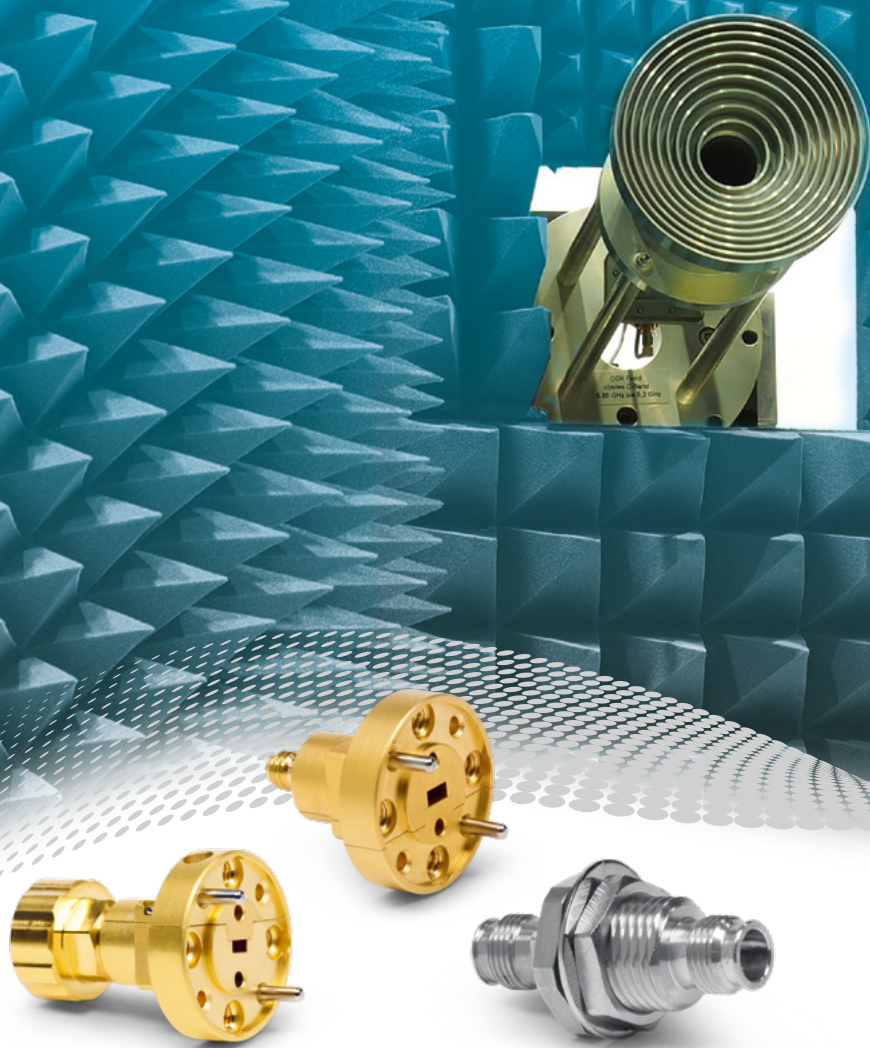


# SPINNER

## Connectivity Solutions for RF Anechoic Chambers



Optimize Your Test Chamber Setup

HIGH FREQUENCY PERFORMANCE WORLDWIDE  
[www.spinner-group.com](http://www.spinner-group.com)



## The SPINNER Group

For more than 70 years, the SPINNER Group has been setting new standards worldwide in high-frequency technology. Based in Munich with production facilities in Germany, Hungary and China, SPINNER currently has over 1,000 employees. Our international network of subsidiaries and distributors supports customers in over 40 countries.



TEST &amp; MEASUREMENT



COMMUNICATION



BROADCAST



SATCOM/SPACE



WIND ENERGY



INDUSTRY



SUBSEA/OFFSHORE

## RF Measurement

These days, up-to-date measurement equipment is essential for all development, production, testing and quality control departments that deal with RF signals on coaxial lines. Particularly for vector network analyzers, high-precision connectors, terminations, and adapters are a must.

The same statement applies to calibration kits and mechanical accessories such as gauges for checking mating face dimensions or torque wrenches for tightening coupling nuts. In all of these cases, SPINNER has established new, extremely high standards of precision which most users would not want to do without.

Precisely measured values are especially important when transmitting high power levels. Other major applications

include extensive testing of mobile communications systems such as GSM, UMTS and LTE and wireless data transmission, e.g. via WiMAX, Wi-Fi and RFID.

SPINNER supplies coaxial measurement equipment of outstanding electrical and mechanical quality for use at frequencies from 1 kHz to 110 GHz.

## Coaxial and Waveguide Measurement Devices

Coaxial measurement devices made by SPINNER are needed for:

### VNA Measurement

- Calibration and verification standards
- Air lines
- Rotary joints
- Articulated lines
- Adapters
- Connector Gauges

### Millimeter Wave Measurement

- Ruggedized test port adapters
- mmWave waveguide-to-coax adapters
- 1.35 mm E Connector
- EasyLaunch PCB connectors
- EasySnake flexible dielectric waveguides
- Connectivity solutions for RF anechoic chambers

### PIM Measurement and Test Automation

- EasyDock push-pull adapters
- Low PIM switches
- Low PIM test cables
- Low PIM rotary joints
- Low PIM loads
- Low PIM passive intermodulation standards





## Optimize Your Test Chamber Setup



Photo by: Jet Fabara

**One of the problems that crop up when testing RF devices, machines, or vehicles in open-air environments is the large number of potentially interfering RF signals from radars, cellphones etc.**

Mobile applications such as smartphones and tablets use high-speed connections, for example, to display or save steady high-resolution videos. The antennas that let these devices connect to a base station are increasingly broadband, which makes them more sensitive to electromagnetic interference.

The best way to test these devices is to place them in an isolated space called a low-reflection or anechoic chamber. Then intrinsic interference or interference radiation can be measured, coexistence tests can be carried out, or antenna characteristics can be verified.

RF test chambers are also used to measure radiated spurious emissions (RSEs) or antenna characteristics in an over-the-air (OTA) space.

Equipment development is usually concluded with measurements for certification known as the “first-time pass”.

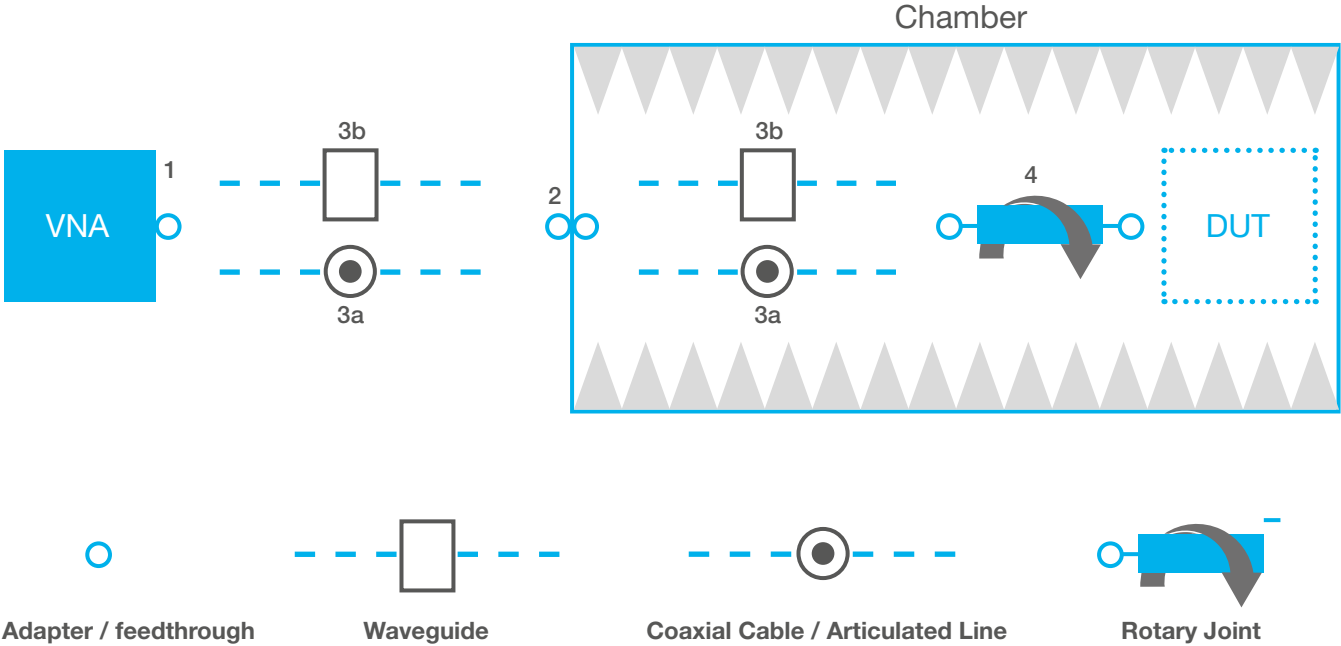
But what about RF signals when the test equipment is outside a chamber? How can signals be routed in and out without large losses and additional interference?

SPINNER offers a whole line of highly suitable components for optimizing signal transmission between the test equipment and the device being tested in an RF anechoic chamber.

They range from precision-manufactured test port adapters across special flexible test cables and flexible waveguides to panel feedthroughs and both single- and multi-channel coaxial and waveguide rotary joints for frequency ranges from DC to 210 GHz.

Please let us know your requirements!

# Test Setup



## Legend / Content

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3b	SPINNER EasySnake   Flex. Waveguide Assembly .....	22
4	Rotary Joint .....	26

## mmWave Waveguide-to-Coax Adapters: Start Testing Faster!



**Get the solution you need! SPINNER has extended its millimeter wave waveguide-to-coax adapter portfolio up to 120 GHz. The SPINNER mmWave waveguide-to-coaxial adapters for the V, E, W, and F bands let you directly connect waveguide-based test network topologies to the coaxial ports of VNA or millimeter-wave-range extender modules.**

Start testing faster with these new adapters from SPINNER. They save time with ruggedized coaxial interfaces for directly connecting millimeter waveguides to the coaxial ports of millimeter wave VNAs.

