

Attenuators and Terminations

Many microwave measurement tasks require attenuators and terminations with different requirements relating to electrical specifications. Simple low frequency measurements have low requirements, while components with high demands on reflection coefficient or attenuation require broadband devices up to very high frequencies for high quality level measurements.

Rosenberger Hochfrequenztechnik offers attenuators and terminations for measuring purposes with different quality levels both for coaxial transmission lines equipped with several types of coaxial connectors and for waveguides.

These are:

- Attenuators with various power rating and attenuation values for different frequency bands and for different types of coaxial connector series.
- Terminations with various power rating values for different types of coaxial connector series.
- Matching pads for minimum reflection connection of transmission lines with characteristic impedances of 50 Ω and 75 Ω
- Feed-through terminations to match low impedance (e.g. 50 Ω) transmission lines to high impedance inputs of measuring instruments.
- Waveguide components for standard waveguides or for other waveguide dimensions with flanges according to customer order.

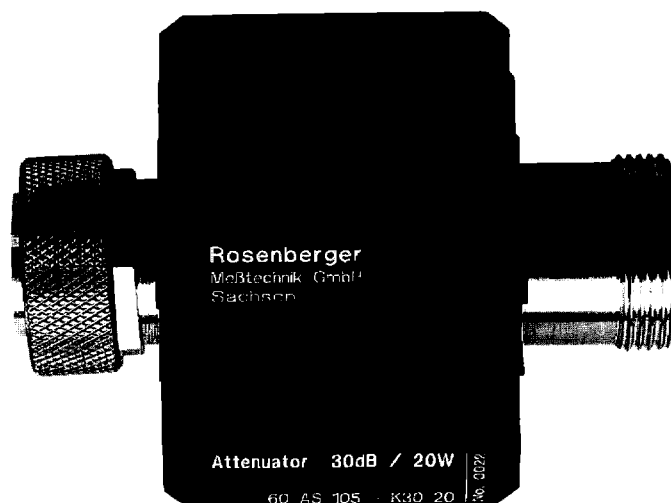
Dämpfungsglieder und Abschlußwiderstände

Viele Aufgaben im Bereich der Mikrowellenmeßtechnik erfordern Dämpfungsglieder und Abschlußwiderstände, wobei die Anforderungen an die elektrischen Daten sehr verschieden sein können. So werden neben Elementen für einfache Meßaufgaben und relativ niedrigen Frequenzen auch Bauteile mit besonderen Anforderungen an Reflexionsfaktor oder Dämpfung benötigt, die in breitbandig einsetzbaren Meßplätzen bis zu hohen Frequenzen qualitativ anspruchsvolle Messungen möglich machen.

Rosenberger Hochfrequenztechnik bietet im Bereich Dämpfungsglieder und Abschlußwiderstände passive Bauteile für Meßaufgaben unterschiedlicher Qualitätsstufen sowohl für koaxiale Leitungen mit verschiedenen Steckverbindertypen als auch für Hohlleiter an.

Dazu gehören:

- Dämpfungsglieder unterschiedlicher Leistungsbelastbarkeit und Dämpfungsgenauigkeit für verschiedene Frequenzbereiche und Steckverbindertypen.
- Abschlußwiderstände unterschiedlicher Leistungsbelastbarkeit für verschiedene koaxiale Steckverbindertypen.
- Anpassungsglieder zur möglichst reflexionsarmen Verbindung von Leitungen mit Wellenwiderständen 50 Ω und 75 Ω .
- Durchführungsabschlüsse zur Herstellung guter Anpassung am Eingang hochohmiger Meßgeräte.
- Hohlleiter-Bauteile verschiedener Hohlleiter-Profile und -Querschnitte mit Flanschen nach Kundenanforderungen.

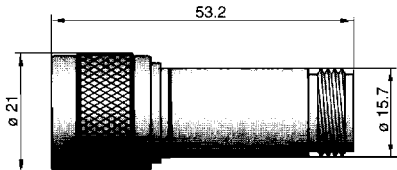


Attenuators

Dämpfungsglieder

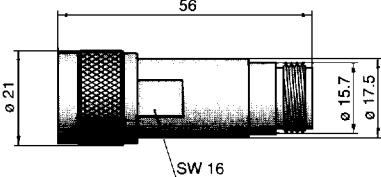
Series RPC-N (50Ω), Frequency range: DC - 18 GHz

