

Waveguide and Flange Data

Frequency Range (Ghz)	Waveguide Designation			Internal Dimensions (mm)	Flann 'Standard' flange details Please see page 110-115 for outline dimensions	
	British WG	IEC R	EIA WR		Flange Designation	Description
1.14 - 1.73	6	14	650	165.100 x 82.550	UG-417B/U Type (but without groove)	Rectangular, Ten hole fixing + 2 dowel holes
1.72 - 2.61	8	22	430	109.220 x 54.610	UG-435B/U Type (but without groove)	Rectangular, Ten hole fixing + 2 dowel holes
2.60 - 3.95	10	32	284	72.140 x 34.040	5985-99-083-1560 also drilled for the 5985-99-083-0010	Circular, Six/Eight hole fixing
3.30 - 4.90	11A	40	229	58.170 x 29.083	UDR 40	Rectangular, Ten hole fixing
3.94 - 5.99	12	48	187	47.550 x 22.149	UAR 48	Circular, Eight hole fixing
4.64 - 7.05	13	58	159	40.390 x 20.193	UAR 58	Circular, Six hole fixing
5.38 - 8.18	14	70	137	34.850 x 15.799	UAR 70	Circular, Six hole fixing
6.58 - 10.0	15	84	112	28.449 x 12.624	UBR 84	Square, Four hole fixing
8.20 - 12.5	16	100	90	22.860 x 10.160	UBR 100	Square, Four hole fixing
9.84 - 15.0	17	120	75	19.050 x 9.525	UBR 120	Square, Four hole fixing
11.9 - 18.0	18	140	62	15.799 x 7.899	UBR 140	Square, Four hole fixing
14.5 - 22.0	19	180	51	12.954 x 6.477	UBR 180	Square, Four hole fixing
17.6 - 26.7	20	220	42	10.668 x 4.318	UBR 220 Type	Square, Four hole fixing
21.7 - 33.0	21	260	34	8.636 x 4.318	UBR 260 Type	Square, Four hole fixing
26.4 - 40.1	22	320	28	7.112 x 3.556	UG-599/U	Square, Four hole fixing
33.0 - 50.1	23	400	22	5.690 x 2.845	*UG-383/U	Circular, Four hole fixing/doweled
39.3 - 59.7	24	500	19	4.775 x 2.388	*UG-383/U (Modified)	Circular, Four hole fixing/doweled
49.9 - 75.8	25	620	15	3.759 x 1.880	*UG-385/U	Circular, Four hole fixing/doweled
60.5 - 92.0	26	740	12	3.099 x 1.549	*UG-387/U	Circular, Four hole fixing/doweled
73.8 - 112	27	900	10	2.540 x 1.270	*UG-387/U (Modified)	Circular, Four hole fixing/doweled
92.3 - 140.0	28	1200	8	2.032 x 1.016	*UG-387/U (Modified)	Circular, Four hole fixing/doweled
114.0 - 173.0	29	1400	6	1.651 x 0.826	*UG-387/U (Modified)	Circular, Four hole fixing/doweled
145.0 - 220.0	30	1800	5	1.295 x 0.648	*UG-387/U (Modified)	Circular, Four hole fixing/doweled
172.0 - 261.0	31	2200	4	1.092 x 0.546	*UG-387/U (Modified)	Circular, Four hole fixing/doweled
217.0 - 330.0	32	2600	3	0.864 x 0.432	*UG-387/U (Modified)	Circular, Four hole fixing/doweled

Note: Products fitted with flange types marked thus * are supplied with two fixing screws per flange and provided with alignment dowels in accordance with Mil-F-3922/67B.

Standard product finishes

Plate: Tin nickel for the larger, low frequency products; gold plate for smaller and millimetric products.

Paint: two part epoxy paint in mid brunswick green.

Waveguide Flanges, General Information

See pages 110 to 115 for “Standard” Flange Details and outline dimensions

- Most waveguide flange types are available from WG6 (WR650) to WG32 (WR3)
- Special waveguide flanges can be supplied to order

Flann is able to provide ‘free fit’ waveguide flanges for WG6 (WR650) to WG32 (WR3) for customers’ own manufacturing assemblies.

Flange fixing hardware (nuts, bolts, gaskets, shims, etc) is also available. We are also able to supply special flanges to customers’ requirements.



Standard Flanges

All waveguide products in this catalogue are fitted with Flann “Standard Flanges” as listed on page 108, except where stated.

Note: Choke flanges are not recommended for broadband waveguide equipment.

Details of the “Standard Flanges” as fitted to Flann products are shown on Pages 110 to 115.

Flanges and flange hardware - quotations for standard and special flanges are available on request. Flange fixing bolts, nuts, dowels and O ring seals are also available - details on request.

Anti-Cocking Flanges for Millimetric Waveguide Bands

- Greatly improved performance and repeatability
- Fully compatible with standard “Mil spec” flanges

The Millimetric flanges in the Series UG-381/U to UG-387/U are notorious for “cocking” during connection which results in leakage, increased insertion loss, discontinuity and poor repeatability. Flann produces a range of millimetric “Anti-cocking” flanges which provide greatly improved performance and repeatability whilst maintaining full compatibility with standard Mil spec flanges. “Anti-cocking” flanges are optionally available on most millimetric products in the Flann product range. Refer to page 119 for details. Customers requiring millimetric products fitted with anti-cocking flanges must request such flanges at the time of the initial enquiry. Purchase orders must specify anti-cocking flanges, if required, as such flanges can not be retro-fitted to products.

NOTE: Anti-cocking flanges must be specified at time of order.

Precision Flanges

Precision flanges are fitted as standard to all Flann calibration kit components and individual Metrology Grade Components.

Flann precision flanges are fully compatible with “standard” flange types. Precision flanges in the millimetric waveguide sizes also incorporate the “anti-cocking” feature. See from page 116 for details.