Ultralow losses are guaranteed. In lab environments, you need to have the right interfaces handy: for waveguide-to-coaxial and with male or female coaxial connectors as required. These convenient solutions save time and let you focus on your testing work.

Unique versions are the WR08 waveguide to 1.00 mm coaxial adapter covering the F band and the WR10 waveguide to 1.35 mm coaxial adapter covering the E band.

Reliable coaxial connections are crucial for good RF performance. A common frustration in RF laboratories is unintended unlocking of the 1.00 mm coaxial thread after time-consuming calibrations, making it necessary to repeat them. The E Connector - a new 1.35 mm interface for DC to 90 GHz featuring a precise metric thread and an integrated push-pull function eliminates this annoyance.

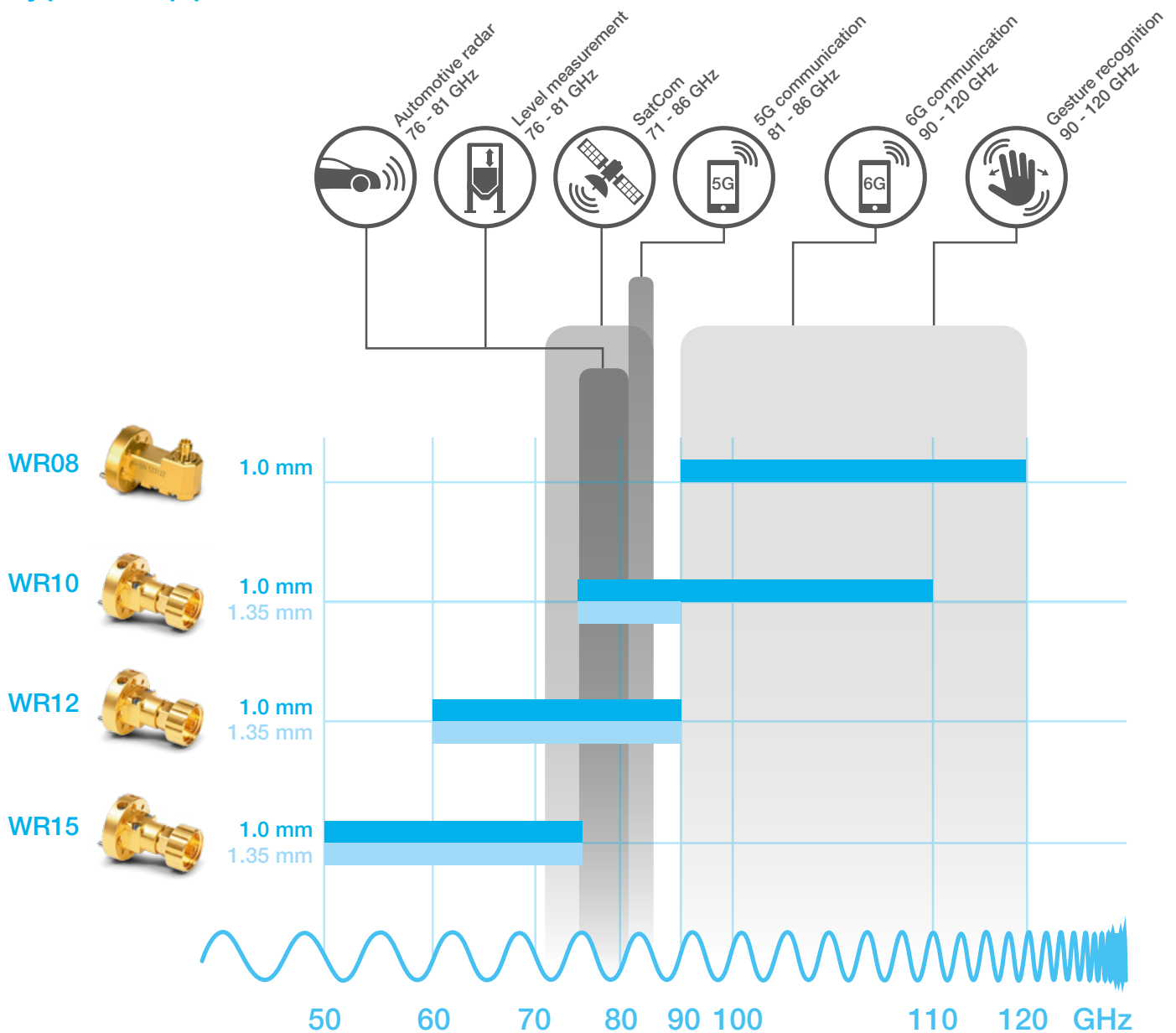
All these mmWave adapters are ideal for testing automotive and industrial radar sensors (in the 76 to 81 GHz range), satcom applications (from 71 to 76 GHz and 81 to 86 GHz), and the proposed new mmWave bands for 5G (81 to 86 GHz) and 6G (90 to 120 GHz) as well as for sensors for gesture recognition and material characterization.

## Less Fuss, Greater Flexibility!



SPINNER mmWave waveguide-to-coax adapters

## SPINNER mmWave Waveguide-to-Coax Adapters: Typical Applications





## Features

- Highly robust mechanical functions
  - Service life of at least 3000 cycles
  - The 1.35 mm connector is locked by a threaded coupling nut that reliably prevents unintended opening.
- The ruggedized coaxial interface includes a large threaded body that is designed to stabilize the advanced coaxial 1.00- or 1.35-mm test port during testing.
- Precision interface with:
  - Well-defined reference plane
  - Maximized return losses
  - High connector repeatability (min. 45 dB)
  - Suitability for precise measurement of S-parameters
- Standardized interface: compatible with IEC 60154-2
- Ideal design for the V, E, W and F frequency bands
- To ensure precise alignment, there are two extra pin holes according to IEC 60154-2.



Two extra pin holes to ensure precise alignment

## Special Design Goals

mmWave waveguide-to-coaxial adapters in various versions



## Waveguide-to-Coax Adapters 1.00 mm and 1.35 mm Ruggedized



Part Number	Style	Description	Frequency Range	Return Loss
<a href="#">BN 533141</a>	in-line	Precision Adapter Waveguide WR 10 to 1.00 mm female ruggedized	Full W band	≥ 16 dB
<a href="#">BN 533142</a>	in-line	Precision Adapter Waveguide WR 12 to 1.00 mm female ruggedized	Full E band	≥ 16 dB
<a href="#">BN 533143</a>	in-line	Precision Adapter Waveguide WR 15 to 1.00 mm female ruggedized	Full V band	≥ 16 dB
BN 533161	in-line	Precision Adapter Waveguide WR 10 to 1.00 mm male ruggedized	Full W band	≥ 16 dB
BN 533162	in-line	Precision Adapter Waveguide WR 12 to 1.00 mm male ruggedized	Full E band	≥ 16 dB
BN 533163	in-line	Precision Adapter Waveguide WR 15 to 1.00 mm male ruggedized	Full V band	≥ 16 dB
BN 533151	in-line	Precision Adapter Waveguide WR 10 to 1.35 mm female ruggedized	75 – 90 GHz	≥ 16 dB
BN 533152	in-line	Precision Adapter Waveguide WR 12 to 1.35 mm female ruggedized	Full E band	≥ 16 dB
BN 533153	in-line	Precision Adapter Waveguide WR 15 to 1.35 mm female ruggedized	Full V band	≥ 16 dB

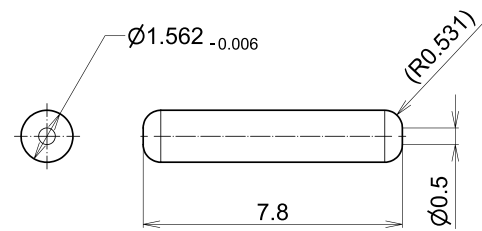


## Waveguide-to-Coax Adapters 1.00 mm and 1.35 mm

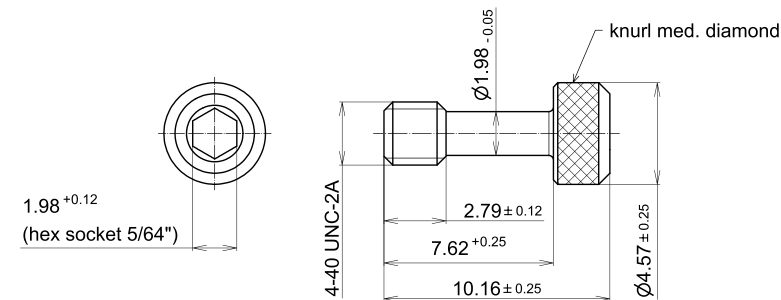


Part Number	Style	Description	Frequency Range	Return Loss
<b>BN 533110</b>	right-angle	Precision Adapter Waveguide WR 08 to 1.00 mm female	90 - 120 GHz	≥ 16 dB
<a href="#">BN 533112</a> <b>BN 533114</b>	in-line right-angle	Precision Adapter Waveguide WR 10 to 1.00 mm female	Full W band	≥ 16 dB
<a href="#">BN 533116</a> <b>BN 533118</b>	in-line right-angle	Precision Adapter Waveguide WR 12 to 1.00 mm female	Full E band	≥ 16 dB
<a href="#">BN 533120</a> <b>BN 533122</b>	in-line right-angle	Precision Adapter Waveguide WR 15 to 1.00 mm female	Full V band	≥ 16 dB
<a href="#">BN 533124</a> <b>BN 533125</b>	in-line right-angle	Precision Adapter Waveguide WR 10 to 1.00 mm male	75–90 GHz	≥ 16 dB
<a href="#">BN 533126</a> <b>BN 533127</b>	in-line right-angle	Precision Adapter Waveguide WR 12 to 1.00 mm male	Full E band	≥ 16 dB
<a href="#">BN 533128</a> <b>BN 533129</b>	in-line right-angle	Precision Adapter Waveguide WR 15 to 1.35 mm female	Full V band	≥ 16 dB
<b>BN 533134</b>	in-line	Precision Adapter Waveguide WR 10 to 1.35 mm male	75 – 90 GHz	≥ 16 dB
<b>BN 533135</b>	in-line	Precision Adapter Waveguide WR 12 to 1.35 mm male	Full E band	≥ 16 dB
<b>BN 533136</b>	in-line	Precision Adapter Waveguide WR 15 to 1.35 mm male	Full V band	≥ 16 dB
<a href="#">BN 533159</a>	in-line	Panel Connector WR 12 to 1.35 female, D-hole mount	Full E band	≥ 16 dB