Part number	Attenuation	Tolerances				VSWR	Power rating
		4 GHz	8 GHz	12.4 GHz	18 GHz		
05 AS 102-K03 S3	3 dB	± 0.3 dB	± 0.3 dB	± 0.5 dB	± 0.8 dB	≤ 1.1 - 6 GHz	2 W at 25°C 0 W at 125°C
05 AS 102-K06 S3	6 dB	± 0.3 dB	± 0.3 dB	± 0.5 dB	± 0.8 dB	≤ 1.15 - 12.4 GHz	
05 AS 102-K10 S3	10 dB	± 0.3 dB	± 0.3 dB	± 0.6 dB	± 0.8 dB	≤ 1.25 - 18 GHz	
05 AS 102-K20 S3	20 dB	± 0.3 dB	± 0.5 dB	± 0.5 dB	± 0.8 dB		
05 AS 102-K30 S3	30 dB	± 0.8 dB	± 1.0 dB	± 1.0 dB	± 1.5 dB		
05 AS 102-K40 S3	40 dB	± 0.8 dB	± 1.0 dB	± 1.0 dB	± 1.5 dB	length = 64 mm	



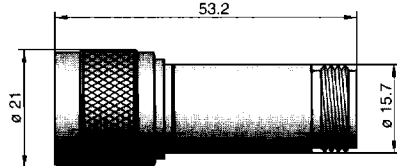
Series N (50Ω), Frequency range: DC - 2 GHz

Part number	Attenuation	Tolerances				VSWR	Power rating
		2 GHz	8 GHz	12.4 GHz	18 GHz		
53 AS A02-K03 A3	3 dB	± 0.4 dB				≤ 1.2 - 1.2 GHz	2 W at 25°C 0 W at 125°C
53 AS A02-K06 A3	6 dB	± 0.4 dB				≤ 1.4 - 2.0 GHz	
53 AS A02-K10 A3	10 dB	± 0.4 dB					
53 AS A02-K20 A3	20 dB	± 0.5 dB					
53 AS A02-K30 A3	30 dB	± 1.0 dB					
53 AS A02-K40 A3	40 dB	± 1.5 dB					
53 AS A02-K50 A3	50 dB	± 1.5 dB					
53 AS A02-K55 A3	55 dB	± 2.0 dB					



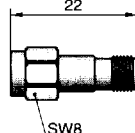
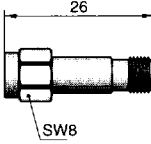
Series N (50Ω), Frequency range: DC - 12.4 GHz

Part number	Attenuation	Tolerances				VSWR	Power rating
		4 GHz	8 GHz	12.4 GHz	18 GHz		
53 AS 102-K03 A3	3 dB	± 0.3 dB	± 0.3 dB	± 0.5 dB		≤ 1.1 - 4.6 GHz	2 W at 25°C 0 W at 125°C
53 AS 102-K06 A3	6 dB	± 0.3 dB	± 0.3 dB	± 0.5 dB		≤ 1.2 - 10.0 GHz	
53 AS 102-K10 A3	10 dB	± 0.3 dB	± 0.3 dB	± 0.6 dB		≤ 1.25 - 12.4 GHz	
53 AS 102-K16 A3	16 dB	± 0.3 dB	± 0.6 dB	± 0.8 dB			
53 AS 102-K20 A3	20 dB	± 0.3 dB	± 0.6 dB	± 0.8 dB			
53 AS 102-K30 A3	30 dB	± 0.3 dB	± 0.6 dB	± 1.0 dB			



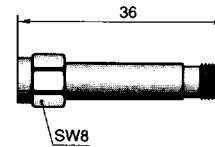
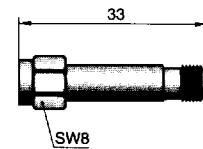
Series SMA, Frequency range: DC - 18 GHz

Part number	Attenuation	Tolerances				VSWR	Power rating
		4 GHz	8 GHz	12.4 GHz	18 GHz		
32 AS 102-K03 S3	3 dB			± 0.75 dB		≤ 1.2 - 4 GHz	2 W at 25°C 0.5 W at 125°C
32 AS 102-K06 S3	6 dB			± 0.75 dB		≤ 1.4 - 12 GHz	
32 AS 102-K10 S3	10 dB				± 0.75 dB	≤ 1.6 - 18 GHz	
32 AS 102-K20 S3	20 dB				± 1.0 dB		
32 AS 102-K30 S3	30 dB				± 1.5 dB		

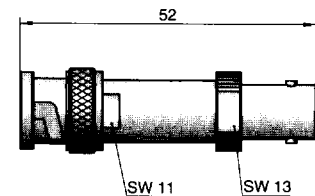
Series RPC-3.50, Frequency range: DC - 26.5 GHz