Waveguide Materials

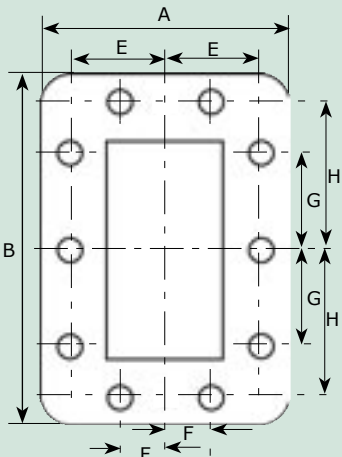
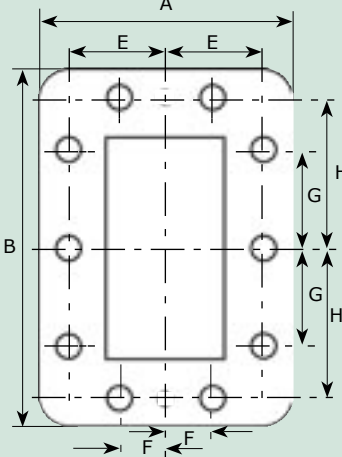
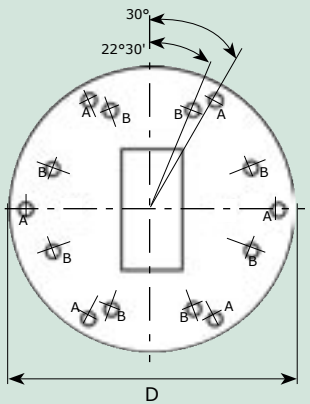
Flann is able to supply most products either in brass / copper waveguide or in aluminium. Metrology grade products have the waveguide sections machined to a high accuracy from solid material. The remaining products utilise premium drawn waveguide supplied to MIL specification or equivalent.

“Standard” Flange Data

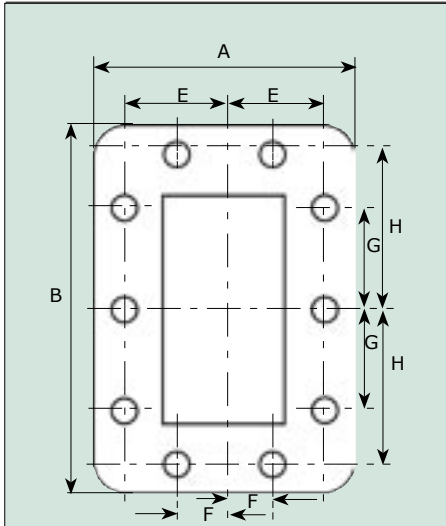
The following flange details show the “standard” flange types as fitted to Flann products, unless otherwise stated. Full dimensional details of all “standard” flange types are available on request.

Alternative and custom flanges can be fitted to special order.

Flann is also able to supply most types of Flanges as separate items. Please contact our sales office for price and availability information.

	<p style="text-align: center;">Flann Standard Flanges</p> <p>WG6 R14 WR650 UG417B/U TYPE (without groove)</p> <p>A 138.90 B 221.50 E 58.69 F 31.73 G 60.30 H 100.00 Holes 10 x 8.20 dia Dowel Holes 6.35dia</p>	<p style="text-align: center;">Non-Standard Flanges</p> <p>Full details on request</p> <p>UDR 14 CPR 650F</p>
	<p style="text-align: center;">WG8 R22 WR430 UG435B/U TYPE (without groove)</p> <p>A 106.38 B 161.14 E 43.69 F 23.83 G 45.39 H 70.99 Holes 10 x 6.71 dia Dowel Holes 6.35dia</p>	<p>UDR 22 CPR 430F</p>
	<p style="text-align: center;">WG10 R32 WR284 5985 - 99 - 083 --1560/0010</p> <p>Holes A 6 x 6.52 dia on 136.52 PCD Holes B 8 x 6.52 dia on 120.65 PCD D 149.20 dia</p>	<p>UDR 32 CPR 284F 5985-99-083-0058 Type UAR 32 UG-53/U</p> <p>NOTE: ALL DIMENSIONS ARE IN MILLIMETERS See pages 116 - 118 for details of Flann precision style flanges.</p>

“Standard” Flange Data



Flann Standard Flanges

Non-Standard Flanges

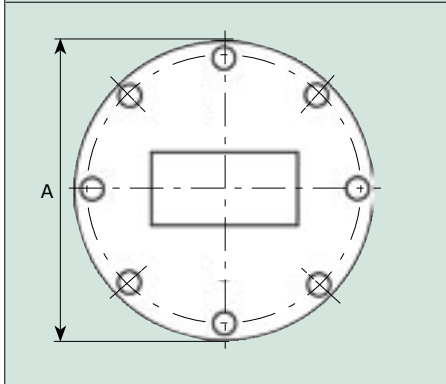
Full details on request

WG11A R40 WR229

UDR 40

UER 40
CPR 229F
CMR 229

- A 70.20
- B 98.73
- E 26.67
- F 12.70
- G 27.18
- H 41.15
- Holes 10 x 6.50 dia

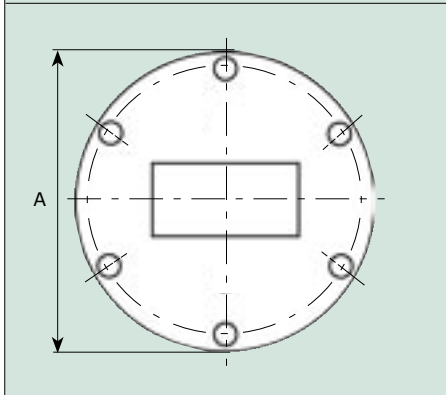


WG12 R48 WR187

UAR 48

UDR 48
UER 48
CPR 187F
CMR 187

- Holes 8 x 5.15 dia
on 82.55 PCD
- A 92.33 dia

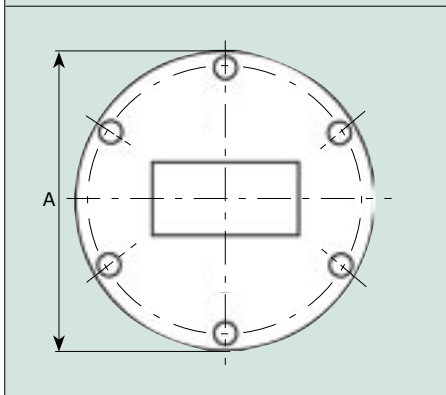


WG13 R58 WR159

UAR 58

UDR 58
UER 58
CPR 159F
CMR 159

- Holes 6 x 5.15 dia
on 76.20 PCD
- A 85.915 dia



WG14 R70 WR137

UAR 70

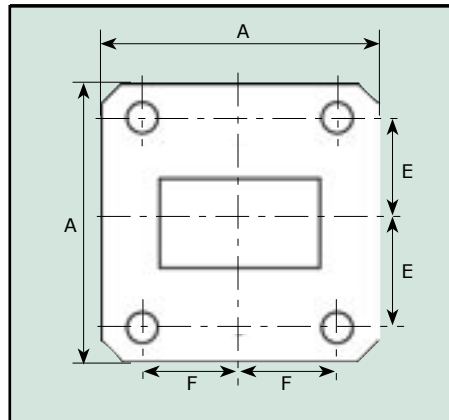
UDR 70
UER 70
CPR 137F
CMR 137

- Holes 6 x 5.15 dia
on 69.85 PCD
- A 79.50 dia

NOTE: ALL DIMENSIONS ARE IN MILLIMETERS

See pages 116 - 118 for details of Flann precision style flanges.