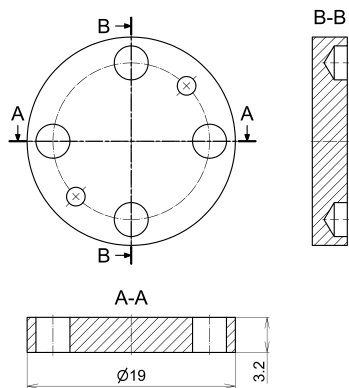
# Accessories for mmWave Waveguide-to-Coaxial Adapters



Part Number	Description
<a href="#">A61785</a>	Aligning pin



Part Number	Description
<a href="#">A61786</a>	Socket-head cap screws 4-40 UNC

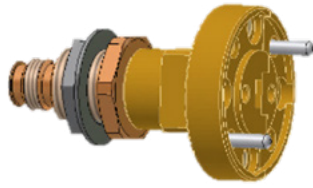


Part Number	Description
<a href="#">A62935</a>	Protective cap

## Panel / Feedthrough Connectors



BN 534990



BN 533159

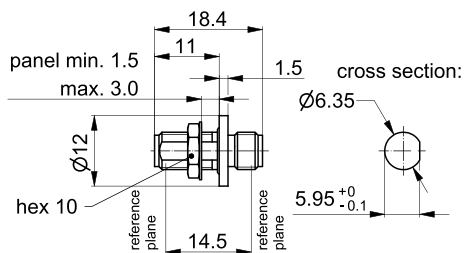
### Features

- Ultra-wideband bulkhead coaxial adapter DC-90 GHz
- Narrow band waveguide to coax adapter

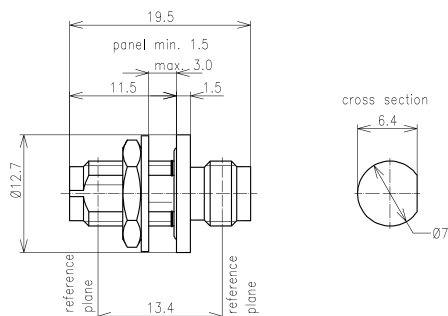
### Applications

- 5G mmW
- Anechoic chamber testing
- SatCom

## Coaxial Panel Connectors



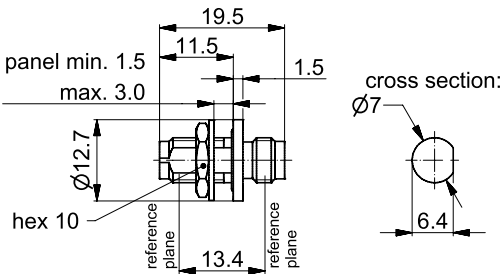
Part Number	Interface type A	Interface type B	Frequency Range	Return Loss, min.
BN 533168	2.92 mm female, bulkhead	2.92 mm female	DC - 44 GHz	27 dB @ DC to 10 GHz 24 dB @ 10 to 26.5 GHz 20 dB @ 26.5 to 44 GHz



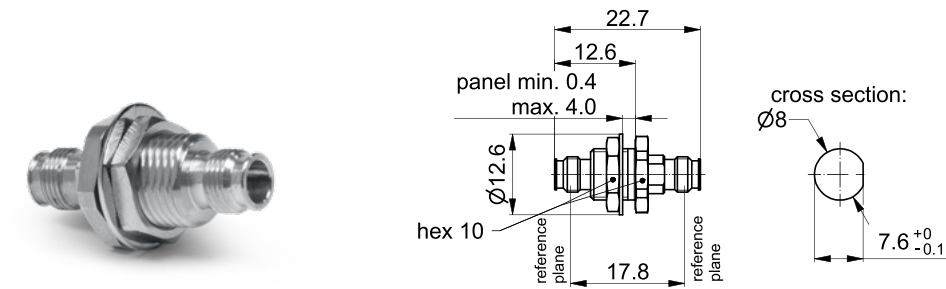
Part Number	Interface type A	Interface type B	Frequency Range	Return Loss, min.
<a href="#">BN 533713</a>	2.4 mm female, bulkhead	2.4 mm female	DC - 50 GHz	27 dB @ DC to 10 GHz 24 dB @ 10 to 26.5 GHz 20 dB @ 26.5 to 50 GHz



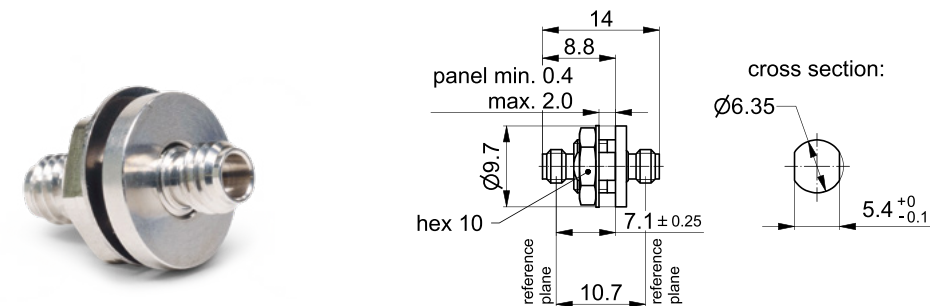
# Coaxial Panel Connectors



Part Number	Interface type A	Interface type B	Frequency Range	Return Loss, min.
BN 533712	1.85 mm female, bulkhead	1.85 mm female	DC - 70 GHz	27 dB @ DC to 10 GHz 24 dB @ 10 to 26.5 GHz 20 dB @ 26.5 to 50 GHz 16 dB @ 50 to 70 GHz

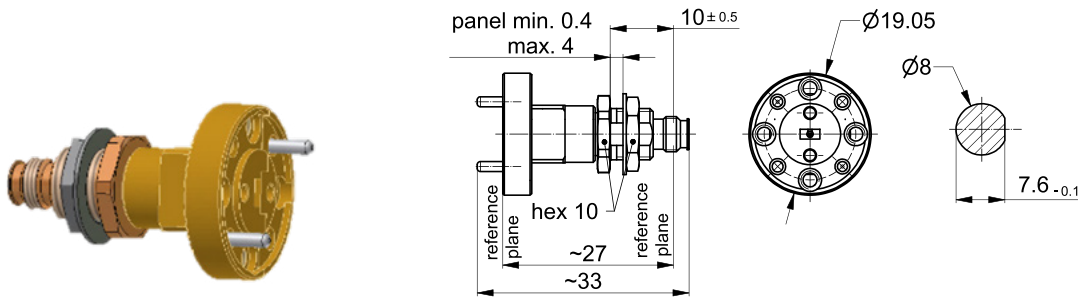


Part Number	Interface type A	Interface type B	Frequency Range	Return Loss, min.
<a href="#">BN 534990</a>	1.35 mm female, bulkhead	1.35 mm female	DC - 90 GHz	24 dB @ DC to 26.5 GHz 18 dB @ 26,5 to 70 GHz 15 dB @ 70 to 90 GHz

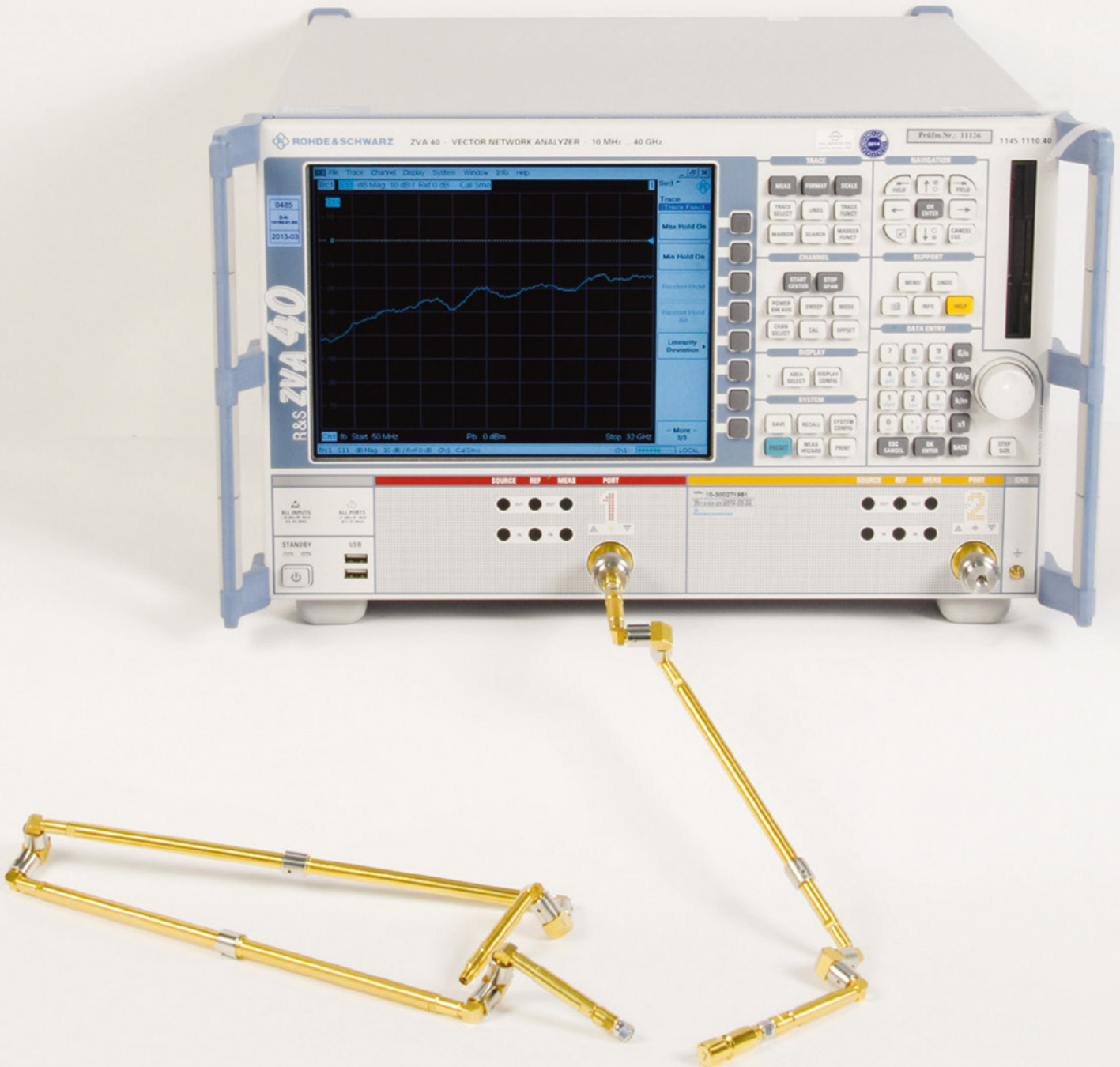


Part Number	Interface type A	Interface type B	Frequency Range	Return Loss, min.
<a href="#">BN 534999</a>	1.00 mm female, bulkhead	1.00 mm female	DC - 110 GHz	24 dB @ DC to 26.5 GHz 18 dB @ 26,5 to 70 GHz 15 dB @ 70 to 90 GHz 12 dB @ 90 to 110 GHz

