Spectrum Elektrotechnik GmbH

Handbook Cable Assemblies 2013

Advanced Designs to your needs

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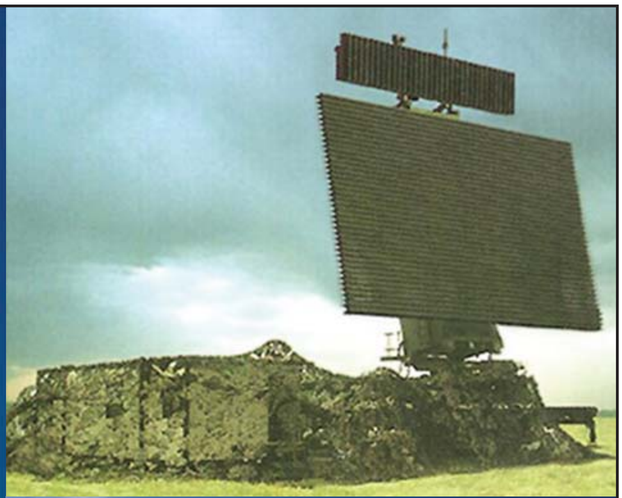

Spectrum Elektrotechnik GmbH has been a preferred supplier in many advanced programs and systems for Cable Assemblies, Components and Subsystems.

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High Performance Cable Assemblies

Although this section shows a wide range of products, it does not show all the flexible cables Spectrum Elektrotechnik GmbH manufactures and offers. But this section lists cables which are used in approximately 90% of the applications. Should you require something different, please do not hesitate to contact the factory. The product you need in your program may have been developed already.

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Note: Towards the end of this Handbook, starting at Page Q1, you will find useful information on connectors most frequently used .

Index by Cable Dimensions

Outer Diameter	Cable Type	Frequency Limit	Page
2.3 mm	677	18.0 GHz	B 48
3.2 mm	11	50.0 GHz	B 10
3.7 mm	39	45.0 GHz	B 18
4.3 mm	43	26.5 GHz	B 20
4.8 mm	37	50.0 GHz	B 16
4.8 mm	102	33.0 GHz	B 30
5.2 mm	10	26.5 GHz	B 8
5.2 mm	100	26.5 GHz	B 26
5.7 mm	104	26.5 GHz	B 32
6.2 mm	106	26.5 GHz	B 35
7.4 mm	105	26.5 GHz	B 34
7.4 mm	14	19.8 GHz	B 14
7.4 mm	140	19.8 GHz	B 38
7.7 mm	141	19.5 GHz	B 42
8.3 mm	143	19.5 GHz	B 44
8.7 mm	65	26.5 GHz	B 25
10.5 mm	57	18.0 GHz	B 23
10.7 mm	12	12.0 GHz	B 12
10.7 mm	120	12.0 GHz	B 36
12.0 mm	60 A	18.0 GHz	B 24
12.0 mm	60 B	18.0 GHz	B 24
12.2 mm	500	11.0 GHz	B 47
13.5 mm	03	9.5 GHz	B 6
13.5 mm	300	9.5 GHz	B 46

Specifications are subject to change without notice.

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Index by Cable Dimensions continued

	Outer Diameter	Cable Type	Frequency Limit	Page
17.0	17.0 mm	51	18.0 GHz	B 22
17.5	17.8 mm	750	7.1 GHz	B 50

Cable specifications may change without notice (for equal or superior electrical performance).

Index by Cable Type

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Specifications are subject to change without notice.

High Performance Flexible Cable Assemblies

B

Index by Insertion Loss

Frequency in (GHz)	1	2	3	4	8	12	15	18	26.5	30	40	50
Band	L	S	C	X	KU	K	KA					

Increasing Insertion Loss

Cable Type	Operational Range
750	(Dia. 17.8mm) 7.1 GHz
03	(Dia. 13.5mm) 9.5 GHz
300	(Dia. 13.5mm) 9.5 GHz
500	(Dia. 12.2mm) 11.0 GHz
677	(Dia. 2.3mm) 18.0 GHz
51	(Dia. 17.0mm). Armored. 18.0 GHz
12	(Dia. 10.7mm). Military Application. 12.0 GHz
120	(Dia. 10.7mm) 12.0 GHz
104	(Dia. 5.7 mm) 26.5 GHz
105	(Dia. 7.4 mm) 26.5 GHz
106	(Dia. 6.2 mm) 26.5 GHz
60A/60B	(Dia. 12.0mm). High Power, armored. 18.0 GHz
141	(Dia. 7.7mm) 19.5 GHz
143	(Dia. 8.3mm) 19.5 GHz
57	(Dia. 10.5mm) 18.0 GHz
14	(Dia. 7.4mm) 19.8 GHz
140	(Dia. 7.4mm) 19.8 GHz
65	(Dia. 8.7mm) 26.5 GHz
102	(Dia 4.8mm) 33.0 GHz
10	(Dia. 5.2mm) 26.5 GHz
100	(Dia. 5.2mm) 26.5 GHz
39	(Dia. 3.7mm) 45.0 GHz
43	(Dia. 4.3mm) 26.5 GHz
37	(Dia. 3.6mm) 50.0 GHz
11	(Dia. 3.2mm) 50.0 GHz

Specifications are subject to change without notice.

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Index by Power

Frequency in (GHz): 1, 2, 3, 4, 8, 12, 15, 18, 26.5, 30, 40, 50

Band: L, S, C, X, KU, K, KA

Increasing Power ↑

Cable Type	Operational Range	
750	(Dia 17.8mm)	7.1 GHz
500	(Dia. 14.0mm)	11.0 GHz
03	(Dia. 13.5mm)	9.5 GHz
300	(Dia. 13.5mm)	9.5 GHz
141	(Dia. 7.8 mm)	19.5 GHz
143	(Dia. 8.3 mm)	19.5 GHz
51	(Dia. 17.0 mm)	18.0 GHz
60A/60B	(Dia. 12.0mm). High Power, armored.	18.0 GHz
12	(Dia. 11.2mm)	12.0 GHz
120	(Dia. 10.7mm)	12.0 GHz
14	(Dia. 7.4mm)	19.8 GHz
140	(Dia. 7.4mm)	19.8 GHz
104	(Dia. 5.7 mm)	26.5 GHz
105	(Dia. 7.4 mm)	26.5 GHz
106	(Dia. 6.2 mm)	26.5 GHz
57	(Dia. 7.4 mm)	18.0 GHz
102	(Dia. 4.83 mm)	33.0 GHz
65	(Dia. 8,7 mm)	26.5 GHz
10	(Dia. 5.2mm)	26.5 GHz
100	(Dia. 5.2mm	26.5 GHz
39	(Dia. 3.7 mm)	40.0 GHz
43	(Dia. 4,3 mm)	26.5 GHz
37	(Dia. 3.6 mm)	50.0 GHz
11	(Dia. 3.2mm)	50.0 GHz
677	(Dia. 2.3 mm)	18.0 GHz

For High Power Applications a variety of High Power Connectors in different Connector styles were developed, using special dielectric for good heat dissipation.

Specifications are subject to change without notice.

B

Cable -Type 03
Low Loss, High Power
DC - 9.5 GHz

SPECIFICATION		Type 03
Cable Code	Standard	03
	Armored	03x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 9.5 GHz
Outer Diameter in mm		13.5
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		77
Capacitance in pF/m		87
Dielectric Strength (60 Hz) in KV rms		8.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		2.0
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.07
	2.0 GHz	0.15
	4.0 GHz	0.21
	6.0 GHz	0.26
	8.0 GHz	0.30
	9.0 GHz	0.32
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	4500
	2.0 GHz	1960
	4.0 GHz	1315
	6.0 GHz	1030
	8.0 GHz	870
	9.0 GHz	810
RF - Leakage at 9.5 GHz		- 90 dBC
Operating Temperature Range		-54°C to +150°C
Outer Conductor Construction		Silver Plated Copper Braid, Aluminum Film, Silver Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		10.29
Dielectric Material		Low DensityPTFE
Dielectric Constant		1.6
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		3.89
Weight in Grams/Meter		416
Connector Retention Force (N)		220
Minimum Bend Radius, Inside, Static (mm)		90
Minimum Bend Radius, Inside, Dynamic (mm)		170

Characteristics:

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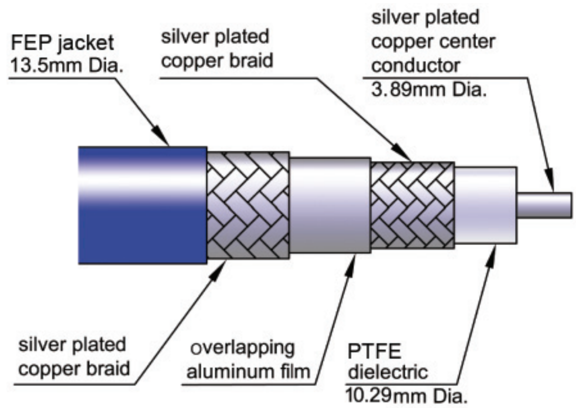
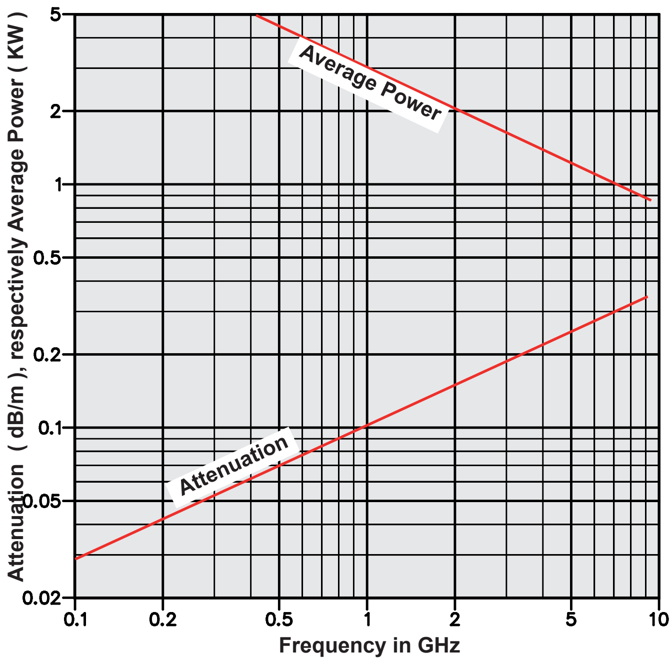
* Ultra low loss to 9.5 GHz
* Very Rugged Construction
* The Ideal Receive/Transmit Cable
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly
* Available connectors: 7/16, C, HN, N, SC, SMA and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

Cable Assembly of Type 03, terminated with N male High Power Connectors with Cooling Fins for better heat dissipation.

Specifications are subject to change without notice.

B

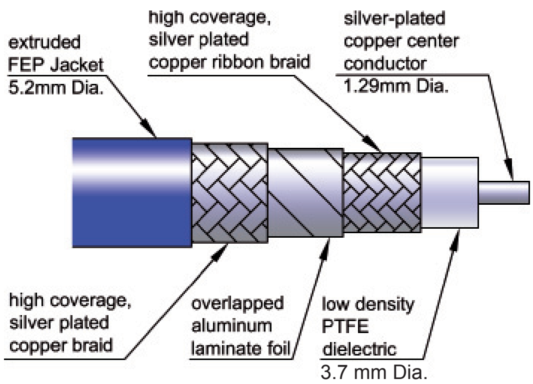
Cable - Type 10
DC - 26.5 GHz

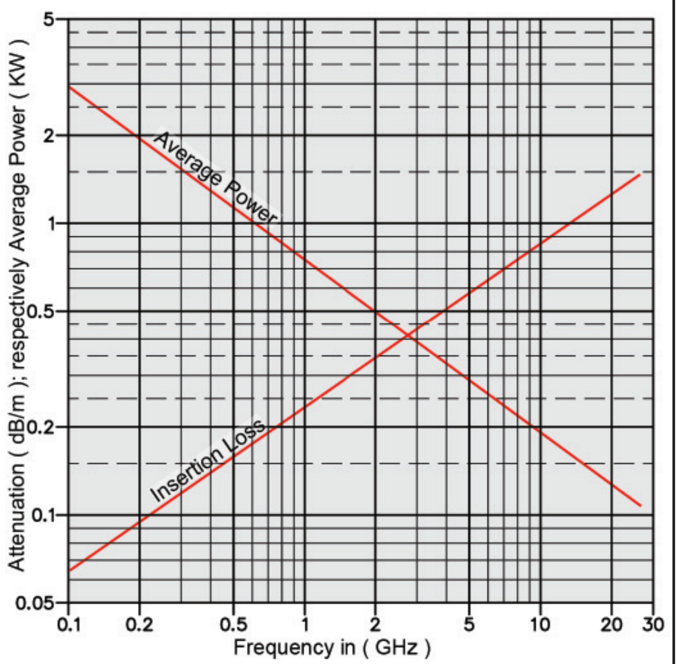
SPECIFICATION		Type 10
Cable Code	Standard	10
	Armored	10x
	X:Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 26.5 GHz
Outer Diameter in mm		5.2
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		75
Capacitance in pF/m		89
Dielectric Strength (60 Hz) in KV rms		6.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.5
Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.18
	2.0 GHz	0.38
	5.0 GHz	0.64
	10.0 GHz	0.94
	18.0 GHz	1.31
	26.5 GHz	1.61
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	1090
	1.0 GHz	750
	2.0 GHz	515
	5.0 GHz	315
	10.0 GHz	215
	18.0 GHz	150
	26.5 GHz	130
RF - Leakage at 18.0 GHz		- 90 dBC
Operating Temperature Range		-54°C to +150°C
Outer Conductor Construction		Copper Ribbon Braid, Overlapping Aluminum Film, Silver Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		3.7
Dielectric Material		Low Density PTFE
Dielectric Constant		1.6
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		1.29
Weight in Grams/Meter		66
Connector Retention Force (N)		140
Minimum Bend Radius, Inside, Static (mm)		26
Minimum Bend Radius, Inside, Dynamic (mm)		54

Characteristics:

TOP SELLER

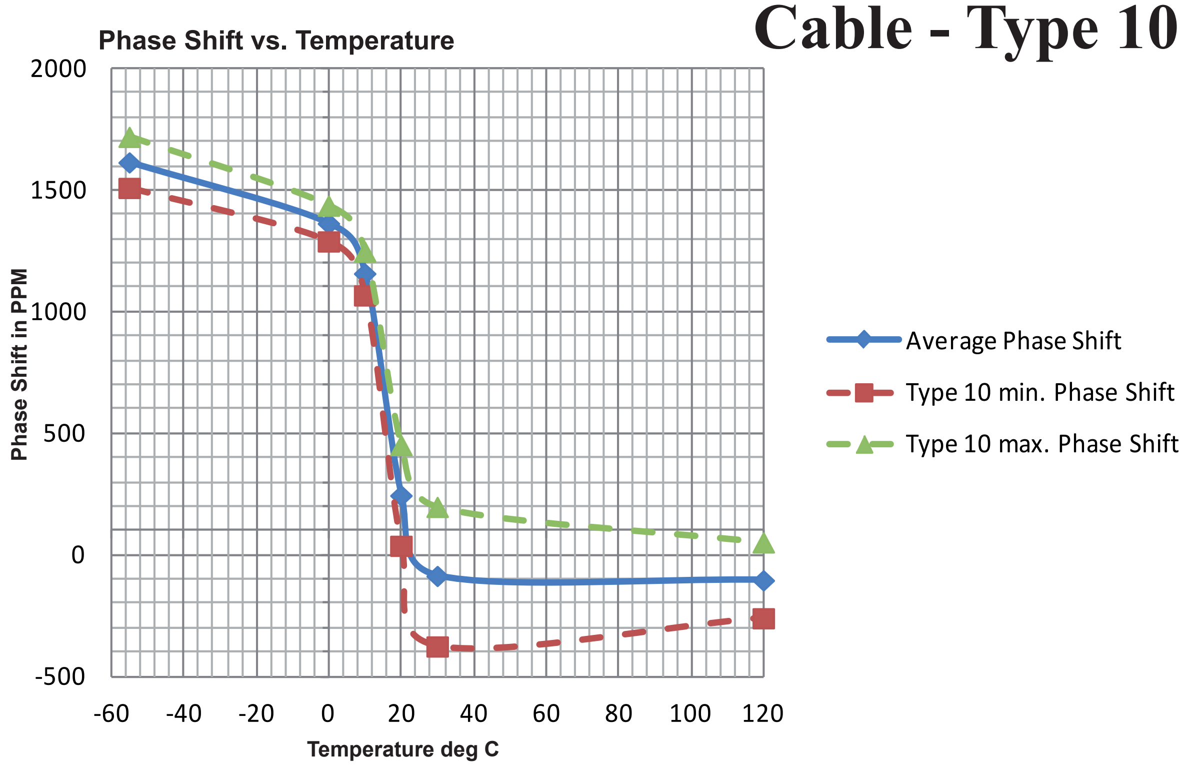
* Performance to 26.5 GHz, when terminated with 2.92mm or 3.5mm connectors (mating with SMA).
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.4mm, 2.92mm, 3.5mm, 7mm, 7/16, HN, N, SBX, SBY, SC, SMA, SPM and TNC.
  For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

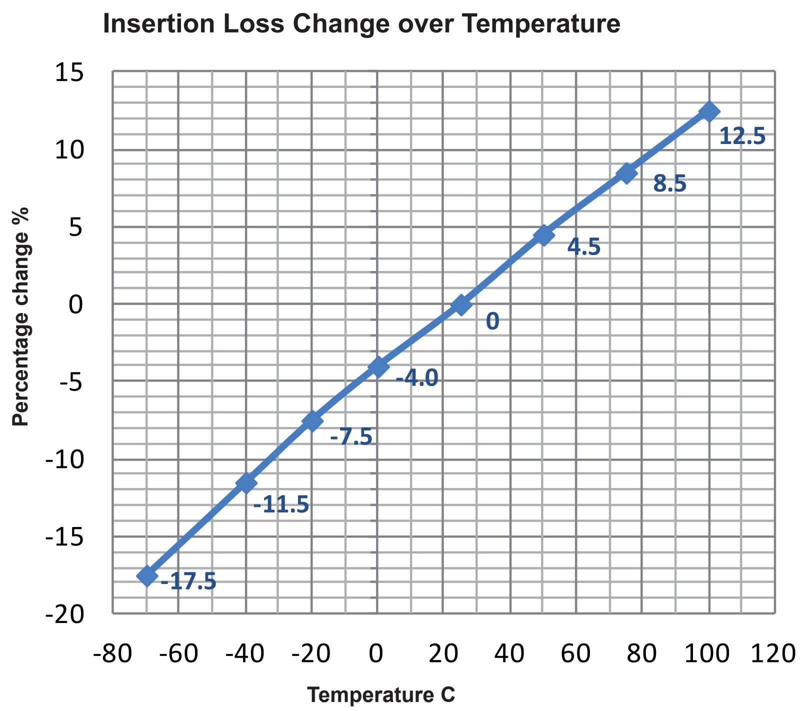




Specifications are subject to change without notice.

Cable - Type 10





Specifications are subject to change without notice.

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B

Cable - Type 11

DC - 50.0 GHz

SPECIFICATION		Type 11
Cable Code	Standard	11
	Armored	11x
	X: Please find Armor & Ruggedizing Options n Section S.	
Frequency Range		DC to 50.0 GHz
Outer Diameter in mm		3.2
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		74
Capacitance in pF/m		90
Dielectric Strength (60 Hz) in KV rms		5.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		0.5
Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.37
	2.0 GHz	0.76
	5.0 GHz	1.24
	10.0 GHz	1.80
	18.0 GHz	2.53
	26.5 GHz	2.98
	40.0 GHz	3.90
	50.0 GHz	4.40
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	470
	2.0 GHz	190
	5.0 GHz	107
	10.0 GHz	65
	18.0 GHz	48
	26.5 GHz	38
	40.0 GHz	30
	50.0 GHz	26
RF - Leakage at 18.0 GHz		- 90 dBC
Operating Temperature Range		-54°C to +150°C
Outer Conductor Construction		Silver Plated Copper Braid, Overlapping Aluminum Film, Silver Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		2.0
Dielectric Material		Low Density PTFE
Dielectric Constant		1.8
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		0.64
Weight in Grams/Meter		26.2
Connector Retention Force (N)		130
Minimum Bend Radius, Inside, Static (mm)		12.7
Minimum Bend Radius, Inside, Dynamic (mm)		31.7

Characteristics:

* Low Loss Performance to 50.0 GHz
* Small Diameter
* Rugged Construction
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.4mm, 2.92mm 3.5mm, 7mm, N, SMA, SBX, SBY, BQ-, CQ-, IQ-, RQ-, SQ- TQ-Series and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

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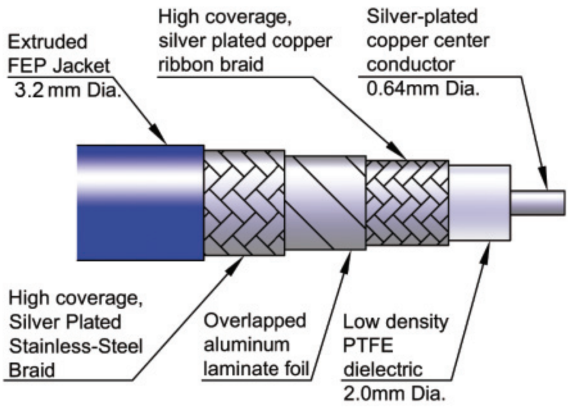
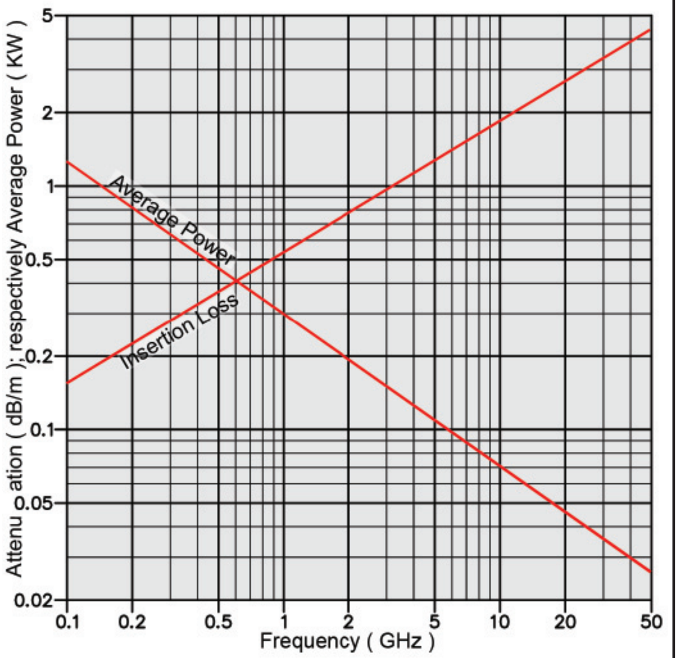
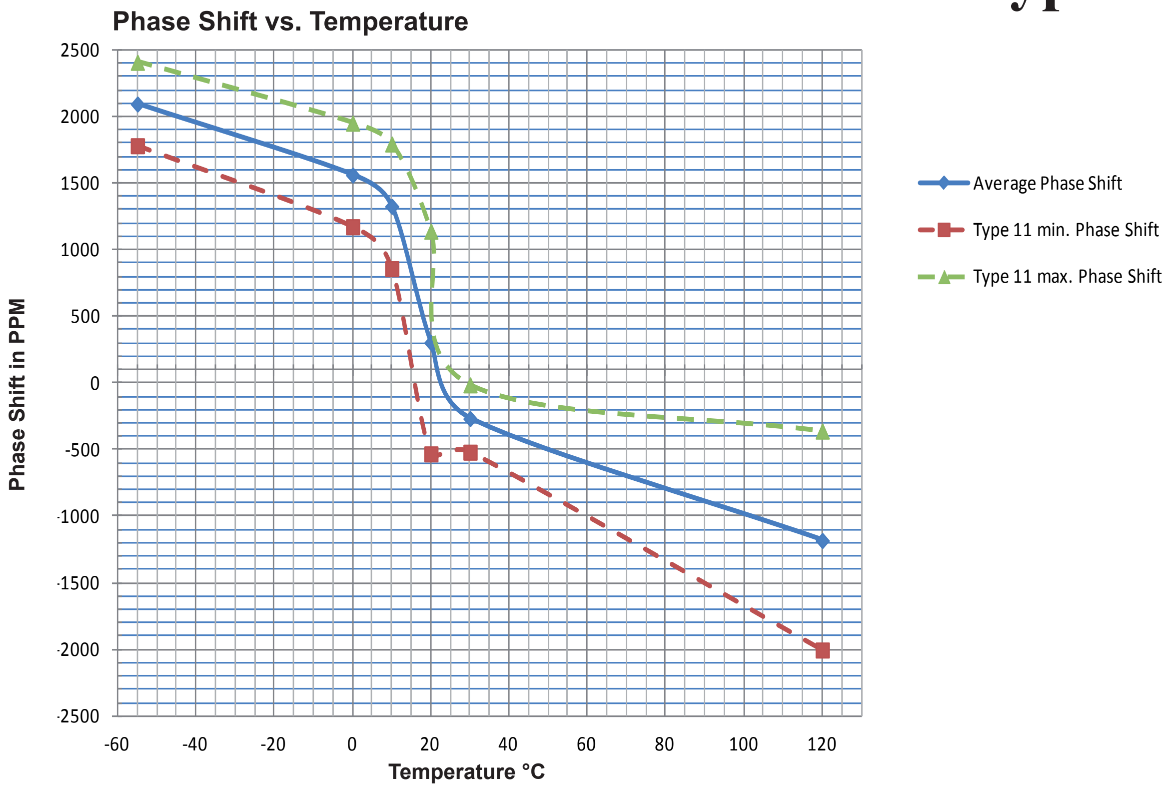


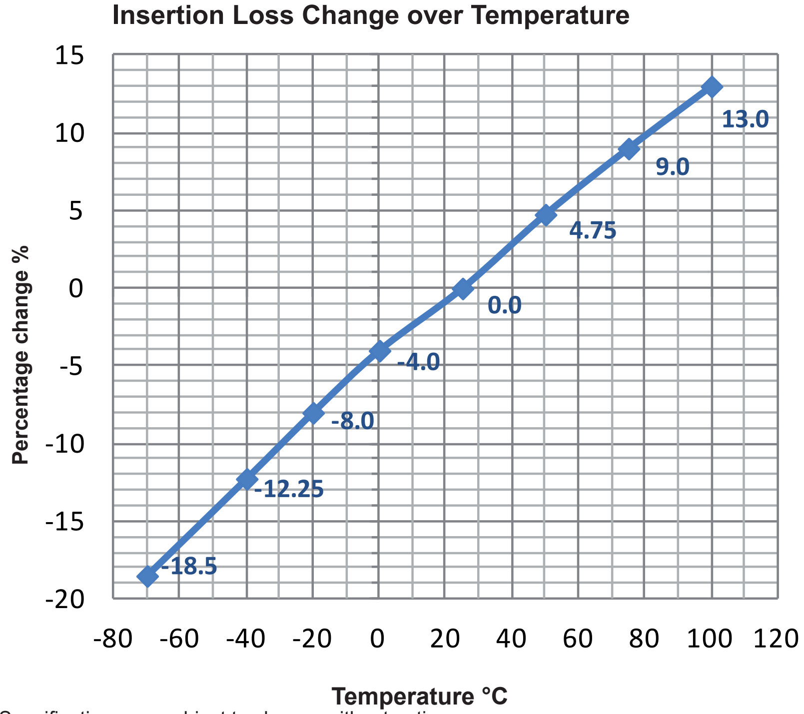


Specifications are subject to change without notice.

B

Cable - Type 11





Specifications are subject to change without notice.

B

Cable - Type 12

DC - 12.0 GHz

SPECIFICATION		Type 12
Cable Code	Standard	**12**
	Armored	12x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 12.0 GHz
Outer Diameter in mm		10.7
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		77
Capacitance in pF/m		87
Dielectric Strength (60 Hz) in KV rms		8.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		2.0
Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.09
	1.0 GHz	0.13
	2.0 GHz	0.19
	5.0 GHz	0.31
	10.0 GHz	0.45
	12.0 GHz	0.50
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	2550
	1.0 GHz	1700
	2.0 GHz	1125
	5.0 GHz	650
	10.0 GHz	431
	12.0 GHz	387
RF - Leakage at 12.0 GHz		-90 dBC
Operating Temperature Range		-54°C to +150°C
Outer Conductor Construction		Silver Plated Copper Braid, Overlapping Aluminum Film, Silver Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		8.3
Dielectric Material		Low Density PTFE
Dielectric Constant		1.6
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		2.97
Weight in Grams/Meter		280
Connector Retention Force (N)		210
Minimum Bend Radius, Inside, Static (mm)		64
Minimum Bend Radius, Inside, Dynamic (mm)		102

Characteristics:

* Excellent Performance to 12.0 GHz.
* Very Rugged Construction.
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 7/16, HN, N, SC, SMA and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

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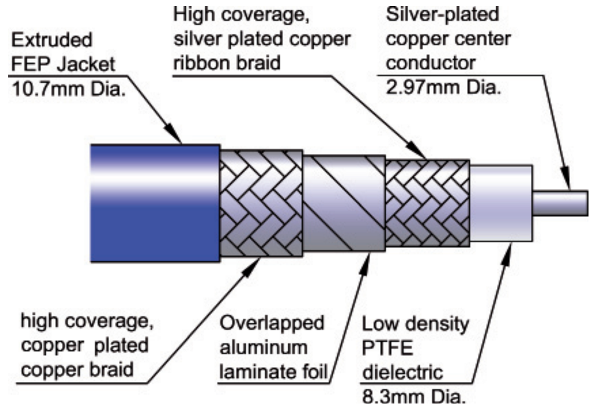

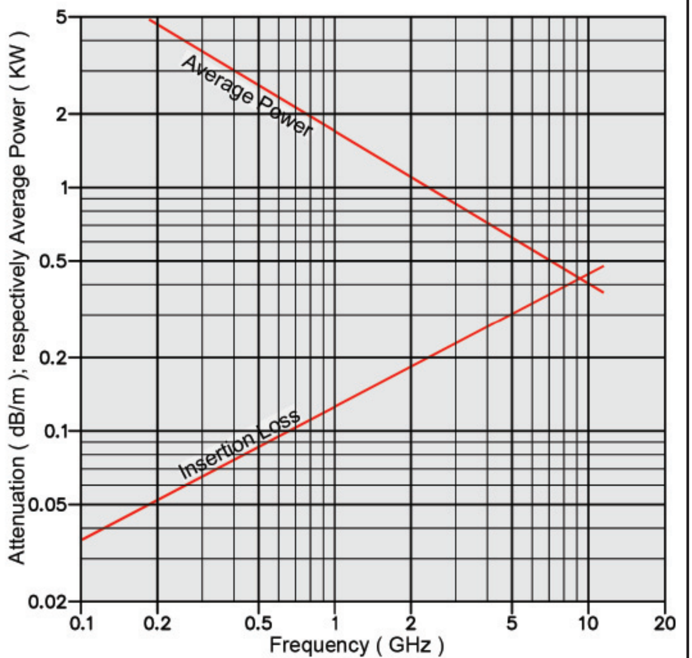

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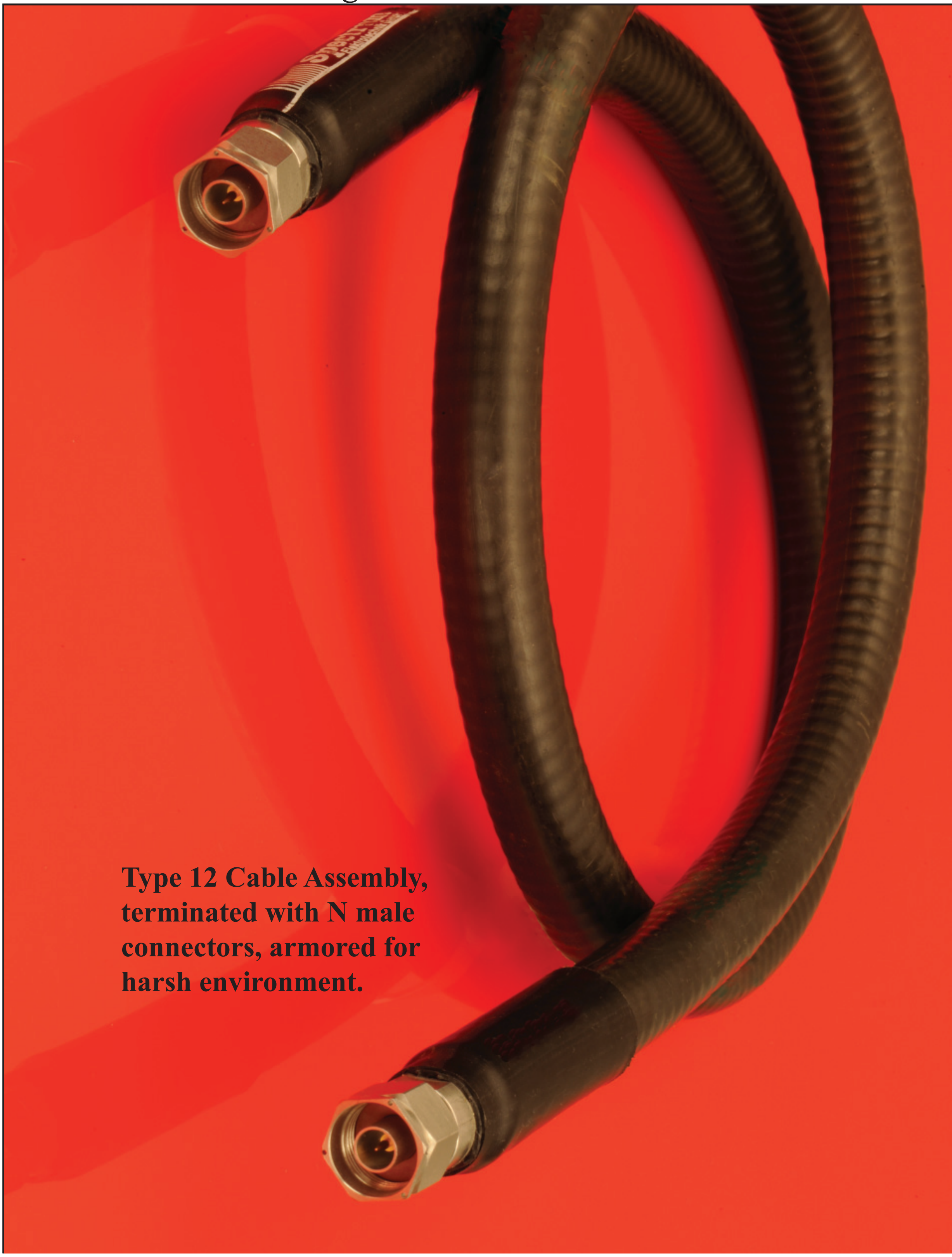
Type 12 Cable Assembly,
terminated with N male
connectors, armored for
harsh environment.

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B

Cable -Type 14
Low Loss,
DC - 19.8 GHz

SPECIFICATION		Type 14
Cable Code	Standard	**14**
	Armored	14x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 19.8 GHz
Outer Diameter in mm		7.4
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		76
Capacitance in pF/m		88
Dielectric Strength (60 Hz) in KV rms		6.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.5
Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.13
	2.0 GHz	0.28
	5.0 GHz	0.46
	10.0 GHz	0.67
	18.0 GHz	0.92
	19.8 GHz	0.98
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	2200
	2.0 GHz	950
	5.0 GHz	570
	10.0 GHz	340
	18.0 GHz	275
	19.8 GHz	260
RF - Leakage at 18.0 GHz		-90 dBC
Operating Temperature Range		-54°C to +150°C
Outer Conductor Construction		Silver Plated Copper Braid, Overlapping Aluminum Film, Silver Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		5.3
Dielectric Material		Low Density PTFE
Dielectric Constant		1.6
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		1.88
Weight in Grams/Meter		118
Connector Retention Force (N)		200
Minimum Bend Radius, Inside, Static (mm)		38
Minimum Bend Radius, Inside, Dynamic (mm)		74

Characteristics:

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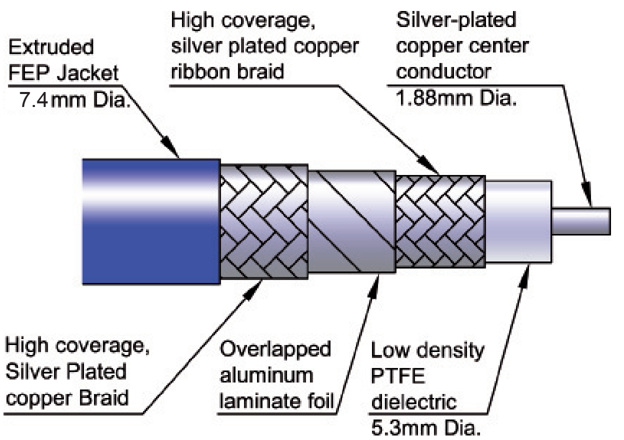
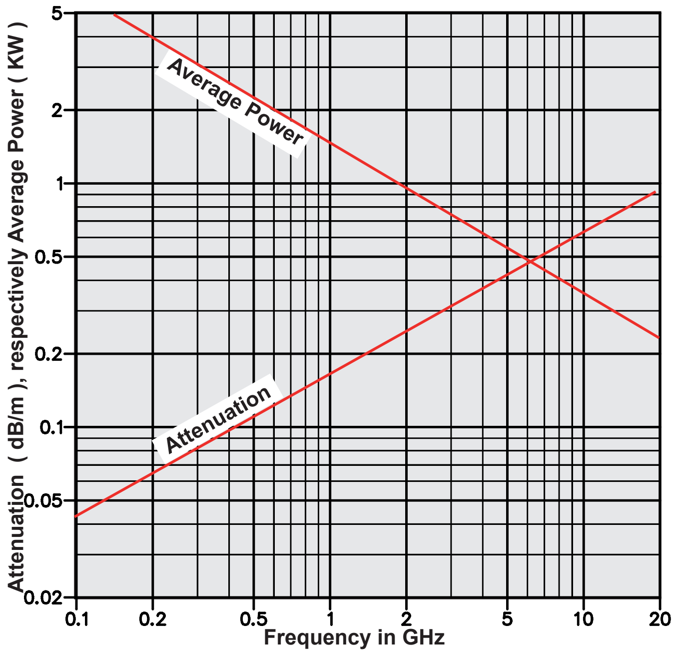
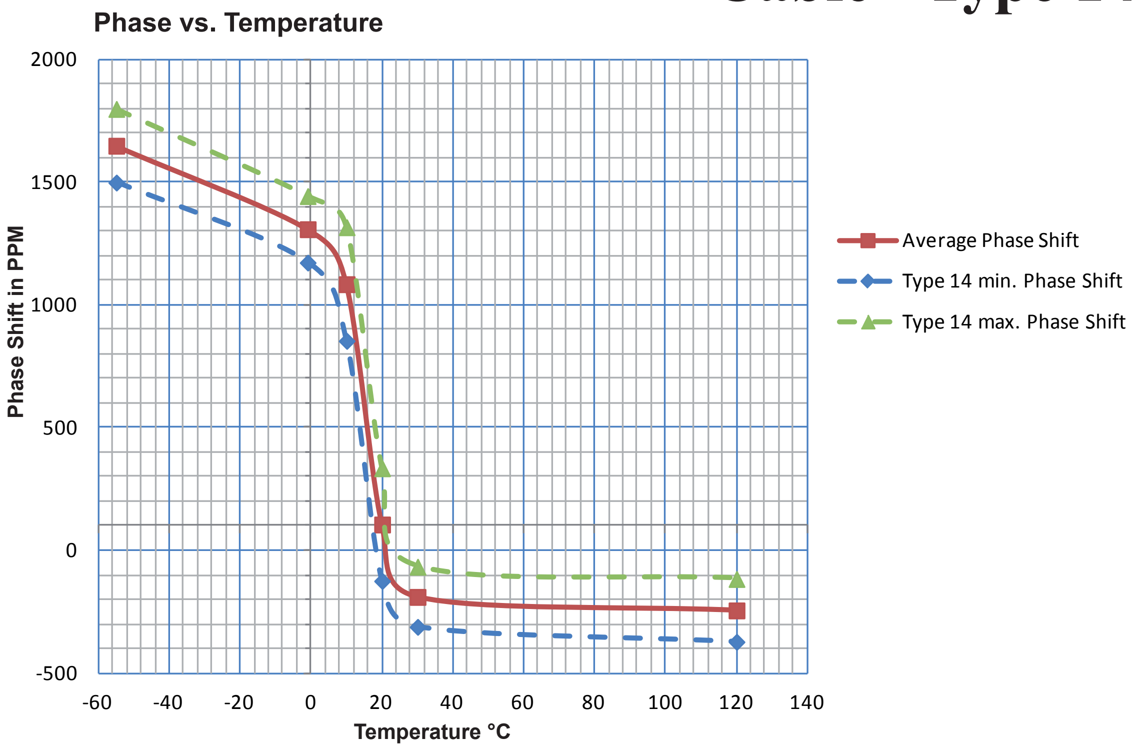
* Excellent Performance to 19.8 GHz.
* Very Rugged Construction.
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 7mm, N, SMA, SBX, SBY, BQ-, CQ-, IQ-, RQ-, SQ- TQ-Series and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

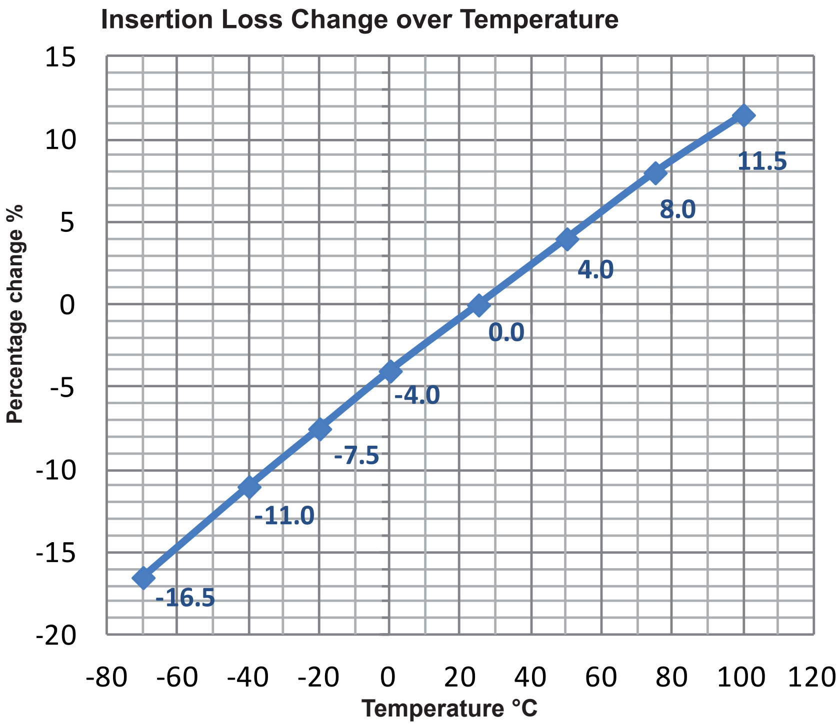




Specifications are subject to change without notice.

Cable - Type 14





Specifications are subject to change without notice.

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B

Cable - Type 37

Ultimate Performance to 50.0 GHz

SPECIFICATION		Type 37
Cable Code	Standard	37
	Armored	37x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 50.0 GHz
Outer Diameter in mm	Standard	3.6
Impedance in Ohms at Sea Level and +25°C		50 ± 1
Velocity in %, ± 2%		84
Capacitance in pF/m		79
Dielectric Strength (60 Hz) in KV rms		2.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.3
Nominal Insertion Loss in dB/m vs. Frequency	4.0 GHz	0.94
	8.0 GHz	1.37
	12.4 GHz	1.75
	18.0 GHz	2.18
	26.5 GHz	2.65
	40.0 GHz	3.10
	50.0 GHz	3.60
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	4.0 GHz	225
	8.0 GHz	150
	12.4 GHz	120
	18.0 GHz	97
	26.5 GHz	80
	40.0 GHz	63
	50.0 GHz	56
RF - Leakage at 18.0 GHz		> 100 dB
Operating Temperature Range		-65°C to +125°C
Outer Conductor Construction		Silver-Plated Copper Foil, Silver-Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		2.26
Dielectric Material		Low Density PTFE
Dielectric Constant		1.5
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		0.83
Weight in Grams/Meter		27
Connector Retention Force (N)		130
Minimum Bend Radius, Inside, Static (mm)		20
Minimum Bend Radius, Inside, Dynamic (mm)		75

Characteristics:

* Excellent Performance to 50 GHz.
* Small diameter
* Excellent Flexibility
* Meeting the very highest Quality Standards.
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.4mm, 2.92mm 3.5mm, 7mm, N, SMA, SBX, SBY, BQ-, CQ-, IQ-, RQ-, SQ- TQ-Series and TNC.. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

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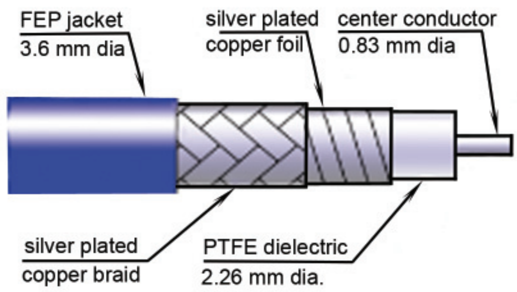

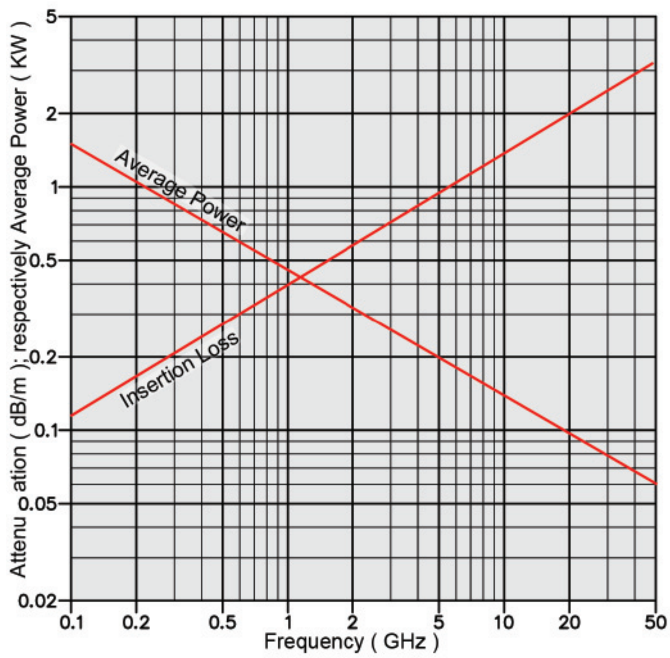

Specifications are subject to change without notice.

Type 37 Cable Assemblies terminated with SMA female connectors, operating to 20 GHz. The cable was chosen for an application, where low loss, small cable diameter and flexibility were needed.

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B

Cable - Type 39
Ultimate Performance
DC - 45.0 GHz

SPECIFICATION		Type 39
Cable Code	Standard	39
	Armored	39x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 45.0 GHz
Outer Diameter in mm	Standard	3.7
Impedance in Ohms at Sea Level and +25°C		50 ± 1
Velocity in %, ± 2%		84
Capacitance in pF/m		79
Dielectric Strength (60 Hz) in KV rms		2.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.3
Nominal Insertion Loss in dB/m vs. Frequency	1.0 GHz	0.35
	4.0 GHz	0.79
	8.0 GHz	1.15
	12.4 GHz	1.43
	18.0 GHz	1.80
	26.5 GHz	2,20
	40.0 GHz	2.70
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	1.0 GHz	520
	4.0 GHz	270
	8.0 GHz	170
	12.4 GHz	150
	18.0 GHz	109
	26.5 GHz	100
	40.0 GHz	70
RF - Leakage at 18.0 GHz		- 100 dBC
Operating Temperature Range		-54°C to +125°C
Outer Conductor Construction		Silver-Plated Copper Foil, Silver-Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		2.69
Dielectric Material		Low Density PTFE
Dielectric Constant		1.6
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		0.93
Weight in Grams/Meter		33
Connector Retention Force (N)		140
Minimum Bend Radius, Inside, Static (mm)		19
Minimum Bend Radius, Inside, Dynamic (mm)		75

Characteristics:

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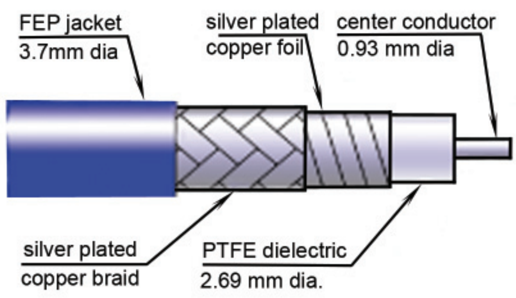
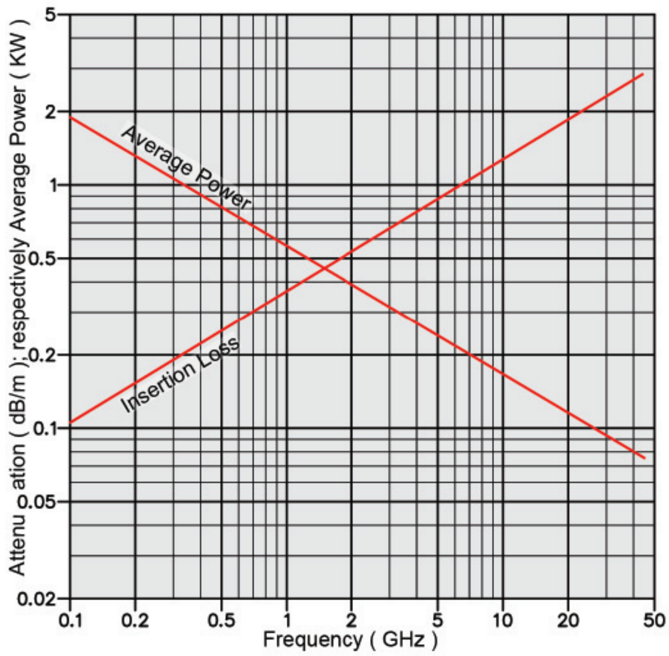
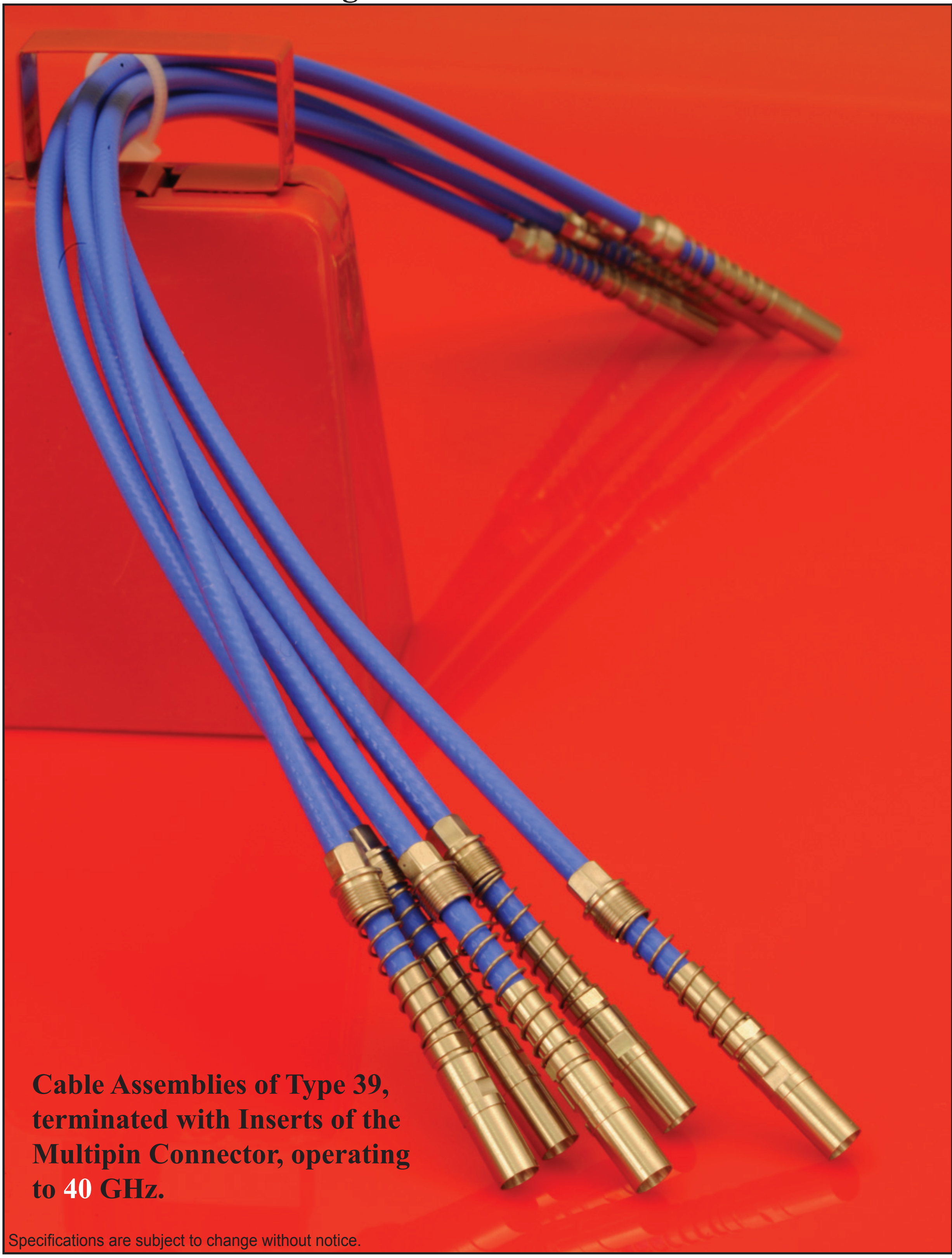
* Excellent Performance DC to 45 GHz.
* Small diameter
* Excellent Flexibility
* Meeting the very highest Quality Standards.
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.4mm, 2.92mm 3.5mm, 7mm, N, SMA, SBX, SBY, BQ-, CQ-, IQ-, RQ-, SQ- TQ-Series and TNC.. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.



Cable Assemblies of Type 39, terminated with Inserts of the Multipin Connector, operating to 40 GHz.

Specifications are subject to change without notice.

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B

Cable - Type 43

DC - 26.5 GHz

SPECIFICATION		Type 43
Cable Code	Standard	43
	Armored	43x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 26.5 GHz
Outer Diameter in mm	Standard	4.3
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		72
Capacitance in pF/m		93.5
Dielectric Strength (60 Hz) in KV rms		5.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		0.7
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.30
	2.0 GHz	0.63
	4.0 GHz	0.93
	8.0 GHz	1.36
	12.4 GHz	1.69
	18.0 GHz	2.12
	26.5 GHz	2.60
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	785
	2.0 GHz	344
	4.0 GHz	227
	8.0 GHz	150
	12.4 GHz	118
	18.0 GHz	93
	26.5 GHz	75
RF - Leakage at 18.0 GHz		-90 dBC
Operating Temperature Range		-54°C to +125°C
Outer Conductor Construction		Silver Plated Copper braid, Aluminum Film, Silver Plated Copper braid
Outer Jacket		FEP
Dielectric Diameter in mm		2.87
Dielectric Material		Low Density PTFE
Dielectric Constant		1.9
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		0.94
Weight in Grams/Meter		45
Connector Retention Force (N)		140
Minimum Bend Radius, Inside, Static (mm)		26
Minimum Bend Radius, Inside, Dynamic (mm)		55

Characteristics:

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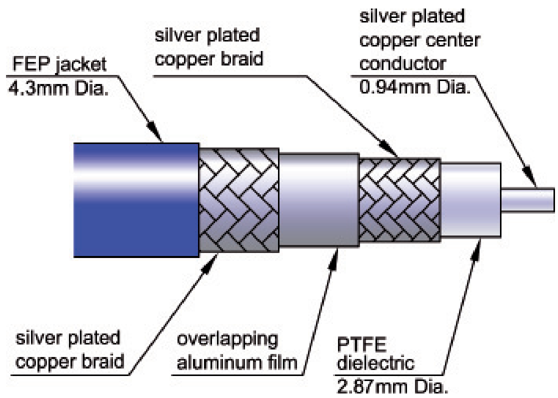
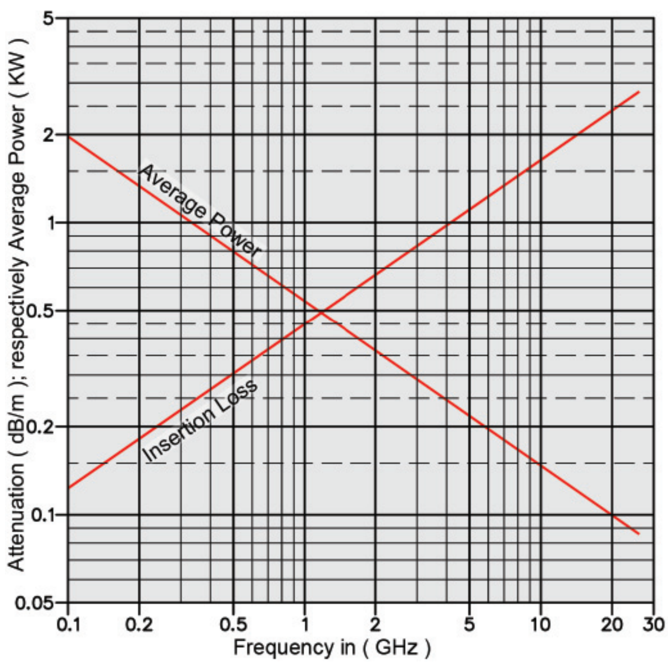
* Excellent Performance to 26.5 GHz.
* Meeting the very highest Quality Standard
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.4mm, 2.92mm 3.5mm, 7mm, N, SMA, SBX, SBY, BQ-, CQ-, IQ-, RQ-, SQ- TQ-Series and TNC.. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

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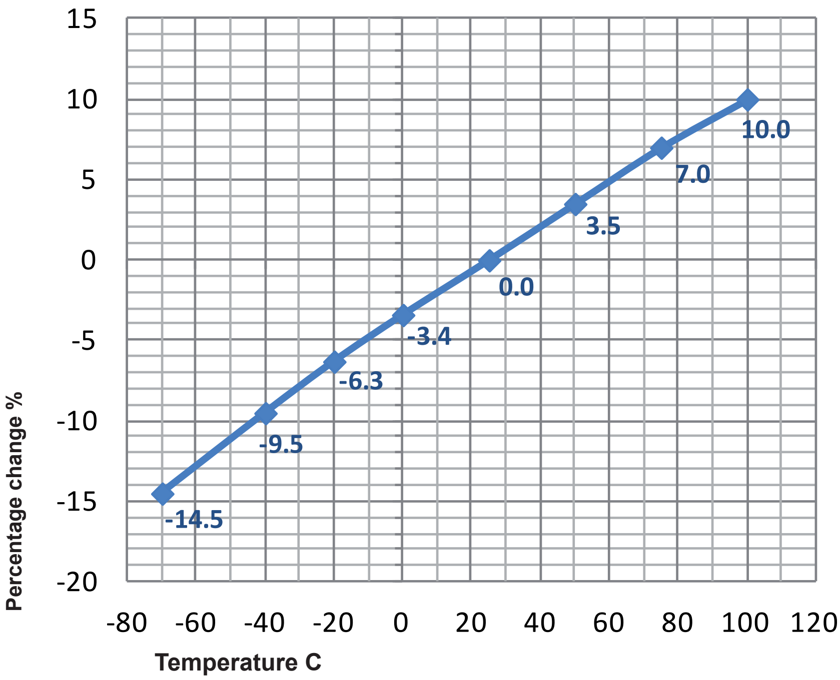
Cable Assembly of Type 43, terminated with SMA males at one end, and with male and female Inserts of Spectrum's Multipin Connectors at the opposite end.

Cable - Type 43

Insertion Loss Change over Temperature



Specifications are subject to change without notice.

B

Cable - Type 51

0.68 dB/m Insertion Loss at 18.0 GHz.

> Type 51 used for low receive power
> Type 51H or High Power requirements.

SPECIFICATION		Type 51
Cable Code	Low Power Assembly<10W	51
	High Power Assembly>10W	51H
Frequency Range		DC to 18.0 GHz
Outer Diameter in mm		17.0
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		84
Capacitance in pF/m		79
Dielectric Strength (60 Hz) in KV rms		6.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.5
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.12
	2.0 GHz	0.23
	4.0 GHz	0.32
	8.0 GHz	0.45
	12.4 GHz	0.54
	18.0 GHz	0.66
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	2760
	2.0 GHz	1300
	4.0 GHz	900
	8.0 GHz	618
	12.4 GHz	496
	18.0 GHz	400
RF - Leakage at 18.0 GHz		-90 dBC
Operating Temperature Range		-65°C to +125°C
Outer Conductor Construction		Silver-Plated-Copper Braid, Silver-Plated Copper Foil
Outer Jacket		Stainless steel Armor, silicone jacketed
Dielectric Diameter in mm		6.30
Dielectric Material		Low Density PTFE
Dielectric Constant		1.4
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		2.3
Weight in Grams/Meter		640
Connector Retention Force (N)		250
Minimum Bend Radius, Inside, Static (mm)		70
Minimum Bend Radius, Inside, Dynamic (mm)		350

Characteristics:

* Ultra low loss to 18 GHz
* The ideal receive cable (**Type 51**); Transmit cable (**Type 51H**)
* Most Rugged Construction due to heavy armor:
  > Assemblies to 10m length will use cotton woven stainless steel spring, silicone jacketed.
  > Longer Assemblies will use interlaced stainless steel spiral polyolefin jacketed.
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly
* Available connectors: 7/16, C, HN, N, SC, SMA and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

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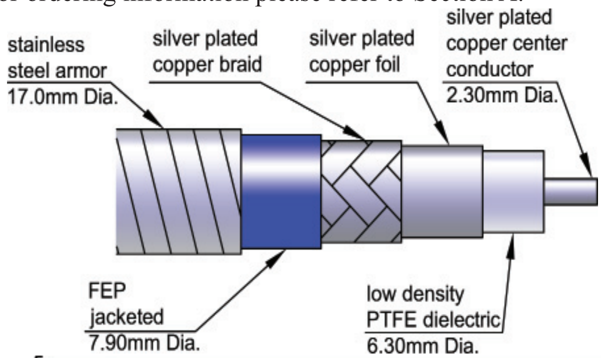

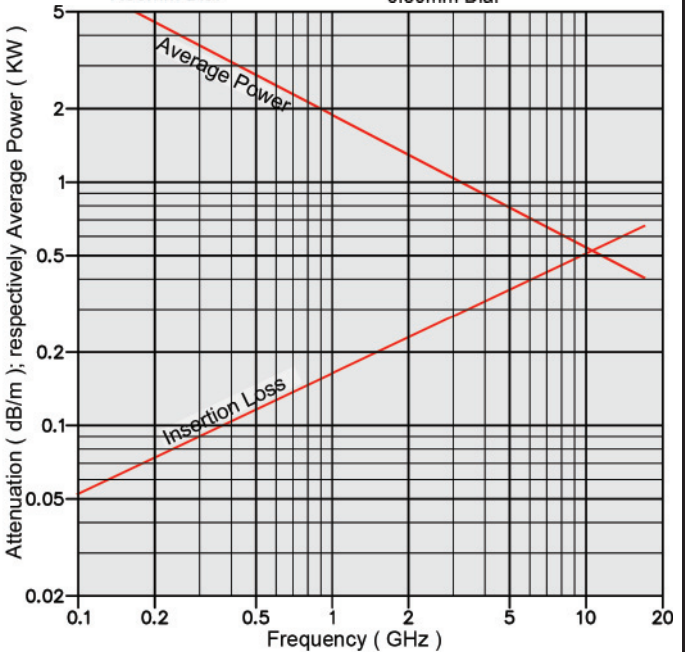

Specifications are subject to change without notice.

Cable - Type 57

0.80 dB/m Insertion Loss at 18.0 GHz

Characteristics:

* Ultra low loss to 18 GHz and low price.
* Receive cable (**Type 51**), & Transmit cable (**Type 51H**)
* Rugged Construction due to an additional Cross linked Polyolefin jacket.
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly
* Available connectors: 7/16, C, HN, N, SC, SMA and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

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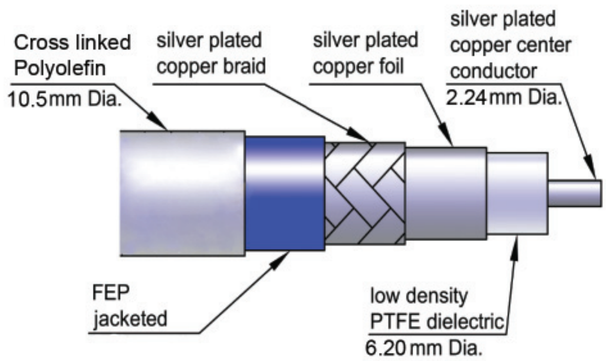
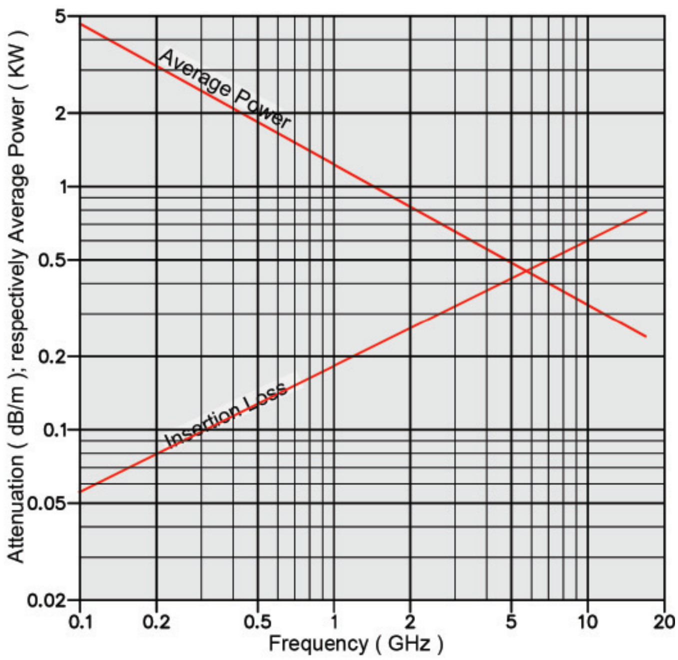
> Type 57 used for low receive power

> Type 57H for High Power requirements.

SPECIFICATION			Type 57
Cable Code	Low Power Assembly		**57**
	High Power Assembly		**57H**
Frequency Range			DC to 18.0 GHz
Outer Diameter in mm		Standard	10.5
Impedance in Ohms at Sea Level and +25°C			50 ± 2
Velocity in %, ± 2%			84
Capacitance in pF/m			79
Dielectric Strength (60 Hz) in KV rms			6.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz			1.5
Nominal Insertion Loss in dB/m vs. Frequency		0.5 GHz	0.12
		2.0 GHz	0.25
		4.0 GHz	0.36
		8.0 GHz	0.52
		12.4 GHz	0.65
		18.0 GHz	0.80
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C		0.5 GHz	1890
		2.0 GHz	830
		4.0 GHz	547
		8.0 GHz	362
		12.4 GHz	284
		18.0 GHz	223
RF - Leakage at 18.0 GHz			-90 dBC
Operating Temperature Range			-54°C to +125°C
Outer Conductor Construction			Silver-Plated-Copper Braid, Silver-Plated Copper Foil
Outer Jacket			Cross linked Polyolefin
Dielectric Diameter in mm			6.2
Dielectric Material			Low Density PTFE
Dielectric Constant			1.4
Center Conductor Material			Copper, Silver Plated
Center Conductor Dia. in mm			2.24
Weight in Grams/Meter			196
Connector Retention Force (N)			220
Minimum Bend Radius, Inside, Static (mm)			80
Minimum Bend Radius, Inside, Dynamic (mm)			400





Specifications are subject to change without notice.

Cable-Types 60A, 60B

High Power to 18.0 GHz
0.75 dB/m Loss at 18 GHz

> Type 60A operates to 90°C
> Type 60B operates to 150°C

SPECIFICATION			Type 60
Cable Code	Operating Temperature -54°C to + 90°C		60A
	Operating Temperature -54°C to +150°C		60B
Frequency Range			DC to 18.0 GHz
Outer Diameter in mm			12.0
Impedance in Ohms at Sea Level and +25°C			50 ± 2
Velocity in %, ± 2%			84
Capacitance in pF/m			79
Dielectric Strength (60 Hz) in KV rms			6.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz			1.5
Nominal Insertion Loss in dB/m vs.		0.5 GHz	0.12
		2.0 GHz	0.23
		4.0 GHz	0.32
		8.0 GHz	0.45
		12.4 GHz	0.54
		18.0 GHz	0.66
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C		0.5 GHz	2760
		2.0 GHz	1300
		4.0 GHz	900
		8.0 GHz	618
		12.4 GHz	496
		18.0 GHz	398
RF - Leakage at 18.0 GHz			-90 dBC
Outer Conductor Construction			2x Copper Braid Silver Plated
Outer Jacket			Stainless steel braid and poly-amide Spiral
Dielectric Diameter in mm			6.02
Dielectric Material			Low Density PTFE
Dielectric Constant			1.4
Center Conductor Material			Copper, Silver Plated
Center Conductor Dia. in mm			2.24
Weight in Grams/Meter			332
Connector Retention Force (N)			250
Minimum Bend Radius, Inside, Static (mm)			100
Minimum Bend Radius, Inside, Dynamic (mm)			375

Characteristics:

* Ultra low loss to 18 GHz
* Most Rugged Construction by a third stainlesss steel braid, and in addition a stainless steel spring, interlaced with fabric material.
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly
* Available connectors: 7/16, C, HN, N, SC, SMA and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

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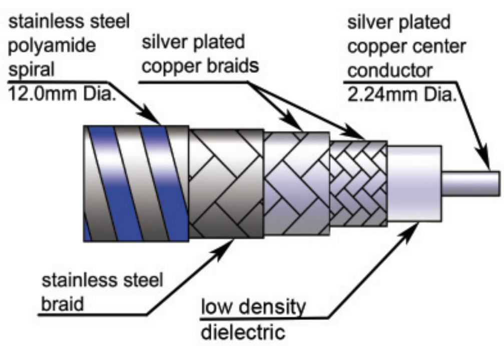
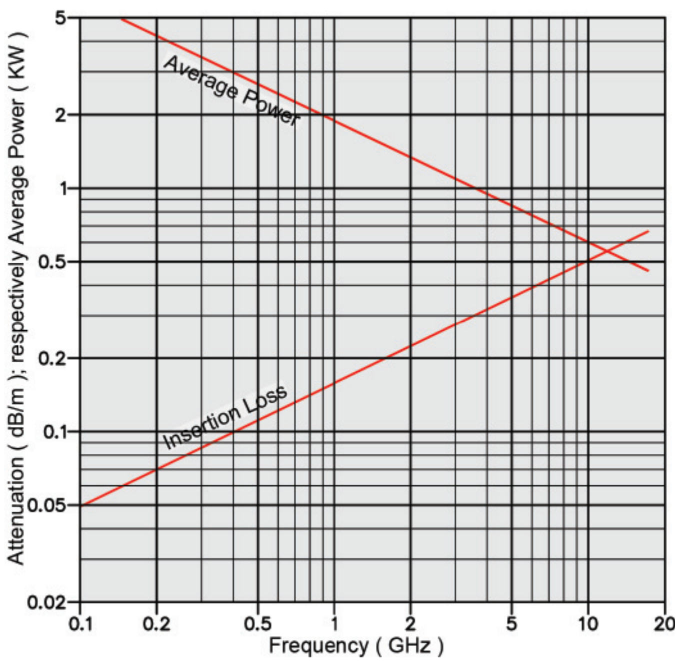




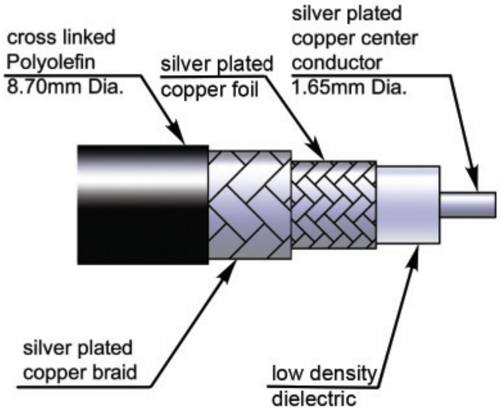
Specifications are subject to change without notice.

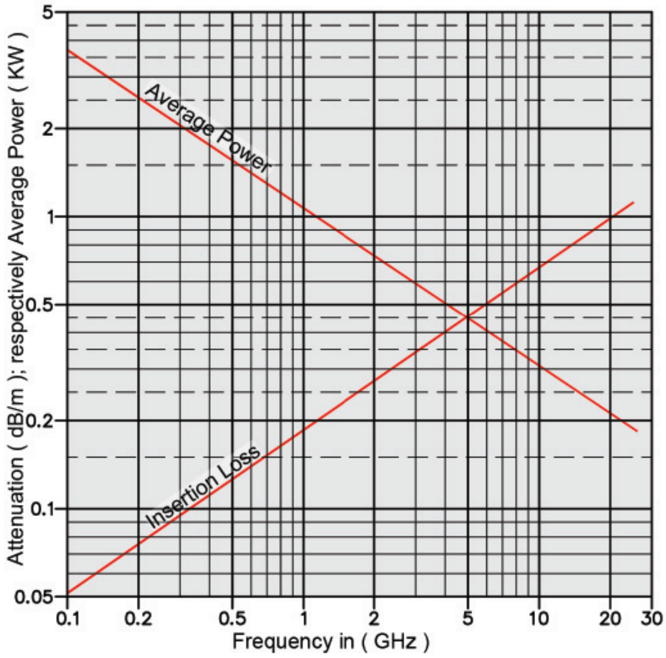
Cable - Type 65

1.16 dB/m Insertion Loss at 26.5 GHz

B

Characteristics:
* Performance to 26.5 GHz, when terminated with 2.92mm or 3.5mm connectors (mating with SMA).
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.5/5.5, 2.92mm, 3.5mm, 7mm, N, SBX, SBY, SC, SMA, SPM and TNC.
  For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

SPECIFICATION		Type 65
Cable Code	Standard	**65**
	Armored	65x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 26.5 GHz
Outer Diameter in mm		8.7
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		84
Capacitance in pF/m		79
Dielectric Strength (60 Hz) in KV rms		6.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.5
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.13
	2.0 GHz	0.31
	4.0 GHz	0.44
	8.0 GHz	0.63
	12.4 GHz	0.78
	18.0 GHz	0.95
	26.0 GHz	1.16
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	1530
	2.0 GHz	720
	4.0 GHz	492
	8.0 GHz	337
	12.4 GHz	270
	18.0 GHz	216
	26.0 GHz	178
RF - Leakage at 18.0 GHz		-90 dBC
Operating Temperature Range		-54°C to +110°C
Outer Conductor Construction		2x Copper Braid, Silver Plated
Outer Jacket		Cross linked Polyolefin
Dielectric Diameter in mm		4.37
Dielectric Material		Low Density PTFE
Dielectric Constant		1.4
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		1.65
Weight in Grams/Meter		153
Connector Retention Force (N)		190
Minimum Bend Radius, Inside, Static (mm)		65
Minimum Bend Radius, Inside, Dynamic (mm)		120

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B

Cable - Type 100
Low Loss, Low Cost High Performance DC - 26.5 GHz

SPECIFICATION		Type 100
Cable Code	Standard	100
	Armored	100x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 26.5 GHz
Outer Diameter in mm	Standard	5.2
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		75
Capacitance in pF/m		89
Dielectric Strength (60 Hz) in KV rms		6.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.5
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.16
	2.0 GHz	0.35
	5.0 GHz	0.58
	10.0 GHz	0.86
	18.0 GHz	1.20
	26.5 GHz	1.48
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	1133
	1.0 GHz	750
	2.0 GHz	496
	5.0 GHz	288
	10.0 GHz	190
	18.0 GHz	134
	26.5 GHz	108
RF - Leakage at 18.0 GHz		- 90 dBC
Operating Temperature Range		-54°C to +150°C
Outer Conductor Construction		Copper Ribbon Braid, Overlapping Aluminum Film, Silver Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		3.7
Dielectric Material		Low Density PTFE
Dielectric Constant		1.6
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		1.29
Weight in Grams/Meter		66
Connector Retention Force (N)		140
Minimum Bend Radius, Inside, Static (mm)		26
Minimum Bend Radius, Inside, Dynamic (mm)		54

Characteristics:

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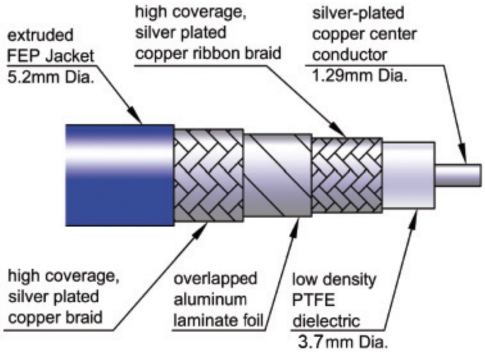
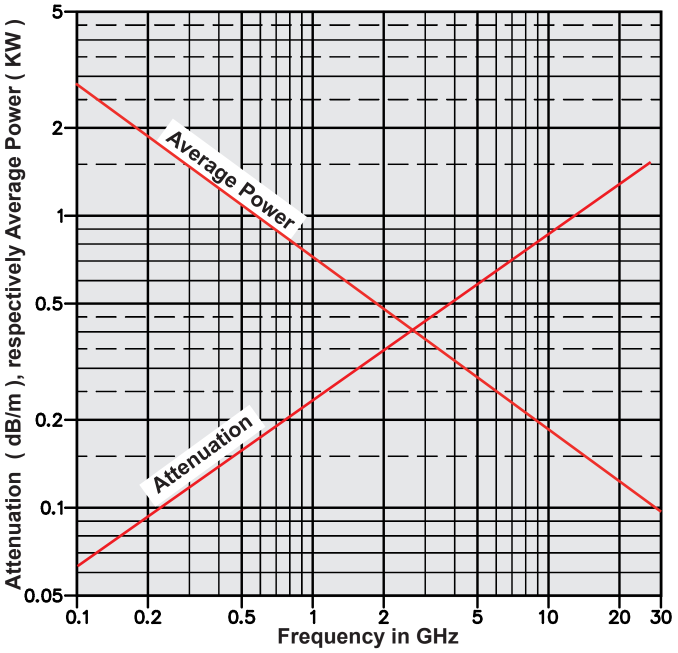
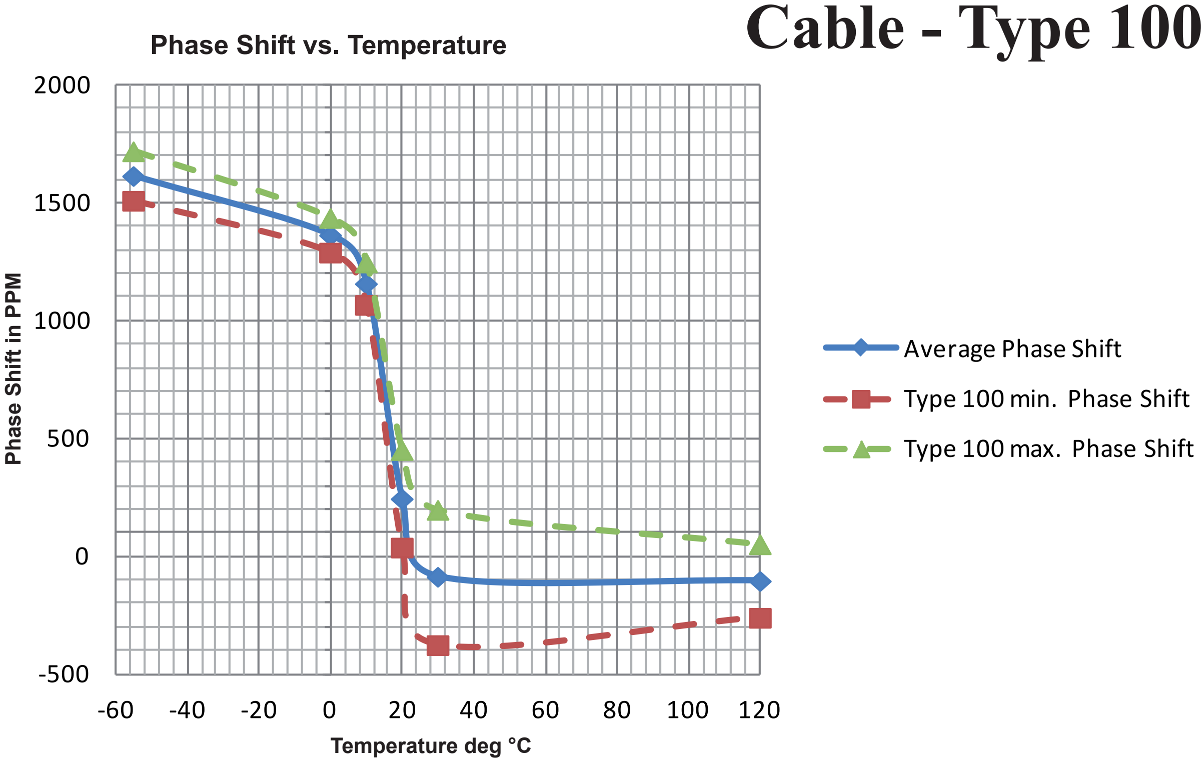
* Performance to 26.5 GHz, when terminated with 2.92mm or 3.5mm connectors (mating with SMA), or Spectrum´s High Performance SMA (Code 11K)
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.4mm, 3.5mm, 7mm, 7/16, HN, 2.92mm, N, SBX, SBY, SC, SMA, SPM, TNC, and Push-On Type Connectors os Series N, TNC and SMA. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

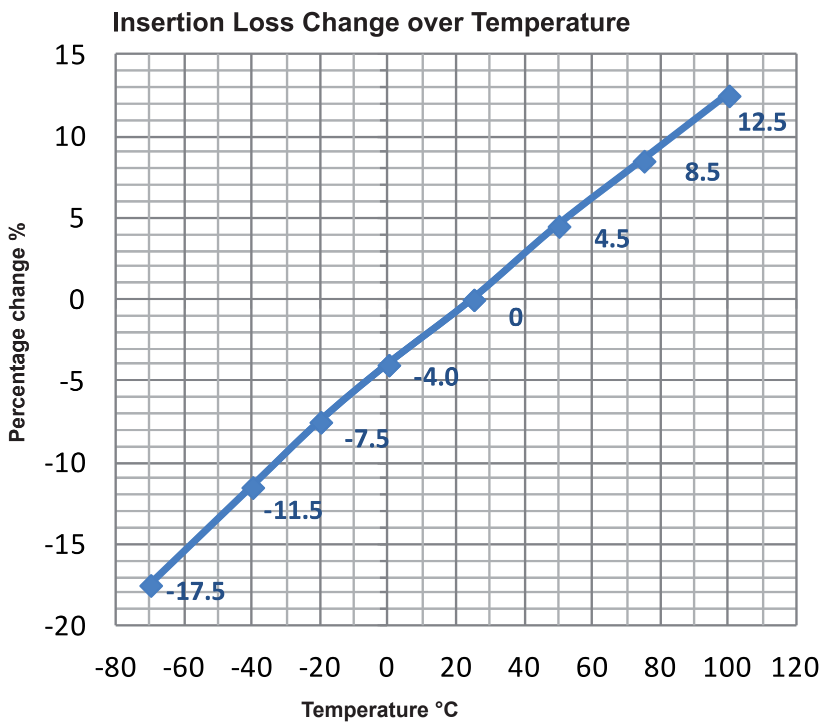




Specifications are subject to change without notice.

Cable - Type 100





Specifications are subject to change without notice.

B

Specifications are subject to change without notice.

Cable Assemblies using Type 100 Cable can be terminated with almost any standard Connector, and with Spectrum's Self Locking Phase Adjustable Connectors as well.

Specifications are subject to change without notice.

B

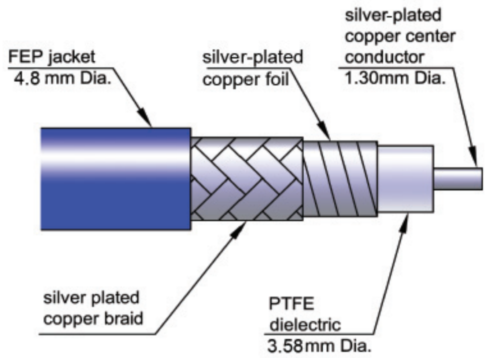
Cable - Type 102

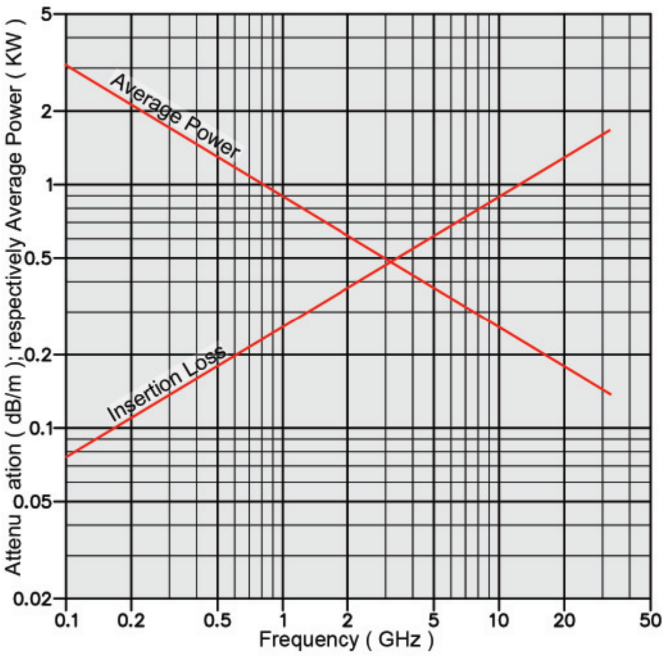
Ultra Low Loss
High Performance
DC - 33.0 GHz

SPECIFICATION			Type 102
Cable Code	Standard		102
	Armored		102x
	X: Please find Armor & Ruggedizing Options in Section S.		
Frequency Range			DC to 33.0 GHz
Outer Diameter in mm			4.8
Impedance in Ohms at Sea Level and +25°C			50 ± 2
Velocity in %, ± 2%			84
Capacitance in pF/m			79
Nominal Insertion Loss in dB/m vs. Frequency		0.5 GHz	0.18
		4.0 GHz	0.53
		8.0 GHz	0.76
		12.4 GHz	0.94
		18.0 GHz	1.15
		26.5 GHz	1.37
		33.0 GHz	1.60
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C		0.5 GHz	1300
		4.0 GHz	400
		8.0 GHz	280
		12.4 GHz	228
		26.5 GHz	154
		33.0 GHz	135
RF - Leakage at 18.0 GHz			-100 dBC
Operating Temperature Range			-65°C to +125°C
Outer Conductor Construction			Silver-Plated Copper Foil, Silver-Plated Copper Braid
Outer Jacket			FEP
Dielectric Diameter in mm			3.48
Dielectric Material			Low Density PTFE
Dielectric Constant			1.4
Center Conductor Material			Copper, Silver Plated
Center Conductor Dia. in mm			1.30
Weight in Grams/Meter			55
Connector Retention Force (N)			140
Minimum Bend Radius, Inside, Static (mm)			25.4
Minimum Bend Radius, Inside, Dynamic (mm)			75

Characteristics:

* Performance to 33 GHz, when terminated with 2.92mm or 3.5mm connectors
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.92mm, 3.5mm, 7mm, N, SBX, SBY, SC, SMA, SPM and TNC.
  For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

Cable Assembly of Type 102, terminated with Connectors of Series SMA male.

Specifications are subject to change without notice.

B

Cable -Type 104

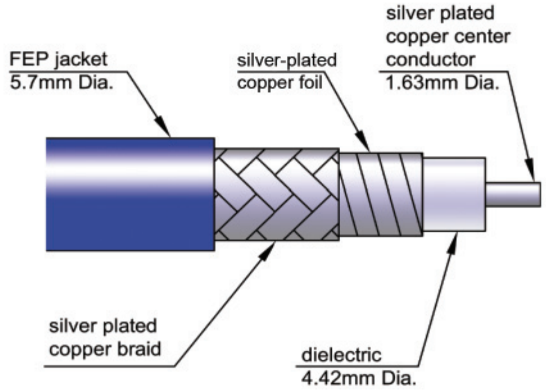
Ultra Low Loss,
DC - 26.5 GHz

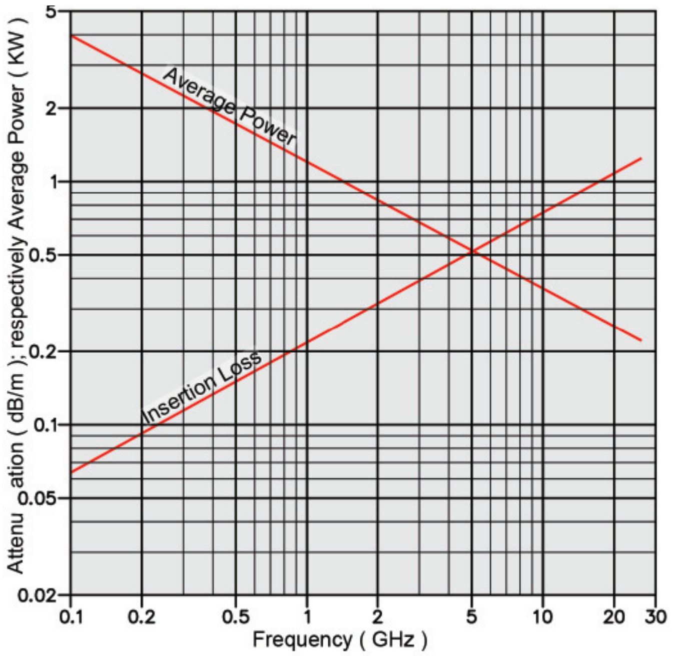
Cable Types 104, 105 and 106 are electrically identical, the difference is in the shielding.

SPECIFICATION		Type 104
Cable Code	Standard	104
	Armored	104x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 26.5 GHz
Outer Diameter in mm		5.7
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		84
Capacitance in pF/m		79
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.15
	2.0 GHz	0.31
	4.0 GHz	0.44
	8.0 GHz	0.63
	12.4 GHz	0.77
	18.0 GHz	0.95
	26.5 GHz	1.15
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	1745
	2.0 GHz	825
	4.0 GHz	567
	8.0 GHz	390
	12.4 GHz	313
	18.0 GHz	252
	26.5 GHz	206
RF - Leakage at 18.0 GHz		-100 dBC
Operating Temperature Range		-65°C to +125°C
Outer Conductor Construction		Silver-Plated Copper Foil, Silver-Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		4.42
Dielectric Material		Low Density PTFE
Dielectric Constant		1.4
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		1.63
Weight in Grams/Meter		67
Connector Retention Force (N)		145
Minimum Bend Radius, Inside, Static (mm)		32
Minimum Bend Radius, Inside, Dynamic (mm)		100

Characteristics:

* Performance to 26.5 GHz, when terminated with 2.92mm or 3.5mm connectors (mating with SMA), or Spectrum´s High Performance SMA (Code 11K)
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.92mm, 3.5mm, 7mm, N, SBX, SBY, SMA, SPM and TNC.
  For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

Cable Assemblies of Type 106, terminated with TNC male Phase Adjustable and Self Locking Right Angle Connectors operating to 18.0 GHz. Phase Adjustable Connectors of Types SMA, N and TNC are available for most of Spectrum's Cables.

The Cable Types 104 through 106 are electrically identical. The difference is in the shielding. Type 104 has only one braid, Type 105 uses one braid and a spiral armor, Type 106 has two braids.

B

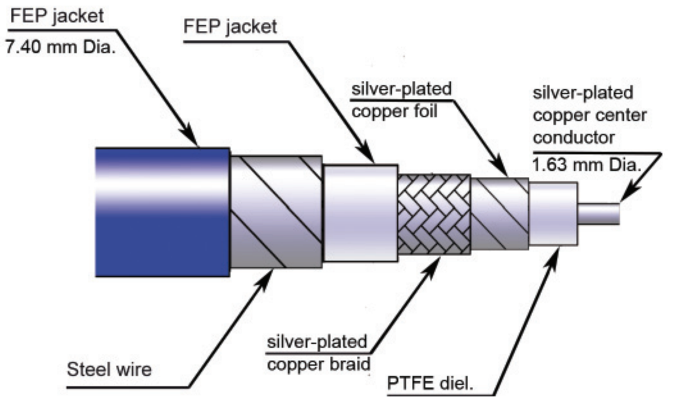
Cable -Type 105
Ultra Low Loss, DC - 26.5 GHz

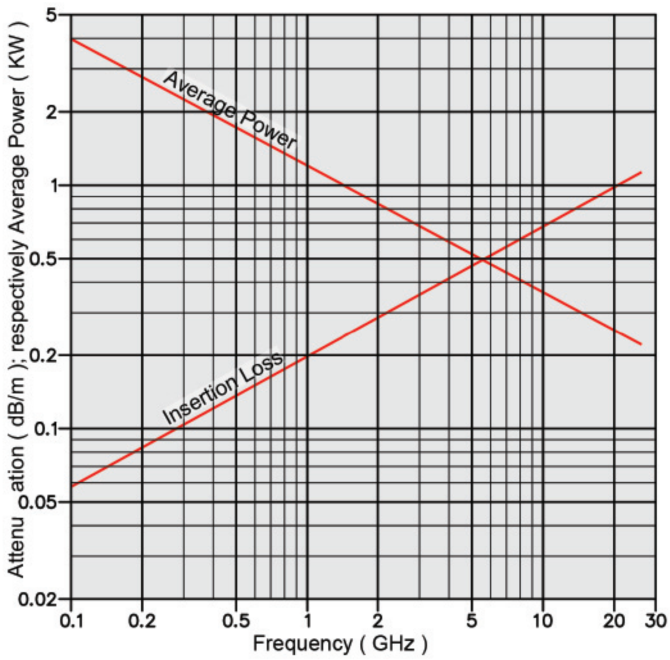
Cable Types 104, 105 and 106 are electrically identical, the difference is in the shielding.

SPECIFICATION			Type 105
Cable Code	Standard		105
	Armored		105x
	X: Please find Armor & Ruggedizing Options in Section S.		
Frequency Range			DC to 26.5 GHz
Outer Diameter in mm			7.40
Impedance in Ohms at Sea Level and +25°C			50 ± 2
Velocity in %, ± 2%			84
Capacitance in pF/m			79
Nominal Insertion Loss in dB/m vs. Frequency		1.0 GHz	0.22
		2.0 GHz	0.31
		4.0 GHz	0.44
		8.0 GHz	0.63
		12.4 GHz	0.77
		18.0 GHz	0.95
		26.5 GHz	1.15
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C		1.0 GHz	1200
		2.0 GHz	825
		4.0 GHz	567
		8.0 GHz	390
		12.4 GHz	313
		18.0 GHz	252
		26.5 GHz	206
RF - Leakage at 18.0 GHz			-100 dBC
Operating Temperature Range			-65°C to +200°C
Outer Conductor Construction			Silver-Plated Copper Foil, Silver-Plated Copper Braid, Steel wire
Outer Jacket			FEP
Dielectric Diameter in mm			4.42
Dielectric Material			Low Density PTFE
Dielectric Constant			1.4
Center Conductor Material			Copper, Silver Plated
Center Conductor Dia. in mm			1.63
Weight in Grams/Meter			67
Connector Retention Force (N)			145
Minimum Bend Radius, Inside, Static (mm)			32
Minimum Bend Radius, Inside, Dynamic (mm)			100

Characteristics:

* Performance to 26.5 GHz, when terminated with 2.92mm or 3.5mm connectors (mating with SMA), or Spectrum´s High Performance SMA (Code 11K)
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.92mm, 3.5mm, 7mm, N, SBX, SBY, SMA, SPM and TNC.
  For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

B

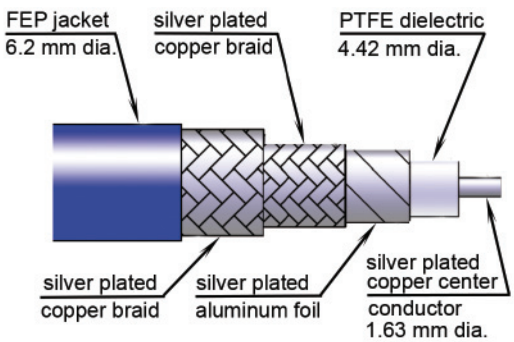
Cable -Type 106

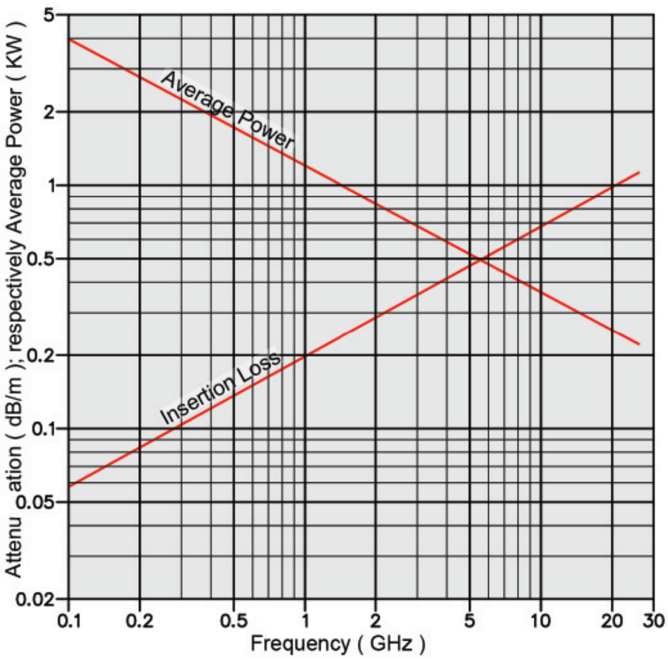
Ultra Low Loss, DC - 26.5 GHz

Cable Types 104, 105 and 106 are electrically identical, the difference is in the shielding.

Characteristics:

* Performance to 26.5 GHz, when terminated with 2.92mm or 3.5mm connectors (mating with SMA), or Spectrum´s High Performance SMA (Code 11K)
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.92mm, 3.5mm, 7mm, N, SBX, SBY, SMA, SPM and TNC.
  For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





SPECIFICATION		Type 106
Cable Code	Standard	**106**
	Armored	**106x**
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 26.5 GHz
Outer Diameter in mm		6.2
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		84
Capacitance in pF/m		79
Nominal Insertion Loss in dB/m vs. Frequency	1.0 GHz	0.2
	2.0 GHz	0.31
	4.0 GHz	0.44
	8.0 GHz	0.62
	12.4 GHz	0.77
	18.0 GHz	0.95
	26.5 GHz	1.15
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	1.0 GHz	1200
	2.0 GHz	820
	4.0 GHz	600
	8.0 GHz	400
	12.4 GHz	310
	18.0 GHz	280
	26.5 GHz	210
RF - Leakage at 18.0 GHz		-100 dBC
Operating Temperature Range		-65°C to +200°C
Outer Conductor Construction		Silver-Plated Aluminum Foil, 2x Silver-Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		4.42
Dielectric Material		Low Density EPTFE
Dielectric Constant		1.4
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		1.63
Weight in Grams/Meter		67
Connector Retention Force (N)		145
Minimum Bend Radius, Inside, Static (mm)		32
Minimum Bend Radius, Inside, Dynamic (mm)		100

Specifications are subject to change without notice.