"Standard" Flange Data



Flann Standard Flanges

Non-Standard Flanges

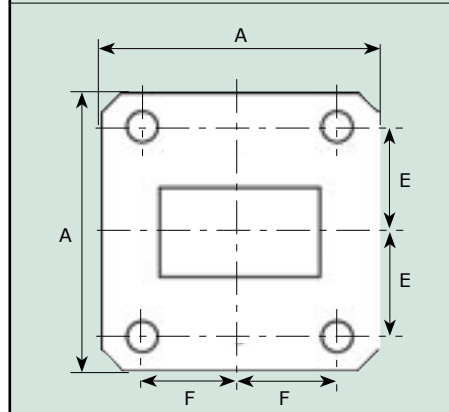
Full details on request

WG15 R84 WR112

UBR 84

A	47.90
E	18.72
F	17.17
Holes	4 x 4.255 dia

UDR 84
UER 84
CPR 112F
CMR 112

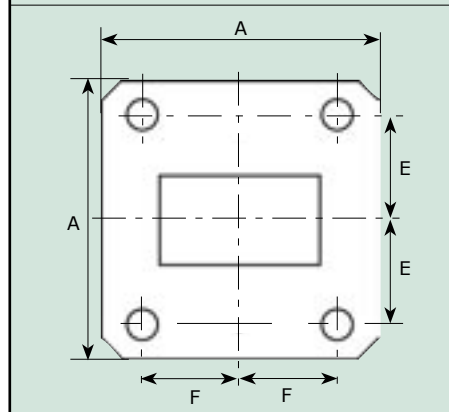


WG16 R100 WR90

UBR 100

A	41.40
E	16.26
F	15.49
Holes	4 x 4.255 dia

UDR 100
UER 100
CPR 90F
CMR 90

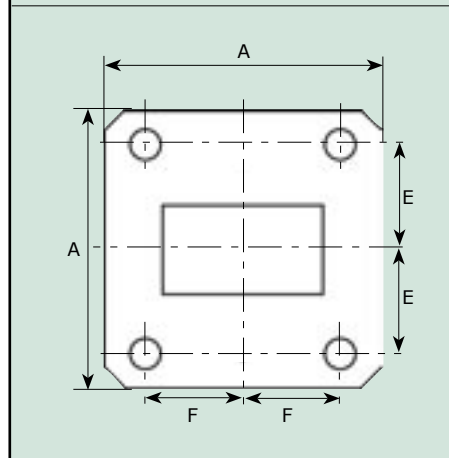


WG17 R120 WR75

UBR 120

A	38.30
E	14.25
F	13.21
Holes	4 x 4.085 dia

UDR 120



WG18 R140 WR62

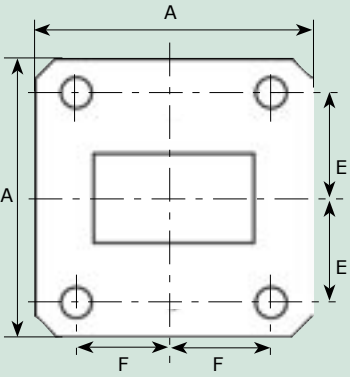
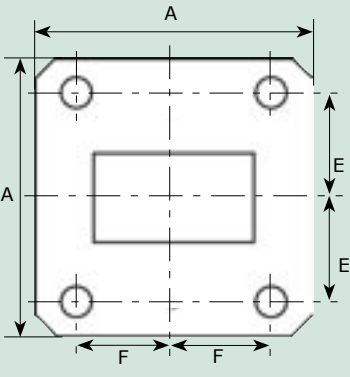
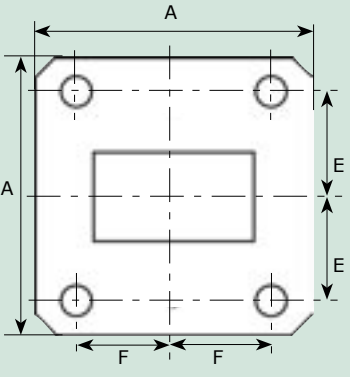
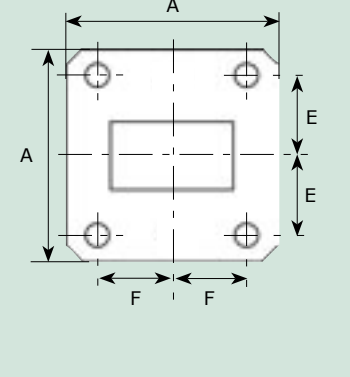
UBR 140

A	33.30
E	12.14
F	12.63
Holes	4 x 4.085 dia

UDR 140
UG-419/U

NOTE: ALL DIMENSIONS ARE IN MILLIMETERS
See pages 116 - 118 for details of Flann precision style flanges.

“Standard” Flange Data

	<p>Flann Standard Flanges</p> <p>WG19 R180 WR51 UBR 180</p> <p>A 31.00 E 11.25 F 10.29 Holes 4 x 4.085 dia</p>	<p>Non-Standard Flanges Full details on request</p> <p>UDR 180</p>
	<p>WG20 R220 WR42 UBR 220 TYPE</p> <p>A 22.41 E 8.51 F 8.13 Holes 4 x 3.07 dia</p>	<p>UG-595/U UG-425/U</p>
	<p>WG21 R260 WR34 UBR 260 TYPE</p> <p>A 22.10 E 7.90 F 7.50 Holes 4 x 3.07 dia</p>	<p>Custom flanges can be considered</p>
	<p>WG22 R320 WR28 UG-599/U</p> <p>A 19.05 E 6.73 F 6.35 Holes 4 x 2.98 dia</p>	<p>UBR 320</p>

NOTE: ALL DIMENSIONS ARE IN MILLIMETERS
See pages 116 - 118 for details of Flann precision style flanges.