Part number	Attenuation	Tolerances				VSWR	Power rating
		26.5 GHz					
03 AS 102-K03 S3	3 dB	± 0.3 dB				≤ 1.10 - 4 GHz	2 W at 25°C 0 W at 125°C
03 AS 102-K06 S3	6 dB	± 0.3 dB				≤ 1.15 - 8 GHz	
03 AS 102-K10 S3	10 dB	± 0.5 dB				≤ 1.20 - 12 GHz	
03 AS 102-K20 S3	20 dB	± 0.6 dB				≤ 1.25 - 18 GHz	
03 AS 102-K30 S3	30 dB	± 0.75 dB				≤ 1.35 - 26 GHz	
03 AS 102-K40 S3	40 dB	± 1.30 dB					



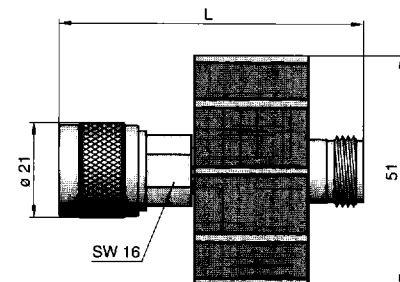
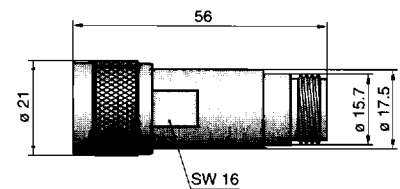
Series BNC (50Ω), Frequency range: DC - 2 GHz

Part number	Attenuation	VSWR	Power rating
51 AS 103-K03 A4	3 dB ± 0.4 dB	≤ 1.20 - 1.2 GHz	3 W at 25°C 0 W at 125°C
51 AS 103-K06 A4	6 dB ± 0.4 dB	≤ 1.40 - 2.0 GHz	
51 AS 103-K10 A4	10 dB ± 0.4 dB		
51 AS 103-K20 A4	20 dB ± 0.5 dB		
51 AS 103-K30 A4	30 dB ± 1.0 dB		
51 AS 103-K40 A4	40 dB ± 1.0 dB		
51 AS 103-K50 A4	50 dB ± 1.5 dB		
51 AS 103-K55 A4	55 dB ± 2.0 dB		



Series N (50Ω), Frequency range: DC - 10 GHz, Power rating 5, 10 and 20 W

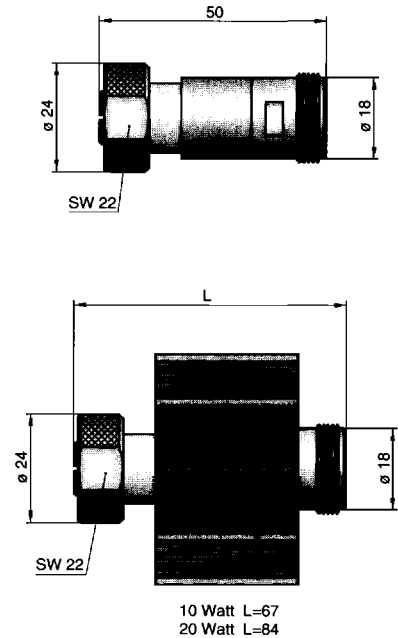
Part number	Attenuation	Tolerances				VSWR	Power rating
		2 GHz	4 GHz	10 GHz	18 GHz		
53 AS 105-K03 A3	3 dB	± 0.3 dB	± 0.5 dB	± 1.0 dB	≤ 1.10 - 2 GHz	5 W	
53 AS 110-K03 A3	3 dB	± 0.3 dB	± 0.5 dB	± 1.0 dB	≤ 1.19 - 5 GHz	10 W	
53 AS 120-K03 A3	3 dB	± 0.3 dB	± 0.5 dB	± 1.0 dB	≤ 1.50 - 10 GHz	20 W	
53 AS 105-K06 A3	6 dB	± 0.3 dB	± 0.5 dB	± 1.0 dB		5 W	
53 AS 110-K06 A3	6 dB	± 0.3 dB	± 0.5 dB	± 1.0 dB		10 W	
53 AS 120-K06 A3	6 dB	± 0.3 dB	± 0.5 dB	± 1.0 dB		20 W	
53 AS 105-K10 A3	10 dB	± 0.3 dB	± 0.5 dB	± 1.0 dB		5 W	
53 AS 110-K10 A3	10 dB	± 0.3 dB	± 0.5 dB	± 1.0 dB		10 W	
53 AS 120-K10 A3	10 dB	± 0.3 dB	± 0.5 dB	± 1.0 dB		20 W	
53 AS 105-K20 A3	20 dB	± 0.4 dB	± 0.5 dB	± 1.5 dB		5 W	
53 AS 110-K20 A3	20 dB	± 0.4 dB	± 0.5 dB	± 1.5 dB		10 W	
53 AS 120-K20 A3	20 dB	± 0.4 dB	± 0.5 dB	± 1.5 dB		20 W	
53 AS 105-K30 A3	30 dB	± 0.4 dB	± 0.5 dB	± 1.75 dB		5 W	
53 AS 110-K30 A3	30 dB	± 0.4 dB	± 0.5 dB	± 1.75 dB		10 W	
53 AS 120-K30 A3	30 dB	± 0.4 dB	± 0.5 dB	± 1.75 dB		20 W	