B

Cable - Type 120
DC - 12.0 GHz

SPECIFICATION		Type 120
Cable Code	Standard	120
	Armored	120x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 12.0 GHz
Outer Diameter in mm		10.7
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		77
Capacitance in pF/m		87
Dielectric Strength (60 Hz) in KV rms		8.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		2.0
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.10
	1.0 GHz	0.15
	2.0 GHz	0.21
	5.0 GHz	0.34
	10.0 GHz	0.49
	12.0 GHz	0.55
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	2570
	1.0 GHz	1700
	2.0 GHz	1125
	5.0 GHz	652
	10.0 GHz	431
	12.0 GHz	387
RF - Leakage at 12.0 GHz		-90 dBC
Operating Temperature Range		-54°C to +150°C
Outer Conductor Construction		Silver Plated Copper Braid, Overlapping Aluminum Film, Silver Plated Copper Braid
Outer Jacket		PTFE
Dielectric Diameter in mm		8.3
Dielectric Material		Low Density PTFE
Dielectric Constant		1.6
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		2.97
Weight in Grams/Meter		280
Connector Retention Force (N)		210
Minimum Bend Radius, Inside, Static (mm)		64
Minimum Bend Radius, Inside, Dynamic (mm)		102

Characteristics:

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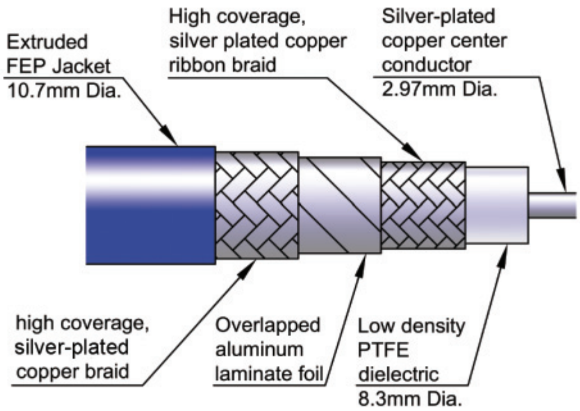
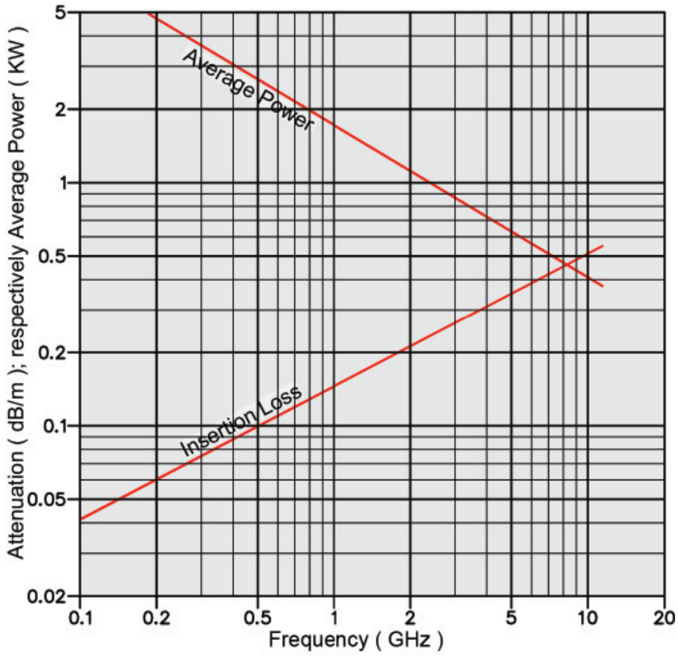
* Excellent Performance to 12.0 GHz.
* Very Rugged Construction.
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 7/16, HN, N, SC, SMA and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

B

Cable Assembly of Type 120, terminated with Connectors of Series N male.

Specifications are subject to change without notice.

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B

Cable - Type 140

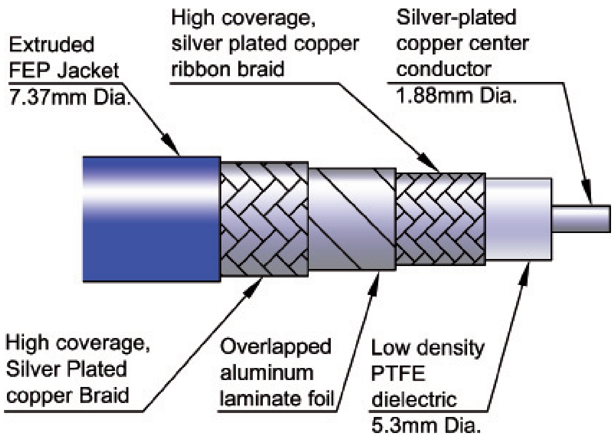
DC - 19.8 GHz

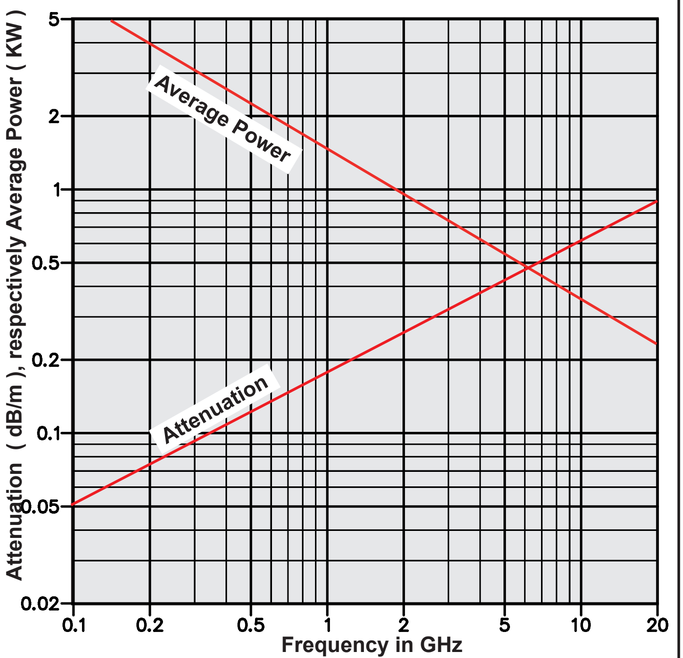
SPECIFICATION		Type 140
Cable Code	Standard	140
	Armored	140x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 19.8 GHz
Outer Diameter in mm	Standard	7.4
Impedance in Ohms at Sea Level and +25°C		50 ± 1
Velocity in %, ± 2%		76
Capacitance in pF/m		88
Dielectric Strength (60 Hz) in KV rms		6.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.5
Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.13
	2.0 GHz	0.27
	5.0 GHz	0.44
	10.0 GHz	0.64
	18.0 GHz	0.87
	19.8 GHz	0.91
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	2115
	2.0 GHz	926
	5.0 GHz	536
	10.0 GHz	355
	18.0 GHz	250
	19.8 GHz	235
RF - Leakage at 18.0 GHz		-90 dBC
Operating Temperature Range		-54°C to +150°C
Outer Conductor Construction		Silver Plated Copper Braid, Overlapping Aluminum Film, Silver Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		5.3
Dielectric Material		Low Density PTFE
Dielectric Constant		1.7
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		1.88
Weight in Grams/Meter		118
Connector Retention Force (N)		200
Minimum Bend Radius, Inside, Static (mm)		38
Minimum Bend Radius, Inside, Dynamic (mm)		74

Characteristics:

TOP SELLER

* Excellent Performance to 19.8 GHz.
* Very Rugged Construction.
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 7mm, N, SMA, SBX, SBY, BQ-, CQ-, IQ-, RQ-, SQ- TQ-Series and TNC.. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

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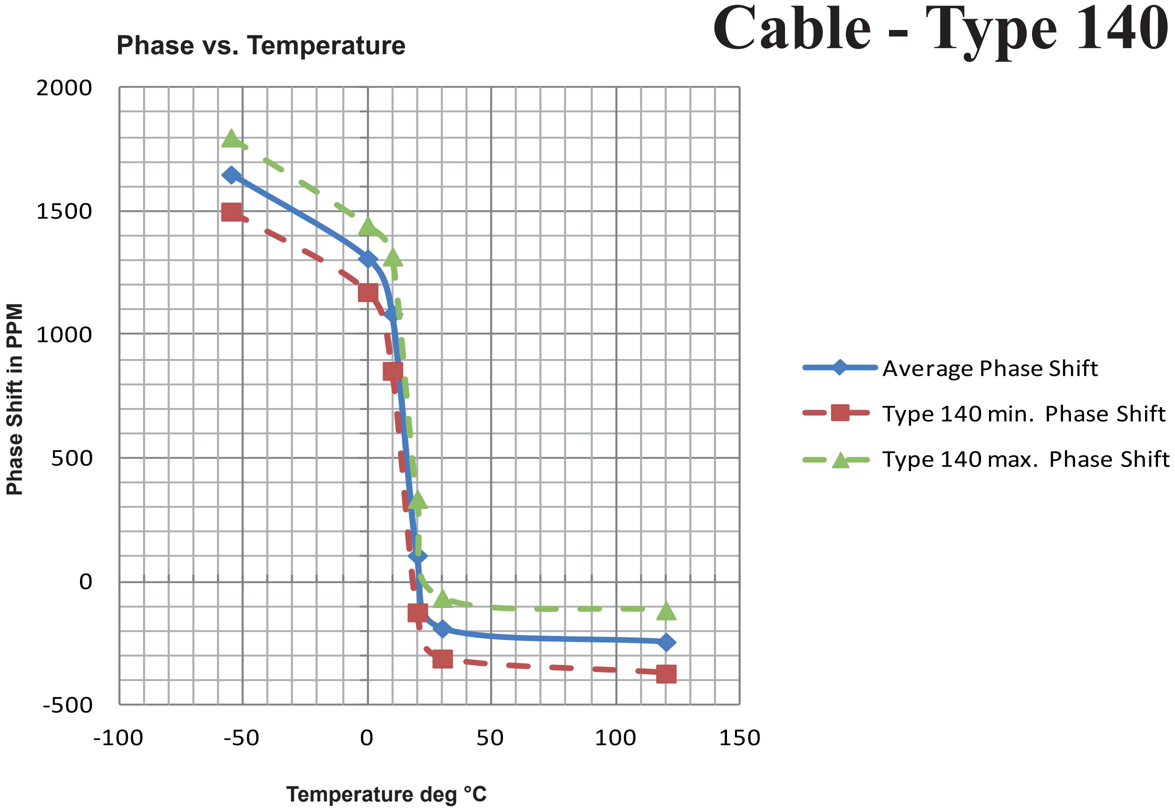
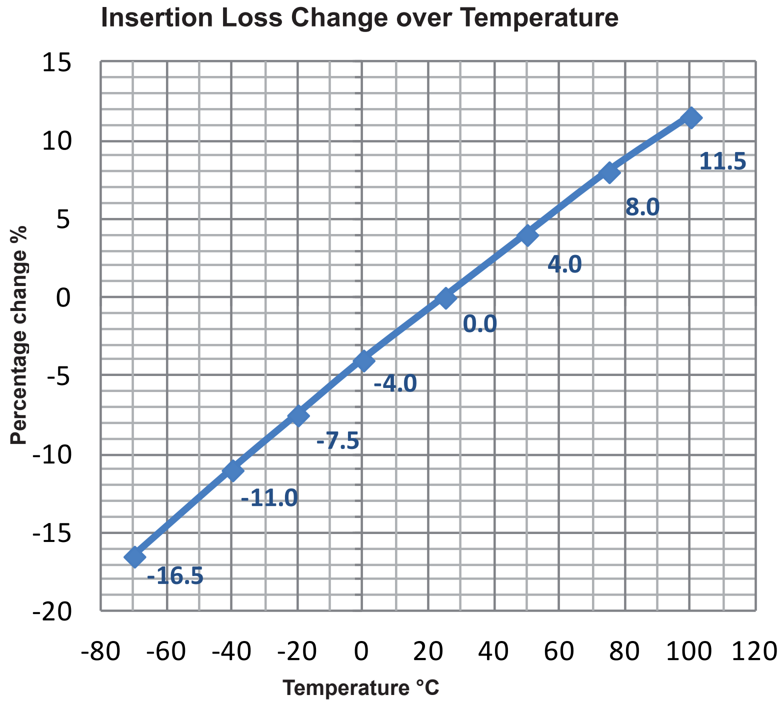
Cable - Type 140





Specifications are subject to change without notice.

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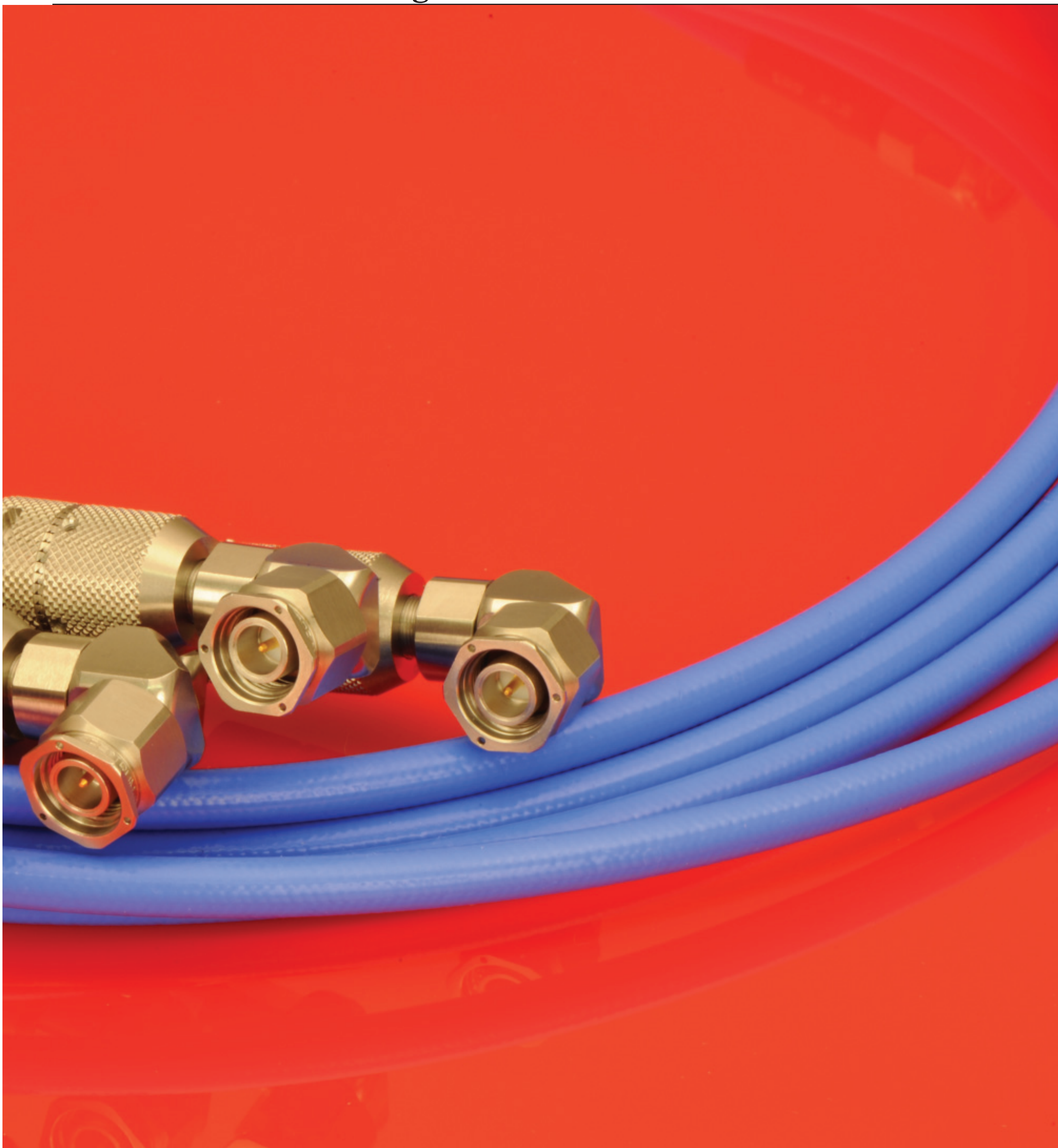
Specifications are subject to change without notice.



Cable Assemblies using Type 140 Cable can be terminated with almost any standard Connector, and with Spectrum's Self Locking Phase Adjustable Connectors as well.

Specifications are subject to change without notice.

Cable -Type 141

Ultra Low Loss to 19.5 GHz

Cables of Types 141 and 143 are identical with the exception of the shielding and O.D.

SPECIFICATION		Type 141
Cable Code	Standard	**141**
	Armored	**141x**
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 19.5 GHz
Outer Diameter in mm	Standard	7.74
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		84
Capacitance in pF/m		79
Dielectric Strength (60 Hz) in KV rms		6.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.5
Nominal Insertion Loss in dB/m vs. Frequency	1.0 GHz	0.16
	2.0 GHz	0.23
	4.0 GHz	0.32
	8.0 GHz	0.45
	12.4 GHz	0.54
	18.0 GHz	0.66
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	1 GHz	1900
	2.0 GHz	1306
	4.0 GHz	900
	8.0 GHz	618
	12.4 GHz	496
	18.0 GHz	400
RF - Leakage at 18.0 GHz		-90 dBC
Operating Temperature Range		-65°C to +200°C
Outer Conductor Construction		Silver Plated Copper Foil, Silver Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		6.32
Dielectric Material		Low Density EPTFE
Dielectric Constant		1.4
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		2.31
Weight in Grams/Meter		116
Connector Retention Force (N)		200
Minimum Bend Radius, Inside, Static (mm)		44
Minimum Bend Radius, Inside, Dynamic (mm)		400

Characteristics:

* Excellent Performance to 19.5 GHz.
* Very Rugged Construction.
* Meets the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 7mm, N, SMA, SBX, SBY, BQ-, CQ-, IQ-, RQ-, SQ- TQ-Series and TNC.. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

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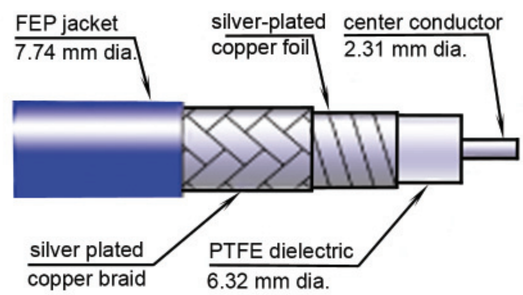
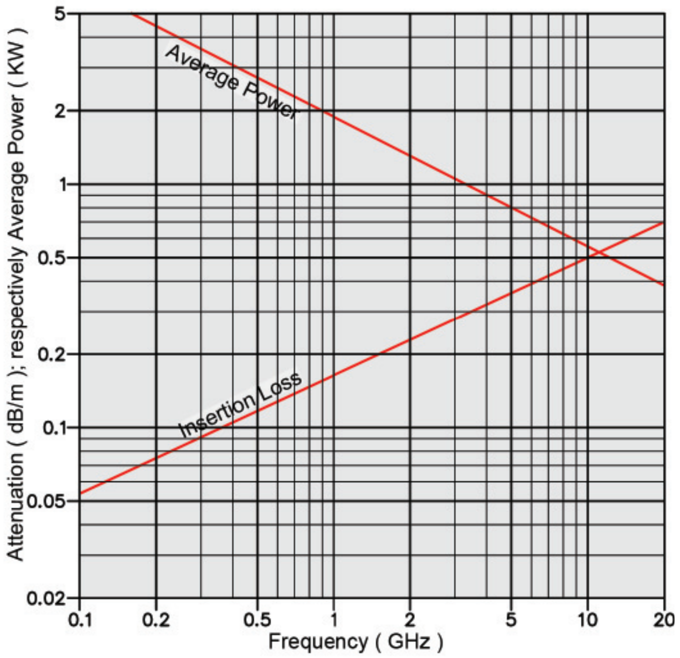




Specifications are subject to change without notice.

The standard cable of Types 141 and 143 are supplied with a Spectrum-Blue jacket. The difference between Type 141 and 143 is in the shielding only. Type 141 has one braid, whereas Type 143 has two braids. Both cables are electrically identical.

Specifications are subject to change without notice.

B

Cable -Type 143

Ultra Low Loss to 19.5 GHz

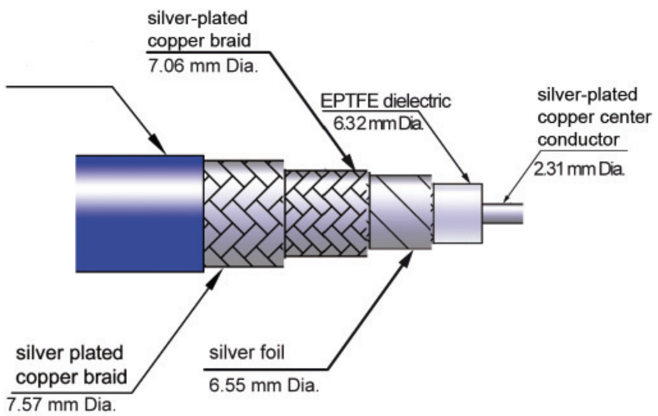
Cables of Types 141 and 143 are identical with the exception of the shielding and O.D.

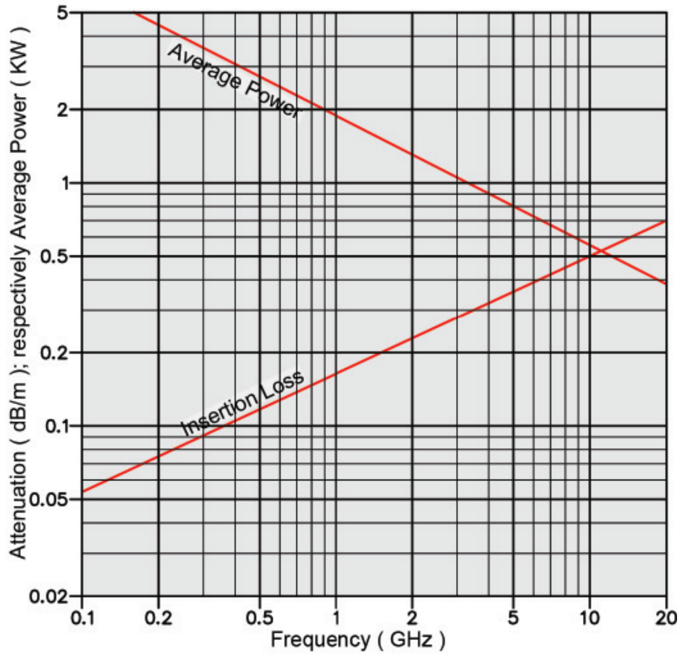
SPECIFICATION		Type 143
Cable Code	Standard	143
	Armored	143x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 19.5 GHz
Outer Diameter in mm	Standard	8.3
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		84
Capacitance in pF/m		79
Dielectric Strength (60 Hz) in KV rms		6.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.5
Nominal Insertion Loss in dB/m vs. Frequency	1.0 GHz	0.16
	2.0 GHz	0.23
	4.0 GHz	0.32
	8.0 GHz	0.45
	12.4 GHz	0.54
	18.0 GHz	0.66
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	1 GHz	1900
	2.0 GHz	1306
	4.0 GHz	900
	8.0 GHz	618
	12.4 GHz	496
	18.0 GHz	420
RF - Leakage at 18.0 GHz		-90 dBC
Operating Temperature Range		-65°C to +200°C
Outer Conductor Construction		Silver Plated Copper Foil, Silver Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		6.32
Dielectric Material		Low Density EPTFE
Dielectric Constant		1.4
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		2.31
Weight in Grams/Meter		116
Connector Retention Force (N)		200
Minimum Bend Radius, Inside, Static (mm)		44
Minimum Bend Radius, Inside, Dynamic (mm)		400

Characteristics:

TOP SELLER

* Excellent Performance to 19.5 GHz.
* Very Rugged Construction.
* Meets the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 7mm, N, SMA, SBX, SBY, and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

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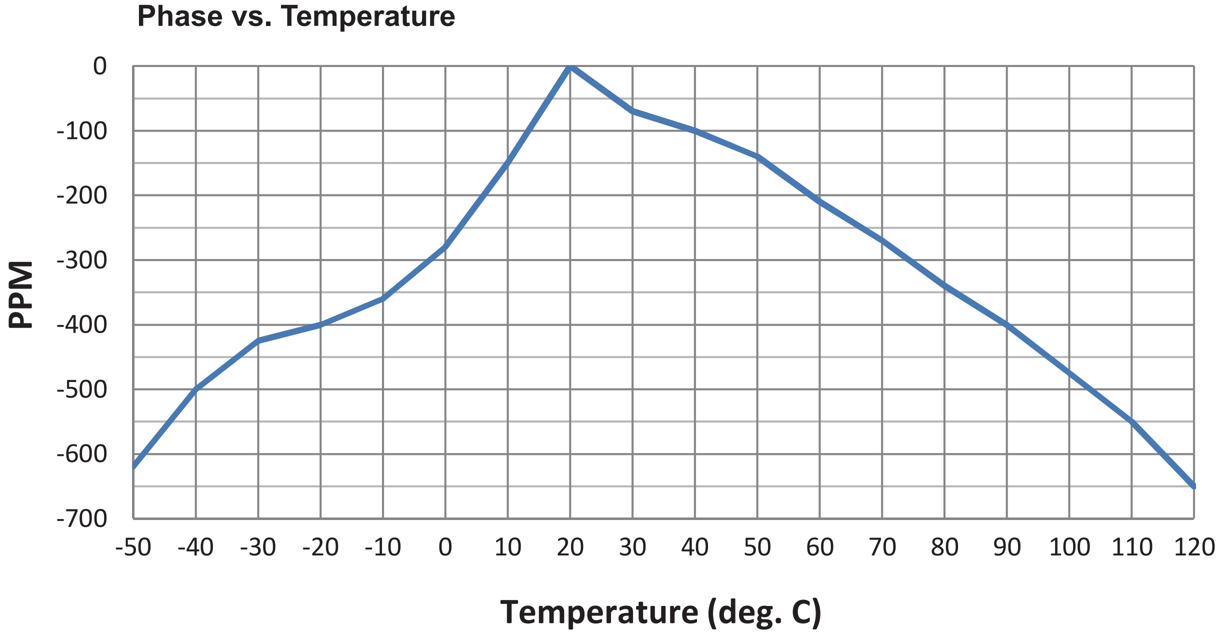
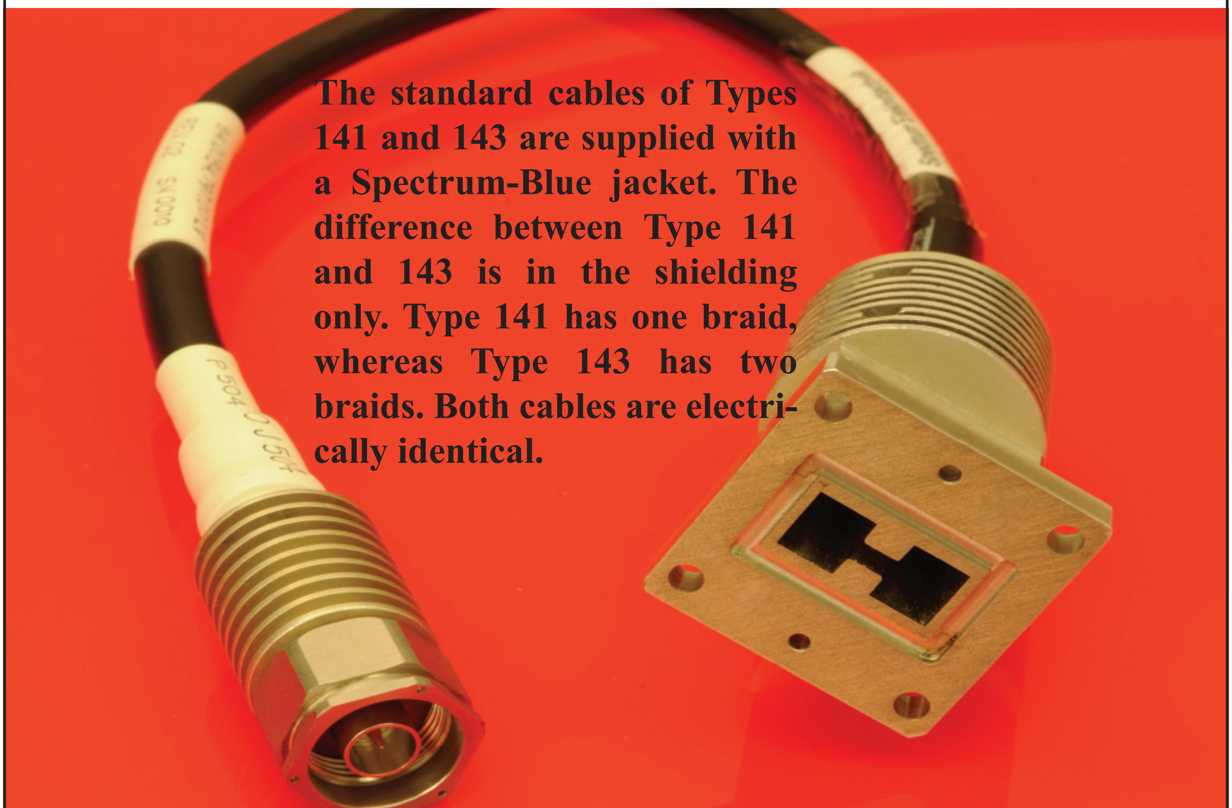
Cable -Types 141 and 143





The standard cables of Types 141 and 143 are supplied with a Spectrum-Blue jacket. The difference between Type 141 and 143 is in the shielding only. Type 141 has one braid, whereas Type 143 has two braids. Both cables are electrically identical.

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B

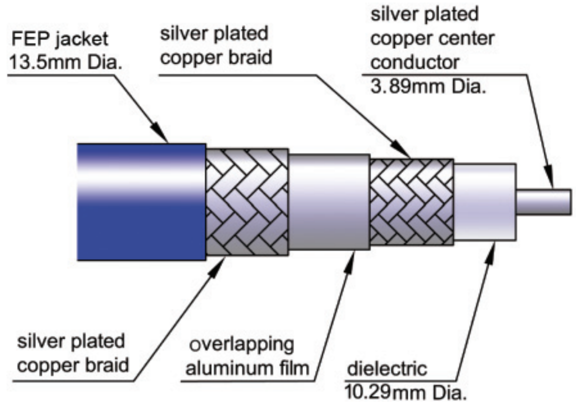
Cable -Type 300
Low Loss, High Power
DC - 9.5 GHz

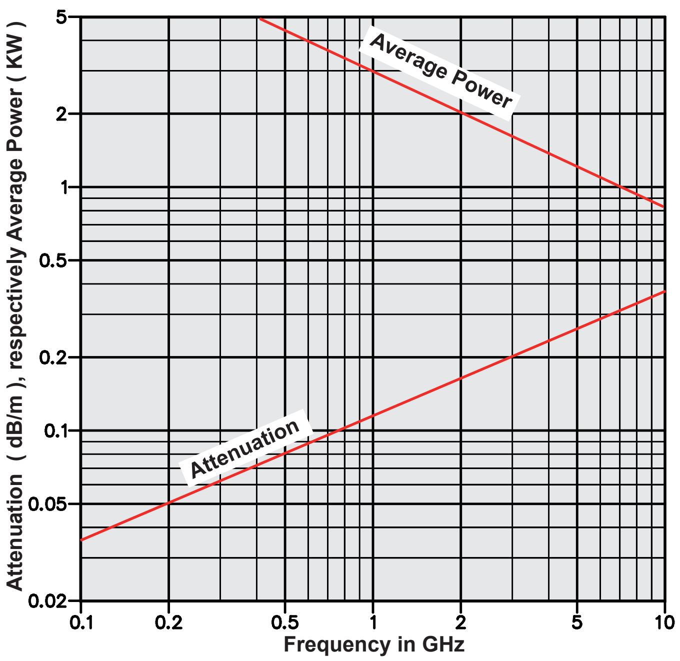
SPECIFICATION		Type 03
Cable Code	Standard	03
	Armored	03x
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 9.5 GHz
Outer Diameter in mm	Standard	13.5
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		77
Capacitance in pF/m		87
Dielectric Strength (60 Hz) in KV rms		8.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		2.0
Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.08
	2.0 GHz	0.16
	4.0 GHz	0.23
	6.0 GHz	0.28
	8.0 GHz	0.33
	9.0 GHz	0.35
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	4530
	2.0 GHz	1985
	4.0 GHz	1314
	6.0 GHz	1032
	8.0 GHz	870
	9.0 GHz	810
RF - Leakage at 9.5 GHz		- 90 dBC
Operating Temperature Range		-54°C to +150°C
Outer Conductor Construction		Silver Plated Copper Braid, Aluminum Film, Silver Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		10.29
Dielectric Material		Low Density PTFE
Dielectric Constant		1.6
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		3.89
Weight in Grams/Meter		416
Connector Retention Force (N)		220
Minimum Bend Radius, Inside, Static (mm)		90
Minimum Bend Radius, Inside, Dynamic (mm)		170

Characteristics:

TOP SELLER

* Ultra low loss to 9.5 GHz
* Very Rugged Construction
* The Ideal Receive/Transmit Cable
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly
* Available connectors: 7/16, C, HN, N, SC, SMA and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

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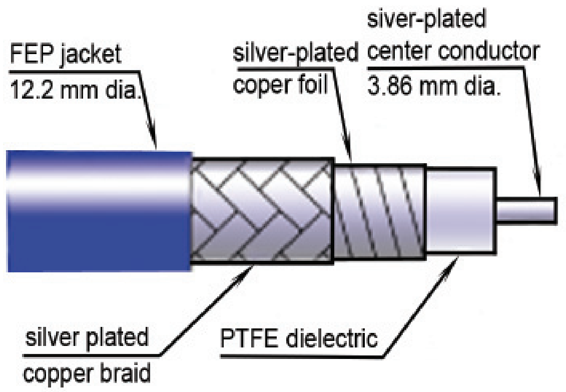
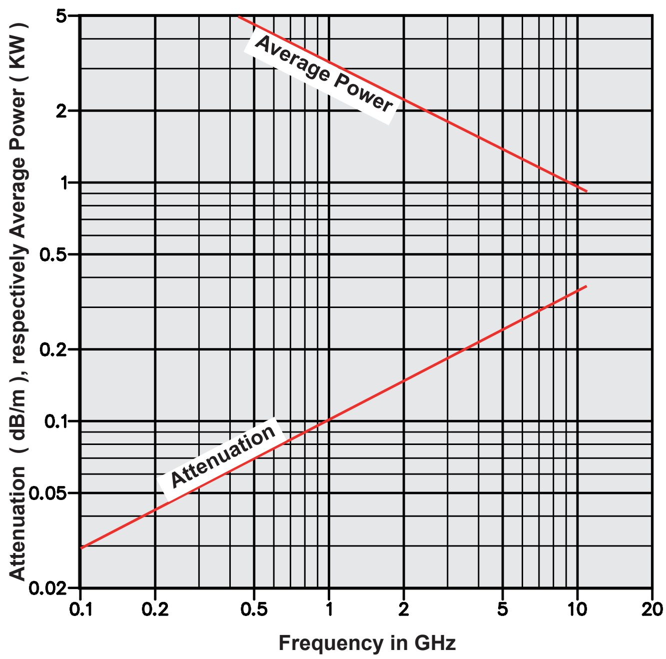
Cable - Type 500
0.37 dB/m at 10.0 GHz
DC - 11.0 GHz

Characteristics:
* Ultra low loss to 11 GHz
* Very Rugged Construction
* The Ideal Receive/Transmit Cable
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly
* Available connectors: 7/16, C, HN, N, SC, SMA and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

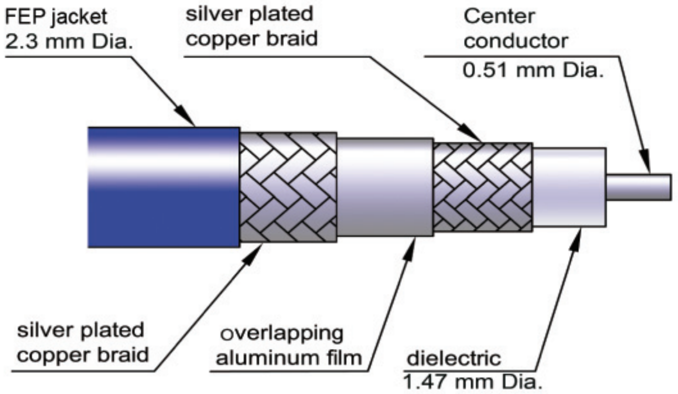
SPECIFICATION		Type 500
Cable Code	Standard	500
	Armored	500X
	X: Please find Armor & Ruggedizing Options in Section S.	
Frequency Range		DC to 11.0 GHz
Outer Diameter in mm	Standard	12.2
Impedance in Ohms at Sea Level and +25°C		50 ± 1
Velocity in %, ± 2%		84
Capacitance in pF/m		79
Dielectric Strength (60 Hz) in KV rms		5.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		2.5
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.08
	2.0 GHz	0.16
	4.0 GHz	0.22
	8.0 GHz	0.33
	11.0 GHz	0.40
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	4930
	2.0 GHz	2207
	4.0 GHz	1480
	8.0 GHz	987
	11.0 GHz	820
RF - Leakage at 11.0 GHz		- 100 dBC
Operating Temperature Range		-65°C to +150°C
Outer Conductor Construction		Silver Plated Copper Braid, Fiber Glass Serving, Silver Plated Copper Braid
Outer Jacket		FEP jacket
Dielectric Diameter in mm		10.08
Dielectric Material		Low Density PTFE
Dielectric Constant		1.5
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		3.86
Weight in Grams/Meter		255
Connector Retention Force (N)		250
Minimum Bend Radius, Inside, Static (mm)		60
Minimum Bend Radius, Inside, Dynamic (mm)		180

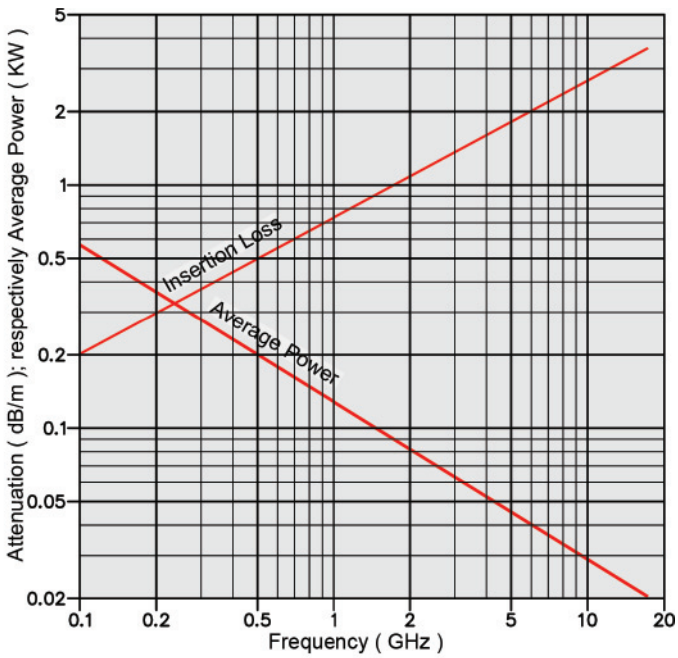
B

Cable - Type 677
Small Diameter
Good Performance
DC - 18.0 GHz

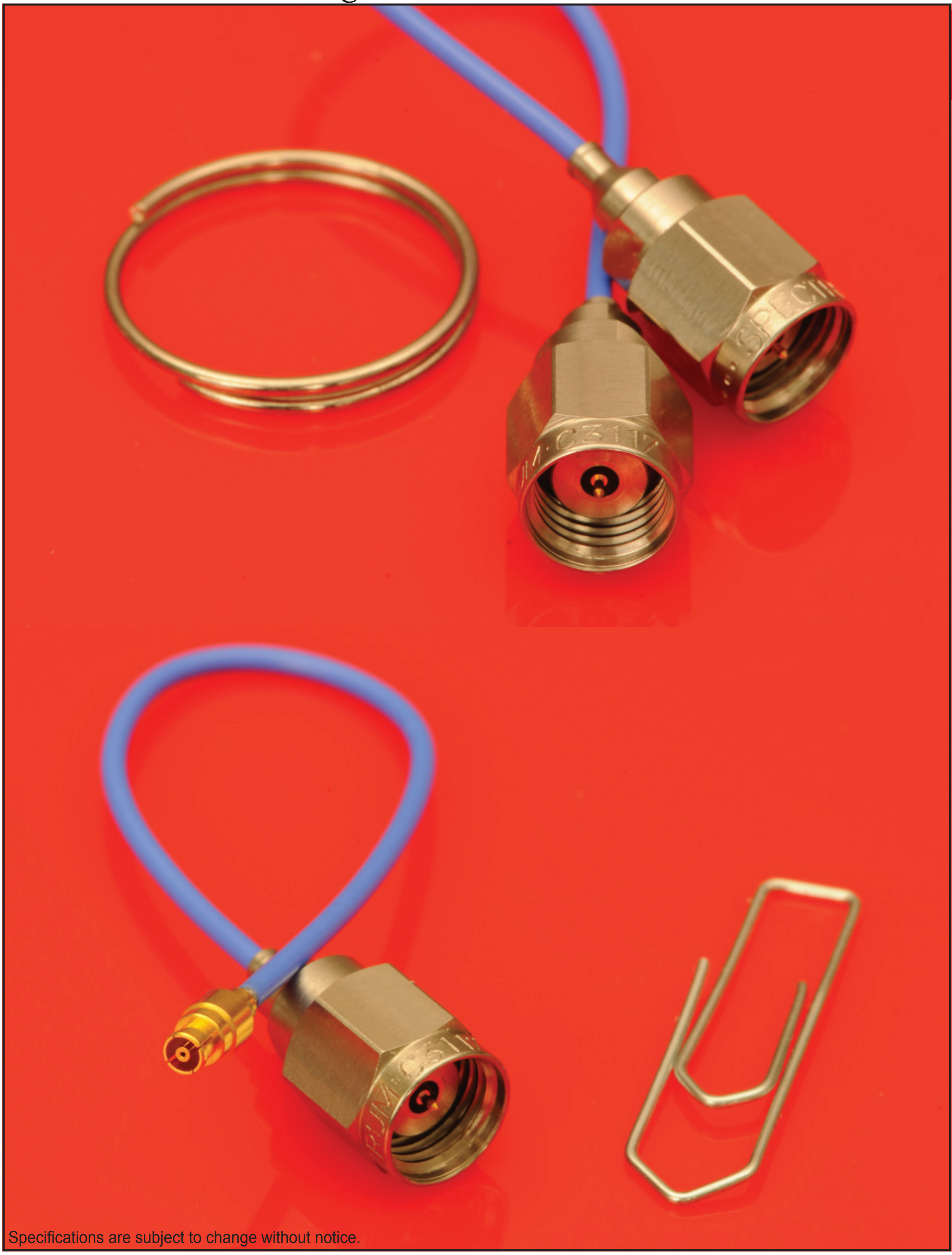
SPECIFICATION		Type 677
Cable Code		**677**
Frequency Range		DC to 18 GHz
Outer Diameter in mm		2.3
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		78
Capacitance in pF/m		87
Dielectric Strength (60 Hz) in KV rms		2.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		0.6
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.50
	2.0 GHz	1.05
	4.0 GHz	1.51
	8.0 GHz	2.23
	12.4 GHz	2.80
	18.0 GHz	3.46
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	200
	2.0 GHz	75
	4.0 GHz	45
	8.0 GHz	28
	12.4 GHz	20
	18.0 GHz	10
RF - Leakage at 9.5 GHz		- 90 dBC
Operating Temperature Range		-54°C to +150°C
Outer Conductor Construction		Ribbon Braid Aluminum Foil round braid
Outer Jacket		PTFE
Dielectric Diameter in mm		1.47
Dielectric Material		Low Density PTFE
Dielectric Constant		1.6
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		0.51
Weight in Grams/Meter		13
Connector Retention Force (N)		65
Minimum Bend Radius, Inside, Static (mm)		11.5
Minimum Bend Radius, Inside, Dynamic (mm)		23

Characteristics:
* Performance to 18 GHz.
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
* Available connectors: 2.4mm, 2.92mm, 3.5mm, SMP and SMPM.
  For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.


SPECTR
M-C311
RJM-C311

B

Cable - Type 750

0.20 dB/m at 8.0 GHz

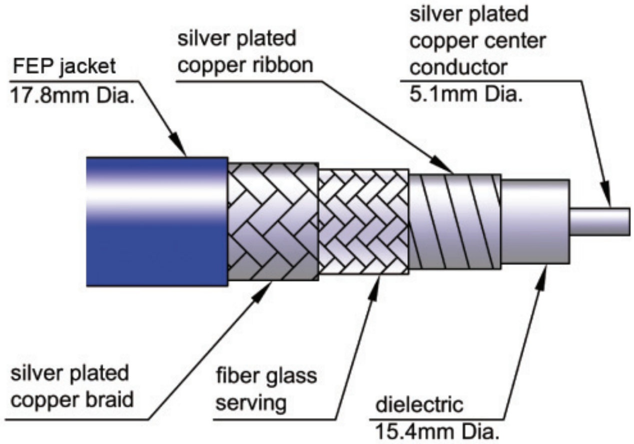
DC - 7.1 GHz

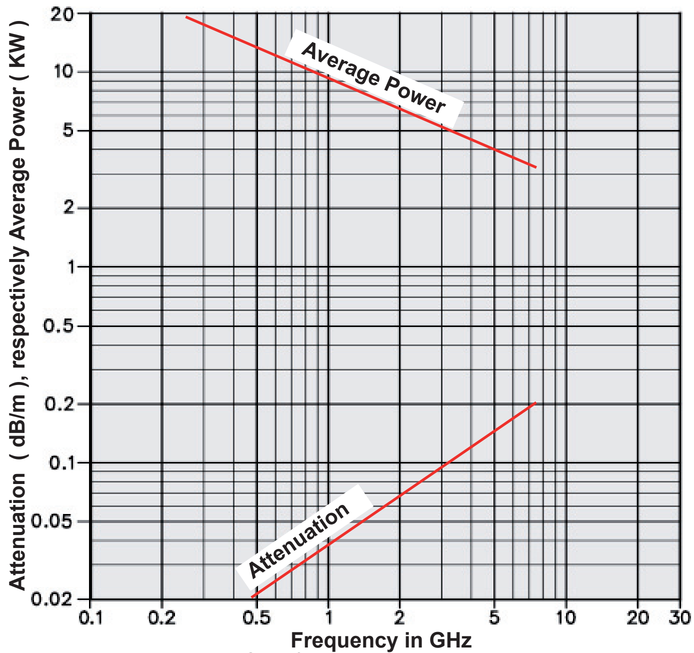
SPECIFICATION		Type 750
Cable Code		**750**
Frequency Range		DC to 8.0 GHz
Outer Diameter in mm	Standard	17.8
	Armored	
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		77
Capacitance in pF/m		86.6
Dielectric Strength (60 Hz) in KV rms		5.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		2.5
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.05
	1.0 GHz	0.07
	2.0 GHz	0.10
	4.0 GHz	0.15
	8.0 GHz	0.21
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	14950
	1.0 GHz	10000
	2.0 GHz	6690
	4.0 GHz	4475
	8.0 GHz	2995
RF - Leakage at 11.0 GHz		-100 dBC
Operating Temperature Range		-65°C to +125°C
Outer Conductor Construction		Silver Plated Copper Ribbon, Fiber Glass Serving, Silver Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		15.4
Dielectric Material		Low Density PTFE
Dielectric Constant		1.7
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		5.1
Weight in Grams/Meter		670
Connector Retention Force (N)		280
Minimum Bend Radius, Inside, Static (mm)		200
Minimum Bend Radius, Inside, Dynamic (mm)		600

Characteristics:

* Ultra low loss to 7.1 GHz
* Very Rugged Construction
* The Ideal Receive/Transmit Cable
* Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
* Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly
* Available connectors: EIA5/8, EIA7/8, 1 5/8, 3 1/8, N, For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

TOP SELLER





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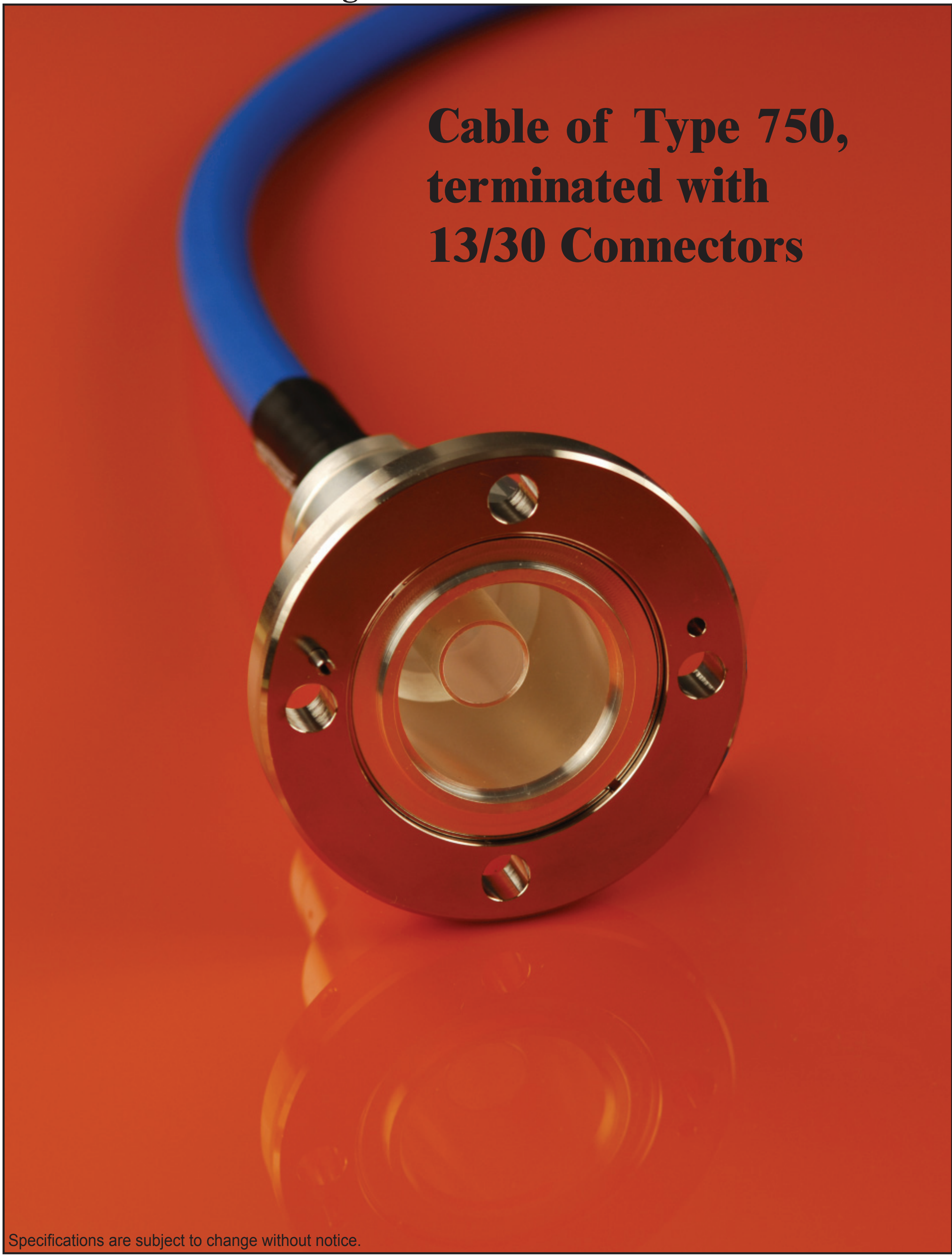
Cable of Type 750, terminated with 13/30 Connectors



Specifications are subject to change without notice.

LSZH

A low smoke zero halogen polyurethane jacket is the characteristic of the material behaviour. The cables are flame retardant and self-extinguishing in the event of a fire, showing low smoke emissions and are 100% halogen free.
The material is a thermoplastic, low smoke zero halogen (LSZH) flame retardant, UV stabilized, natural jacketing compound combining with excellent extrusion properties. The composition is based on the elements Carbon, Hydrogen, Oxygen, Silicon and Calcium. Compounds based on these elements will therefore be the only significant constituents of the combustion fumes. Other elements may be present in concentrations less than 0.1%.

We offer LSZH Jacket on all our cables. The LSZH jacketed Cables are identical with cables listed in this section, except for the jacket and the final diameter which is slightly larger.

The cables are normally used in special areas, such as tunnels, safety environments, computer rooms, hospitals, where the risk of fire and smoke has to be kept to a minimum. The cables mainly replace PVC-jacketed cables.

LSZH is identical to LSFH, which is a Trademak of Huber und Suhner.

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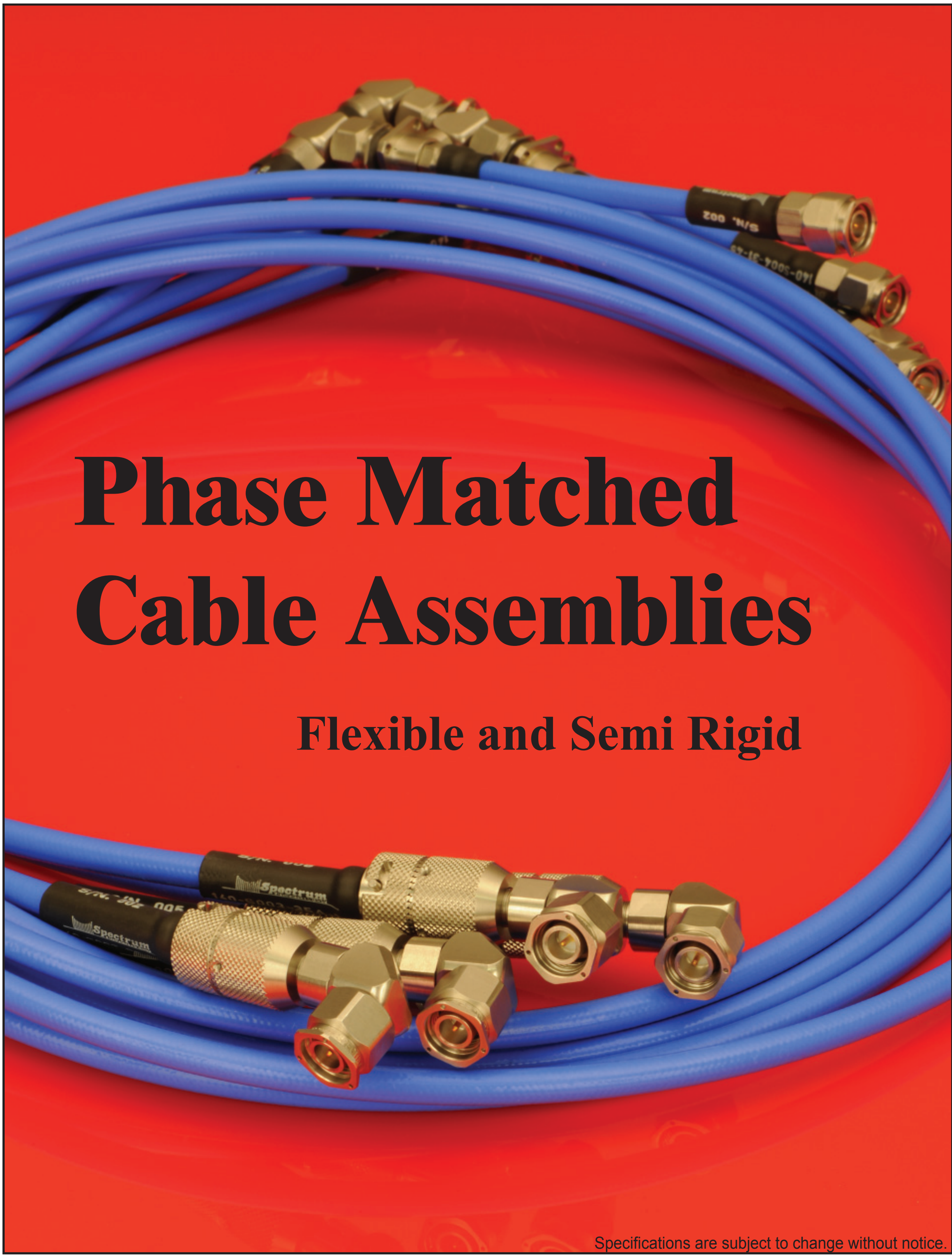
Spectrum Elektrotechnik GmbH

C



Phase Matched Cable Assemblies

Flexible and Semi Rigid

Specifications are subject to change without notice.

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C

Phase Matching

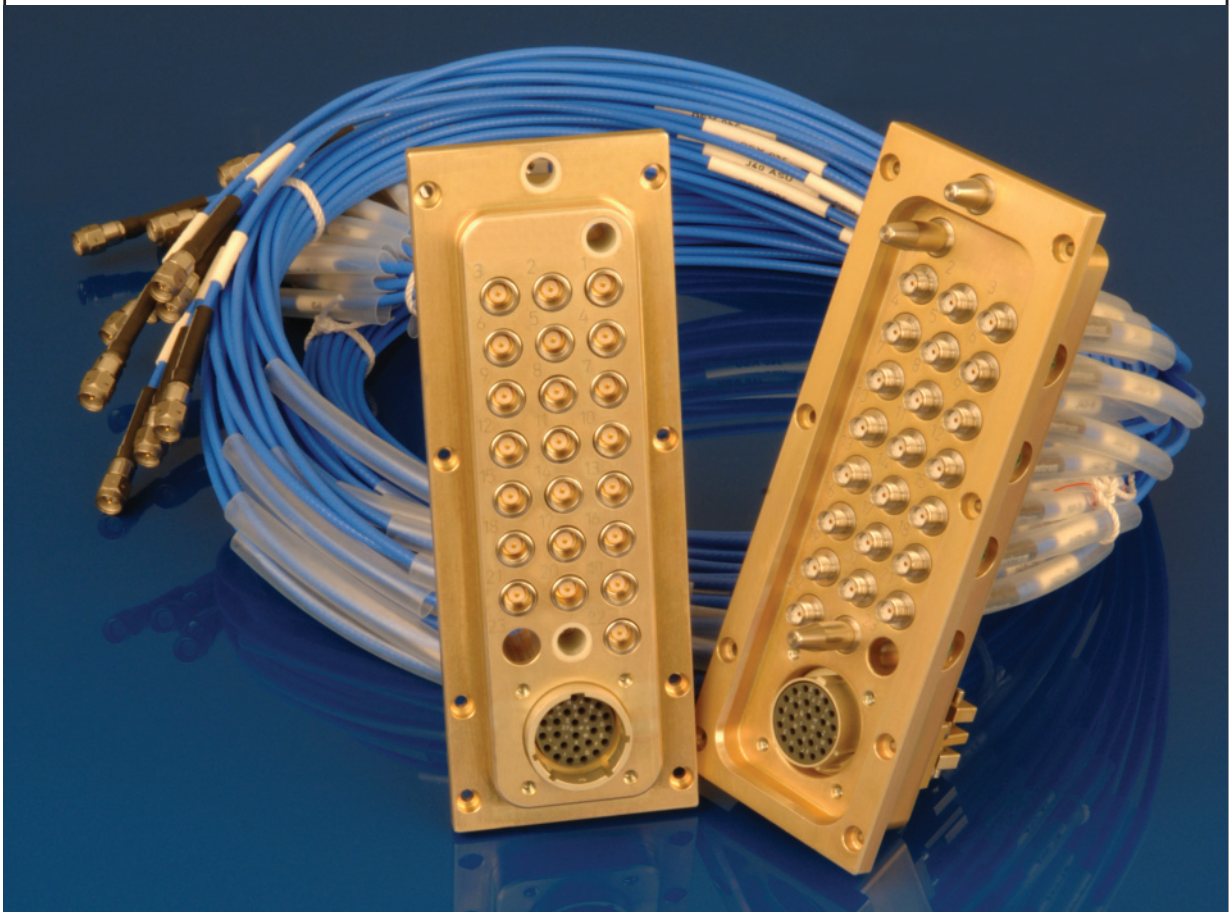
Cable Assemblies can be matched in **Phase**, **Delay**, and **Amplitude**. The most common matching is the **Phase matching**. It can be specified in electrical degrees at a specified frequency or in time delay. Three groups of candidates are of interest for phase matched cable assemblies:

- **Flexible Cables**, having one or more layers of braid as outer conductor
- **Semi Rigid Cables**, using copper or stainless steel for the outer conductor
- **Semi Flexible Cables**, easier formable by hand, using as outer conductor aluminum tubing (HandyForm II) or tinned copper braid (HandyForm I)

Phase Matched Cable Assemblies in Sets

Normally two specifications are being used for phase matched sets of cables assemblies:

- **Matching to a Standard:** The phase standard is usually a piece of hardware, a “Gold Standard”, it also could be an unchanging software standard; i.e. a specified electrical length at a certain frequency.
- **Matching as a Set:** Cable assemblies matched as a set means that the assemblies of the same set are matched to each other. The cables in one set may not match those of another set.



Governing Parameters when Phase Matching

Phase matched Cable Assemblies are being used in many applications, the best known usage is in phase array antennas, where up to hundreds of assemblies have to be matched to a few degrees at the operating frequency. If it were possible to cut the cable assemblies mechanically 100% to length, this would not automatically mean that the assemblies had the same electrical length. This can easily be understood due to the following:

Frequency of Operation: The higher the operating frequency and the closer the required phase match, the more difficult the matching process will be, and the cost might be higher.

Length of Cable Assemblies: Short Cable Assemblies are usually easier to match and to test than longer assemblies. With longer assemblies there is already the problem that they need to be coiled for testing and this already results in phase changes, a wider match window is required.

Preconditioning: The cables of a phase-matched set need to be thermally stress relieved before phase matching. At Spectrum Elektrotechnik GmbH the cable is preconditioned by exposing it several times to temperatures of -54°C to +125°C, in some cases even between -71°C to +200°C. This will assure good phase tracking.

Temperature: Change in temperature will result in change of electrical length of the cable assembly, caused by the dielectric of the cable. Cables using solid extruded PTFE dielectric are generally strong mechanically but higher for insertion loss and show worst phase changes over temperature when compared to cables using high density dielectric. These latter cables are weaker mechanically but lower in insertion loss and have better phase versus temperature characteristics. The phase change with temperature may not be that critical if the complete set is exposed to the changing temperature, as the phase will shift equally in all of the assemblies of the set, assuming that assemblies are not formed in a bundle where the inner assemblies will see the temperature change much later than the outer assemblies. It will be most critical when assemblies of the same set, matched at the same temperature (e.g. ambient), but are subjected to different temperatures in the system.

Different Connectors at Assemblies in a set: There is no problem to use different connector styles in a set of matched cable assemblies; it may add additional cost though, as the matching process may get more complicated because of different connector lengths and dielectrics.

Cable Properties: A cable is not 100% mechanically homogeneous. The cable center contact has tolerances, as well as the dielectric and the outer conductor, causing slight differences in impedance and velocity of propagation. Manufacturing the cable without tolerance is not possible, unfortunately. For a cable the tolerance of the velocity of propagation is usually specified between +/-1% and +/-2%, resulting in different electrical lengths of cable assemblies in spite of having identical physical lengths. This will be noticeable especially with long cable assemblies or when using cable from different manufacturing lots.

continuing next page

Governing Parameters when Phase Matching

Connector Properties: The connectors used for terminating the Assemblies have tolerances as well, also in diameters and lengths of the center contact, dielectric and outer conductor. Although Spectrum Elektrotechnik GmbH is using the tightest tolerances of +/- 0.005 mm (0.0002 inches) at the important dimensions of the connectors; the connectors are not 100% identical.

Workmanship: Terminating the connectors to the assembly will add the next problem, as it is definitely not possible to mount the connectors 100% identical to each other onto the cables. There will always be minor mechanical differences in the gaps, and the solder joints, causing discrepancies in mechanical and electrical lengths. The cable assemblies will have slightly different VSWR, and this will cause some difference in phase as well. The tolerances will add up, and also the best possible workmanship will not guarantee for cable assemblies, identical electrically, especially at higher frequency applications.

Installation: Especially for matched sets with long cable assemblies phase changes can be expected during installation. Phase adjustable connectors or adapters can be used for phase correction after installation.

Bending: When the cable assemblies are being bent after the connectors have been terminated to the cable a phase change can be expected, due to the center conductor shifting versus the outer conductor. The mechanical and electrical length of the assembly will change, and the VSWR may change as well. This will result in phase change. For sets with long cable assemblies phase changes can be expected after the installation in a system. Phase change will depend also on the bend radii. If the cables are flexed, the number of cycles, and the similarity of the flexure cycles of the assemblies in the set have to be taken into consideration for phase tracking.

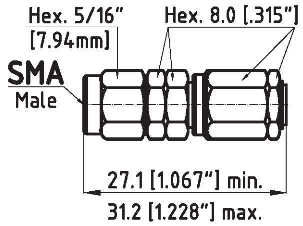
Phase matching using Phase Adjustable Connectors: In certain applications, especially when using Semi-Rigid Cable, the customer may want to make his own phase matched assemblies. Spectrum Elektrotechnik GmbH offers for those applications a variety of Phase Adjustable Connectors. The assembly procedures for terminating the cable with these Phase Adjustable connectors are similar to the procedure for regular connectors. The Phase Adjustable Connectors are available for frequencies from DC to 18.0 GHz, and DC to 26.0 GHz using SMA connectors, and designs operating from DC to 40.0 GHz, using 2.92 mm connectors. Designs for higher frequency applications may be available in the near future, using 2.4 mm and 1.85 mm connectors.

Phase matching using Phase Adjustable Adapters: Phase Adjustable Adapters operating up to 63.00 GHz are available as well. Standard cable assemblies may be matched by adding such a Phase Adjustable Adapter. These devices are available for frequencies from DC to 12.4 GHz, DC to 18.0 GHz and DC to 26.5 GHz, using SMA connectors, designs operating from DC to 40.0 GHz, using 2.92 mm connectors, units operating from DC to 50.0 GHz, using 2.4 mm connectors and devices operating from DC to 63.0 GHz, connectorized with 1.85 mm connectors.

Uncertainties: Vector Network Analyzers will be usually used in a temperature-controlled room. But still it has to be taken into consideration that test results taken even with the best equipment are subjected to tolerances.

Phase Adjustable Connectors of Series SMA for Semi-Rigid Cable Assemblies DC to 18.0 and to 26.0 GHz

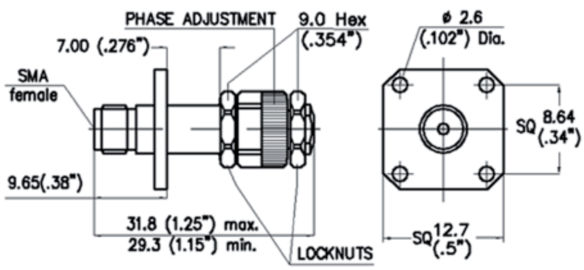
SMA Adjustable coaxial Phase Shifters Models LS-0141-02 and LS-0085-02	
Cable Type	0.085" & 0.0141" Semi Rigid
Frequency Range	DC - 26.0 GHz
Adjustment	Max. 127° at 26.0 GHz
Impedance	50 Ohms
Max. VSWR	1.05 + .008f(GHz)
Insertion Loss	(.05 SQT(f(GHz)))dB
R.F. Leakage	-90 dBC
Temperature Range	-65°C to +115°C



The Models LS-0141-02 and LS-0085-02 are adjustable coaxial Phase Shifters, covering the full frequency range of DC to 26.0 GHz with an adjustment capability of max. 127° at 26.0 GHz. The Phase Adjustable Connectors may practically eliminate the need to trim cables to predetermined lengths, in order to achieve the exact phase requirements of a microwave network. Cables only need to be trimmed to the approximate electrical length. The Phase Shifter then allows to make the necessary adjustment between the other components in the system. As a result of the small size and light weight, these Phase Shifters can be used in applications with space limitations, such as airborne and satellite equipment.

The Phase Adjustable Connector LS-0085-S001 has been designed for panel mount usage where the phase adjusted assembly is inside a box. Application might be the fine adjustment of a delay line.

SMA Adjustable coaxial Phase Shifter Model LS-0085-S001	
Cable Type	0.085" Semi Rigid
Frequency Range	DC - 18.0 GHz
Adjustment	Max. 50° at 18.0 GHz
Impedance	50 Ohms
Max. VSWR	1.12:1 at 18.0 GHz
Insertion Loss	0.25 dB at 18.0 GHz
R.F. Leakage	-90 dBC
Temperature Range	-65°C to +115°C



Part Number	Cable Type	Frequency Range	VSWR max.	Insertion Loss max.	Phase Shift min.	No. of Turns	Nom. Phase Shift Deg./GHz/Turnh	Time Delay (psec.) min.	Time Delay (psec.) max.	Weight max.
LS-0141-02	0.141" Semi-Rigid	DC - 26.0 GHz	1.25 : 1	0.26 dB	127° at 26.0 GHz	9	0.55	72.2	87.6	9 g
LS-0085-02	0.085" Semi-Rigid									9 g
LS-0085-S001	0.085" Semi-Rigid	DC - 18.0 GHz	1.12 : 1	0.25 dB	50° at 18.0 GHz	5	0.55	85.3	93.7	9 g

Specifications are subject to change without notice.

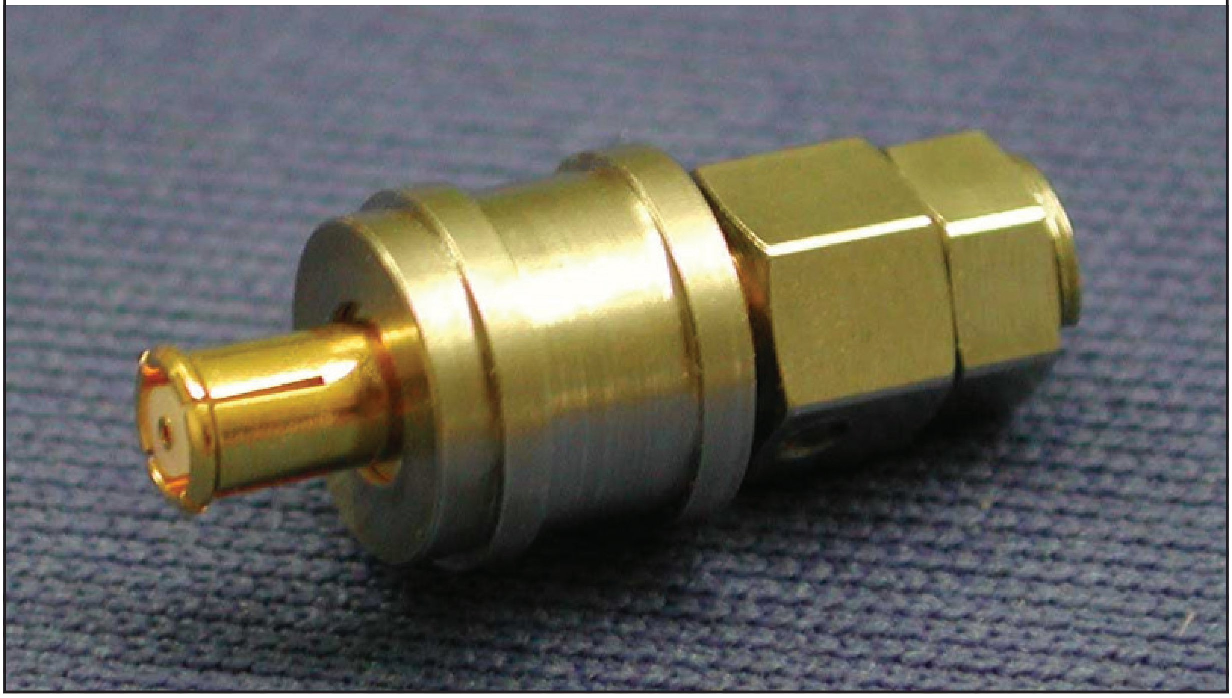
C

Phase Adjustable Connectors of Series 2.92 mm and SMP for Semi-Rigid Cable Assemblies operating from DC to 18.0 GHz and DC to 40.0 GHz, for easy use at customer site.

2.92 mm Adjustable coaxial Phase Shifters Model 15L3-1001-02	
Cable Type	0.085" Semi Rigid
Connector Type	2.92 mm
Frequency Range	DC - 40.0 GHz
Adjustment	200° min. at 40.0 GHz
Impedance	50 Ohms
Max. VSWR	1.4 max at 40.0 GHz
Insertion Loss	0.2 dB max. at 40 GHz
R.F. Leakage	-90 dBC
Temperature Range	-65°C to +115°C

SMP Adjustable coaxial Phase Shifters Model 1102-65LS-04	
Cable Type	0.047" Semi Rigid
Connector Type	SMP
Frequency Range	DC - 26.0 GHz
Adjustment	45°min at 26.0 GHz
Impedance	50 Ohms
Max. VSWR	1.15 max, @ 26 GHz
Insertion Loss	0.25 max. at 26 Ghz
R.F. Leakage	not applicable
Temperature Range	-65°C to +115°C

Part Number	Cable Type	Frequency Range	VSWR max.	Insertion Loss max.	Phase Shift min.	No. of Turns	Nom. Phase Shift Deg./GHz/Turnh	Time Delay (psec.) min.	Time Delay (psec.) max.	Weight max.
15L3-1001-02	0.085" Semi-Rigid	DC-40.0 GHz	1.2:1 max.	0.4 dB max.	200° at 40 GHz	9	0.55	110	125	35
1102-65LS-04	0.047" Semi-Rigid	DC - 18.0 GHz	1.15 : 1	0.21 dB	30° at 18.0 GHz	5.5	0.3	57	62	2.6 g



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Phase Matched Cable Assemblies

Phase Adjustable Connectors of Series SMP for Semi Rigid Cable of Type 0.047". These Connectors are used for panel mount, as desired by a customer in a certain program. The Connectors have the option for locking after Phase Adjustment. Spectrum Elektrotechnik GmbH is designing Phase Adjustable connectors for special applications, unique programs and harsh environment.

Specifications are subject to change without notice.

C

Factory Phase Matched Cable Assemblies

Spectrum Elektrotechnik GmbH has developed a number of techniques to phase match flexible assemblies and Semi-Rigid Cable Assemblies as well. From the outline the factory phase adjustable connectors do not show any difference, compared to any of Spectrum's standard connectors.

Internally these connectors are using well engineered components that are designed for:

Center Contact, Dielectric and Outer Conductor swopping for length changes, some of them to achieve length changes of a few hundreds of a millimeter only but maintaining perfectly 50 Ohms impedance. This system is of especial interest in programs where weight restrictions do exist, or where no parts are allowed that cannot be locked 100%, or where the assemblies are submitted to vibration.

A well kept secret for achieving Phase Adjustment is by swapping certain internal ferrules. After installation the parts are well secured within the connector that the units can undergo vibration without any problems. The design is also used where weight restrictions do exist. 50 Ohms impedance will be maintained 100%.

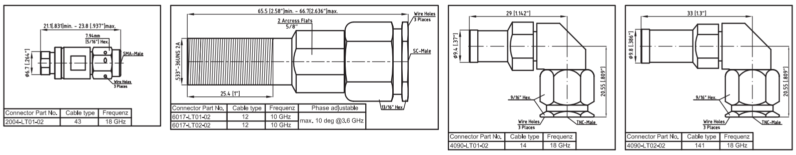
In several applications there are long flexible cable assemblies needed and Phase Matching among the assemblies is required as well. What happens to a 20 m assembly after having been pulled, even very carefully, through an airline body or its wings? The flexible cable assembly that has undergone factory phase matching, might not be phase matched any more. So after installation adjustment is necessary. A sizable number of phase adjustable connectors have been developed, even using a self locking mechanism.

Center Contact, and Outer Conductor swopping for length and diameter changes, and Dielectrics swopping with different Dielectric Constants. With this system changes of parts of a degree are possible, but always maintaining perfectly 50 Ohms impedance. These phase adjustable connectors are also of interest in programs where weight restrictions do exist, or where no parts are allowed that cannot be locked 100%, or where the assemblies are submitted to heavy vibration.

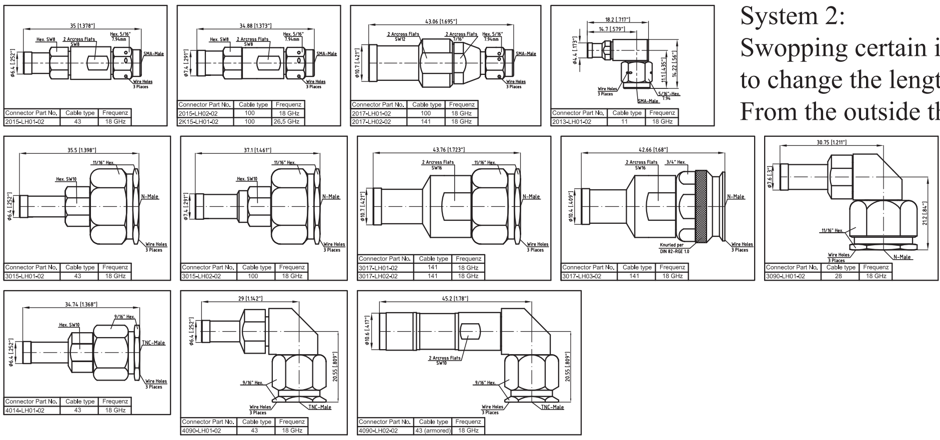
The systems only pay off for factory phase adjustments. The reason is borne in the high number of piece parts needed. Using the system by the customer, the necessary number of piece parts, center contacts, dielectrics and outer conductors would need to be in stock at customer site for phase matching only a few assemblies, and this would make it obviously too expensive. As Spectrum is phase matching assemblies on a daily basis, all necessary piece parts in all the different lengths and diameters are in stock, resulting in reasonable priced Phase Matched Cable Assemblies.

The outline drawings to the right show a number of Phase Adjustable Connectors that have been developed and delivered to several customers and their programs. For new applications Spectrum Elektrotechnik GmbH is constantly designing additional Phase Adjustable Connectors and new Techniques. Please do not hesitate to contact the Company, if a standard product does not fit your needs.

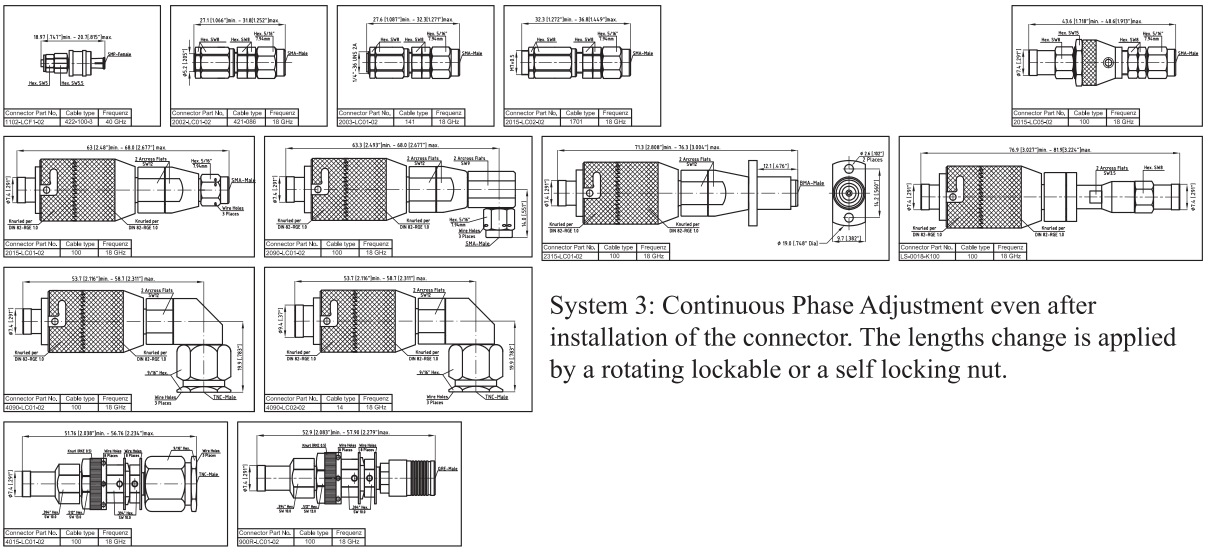
Summary on Factory installed Phase Adjustable Connectors



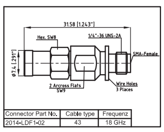
System 1:
Swopping internal parts, such as Center- & Outer Conductor, & Dielectric. From the outside the unit looks like a normal Connector.



System 2:
Swopping certain internal ferrules to change the length of the connector. From the outside the Phase Adjustment cannot be seen.



System 3: Continuous Phase Adjustment even after installation of the connector. The lengths change is applied by a rotating lockable or a self locking nut.



System 4: Phase Adjustment by swopping internal parts of the connectors, exchanging also dielectrics with different dielectric constant, but maintaining always 50 Ohms.

Specifications are subject to change without notice.

Phase Matched Cable Assemblies

Phase Matching Long Flexible Cable Assemblies

There always will be a problem with long flexible phase matched Cable Assemblies. When they are routed in the system to their final position, e.g. through the wings or in the body of an airplane, they will be bent and maybe slightly stretched. The perfectly factory matched assemblies may not be phase matched anymore after the installation. Spectrum Elektrotechnik GmbH developed phase adjustable connectors, being adjustable over a wide range in order to adjust the Cable Assemblies after installation. These phase adjustable connectors are self locking.

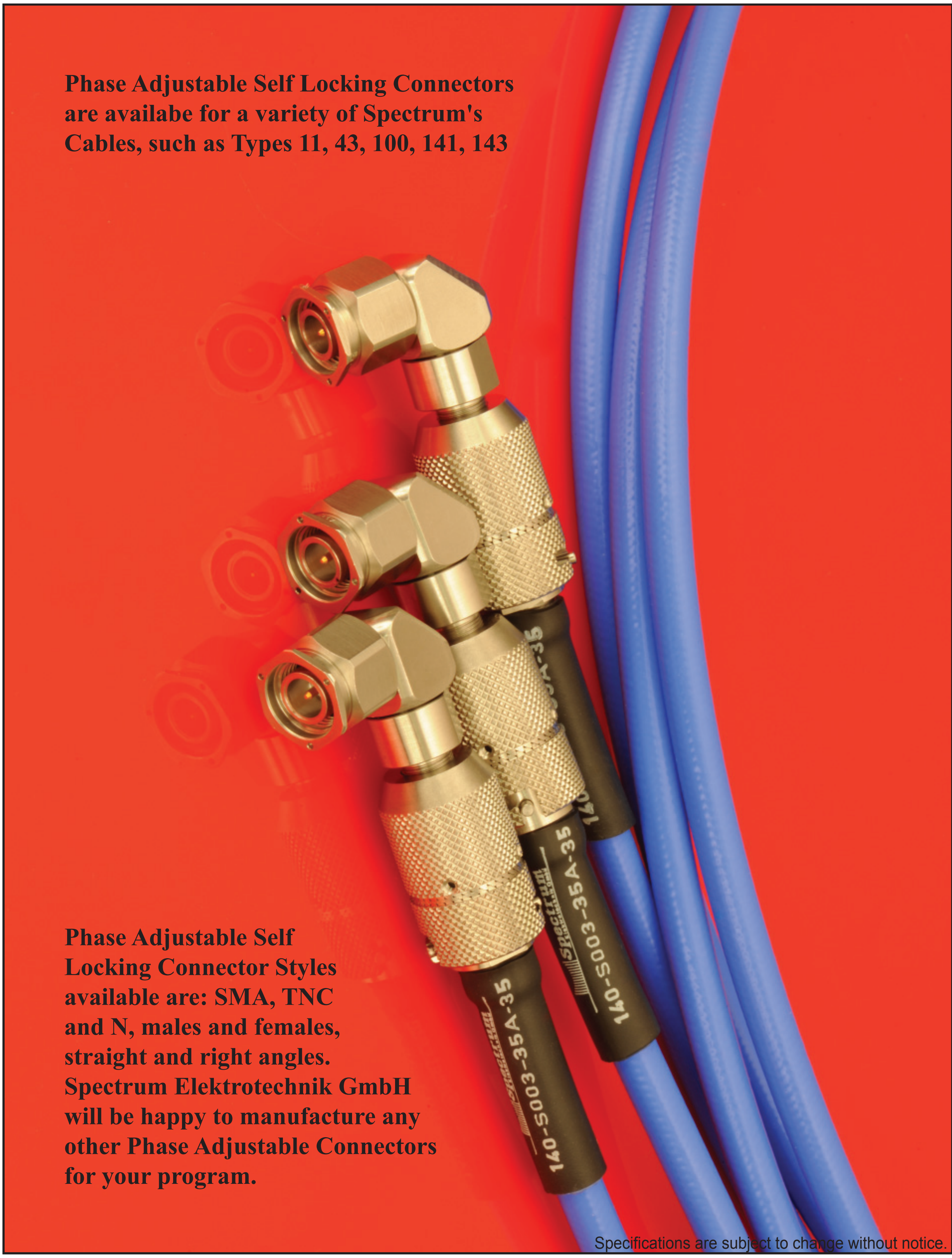
Specification of the Phase Adjustable Self Locking Connectors

Frequency Range	Nom. Phase Shift Deg/GHz/Locking Tooth	No. of Turns	Phase Shift min.	Nom. Phase Shift Deg/GHz/Turn
DC-18.0 GHz	0.015	10	100° @ 18 GHz	0.6
DC-18.0 GHz	0.015	22.5	240° @ 18 GHz	0.6
DC-18.0 GHz	0.015	26	280° @ 18 GHz	0.6

The details about the most used Phase Adjustable Self Locking Connectors by connector code are shown in this table. Please note: The table is not complete.

Connector Code	Connector	Phase Adjustment		Frequency Range
11L	SMA male straight	few degrees	fixed	DC to 4 GHz
11A		100° min. @ 18 GHz	continuous	DC to 18 GHz
11C		240° min. @ 18 GHz		
15L	SMA Right Angle male	few degrees	fixed	DC to 4 GHz
15A		100° min. @ 18 GHz	continuous	DC to 18 GHz
15C		240° min. @ 18 GHz		
31L	TNC male straight	few degrees	fixed	DC to 4 GHz
31A		100° min. @ 18 GHz	continuous	DC to 18 GHz
31C		240° min. @ 18 GHz		
35L	TNC Right Angle male	few degrees	fixed	DC to 4 GHz
35A		100° min. @ 18 GHz	continuous	DC to 18 GHz
35C		240° min. @ 18 GHz		
51L	N male straight	few degrees	fixed	DC to 4 GHz
51A		100° min. @ 18 GHz	continuous	DC to 18 GHz
51C		240° min. @ 18 GHz		
55L	N Right Angle male	few degrees	fixed	DC to 4 GHz
55A		100° min. @ 18 GHz	continuous	DC to 18 GHz
55C		240° min. @ 18 GHz		
80L	SC male straight	few degrees	fixed	DC to 8.5 GHz
80A		55° min. @ 10 GHz	continuous	DC to 8.5 GHz
KMA	2.92 mm male straight	220° min. @ 40 GHz	continuous	DC to 40 GHz

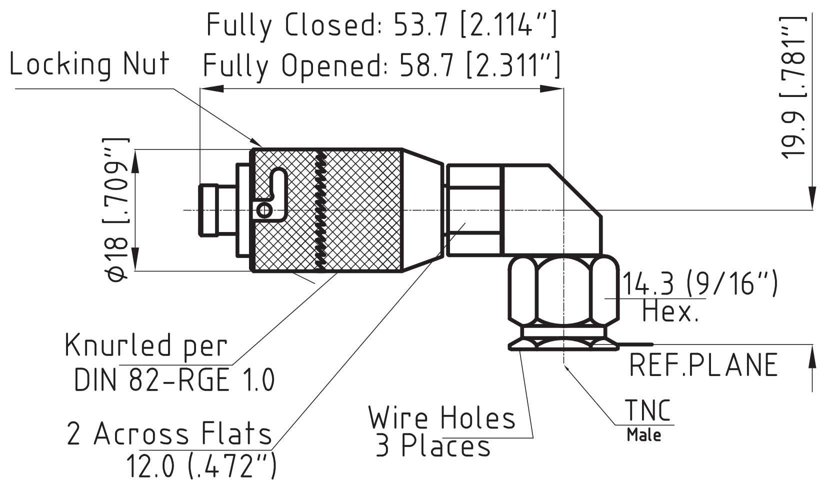
Phase Adjustable Self Locking Connectors are availabe for a variety of Spectrum's Cables, such as Types 11, 43, 100, 141, 143



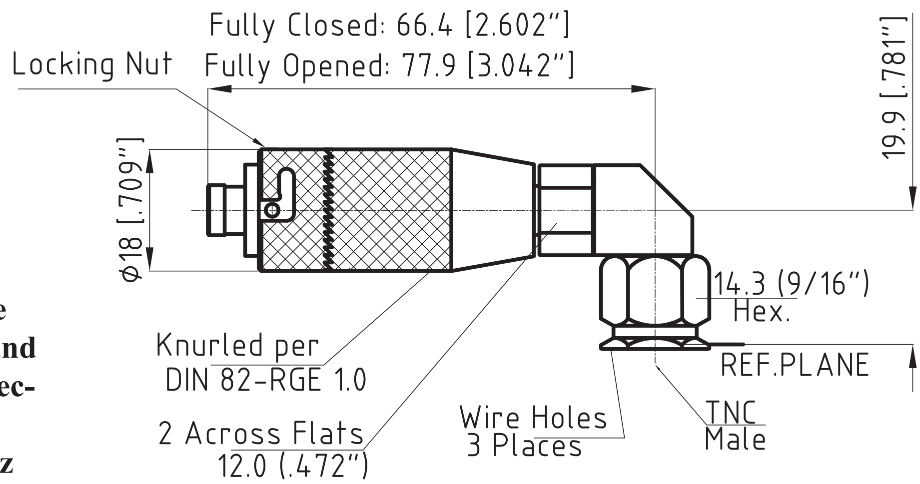
Phase Adjustable Self Locking Connector Styles available are: SMA, TNC and N, males and females, straight and right angles. Spectrum Elektrotechnik GmbH will be happy to manufacture any other Phase Adjustable Connectors for your program.

Specifications are subject to change without notice.

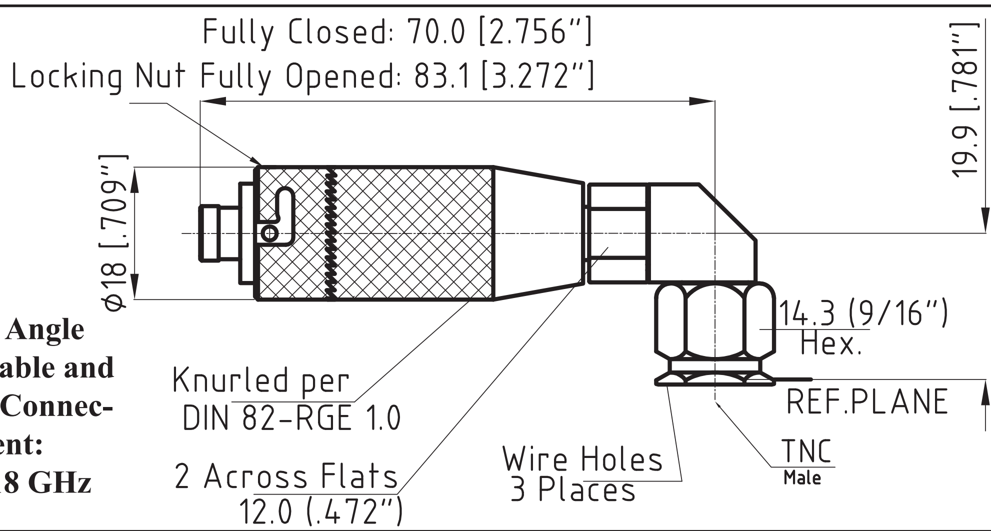
Phase Adjustable Self Locking Connectors



TNCm Right Angle Phase Adjustable and Self Locking Connector, Adjustment: 100° min. @18 GHz



TNCm Right Angle Phase Adjustable and Self Locking Connector, Adjustment: 240° min. @18 GHz



TNCm Right Angle Phase Adjustable and Self Locking Connector, Adjustment: 280° min. @18 GHz

Phase Adjustable Self Locking Connectors

In addition to the Summary of Factory Installed Phase Adjustable Connectors, as seen on page C7, to the left you will find the dimensions of the Right Angle Phase Adjustable Connector of Type TNC male, which has been used in several major programs. As you can see, the dimensions of these Phase Adjustable Connectors have been kept to a minimum, and therefore can easily be used to replace the standard non-adjustable connectors.

The connectors are available with 3 different adjustments, 100° min., 240° min. and 280° min @ 18 GHz.

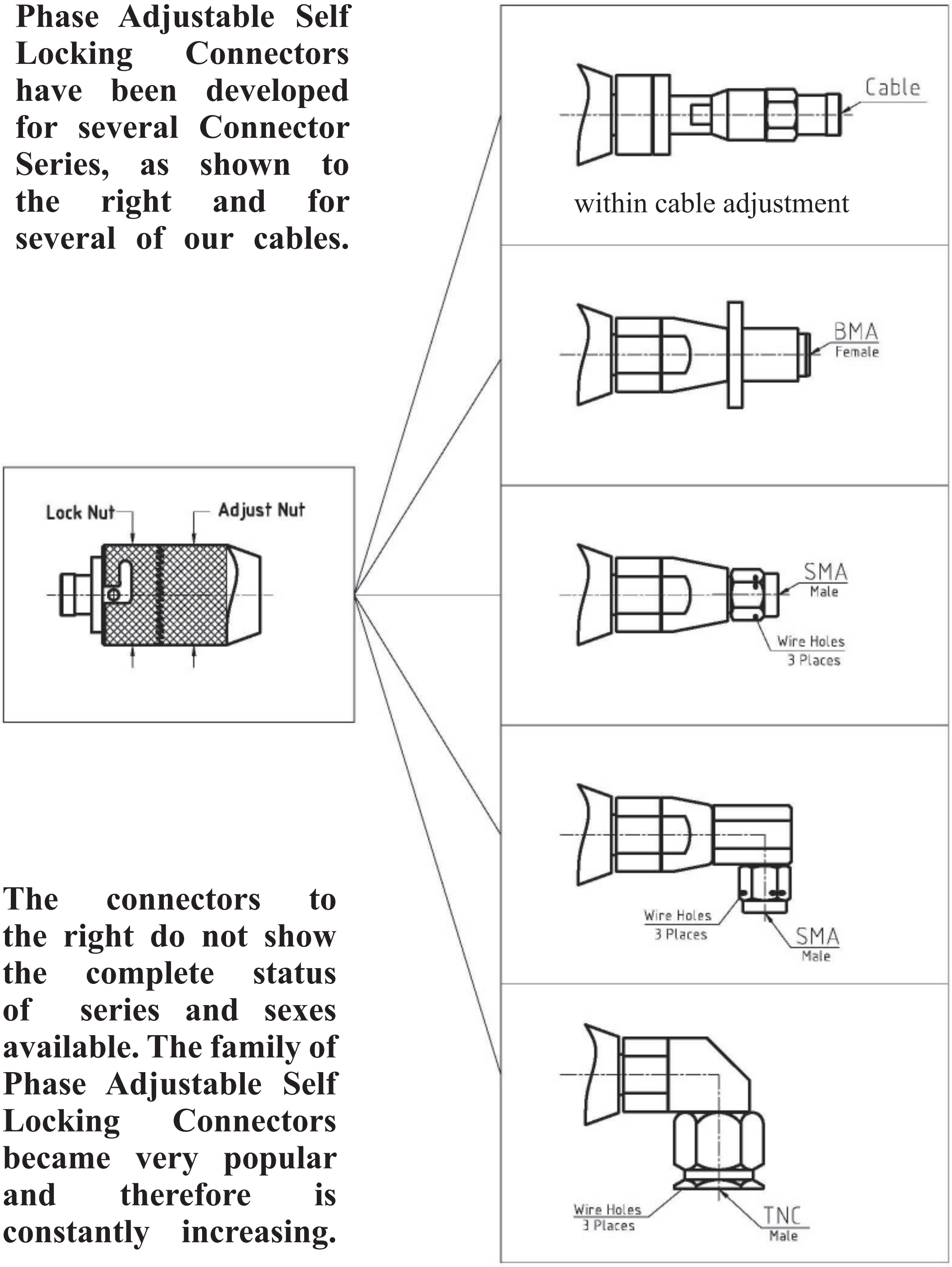
Please do not hesitate to ask for data sheets on the other connectors

Cable of Type 140 assembled with the Right Angle Phase Adjustable and Self Locking Connector, Adjustment 240° at 18 GHz.

Phase Adjustable Self Locking Connectors, connector styles:

C

Phase Adjustable Self Locking Connectors have been developed for several Connector Series, as shown to the right and for several of our cables.

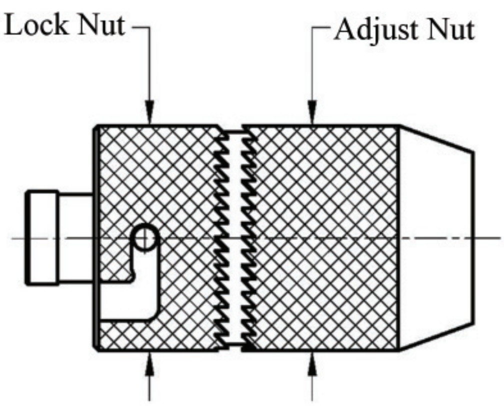


The connectors to the right do not show the complete status of series and sexes available. The family of Phase Adjustable Self Locking Connectors became very popular and therefore is constantly increasing.

Phase Setting Procedure for the Phase Adjustable Self Locking Connectors

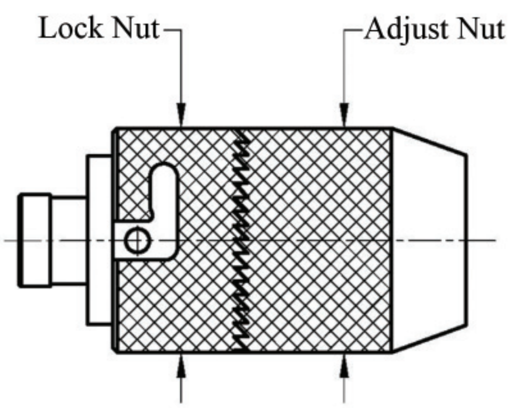
1) The phase of a set of cable assemblies will be set at the factory to customer specification before delivery.
2) After installing and routing the cables in the system, pulling the cables through the wings or the body of an airplane, the phase might have been changed.
3) Please follow the steps A) to 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.

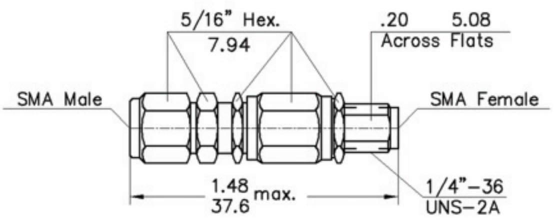
C) When phase has been set, release Lock Nut to keep the Adjust Nut from moving, and to set the phase safely.



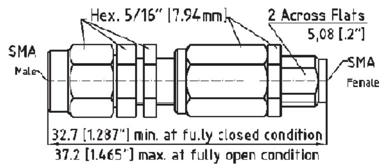
Phase Adjustable Adapters

When adding a Phase Adjustable Adapter to your Cable Assembly or Component, you turn your Cable Assembly or Component into a Phase Adjustable Assembly.

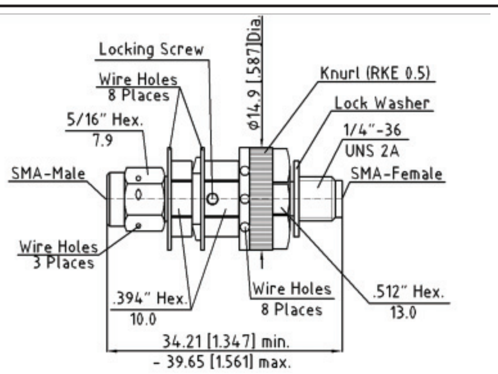
Detailed information about all of Spectrum's Phase Adjusters can be found in the Catalog "Adjusting Phase", or at the Web Site www.spectrum-et.com



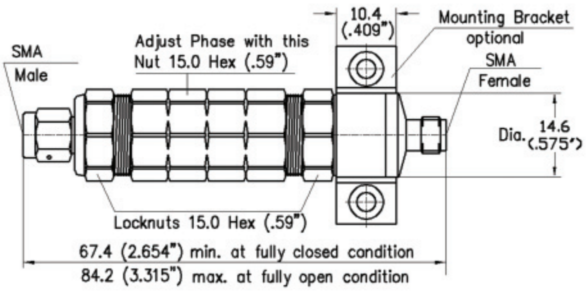
Phase Adjuster of Type LS-0170-1121
Frequency Range: DC-26 GHz
Connector Configuration: SMAm-SMAf
Unit can be taken apart by adjusting over the max. allowed extended position.



