminated aluminium film. The net result is that T+A audio leads achieve very finely balanced sound qualities, independent of frequency and skin effect problems.

Audio Triax cable exhibits sophisticated double co-axial construction. The signal conductor is in the centre of the cable in a special PE foam insulator, around which are two high-quality shielding braids and a supplementary shielding film. This quadruple shielding design achieves an extremely high shield rating of more than 120 dB, which effectively prevents any trace of induced radio-frequency interference. The core design is completed with a monofilament braid and a rugged jacket made of special PVC with anti-static admixture, which prevents the build-up of static charge in the cable. Audio Triax is available terminating in four different connectors: Cinch leads with rhodium-plated RCA plugs, aerial leads with rhodium-plated co-axial plugs, rhodium-plated F-plugs or digital leads with BCN plugs. The plug sleeves are accurately machined from solid high-quality aluminium, and then hard-anodised. This process results in a very robust surface which is almost immune to damage.



Audio Quad (Carbon). Audio cable

XLR-Plug female



XLR-Plug male



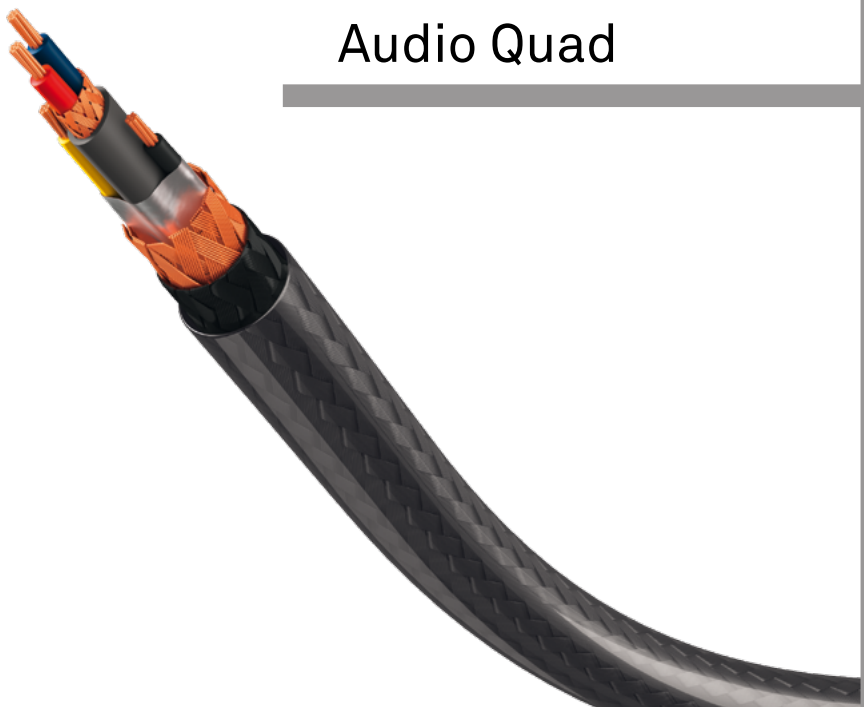
The two most important types of connection for high-quality audio equipment are Cinch leads (RCA) and symmetrical leads (XLR). Audio Triax represents a co-axial Cinch cable of superior construction, which satisfies the most exacting demands, and is also extremely versatile in use. However, in the studio and professional fields XLR connections are frequently encountered, and these require special cables. These are often known as symmetrical or balanced cables, and require two signal conductors - which transfer the music signal with opposite phase - and at least one separate earth lead. This principle makes it possible to eliminate interference by generating a difference signal, and therefore to use very long cables. For example, this attribute is helpful when using active speakers, or if you wish to position the power amplifiers immediately adjacent to the loudspeakers.

In terms of high-end sound, the requirements for a high-quality XLR cable are exactly the same as those for a Cinch lead, so the cable construction must be equally refined and sophisticated. The complex design of the Audio Quad's cable geometry, with different insulators, shielding measures and materials, ensures low capacitance and frequency-independent transfer characteristics.