10 Watt L=67
20 Watt L=93

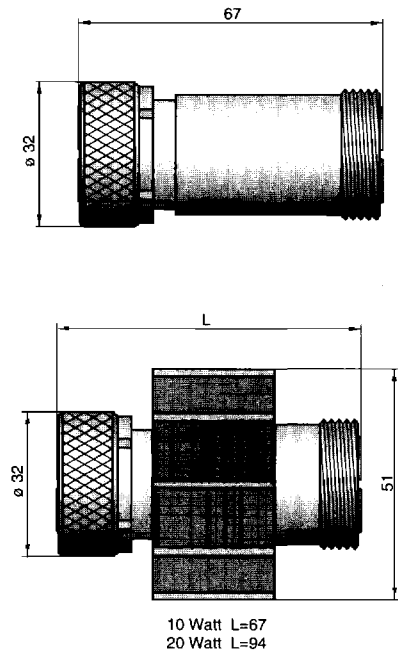
Series 4.1 / 9.5 (50Ω), Frequency range: DC - 8 GHz, Power rating 5, 10 and 20 W

Part number	Attenuation	Tolerances			VSWR	Power rating
		2 GHz	4 GHz	8 GHz		
65 AS 105-K03 B1	3 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB	≤ 1.06 - 1 GHz ≤ 1.10 - 2 GHz ≤ 1.22 - 8 GHz	5 W
65 AS 110-K03 B1	3 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		10 W
65 AS 120-K03 B1	3 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		20 W
65 AS 105-K06 B1	6 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		5 W
65 AS 110-K06 B1	6 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		10 W
65 AS 120-K06 B1	6 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		20 W
65 AS 105-K10 B1	10 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		5 W
65 AS 110-K10 B1	10 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		10 W
65 AS 120-K10 B1	10 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		20 W
65 AS 105-K20 B1	20 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		5 W
65 AS 110-K20 B1	20 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		10 W
65 AS 120-K20 B1	20 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		20 W
65 AS 105-K30 B1	30 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		5 W
65 AS 110-K30 B1	30 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		10 W
65 AS 120-K30 B1	30 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		20 W
65 AS 105-K40 B1	40 dB	± 0.4 dB	± 0.5 dB	± 1.75 dB		5 W
65 AS 110-K40 B1	40 dB	± 0.4 dB	± 0.5 dB	± 1.75 dB		10 W
65 AS 120-K40 B1	40 dB	± 0.4 dB	± 0.5 dB	± 1.75 dB		20 W



Series 7/16 (50Ω), Frequency range: DC - 8 GHz, Power rating 5, 10 and 20 W

Part number	Attenuation	Tolerances			VSWR	Power rating
		2 GHz	4 GHz	8 GHz		
60 AS 105-K03 B1	3 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB	≤ 1.06 - 1 GHz ≤ 1.10 - 2 GHz ≤ 1.22 - 8 GHz	5 W
60 AS 110-K03 B1	3 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		10 W
60 AS 120-K03 B1	3 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		20 W
60 AS 105-K06 B1	6 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		5 W
60 AS 110-K06 B1	6 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		10 W
60 AS 120-K06 B1	6 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		20 W
60 AS 105-K10 B1	10 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		5 W
60 AS 110-K10 B1	10 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		10 W
60 AS 120-K10 B1	10 dB	± 0.3 dB	± 0.5 dB	± 0.9 dB		20 W
60 AS 105-K20 B1	20 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		5 W
60 AS 110-K20 B1	20 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		10 W
60 AS 120-K20 B1	20 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		20 W
60 AS 105-K30 B1	30 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		5 W
60 AS 110-K30 B1	30 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		10 W
60 AS 120-K30 B1	30 dB	± 0.4 dB	± 0.4 dB	± 1.5 dB		20 W
60 AS 105-K40 B1	40 dB	± 0.4 dB	± 0.5 dB	± 1.75 dB		5 W
60 AS 110-K40 B1	40 dB	± 0.4 dB	± 0.5 dB	± 1.75 dB		10 W
60 AS 120-K40 B1	40 dB	± 0.4 dB	± 0.5 dB	± 1.75 dB		20 W