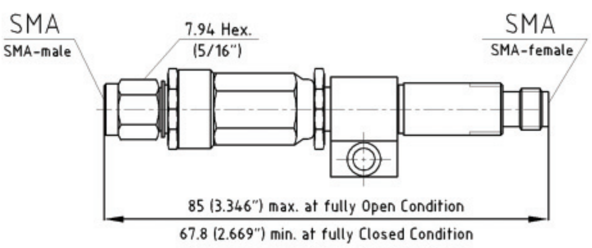
Phase Adjuster of Series LS-0070-.........
Frequency Range: DC-26 GHz
Connector Configuration: SMAm-SMAf; SMAm-SMAm, or SMAf-SMAf
The Units lock in the extended position



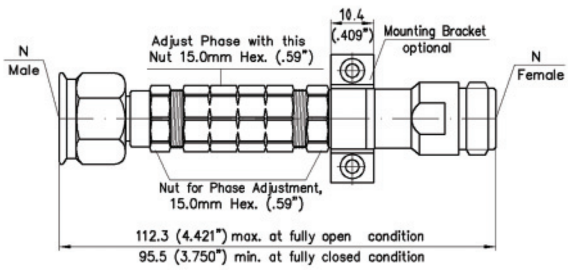
Phase Adjuster, Type LS-S008-1121; Frequency Range: DC-26 GHz; Lockwire Holes everywhere



These Phase Adjusters are available for Frequency Ranges: DC-12 GHz, DC-18 GHz, DC-26 GHz
Connector Configuration: SMAm-SMAf; SMAf-SMAf, or SMAm-SMAm



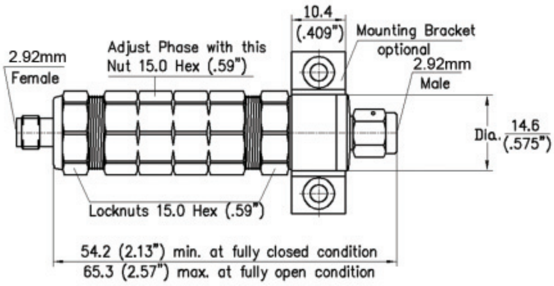
Phase Adjuster of Type LS-0321-1121
Frequency Range: DC-26 GHz
Connector Configuration: SMAm-SMAf



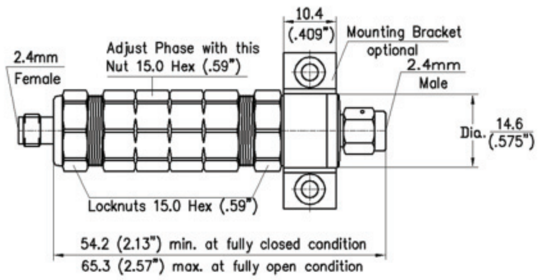
Phase Adjuster of Type LS-0118-5161 and LS-U118-5161; Frequency Range: DC-18 GHz
Connector Configuration: N male/female

Spectrum Elektrotechnik GmbH

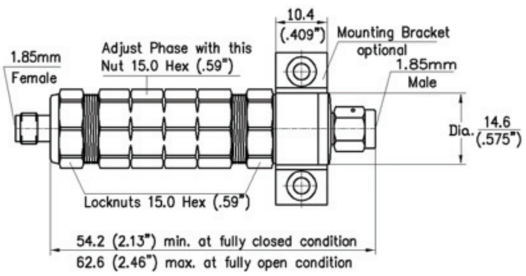
Phase Adjustable Adapters



Phase Adjuster of Type LS-0140-KFKM and LS-P140-KFKM; Frequency Range: DC-40 GHz Connector Configuration: 2.92mm male/female

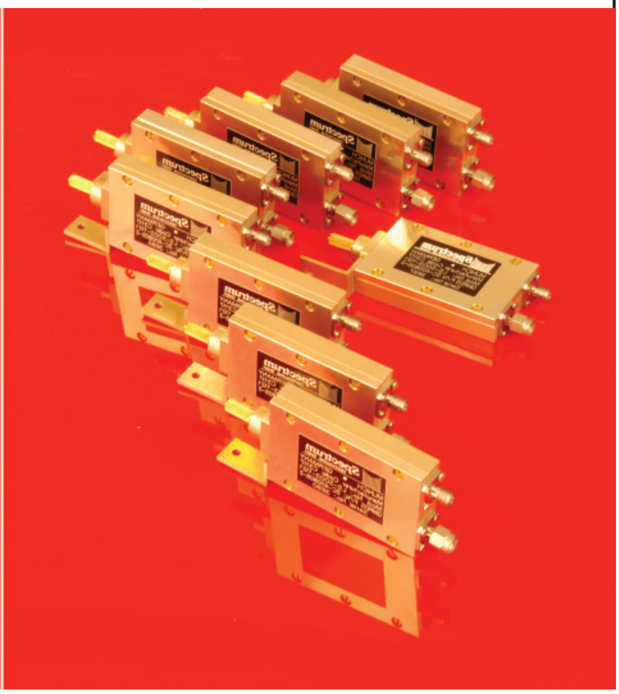


Phase Adjuster of Type LS-0150-HFHM and LS-P150-HFHM; Frequency Range: DC-50 GHz Connector Configuration: 2.4mm male/female



Phase Adjuster of Type LS-0165-VFVM and LS-P165-VFVM; Frequency Range: DC-63 GHz Connector Configuration: 1.85mm male/female

For longer phase adjustment a series of flat housed phase adjusters are available, using SMA Type or N-Type connectors.



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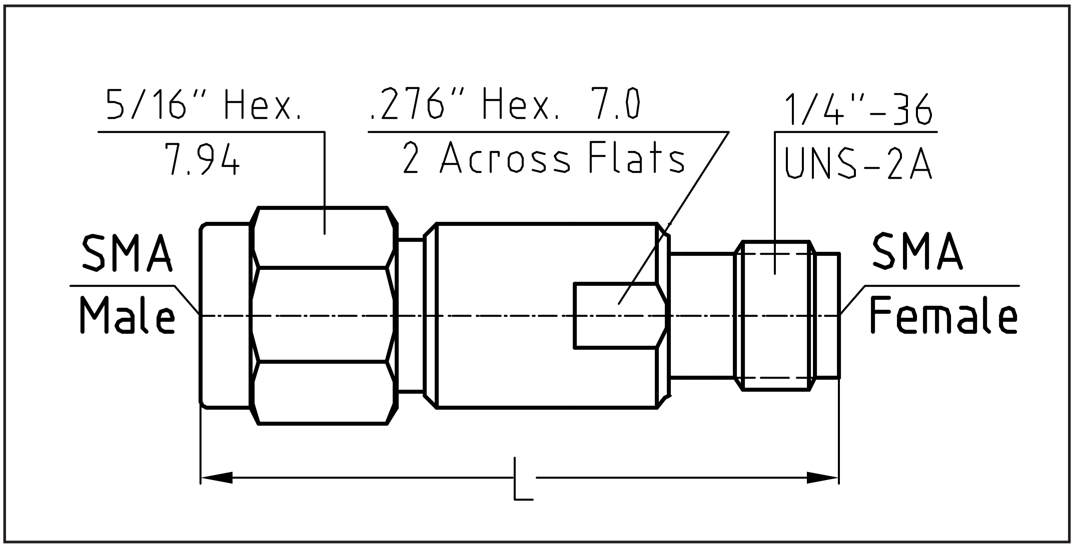
Phase Adjustable Adapters

13 Adapters SMA m/f of different lengths are available for phase matching.



Part Number	Length L in inches	Length L in mm
8035-1121-05	0.948	24.08
8040-1121-05	1.058	26.88
8045-1121-05	1.163	29.53
8050-1121-05	1.270	32.25
8055-1121-05	1.377	34.98
8060-1121-05	1.489	37.83
8065-1121-05	1.597	40.56
8070-1121-05	1.707	43.35
8075-1121-05	1.813	46.04
8080-1121-05	1.921	48.79
8085-1121-05	2.029	51.54
8090-1121-05	2.135	54.24
8095-1121-05	2.246	57.05

Specifications are subject to change without notice.


360° @ 1 GHz
85° @ 2 GHz
520° @ 12 GHz
770° @ 18 GHz
230° @ 12 GHz
350° @ 18 GHz
500° @ 26 GHz
590° @ 40 GHz
400° @ 50 GHz
600° @ 63 GHz
Biggest Family of
Phase Adjusters

Spectrum Elektrotechnik GmbH

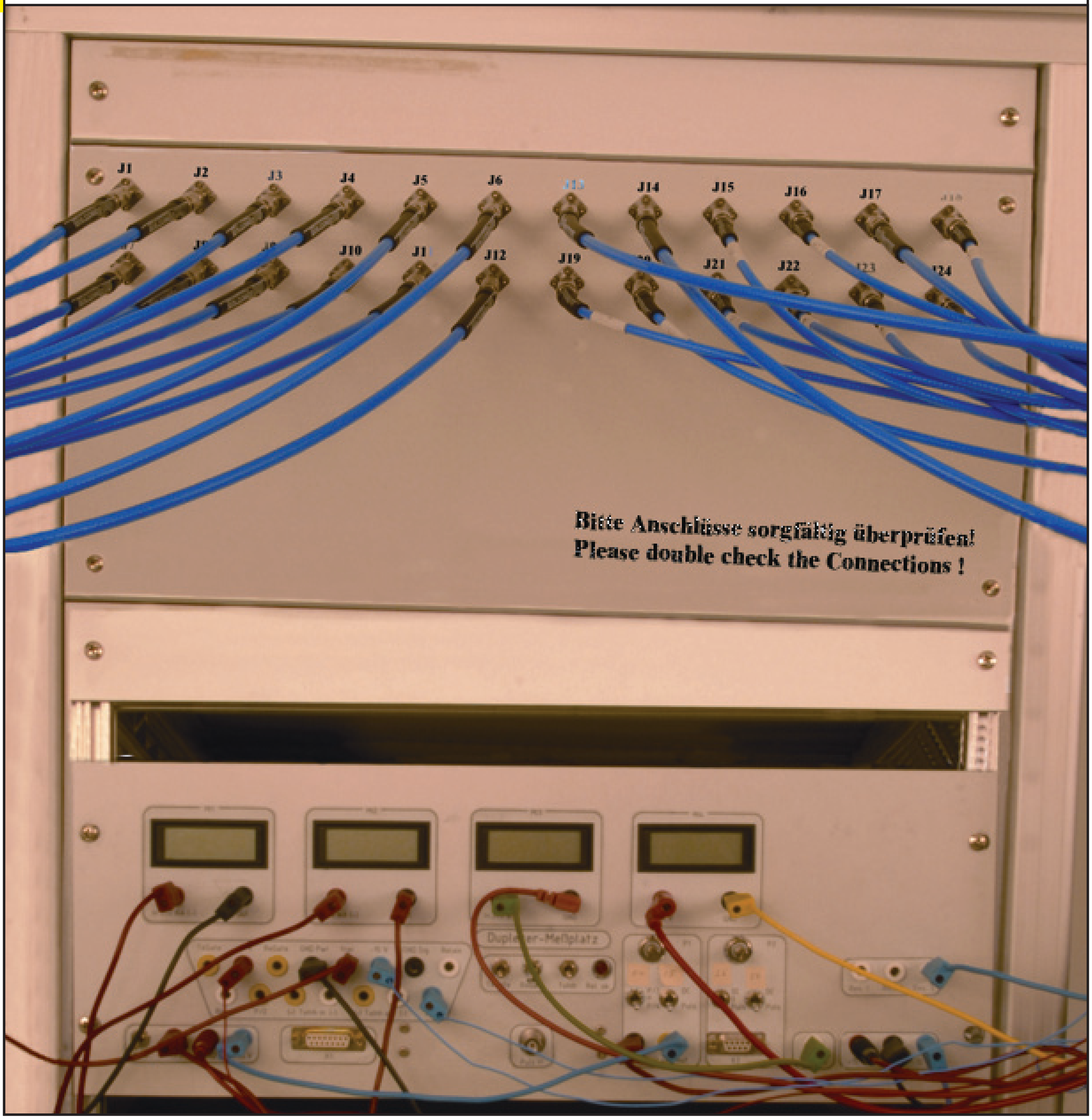
Multipin- / Multiport-Cable Assemblies

D

A quick overview. For details please refer to the complete catalog at www.spectrum-et.com

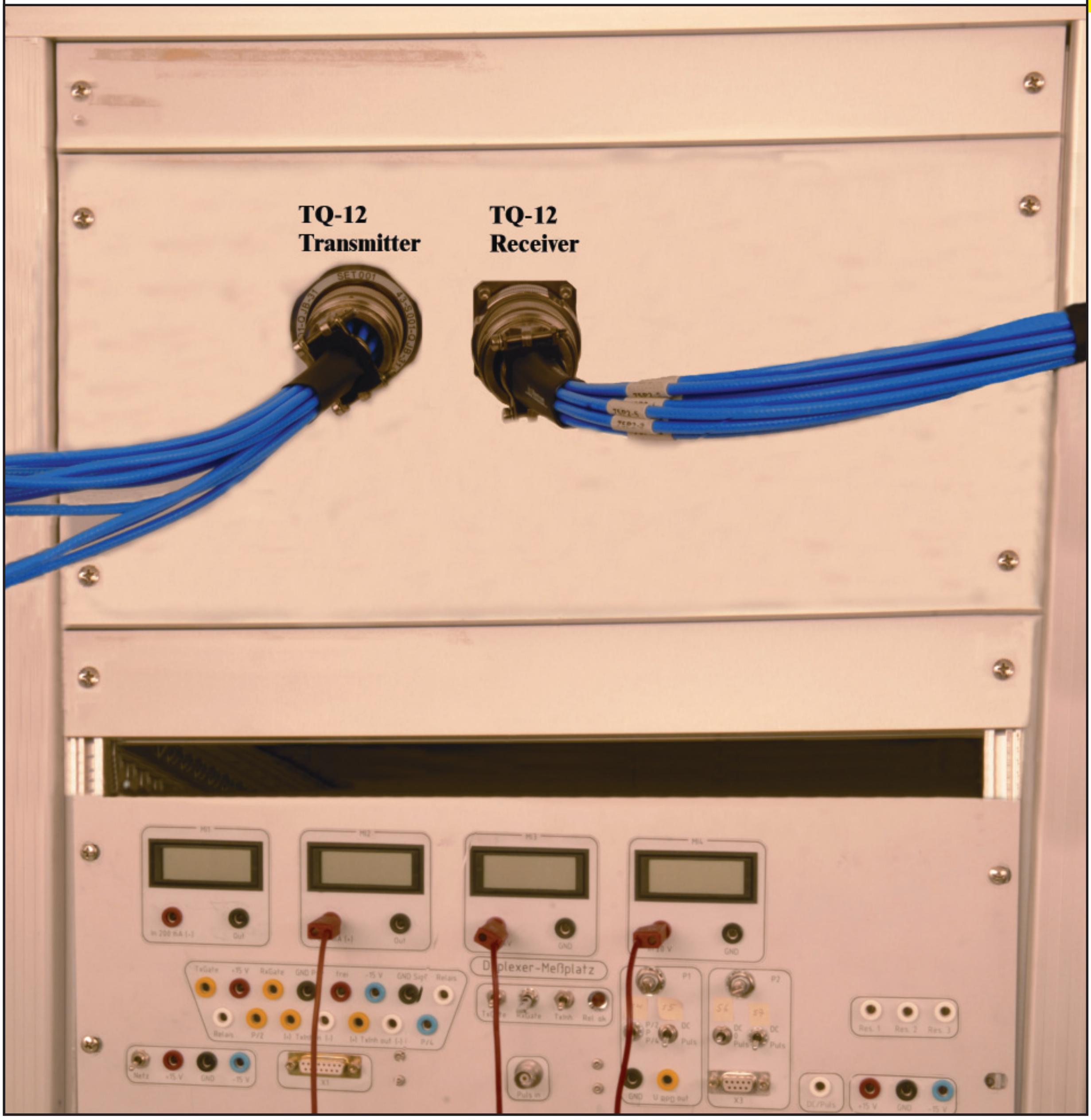
Multipin- / Multiport- Cable Assemblies

The Problem: In various applications many coaxial microwave links have to be connected and disconnected. This means threading and unthreading, torquing and untorquing. Very dense packaging is not possible, as there is still room needed for manual threading and for the use of a torque wrench. All connectors in helicopters and aircrafts usually have to be safely secured, e.g. by wiring the coupling nuts of the connectors, using wire holes, a time-consuming process. Threading and torquing, unthreading and untorquing 24 connections, a time consuming process, and lots of space is needed.



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, connecting all the coaxial cable assemblies at once and in seconds with no need of a torque wrench, no need for safety wires and using minimum space.

24 cable assemblies in 2 connectors, safely connected and disconnected within seconds.



D

The traditional RF Multipin Connector SQ-8, per MIL-DTL-38999, Series III

The traditional model is the SQ-8 Multipin Connector using the circular size 21 shell per MIL-DTL-38999 Series III, supplied with eight (8) coaxial microwave inserts, terminating always one end of each cable assembly. As the inserts are spring loaded and use a bayonet catch, the cable assemblies can be inserted and replaced in seconds. The inserts were designed for Spectrum's Type 11 and Type 43 cables. The SQ-8 does not mate with the TQ-, IQ-, BQ or CQ-Series.

The new RF Multipin Connectors TQ- & IQ- Series, per MIL-DTL-38999, Series III

The new TQ-Series Multipin Connectors are using the circular size 21 shell per MIL-DTL-38999 Series III with four (4) or eight (8) inserts and size 25 with seven (7), ten (10) or twelve (12) inserts allowing the use of four different cables, Type 11, Type 43, Type 100 and Type 141, depending on flexibility and/or loss needed.

The new IQ-Series Multipin Connectors are almost identical with the TQ-series, with one major difference: The outer conductors of the coaxial lines and the connector shell do not use the same ground. So the coaxial lines can be guided in a metal hose, netmesh or armor, for lightening protection. TQ- and IQ-Series do mate with each other.

Specifications are subject to change without notice.

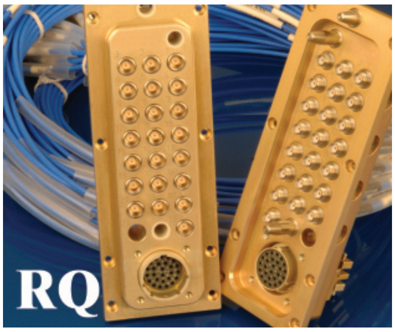
The new RF Multipin Connectors BQ- & CQ- Series, per MIL-DTL-38999, Series I

The new BQ-Series Multipin Connectors are almost identical with the TQ-Series. The only difference is in the shell. The BQ-Series do use the Bayonet catch shell per MIL-DTL-38999 Series I instead of the thread on shell per MIL-DTL-38999 Series III.

The new CQ-Series Multipin Connectors are almost identical with the BQ-Series, having one major difference: The outer conductor of the coaxial cable assemblies and the connector shell per MIL-DTL-38999 series 1 are not using the same ground. The coaxial lines can be guided in a metal hose, net mesh or armor, connected to the shells for lightening protection. TQ-,IQ-, BQ-, and CQ-Series mate with each other.

The rectangular RQ-Series using 23 RF lines & 26 DC or low frequency Signal lines

The new RQ-Series Multipin Connectors are using a rectangular shell developed by Spectrum Elektrotechnik GmbH, allowing the dense packaging of twenty-three (23) coaxial cable assemblies plus twenty-six (26) signal lines in one connector, using Type 11 and/or Type 43 coacial cable and AWG20 wire for the lower frequency signals or supplies.




The traditional
RF Multipin Connector
SQ-8
Circular Multipin Connector guiding 8 Coaxial Lines
in a MIL - DTL - 38999 Shell of size 21, Series III
SQ-8 traditional

D

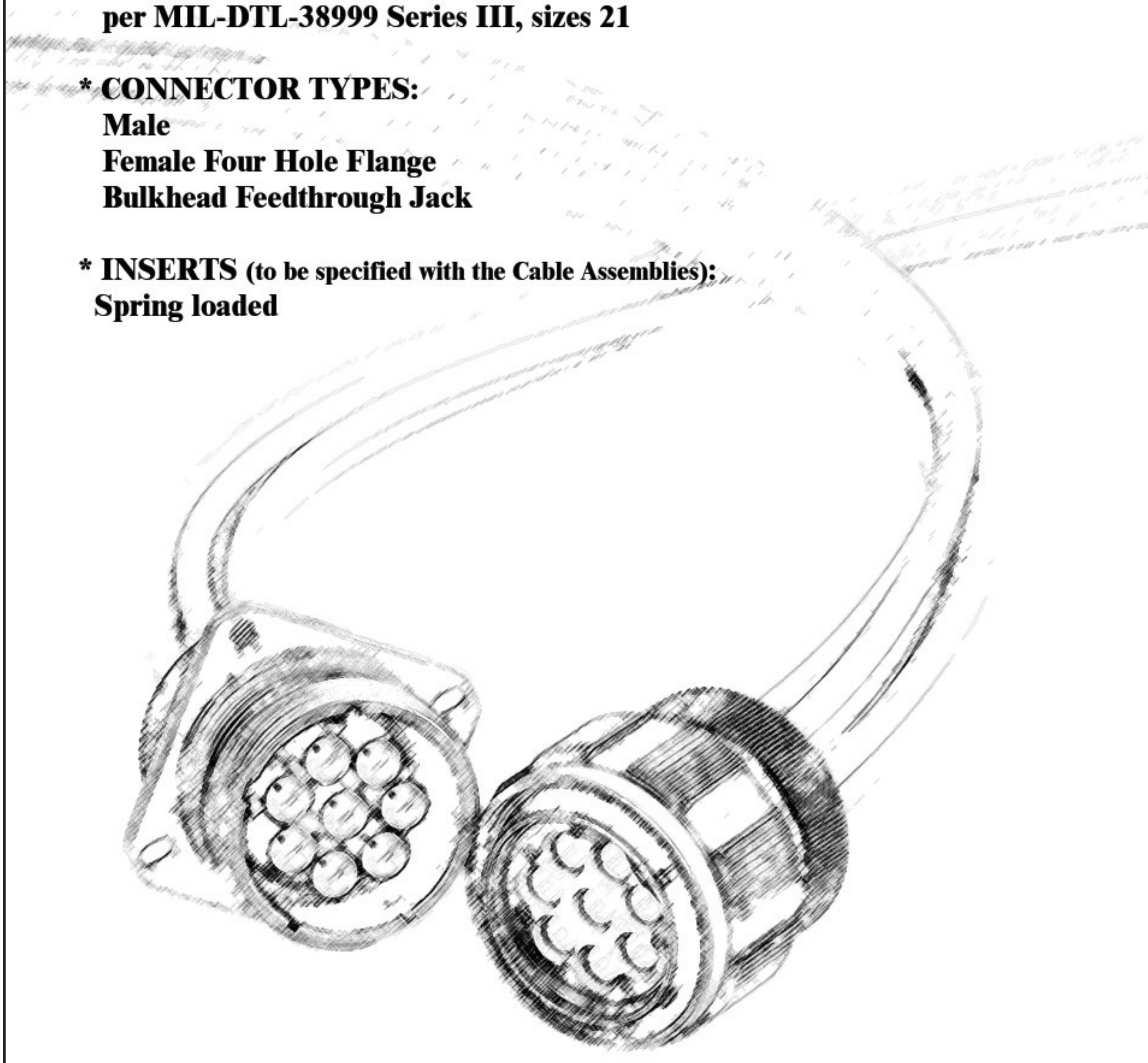
SQ-8

FEATURES

* **SHELLS:**
  per MIL-DTL-38999 Series III, sizes 21

* **CONNECTOR TYPES:**
  Male
  Female Four Hole Flange
  Bulkhead Feedthrough Jack

* **INSERTS** (to be specified with the Cable Assemblies):
  Spring loaded



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Spectrum Elektrotechnik GmbH

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TQ-Series

FEATURES

* **SHELLS:**
  per MIL-DTL-38999 Series III, sizes 21 and 25

* **CONNECTOR TYPES:**
  Male
  Female Four Hole Flange
  Bulkhead Feedthrough Jack
  and also pressurized versions of the Female Four Hole Flange and the Bulkhead Feedthrough Jack

* **INSERTS (to be specified with the Cable Assemblies):**
  Spring loaded
  Limited spring loaded
  Fixed
  Pressurized


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PEDESTAL

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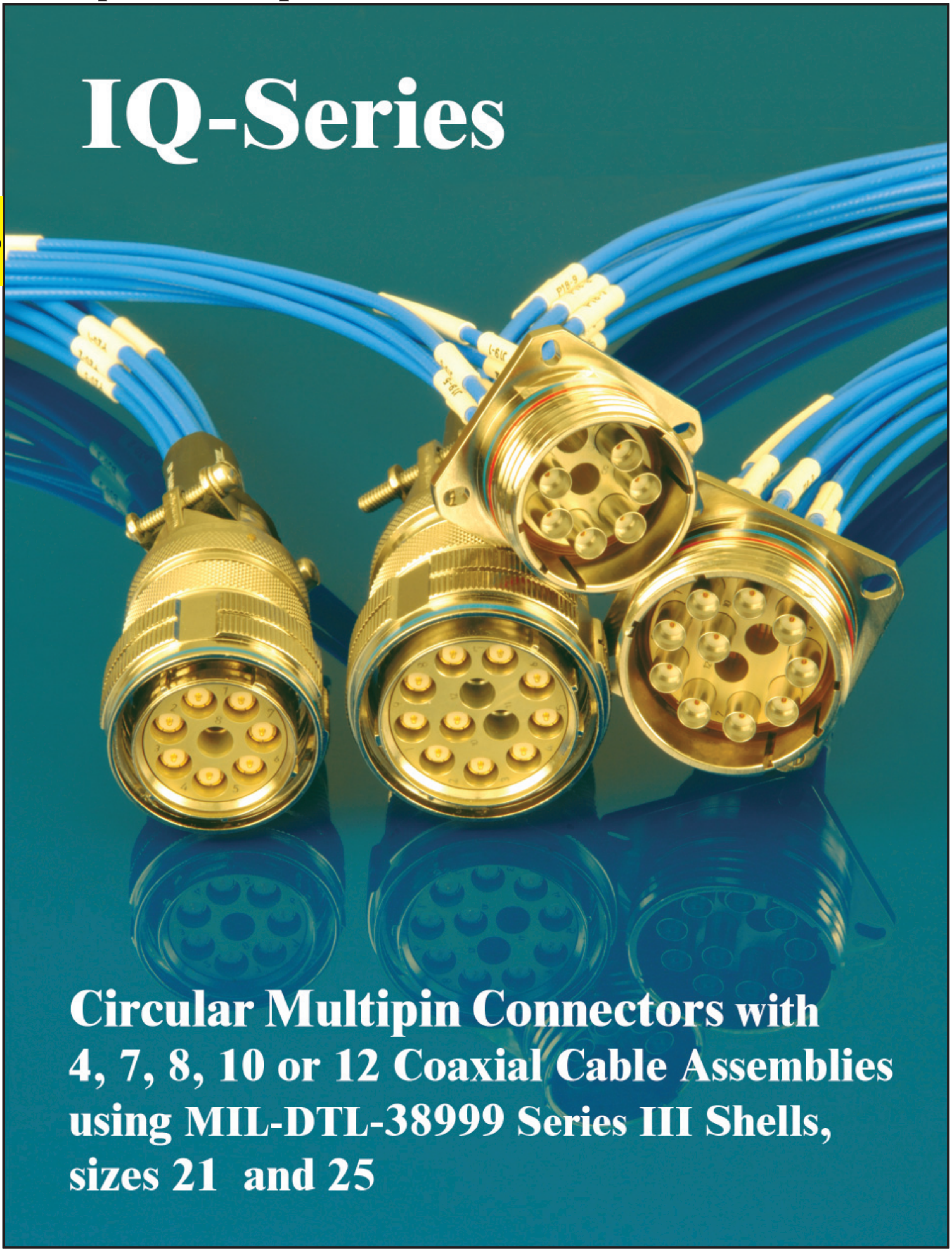
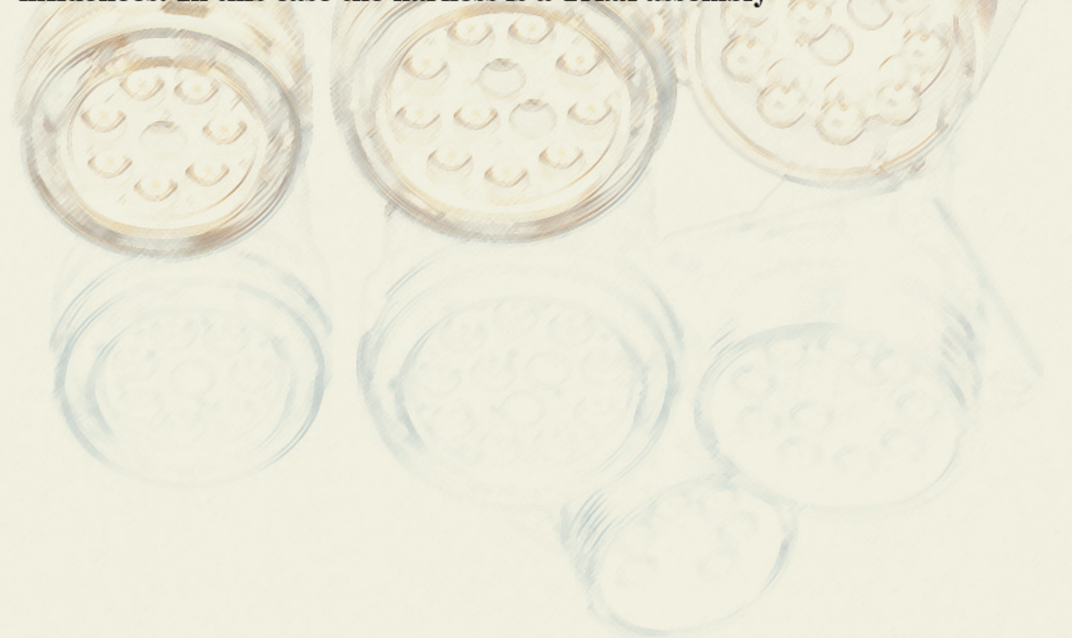

IQ-Series
Circular Multipin Connectors with
4, 7, 8, 10 or 12 Coaxial Cable Assemblies
using MIL-DTL-38999 Series III Shells,
sizes 21 and 25

IQ-Series

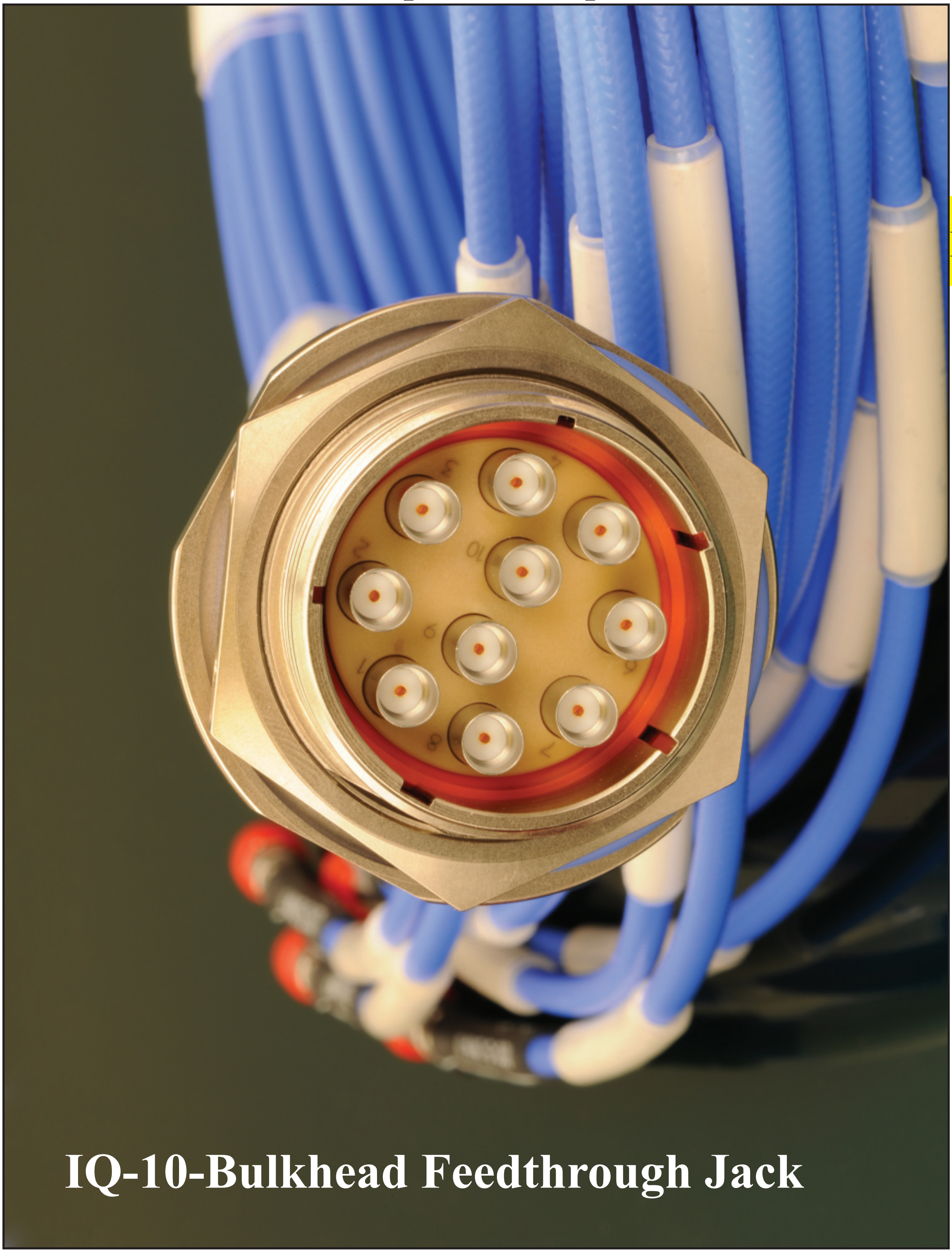
The TQ-Series and the IQ-Series are identical with just one major difference, the grounding of the assemblies.

TQ-Series:
The connector Body of the MIL-DTL-38999 Series III Shell and the outer conductors of the coaxial cable assemblies are using one common ground.

IQ-Series:
The connector Body of the MIL-DTL-38999 Series III Shell and the outer conductors of the coaxial cable assemblies are insulated from each other. Guiding the coaxial lines in metal armor or net mesh will protect the coaxial signal lines from lightning or other influences. In this case the harness is a Triax assembly

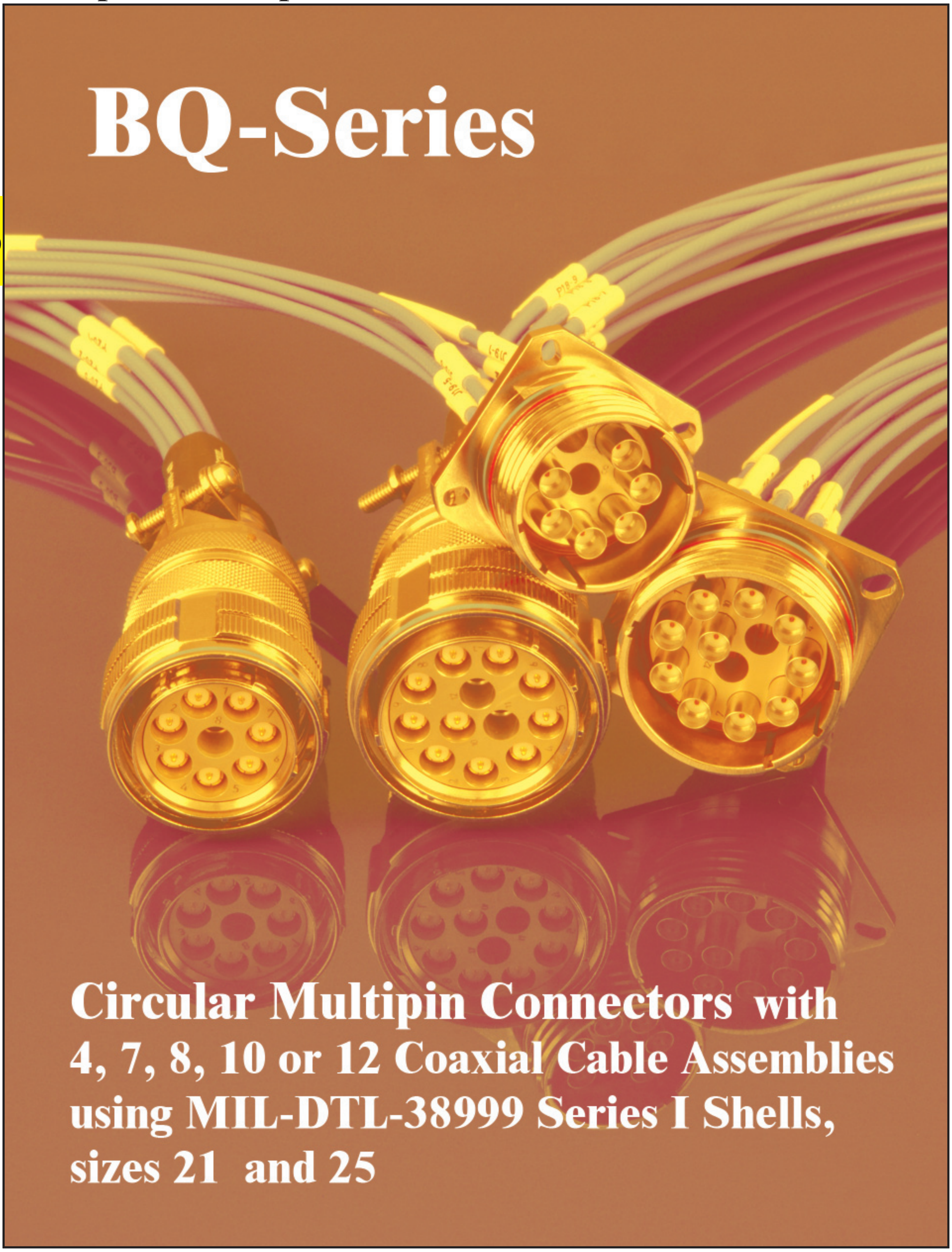



IQ-7 Male
1
2
3
4
5
6
7



IQ-10-Bulkhead Feedthrough Jack

D



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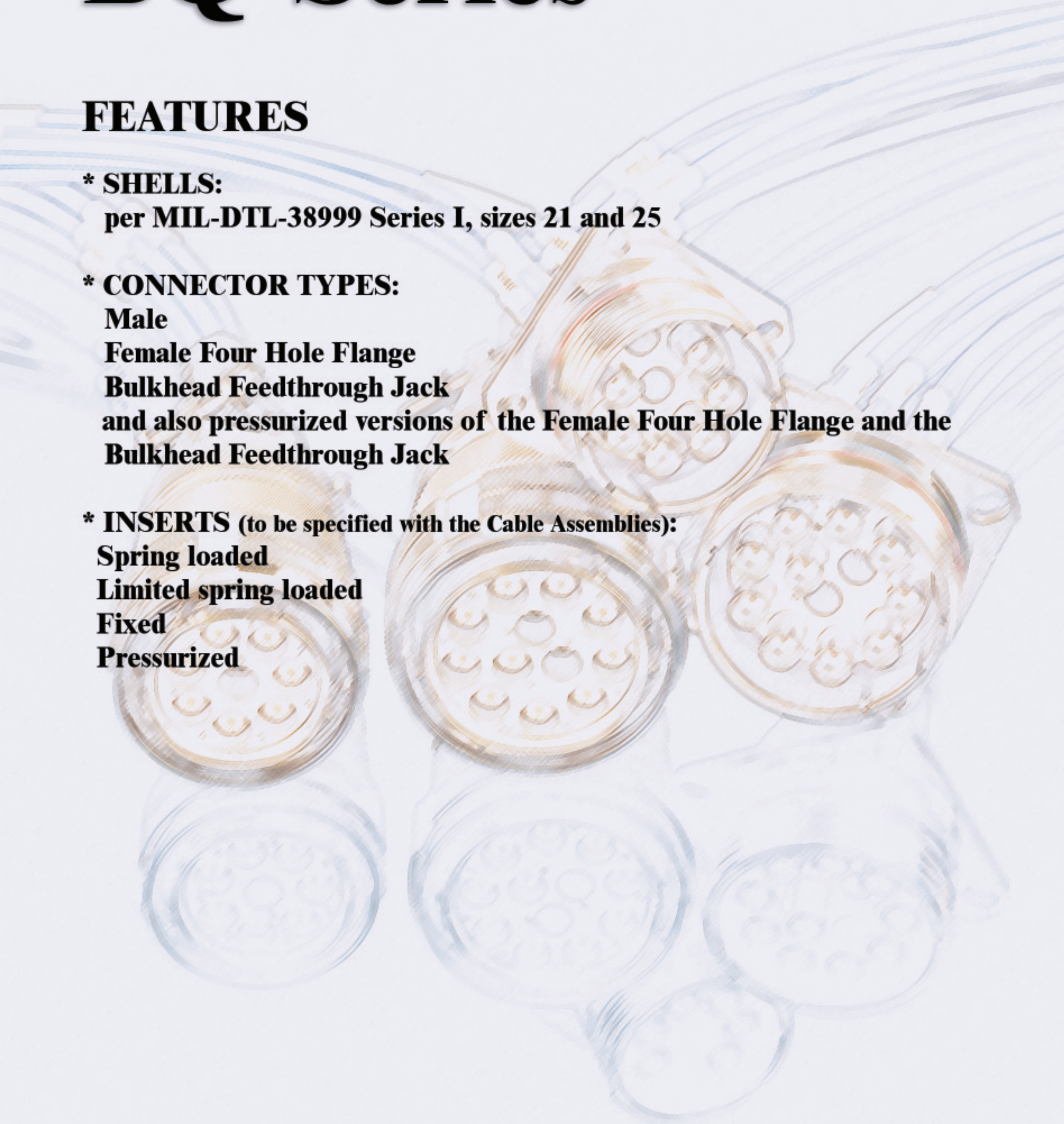
BQ-Series

FEATURES

* SHELLS:
  per MIL-DTL-38999 Series I, sizes 21 and 25

* CONNECTOR TYPES:
  Male
  Female Four Hole Flange
  Bulkhead Feedthrough Jack
  and also pressurized versions of the Female Four Hole Flange and the Bulkhead Feedthrough Jack

* INSERTS (to be specified with the Cable Assemblies):
  Spring loaded
  Limited spring loaded
  Fixed
  Pressurized



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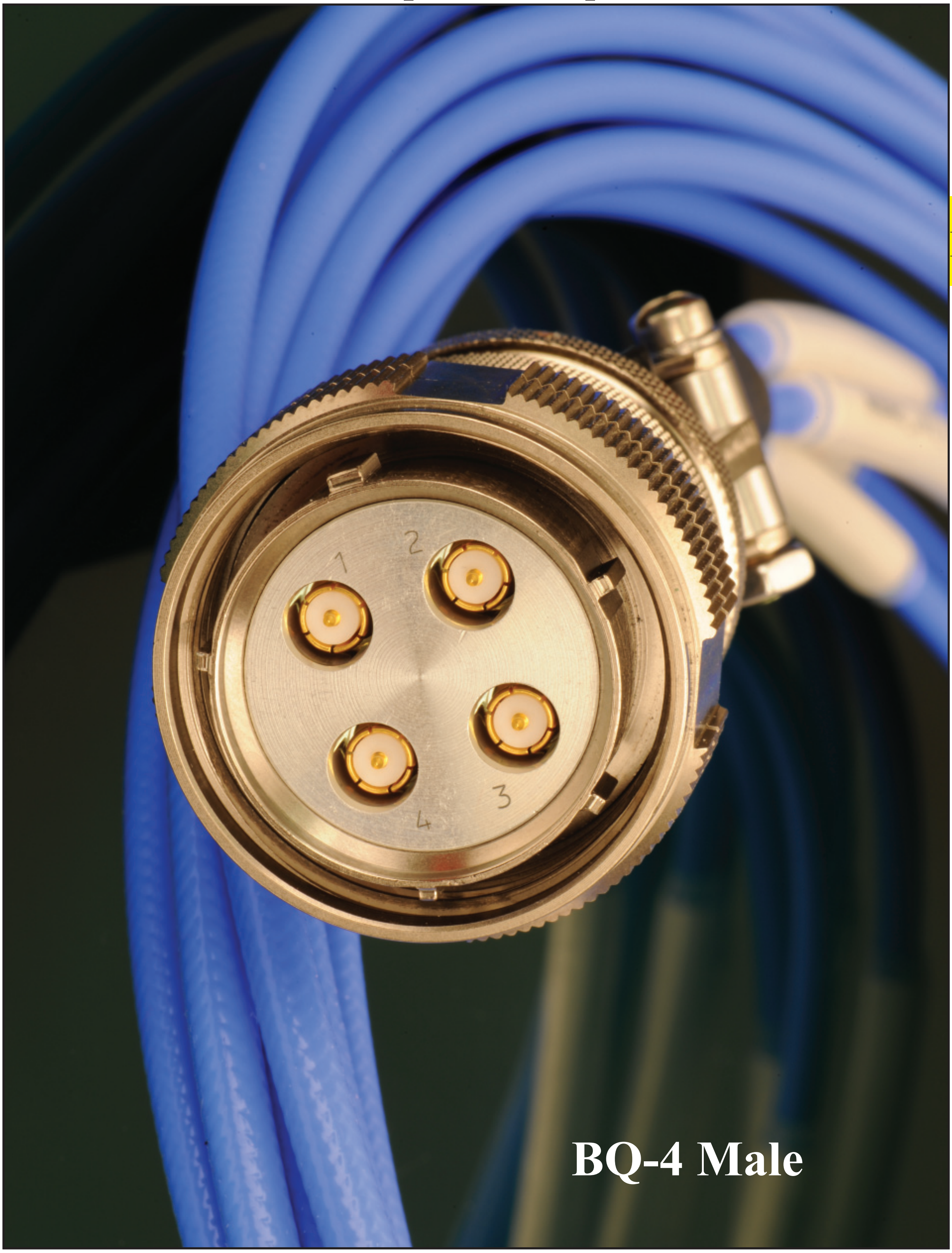
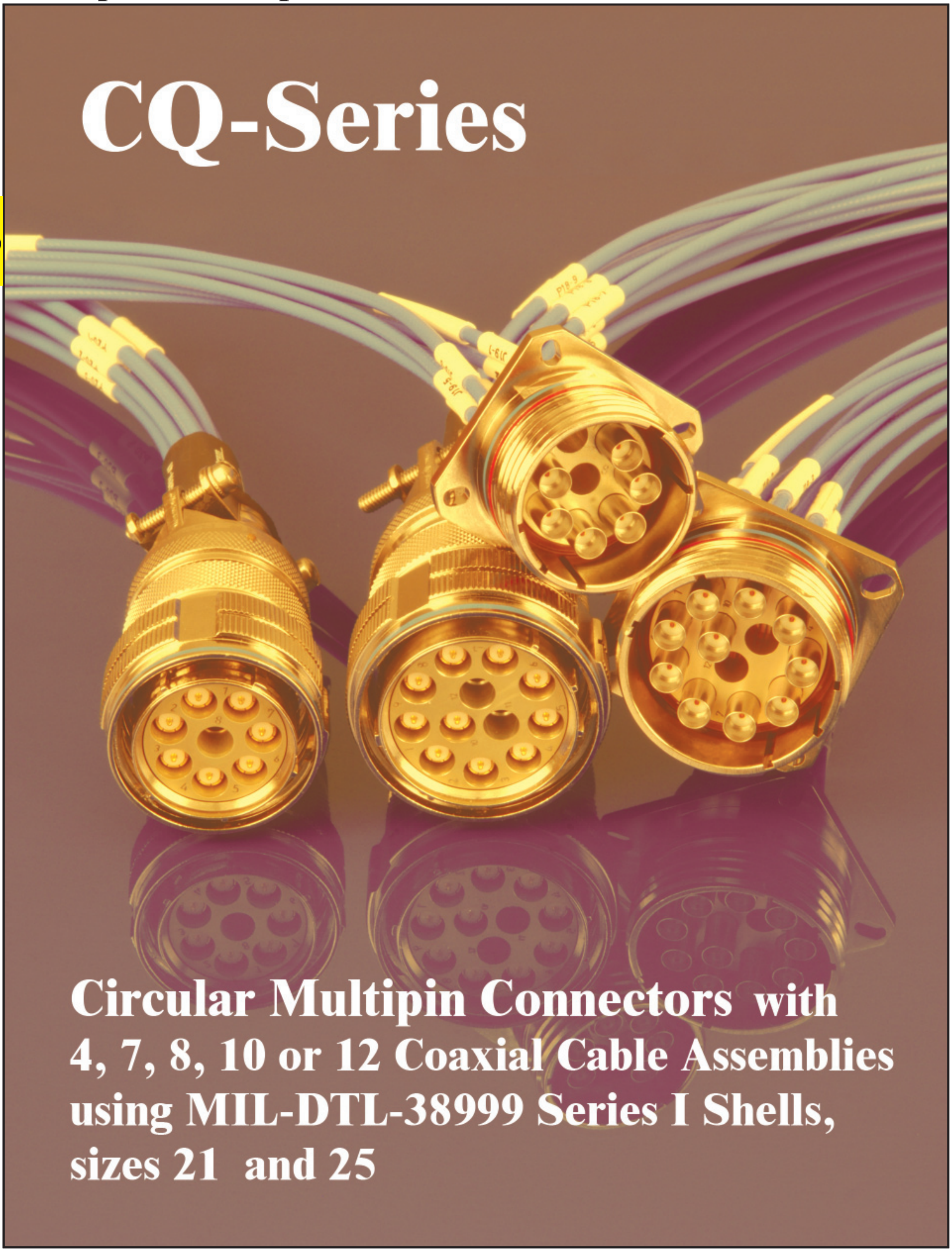


CQ-Series



Circular Multipin Connectors with 4, 7, 8, 10 or 12 Coaxial Cable Assemblies using MIL-DTL-38999 Series I Shells, sizes 21 and 25

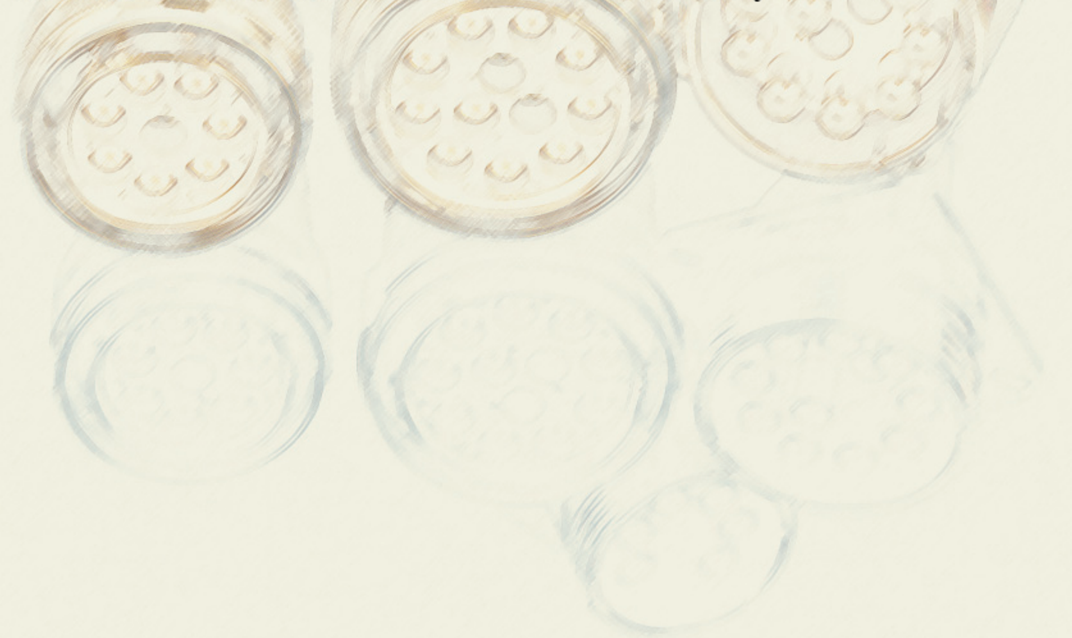
D

CQ-Series

The BQ-Series and the CQ-Series are identical with just one major difference, the grounding of the assemblies.

BQ-Series:
The connector Body of the MIL-DTL-38999 Series I Shell and the outer conductors of the coaxial cable assemblies are using one common ground.

CQ-Series:
The connector Body of the MIL-DTL-38999 Series I Shell and the outer conductors of the coaxial cable assemblies are insulated from each other. Guiding the coaxial lines in metal armor or net mesh will protect the coaxial signal lines from lightning or other influences. In this case the harness is a Triax assembly



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Build your own Multipin/Multiport Connector

Part Number System of the traditional SQ-Multipin/Multiport Connecto

1 & 2	3	4		5	
Series		Shell Size	Number of Inserts	Sex	
SQ	- = straight + = 90° angled	21	8	M	Male
				F	Fem. 4-Hole Front M
				R	Fem. 4-Hole Rear M
				B	**Bulkhead Feedthroug**

Part Number System of the TQ-, IQ-,BQ-, and CQ-Multipin/Multiport Conn

1 & 2	3	4							5	
Series		Remarks	Number of Inserts						Sex	
TQ	- = straight + = 90° angled	No of Inserts	4	4	7	8	10	12		
		Codes	F	4	7	8	T	Z	M	Male
		Shell Sizes	25	21	25	21	25	25	F	Female 4-Hole Front Mo
IQ		Cable Types	141	11 43 100	11 43 100	11 43	11 43 100	11 43	R	Female 4-Hole Rear Mo
BQ									B	Bulkhead Feedthrough J
CQ										

Part Number System of the RQ-Multipin/Multiport Connector. The Pa

1 & 2	3	4	5	
RQ	-	R = 23max	M	Male
			F	Female

by using the Table below.

:or. The Part Number consists of 12 digits, e.g. SQ-8M0-B11NN

	6		7	8		9 and 10		11	12	
	Pressure			Back Body		Cable Type		Key	Surface Treatment	
	0	Normal	-	B	Bayonet	11	Type 11	N	N	Nickel
								A		
t Mount						43	Type 43	B	C	Cadmium
r Mount								C		
ough Jack								D		

D

nectors. The Part Number consists of 12 digits, e.g. TQ-TM0-T10NC

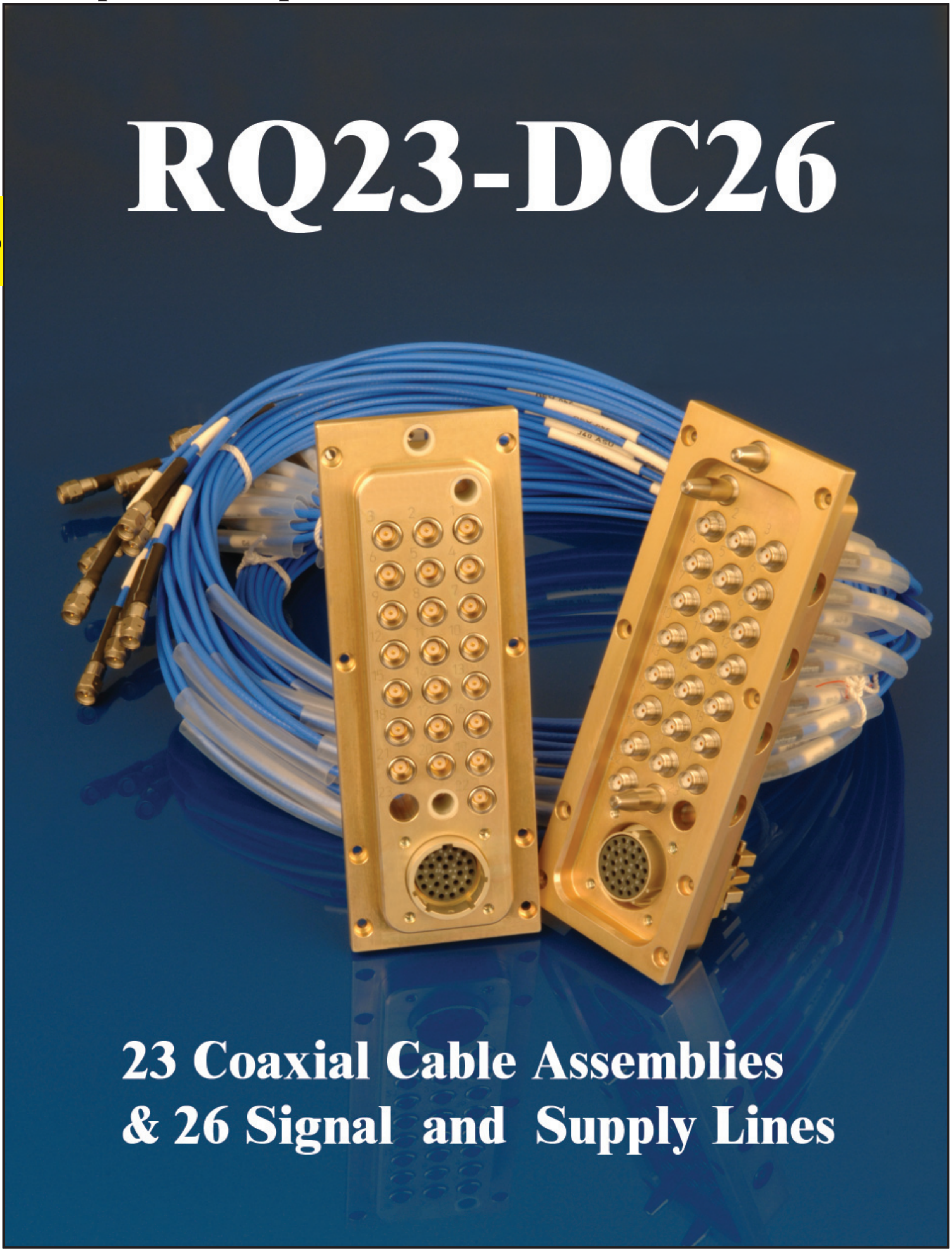
	6		7	8		9 and 10		11	12	
	Pressure			Back Body		Cable Type		Key	Surface Treatment	
				B	Bayonet	10	Type 10	N	N	Nickel
	0	Normal		T	Thread Fixed	11	Type 11	A		
Mount	P	Pressurized				43	Type 43	B		
Mount	H	Hermetic	-	L	Limited Spring Load Thread	2S	Times SFT 205	C	C	Cadmium
						1N	Type 102	D		
						10	Type 100			
d						41	Type 141			
Jack						42	SFT142			

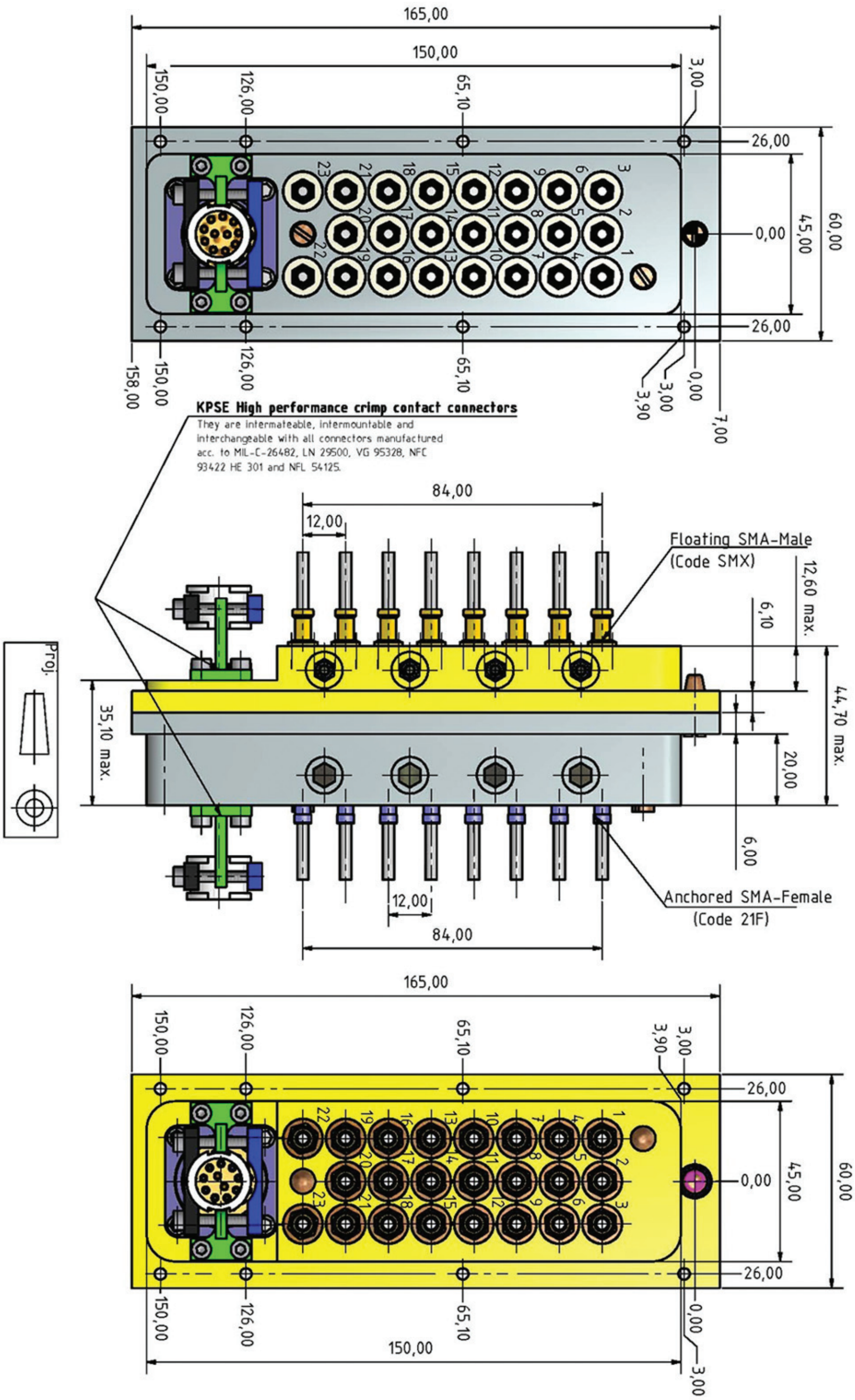
'art Number consists of 12 digits, e.g. RQ-RM0-T110S

	6		7	8		9 and 10		11	12	
	0	Normal	-	T	Thread	11	Type 11	0	G	Gold Chrom.
						43	Type 43		S	Surtech

Kabelka

D


RQ23-DC26
23 Coaxial Cable Assemblies
& 26 Signal and Supply Lines


165,00
150,00
3,00
150,00
126,00
65,10
26,00
0,00
45,00
60,00
158,00
3,90
7,00
KPSE High performance crimp contact connectors
They are intermateable, intermountable and interchangeable with all connectors manufactured acc. to MIL-C-26482, LN 29500, VG 95328, NFC 93422 HE 301 and NFL 54125.
84,00
12,00
Floating SMA-Male
(Code SMX)
12,60 max.
6,10
44,70 max.
35,10 max.
20,00
6,00
Proj.
Anchored SMA-Female
(Code 21F)

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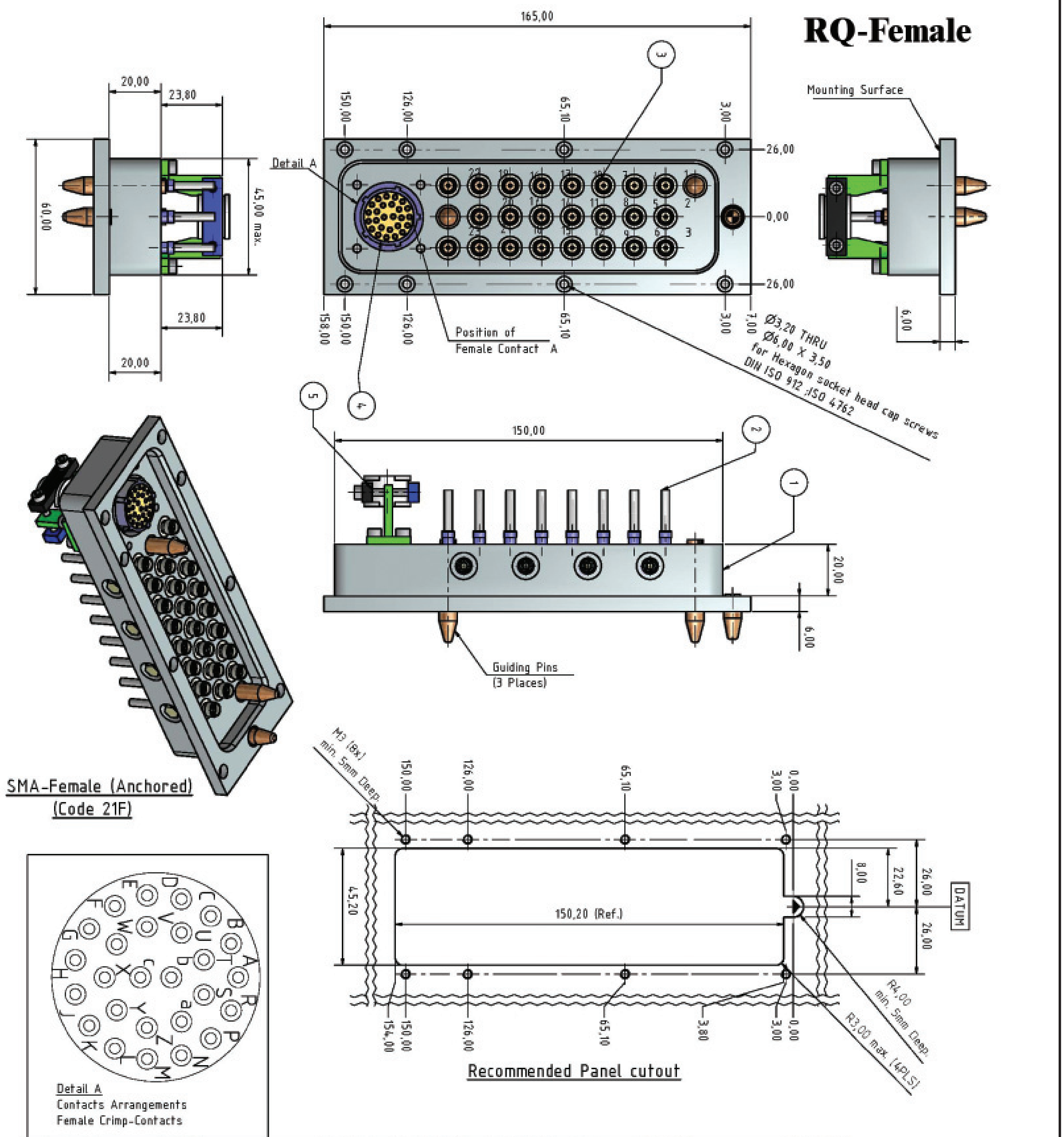
D

RQ-Female



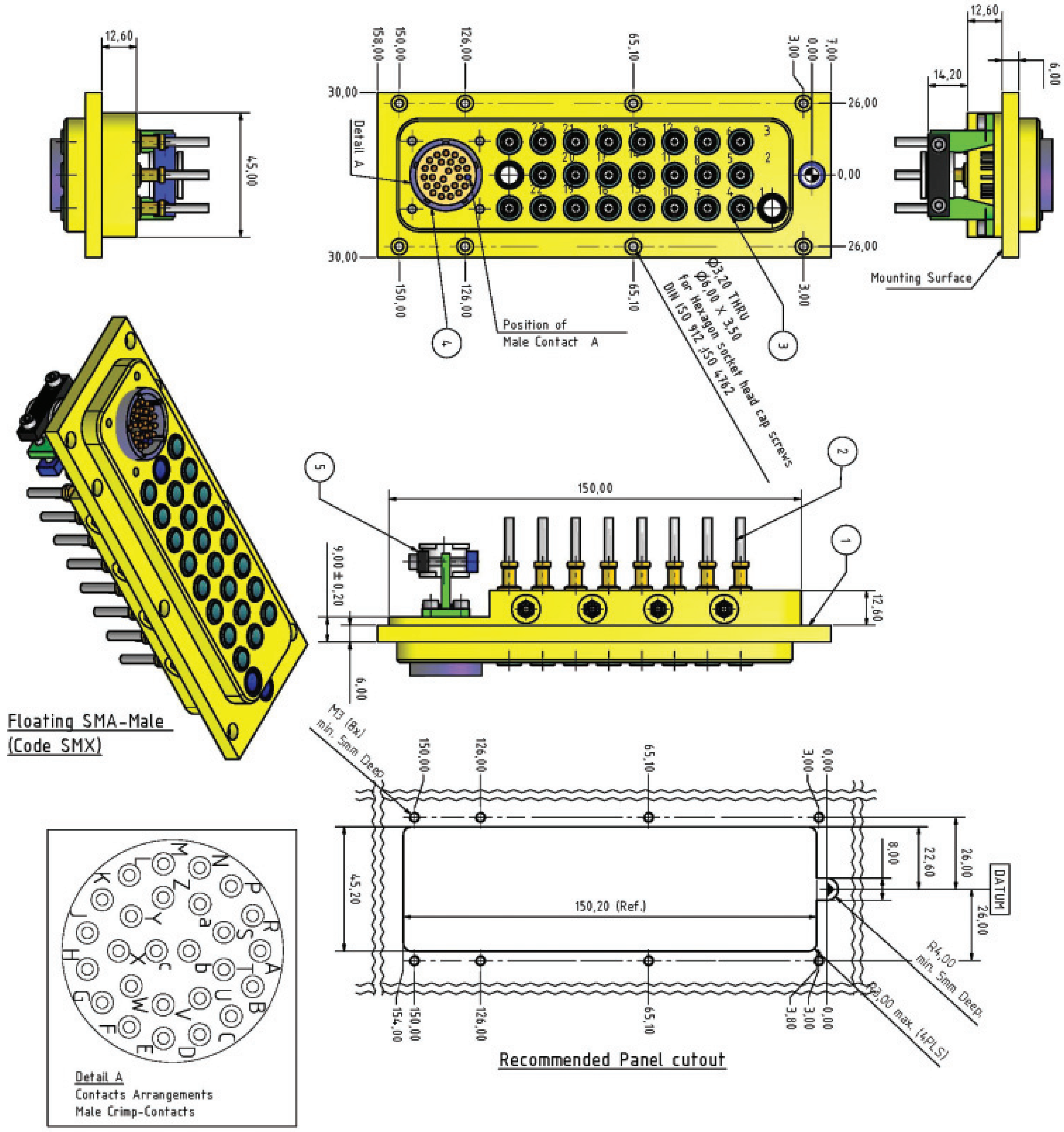
ITEM	Qty.	PART NUMBER		DESCRIPTION		MATERIAL AND FINISH	
5	1	07-146-Z		Back Shell for AWG20-22		Material: AlMg4.5Mn; Alodine	
4	1	07-058-Z		Receptacle Housing 06-KPT/KPSE-16 (26 Pole) With 26 Crimp Contacts AWG-20		Receptacle Housing:Interface Per MIL-C-26482 / VG95328 ;Alodine (or Anodized Finish) With Crimp Contacts AWG-20 Gold Plated.	
3	23	RQ23-2101-02	RQ23-2102-02	SMA-Female Anchored		Interface Per MIL-STD- 348A.Fig.310.2	
2	23	TYP 11	TYP 43	Cable Typ 11	Cable Typ 43	Spectrum TYP 11	Spectrum TYP 43
1	1	07-058-1		Housing		Material: AlMg4.5Mn; Alodine	

DESCRIPTION	SPECIFICATIONS
INSERTION AND WITHTDRAWAL OF WHOLE CONNECTOR	150 N max.
DURABILTY	200 CYCLES MIN.

Tolerances ± 0.05mm

Proj.

RQ-Male



DESCRIPTION	SPECIFICATIONS
INSERTION AND WITHTDRAWAL OF WHOLE CONNECTOR	150 N max.
DURABILTY	200 CYCLES MIN.

Proj.

Tolerances ± 0.05mm

ITEM	Qty.	PART NUMBER		DESCRIPTION		MATERIAL AND FINISH	
5	1	07-146-Z		Back Shell for AWG20-22		Material: AlMg4.5Mn; Alodine	
4	1	07-057-Z		Receptacle Housing 02-16KPT (26 Pole) With 26 Crimp Contacts AWG-20		Receptacle Housing:Interface Per MIL-C-26482 / VG95328 ;Alodine (or Anodized Finish) With Crimp Contacts AWG-20 Gold Plated.	
3	23	RQ23-1101-02	RQ23-1102-02	SMA-male floating mount		Interface Per MIL-STD- 348A.Fig.310.1	
2	23	TYP 11	TYP 43	Cable Typ 11	Cable Typ 43	Spectrum TYP 11	Spectrum TYP 43
1	1	07-057-1		Housing		Material: AlMg4.5Mn; Alodine	

D

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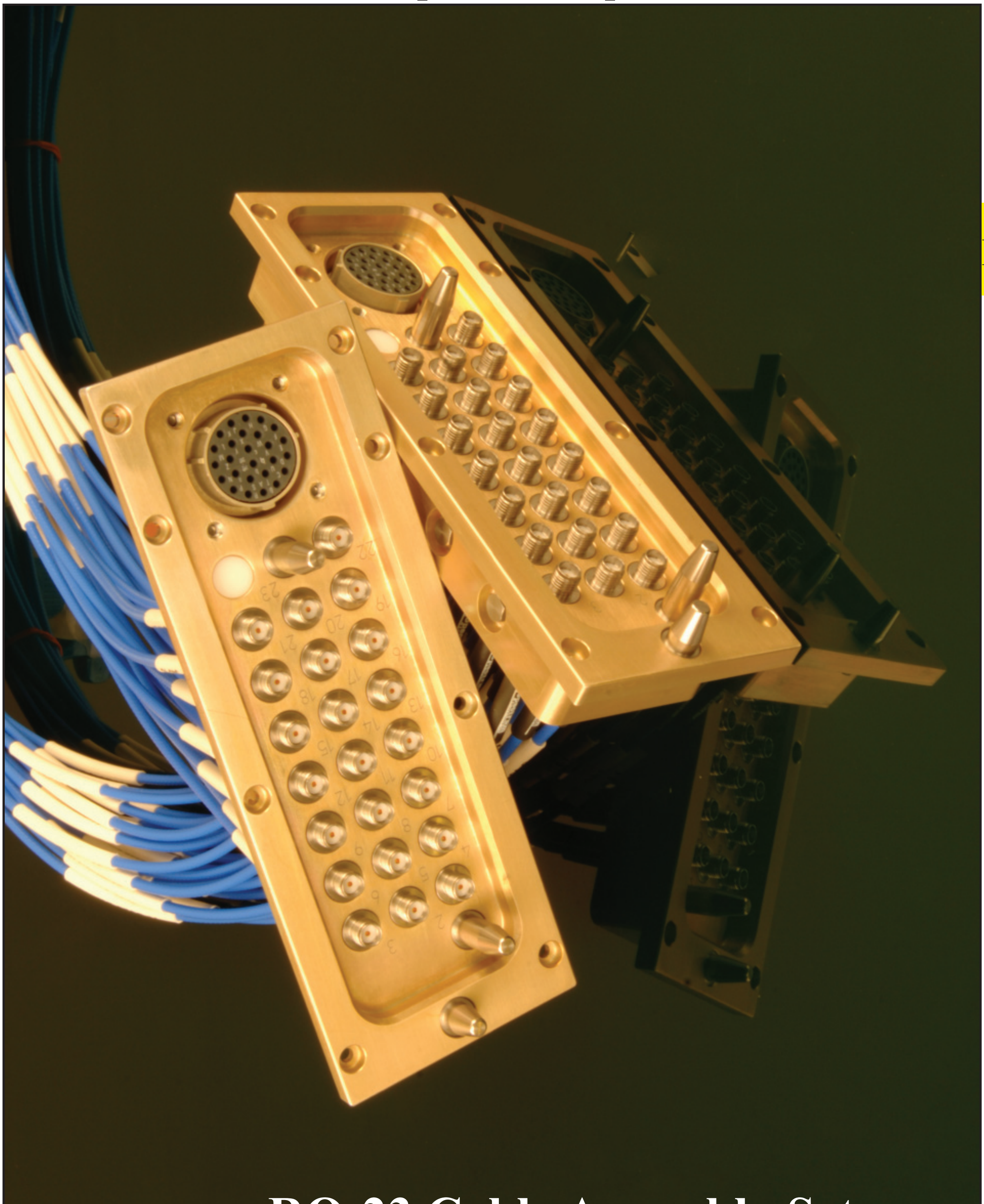
RQ-23 Cable Assembly Set



RQ-23 Cable Assembly Set

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D

For full Information on Multipin / Multiport-Connectors ...

... please refer to the complete catalog at www.spectrum-et.com

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Spectrum Elektrotechnik GmbH

Phase King Cable Assemblies

E

Cable Assemblies with limited Phase Change

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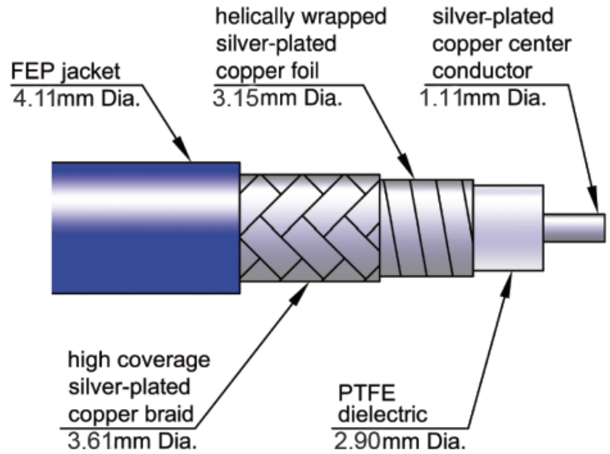
Spectrum Elektrotechnik GmbH

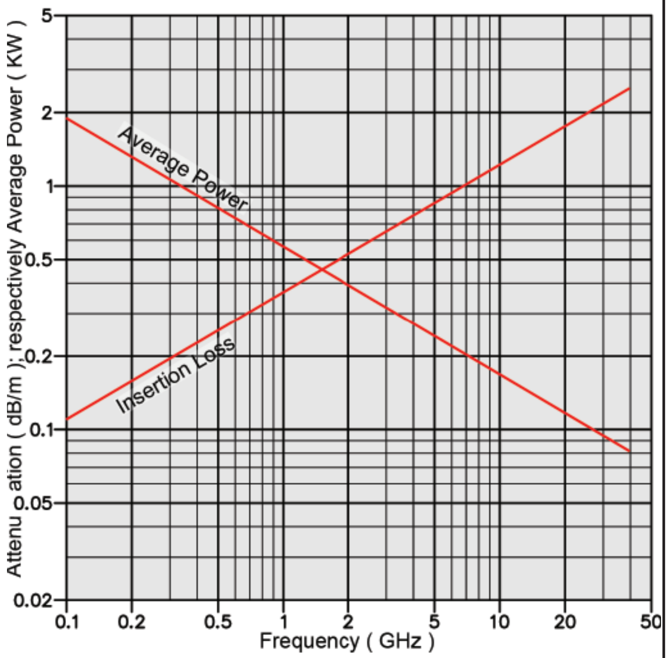
Phase King P160

SPECIFICATION		Phase King P160
Cable Code	Standard	16P
	Armored	16Px
	X: Please find Armor & Ruggedizing Options in Section S	
Frequency Range		DC - 40.0 GHz
Outer Diameter in mm		4.11
Impedance, Ohms at Sea Level and +25°C		50 ± 2
Velocity in %		87
Delay (ns/m) (nominal)		3.87
Capacitance nominal pF/m		77.1
Operating Temperature Range		-54°C to +125°C
Phase temp. stability, -50 to +85 °C		1200 ppm
Average Phase Change from DC to 18 GHz around a 100 mm mandril and 360 degree bend		7° nom. 9° max.
Average Phase Change from DC to 40 GHz around a 100 mm mandril and 360 degree bend		24° nom. 36° max.
Nominal Insertion Loss vs. Frequency in dB/m	1.0 GHz	0.35
	2.5 GHz	0.55
	10.0 GHz	1.14
	18.0 GHz	1.55
	26.0 GHz	1.98
	40.0 GHz	2.40
Nominal CW-Power in Watts, vs. Frequency at Sea Level and + 20°C	1.0 GHz	530
	2.5 GHz	340
	10.0 GHz	160
	18.0 GHz	130
	26.0 GHz	100
	40.0 GHz	80
Outer Conductor Construction		Silver-plated copper braid over helically silver-plated copper foil
Outer Jacket		FEP
Dielectric Diameter in mm		2.9
Dielectric Material		Expanded PTFE
Dielectric Constant		1.35
Center Conductor Material		silver-plated copper
Center Conductor Dia. in mm		1.11
Connector retention in Newtons min.		85
Weight in Grams/Meter		40
Minimum Bend Radius (mm)	dynamic	40
	static	20

Characteristics, DC to 40 GHz

- Robust connector attachment/captivation
- Crush & kink resistant armoring options available
- Less frequent calibration required due to flatter phase versus temperature profile
- More precise measurements due to reduced phase shift versus flexure
- Reduced insertion loss and increased amplitude stability versus flexure
- Maintaining electrical stability over time and handling
- For Connector Outline Drawings please refer to Section Q.
- For Connector Code details please refer to Section S.
- For information on armor please refer to Section S as well.
- For ordering information please refer to Section A.





Specifications are subject to change without notice.

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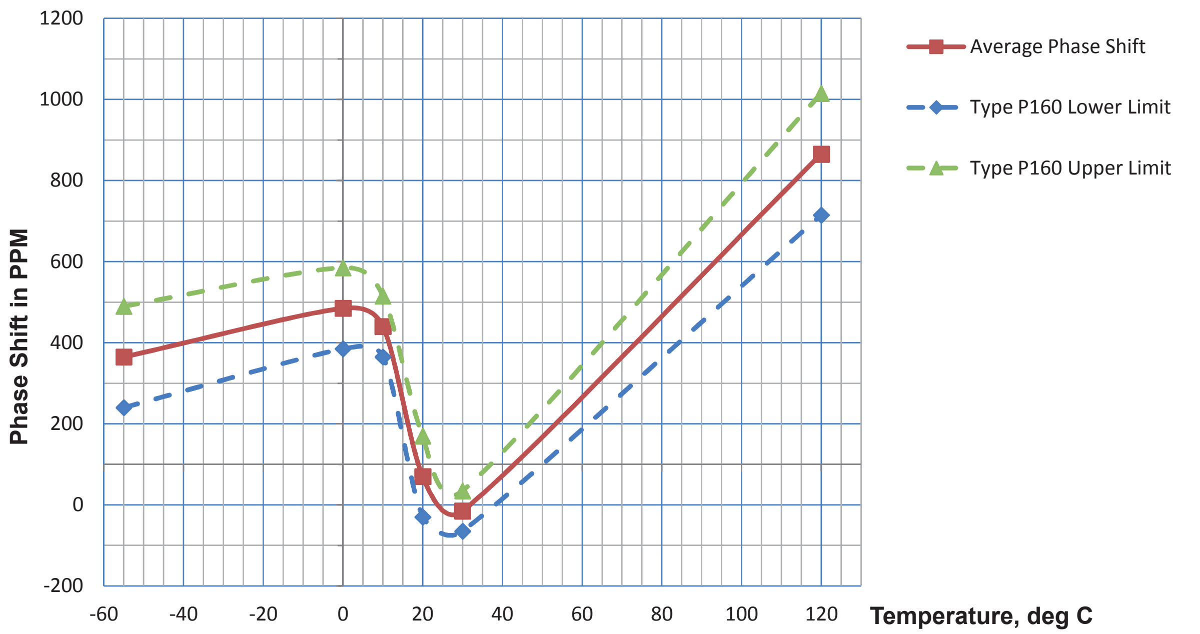
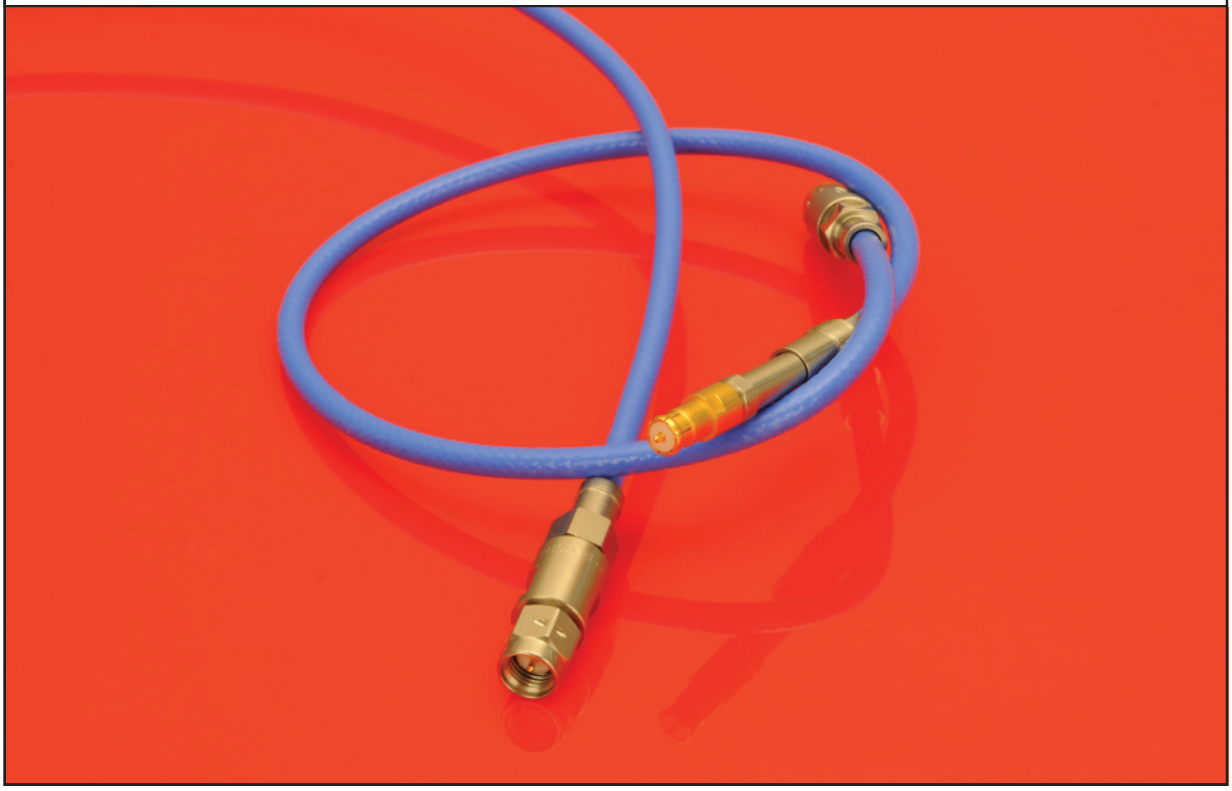
Cable Type P160, Phase Shift vs. Temperature





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Elektrotechnik GmbH

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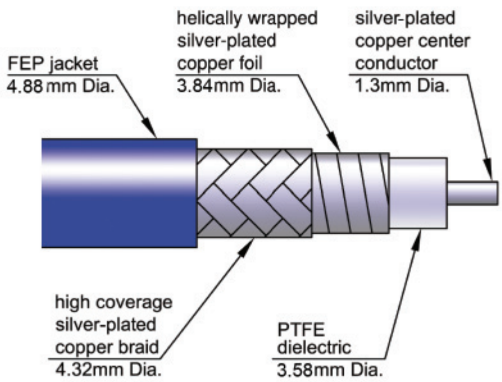
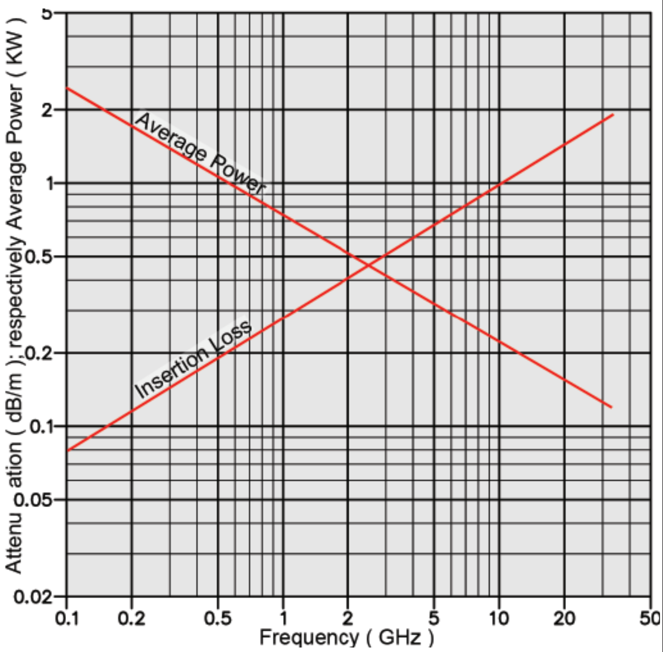
Phase King P190

SPECIFICATION		Phase King P190
Cable Code	Standard	19P
	Armored	19Px
	X: Please find Armor & Ruggedizing Options in Section S	
Frequency Range		DC - 32.0 GHz
Outer Diameter in mm		4.88
Impedance, Ohms at Sea Level and +25°C		50 ± 2
Velocity in %		82.4
Delay (ns/m) (nominal)		4.1
Capacitance nominal pF/m		79.1
Operating Temperature Range		-54°C to +125°C
Phase temp. stability, -50 to +85 °C		900 ppm
Average Phase Change from DC to 18 GHz around a 100 mm mandril and 360 degree bend		8° nom. 16° max.
Average Phase Change from DC to 40 GHz around a 100 mm mandril and 360 degree bend		16° nom. 32° max.
Nominal Insertion Loss vs. Frequency in dB/m	1.0 GHz	0.28
	2.5 GHz	0.44
	10.0 GHz	0.92
	18.0 GHz	1.27
	26.0 GHz	1.56
Nominal CW-Power in Watts, vs. Frequency at Sea Level and + 20°C	1.0 GHz	730
	2.5 GHz	470
	10.0 GHz	220
	18.0 GHz	170
	26.0 GHz	135
Outer Conductor Construction		High coverage silver plated copper braid over helically wrapped silver-plated copper foil
Outer Jacket		FEP
Dielectric Diameter in mm		3.58
Dielectric Material		Expanded PTFE
Dielectric Constant		1.5
Center Conductor Material		silver-plated copper
Center Conductor Dia. in mm		1.30
Connector retention in Newtons min.		220
Weight in Grams/Meter		55
Minimum Bend Radius (mm)	dynamic	50
	static	25

Characteristics, DC to 32 GHz

- Robust connector attachment/captivation
- Crush & kink resistant armoring options available
- Less frequent calibration required due to flatter phase versus temperature profile
- More precise measurements due to reduced phase shift versus flexure
- Reduced insertion loss and increased amplitude stability versus flexure
- Maintaining electrical stability over time and handling
- For Connector Outline Drawings please refer to Section Q.
- For Connector Code details please refer to Section S.
- For information on armor please refer to Section S as well.
- For ordering information please refer to Section A.





Specifications are subject to change without notice.

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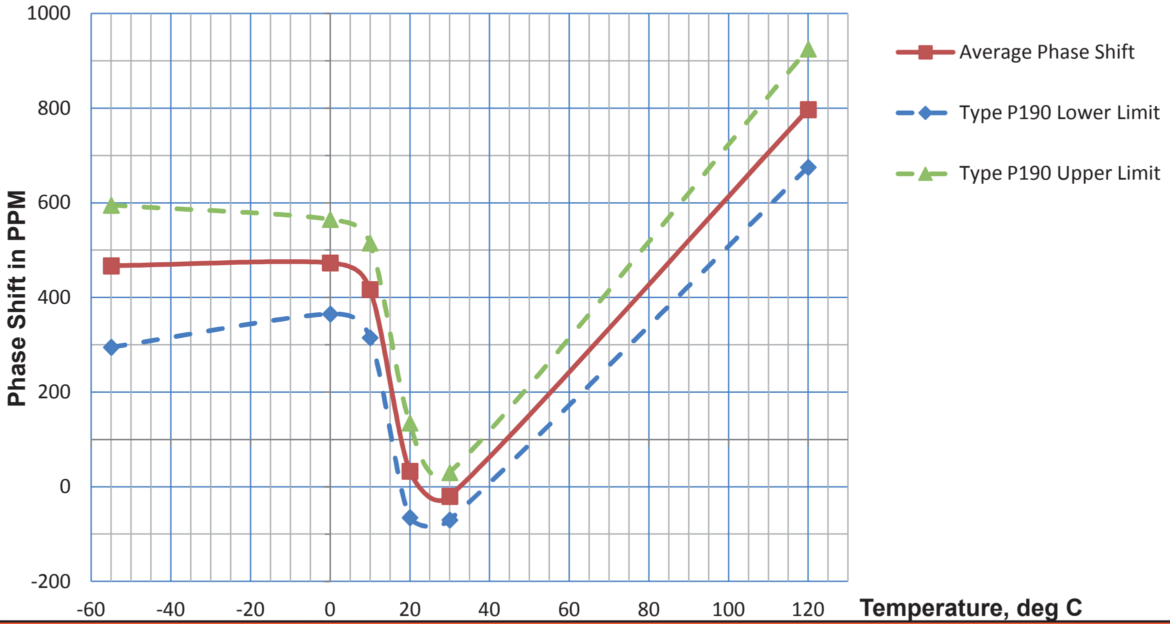
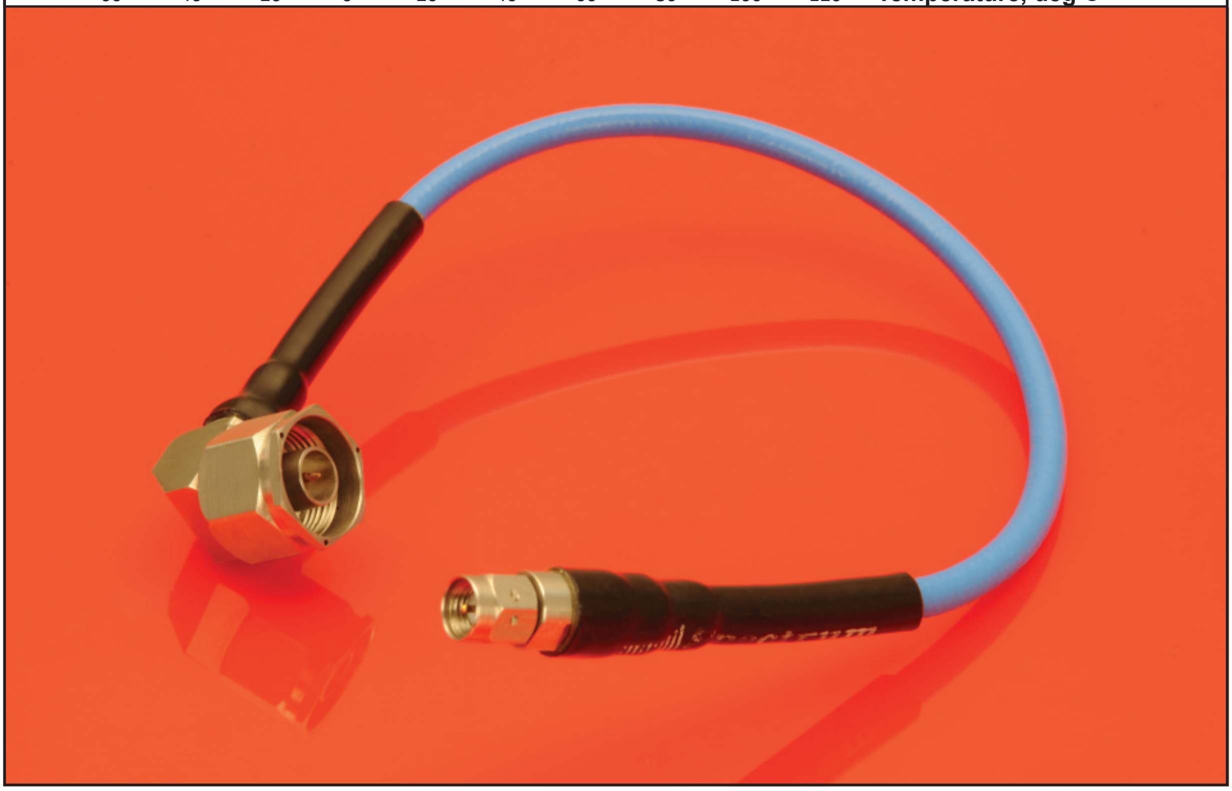
Cable Type P190, Phase Shift vs. Temperature



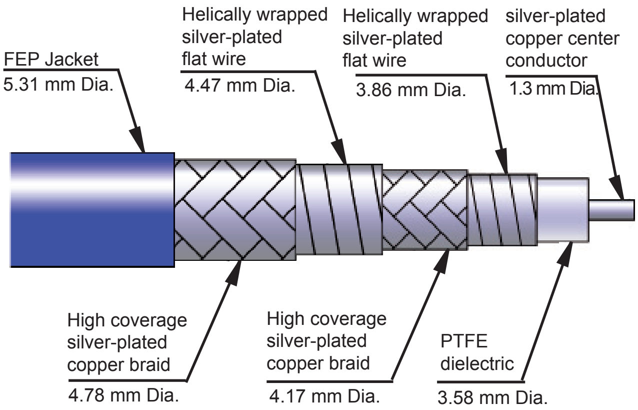


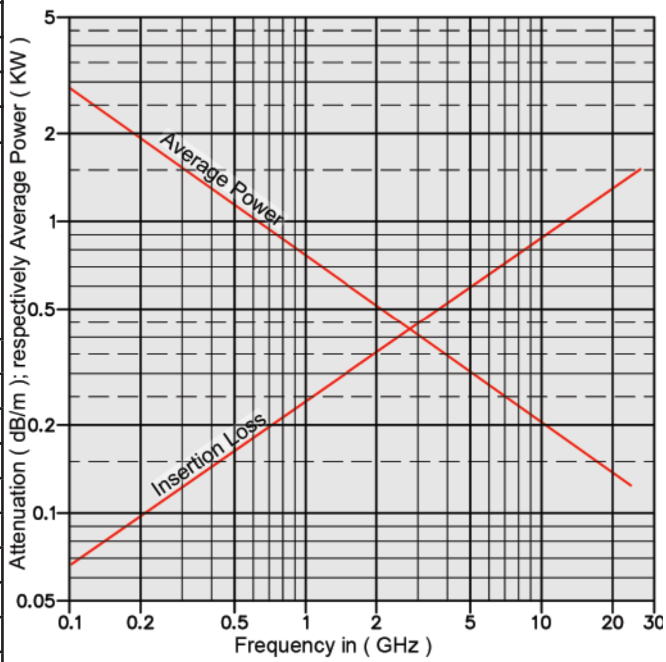
Phase King P190E

SPECIFICATION			Phase King P190 E
Cable Code	Standard		19E
	Armored		19Ex
	X: Please find Armor & Ruggedizing Options in Section S		
Frequency Range			DC - 26.5 GHz
Outer Diameter in mm			5.31
Impedance in Ohms at Sea Level and +25°C			50 ± 2
Velocity in %			82.4
Delay (ns/m) (nominal)			4.0
Capacitance nominal pF/m			79.7
Operating Temperature Range			-54°C to +125°C
Phase temp. stability, -50 to +85 °C			500 ppm
Average Phase Change from DC to 18 GHz around a 100 mm mandril and 360 degree bend			5° nom. 10° max.
Average Phase Change from DC to 26 GHz around a 100 mm mandril and 360 degree bend			7 ° nom. 15° max.
Nominal Insertion Loss vs. Frequency in dB/m		1.0 GHz	0.28
		2.5 GHz	0.44
		10.0 GHz	0.92
		18.0 GHz	1.27
		26.0 GHz	1.56
Nominal CW-Power in Watts, vs. Frequency at Sea Level and + 20°C		1.0 GHz	730
		2.5 GHz	470
		10.0 GHz	220
		18.0 GHz	170
		26.0 GHz	135
Outer Conductor Construction			High coverage silver-plated copper braid over helically wrapped silver-plated flat wire over high coverage silver-plated copper braid over helically wrapped silver-plated flat wire
Outer Jacket			FEP
Dielectric Diameter in mm			3.58
Dielectric Material			Expanded PTFE
Dielectric Constant			1.5
Center Conductor Material			silver-plated copper
Center Conductor Dia. in mm			1.30
Connector retention in Newtons min.			175
Weight in Grams/Meter			70
Minimum Bend Radius (mm)	dynamic		52
	static		26

Characteristics, DC to 26.5 GHz

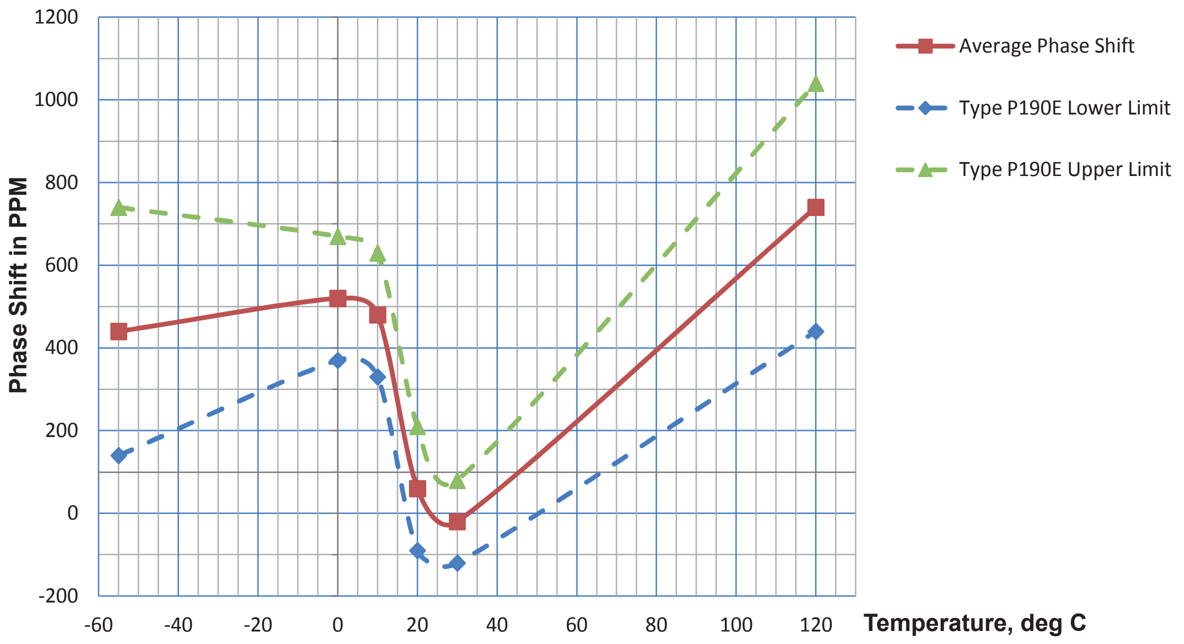
- Robust connector attachment/captivation
- Crush & kink resistant armoring options available
- Less frequent calibration required due to flatter phase versus temperature profile
- More precise measurements due to reduced phase shift versus flexure
- Reduced insertion loss and increased amplitude stability versus flexure
- Maintaining electrical stability over time and handling
- For Connector Outline Drawings please refer to Section Q.
- For Connector Code details please refer to Section S.
- For information on armor please refer to Section S as well.
- For ordering information please refer to Section A.