“Standard” Flange Data

Note: Products fitted with Circular, Four hole fixing/Doweled flanges WG23 (WR22) to WG28 (WR8) are supplied with two captive fixing screws per flange.

“Anti-cocking” Flanges - We strongly recommend that customers specify “anti-cocking” flanges on instruments in the waveguide range WG23 (WR22) to WG28 (WR8). “Anti-cocking” flanges provide better performance and repeatability than standard flanges whilst maintaining full compatibility with MIL spec types. Please refer to page 119 for details and outline dimensions.

Flann Standard Flanges

Non-Standard Flanges

Full details on request

WG23 R400 WR22

UG-383/U (MIL-F-3922/67B-006)

Holes C4 x 4-40 UNC-2B

Holes D2 x 1.65 dia

Holes E2 x dowels 1.549/
1.562 dia x 4
projection

All Holes on 23.81 PCD

A28.55

WG24 R500 WR19

UG-383/U Modified (MIL-F-3922/67B-007)

Holes C4 x 4-40 UNC-2B

Holes D2 x 1.65 dia

Holes E2 x dowels 1.549/
1.562 dia x 4
projection

All Holes on 23.81 PCD

A28.55

WG25 R620 WR15

UG-385/U modified (MIL-F-3922/67B-08)

Holes C4 x 4-40 UNC-2B

Holes D2 x 1.65 dia

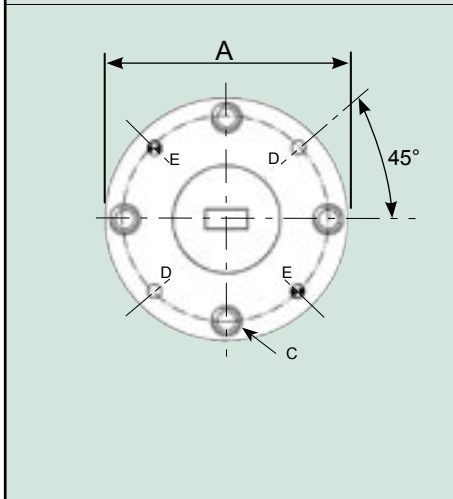
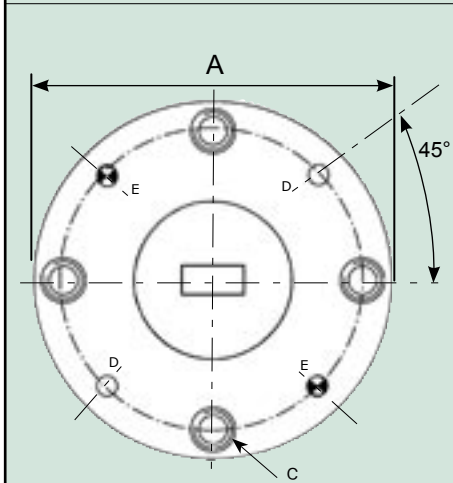
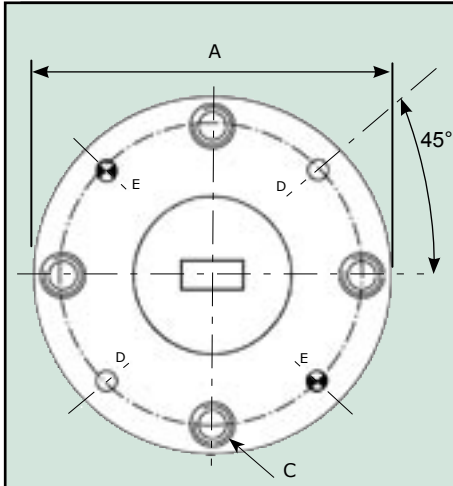
Holes E2 x dowels 1.549/
1.562 dia x 4
projection

All Holes on 14.29 PCD

A19.05

NOTE: ALL DIMENSIONS ARE IN MILLIMETERS

See pages 116 - 118 for details of Flann precision style flanges.



“Standard” Flange Data

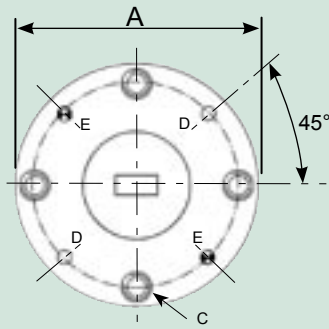
Note: Products fitted with Circular, Four hole fixing/Doweled flanges WG23 (WR22) to WG28 (WR8) are supplied with two captive fixing screws per flange.

“Anti-cocking” Flanges - We strongly recommend that customers specify “anti-cocking” flanges on instruments in the waveguide range WG23 (WR22) to WG28 (WR8). “Anti-cocking” flanges provide better performance and repeatability than standard flanges whilst maintaining full compatibility with MIL spec types. Please refer to page 119 for details and outline dimensions.

Flann Standard Flanges

Non-Standard Flanges

Full details on request

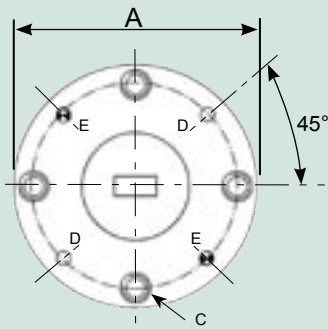


WG26 R740 WR12

UG-387/U (MIL-F-3922/67B-009)

Holes C4 x 4-40 UNC-2B
 Holes D.....2 x 1.65 dia
 Holes E2 x dowels 1.549/
 1.562 dia x 4
 projection
 All Holes on 14.29 PCD
 A19.05

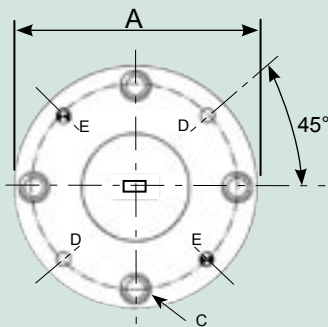
MIL-F3922/74-001



WG27 R900 WR10

UG-387/U Modified(MIL-F-3922/67B-010)

Holes C4 x 4-40 UNC-2B
 Holes D.....2 x 1.65 dia
 Holes E2 x dowels 1.549/
 1.562 dia x
 projection
 All Holes on 14.29 PCD
 A19.05



WG28 R1200 WR8

UG-387/U Modified

Holes C4 x 4-40 UNC-2B
 Holes D.....2 x 1.65 dia
 Holes E2 x dowels 1.549/
 1.562 dia x 4
 projection
 All Holes on 14.29 PCD
 A19.05