The two signal conductors, consisting of OFC stranded cable in a PE foam jacket, are tightly twisted together (twisted pair), shielded with a dense copper braid, and enclosed in a PE insulator. Two further conductors are arranged outside the core, serving as earth conductors, although they can also be used as control conductors, e.g. for power-on or trigger voltages. This internal construction is in turn enclosed in a laminated aluminium film (with anti-static properties), followed by a dense OFC shielding braid (to counteract induced alternating fields) and a damping braid of PE monofilament (mechanical damping effect). The cable is finished off with a strong jacket of special PVC incorporating a static inhibitor.

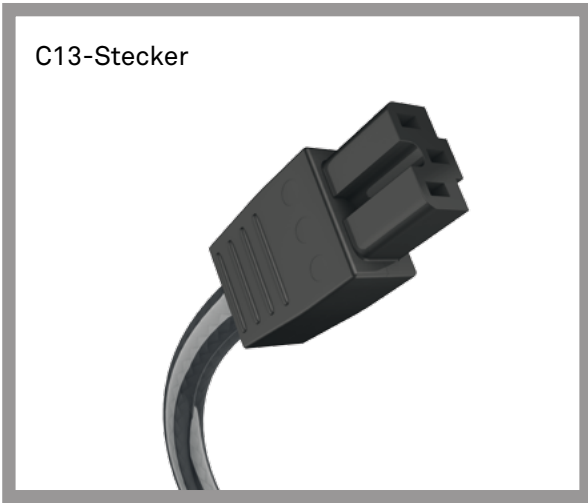
The male and female XLR connectors employed are made by Neutrik, and are robust and of extremely high quality. The case is a pressure-casting, the inserts of glass fibre reinforced plastic. These connectors lock reliably, and guarantee secure, corrosion-free contact.