Specifications are subject to change without notice.

Cable Type P190E, Phase Shift vs. Temperature



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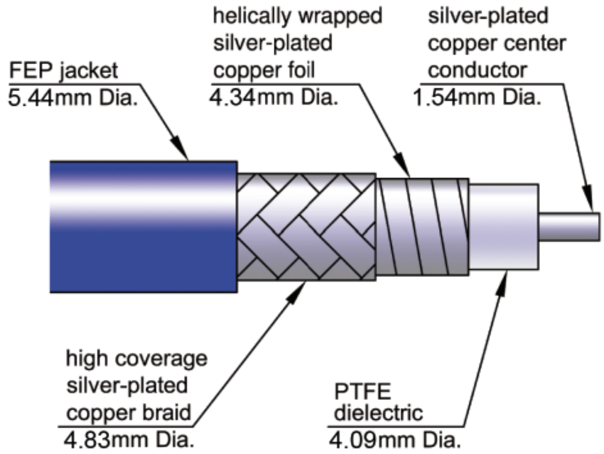
Phase King P210

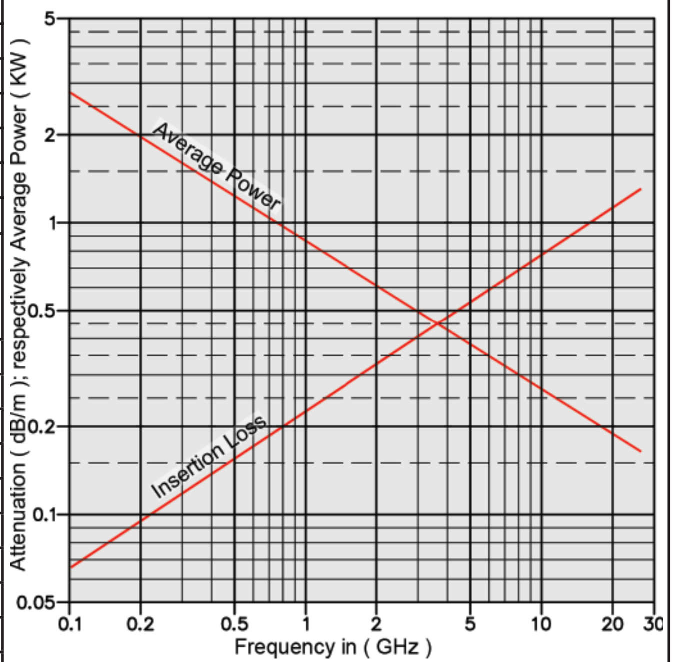
E

SPECIFICATION		Phase King P210	
Cable Code	Standard	21P	
	Armored	21Px	
	X: Please find Armor & Ruggedizing Options in Section S		
Frequency Range		DC - 26.5 GHz	
Outer Diameter in mm		5.44	
Impedance in Ohms at Sea Level and +25°C		50 ± 2	
Velocity in %		84	
Delay (ns/m) (nominal)		3.98	
Capacitance nominal pF/m		79.07	
Operating Temperature Range		-54°C to +125°C	
Phase temp. stability, -50 to +85 °C		700 ppm	
Average Phase Change from DC to 18 GHz around a 100 mm mandril and 360 degree bend		9° nom. 12° max.	
Average Phase Change from DC to 26 GHz around a 100 mm mandril and 360 degree bend		13° nom. 18° max.	
Nominal Insertion Loss vs. Frequency in dB/m		1.0 GHz	0.23
		2.5 GHz	0.37
		10.0 GHz	0.76
		18.0 GHz	1.05
		26.0 GHz	1.29
Nominal CW-Power in Watts, vs. Frequency at Sea Level and + 20°C		1.0 GHz	880
		2.5 GHz	540
		10.0 GHz	250
		18.0 GHz	200
		26.0 GHz	170
Outer Conductor Construction		High coverage silver-plated copper braid over helically wrapped silver-plated copper foil	
Outer Jacket		FEP	
Dielectric Diameter in mm		4.09	
Dielectric Material		Expanded PTFE	
Dielectric Constant		1.5	
Center Conductor Material		silver-plated copper	
Center Conductor Dia. in mm		1.54	
Connector retention in Newtons min.		220	
Weight in Grams/Meter		65	
Minimum Bend Radius (mm)	dynamic	52	
	static	26	

Characteristics, DC to 26,5 GHz

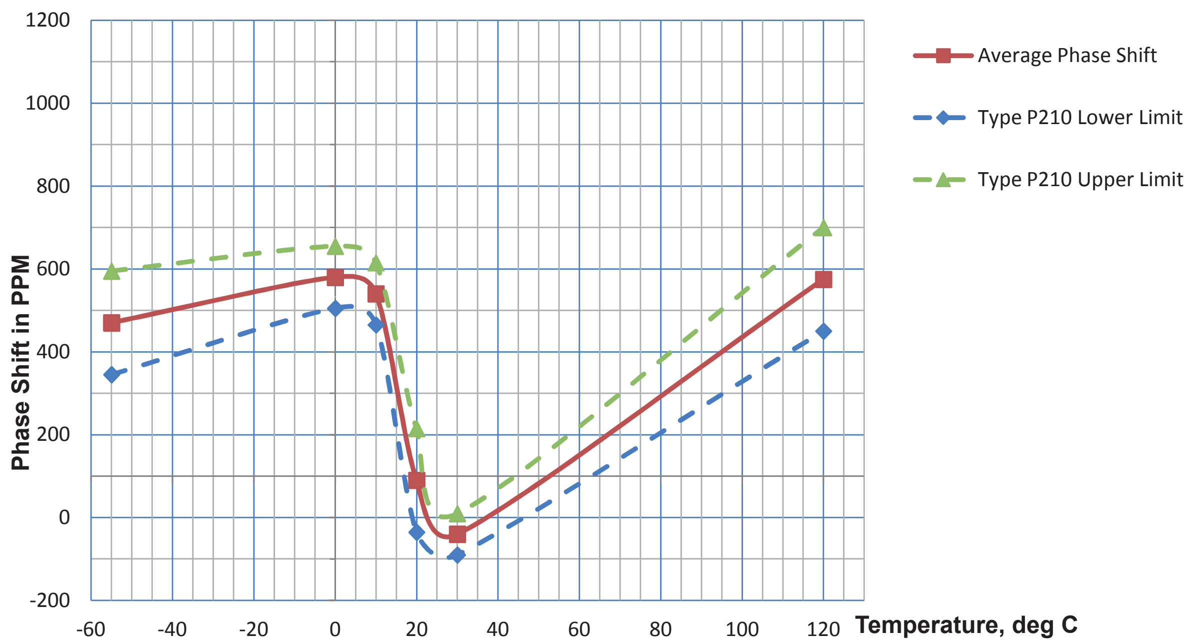
- Robust connector attachment/captivation
- Crush & kink resistant armoring options available
- Less frequent calibration required due to flatter phase versus temperature profile
- More precise measurements due to reduced phase shift versus flexure
- Reduced insertion loss and increased amplitude stability versus flexure
- Maintaining electrical stability over time and handling
- For Connector Outline Drawings please refer to Section Q.
- For Connector Code details please refer to Section S.
- For information on armor please refer to Section S as well.
- For ordering information please refer to Section A.





Specifications are subject to change without notice.

Cable Type P210, Phase Shift vs. Temperature



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Phase King P300

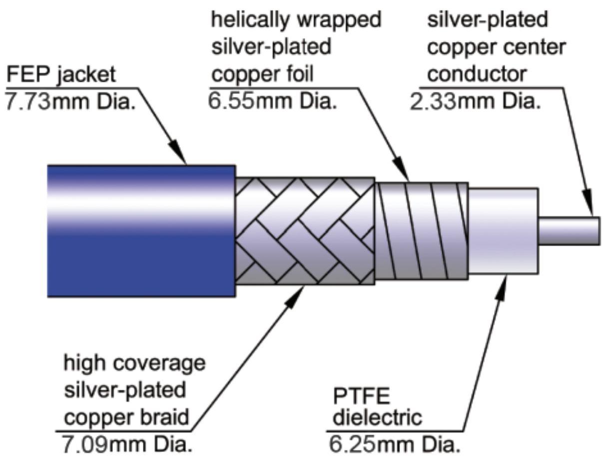
DC - 18.0 GHz

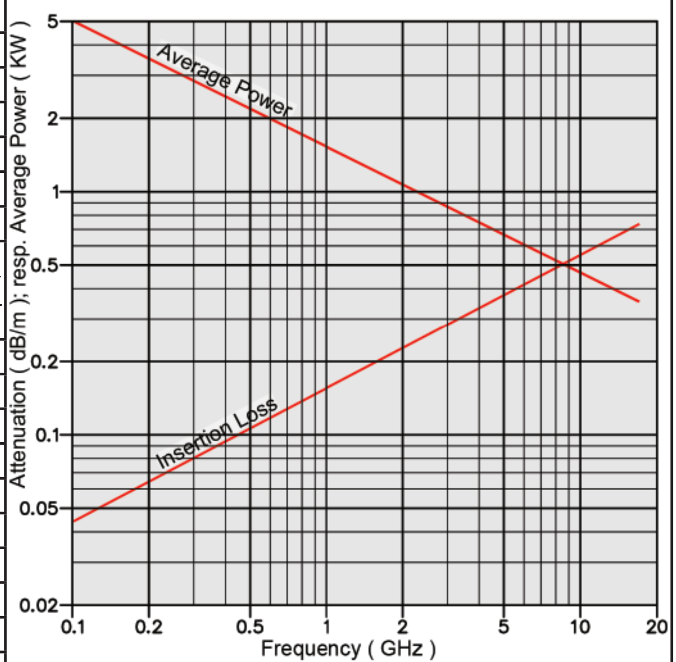
E

SPECIFICATION		Phase King P300
Cable Code	Standard	30P
	Armored	30Px
	X: Please find Armor & Ruggedizing Options in Section S	
Frequency Range		DC - 18.0 GHz
Outer Diameter in mm		7.73
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %		84.6
Delay (ns/m) (nominal)		3.96
Capacitance nominal pF/m		78.7
Operating Temperature Range		-54°C to +125°C
Phase temp. stability, -50 to +85 °C		700 ppm
Average Phase Change from DC to 18 GHz around a 150 mm mandril and 360 degree bend		16° nom. 32° max.
Nominal Insertion Loss vs. Frequency in dB/m	1.0 GHz	0.18
	2.5 GHz	0.25
	10.0 GHz	0.52
	18.0 GHz	0.72
Nominal CW-Power in Watts, vs. Frequency at Sea Level and + 20°C	1.0 GHz	1600
	2.5 GHz	1000
	10.0 GHz	540
	18.0 GHz	340
Outer Conductor Construction		High coverage silver-plated copper braid over helically wrapped silver-plated copper foil
Outer Jacket		FEP
Dielectric Diameter in mm		6.25
Dielectric Material		Expanded PTFE
Dielectric Constant		1.5
Center Conductor Material		silver-plated copper
Center Conductor Dia. in mm		2.33
Connector retention in Newtons min.		330
Weight in Grams/Meter		130
Minimum Bend Radius (mm)	dynamic	80
	static	40

Characteristics, DC to 18 GHz

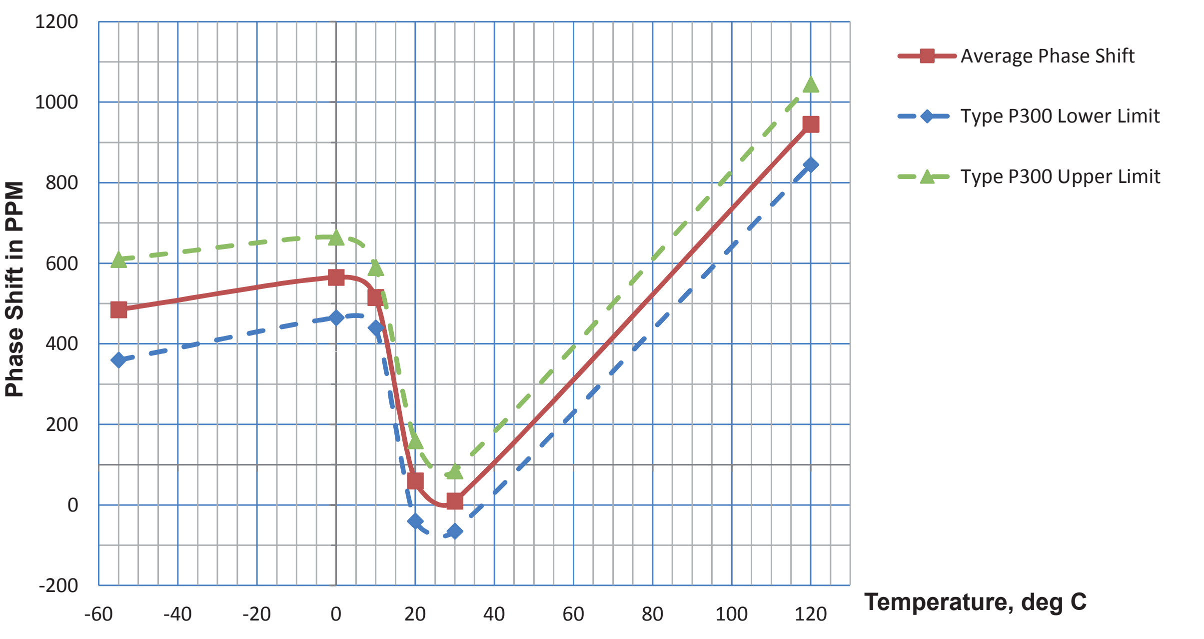
- Robust connector attachment/captivation
- Crush & kink resistant armoring options available
- Less frequent calibration required due to flatter phase versus temperature profile
- More precise measurements due to reduced phase shift versus flexure
- Reduced insertion loss and increased amplitude stability versus flexure
- Maintaining electrical stability over time and handling
- For Connector Outline Drawings please refer to Section Q.
- For Connector Code details please refer to Section S.
- For information on armor please refer to Section S as well.
- For ordering information please refer to Section A.





Specifications are subject to change without notice.

Cable Type P300, Phase Shift vs. Temperature



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Protect your Systems by checking the connector Interfaces.

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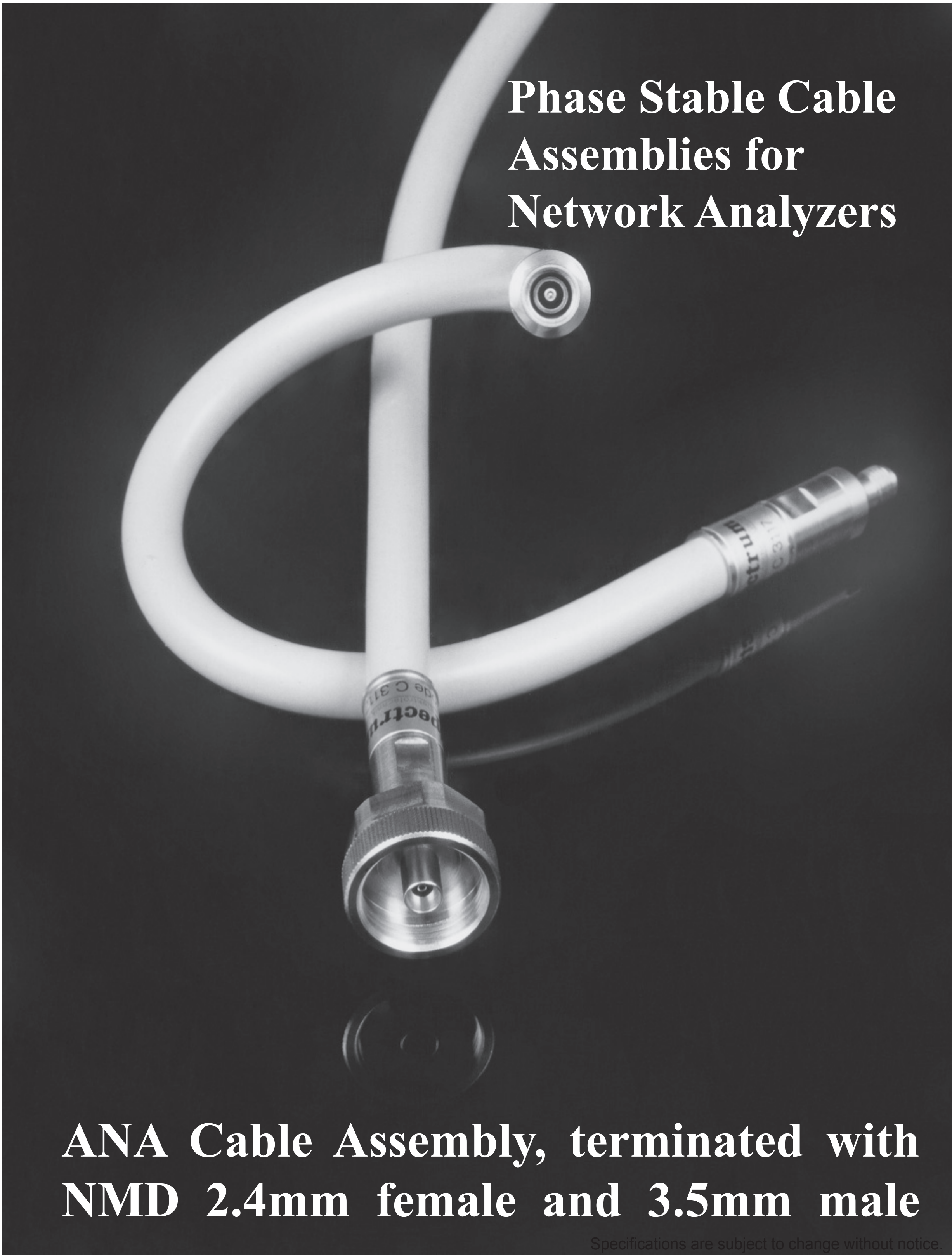
Phase Stable Cable Assemblies for Network Analyzers



F

ANA Cable Assembly, terminated with NMD 2.4mm female and 3.5mm male

Specifications are subject to change without notice.

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Phase Stable Assemblies (ANA-Cable Assemblies)

The Cable Assemblies of Series 18 and 22 are Phase Stable Assemblies, designed for the Vector Network Analyzers of Agilent and Anritzu..
The Cables of Types 18 and 22 operate to 26.5 GHz. One end of the Assembly is usually terminated with a "special" 2.4mm, 3.5mm, or 2.92mm connector.
These connectors are designed with a larger than standard coupling nut for greater stability, mating directly with the RF ports of the Network Analyzers.
The other end of the ANA - Assembly may be terminated with any of the connectors available and needed in the customer's test application, mating in direct connection with the device under test. By eliminating expensive adapters the test setup becomes simple and trustworthy.

The cable assemblies can be manufactured in various lengths up to 6 meters (20ft.). All necessary piece parts will be carried in stock, helping to facilitate fast deliveries. Cable assemblies of the most popular lengths, e.g. 30 cm. (11.8") and 45 cm. (17.7"), terminated with preferred connector styles, such as N, 2.4mm and 3.5mm for the Agilent ANAs, 2.92mm and 1.85mm for Anritzu ANAs, will be available, in most cases, within a few days of order placement.

Note:
For special requirements, the cable can be terminated with almost any connector style. Please call your nearest Spectrum Representative or contact our Marketing or Engineering Staff.

ANA Cable Assembly Characteristics:

Cable Code		18	22 (= Type 18 armored)
Frequency Range		DC to 26.5 GHz	DC to 26.5 GHz
Cable Outer diameter		6.0mm (.24")	9.2mm (.36")
Mechanical length		custom made up to 6m	custom made up to 6m
Electrical length		~1.36 x mechan. length	~1.36 x mechan. length
Bend radius min.		6 cm. (2.36")	6 cm. (2.36")
Pull resistance		2 kg. (4.4 pounds)	10 kg. (22 pounds)
Crush resistance		16 kg./cm² (225 psi)	62 kg./cm² (880 psi)
Return loss, min. /Assembly 2.4mm connectors		20 dB up to 26.5 GHz	20 dB up to 26.5 GHz
2.92mm connectors			
3.5mm connectors			
7mm connectors		20 dB up to 18.0 GHz	20 dB up to 18.0 GHz
N connectors		20 dB up to 18.0 GHz	20 dB up to 18.0 GHz
SMA connectors			
TNC connectors			
Return loss stability		40 dB min.	40 dB min.
Phase stab., 2 x 45 cm. assies manual flexing/torque		Please see also Diagrams on Page F3. 4.0° max. @ 26.5 GHz	Please see also Diagrams on Page F3. 4.0° max. @ 26.5 GHz
Straight vs. 90° bend		2.5° max. @ 26.5 GHz	2.5° max. @ 26.5 GHz
Straight after 3 x 90° bends		2.0° max. @ 26.5 GHz	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	<0.05dB @ 26.5 GHz
Straight after 3 x 90° bends		<0.05dB @ 26.5 GHz	<0.05dB @ 26.5 GHz
Insertion Loss / m (39.37")	1.0 GHz	0.40	0.40
	10.0 GHz	1.34	1.34
	18.0 GHz	1.80	1.80
	26.5 GHz	2.20	2.20
	40.0 GHz	-	-
	50.0 GHz		

Specifications are subject to change without notice.

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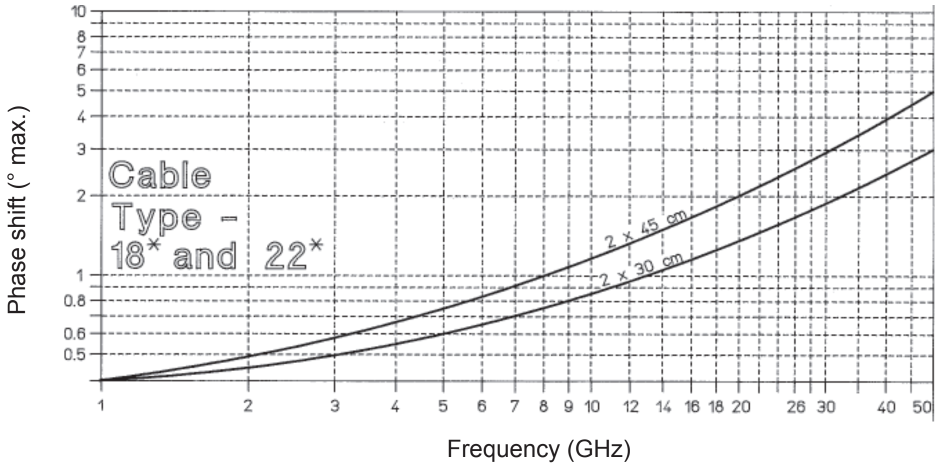
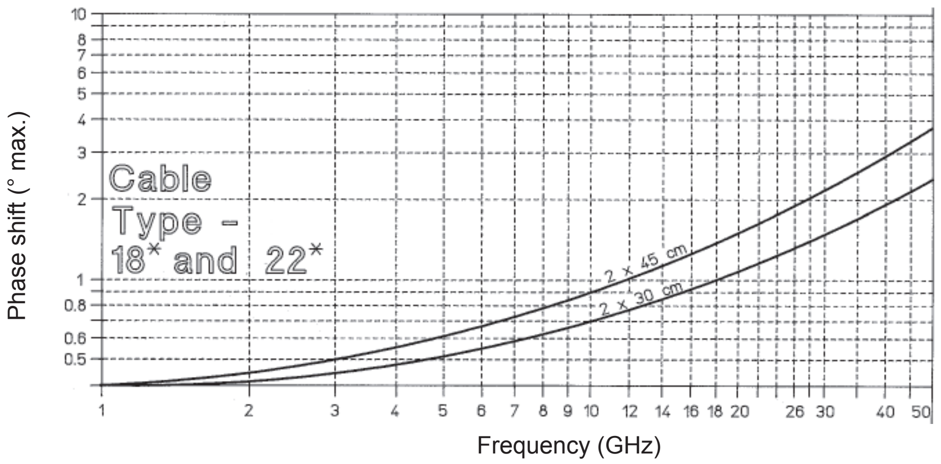
Phase Stability, measured when flexed from straight position to a 90° bend



Phase Stability measured in straight position after three 90° bends



Diagrams: Three different criteria were determined to demonstrate the max. phase shift of the cables at ambient temperature. Tests were performed on pairs of cables, so that the total lengths of the assemblies under test were always 60 cm and 90 cm respectively.
* Cable Types 18 and 22: max. operating Frequency: 26.5 GHz.

Specifications are subject to change without notice.

Phase Stable Assemblies (ANA-Cable Assemblies)

Spectrum Elektrotechnik GmbH

The Cable Assemblies of Series 18 are Phase Stable Assemblies, designed for the Vector Network Analyzers of Agilent and Anritzu.

The Cables of Types 18 operate to 26.5 GHz.

One end of the Assembly is usually terminated with a "special" 2.4mm, 3.5mm, or 2.92mm connector. These connectors are designed with a larger than standard coupling nut for greater stability, mating directly with the RF ports of the Network Analyzers. The other end of the ANA - Assembly may be terminated with any of the connectors available and needed in the customer's test application, mating in direct connection with the device under test. By eliminating expensive adapters the test setup becomes simple and trustworthy.

The cable assemblies can be manufactured in various lengths up to 6 meters (20ft.). All necessary piece parts will be carried in stock, helping to facilitate fast deliveries.

Cable assemblies of the most popular lengths, e.g. 30 cm. (11.8") and 45 cm. (17.7"), terminated with preferred connector styles, such as N, 2.4mm and 3.5mm for the Agilent ANAs, 2.92mm and 1.85mm for Anritzu ANAs, will be available, in most cases, within a few days of order placement.

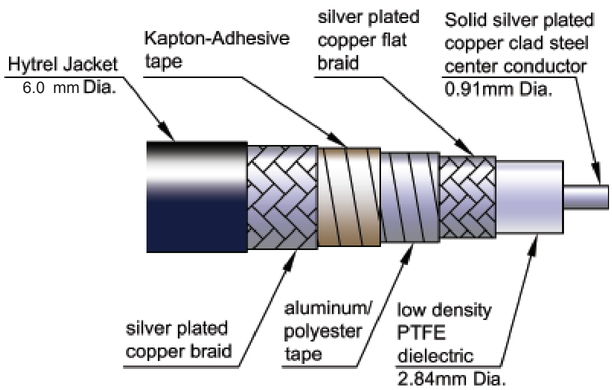
Note:

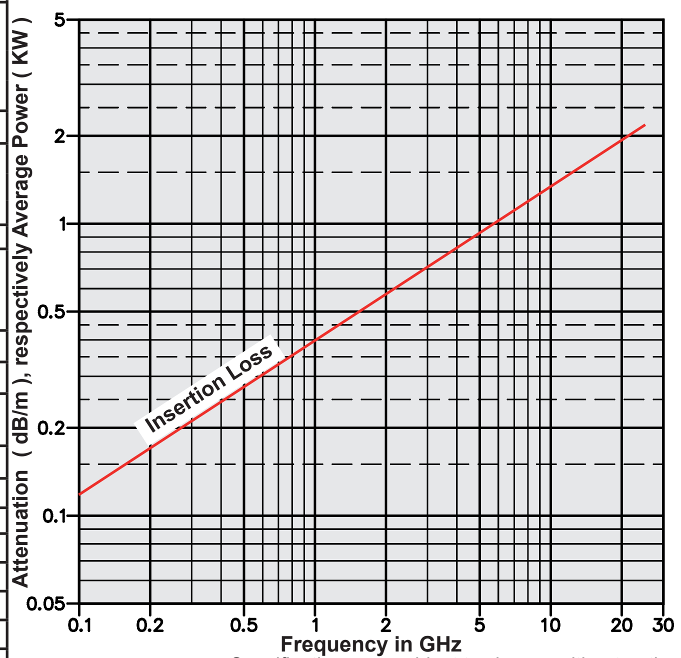
For special requirements, the cable can be terminated with almost any connector style. Please call your nearest Spectrum Representive or contact our Marketing or Engineering Staff.

F

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 see also Diagrams on Page 71. 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 (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	-





Specifications are subject to change without notice.

Phase Stable Assemblies (ANA-Cable Assemblies)

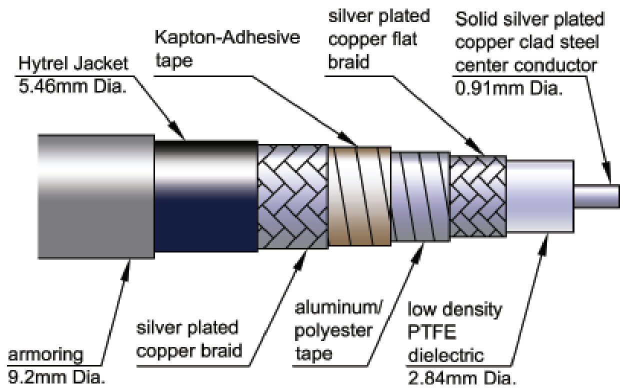
The Cable Assemblies of Series 22 are Phase Stable Assemblies, designed for the Vector Network Analyzers of Agilent and Anritzu.

The Cables of Types 22 operate to 26.5 GHz.

One end of the Assembly is usually terminated with a "special" 2.4mm, 3.5mm, or 2.92mm connector. These connectors are designed with a larger than standard coupling nut for greater stability, mating directly with the RF ports of the Network Analyzers. The other end of the ANA - Assembly may be terminated with any of the connectors available and needed in the customer's test application, mating in direct connection with the device under test. By eliminating expensive adapters the test setup becomes simple and trustworthy.

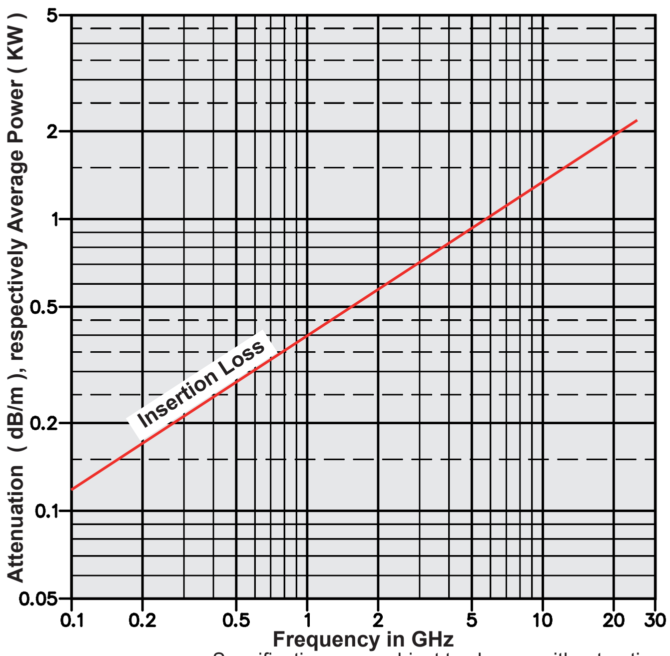
The cable assemblies can be manufactured in various lengths up to 6 meters (20ft.). All necessary piece parts will be carried in stock, helping to facilitate fast deliveries.
Cable assemblies of the most popular lengths, e.g. 30 cm. (11.8") and 45 cm. (17.7"), terminated with preferred connector styles, such as N, 2.4mm and 3.5mm for the Agilent ANAs, 2.92mm and 1.85mm for Anritzu ANAs, will be available, in most cases, within a few days of order placement.

Note:
For special requirements, the cable can be terminated with almost any connector style. Please call your nearest Spectrum Representaive or contact our Marketing or Engineering Staff.



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 see also Diagrams on Page 71. 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 (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	-



Specifications are subject to change without notice.

Connector Selection Chart

Phase Stable Cable Assemblies

Spectrum Elektrotechnik GmbH

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Type	Frequency	Sex	Description	Remarks	Connector Code	Finish
1.85 mm	DC - 71.0 GHz1)	Male	straigh		**VM**	passivated Stainless Steel
				Maxi Nut	**MV**	
				The V2M and V2 developed at Spectrum, have larger than standard coupling threads for greater stability. The connectors are used on test ports, test port adapters, and test port cables.	**V2M**	
		Female			**V2**	
					VF	
2.4 mm	DC - 50.0 GHz1)	Male	straight		**HM**	passivated Stainless Steel
				Maxi Nut	**M2**	
				The H2M and H2 developed at Spectrum, have larger than standard coupling threads for greater stability. The connectors are used on test ports, test port adapters, and test port cables.	**H2M**	
		Female			**H2**	
					HF	
2.92 mm	DC - 40.0 GHz1)	Male	straight		**KM**	passivated Stainless Steel
				Maxi-Nut	**MK**	
				The WIM and WI developed at Spectrum, have larger than standard coupling threads for greater stability. The connectors are used on test ports, test port adapters, and test port cables.	**WIM**	
		Female			**WI**	
					KF	
3.5 mm	DC - 26.5 GHz	Male	straight		**91**	passivated Stainless Steel
				Maxi-Nut	**M3**	
				The H3M and H3 developed at Spectrum, have larger than standard coupling threads for greater stability. The connectors are used on test ports, test port adapters, and test port cables.	**H3M**	
		Female			**H3**	
					92	
7 mm	DC - 18.0 GHz	Connector	straight, Contact 4 equally spaced slots		**90**	passivated Stainless Steel
			straight, Contact 6 equally spaced slots		**96**	
N	DC - 18.0 GHz	Male	straight		**51**	passivated Stainless Steel
				PUSH-ON, locking	**NS**	
		Female			**61**	
SMA	DC - 18.0 GHz	Male	straight		**11**	passivated Stainless Steel
				Maxi-Nut	**MA**	
				PUSH-ON, non-locking	**SM**	
		Female			**21**	
TNC	DC - 18.0 GHz	Male	straight		**31**	passivated Stainless Steel
				PUSH-ON, locking	**TS**	
		Female			**41**	

1) DC - 26.5 GHz for Cable Type 18 and 22.
Note: For Connector Outline Drawings please refer to Section Q.

Specifications are subject to change without notice.

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S/N
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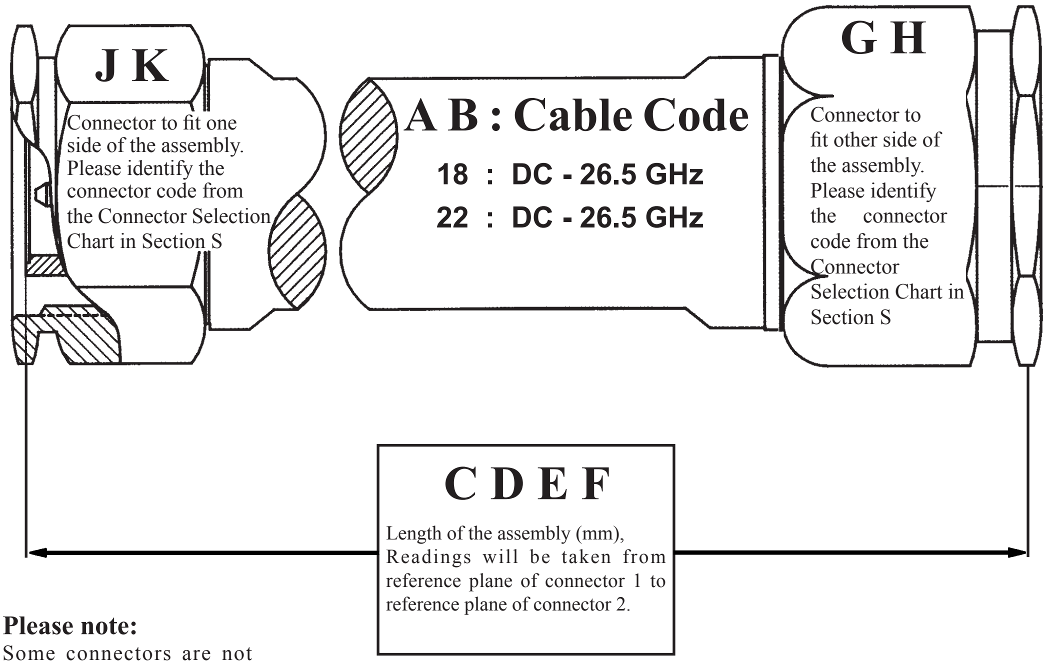
Purchasing Information on Phase Stable Assemblies

Ordering Details:

The Part Number Sequence is:

AB - CDEF - GH - JK



Please note:
Some connectors are not available for certain cables as standard with short deliveries. On the other hand, more connectors than listed might be available.

For cable assemblies, made to customer specification, or complying with special requirements, the company will issue a special part number.

Ordering Example: The cable assembly of Type '16' shall have the length of 65 cm. It shall be terminated with '3.5mm' - female and '2.92mm' - male connectors (length is from interface to interface).

AB = cable code = 18 * CDEF = length in mm = 0650 * GH and JK are the connectors = 92 and KM.

Part Number for the cable assembly in this example: 18 - 0650 - KM - 92

Push- & Slide-On Connectors & Adapters & Quick Connections and Push-On Cable Assemblies

Push-On male connectors do not use threaded coupling nuts. They are mating with any standard connector of same series and opposite sex by just sliding together. They are allowing easy connection and disconnection, guaranteeing repeatable performance, reduced test time and longevity.

Specifications are subject to change without notice.

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Specifications are subject to change without notice.

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Regular connectors of styles SMA, N, TNC and 7/16 use a coupling nut to tighten males and females together.
The great idea was to develop male slide-on connectors which mate perfectly with the standard female. This means replacing the standard male thread on connector and replace it with a slide on, but mating with the standard female connector.

7/16, N and TNC Push-Ons are available as:
- **Slide On**, as used for go/no-go testing
- **Locking with non locking rear nut**; this connector locks safely onto the female unit
- **Full Locking**; this connector is similar to the previous unit, but can be locked completely for long term testing, so that nobody can take it off by coincidence.

SMA Push-On Connectors are only available as non-locking. They have been designed as **male Push-On**, mating with any standard female SMA, and as **female Push-On** as well, mating with any standard SMA male connector.

Cable Selection Chart used with Quick Connections

→	1	2	3	4	8	12.0	15	18	26.5	30	40 50
Band	L	S		C	X	KU		K	KA		

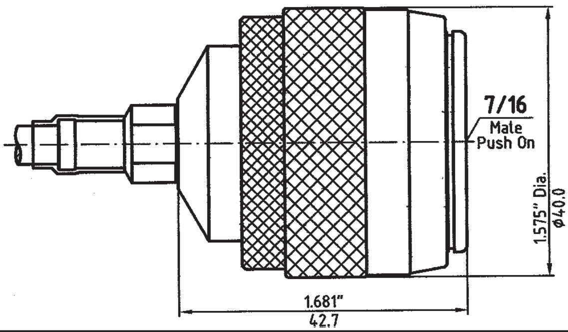
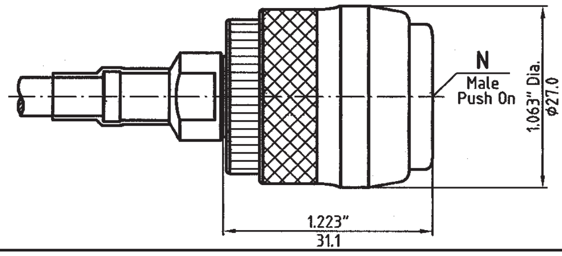
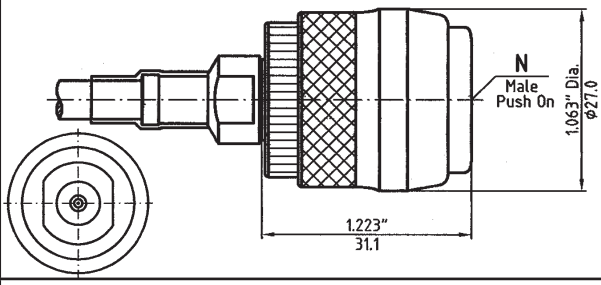
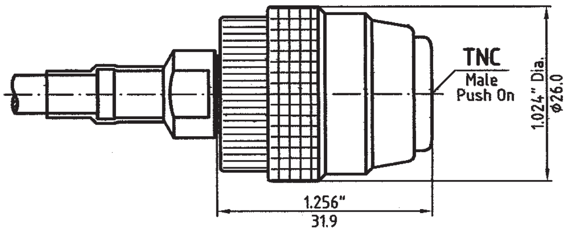
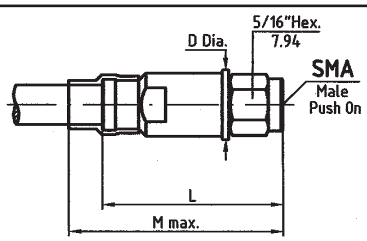
Cable Type	Operational Range	
14	(Dia. 7.4mm)	20.0 GHz
140	(Dia. 7.4mm)	20.0 GHz
10	(Dia. 7.0mm)	26.5 GHz
100	(Dia. 5.2mm)	26.5 GHz
18	ANA-Cable (Dia. 6.0mm)	26.5 GHz
22	ANA-Cable (Dia. 9.2mm)	26.5 GHz
40	RG-400/U (Dia. 4.95mm)	12.0 GHz The Cable limits the frequency range.
42	RG-142B/U (Dia. 4.95mm)	12.0 GHz The Cable limits the frequency range.

Specifications are subject to change without notice.

Push-On Connectors for Cable Assemblies

Spectrum Elektrotechnik GmbH

The table below lists the cabled Push-On connectors with codes that are used most often. Besides these connectors locking connectors with non locking rear nut and also slide on connectors are available. SMA is not only available as Push-On male, but also as female as well. For full information please refer to the Handbook Quick Connections.

Conn. Code	Body Material	Description	Outline
7S	passivated Stainless Steel	**7/16 Push-On Full Locking**	
7SB	Brass, Silver-Plated for lower Intermodulation		
NS	passivated Stainless Steel	**N Push-On Full Locking**	
NSB	Brass, Silver-Plated for lower Intermodulation		
ND	passivated Stainless Steel		
NDB	Brass, Silver Plated for lower Intermodulation		
TS	passivated Stainless Steel	**TNC Push-On Full Locking**	
SM	passivated Stainless Steel	**SMA Push-On Non Locking**	

Specifications are subject to change without notice.

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Some customers want to use Push-On connectors, but they are hesitant to replace their standard cable assemblies by assemblies, connectorized with Push-On connectors. For these customers adapters, using a Standard Connector (either SMA, N, TNC, or 7/16) to the Push-On Connector, were developed to be added to their cable assemblies and so convert their standard assemblies to Push-On assemblies.

Examples of our SMA Push-On Adapters

P/N 8001-SM21-02
SMA male Push-On to SMA female

P/N 8003-SM21-02
SMA male Push-On to SMA female

P/N 8005-SM21-02
SMA male Push-On to SMA female

P/N 8004-SM21-02
SMA male Push-On to SMA female

P/N 8001-SF21-02
SMA female Push-On to SMA BFJ

SMA Push-Ons are also available in Style Reverse Sex

P/N 8001-RM21-02
SMA female Push-On to SMA female

Examples of our N Push/Slide-On Adapters

P/N 8001-NS61-02
N male Push-On Full Locking to N female

P/N 8002-NS61-02
P/N 8002-NL61-02
Nm Push-On Full Lock & NLRN to Nf

P/N 8003-NS61-02
N male Push-On Full Lock DD to N female

P/N 8003-NL61-02
N male Push-On NLRN DD to N female

Materials: Center Conductor and Outer Conductor Spring Parts are BeCu2, gold plated, the balance of the materials are Stainless Steel (last 2 digits 02) or Brass silver-plated (last 2 digits =13). As Standard Connectors, opposite the Push-On side, are available N-female (as shown above), TNC-female and SMA-female.

P/N 8003-NN41-02
N male Slide-On to N female

Slide-On Connectors have been developed for Go/Nogo Testing, where a locking mechanism would be hindering.

Instead of the TNC-female (as shown on the picture to the left), N-female and SMA-female are available as well.

NLRN: Non Locking Rear Nut (the Locking Rear Nut is supplied with the Full Locking. Connector. This Rear Nut, when engaged does not allow to take off the Push-On).
DD: Push-On is designed to engage with the Double D N-female.

Specifications are subject to change without notice.

Examples of our TNC Push/Slide-On Adapters

P/N 8001-TS21-02
P/N 8001-TL21-02
TNCm Push-On Full Lock & NLRN to SMAf

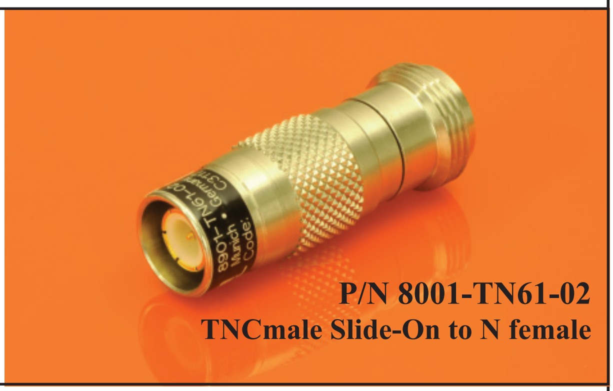
P/N 8001-TS41-02
P/N 8001-TL41-02
TNCm Push-On Full Lock & NLRN to TNCf

P/N 8001-TS61-02
P/N 8001-TL61-02
TNCm Push-On Full Lock & NLRN to Nf

In this section not all of the available Push-On and Slide-On Adapters are shown. For all Adapters available and full details , please refer to the **Handbook Quick Connections.**

Materials: Center Conductor and Outer Conductor Spring Parts are BeCu2, gold plated, the balance of the materials are Stainless Steel (last 2 digits 02) or Brass silver-plated (last 2 digits =13). As Standard Connectors, opposite the Push-On side, are available N-fem. (as shown above), TNC-female and SMA-female as well.

P/N 8001-TN21-02
TNCmale Slide-On to SMA female



P/N 8001-TN61-02
TNCmale Slide-On to N female

NLRN: Non Locking Rear Nut (the Locking Rear Nut is supplied with the Full Locking Connector. This Rear Nut, when engaged does not allow to take off the Push-On).
DD: Push-On is designed to engage with the Double D N-female.

Specifications are subject to change without notice.

Spectrum Elektrotechnik GmbH

Examples of our 7/16 Push/Slide-On Adapters

P/N 8001-7S61-02
P/N 8001-7R61-02
7/16m Push-On Full Locking & NLRN to Nf

P/N 8001-7S76-02
P/N 8001-7R76-02
7/16m Push-On Full Lock & NLRN to 7/16f

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Materials: Center Conductor and Outer Conductor Spring Parts are BeCu2, gold-plated, the balance of the materials are Stainless Steel (last 2 digits 02) or Brass silver-plated (last 2 digits =13). As Standard Connectors are available N-fem. (as shown above), TNC-fem. & SMA-fem.

P/N 8001-7N61-02
7/16 male Slide-On to N female

P/N 8001-7N76-02
7/16 male Slide-On to 7/16 female

Slide-On Connectors have been developed for Go/Nogo Testing, where a locking mechanism would be hindering.
Instead of the N-female and 7/16 female at the opposite end of the Push-On, other connector configurations are available as well. Please check with the company

NLRN: Non Locking Rear Nut (the Locking Rear Nut is supplied with the Full Locking Connector. This Rear Nut, when engaged does not allow to take off the Push-On).
DD: Push-On is designed to engage with the Double D N-female.

Specifications are subject to change without notice.

Special Push-/Slide-On Adapters to Customer Specifications. We design to your needs.

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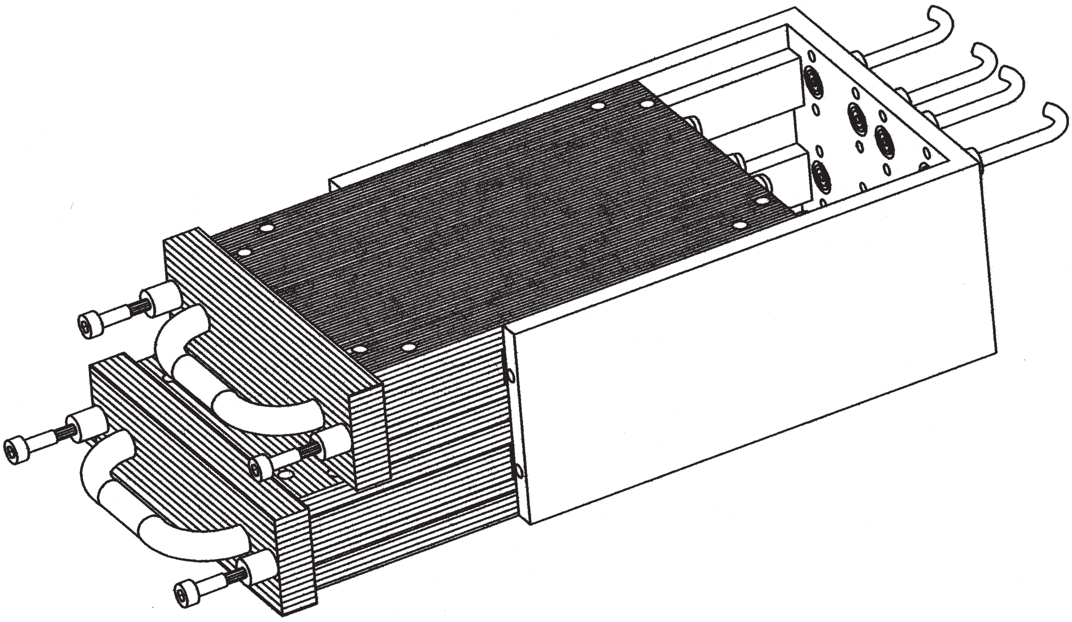
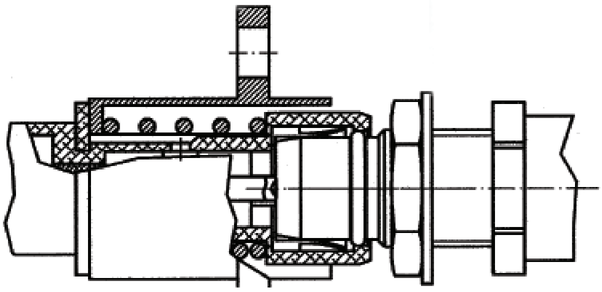
Quick Connections

Quick Connections are Connectors that have been designed to just slide together, not using threads. Spectrum Elektrotechnik GmbH has designed the following Series for high power applications, e.g. sliding a drawing for connection in a housing.



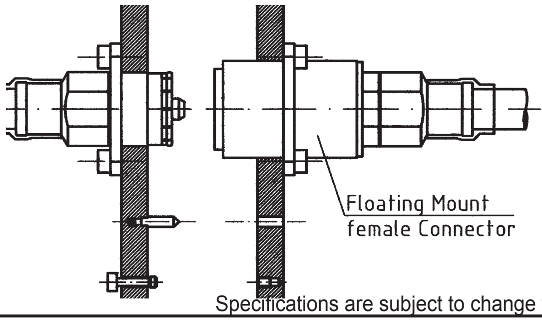
BMA

DC to 22.0 GHz



SBX

DC to 8.0 GHz



Specifications are subject to change without notice.

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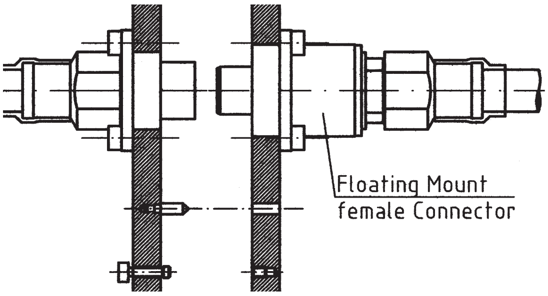
Quick Connections

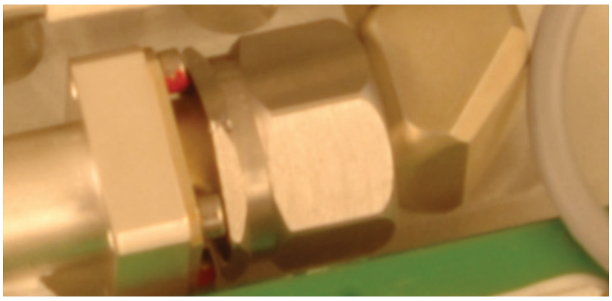
SBY

DC to 12.0 GHz



SBZ

These are connectors designed for applications where no standard connector fits, usually because of space restrictions.



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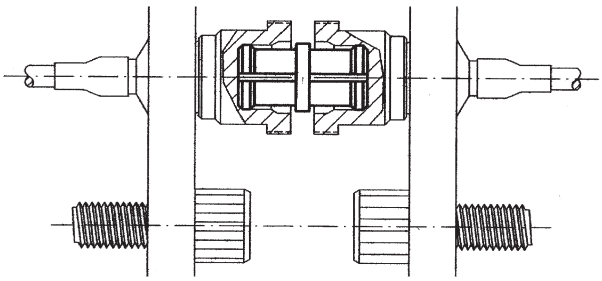
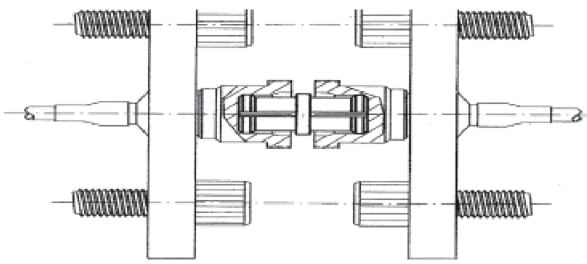
SMP

DC to 40.0 GHz



SMPM

DC to 65.0 GHz



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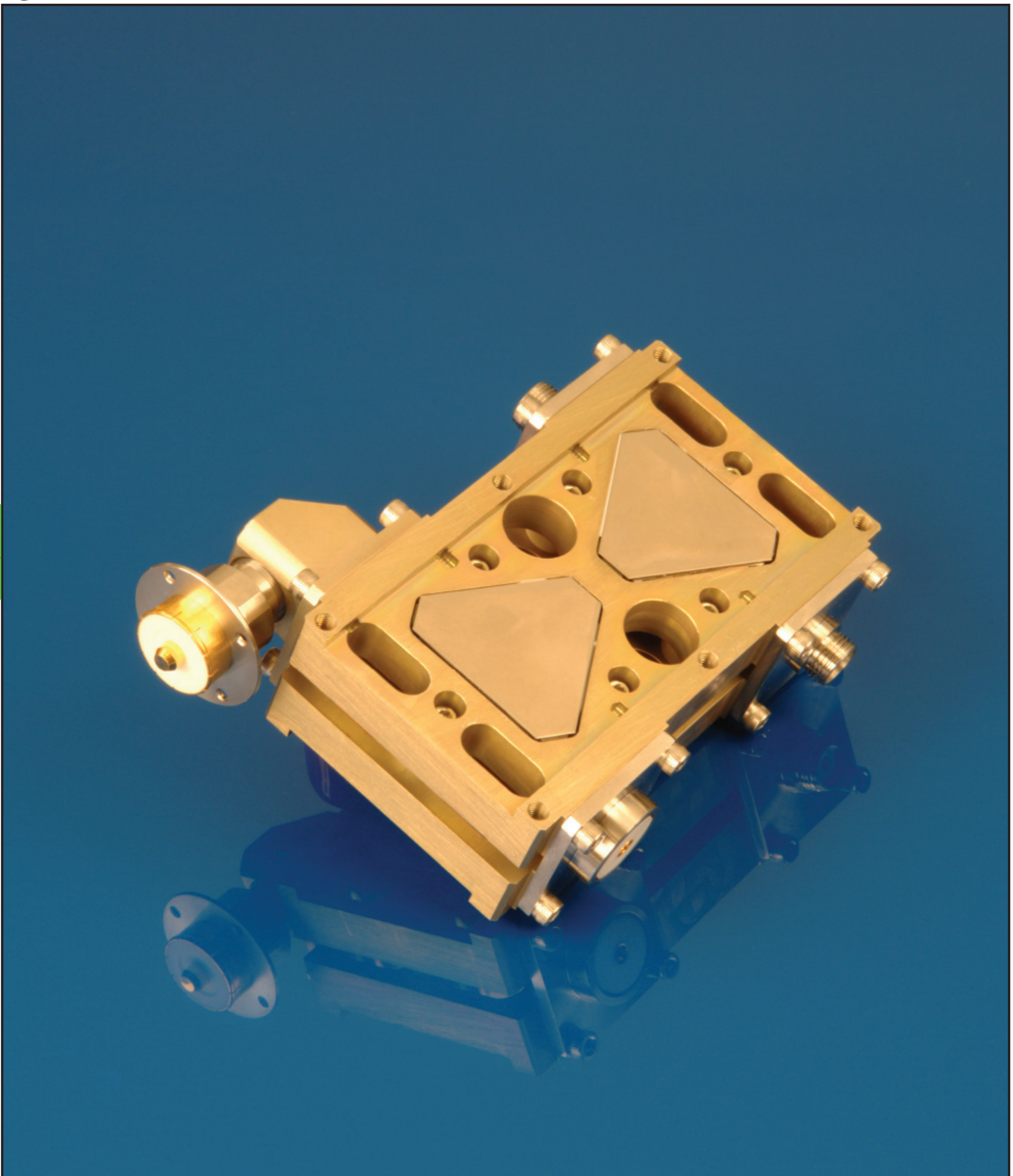
Specifications are subject to change without notice.



High Power 4-Port Circulator using Quick Connections of Types SBX and SBY

Quick Connections (PUSH-ONs) Specifications

The specifications below are general specifications for all PUSH -ON connectors. Specifications in the following table are recommended for any procurement documents or drawings. In the event of any conflict, these specifications shall govern. The Push-ON Connectors were developed to eliminate the time consuming lightning, torquing and loosening of connectors during test. The connector slides directly onto any Female of the same connector style, allowing quick connecting and disconnecting. Its mechanism locks safely onto the standard thread of the Female connector.

GENERAL				
STANDARD MATERIALS	STEEL corrosion resistant 1.4305 per DIN EN 10088-3 (ASTM-A 582). ALUMINUM AlMg4.5Mn, AlMgSi0.5, AlMgSi1per DIN EN 573-3 (SAE AMS QQ-A-225/8). BRASS CuZn39Pb3 per DIN EN 12163/12164 (ASTM B 16). COPPER BERYLLIUM CuBe2Pb H per ASTM B196. TFE Fluorocarbon per ASTM D 1710. SILICONE RUBBER per A A 59588. THERMOPLAST per in-house specification FLUOROPOLY-BN Dielectric for high power applications per in-house specification.			
FINISH				
COPPER BERYLLIUM	Center Contacts shall be gold plated to a minimum thickness of .00005 inch (1.27 µm) in accordance with MIL-G-45204, Type II, Grade C.			
STAINLESS STEEL	shall be passivated per ASTM-A967.			
ALUMINUM	Conductive Parts shall have an iridited finish per MIL-DTL-5541. Other parts, such as Coupling Nuts and Back-Bodies shall be anodized per MIL-A-8625.			
BRASS	.00003 inch (0.8 µm) min.gold plating per MIL-G-45204, or nickle plating per QQ-N-190, as specified.			
VARIOUS	Imoloy .0001 inch (2.5 µm) min. plating, consisting of 55% Copper / 20% Zinc / 25% Tin (on special request).			
Design	The design shall be such that the outline dimensions in this catalog are met. In addition, the assembled connector shall meet the interface dimensions.			
ELECTRICAL				
Connector Type	**7/16**	**N**	**SMA**	**TNC**
Frequency Range	DC to 7.5 GHz	DC to 18.0 GHz	DC to 18.0 / 26.5 GHz	DC to 18.0 GHz
Insulation Resistance	Not less than 1.000 megaohms.	Not less than 5.000 megaohms.	Not less than 5.000 megaohms.	Not less than 5.000 megaohms.
Voltage Standing Wave Ratio (VSWR)	1.10 : 1	1.15 : 1	1.15 : 1 (DC - 18.0 GHz) 1.20 :1 (18.0 - 26.5 GHz)	1.15 : 1
Contact Resistance	1.0 milliohms max.	1.0 milliohms max.	3.0 milliohms max.	1.0 milliohms max.
Dielectric Withstanding Voltage	3000 VRMS, 60 Hz	2500 VRMS, 60 Hz	1500 VRMS, 60 Hz	2500 VRMS, 60 Hz
RF High Potent.Withstanding Voltage	4000 VRMS at 5 MHz	1500 VRMS at 5 MHz	1000 VRMS at 5 MHz	1500 VRMS at 5 MHz
RF Leakage	Not applicable.			
Insertion Loss	0.15 dB max. at 7.5 GHz	0.2 dB max. at 18.0 GHz	0.3 dB max. at 18.0 GHz	0.2 dB max. at 18.0 GHz
Impedance	50 Ohms Nominal			
Corona Level Voltage	2800 Volts at 0 ft.	500 Volts at 70,000 ft.	250 Volts at 70,000 ft	500 Volts at 70,000 ft
MECHANICAL				
Connector Durability	500 mating cycles min.			
Temperature	-65°C to +115°C			
Force to Engage and Disengage	Not applicable.			
Longitudinal Force max.	Not applicable.			
ENVIRONMENTAL				
Corrosion (Salt Spray)	Specification MIL-STD-202, Method 101, Test Condition B. The salt solution shall be 5%			
Shock and Vibration	Not applicable.			
Thermal Shock	Specification MIL-STD-202, Method 107, Test Condition B, except high temp. shall be + 165°C			
Moisture Resistance	Specification MIL-STD-202, Method 106. Step 7b (vibration) shall be omitted. Insulation resistance shall be 200 megaohms min. within 5 minutes of removal from humidity.			

Specifications are subject to change without notice.

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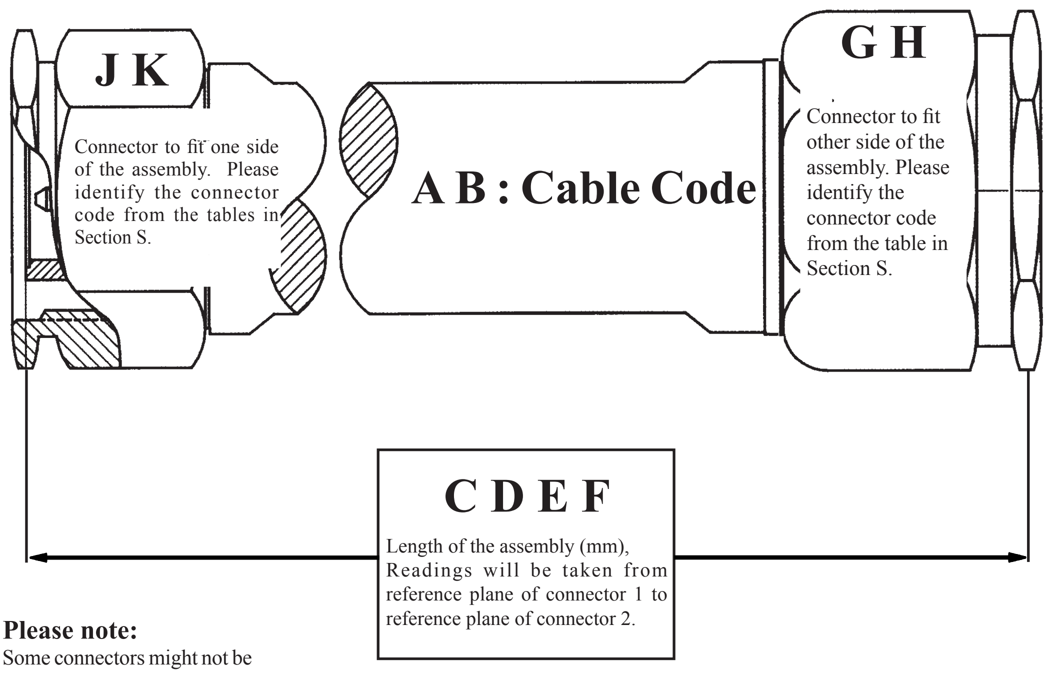
Purchasing Information on Quick Connecting Assemblies

Ordering Details:

The Part Number Sequence is:

AB - CDEF - GH - JK



Please note:
Some connectors might not be available for certain cables as standard with short deliveries. On the other hand, more connectors than listed might be available.

For cable assemblies, made to customer specification, or complying with special requirements, the company will issue a special part number.

Ordering Example: The cable assembly of Type '18' shall have the length of 80 cm. It shall be terminated with 'TNC PUSH-ON locking' and 'SMA female' - (Codes from Section S, General Information). Length is from interface to interface.

AB = cable code = 18 * CDEF = length in mm = 0800 * GH and JK are the connectors = TS and 21.

Part Number for the cable assembly in this example: 18 - 0800 - TS - 21.

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Cable Assemblies with interchangeable Connectors (Field Replaceable Connectors)

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Cable Assemblies with interchangeable Connectors are usually supplied in a pristine wooden box.

Features:

- The Cable Assembly will always have the same electrical length when fitted with any of the connectors supplied with the assembly.
- Connectors supplied are:
  SMA male with Maxi Nut and SMA female
  N male and female plus one N female with offset length
  TNC male and female
  7mm
- Torque Wrenches are supplied for the connectors: SMA, N, TNC, and 7mm
- A Wrench for the Primary unit is supplied as well.
- Standard Cables available are: Type 22 and Type 100.

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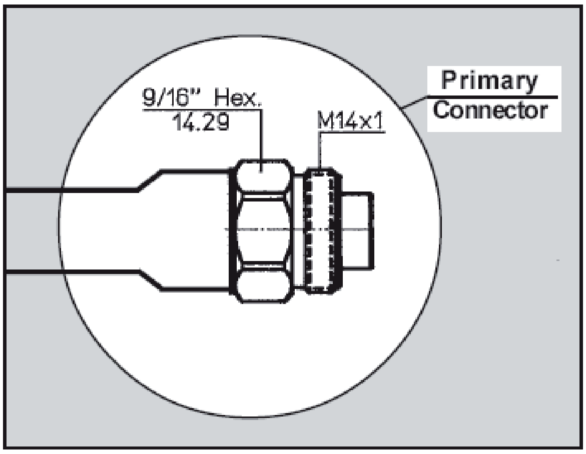
Connector Selection Chart



Primary Connector Unit for Interchangeable Connector Series as supplied with the cable assembly.

Type	Sex	Description	Remarks	Connector of equal Electrical Length	Code	Part Number	Finish
7mm	--	straight	4 equally spaced Contact slots	**YES**	**E90**	**9015-E110-02**	passivated Stainless Steel
			6 equally spaced Contact slots	**YES**	**E96**	**9615-E110-02**	
N	Male	straight		**YES**	**E51**	**3015-E110-02**	passivated Stainless Steel
	Female			**YES**	**E61**	**3015-E210-02**	
			Short Version	**NO**	**E62**	**3015-E211-02**	
SMA	Male	straight	Maxi-Nut	**YES**	**E11**	**2015-E110-02**	passivated Stainless Steel
	Female			**YES**	**E21**	**2015-E210-02**	
TNC	Male	straight		**YES**	**E31**	**4015-E110-02**	passivated Stainless Steel
	Female			**YES**	**E41**	**4015-E210-02**	

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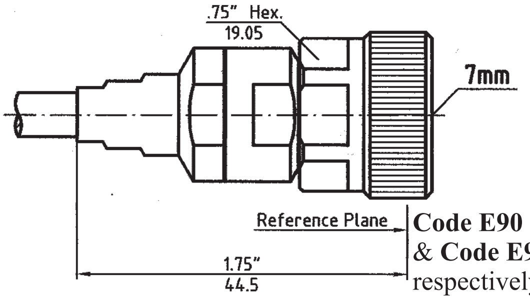
Interchangeable Connectors

Spectrum Elektrotechnik GmbH offers a series of field replaceable connectors for Cable Types 22 and 100, allowing the user to repair worn connector interface parts quickly and easily. Replacement of the damaged or worn connector parts can be accomplished in a matter of minutes, using two standard wrenches.

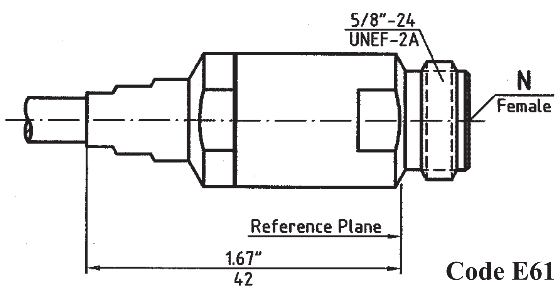
Field Replaceable Interface Options



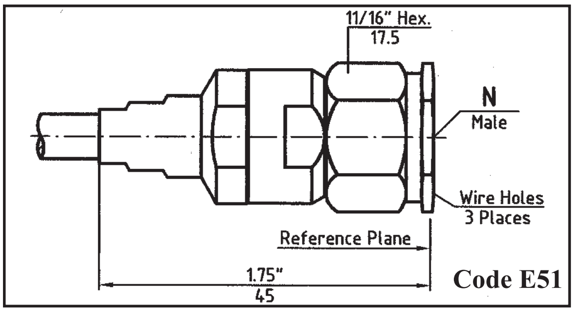
Code E90 & Code E96 respectively.

Additionally the connector head of one connector style can be exchanged with a connector head of another style, a 7mm can be substituted for an SMA, or an N, or TNC, a male can be replaced by a female, etc. Instead of using adapters, the customer can modify within minutes his cable assembly for the connector style and sex needed in the application.

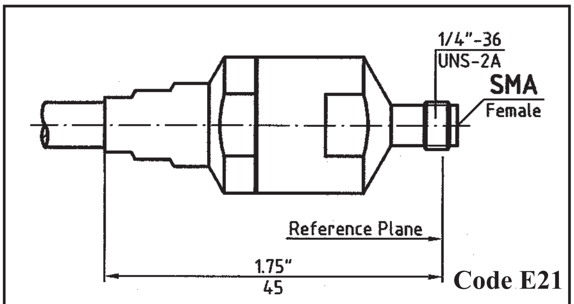
For Connector codes please refer also to Page H3.



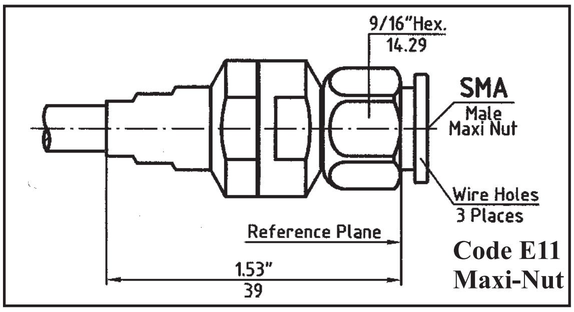
Code E61



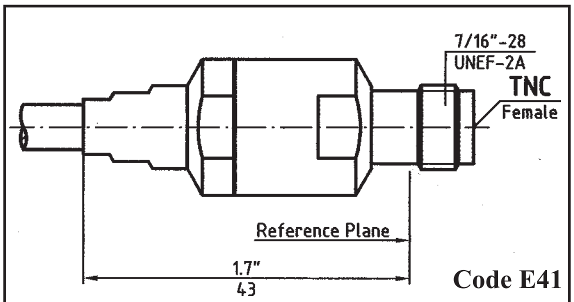
Code E51



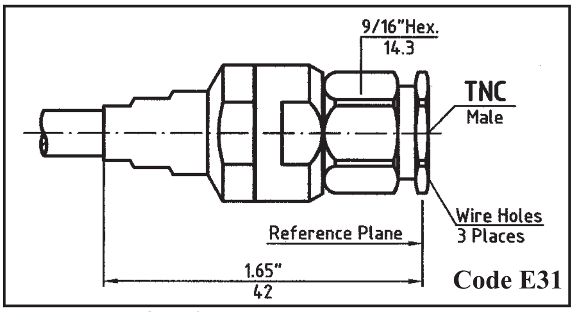
Code E21



Code E11 Maxi-Nut



Code E41



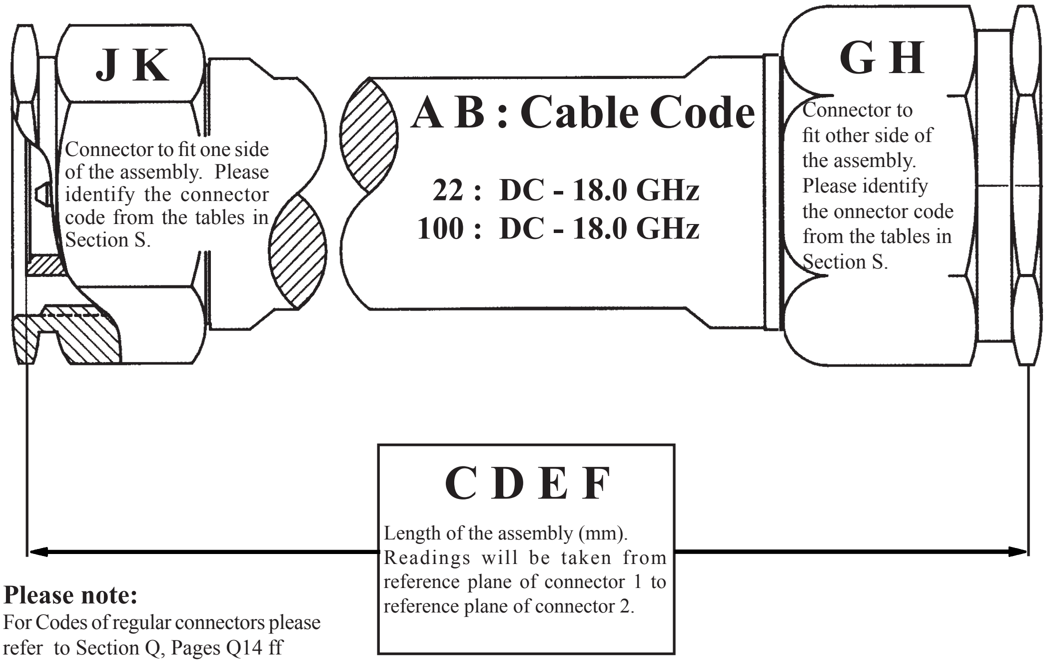
Code E31

Purchasing Information on Field Replaceable Cable Assemblies

Ordering Details:

The Part Number Sequence is:

AB - CDEF - GH - JK



Please note:
For Codes of regular connectors please refer to Section Q, Pages Q14 ff

For individual cable assemblies, made to customer specification, or complying with special requirements, the company will issue a special part number.

Ordering Example:

The cable assembly of Type '22' shall have the length of 75 cm (length is measured from interface to interface in mm). It shall be terminated with Field Replaceable Connectors, N-female and 7mm.

AB = cable code = 22 ; CDEF = length in mm = 0750 ; GH and JK are the connectors = E61 and E90.

Part Number for the cable assembly in this example: 22 - 0750 - E61 - E90.

Ordering a complete box with all 7 standard field replaceable connectors the following Part Number can be used: **EXXX-YYYY-S1**
For XXX please fill in the cable required, either 022 (for Type 22), or 100 (for Type 100).
For YYYY, please fill in the length of the assembly in mm (measured from the Reference Planes of the Primary Connectors). For non standard orders a special Part No. will be given.

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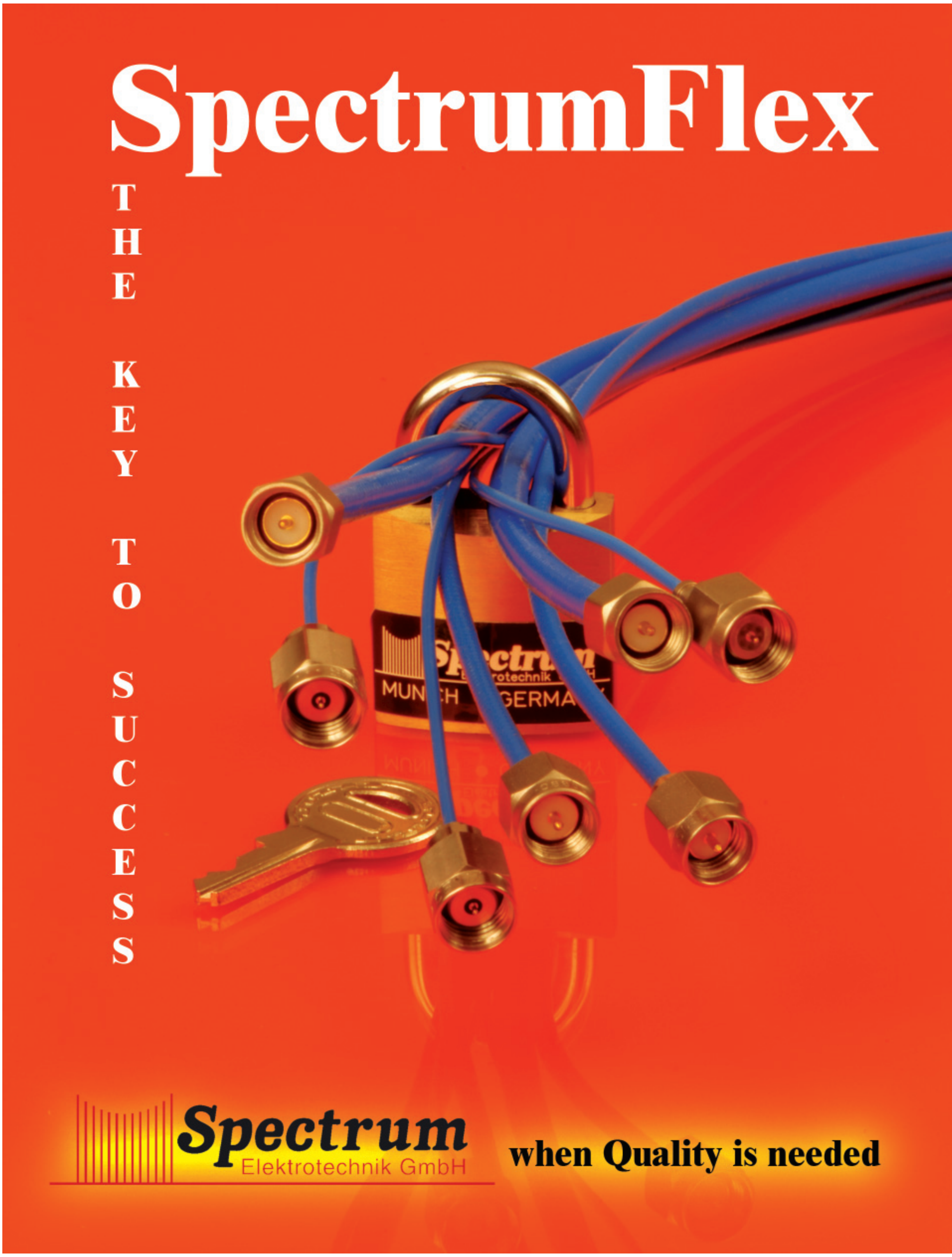
It does not matter which style of the field replaceable connectors has been used at the cable assembly. The electrical length of the connectorized assembly will always remain the same.



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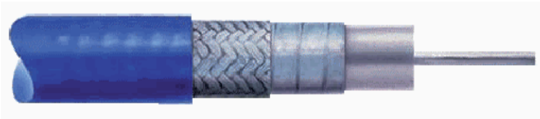
SpectrumFlex Cable Assemblies



SpectrumFlex 47F & 89F

Miniature Assemblies

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

Ideal when:

- **Development of complicated Semi-Rigid cable drawings is prohibitive as far as time and cost are concerned.**
- **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.**
- **Expensive SMA right-angle connectors may be prohibitive as far as time and cost are concerned.**

SpectrumFlex 169F

Combining flexibility and durability with a larger diameter (0.160” / 4.06 mm), SpectrumFlex 169F maintains excellent electrical characteristics through multiple flexures and offers a high strength flexible replacement for RG 402 semi-rigid cable.

FEATURES

- **Solid PTFE dielectric**
- **Ultra-high strength, multilayer outer braid**
- **0.055“ (1.40 mm), 0.096“ (2.44 mm) and 0.160“ (4.06 mm) diameters.**

BENEFITS

- **High compression resistance and greater durability.**
- **Eliminates cable breakage associated with repeated bending and handling.**
- **Provides alternatives to 0.047” (3.58 mm) semi-rigid cable - eliminating costs associated with time-consuming cable layout.**
- **SpectrumFlex cables can be configured to solve tough packaging challenges.**

Specifications are subject to change without notice.

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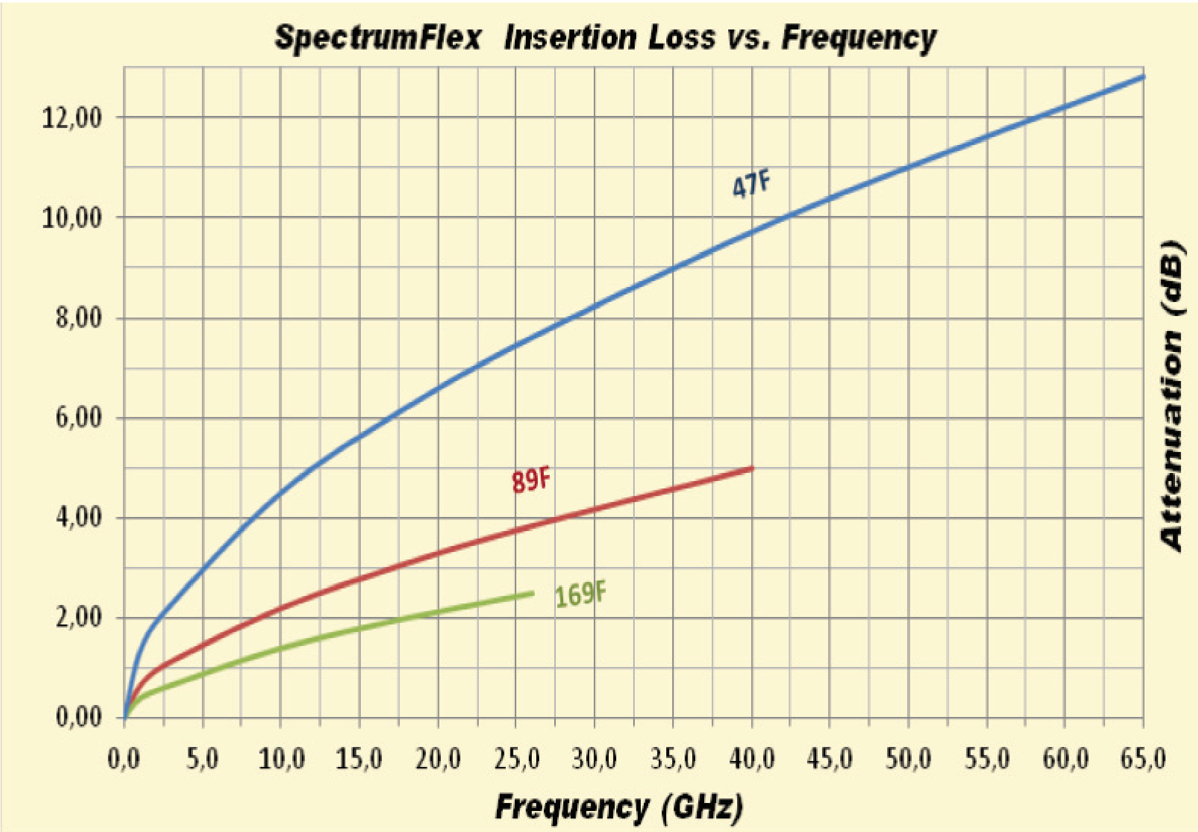
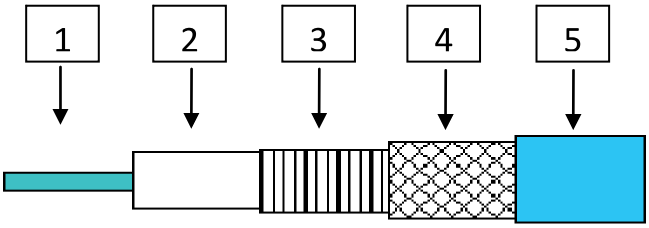
SpectrumFlex Cable Assemblies

Specification	SpectrumFlex		
Cable Code	**47F**	**89F**	**169F**
Outer Diameter (mm)	1.40	2.44	4.06
Maximum Frequency (GHz)	65.0	50.0	26.5
Impedance in Ohms	50	50	50
Attenuation-Nominal (dB/m) at 1.0 GHz	1.35	0.64	0.39
Attenuation-Nominal (dB/m) at 2.5 GHz	2.15	1.05	0.62
Attenuation-Nominal (dB/m) at 10.0 GHz	4.50	2.20	1.41
Attenuation-Nominal (dB/m) at 18.0 GHz	6.20	3.10	2.00
Attenuation-Nominal (dB/m) at 26.0 GHz	7.60	3.90	2.53
Attenuation-Nominal (dB/m) at 40.0 GHz	9.70	5.00	
Phase Matching	Available	Available	Available
Minimum Bend Radius static (mm)	2.54	4.75	8.1
Minimum Bend Radius dynamic (mm)	15.25	25.4	38.1
Weight (Grams/Meter)	5.05	17.22	43.95
Temperature range	-54 to +125°C	-54 to +125°C	-54 to +125°C



Specifications are subject to change without notice.

CABLE CONSTRUCTION



SpectrumFlex 47F

Part	Description	Diameter
1	Solid silver-plated copper-clad steel center conductor	0.29 mm
2	Solid PTFE dielectric	0.91 mm
3	High coverage, silver-plated copper ribbon braid	1.03 mm
4	High coverage, silver-plated stainless-steel braid	1.14 mm
5	Extruded FEP jacket	1.40 mm

SpectrumFlex 89F

Part	Description	Diameter
1	Solid silver-plated copper-clad steel center conductor	0.51 mm
2	Solid PTFE dielectric	1.65 mm
3	Helically wrapped silver-plated copper foil shield	1.80 mm
4	High coverage, silver-plated high strength alloy braid	2.16 mm
5	Extruded FEP jacket	2.44 mm

SpectrumFlex 169F

Part	Description	Diameter
1	Solid silver-plated copper-clad steel center conductor	0.92 mm
2	Solid PTFE dielectric	3.05 mm
3	Helically wrapped silver-plated copper foil shield	3.25 mm
4	High coverage, silver-plated high strength alloy braid	3.70 mm
5	Extruded FEP jacket	4.06 mm

Specifications are subject to change without notice.

SpectrumFlex Connector Selection Chart

Connector Selection Chart

Frequency	Connector Types	Description	Code	Available 47F	Available 89F	Available 169F
18.0 GHz	SMA	Male, straight	11		X	X
		Female, straight	21	X	X	X
		Male, mitred right angle	15		X	X
	N	Male, straight	51		X	X
		Female, straight	61		X	X
		Male, mitred right angle	55		X	X
		Female, bulkhead feedthrough	63		X	X
	TNC	Male, straight	31		X	X
		Female, straight	41			X
		Male, mitred right angle	35		X	X
		Female, bulkhead feedthrough	43		X	X
35.0 GHz	3.5mm	Male, straight	91		X	X
		Female, straight	92		X	X
		Female, bulkhead feedthrough	92B			
40.0 GHz	2.92mm (K)	Male, straight	KM	X	X	X
		Female, straight	KF	X	X	X
		Female, bulkhead feedthrough	KFB		X	
50.0 GHz	2.4mm	Male, straight	HM	X	X	X
		Female, straight	HF	X	X	X
		Female, bulkhead feedthrough	HB	X		
65.0 GHz	1.85mm (V)	Male, straight	VM	X		
		Female, straight	VF	X		

X: connectors are usually in stock **X: Connectors available, but cable limits frequency range**

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Ordering Details:

ABCD – EFGH – JKL – MNO

ABCD: Cable Code

EFGH: Length of the assembly (mm), readings will be taken from reference plane of connector 1 to reference plane of connector 2.

JKL: For the standard Connector configuration please fill in the two or three numbers/letters

MNO: Code, describing the Connector.
For the standard Connector configuration please fill in the two or three numbers/letters
Code, describing the Connector.

Ordering Example: The cable assembly of Type 47F shall have the length of 80 cm and shall be terminated with 2.4 mm male connec tors on both ends.

ABCD = cable code = 47F (cable code is min. 2 and max. 4 letters)
EFGH = length in mm = 0800
JKL and MNO are the connectors = HM (code is min. 2 and max. 3 letters), **Connector Codes please find in Section S**
Part Number for the cable assembly in this example: 47F-0800-HM-HM

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For cable assemblies, made to customer specification, or complying with special requirements, the company will issue a special part number.

Cable - Type 47F
DC - 65.0 GHz

SPECIFICATION	SpectrumFlex 47F	
Cable Code	**47F**	
Frequency Range	DC - 65.0 GHz	
Outer Diameter in mm	1.40	
Impedance in Ohms at Sea Level and +25°C	50 ± 2	
Velocity in %	70.5	
Delay (ns/m) (nominal)	4.75	
Power Handling Avg. in Watts at 1.0 GHz	50	
Capacitance nominal pF/m	94.8	
Operating Temperature Range	-54°C to +125°C	
Nominal Insertion Loss in dB/m vs. Frequency	1.0 GHz	1,35
	2.5 GHz	2,15
	10.0 GHz	4,5
	18.0 GHz	6,2
	26.5 GHz	7,6
	40.0 GHz	9,7
	50.0 GHz	11.35
	65.0 GHz	13.06
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	1.0 GHz	46
	2.5 GHz	28
	10.0 GHz	14
	18.0 GHz	10
	26.5 GHz	7
	40.0 GHz	6
	50.0 GHz	5
	65.0 GHz	3
Outer Conductor Construction	High coverage, silver-plated copper ribbon braid, High coverage, silver-plated stainless-steel braid	
Outer Jacket	Extruded FEP jacket	
Dielectric Diameter in mm	0.91	
Dielectric Material	Solid PTFE	
Dielectric Constant	2.0	
Center Conductor Material	Solid silver-plated copper-clad steel	
Center Conductor Dia. in mm	0.29	
Connector retention (N)	45	
Weight in Grams/Meter	6	
Minimum Bend Radius (mm) dynamic	15.25	
Minimum Bend Radius (mm) static	2.54	

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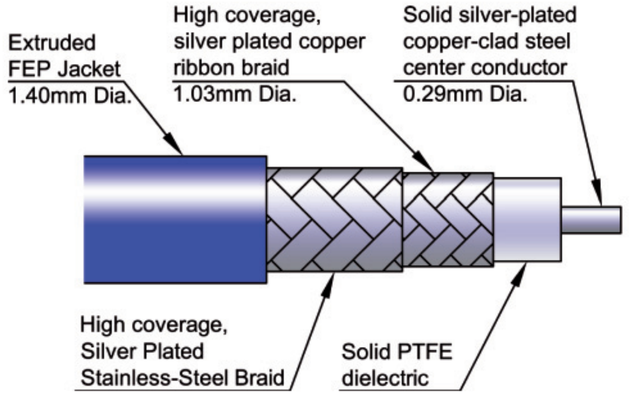
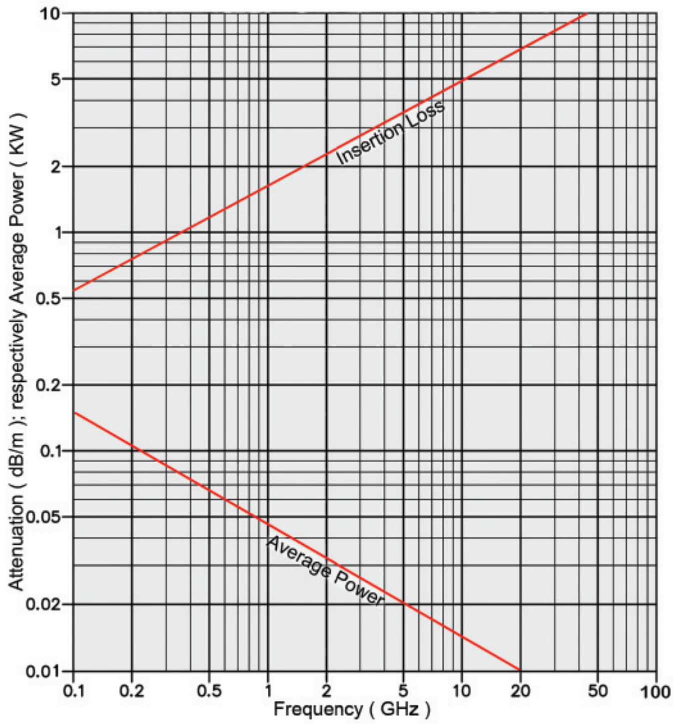
Characteristics:

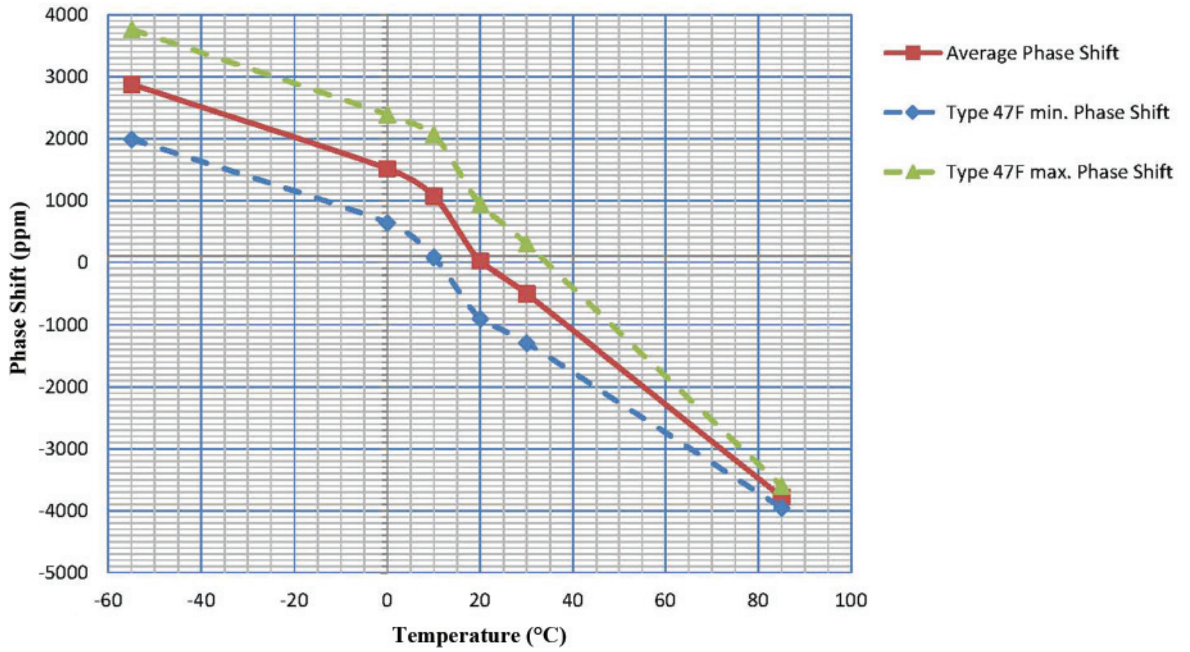
- Performance to 65.0 GHz.
- Solid PTFE dielectric featuring Ultra-high strength, multi-layer outer braid:
- High compression resistance and greater durability
- Eliminates cable breakage associated with repeated bending and handling
- Flexible alternative to 0.047"" Semi Rigid
- Eliminates costs associated with time-consuming cable layout
- Increased phase stability versus temperature and bending
- SpectrumFlex cables can be configured to solve tough pack-aging challenges





Specifications are subject to change without notice.

Phase Shift vs. Temperature of SpectrumFlex Type 47F



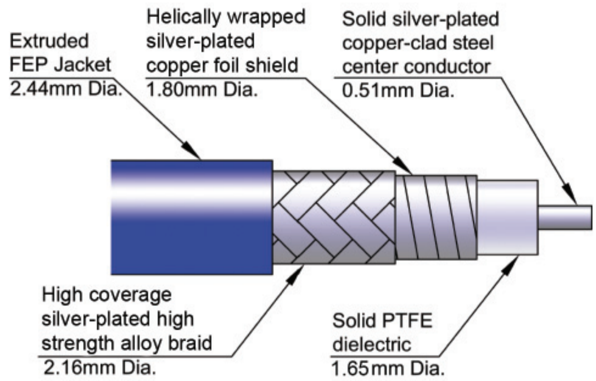
Specifications are subject to change without notice.

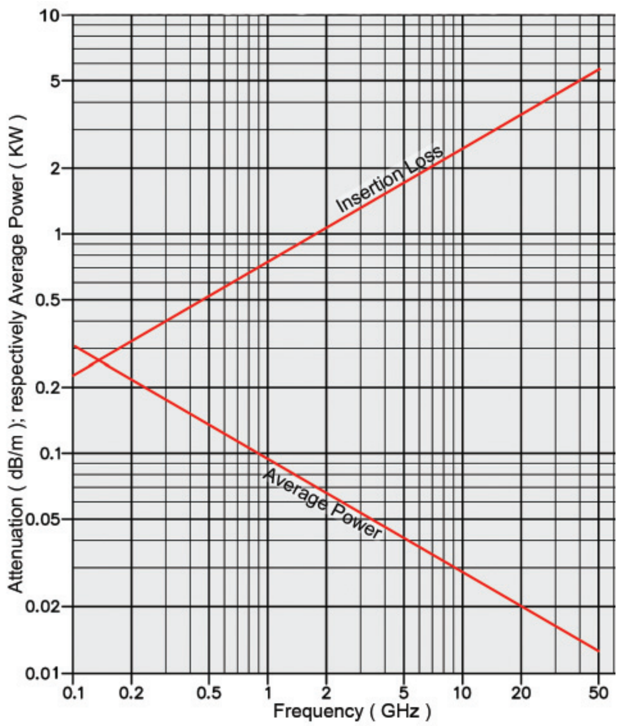
Spectrum Elektrotechnik GmbH

Cable - Type 89F
DC - 50.0 GHz

Characteristics:
- Performance to 50.0 GHz
- Solid PTFE dielectric featuring Ultra-high strength, multilayer outer braid:
- High compression resistance and greater durability
- Eliminates cable breakage associated with repeated bending and handling
- Flexible alternative to 0.085" Semi Rigid
- Eliminates costs associated with time-consuming cable layout
- Increased phase stability versus temperature and bending
- SpectrumFlex cables can be configured to solve tough packaging challenges

SPECIFICATION		SpectrumFlex 89F	
Cable Code		**89F**	
Frequency Range		DC - 50.0 GHz	
Outer Diameter in mm		2.44	
Impedance in Ohms at Sea Level and +25°C		50 ± 2	
Velocity in %		70.5	
Delay (ns/m) (nominal)		4.72	
Capacitance nominal pF/m		95.1	
Operating Temperature Range		-54°C to +125°C	
Nominal Insertion Loss in dB/m vs. Frequency		1.0 GHz	0.64
		2.5 GHz	1.05
		10.0 GHz	2.20
		18.0 GHz	3.10
		26.0 GHz	3.90
		40.0 GHz	5.00
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C		1 GHz	96
		2.5 GHz	58
		10.0 GHz	28
		18.0 GHz	21
		26.0 GHz	17
		40.0 GHz	13
Outer Conductor Construction		Helically wrapped silver-plated copper foil shield, High coverage, silver-plated high strength alloy braid	
Outer Jacket		Extruded FEP jacket	
Dielectric Diameter in mm		1.65	
Dielectric Material		Solid PTFE	
Dielectric Constant		2.0	
Center Conductor Material		Solid silver-plated copper-clad steel	
Center Conductor Dia. in mm		0,51	
Connector retention in Newtons min.		65	
Weight in Gramms/Meter		18	
Minimum Bend Radius (mm)	dynamic	24.4	
	static	4.75	





Specifications are subject to change without notice.