MIL-F3922/74-001

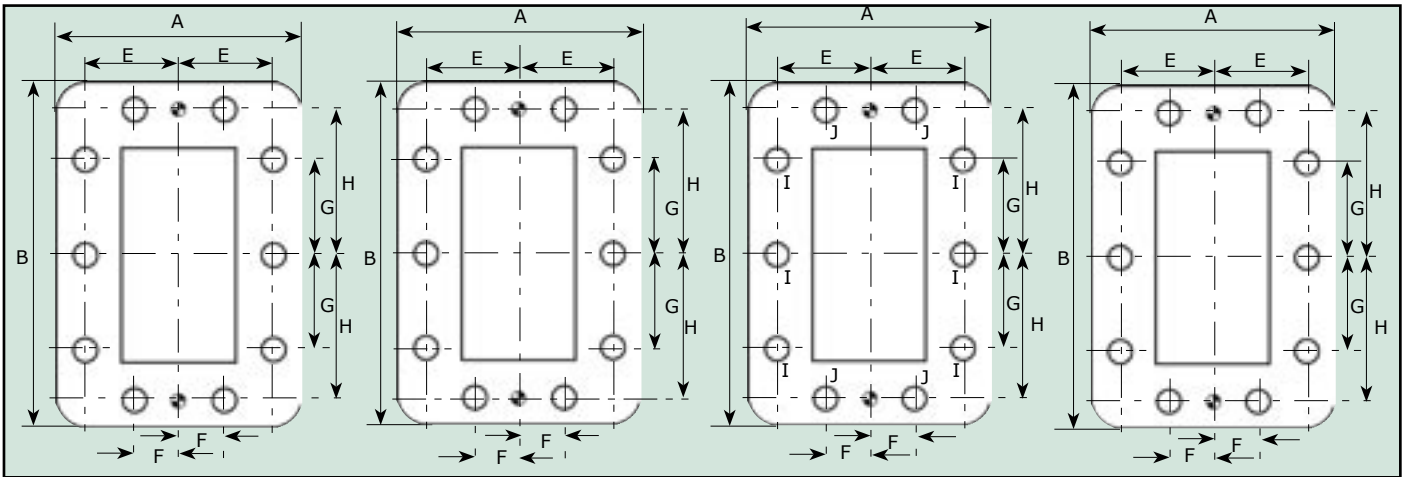
NOTE: ALL DIMENSIONS ARE IN MILLIMETERS
 See pages 116 - 118 for details of Flann Precision Style Flanges.

Precision Style Flange Details

The following flange details show the precision style flange types as fitted to Flann calibration grade products, unless otherwise stated.

Full dimensional details of all precision style flange types are available on request.

Alternative flanges may be supplied to special order.



WG6 R14 WR650
UG417B/U TYPE (Without Groove)-PF

A.....	138.90
B.....	221.50
E.....	58.69
F.....	31.73
G.....	60.30
H.....	100.00
Holes.....	10 x 8.20 dia
Dowel Holes.....	2 x 6.375 dia

WG8 R22 WR430
UG435B/U TYPE (Without Groove)-PF

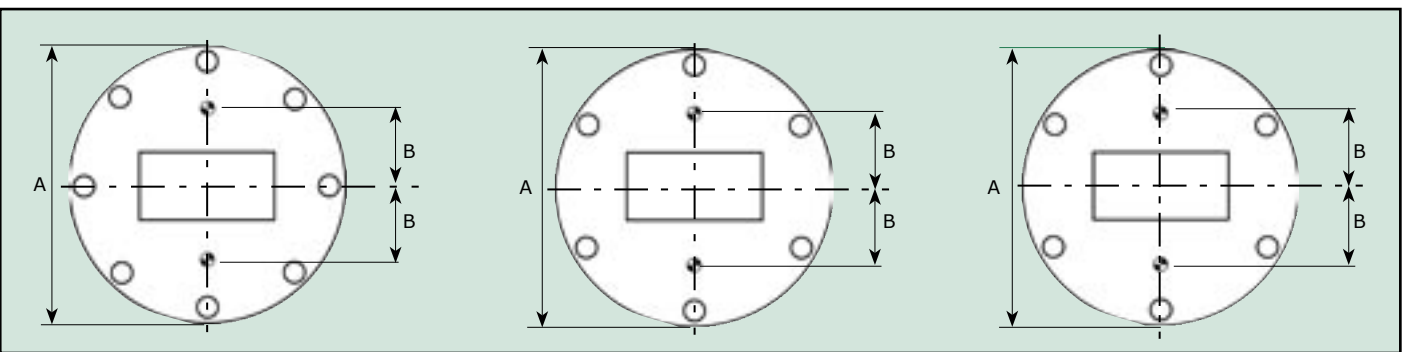
A.....	106.38
B.....	161.14
E.....	43.69
F.....	23.83
G.....	45.39
H.....	71.0
Holes.....	10 x 6.71 dia
Dowel Holes.....	2 x 6.375 dia

WG10 R32 WR284
UDR 32

A.....	76.20
B.....	114.3
E.....	29.57
F.....	14.68
G.....	32.54
H.....	48.61
Holes I.....	6 x 7 dia
Holes J.....	4 x 6.6 dia
Dowel Holes.....	2 x 6.375 dia

WG11A R40 WR229
UDR 40 -PF

A.....	70.20
B.....	98.73
E.....	26.67
F.....	12.70
G.....	27.18
H.....	41.15
Holes.....	10 x 6.50 dia
Dowel Holes.....	2 x 6.375 dia



WG12 R48 WR187
UAR 48 -PF

Holes.....	8 x 5.15 dia on 82.55 PCD
A.....	92.33 dia
Dowel Holes.....	2 x 6.375 dia
B.....	29.188