## Waveguide Panel Connectors

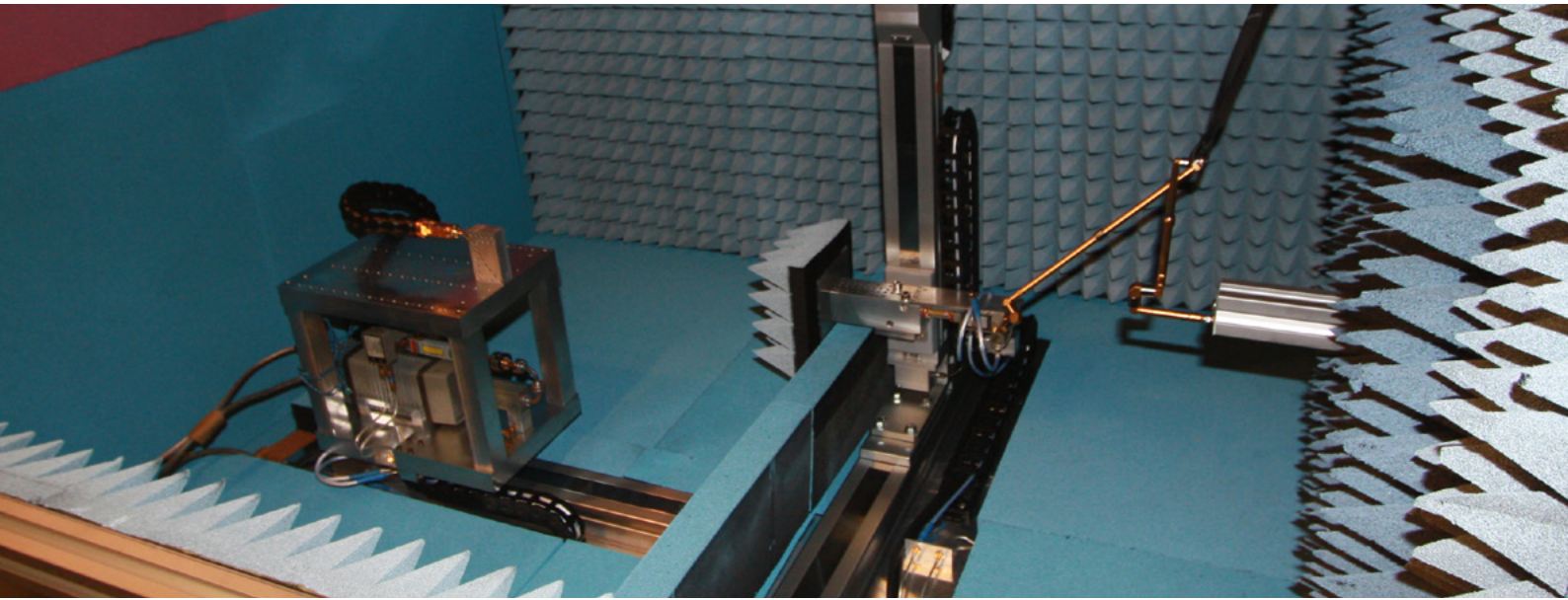


Part Number	Interface type A	Interface type B	Frequency Range	Return Loss, min.
<a href="#">BN 533159</a>	WR 12 bulkhead	1.35 mm female	DC - 90 GHz	16 dB @ DC to 90 GHz





## Articulated Lines



**Articulated lines boast excellent RF properties and an extremely long service life. They are considerably more robust than ordinary test cables, lasting several times as long.**

### Features

- Extremely long life
  - 1 Million flex cycles guaranteed for articulated line (The rotary joints allow movements without stressing of the material by strain or torsion)
  - Worn-out port saver connectors (5000 matings guaranteed) can be easily replaced by customer
- Excellent amplitude and phase stability
  - Also during movement
  - Also with temperature drift
- Accurate and reproducible RF measurements
  - No need for adapters because 3.5 and N connectors are available as male and female
  - VNA calibration is not affected by movements
- Highly flexible
  - DUT ports in any orientation can be connected within a sphere 1 m in diameter (0.5 m for short line)
  - Rotation allowed
  - No mechanical stress introduced to DUT
- Ecofriendly
  - Long life
  - Repair-friendly
  - Recyclable

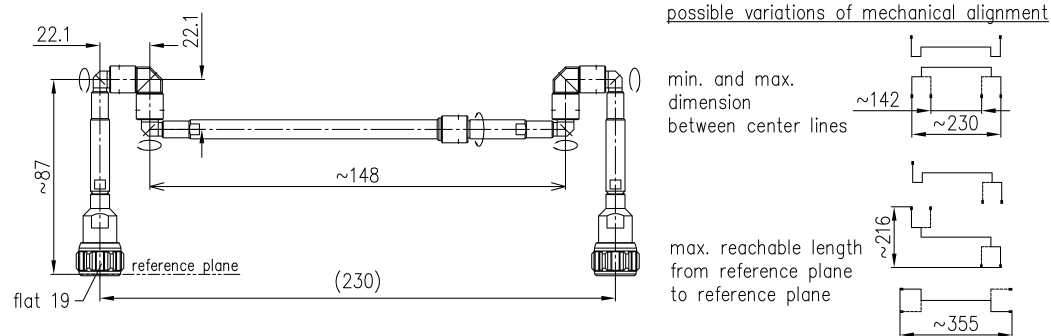
### Applications

- General test bench use
- Network analysis (S-parameter measurement)
- Robotic test setups
- Measurement of rotatable DUTs (e.g. rotary joints and rotating systems)



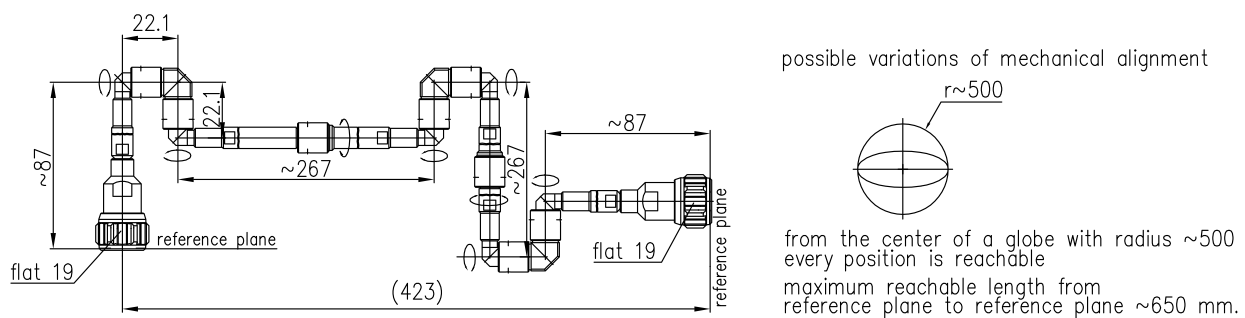
YouTube - Articulated Lines  
 SPINNER RF Articulated Lines  
 contra RF test cables

## DC to 18 GHz – 365 mm



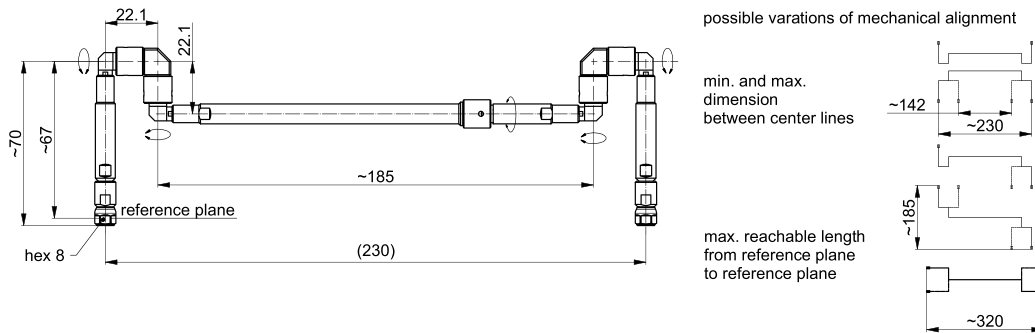
Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
<a href="#">BN 533626C1010</a>	Type N male/male	DC to 4 GHz $\geq 26$ dB 4 to 12 GHz $\geq 20$ dB 12 to 18 GHz $\geq 15$ dB	DC to 18 GHz $\leq 1.7$ dB	365	1
<a href="#">BN 533626C2010</a>	Type N male/female				
<a href="#">BN 533626C3010</a>	Type N female/female				
<a href="#">BN 533626C1111</a>	Type N male/male				2
<a href="#">BN 533626C2211</a>	Type N male/female				
<a href="#">BN 533626C3311</a>	Type N female/female				