Audio Quad



Power Three (Carbon). Mains cable

C13-Stecker



C19-Stecker

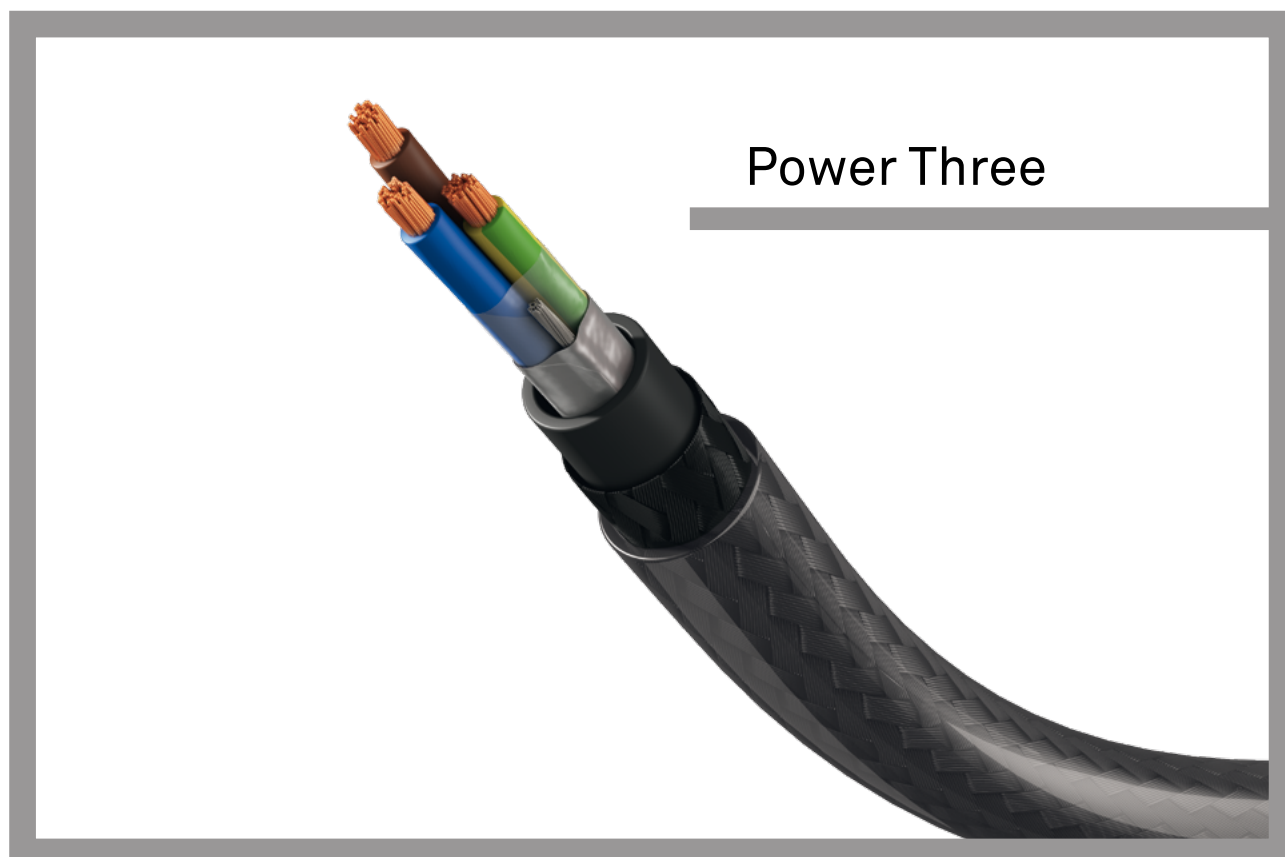


The mains leads are just as important to a Hi-Fi system as the loudspeaker cables or Cinch leads, as they can have an equally dramatic influence on the overall sound. Enormous levels of interference can find their way into the system via the mains. On the one hand this can occur directly through modulated interference in the mains supply, as virtually all devices which consume current have repercussions on mains quality to a greater or lesser extent. On the other hand the mains leads attached to devices also act as aerials, picking up all the electro-magnetic smog. For this reason T+A has invested a very great deal of effort in developing really effective mains leads.

Power Three is one of the finest and most complex mains leads on the market. The cable is 11 mm thick and is of extremely tight construction, in order to prevent any trace of resonance or oscillation even when high currents are flowing. The hard outer jacket of anti-static PVC encloses a dense braid of PE monofilament which provides mechanical damping. Under this is another high-quality insulator enclosing the aluminium PET film shield with stranded shield wire which is permanently laminated to a PP film. Inside the core there are three stranded cables, each with a cross-sectional area of 1.5 mm². Every one of these three conductors consists of a bundle of thirty firmly twisted strands of high-purity, oxygen-free copper, in turn enclosed by high-quality PE insulation.

This cable design is one of the finest feasible in terms of mechanical, electrical and material qualities. Each cable is also fitted with a sliding shield current blocking filter. The mains plugs and IEC power sockets employed are very robust, heavy-duty items. As an option we can supply the large C19 version of the socket which is approved for 16 Ampere. These are required, for example, for use with the high-performance power amplifiers and mains power supplies featured by our HV series.

The use of Power Three cable results in a clear, open and vivid sound image, although the degree of sound enhancement does vary very greatly according to the actual level of contamination in the mains supply: the more pronounced the mains interference, the more significant the sound improvement produced by Power Three cable.



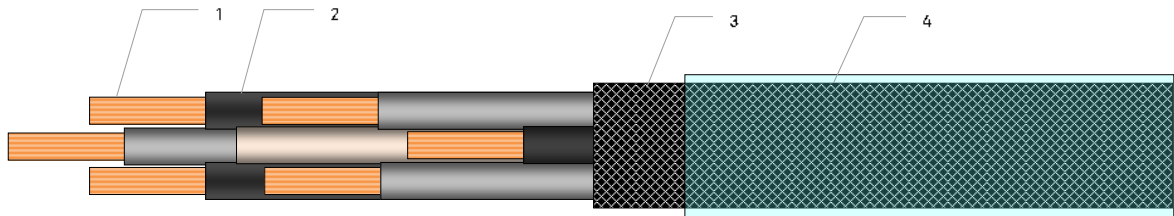
Power Bar. Mains distribution

Anyone who really desires the perfect solution to mains interference in a high-quality audio system should consider the use of a high-end mains distribution panel such as our Power Bar. This provides the central filtering and protective measures required for the whole Hi-Fi system, and effectively prevents mutual interference between the system's individual components as well as preventing mains-borne interference reaching the system from the mains socket. There are separate sockets for analogue, digitally-controlled and fully digital devices. All Power Bars are equipped with a polarity indicator for correctly connecting the unit to the mains socket. An integral excess voltage guard serves to dissipate voltage peaks, and prevents them reaching the devices connected to the panel. Comprehensive information on these items can be found in our special Power Bar brochure.





