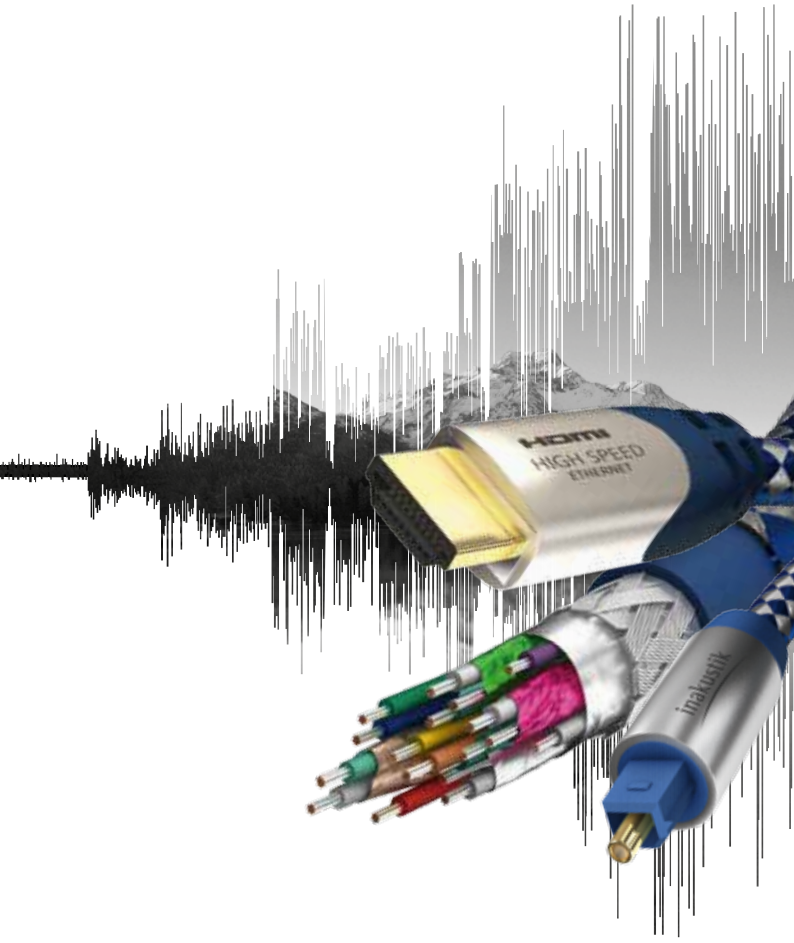
WIRED UP

WHAT YOU NEED TO KNOW WHEN CHOOSING CABLES



inakustik

KABEL | LAUTSPRECHER | MUSIK

Most of the in-akustik Referenz and Exzellenz cables are manufactured in our headquarter in Ballrechten-Dottingen.

PHYSICS NOT VOODOO

"The best cable is the one that least affects the reproduction quality of the hi-fi or video chain and transmits the original signal with the minimum loss."