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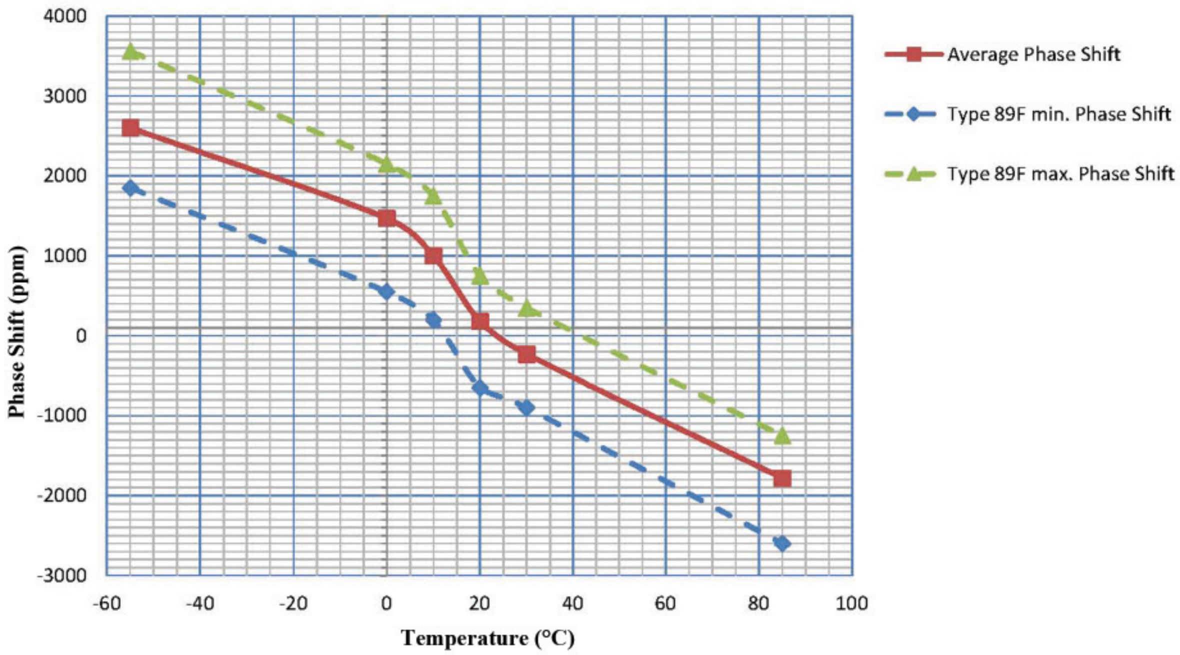
Phase Shift vs. Temperature of SpectrumFlex Type 89F

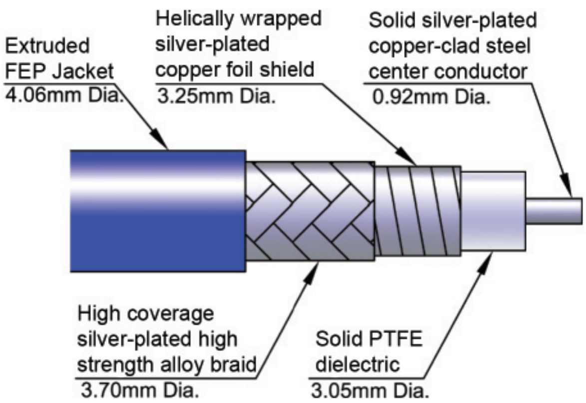


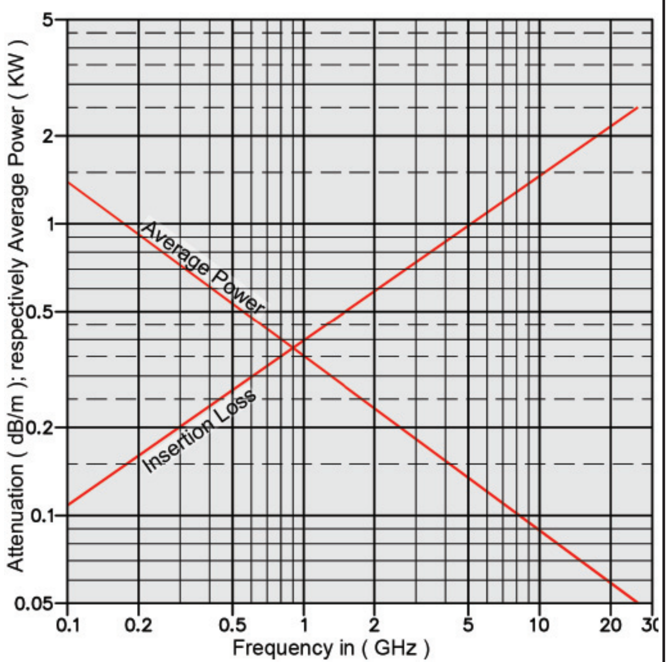
Specifications are subject to change without notice.

Cable - Type 169F
DC - 26.5 GHz

Characteristics:
- Performance to 26.5 GHz
- Solid PTFE dielectric featuring Ultra-high strength, multilayer outer braid
- High compression resistance and greater durability
- Eliminates cable breakage associated with repeated bending and handling
- Flexible alternative to 0.141 Semi Rigid
- Eliminates costs associated with time-consuming cable layout
- Increased phase stability versus temperature and bending
- SpectrumFlex cables can be configured to solve tough packaging challenges

SPECIFICATION	SpectrumFlex 169F	
Cable Code	**169F**	
Frequency Range	DC - 26.5 GHz	
Outer Diameter in mm	4.06	
Impedance in Ohms at Sea Level and +25°C	50 ± 2	
Velocity in %	70.5	
Delay (ns/m) (nominal)	4.72	
Capacitance nominal pF/m	95.1	
Operating Temperature Range	-54°C to +125°C	
Nominal Insertion Loss in dB/m vs. Frequency	1.0 GHz	0.39
	2.5 GHz	0.62
	10.0 GHz	1.41
	18.0 GHz	2.0
	26.0 GHz	2.53
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	1 GHz	282
	2.5 GHz	190
	10.0 GHz	90
	18.0 GHz	60
	26.0 GHz	48
Outer Conductor Construction	Helically wrapped silver-plated copper foil shield, High coverage, silver-plated high strength alloy braid	
Outer Jacket	Extruded FEP jacket	
Dielectric Diameter in mm	3.05	
Dielectric Material	Solid PTFE dielectric	
Dielectric Constant	2.0	
Center Conductor Material	Solid silver-plated copper-clad steel	
Center Conductor Dia. in mm	0.92	
Connector retention in Newtons min.	66.6	
Weight in Gramms/Meter	44	
Minimum Bend Radius (mm) dynamic	38.1	
Minimum Bend Radius (mm) static	8.1	





Specifications are subject to change without notice.

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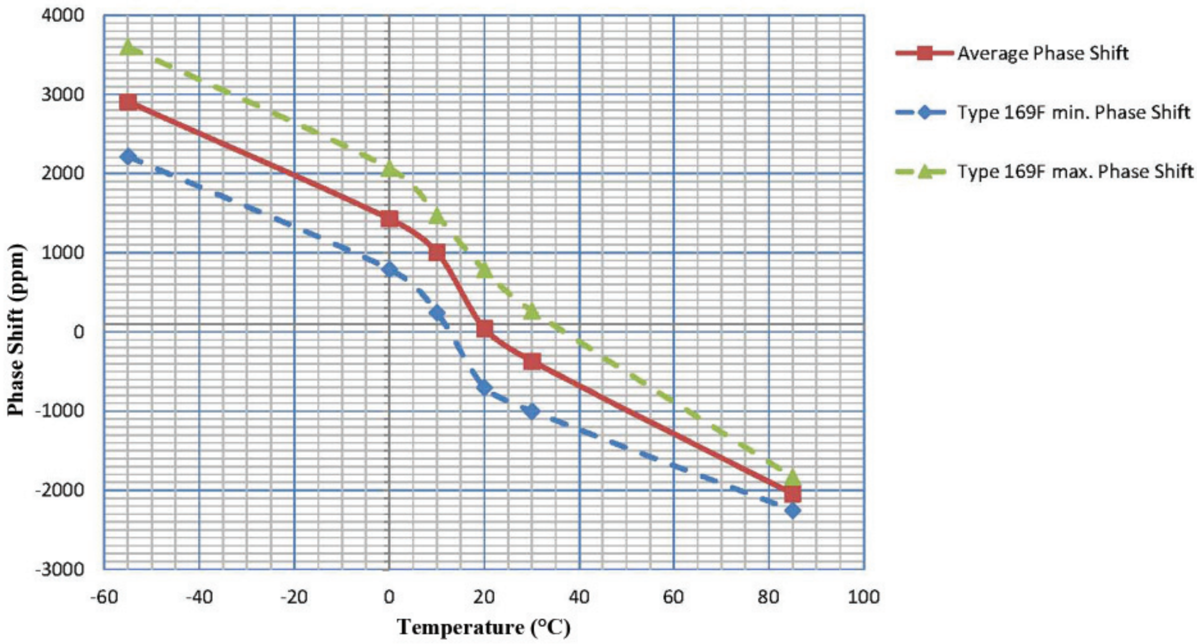
Phase Shift vs. Temperature of SpectrumFlex Type 169F



SpectrumFlex
Cable Assemblies

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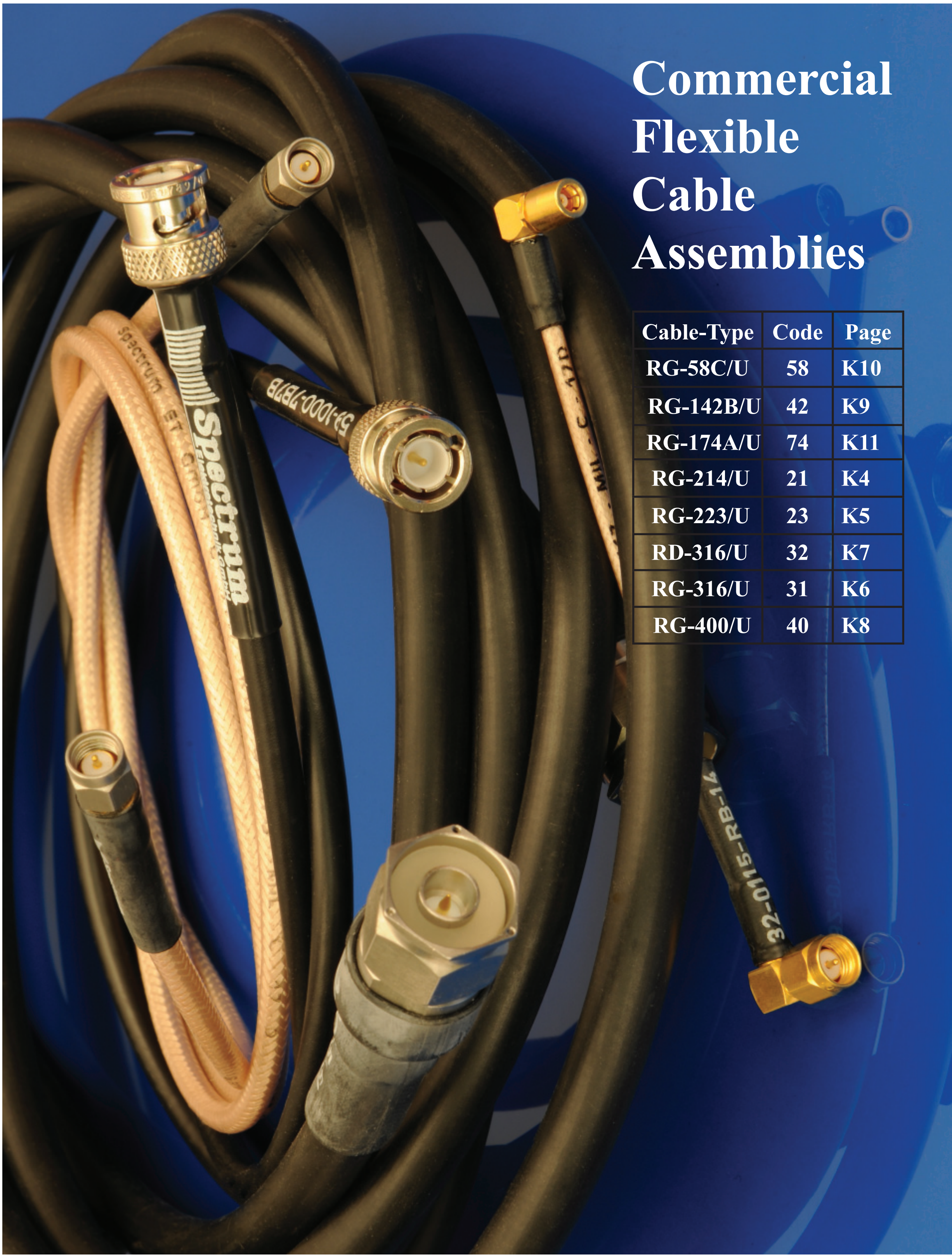

Commercial Flexible Cable Assemblies

Commercial Flexible Cable Assemblies

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Commercial Flexible Cable Assemblies

RG - Flexible Cable Selection Chart

Frequency in (GHz) →	1	2	3	4	8	12.0	15	18
Band		L	S	C	X		KU	

Increasing Insertion Loss ↓

Cable Type	Operational Range →	
21	RG-214/U (Dia. 10.8 mm)	11.0 GHz
23	RG-223/U (Dia. 5.38 mm)	12.4 GHz
42	RG-142B/U (Dia. 4.95 mm)	12.4 GHz
40	RG-400/U (Dia. 4.95 mm)	12.4 GHz
58	RG-58C/U (Dia. 4.95 mm)	1.0 GHz
32	RD-316/U Double shielded. (Dia. 3.1 mm)	3.0 GHz
31	RG-316/U (Dia. 2.5 mm)	3.0 GHz
74	1 GHz	RG-174 A/U (Dia. 2.8 mm)

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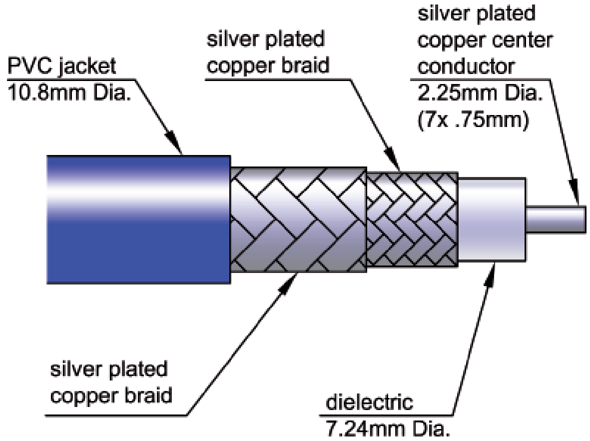
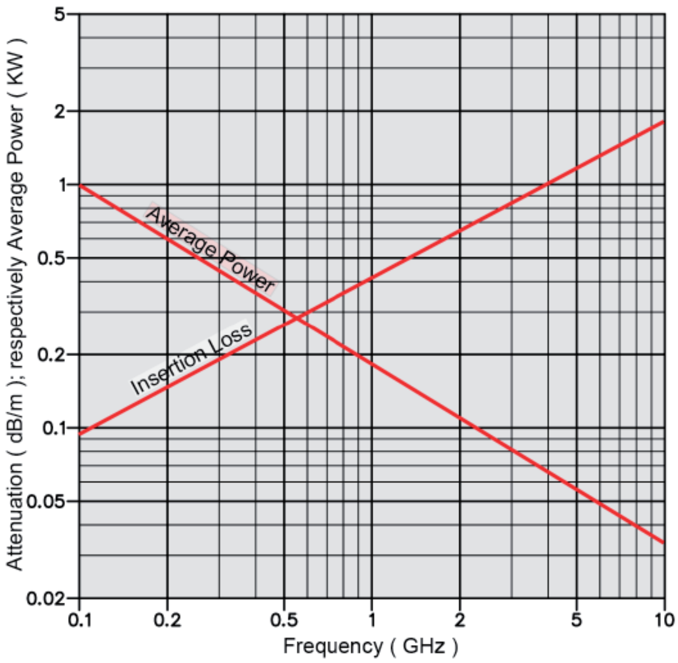
Specifications are subject to change without notice.

Cable-Type 21
RG - 214/U
DC - 11.0 GHz

Characteristics:
- Performance to 11.0 GHz
- Commercial applications or Test Centers where price is of importance; reasonable Insertion Loss
- Procurement for completely terminated assemblies, 100% tested in VSWR and Insertion Loss.
- Available connectors: 7mm, 7/16, N, SBX, SBY, SMA and TNC.
- For Connector Outline Drawings please refer to Section Q.
- For Connector Code details please refer to Section S.
- For information on armor please refer to Section S as well.
- For ordering information please refer to Section A.

SPECIFICATION		Type 21
Cable Code		**21**
Frequency Range		DC to 11.0 GHz
Outer Diameter in mm		10.8
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		66
Capacitance in pF/m		106
Dielectric Strength (60 Hz), KVrms		10.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		3.7
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0..25
	2.0 GHz	0.62
	4.0 GHz	1.05
	8.0 GHz	1.64
	10.0 GHz	1.87
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	300
	2.0 GHz	110
	4.0 GHz	64
	8.0 GHz	38
	10.0 GHz	32
RF - Leakage at 10.0 GHz		-90 dBC
Operating Temperature Range		-40°C to +85°C
Outer Conductor Construction		2x Silver Plated Copper Braid
Outer Jacket		PVC
Dielectric Diameter in mm		7.2
Dielectric Material		PE
Dielectric Constant		2.3
Center Conductor Material		Silver-Plated stranded Copper
Center Conductor Dia. in mm		2.25
Weight in Grams/Meter		185
Minimum Bend Radius, Inside, Static (mm)		55
Minimum Bend Radius, Inside, Dynamic (mm)		165





Specifications are subject to change without notice.

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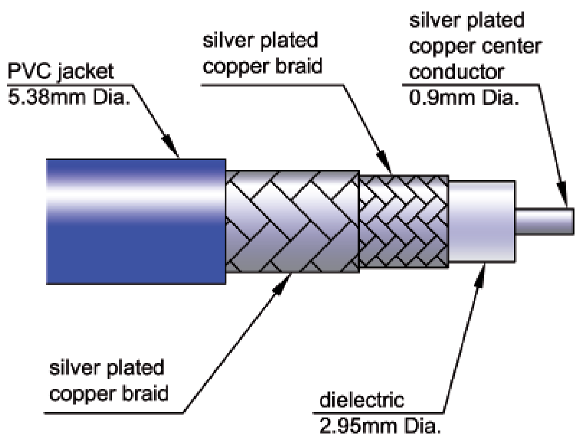
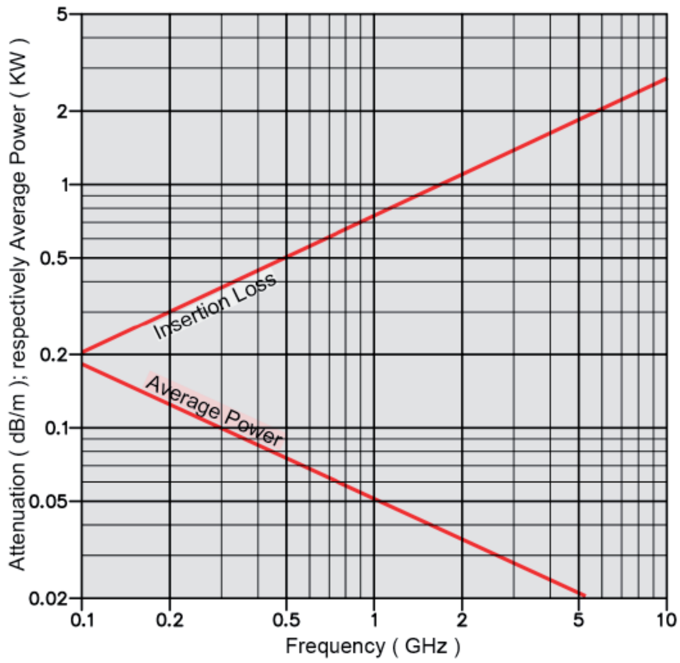
Characteristics:

- Performance to 12.4 GHz
- Double shielded for lower leakage.
- Usage in Commercial Systems.
- Low Price.
- Procurement for completely terminated assemblies, 100% tested in VSWR and Insertion Loss.
- Available connectors: BNC, N, SMA and TNC.
- For Connector Outline Drawings please refer to Section Q.
- For Connector Code details please refer to Section S.
- For information on armor please refer to Section S as well.
- For ordering information please refer to Section A.

Cable - Type 23
RG - 223/U
DC - 12.4 GHz





Specifications are subject to change without notice.

SPECIFICATION		Type 23
Cable Code		**23**
Frequency Range		DC to 12.4 GHz
Outer Diameter in mm		5.38
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		65.9
Capacitance in pF/m		106
Dielectric Strength (60 Hz), KVrms		5.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.9
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.49
	2.0 GHz	1.08
	4.0 GHz	1.64
	8.0 GHz	2.29
	10.0 GHz	2.62
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	75
	2.0 GHz	33
	4.0 GHz	22
	8.0 GHz	15
	10.0 GHz	12
RF - Leakage at 12.4 GHz		- 90 dBC
Operating Temperature Range		-40°C to +85°C
Outer Conductor Construction		2x Silver Plated Copper Braid
Outer Jacket		PVC
Dielectric Diameter in mm		2.95
Dielectric Material		PE
Dielectric Constant		2.3
Center Conductor Material		Silver-Plated Copper
Center Conductor Dia. in mm		0.9
Weight in Grams/Meter		61
Minimum Bend Radius, Inside, Static (mm)		30
Minimum Bend Radius, Inside, Dynamic (mm)		80

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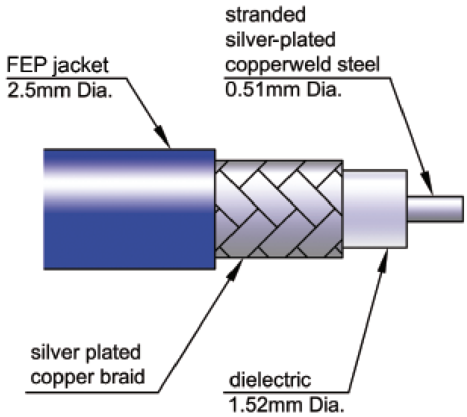
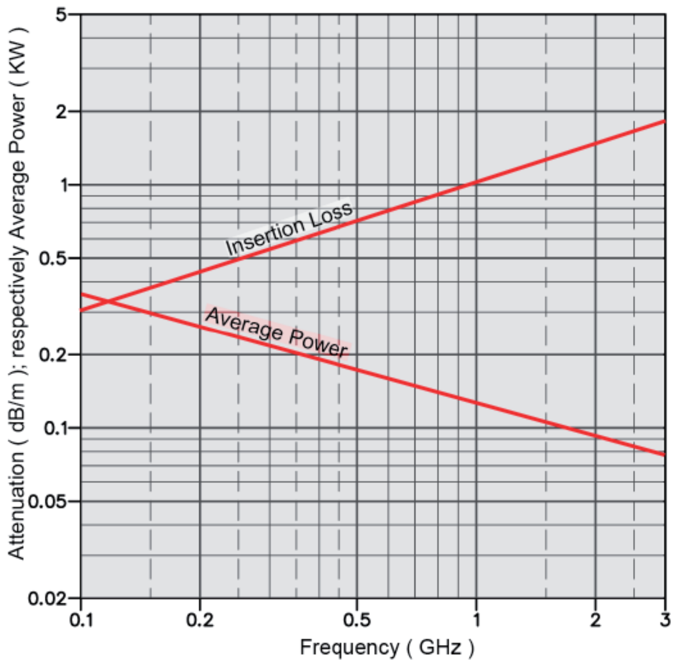
Cable - Type 31
RG - 316/U DC - 3.0 GHz

SPECIFICATION		Type 31
Cable Code		**31**
Frequency Range		DC to 3.0 GHz
Outer Diameter in mm		2.5
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		69.5
Capacitance in pF/m		105
Dielectric Strength (60 Hz) in KV rms		2.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		0.9
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.70
	1.0 GHz	1.10
	2.0 GHz	1.57
	3.0 GHz	1.85
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	170
	1.0 GHz	130
	2.0 GHz	91
	3.0 GHz	75
RF - Leakage at 3.0 GHz		-80 dBC
Operating Temperature Range		-55°C to +200°C
Outer Conductor Construction		1x Silver-Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		1.52
Dielectric Material		FEP
Dielectric Constant		2.0
Center Conductor Material		Stranded Silver-Plated Copperweld Steel
Center Conductor Construction		7x.17 mm
Center Conductor Dia. in mm		0.51
Weight in Grams/Meter		18
Minimum Bend Radius, Inside, Static (mm)		24
Minimum Bend Radius, Inside, Dynamic (mm)		60

Characteristics:
* Performance to 3.0 GHz
* Usage in Commercial Systems for low frequency applications.
* Low Price.
* Procurement for the raw cable only, or completely terminated assemblies, 100% tested in VSWR and Insertion Loss.
* Available connectors: 1.8/5.6, SMA, SMP, N and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





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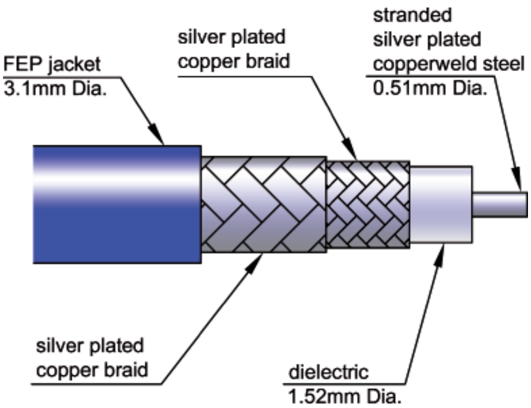
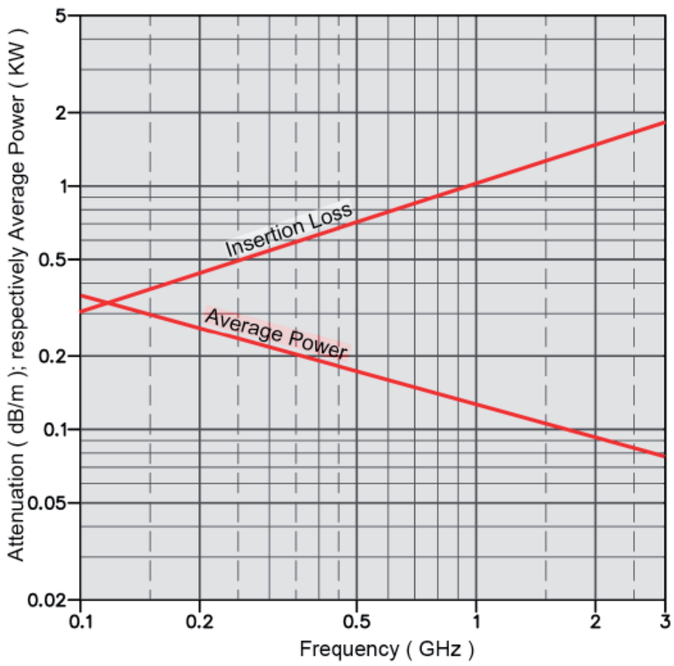
Cable - Type 32
RD - 316/U
DC - 3.0 GHz

Characteristics:
* Performance to 3.0 GHz
* The cable is identical to the RG316/U with the exception that it is double shielded for lower leakage.
* Usage in Commercial Systems for low frequency applications.
* Low Price.
* Procurement for the raw cable only, or completely terminated assemblies, 100% tested in VSWR and Insertion Loss.
* Available connectors: 1.8/5.6, SMA, SMP, N and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

SPECIFICATION		Type 32
Cable Code		**32**
Frequency Range		DC to 3.0 GHz
Outer Diameter in mm		3.1
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		69.5
Capacitance in pF/m		105
Dielectric Strength (60 Hz) in KV rms		2.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		0.9
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.70
	1.0 GHz	1.10
	2.0 GHz	1.57
	3.0 GHz	1.85
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	170
	1.0 GHz	130
	2.0 GHz	91
	3.0 GHz	75
RF - Leakage at 3.0 GHz		-80 dBC
Operating Temperature Range		-55°C to +110°C
Outer Conductor Construction		2x Silver-Plated Copper Braid
Outer Jacket		PTFE
Dielectric Diameter in mm		1.52
Dielectric Material		FEP
Dielectric Constant		2.0
Center Conductor Material		Stranded Silver-Plated Copperweld Steel
Center Conductor Construction		7x.17 mm
Center Conductor Dia. in mm		0.51
Weight in Grams/Meter		18
Minimum Bend Radius, Inside, Static (mm)		24
Minimum Bend Radius, Inside, Dynamic (mm)		60

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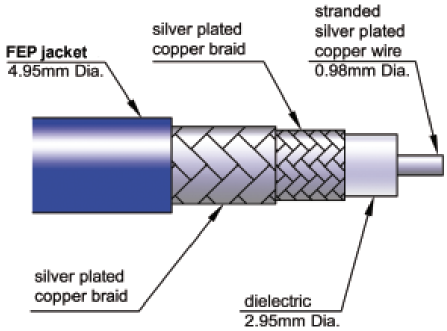
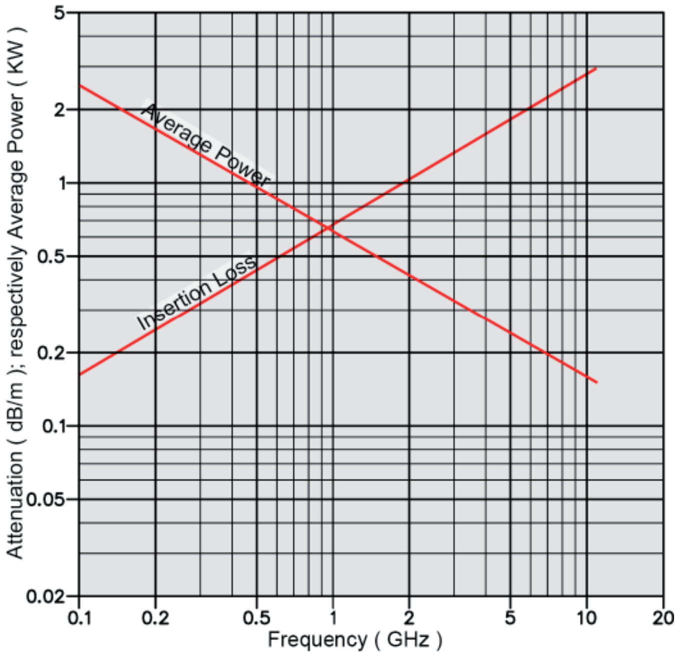
Cable - Type 40
RG - 400/U
DC - 12.4 GHz

Characteristics:
* Performance to 12.4 GHz.
* Identical with RG-142/U, with the exception of the center conductor of the RG-400/U which is stranded.
* Usage in Commercial Applications where price is of utmost importance.
* Procurement for the raw cable only, or completely terminated assemblies, 100% tested in VSWR and Insertion Loss
* Available connectors: 1.8/5.6, BNC, N, SMA and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

SPECIFICATION		Type 40
Cable Code		**40**
Frequency Range		DC to 12.4 GHz
Outer Diameter in mm		4.95
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		69.5
Capacitance in pF/m		105
Dielectric Strength (60 Hz) in KV rms		3.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.4
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.43
	2.0 GHz	0.98
	4.0 GHz	1.41
	8.0 GHz	2.20
	12.0 GHz	2.95
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	950
	2.0 GHz	400
	4.0 GHz	280
	8.0 GHz	180
	12.0 GHz	150
RF - Leakage at 12.4 GHz		-80 dBC
Operating Temperature Range		-54°C to +125°C
Outer Conductor Construction		2x Silver-Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		2.95
Dielectric Material		PTFE
Dielectric Constant		2.0
Center Conductor Material		Stranded Silver-Plated Copper wire
Center Conductor Construction		19 x 0.20 mm
Center Conductor Dia. in mm		0.98
Weight in Grams/Meter		74
Minimum Bend Radius, Inside, Static (mm)		40
Minimum Bend Radius, Inside, Dynamic (mm)		100





Specifications are subject to change without notice.

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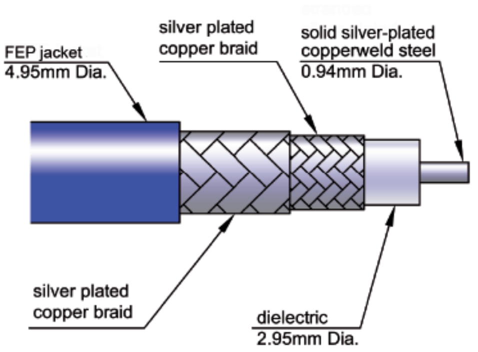
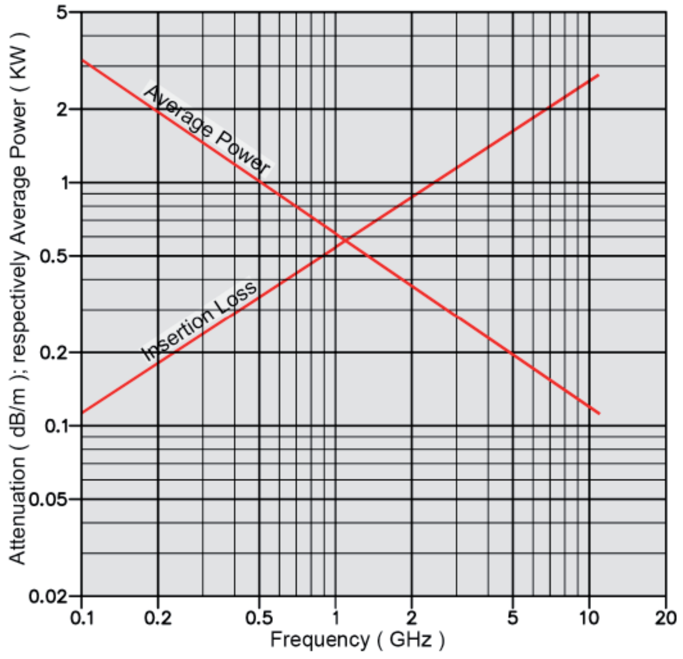
Cable - Type 42
RG - 142B/U
DC - 12.4 GHz

Characteristics:
* Performance to 12.4 GHz.
* Identical with RG-400/U, with the exception of the center conductor of the RG-142/U which is solid.
* Usage in Commercial Applications where price is of utmost importance.
* Procurement for the raw cable only, or completely terminated assemblies, 100% tested in VSWR and Insertion Loss.
* Available connectors: 1.8/5.6, BNC, N, SMA and TNC. For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.





Specifications are subject to change without notice.

SPECIFICATION		Type 42
Cable Code		**42**
Frequency Range		DC to 12.4 GHz
Outer Diameter in mm		4.95
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		69.5
Capacitance in pF/m		105
Dielectric Strength (60 Hz) in KV rms		5.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.4
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.33
	2.0 GHz	0.78
	4.0 GHz	1.21
	8.0 GHz	1.87
	12.0 GHz	2.78
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	1000
	2.0 GHz	490
	4.0 GHz	250
	8.0 GHz	180
	12.0 GHz	110
RF - Leakage at 12.4 GHz		-80 dBC
Operating Temperature Range		-54°C to +125°C
Outer Conductor Construction		2x Silver-Plated Copper Braid
Outer Jacket		FEP
Dielectric Diameter in mm		2.95
Dielectric Material		PTFE
Dielectric Constant		2.0
Center Conductor Material		Silver-Plated Copperweld Steel
Center Conductor Construction		1 x 0.94 mm
Center Conductor Dia. in mm		0.94
Weight in Grams/Meter		69
Minimum Bend Radius, Inside, Static (mm)		40
Minimum Bend Radius, Inside, Dynamic (mm)		100

Cable - Type 58
RG - 58C/U
DC - 1.0 GHz

Characteristics:
* Performance to 1.0 GHz.
* Usage in Commercial applications or Test Centers where the Insertion Loss is of little importance.
* Procurement for the raw cable only, or completely terminated assemblies, 100% tested in VSWR and Insertion Loss.
* Available connectors: BNC.
  For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

SPECIFICATION		Type 58
Cable Code		**58**
Frequency Range		DC to 1.0 GHz
Outer Diameter (mm)		4.95
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		65.9
Capacitance in pF/m		106
Dielectric Strength (60 Hz) in KV rms		5.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.4
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.55
	1.0 GHz	0.92
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	72
	1.0 GHz	50
RF - Leakage at 1.0 GHz		-80 dBC
Operating Temperature Range		-40°C to +85°C
Outer Conductor Construction		Tin plated copper braid
Outer Jacket		PVC-II A
Dielectric Diameter in mm		2.95
Dielectric Material		PE
Dielectric Constant		2.3
Center Conductor Material		Stranded Tinned Copper
Center Conductor Construction		19 x 0.18 mm
Center Conductor Dia. in mm		0.90
Weight in Grams/Meter		39
Minimum Bend Radius, Inside, Static (mm)		25
Minimum Bend Radius, Inside, Dynamic (mm)		60

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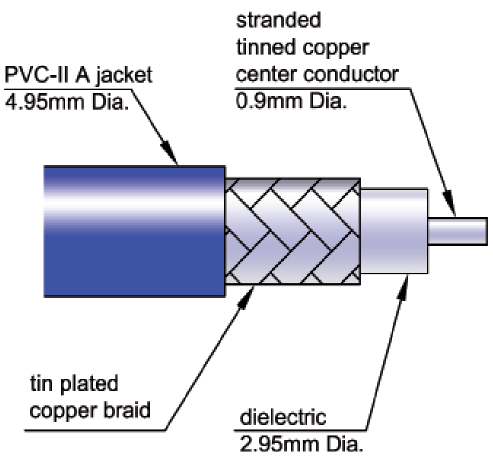

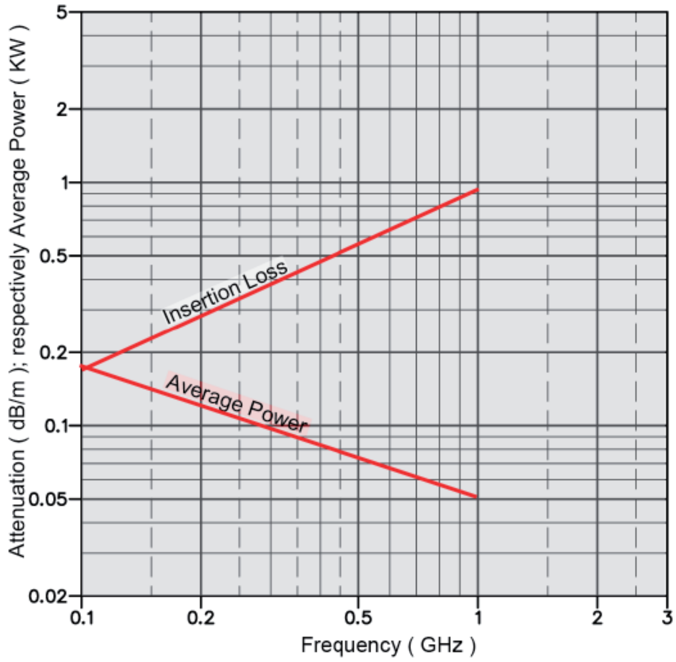

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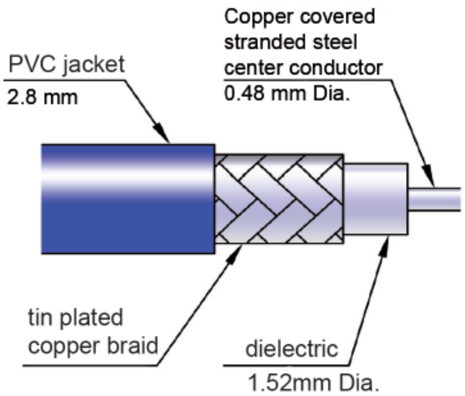
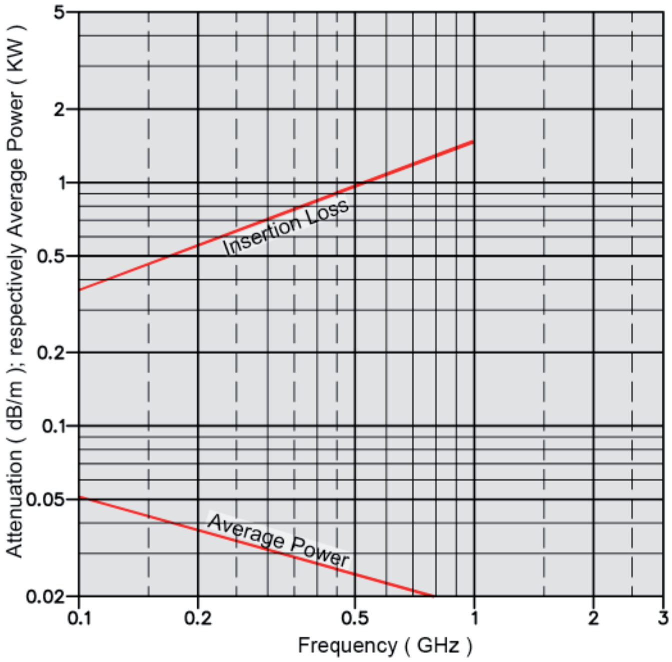
Characteristics:
* Performance to 1.0 GHz
* Usage in Commercial Applications where price is of utmost importance.
* Procurement for the raw cable only, or completely terminated assemblies, 100% tested in VSWR and Insertion Loss.
* Available connectors: SMA.
  For Connector Outline Drawings please refer to Section Q.
* For Connector Code details please refer to Section S.
* For information on armor please refer to Section S as well.
* For ordering information please refer to Section A.

Cable - Type 74
RG - 174A/U
DC - 1.0 GHz





SPECIFICATION		Type 74
Cable Code		**74**
Frequency Range		DC to 1.0 GHz
Outer Diameter in mm		2.8
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		65.9
Capacitance in pF/m		105
Dielectric Strength (60 Hz) in KV rms		2
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.1
Nominal Insertion Loss in dB/m vs. Frequency	0.2 GHz	0.56
	0.5 GHz	0.92
	0.8 GHz	1.31
	1.0 GHz	1.48
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.2 GHz	38
	0.5 GHz	23
	0.8 GHz	19
	1.0 GHz	17
RF - Leakage at 1.0 GHz		80 dBC
Operating Temperature Range		-40°C to +85°C
Outer Conductor Construction		1x Tin-Plated Copper Braid
Outer Jacket		PVC
Dielectric Diameter in mm		1.52
Dielectric Material		PE
Dielectric Constant		2.3
Center Conductor Material		Stranded copper covered steel
Center Conductor Construction		7 x 0.16 mm
Center Conductor Dia. in mm		0.48
Weight in Grams/Meter		14
Minimum Bend Radius, Inside, Static (mm)		24
Minimum Bend Radius, Inside, Dynamic (mm)		60

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Specifications are subject to change without notice.

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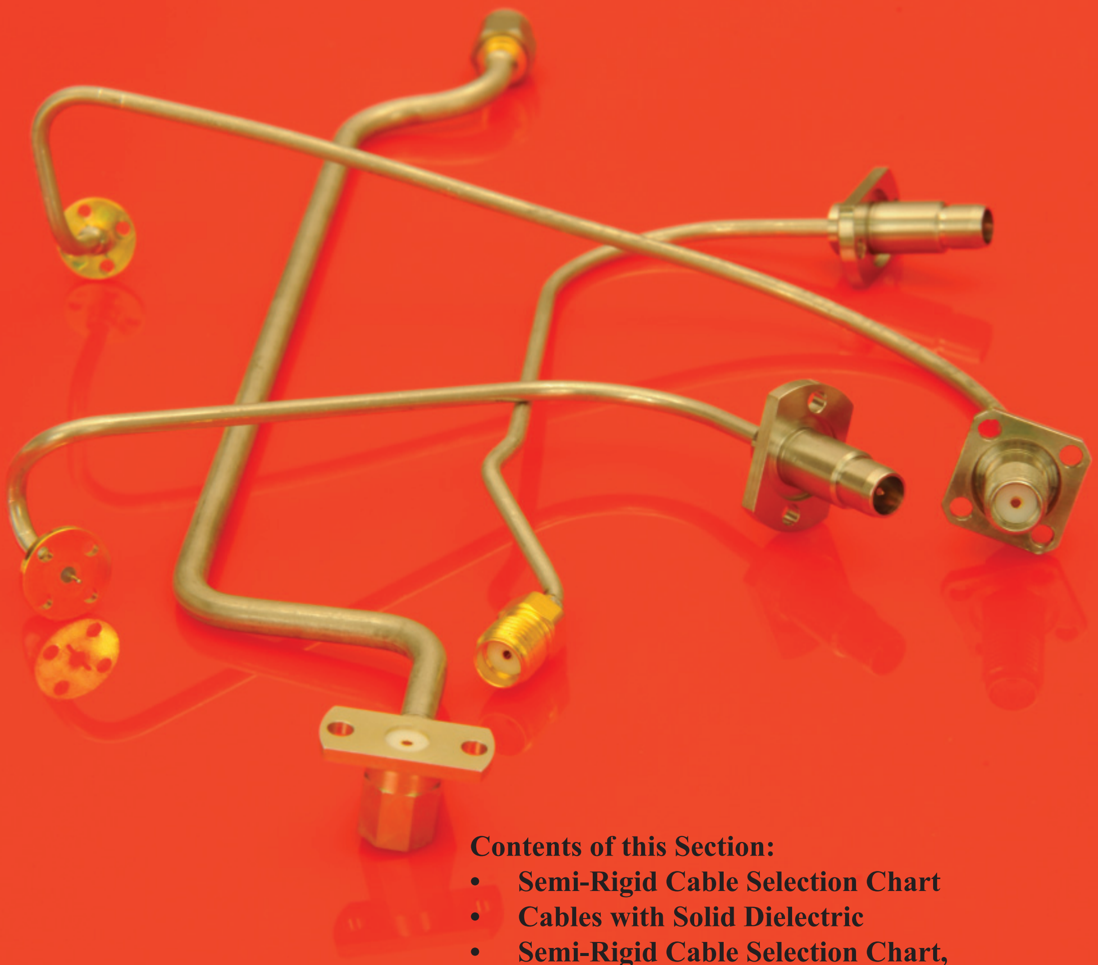
Semi-Rigid Cable Assemblies



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Contents of this Section:

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Semi-Rigid Cables with solid Dielectric

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Semi - Rigid Cable Selection Chart

Frequency in (GHz) →	1	2	3	4	8	12.0	15	18	26.5	30	40	60	109	150
Band	L	S	C	X	KU	K	KA							

Increasing Insertion Loss ↓

Cable Type	Operational Range →	
421-250	Outer Conductor Construction: Aluminum (Dia. 6.35mm). **Code 50**	19.0 GHz
421-252	Outer Conductor Construction: Copper (Dia. 6.35mm). **Code 52**	19.0 GHz
421-669	Outer Conductor Construction: Copper (Dia. 3.58mm). **Code 69**	33.0 GHz
421-670	Outer Conductor Construction: Copper (Dia. 3.58mm). **Code 670**	33.0 GHz
421-086	Outer Conductor Construction: Copper (Dia. 2.18mm). **Code 89**	60.0 GHz
421-087	Outer Conductor Construction: Copper (Dia. 2.18mm). **Code 83**	60.0 GHz
421-669SS	Outer Conductor Construction: Stainless Steel (Dia. 3.58mm). **Code 69S**	33.0 GHz
421-047	Outer Conductor Construction: Copper (Dia. 1.19mm). **Code 46**	109.0 GHz
421-086SS	Outer Conductor Construction: Stainless Steel (Dia. 2.18mm). **Code 94**	60.0 GHz
421-034	Outer Conductor Construction: Copper (Dia. 0.86mm). **Code 434**	
421-669SSSS	Outer Conductor Construction: Stainless Steel (Dia. 3.58mm). **Code 76**	33.0 GHz

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Semi-Rigid Cables with Low Density Dielectric

Semi - Rigid Cable Selection Chart (Low Density)

Frequency in (GHz) →	1	2	3	4	8	12.4	15	18	26.5	30	40	50	60
Band	L	S	C	X	KU	K	KA						

Increasing Insertion Loss ↓

Cable Type	Operational Range →	
421-220	Outer Conductor Construction: Aluminum (Dia. 12.7mm). **Code 20**	10.0 GHz
421-227	Outer Conductor Construction: Aluminum (Dia. 9.53mm). **Code 27**	14.0 GHz
421-281	Outer Conductor Construction: Aluminum (Dia. 6.35mm). **Code 81**	20.0 GHz
421-336	Outer Conductor Construction: Copper (Dia. 6.35mm). **Code 36**	20.0 GHz
421-298	Outer Conductor Construction: Copper (Dia. 3.58mm). **Code 98**	35.0 GHz
421-307	Outer Conductor Construction: Copper (Dia. 2.18mm). **Code 05**	65.0 GHz

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Semi-Rigid Cables with solid Dielectric

Semi - Rigid Cables with solid PTFE, 50 Ohms

All cables in this table have a:
- **Velocity (in % ± 2%) of 69.5**
- **Capacitance (pF/m) of 95.1**
- **Dielectric Constant of ~2.0**
- **Solid Density PTFE as Dielectric Material**

Specification													
Cable Model No.	**421-034**	**421-034-1**	**421-034-3**	**421-047**	**421-047-1**	**421-047-3**	**421-086**	**421-086-1**	**421-086-3**	**421-086SS**	**421-087**	**421-087-1**	**421-087-3**
Cable Code for Cable Assemblies	**434**	**435**	**436**	**46**	**47**	**48**	**89**	**90**	**91**	**94**	**83**	**84**	**85**
Cable MIL-C17-No.	**17/154-00001**		**17/154-00002**	**17/151-00001**		**17/151-00002**	**17/133-RG405**		**17/133-00001**		**17/133-00002**		**17/133-00003**
Cut Off Frequency (GHz)	150	150	150	107	107	107	60	60	60	60	60	60	60
Mechanical Requirements													
Outer Conductor Diameter (mm)	0.86	0.86	0.86	1.19	1.19	1.19	2.24	2.24	2.24	2.24	2.24	2.24	2.24
Semi-Rigid Type (^ Dia in inch)	0.034"	0.034"	0.034"	0.047"	0.047"	0.047"	0.086"	0.086"	0.086"	0.086"	0.086"	0.086"	0.086"
Dielectric Diameter DD in mm	0.66	0.66	0.66	0.94	0.94	0.94	1.68	1.68	1.67	1.67	1.67	1.67	1.67
Outer Conductor Material	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Steel	Cu	Cu	Cu
Outer Conductor Finish	-	Silver	Tin	-	Silver	Tin	-	Silver	Tin	-	-	Silver	Tin
Center Conductor, Dia. in mm	0.20	0.20	0.20	0.30	0.30	0.30	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Center Conductor Material	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Cu	Cu	Cu
Center Conductor Finish	Silver	Silver	Silver	Silver	Silver	Silver	Silver	Silver	Silver		Silver	Silver	Silver
Weight in Grams/Meter	3.9	3.9	4.2	6.7	7.1	7.1	21.1	21.1	23.5	26.6	22.6	22.6	23.4
Minimum Bend Radius, Inside, Static (mm)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Electrical Requirements													
Impedance (Ohms)	50±3.0	50±3.0	50±3.0	50±2.5	50±2.5	50±2.5	50±1.5	50±1.5	50±1.5	50±1.5	50±1.5	50±1.5	50±1.5
Dielectric Strength (60 Hz) in KV ms	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Max. Operating Voltage at Sea Level (in KV rms)	0.75	0.75	0.75	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Operating Temp. Range (°C)	-54/ +100	-54/ +100	-54/ +100	-54/ +100	-54/ +125	-54/ +100	-54/ +125	-54/ +125	-54/ +125	-54/ +125	-54/ +125	-54/ +125	-54/ +125

Only the most common cables are listed on this page. A number of special cables were developed and manufactured for individual Programs and unique requirements. Please contact us, if you need further assistance.

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Semi-Rigid Cables with solid Dielectric

Semi - Rigid Cables with solid PTFE, 50 Ohms

All cables in this table have a:
- **Velocity (in % ± 2%) of 69.5**
- **Capacitance (pF/m) of 95.1**
- **Dielectric Constant of ~2.0**
- **Solid Density PTFE as Dielectric Material**

													Specification
421-669	**421-669-1**	**421-669**	**421-669-3**	**421-669SS**	**421-669 SSSS**	**421-670**	**421-670-1**	**421-670-3**	**421-250**	**421-252**	**421-252-1**	**421-252-3**	**Cable Model No.**
69	**70**	**71**	**72**	**69S**	**76**	**670**	**671**	**673**	**50**	**52**	**53**	**54**	**Cable Code for Cable Assemblies**
M17/130 -RG402		**M17/130 -00001**	**M17/130 -00001**							**M17/129 -RG401**		**M17/129 -00001**	**Cable MIL-C17-No.**
33	33	18	33	33	33	33	33	33	19	19	19	19	**Cut Off Frequency (GHz)**
													Mechanical Requirements
3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	6.35	6.35	6.35	6.35	**Outer Conductor Diameter (mm)**
0.141"	0.141"	0.141"	0.141"	0.141"	0.141"	0.141"	0.141"	0.141"	0.250"	0.250"	0.250"	0.250"	**Semi-Rigid Type (^ Dia in inch)**
2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	5.31	5.31	5.31	5.31	**Dielectric Diameter DD in mm**
Cu	Cu	Cu	Cu	Steel	Steel	Cu	Cu	Cu	Alu	Cu	Cu	Cu	**Outer Conductor Material**
-	Silver	Tin	Tin	-	-	-	Silver	Tin	-	-	Silver	Tin	**Outer Conductor Finish**
0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	1.63	1.63	1.63	1.63	**Center Conductor, Dia. in mm**
Steel	Steel	Steel	Steel	Cu	Steel	Cu	Cu	Cu	Cu	Cu	Cu	Cu	**Center Conductor Material**
Silver	Silver	Silver	Silver	Silver	-	Silver	Silver	Silver	Silver	Silver	Silver	Silver	**Center Conductor Finish**
51.2	51.2	51.2	52.2	51.2	51.2	51.2	51.2	51.2	103.0	148.8	156.0	156.0	**Weight in Grams/ Meter**
6.35	6.35	6.35	6.35	12.7	12.7	6.35	6.35	6.35	9.5	9.5	9.5	9.5	**Minimum Bend Radius, Inside, Static (mm)**
													Electrical Requirements
50±1.0	50±1.0	50±1.0	50±1.0	50±1.0	50±1.0	50±1.0	50±1.0	50±1.0	50±0.5	50±0.5	50±0.5	50±0.5	**Impedance (Ohms)**
5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	7.0	7.0	7.0	7.0	**Dielectric Strength (60 Hz) in KV ms**
1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3.0	3.0	3.0	3.0	**Max. Operating Voltage at Sea Level (in KV rms)**
-54/ +125	-54/ +125	-54/ +125	-54/ +125	-54/ +125	-54/ +125	-54/ +125	-54/ +125	-54/ +125	-40/ +90	-40/ +90	-40/ +90	-40/ +90	**Operating Temp. Range (°C)**

Only the most common cables are listed on this page. A number of special cables were developed and manufactured for individual Programs and unique requirements. Please contact us, if you need further assistance.

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Semi-Rigid Cables with Low Density Dielectric

Spectrum Elektrotechnik GmbH

Semi - Rigid Cables with Low Density Dielectric, 50 Ohms

All cables in this table have a(n):
- Copper Center Conductor
- Silver Center Conductor Finish
- Low Density PTFE as Dielectric Material
- Operating Temperature of -100 to +250°C
- Impedance (Ohms) of 50±2.0
- Dielectric Constant of ~1.5

Specification												
Cable Model No.	**421-307**	**421-307-1**	**421-307-3**	**421-298**	**421-298-1**	**421-298-3**	**421-336**	**421-336-1**	**421-336-3**	**421-281**	**421-227**	**421-220**
Cable Code for Cable Assemblies	**05**	**06**	**07**	**98**	**97**	**99**	**36**	**361**	**363**	**81**	**27**	**20**
Cut Off Frequency (GHz)	75	75	75	36	36	36	21	21	21	20	14	10
Mechanical Requirements												
Outer Conductor Dia. (mm)	2.18	2.18	2.18	3.58	3.58	3.58	6.35	6.35	6.35	6.35	9.53	12.7
Semi-Rigid Type (^ Dia in inch)	.086"	.086"	.086"	.141"	.141"	.141"	.250"	.250"	.250"	.250"	.375"	.495"
Dielectric Diameter DD in mm	1.47	1.47	1.47	2.95	2.95	2.95	5.28	5.28	5.28	5.28	7.80	10.7
Outer Conductor Material	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Alu	Alu	Alu
Outer Conductor Finish	-	Silver	Tin	-	Silver	Tin	-	Silver	Tin	-	-	-
Center Conductor, Dia. (mm)	0.51	0.51	0.51	1.09	1.09	1.09	1.88	1.88	1.88	1.88	2.97	3.89
Weight in Grams/m	22.7	23.9	23.9	40.9	42.3	42.3	136.2	137.7	137.7	75.7	159.2	282.8
Minimum Bend Radius, Inside, Static (mm)	6.4	6.4	6.4	11.1	11.1	11.1	20.0	20.0	20.0	38.1	50.8	57.2
Electrical Requirements												
Velocity in %, ± 2%	78	78	78	80	80	80	80	80	80	80	84	84
Capacitance in pF/m	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	78.7	78.7
Dielectric Strength (60 Hz) in KV ms	2.0	2.0	2.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0	8.0	9.0
Max. Operating Voltage at Sea Level (in KV rms)	0.6	0.6	0.6	1.0	1.0	1.0	1.5	1.5	1.5	1.5	2.0	2.5

Only the most common cables are listed on this page. A number of special cables were developed and manufactured for individual Programs and unique requirements. Please contact us, if you need further assistance.

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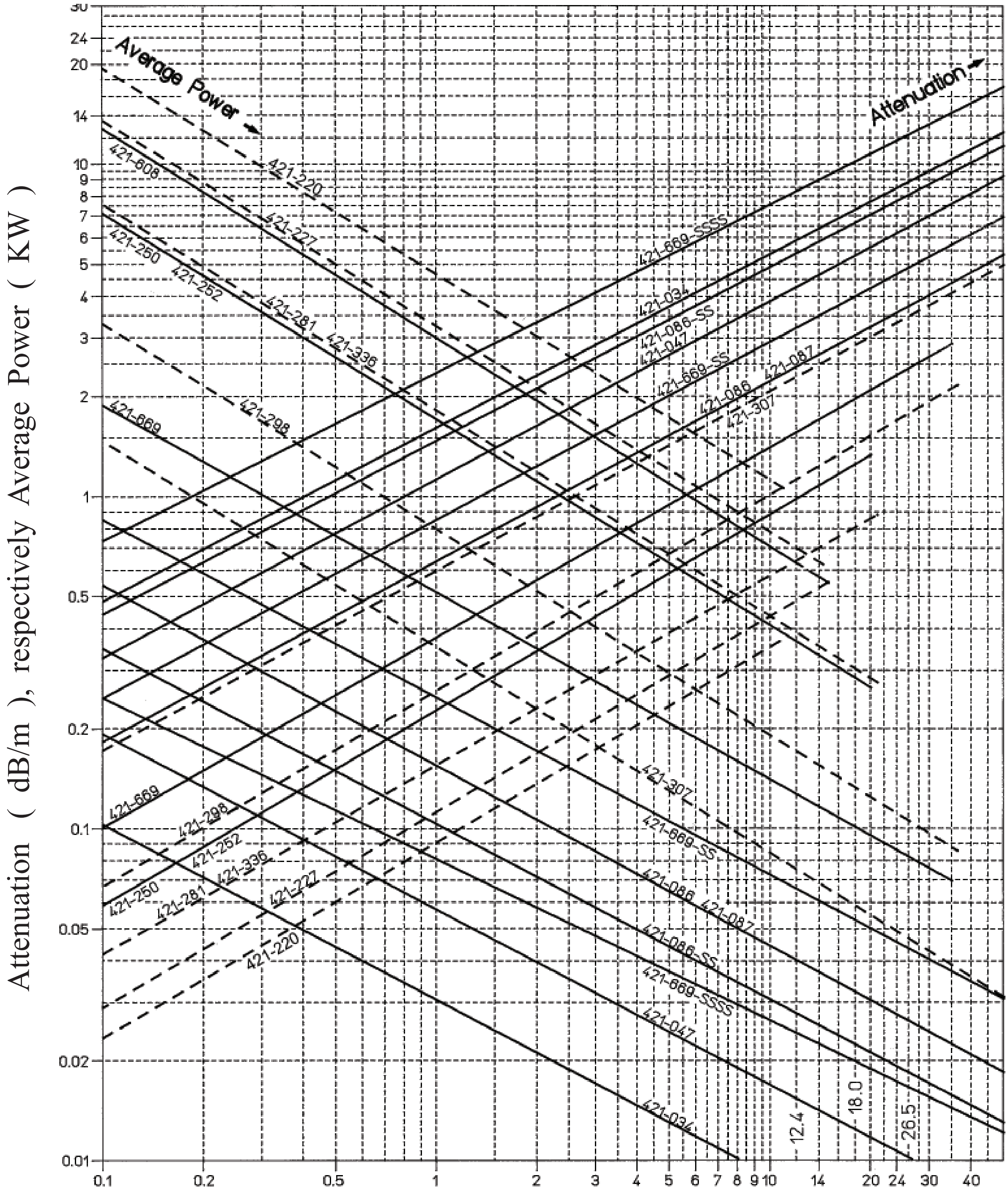
Insertion Loss and Power Handling

Data for Semi - Rigid Cables with regular Low Density Dielectric and with solid PTFE.



Note: Maximum allowable power on tin plated outer conductors is 15-20% less.

Comparison of Regular PTFE and Low Density PTFE

Spectrum Elektrotechnik GmbH

	Regular PTFE Dielectric	Low Density Dielectric	
Mechanical Stability vs. Temperature	**Poor**	**Good**	Lower coefficient of thermal expansion results in improved dimensional stability from -100°C to +250°C.
Phase Stability vs. Temperature	**Poor**	**Good**	Lower coefficient of thermal expansion results in lower Phase Shift vs. Temperature.
Change in Propagation Time vs. Temperature	**Poor**	**Improved**	The change in propagation time 70 - 80% less than when using solid PTFE.
Attenuation	**Higher**	**Lower**	Lower dissipation factor of the dielectric, lower dielectric constant, larger center conductor result in lower attenuation.
Power Handling	**Lower**	**Higher**	Good temperature stability allows higher operating temperature, and therefore higher power.
Weight	**Higher**	**Lower**	Low density dielectric results in lower weight.

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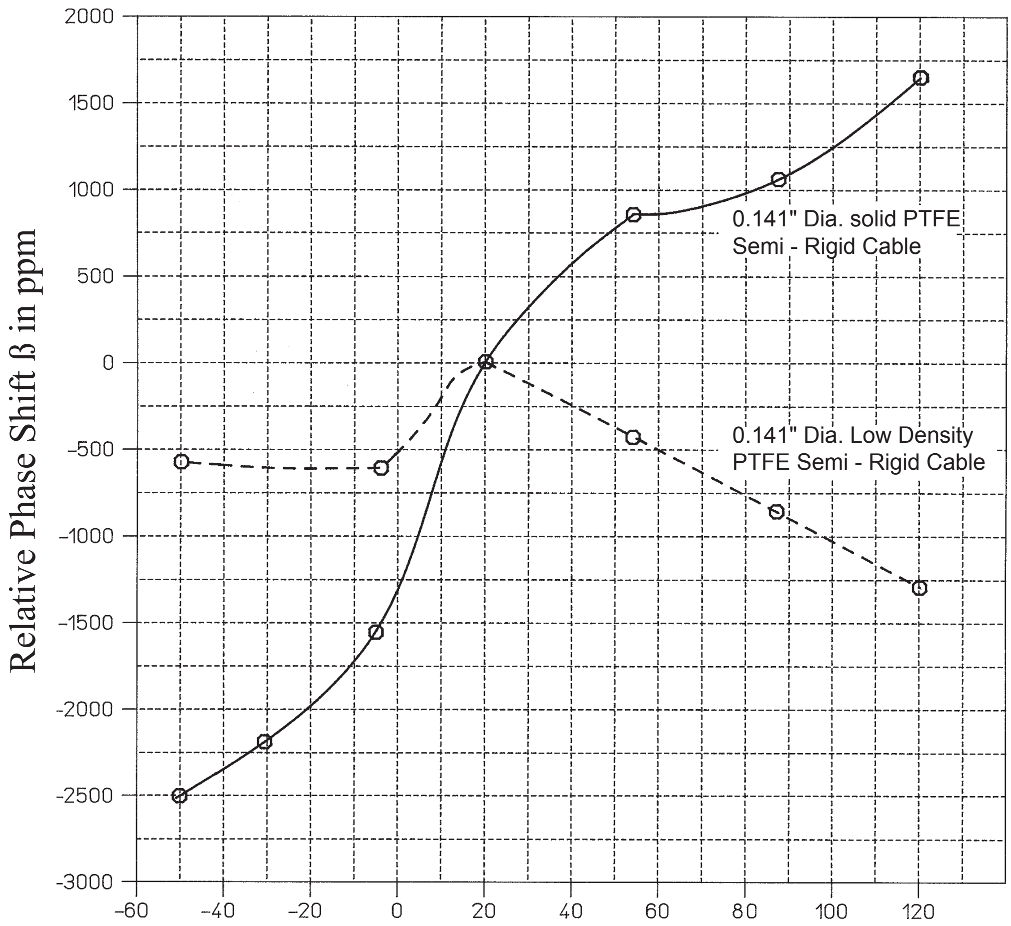
Phase vs. Temperature of Solid PTFE and Low Density PTFE



To determine the phase shift (due to temperature) that is contributed to your system by any particular Semi-Rigid Cable assembly or assemblies, find first the relative phase shift ß im ppm from above diagram. Then calculate the phase shift § using:

$$\S = 11.8 * 10^{-6} * ß * l * t * f \ (^\circ)$$

l = Total length of cable that is exposed to the temperature change (expressed in cm).

t = Time delay. This is approximately 1.25 for our Low Density Dielectric cables and 1.44 for solid Teflon cables.

f = Frequency in GHz.

ß = Relative shift in ppm = §/dl * 10^6.

dl = Total electrical length of cable (in degrees) that was inside of the temperature chamber for the test results plotted above.

Note: Approximately 30' (9.15m) of 0.141" Dia. Semi -Rigid Cable was inside the chamber. Other sizes of solid and Low Density PTFE cables have diagrams that are similar to the ones above.

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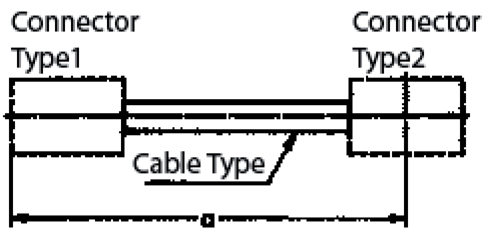
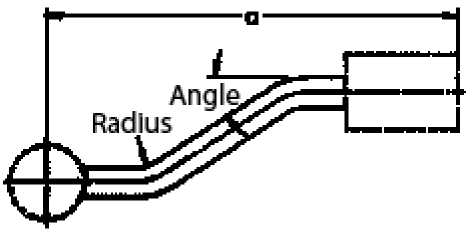
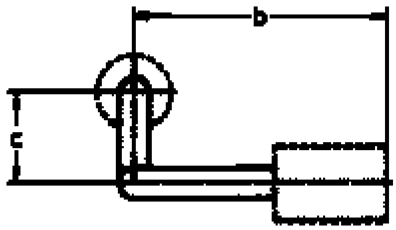
Custom-made Cable Assemblies

The manufacturing of high performance cable assemblies and connectors with integrity and reliability of performance requires the use of fully trained personnel, specialized techniques, tools, jigs and machinery.







Spectrum Elektrotechnik GmbH has developed over more than 25 years processes, and specialized equipment, many unique to Spectrum, to enable the production of state-of-the-art cable assemblies for customers' individual needs. Only materials of the highest grade, conforming to IEC, DIN, MIL-Specifications and DIN ISO are being used. Spectrum Elektrotechnik GmbH ensures optimum electrical and mechanical performance between connector and the coaxial cable by designing and manufacturing their own extensive range of connectors. A stringent quality assurance program ensures that every product, leaving the factory, meets the highest quality level. All products are 100% tested. RF test plots are supplied with each individual assembly, with the exception of the "Low Cost" assemblies, which are tested on a go/nogo basis only.

Our sales and engineering department will respond promptly to every inquiry. With the request for quotation, please send the complete specification and a mechanical drawing, or sketch, showing the complete information on the mechanical configuration, mechanical tolerances on all lengths and radii, etc. The electrical specification should mention all key parameters, such as VSWR, insertion loss, power, phase match. Our engineering department will assist you with your specification and can discuss possible alternatives on cable materials and connectors, suitable to your application.

For cable assemblies, formed and terminated to customer's specification, or complying to special requirements, the company will issue an individual part number. For cable assemblies being ordered in straight lengths, the customer can develop his own part number, using the Purchasing Information shown on the next page.

0.250" Semi-Rigid Cable Assembly, 3D shaped to customer's design, terminated with a standard N male and an SCC female Connector. SCC is a connector type, custom designed for a special application, usually because of space restrictions.

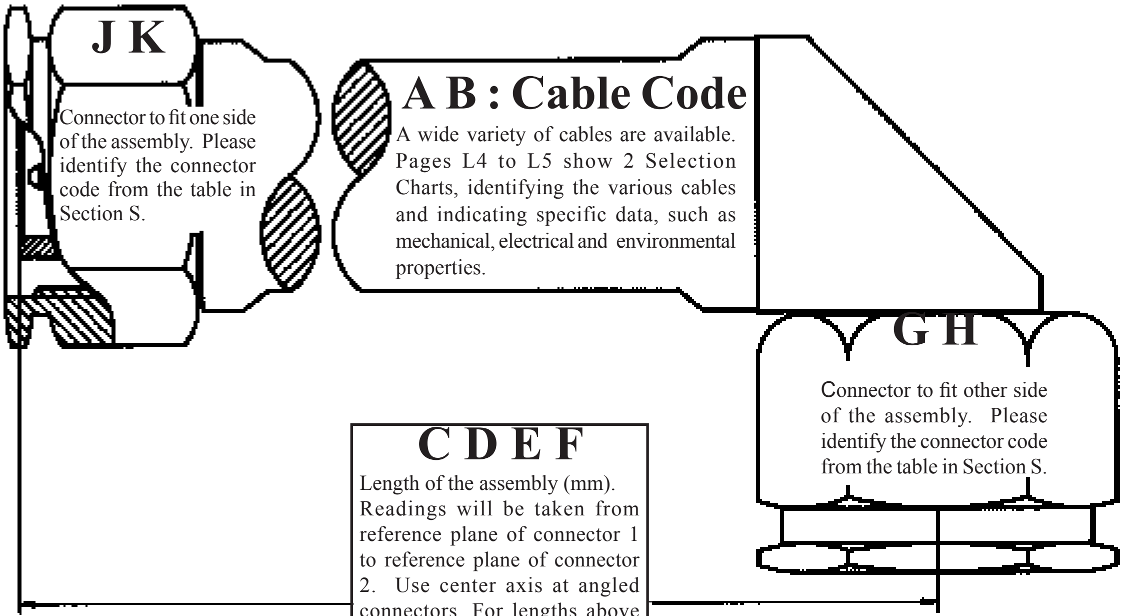
0.141" Semi-Rigid Cable Assembly, 3D shaped to customer's design, terminated with N-Connectors.

Purchasing Information on Semi - Rigid Cable Assemblies

Ordering Details:

The Part Number Sequence is:

AB - CDEF - GH - JK



C D E F

Length of the assembly (mm). Readings will be taken from reference plane of connector 1 to reference plane of connector 2. Use center axis at angled connectors. For lengths above 9.99 meters, three digits with a leading D are used to describe the lengths in decimetres.
Example: 22.7 meters become "D227".

Please note:
Some connectors may not be available for certain cables as standard with short deliveries. On the other hand, more connectors than listed may be available.

With your order please specify operating Frequency range.

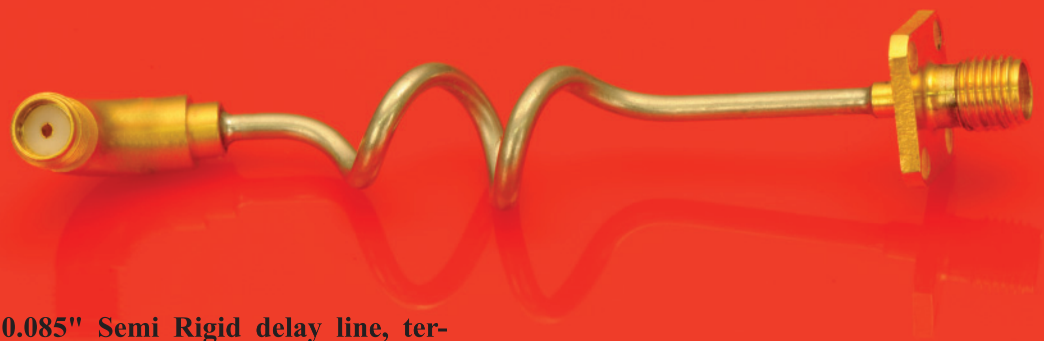
For cable assemblies, manufactured and shaped to customer specification, or complying to special requirements, the company will issue a special part number. For cable assemblies being ordered in straight length, the customer can develop his own part number, using the code shown on the Connector Selection Chart in Section S. An example is given below.

Ordering Example:

The cable assembly of Semi-Rigid Cable 421-669 Cable, Code 69, shall have the length of 45 cm. The length of the assembly is measured from the interface of a straight connector to the center axis of an angled connector. It shall be terminated with a TNC straight male and a N right angle male.

AB = cable code = 69 ; CDEF = length in mm = 0450 ; GH and JK are the connectors (their codes have been identified from Section S) = 31 and 55.

Part Number for the cable assembly in this example: 69 - 0450 - 31 - 55.



0.085" Semi Rigid delay line, terminated with a swept angled SMA female and a 4-Hole SMA female, used at a TWT Input for phase adjustment.

0,085" Semi Rigid Cable, terminated with an SMA male and a circular adjustable SMA female.

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Semi-Rigid Cable Assemblies, built to customer's specification.

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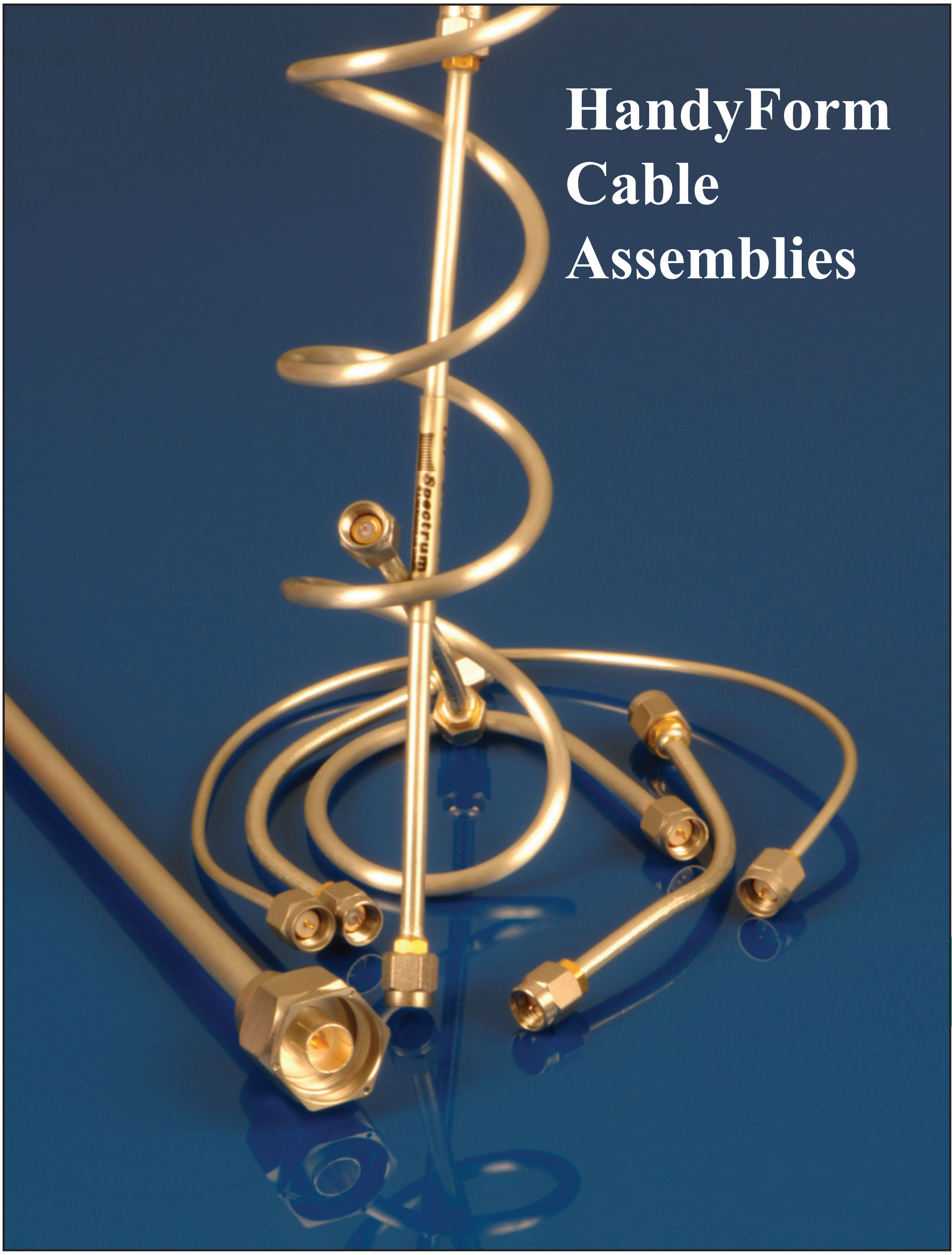
HandyForm Cable Assemblies



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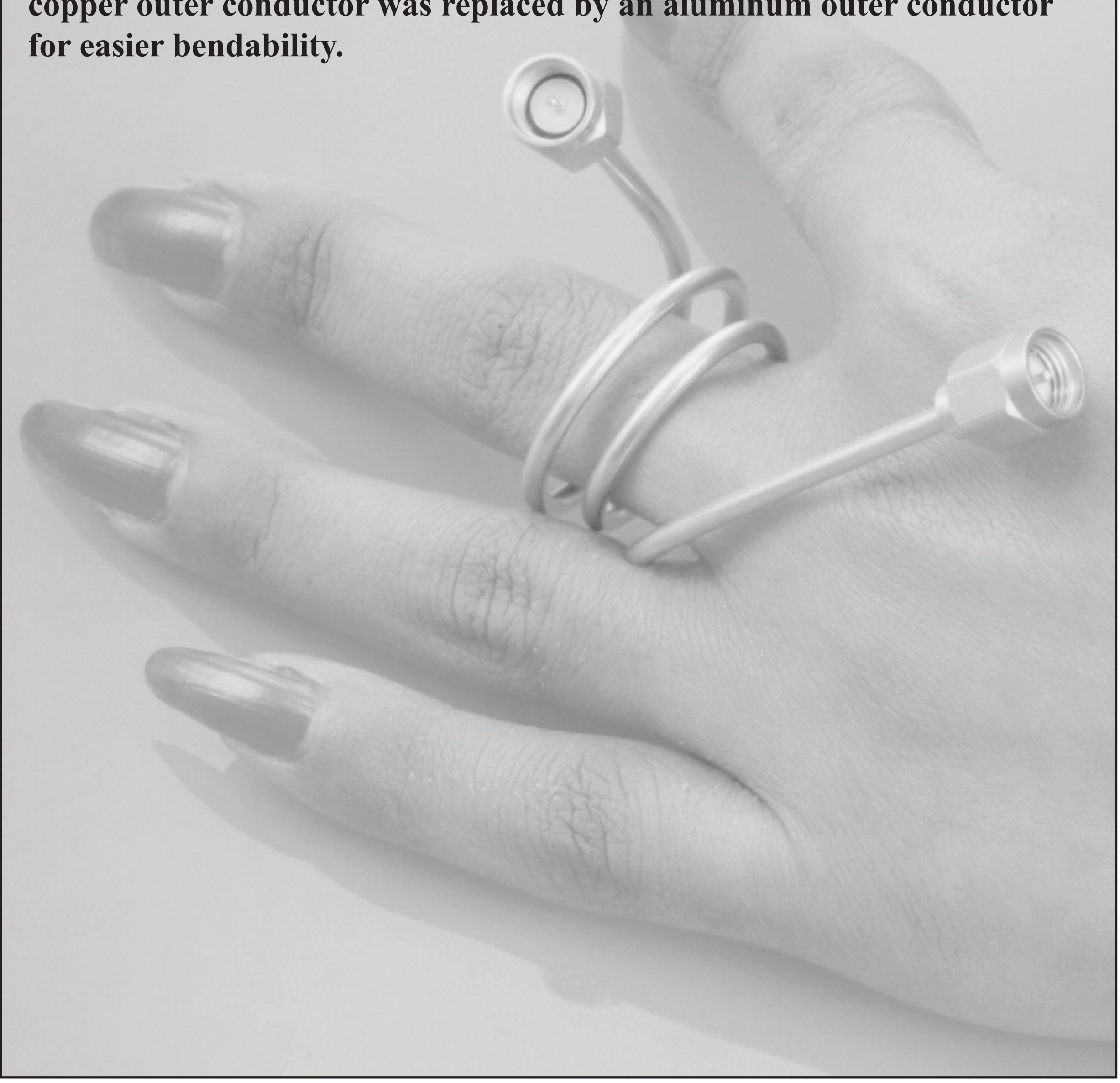
HandyForm means easy formable by hand.

HandyForm I: The cables' ancestors were flexible cables. The jacket was taken off and the cable was then pulled through a tin bath for 97% coverage of the outer conductor. Thus the cable is not flexible anymore, but easily formable, remaining in position.

HandyForm II: The cables' ancestors were the Semi Rigid Cables. The copper outer conductor was replaced by an aluminum outer conductor for easier bendability.



Handy Form Cable Selection Chart

Frequency in (GHz) →	1	2	3	4	8	12.0	15	18	26.5	30	40	60	110
Band	L	S	C	X	KU	K	KA						

Increasing Insertion Loss ↓

Cable Type	Operational Range →	
422-250-3	Outer Conductor Construction: Aluminum Tin Plated (Dia. 6.35mm). Code 250L. Low Density Dielectric.	20.0 GHz
422-900-3	Outer Conductor Construction: Copper Tin Plated (Dia. 3.58mm). Code 141L. Low Density Dielectric.	39.0 GHz
422-121-3	Outer Conductor Construction: Seamless Aluminum Tin Plated (Dia. 6.35mm). Code 150.	20.0 GHz
422-800	Outer Conductor Construction: Seamless Aluminum (Dia. 3.58mm). Code 168.	36.0 GHz
422-800-3	Outer Conductor Construction: Seamless Aluminum Tin Plated (Dia. 3.58mm). Code 167.	36.0 GHz
422-700-3	Outer Conductor Construction: Copper Tin Plated (Dia. 2.20mm). Code 85L. Low Density Dielectric.	60.0 GHz
501-19	Outer Conductor Construction: Copper/Tin Composite (Dia. 3.58mm). Code 67	18.0 GHz
501-19A	Outer Conductor Construction: Copper/Tin Composite (Dia. 3.58mm). Code 67, covered with a FEP jacket	18.0 GHz
422-600	Outer Conductor Construction: Seamless Aluminum (Dia. 2.20mm). Code 165.	40.0 GHz
422-600-3	Outer Conductor Construction: Seamless Aluminum Tin Plated (Dia. 2.20mm). Code 166.	40.0 GHz
502-13	Outer Conductor Construction: Copper/Tin Composite (Dia. 2.18mm). Code 66	18.0 GHz
422-100-3	Outer Conductor Construction: Copper Tin Plated (Dia. 1.19mm). Code 47L. Low Density Dielectric.	110.0 GHz
422-130	Outer Conductor Construction: Seamless Aluminum (Dia. 1.19mm). Code 145.	110.0 GHz
422-130-3	Outer Conductor Construction: Seamless Aluminum Tin Plated . (Dia. 1.19mm). Code 146	110.0 GHz

Specifications are subject to change without notice.

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Characteristics:
Easily formable by hand. Electrical Performance is close to regular Semi - Rigid Cable with slightly higher insertion loss.
The outer conductor consists of a tinned copper braid with approximately 97% coverage.

SPECIFICATION		Handy-Form - I		
Cable Model No.		**502-13**	**501-19**	**501-19A**
Cable Code		**66**	**67**	**67A**
Max. Operating Frequency (GHz)		18.0		
Mechanical Requirements				
Outer Diameter Dia. in mm	in inch	0.085"	0.141"	
	in mm	2.18	3.6	3,6
Outer Conductor Construction		Copper braid/Tin Composite 97% shield coverage		Copper braid/Tin Composite 97% shield coverage covered by a FEP jacket
Dielectric Diameter in mm		1.68	2.98	
Dielectric Material		PTFE		
Dielectric Constant		2.00		
Center Conductor Material		Silver Plated Copper Covered Steel		
Center Conductor Dia. in mm		0.51	0.91	
Weight in Grams/Meter		20	40	45
Safe Bend Radius for a 360° bend with proper tooling in mm		3.5	6.5	
Electrical Requirements				
Impedance in Ohms at Sea Level and 25°C		50 ± 1.0		
Velocity in %, ± 2 %		69.5		
Capacitance in pF/m		97.0		
Dielectric Strength (60 Hz) in KV		2.5	5.0	
Max. Operating Voltage at Sea Level, in KVrms, 60 Hz		1.5	1.9	
Nominal Insertion Loss in dB/m, vs. Frequency	0.5 GHz	0.39	0.26	
	1.0 GHz	0.63	0.42	
	5.0 GHz	1.88	1.22	
	10.0 GHz	3.10	2.05	
	18.0 GHz	4.90	3.30	
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and +20°C	0.5 GHz	130	450	
	1.0 GHz	88	290	
	5.0 GHz	32	110	
	10.0 GHz	22	72	
	18.0 GHz	13	48	
Environmental Requirements				
Operating Temperature Range		-54°C to +110°C		

Specifications are subject to change without notice.

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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		Handy-Form - 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 ± 1.0						
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						

Specifications are subject to change without notice.

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Low Density Handy Form II

Characteristics:
Easily formable by hand. Electrical Performance is identical when compared to Low Density Semi - Rigid Cables.

SPECIFICATION		Low Density			
Cable Model No.		**422-100-3**	**422-700-3**	**422-900-3**	**422-250-3**
Cable Code		**47L**	**85L**	**141L**	**250L**
Max. Operating Frequency (GHz)		110	60	40	20
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		Copper/Tin			Aluminum/Tin
Dielectric Diameter in mm		0.95	1.68	3.05	5.31
Dielectric Material		Low Density Dielectric			
Dielectric Constant		1.5			
Center Conductor Material		Silver Plated Copper			
Center Conductor Dia. in mm		0.32	0.65	1.16	1.87
Weight in Grams/Meter		7	21	42	88
Safe Bend Radius using proper tooling in mm		3.2	3.2	15.9	25.4
Electrical Requirements					
Impedance in Ohms at Sea Level and +25°C		50 ± 2.0	50 ± 1.0		
Velocity in %, ± 2 %		83			
Capacitance in pF/m		105.0	87.3	85.9	85.0
Dielectric Strength (60 Hz) in KV ms		2.0	5.0	5.0	7.5
Max. Operating Voltage at Sea Level, in KVrms, 60 Hz		0.6	1.0		1.8
Nominal Insertion Loss in dB/m, vs.Frequency	0.5 GHz	0.8	0.31	0.17	0.14
	1.0 GHz	1.15	0.46	0.25	0.20
	5.0 GHz	2.65	1.20	0.62	0.52
	10.0 GHz	3.66	1.74	0.92	0.68
	18.0 GHz	4.98	2.55	1.31	1.05
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and +20°C	0.5 GHz	92	410	1400	4300
	1.0 GHz	60	260	900	2800
	5.0 GHz	23	100	300	1000
	10.0 GHz	15	70	200	700
	18.0 GHz	11	43	110	420
Environmental Requirements					
Operating Temperature Range		-65°C + 200°C			-40°C + 200°C

Specifications are subject to change without notice.

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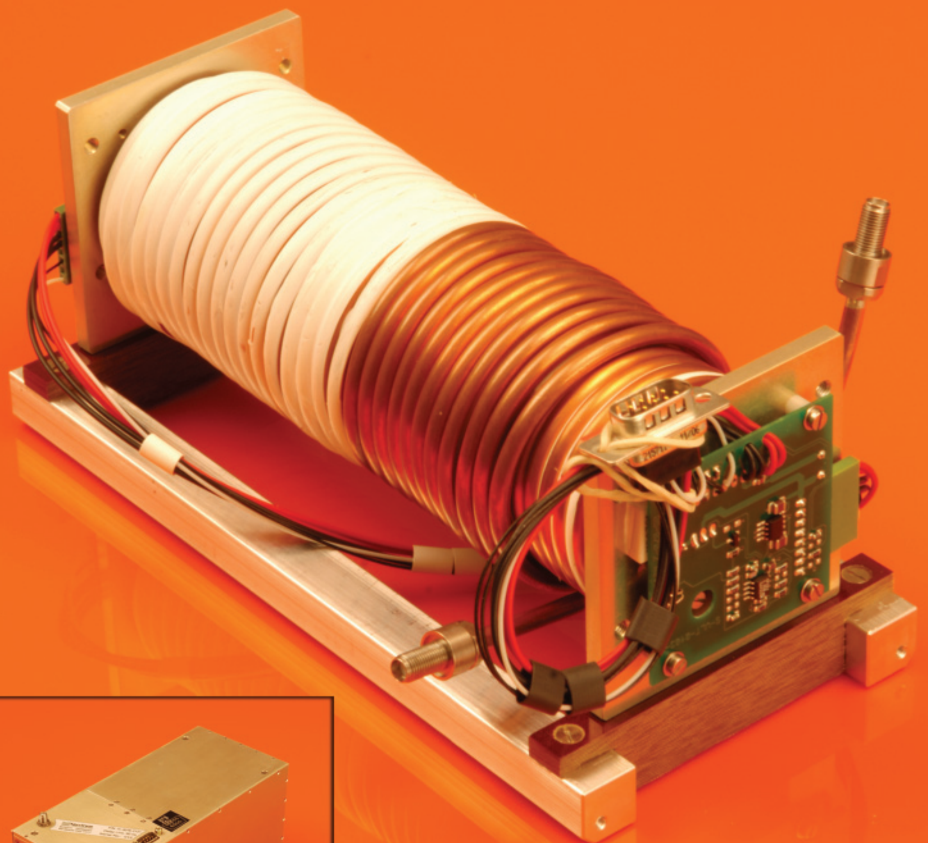
Coaxial Delay Lines
Semi-Rigid, and flexible, and also temp. controlled



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Delay Lines, General Information

Microwave delay devices are designed and manufactured to meet delay requirements in frequency ranges from UHF through Ka-Band. Several techniques are used to achieve the delays. It is the responsibility of the design engineer to decide about the best method for delaying the signals in his particular application. The decision depends on the frequency range, the delay needed, the desired VSWR, the suppression of undesired signals, the size of the device and its form, and last but not least, the price of the device will be an important factor.

The coaxial delay line is a classical device. The length of the delay line can easily be calculated from the propagation delay of the signal within the coaxial cable and the delay needed. Other advantages are the good electrical performance of the professional delay line, the usually fast availability and an attractive price. Disadvantages are in some cases the large size and the high insertion loss, especially for longer delays at higher frequencies.

Spectrum Elektrotechnik GmbH offers a wide variety of coaxial delay lines. The designs use normally Semi-Rigid Cable, from very small diameters, such as 0.047", up to diameters of 0.250", for certain applications even bigger. The Semi-Rigid Cables use either Solid Dielectric, or Low Density Dielectric. The advantage of the Low Density Dielectric is a lower insertion loss, a wider temperature range and smaller delay changes over temperature.

All Delay Lines are made to customers' specifications: A specific delay that is needed in the applications, a maximum allowable insertion loss, a minimum return loss, a maximum change vs. temperature, and usually a certain mechanical configuration.

Delay Lines Packaging Options

The delay line can be packaged in a number of different ways, such as:

* **An especially designed housing:** It can be made of any kind of material, although aluminum excavated is mostly used.
* **19" Rack Mounting:** this is common for larger delay lines, or for applications in laboratories or test sets.
* **Spool Mounting:** This is an economical way of packaging, using a spool as supporting and mounting fixture.
* **Free Coils:** This is definitely the most inexpensive packaging, winding the delay line in a free coil and then using either tape, plastic or stainless steel ties, or just solder, to hold the delay line together.

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Semi Rigid Cables for Delay Lines

The following Table can be used as a quick reference. Comparing the data of the different cables listed in attenuation, diameter, length and weight will allow a fast decision as to which of the cables may be suited best in a specific application.

Dielectric	Cable P/N	Code	Outer Diameter	Attenuation dB (10 Ghz)			Phase Stability	Min. Bend Radius (mm)	Length (Nom.) (m)			Weight (grs)		
				/10ns	/50ns	/100ns			/10ns	/50ns	/100ns	/10ns	/50ns	/100ns
Low Density	421-307	**05**	0.085"	5.00	24.9	49.8		15.2	2.33	11.6	23.3	54	272	544
	422-700-3	-	0.085"	4.20	21.1	43.3		15.0	2.43	12.2	24.3	50	250	501
	421-069	-	0.116"	3.10	15.5	31.0	Best	17.80	2.35	11.7	23.5	82	408	816
	421-298	**98**	0.141"	2.40	12.0	24.0	Best	25.4	2.43	12.2	24.3	100	499	998
	422-900-3	**141L**	0.141"	2.24	11.2	22.4		25.4	2.43	12.2	24.3	102	508	1017
	421-336	**36**	0.250"	1.12	5.6	11.2	Best	50.8	2.40	12.0	24.0	327	1633	3266
	421-281	**81**	0.250"	1.12	5.6	11.2	Best	50.8	2.40	12.0	24.0	181	907	1814
Solid	RG-405 421-086	**89**	0.086"	5.22	26.10	52.2	Note "A"*	5.1	2.12	10.6	21.2	45	226	454
	RG-402 421-669	**69**	0.141"	2.92	14.60	29.2	Note "A"*	8.9	2.12	10.6	21.2	100	499	998
	RG-401 421-252	**52**	0.250"	1.80	9.0	18.0	Note "A"*	12.7	2.12	10.6	21.2	318	1588	3175
	421-250	**50**	0.250"	1.80	9.0	18.0		12.7	2.12	10.6	21.2	315	1575	3150

A*: In general cable fitted with Low Density Dielectric Cable has better phase response over temperature, compared to cable using solid PTFE dielectric.

Quick Response Manufacturing

The Quick Response Manufacturing is another good example for the commitment to provide excellent Customer Service. The Quick Response Group was implemented to react immediately to customer needs. Sometimes Products will be shipped within 24 hours. All Products manufactured in the Quick Response Area will meet the same Quality Standard as all the other products. They are submitted to the same inspection criteria, they are tested to the same procedures.

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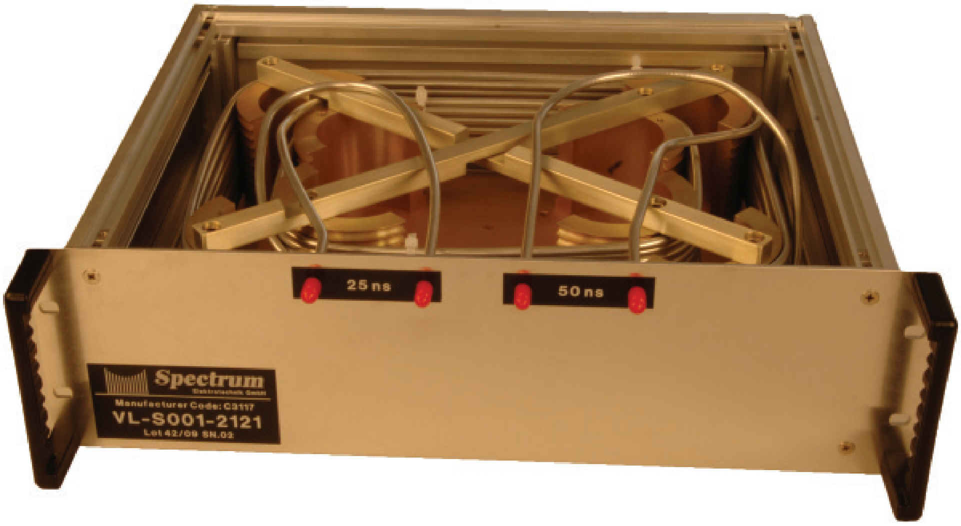
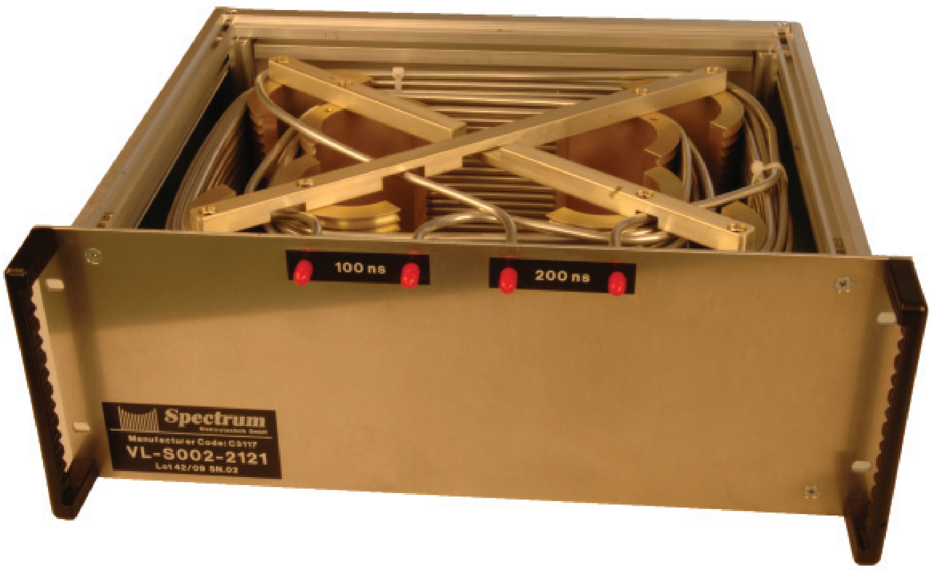


19" Drawers for 25 and 50 ns, 100 and 200 ns Delay.



