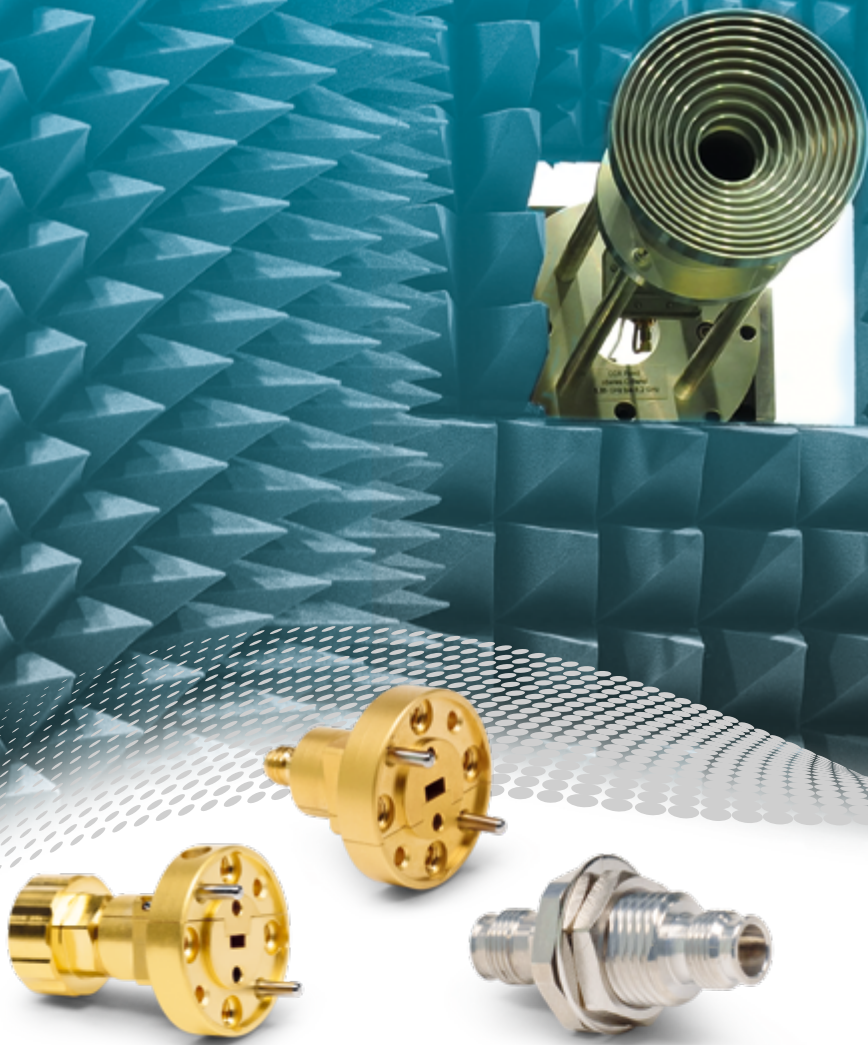


SPINNER

Connectivity Solutions for RF Anechoic Chambers



Optimize Your Test Chamber Setup

HIGH FREQUENCY PERFORMANCE WORLDWIDE
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 & 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, LTE, 5G or 6G 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 up to 165 GHz.

Coaxial and Waveguide Measurement Devices

Coaxial measurement devices made by SPINNER are needed for:

VNA / S-Parameter Measurement

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

Millimeter Wave Measurement

- Ruggedized test port adapters
- mmWave wave-to-coaxial-adapters
- 0.8 mm Coaxial Connector System
- 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



Connectivity Solutions for RF Anechoic Chambers

- Ruggedized test port adapters
- mmWave wave-to-coaxial-adapters
- Panel feedthroughs
- Articulated lines
- EasySnake flexible dielectric waveguides
- Rotary joints

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”.

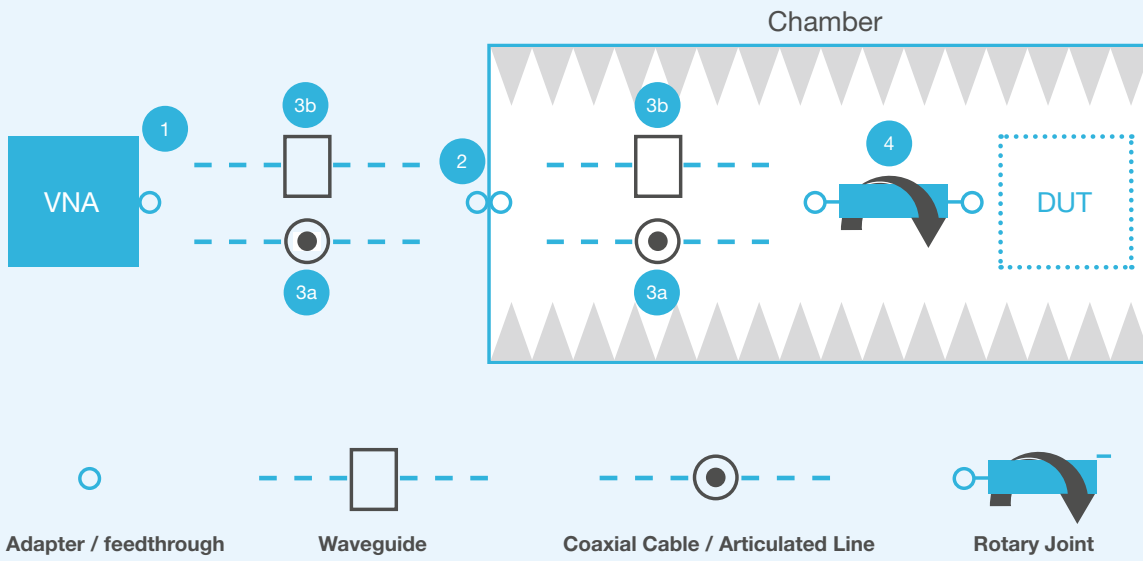
But what about RF signals when the test equipment is outside a chamber? How can signals be routed in and out without large losses and additional interference?

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!

Anechoic Chambers Testing Product Range



Test Port / Adapter



Panel /
Feedthrough Connector



Articulated Line

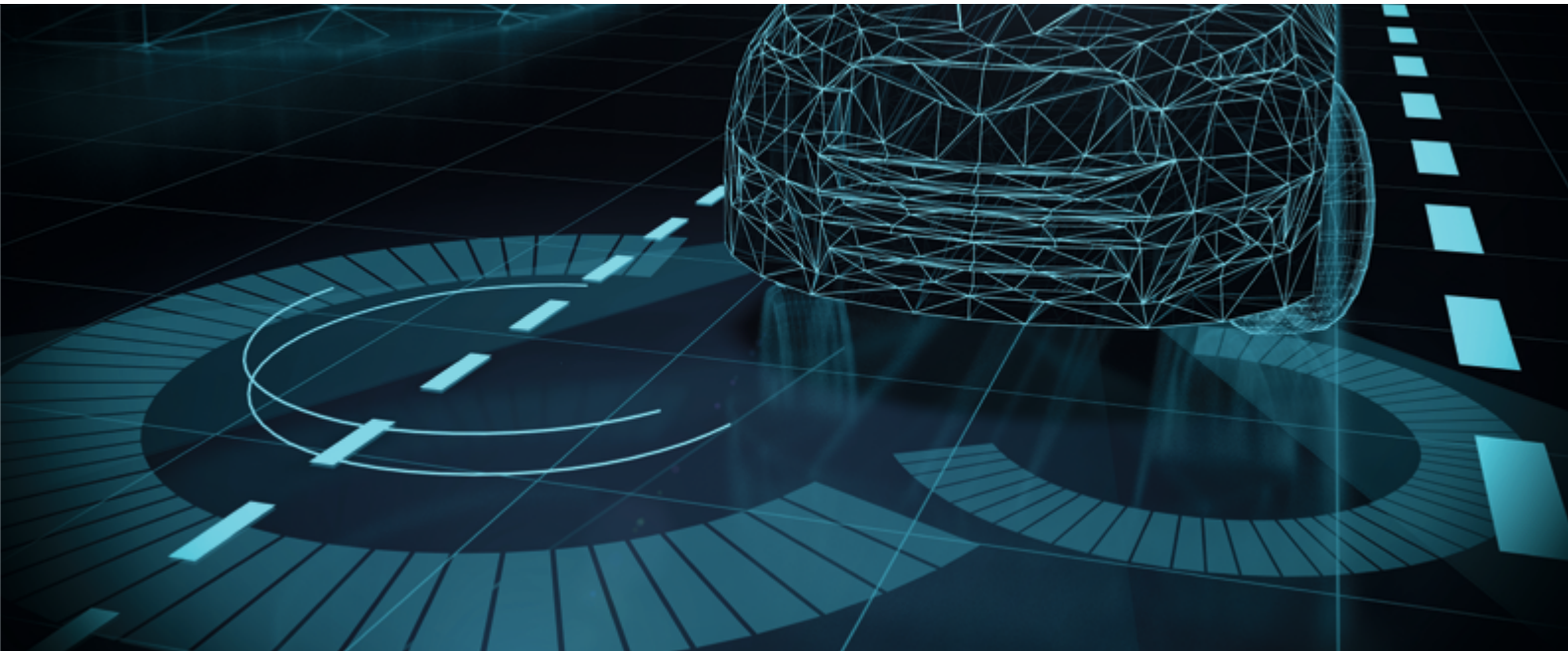


Flex. Waveguide Assembly



Rotary Joint

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.

