

Types of BNC Connectors

The BNC (Bayonet Neill–Concelman) connector is a miniature quick connect / disconnect radio frequency connector used for coaxial cable. It features two bayonet lugs on the female connector; mating is fully achieved with a quarter turn of the coupling nut.

BNC connectors are most commonly made in 50 ohm and 75 ohm versions, matched for use with cables of the same characteristic impedance. The 75 ohm connector is dimensionally slightly different from the 50 ohm variant, but the two nevertheless can be made to mate.

The 75 ohm types can sometimes be recognized by the reduced or absent dielectric in the mating ends but this is by no means reliable. There was a proposal in the early 1970s for the dielectric material to be coloured red in 75 ohm connectors, and while this is occasionally implemented, it did not become standard. The 75 ohm connectors are typically specified for use at frequencies up to 2 GHz. 75 ohm BNC connectors are primarily used in Video (particularly HD video signals) and DS3 Telco central office applications. Many VHF receivers use 75 ohm antenna inputs, so they often used 75 ohm BNC connectors.

The 50 ohm connectors are typically specified for use at frequencies up to 4 GHz. 50 ohm connectors are used for data and RF.

A 95 ohm variant is used within the aerospace sector, but rarely elsewhere. It is used with the 95 ohm video connections for glass cockpit displays on some aircraft.



Compatibility

The different versions are designed to mate with each other, and a 75 ohm and a 50 ohm BNC connector which both comply with the 1978 standard, IEC 169-8, will mate non-destructively. At least one manufacturer claims very high reliability for the connector's compatibility.

At frequencies below 10 MHz the impedance mismatch between a 50 ohm connector or cable and a 75 ohm one has negligible effects. BNC connectors were thus originally made only in 50 ohm versions, for use with any impedance of cable. Above this frequency, however, the mismatch becomes progressively more significant and can lead to signal reflections.

SHV and MHV connectors (for high voltages)

Safe High Voltage (SHV) Miniature High Voltage (MHV) connectors are suitable for all high voltage applications up to 5 kV DC or 3.5 kV rms.

The SHV connector uses reverse polarity configuration (RP-BNC) which reverses the polarity of the interface. In a connector of this type, the female contact normally found in a jack is usually in the plug, while the male contact normally found in a plug is in the jack. This ensures that reverse polarity interface connectors do not mate with standard interface connectors.

The MHV connectors are easily mistaken for BNC type, and can be made to mate with them by brute force. The SHV connector was developed as a safer alternative, it will not mate with ordinary BNC connectors and the inner conductor is much harder to accidentally contact.

These connectors provide more secure handling: center contacts are well recessed to prevent shock hazards in unmated condition. All inner contacts are fully captivated and will withstand axial forces of 100 N minimum. When mating a connector pair the outer conductor contact is made prior to the inner conductor contacts.



TNC connectors

A threaded version of the BNC connector, known as the TNC connector (Threaded Neil-concelman) is also available.

The connector has a 50 Ω impedance and operates best in the 0–11 GHz frequency spectrum. It has better performance than the BNC connector at microwave frequencies.



Twin BNC or twinax

Twin BNC (also known as twinax) connectors use the same bayonet latching shell as an ordinary BNC connector but contain two independent contact points (one male and one female), allowing the connection of a 78 ohm or 95 ohm shielded differential pair such as RG-108A.

They can operate up to 100 MHz and 100 volts. They cannot mate with ordinary BNC connectors.

Twinax connectors feature keyway polarization to ensure system integrity and prevent signals from being mixed, making them ideal for computer network applications.

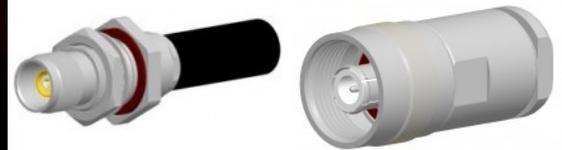


Triaxial

Triaxial (or Triax) connectors are a variant of BNC that carry a signal and guard as well as ground conductor.

Triax connectors are used in applications where maximum RF shielding and minimum noise radiation is required.

These are used in sensitive electronic measurement systems, such as those made by Keithley Instruments.



Early triaxial connectors were designed with just an extra inner conductor, but later triaxial connectors also include a three-lug arrangement to rule out an accidental forced mating with a BNC connector. Adaptors exist to allow some interconnection possibilities between triaxial and BNC connectors.

Miniature connectors

There are smaller versions of the BNC connector, called Mini BNC and High Density BNC (HD BNC).

While retaining the electrical characteristics of the original specification, they have smaller footprints giving a higher packing density on circuit boards and equipment backplanes. These connectors have true 75 ohm impedance making them suitable for HD video applications.

These BNC connectors are commonly used in electronics, but in some applications they are being replaced by LEMO-00 miniature connectors which allow for significantly higher densities. In video broadcast industry, the DIN 1.0/2.3 and the HD-BNC connector are used for higher density products.