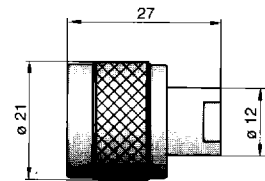


Terminations

Abschlußwiderstände

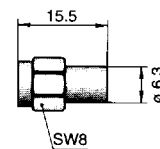
Series N (50Ω)

Part number	VSWR				Power rating
	1 GHz	2 GHz	4 GHz	12.4 GHz	
53 S 15R-001	≤ 1.05	≤ 1.10	≤ 1.20	–	1 W
53 S 17R-001	≤ 1.05	≤ 1.10	≤ 1.20	≤ 1.20	1 W



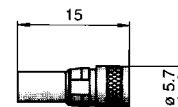
Series SMA

Part number	VSWR				Power rating
	2 GHz	8 GHz	12.4 GHz	18 GHz	
32 S 15R-0.5 D3	≤ 1.05	≤ 1.10	≤ 1.19	–	0.5 W
32 S 17R-0.5 D3	≤ 1.05	≤ 1.10	≤ 1.19	≤ 1.20	0.5 W
32 S 15A-1.0 A3	≤ 1.20				1.0 W



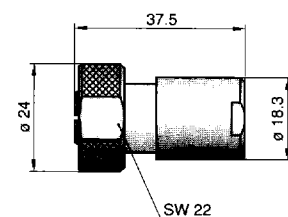
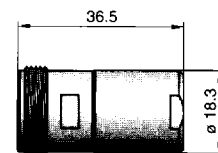
Series 1.0 / 2.3 (50Ω), DIN 41626 - Part 2

Part number	VSWR				Power rating
	1.5 GHz	2 GHz			
45 S 15R-0.5 H3	≤ 1.15	≤ 1.20			0.5 W



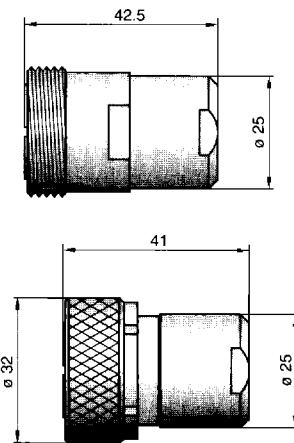
Series 4.1 / 9.5 (50Ω)

Part number	VSWR				Power rating
	2 GHz				
65 K 15R-001 B1	≤ 1.04				1 W
65 S 15R-001 B1	≤ 1.04				1 W



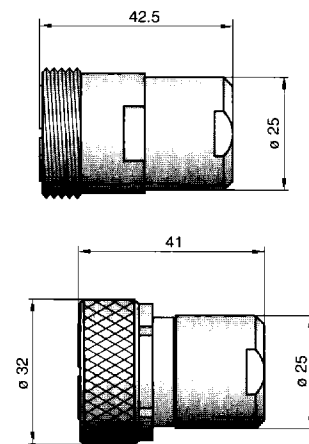
Series 7/16 (50Ω), Frequency range: DC - 2 GHz

Part number	VSWR			Power rating
	2 GHz			
60 K 15R-001	≤ 1.04			1 W
60 S 15R-001	≤ 1.04			1 W



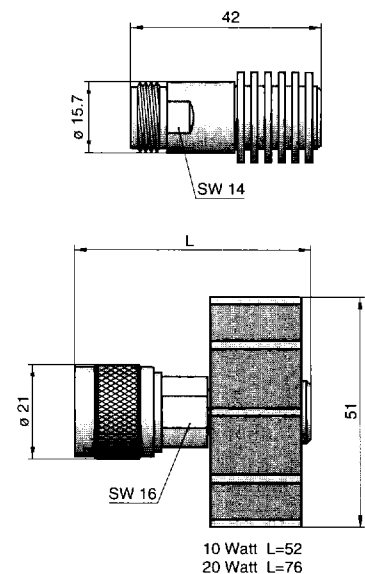
Series 7/16 (50Ω), Frequency range: DC - 8 GHz

Part number	VSWR			Power rating
	4 GHz	8 GHz		
60 K 17R-001	≤ 1.02	≤ 1.03		1 W
60 S 17R-001	≤ 1.02	≤ 1.03		1 W