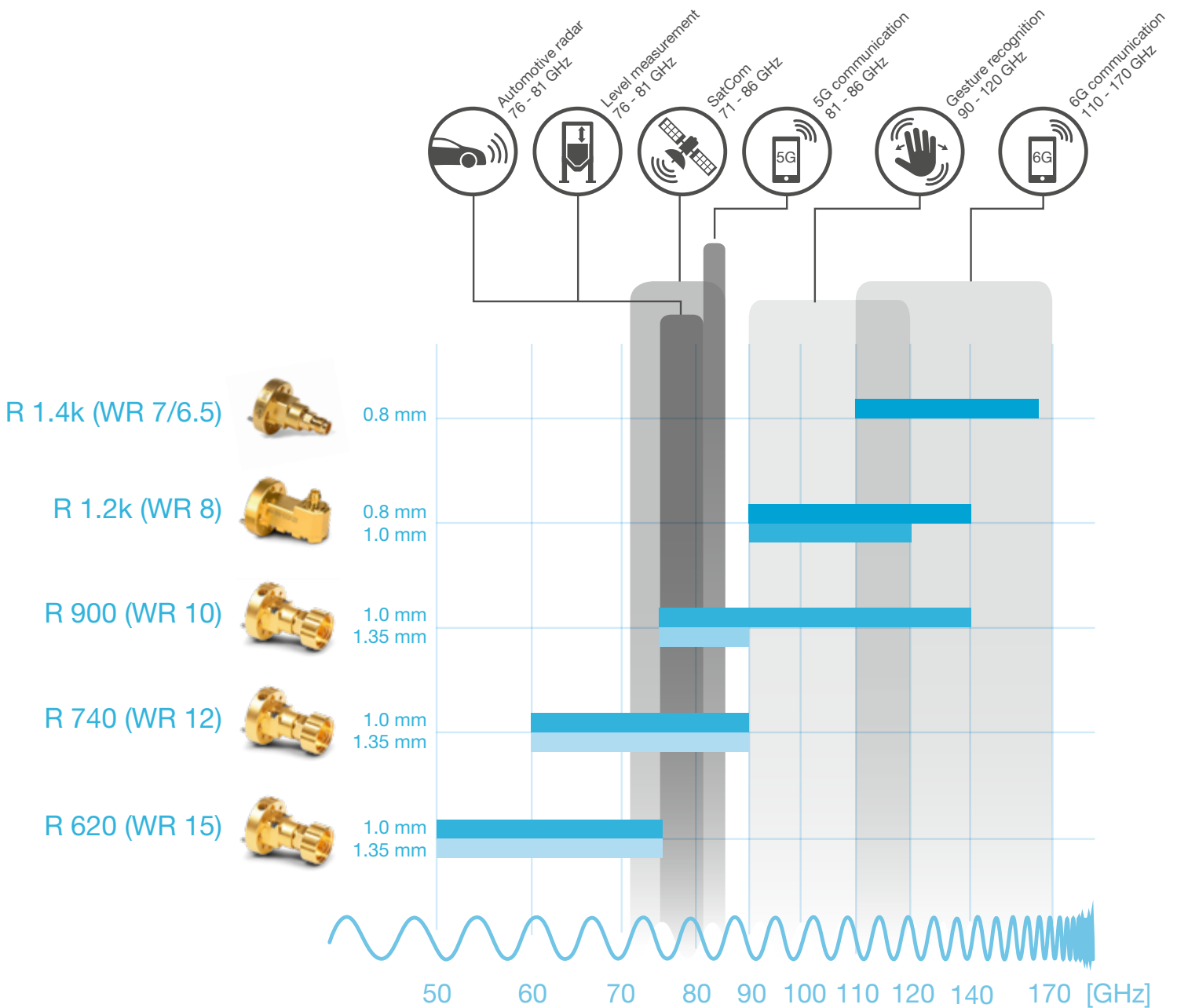
All these mmWave adapters are ideal for testing automotive and industrial radar sensors (in the 76 to 81 GHz range), satcom applications (from 71 to 76 GHz and 81 to 86 GHz), and the proposed new mmWave bands for 5G (81 to 86 GHz) and 6G (90 to 120 GHz) as well as for sensors for gesture recognition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

Less Fuss, Greater Flexibility!



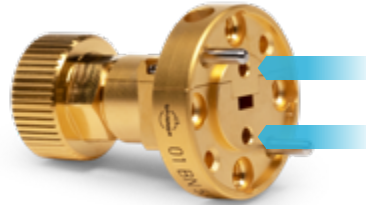
SPINNER mmWave waveguide-to-coax adapters

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 to the V, E, W, F and D 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



Precision interfaces with

- Well-defined reference plane
- Maximized return losses
- High connector repeatability (min. 45 dB)
- Suitable for precision measurement of S-parameters
- Ruggedized coaxial ports

Part Number	Style	Description	Frequency Range	Return Loss, min.
BN 533140	In-line	Precision waveguide-to-coaxial adapter R 1.2k (WR 8) to RUG-1.00 mm female	90 - 120 GHz	≥ 10 dB
BN 533141	In-line	Precision waveguide-to-coaxial adapter R 900 (WR 10) to RUG-1.00 mm female	Full W band	≥ 16 dB
BN 533142	In-line	Precision waveguide-to-coaxial adapter R 740 (WR 12) to RUG-1.00 mm female	Full E band	≥ 16 dB
BN 533143	In-line	Precision waveguide-to-coaxial adapter R 620 (WR 15) to RUG-1.00 mm female	Full V band	≥ 16 dB
BN 533161	In-line	Precision waveguide-to-coaxial adapter R 900 (WR 10) to RUG-1.00 mm male	Full W band	≥ 16 dB
BN 533162	In-line	Precision waveguide-to-coaxial adapter R 740 (WR 12) to RUG-1.00 mm male	Full E band	≥ 16 dB
BN 533163	In-line	Precision waveguide-to-coaxial adapter R 620 (WR 15) to RUG-1.00 mm male	Full V band	≥ 16 dB
BN 533151	In-line	Precision waveguide-to-coaxial adapter R 900 (WR 10) to RUG-1.35 mm female	75 – 90 GHz	≥ 16 dB
BN 533152	In-line	Precision waveguide-to-coaxial adapter R 740 (WR 12) to RUG-1.35 mm female	Full E band	≥ 16 dB
BN 533153	In-line	Precision waveguide-to-coaxial adapter R 620 (WR 15) to RUG-1.35 mm female	Full V band	≥ 16 dB

Waveguide-to-Coax Adapters 1.00 mm and 1.35 mm

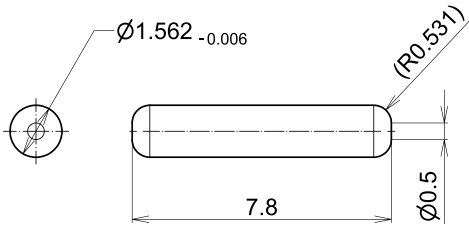


Precision interfaces with

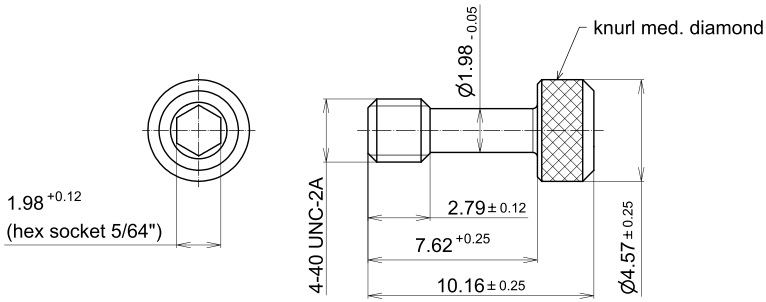
- Well-defined reference plane
- Maximized return losses
- High connector repeatability (min. 45 dB)
- Suitable for precision measurement of S-parameters

