PRODUCT PORTFOLIO

TAKE OFF WITH OUR PRODUCTS

Coaxial Connectors
DC to 71 GHz

and Adapters
DC to 71 GHz

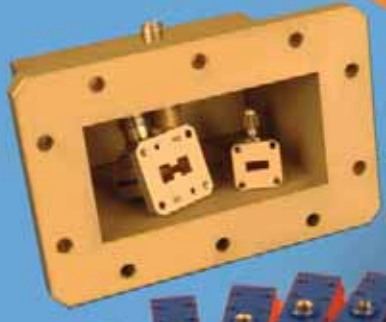
Multiport
Assemblies
DC to 40 GHz

Spectrum
Elektrotechnik GmbH
where quality is needed

Adapters
DC to 71 GHz

Coaxial
Delay Lines
DC to 40 GHz

Cable Assemblies
DC to 71 GHz



Waveguide to
Coax Adapters

Gain Amplitude
Equalizers

Phase-Adjusters
DC to 63 GHz

Telephone: +49-89-3548-040
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Email: Sales@Spectrum-et.com

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Issue 06/2018

High Performance Cable Assemblies

In the Handbook Cable Assemblies 2013 you will find over 30 High Performance Cable Assemblies which can be terminated with most standard coaxial connector series and with wave guides as well.
Frequency Range is DC to 65.0 GHz as standard, with option to 71.0 GHz.
Standard High Power connectors are available as well.

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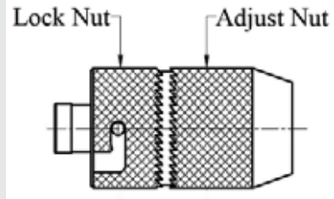
Self Locking Phase Adjustable Connectors, Adjustable Range: 100°, 240° and 280° @ 18.0 GHz

Phase Setting Procedure for the Phase Adjustable Self Locking Connectors

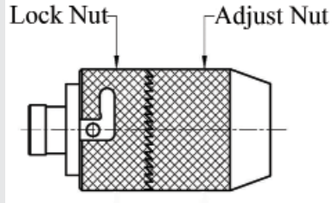
1) The phase of a set of cable assemblies will be set at the factory to customer specification before delivery.
2) After installing and routing the cables in the system, pulling the cables through the wings or the body of an airplane, the phase might have been changed.
3) Please follow the steps A) to C) below to adjust the Phase. The Phase Adjustable Connector is using an Adjust Nut for the Phase Adjustment and a Lock Nut for safe locking.

A) Unlock the Adjust Nut by pulling the Lock Nut back and lock it safely, as shown.



B) Adjust the phase to your needs by rotating the Adjust Nut in the direction required.

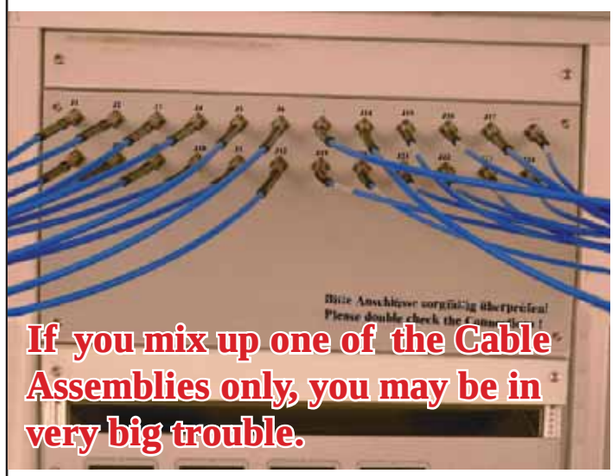
C) When phase has been set, release Lock Nut to keep the Adjust Nut from moving, and to set the phase safely.



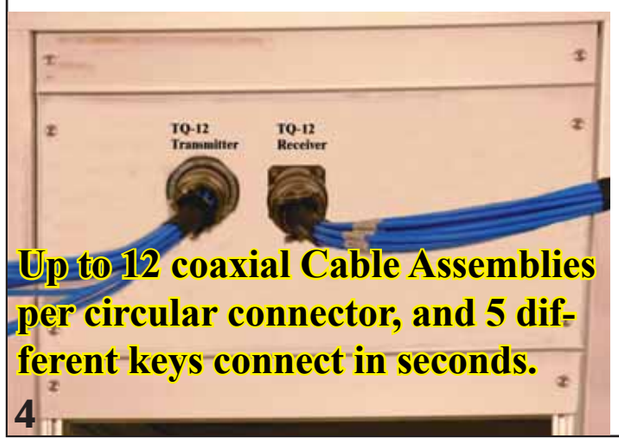
For more Information please refer to the “Handbook Cable Assemblies 2013”

RF Multiport Connectors

Catalog, 52 pages showing 6 coaxial Multipin Connector Series, demonstrating how to connect and disconnect up to 23 coaxial lines in seconds and saving space.