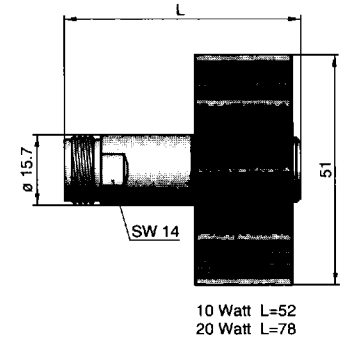
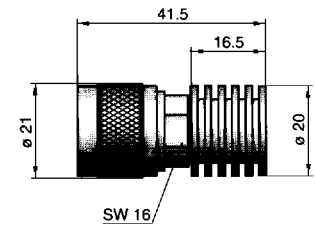
Series N (50Ω), Frequency range: DC - 3 GHz, Power rating 5, 10 and 20W

Part number	VSWR			Power rating
	3 GHz			
53 K 15R-005	≤ 1.2			5 W
53 S 15R-005	≤ 1.2			5 W
53 K 15R-010	≤ 1.2			10 W
53 S 15R-010	≤ 1.2			10 W
53 K 15R-020	≤ 1.2			20 W
53 S 15R-020	≤ 1.2			20 W

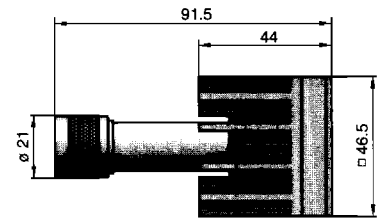


Series N (50Ω), Frequency range: DC - 10 GHz, Power rating 5, 10 and 20W

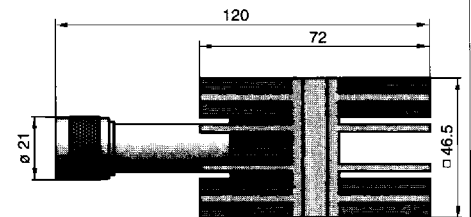
Part number	VSWR			Power rating
	2 GHz	5 GHz	10 GHz	
53 K 17R-005	≤ 1.1	≤ 1.19	≤ 1.5	5 W
53 S 17R-005	≤ 1.1	≤ 1.19	≤ 1.5	5 W
53 K 17R-010	≤ 1.1	≤ 1.19	≤ 1.5	10 W
53 S 17R-010	≤ 1.1	≤ 1.19	≤ 1.5	10 W
53 K 17R-020	≤ 1.1	≤ 1.19	≤ 1.5	20 W
53 S 17R-020	≤ 1.1	≤ 1.19	≤ 1.5	20 W



53 S 17R-025	≤ 1.1	≤ 1.15		25 W
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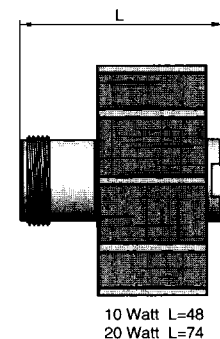
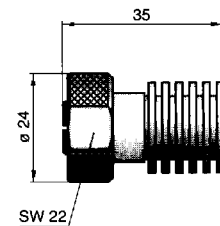


53 S 17R-040	≤ 1.1	≤ 1.15		40 W
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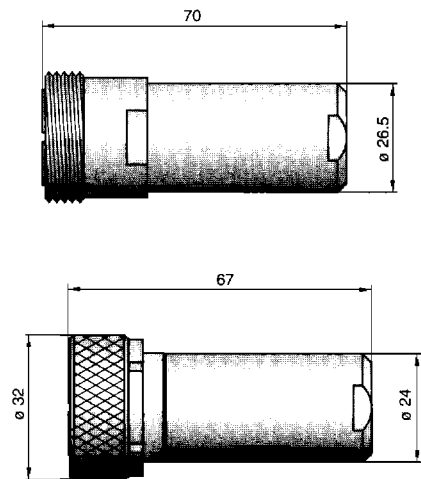
Series 4.1 / 9.5 (50Ω), Frequency range: DC - 10 GHz, Power rating 5, 10 and 20W

Part number	VSWR			Power rating
	1 GHz	2 GHz	8 GHz	
65 K 17R-005	≤ 1.04	≤ 1.06	≤ 1.22	5 W
65 S 17R-005	≤ 1.04	≤ 1.06	≤ 1.22	5 W
65 K 17R-010	≤ 1.04	≤ 1.06	≤ 1.22	10 W
65 S 17R-010	≤ 1.04	≤ 1.06	≤ 1.22	10 W
65 K 17R-020	≤ 1.04	≤ 1.06	≤ 1.22	20 W
65 S 17R-020	≤ 1.04	≤ 1.06	≤ 1.22	20 W