Part Number	Style	Description	Frequency Range	Return Loss, min.
BN 533192	In-line	Precision waveguide-to-coaxial adapter R 1.4k (WR 7 / WR 6.5), 0.8mm-f	110 - 165 GHz	≥ 12 dB
BN 533193	In-line	Precision waveguide-to-coaxial adapter R 1.4k (WR 7 / WR 6.5), 0.8mm-m	110 - 165 GHz	≥ 12 dB
BN 533150	Right-angle	Precision waveguide-to-coaxial adapter R 1.2k (WR 8), 0.8-f	90 - 140 GHz	≥ 12 dB
BN 533107	In-line	Precision waveguide-to-coaxial adapter R 1.2k (WR 8) to 1.00 mm female	90 - 120 GHz	≥ 10 dB
BN 533108	In-line	Precision waveguide-to-coaxial adapter R 1.2k (WR 8) to 1.00 mm male	90 - 120 GHz	≥ 10 dB
BN 533110	Right-angle	Precision waveguide-to-coaxial adapter R 1.2k (WR 8) to 1.00 mm male	90 - 120 GHz	≥ 16 dB
BN 533112 BN 533114	In-line Right-angle	Precision waveguide-to-coaxial adapter R 900 (WR 10) to 1.00 mm female	Full W band	≥ 16 dB
BN 533116 BN 533118	In-line Right-angle	Precision waveguide-to-coaxial adapter R 740 (WR 12) to 1.00 mm female	Full E band	≥ 16 dB
BN 533120 BN 533122	In-line Right-angle	Precision waveguide-to-coaxial adapter R 620 (WR 15) to 1.00 mm female	Full V band	≥ 16 dB
BN 533124 BN 533125	In-line Right-angle	Precision waveguide-to-coaxial adapter R 900 (WR 10) to 1.35 mm female	75 - 90 GHz	≥ 16 dB
BN 533126 BN 533127	In-line Right-angle	Precision waveguide-to-coaxial adapter R 740 (WR 12) to 1.35 mm female	Full E band	≥ 16 dB
BN 533128 BN 533129	In-line Right-angle	Precision waveguide-to-coaxial adapter R 620 (WR 15) to 1.35 mm female	Full V band	≥ 16 dB
BN 533134	In-line	Precision waveguide-to-coaxial adapter R 900 (WR 10) to 1.35 mm male	75 - 90 GHz	≥ 16 dB
BN 533135	In-line	Precision waveguide-to-coaxial adapter R 740 (WR 12) to 1.35 mm male	Full E band	≥ 16 dB
BN 533136	In-line	Precision waveguide-to-coaxial adapter R 620 (WR 15) to 1.35 mm male	Full V band	≥ 16 dB
BN 533159	In-line	Panel Connector R 740 (WR 12) to 1.35 female, D-hole mount	Full E band	≥ 16 dB
BN 533190	Right-angle	Precision waveguide-to-coaxial adapter R 260 (WR 34) to 2.92 mm female	21.7 to 33 GHz	≥ 20 dB
BN 533194	In-line	Precision waveguide-to-coaxial adapter R 260 (WR 34) to 2.92 mm female	21.7 to 33 GHz	≥ 20 dB
BN 533195	In-line	Precision waveguide-to-coaxial adapter R 220 (WR 42) to 3.5 mm female	17.6 to 26.7 GHz	≥ 16 dB

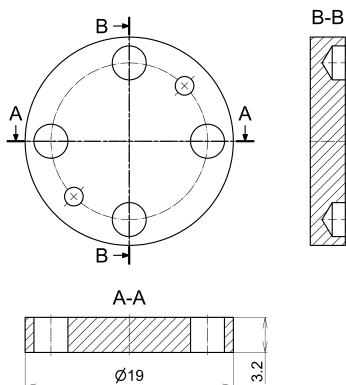
Accessories for Waveguide-to-Coaxial Adapters



Part Number	Description
A61785	Aligning pin

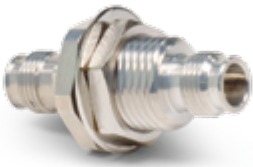


Part Number	Description
A61786	Socket-head cap screws 4-40 UNC

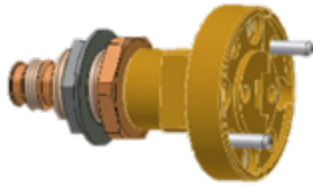


Part Number	Description
A62935	Protective cap

Panel / Feedthrough Connectors



BN 534990



BN 533159

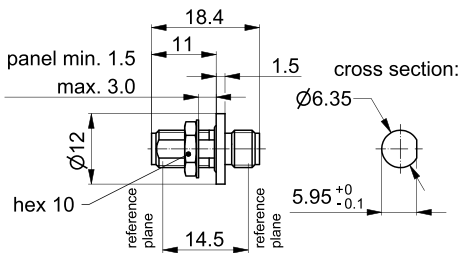
Features

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

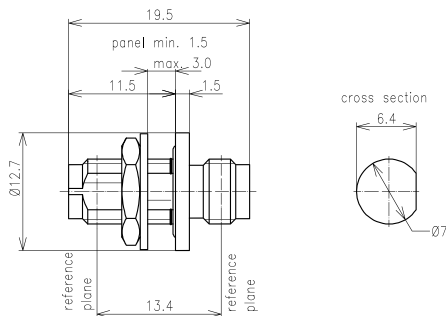
Applications

- 5G mmW
- Anechoic chamber testing
- SatCom

Coaxial Panel Connectors

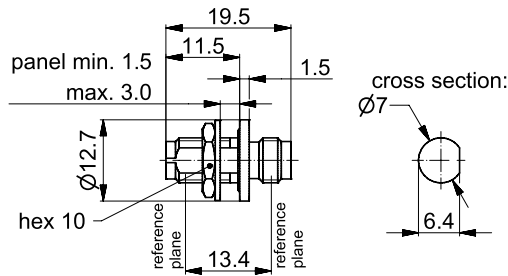
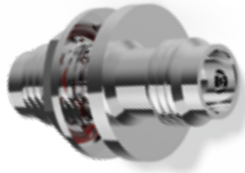


Part Number	Interface type A	Interface type B	Frequency Range	Return Loss, min.
BN 533168	2.92 mm female, bulkhead	2.92 mm female	DC - 44 GHz	27 dB @ DC to 10 GHz 24 dB @ 10 to 26.5 GHz 20 dB @ 26.5 to 44 GHz

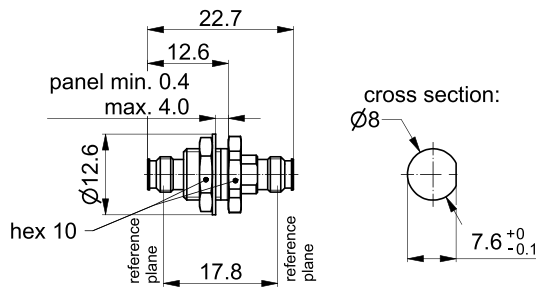


Part Number	Interface type A	Interface type B	Frequency Range	Return Loss, min.
BN 533713	2.4 mm female, bulkhead	2.4 mm female	DC - 50 GHz	27 dB @ DC to 10 GHz 24 dB @ 10 to 26.5 GHz 20 dB @ 26.5 to 50 GHz

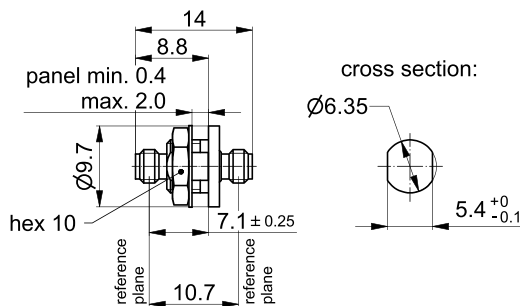
Coaxial Panel Connectors



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

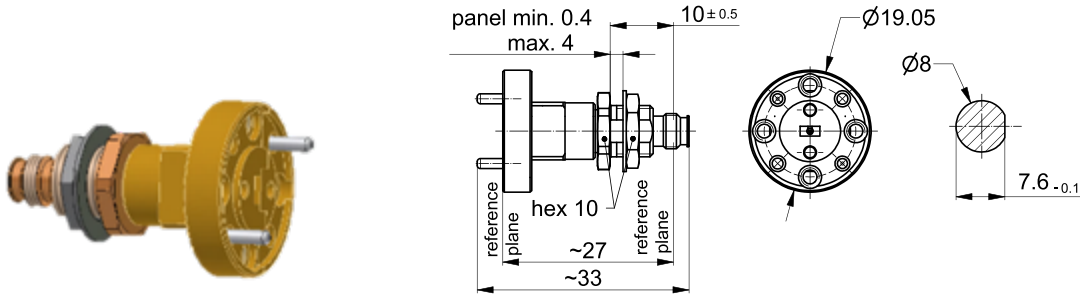


Part Number	Interface type A	Interface type B	Frequency Range	Return Loss, min.
BN 534990	1.35 mm female, bulkhead	1.35 mm female	DC - 90 GHz	24 dB @ DC to 26.5 GHz 18 dB @ 26.5 to 70 GHz 15 dB @ 70 to 90 GHz