H. Wachsmann

Holger Wachsmann, Product Developer

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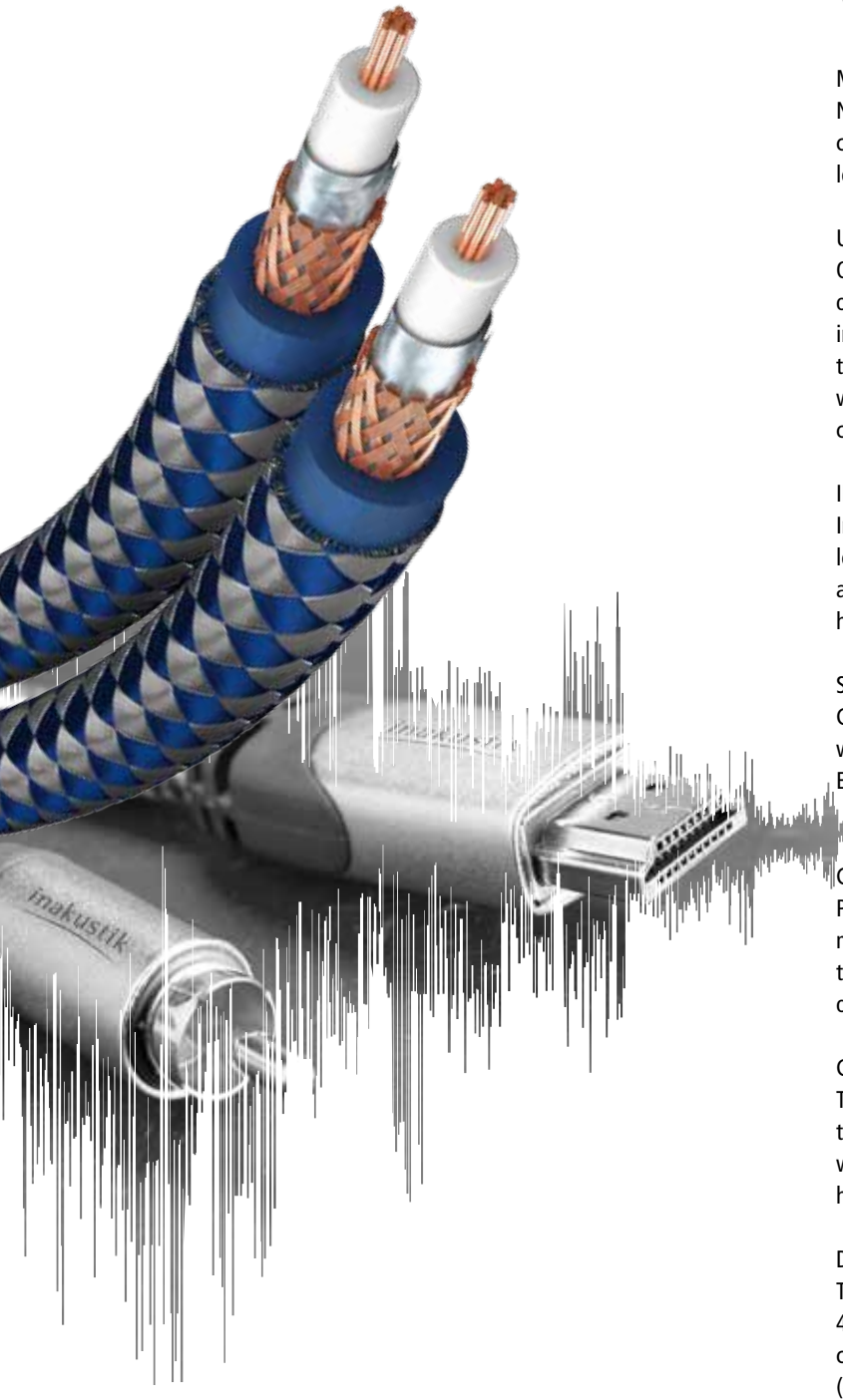
PRODUCT COMPARISONS



WHAT'S IMPORTANT

MINIMISING LOSSES

No cable can actually improve the sound or picture on an AV system. A good cable is not the one that gets the most out of a system, but the one that loses the least!

UTILISING THE POTENTIAL OF THE COMPONENTS

Often, the potential of an expensively purchased system is wasted because of unsuitable cables. The cables supplied work, but their susceptibility to interference, inadequate material properties and small cross-sections mean that signals suffer losses during transmission. Even with bad tyres, a Ferrari will get you from A to B, but you won't be getting the performance it is capable of.

INSULATING MATERIAL

In poorly insulated cables, the copper oxidises and loses conductivity. If you look at copper guttering, you can see how environmental effects (such as air humidity) act on unprotected copper and cause corrosion. As well as this, high-quality insulating material prevents unwanted capacitance.

SHIELDING

Cables function as aerials and "mop up" interference. You will be familiar with this from the buzzing that mobile phones cause from loudspeakers. Effective, multi-layer shielding counteracts this.

CONDUCTOR MATERIAL

Products often come with copper-coated aluminium wires, or conductors manufactured from impure, recycled copper, which significantly reduces the conductivity. For a smooth signal flow, it is important to use very pure, oxygen-free copper (OFC) with a high conductivity rating.

CROSS-SECTION

The higher the cross-section, the lower the resistance of the conductor and therefore the better the signal flow. This is comparable to a thick fire hose, which allows much more water to flow through it than an ordinary garden hose.

DIFFERENCES WITH HDMI CABLES

The longer an HDMI cable is, and the higher the data rate to be carried (e.g. 4k; UHD), the more errors are caused by the HDMI cable. Therefore, especially with longer HDMI cables, it is important to pay attention to quality (cross-section, conductor material, shielding etc.).