WG13 R58 WR159
UAR 58 -PF

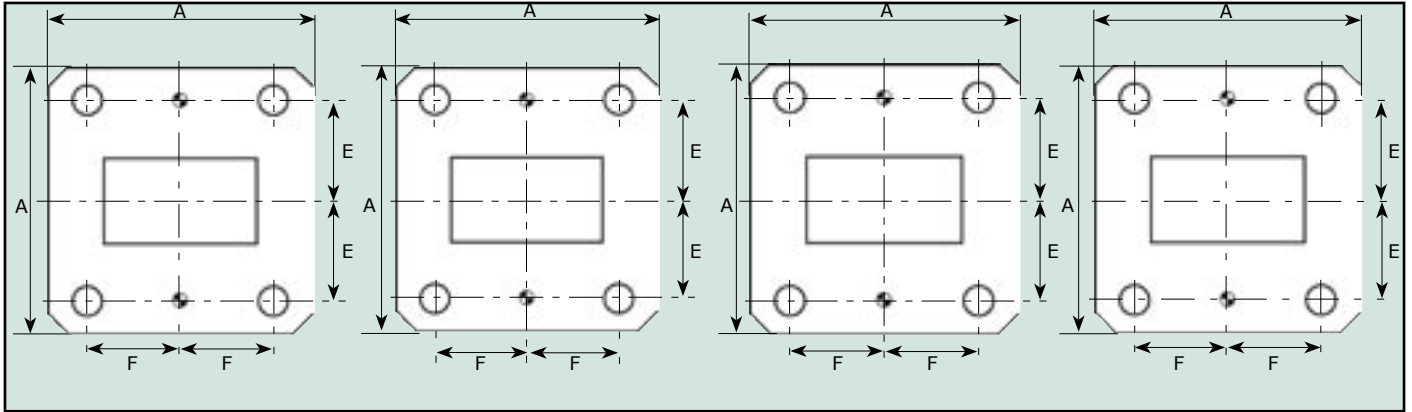
Holes.....	6 x 5.15 dia on 76.20 PCD
A.....	85.915 dia
Dowel Holes.....	2 x 6.375 dia
B.....	26.94

WG14 R70 WR137
UAR 70 -PF

Holes.....	6 x 5.15 dia on 69.85 PCD
A.....	79.50 dia
Dowel Holes.....	2 x 6.375 dia
B.....	24.695

NOTE: ALL DIMENSIONS ARE IN MILLIMETERS

Precision Style Flange Details



WG15 R84 WR112

UBR 84 -PF

A..... 47.90
 E..... 18.72
 F..... 17.17
 Holes..... 4 x 4.255 dia
 Dowel Holes..... 2 x 2.38 dia

WG16 R100 WR90

UBR 100 -PF

A..... 41.40
 E..... 16.26
 F..... 15.49
 Holes..... 4 x 4.255 dia
 Dowel Holes..... 2 x 2.38 dia

WG17 R120 WR75

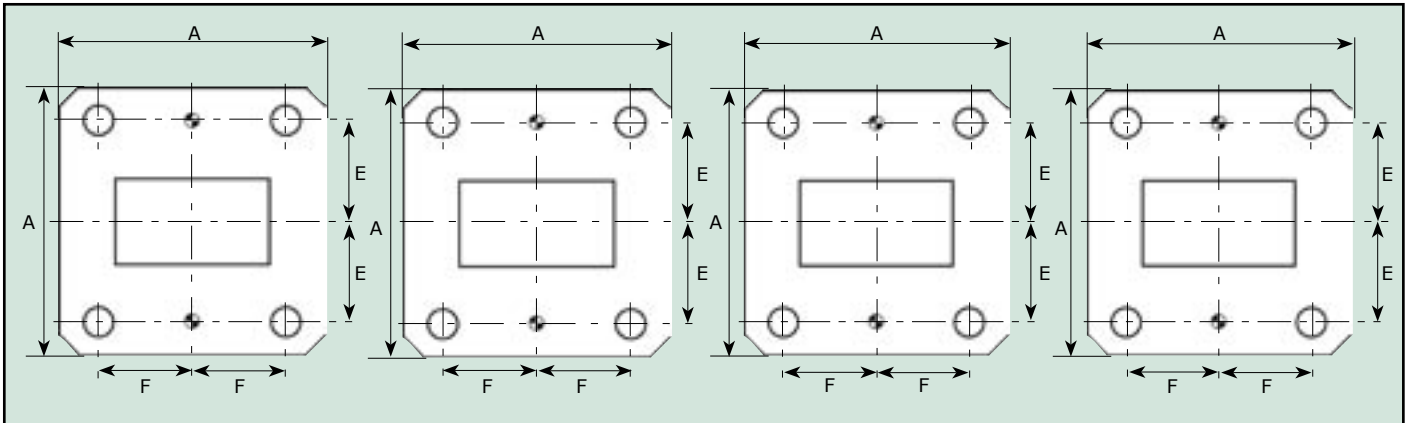
UBR 120 -PF

A..... 38.30
 E..... 14.25
 F..... 13.21
 Holes..... 4 x 4.085 dia
 Dowel Holes..... 2 x 2.38 dia

WG18 R140 WR62

UBR 140 -PF

A..... 33.30
 E..... 12.14
 F..... 12.63
 Holes..... 4 x 4.085 dia
 Dowel Holes..... 2 x 2.38 dia



WG19 R180 WR51

UBR 180 -PF

A..... 31.00
 E..... 11.25
 F..... 10.29
 Holes..... 4 x 4.085 dia
 Dowel Holes..... 2 x 2.38 dia

WG20 R220 WR42

UBR 220 TYPE -PF

A..... 22.41
 E..... 8.51
 F..... 8.13
 Holes..... 4 x 3.07 dia
 Dowel Holes..... 2 x 2.38 dia

WG21 R260 WR34

UBR 260 TYPE -PF

A..... 22.10
 E..... 7.90
 F..... 7.50
 Holes..... 4 x 3.07 dia
 Dowel Holes..... 2 x 2.38 dia

WG22 R320 WR28

UG-599/U -PF

A..... 19.05
 E..... 6.73
 F..... 6.34
 Holes..... 4 x 2.98 dia
 Dowel Holes..... 2 x 2.38 dia