The Problem: Many coaxial microwave links have to be connected and disconnected in various applications. This means threadening and unthreadening, torquing and untorquing. Very dense packaging is not possible, as there is still room needed for manual threadening and for the use of a torque wrench. In helicopters and aircrafts all connectors usually have to be safely secured, wiring the coupling nuts of the connectors, using wire holes, a time-consuming process.



The Solution: Spectrum's Multipin Connectors are available with four (4), seven (7), eight (8), ten (10), twelve (12) and twenty-three (23) coaxial inserts (terminating the coaxial cable assemblies) at the Multipin end, and connecting all the coaxial cable assemblies at once and in seconds with no need of a torque wrench, no need for safety wires and are using minimum space.

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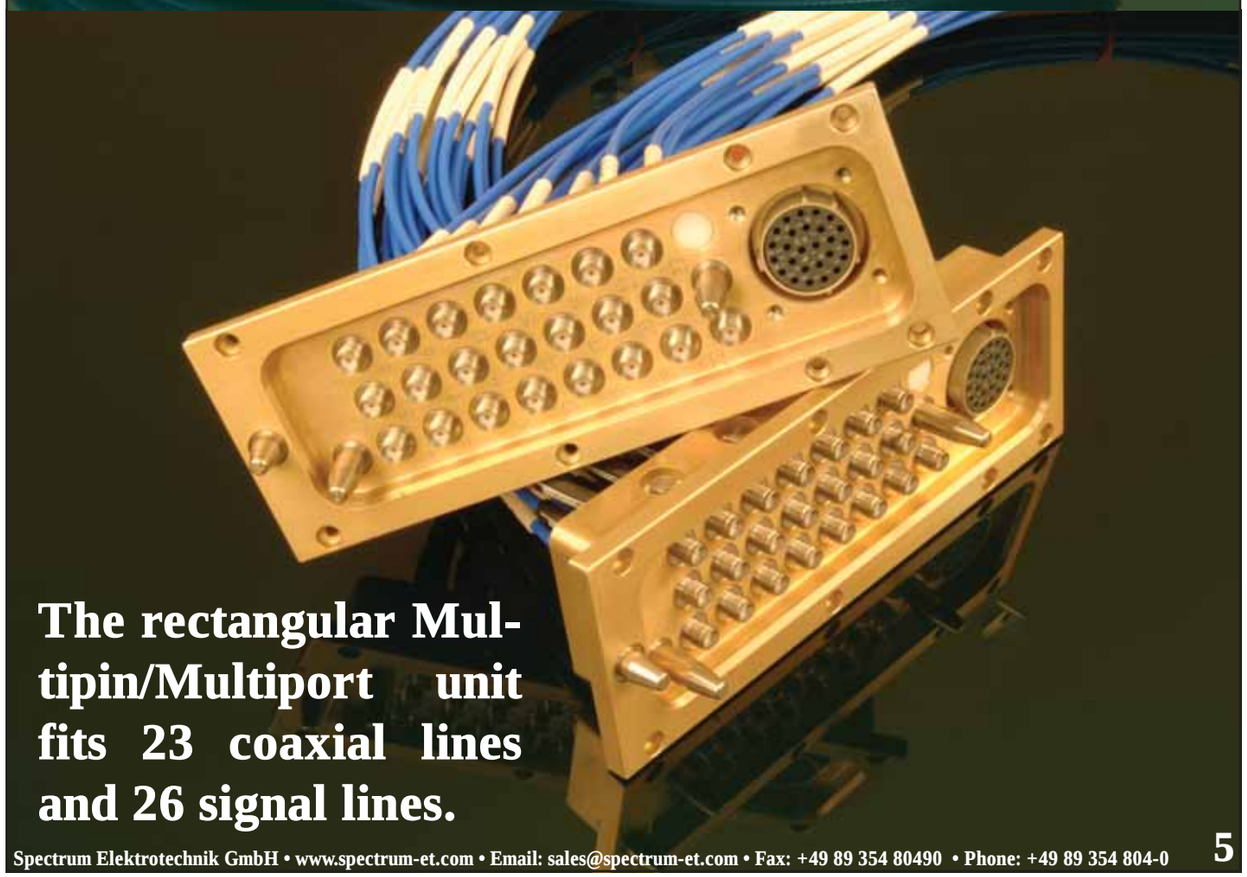


SpectrumFlex 47F & 89F & 169F

Miniature Assemblies

with 0.055” (1.40 mm) and 0.096” (2.44 mm) and 0.160” (4.06 mm),diameters, durable construction, and low profiles in SMA configuration, SpectrumFlex miniature cables offer superior electrical performance in a trouble-free, compact assembly.