TECHNOLOGY LEXIKON

BANDWIDTH

Bandwidth is the frequency scope of a transmission. The bandwidth of a typical audio signal ranges from 20Hz to 20 kHz. A narrower bandwidth transmits fewer frequencies, a telephone typically transmits around 300 Hz to 3 kHz, a larger one will transmit more. DVB-S (satellite) systems currently use bandwidths of more than 2 GHz.

CAPACITANCE

Capacitance is the measure of the capacity to store electrical charges. However, cables should be able to transmit 100% of the signal without temporarily storing it. The less capacitance a cable has, the better.

CONSUMER ELECTRONICS CONTROL

CEC enables several devices, such as TV or DVD player, to be operated with only one remote control. Several devices from any manufacturer can be controlled, provided all the connected components are CEC compatible.

CROSS SECTION

The cross section is the size of the face surface of the conductor in a cable and is specified in square millimetres. The greater the cross section, the lower the losses. It should not be confused with the diameter.

DAMPING

The weakening of a signal transferred in a cable is called damping and it is specified in dB (decibels). I.e. it is a measure of signal loss. The damping of a cable depends on frequency and increases with rising transmission frequency. This specification is important for planning antenna cables for antenna systems. It should not be confused with the shielding dimension, which is also specified in dB.

DIAMETER

The diameter specifies the overall diameter of the cable in millimetres. This information is necessary for example when selecting the plug or calculating the spatial requirement of an overall installation (diameter of the conduits, etc.).

DATA RATE

The data rate specifies how many data units (bits) are transferred per second. The maximum data rate with an HDMI 2.0 interface is up to 18 Gbps. That is 18 billion bits or 2.25 billion characters per second (8 bits = 1 byte).

EXTENDED DISPLAY IDENTIFICATION DATA (EDID)

With the EDID function, the display (e.g. LCD monitor) transmits information via the HDMI cable to the source (e.g. DVD player) as to which resolution formats it supports. The source, in turn, sends back the highest suitable format.

FINELY STRANDED

Many individual wires are twisted into a braid to make the cable more flexible. The sum of the individual wires makes the total Cross-section. The thinner the wires, the more flexible the cable.

FULL-HD

Full-HD or 1080p has established itself as the term for the maximum HDTV resolution of 1920x1080 pixels. Full HD enables the use of larger screens or far better picture quality with the same screen size.

GOLD-PLATED CONTACTS

The 24 carat gold-plated plug contacts considerably reduce contact resistance and transfer signals optimally. The quality of the connection can be expressed in the contact resistance. Poor contacts have a high contact resistance and cause signal losses. Special surface treatment such as gold-plating contact surfaces considerably reduce resistance, improve contact and therefore the sound and picture quality.

HDTV

HDTV stands for high definition television. All new TV and video formats belong to the HDTV family. The assignment of the HDTV resolutions is simple and clear: The resolution in video lines gives the names to the American HDTV formats 720p (p = progressive, i.e. 720 full lines per picture) and 1,080i (i = interlaced, i.e. 2 x 540 line half-pictures). In addition, a horizontal resolution that matches the vertical resolution was selected that forms the picture format factor in the following simple manner: 720 x 16:9 = 1,280 and 1,080 x 16:9 = 1,920 horizontal pixels.

HIGH-BANDWIDTH DIGITAL CONTENT PROTECTION

As the HDMI interface sound and picture content is available in absolutely perfect resolution, the film and software industry have instructed that data may only be released as copy-proof. This is the reason for using HDCP.

IMPEDANCE (75 OHMS)

The wave resistance, or impedance, is an important key figure for cables, calculated from the ratio of inductivity to capacity.

INDUCTIVITY

Each conductor that is flowed through forms a magnetic field around it. If the flow of current changes, the strength of the magnetic field also changes. This in turn results in an inductive current which counteracts the change of current in the conductor. A frequency-dependent resistance develops (also called inductive resistance) which has a negative impact on the transmission. Special designs reduce the inductivity of a cable.

INSULATION (DIELECTRIC)

The conductors are covered in a non-conductive material to protect against short circuits, corrosion and damage. However, because these materials store energy (capacitance), which is undesirable in audio and video cables, in-akustik takes special care to reduce this.