NOTE: ALL DIMENSIONS ARE IN MILLIMETERS

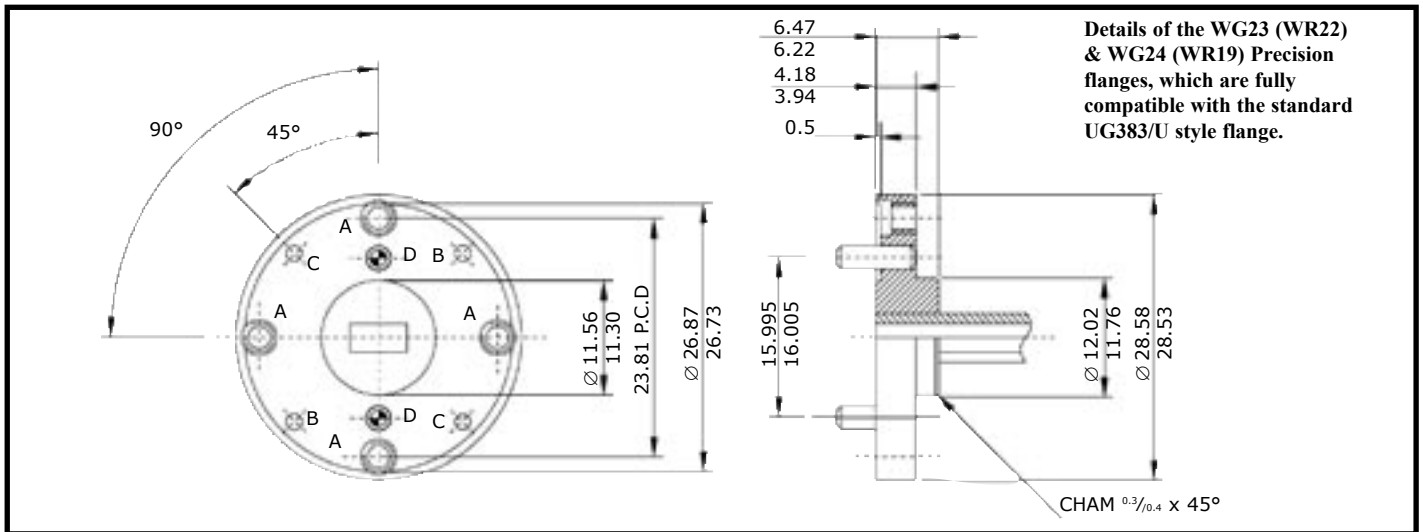
Precision Style Flange Details

WG 23 (WR 22) to WG 28 (WR 8) inclusive

- Enhanced accuracy & performance
- Fully compatible with the standard “MIL spec” flanges

Flann Precision millimetric flanges are fitted as standard to the Company’s range of Network Analyser Calibration Kits and Metrology grade components. Our precision millimetric flanges incorporate an “anti-cocking” feature which minimizes the risk of leakage or discontinuity occurring at the interface.

Note: Flann Precision flanges are compatible with standard MIL spec types if the additional precision dowels are not used.



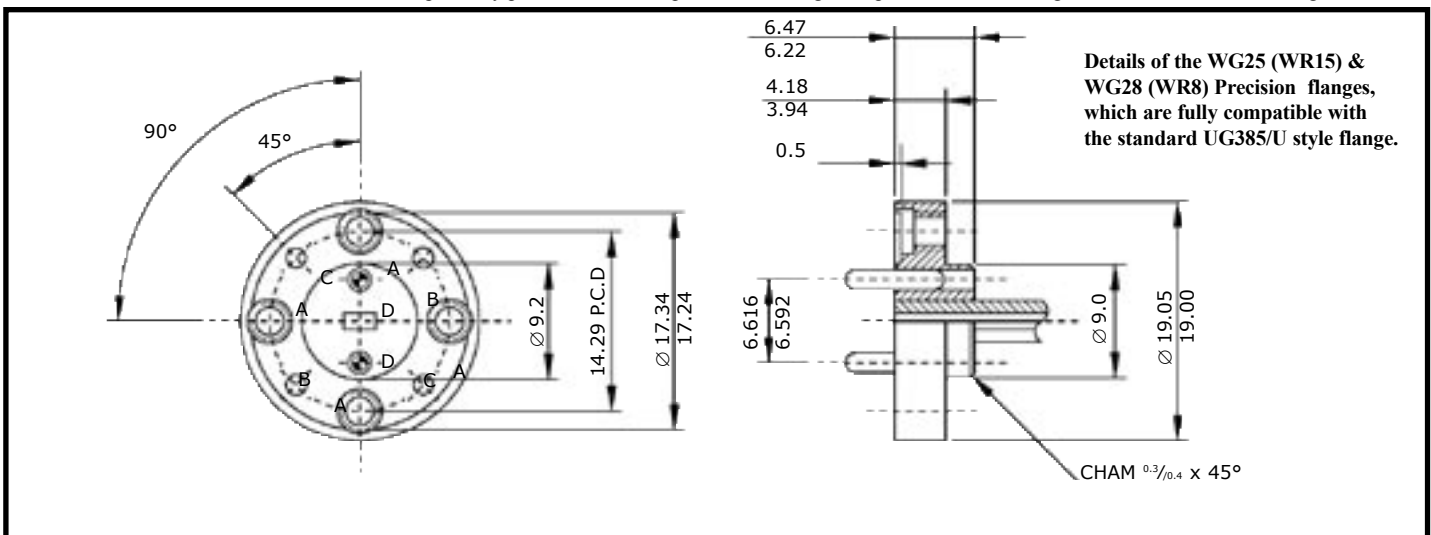
A Holes 4 off - 4.40 UNC-2B. C'bore 3.56 dia x 1.6 deep from flange face

B Holes 2 off - 1.65/1.66 dia. C'sink 2.3 dia @ 90° on front face

C Holes 2 off - Alignment pins 1.562/1.549 dia

D Holes 2 off - Drill and bore 2.25 dia through C'sink 2.8 dia @ 90° and ream 2.395/2.379 dia

Note: Dowels 'C' & Dowel holes 'B' & 'D' are precisely positioned with respect to the waveguide aperture after the flange has been fitted to the waveguide.



A Holes 4 off - 4.40 UNC-2B. C'bore 3.56 dia x 1.6 dia deep from flange face

B Holes 2 off - 1.65/1.66 dia. C'sink 2.3 dia @ 90° on front face

C Holes 2 off - Alignment pins 1.562/1.549 dia

D Holes 2 off - Drill and bore 1.5 dia through C'sink 2.3 dia @ 90° and ream 1.588/1.600 dia

Note: Dowels 'C' & Dowel holes 'B' & 'D' are precisely positioned with respect to the waveguide aperture after the flange has been fitted to the waveguide.

Note: Instruments fitted with precision flanges are supplied with two fixing screws per flange.