- **Instead of developing complicated Semi-Rigid cable drawings for time and cost saving**
- **Installation of other miniature cable assemblies has caused expensive or hard-to-find failures.**
- **High density devices require stable, miniature cable assemblies for connection during test.**

THE KEY TO SUCCESS

Semi-Rigid

Cable Assemblies from diameters 0.034” to 0.5”, terminated with any connector, manufactured with integrity and reliability of performance to customers’ specifications for advanced systems applications.

HandyForm -II

Characteristics:
Easily formable by hand. Electrical Performance is identical when compared to regular Semi - Rigid Cables. Outer Conductor consists of a seamless aluminum tubing, resulting in lower weight.

SPECIFICATION		HandyForm - II						
Cable Model No.		422-130	422-130-3	422-600	422-600-3	422-800	422-800-3	422-121-3
Cable Code		145	146	165	166	168	167	150
Max. Operating Frequency (GHz)		110.0	110.0	40.0	40.0	36.0	36.0	20.0
Mechanical Requirements								
Outer Diameter Dia. in mm	in inch	0.047"		0.087"		0.141"		0.250"
	in mm	1.19		2.20		3.58		6.35
Outer Conductor Construction		Seamless Aluminum	Seamless Aluminum Tin Plated	Seamless Aluminum	Seamless Aluminum Tin Plated	Seamless Aluminum	Seamless Aluminum Tin Plated	
Dielectric Diameter in mm		0.91	0.94	1.68	1.68	2.99	2.99	5.31
Dielectric Material		PTFE						
Dielectric Constant		2.00						
Center Conductor Material		Silver Plated Copper Clad Steel						Silver Plated Copper
Center Conductor Dia. in mm		0.29	0.29	0.51		0.92		1.63
Weight in Grams/Meter		6	7	12	13	30	31	78
Safe Bend Radius for a 360° bend with proper tooling in mm		1.50		3.2		6.5		10
Electrical Requirements								
Impedance in Ohms at Sea Level and 25°C		50 ± 2.0						
Velocity in %, ± 2 %		69.9						
Capacitance in pF/m		105				98		
Dielectric Strength (60 Hz) in KV		2.0		5.0				7.5
Max. Operating Voltage at Sea Level, in KVrms, 60 Hz		1.0	1.0	1.5		1.9		3.0
Nominal Insertion Loss in dB/m, vs. Frequency	0.5 GHz	0.81		0.42		0.28		0.19
	1.0 GHz	1.15		0.64		0.41		0.29
	5.0 GHz	2.80		1.60		1.05		0.71
	10.0 GHz	4.60		2.40		1.55		1.12
	18.0 GHz	6.50		3.40		2.20		1.50
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and +20°C	0.5 GHz	50		195		680		2000
	1.0 GHz	32		130		450		1400
	5.0 GHz	12		47		170		470
	10.0 GHz	8		31		120		300
	18.0 GHz	5.5		22		74		210
Environmental Requirements								
Operating Temperature Range		-54°C to +125°C						

For more data please refer to the “Handbook Cable Assemblies 2013” about:

- **HandyForm II with Low Loss Dielectric**
- **HandyForm I using tinned braid as outer conductor**

Specifications are subject to change without notice.