## DC to 18 GHz – 650 mm



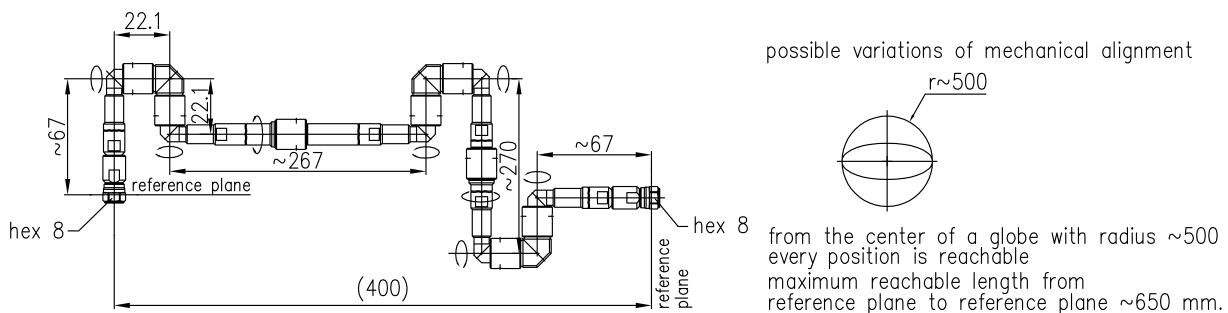
Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
<a href="#">BN 533645C1010</a>	Type N male/male	DC to 4 GHz $\geq 26$ dB 4 to 9 GHz $\geq 17$ dB 9 to 18 GHz $\geq 15$ dB	DC to 18 GHz $\leq 2.7$ dB	650	1
<a href="#">BN 533645C2010</a>	Type N male/female				
<a href="#">BN 533645C3010</a>	Type N female/female				
<a href="#">BN 533645C1111</a>	Type N male/male				2
<a href="#">BN 533645C2211</a>	Type N male/female				
<a href="#">BN 533645C3311</a>	Type N female/female				

## DC to 32 GHz – 320 mm



Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
<a href="#">BN 533627C1010</a>	3.5 mm male/male	DC to 4 GHz $\geq 26$ dB 4 to 12 GHz $\geq 20$ dB 12 to 18 GHz $\geq 15$ dB	DC to 18 GHz $\leq 1.7$ dB 18 to 26.5 GHz $\leq 2.2$ dB 26.5 to 32 GHz $\leq 3.0$ dB	320	1
<a href="#">BN 533627C2010</a>	3.5 mm male/female				
<a href="#">BN 533627C3010</a>	3.5 mm female/female				
<a href="#">BN 533627C1111</a>	3.5 mm male/male				2
<a href="#">BN 533627C2211</a>	3.5 mm male/female				
<a href="#">BN 533627C3311</a>	3.5 mm female/female				

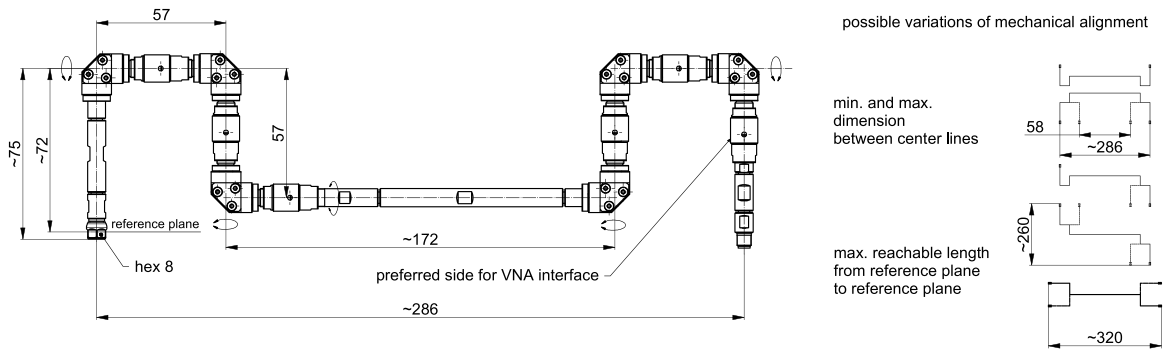
## DC to 32 GHz – 650 mm



Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
<a href="#">BN 533638C1010</a>	3.5 mm male/male	DC to 4 GHz $\leq 26$ dB 4 to 9 GHz $\leq 17$ dB 9 to 18 GHz $\leq 15$ dB 18 to 26.5 GHz $\leq 12$ dB 26.5 to 32 GHz $\leq 9$ dB	DC to 18 GHz $\leq 2.7$ dB 18 to 26.5 GHz $\leq 3.2$ dB 26.5 to 32 GHz $\leq 3.4$ dB	650	1
<a href="#">BN 533638C2010</a>	3.5 mm male/female				
<a href="#">BN 533638C3010</a>	3.5 mm female/female				
<a href="#">BN 533638C1111</a>	3.5 mm male/male				2
<a href="#">BN 533638C2211</a>	3.5 mm male/female				
<a href="#">BN 533638C3311</a>	3.5 mm female/female				

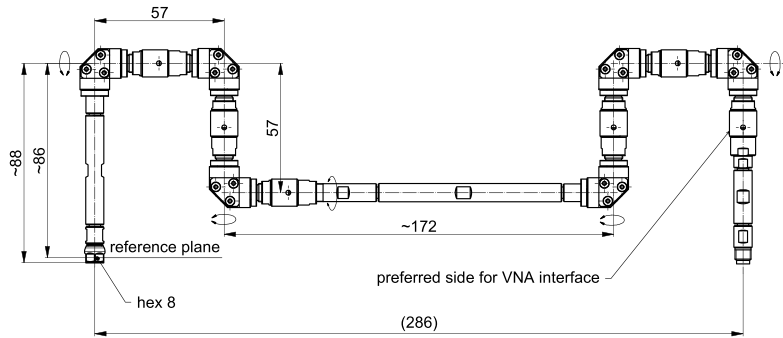


DC to 40 GHz – 320 mm



Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
<a href="#">BN 533647C1010</a>	2.92 mm male/male	DC to 4 GHz ≤ 26 dB 4 to 9 GHz ≤ 20 dB 9 to 18 GHz ≤ 15 dB 18 to 26.5 GHz ≤ 12 dB 26.5 to 40 GHz ≤ 10 dB	DC to 18 GHz ≤ 2.3 dB 18 to 26.5 GHz ≤ 3.0 dB 26.5 to 40 GHz ≤ 4.0 dB	320	1
<a href="#">BN 533647C2010</a>	2.92 mm male/female				
<a href="#">BN 533647C3010</a>	2.92 mm female/female				
<a href="#">BN 533647C1111</a>	2.92 mm male/male				2
<a href="#">BN 533647C2211</a>	2.92 mm male/female				
<a href="#">BN 533647C3311</a>	2.92 mm female/female				

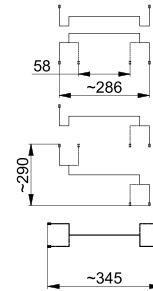
## DC to 50 GHz – 345 mm



possible variations of mechanical alignment

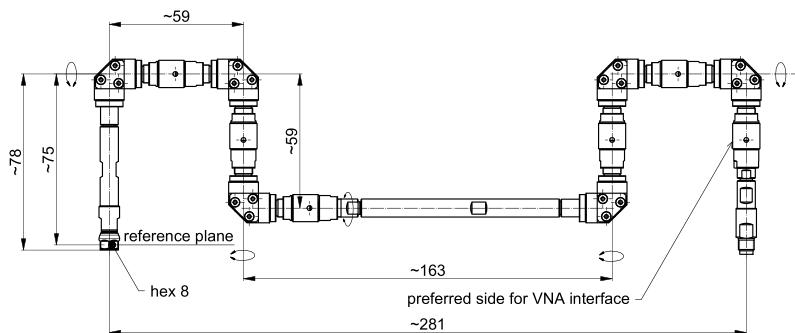
min. and max.  
dimension  
between center lines

max. reachable length  
from reference plane  
to reference plane

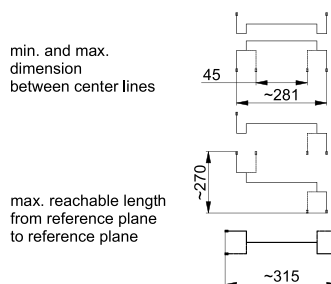


Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
<a href="#">BN 533646C1010</a>	2.4 mm male/male	DC to 4 GHz ≤ 26 dB 4 to 9 GHz ≤ 20 dB 9 to 18 GHz ≤ 15 dB 18 to 26.5 GHz ≤ 12 dB 26.5 to 40 GHz ≤ 10 dB 40 to 50 GHz ≤ 8 dB	DC to 18 GHz ≤ 2.5 dB 18 to 26.5 GHz ≤ 3.5 dB 26.5 to 40 GHz ≤ 4.5 dB 40 to 50 GHz ≤ 5.5 dB	345	1
<a href="#">BN 533646C2010</a>	2.4 mm male/female				
<a href="#">BN 533646C3010</a>	2.4 mm female/female				
<a href="#">BN 533646C1111</a>	2.4 mm male/male				2
<a href="#">BN 533646C2211</a>	2.4 mm male/female				
<a href="#">BN 533646C3311</a>	2.4 mm female/female				

DC to 67 GHz – 315 mm



possible variations of mechanical alignment



Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
<a href="#">BN 533652C1010</a>	1.85 mm male/male	DC to 4 GHz ≤ 25 dB 4 to 6 GHz ≤ 20 dB 6 to 18 GHz ≤ 15 dB 18 to 26.5 GHz ≤ 12 dB 26.5 to 40 GHz ≤ 10 dB 40 to 67 GHz ≤ 8 dB	DC to 18 GHz ≤ 2.5 dB 18 to 26.5 GHz ≤ 3.5 dB 26.5 to 40 GHz ≤ 4.5 dB 40 to 50 GHz ≤ 5.5 dB 50 to 67 GHz ≤ 6.5 dB	315	1
<a href="#">BN 533652C2010</a>	1.85 mm male/female				
<a href="#">BN 533652C3010</a>	1.85mm female/female				
<a href="#">BN 533652C1111</a>	1.85 mm male/male				
<a href="#">BN 533652C2211</a>	1.85 mm male/female			2	
<a href="#">BN 533652C3311</a>	1.85 mm female/female				



