Precision Rotary Vane Attenuators
Series 110

Features
- 1% accuracy
- 0 dB - 60 dB
- Direct Reading
- Unsurpassed Reliability
- 2.60 GHz to 500 GHz

Applications
- Instrumentation
- Calibration

Model 32110

Flann Precision Rotary Vane Attenuators are considered by many to represent the 'Industry Standard' in precision waveguide attenuators, offering high accuracy and unsurpassed repeatability and reliability.

The Rotary Vane Attenuator is the ideal instrument for use in waveguide systems where broadband direct reading of attenuation is required, particularly as a standard for reflectometer and swept systems.

The Flann Rotary Vane Attenuator consists of a rotating circular waveguide section flanked by a pair of low VSWR rectangular to circular transitions. The three waveguide sections are fitted with stable high attenuation elements which ensure close agreement of the attenuation characteristic to the theoretical law. The attenuation is directly related to the relative angular position of the attenuating element in the centre section (Ø) and can be seen to follow the law 40 log (sec Ø). The attenuation is insensitive to frequency; variations of phase with attenuation are negligible. Choking of the rotating joints is employed to minimise RF leakage whilst sound mechanical design ensures the instruments are free from backlash. A precision 10 turn, 75 mm diameter helical drum scale provides extremely high resolution as the table below indicates:-

Attenuation (dB)	Repeatibility (dB)
10	0.002
20	0.003
40	0.005
60	0.008

Attenuation repeatibility over a 0 dB to 60 dB attenuation range

Attenuation scale range	1-4dB	4-30dB	30-40dB	40-60dB
Scale increment	0.01dB	0.1dB	0.2dB	0.5dB

Discrimination of the drum scale over a 0 dB to 60 dB attenuation range

By using high value attenuation markings on the scale, symmetrically positioned about the maximum attenuation position, the user is able to verify the attenuation characteristic alignment which gives the highest confidence in the accuracy of subsequent measurements.

Custom Built Units:-

Special attenuators can be supplied with a calibration range in excess of 60 dB. Combined rotary vane attenuator and rotary vane phase changer units are also available; these units are usually coupled at the circular waveguide section thereby minimising mismatch errors at low attenuation settings.

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Specifications: All ranges 0 dB to 60 dB with the following accuracy[1]

	WG10 to WG29	WG30	WG31	WG32	WM710	WM570
Attenuation accuracy	0 dB to 60 dB	0 dB to 50 dB	0 dB to 45 dB	0 dB to 40 dB	0 dB to 35 dB	0 dB to 30 dB
	0.1 dB or 1% whichever is greater	0.15 dB or 1.2% whichever is greater	0.2 dB or 1.5% whichever is greater	0.2 dB or 1.5% whichever is greater	0.3 dB or 2.0% whichever is greater	0.4 dB or 2.5% whichever is greater

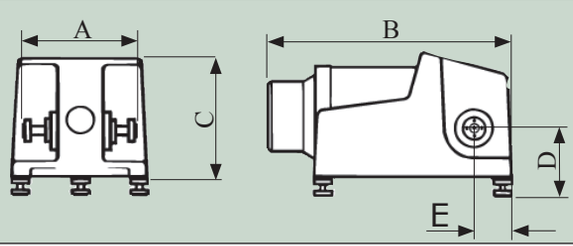
Operating temperature range: +5°C to +35°C (Refer to Flann for wider temperature range consideration)

Note 1: Customised models with extended attenuation ranges can be supplied. Please contact our Sales Team for further details.

Model	Frequency Range (GHz)	Waveguide				VSWR (better than)	Maximum Insertion Loss (dB)	Maximum Power (Watts)	Dimensions (mm)					Weight (kg)
		WG	WM	R	WR				A	B	C	D	E	
10110	2.60 - 3.95	10	-	32	284	1.15	0.25	12	935	358	198	88.2*	108	28
11A110	3.22 - 4.90	11A	-	40	229	1.15	0.25	10	687	358	198	81.2*	108	13
12110	3.94 - 5.99	12	-	48	187	1.15	0.25	10	560	244	149	66/75	58	8.5
13110	4.64 - 7.05	13	-	58	159	1.15	0.25	9	520	244	149	66/75	58	8.0
14110	5.38 - 8.18	14	-	70	137	1.15	0.25	8	420	244	149	66/75	58	6.0
15110	6.58 - 10.0	15	-	84	112	1.15	0.25	6	340	226	119	45/54	44	4.0
16110	8.20 - 12.5	16	-	100	90	1.15	0.25	4	300	226	119	45/54	44	3.8
17110	9.84 - 15.0	17	-	120	75	1.15	0.25	3	276	226	119	45/54	44	3.8
18110	11.9 - 18.0	18	-	140	62	1.15	0.3	2	250	226	119	45/54	44	3.4
19110	14.5 - 22.0	19	-	180	51	1.15	0.4	1.5	250	226	119	45/54	44	3.4
20110	17.6 - 26.7	20	-	220	42	1.15	0.6	1	250	226	119	45/54	44	3.3
21110	21.7 - 33.0	21	-	260	34	1.15	0.8	0.75	225	226	119	45/54	44	3.2
22110	26.4 - 40.1	22	-	320	28	1.15	0.9	0.5	174	227	119	55/64	36	2.6
23110	33.0 - 50.1	23	-	400	22	1.15	1.0	0.3	140	227	119	55/64	36	2.6
24110	39.3 - 59.7	24	-	500	19	1.15	1.0	0.25	134	227	119	55/64	36	2.6
25110	49.9 - 75.8	25	-	620	15	1.15	1.0	0.15	100	227	119	55/64	36	2.5
26110	60.5 - 92.0	26	-	740	12	1.15	1.3	0.1	89	227	119	55/64	36	2.5
27110	73.8 -112.0	27	-	900	10	1.15	1.5	0.07	89	227	119	55/64	36	2.5
28110	92.3 - 140	28	-	1200	8	1.20	1.8	0.05	89	227	119	55/64	36	2.3
29110	114 - 173	29	-	1400	6	1.25	2.2	0.035	58	227	119	55/64	36	2.3
30110	145 - 220	30	-	1800	5	1.28	2.7	0.02	42.8	127.5	79.5	46/55	41.5	1.1
31110	172 - 261	31	-	2200	4	1.40	3.0	0.015	38	127.5	79.5	46/55	41.5	1.1
32110	217 - 330	32	-	2600	3	1.55	3.5	0.01	32	127.5	79.5	46/55	41.5	1.1
710110	260 - 400	-	710	-	'2.8'	1.75	4.0	0.007	28	127.5	79.5	46/55	41.5	1.1
570110	330 - 500	-	570	-	'2.2'	2.20	4.5**	0.005	23	127.5	79.5	46/55	41.5	1.1

*** Non-adjustable mounting feet**
****5.3 dB @ 500 GHz**

ORDERING INFORMATION
Model: Description
Example: Model 16110 Rotary Vane Attenuator



For standard flange types and recommendations see pages 118 onwards