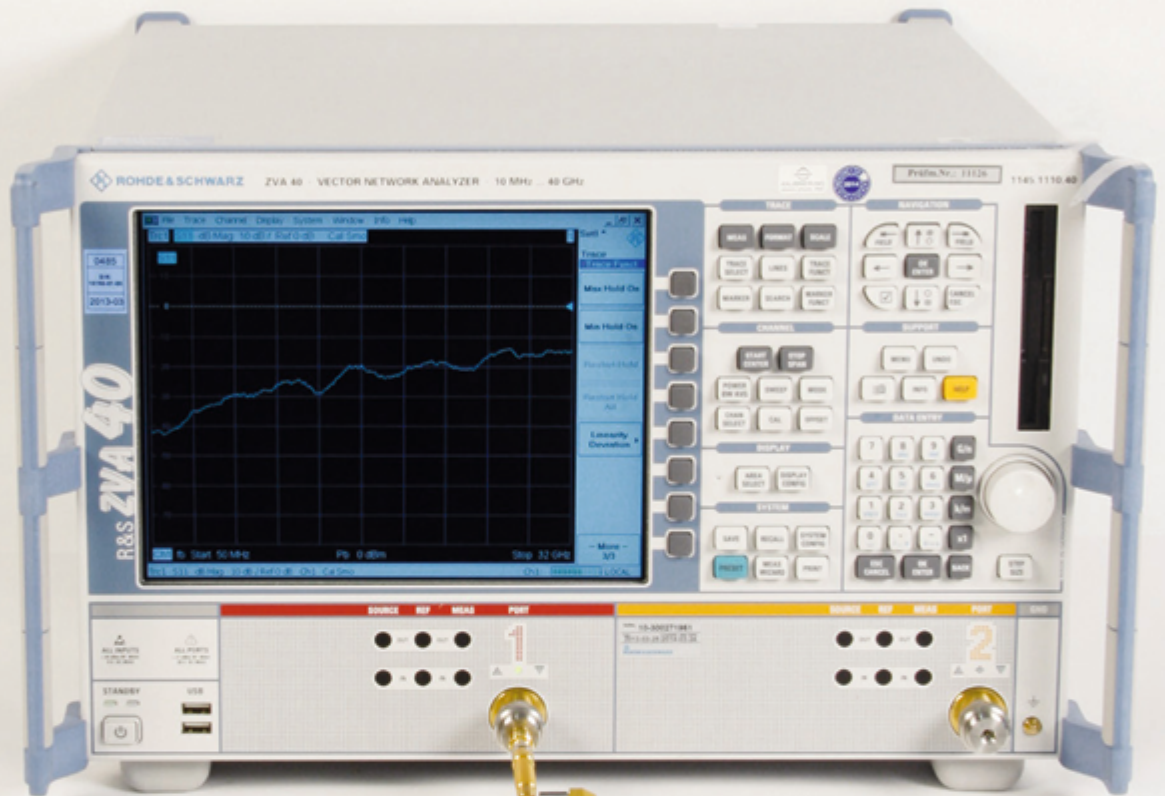


Part Number	Interface type A	Interface type B	Frequency Range	Return Loss, min.
BN 534999	1.00 mm female, bulkhead	1.00 mm female	DC - 110 GHz	24 dB @ DC to 26.5 GHz 18 dB @ 26.5 to 70 GHz 15 dB @ 70 to 90 GHz 12 dB @ 90 to 110 GHz

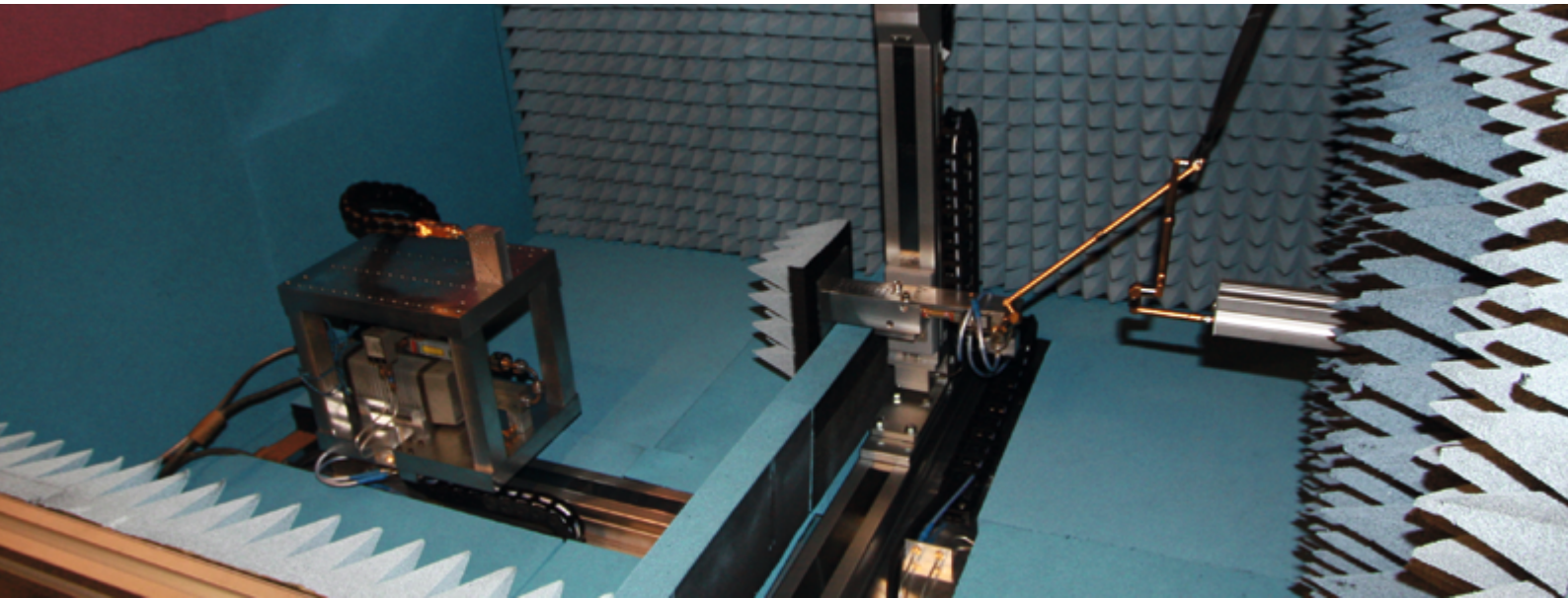
Waveguide Panel Connectors



Part Number	Interface type A	Interface type B	Frequency Range	Return Loss, min.
BN 533159	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

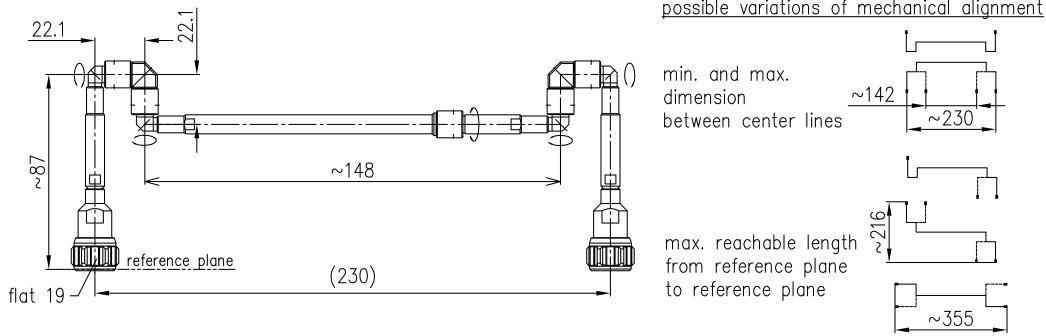
Applications

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



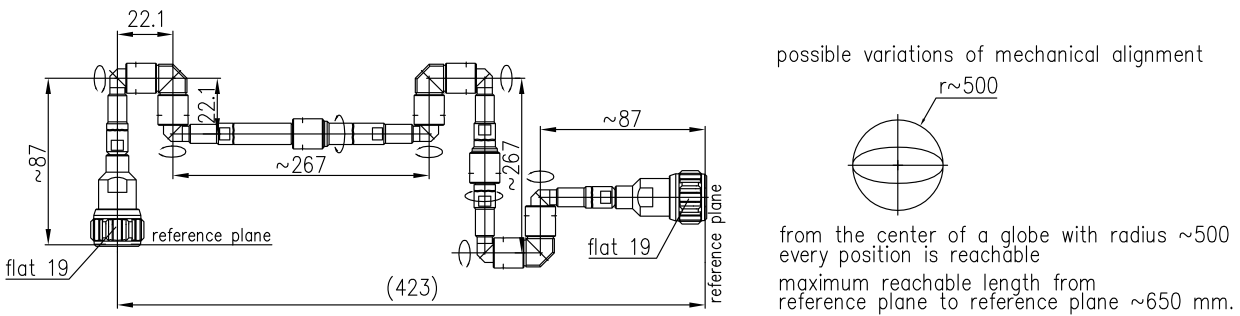
YouTube - Articulated Lines
 SPINNER RF Articulated Lines
 contra RF test cables

DC to 18 GHz – 365 mm



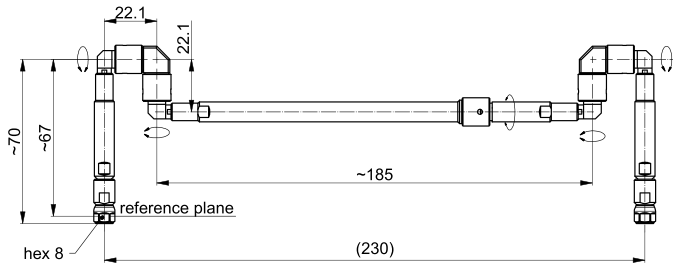
Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
BN 533626C1010	Type N male/male	DC to 4 GHz \geq 26 dB 4 to 12 GHz \geq 20 dB 12 to 18 GHz \geq 15 dB	DC to 18 GHz \leq 1.7 dB	365	1
BN 533626C2010	Type N male/female				
BN 533626C3010	Type N female/female				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