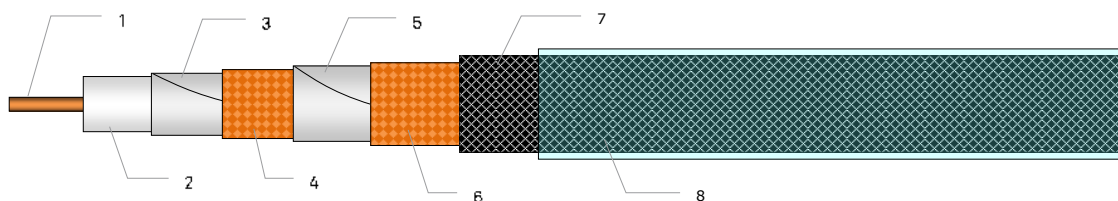
Specifications



Speaker Hex. This round cable consists of six (1) conductor bundles insulated with high-quality PE (2), each consisting of 37 strands of high-purity, oxygen-free copper. The six bundles are wound (twisted) tightly around a PUR core, and colour-marked in such a way that three opposed bundles are always wired to one channel. Over this there is a carbon-coloured, monofilament jacket (3) which has a mechanical damping effect. The outer jacket (4) is very tightly and firmly extruded onto this assembly, with the aim of preventing any trace of oscillation or pulsing even when high currents are flowing. It has anti-static properties, because a static inhibitor is mixed in at the production stage. The total cross-sectional area amounts to almost six square millimetres, even though the external diameter is only 9 mm.

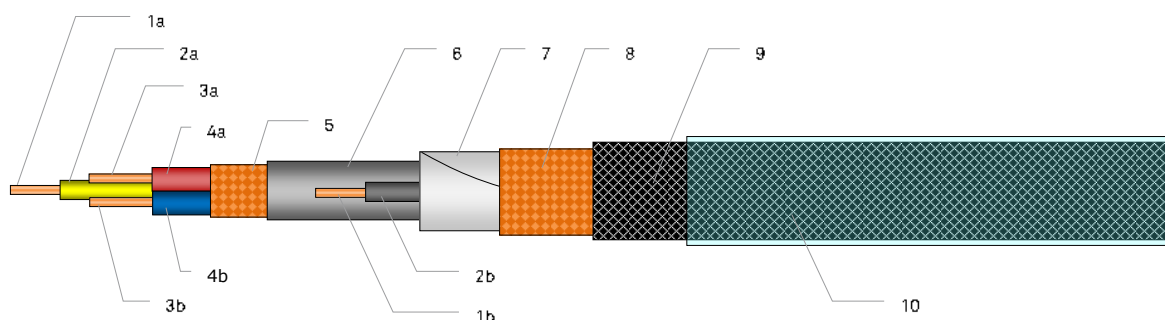
The data are extremely well-balanced and frequency-independent over all the parameters, which, in conjunction with the cable's construction, helps to explain the superb sound provided by Speaker Hex.

$L = 190 / 190 \text{ nH}$; $R = 6.8 / 7.1 \text{ m}\Omega$; $C = 260 / 260 \text{ pF}$; $G = 0.01 / 0.15 \text{ }\mu\text{S}$ (at 1 kHz / 10 kHz).