JITTER

When serially transmitting A/V data, "one" and "zero" are coded by different impulse durations. Cable properties affect these impulse durations so that the data is not received perfectly. In the case of pronounced jitters, the D/A converter has to frequently correct the error and consequently the quality of playback for pictures and sound suffers.

OFC COPPER

The transmission of picture and sound signals is highly complex and susceptible to interference. Any contamination in the conductor material prevents the flow of current, impairing the conductance and increasing the background noise. Therefore, we only use especially pure-grade, oxygen-free copper (OFC) with an especially high conductance.

POLYETHYLENE (PE)

PE is a high-quality insulating material (dielectric) which is ideal as an insulator. It reduces the capacitance of a cable by a factor of two compared with PVC (polyvinylchloride). The electrical loss of PE is also very low.

ROHS

Each of our cables complies with the RoHS directive. RoHS (Restriction Of Hazardous Substances) is an EU directive (2002/95/EG) with the aim of reducing substances damaging to health and the environment in electronic devices.

SHIELDING

To protect against electromagnetic interference such as from mobile devices or wireless networks, cables are shielded with one or more layers (e.g. a wire braid and/or an aluminium coated Mylar film). The impact of the screening is measured in dB and describes the reduction of any interference.

SILVER-PLATING

High frequencies are mainly transmitted on the surface of the conductor (skin effect). As silver is the best conductor, the high frequencies are transmitted better via silver-plated conductors. On audio and speaker cables silver-plated cables boost the high-frequency range. On HDMI connections the silver-plated conductors also ensure optimum signal transfer even on long cables.

SOLID CONDUCTORS

On standard cables the many fine wires are bundled, meaning the electrons can „jump" from one wire to another. The signals travel for different lengths of time, fast impulses are „braked". Solid conductors prevent this by providing the same transit times and clear, strong contours. Solid conductors also provide another benefit for digital and video quality: The smooth surface allows the impedance to be precisely adjusted and the high signal frequencies which mainly move on the surface of the conductor can be transmitted perfectly.

S/Z STRANDING

Loudspeaker cables with the wires arranged in the same direction tend to get twisted. This makes laying the cable and installation difficult. Cables with S/Z stranding have wires with opposite stranding to avoid this effect. Laying the cable is then much easier.

TWISTED PAIR

With symmetrically designed cables, two exactly identical wires are used for the initial and return conductors. This counteracts the level of electro-magnetic interference and provides an extremely high immunity to interference. In addition, separate shielding protects the signal.

ULTRA HD

Ultra high definition TV abbreviated to Ultra HD or UHD. An ultra high-resolution, digital video format introduced in 2013 that incorporates two resolutions (4K and 8K). In Japan, the 8K format is also known as super hi-vision (SHV). The UHD standard introduced in Europe in 2013 has a calculated pixel resolution of 3,840 x 2,160 pixels (4k) and is also known as UHD 2160p.

QUALITY LEVELS

Our products are made of first-rate materials and offer optimum performance. And that is also reflected in the quality. With every quality level, from Star to Premium and Excellence, right up to our absolute top-of-the-range Reference class, you benefit from finer, more sophisticated and ingenious cable technology. What do you get? More sound. More sharpness. Less loss.

REFERENZ

MADE IN GERMANY

THE BENCHMARK FOR PICTURE AND SOUND – SIMPLY CAN'T BEAT IT!

EXZELLENZ

MADE IN GERMANY

FOR THE LOVERS OF PERFECT PICTURE AND SOUND EXPERIENCES.

