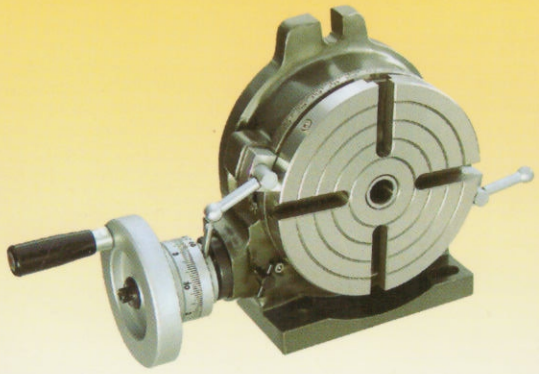
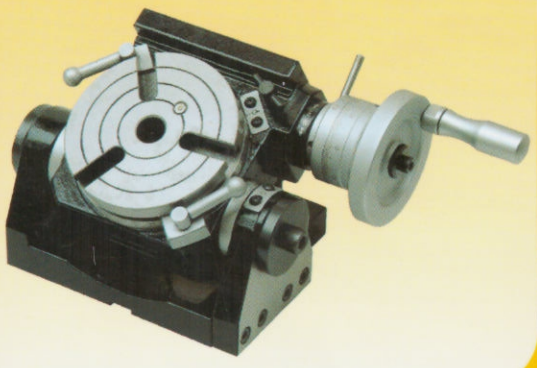
SOBA®