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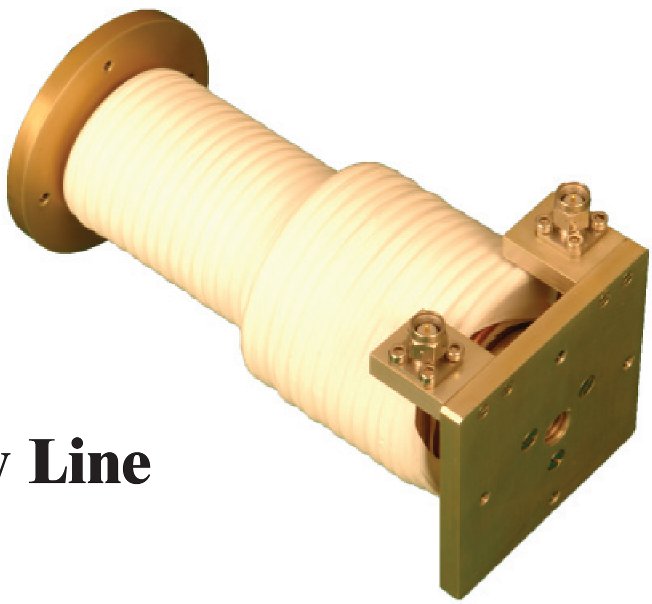
Delay Line
70 ns

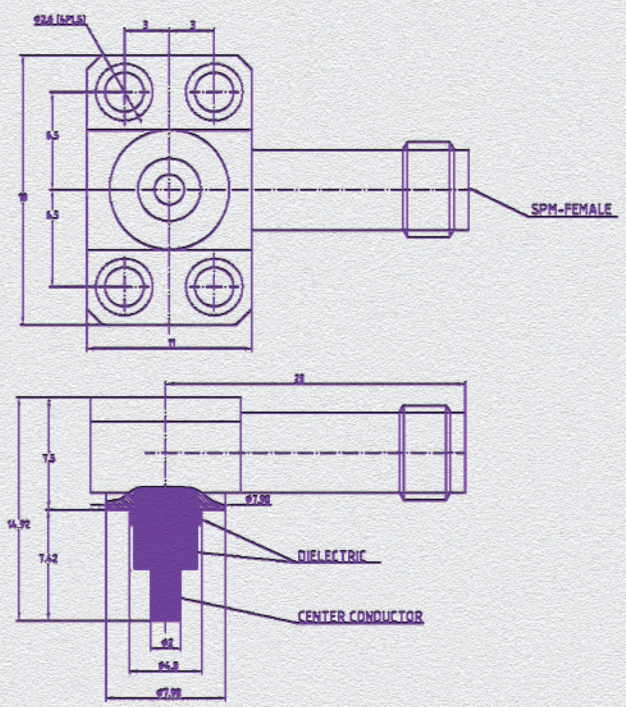


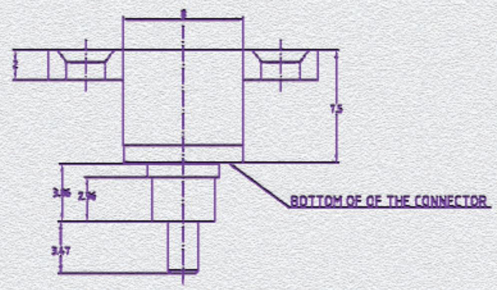
Delay Line
50 ns

200 ns Delay Line using 0.250" Low Loss Semi-Rigid Cable, terminated with SMA female Connectors.

P

Connector Outline Drawings





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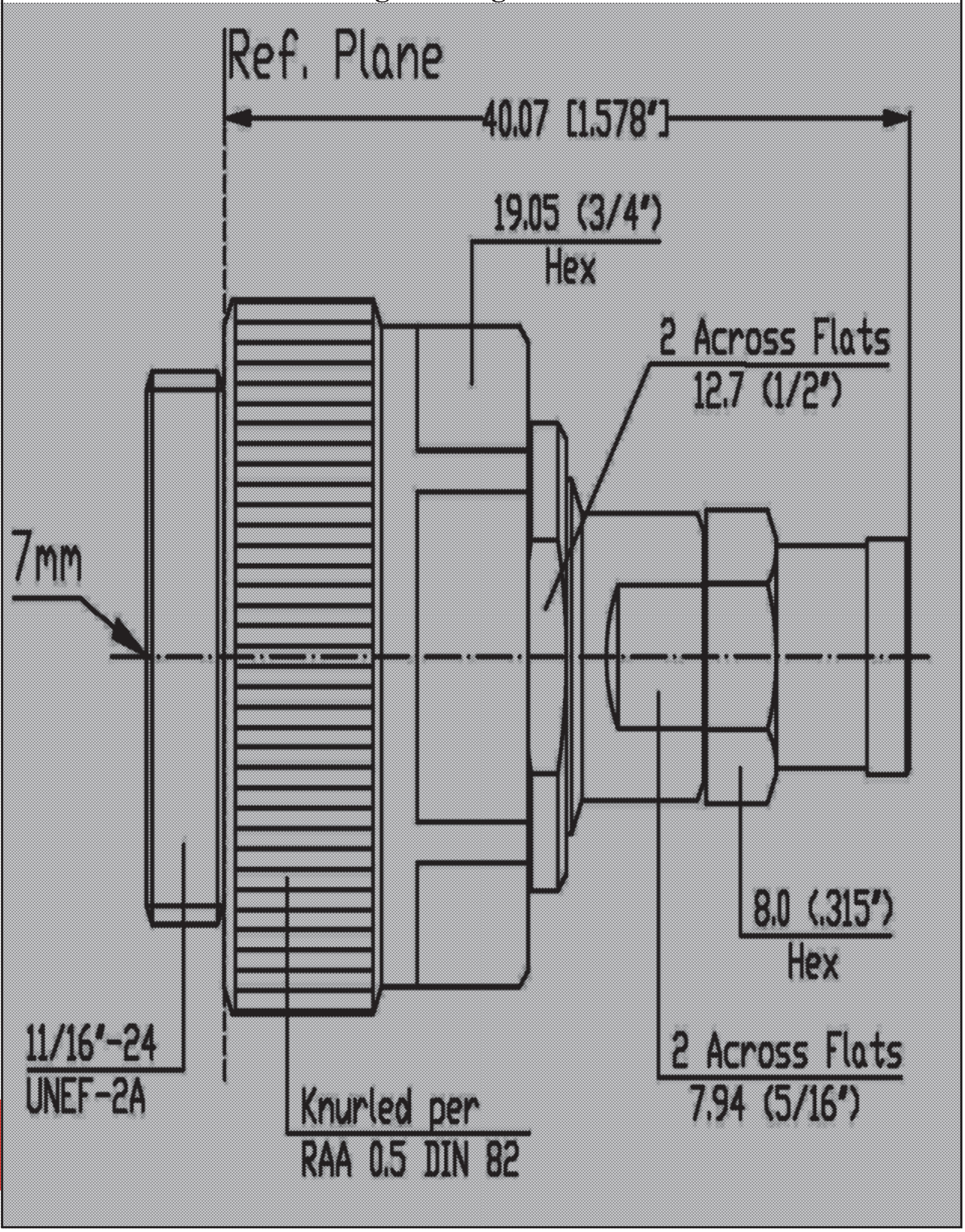
Connector Outline Drawings for High Performance Cable Assemblies



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Spectrum Elektrotechnik GmbH

Connector Outline Drawings for High Performance Cable Assemblies

Cable Type	1.85 mm	2.4 mm	2.92 mm	3.5 mm	7 mm	7/16	13/30	BMA	BNC	C	EIA	HN	N	SBX	SBY	SC	SMA	SMP	SPM	TNC
03						Page Q9	Page Q10				Page Q11	Page Q11	Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.			Page Q27
10		Page Q4	Page Q5 f.f.	Page Q7	Page Q8	Page Q9		Page Q10				Page Q11 f.f.	Page Q13 f.f.	Page Q17	Page Q17		Page Q20 f.f.		Page Q26	Page Q26 f.f.
11		Page Q4	Page Q5 f.f.	Page Q7	Page Q8					Page Q10		Page Q11 f.f.	Page Q13 f.f.				Page Q20 f.f.			Page Q26 f.f.
12					Page Q8	Page Q9						Page Q11 f.f.	Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.			Page Q27
14				Page Q7	Page Q8	Page Q9							Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.		Page Q26	Page Q26 f.f.
37		Page Q4	Page Q5 f.f.	Page Q7	Page Q8					Page Q10			Page Q13 f.f.				Page Q20 f.f.			Page Q26 f.f.
39		Page Q4	Page Q5 f.f.	Page Q7	Page Q8					Page Q10			Page Q13 f.f.				Page Q20 f.f.			Page Q26 f.f.
43				Page Q7	Page Q8								Page Q13 f.f.				Page Q20 f.f.			Page Q26 f.f.
51				Page Q7	Page Q8	Page Q9						Page Q11 f.f.	Page Q13 f.f.	Page Q17	Page Q17	Page Q18 f.f.	Page Q20 f.f.			Page Q27
57				Page Q7	Page Q8	Page Q9						Page Q11 f.f.	Page Q13 f.f.	Page Q17	Page Q17	Page Q18 f.f.	Page Q20 f.f.			Page Q27
60 A&B						Page Q9							Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.			
65													Page Q13 f.f.							
100		Page Q4	Page Q5 f.f.	Page Q7	Page Q8	Page Q9		Page Q10				Page Q11 f.f.	Page Q13 f.f.	Page Q17	Page Q17		Page Q20 f.f.		Page Q26	Page Q26 f.f.
102		Page Q4	Page Q5 f.f.										Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.			Page Q26 f.f.
104		Page Q4											Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.			Page Q26 f.f.
105													Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.			Page Q26 f.f.
106																Page Q18 f.f.	Page Q20 f.f.			
120					Page Q8	Page Q9						Page Q11 f.f.	Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.			Page Q27
140				Page Q7	Page Q8	Page Q9							Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.		Page Q26	Page Q26 f.f.
141					Page Q8	Page Q9							Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.			Page Q26 f.f.
143				Page Q7									Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.			Page Q26 f.f.
300						Page Q9	Page Q10				Page Q11	Page Q11	Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.			Page Q27
500						Page Q9					Page Q11		Page Q13 f.f.			Page Q18 f.f.	Page Q20 f.f.			Page Q27
677																	Page Q20 f.f.			
750						Page Q9	Page Q10				Page Q11		Page Q13 f.f.							

Q

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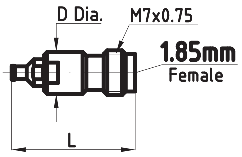
Connector Outline Drawings

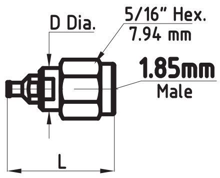
1



1.85mm-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
VF				

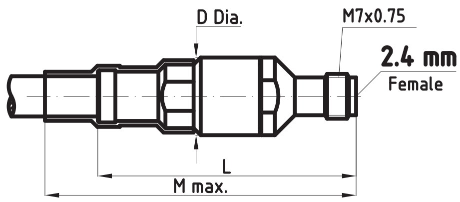
2



1.85mm-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
VM				

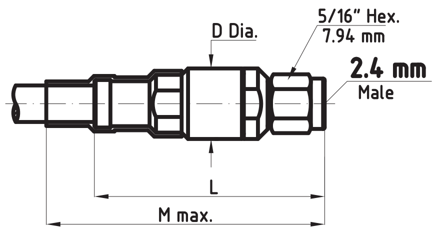
3



2.4mm-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
HF	10	11.0	36.8	75.0
	11	11.0	29.5	75.0
	37	11.0	32.3	75.0
	39	11.0	32.3	75.0
	100	11.0	35.9	75.0
	102	in Development		
	104	in Development		

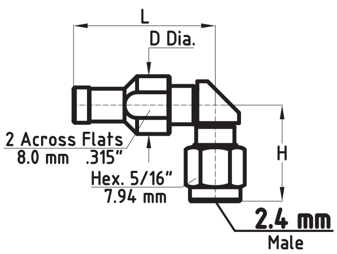
4



2.4mm-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
HM	10	in Development		
	11	11.0	28.6	75.0
	37	11.0	31.4	75.0
	39	11.0	31.4	75.0
	100	in Development		
	102	in Development		
	104	in Development		

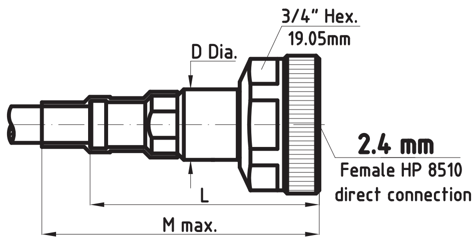
5



2.4mm-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	H in mm
HM9	11	in Development		
	37	11.0	32.3	75.0
	39	11.0	32.3	75.0

6

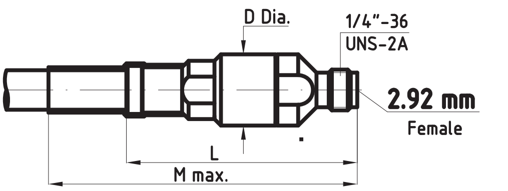


2.4mm-Female Direct HP 8510 Connection

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
H2	11	11.0	29.5	75.0
	37	11.0	32.3	75.0
	39	11.0	32.3	75.0

Connector Outline Drawings

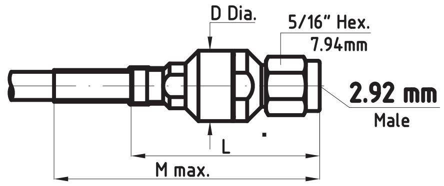
7



2.92mm-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
KF	10	12.5	35.7	75.0
	11	12.5	28.4	75.0
	37	12.5	31.2	75.0
	39	12.5	31.2	75.0
	100	12.5	35.7	75.0
	102	11.0	35.6	61.2

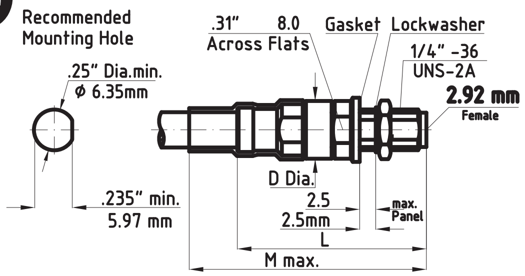
8



2.92mm-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
KM	10	12.5	36.7	75.0
	11	12.5	29.4	75.0
	37	12.5	32.2	75.0
	39	12.5	32.2	75.0
	100	12.5	36.7	75.0
	102	11.0	36.7	62.2

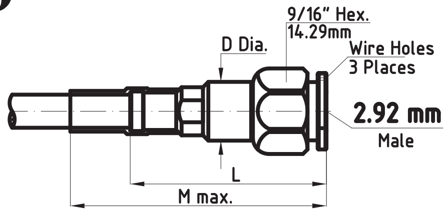
9



2.92mm-Female Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
KFB	11	10.0	31.2	75.0
	37	10.0	31.2	75.0
	39	10.0	31.2	75.0
	102	in Development		

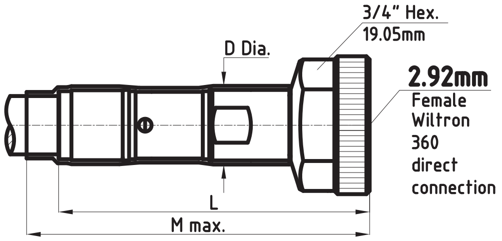
10



2.92mm-Male straight, Maxi Nut

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
MK	10	12.5	36.7	75.0
	100	12.5	36.7	75.0

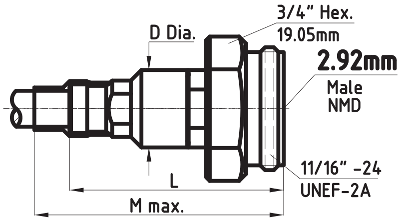
11



2.92mm-Female Direct Wiltron 360 Connection

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
WI	10	12.5	35.7	75.0
	11	12.5	28.4	75.0
	37	12.5	31.2	75.0
	39	12.5	31.2	75.0
	100	12.5	35.7	75.0

12



2.92mm-Male straight NMD

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
WIM	10	12.5	36.7	75.0
	11	12.5	29.4	75.0
	37	12.5	32.2	75.0
	39	12.5	32.2	75.0
	100	12.5	36.7	75.0

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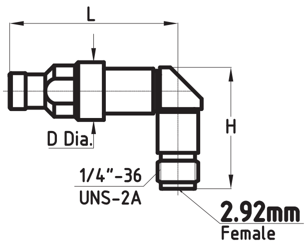
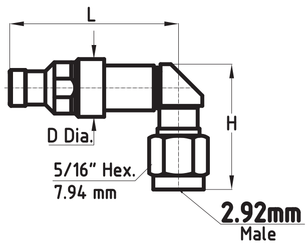
13



2.92mm-Female Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	H in mm
KF9	11	in Development		
	37	in Development		
	39	9.0	26.3	51.3

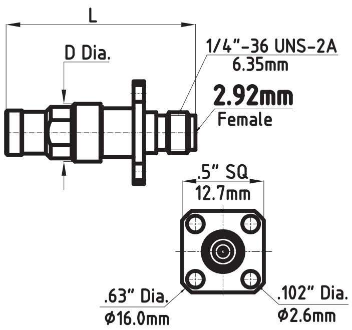
14



2.92mm-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	H in mm
KM9	10	9.0	26.3	51.3
	11	in Development		
	37	in Development		
	39	9.0	26.3	51.8
	100	9.0	26.3	51.3
	102	7.4	27.0	52.5

15



2.92mm-Female 4-Hole Flange Mount

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
KF4	11	in Development		
	37	in Development		
	39	10.0	31.2	75.0

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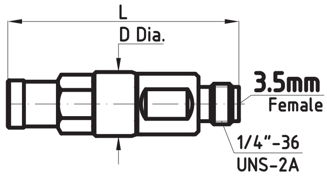
Connector Outline Drawings

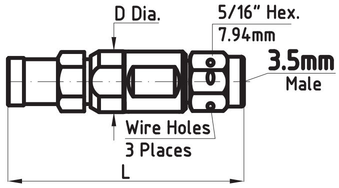
16



3.5mm-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
92	10	11.0	36.1	73.0
	11	in Development		
	37	11.0	35.7	73.0
	39	11.0	35.7	73.0
	43	11.0	38.1	73.0
	100	10.0	36.0	61.5

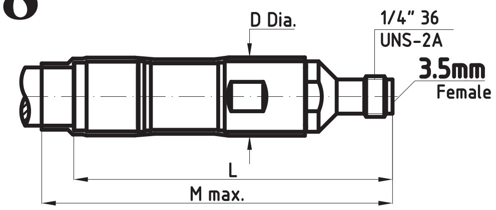
17



3.5mm-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
91	10	11.0	38.8	76.0
	11	11.0	39.9	56.0
	37	11.0	37.5	76.0
	39	11.0	37.5	76.0
	43	11.0	36.8	74.0
	100	11.0	38.8	76.0

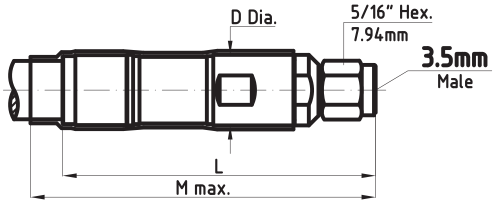
18



3.5mm-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
92	51	18.0	44.9	80.0
	57	18.0	46.0	80.0
	143	16.0	48.0	88.0

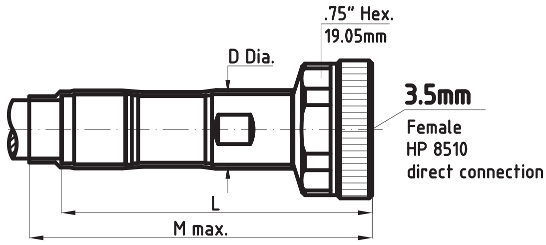
19



3.5mm-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
91	14	16.0	48.0	88.0
	51	18.0	45.9	82.0
	57	18.0	48.9	82.0
	140	15.5	37.9	75.0
	143	16.0	48.0	88.0
	100	11.0	38.8	76.0

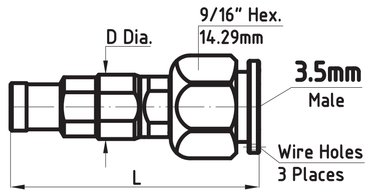
20



3.5mm-Female Direct HP 8510 Connection

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
H3	10	11.0	36.1	73.0
	100	11.0	36.1	73.0

21

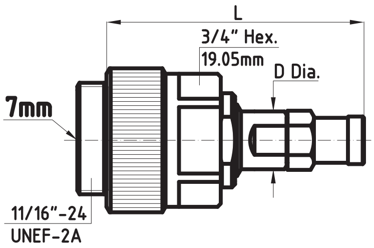


3.5mm-Male straight, Maxi Nut

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
M3	10	11.0	38.7	76.0
	100	11.0	38.7	76.0

Q

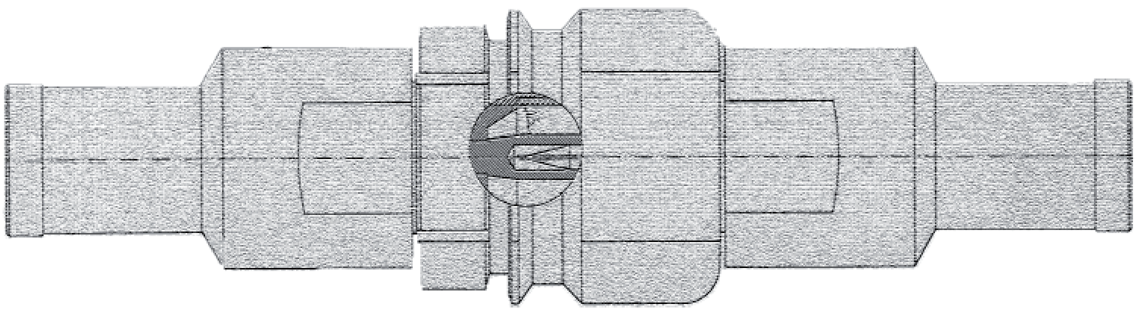
22



7mm-Connector straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
90	10	11.5	40.3	88.0
	11	in Development		
	12	in Development		
	14	in Development		
	37	in Development		
	39	9.0	40.1	
	43	11.5	40.4	88.0
	51	20.0	44.2	81.0
	57	12.8	44.2	81.0
	100	11.5	40.3	88.0
	120	in Development		
	140	in Development		
	141	12.9	44.2	

The Center Conductor of the 7mm Connector is supplied with 4 slots. If you require 6 slots, Connector Code changes to : 96.



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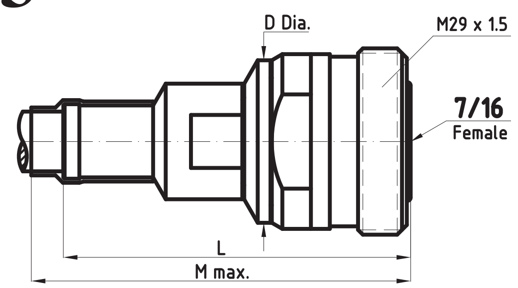
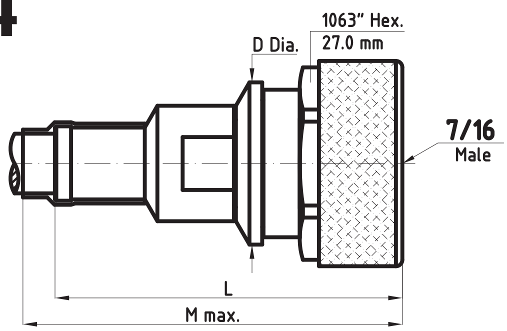
Connector Outline Drawings

23



24



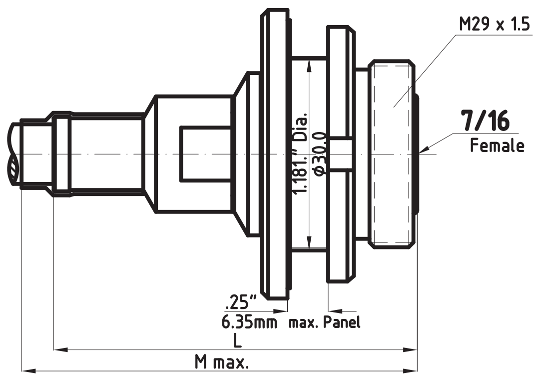
7/16-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
76	03	24.0	53.3	100.0
	10	24.0	45.0	95.0
	12	25.3	55.2	
	14	24.0	46.0	95.0
	51	24.0	54.2	100.0
	57	24.0	54.2	100.0
	100	24.0	45.0	95.0
	120	25.3	55.2	
	140	24.0	45.0	95.0
	141	in Development		
	300	24.0	53.3	100.0

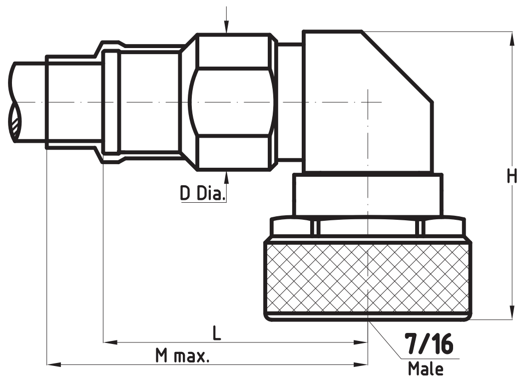
7/16-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
75	03	24.0	54.2	100.0
	10	24.0	46.0	95.0
	12	in Development		
	14	24.0	47.0	95.0
	51	24.0	55.1	100.0
	57	24.0	55.1	100.0
	60 A&B	24.0	55.1	100.0
	100	24.0	46.0	95.0
	120	in Development		
	140	24.0	47.0	95.0
	141	in Development		
	300	24.0	54.2	100.0
	500	25.4	54.2	
	750	24.7	71.3	110.0

25



26



7/16-Female Bulkhead Feedthrough Jack

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
753	03	24.0	53.3	98.0
	51	24.0	54.2	99.0
	57	24.0	54.2	99.0
	300	24.0	53.3	98.0

7/16-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
755	500	21.0	33.9	41.3
	750	in Development		

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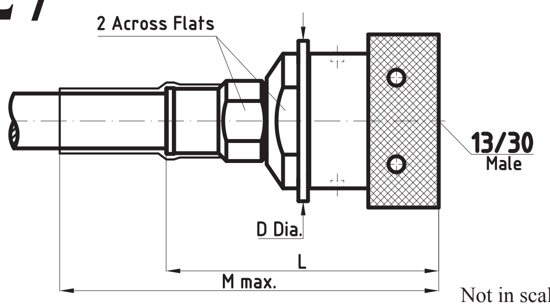
27

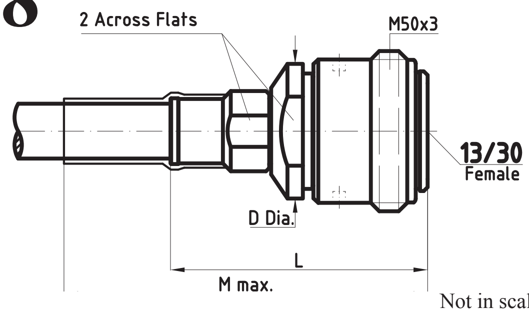


Not in scale

13/30-Male Straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
Z13	03	25.0	85.1	120.1
	300	in Development		
	750	25.0	85.1	120.1

28

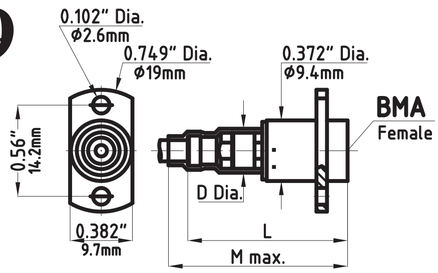


Not in scale

13/30-Female Straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
ZB1				

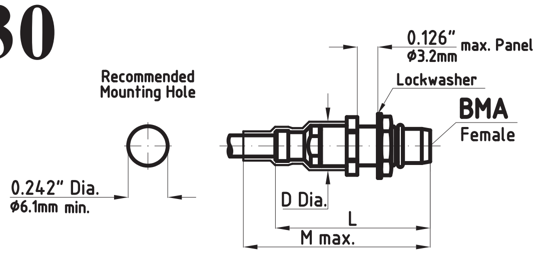
29



BMA-Female 2-Hole Flange

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
BF	10	9.4	39.1	
	100	9.4	39.1	

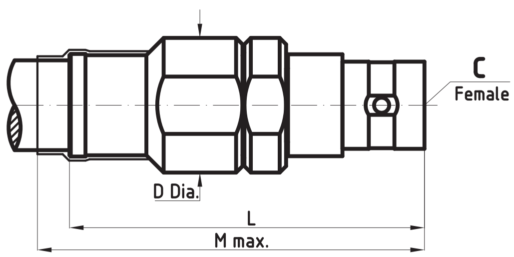
30



BMA-Male Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
BM	10	in Development		
	100	in Development		

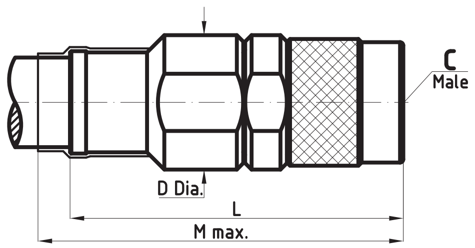
31



C-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
89	11	in Development		
	37	11.0	32.3	75.0
	39	11.0	32.3	75.0

32

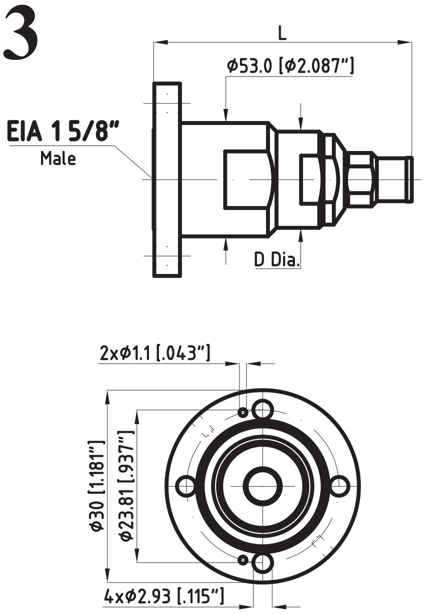


C-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
88	11	11.0	29.5	75.0
	37	11.0	32.3	75.0
	39	11.0	32.3	75.0

Q

33

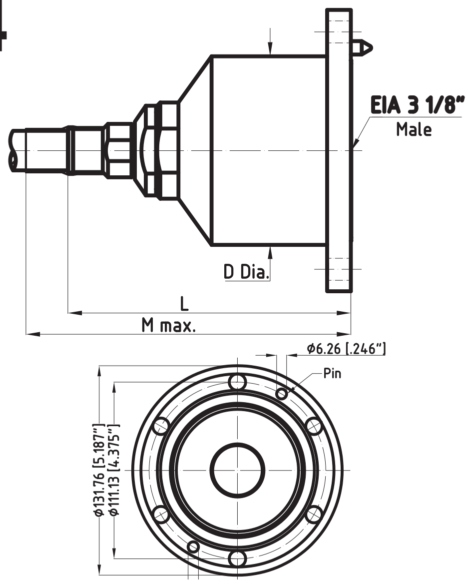


Not in scale

EIA-Male 1 5/8" straight Flange Mount

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
EA5	500	21	33.9	41.3
	750	in Development		

34

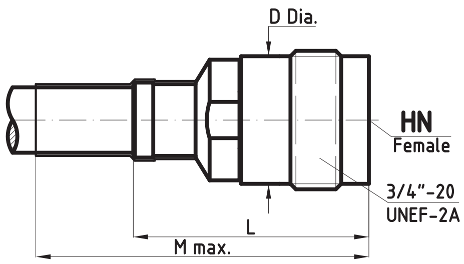


Not in scale

EIA-Male 3 1/8" straight 4-Hole Flange

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
EA3	03	in Development		
	300	in Development		
	500	42.0	120.8	156.0
	750	in Development		

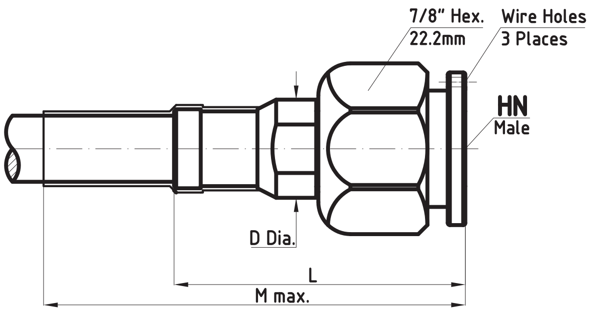
35



HN-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
68	10	19.1	49.4	
	12	in Development		
	51	in Development		
	57	in Development		
	100	19.1	49.4	
	120	in Development		

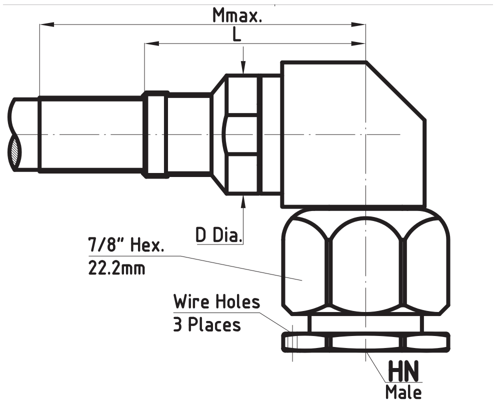
36



HN-Male straight

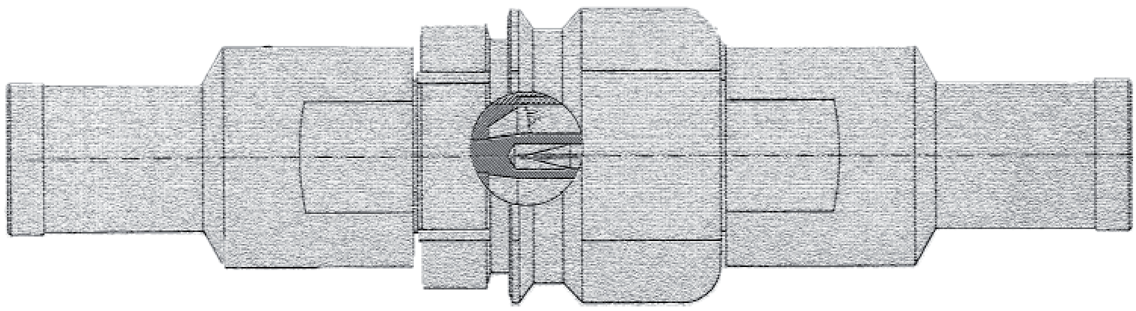
Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
69	03	in Development		
	10	in Development		
	12	18.0	45.0	70.0
	51	in Development		
	57	in Development		
	100	in Development		
	120	18.0	45.0	70.0
	300	in Development		

37



HN-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
67	10	in Development		
	12	18.0	42.2	86.6
	51	in Development		
	57	in Development		
	100	in Development		
	120	18.0	42.2	86.6



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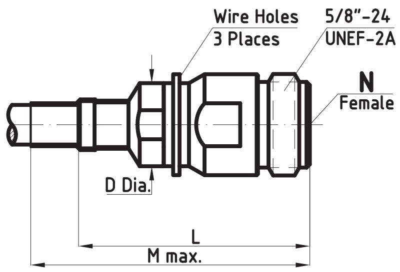
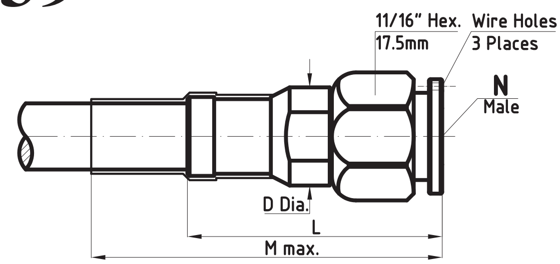
38



N-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
61	10	15.5	42.0	85.0
	11	13.0	40.0	80.0
	14	15.5	40.0	80.0
	37	15.5	42.0	85.0
	39	15.5	42.0	85.0
	43	15.5	42.0	85.0
	100	15.5	42.0	85.0
	140	15.5	40.0	80.0

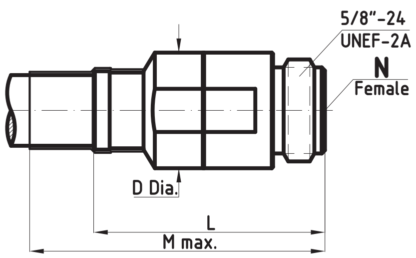
39



N-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
51	03	in Development		
	10	13.0	31.8	73.0
	14	15.5	31.8	73.0
	37	13.0	31.8	73.0
	39	13.0	31.8	73.0
	43	13.0	31.8	73.0
	100	13.0	31.8	73.0
	102	11.5	31.8	
	104	14.0	31.8	
	105	in Development		
	140	15.5	31.8	73.0
	300	in Development		

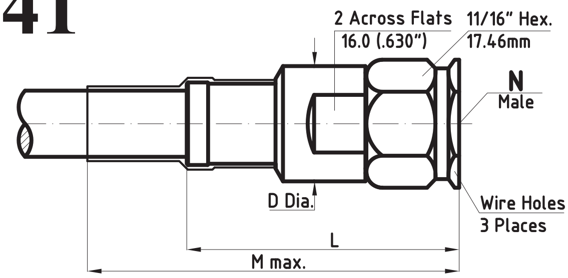
40



N-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
61	03	21.0	49.1	95.0
	12	18.0	48.8	94.0
	51	20.0	48.8	94.0
	57	18.0	48.8	94.0
	120	18.0	48.8	94.0
	143	in Development		
	300	21.0	49.1	95.0

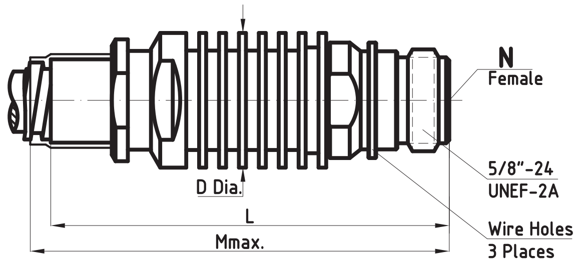
41



N-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
51	12	20.0	41.6	73.0
	51	20.0	42.7	73.0
	57	20.0	42.7	73.0
	60A	21.0	59.5	
	65	15.5	31.8	73.0
	120	20.0	41.6	73.0
	141	18.0	42.7	
	143	16.2	42.4	
	300	21.0	43.0	75.0
	500	21.0	42.8	75.0
	750	25.0	60.6	

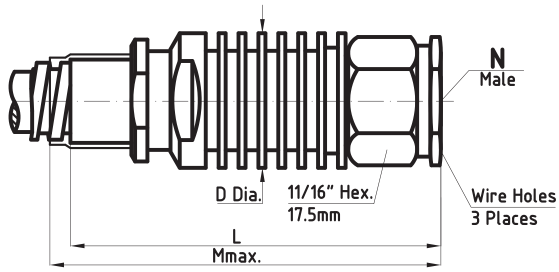
42



N-Female straight High Power

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
61H	12	in Development		
	120	in Development		

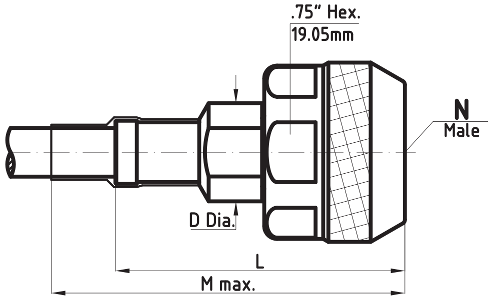
43



N-Male straight High Power

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
51H	12	20.0	42.1	67.6
	14	in Development		
	120	20.0	42.1	67.9
	140	in Development		
	141	21.0	56.6	82.1
	300	in Development		
	500	21.0	59.5	89.5

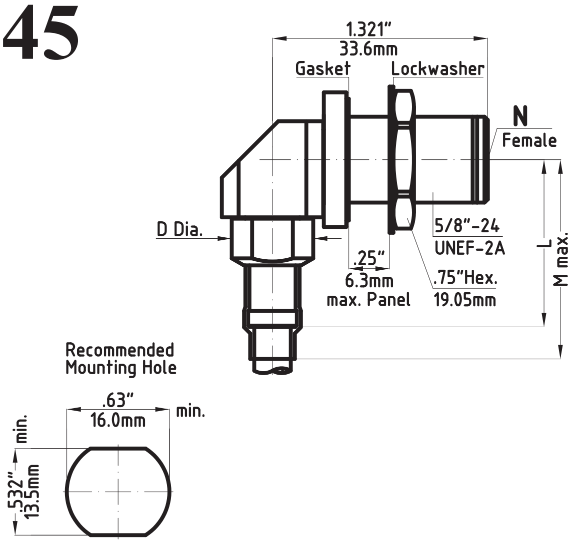
44



N-Male straight Hex/ Knurl Nut

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
510	10	13.0	31.8	73.0
	14	15.5	31.8	73.0
	51	20.0	42.7	73.0
	57	20.0	42.7	73.0
	100	13.0	31.8	73.0
	140	15.5	31.8	73.0

45



N-Female Bulkhead Feedthrough Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
5A	10	13.0	26.2	66.0
	12	18.0	39.1	83.0
	14	16.0	26.2	66.0
	100	13.0	26.2	66.0
	120	18.0	39.1	83.0
	140	16.0	26.2	66.0

Connector Outline Drawings

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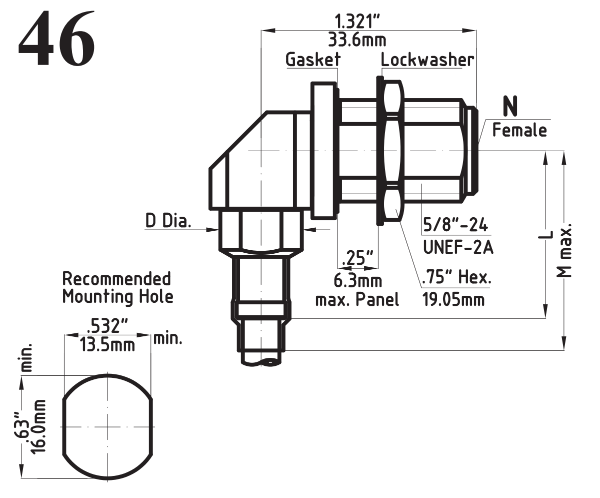
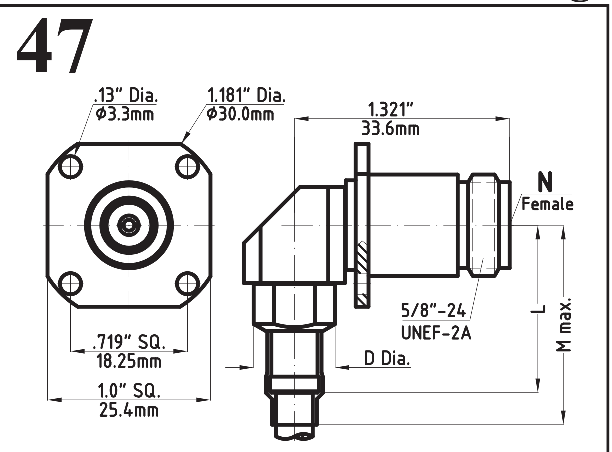


47



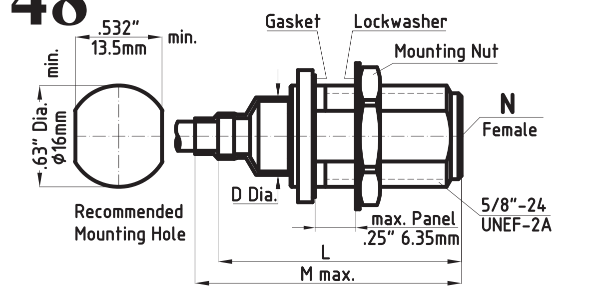
N-Female Bulkhead Feedthrough Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
5B	10	13.0	26.2	66.0
	12	18.0	39.1	83.0
	14	16.0	26.2	66.0
	100	13.0	26.2	66.0
	120	18.0	39.1	83.0
	140	16.0	26.2	66.0

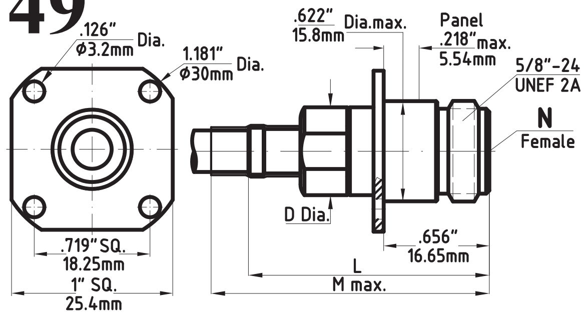
N-Female 4-Hole Flange Mount Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
5C	10	13.0	26.2	66.0
	100	13.0	26.2	66.0

48



49



N-Female Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
63	10	13.0	44.1	84.0
	11	13.0	44.1	84.0
	12	18.0	50.1	84.0
	14	18.0	44.3	84.0
	37	15.5	44.1	84.0
	39	15.5	44.1	84.0
	43	13.0	44.1	84.0
	51	20.0	50.1	84.0
	57	18.0	50.1	84.0
	100	13.0	44.1	84.0
	120	18.0	50.1	84.0
	140	18.0	44.3	84.0
	141	in Development		
	143	in Development		

N-Female 4-Hole Flange Mount

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
65	10	14.0	40.0	88.0
	12	18.0	48.8	94.0
	14	18.0	42.7	90.0
	43	14.0	40.0	88.0
	51	20.0	48.9	80.0
	57	18.0	50.0	50.0
	100	14.0	40.0	40.0
	102	in Development		
	104	in Development		
	120	18.0	48.8	94.0
	140	18.0	42.7	90.0
	141	in Development		
	143	in Development		

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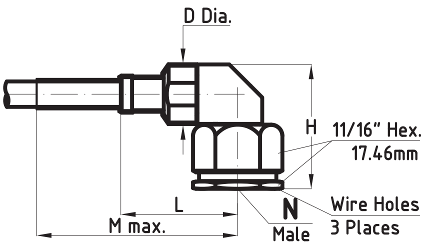
Connector Outline Drawings

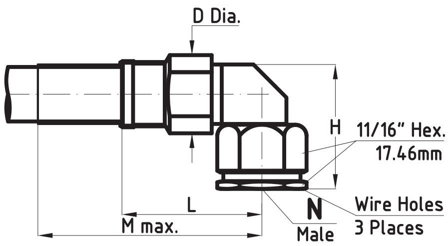
50



N-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
55	10	13.0	26.2	66.0
	11	13.0	26.2	66.0
	14	16.0	26.2	66.0
	37	14.5	26.2	66.0
	39	14.5	26.2	66.0
	43	12.7	26.2	66.0
	100	13.0	26.2	66.0
	102	in Development		
	104	in Development		
	105	in Development		
	106	in Development		
	140	16.0	26.2	66.0

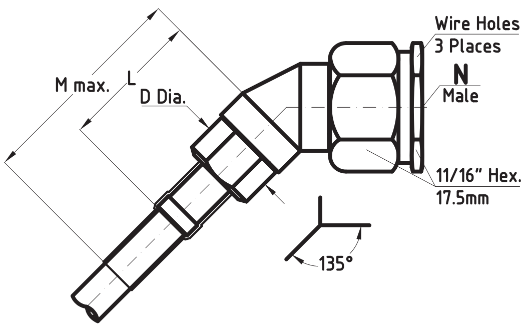
51



N-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
55	03	21.0	52.9	98.0
	12	18.0	39.1	83.0
	51	18.0	39.2	83.0
	57	20.0	39.2	65.0
	60A	in Development		
	60B	in Development		
	120	18.0	39.1	83.0
	300	21.0	52.9	98.0
	141	in Development		
	143	in Development		
	500	21.0	52.8	98.0

52



N-Male 135° Angle High Power

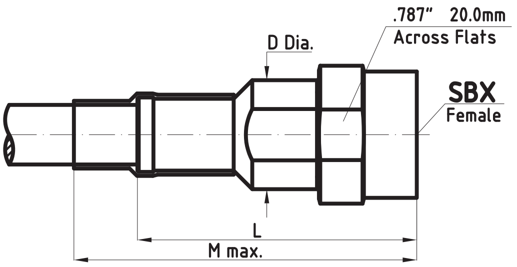
Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
53	10	13.0	26.2	66.0
	11	13.0	26.2	66.0
	140	16.0	26.2	66.0

Q

Kabelkatalog.indd

Connector Outline Drawings

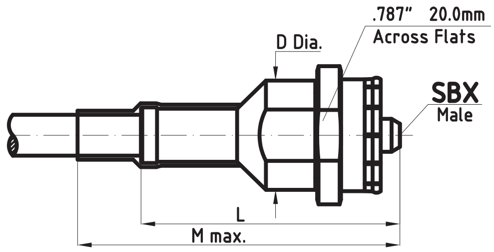
53



SBX-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
XF	10	in Development		
	51	in Development		
	57	in Development		
	100	in Development		

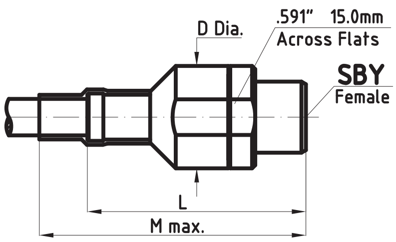
54



SBX-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
XM	10	in Development		
	51	in Development		
	57	in Development		
	100	in Development		

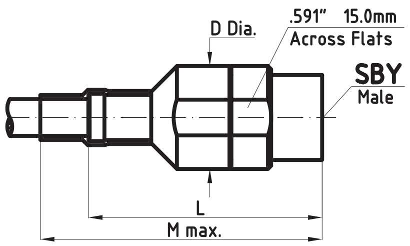
55



SBY-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
YF	10	in Development		
	51	in Development		
	57	in Development		
	100	in Development		

56



SBY-Male straight

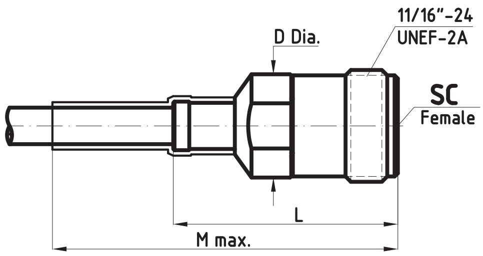
Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
YM	10	in Development		
	51	in Development		
	57	in Development		
	100	in Development		

Q

Kabelkatalog.indd

Connector Outline Drawings

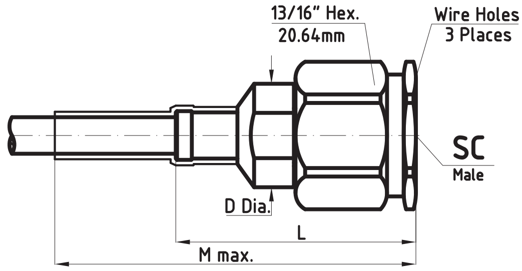
57



SC-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
79	03	21.0	46.8	90.0
	12	18.0	51.4	95.0
	14	17.0	48.4	95.0
	51	21.0	51.4	95.0
	57	21.0	51.4	95.0
	120	18.0	51.4	95.0
	140	17.0	48.4	95.0
	141	in Development		
	143	in Development		
	300	21.0	46.8	90.0
	500	in Development		

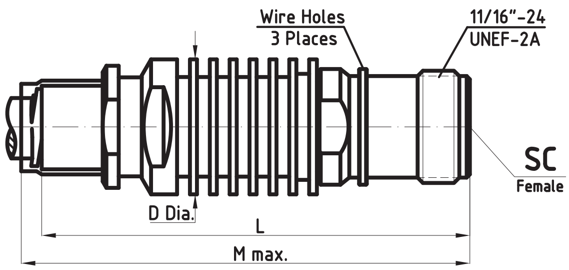
58



SC-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
80	03	21.0	44.5	95.0
	10	17.0	41.2	88.0
	12	18.0	472	90.0
	14	17.0	43.2	90.0
	51	20.0	47.2	90.0
	57	17.0	47.2	90.0
	100	17.0	41.2	88.0
	102	in Development		
	104	in Development		
	105	in Development		
	106	in Development		
	120	18.0	47.2	90.0
	140	17.0	43.2	90.0
	141	in Development		
	300	21.0	44.5	95.0
	500	21.0	44.5	95.0

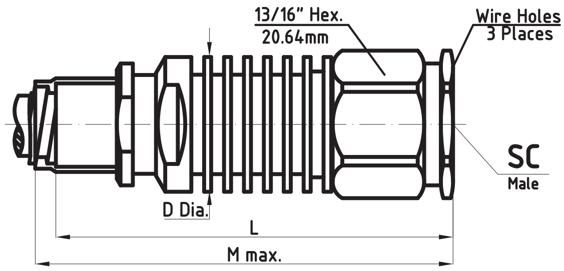
59



SC-Female straight High Power

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
79H	03	in Development		
	60A	in Development		
	60B	in Development		
	300	in Development		
	500	in Development		

60



SC-Male straight High Power

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
80H	03	27.0	62.6	87.6
	60A	in Development		
	60B	in Development		
	300	27.0	62.6	87.6
	500	in Development		

Q

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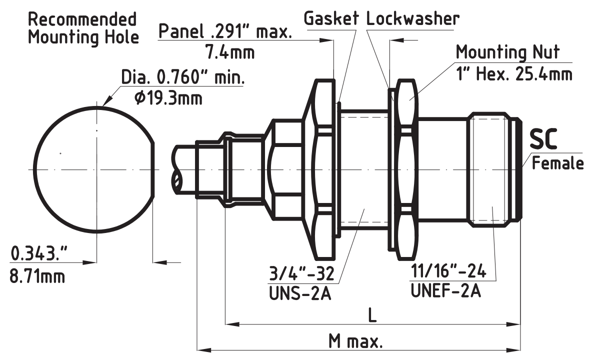
Connector Outline Drawings

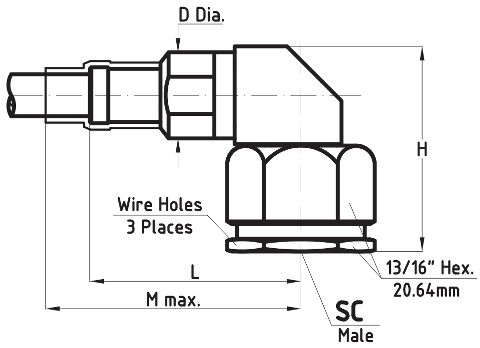
61



SC-Female Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
78	12	18.0	58.4	86.0
	51	in Development		
	57	in Development		
	60A	in Development		
	60B	in Development		
	120	18.0	58.4	86.0
	141	in Development		
	143	in Development		

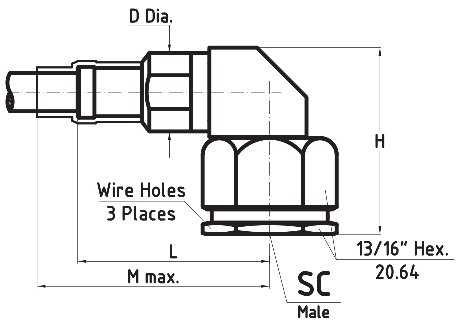
62



SC-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
77	03	in Development		
	10	in Development		
	12	18.0	42.2	86.0
	14	18.0	42.2	86.0
	100	in Development		
	120	18.0	42.2	86.0
	140	18.0	42.2	86.0
	141	in Development		
	143	in Development		
	300	in Development		

63



SC-Male Right Angle High Power

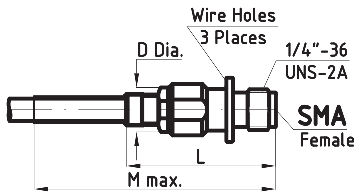
Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
77H	03	in Development		
	300	in Development		
	500	in Development		

Q

High Performance Cable Assemblies

Spectrum Elektrotechnik GmbH

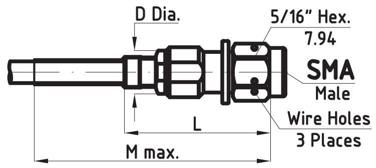
64



SMA-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
21	11	7.8	20.8	55.0
	37	in Development		
	39	in Development		

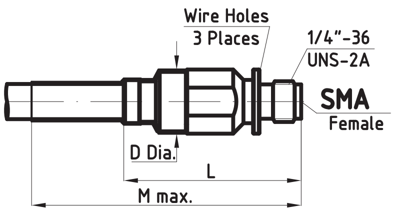
65



SMA-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
11	11	7.8	20.6	55.0
	37	in Development		
	39	in Development		
	677	7.8	20.8	55.0

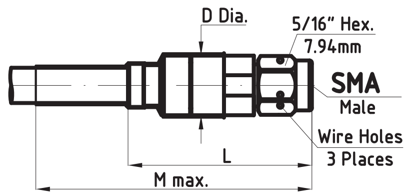
66



SMA-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
21	03	21.0	46.8	90.0
	12	18.0	51.4	95.0
	14	17.0	48.4	95.0
	51	21.0	51.4	95.0
	57	21.0	51.4	95.0
	120	18.0	51.4	95.0
	140	17.0	48.4	95.0
	141	in Development		
	143	in Development		
	300	21.0	46.8	90.0
	500	in Development		

67



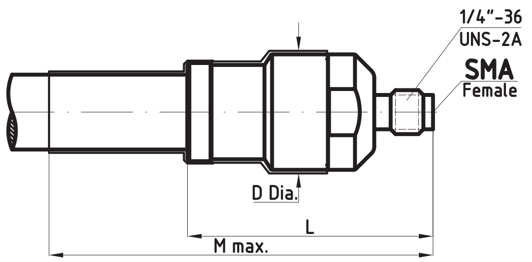
SMA-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
11 SMA-Male straight	10	10.5	35.0	74.0
	43	11.0	35.0	74.0
	51	in Development		
	57	in Development		
	60A	in Development		
	60B	in Development		
	100	10.5	35.0	74.0
	102	in Development		
	104	in Development		
	105	in Development		
	106	in Development		
	141	12.8	42.0	
	143	in Development		
10 gold plated	10	10.5	35.0	74.0
	100	10.5	35.0	74.0

Q

Connector Outline Drawings

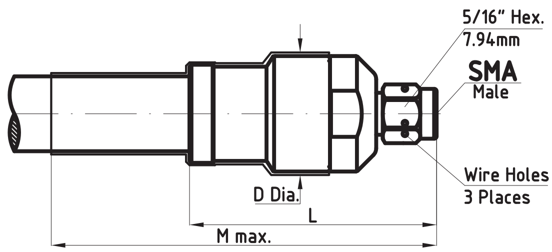
68



SMA-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
21	12	18.0	39.5	73.0
	14	16.0	30.1	70.0
	51	in Development		
	57	18.2	38.2	
	120	18.0	39.5	73.0
	140	16.0	30.1	70.0

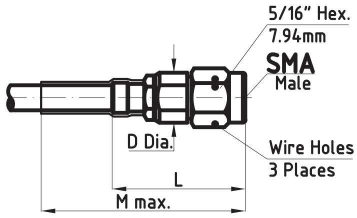
69



SMA-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
11	03	21.0	47.3	
	12	18.0	42.4	75.0
	14	16.0	33.1	73.0
	120	18.0	42.4	75.0
	140	16.0	33.1	73.0
	300	21.0	47.3	

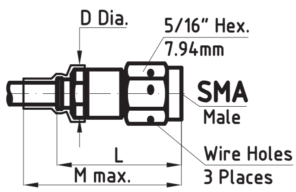
70



SMA-Male straight, DC - 26.5 GHz

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
11K	10	9.0	34.9	
	11	7.8	20.8	
	37	7.8	20.8	
	39	7.8	20.8	
	100	9.0	34.9	
	102	in Development		

71



SMA-Male Short straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
11S Passivated Stainless Steel	10	9.0	23.0	58.0
	11	9.0	23.0	58.0
10S Gold Plated	10	9.0	23.0	58.0
	100	9.0	23.0	58.0

Q

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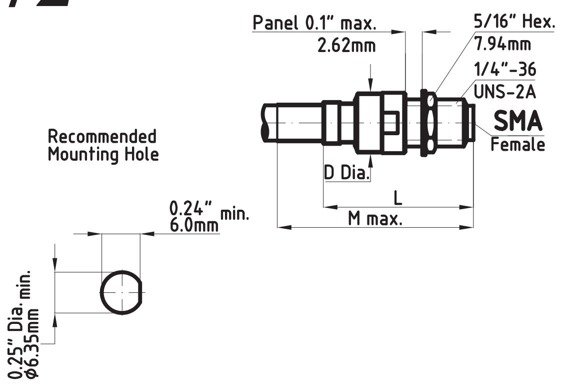
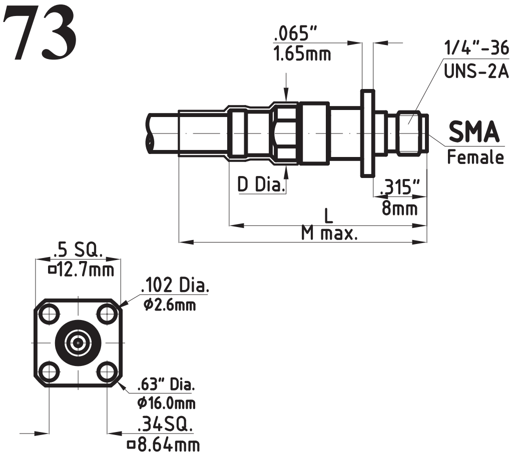
72



SMA-Female Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
23	10	11.0	31.3	72.0
	11	11.0	23.3	52.0
	14	15.5	34.7	74.0
	37	in Development		
	39	in Development		
	43	11.0	31.3	72.0
	100	11.0	31.3	72.0
	102	in Development		
	104	in Development		
	140	in Development		
	141	in Development		
	143	in Development		
	677	in Development		

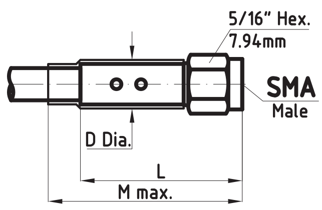
73



SMA-Female 4-Hole Flange Mount

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
25	10	11.0	31.3	72.0
	11	11.0	23.3	52.0
	12	in Development		
	37	in Development		
	39	in Development		
	100	11.0	31.3	72.0
	102	in Development		
	120	in Development		

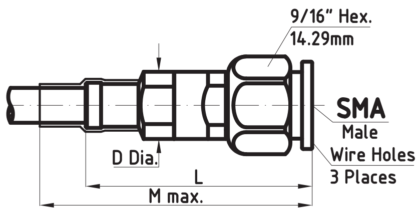
74



SMA-Male Low Cost

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
101	10	6.3	22.1	58.0
	11	4.6	22.1	58.0
	100	6.3	23.3	58.0

75



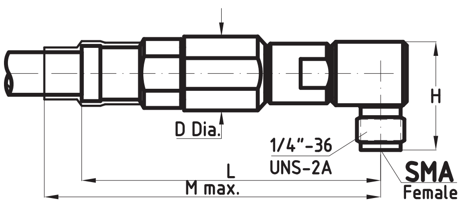
SMA-Male straight, Maxi Nut

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
MA	10	10.5	35.0	74.0
	100	10.5	35.0	74.0

Q

Connector Outline Drawings

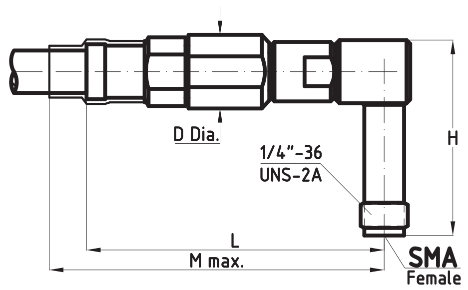
76



SMA-Female Regular Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
18R	10	11.5	40.0	78.0
	11	in Development		
	14	14.8	38.0	80.0
	43	in Development		
	100	11.5	40.0	78.0
	104	in Development		
	140	in Development		
	141	in Development		

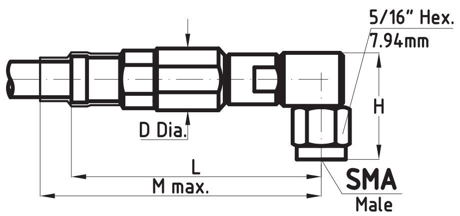
77



SMA-Female Long Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
18L	10	11.5	40.0	78.0
	11	in Development		
	14	14.8	38.0	80.0
	43	in Development		
	100	11.5	40.0	78.0
	104	in Development		
	140	in Development		
	141	in Development		

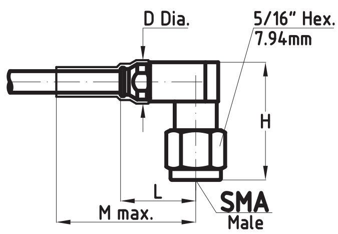
78



SMA-Male Short Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
152	10	11.5	40.0	78.0
	11	in Development		
	12	in Development		
	14	in Development		
	37	14.8	38.0	80.0
	39	14.8	41.2	80.0
	43	in Development		
	65	12.5	39.1	80.0
	100	11.5	40.0	78.0
	105	in Development		
	120	in Development		
	140	in Development		
	677	in Development		

79



SMA-Male Regular Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
154	10	11.5	40.0	78.0
	11	11.0	23.3	52.0
	12	in Development		
	37	14.8	38.0	80.0
	39	14.8	41.2	80.0
	43	in Development		
	65	12.5	39.1	80.0
	100	11.5	40.0	78.0
	105	in Development		
	120	in Development		
	677	in Development		

Q

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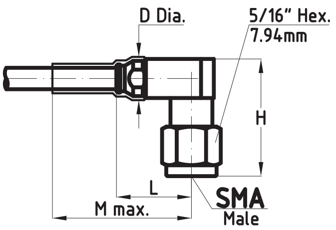
Connector Outline Drawings

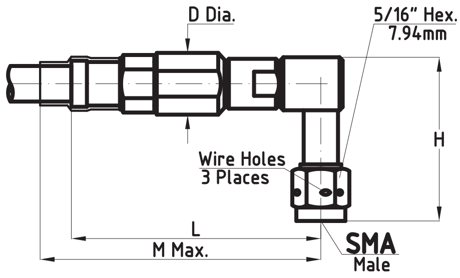
80



SMA-Male Short Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
154	14	15.5	34.7	74.0
	140	15.5	34.7	74.0
	141	in Development		
	143	in Development		

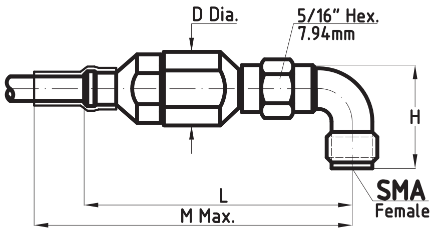
81



SMA-Male Long Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
156	10	9.4	36.0	17.8
	11	in Development		
	37	in Development		
	39	in Development		
	43	in Development		
	65	in Development		
	100	9.4	36.0	17.8
	105	in Development		
	677	9.2	14.1	16.3

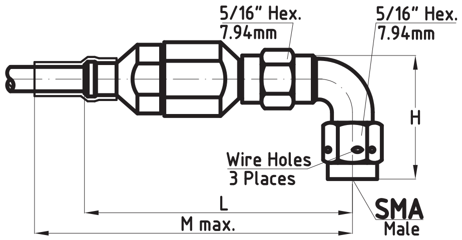
82



SMA-Female Radius Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
19	10	11.5	42.0	70.0
	11	11.5	42.0	70.0
	12	17.0	43.0	70.0
	43	in Development		
	100	11.5	42.0	70.0
	102	in Development		
	104	in Development		
	120	17.0	43.0	70.0
	140	15.0	42.0	70.0

83

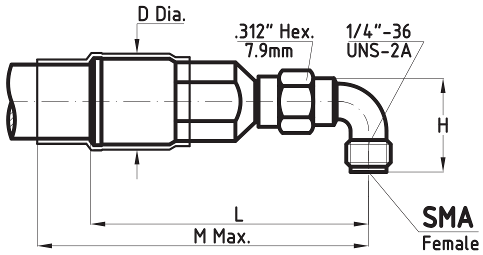


SMA-Male Radius Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
17	10	11.5	42.0	70.0
	11	11.5	42.0	70.0
	12	17.0	43.0	70.0
	43	in Development		
	100	11.5	42.0	70.0
	102	in Development		
	104	in Development		
	120	17.0	43.0	70.0
	140	15.0	42.0	70.0
	141	in Development		

Connector Outline Drawings

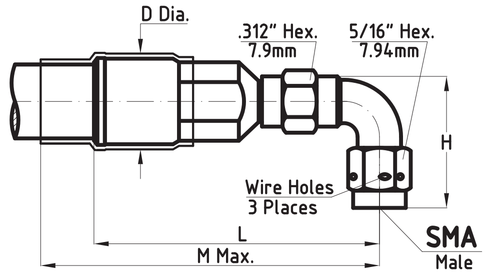
84



SMA-Female Radius Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
19	51	17.0	42.0	70.0
	57	in Development		

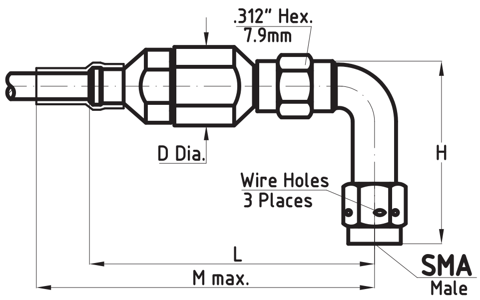
85



SMA-Male Radius Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
17	51	17.0	42.0	70.0
	57	in Development		

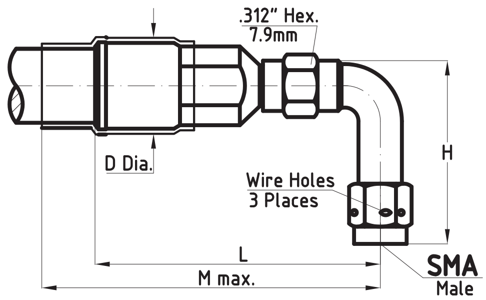
86



SMA-Male Long Radius Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
17L	10	11.5	42.0	70.0
	11	11.5	42.0	70.0
	12	17.0	43.0	70.0
	43	in Development		
	100	11.5	42.0	70.0
	102	in Development		
	104	in Development		
	120	17.0	43.0	70.0
	140	15.0	42.0	70.0
	141	in Development		

87



SMA-Male Long Radius Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
17L	51	17.0	44.2	70.0
	57	15.0	43.2	70.0

Q

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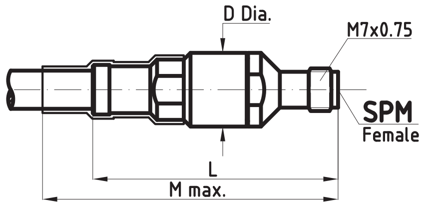
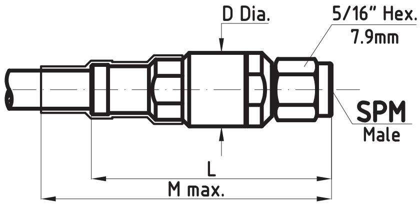
88



SPM-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
PJ	10	in Development		
	100	in Development		

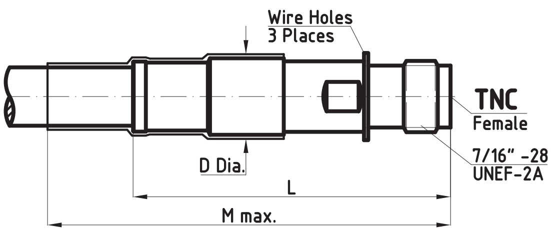
89



SPM-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
PM	10	9.0	34.9	60.0
	14	13.7	29.7	
	100	9.0	34.9	60.0
	140	13.7	29.7	

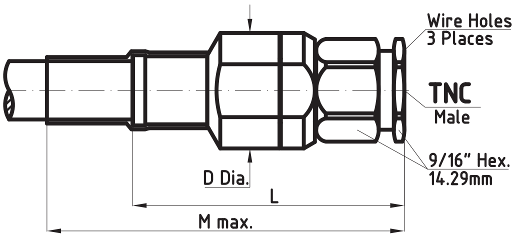
90



TNC-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
41	10	13.0	34.4	78.0
	11	13.0	34.4	78.0
	14	15.0	40.0	78.0
	37	13.0	34.4	78.0
	39	13.0	34.4	78.0
	43	13.0	34.4	78.0
	100	13.0	34.4	78.0
	104	in Development		
	140	15.0	40.0	78.0
	141	12.0	48.2	

91



TNC-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
31	10	13.0	31.1	72.0
	11	13.0	28.6	70.0
	14	15.0	31.1	72.0
	37	13.0	31.1	72.0
	39	13.0	31.1	72.0
	43	13.0	31.1	72.0
	100	13.0	31.1	72.0
	102	in Development		
	105	in Development		
	140	15.0	31.1	72.0
	141	in Development		
	143	in Development		

Q

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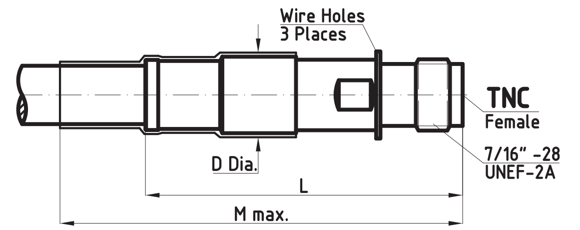
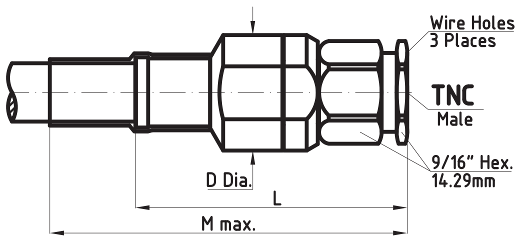
92



TNC-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
41	12	16.0	48.2	90.0
	51	20.0	48.2	81.0
	57	15.0	48.2	90.0
	120	16.0	48.2	90.0

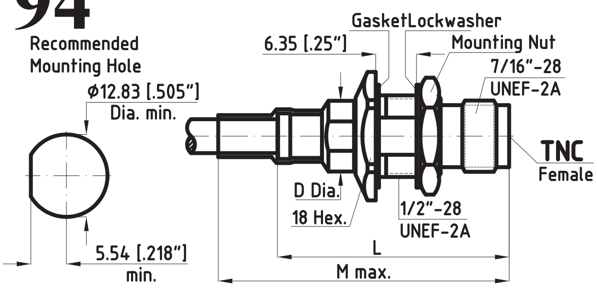
93



TNC-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
31	03	in Development		
	12	18.0	45.4	92.0
	51	20.0	53.7	90.0
	57	18.0	53.7	90.0
	120	18.0	45.4	92.0
	300	in Development		
	500	21.0	52.2	

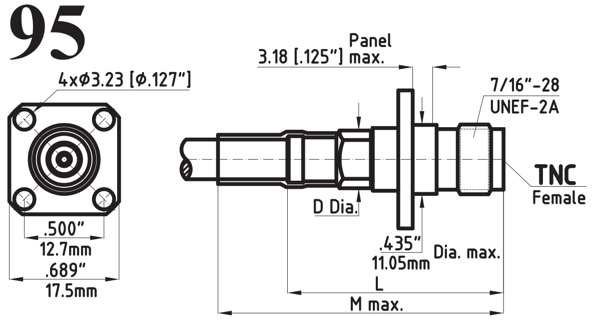
94



TNC-Female Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
43	03	21.0	50.7	100.0
	10	13.0	41.4	73.0
	11	9.5	30.4	65.0
	12	18.0	50.6	82.0
	14	13.0	36.7	73.0
	43	13.0	41.4	73.0
	51	20.0	48.2	82.0
	57	14.8	48.2	82.0
	100	13.0	41.4	73.0
	102	in Development		
	104	in Development		
	120	18.0	50.6	82.0
	140	13.0	36.7	73.0
	141	in Development		
	143	in Development		
	300	21.0	50.7	100.0
	500	21.0	50.7	100.0

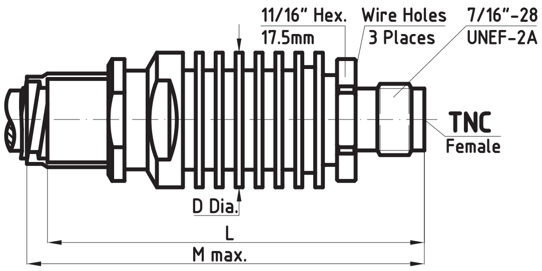
95



TNC-Female 4-Hole Flange Mount

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
45	10	13.0	40.5	80.0
	11	11.5	30.4	70.0
	14	15.0	48.2	80.0
	37	in Development		
	39	in Development		
	43	13.0	40.5	80.0
	51	20.0	48.2	82.0
	57	15.0	48.2	82.0
	100	13.0	40.5	80.0
	140	15.0	48.2	80.0

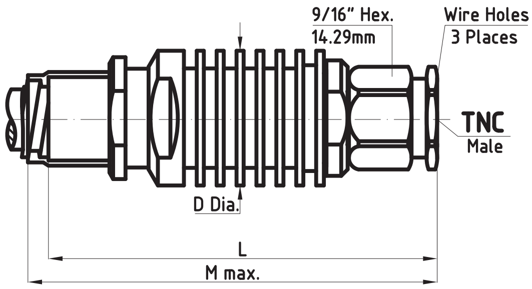
96



TNC-Female straight High Power

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
41H	51	in Development		
	57	in Development		
	141	in Development		
	143	in Development		

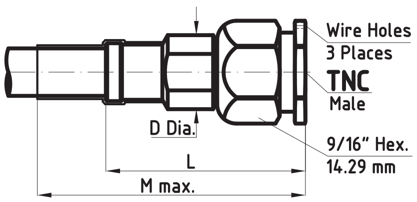
97



TNC-Male straight High Power

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
31H	03	in Development		
	12	20.0	42.3	
	120	20.0	42.3	
	141	21.0	44.1	
	143	14.9	41.2	
	300	in Development		

98



TNC-Male straight High Power

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
31H	14	in Development		
	140	in Development		

Q

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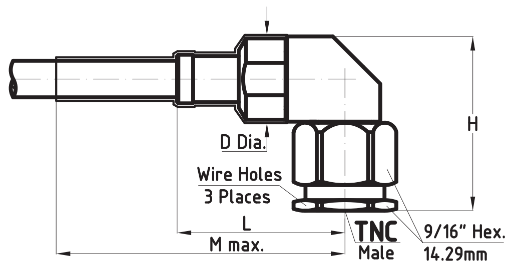
Connector Outline Drawings

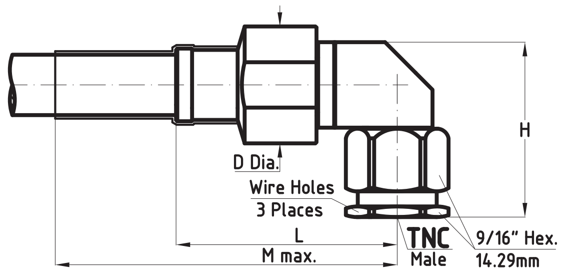
99



TNC-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
35	10	13.0	26.2	74.0
	11	13.0	26.2	74.0
	14	16.0	26.2	74.0
	37	14.5	26.2	70.0
	39	14.5	26.2	70.0
	43	13.0	26.2	74.0
	100	13.0	26.2	74.0
	140	16.0	26.2	74.0

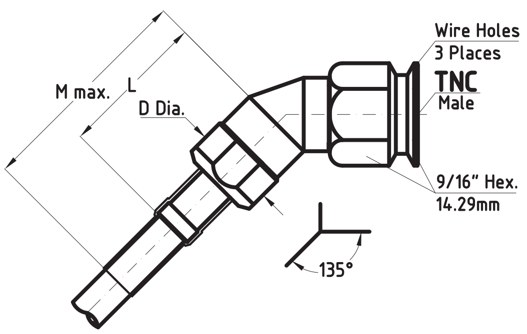
100



TNC-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
35	03	21.0	52.9	100.0
	12	18.0	39.1	85.0
	51	20.0	39.2	80.0
	57	18.0	39.2	85.0
	120	18.0	39.1	85.0
	141	18.0	39.2	
	143	in Development		
	300	21.0	52.9	100.0
	500	21.0	52.9	100.0

101



TNC-Male 135° Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
36	11	12.7	22.0	74.0
	14	in Development		
	37	in Development		
	39	in Development		
	43	in Development		
	140	in Development		
	141	12.7	22.0	

Q

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Spectrum
Elektrotechnik GmbH

Q

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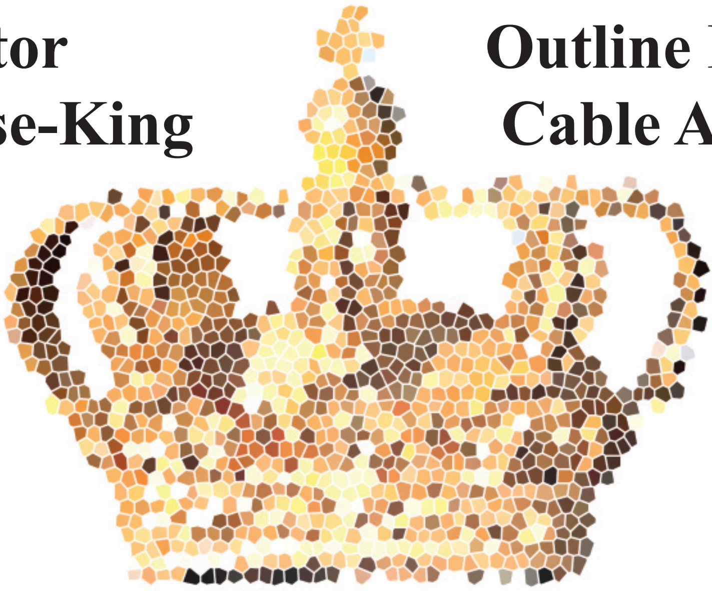
Spectrum Elektrotechnik GmbH

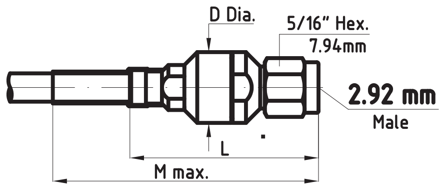
Connector for Phase-King

Outline Drawings Cable Assemblies



Phase-King Cable Assemblies	Connector				
	2.92 mm	3.5 mm	N	SMA	TNC
P160	in Development				
P190	Page Q32	Page Q32	Page Q32	Page Q33	
P190E	Page Q32	Page Q32		Page Q34	Page Q34
P210	in Development				
P300	in Development				

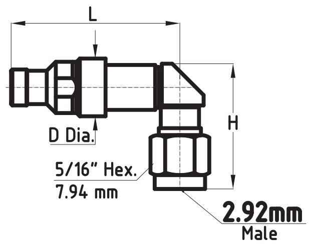
249



2.92mm-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
KM	P190	in Development		

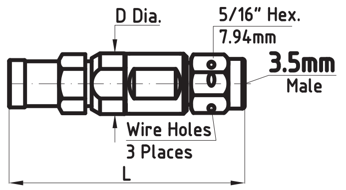
250



2.92mm-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	H in mm
KM9	P190	7.4	27.0	16.5
	P190E	7.4	27.0	16.5

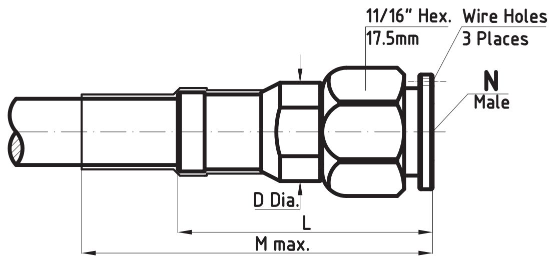
251



3.5mm-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
91	P190	10.0	40.8	66.3
	P190E	10.0	38.3	63.8

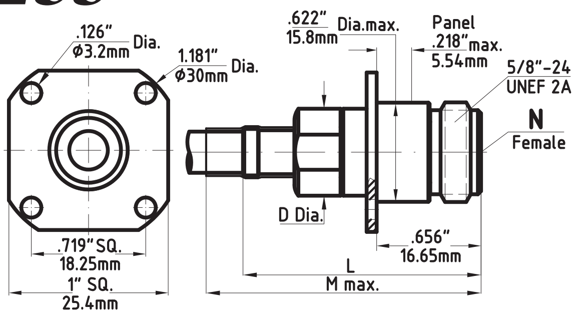
252



N-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
51	P190	11.5	31.8	57.3

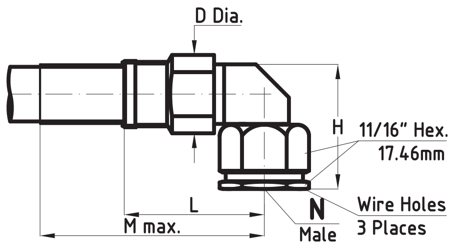
253



N-Female 4-Hole Flange Mount

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
65	P190	13.9	40.0	65.5

254

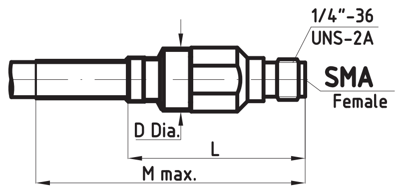


N-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	H in mm
55	P190	11.5	26.0	27.9

Connector Outline Drawings

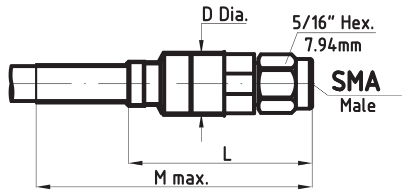
255



SMA-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
21	P190	9.5	34.9	60.4

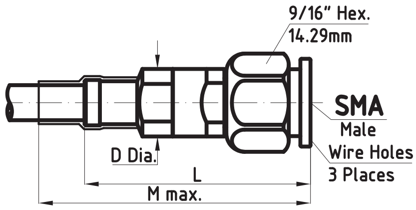
256



SMA-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
11	P190	9.5	37.0	62.5

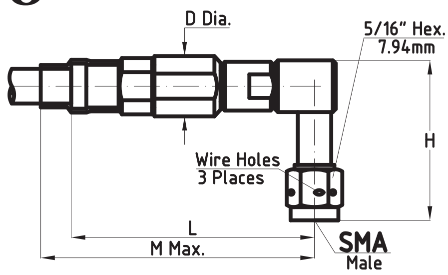
257



SMA-Male straight, Maxi Nut

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
MA	P190	10.5	28.7	54.2

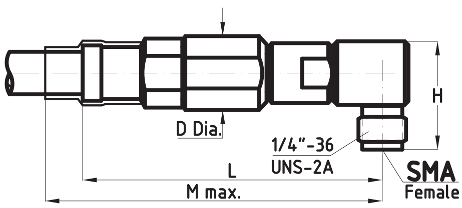
258



SMA- Male Long Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	H in mm
156	P190	9.2	35.0	18.2

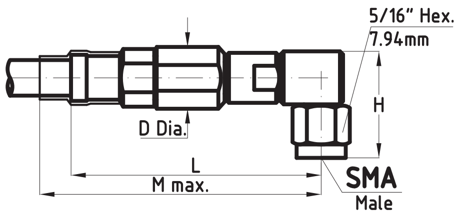
259



SMA-Female Regular Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	H in mm
18R	P190	9.2	35.0	10.2

260



SMA-Male Short Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	H in mm
152	P190	9.9	43.5	18.2

Q

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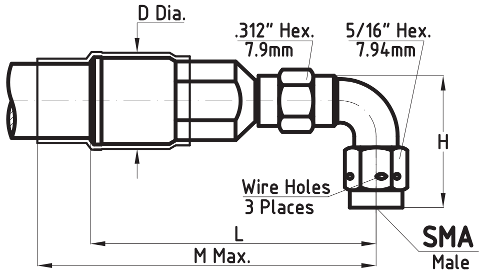
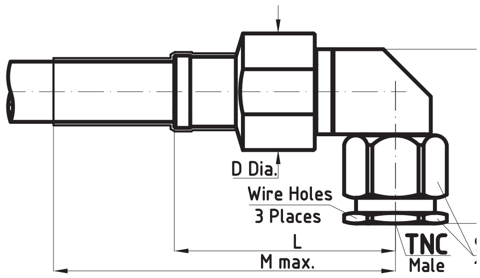
261



SMA-Male Radius Right Angle

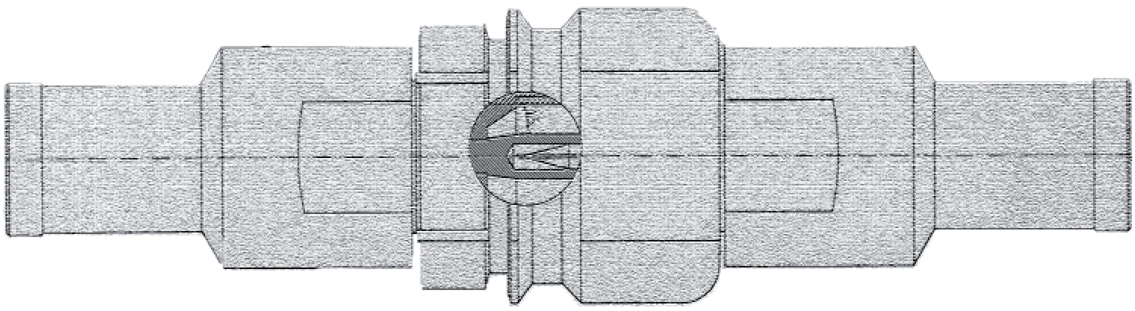
Connector Code	Cable Type	D Dia in mm	L in mm	H in mm
17	P190E	in Development		

262



TNC-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	H in mm
35	P190E	11.5	26.3	27.2



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You need technical assistance?

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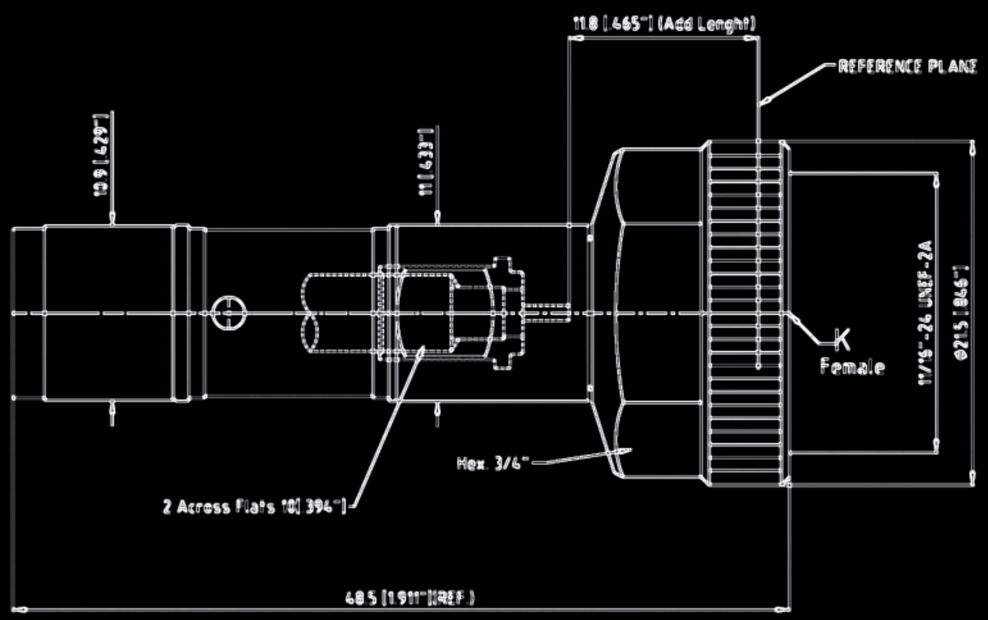
Q

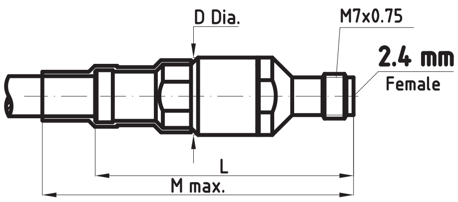
Connector Outline Drawings
for
Phase Stable Cable Assemblies



ANA - Cable	Connector																
	2.4 mm	2.92 mm	3.5 mm	7 mm	7/16	BMA	BNC	C	HN	N	SBX	SBY	SC	SMA	SMP	SPM	TNC
18	Page Q36	Page Q36 f.f.	Page Q37	Page Q38						Page Q38				Page Q38 f.f.			Page Q39
22 (= Type 18 armored)	Page Q36	Page Q36 f.f.	Page Q37	Page Q38						Page Q38				Page Q38 f.f.			Page Q39

Q

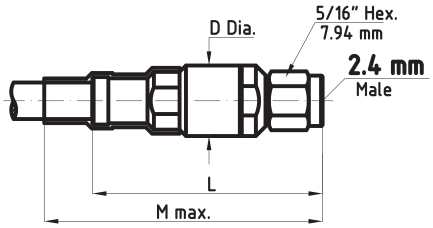
151



2.4mm-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
HF	18	12.5	34.5	74.0
	22	12.5	49.7	74.0

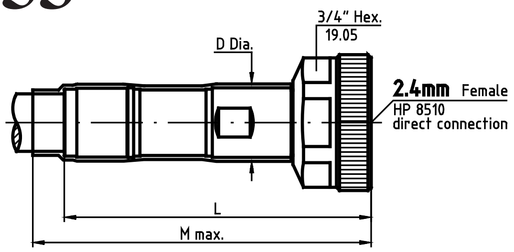
152



2.4mm-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
HM	18	12.5	34.3	74.0
	22	12.5	48.9	74.0

153

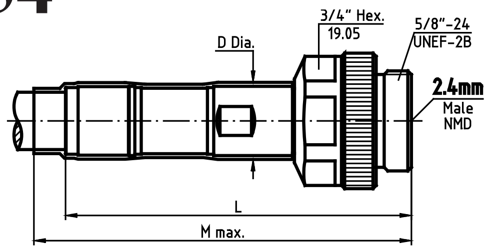


2.4mm-Female straight Direct HP Connection

The H2 connector developed at Spectrum, has larger than standard coupling threads for greater stability. The connector is used on test ports, test port adapters, and test port cables.

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
H2	18	12.5	34.5	74.0
	22	12.5	49.7	74.0

154

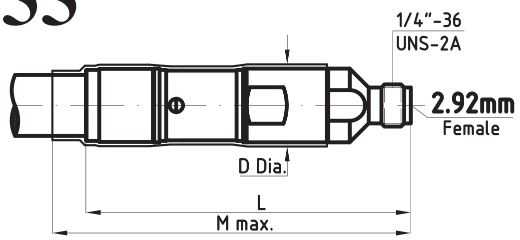


2.4mm-Male straight NMD

The H2M connector developed at Spectrum, has larger than standard coupling threads for greater stability. The connector is used on test ports, test port adapters, and test port cables.

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
H2M	18	12.5	34.3	74.0
	22	12.5	48.9	74.0

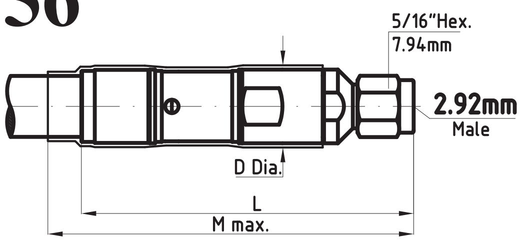
155



2.92mm-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
KF	18	12.5	33.3	75.0
	22	12.5	48.5	75.0

156

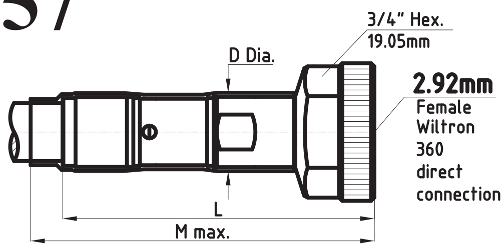


2.92mm-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
KM	18	12.5	34.4	75.0
	22	12.5	49.6	75.0

Connector Outline Drawings

157

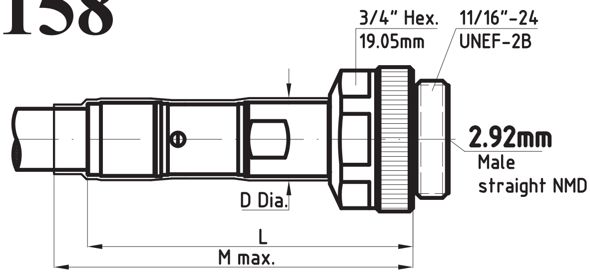


2.92mm-Female straight Direct Connection

The WI connector developed at Spectrum, has a larger than standard coupling threads for greater stability. The connector is used on test ports, test port adapters, and test port cables.

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
WI	18	12.5	33.3	7.5
	22	12.5	48.5	7.5

158

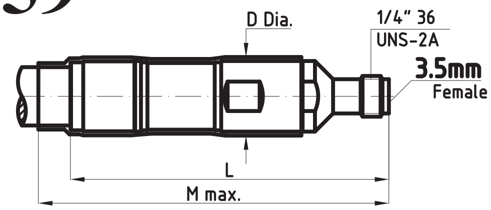


2.92mm-Male straight NMD

The WIM connector developed at Spectrum, has a larger than standard coupling threads for greater stability. The connector is used on test ports, test port adapters, and test port cables.

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
WIM	18	12.5	34.4	75.0
	22	12.5	49.6	75.0

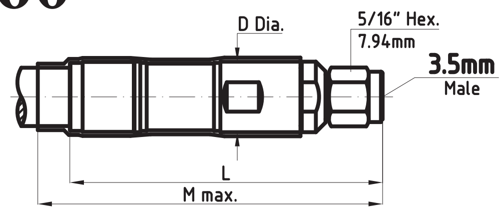
159



3.5mm-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
92	18	11.0	34.0	73.0
	22	12.5	48.3	75.0

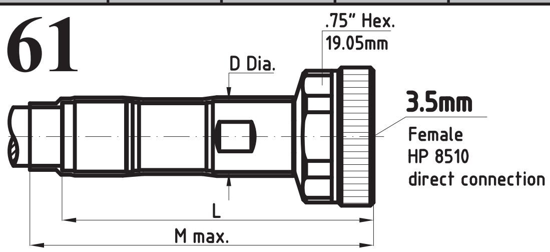
160



3.5mm-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
91	18	11.0	36.8	75.0
	22	12.5	52.5	75.0

161

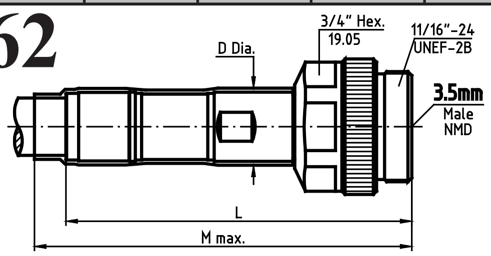


3.5mm-Female straight Direct HP Connection

The H3 connector developed at Spectrum, has a larger than standard coupling threads for greater stability. The connector is used on test ports, test port adapters, and test port cables.

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
H3	18	11.0	34.0	73.0
	22	12.5	48.3	75.0

162

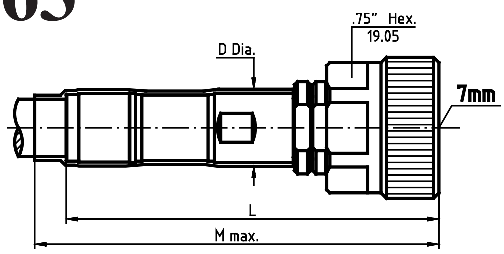


3.5mm-Male straight NMD

The H3M connector developed at Spectrum, has a larger than standard coupling threads for greater stability. The connector is used on test ports, test port adapters, and test port cables.

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
H3M	18	11.0	36.8	75.0
	22	12.5	52.5	75.0

163

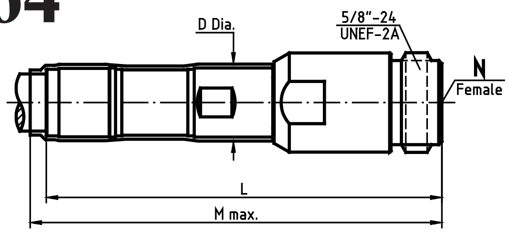


7mm-Connector straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
90	18	9.5	41.0	82.0
	22	12.5	56.7	82.0

The Center Conductor of the 7mm Connector is supplied with 4 slots. If you require 6 slots, Connector Code changes to: 96.