PREMIUM

DESIGNED BY IN-AKUSTIK ESTABLISHED 1977

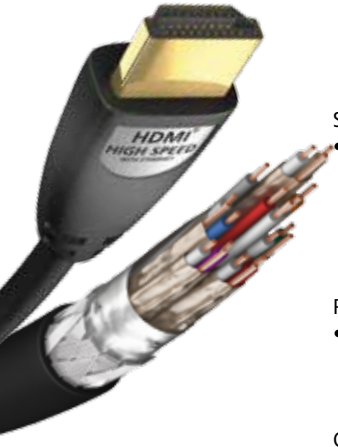
PICTURE AND SOUND FOR ADVANCED USERS

STAR

DESIGNED BY IN-AKUSTIK ESTABLISHED 1977

THE BEST GATEWAY TO THE WORLD OF PICTURE AND SOUND

DIFFERENCES IN HIGH SPEED HDMI CABLES



PLUG
- Moulded plastic plug
- Gold-plated contacts

CABLE
- PVC coat

SHIELDING
- 1. Film
- 2. Braid with 80 wires

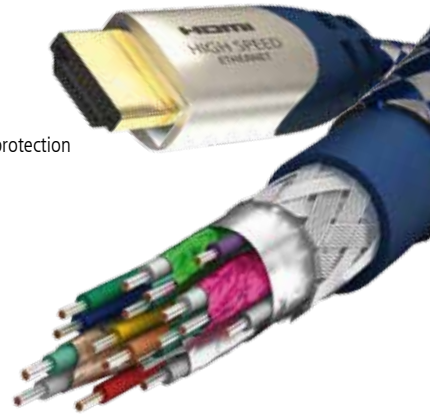
SIGNAL CONDUCTOR
- Cross-section: 0,056mm²

PROCESSING
- Very good processing

CABLE LENGTH
- Full HD up to 5m

VERSIONS
- HDMI (A) <-> HDMI (A)

PLUG
- Moulded plastic plug
- Gold-plated contacts
- Metal plug: additional metal sleeve for better protection
- High-quality and elegant design



CABLE
- PVC coat
- Additional textile coat for better protection
- High-quality and elegant design

SHIELDING
- 1. Film
- 2. Film shielding
- 3. Braid with 160 wires
- 100% more shielding than Star

SIGNAL CONDUCTOR
- Cross-section: 0,088mm²
- 57% larger cross section than Star
- OFC copper conductor
- Tin-plated conductors as additional oxidation protection

PROCESSING
- Excellent processing
- Special focus on low tolerances (impedance)

CABLE LENGTH
- Full HD up to 10m

VERSIONS
- HDMI (A) <-> HDMI (A)
- Mini | Micro | Flat | XS | angle plug

DIFFERENCES IN
HIGH SPEED HDMI CABLES

PLUG
- Moulded plastic plug
- Gold-plated contacts

CABLE
- PVC coat
- Additional textile coat for better protection
- High-quality elegant design

SHIELDING
- 1. Spiral shielding
- 2. Film shielding
- 3. Film shielding
- 4. Braid with 192 wires
- 20% more shielding braiding than Premium

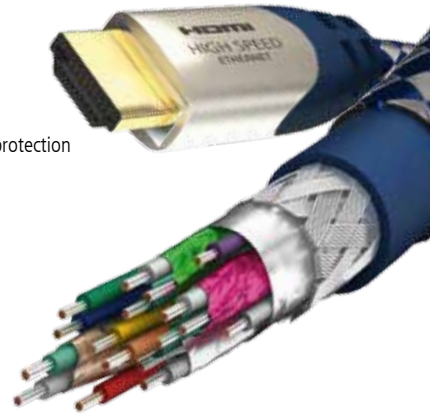
SIGNAL CONDUCTOR
- Cross-section: 0,15mm²
- 70% larger cross section than Premium
- OFC copper conductor
- Solid conductors for homogeneous signal flow
- Silver plated conductors

PROCESSING
- Outstanding processing
- Special focus on low tolerances (impedance)

CABLE LENGTH
- Full HD up to 15m

VERSIONS
- HDMI (A) <-> HDMI (A)

PLUG
- Moulded plastic plug
- Gold-plated contacts
- Metal plug: additional metal sleeve for better protection
- High-quality and elegant design



CABLE
- PVC coat
- Additional textile coat for better protection
- High-quality and elegant design

SHIELDING
- 1. Film
- 2. Film shielding
- 3. Braid with 160 wires
- 100% more shielding than Star

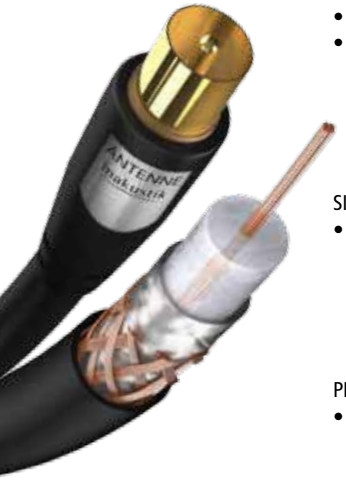
SIGNAL CONDUCTOR
- Cross-section: 0,088mm²
- 57% larger cross section than Star
- OFC copper conductor
- Tin-plated conductors as additional oxidation protection