## Port Saver for Articulated Lines



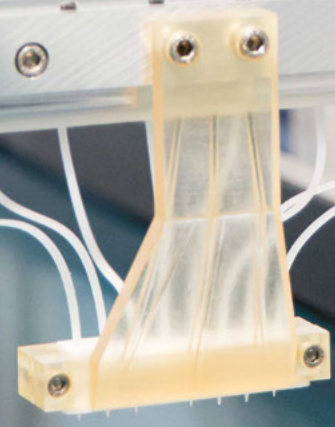
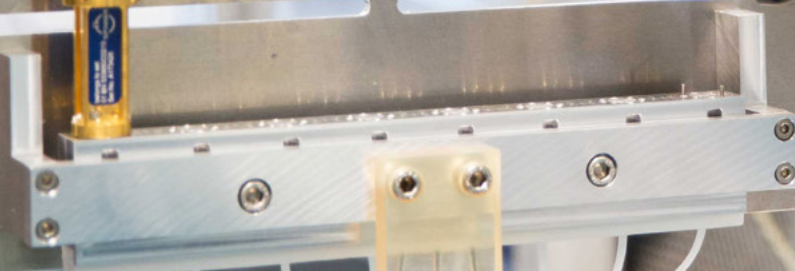
**BN 533918C0001**

- High-precision adapter in instrument quality
- Minimize wear at articulated line ports
- Male-male, female-female, or male-female available
- For frequencies up to 70 GHz

Part Number	Interface type	Frequency range	Return Loss, min.
<a href="#">BN 533916C0001</a>	Type N male-male	DC to 18 GHz	38 dB @ DC to 4 GHz 34 dB @ 4 to 8 GHz 28 dB @ 8 to 18 GHz
<a href="#">BN 533917C0001</a>	Type N female-female		
<a href="#">BN 533918C0001</a>	Type N male-female		
<a href="#">BN 533767C0001</a>	3.5 mm male-male	DC to 32 GHz	34 dB @ DC to 4 GHz 30 dB @ 4 to 26.5 GHz 26 dB @ 26.5 to 32 GHz
<a href="#">BN 533768C0001</a>	3.5 mm female-female		
<a href="#">BN 533769C0001</a>	3.5 mm male-female		
<a href="#">BN 533907C0001</a>	2.92 mm male-male	DC to 40 GHz	33 dB @ DC to 4 GHz 30 dB @ 4 to 26.5 GHz 25 dB @ 26.5 to 40 GHz
<a href="#">BN 533908C0001</a>	2.92 mm female-female		
<a href="#">BN 533909C0001</a>	2.92 mm male-female		
<a href="#">BN 533776C0001</a>	2.4 mm male-male	DC to 50 GHz	32 dB @ DC to 4 GHz 30 dB @ 4 to 26.5 GHz 25 dB @ 26.5 to 40 GHz 23 dB @ 40 to 50 GHz
<a href="#">BN 533777C0001</a>	2.4 mm female-female		
<a href="#">BN 533778C0001</a>	2.4 mm male-female		



Millimeter Wave VNA Extender  
Optimized for Agilent N5280A  
75 to 110 GHz  
V10VNA2-T/R  
OML inc.  
Model # VNA2-T/R  
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# SPINNER EasySnake - The Flexible Terahertz Waveguide Assembly



**SPINNER EasySnake** for E- and W-band performs the function of a **hollow metallic** waveguide but offers two degrees of freedom: flexible bending and twisting **in any direction** while delivering excellent measurement results at the same time. Even conventional flexible waveguides made of electrically conductive bellows are typically non-twistable i.e. resist torsion, which significantly limits the feasible test configurations.

They are also completely intolerant of minimally misalign or twisted flanges. The SPINNER EasySnake overcomes this by combining the flexibility of a conventional RF measurement cable with the excellent low-loss transmission characteristics of a conventional non-flexible waveguide system.

## Features

- Dielectric waveguide supported by unique tubular segments (patent pending)
- Flexible, i.e. bendable and twistable (eliminates installations problems caused by misalignment of flanges)
- Flex-stable, i.e. keeps chosen bending geometry
- Built-in transitions from dielectric to rectangular waveguide
- Insertion loss outperforms any coaxial cable and single-mode metallic waveguide
- Excellent amplitude stability with flexure and temperature change
- Length configurable in steps of 25 mm
- Mechanically protected and electrically shielded
- High-voltage decoupled waveguide transitions

## Applications

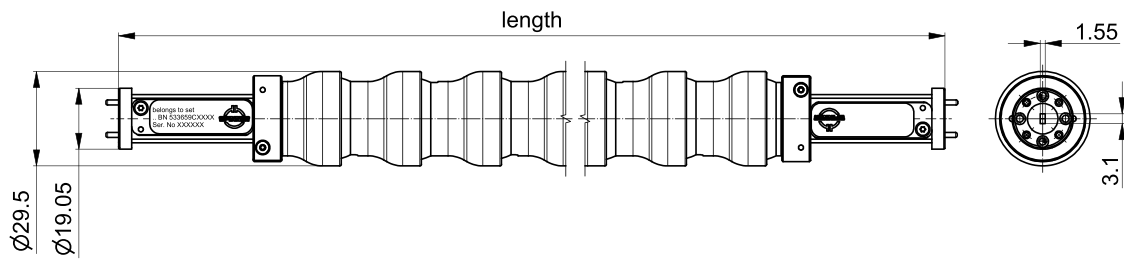
- General test bench use
- Network analysis (S-parameter measurement)
- Antenna testing (near field, far field)
- Environmental chamber and vibration testing



## Conference Paper

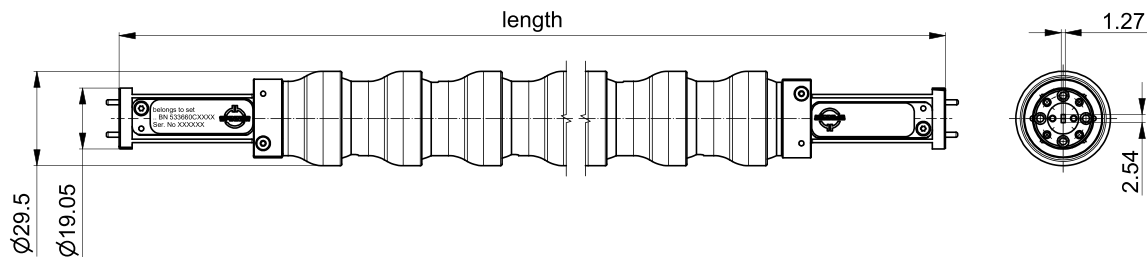
Nickel, H.-U. and Zovo, J., 2014, Novel flexible dielectric waveguide for millimeter and sub-millimeter frequencies – Design and characterization, 84th ARFTG Microwave Measurement Conference (ARFTG 84th), Boulder, Colorado, USA, Proceedings.

## 60 - 90 GHz, E-Band



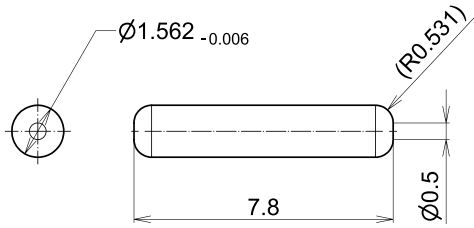
Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
<a href="#">BN 533659C0107</a>	WR 12 / R 740	16 dB	1.8 dB @ 60 to 65 GHz	300	1
<a href="#">BN 533659C0207</a>			1.4 dB @ 65 to 90 GHz	300	2
<a href="#">BN 533659C0119</a>			2.6 dB @ 60 to 65 GHz	600	1
<a href="#">BN 533659C0219</a>			2.1 dB @ 65 to 90 GHz	600	2
<a href="#">BN 533659C0131</a>		14 dB	3.5 dB @ 60 to 65 GHz 2.9 dB @ 65 to 90 GHz	900	1

## 75 - 110 GHz, W-Band

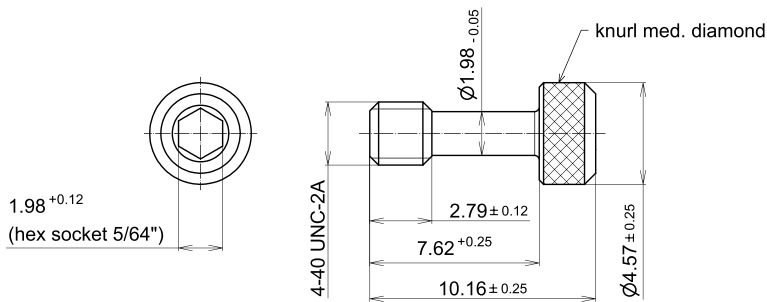


Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
<a href="#">BN 533660C0107</a>	WR 10 / R 900	16 dB	0.4 dB @ 75 to 80 GHz	300	1
<a href="#">BN 533660C0207</a>			0.2 dB @ 80 to 110 GHz	300	2
<a href="#">BN 533660C0119</a>			0.8 dB @ 75 to 80 GHz	600	1
<a href="#">BN 533660C0219</a>			0.4 dB @ 80 to 85 GHz 0.2 dB @ 85 to 110 GHz	600	2
<a href="#">BN 533660C0131</a>		14 dB	0.8 dB @ 75 to 80 GHz 0.6 dB @ 80 to 85 GHz 0.4 dB @ 85 to 90 GHz 0.2 dB @ 90 to 110 GHz	900	1