DC to 18 GHz – 650 mm



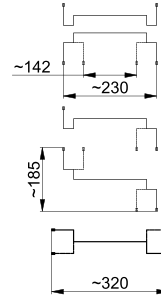
Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
BN 533645C1010	Type N male/male	DC to 4 GHz \geq 26 dB 4 to 9 GHz \geq 17 dB 9 to 18 GHz \geq 15 dB	DC to 18 GHz \leq 2.7 dB	650	1
BN 533645C2010	Type N male/female				
BN 533645C3010	Type N female/female				
BN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

DC to 32 GHz – 320 mm



possible variations of mechanical alignment

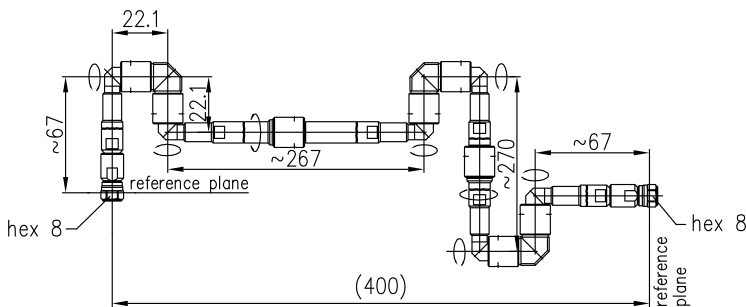
min. and max. dimension between center lines



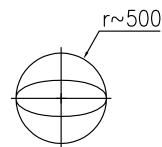
max. reachable length from reference plane to reference plane

Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
BN 533627C1010	3.5 mm male/male	DC to 4 GHz ≥ 26 dB 4 to 12 GHz ≥ 20 dB 12 to 18 GHz ≥ 15 dB	DC to 18 GHz ≤ 1.7 dB 18 to 26.5 GHz ≤ 2.2 dB 26.5 to 32 GHz ≤ 3.0 dB	320	1
BN 533627C2010	3.5 mm male/female				
BN 533627C3010	3.5 mm female/female				
BN 533627C1111	3.5 mm male/male				2
BN 533627C2211	3.5 mm male/female				
BN 533627C3311	3.5 mm female/female				

DC to 32 GHz – 650 mm



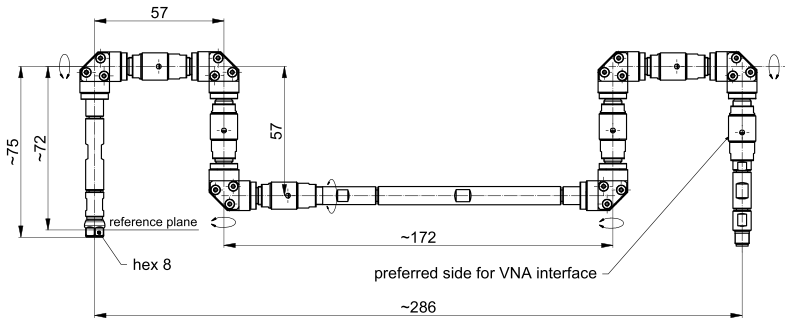
possible variations of mechanical alignment



from the center of a globe with radius ~ 500 every position is reachable
maximum reachable length from reference plane to reference plane ~ 650 mm.

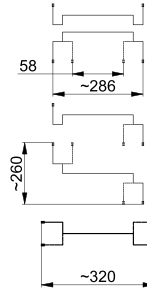
Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
BN 533638C1010	3.5 mm male/male	DC to 4 GHz ≤ 26 dB 4 to 9 GHz ≤ 17 dB 9 to 18 GHz ≤ 15 dB 18 to 26.5 GHz ≤ 12 dB 26.5 to 32 GHz ≤ 9 dB	DC to 18 GHz ≤ 2.7 dB 18 to 26.5 GHz ≤ 3.2 dB 26.5 to 32 GHz ≤ 3.4 dB	650	1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

DC to 40 GHz – 320 mm



possible variations of mechanical alignment

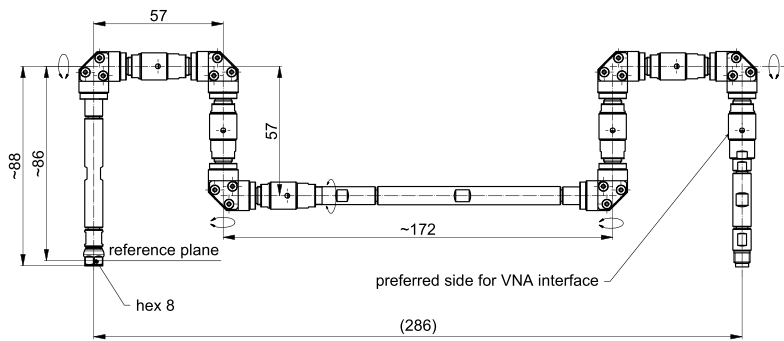
min. and max. dimension between center lines



max. reachable length from reference plane to reference plane

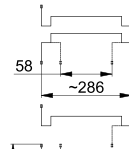
Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
BN 533647C1010	2.92 mm male/male	DC to 4 GHz ≤ 26 dB 4 to 9 GHz ≤ 20 dB 9 to 18 GHz ≤ 15 dB 18 to 26.5 GHz ≤ 12 dB 26.5 to 40 GHz ≤ 10 dB	DC to 18 GHz ≤ 2.3 dB 18 to 26.5 GHz ≤ 3.0 dB 26.5 to 40 GHz ≤ 4.0 dB	320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

DC to 50 GHz – 345 mm

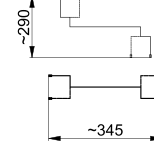


possible variations of mechanical alignment

min. and max. dimension between center lines

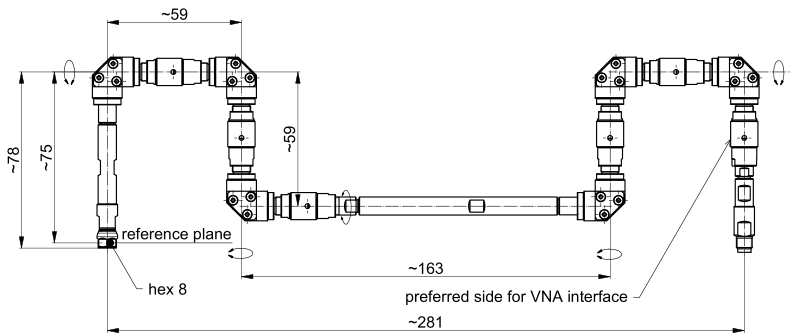


max. reachable length from reference plane to reference plane

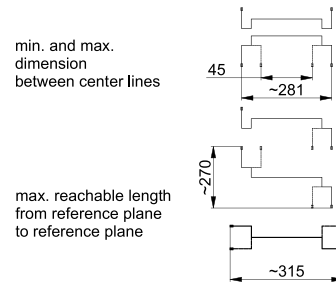


Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
BN 533646C1010	2.4 mm male/male	DC to 4 GHz ≤ 26 dB 4 to 9 GHz ≤ 20 dB 9 to 18 GHz ≤ 15 dB 18 to 26.5 GHz ≤ 12 dB 26.5 to 40 GHz ≤ 10 dB 40 to 50 GHz ≤ 8 dB	DC to 18 GHz ≤ 2.5 dB 18 to 26.5 GHz ≤ 3.5 dB 26.5 to 40 GHz ≤ 4.5 dB 40 to 50 GHz ≤ 5.5 dB	345	1
BN 533646C2010	2.4 mm male/female				
BN 533646C3010	2.4 mm female/female				
BN 533646C1111	2.4 mm male/male				2
BN 533646C2211	2.4 mm male/female				
BN 533646C3311	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
BN 533652C1010	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
BN 533652C2010	1.85 mm male/female				
BN 533652C3010	1.85mm female/female				
BN 533652C1111	1.85 mm male/male				2
BN 533652C2211	1.85 mm male/female				
BN 533652C3311	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.
BN 533916C0001	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
BN 533917C0001	Type N female-female		
BN 533918C0001	Type N male-female		
BN 533767C0001	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
BN 533768C0001	3.5 mm female-female		
BN 533769C0001	3.5 mm male-female		
BN 533907C0001	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
BN 533908C0001	2.92 mm female-female		
BN 533909C0001	2.92 mm male-female		
BN 533776C0001	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
BN 533777C0001	2.4 mm female-female		
BN 533778C0001	2.4 mm male-female		



Millimeter Wave VNA Extender
Optimized for Agilent VNAs
75 to 110 GHz
V10VNA2-T/R
Oxy Inc.
Model # 10000-2
Made in U.S. 800.777.1234