PROCESSING
- Excellent processing
- Special focus on low tolerances (impedance)

CABLE LENGTH
- Full HD up to 10m

VERSIONS
- HDMI (A) <-> HDMI (A)
- Mini | Micro | Flat | XS | angle plug

DIFFERENCES IN ANTENNA CABLES



PLUG
- Moulded plastic plug
- Gold-plated contacts

CABLE
- PVC coat

SHIELDING
- 1. Film
- 2. Braid with 64 wires
- 90dB shielding

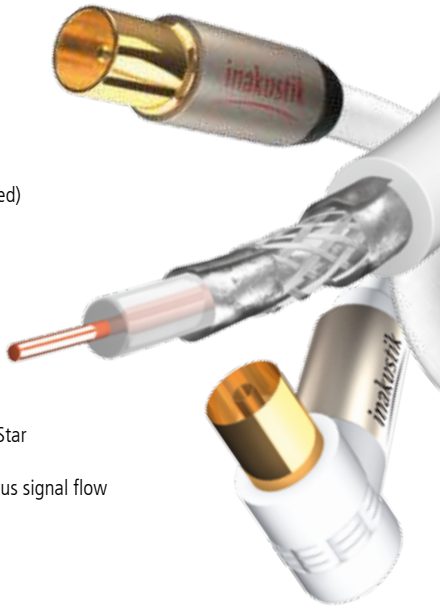
SIGNAL CONDUCTOR
- Cross-section: 0,30mm²

PROCESSING
- Very good processing

CABLE LENGTH
- Up to 5m

PLUG
- Moulded plastic plug
- Gold-plated contacts
- Metal plug: additional metal sleeve for better protection
- High-quality and elegant design

CABLE
- PVC coat



SHIELDING
- 1. Film
- 2. Braid with 128 wires (tin-plated)
- 3. Film
- 100% more shielding than Star
- 100dB shielding

SIGNAL CONDUCTOR
- Cross-section: 0,79mm²
- 163% larger cross section than Star
- OFC copper conductor
- Solid conductors for homogeneous signal flow

PROCESSING
- Excellent processing
- Special focus on low tolerances (impedance)

CABLE LENGTH
- Up to 10m

VERSIONS
- Also available with 90° angled plug

DIFFERENCES IN ANTENNA CABLES

PLUG
- Vollmetallstecker
- Gold-plated contacts
- Steckerkopf austauschbar
- High-quality elegant design

CABLE
- PVC coat

SHIELDING
- 1. Film
- 2. Braid with 72 wires
- 3. Film
- 4. Braid with 72 wires
- 12,5% more shielding than Premium
- 120dB shielding

SIGNAL CONDUCTOR
- Cross-section: 0,79mm²
- 163% larger cross section than Star
- OFC copper conductor
- Solid conductors for homogeneous signal flow

PROCESSING
- Outstanding processing
- Special focus on low tolerances (impedance)
- Made in Germany

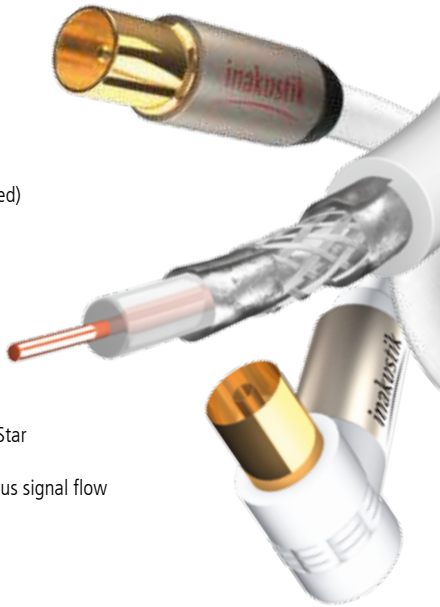
CABLE LENGTH
- Up to 10m

VERSIONS
- Changeable plugs
- On spool + Twist On plug

PLUG
- Moulded plastic plug
- Gold-plated contacts
- Metal plug: additional metal sleeve for better protection
- High-quality and elegant design

CABLE
- PVC coat

SHIELDING
- 1. Film
- 2. Braid with 128 wires (tin-plated)
- 3. Film
- 100% more shielding than Star
- 100dB shielding