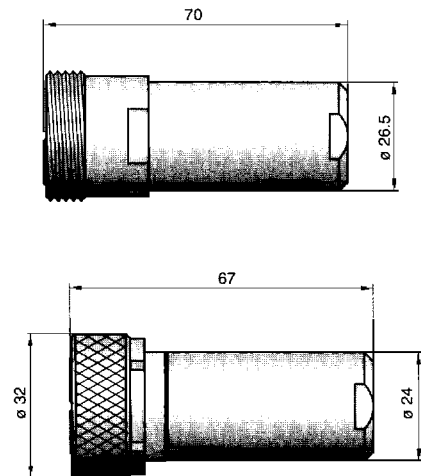
Series 7/16 (50Ω), Frequency range: DC - 2 GHz, Power rating 5, 10 and 20W

Part number	VSWR			Power rating
	2 GHz			
60 K 15R-005	≤ 1.2			5 W (fig.)
60 S 15R-005	≤ 1.2			5 W (fig.)
60 K 15R-010	≤ 1.2			10 W
60 S 15R-010	≤ 1.2			10 W
60 K 15R-020	≤ 1.2			20 W
60 S 15R-020	≤ 1.2			20 W



Series 7/16 (50Ω), Frequency range: DC - 8 GHz, Power rating 5, 10 and 20W

Part number	VSWR			Power rating
	1 GHz	2 GHz	8 GHz	
60 K 17R-005	≤ 1.04	≤ 1.06	≤ 1.22	5 W (fig.)
60 S 17R-005	≤ 1.04	≤ 1.06	≤ 1.22	5 W (fig.)
60 K 17R-010	≤ 1.04	≤ 1.06	≤ 1.22	10 W
60 S 17R-010	≤ 1.04	≤ 1.06	≤ 1.22	10 W
60 K 17R-020	≤ 1.04	≤ 1.06	≤ 1.22	20 W
60 S 17R-020	≤ 1.04	≤ 1.06	≤ 1.22	20 W

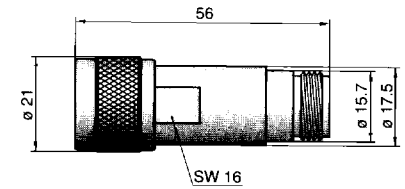


Matching Attenuators

Anpassungsglieder

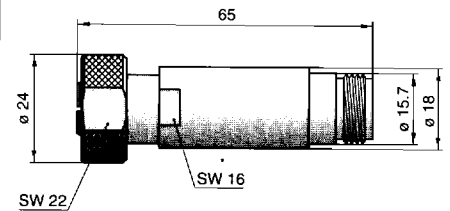
Series Nm (50Ω) / Nf (75Ω), Frequency range: DC - 2 GHz

Part number	Attenuation	VSWR		Power rating
		1 GHz	2 GHz	
53 S 173-K00	5.72 dB	≤ 1.1	≤ 1.2	1 W at 25°C 0 W at 125°C



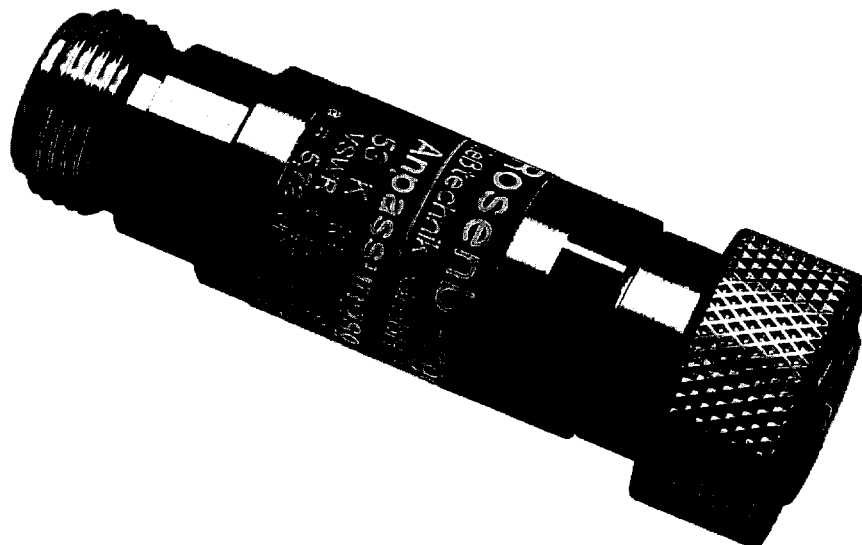
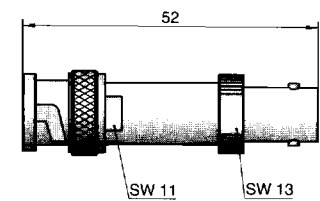
Series Nf (50Ω) / 3.5/12 (75Ω), Frequency range: DC - 1 GHz