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

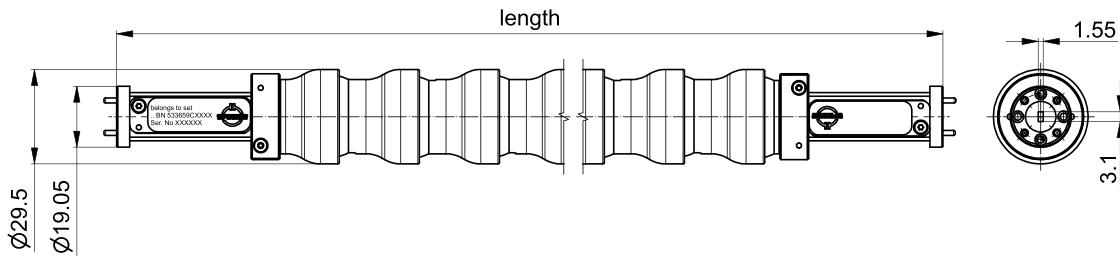
- General test bench use
- Network analysis (S-parameter measurement)
- Antenna testing (near field, far field)
- Environmental chamber and vibration testing



Conference Paper

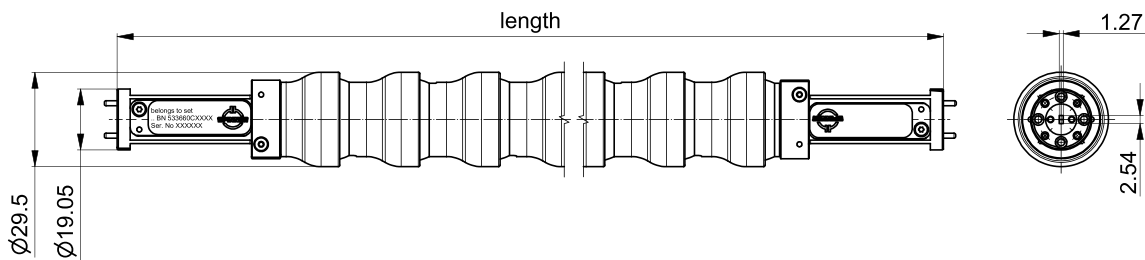
Nickel, H.-U. and Zovo, J., 2014, Novel flexible dielectric waveguide for millimeter and sub-millimeter frequencies – Design and characterization, 84th ARFTG Microwave Measurement Conference (ARFTG 84th), Boulder, Colorado, USA, Proceedings.

60 - 90 GHz, E-Band



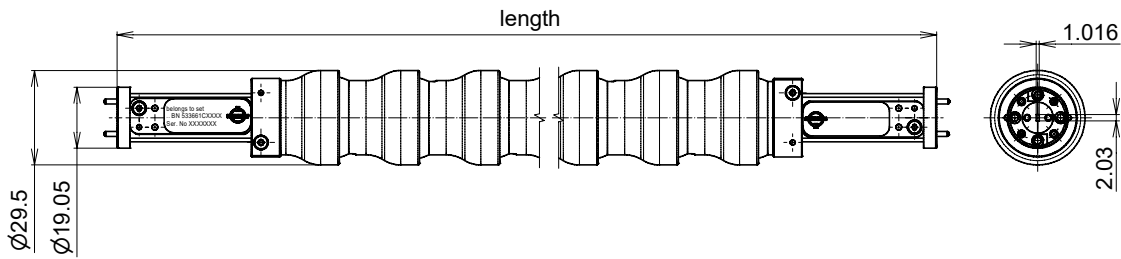
Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
BN 533659C0107	R 740 (WR 12)	16 dB	1.8 dB @ 60 to 65 GHz 1.4 dB @ 65 to 90 GHz	300	1
BN 533659C0207					2
BN 533659C0115			2.3 dB @ 60 to 65 GHz 1.8 dB @ 65 to 90 GHz	500	1
BN 533659C0215					2
BN 533659C0119			2.6 dB @ 60 to 65 GHz 2.1 dB @ 65 to 90 GHz	600	1
BN 533659C0219					2
BN 533659C0131		14 dB	3.5 dB @ 60 to 65 GHz 2.9 dB @ 65 to 90 GHz	900	1

75 - 110 GHz, W-Band



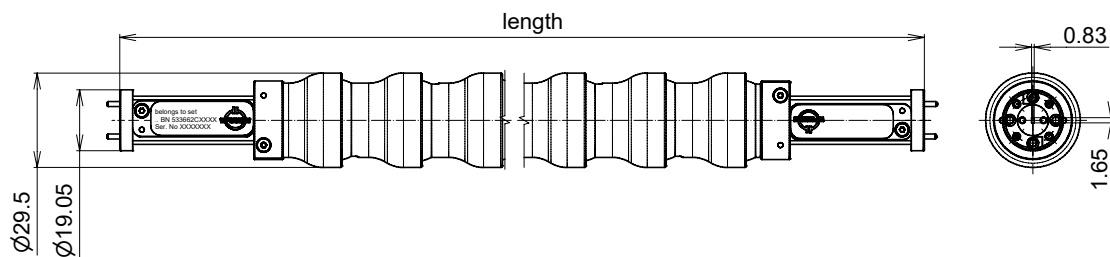
Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
BN 533660C0107	R 900 (WR 10)	16 dB	1.9 dB	300	1
BN 533660C0207					2
BN 533660C0119			2.8 dB	600	1
BN 533660C0219					2
BN 533660C0131		14 dB	3.7 dB	900	1

90 - 140 GHz, F-Band



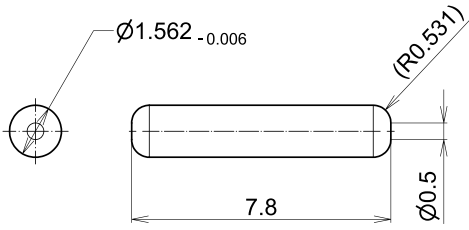
Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
BN 533661C0107	R 1.2k (WR 8)	16 dB	2.3 dB	300	1
BN 533661C0207					2
BN 533661C0115		14 dB	3.0 dB @ 90 to 110 GHz 3.2 dB @ 110 to 130 GHz 3.7 dB @ 130 to 140 GHz	500	1
BN 533661C0215					2
BN 533661C0119					3.0 dB @ 90 to 110 GHz 3.2 dB @ 110 to 130 GHz 3.7 dB @ 130 to 140 GHz
BN 533661C0219		2			
BN 533661C0131		12 dB	3.7 dB @ 90 to 110 GHz 4.1 dB @ 110 to 130 GHz 5.0 dB @ 130 to 140 GHz	900	1

110 - 170 GHz, D-Band

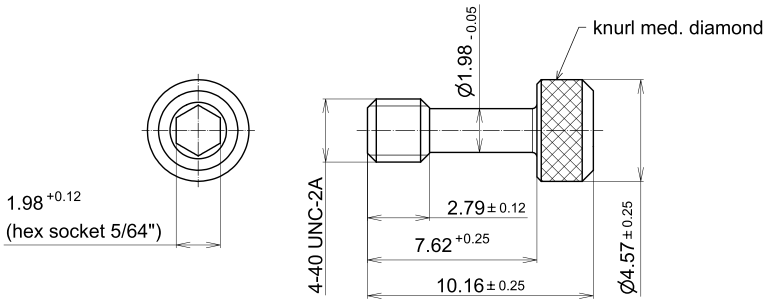


Part Number	Interface	Return Loss, min.	Insertion Loss, max.	Length (mm)	Quantity per Set
BN 533662C0107	R 1.4k (WR 7)	16 dB	2.5 dB	300	1
BN 533662C0207					2
BN 533662C0119		13 dB	3.2 dB @ 110 to 130 GHz 3.4 dB @ 130 to 150 GHz 3.9 dB @ 150 to 170 GHz	600	1
BN 533662C0219					2
BN 533662C0131	10 dB	3.8 dB @ 110 to 130 GHz 4.3 dB @ 130 to 150 GHz 5.2 dB @ 150 to 170 GHz	900	1	