Audio Triax. We developed this cable specifically for use in top-class high-end systems, and that is why it takes the form of a co-axial cable with quadruple shielding. It is the sophisticated shielding measures which are the key to the exceptionally high-quality, interference-rejecting connections possible with the cable. Its impedance of 75 Ω and extremely low capacitance make it the perfect solution for connecting high-quality components. Its refined construction, employing the best mix of insulators and conductors, produces a cable with perfect measured data and ideal sonic characteristics. The internal conductor (1) consists of ultra-pure oxygen-free copper with a PE foam insulator (2). Over this is an anti-static film shield (3), followed by the initial shielding braid (4), consisting of 128 strands of the purest copper, which provides shielding against alternating fields. The second outer braid (6) consists of 144 ultra-pure copper strands and an aluminium film shield (5). The cable is finished off with a monofilament braid (7) and a strong PVC jacket (8) incorporating a static inhibitor, designed to prevent the build-up of static charge in the cable. The result of this ultra-sophisticated development is not just a superb set of measured results, but also outstanding sound qualities.

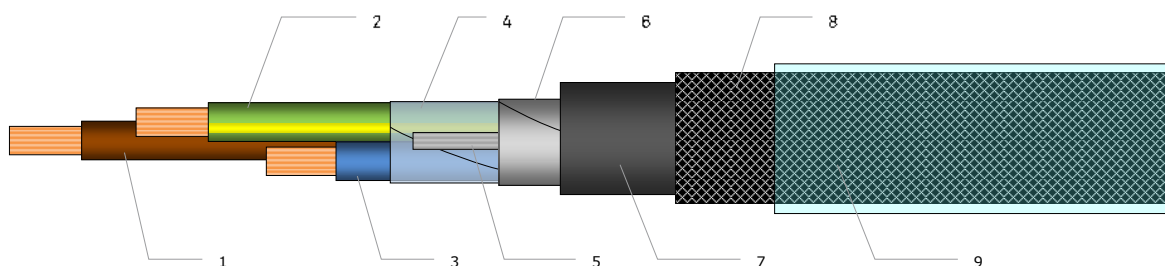
Impedance = 75 Ω ; $C = 45,6 / 45,5 \text{ pF}$; $G = 0.0003 / 0.0036 \text{ }\mu\text{S}$ (at 1 kHz / 10 kHz); damping ratio > 120 dB.



Audio Quad. This extremely sophisticated audio cable is a completely new development, and has been produced specifically for the very highest-quality symmetrical connections in the professional sphere. It has two twisted internal conductors of ultra-pure oxygen-free copper in the form of a twisted pair (3) with a PE foam insulator (4). This is enclosed in a dense shielding braid of OFC copper (5), in turn surrounded by a PE insulator (6) for matching the wave impedances. Two OFC earth / control conductors (1) and PE foam insulation (2) are closely fitted, in turn enclosed in a film shield (7) followed by a dense OFC braid (8). This triple shield design helps to achieve a very high level of damping. A dense braid of damping PE monofilament (9) is pressed firmly against the internal assembly by the anti-static external jacket (10).

The result of this ultra-refined development is not just superior data and interference-rejecting signal transfer; it also ensures sonic characteristics of unique quality.

Impedance = 110 Ω ; C = 38.4 / 38.6 pF; G = 0.0005 / 0.0014 μ S (at 1 kHz / 10 kHz).



Power Three. These mains cables are intended to carry mains voltage in the range 100 - 240 V, 50 - 60 Hz, with a total current-handling capacity of 10 A / 16 A. The three fine-stranded cables of ultra-pure oxygen-free copper are enclosed in high-quality insulators (1, 2, 3), and are grouped together by a PP film (4). Over this there is an aluminium film shield (6) with shield braid (5) for dissipating induced interference components. These are fixed by a robust PVC jacket (7), onto which a damping braid of PE monofilament (8) is woven. The outer jacket (9) again consists of the special PVC insulator with static-inhibiting admixture. The Power Three is also fitted with a ferrite filter which filters out power-generated interference components. The cable is available in two variants, with C19 or C 13 IEC power connectors.

L = 730 / 730 nH; R = 28.9 / 30.0 m Ω ; C = 64.3 / 64.4 pF; G=0.003 / 0.022 μ S (at 1 kHz / 10 kHz).