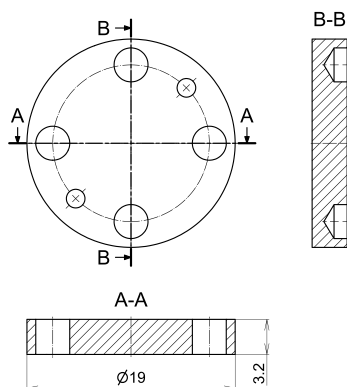
## Accessories for SPINNER EasySnake



Part Number	Description
<a href="#">A61785</a>	Aligning pin

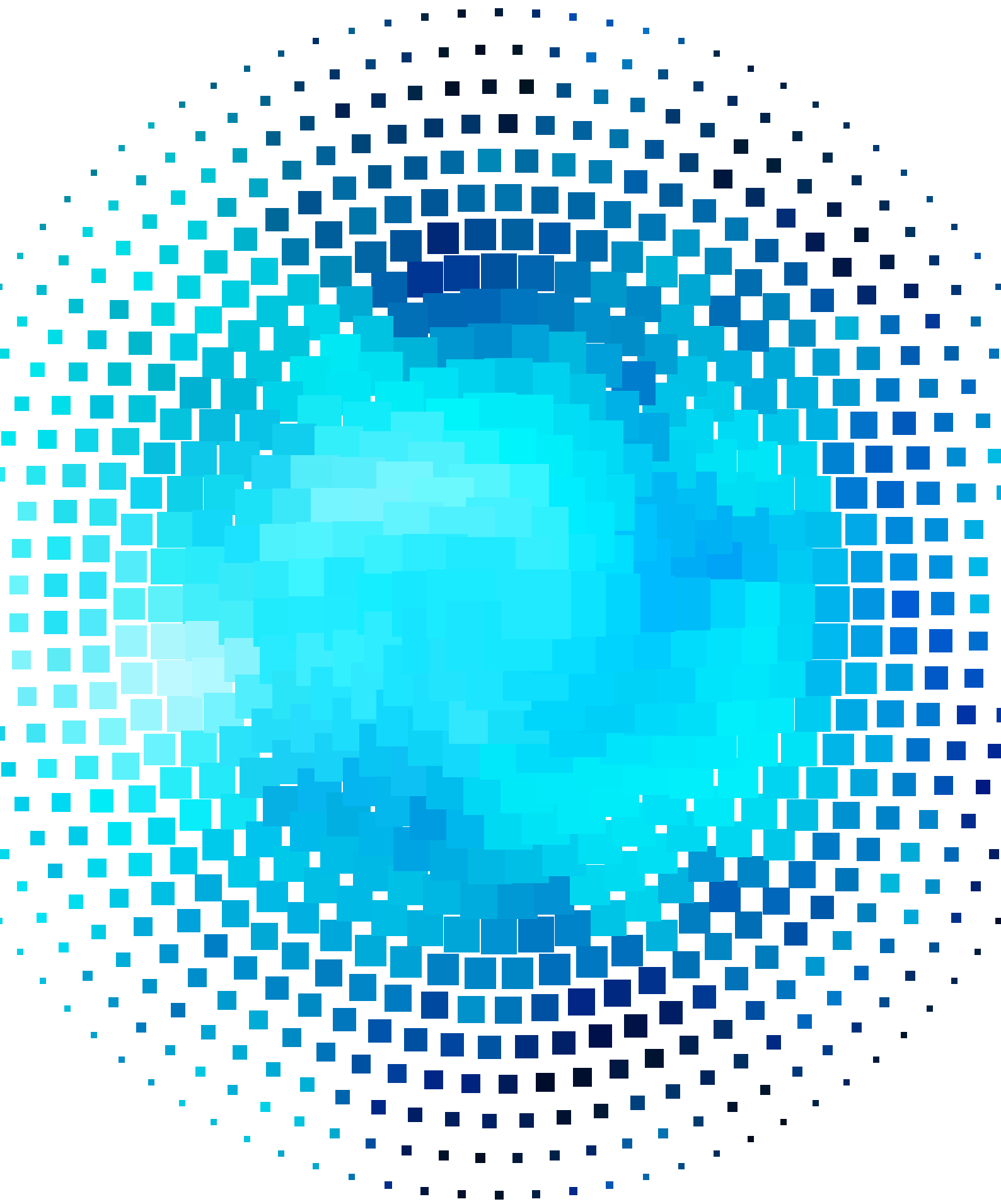


Part Number	Description
<a href="#">A61786</a>	Socket-head cap screws 4-40 UNC



Part Number	Description
<a href="#">A62935</a>	Protective cap





# RF Rotary Joints

## Swivel Your Signals in the Direction You Need

**SPINNER rotary joints excel with compact designs, excellent VSWR, low insertion losses, minimal fluctuation of transmission characteristics while rotating, and high crosstalk attenuation between individual channels across the entire range of frequencies used.**

With over 70 years of experience in the field of high-frequency technology, SPINNER is able to develop and supply rotary joints in any desired combination. They include fiber-optic rotary joints, joints for transmitting high power or large data volumes (e.g. via slip rings), and joints with integrated passages for media. The results can also be described as hybrid rotary joints. We also repair and service rotary joints of all makes.

### Noncontacting Rotary Joints

Noncontacting RF rotary joints (RJ) are available in **coaxial and waveguide designs for frequency ranges up to 100 GHz**. They are characterized by an especially long service life. Signal transmission is possible at a bandwidth of about 20% of the highest transmitted frequency.

Noncontacting rotary joints are used for **narrow-band transmission**. With special coupling structures, the same module can also be used to transmit two different frequency bands (e.g. the X and L bands).

### Contacting Rotary Joints

In contacting rotary joints, the inner and outer conductors of the stator and rotor are DC-coupled. The maximum frequency depends on the diameter of the coaxial line. These coaxial rotary joints are used for **broadband applications**, allowing signal transmission in the frequency range from DC up to 120 GHz.

### Interface Styles

The interfaces are available in I, U and L styles. These differ in the orientation of the input and output connections of a rotary joint (at the rotor and stator).

In the I style, both are aligned with the rotational axis, in the U style both are perpendicular to the rotational axis, and in the L style one is perpendicular to the axis while the other is aligned with it.

### Multi-Channel Solutions

Multi-channel coaxial rotary joints from DC-92, and full band waveguide rotary joints up to 110 GHz available on request.



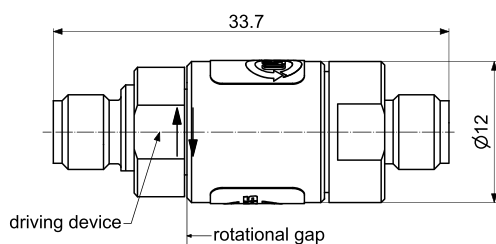
Application note:  
[Rotary Joints – Installations Guidelines](#)

## Single-Channel Coaxial Rotary Joints

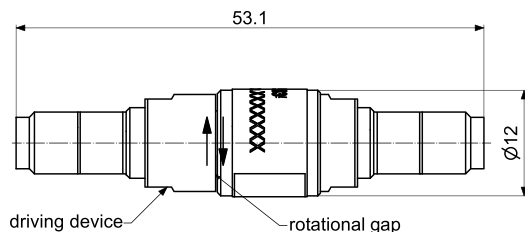


BN 835082

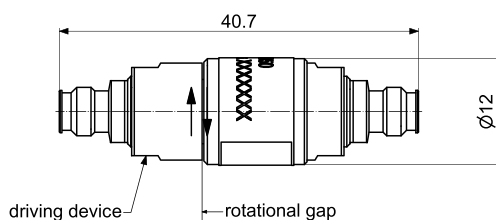
### I-style



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 835091</a>	3.5 mm female	3.5 mm female	DC - 26.5 GHz	1.3 @ DC to 10 GHz 1.4 @ 10 to 18 GHz 1.7 @ 18 to 26.5 GHz



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 835080</a>	1.85 mm female	1.85 mm female	DC - 67 GHz	1.1 @ DC to 10 GHz 1.2 @ 10 to 26 GHz 1.3 @ 26 to 50 GHz 1.4 @ 50 to 67 GHz



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 835082</a>	1.35 mm female	1.35 mm female	DC - 92 GHz	1.2 @ DC to 26.5 GHz 1.4 @ 26.5 to 70 GHz 1.6 @ 70 to 90 GHz

### Features

- 1.35 mm coaxial ultra-wideband single channel rotary joint DC-92 GHz
- Excellent RF performance for highest frequencies
- Low form factor
- Available with panel 3-hole flange

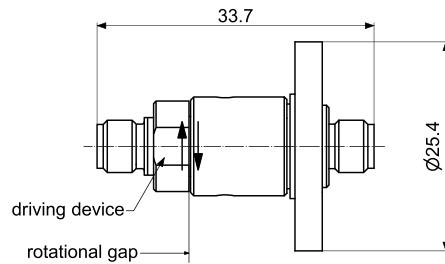
### Applications

Avoidance of torques on high precision measuring cables used in anechoic chambers for product testing of

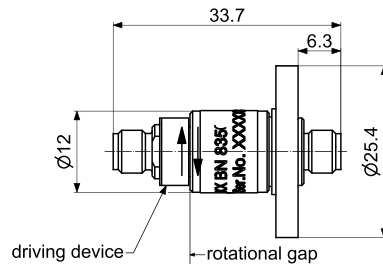
- 5G mmW
- SatCom
- Automotive radar
- General test bench use
- Network analysis (S-parameter measurement)

# Single-Channel Coaxial Rotary Joints

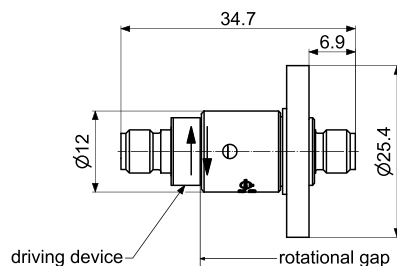
## I-style, flanged



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 835047</a>	SMA female	SMA female	DC - 18 GHz	1.3 @ DC to 10 GHz 1.4 @ 10 to 18 GHz



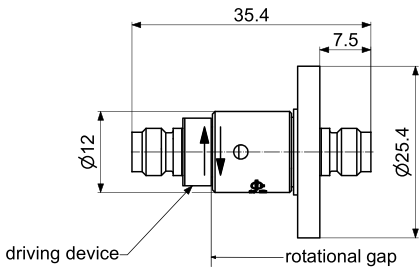
Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 835068</a>	3.5 mm female	3.5 mm female	DC - 32 GHz	1.3 @ DC to 10 GHz 1.4 @ 10 to 18 GHz 1.7 @ 18 to 26.5 GHz