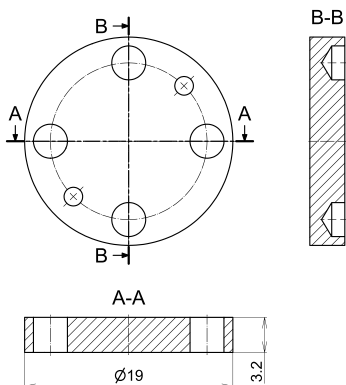
Accessories for SPINNER EasySnake



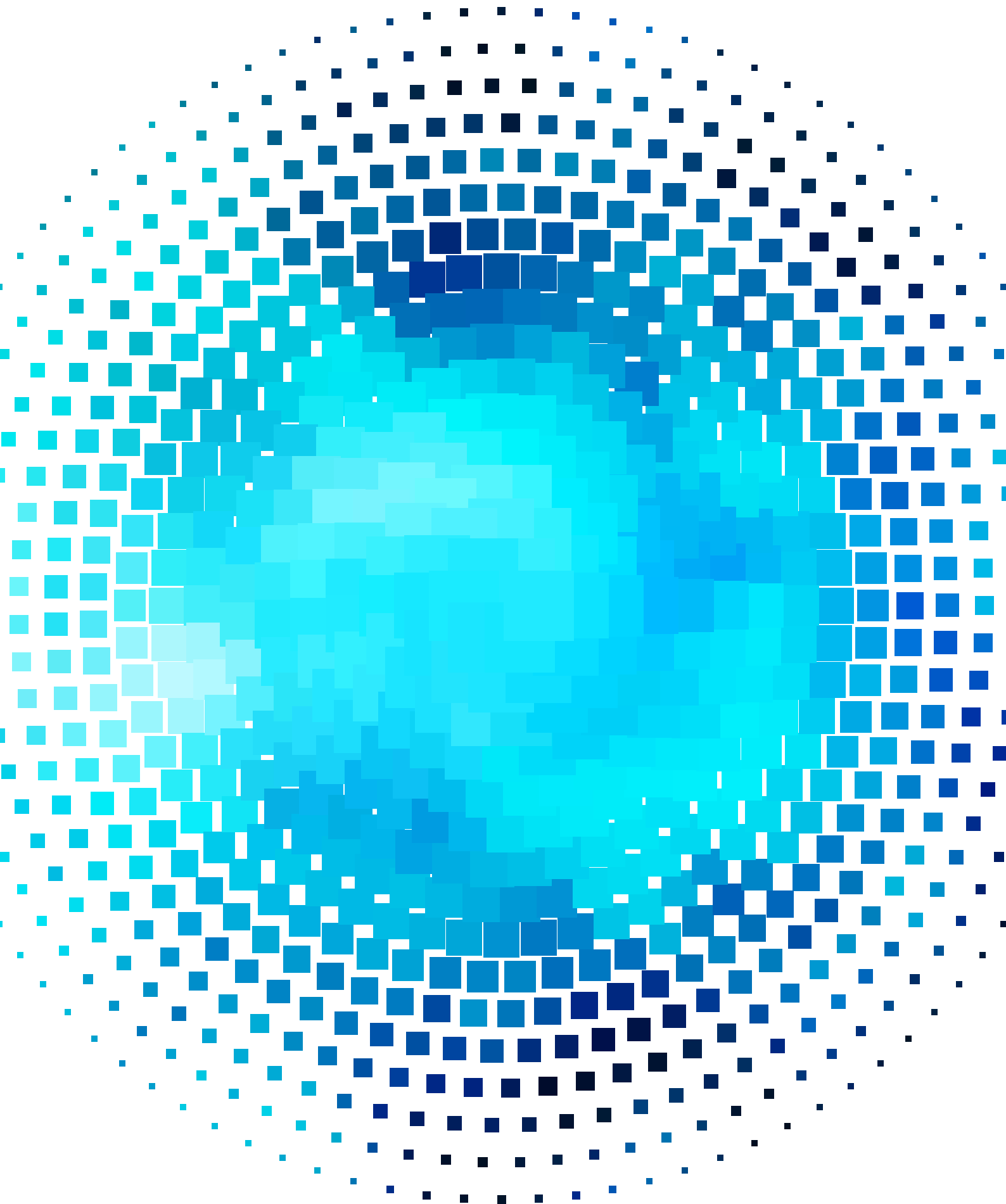
Part Number	Description
A61785	Aligning pin



Part Number	Description
A61786	Socket-head cap screws 4-40 UNC



Part Number	Description
A62935	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

Features

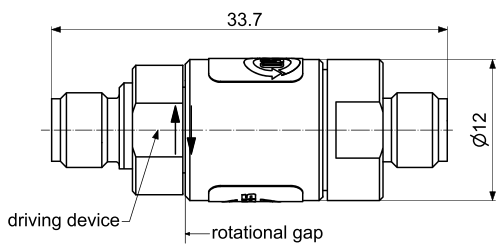
- 1.35 mm coaxial ultra-wideband single channel rotary joint DC-92 GHz
- Excellent RF performance for highest frequencies
- Low form factor
- Available with panel 3-hole flange

Applications

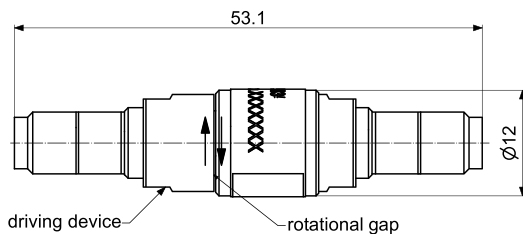
Avoidance of torques on high precision measuring cables used in anechoic chambers for product testing of

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

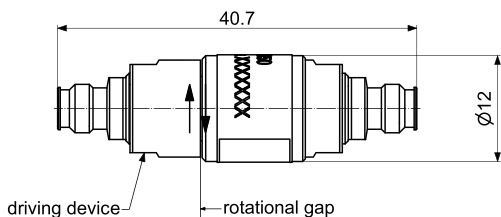
I-style



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 835091	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



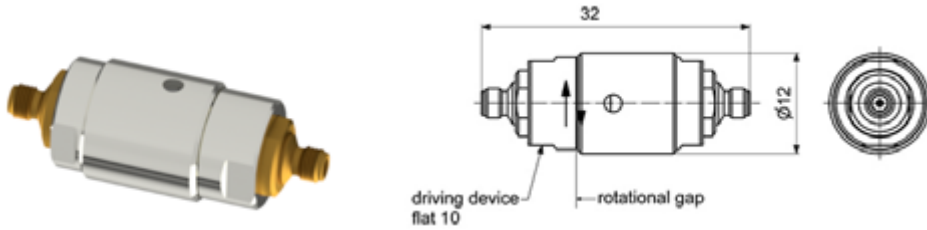
Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 835080	1.85 mm female	1.85 mm female	DC - 67 GHz	1.1 @ DC to 10 GHz 1.2 @ 10 to 26 GHz 1.3 @ 26 to 50 GHz 1.4 @ 50 to 67 GHz



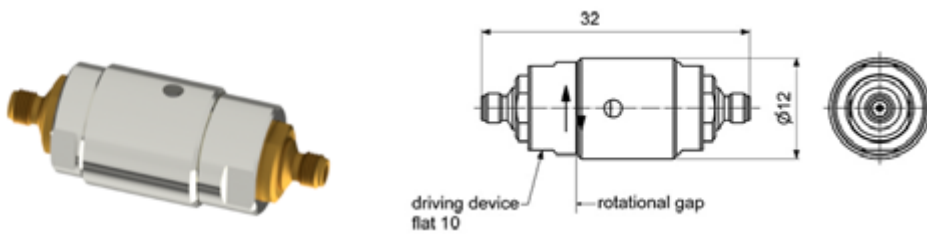
Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 835082	1.35 mm female	1.35 mm female	DC - 92 GHz	1.2 @ DC to 26.5 GHz 1.4 @ 26.5 to 70 GHz 1.6 @ 70 to 90 GHz

Single-Channel Coaxial Rotary Joints

I-style, flanged



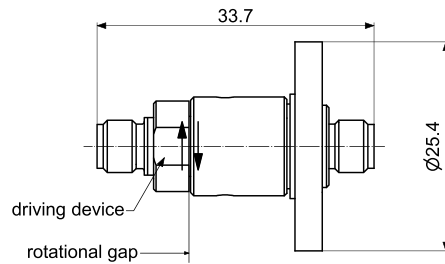
Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 8350BNE2	1.0 mm female	1.0 mm female	DC - 110 GHz	1.2 @ DC to 26.5 GHz 1.4 @ 26.5 to 70 GHz 1.6 @ 70 to 110 GHz



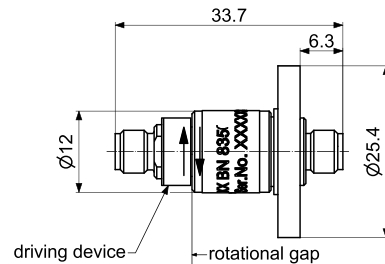
Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 8350BNE1	0.8 mm female	0.8 mm female	DC - 150 GHz	1.2 @ DC to 26.5 GHz 1.4 @ 26.5 to 70 GHz 1.5 @ 70 to 120 GHz 1.6 @ 120 to 150 GHz

Single-Channel Coaxial Rotary Joints

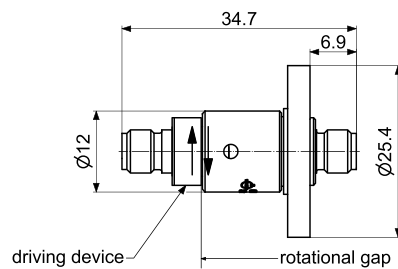
I-style, flanged



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 835047	SMA female	SMA female	DC - 18 GHz	1.3 @ DC to 10 GHz 1.4 @ 10 to 18 GHz



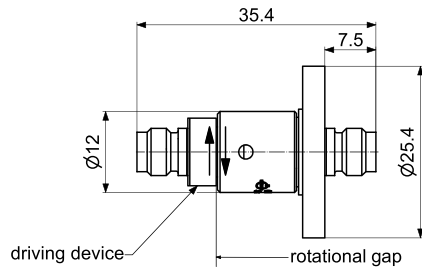
Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 835068	3.5 mm female	3.5 mm female	DC - 32 GHz	1.3 @ DC to 10 GHz 1.4 @ 10 to 18 GHz 1.7 @ 18 to 26.5 GHz