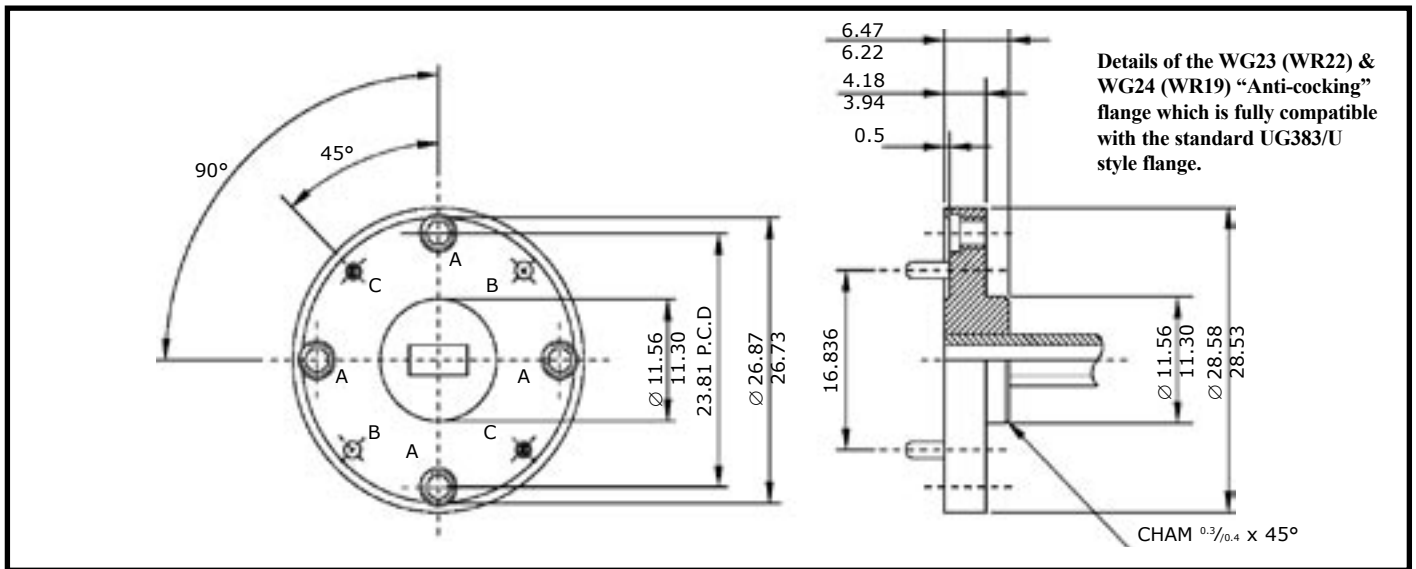
NOTE: ALL DIMENSIONS ARE IN MILLIMETERS

Anti-Cocking Flanges

- Greatly improved performance & repeatability
- Fully compatible with standard “MIL spec” flanges

The standard MIL spec style of flanges, normally used in the frequency bands from 26.0 to 220 GHz, are designs with the serious disadvantage that “cocking” can easily take place unless extreme care is taken when tightening the clamping screws. “Cocked” flanges introduce high leakage levels and unnecessary discontinuities. In common with many other major manufacturers Flann offers “anti-cocking” flanges, which prevent cocking when connected to similar “anti-cocking” flanges; these flanges are fully compatible with standard MIL spec designs.

*“Anti-cocking” flanges must be specified at time of order.
The Flann “anti-cocking” flanges are detailed below.*

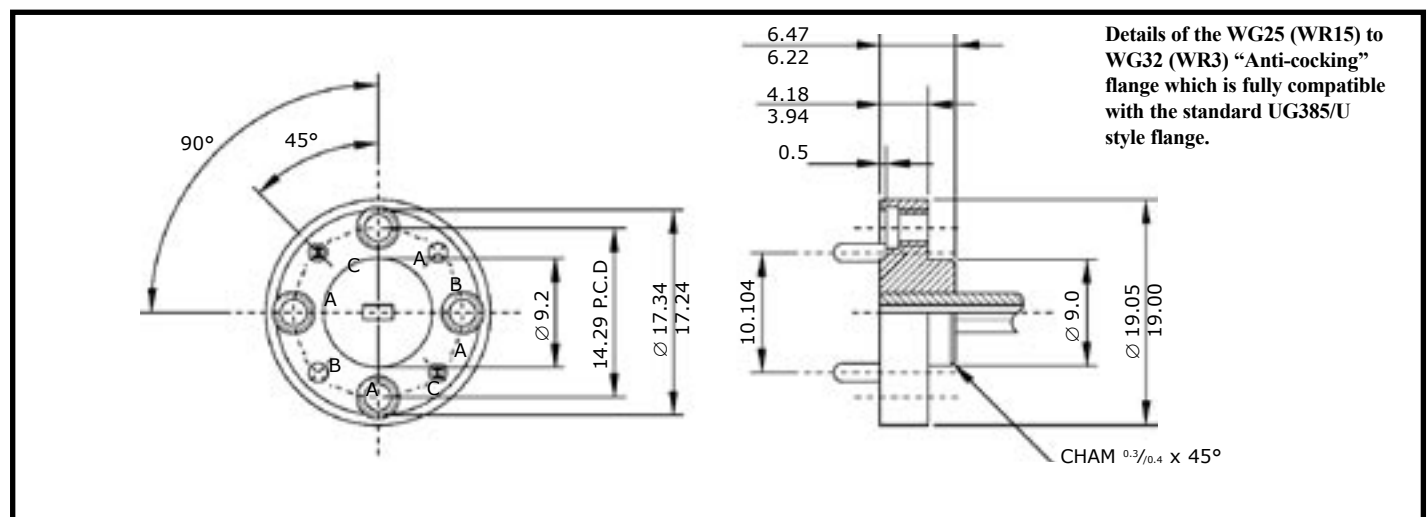


A Holes 4 off - 4.40 UNC-2B. C’bore 3.56 dia x 1.6 deep from flange face

B Holes 2 off - 1.65/1.66 dia. C’sink 2.3 dia x 90° on front face

C Holes 2 off - Alignment pins 1.562/1.549 dia

Note: Dowels ‘C’ & Dowel holes ‘B’ are precisely positioned with respect to the waveguide aperture after the flange has been fitted to the waveguide.



A Holes 4 off - Drill 4.40 UNC-2B. C’bore 3.56 dia x 1.6 dia deep from flange face

B Holes 2 off - 1.65/1.66 dia. C’sink 2.3 dia x 90° on front face

C Holes 2 off - Alignment pins 1.562/1.549 dia

Note: Dowels ‘C’ & Dowel holes ‘B’ are precisely positioned with respect to the waveguide aperture after the flange has been fitted to the waveguide.

Note: Instruments fitted with an anti-cocking flange are supplied with two fixing screws per flange.

NOTE: ALL DIMENSIONS ARE IN MILLIMETERS