SIGNAL CONDUCTOR
- Cross-section: 0,79mm²
- 163% larger cross section than Star
- OFC copper conductor
- Solid conductors for homogeneous signal flow

PROCESSING
- Excellent processing
- Special focus on low tolerances (impedance)

CABLE LENGTH
- Up to 10m

VERSIONS
- Also available with 90° angled plug

DIFFERENCES IN AUDIO CABLES

PLUG
- Moulded plastic plug
- Gold-plated contacts

CABLE
- PVC coat

SHIELDING
- Braided shielding

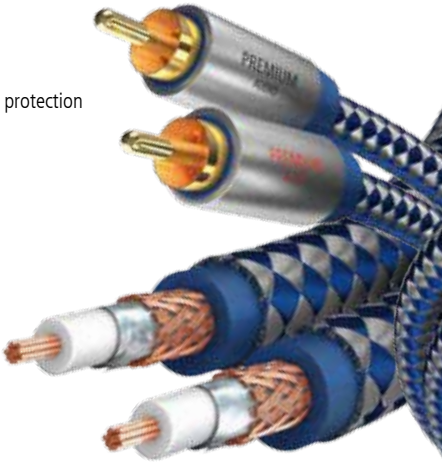
SIGNAL CONDUCTOR
- Cross-section: 0,32mm²

PROCESSING
- Very good processing

VERSIONS
- Up to 12m
- Y-Sub and Mono-Sub
- Stereo audio cable

PLUG
- Moulded plastic plug
- Gold-plated contacts
- Metal plug: additional metal sleeve for better protection
- High-quality and elegant design

CABLE
- PVC coat
- Additional textile coat for better protection
- High-quality and elegant design



SHIELDING
- 1. Film
- 2. Braided shielding

SIGNAL CONDUCTOR
- Cross-section: 0,32mm²
- Foam PE als Dielektrikum
- Double mono design
- OFC copper conductor

PROCESSING
- Excellent processing
- Special focus on low tolerances

VERSIONS
- Up to 15m
- Y-Sub and Mono-Sub
- Stereo audio cable

DIFFERENCES IN JACK CABLES

PLUG
- Moulded plastic plug
- Gold-plated contacts

CABLE
- PVC coat

SHIELDING
- 1. Film shielded

SIGNAL CONDUCTOR
- Cross-section: 3 x 0,11mm²

PROCESSING
- Very good processing

VERSIONS
- Phone plug m/f | m/m | m/m 90°
- Phone plug Y-adapter (m/2 x Cinch)
- Phone plug Y-adapter (m/2 x w)
- Phone plug extension cable

PLUG
- Moulded plastic plug
- Gold-plated contacts
- Metal plug: additional metal sleeve for better protection
- High-quality and elegant design

CABLE
- PVC coat
- Additional textile coat for better protection
- High-quality and elegant design

SHIELDING
- 1. Film shielded
- 2. Spiral shielding

SIGNAL CONDUCTOR
- Cross-section: 3 x 0,11mm²
- Additional insulation between conductor and shielding
- OFC copper conductor

PROCESSING
- Excellent processing
- Special focus on low tolerances

VERSIONS
- Phone plug m/f | m/m | m/m 90°
- Phone plug Y-Adapter (m/2 x Cinch)
- Phone plug Y-Adapter (m/2 x w)
- Phone plug extension cable incl. 6,3mm phone plug adapter

ear in Zubehör-Tipp

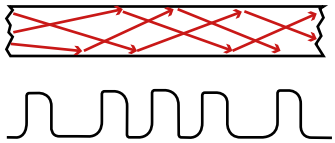
DIFFERENCES IN OPTICAL CABLES

PLUG
- Moulded plastic plug
- TOS-Link

CABLE
- Double PVC jacket for physical protection

SIGNAL CONDUCTOR
- Plastic fibres

PROCESSING
- Very good processing
- More light reflection than Premium optical cable



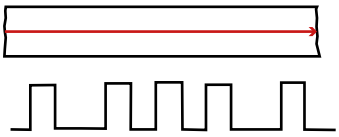
Light reflections impair detection of ones and zeroes.