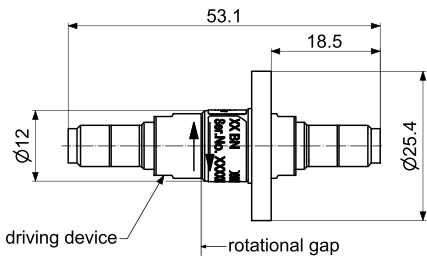
Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 835045</a>	2.92 mm female	2.92 mm female	DC - 44 GHz	1.3 @ DC to 10 GHz 1.4 @ 10 to 18 GHz 1.7 @ 18 to 26.5 GHz 2.0 @ 26.5 to 44 GHz

# Single-Channel Coaxial Rotary Joints

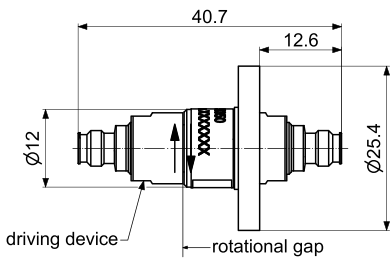
## I-style, flanged



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 835077</a>	2.4 mm female	2.4 mm female	DC - 50 GHz	1.3 @ DC to 10 GHz 1.4 @ 10 to 26.5 GHz 1.7 @ 26.5 to 50 GHz



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<b>BN 835080C0001</b>	1.85 mm female	1.85 mm female, with 3-hole flange	DC - 67 GHz	1.10 @ DC to 10 GHz 1.20 @ 10 to 26 GHz 1.30 @ 26 to 50 GHz 1.40 @ 50 to 67 GHz



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<b>BN 835082C0001</b>	1.35 mm female	1.35 mm female, with 3-hole flange	DC - 92 GHz	1.20 @ DC to 26.5 GHz 1.40 @ 26.5 to 70 GHz 1.60 @ 70 to 90 GHz



# Single-Channel Rectangular Waveguide Rotary Joints

## Features

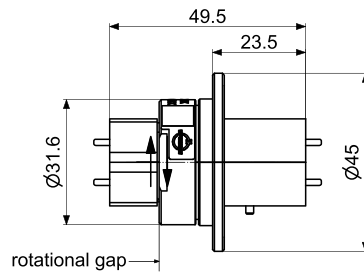
- I and L styles
- Long service life

## Applications

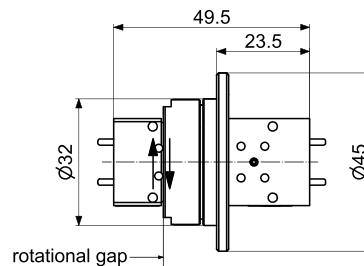
Avoidance of torques on high-precision measuring cables used in anechoic chambers for testing of

- 5G mmW
- SatCom
- Automotive radar

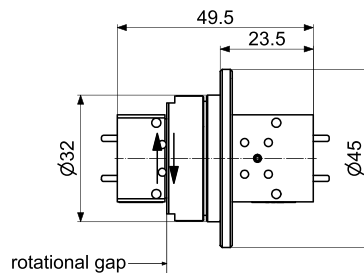
## I-style



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 636281</a>	WR 15 / R 620	WR 15 / R 620	50 – 75 GHz	1.8



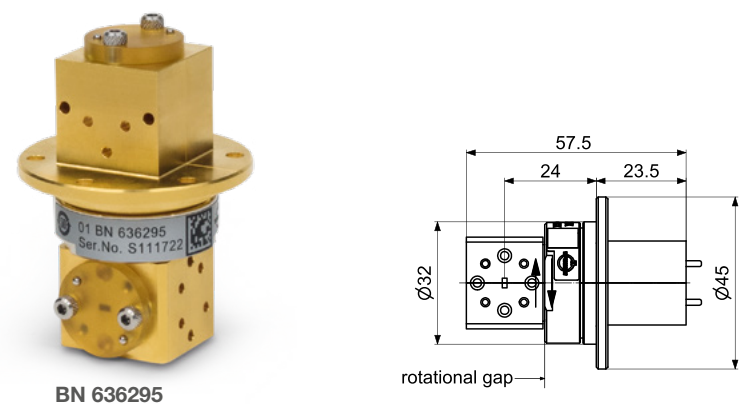
Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 636282</a>	WR 12 / R 750	WR 12 / R 750	60 – 90 GHz	1.8



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 636283</a>	WR 10 / R 900	WR 10 / R 900	75 – 110 GHz	1.8

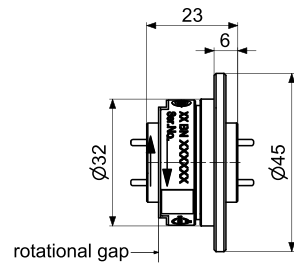
# Single-Channel Rectangular Waveguide Rotary Joints

## L-style, narrow band

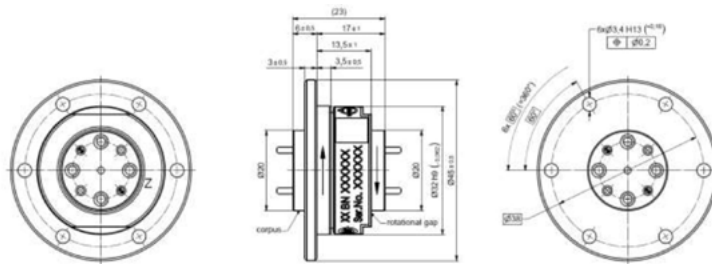


Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 636295</a>	WR 10 / R 900	WR 10 / R 900	94 GHz	1.3 @ 94±1 GHz 1.5 @ 94±2 GHz 2.0 @ 94±3 GHz

## Single-Channel Circular Waveguide Rotary Joints



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 636214</a>	WC 6.7	WC 6.7	110 - 210 GHz	1.2



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
<a href="#">BN 636210</a>	WC 6.7	WC 6.7	110 - 210 GHz	1.2 @ 110 to 200 GHz 1.4 @ 200 to 210 GHz

# Dial Gauges



- Designed to properly gage the contact pin locations and pin depth of used Interfaces
- Marked tolerance limits for different connector grades
- Calibration standard to adjust to zero

## Why use a gauge?

Proven RF measurement procedures require that all coaxial connectors on equipment, cables and terminations be routinely measured to detect mechanical tolerance variations that could affect electrical performance or damage the connector.

When using coaxial cables, it is particularly important for them to be tested before use to ensure that the assembled connector conforms to the relevant mechanical specification limits. There is otherwise a risk of damage to the calibration components, which would in turn result in costly downtimes and repairs.

Coaxial connectors should never be forced together when making a connection, since the apparent need to do so often indicates that they are defective, damaged, or incompatible.

Certain dimensions are critical for the mechanical integrity, non-destructive mating and electrical performance of the connector. The mating face is usually offset from the reference plane. This is done to reduce mechanical damage or isalignment when making connections.

On a SPINNER dial gauge, the tolerance limits for the various connector standards are color-coded on the dial. This makes a good/bad assessment of the gauge dimensions of precision connectors easy even without in-depth knowledge of the standard. A so-called reference gauge for monitoring and calibrating the dial gauge is included in the scope of delivery.

Part Number	Interface type	Gauge range	Scale marking	Measurement accuracy
<a href="#">BN 537074</a>	3.5 mm male	1 mm	0.001 mm	0.003 mm
<a href="#">BN 537075</a>	3.5 mm female			
<a href="#">BN 537081</a>	2.92 mm male			
<a href="#">BN 537082</a>	2.92 mm female			
<a href="#">BN 537078</a>	3.5 mm male			
<a href="#">BN 537079</a>	3.5 mm female			
<a href="#">BN 537083</a>	2.92 mm male	0.1 mm		
<a href="#">BN 537084</a>	2.92 mm female			
<a href="#">BN 534940</a>	1.35 mm male			
<a href="#">BN 534941</a>	1.35 mm female			

## Torque Wrenches

Properly tightening connectors improves every calibration and subsequent measurement.



- Preset with the precise torque needed for 1.35 mm, 1.85 mm, 2.4 mm, 2.92 mm, 3.5 mm and Type N Interfaces
- 8 mm version with soft pads on spanner flats avoiding scratches on precision connector surfaces
- Additional open-ended wrench included in set BN 238741

### Why use a torque wrench?

RF torque wrenches are designed to help prevent excessive tightening of the coupling nut of the sensitive coaxial precision connectors. The international standards specify a maximum tightening torque for each precision connector size, which must not be exceeded. These torque values differ considerably from those of the standard connectors. The user must therefore ensure that the correct torque value is applied to the connector.

SPINNER torque wrenches for precision connectors are therefore already preset to the correct torque. However, this alone is not enough for torque-controlled screwing with high accuracy. Even when using a torque wrench, both sides of the connector can be damaged if, for example, the connector covered by the coupling nut rotates unintentionally. To prevent this, the connector should be additionally held in its initial position with a simple open-ended wrench.

When the set torque value is reached, this is indicated by a clearly audible clicking of the torque wrench. From this point on, no further force should be applied. It is also not necessary to repeat the tightening process.

Torque wrenches for precision applications should be checked or calibrated regularly. An interval of 12 months is recommended. This service can be requested from our aftersales service center.

Part Number	Interface type	Frequency range	Return Loss, min.
<a href="#">BN 537091R000</a>	Type N	19 mm	0.9 N·m
<a href="#">BN 154141R000</a>	1.85 mm – 3.5 m	8 mm	0.9 N·m
<a href="#">BN 238741</a>	1.35 mm, 1.85 mm, 2.4 mm, 2.92 mm, 3.5 mm	8 mm, softpads, storage box, with counterholder wrench	0.9 N·m

## Accessories for Torque Wrench

Part Number	Description
<a href="#">A45535</a>	Spare soft pads for torque Wrench BN 238741





## HIGH FREQUENCY PERFORMANCE WORLDWIDE

SPINNER designs and builds cutting-edge radio frequency systems, setting performance and longevity standards for others to follow. The company's track record of innovation dates back to 1946, and many of today's mainstream products are rooted in SPINNER inventions.

Industry leaders continue to count on SPINNER's engineering excellence to drive down their costs of service and ownership with premium-quality, off-the-shelf products and custom solutions. Headquartered in Munich, Germany, the global frontrunner in RF components remains the first choice in simple-yet-smart RF solutions.

[www.spinner-group.com](http://www.spinner-group.com)

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