Phase Stable Cable Assemblies for Network Analyzers

ANA Cable Assembly Characteristics:

Cable Code		22 (= Type 18 armored)
Frequency Range		to 26.5 GHz
Cable Outer diameter		9.2mm (.36")
Mechanical length		custom made up to 6m
Electrical length		~1.36 x mechan. length
Bend radius min.		6 cm. (2.36")
Pull resistance		10 kg. (22 pounds)
Crush resistance		62 kg./cm² (880 psi)
Return loss, min. /Assembly 2.4mm connectors		20 dB up to 26.5 GHz
2.92mm connectors		
3.5mm connectors		
7mm connectors		20 dB up to 18.0 GHz
N connectors		20 dB up to 18.0 GHz
SMA connectors		
TNC connectors		
Return loss stability		40 dB min.
Phase stab., 2 x 45 cm. assies manual flexing/torque		Please refer to the 2013 Cable Assembly Handbook Diagrams on Page F3. 4.0° max. @ 26.5 GHz
Straight vs. 90° bend		2.5° max. @ 26.5 GHz
Straight after 3 x 90° bends		2.0° max. @ 26.5 GHz
Amplitude stab., 2 x 45 cm. assies manual flexing/torque		-
Straight vs. 90° bend		<0.05dB @ 26.5 GHz
Straight after 3 x 90° bends		<0.05dB @ 26.5 GH
Insertion Loss/m (39.37")	1.0 GHz	0.40
	10.0 GHz	1.34
	18.0 GHz	1.80
	26.5 GHz	2.20
	40.0 GHz	-
	50.0 GHz	-

ANA Cable Assembly Characteristics:

Cable Code		18
Frequency Range		to 26.5 GHz
Cable Outer diameter		6.0mm (.24")
Mechanical length		custom made up to 6m
Electrical length		~1.36 x mechan. length
Bend radius min.		6 cm. (2.36")
Pull resistance		2 kg. (4.4 pounds)
Crush resistance		16 kg./cm² (225 psi)
Return loss, min. /Assembly 2.4mm connectors		20 dB up to 26.5 GHz
2.92mm connectors		
3.5mm connectors		
7mm connectors		20 dB up to 18.0 GHz
N connectors		20 dB up to 18.0 GHz
SMA connectors		
TNC connectors		
Return loss stability		40 dB min.
Phase stab., 2 x 45 cm. assies manual flexing/torque		Please refer to the 2013 Cable Assembly Handbook Diagrams on Page F3. 4.0° max. @ 26.5 GHz
Straight vs. 90° bend		2.5° max. @ 26.5 GHz
Straight after 3 x 90° bends		2.0° max. @ 26.5 GHz
Amplitude stab., 2 x 45 cm. assies manual flexing/torque		-
Straight vs. 90° bend		<0.05dB @ 26.5 GHz
Straight after 3 x 90° bends		<0.05dB @ 26.5 GHz
Insertion Loss/m	1.0 GHz	0.40
	10.0 GHz	1.34
	18.0 GHz	1.80
	26.5 GHz	2.20

ANA Cable Assembly, can be terminated with NMD 2.4mm 2.9mm and 3.5mm connectors

Cable Assemblies with interchangeable Connectors (Field Replaceable Connectors)

Cable Assemblies using
of same electrical length.

Different SMA, N, TNC Connectors Styles with same electrical lengths.

Prestine wooden box with the complete Set of phase matched Connectors, a basic Assembly and a complete set of Torque Wrenches.

We do it, successfully!

Procedure for how to use the N, TNC and 7/16 Push-On male. Push-On Connectors mate with any standard female connector of the same connector style.

1. Convert your standard Assembly into a Push-On Assembly using the Nf to Nm Push-On Adapter

2. Put your fingers firmly onto the knurls of the “Lock Nut”

3. Push “Lock Nut” forward and engage the Push-On end of the Adapter with the mating female. Back nut must be released.

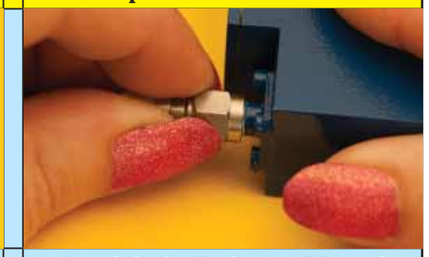
4. The Connection has been completed, easy and fast. The connector has been locked on safely.

5 . To unlock (when “Back Nut” is in unlocked mode) push the “Lock Nut” forward and stop reverse movement by setting your fingers onto the “Back Nut”.

6. Keep fingers on “Back Nut” to ensure that “Lock Nut” cannot slide back and pull the connector off.

1. Convert your standard cable assembly into a Push-On Assembly by threadening the standard female side of the adapter onto the male connector of the assembly.

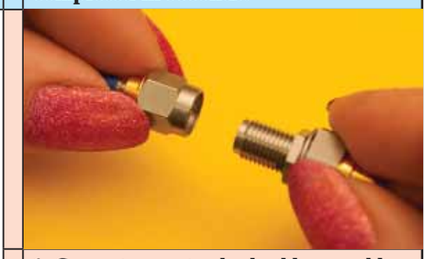
2. Your standard SMA male cable assembly is converted into an SMA male Push-On Assembly.