PLUG
- Moulded plastic plug
- TOS-Link
- Metal plug: additional metal sleeve for better protection
- High-quality and elegant design

CABLE
- Triple PVC jacket for physical protection
- Additional textile coat for better protection
- High-quality and elegant design

SIGNAL CONDUCTOR
- PMMA fibres (polymethyl methacrylate)
- Optimised light reflection

PROCESSING
- Excellent processing
- Optical fibres cut straight
- Reduced jitter effect
- The optical conductor faces are carefully smoothened. The faces of the optical conductors must be precisely ground and polished to transmit the light with as little reflection as possible.



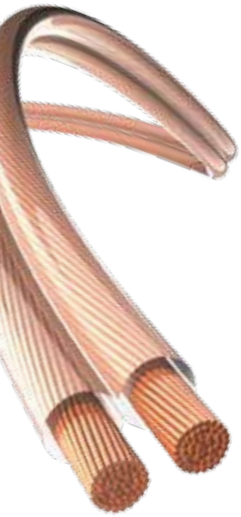
The relatively large optical conductor diameter of one millimetre, as prescribed by the TOS Link standard, produces significant reflections and phase shifts between the individual light beams. This causes a kind of jitter, which makes it difficult for the receiver to detect ones and zeroes. The higher the quality of the optical conductor, the less light is reflected and the more precise the transmission.

HEIMKINO Praxistipp 12/1-2015

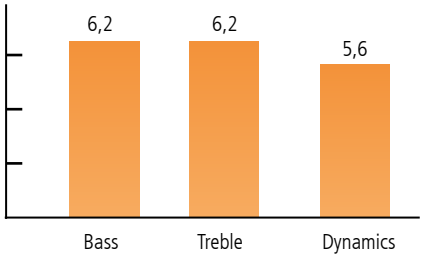
DIFFERENCES IN SPEAKER CABLES

STAR SPEAKER CABLES

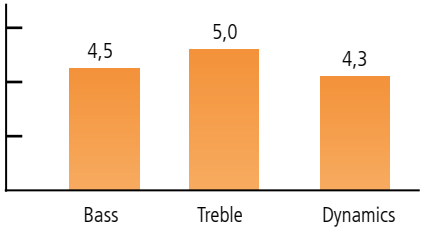
- Easy to lay with opposed S/Z stranding
- Compact design for minimum space requirement
- Universal speaker cable for any application
- Plus/minus marking
- Structure: 0.30 mm wires
- Cross-section: 0.75 mm² | 1.5 mm² | 2.5 mm²
- Made in Germany



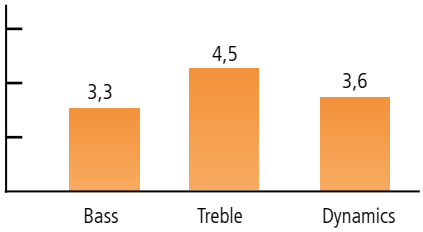
Tonecolour Star 2,5 mm² *



Tonecolour Star 1,5 mm² *



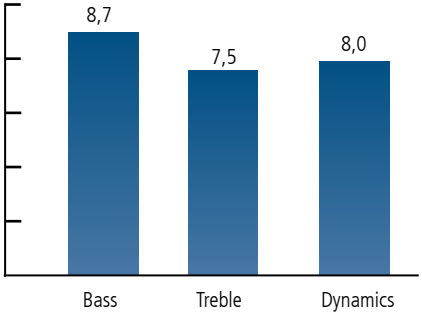
Tonecolour Star 0,75 mm² *



PREMIUM SPEAKER CABLES

- Easy to lay with opposed S/Z stranding
- For discerning music-lovers and professional users
- Universal speaker cable for any application
- Plus/minus marking
- Fine-wired structure: 0.15 mm wired for maximum flexibility
- Hard-wearing insulation.
- Increased protection against oxidation
- Cross-section: 4.0 mm2
- Handy mini-spool for easy handling
- Made in Germany

Tonecolour Premium 4,0 mm² *



* Each and every cable has its very own characteristic, even its own ?character?, which is relected in its very own timbre. This is because of its technical construction and the materials used for its manufacturing. The diagram shows how the described cable is positioned and where and what are its strong points. The indicated rating by numbers is based on our best knowledge and experience, as well as our own statistical calculations. It should give you some solid and easy to comprehend guideline, which should also be helpful to compare various products and to serve as a profound assistance for your selection and purchasing decision. Note: The subjective sound characteristics depend also on the connected components in use.

STAR

PREMIUM

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