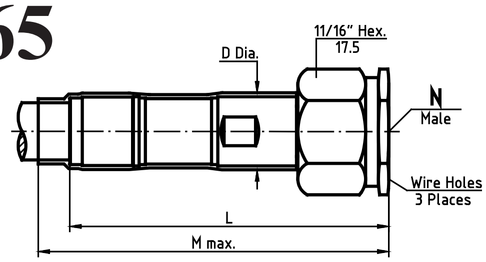
164



N-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
61	18	15.5	40.0	94.0
	22	15.5	59.1	94.0

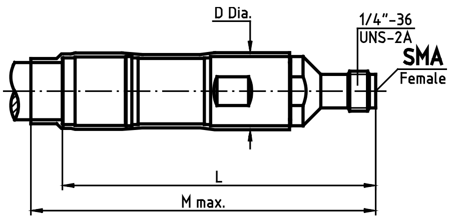
165



N-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
51	18	13.0	31.8	77.0
	22	12.5	50.9	77.0

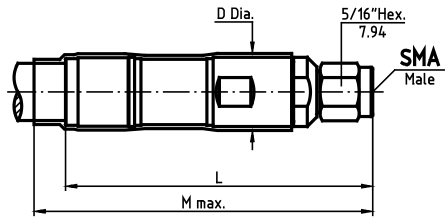
166



SMA-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
21	18	11.5	31.6	75.0
	22	11.0	45.3	70.3

167

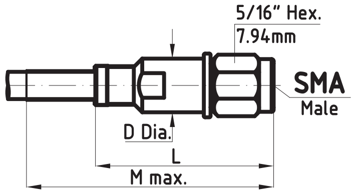


SMA-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
11	18	11.0	35.0	75.0
	22	11.0	48.7	73.7

Connector Outline Drawings

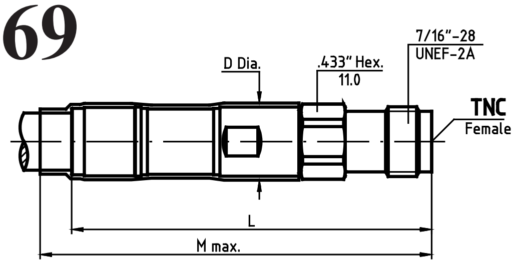
168



SMA-Male PUSH-ON, non-locking

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
SM	18	10.5	27.1	82.0
	22	in Development		

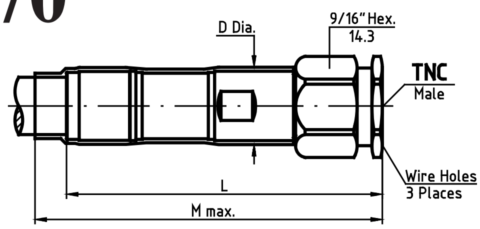
169



TNC-Female straight

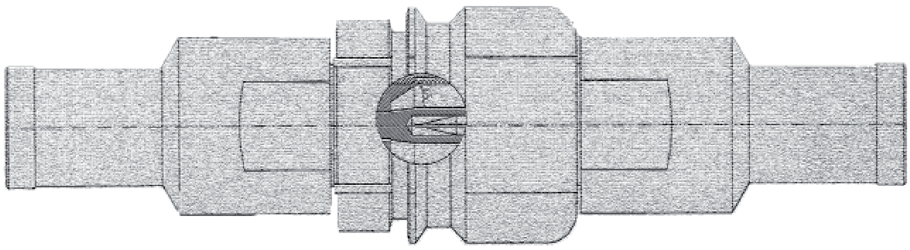
Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
41	18	11.0	34.3	80.0
	22	12.5	53.3	80.0

170



TNC-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
31	18	13.0	31.1	75.0
	22	12.5	50.1	75.0

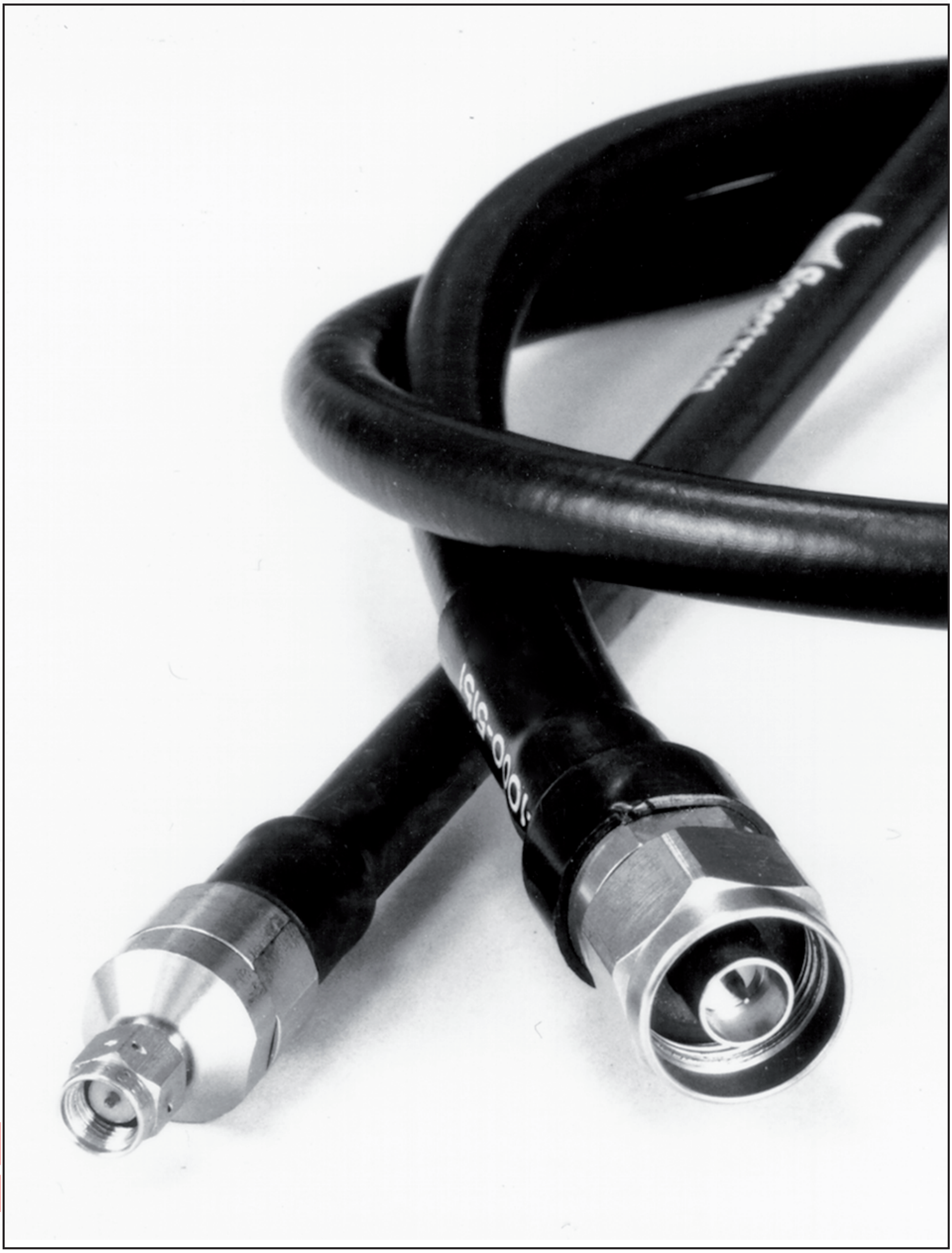


You need something different?
You need technical assistance?

You will find immediate support from our engineering and marketing staff. Please do not hesitate to contact us.

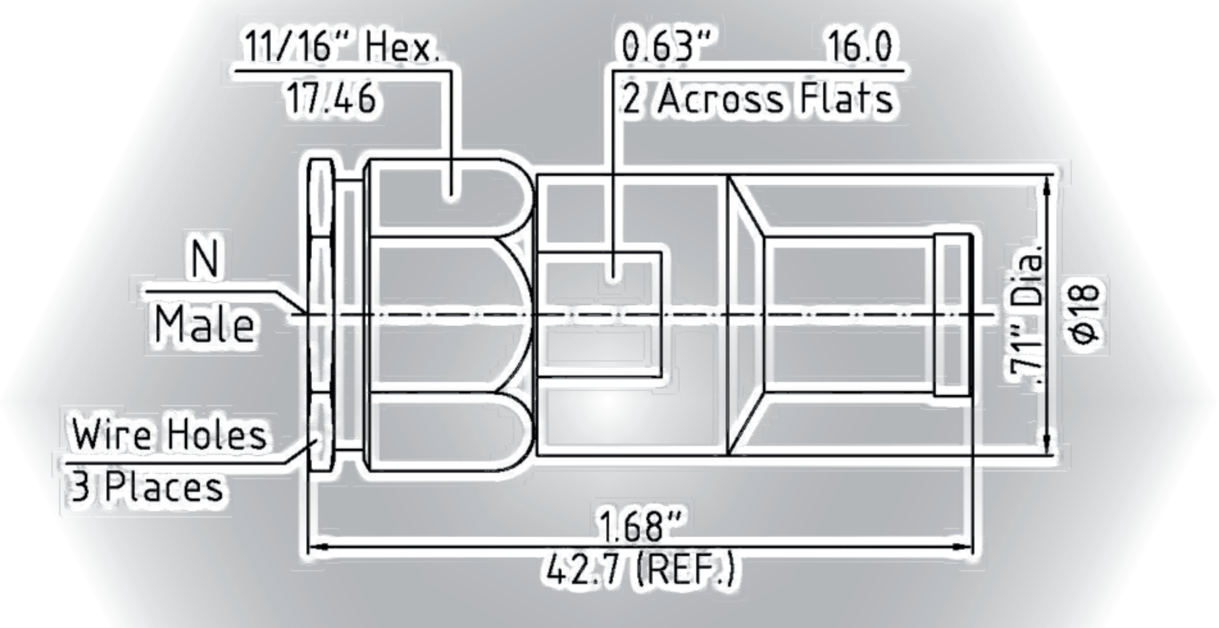
Q

Spectrum Elektrotechnik GmbH



Q

Connector Outline Drawings
for
Commercial Cable Assemblies



RG Cable	Cable Types	Connector																
		1.4/ 4.4	1.8/ 5.6	2.92 mm	7 mm	7/16	BMA	BNC	C	HN	N	SBX	SBY	SC	SMA	SMP	SPM	TNC
RG-58C /U	58							Page Q44							Page Q48 f.f.			Page Q51
RG-142B/U	42		Page Q42					Page Q44			Page Q45 f.f.				Page Q48 f.f.			Page Q51
RG-174/A/U	74																	
RG-214 /U	21				Page Q43	Page Q43				Page Q44	Page Q45 f.f.			Page Q47	Page Q48			
RG-223 /U	23										Page Q45							Page Q51
RD-316 /U	32		Page Q42				Page Q43				Page Q45				Page Q48 f.f.			Page Q51
RG-316 /U	31		Page Q42				Page Q43				Page Q45				Page Q48 f.f.			Page Q51
RG-400 /U	40		Page Q42					Page Q44			Page Q45 f.f.				Page Q48 f.f.			Page Q51

Q

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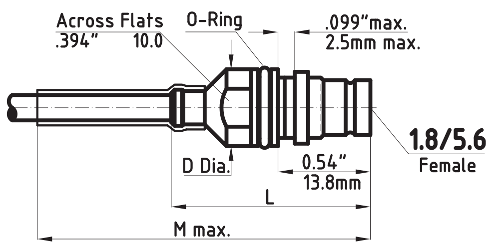
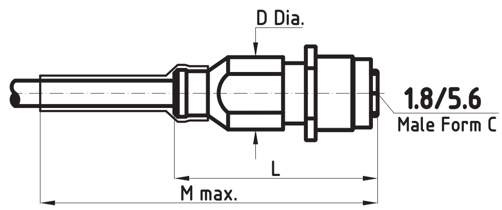
102



1.8/5.6-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
04	RG-142B/U	10.8	30.0	80.0
	RD-316 /U	10.8	30.0	60.0
	RG-316 /U	10.8	30.0	60.0
	RG-400 /U	10.8	30.0	80.0

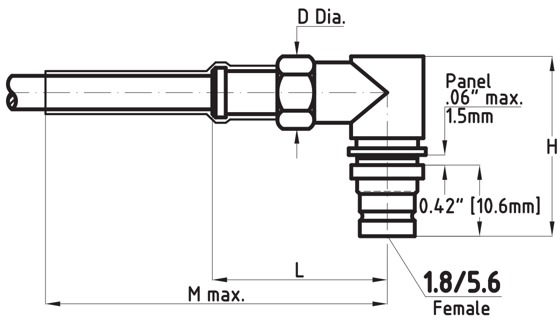
103



1.8/5.6-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
07	RG-142B/U	10.8	30.0	80.0
	RD-316 /U	10.8	30.0	60.0
	RG-316 /U	10.8	30.0	60.0
	RG-400 /U	10.8	30.0	80.0

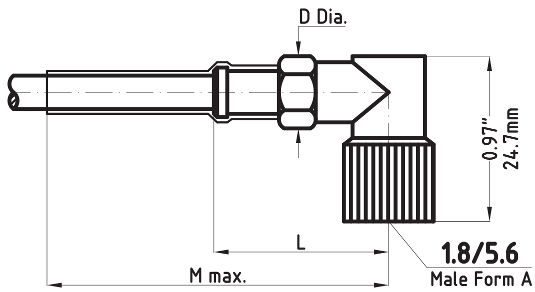
104



1.8/5.6-Female Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
06	RD-316/U	11.5	26.1	46.0
	RG-316/U	11.5	26.1	46.0

105



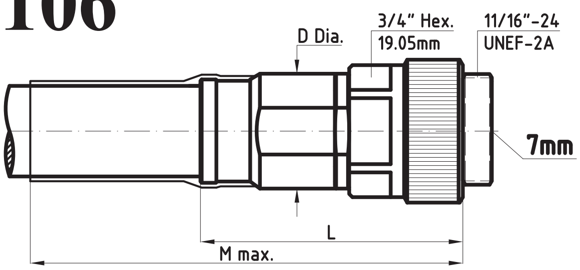
1.8/5.6-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
05	RD-316/U	11.5	26.1	46.0
	RG-316/U	11.5	26.1	46.0

Q

Connector Outline Drawings

106

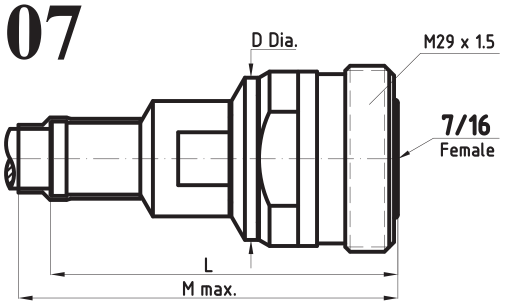


7mm-Connector straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
90	RG-214/U	18.0	46.6	90.0

The Center Conductor of the 7mm Connector is supplied with 4 slots. If you require 6 slots, Connector Code changes to: 96.

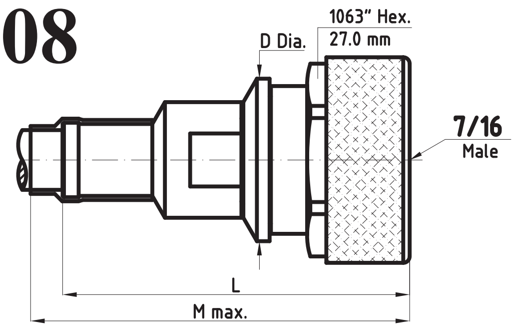
107



7/16-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
76	RG-214/U	24.0	54.2	100.0

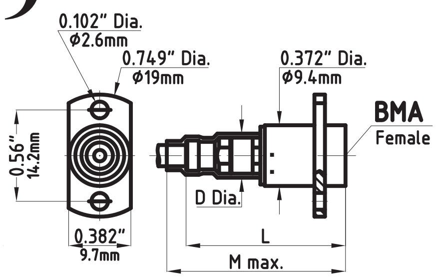
108



7/16-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
75	RG-214/U	24.0	55.1	100.0

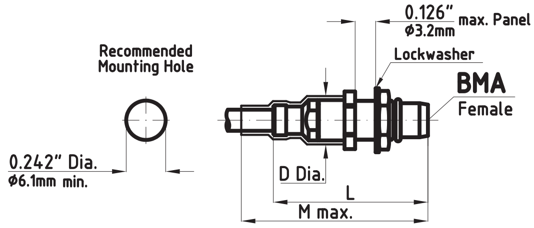
109



BMA-Female 2-Hole Flange Mount

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
BF	RD-316/U	7.0	27.4	78.0
	RG-316/U	7.0	27.4	78.0

110



BMA-Male Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
BM	RD-316/U	8.0	24.5	75.0
	RG-316/U	8.0	24.5	75.0

Q

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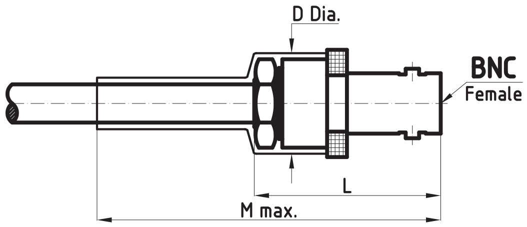
Commercial Cable Assemblies

Spectrum Elektrotechnik GmbH

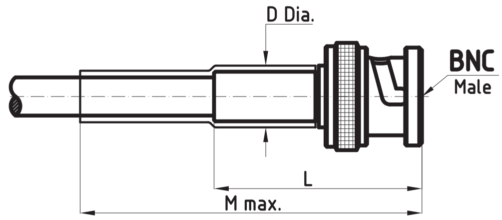
111



BNC-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
81	RG-58C /U	13.0	~ 28.5	80.0
	RG-142B/U	13.0	~ 28.5	80.0
	RG-400 /U	13.0	~ 28.5	80.0

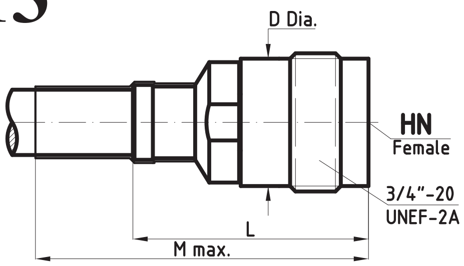
112



BNC-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
71	RG-58C /U	8.0	~ 31	75.0
	RG-142B/U	8.0	~ 31	75.0
	RG-400 /U	8.0	~ 31	75.0

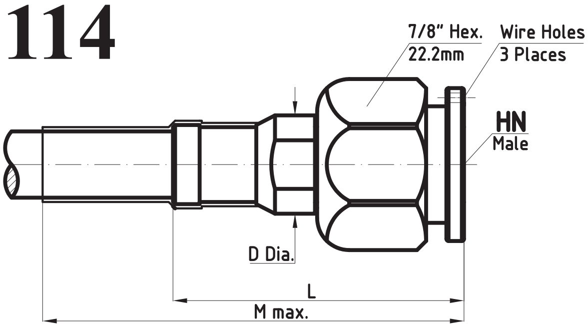
113



HN-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
68	RG-214/U	in Development		

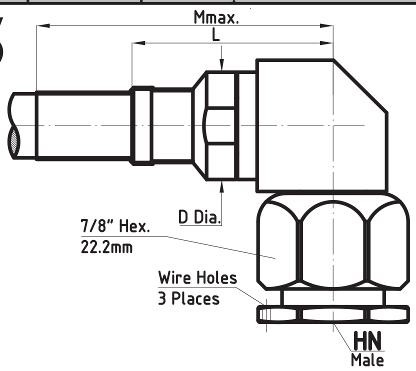
114



HN-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
69	RG-214/U	in Development		

115



Q

HN-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
67	RG-214/U	18.0	42.2	86.0

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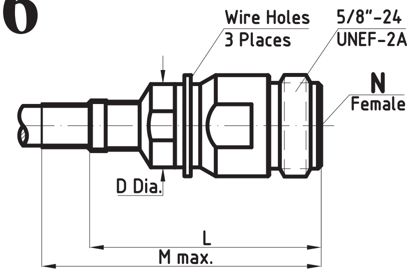
Connector Outline Drawings

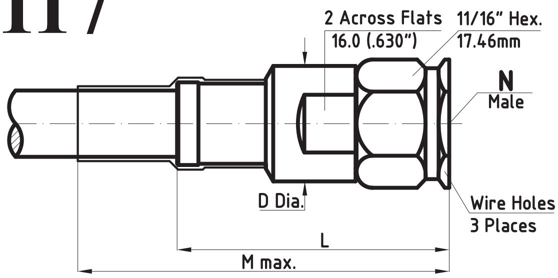
116



N-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
61	RG-142B/U	12.0	42.0	67.0
	RG-400 /U	12.0	42.0	67.0

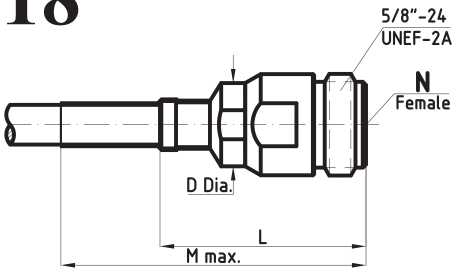
117



N-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
51	RG-142B/U	10.0	31.8	57.0
	RG-214 /U	16.0	41.7	82.0
	RG-223 /U	10.0	32.3	58.0
	RD-316 /U	10.0	29.6	59.0
	RG-316 /U	10.0	29.6	59.0
	RG-400 /U	10.0	31.8	57.0

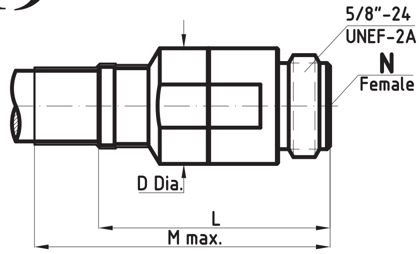
118



N-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
61	RG-142B/U	12.0	42.0	67.0
	RG-400 /U	12.0	42.0	67.0

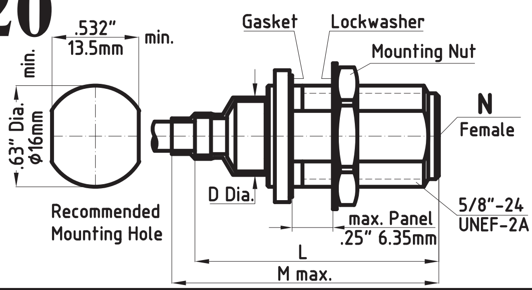
119



N-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
61	RG-214/U	18.0	43.1	87.0

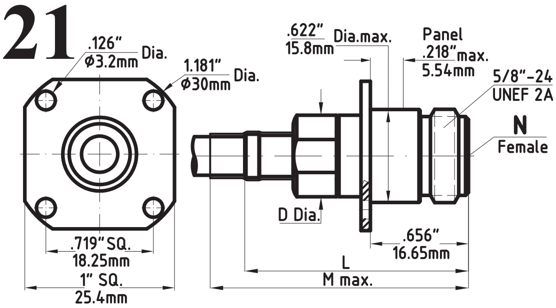
120



N-Female Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
63	RG-142B/U	10.0	44.0	69.2
	RD-316 /U	10.0	41.9	71.0
	RG-316 /U	10.0	41.9	71.0
	RG-400 /U	10.0	44.0	69.2

121



N-Female 4-Hole Flange Mount

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
65	RG-142B/U	12.0	40.0	85.0
	RG-400 /U	12.0	40.0	85.0

Q

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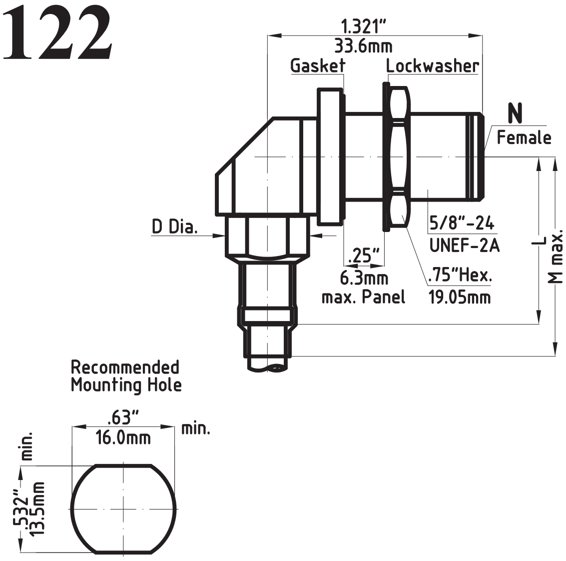
Connector Outline Drawings

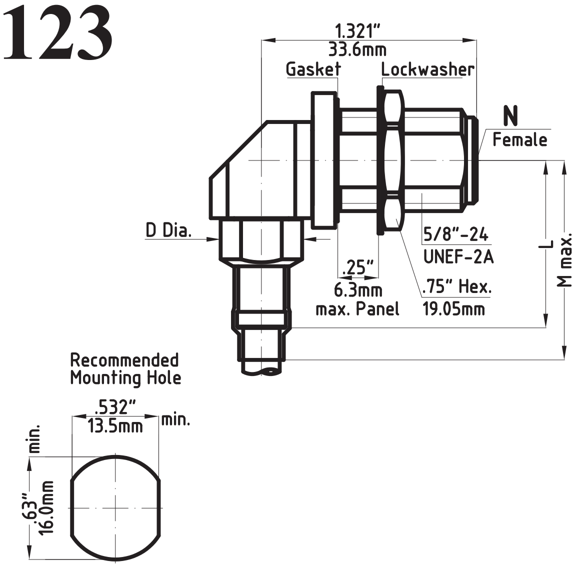
Commercial
Cable Assemblies

Spectrum Elektrotechnik GmbH

122



123



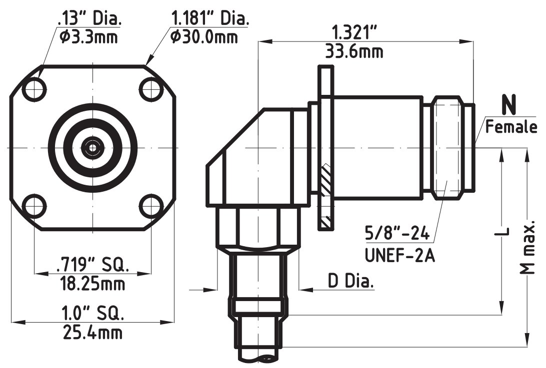
N-Female Right Angle Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
5A	RG-142B/U	11.0	26.2	52.0
	RG-214 /U	18.0	37.5	80.0
	RG-400 /U	11.0	26.2	52.0

N-Female Right Angle Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
5B	RG-142B/U	11.0	26.2	52.0
	RG-214 /U	18.0	37.5	80.0
	RG-400 /U	11.0	26.2	52.0

124



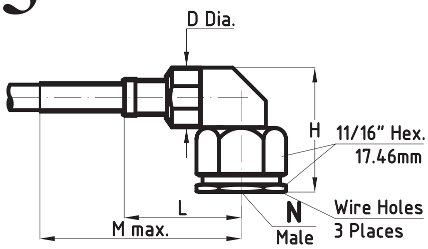
N-Female Right Angle 4-Hole Flange

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
5C	RG-142B/U	11.0	26.2	52.0
	RG-214 /U	18.0	37.5	80.0
	RG-400 /U	11.0	26.2	52.0

Q

Connector Outline Drawings

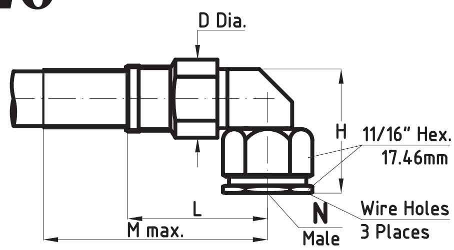
125



N-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
55	RG-142B/U	11.0	26.2	52.0
	RG-400 /U	11.0	26.2	52.0

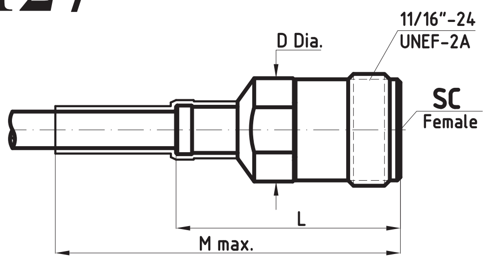
126



N-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
55	RG-214/U	18.0	37.5	80.0

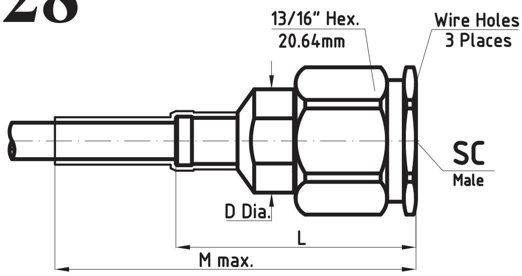
127



SC-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
79	RG-214/U	in Development		

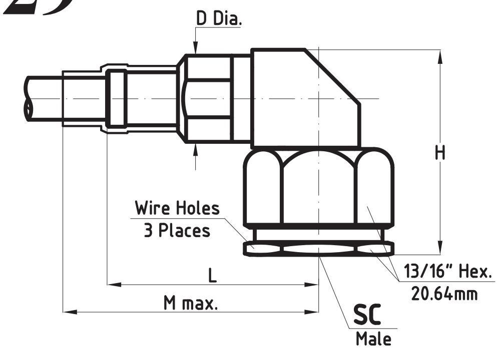
128



SC-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
80	RG-214/U	18.0	47.2	90.0

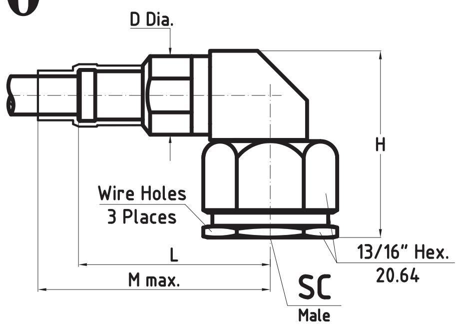
129



SC-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
77	RG-214/U	18.0	42.2	86.0

130



SC-Male Right Angle High Power

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
77H	in Development			

Q

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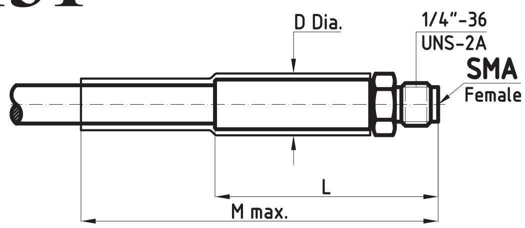
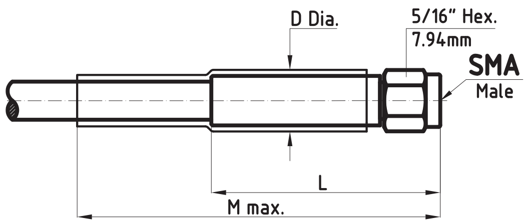
131



132



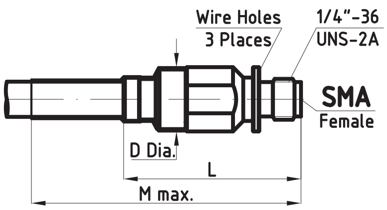
SMA-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
21	RD-316/U	5.7	18.8	28.5
	RG-316/U	5.6	18.8	28.5

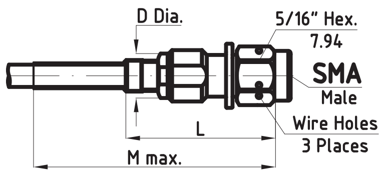
SMA-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
11	RD-316/U	5.7	21.1	30.5
	RG-316/U	5.6	21.1	30.5

133



134



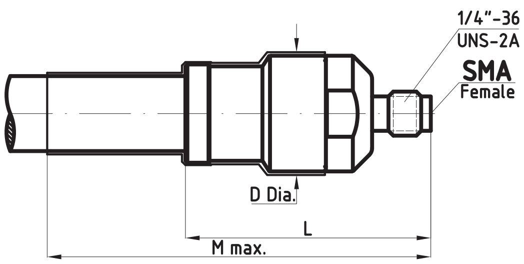
SMA-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
21	RG-142B/U	11.0	31.6	74.0
	RG-400/ U	11.0	31.6	74.0

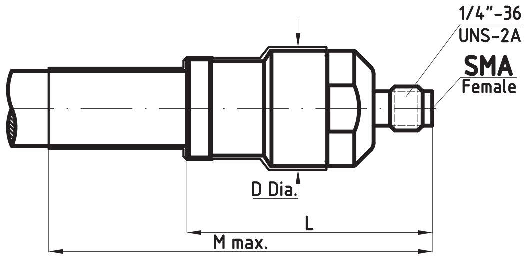
SMA-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
11	RG-142B/U	10.5	35.0	74.0
	RG-400/ U	10.5	35.0	74.0

135



136



Q

SMA-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
21	RG-214/U	18.0	37.4	80.0

SMA-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
11	RG-214/U	18.0	42.3	85.0

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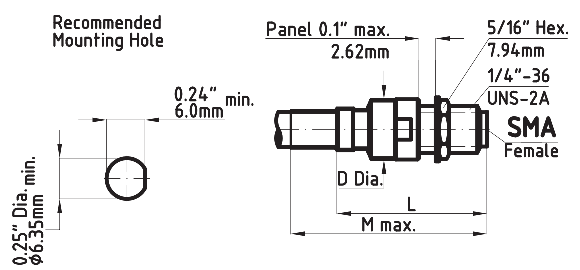
Connector Outline Drawings

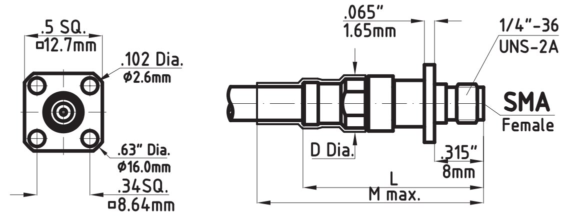
137



SMA-Female Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
23	RD-316 /U	11.0	31.4	72.0
	RG-142B/U	11.0	31.4	72.0
	RG-400 /U	11.0	31.4	72.0

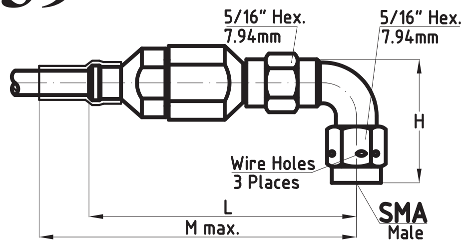
138



SMA-Female 4-Hole Flange Mount

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
25	RG-142B/U	11.5	29.5	75.0
	RG-400 /U	11.5	29.5	75.0

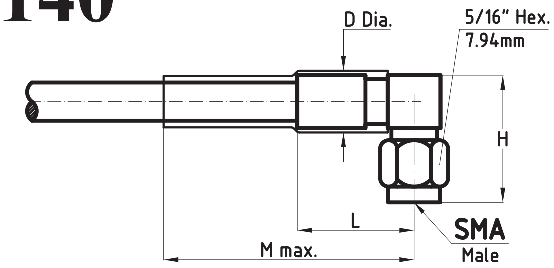
139



SMA-Male Radius Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
17	RG-142B/U	11.5	41.2	70.0
	RG-400/ U	11.5	41.2	70.0

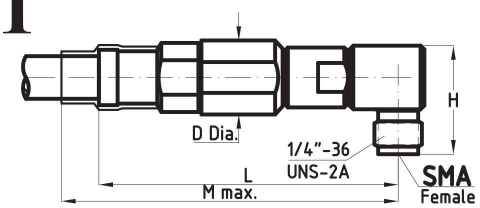
140



SMA-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
15	RG-142B/U	7.8	14.6	40.0
	RG-400/ U	7.8	14.6	40.0

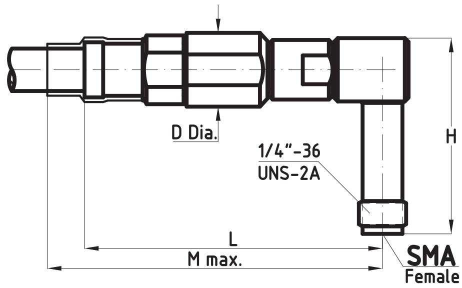
141



SMA-Female Regular Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
18R	RG-58C /U	11.5	41.2	70.0
	RG-142B/U	11.5	41.2	70.0
	RD-316 /U	in Development		
	RG-316 /U	in Development		
	RG-400 /U	11.5	41.2	70.0

142



SMA-Female Long Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
18L	RG-58C /U	11.5	41.2	70.0
	RG-142B/U	11.5	41.2	70.0
	RD-316 /U	in Development		
	RG-316 /U	in Development		
	RG-400 /U	11.5	41.2	70.0

Q

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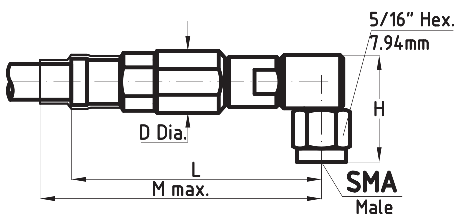
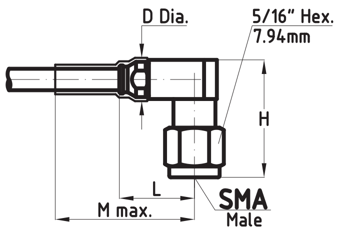
143



SMA-Male Short Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
152	RG-58C /U	11.5	41.2	70.0
	RG-142B/U	11.5	41.2	70.0
	RD-316 /U	in Development		
	RG-316 /U	in Development		
	RG-400 /U	11.5	41.2	70.0

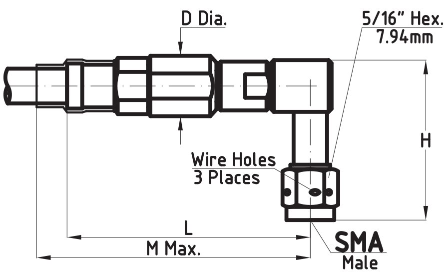
144



SMA-Male Regular Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
154	RG-58C /U	11.5	41.2	70.0
	RG-142B/U	11.5	41.2	70.0
	RD-316 /U	in Development		
	RG-316 /U	in Development		
	RG-400 /U	11.5	41.2	70.0

145



SMA- Male Long Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
156	RG-58C /U	11.5	41.2	70.0
	RG-142B/U	11.5	41.2	70.0
	RD-316 /U	in Development		
	RG-316 /U	in Development		
	RG-400 /U	11.5	41.2	70.0

Q

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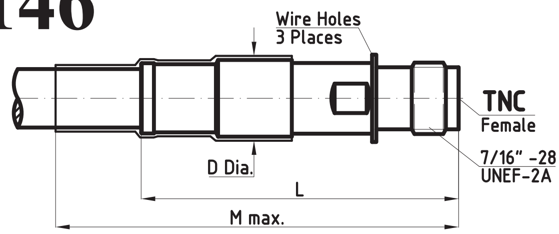
Connector Outline Drawings

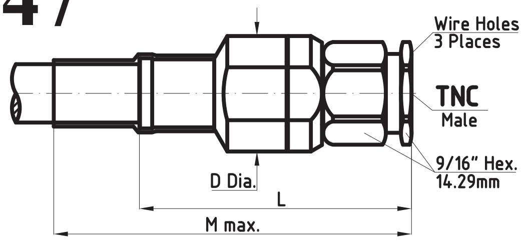
146



TNC-Female straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
41	RG-58C /U	8.0	33.3	80.5
	RG-142B/U	8.0	33.3	80.5
	RG-223 /U	8.0	34.8	82.0
	RD-316 /U	8.0	30.8	63.0
	RG-316 /U	8.0	30.8	63.0
	RG-400 /U	8.0	33.3	80.5

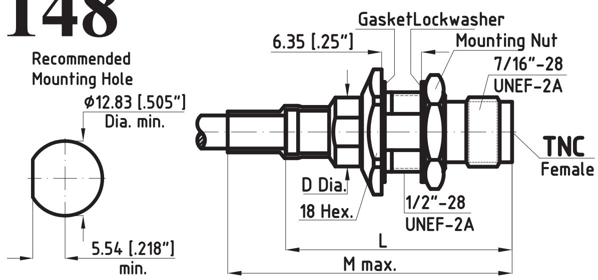
147



TNC-Male straight

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
31	RG-58C /U	10.0	30.3	76.0
	RG-142B/U	10.0	30.3	76.0
	RD-316 /U	10.0	29.1	65.0
	RG-316 /U	10.0	29.1	65.0
	RG-400 /U	10.0	30.3	76.0

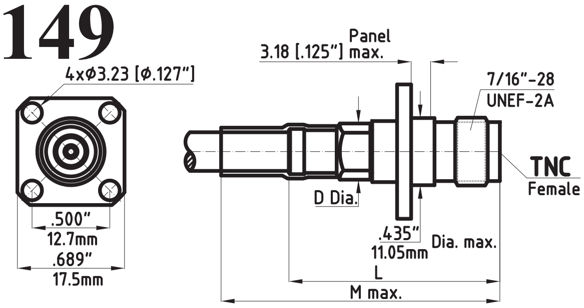
148



TNC-Female Bulkhead Feedthrough

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
43	RG-142B/U	8.0	41.4	73.0
	RG-223 /U	8.0	41.4	73.0
	RD-316 /U	8.0	30.8	63.0
	RG-316 /U	8.0	30.8	63.0
	RG-400 /U	8.0	41.4	73.0

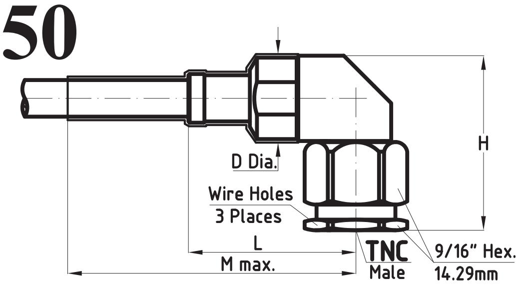
149



TNC-Female 4-Hole Flange Mount

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
45	RG-142B/U	8.0	40.5	80.0
	RG-400 /U	8.0	40.5	80.0

150



TNC-Male Right Angle

Connector Code	Cable Type	D Dia in mm	L in mm	M in mm
35	RG-142B/U	8.0	41.4	73.0
	RG-223 /U	8.0	41.4	73.0
	RG-400 /U	8.0	41.4	73.0

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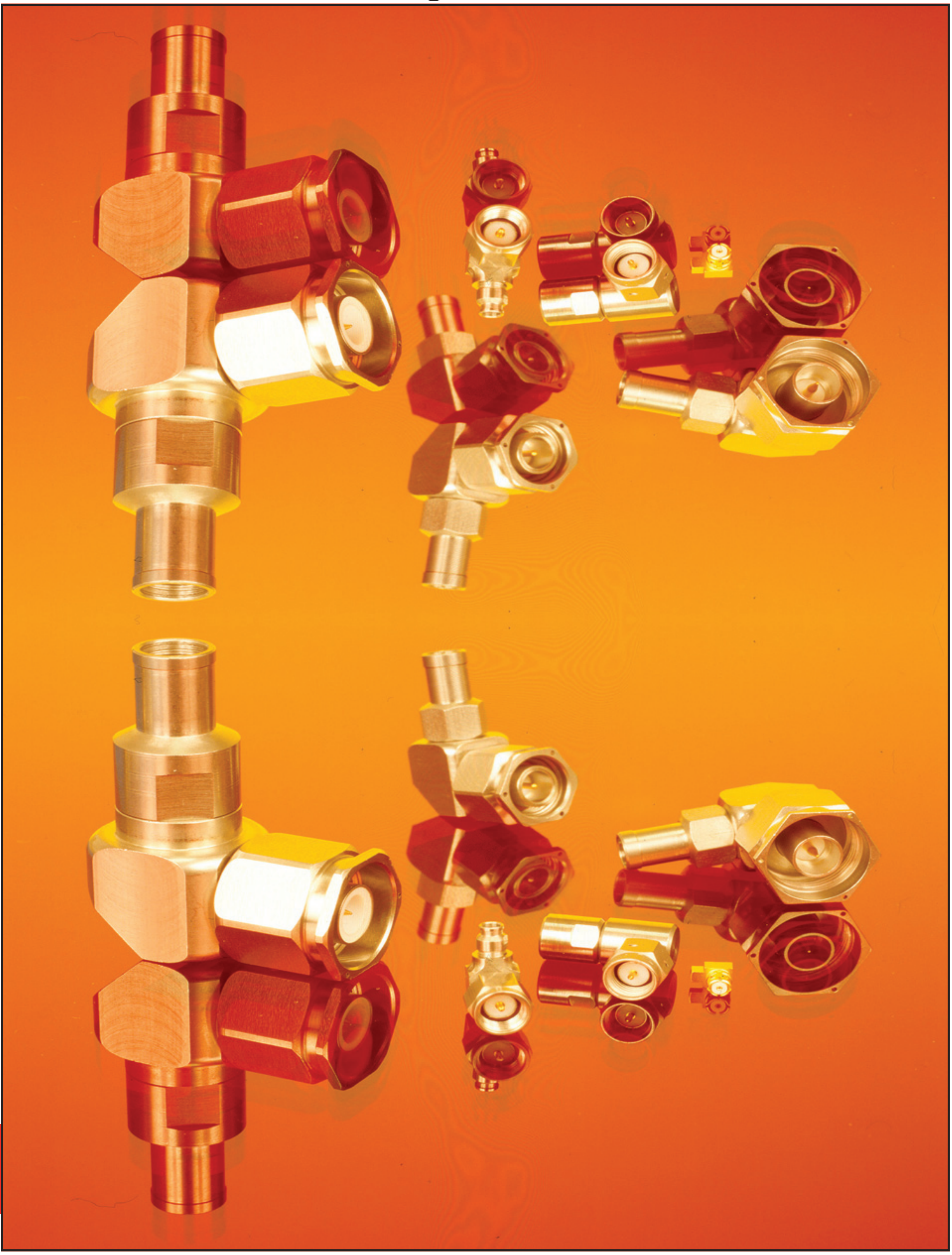

Q

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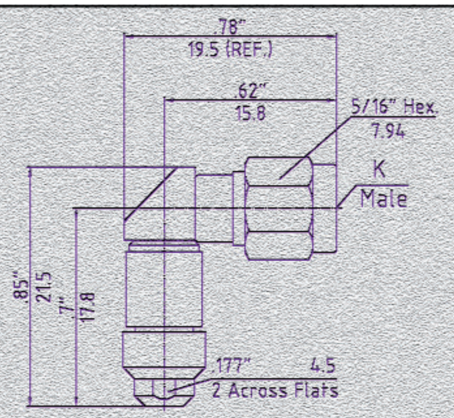
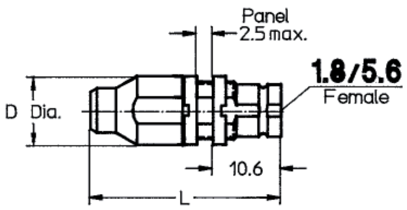
Connector Outline Drawings for Semi-Rigid Cable Assemblies



Semi-Rigid Cable	Cable Types	Connector																	
		1.4/ 4.4	1.8/ 5.6	2.4 mm	2.92 mm	3.5 mm	7 mm	7/16	BMA	BNC	HN	N	SBX	SBY	SC	SMA	SMP	SPM	TNC
421-047	46			Page Q54 f.f.															
421-086	89		Page Q54	Page Q54 f.f.	Page Q55 f.f.	Page Q56	Page Q57					Page Q60 f.f.				Page Q65 f.f.		Page Q68 f.f.	Page Q69 f.f.
421-086	90																		
421-202	20							Page Q58			Page Q59	Page Q60 f.f.			Page Q63 f.f.				Page Q71
421-227	27										Page Q59	Page Q60			Page Q63 f.f.				Page Q69 f.f.
421-250	50										Page Q59	Page Q60 f.f.			Page Q63	Page Q64			
421-252	52						Page Q57	Page Q58			Page Q59	Page Q60 f.f.			Page Q63 f.f.	Page Q64 f.f.			Page Q69 f.f.
421-281	81										Page Q59	Page Q60 f.f.			Page Q63	Page Q64			
421-298	98					Page Q57						Page Q60 f.f.				Page Q65 f.f.			Page Q69 f.f.
421-307	05				Page Q55							Page Q60				Page Q67			Page Q69
421-325	-											Page Q62							
421-336	36										Page Q59	Page Q60 f.f.			Page Q63 f.f.	Page Q64 f.f.			Page Q69 f.f.
421-669	69		Page Q54	Page Q55	Page Q55	Page Q57	Page Q57	Page Q58			Page Q59	Page Q60 f.f.				Page Q65 f.f.		Page Q68 f.f.	Page Q69 f.f.
422-121-3	150						Page Q57	Page Q58				Page Q60			Page Q63 f.f.	Page Q64 f.f.			Page Q69 f.f.
422-600-3	166				Page Q55		Page Q57					Page Q60 f.f.				Page Q65 f.f.		Page Q68 f.f.	Page Q69 f.f.
422-800-3	167						Page Q57	Page Q58				Page Q60 f.f.				Page Q65 f.f.		Page Q68 f.f.	Page Q69 f.f.
501-19	67						Page Q57					Page Q60 f.f.				Page Q65 f.f.			Page Q69 f.f.
502-13	66						Page Q57					Page Q60 f.f.				Page Q65 f.f.			Page Q69 f.f.

Q

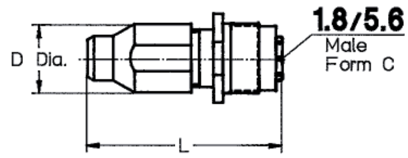
171



1.8/5.6-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
04	DIA. 0.141" (Type 69)	421-669	in Development	

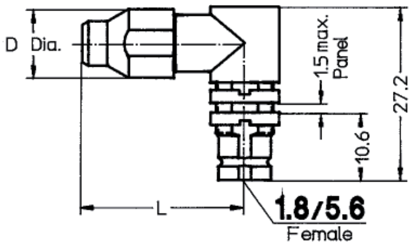
172



1.8/5.6-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
07	DIA. 0.086" (Type 89)	421-086	in Development	
	DIA. 0.141" (Type 69)	421-669	in Development	

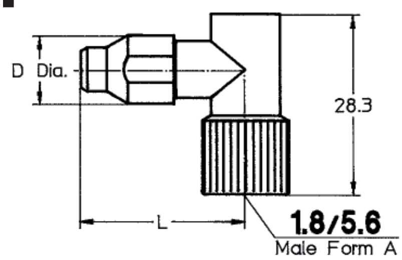
173



1.8/5.6-Female Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
06	DIA. 0.086" (Type 89)	421-086	in Development	
	DIA. 0.141" (Type 69)	421-669	in Development	

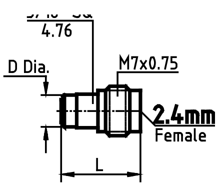
174



1.8/5.6-Male Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
05	DIA. 0.086" (Type 89)	421-086	in Development	
	DIA. 0.141" (Type 69)	421-669	in Development	

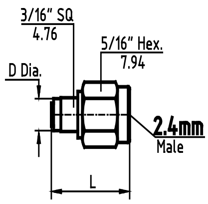
175



2.4mm-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
HF	DIA. 0.047" (Type 46)	421-047	4.5	11.2

176



2.4mm-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
HM	DIA. 0.086" (Type 89)	421-086	in Development	

Q

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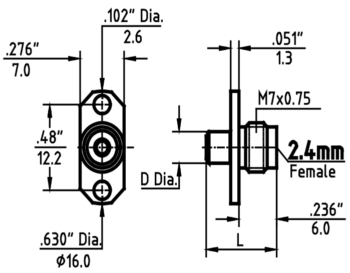
Connector Outline Drawings

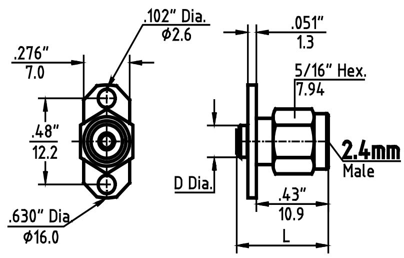
177



2.4mm-Female 2-Hole Flange Mount

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
04	DIA. 0.047" (Type 46)	421-047	4.5	11.2

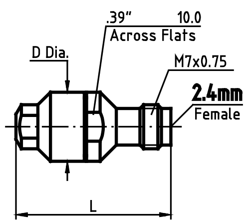
178



2.4mm-Male 2-Hole Flange Mount

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
07	DIA. 0.047" (Type 46)	421-047	4.5	13.9

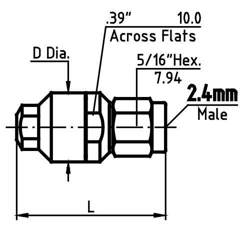
179



2.4mm-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
HF	DIA. 0.086" (Type 89)	421-086	11.0	24.5
	DIA. 0.141" (Type 69)	421-669	11.0	23.9

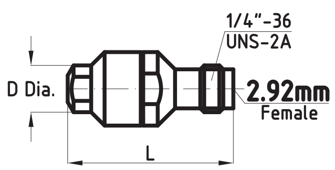
180



2.4mm-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
HM	DIA. 0.086" (Type 89)	421-086	11.0	23.7
	DIA. 0.141" (Type 69)	421-669	11.0	23.1

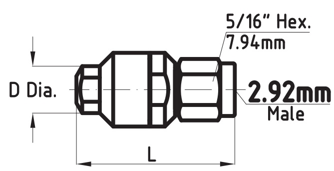
181



2.92mm-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
KF	0.086" Low Density PTFE	421-307	11.0	23.5
	DIA. 0.086" (Type 89)	421-086	7.6	21.5
	DIA. 0.141" (Type 69)	421-669	11.0	23.6

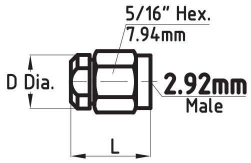
182



2.92mm-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
KM	0.086" Low Density PTFE	421-307	11.0	24.5
	DIA. 0.086" (Type 89)	421-086	7.6	22.5
	DIA. 0.087" Handy Form II	422-600-3	11.0	24.5
	DIA. 0.141" (Type 69)	421-669	11.0	23.8

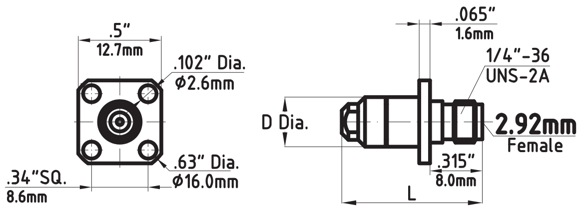
183



2.92mm-Male Short straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
KMS	DIA. 0.086" (Type 89)	421-086	8.0	13.9

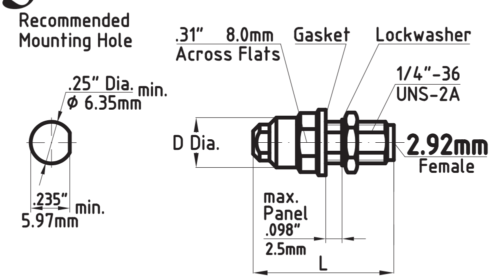
184



2.92mm-Female 4-Hole Flange Mount

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
KF4	DIA. 0.086" (Type 89)	421-086	7.6	21.5

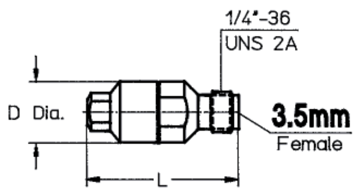
185



2.92mm-Female Bulkhead Feedthrough

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
KFB	DIA. 0.086" (Type 89)	421-086	7.6	21.5

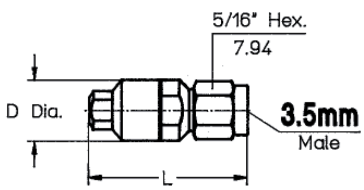
186



3.5mm-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
92	DIA. 0.086" (Type 89)	421-086	7.6	21.5

187



3.5mm-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
91	DIA. 0.086" (Type 89)	421-086	7.6	21.5

Q

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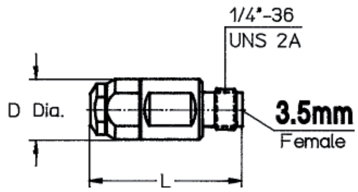
Connector Outline Drawings

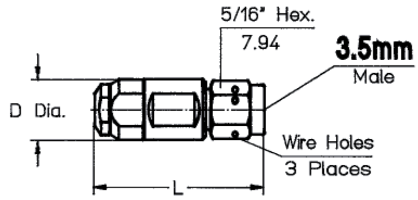
188



3.5mm-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
92	DIA. 0.141" (Type 69)	421-669	9.5	23.7
	0.141" Low Density PTFE	421-298	9.5	23.7

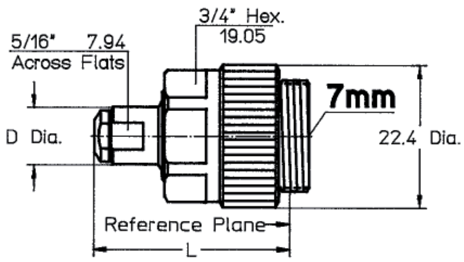
189



3.5mm-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
91	DIA. 0.141" (Type 69)	421-669	9.5	26.4
	0.141" Low Density PTFE	421-298	9.5	26.4

190

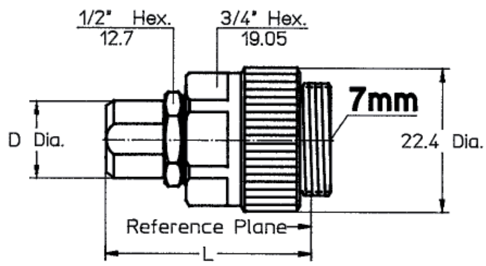


7mm-Connector straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
90	DIA. 0.086" Handy Form I	502-13	9.0	30.6
	DIA. 0.086" (Type 89)	421-086	9.0	30.6
	DIA. 0.087" Handy Form II	422-600-3	9.0	30.6
	DIA. 0.141" (Type 69)	421-669	9.0	30.6
	DIA. 0.141" Handy Form II	422-800-3	9.0	30.6
	DIA. 0.141" Handy Form I	501-19	9.0	30.6

The Center Conductor of the 7mm Connector is supplied with 4 slots. If you require 6 slots, Connector Code changes to: 96.

191



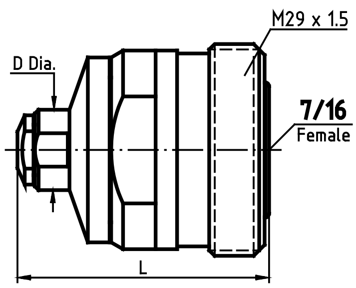
7mm-Connector straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
90	DIA. 0.250" (Type 52)	421-252	12.0	32.1
	DIA. 0.250" Handy Form II	422-121-3	12.0	32.1

The Center Conductor of the 7mm Connector is supplied with 4 slots. If you require 6 slots, Connector Code changes to: 96.

Q

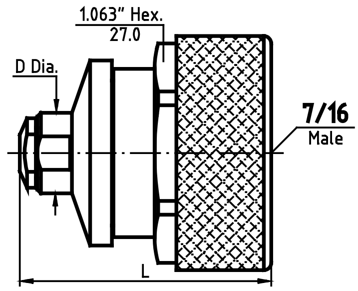
192



7/16-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
76	DIA. 0.141" (Type 69)	421-669	11.0	34.5
	DIA. 0.141" Handy Form II	422-800-3	11.0	34.5
	DIA. 0.250" (Type 52)	421-252	in Development	
	DIA. 0.250" Handy Form II	422-121-3	in Development	
	0.495" Low Density PTFE	421-202	in Development	

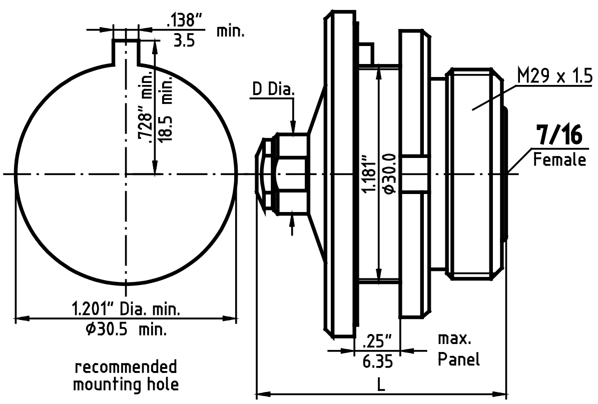
193



7/16-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
75	DIA. 0.141" (Type 69)	421-669	11.0	35.4
	DIA. 0.141" Handy Form II	422-800-3	11.0	35.4
	DIA. 0.250" (Type 52)	421-252	in Development	
	DIA. 0.250" Handy Form II	422-121-3	in Development	
	0.495" Low Density PTFE	421-202	in Development	

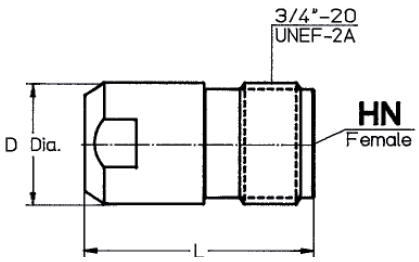
194



7/16-Female Bulkhead Feedthrough Jack

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
753	DIA. 0.141" (Type 69)	421-669	11.0	34.5
	DIA. 0.141" Handy Form II	422-800-3	11.0	34.5
	DIA. 0.250" (Type 52)	421-252	in Development	
	DIA. 0.250" Handy Form II	422-121-3	in Development	
	0.495" Low Density PTFE	421-202	in Development	

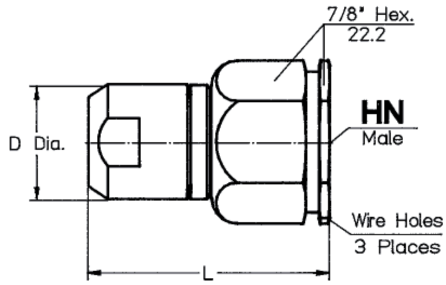
195



HN-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
68	DIA. 0.250" (Type 52)	421-252	in Development	
	0.250" Low Density PTFE	421-336	in Development	

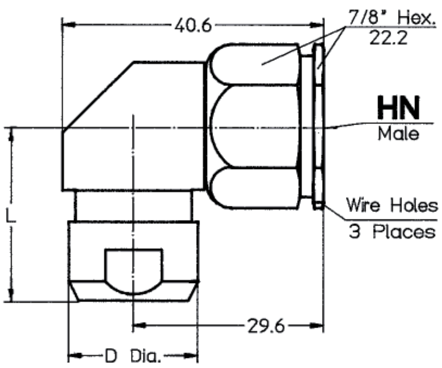
196



HN-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
69	DIA. 0.250" (Type 50)	421-669	18.0	45.0
	DIA. 0.250" (Type 52)	421-252	18.0	44.8
	0.250" Low Density PTFE	421-281	18.0	45.0
	0.250" Low Density PTFE	421-336	18.0	44.8
	0.375" Low Density PTFE	421-227	18.0	38.6
	0.495" Low Density PTFE	421-202	21.0	38.6

197

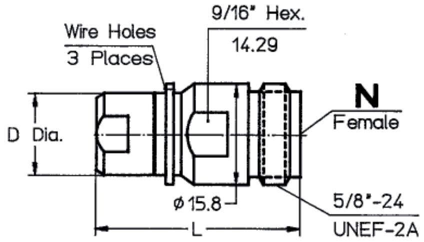


HN-Male Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
67	DIA. 0.250" (Type 52)	421-252	in Development	
	0.250" Low Density PTFE	421-336	in Development	
	0.375" Low Density PTFE	421-227	in Development	
	0.495" Low Density PTFE	421-202	21.0	34.8

Q

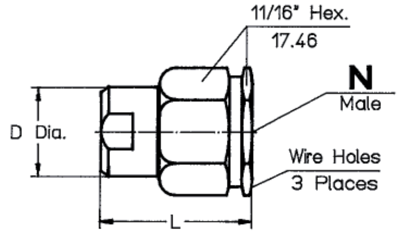
198



N-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
61	DIA. 0.141" (Type 69)	421-669	11.0	37.5
	0.141" Low Density PTFE	421-298	11.0	37.5
	DIA. 0.141" Handy FormII	422-800-3	11.0	37.5
	DIA. 0.141" Handy FormI	501-19	11.0	37.5
	DIA. 0.250" (Type 52)	421-252	14.0	31.8
	0.250" Low Density PTFE	421-336	14.0	31.8
	DIA. 0.250" Handy FormII	422-121-3	14.0	31.8

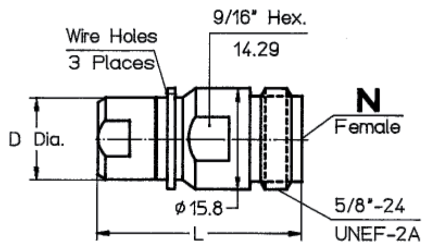
199



N-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
51	0.086" Low Density PTFE	421-307	11.5	23.0
	DIA. 0.086" Handy Form I	502-13	11.5	23.0
	DIA. 0.086" (Type 89)	421-086	11.5	23.0
	DIA. 0.087" Handy FormII	422-600-3	11.5	23.0
	DIA. 0.141" (Type 69)	421-669	11.0	25.3
	0.141" Low Density PTFE	421-298	11.0	25.3
	DIA. 0.141" Handy FormII	422-800-3	11.0	25.3
	DIA. 0.141" Handy Form I	501-19	11.0	25.3
	DIA. 0.250" (Type 52)	421-252	14.0	23.6
	DIA. 0.250" (Type 50)	421-250	14.0	25.0
	0.250" Low Density PTFE	421-336	14.0	23.6
	0.250" Low Density PTFE	421-281	14.0	25.0
	DIA. 0.250" Handy FormII	422-121-3	14.0	23.6
	0.375" Low Density PTFE	421-227	18.0	36.8
	0.495" Low Density PTFE	421-202	21.0	36.6

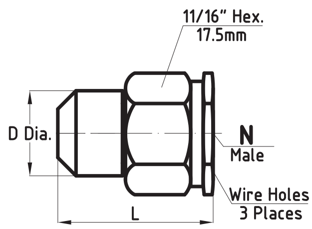
200



N-Female straight High Power

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
61H	0.250" Low Density PTFE	421-336	14.0	36.9
	0.495" Low Density PTFE	421-202	21.0	36.6

201



N-Male straight High Power

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
51H	0.250" Low Density PTFE	421-336	14.0	23.6

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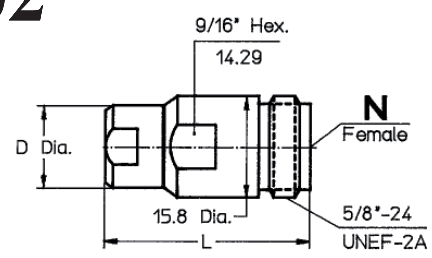
Connector Outline Drawings

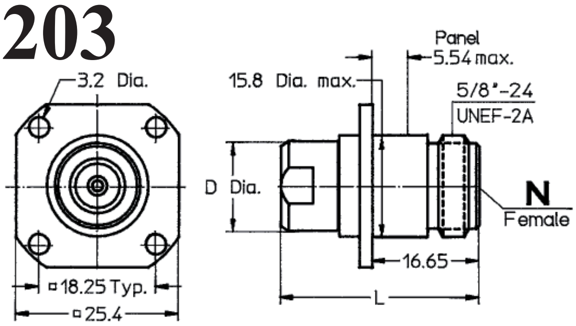
202



N-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
61	DIA. 0.086" Handy Form I	502-13	11.5	35.3
	DIA. 0.086" (Type 89)	421-086	11.5	35.3
	DIA. 0.087" Handy Form II	422-600-3	11.5	35.3
	0.141" Low Density PTFE	421-298	11.0	37.5
	0.250" Low Density PTFE	421-336	14.0	31.8

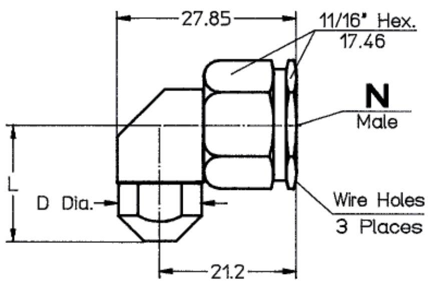
203



N-Female straight 4-Hole Flange Mount

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
65	DIA. 0.086" Handy Form I	502-13	11.5	35.3
	DIA. 0.086" (Type 89)	421-086	11.5	35.3
	DIA. 0.087" Handy Form II	422-600-3	11.5	35.3
	DIA. 0.141" (Type 69)	421-669	14.0	33.4
	0.141 Low Density PTFE	421-298	11.0	37.5
	DIA. 0.141" Handy Form II	422-800-3	14.0	33.4
	DIA. 0.141" Handy Form I	501-19	14.0	33.4
	DIA. 0.250" (Type 52)	421-252	14.0	35.7
	DIA. 0.250" (Type 50)	421-250	14.0	38.0
	0.250" Low Density PTFE	421-336	16.0	34.5

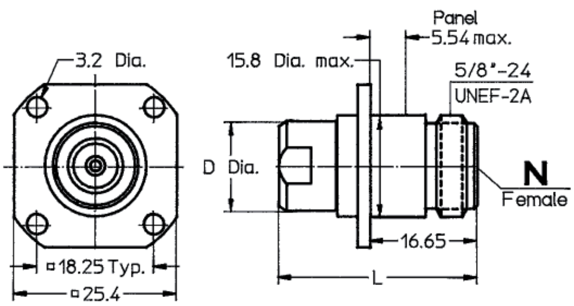
204



N-Male Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
55	DIA. 0.086" Handy Form I	502-13	12.9	22.7
	DIA. 0.086" (Type 89)	421-086	12.9	19.7
	DIA. 0.087" Handy Form II	422-600-3	12.9	19.7
	DIA. 0.141" (Type 69)	421-669	12.9	19.7
	DIA. 0.141" Handy Form II	422-800-3	12.9	19.7
	DIA. 0.141" Handy Form I	501-19	12.9	22.7
	0.495" Low Density PTFE	421-202	21.0	45.2

205



N-Female straight 4-Hole Fl. Mount High Power

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
65H	0.250" Low Density PTFE	421-336	14.0	23.6

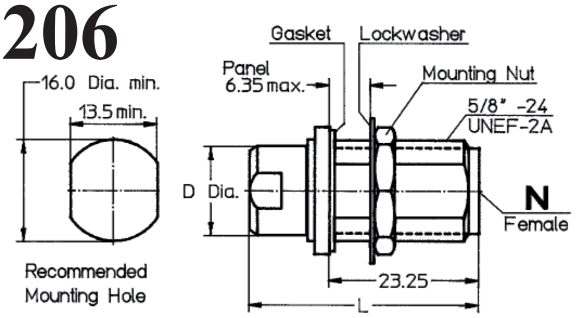
Q

Connector Outline Drawings

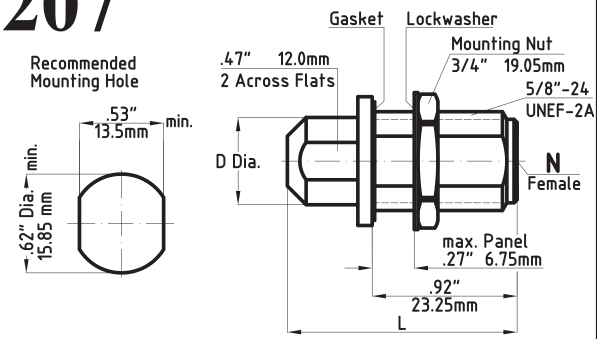
Semi -Rigid
Cable Assemblies

Spectrum
Elektrotechnik GmbH

206



207



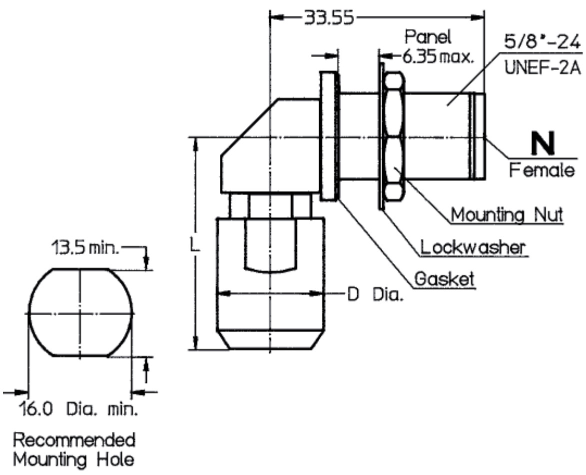
N-Female straight Bulkhead Feedthrough

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
63	0.086" Low Density PTFE	421-307	11.0	37.5
	DIA. 0.086" Handy Form I	502-13	11.0	37.5
	DIA. 0.086" (Type 89)	421-086	11.0	37.5
	DIA. 0.087" Handy Form II	422-600-3	11.0	37.5
	DIA. 0.141" (Type 69)	421-669	11.0	37.5
	0.141" Low Density PTFE	421-298	11.0	37.5
	DIA. 0.141" Handy Form II	422-800-3	11.0	37.5
	DIA. 0.141" Handy Form I	501-19	11.0	37.5
	DIA. 0.250" (Type 50)	421-250	14.0	38.0
	DIA. 0.250" (Type 52)	421-252	14.0	35.7
	0.250" Low Density PTFE	421-281	14.0	38.0
	0.250" Low Density PTFE	421-336	16.0	34.5
	DIA. 0.250" Handy Form II	422-121-3	14.0	35.7
	0.375" Low Density PTFE	421-227	18.0	44.7
	0.495" Low Density PTFE	421-202	21.0	46.1

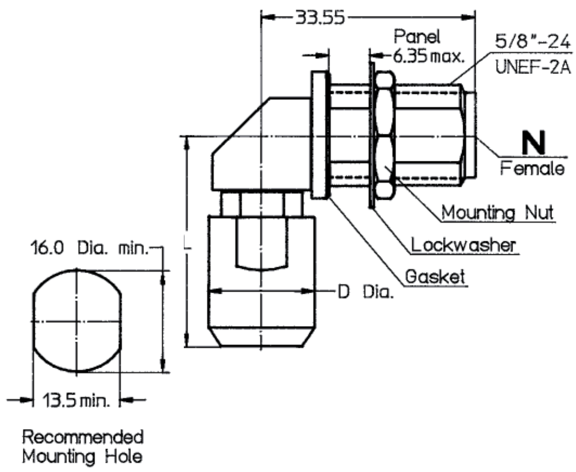
N-Female straight Bulkhead High Power

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
63H	0.495" Low Density PTFE	421-202	21.0	44.8

208



209



Q

N-Female Bulkhead Feedthrough Right Angle

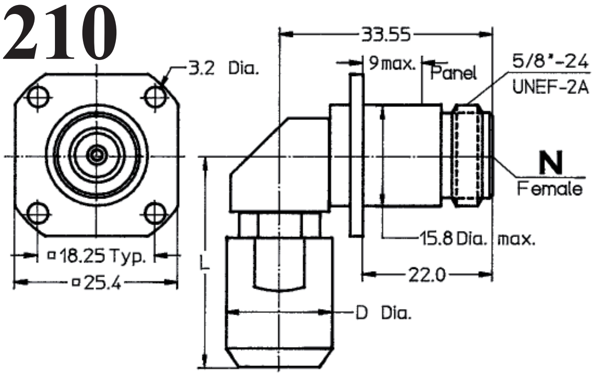
Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
5A	DIA. 0.325"	421-325	17.0	33.0

N-Female Bulkhead Feedthrough Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
5B	DIA. 0.325"	421-325	17.0	33.0

Connector Outline Drawings

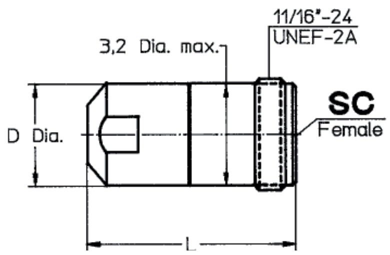
210



N-Female 4-Hole Flange Mount Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
5C	DIA. 0.325"	421-325	17.0	33.0

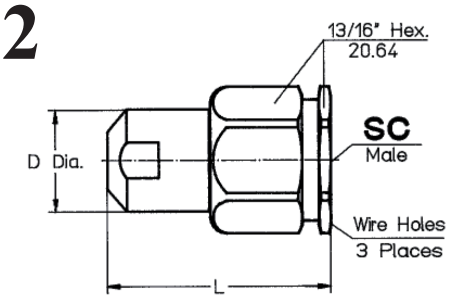
211



SC-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
79	DIA. 0.250" (Type 52)	421-252	in Development	
	DIA. 0.250" Handy FormII	422-121-3	in Development	
	0.375" Low Density PTFE	421-227	in Development	
	0.495" Low Density PTFE	421-202	21.0	42.4

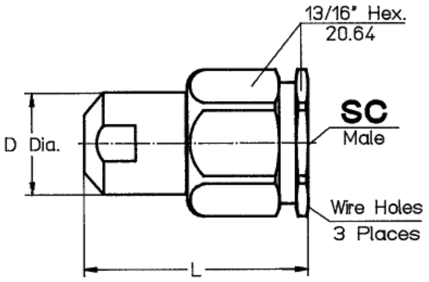
212



SC-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
80	DIA. 0.250" (Type 50)	421-250	in Development	
	DIA. 0.250" (Type 52)	421-252	16.0	35.9
	0.250" Low Density PTFE	421-281	in Development	
	0.250" Low Density PTFE	421-336	16.0	35.9
	DIA. 0.250" Handy FormII	422-121-3	16.0	35.9
	0.375" Low Density PTFE	421-227	18.0	37.4
	0.495" Low Density PTFE	421-202	21.0	39.6

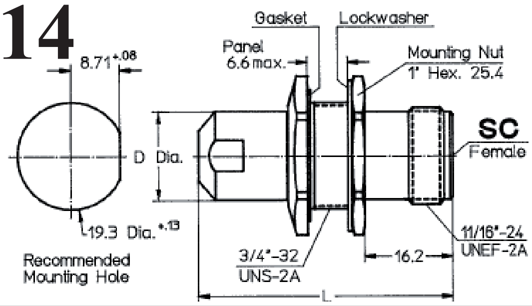
213



SC-Male straight High Power

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
80H	0.250" Low Density PTFE	421-336	16.0	35.9

214

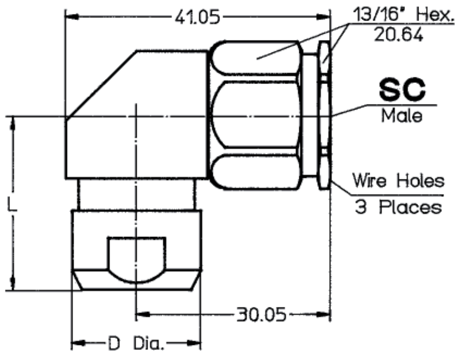


SC-Female Bulkhead Feedthrough

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
78	DIA. 0.250" (Type 52)	421-252	in Development	
	0.375 Low Density PTFE	421-227	in Development	

Q

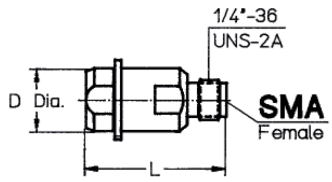
215



SC-Male Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
77	DIA. 0.250" (Type 52)	421-252	in Development	
	0.250" Low Density PTFE	421-336	in Development	
	0.375" Low Density PTFE	421-227	in Development	
	0.495" Low Density PTFE	421-202	21.0	34.8

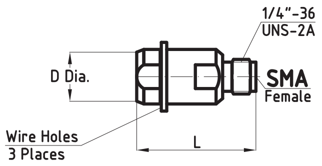
216



SMA-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
21	DIA. 0.250" (Type 52)	421-252	10.5	20.9
	0.250" Low Density PTFE	421-250	12.0	22.7
	0.250" Low Density PTFE	421-281	12.0	22.7
	0.250" Low Density PTFE	421-336	10.5	20.9
	DIA. 0.250" Handy FormII	422-121-3	12.0	20.9

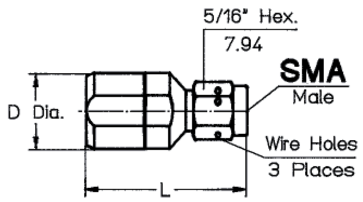
217



SMA-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
21W	DIA. 0.250" (Type 52)	421-252	10.5	20.9
	0.250" Low Density PTFE	421-250	12.0	22.7
	0.250" Low Density PTFE	421-281	12.0	22.7
	0.250" Low Density PTFE	421-336	10.5	20.9
	DIA. 0.250" Handy FormII	422-121-3	12.0	20.9

218

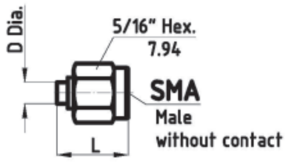


SMA-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
11	DIA. 0.250" (Type 50)	421-250	12.0	30.0
	DIA. 0.250" (Type 52)	421-252	12.0	28.1
	0.250" Low Density PTFE	421-281	12.0	30.1
	0.250" Low Density PTFE	421-336	12.0	28.1
	DIA. 0.250" Handy FormI	422-121-3	12.0	28.1

Connector Outline Drawings

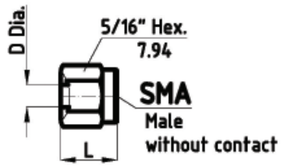
219



SMA-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
11	0.250" Low Density PTFE	421-336	16.0	35.9

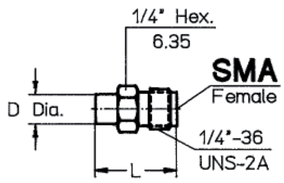
220



SMA-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
11	DIA. 0.141" (Type 69)	421-669	4.6	11.3

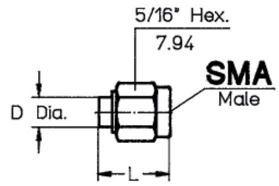
221



SMA-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
20	DIA. 0.086" Handy Form I	502-13	3.2	12.7
	DIA. 0.086" (Type 89)	421-086	4.7	12.7
	DIA. 0.087" Handy FormII	422-600-3	3.2	12.7
	DIA. 0.141" (Type 69)	421-669	4.7	12.7
	0.141" Low Density PTFE	421-298	4.7	12.7
	DIA. 0.141" Handy FormII	422-800-3	4.7	14.2
	DIA. 0.141" Handy Form I	501-19	4.7	14.2

222



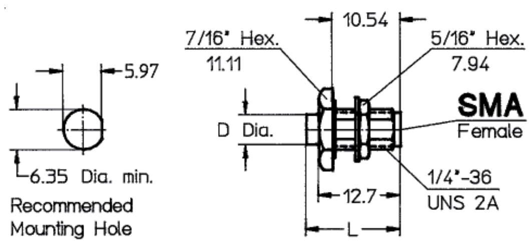
SMA-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
11	DIA. 0.086" Handy Form I	502-13	4.7	11.1
	DIA. 0.086" (Type 89)	421-086	4.7	11.1
	DIA. 0.087" Handy FormII	422-600-3	4.7	11.4
	DIA. 0.141" (Type 69)	421-669	4.7	11.1
	0.141" Low Density PTFE	421-298	4.7	11.1
	DIA. 0.141" Handy FormII	422-800-3	4.7	11.1
	DIA. 0.141" Handy FormI	501-19	4.7	11.1

Connector Outline Drawings

Spectrum Elektrotechnik GmbH

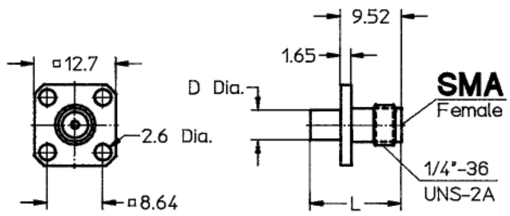
223



SMA-Female Bulkhead Feedthrough

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
22	DIA. 0.086" Handy Form I	502-13	4.7	13.4
	DIA. 0.086" (Type 89)	421-086	4.7	14.6
	DIA. 0.087" Handy FormII	422-600-3	4.7	13.4
	DIA. 0.141" (Type 69)	421-669	6.4	14.6
	0.141" Low Density PTFE	421-298	6.4	14.6
	DIA. 0.141" Handy FormII	422-800-3	5.2	15.8
	DIA. 0.141" Handy Form I	501-19	5.2	15.8

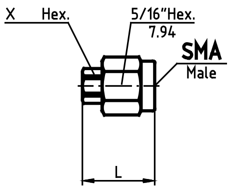
224



SMA-Female 4-Hole Flange Mount

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
24	DIA. 0.086" Handy Form I	502-13	3.2	12.7
	DIA. 0.086" (Type 89)	421-086	3.2	12.7
	DIA. 0.087" Handy FormII	422-600-3	3.2	12.7
	DIA. 0.141" (Type 69)	421-669	4.7	14.2
	0.141" Low Density PTFE	421-298	4.7	14.2
	DIA. 0.141" Handy FormII	422-800-3	4.7	14.2
	DIA. 0.141" Handy Form I	501-19	4.7	14.2

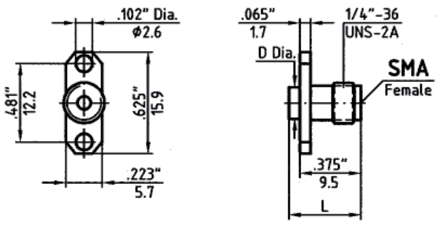
225



SMA-Male straight Across Flats

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
1S	DIA. 0.086" Handy Form I	502-13	4.0	11.4
	DIA. 0.086" (Type 89)	421-086	4.0	11.1
	DIA. 0.087" Handy FormII	422-600-3	4.0	11.4
	DIA. 0.141" (Type 69)	421-669	5.0	11.0
	DIA. 0.141" Handy FormII	422-800-3	5.0	11.1
	DIA. 0.141" Handy FormI	501-19	5.0	11.1

226

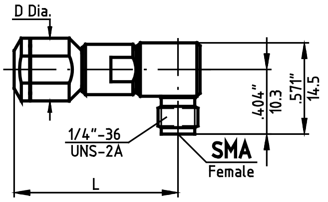


SMA-Female 2-Hole Flange Mount

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
26	DIA. 0.086" Handy Form I	502-13	3.2	12.7
	DIA. 0.086" (Type 89)	421-086	3.2	12.7
	DIA. 0.087" Handy FormII	422-600-3	3.2	12.7
	DIA. 0.141" (Type 69)	421-669	4.7	14.2
	0.141" Low Density PTFE	421-298	4.7	14.2
	DIA. 0.141" Handy FormII	422-800-3	4.7	14.2
	DIA. 0.141" Handy Form I	501-19	4.7	14.2

Connector Outline Drawings

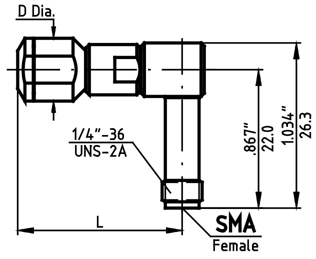
227



SMA-Female Regular Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
18R	DIA. 0.250" (Type 52)	421-252	13.3	29.7
	0.250" Low Density PTFE	421-336	13.3	29.7
	DIA. 0.250" Handy FormII	422-121-3	13.3	29.7

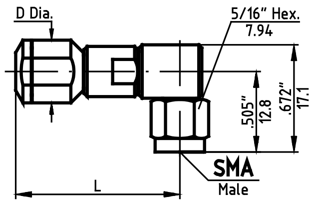
228



SMA-Female Long Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
18L	DIA. 0.250" (Type 52)	421-252	13.3	29.7
	0.250" Low Density PTFE	421-336	13.3	29.7
	DIA. 0.250" Handy Form II	422-121-3	13.3	29.7

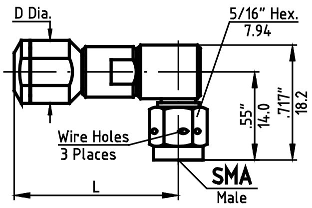
229



SMA-Male Short Right Angle (w/o wire holes)

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
152	DIA. 0.250" (Type 52)	421-252	13.3	29.7
	0.250" Low Density PTFE	421-336	13.3	29.7
	DIA. 0.250" Handy FormII	422-121-3	13.3	29.7

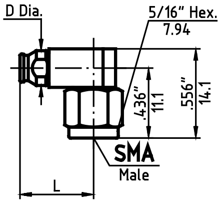
230



SMA-Male Regular Right Angle (with wire holes)

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
154	DIA. 0.250" (Type 52)	421-252	13.3	29.7
	0.250" Low Density PTFE	421-336	13.3	29.7
	DIA. 0.250" Handy FormII	422-121-3	13.3	29.7

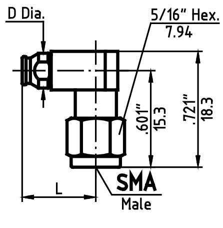
231



SMA-Male Short Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
152	0.086" Low Density PTFE	421-307	5.5	11.7
	DIA. 0.086" (Type 89)	421-086	5.5	11.7
	DIA. 0.087" Handy FormII	422-600-3	5.5	11.7

232



SMA-Male Regular Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
154	0.086" Low Density PTFE	421-307	5.5	11.7
	DIA. 0.086" (Type 89)	421-086	5.5	11.7
	DIA. 0.087" Handy FormII	422-600-3	5.5	11.7

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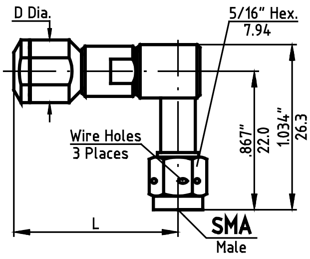
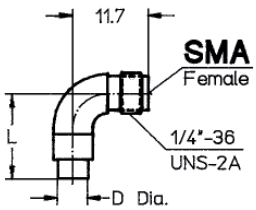
233



SMA-Male Long Right Angle (with wire holes)

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
156	DIA. 0.250" (Type 52)	421-252	13.3	29.7
	0.250" Low Density PTFE	421-336	13.3	29.7
	DIA. 0.250" Handy FormII	422-121-3	13.3	29.7

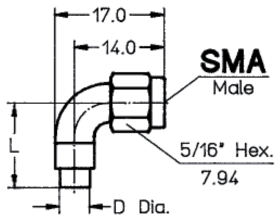
234



SMA-Female Radius Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
28	DIA. 0.086" Handy FormI	502-13	4.7	13.4
	DIA. 0.086" (Type 89)	421-086	4.7	13.4
	DIA. 0.087" Handy FormII	422-600-3	4.7	13.4
	DIA. 0.141" (Type 69)	421-669	5.2	15.9
	DIA. 0.141" Handy FormII	422-800-3	5.2	15.9
	DIA. 0.141" Handy Form I	501-19	5.2	15.9

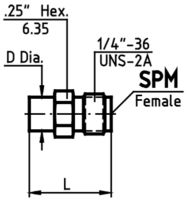
235



SMA-Male Radius Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
17	DIA. 0.086" Handy Form I	502-13	4.7	13.4
	DIA. 0.086" (Type 89)	421-086	4.7	13.4
	DIA. 0.087" Handy FormII	422-600-3	4.7	13.4
	DIA. 0.141" (Type 69)	421-669	5.2	15.8
	DIA. 0.141" Handy FormII	422-800-3	5.2	15.8
	DIA. 0.141" Handy Form I	501-19	5.2	15.8

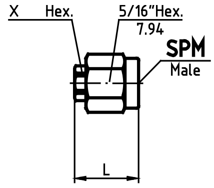
236



SPM-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
PJ	DIA. 0.086" (Type 89)	421-086	5.0	10.7
	DIA. 0.087" Handy FormII	422-600-3	5.0	10.7
	DIA. 0.141" (Type 69)	421-669	4.7	12.4
	DIA. 0.141" Handy FormII	422-800-3	4.7	12.4

237



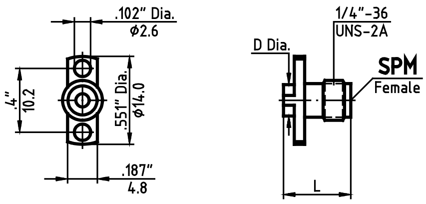
SPM-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
PM	DIA. 0.086" (Type 89)	421-086	5.0	10.1
	DIA. 0.087" Handy FormII	422-600-3	5.0	10.1
	DIA. 0.141" (Type 69)	421-669	5.0	11.1
	DIA. 0.141" Handy FormII	422-800-3	5.0	11.1

Q

Connector Outline Drawings

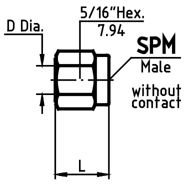
238



SPM-Female 2 Hole-Flange Mount

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
PG2	DIA. 0.086" (Type 89)	421-086	5.0	10.7
	DIA. 0.087" Handy FormII	422-600-3	5.0	10.7
	DIA. 0.141" (Type 69)	421-669	4.7	12.4
	DIA. 0.141" Handy FormII	422-800-3	4.7	12.4

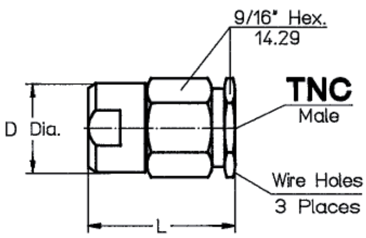
239



SPM-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
PM	DIA. 0.141" (Type 69)	421-669	3.63	8.5
	DIA. 0.141" Handy Form II	422-800-3	3.63	8.5

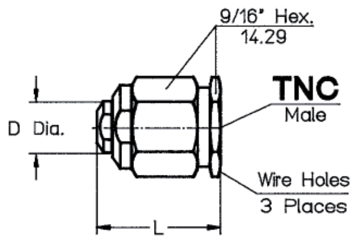
240



TNC-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
31	0.086" Low Density PTFE	421-307	11.5	22.4
	DIA. 0.086" Handy Form I	502-13	11.5	22.4
	DIA. 0.086" (Type 89)	421-086	11.5	22.4
	DIA. 0.087" Handy Form II	422-600-3	11.5	22.4
	DIA. 0.141" (Type 69)	421-669	8.0	19.4
	0.141" Low Density PTFE	421-298	8.0	19.4
	DIA. 0.141" Handy Form II	422-800-3	8.0	19.2
	DIA. 0.141" Handy Form I	501-19	8.0	19.2

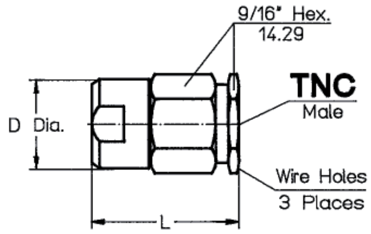
241



TNC-Male straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
31	DIA. 0.250" (Type 52)	421-252	14.0	22.9
	0.250" Low Density PTFE	421-336	14.0	22.9
	DIA. 0.250" Handy Form II	422-121-3	14.0	22.9
	0.375" Low Density PTFE	421-227	18.0	37.9

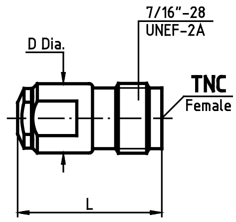
242



TNC-Male straight High Power

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
31H	0.250" Low Density PTFE	421-336	12.9	22.9

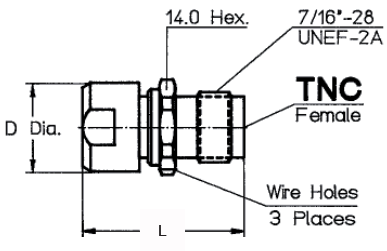
243



TNC-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
41	DIA. 0.141" (Type 69)	421-669	11.0	22.9
	DIA. 0.141" Handy Form II	422-800-3	11.0	22.9
	DIA. 0.141" Handy Form I	501-19	11.0	22.9

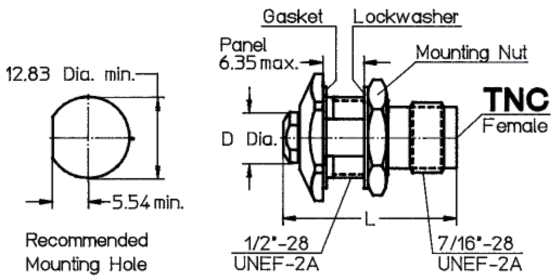
244



TNC-Female straight

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
41	DIA. 0.250" (Type 52)	421-252	14.0	25.2
	0.250" Low Density PTFE	421-336	14.0	25.2
	DIA. 0.250" Handy FormII	422-800-3	14.0	25.2

245



TNC-Female Bulkhead Feedthrough

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
43	DIA. 0.086" (Type 89)	421-086	8.0	27.0
	DIA. 0.141" (Type 69)	421-669	8.0	26.1
	0.141" Low Density PTFE	421-298	8.0	26.1
	DIA. 0.141" Handy FormII	422-800-3	8.0	26.1
	DIA. 0.141" Handy Form I	501-19	11.5	35.2

Q

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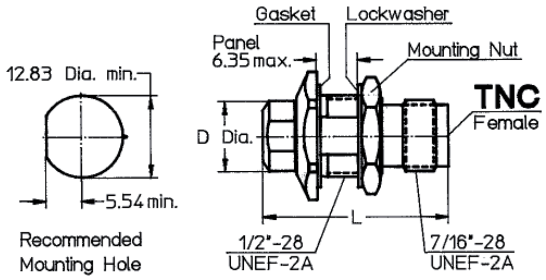
Connector Outline Drawings

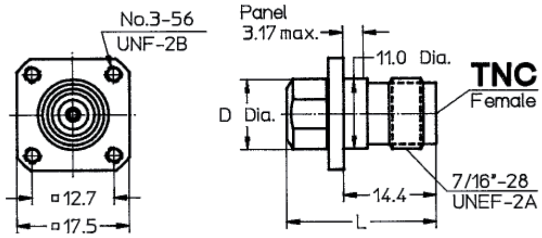
246



TNC-Female Bulkhead Feedthrough

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
43	DIA. 0.250" (Type 52)	421-252	11.0	27.9
	0.250" Low Density PTFE	421-336	12.0	28.5
	0.375" Low Density PTFE	421-227	18.0	43.3

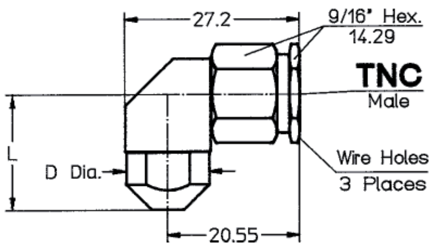
247



TNC-Female 4-Hole Flange Mount

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
45	DIA. 0.086" Handy Form I	502-13	11.5	35.2
	DIA. 0.141" (Type 69)	421-669	10.0	22.9
	DIA. 0.141" Handy FormII	422-800-3	10.0	22.9
	DIA. 0.141" Handy Form I	501-19	11.5	35.2
	DIA. 0.250" (Type 52)	421-252	11.0	27.9
	DIA. 0.250" Handy FormII	422-121-3	11.0	27.9

248



TNC-Male Right Angle

Connector Code	Semi Rigid Cable	Cable Part No	D Dia in mm	L in mm
43	DIA. 0.086" Handy Form I	502-13	12.9	22.7
	DIA. 0.086" (Type 89)	421-086	12.9	19.7
	DIA. 0.087" Handy Form II	422-600-3	12.9	19.7
	DIA. 0.141" (Type 69)	421-669	12.9	19.7
	DIA. 0.141" Handy Form II	422-800-3	12.9	19.7
	DIA. 0.141" Handy Form I	501-19	12.9	22.7
	0.495" Low Density PTFE	421-202	21.0	45.2

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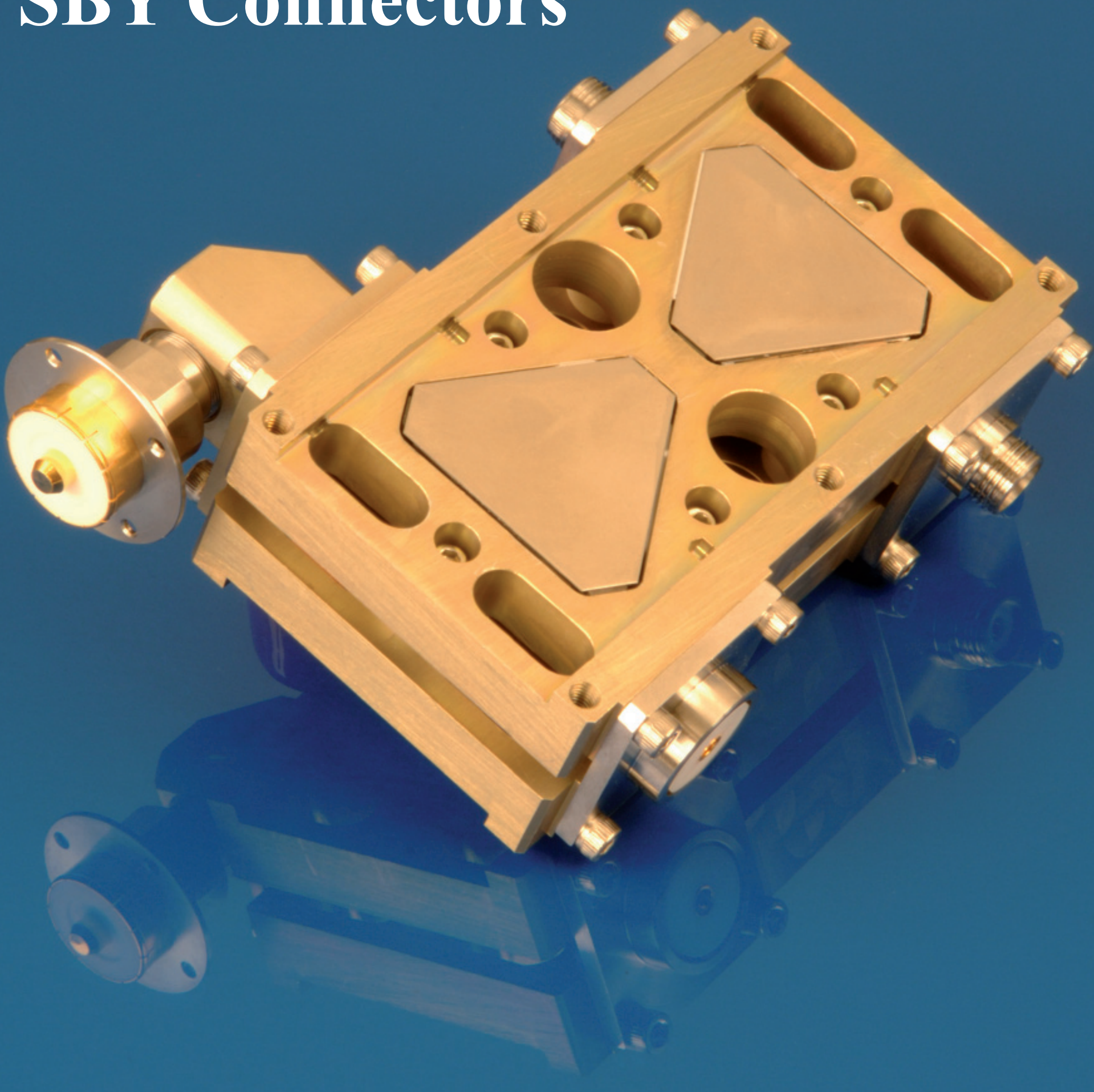
High Power Circulator fitted with SBX and SBY Connectors



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Components for unique applications

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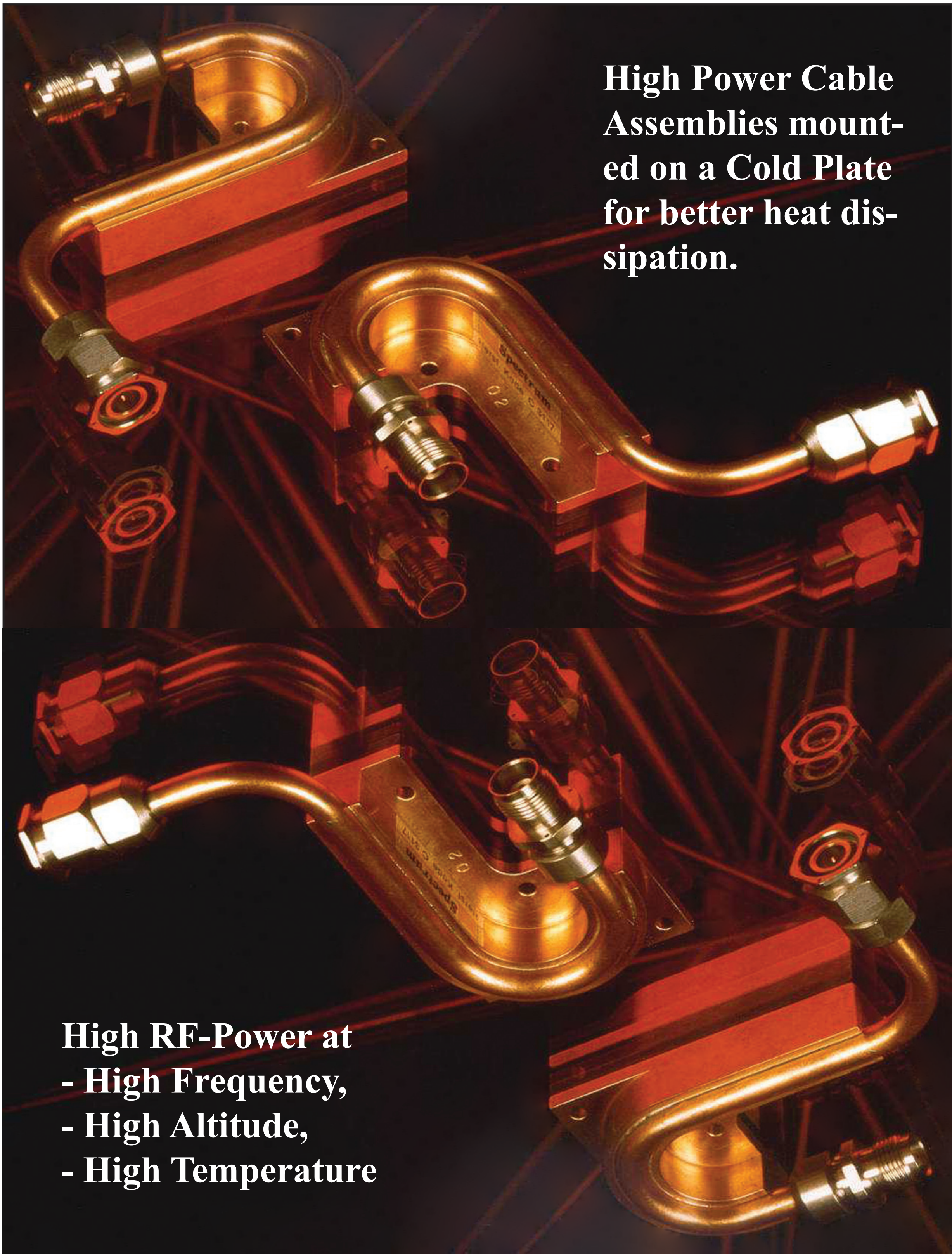
General Information

Cable Assembly Environmental Information

The cable assemblies of Spectrum Elektrotechnik are tested to mechanical and environmental requirements. Some of these tests are listed below. After exposure to these conditions, the assemblies did not show visible signs of damage and the VSWR, insertion loss, and connector interface dimensions remained within allowable limits.