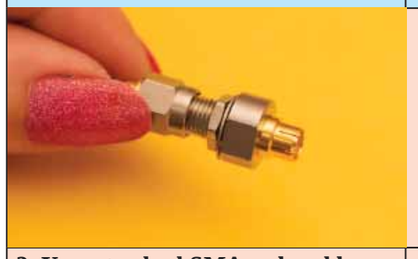
3. Just slide the Push-On SMA male Connector onto any standard SMA female. The connection is securely completed in seconds.

4. To disconnect, just pull the connector off.

Procedure for how to use the SMA male and female Push-On connectors. SMA Push-On Connectors mate with any standard connector of the same but opposite connector style.



1. Convert your standard cable assembly into a Push-On Assembly by threadening the standard female side of the adapter onto the male connector of the assembly.



2. Your standard SMA male cable assembly is converted to a Push-On SMA female Cable Assembly.

3. Just slide the Push-On SMA female Connector onto any standard SMA male. The connection is securely connected in seconds.

4. To disconnect, just pull the connector off.

Phase Adjusters

Part Number	Con-nec-tors	Fre-quency Range (GHz)	VSWR max.	Inser-tion Loss max. (dB)	Phase Shift min. (°)	No. of Turns	Phase Shift Deg/ GHz/ Turn	Time Delay min. (psec.)	Time Delay max. (psec.)	Tem-perature (°C)	Weight max. (g)
LS-0002-YYYY[1]	div.	DC - 2	1.2:1	0.3	85	37	1.15	393	516	-65 to +125	98-220[2]
LS-0103-6161	Nf	DC - 3	1.15:1	0.4	540	cont.		1826	2328		700
LS-0203-6161				0.9	1080			3693	4694		1200
LS-0012-YYYY[1]	div.	DC - 12	1.3:1	0.8	520	37		406	530		114-234[2]
LS-0112-XXXX[3]	SMA	DC-12.0	1.25:1	0.4	230	16.5	1.2	238	293	-65 to +125	70
LS-A112-XXXX[3]											47
LS-0212-1121											70
LS-A212-1121											47
LS-0118-XXXX[3]		DC-18.0		0.6	350						70
LS-A118-XXXX[3]											47
LS-0218-1121											70
LS-A218-1121											47
LS-0118-5161	N							300	355	-65/+70	105
LS-U118-5161										-65/+165	
LS-0018-YYYY[1]	div.	DC - 18	1.5:1	1.0	770	37	1.15	406	530		98-220[2]
LS-0121-XXXX[3]	SMA	DC-26.0	1.30:1	0.8	500	16.5	1.2	238	293	-65 to +125	70
LS-A121-XXXX[3]											47
LS-0221-1121											70
LS-A221-1121											47
LS-0321-1121			1.31:1		500	35	0.6	236.7	290.5		30
LS-0170-1121			1.26:1	0.26	127	13.5	0.36	109.2	122.8		9
LS-S008-1121			1.50:1	0.4	155	10	0.6	118.6	135.1		20
LS-P140-KFKM	2.92 mm	DC-40.0	1.2:1	0.6	590	12	1.2	168	208	-65 to +65	51
LS-0140-KFKM			1.4:1								49
LS-P150-HFHM	2.40 mm	DC-50.0	1.3:1	0.8	400	7		172	195		55
LS-0150-HFHM			1.5:1								53
LS-P165-VFVM	1.85 mm	DC-63.0	1.4:1	0.8	600	8		167	195		55
LS-0165-VFVM			1.5:1								53

[1] div.: Connector Configuration available: SMA, male and female; N, male and female; TNC male and female
[2] Weight depends on connector configuration
[3] SMA Connector Configuration available: male/female; male/male; female/female; female/male

Broadest Line of Phase Adjusters. For details please refer to the 52 pages Catalog „Adjusting Phase“, available on the Internet and as Hardcopy as well.