Part number	Attenuation	VSWR		Power rating
		1 GHz		
53 K 167-S00	5.72 dB	≤ 1.15		1 W at 25°C 0 W at 125°C



Series BNCm (50Ω) / BNCf (75Ω), Frequency range: DC - 2 GHz

Part number	Attenuation	VSWR		Power rating
		1 GHz	2 GHz	
51 S 171-K00	5.72 dB	≤ 1.2	≤ 1.4	1 W at 25°C 0 W at 125°C



Feed-through Terminations

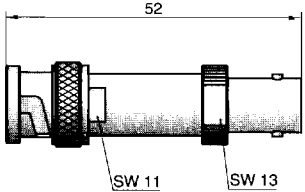
Rosenberger feed-through terminations are suited to match 50 Ω transmission lines to high impedance inputs of measuring instruments, e.g. of oscilloscopes with an input impedance of typically 1M Ω . The feed-through terminations contain a thin-film resistor which is connected in parallel to the input impedance of the measuring instrument. Therefore the feed-through termination must be connected directly to the input of the measuring instrument.

Durchführungsabschlüsse

Rosenberger Durchführungsabschlüsse werden zur Herstellung einer guten Anpassung hochohmiger Meßgeräte verwendet. Sie enthalten einen Dünnschicht-Widerstand, der parallel zur Eingangsimpedanz des Meßgerätes geschaltet ist. Der Durchführungsabschluß muß deswegen direkt, d.h. ohne zwischengeschaltete Leitung an den Meßgeräteeingang angesteckt werden.

Series BNC (50 Ω), Frequency range: DC - 1 GHz

Part number	VSWR (measured with open output)			Power rating
	0.1 GHz	0.5 GHz	1 GHz	
51 S 15R-K02	≤ 1.05	≤ 1.1	≤ 1.2	2 W



Waveguide-Coax Transitions

Standard waveguide-coax transitions are available for rectangular, standardized waveguide dimensions IEC R40 to R 220 (WG 11A to WG 20) with a VSWR ≤ 1.22 for the corresponding full waveguide frequency bands.

Special devices for other waveguide dimensions (e.g. small profile waveguides, circular waveguides) or high performance full and narrow band devices with improved VSWR are available on request.

Hohlleiter-Koax Übergänge

Hohlleiter-Koax Übergänge sind als Standardausführung für die Rechteckhohlleiter Querschnitte R 40 bis R 220 mit einem VSWR ≤ 1.22 für die jeweiligen Hohlleiterbänder lieferbar.

Auf Kundenwunsch werden auch Sonderausführungen z.B. für Flachprofil- und Rundhohlleiter, sowie für höhere Anforderungen an die Anpassung gefertigt.

Standard Waveguide-Coax Transitions

Part number	Waveguide	Connector
03 K 100-UBR	R 100	RPC-3.50 female
03 K 120-UBR	R 120	RPC-3.50 female
03 K 140-UBR	R 140	RPC-3.50 female
03 K 220-UBR	R 220	RPC-3.50 female
02 K 320-UBR	R 320	RPC-2.92 female
08 K 400-xxx	R400	RPC-1.85 female
01 K 900-xxx	R 900	RPC-1.00 female

Special Waveguide-Coax Transitions

Part number	Waveguide	Flange - connector	VSWR	Frequency
07 P 048 PDR	R48	PDR 48 - RPC-7	≤ 1.05	3.94 - 5.99
53 K 048 PDR	R 48	PDR 48 - N female	≤ 1.20	3.94 - 5.99
65 C 048 UER	R 48	UER 48 - 4.1/9.5 flange	≤ 1.03	4.40 - 5.00
65 C 070 UER	R 70	UER 70 - 4.1/9.5 flange	≤ 1.22	5.38 - 8.18
53 K 070 UAR	R 70	UAR 70 - N female	≤ 1.12	5.38 - 8.18
53 K 084 UER	R 84	UER 84 - N female	≤ 1.11	6.58 - 10.00
53 K 100 UBR	R 100	UBR 100 - N female	≤ 1.20	8.20 - 12.5
05 K 140 UBR	R 140	UBR 140 - N female	≤ 1.22	11.9 - 18.0 end launch