- **Cold Bend per MIL–C–17, paragraph 4.8.19**
- **Stress Crack Resistance per MIL–C–17, paragraph 4.8.17**
- **Dimensional Stability per MIL–C–17, paragraph 4.8.20**
- **Concentrated Load per MIL–T–81490, paragraph 4.7.18**
- **Tensile Load per MIL–T–81490, paragraph 4.7.17**
- **Flexure per MIL–C–87104, paragraph 4.6.3.4, 5000 cycles**
- **Temperature per MIL–T–81490, paragraph 4.7.9, –54° C to +150° C**
- **Impact Shock per MIL–E–5272, paragraph 4.15, procedure V**
- **Vibration per MIL–T–81490, paragraph 4.7.12**
  (MIL–STD–202, method 204, test condition B)
- **Flammability per MIL–C–87104, paragraph 4.6.4.8**
- **Humidity per MIL–T–81490, paragraph 4.7.22**
  (MIL–STD–810, method 507, procedure IV)
- **Salt Fog per MIL–T–81490, paragraph 4.7.23**
  (MIL–STD–810, method 509)
- **Thermal Shock per MIL–T–81490, paragraph 4.7.11**
  (MIL–STD–202, method 107, 25 cycles)
- **Water Immersion–Leakage per MIL–C–87104, paragraph 4.6.4.13.2, procedure II**
- **Chemical Resistance per MIL–C–87104, paragraph 4.6.4.12**
  JP–4
  Hydraulic fluid
- **Vacuum per ASTM E–595, less than 1% TML and 0.10% CVCM**

Spectrum Elektrotechnik GmbH



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Manufacturing and Test Capabilities

Spectrum Elektrotechnik GmbH

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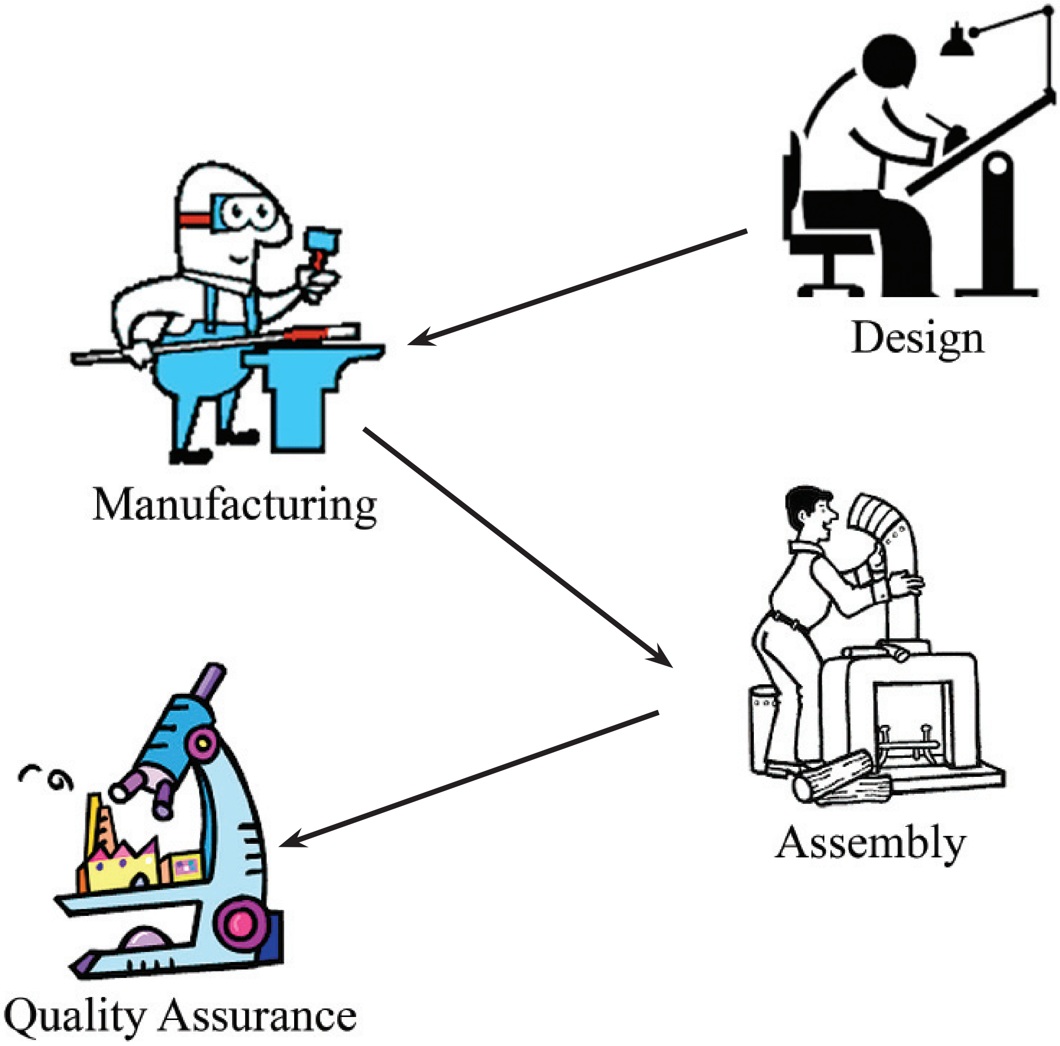
SPECTRUM DESIGNS, MANUFACTURES, ASSEMBLES AND TESTS ALMOST EVERYTHING IN-HOUSE, RESULTING IN:

- SHORT WAYS
- FAST RESPONSE TIME
- SHORT DELIVERY
- HIGHEST QUALITY



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Manufacturing and Test Capabilities

THE COMMITMENT: Building a superior product takes a big commitment: A commitment to hire motivated people, to use the finest equipment, and to uphold a standard of quality in every project.
Spectrum Elektrotechnik GmbH has built its reputation on this same commitment. Quality is the basis for every employee, every procedure, and every product. It is reflected in the creativity of our organization and in the satisfaction of our customers. It ensures that Spectrum Elektrotechnik GmbH will continue to offer the highest standards in microwave components.
Spectrum Elektrotechnik GmbH has earned a reputation for quality, but it is a reputation which requires constant attention. Through close communication with customers and repeated analysis of performance, we continually strive to strengthen our commitment, and as commitment is our policy, quality is our product.

THE PHILOSOPHY: The management philosophy at Spectrum Elektrotechnik GmbH is based upon the creative concept of „Entrepreneurship", the company within the company. A team of individuals, who act as a small company within the corporate structure and specialize in a particular product, manages each of our product families.
Spectrum Elektrotechnik GmbH has adopted the entrepreneurial system for one simple reason: Customer satisfaction.
Responsible for the production of a single product, our entrepreneurs give your project undivided attention. No compromises are made, no details are overlooked. The team remains more alert to customer requirements and is able to maintain complete communication with the customer. And the result of complete communication is complete understanding. Understanding begins as the team studies the specifications. Goals are identified, a course is plotted.
Questions are answered before they become problems; doubts are clarified before they are misunderstood. Then the team guides your project through design, manufacturing and testing, until we finally reach our ultimate objective: to deliver a quality product on time and within budget.

THE SYSTEM: A creative plan is useless if the details are ignored. At Spectrum Elektrotechnik GmbH, we have developed a system, which carefully monitors each step in the manufacturing process. Even before a single drafting pencil is raised, all specifications are closely scrutinized, including applicable military specifications. Then the documentation procedure will be started, an integral part of the monitoring process. Our integrated MRP System tracks each individual operation and piece part with full lot traceability. At Spectrum Elektrotechnik GmbH, we consider the quality of our documentation as critical as the quality of our product, and our methods reflect that integrity. Next, each product is defined with our manufacturing process sheet. This unique document provides a complete interpretation of the specifications, transcribed according to Spectrum Elektrotechnik GmbH manufacturing procedures. This uniform interpretation of customer specifications streamlines production and reduces any margin for error because production personnel are never required to interpret specifications.
Spectrum Elektrotechnik GmbH invests much time and attention to the intricacies of your project for one reason: detailed planning is our primary method of quality control. If we can solve problems before the project begins, we only need to concentrate on building quality into every step thereafter.

Manufacturing and Test Capabilities

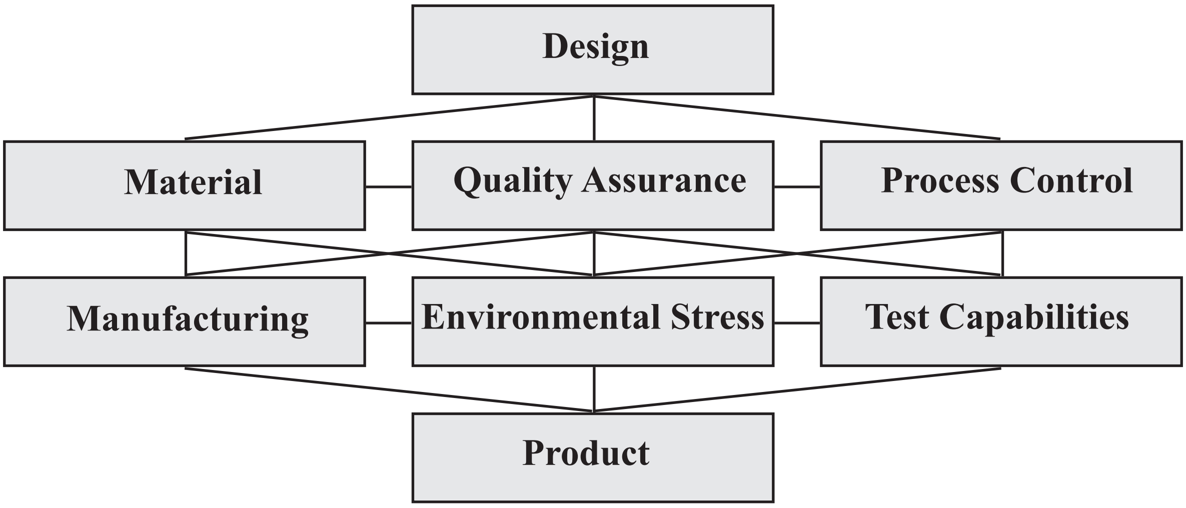
THE DEDICATION TO QUALITY: Quality is a high level of superiority, a degree of excellence, something that gives especial worth and value to the product. Quality Products conform to Specification. Quality Products work much longer without defect or the need for repair than other products. Spectrum Elektrotechnik GmbH manufactures Quality Products.
Quality is the commitment that Spectrum Elektrotechnik GmbH is built on. You can see it in the people as they steer every project from design to completion. You can see it in the methods they use to ensure a smooth course. And you can see it in the craftsmanship of the final product.
Quality is the commitment we make to our customers. And it‘s a commitment we‘ll never change.
The first Quality Control Manual of the Spectrum Elektrotechnik GmbH was issued in 1982 and had been maintained and frequently revised since then. It was based on MIL-Q-9858A and MIL-I-45208A respectively.
In August 2007 Spectrum Elektrotechnik GmbH has been approved for being DIN ISO 9001:2008 compliant.

THE PRODUCTS: FREQUENCY RANGE: DC to 71.0 GHz
Spectrum Elektrotechnik GmbH is a world leader in design and manufacture of state-of-the-art products in the frequency range of DC to 65 GHz. Offering thousands of different passive components of superior quality, listed in 8 different catalogues, totalling up to more than 2000 pages of product information, makes Spectrum Elektrotechnik GmbH the choice for the world. The product main range consists of the following:

- Adapters, instrument grade, between- and in-series, coax- and waveguide-
- Cable assemblies, regular, phase matched, phase stable, and field replaceable
- Cable cutting and stripping machines
- Circulators and Isolators
- Connectors, precision style, most series
- Couplers
- Duplexers
- Gain Equalizer, coax and waveguide
- Limiters
- Phase Shifters, coaxial
- Terminations, coax
- Super components, coax and waveguide

The products of Spectrum Elektrotechnik GmbH are unique in many cases, not competing with mass production of the various suppliers, often engineered to very specific needs in complex programs. Spectrum Elektrotechnik GmbH is not a company trying to compete in price with mass production companies. Spectrum is rather the company supplying a product which usually has superior quality compared to most other suppliers. High Quality cannot sell at lowest price.

QUALITY ASSURANCE: Although the Design is at the very beginning, Quality Assurance is involved already at that stage. Quality Assurance is always involved! Quality Assurance is always geared to the prevention of problems and is constantly working on process improvements. The well structured Quality Assurance of Spectrum Elektrotechnik GmbH assures that a product will be designed and built, meeting the highest expectations.



Design: Only a good design can be the basis for reliable products of good quality. To design state-of-the-art products most economically and most efficiently, new techniques are needed. Spectrum Elektrotechnik GmbH added CAD already in 1984, being one of the first companies, installing a CAD design center, and using now Inventor.

Manufacturing and Test Capabilities

PROTOTYPING: Spectrum Elektrotechnik GmbH is using three-dimensional computer aided design (CAD), it decreases development time by allowing corrections to a product to be made early in the process. By giving engineering, manufacturing, marketing, and purchasing a look at the product early in the design process. Mistakes can be corrected and changes can be made while they are still inexpensive.

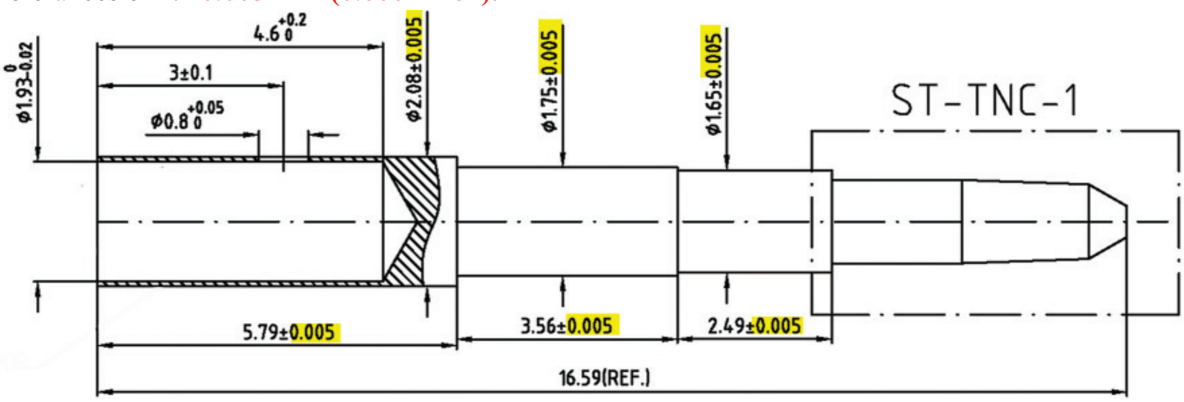
A mechanical prototype is often built as part of the product design process to allow our engineers to explore design alternatives, test theories and confirm performance prior to starting production of a new product. Engineers use their experience to tailor the prototype according to the specific unknowns still present in the intended design. Prototypes are used to confirm and verify consumer interest in a proposed design, or will attempt to verify the performance or suit ability of a specific design approach. A common strategy is to design, test, evaluate and then modify the design based on analysis of the prototype.

Manufacturing and Test Capabilities

MANUFACTURING: An almost perfect manufacturing process can be an assurance for a product of outstanding performance and repeatability. The best machines, the best and effective tooling and highly trained personnel are also fundamentals for manufacturing a Quality Product. Spectrum Elektrotechnik GmbH uses the most modern CNC-controlled machines and employs highly skilled and trained personnel.

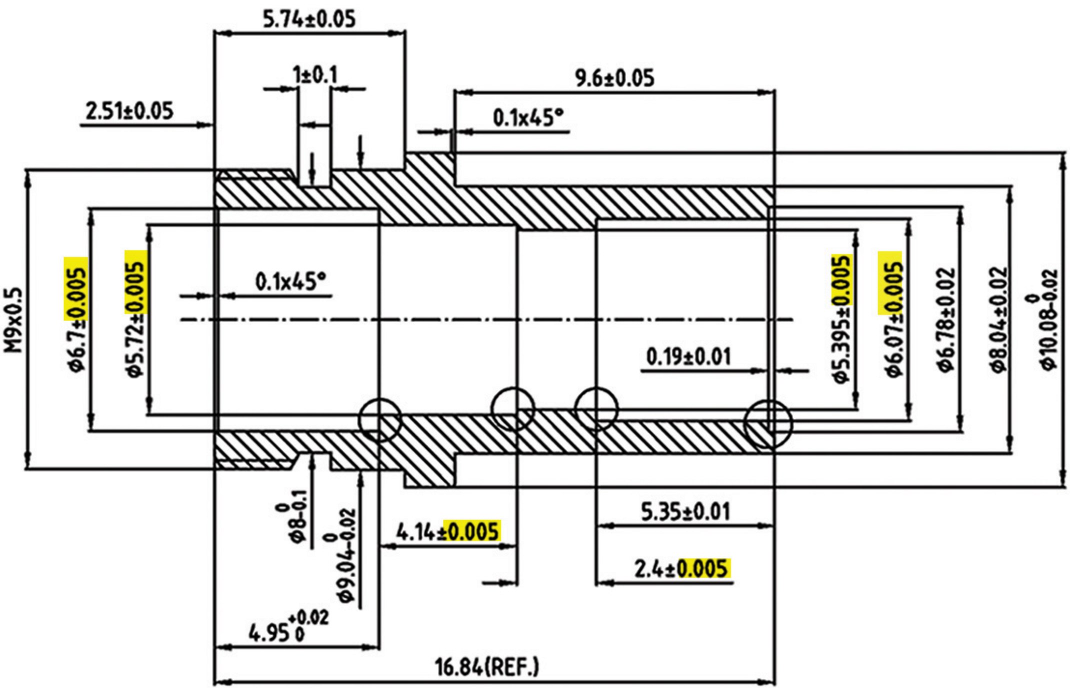
MATERIAL: The best material can be the basis for a dependable product of best quality. Spectrum Elektrotechnik GmbH only uses best materials. Only the best can be just good enough. STEEL corrosion resistant 1.4305 per DIN 17440 (QQ-S-763, class 303 or ASTM-A-582-80, 1.4404 DIN 71752 (316L) COPPER BERYLLIUM 33-25 Cu-Be2Pb per DIN 17666 (QQ-C-530). PTFE Fluorocarbon per DIN 52900 (ASTM-D-1457). Boron Nitride sintered dielectric per in-house specification Flouropoly-BN for high power connectors, BOROSILICATE per inhouse specifications for hermetic connectors.

TOLERANCES: The tightest tolerances are necessary for the best quality and highest performance. In the specific areas as needed for best electrical performance Spectrum Elektrotechnik GmbH is using Tolerances of **+/- 0.005 mm (0.0002 inch)**.



Manufacturing and Test Capabilities

PROCESS CONTROL: Controlling the process means controlling every step that is involved in making the product. A good Process Control assures repeatability. At Spectrum Elektrotechnik GmbH every process is completely documented. With every work order a complete set of documentation is automatically issued, describing the manufacturing process in detail, step by step. Manufacturing sequences are always followed by inspection steps, assuring that a mistake is caught right away. And: The Process Documentation is immediately updated, whenever a change is implemented in the process.



ENVIRONMENTAL STRESS: Cables and connectors use a number of different materials with different behaviour, different thermal expansion. Cable and connectors are therefore being temperature cycled in a wide temperature range and up to 32 hours, depending on the product and the application. The thermal stress reduced the strain and makes the materials become predictable during normal operation.

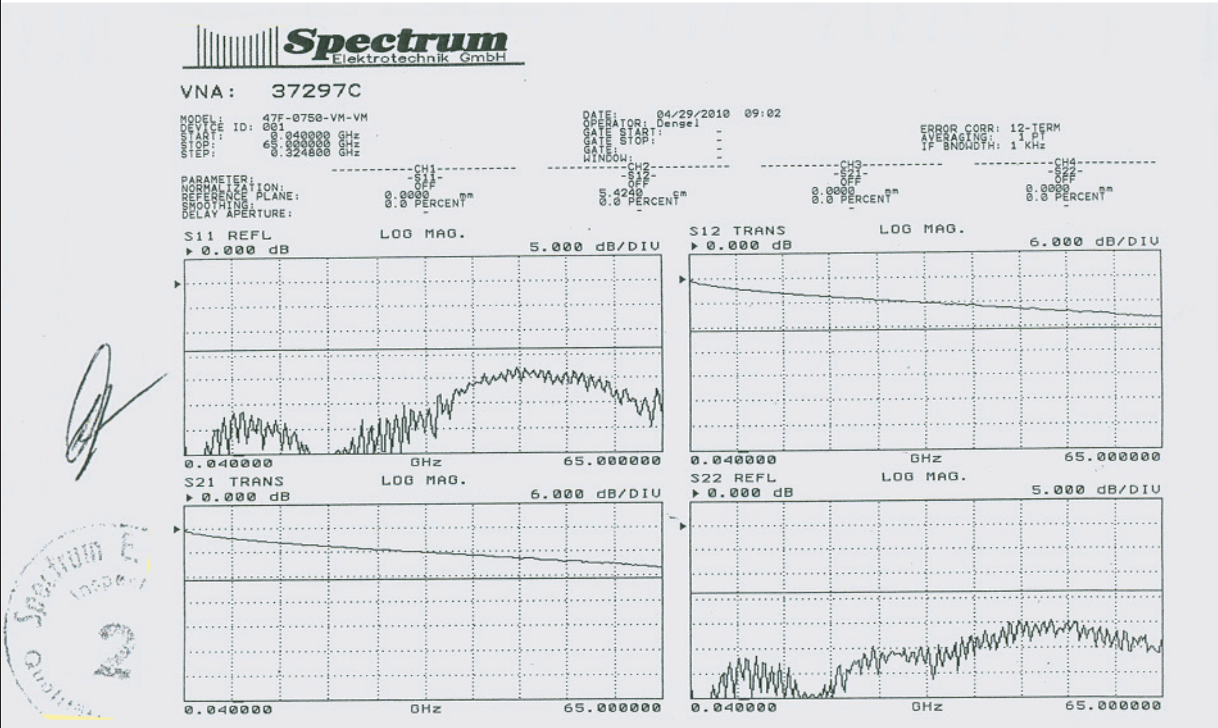
Let's have a look at the "simple" ageing process during manufacturing of a High Performance Cable Assembly:

- **Step 1:** The raw cable is cut to length, as calculated necessary for the customer's order:
- **Step 2:** Temperature cycling process of 4 x 4 hours from -54°C to +115°C (for special assemblies the temperature range may be widened, in special cases even from – 65°C to +200°C).
- **Step 3:** QA to record dimensions before and after temperature cycling.
- **Step 4:** The interface is trimmed for the ferrule (outer conductor) and it is soldered
- **Step 5:** Temperature cycling of 4 x 4 hours from -54°C to +115°C (for special assemblies the temperature range may be widened, in special cases even from – 65°C to +200°C).
- **Step 6:** QA to record dimensional changes after temperature cycling, if any, record changes and decide whether they are acceptable and allowed in the specification.
- **Step 7:** The interface is trimmed for the center conductor to be soldered to the cable center conductor and the connectors of the assembly are completed :
- **Step 8:** Temperature cycling of 4 x 4 hours from -54°C to +115°C (for special assemblies the temperature range may be widened, in special cases even from – 71°C to +200°C).
- **Step 9:** QA to record dimensional changes after temperature cycling, record changes and decide whether they are acceptable and allowed in the specification.
- **Step 10:** QA to test performance of the assembly, mechanically and electrically (Insertion Loss and Return Loss); go, no-go testing.
- **Step 11:** The back body of the connector is secured with Loktite or similar, the marking sleeves are being put on.
- **Step 12:** Assemblies for certain programs and those used in harsh environment undergo another Temperature cycling of 4 x 4 hours from -54°C to +115°C (for special assemblies the temperature range is opened up, from – 65°C to +200°C).
- **Step 13:** QA to record dimensional changes after temperature cycling, record changes and decide whether they are acceptable and allowed in the specification.
- **Step 14:** QA to test performance of the assembly, mechanically and electrically (Insertion Loss and Return Loss)…………………..

Note: The above is not a complete work sheet, it only shows a fraction, the part concerning the temperature cycling. The manufacturing process and the assembly and the testing consists of many more steps.
For more complex components than cable assemblies a much more detailed work sheet is necessary.The work procedure for a gain equalizer may have more than 30 pages. The work procedure for a Duplexer consists of several hundred pages.

Manufacturing and Test Capabilities

ASSEMBLY: The best and aged connectors and the aged cable become a unique quality product, a cable assembly made by Spectrum Elektrotechnik GmbH. Every High Performance Cable Assembly will be shipped with complete test data, showing minimum Insertion Loss and Return Loss, or additional Phase as well, when requested. Commercial Assemblies will be tested on a go/no go basis.



Manufacturing and Test Capabilities

Quality Assurance is everywhere, checking the piece part when the CNC Machine is being set up, and during production, minimum 3 times during an 8 hour shift.

Manufacturing and Test Capabilities

...Checking parts during assembly, and recording data of the finished product.

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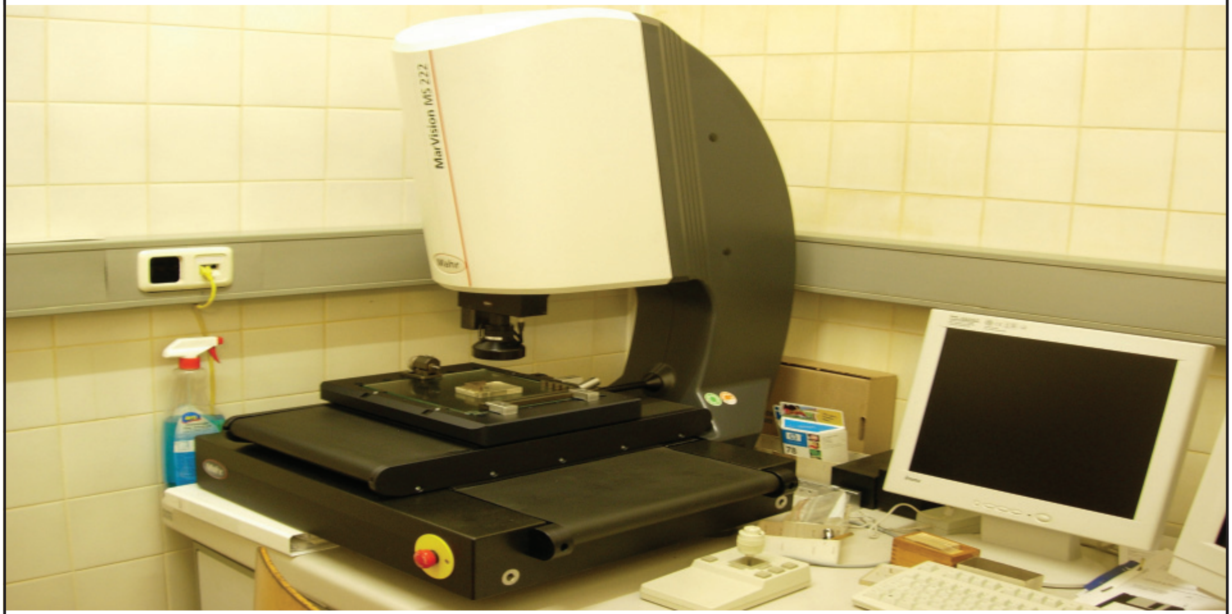
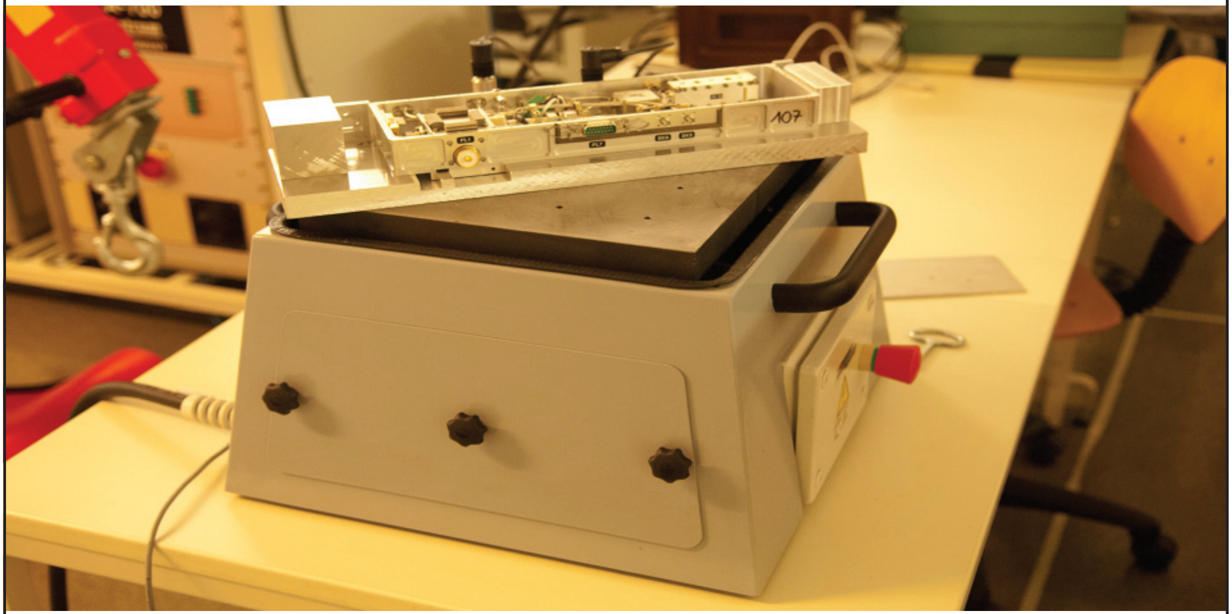
Test Capabilities: Spectrum Elektrotechnik GmbH uses most sophisticated test equipment. Having the Facilities also means: Using them for verifying the specification of the components, connectors, adapters and cable assemblies during the manufacturing process. Advanced test equipment meets the standards demanded by our customers.



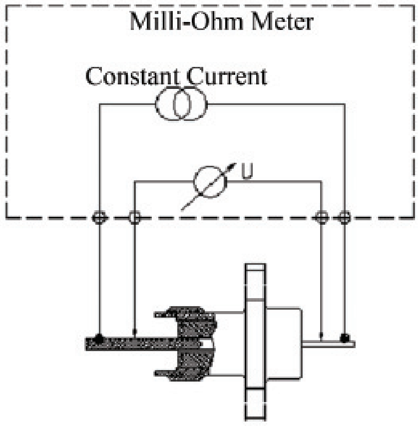
Automatic three dimensional measurement.

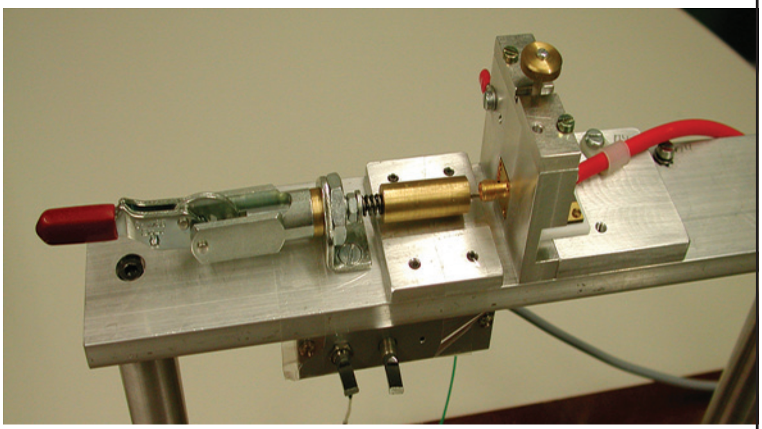


Vibration table

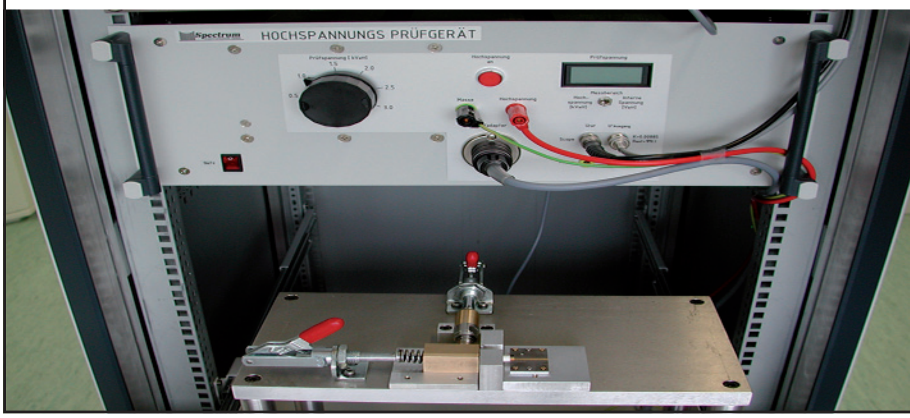
Manufacturing and Test Capabilities

Insulation Resistance Test





Center Contact Resistance Test Setup

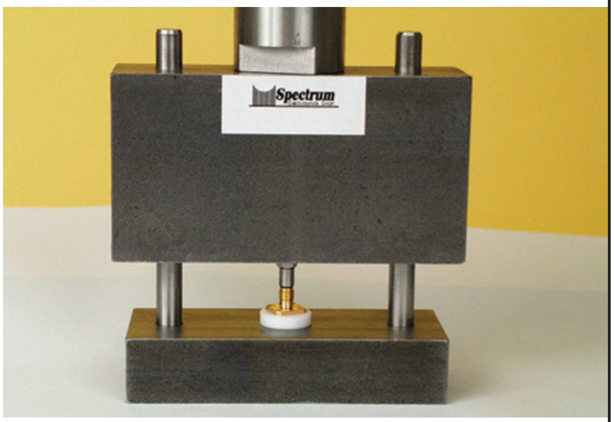


Dielectric Withstanding Voltage Test Setup

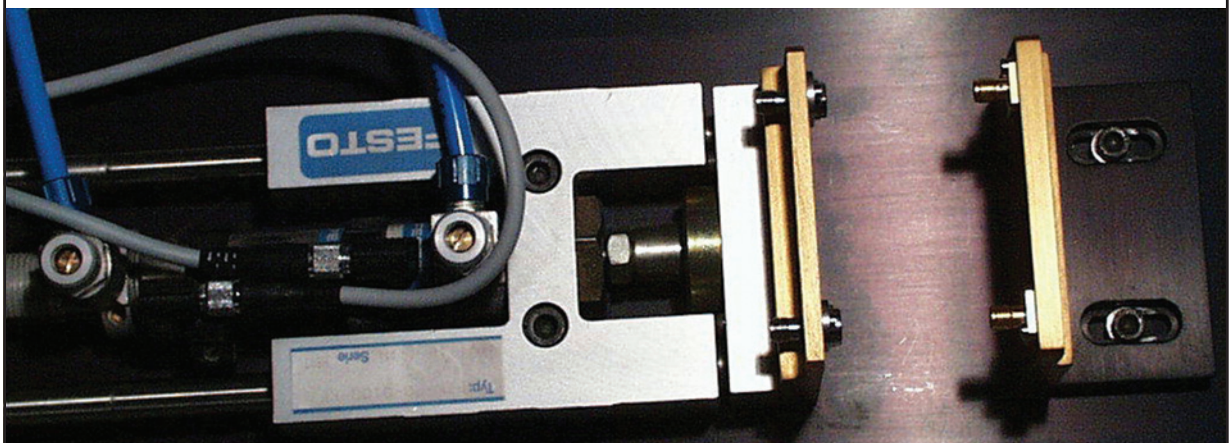
Spectrum Elektrotechnik GmbH • www.spectrum-et.com • Email: sales@spectrum-et.com • Fax: +49 89 354 80490 • Phone: +49 89 354 804-0

Manufacturing and Test Capabilities

Temperature Chambers operating in the temperature range of -72°C to +200°C and Vacuum Chambers up to 150°C.



Test Fixture for testing the Center Contact Retention Force per MIL-PRF-39012D, § 4.7.9



Automated Test Setup for testing the Connector Durability per MIL-PRF-39012D, § 4.7.12

Spectrum Elektrotechnik GmbH offers a wide variety of cables. They are shown in the following sections:

- **High Performance Cable Assemblies**
- **Phase Matched Cable Assemblies**
- **Multipin- Multiport- Cable Assemblies**
- **Phase King Cable Assemblies**
- **Phase Stable Assemblies (ANA - Cable Assemblies)**
- **Quick Connecting Cable Assemblies (with PUSH - ON Connectors)**
- **Cable Assemblies with interchangeable connectors**
- **SpectrumFlex Cable Assemblies**
- **Commercial RG - Cable Assemblies**
- **Semi - Rigid Cable Assemblies**
- **Handy - Form Cable Assemblies**
- **Delay Lines**

The Flexible Microwave Cables of Spectrum Elektrotechnik GmbH are built to withstand mechanical abuse. However, for those extra rough applications, Spectrum Elektrotechnik GmbH offers additional protection of ruggedizing or armoring and soft armoring. Information on armoring is given in Section S.
Detailed Information on every Cable is shown on the Data Sheets or Tables in the individual sections, lining out the Characteristics, the mechanical, electrical and environmental specification. An example of a Data Sheet for Flexible Cable Assemblies is given below. The original Data Sheets are shown in larger scale.

Cable - Type 10
DC - 26.5 GHz

Electrical Specifications

Temperature Range

Mechanical Specifications

SPECIFICATION		Type 10
Cable Code	Standard	10
	Armored	10x X Please find Armor & Ruggedizing Options in Section S.
Frequency Range		DC to 26.5 GHz
Outer Diameter in mm	Standard	5.2
	Armored	See Pages 18 - 19
Impedance in Ohms at Sea Level and +25°C		50 ± 2
Velocity in %, ± 2%		75
Capacitance in pF/m		87
Dielectric Strength (60 Hz) in KV rms		6.0
Max. Operating Voltage at Sea Level, in KV rms, 60 Hz		1.5
Nominal Insertion Loss in dB/m vs. Frequency	0.5 GHz	0.16
	2.0 GHz	0.35
	5.0 GHz	0.58
	10.0 GHz	0.86
	18.0 GHz	1.19
	26.5 GHz	1.46
Nominal CW-Power in Watts, vs. Frequency, at Sea Level and + 20°C	0.5 GHz	1133
	1.0 GHz	750
	2.0 GHz	496
	5.0 GHz	288
	10.0 GHz	190
	18.0 GHz	134
	26.5 GHz	108
Peak-Power, 10% Duty Cycle		4 x CW-Power
RF - Leakage at 18.0 GHz		- 90 dBC
Operating Temperature Range		-54°C to +150°C
Outer Conductor Construction		Copper Ribbon Braid, Overlap-ping Aluminum Film, Silver Plated Copper Braid
Outer Jacket		PTFE
Dielectric Diameter in mm		3.7
Dielectric Material		Low Density PTFE
Dielectric Constant		1.8
Center Conductor Material		Copper, Silver Plated
Center Conductor Dia. in mm		1.29
Weight in Gramms/Meter		66
Minimum Bend Radius, Inside, Static (mm)		26
Minimum Bend Radius, Inside, Dynamic (mm)		54

Characteristics

Characteristics:

TOP SELLER

- Performance to 26.5 GHz, when terminated with 2.92mm or 3.5mm connectors (mating with SMA).
- Meeting the very highest Quality Standard, as needed for crucial applications in harsh environment
- Procurement for completely terminated assemblies, fully tested. The test documentation for VSWR and Insertion Loss will be supplied with the cable assembly.
- Available connectors: 2.4mm, 2.92mm, 3.5mm, 7mm, 7/16, HN, N, SBX, SBY, SC, SMA, SPM and TNC.
  For Connector Outline Drawings please refer to Section Q.
- For Connector Code details please refer to Section S.
- For information on armor please refer to Section S as well.
- For ordering information please refer to Section A.

Cable Cross Section

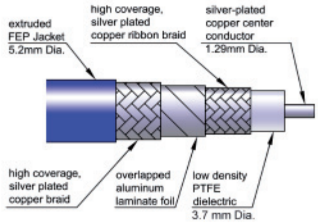
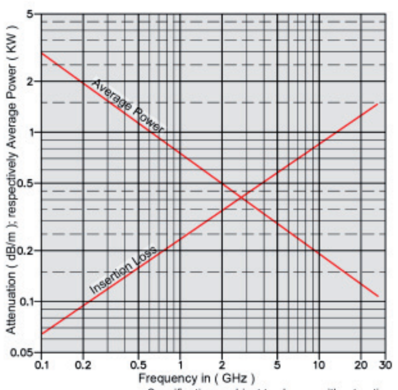


Diagram: Insertion Loss and Power vs. Frequency



Specifications subject to change without notice.

Insertion Loss Calculation of Cable Assemblies

To calculate a cable assembly's insertion loss:

Use the Data Sheets provided for the cable and calculate the cable attenuation for the length of your assembly. The Data Sheets show the cable attenuation/m vs. frequency. (If you are more used to the length in ft., please multiply the attenuation/m by 0.305 and you will obtain the attenuation/ft.). Add the Connector Insertion Loss and the Mismatch Loss from the Tables below.

Example:
Cable Assembly Insertion Loss.

= Attenuation (dB/m) x Assembly Length (m) + Connector 1 loss + Connector 2 loss + Mismatch loss

Where: **Attenuation =** value from the Data Sheet
Connector 1 loss and Connector 2 loss = value from chart below
Mismatch loss = value due to assembly VSWR, from chart below

Connector Insertion Loss (dB/Connector)

Frequency (GHz)	0.5	1.0	2.0	4.0	8.0	12.0	18.0	26.0	30.0	40.0	50.0
Fixed Straight	0.03	0.04	0.04	0.05	0.07	0.08	0.11	0.15	0.17	0.19	0.22
Replaceable Straight	0.05	0.06	0.06	0.07	0.11	0.12	0.16	0.18	0.19	0.20	0.25
Angle	0.07	0.08	0.08	0.10	0.12	0.14	0.20	0.22	0.23	0.25	0.30

Note: There will be variation in loss from one connector series to another. However, since the insertion loss of a connector increases with length, and decreases with diameter, these tend to balance, and the actual variation is relatively small. This table provides maximum values.

Mismatch Loss (dB)

VSWR	1.20:1	1.25:1	1.30:1	1.35:1	1.40:1
Insertion Loss (dB)	0.04	0.06	0.07	0.10	0.12

Assembly VSWR

VSWR figures listed below are maximum values.

Cable Length	Frequency Range (GHz)	Cable Assembly 2 straight connectors	Cable Assembly 1 straight 1 angled	Cable Assembly 2 angled connectors
< 5m	Up to DC - 18.0	1.25:1	1.30:1	1.35:1
> 5m	Up to DC - 18.0	1.30:1	1.30:1	1.35:1
< / > 5m	Up to DC - 20.0	1.25:1 / 1.30:1	1.30:1 / 1.35:1	1.40:1
< / > 5m	Up to DC - 40.0	1.35:1 / 1.40:1	1.40:1 / 1.45:1	1.40:1 / 1.45:1
< / > 5m	Up to DC - 50.0	1.40:1 / 1.45:1	1.45:1 / 1.50:1	1.45:1 / 1.50:1

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Power Limiting Factors at Cable Assemblies

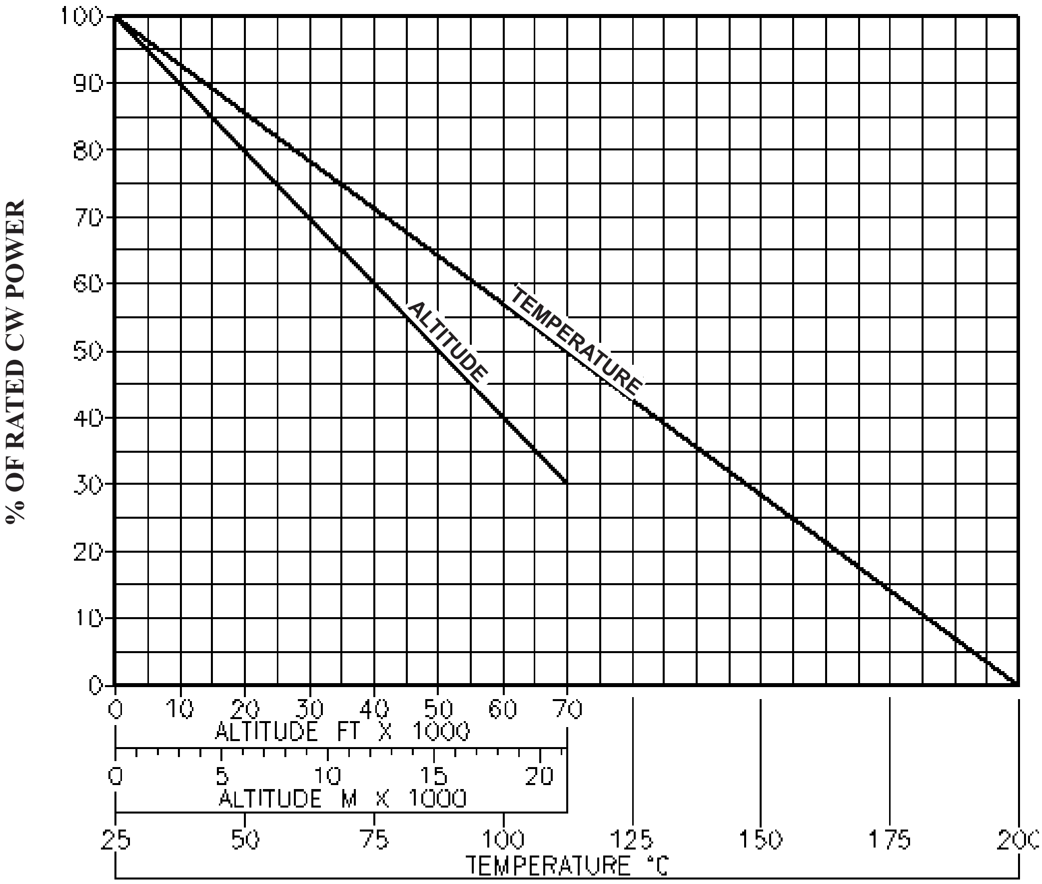
The Power Specifications, as listed on the Data Sheets, are based on Sea Level and an Ambient Temperature of 25 °C.
Other altitudes and/or higher temperatures will limit the power. The power derating diagrams below can be used to calculate the maximum power at certain altitudes and temperatures.

For information on Power Limits of complete Cable Assemblies, also power limiting information on the Connectors is needed. To obtain this information, please consult the factory.

Additional Power Limits can be borne in the application, or the shape of the cable assembly. Sharp bends or other mechanical stress can limit the power in addition.

A cable assembly with high VSWR will also take much less power stress than an electrical almost ideal assembly. An assembly with high loss will also not be a good candidate for high power.

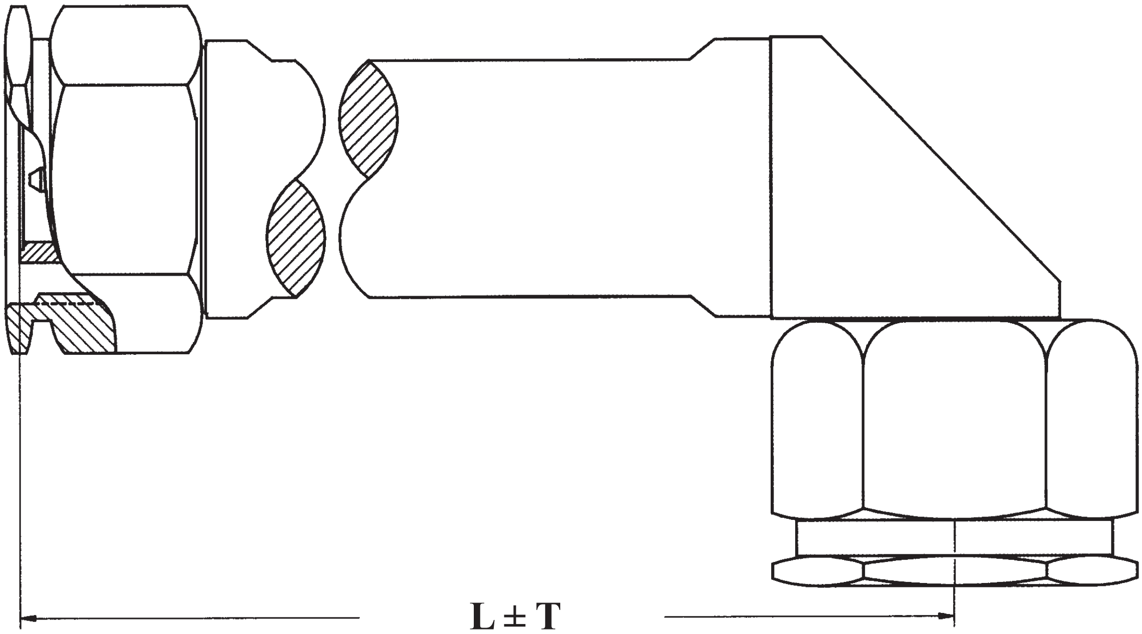
% DERATING FOR ALTITUDE AND TEMPERATURE



CABLE POWER CAPABILITY =
(RATED POWER) X (TEMPERATURE DERATING)

Lengths Tolerances on Cable Assemblies

The Length "L" of a Standard Cable Assembly is measured from the Reference Planes of the connectors, if not specified differently in the order. For angled connectors the center axis is used instead.



The Standard Tolerance "T" of the Length of the Cable Assembly depends on the actual length and the type of cable, flexible or semi rigid.

If not specified in the order, the standard tolerances below will be used. Upon request other tolerances can be offered. But it will depend on the type of cable, the style of the connectors and possibly also on other parameters of the customer specification. Smaller lengths tolerances may be subject to surcharge.

Semi-Rigid Cable Assemblies:

Length "L"	Tolerance "T"
20 cm max.	± 0.5 mm
20 cm to 50 cm	± 1.0 mm
50 cm to 100 cm	± 1.5 mm
100 cm to 310 cm	± 3.0 mm
310 cm to 610 cm	± 5.0 mm
> 610 cm	± 10.0 mm or 1% of the length, whichever is greater

Flexible Cable Assemblies:

Length "L"	Tolerance "T"
100 cm max	± 2.0 mm
100 cm to 200 cm	± 3.0 mm
> 200 cm	± 10.0 mm or 1% of the length, whichever is greater

Armor & Ruggedizing Options

In some applications it will be of advantage, or it even might be a necessity, to add some kind of protection to the cable assembly, to withstand harsh environment or rough handling, or both.

Spectrum Elektrotechnik GmbH offers a number of standard armor and ruggedizing options. The customer may decide which of the options fits best his requirement.

But besides these standard options, in certain programs different armoring or ruggedizing need to be used. It can be offered on request, knowing the exact application and the specific environment, a special Part Number will then be assigned.

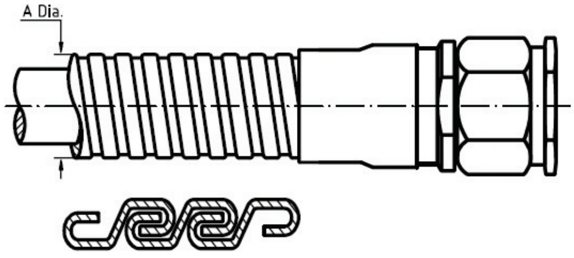
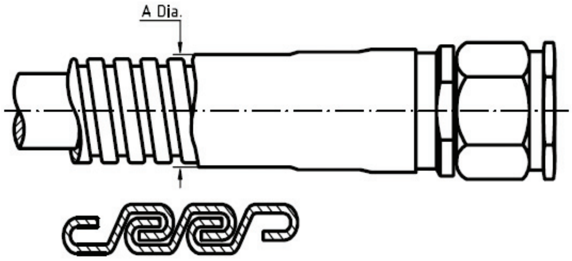
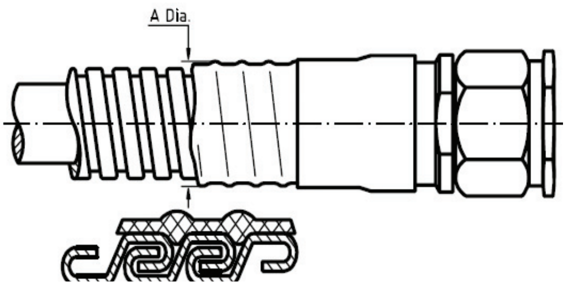
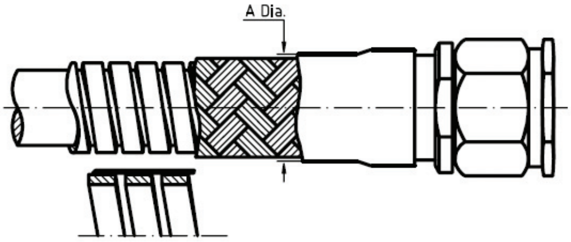
To have armor added to the cable, please proceed as follows:

* **For cable, using a 2 or 3 digit code, Types 01 - 999:**
  Add the code of the armor or ruggedizing option as described on the following pages, to the cable code (e.g.: cable of type **10**, armored with type **L** armor, becomes **10L**).

Examples for Armor & Ruggedizing Options	Description
H	The ultimate crush resistance
K	The ultimate crush resistance and excellent protection against humidity.
L	The ultimate crush resistance and excellent protection for humidity. It´s waterproof but also resistant to almost most chemicals.
M	When there is need for hard armor but with good flexibility, pull relief and twist resistance, this armor is recommended.

Suggested Armoring & Ruggedizing Options

Hard armor is used where crush resistance is required and less flexibility and higher weight are acceptable. The armor is known for its strength and toughness. The edges of the metal strip of the armor are folded in so that the joints interlock and form a four-wall thickness. To protect the assembly from humidity, the armor can be covered with flexible tubing. For details, please refer to the following pictures and descriptions (figures H - M) as shown below.

H	Type H: The ultimate crush resistance.	
K	Type K: The ultimate crush resistance and excellent protection against humidity. The stainless steel armor of Type H is completely covered with polyolefin shrink tubing per MIL - I - 23053/4	
L	Type L: The ultimate crush resistance and best protection against humidity. The jacket over the metal hose consists of gray silicone caoutchouc compound. The jacket is not only waterproof but also resistant to most chemicals over a wide temperature range.	
M	Type M: For hard armor but highest flexibility, pull relief and twist resistance this cable armoring can be recommended. It consists of a stainless steel spiral, interwoven by interlocking fiberglass yarn and jacketed by a silicone caoutchouc compound. The jacket is not only waterproof but also resistant to most chemicals over a wide temperature range.	

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Suggested Armoring & Ruggedizing Options

Cable Type	Cable Dia. (mm)	Armor Diameter / Min. Bend Radius (static) in mm			
		H	K	L	M
03	13.5	17.8 / 95	19.5 / 105		
10	5.8		9.6 / 50		
11	3.2			9.6 / 50	7.5 / 20
12	11.2	17.2 / 80	19.0 / 90		
14	7.4	12.2 / 55	12.2 / 55	15.6 / 75	
17	2.7			9.6 / 40	7.5 / 20
21	10.8	17.2 / 80	19.0 / 85		
37	4.6			9.6 / 40	
39	5.0			9.6 / 40	
43	4.3			9.6 / 50	
57	10.5	17.2 / 80	19.0 / 90		15.6 / 75
65	8.7	17.2 / 80	14.0 / 65		15.6 / 65
100	5.2			9.6 / 40	
120	11.2	17.2 / 80	18.5 / 90		
140	7.4	12.2 / 55	14.0 / 65	15.6 / 75	
300	13.5	17.8 / 95	19.5 / 105		
500L / 500H	14.0	17.8 / 95	19.5 / 105		

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Connector Specifications

A very important part of the cable assembly is the connector. The best cable without the best connectors is not worth much. Spectrum Elektrotechnik GmbH designs and manufactures its own connectors, each one especially engineered to the specific cable, to the application and even to customers' individual needs.

Connector Specifications

All the connectors manufactured and used by Spectrum Elektrotechnik GmbH, if not specified differently in the order, will meet the following standard specifications:

1.4/4.4	DIN 47298
1.8/5.6	IEEE - STD 287
2/5.5	DIN 47235
1.85 mm	IEEE - STD 287
2.4 mm	IEEE - STD 287
2.92 mm	IEEE - STD 287
3.5 mm	IEEE - STD 287
7 mm	IEEE - STD 287
7/16	DIN 47223
BMA	MIL-PRF-31031/1B
BNC	MIL-STD-348A/MIL-PRF-39012
C	MIL-STD-348A/MIL-PRF-39012
HN	MIL-STD-348A/MIL-PRF-39012
Multipins	MIL-DTL-38999 (for Series: SQ, TQ, IQ, CQ, BQ, RQ)
N	MIL-STD-348A/MIL-PRF-39012
SBC	Spectrum Elektrotechnik GmbH Specifications
SBX	Spectrum Elektrotechnik GmbH Specifications
SBY	Spectrum Elektrotechnik GmbH Specifications
SBZ	Spectrum Elektrotechnik GmbH Specifications
SC	MIL-STD-348A/MIL-PRF-39012
SCC	Spectrum Elektrotechnik GmbH Specifications
SMA	MIL-STD-348A/MIL-PRF-39012
SMP	MIL-STD-348A/MIL-PRF-39012
SMPM	MIL-STD-348A/MIL-PRF-39012
TNCA	MIL-STD-348A (DC-18.0 GHz)
TNC	MIL-STD-348A (DC-11.0 GHz)
TNX	Spectrum Elektrotechnik GmbH Specifications

The Specifications listed above are available on request. The Specifications are also shown in full detail in "The 97´ Adapter Handbook", and "The 97´ Connector Handbook". The Handbooks can be supplied free of charge. An example of a typical connector specification is shown on the following pages. Connectors that do not meet the appropriate specifications can ruin the mating connectors, test sets, etc.

Connector Specifications (Example)

The specifications below are general specifications for connectors. Specific Data for VSWR, Insertion loss, R.F. leakage etc., are available from the factory upon request. Specifications in the following table are recommended for any procurement documents or drawings. In the event of any conflict between these specifications and other documentation, these specifications shall govern. These specifications are subject to change according to the latest revision.

REQUIREMENT		GENERAL SPECIFICATIONS
GENERAL		
Standard Materials		STEEL corrosion resistant 1.4305 per DIN EN 10088-3 (ASTM-A 582). ALUMINUM AlMg4.5Mn, AlMgSi0.5, AlMgSi1per DIN EN 573-3 (SAE AMS QQ-A-225/8). BRASS CuZn39Pb3 per DIN EN 12163/12164 (ASTM B 16). COPPER BERYLLIUM CuBe2Pb H per ASTM B196. TFE Fluorocarbon per ASTM D 1710. SILICONE RUBBER per A A 59588. BORRIUM NITRITE Dielectric for high power applications per inhouse specification. KOVAR per ASTM F 15 GLASS Type: 7070 PTFE WOLFRAM COPPER WCu as per ASTM B702
Finish for	COPPER BERYLLIUM	Center Contacts shall be gold plated to a minimum thickness of .00005 inch (1.27 µm) in accordance with MIL-G-45204, Type II, Grade C.
	STAINLESS STEEL	shall be passivated per ASTM-A967.
	ALUMINUM	Conductive Parts shall have an iridited finish per MIL-DTL-5541. Other parts, such as Coupling Nuts and Back-Bodies shall be anodized per MIL-A-8625.
	BRASS	.00003 inch (0.8 µm) min.gold plating per MIL-G-45204, or nicle plating per QQ-N-190, as specified. Imoloy .0001 inch (2.5 µm) min. plating, consisting of 55% Copper / 20% Zinc / 25% Tin
	VARIOUS	(on special request).
	KOVAR	shall be gold plated to a minimum thickness of .00005 inch (1.27 µm) in accordance with MIL-G-45204, Type II, Grade C.
Design		The design shall be such that the outline dimensions in this catalog are met. In addition, the assembled connector shall meet the interface dimensions.
ELECTRICAL		
Frequency Range Insulation Resistance Voltage Standing Wave Ratio (VSWR) Contact Resistance Dielectric Withstanding Voltage RF High Potential Withstanding Voltage RF Leakage Insertion Loss		Please refer to the appropriate connector data sheet.
MECHANICAL		
Connector Durabilitiy Cable Retention Force Coupling Nut Retention Force Force to Engage and Disengage Longitudinal Force max. Mating Characteristics Recommended Mating Torque		Please refer to the appropriate connector data sheet.
ENVIRONMENTAL		
Corrosion (Salt Spray)		Specification MIL-STD-202, Method 101, Test Condition B. The salt solution shall be 5%.
Vibration		Specification MIL-STD-202, Method 204, Test Condition B.
Shock		Specification MIL-STD-202, Method 213, Test Condition 1.
Thermal Shock		Specification MIL-STD-202, Method 107, Test Condition B, except high temperature shall be +200°C.
Moisture Resistance		Specification MIL-STD-202, Method 106. Step 7b (vibration) shall be omitted. Insulation resistance shall be 200 megohms min. within 5 minutes of removal from humidity.

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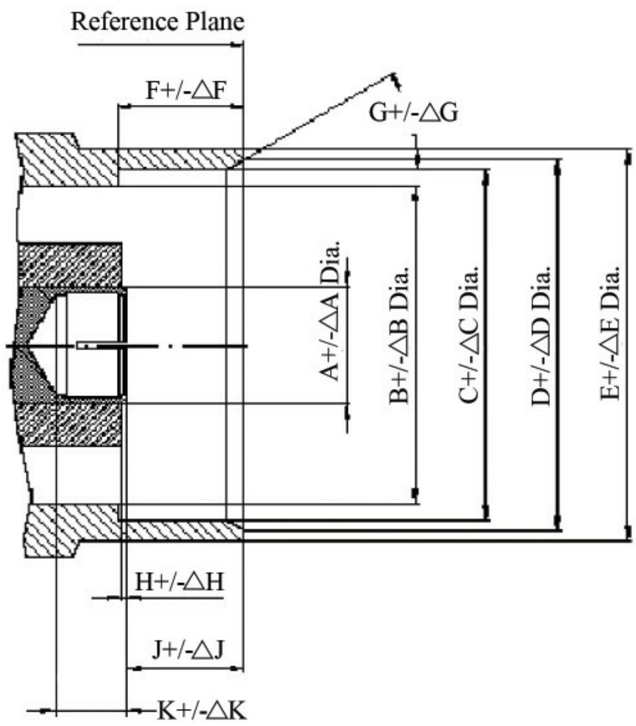
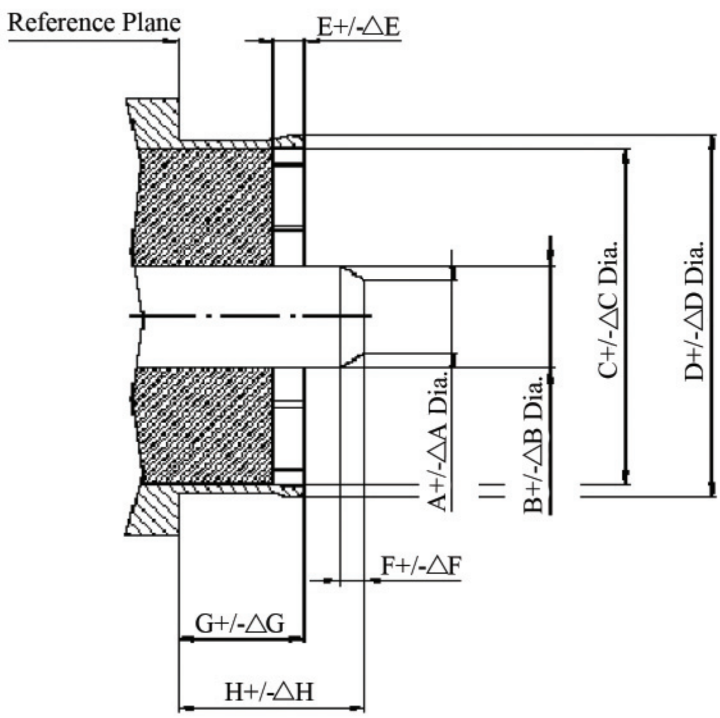
Connector Specifications (Example)





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Connector Selection Chart

Type	Sex	Description	Details	Code	Finish
1.4/4.4	Male	Straight		03	Brass Silver Plated
1.8/5.6	Female	Mitred Right Angle		06	Brass Gold Plated
	Female	Straight		04	
	Male	Mitred Right Angle		05	
	Male	Straight		07	
1.85mm	Female	Radius Right Angle		VF9	Stainless Steel Passivated
	Female	Straight		VF	
	Female	Straight	NMD	V2	
	Male	Straight	Maxi Nut	MV	
	Male	Radius Right Angle		VM9	
	Male	Straight		VM	
	Male	Straight	NMD	V2M	
13/30	Female	Straight		ZB1	Brass Silver Plated
	Male	Straight		Z13	
2.4mm	Female	Bulkhead Feedthrough		HB	Stainless Steel Passivated
	Female	Radius Right Angle		HF9	
	Female	Straight	2-Hole Flange Mount	HF2	
	Female	Straight	4-Hole Flange Mount	HF4	
	Female	Straight	NMD	H2	
	Female	Straight		HF	
	Male	Radius Right Angle		HM9	
	Male	Straight	Maxi Nut	M2	
	Male	Straight	NMD	H2M	
	Male	Straight		HM	
2/5.5	Male	Mitred Right Angle		02	Brass Silver Plated
2.92mm	Female	Bulkhead Feedthrough		KFB	Stainless Steel Passivated
	Female	Radius Right Angle		KF9	
	Male	Radius Right Angle		KM9	
	Female	Straight	2-Hole Flange Mount	KF2	
	Female	Straight	4-Hole Flange Mount	KF4	
	Female	Straight	NMD	WI	
	Female	Straight		KF	
	Male	Straight	Extreme Short Connector	KMS	
	Male	Straight	High Power	KMU	
	Male	Straight	Maxi-Nut	MK	
	Male	Straight	NMD	WIM	
	Male	Straight		KM	

Connector Selection Chart

Type	Sex	Description	Details	Code	Finish
3.5mm	Female	Straight	2-Hole Flange Mount	922	Stainless Steel Passivated
	Female	Straight	4-Hole Flange Mount	924	
	Female	Straight	NMD	H3	
	Female	Straight		92	
	Male	Straight	Maxi Nut	M3	
	Male	Straight	NMD	H3M	
	Male	Straight		91	
7 mm	Male	Straight	4 Slots Center Contact	90	Stainless Steel Passivated
	Male	Straight	6 Slots Center Contact	96	
	Male	Straight	Field Replaceable 4 sl.	E90	
	Male	Straight	Field Replaceable 6 sl.	E96	
7/16	Female	Bulkhead Feedthrough		753	Stainless Steel Passivated
	Female	Straight	4-Hole Flange Mount	754	
	Female	Straight	High Power	76H	
	Female	Straight		76	
	Male	Mitred Right Angle		755	
	Male	Straight	High Power	75H	
	Male	Straight		75	
BMA	Female	Bulkhead Feedthrough		BB	Stainless Steel Passivated
	Female	Straight	2-Hole Flange	BF	
	Female	Straight		BW	
	Male	Straight		BM	
BNC	Female	Bulkhead Feedhrough		81B	Brass Nickel Plated
	Female	Bulkhead Feedthrough		85	
	Female	Mitred Right Angle		83	
	Female	Straight	4-Hole Flange	84	
	Female	Straight		81	
	Male	Mitred Right Angle		74	
	Male	Straight		71	
	Male	Straight		72	Stainless Steel Passivated
C	Female	Straight		89	Stainless Steel Passivated
	Male	Straight		88	
EIA 1 5/8	Male	Straight		EA5	Brass Silver Plated
EIA 3 1/8	Male	Straight	4-Hole Flange	EA3	Brass Silver Plated
HN	Female	Bulkhead Feedthrough		68B	Stainless Steel Passivated
	Female	Straight		68	
	Male	Right Angle		67	
	Male	Straight	for Armoring	69	

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Connector Selection Chart

Type	Sex	Description	Details	Code	Finish
Multi Inserts for BQ,CQ,IQ SQ,TQ	Female	Firm, DC - 24.0 GHz		QFF	Stainless Steel Passivated
	Female	Firm, DC - 40.0 GHz		XFF	
	Female	Lim. Spring Load, DC - 24.0 GHz		QFE	
	Female	Lim. Spring Load, DC - 40.0 GHz		XFE	
	Female	Pressurized DC - 24.0 GHz		QPF	
	Female	Pressurized DC - 40.0 GHz		XPF	
	Female	Spring Loaded, DC - 24.0 GHz		QF	
	Female	Spring Loaded, DC - 40.0 GHz		XF	
	Male	Firm, DC - 24.0 GHz		QMF	
	Male	Firm, DC - 40.0 GHz		XMF	
	Male	Lim. Spring Load, DC - 24.0 GHz		QME	
	Male	Lim. Spring Load, DC - 40.0 GHz		XME	
	Male	Spring Loaded, DC - 24.0 GHz		QM	
	Male	Spring Loaded, DC - 40.0 GHz		XM	
N	Female	Bulkhead Feedthrough		63	Stainless Steel Passivated
	Female	Mitred Right Angle	4-Hole Flange	5C	
	Female	Mitred Right Angle	Bulkhead Feedthrough	5A	
	Female	Straight	4-Hole Flange	65	
	Female	Straight	4-Hole Flange Hi.Power	64H	
	Female	Straight	High Power	61H	
	Female	Straight	Interchangeable Connector	E61	
	Female	Straight		61	
	Male	135° Angle		53	
	Male	Mitred Right Angle		55	
	Male	Push-On, Full Locking		NS	
	Male	Push-On, Full Locking	Double "D"	ND	
	Male	Push-On, Full Locking	Double "D"	NDB	Brass Silver Plated
	Male	Push-On, Full Locking		NDS	Stainless Steel Passivated
	Male	Right Angle	Double "D", Hi. Power	55H	
	Male	Straight	90° Cable Bent	51B	
	Male	Straight	Factory Phase Adjustable	51L	
	Male	Straight	Hexagonal Knurl Nut	510	
	Male	Straight	High Power	50	BeCu2 Silver Plated
	Male	Straight	High Power	51H	Stainless Steel Passivated
	Male	Straight	Interchangeable Connector	E51	
	Male	Straight	Phase Adjustable	51A	
	Male	Straight	Ruggedized	52	
	Male	Straight	Venting Holes	51V	
	Male	Straight		51	
	Male	Straight, Push-On, Full Lockg		NSB	Brass Silver Plated

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Connector Selection Chart

Type	Sex	Description	Details	Code	Finish
RQ23	Female	Insert, Firm	Multipin Insert	21F	Stainless Steel Passivated
	Male	Insert, Spring Loaded		SMX	
SBX	Female	Bulkhead Feedthrough		XFR	Stainless Steel Passivated
	Female	Push-On; 4-Hole Flge Float Mount	High Power	XF4	
SBY	Female	Straight		YF	Stainless Steel Passivated
	Male	Straight		YM	
SC	Female	Bulkhead Feedthrough	High Power	78H	Stainless Steel Passivated
	Female	Bulkhead Feedthrough		78	
	Female	Straight	High Power	79H	
SC	Female	Straight		79	Stainless Steel Passivated
	Male	Mitred Right Angle		77	
	Male	Mitred Right Angle	High Power	77H	
	Male	Straight	High Power	80H	
	Male	Straight	Venting Holes	80V	
	Male	Straight		80	
SMA continuning at next Page	Female	Radius Right Angle	Reverse Sex	R99	Stainless Steel Passivated
	Female	Bulkhead Feedthrough		22	
	Female	Bulkhead Feedthrough		23	
	Female	Mitred Right Angle	Long Neck	18L	
	Female	Mitred Right Angle	Regular Neck	18R	
	Female	Mitred Right Angle		18	Stainless Steel Gold Plated
	Female	Radius Right Angle		19	Stainless Steel Passivated
	Female	Radius Right Angle		28	Stainless Steel Gold Plated
	Female	Radius Right Angle	4-Hole Flange	29	
	Female	Right Angle, Water Protected	Water Protected	14P	Stainless Steel Passivated
	Female	Straight		20	Stainless Steel Gold Plated
	Female	Straight	2-Hole Flange	26	
	Female	Straight	4-Hole Flange	24	
	Female	Straight	4-Hole Flange	25	Stainless Steel Passivated
	Female	Straight	High Power	21H	
	Female	Straight	Interchangeable Connector	E21	
	Female	Straight		21	
	Female	Radius Right Angle		18	Stainless Steel Gold Plated
	Female	Straight, Phase Adjustable	4-Hole Flange	PH1	Stainless Steel Passivated
	Male	180 Degree Bow		8W	
	Male	Mitred Right Angle	Long Neck	153	
	Male	Mitred Right Angle	Regular Neck	151	
	Male	Mitred Right Angle	Short Neck	152	
	Male	Mitred Right Angle		14	Stainless Steel Gold Plated
	Male	Mitred Right Angle		15	Stainless Steel Passivated
	Male	Mitred Right Angle, Wire-holes	Long	156	

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Connector Selection Chart

Type	Sex	Description	Details	Code	Finish
SMA continued	Male	Mitred Right Angle, Wire-holes	Regular	154	Stainless Steel Passivated
	Male	Mitred Right Angle, Wire-holes	Short Neck	155	
	Male	Push-On		SM	
	Male	Radius Right Angle		16	
	Male	Radius Right Angle		17	
	Male	Straight	2-Hole Flange	27	
	Male	Straight	Across Flats at the cable entry	1S	
	Male	Straight	for Armoring	1E	
	Male	Straight	Maxi Nut	MA	
	Male	Straight	Phase Adjustable	PH	
	Male	Straight	Phase Adjustable Connector	11A	
	Male	Straight	Phase Adjustable, Factory	11L	
	Male	Straight	Regular	10	
	Male	Straight	Short Connector	10S	
	Male	Straight	Short Connector	11S	
	Male	Straight		11	
	Male	Straight, DC - 26.5 GHz		11K	
	Male	Straight, using Cable C. Conductor		12	
	Male	Straight, using Cable C. Conductor		12	
SMB	Female	Right Angle, Mitred		RB	Brass Gold Plated
	Female	Straight, Push-On		FB	
	Male	Straight		MB	
SMC	Male	Mitred Right Angle		CW	Brass Gold Plated
	Male	Straight		MC	
	Female	Straight		FC	
SMP	Female	Bulkhead Feedthrough		SPU	BeCu2 Gold Plated
	Female	Float Mount		SPV	
	Female	Mitred Right Angle		MPR	
	Female	Mitred Right Angle		SPQ	
	Female	Push-On, Right Angle, Mitred		SPR	
	Female	Straight	EMI-Gasket	SPG	
	Female	Straight		SPT	
	Female	Straight		TMP	Stainless Steel Passivated
	Female	Straight		TP	
	Female	Straight, DC - 18.0 GHz		SPF	BeCu2 Gold Plated
	Female	Straight, DC - 26.5 GHz		SPE	
	Female	Straight, DC - 40.0 GHz		PF	
	Male	Bulkhead Feedthrough	Smooth Bore	STS	Stainless Steel Passivated
	Male	Straight	Test Connector Commercial	TMJ	
	Male	Straight		SPW	
	Male	Straight, 2-Hole Flange	Full Detent	SRF	
SMPM	Female	Straight		SZF	Stainless Steel Passivated
SSMA	Male	Straight		SSM	Stainless Steel Passivated

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Connector Selection Chart

Type	Sex	Description	Details	Code	Finish
SPM	Female	Bulkhead Feedthrough		PGF	Stainless Steel Passivated
	Female	Straight	2- Hole Flange	PG2	
	Female	Straight	4- Hole Flange	PG4	
	Female	Straight		PJ	
	Male	Straight	High Power	PMH	
	Male	Straight		PM	
SSMA	Female	Straight		SSF	Stainless Steel Passivated
	Male	Straight		SSM	
TNC	Female	135° Angle, Bulkhead Feethrough		42	Stainless Steel Passivated
	Female	Bulkhead Feedthrough	High Power	43H	
	Female	Bulkhead Feedthrough	Pressure Tight	43P	
	Female	Bulkhead Feedthrough		43	
	Female	Radius Right Angle	4- Hole Flange	46	
	Female	Radius Right Angle	4- Hole Flange	47	
	Female	Straight		41	
	Female	Straight	4-Hole Flange	41H	
	Female	Straight	High Power	41U	
	Female	Straight	High Power, 4-Hole Flange	45H	
	Female	Straight	Interchangeable Connector	E41	
	Female	Straight	Venting Holes	41V	
	Female	Straight, 4-Hole Flange		44	
	Female	Straight, 4-Hole Flange		45	
	Female	Straight		40	
	Male	135° Angle		36R	
	Male	135° Angle, 18.0 GHz		36	
	Male	Mitred Right Angle	High Power	35H	
	Male	Mitred Right Angle	High Power, Factory Phase Adj.	35L	
	Male	Mitred Right Angle	Long Neck	35M	
	Male	Mitred Right Angle	Very Long Neck	35N	
	Male	Mitred Right Angle		35	
	Male	Radius Right Angle		35R	
	Male	Straight	90° Radius at Cable	31B	
	Male	Straight	High Power	31H	
	Male	Straight	High Power, Factory Phase Adj.	31L	
	Male	Straight		31	
	Male	Straight	Interchangeable Connector	E31	
	Male	Straight	Phase Adjustable	31A	
	Male	Straight	Venting Holes	31V	
	Male	Straight, Push-On	Full Locking	TS	
TNX	Female	Straight		49	Stainless Steel Passivated
	Male	Straight		39	
WG-Conn		WR-137 Connection	direct Waveguide Connection	137	Aluminum Surtech passivated

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Connector Selection vs. Frequency Range

Spectrum Elektrotechnik GmbH

Coaxial Connector Frequency Range Chart

Frequency in (GHz) →	1	2	3	4	8	12.0	15	18	26.5	30	40	50	65
Band	L	S		C	X	KU		K	KA				

Connector Type	Operational Range →	Applicable MIL, DIN or IEC Spec
1.4/4.4	DC - 20.0 GHz	DIN 47298
1.8/5.6	DC - 10.0 GHz	DIN 47226
2/5.5	DC - 14.0 GHz	DIN 47235
1.85 mm	DC - 71.0 GHz for some Designs	IEEE-STD 287
2.4 mm	DC - 50.0 GHz	IEEE-STD 287
2.92 mm	DC - 40.0 GHz	MIL-STD-348A
3.5 mm	DC - 35.0 GHz	IEEE-STD 287
7 mm	DC - 18.0 GHz	IEEE-STD 287
7/16	DC - 7.5 GHz	DIN 47223
BMA	DC - 22.0 GHz	MIL-PRF-39012/1B
BNC	DC - 4.0 GHz	MIL-STD-348A/MIL-PRF-39012
C	DC - 10.0 GHz	MIL-STD-348A/MIL-PRF-39012
HN	DC - 8.0 GHz	MIL-STD-348A/MIL-PRF-39012
N	DC - 18.0 GHz min., optional DC - 20.0 GHz	MIL-STD-348A/MIL-PRF-39012
SBC	Frequency Range depending on Design and Application	Spectrum Specification
SBX	DC - 8.0 GHz	Spectrum Specification
SBY	DC - 12.0 GHz	Spectrum Specification
SBZ	Frequency Range depending on Design and Application	
SC	DC - 10.0 GHz	MIL-STD-348A/MIL-PRF-39012
SMA	DC - 18.0 GHz	MIL-STD-348A/MIL-PRF-39012
SMP	DC - 40.0 GHz	MIL-STD-348A/MIL-PRF-39012
SMPM	DC - 65.0 GHz	MIL-STD-348A/MIL-PRF-39012
TNC	DC - 11.0 GHz	MIL-STD-348A/MIL-PRF-39012
TNCA	DC - 18.0 GHz	MIL-STD-348A/MIL-PRF-39012
TNX	DC - 18.0 GHz	Spectrum Specification

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135° angled Connectors and Adapters where straight and mitred units do not fit.

Cable Index

Cable Code	Description	Part Number	Frequency	Page
03	High Performance Cable		DC - 9.5 GHz	B 6
05	Semi - Rigid Cable with Low Density Dielectric	421-307	DC - 75.0 GHz	L 3 & L 6
06	Semi - Rigid Cable with Low Density Dielectric	421-307-1	DC - 75.0 GHz	L 3 & L 6
07	Semi - Rigid Cable with Low Density Dielectric	421-307-3	DC - 75.0 GHz	L 3 & L 6
10	High Performance Cable		DC - 26.5 GHz	B 8
11	High Performance Cable		DC - 50.0 GHz	B10
12	High Performance Cable		DC - 12.0 GHz	B12
14	High Performance Cable		DC - 19.8 GHz	B14
16P	Phase Stable Cable, Phase King	P160	DC - 40.0 GHz	E 2
18	ANA-Cable		DC - 26.5 GHz	F 4
19E	Phase Stable Cable, Phase King	P190E	DC - 26.5 GHz	E 6
19P	Phase Stable Cable, Phase King	P190	DC - 26.5 GHz	E 4
20	Semi - Rigid Cable with Low Density Dielectric	421-220	DC - 10.0 GHz	L 3 & L 6
21	RG - 214/U	RG - 214/U	DC - 10.0 GHz	K 3 & K 4
21P	Phase Stable Cable, Phase King	P210	DC - 26.5 GHz	E 8
22	ANA-Cable		DC - 26.5 GHz	F 5
23	RG - 223/U	RG - 223/U	DC - 10.0 GHz	K 3 & K 5
27	Semi-Rigid Cable with Low Density Dielectric	421-227	DC - 14.0 GHz	L 3 & L 6
30P	Phase Stable Cable, Phase King	P300	DC - 18.0 GHz	E10
31	RG - 316/U	RG - 316/U	DC - 3.0 GHz	K 3 & K 6
32	RD - 316/U	RD - 316/U	DC - 3.0 GHz	K 3 & K 7
33	Handy Form: SL - Flex		DC - 24.0 GHz	on Request
36	Semi - Rigid Cable with Low Density Dielectric	421-336	DC - 21.0 GHz	L 3 & L 6
37	High Performance Cable		DC - 50.0 GHz	B16
39	High Performance Cable		DC - 45.0 GHz	B18
40	RG - 400/U	RG - 400/U	DC - 12.0 GHz	K 3 & K 8
42	RG - 142B/U	RG - 142B/U	DC - 12.0 GHz	K 3 & K 9
43	High Performance Cable		DC - 26.5 GHz	B20
46	Semi - Rigid Cable with solid Dielectric	421-047	DC - 107.0 GHz	L 2 & L 4
47	Semi - Rigid Cable with solid Dielectric	421-047-1	DC - 107.0 GHz	L 2 & L 4
47F	SpectrumFlex		DC - 65.0 GHz	J 2 & J 5

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Cable Index

Cable Code	Description	Part Number	Frequency	Page
47L	Handyform II, Low Density	422-100-3	DC - 118.0 GHz	H 3 & H 6
48	Semi - Rigid Cable with solid Dielectric	421-047-3	DC - 107.0 GHz	L 2 & L 4
50	Semi - Rigid Cable with solid Dielectric	421-250	DC - 19.0 GHz	L 3 & L 5
51	High Performance Cable		DC - 18.0 GHz	B22
52	Semi - Rigid Cable with solid Dielectric	421-252	DC - 19.0 GHz	L 3 & L 5
53	Semi - Rigid Cable with solid Dielectric	421-252-1	DC - 19.0 GHz	L 3 & L 5
54	Semi - Rigid Cable with solid Dielectric	421-252-3	DC - 19.0 GHz	L 3 & L 5
57	High Performance Cable		DC - 18.0 GHz	B23
58	RG - 58C/U	RG - 58C/U	DC - 3.0 GHz	K 3 & K10
60A	High Performance Cable		DC - 18.0 GHz	B24
60B	High Performance Cable		DC - 18.0 GHz	B24
65	High Performance Cable		DC - 26.5 GHz	B25
66	Handy Form I	502-13	DC - 18.0 GHz	H 3 & H 4
67	Handy Form I	501-19	DC - 18.0 GHz	H 3 & H 4
69	Semi - Rigid Cable with solid Dielectric	421-669	DC - 33.0 GHz	L 2 & L 5
69S	Semi - Rigid Cable with solid Dielectric	421-669SS	DC - 33.0 GHz	L 3 & L 6
70	Semi - Rigid Cable with solid Dielectric	421-669-1	DC - 33.0 GHz	L 3 & L 6
71	Semi - Rigid Cable with solid Dielectric	421-669-3	DC - 18.0 GHz	L 3 & L 6
72	Semi - Rigid Cable with solid Dielectric	421-669-3	DC - 33.0 GHz	L 3 & L 6
74	RG-174/A/U	RG-174/A/U	DC - 1.0 GHz	K 3 & K10
76	Semi - Rigid Cable with solid Dielectric	421-669-SSSS	DC - 33.0 GHz	L 3 & L 6
81	Semi - Rigid Cable with Low Density Dielectric	421-281	DC - 20.0 GHz	L 3 & L 6
83	Semi - Rigid Cable with solid Dielectric	421-087	DC - 60.0 GHz	L 2 & L 4
84	Semi - Rigid Cable with solid Dielectric	421-087-1	DC - 60.0 GHz	L 2 & L 4
85	Semi - Rigid Cable with solid Dielectric	421-087-3	DC - 60.0 GHz	L 2 & L 4
85L	Handy-Form II, Low Density	422-700-3	DC - 60.0 GHz	H 3 & H 6
89F	SpectrumFlex		DC - 50.0 GHz	J 2 & J 8
89	Semi - Rigid Cable with solid Dielectric	421-086	DC - 60.0 GHz	L 2 & L 4
90	Semi - Rigid Cable with solid Dielectric	421-086-1	DC - 60.0 GHz	L 2 & L 4
91	Semi - Rigid Cable with solid Dielectric	421-086-3	DC - 60.0 GHz	L 2 & L 4
94	Semi - Rigid Cable with solid Dielectric	421-086SS	DC - 60.0 GHz	L 2 & L 4

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Cable Index

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97	Semi - Rigid Cable with Low Density Dielectric	421-298-1	DC - 36.0 GHz	L 3 & L 6
98	Semi - Rigid Cable with Low Density Dielectric	421-298	DC - 36.0 GHz	L 3 & L 6
99	Semi - Rigid Cable with Low Density Dielectric	421-298-3	DC - 36.0 GHz	L 3 & L 6
100	High Performance Cable		DC - 26.5 GHz	B26
102	High Performance Cable		DC - 33.0 GHz	B30
104	High Performance Cable		DC - 26.5 GHz	B32
105	High Performance Cable		DC - 26.5 GHz	B34
106	High Performance Cable		DC - 26.5 GHz	B35
120	High Performance Cable		DC - 12.0 GHz	B36
140	High Performance Cable		DC - 19.8 GHz	B38
141	High Performance Cable		DC - 19.5 GHz	B42
141L	Handy-Form II, Low Density	422-900-3	DC - 40.0 GHz	H 3 & H 6
143	High Performance Cable		DC - 19.5 GHz	B44
145	Handy-Form II	422-130	DC - 120.0 GHz	H 3 & H 5
146	Handy-Form II	422-130-3	DC - 120.0 GHz	H 3 & H 5
150	Handy-Form II	422-121-3	DC - 20.0 GHz	H 3 & H 5
165	Handy-Form II	422-600	DC - 60.0 GHz	H 3 & H 5
166	Handy-Form II	422-600-3	DC - 60.0 GHz	H 3 & H 5
167	Handy-Form II	422-800-3	DC - 40.0 GHz	H 3 & H 5
168	Handy-Form II	422-800	DC - 40.0 GHz	H 3 & H 5
169F	SpectrumFlex		DC - 26.5 GHz	J2 & J10
250L	Handy-Form II, Low Density	422-250-3	DC - 20.0 GHz	H 3 & H 6
300	High Performance Cable		DC - 9.5 GHz	B46
361	Semi-Rigid Cable with Low Density Dielectric	421-336-1	DC - 21.0 GHz	L 3 & L 6
363	Semi-Rigid Cable with Low Density Dielectric	421-336-3	DC - 21.0 GHz	L 3 & L 6
434	Semi-Rigid Cable with solid Dielectric	421-034	DC - 150.0 GHz	L 2 & L 4
435	Semi-Rigid Cable with solid Dielectric	421-034-1	DC - 150.0 GHz	L 3 & L 6
436	Semi -Rigid Cable with solid Dielectric	421-034-3	DC - 107.0 GHz	L 3 & L 6
500	High Performance Cable		DC - 11.0 GHz	B47
670	Semi-Rigid Cable with solid Dielectric	421-671	DC - 33.0 GHz	L 2 & L 5
671	Semi-Rigid Cable with solid Dielectric	421-670-1	DC - 33.0 GHz	L 2 & L 5
672	Semi-Rigid Cable with solid Dielectric	421-670-3	DC - 33.0 GHz	L 2 & L 5
677	High Performance Cable		DC - 18.0 GHz	B48
750	High Performance Cable		DC - 8.0 GHz	B50

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RF Measurement Chart

VSWR = (1+r)/(1-r)	Reflection Coefficient "r"	Return Loss (dB)	Relative to Unity Reference			
			X dB Below Reference	Ref + x (dB)	Ref - x (dB)	Ref ± x Pk to Pk Ripple (dB)
∞	1.00	0	0	-6.00	∞	∞
17.40	0.891	1	1	-5.53	19.28	24.81
8.72	0.794	2	2	-5.08	13.74	18.81
5.85	0.708	3	3	-4.65	10.69	15.34
4.42	0.631	4	4	-4.25	8.66	12.91
3.57	0.562	5	5	-3.87	7.18	11.05
3.01	0.501	6	6	-3.53	6.22	9.75
2.61	0.477	7	7	-3.21	5.14	8.35
2.32	0.398	8	8	-2.91	4.41	7.32
2.10	0.355	9	9	-2.64	3.81	6.45
1.92	0.316	10	10	-2.39	3.30	5.69
1.78	0.282	11	11	-2.16	2.88	5.03
1.67	0.251	12	12	-1.95	2.51	4.46
1.58	0.224	13	13	-1.76	2.20	3.96
1.50	0.200	14	14	-1.58	1.93	3.51
1.43	0.178	15	15	-1.42	1.70	3.12
1.38	0.159	16	16	-1.28	1.50	2.78
1.33	0.141	17	17	-1.15	1.32	2.47
1.29	0.126	18	18	-1.03	1.17	2.20
1.25	0.112	19	19	-0.92	1.03	1.96
1.22	0.100	20	20	-0.83	0.92	1.74
1.196	0.0891	21	21	-0.741	0.811	1.552
1.172	0.0794	22	22	-0.644	0.719	1.382
1.152	0.0708	23	23	-0.594	0.638	1.232
1.134	0.0631	24	24	-0.531	0.566	1.098
1.119	0.0562	25	25	-0.475	0.502	0.977
1.107	0.0501	26	26	-0.434	0.466	0.880
1.096	0.0447	27	27	-0.380	0.397	0.777
1.083	0.0398	28	28	-0.338	0.353	0.691
1.074	0.0355	29	29	-0.303	0.314	0.556
1.065	0.0316	30	30	-0.270	0.279	0.549
1.058	0.0282	31	31	-0.242	0.248	0.490
1.052	0.0251	32	32	-0.215	0.221	0.436
1.046	0.0224	33	33	-0.192	0.197	0.389
1.041	0.0200	34	34	-0.172	0.174	0.347
1.036	0.0178	35	35	-0.153	0.156	0.309
1.032	0.0159	36	36	-0.137	0.138	0.275
1.029	0.0141	37	37	-0.122	0.123	0.245
1.026	0.0126	38	38	-0.109	0.110	0.219
1.023	0.0112	39	39	-0.098	0.098	0.196
1.020	0.0100	40	40	-0.086	0.087	0.173
1.0112	0.0056	45	45	-0.049	0.049	0.097
1.0064	0.0032	50	50	-0.028	0.028	0.056
1.0036	0.0018	55	55	-0.016	0.016	0.031
1.0020	0.0010	60	60	-0.008	0.0086	0.0172

Conversion Factors

To Convert		Into		Multiply by	Conversely multiply by
Ampere-hours	Ah	coulombs	C	3600,00	2.778 x 10-4
Celsius	°C	Fahrenheit	°F		°C = (°F-32) / 1.8
centimeters	cm	feet	ft	0.03281	30.48
centimeters	cm	inches	in	0.3937	2.54
ergs	erg	joules	J	10^{-7}	10^{7}
Fahrenheit	°F	Celsius	°C		°F = C° * 1.8 + 32
feet	ft	centimeters	cm	30.48	0.03281
feet	ft	yards	yd	0.33333	3
gallons, US	gal	liters	l	3.785	0.2642
grams	g	ounces	oz	0.03527	28.35
horsepower	hp	kilowatts	kW	0.745	1.342
inches	in	centimeters	cm	2.54	0.3937
inches	in	feet	ft	0.08333	12
inch-ponds	inlbf	newton-meters	Nm	0.11298	88.512
joules	J	ergs	erg	10^{7}	10^{-7}
joules	J	kilowatt-hours	kWh	2.788×10^{-7}	3.6×10^{-6}
kilograms [force]	kg m/s²	kilopond	kp	1.020	0.9807
kilograms	kg	pounds	lb	2.205	0.4536
kilopond	kp	kilograms [force]	kg m/s²	0.9807	0.1020
kilopond	Kp	newtons	N	9.807	1.020
kilowatt-hours	kWh	joules	J	3.6×10^{6}	2.778 x 10-7
kilowatts	kW	horsepowers	hp	1.342	0.745
liters	l	gallons	gal	0.2642	3.785
meters	m	microns	µm	10^{6}	10^{-6}
meters	m	miles [nautical]	nmi	5.4×10^{-4}	1852
meters	m	miles [statute]	mi	6.215×10^{-4}	1609
meters	m	mils	mil	3.937×10^{4}	2.54×10^{-5}
microns [micrometer]	µm	meters	m	10^{-6}	10^{6}
miles [nautical]	nmi	meters	m	1852	5.4×10^{-4}
miles [statue]	mi	meters	m	1609,00	6.215×10^{-4}
mils	mil	meters	m	2.54 x 10-5	3.937×10^{4}
newtons	N	kilopond	kp	0.1020	9.807
newtons	N	ounces [force]	oz	3.5968	0.2780
newtons	N	pounds [force]	lbf	0.2248	4.448
newtons-meters	Nm	inch-pounds	inlbf	8.8512	0.11298
newtons-meters	Nm	ounce-inches		1.416×10^{2}	7.062 x 10-3
ounces	oz	grams	g	28.35	0.03527
ounces [force]	oz	newtons	N	0.2780	3.5968
ounce-inches		newton-meters	Nm	7.062×10^{-3}	1.416×10^{2}
pounds	lb	kilograms	kg	0.4536	2.205
pounds [force]	lbf	newtons	N	4448,00	0.2248
yards	yd	feet	ft	3,00	0.33333

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