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Double Ridge Waveguides		
Designa-tion (WRD)	Waveguide Code	Frequency (GHz)
200 - D24	D200	2.00 - 4.80
350 - D24	D350	3.50 - 8.20
350 - D36	D351	3.50 - 12.40
475 - D24	D475	4.75 - 11.00
500 - D36	D500	5.00 - 18.00
650 - D28	D650	6.50 - 18.00
750 - D24	D750	7.50 - 18.00

End-Launched

WG to Coax Adapters

available with any standard coaxial Connector

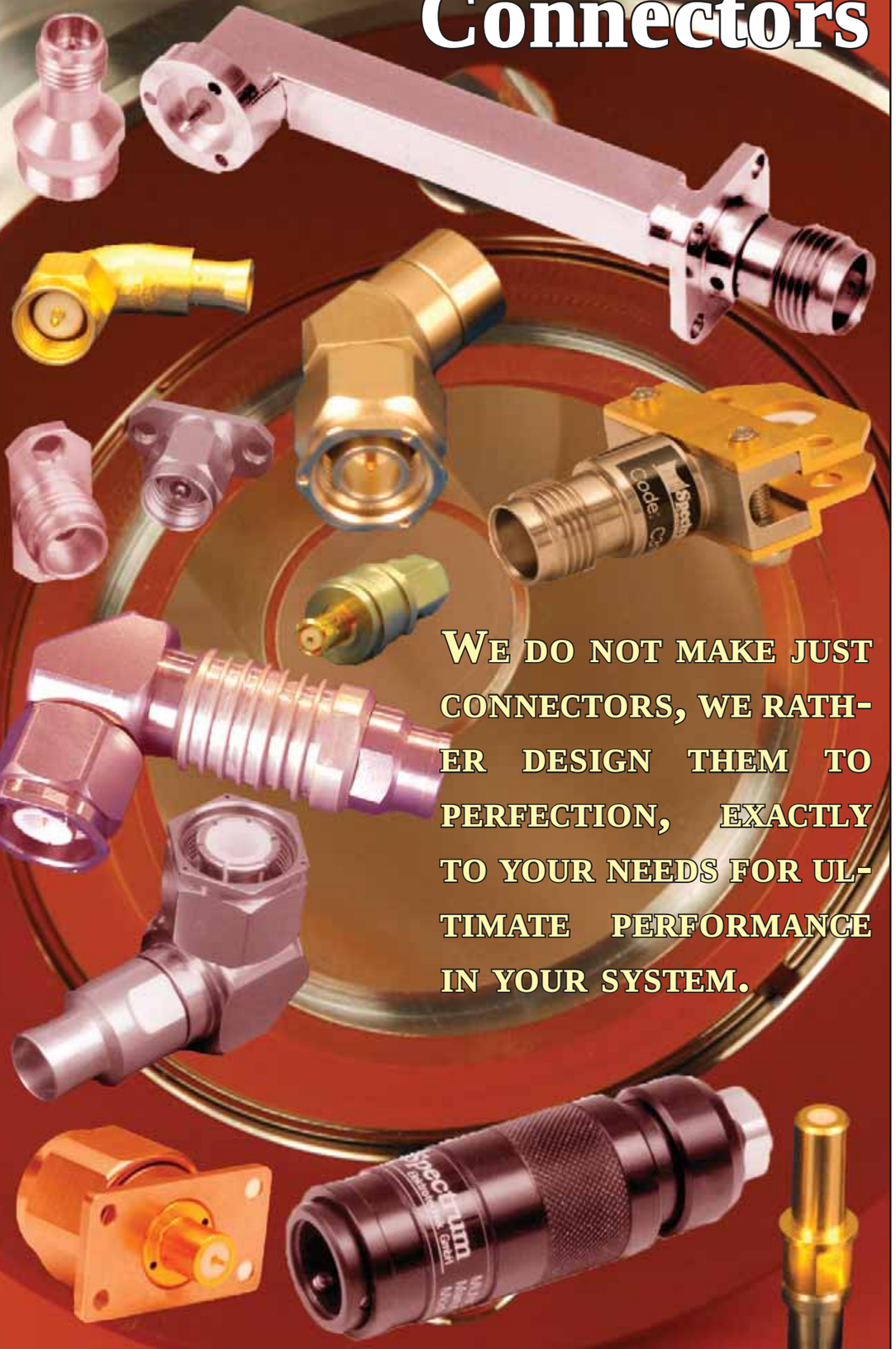
Rectangular Waveguides				
Designation			Wave-guide Code	Frequency (GHz)
EIA (WR)	DEF (WG)	IEC (R)		
650	6	14	R650	1.12 - 1.70
510	7	18	R510	1.45 - 2.20
430	8	22	R430	1.70 - 2.60
340	9 A	26	R340	2.20 - 3.30
284	10	32	R284	2.60 - 3.95
229	11 A	40	R229	3.30 - 4.90
187	12	48	R187	3.95 - 5.85
159	13	58	R159	4.90 - 7.05
137	14	70	R137	5.85 - 8.20
102			R102	7.00 - 11.0
112	15	84	R112	7.05 - 10.0
90	16	100	R090	8.20 - 12.4
75	17	120	R075	10.0 - 15.0
67			R067	11.0 - 17.0
62	18	140	R062	12.4 - 18.0
51	19	180	R051	15.0 - 22.0
42	20	220	R042	18.0 - 26.5
34	21	260	R034	22.0 - 33.0
28	22	320	R028	26.5 - 40.0
22	23	400	R022	33.0 - 50.0