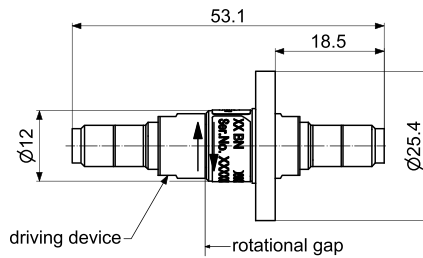
Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 835045C0044	2.92 mm female	2.92 mm female	DC - 44 GHz	1.3 @ DC to 10 GHz 1.4 @ 10 to 18 GHz 1.7 @ 18 to 26.5 GHz 2.0 @ 26.5 to 44 GHz

Single-Channel Coaxial Rotary Joints

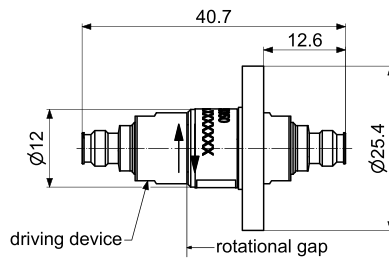
I-style, flanged



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 835077	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

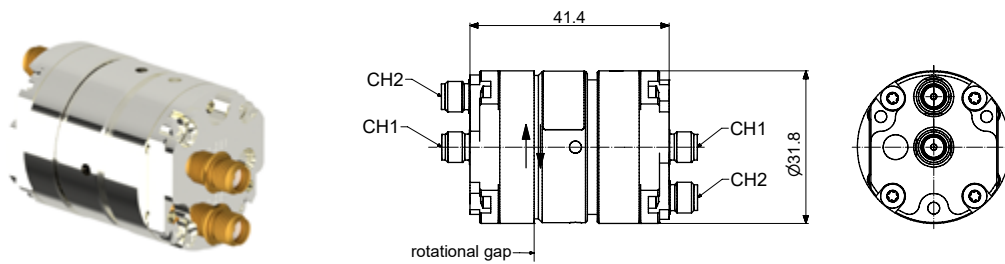


Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 835080C0001	1.85 mm female	1.85 mm female, with 3-hole flange	DC - 67 GHz	1.10 @ DC to 10 GHz 1.20 @ 10 to 26 GHz 1.30 @ 26 to 50 GHz 1.40 @ 50 to 67 GHz



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 835082C0001	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

Dual-Channel Coaxial Rotary Joints



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 153264	SMA female	SMA female	DC - 20 GHz	1.3 @ DC to 8 GHz 1.6 @ 8 to 20 GHz

Single-Channel Rectangular Waveguide Rotary Joints

Features

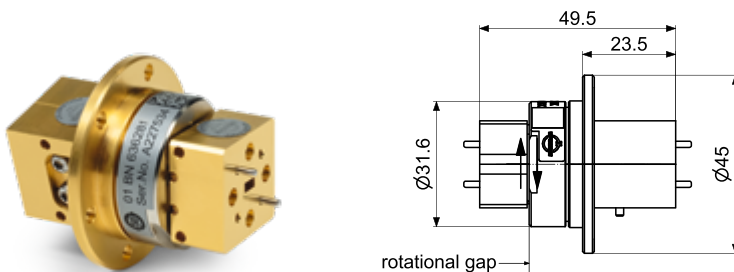
- I and L styles
- Long service life

Applications

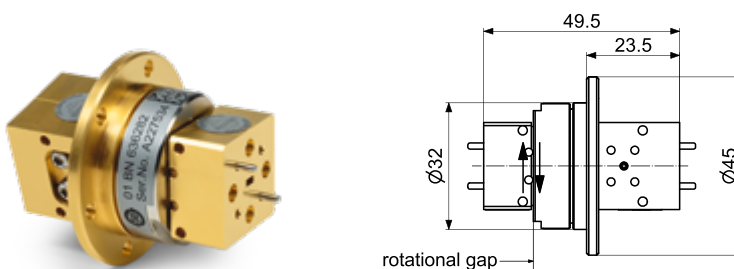
Avoidance of torques on high-precision measuring cables used in anechoic chambers for testing of

- 5G mmW
- SatCom
- Automotive radar

I-style

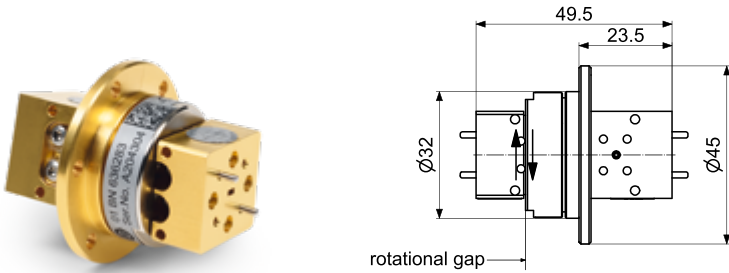


Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 636281	R 620 (WR 15)	R 620 (WR 15)	50 – 75 GHz	1.8

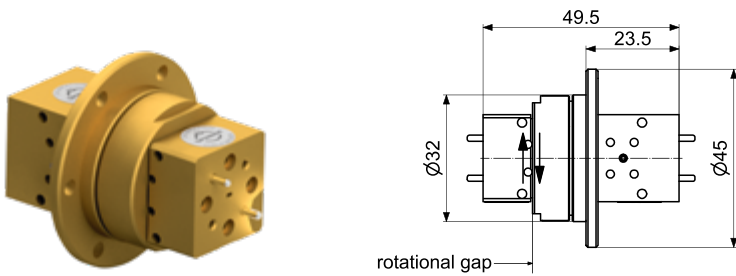


Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 636282	R 750 (WR 12)	R 750 (WR 12)	60 – 90 GHz	1.8

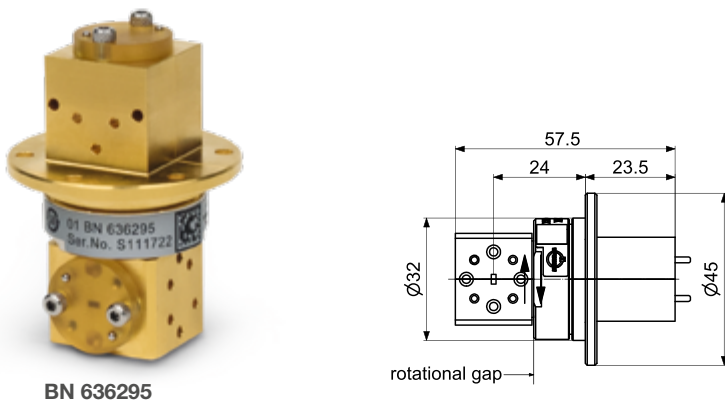
Single-Channel Rectangular Waveguide Rotary Joints



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 636283	R 900 (WR 10)	R 900 (WR 10)	75 – 110 GHz	1.8



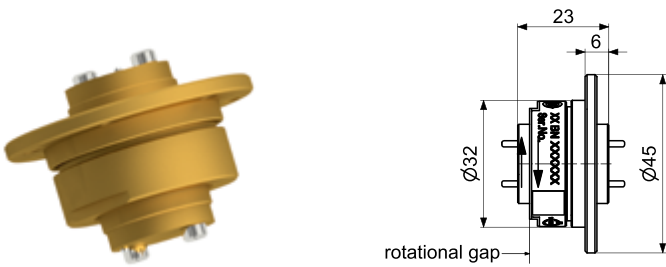
Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 6352BNE1	R 1.4k (WR 7)	R 1.4k (WR 7)	110 – 170 GHz	1.8



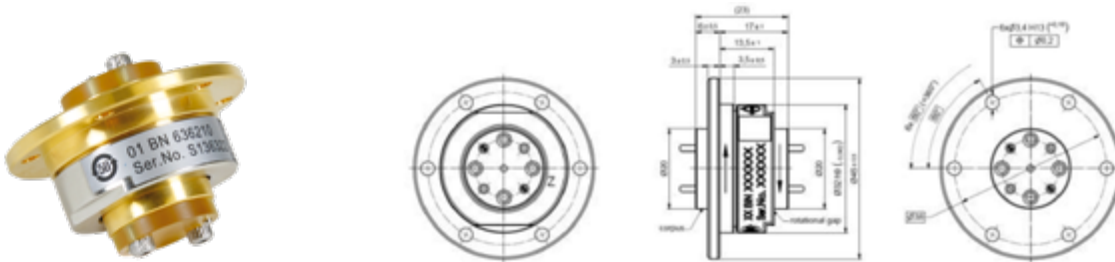
BN 636295

Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 636295	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.
BN 636214	C 765 (WC 11)	C 765 (WC 11)	73 - 110 GHz	1.2



Part Number	Interface type A	Interface type B	Frequency Range	VSWR, max.
BN 636210	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
BN 537074	3.5 mm male	1 mm	0.001 mm	0.003 mm
BN 537075	3.5 mm female			
BN 537081	2.92 mm male			
BN 537082	2.92 mm female			
BN 537078	3.5 mm male			
BN 537079	3.5 mm female			
BN 537083	2.92 mm male	0.1 mm		
BN 537084	2.92 mm female			
BN 534940	1.35 mm male			
BN 534941	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.
BN 537091R000	Type N	19 mm	0.9 N·m
BN 154141R000	1.85 mm – 3.5 m	8 mm	0.9 N·m
BN 238741	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
A45535	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.

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