Top-Launched

Connectors

Connector Series

- 1.85 mm
- 2.4 mm
- 2.92 mm
- 3.5 mm
- 7 mm
- 7/16
- 13/30
- BMA
- BNC
- C
- EIA 1/8”
- EIA 5/8”
- HN
- N
- SBX
- SBY
- SBZ
- SC
- SCC
- SMA
- SMP
- SMPM
- SPM
- TNC
- TNX



We do not make just connectors, we rather design them to perfection, exactly to your needs for ultimate performance in your system.

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Adapters

Adapter In- and Between-Series

- 1.85 mm
- 2.4 mm
- 2.92 mm
- 3.5 mm
- 7 mm
- 7/16
- 13/30
- BMA
- BNC
- C
- HN
- N
- SBX
- SBY
- SC
- SCC
- SMA
- SMP
- SMPM
- SPM
- TNC
- TNX

Largest Series of Adapters:

- **High Precision**
- **High Power**
- **Pressurized**
- **Hermetically Sealed**
- **DC to 71.0 GHz**

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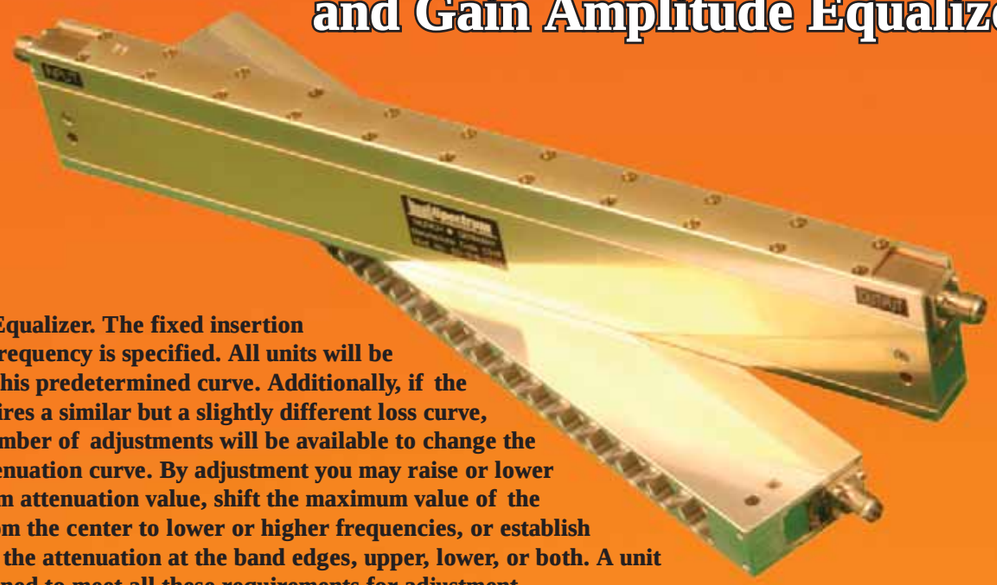
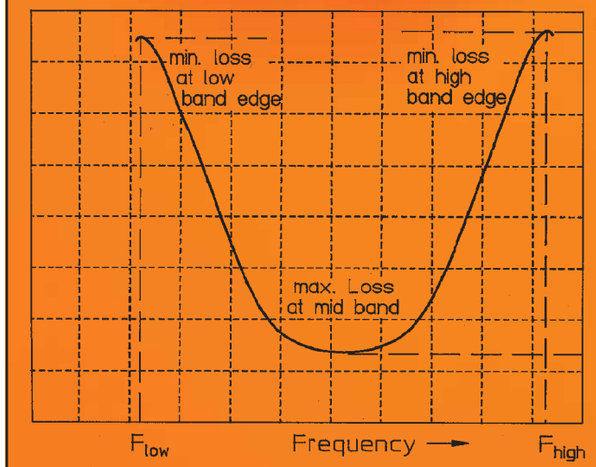
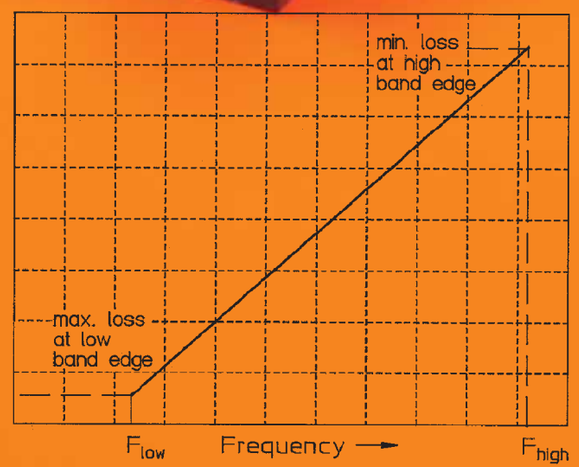
Fine Grain Equalizers and Gain Amplitude Equalizers



Adjustable Equalizer. The fixed insertion loss versus frequency is specified. All units will be set to meet this predetermined curve. Additionally, if the system requires a similar but a slightly different loss curve, a certain number of adjustments will be available to change the nominal attenuation curve. By adjustment you may raise or lower the maximum attenuation value, shift the maximum value of the response from the center to lower or higher frequencies, or establish a change of the attenuation at the band edges, upper, lower, or both. A unit can be designed to meet all these requirements for adjustment.



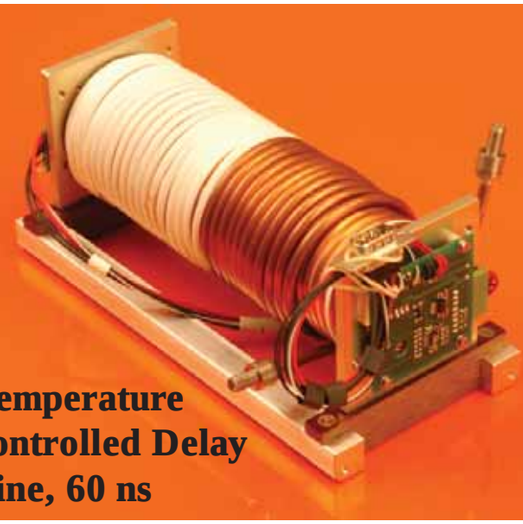
Fundamental Parabolic Equalizer Response



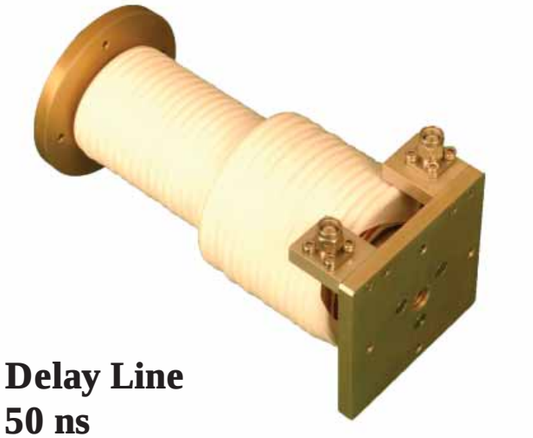
Fundamental Linear Equalizer Response

Coaxial Delay Lines

Spectrum Elektrotechnik GmbH



Temperature controlled Delay Line, 60 ns



Delay Line 50 ns

Delay Line 200 ns

19" Drawer for 25 ns and 50 ns delay Line

19" Drawer for 100 ns and 200 ns delay

manufactured to customer's specifications

High Power Super Components

manufactured to customers' specifications.

Spectrum manufactures almost every thing in-house, the microwave components, all connectivity units, even the housings, PC-Boards, just everything. This ensures 100% control.

SMP Calibration Kit

Tools

Torque Wrenches

Using a Torque Wrench at the coupling nut when mating the connectors ensures proper mechanical and electrical performance.

Interface Gauges

Interface Gauges are available for all standard Connector Series

Protect your Systems by measuring the Interfaces

Hermetically Sealed Adapters

Hermeticity: 10^{-8} atm.cm^3/s min.

2.92mm, TNC, N, Feedthroughs

with venting holes for Vacuum Test Chambers

Spectrum Elektrotechnik GmbH **when Quality is needed**

80905 Munich, Germany **P.O. Box 450533**

Telephone: +49-89-3548-040 **Facsimile: +49-89-3548-0490**

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