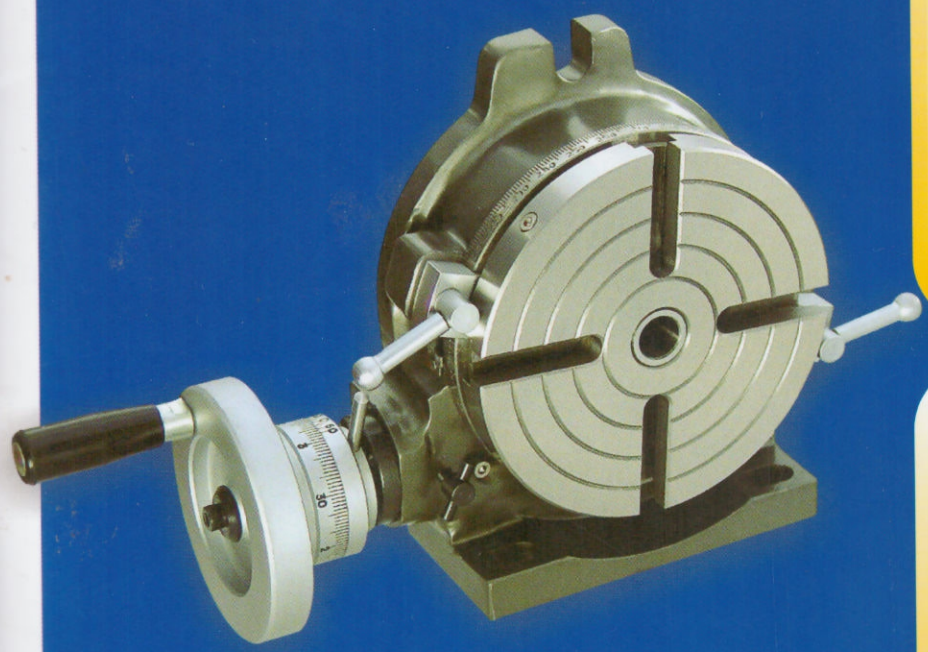
OPERATION AND SERVICE MANUAL

Horizontal & Vertical Rotary Table

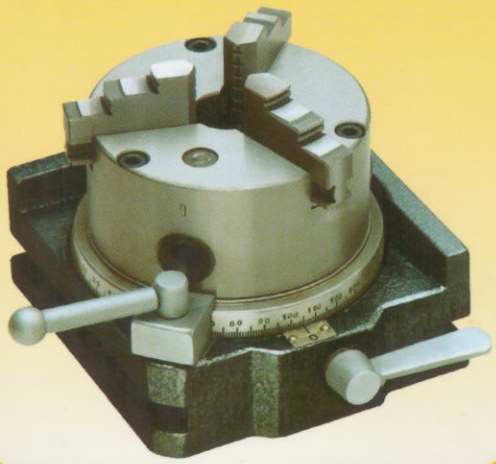


Tilting Rotary Table





Horizontal & Vertical Rapid Indexer



HORIZONTAL AND VERTICAL

ROTARY TABLE

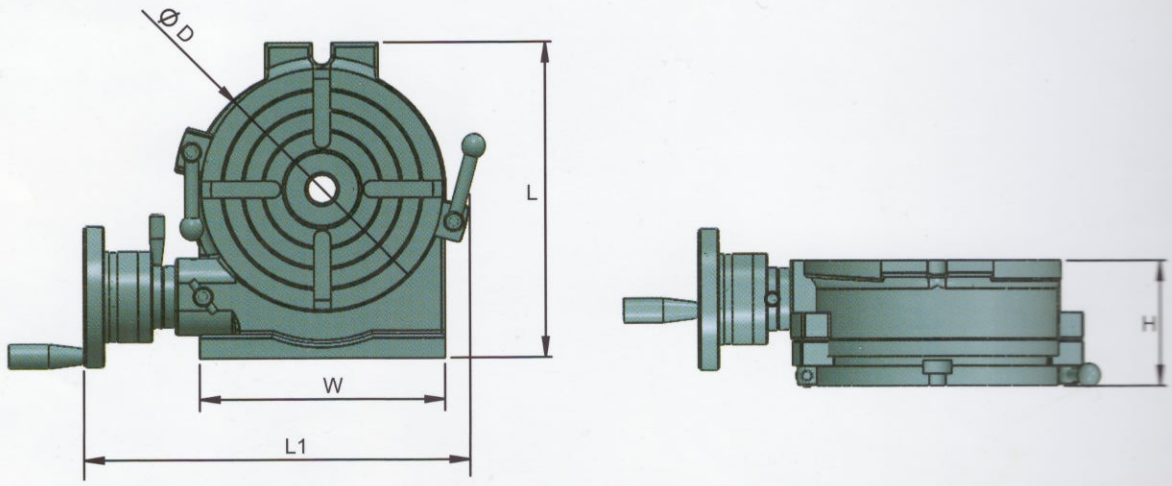
SOBA®

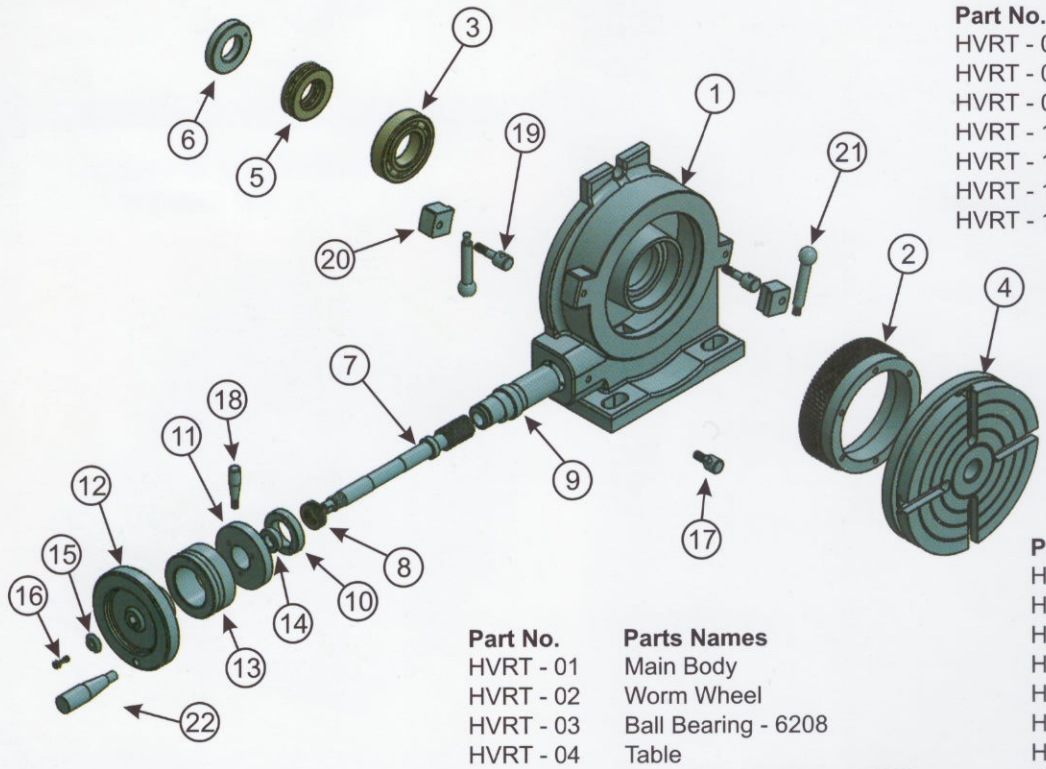
Horizontal & Vertical Rotary Table

This Horizontal & vertical table is so designed as to permit machining operations at a higher dimension. The base can be used in a vertical position to enabling to carry out center work.

Dimensions

Order No.	TABLE DIMENSION				BASE DIMENSION																
	TABLE		HIGHT		OVERALL LENGTH		OVERALL HEIGHT		CENTER HEIGHT		BASE LENGTH		BASE WIDTH		BASE HEIGHT		T-SLOT WDITH		TYPE OF SLOT	T-BOLT SIZE	CENTER BORE	Weight Kg/lb		Gear ratio
	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm		mm		Kg	lb	
110239	4.5/16	110	2.3/8	63	7.7/8	200	2.7/8	72	3.1/4	82.1	4.1/2	114	1.1/2	138	1.3/4	46	7/16	11		M8	MT-2	7	15.4	90:1
110241	5	125	2.3/4	70	9	228	2.7/8	72	3.5/8	92.1	5	127	7	178	1.3/4	46	7/16	11		M8	MT-2	8	17.6	90:1
110242	6	150	3	75	10.1/4	258	3	77	4	102.7	6	151	8	204	2	50	7/16	11		M8	MT-2	11.5	25.3	90:1
110243	8	200	4	101	13	330	4	103	5.1/4	135	8	203	10.1/2	264	2.1/2	64	9/16	14		M10	MT-3	25	55	90:1
110244	10	250	4.1/4	108	15	382	4.1/4	110	6.1/2	163.5	10	250	13	328	2.7/8	72	9/16	14		M10	MT-3	35	77	90:1



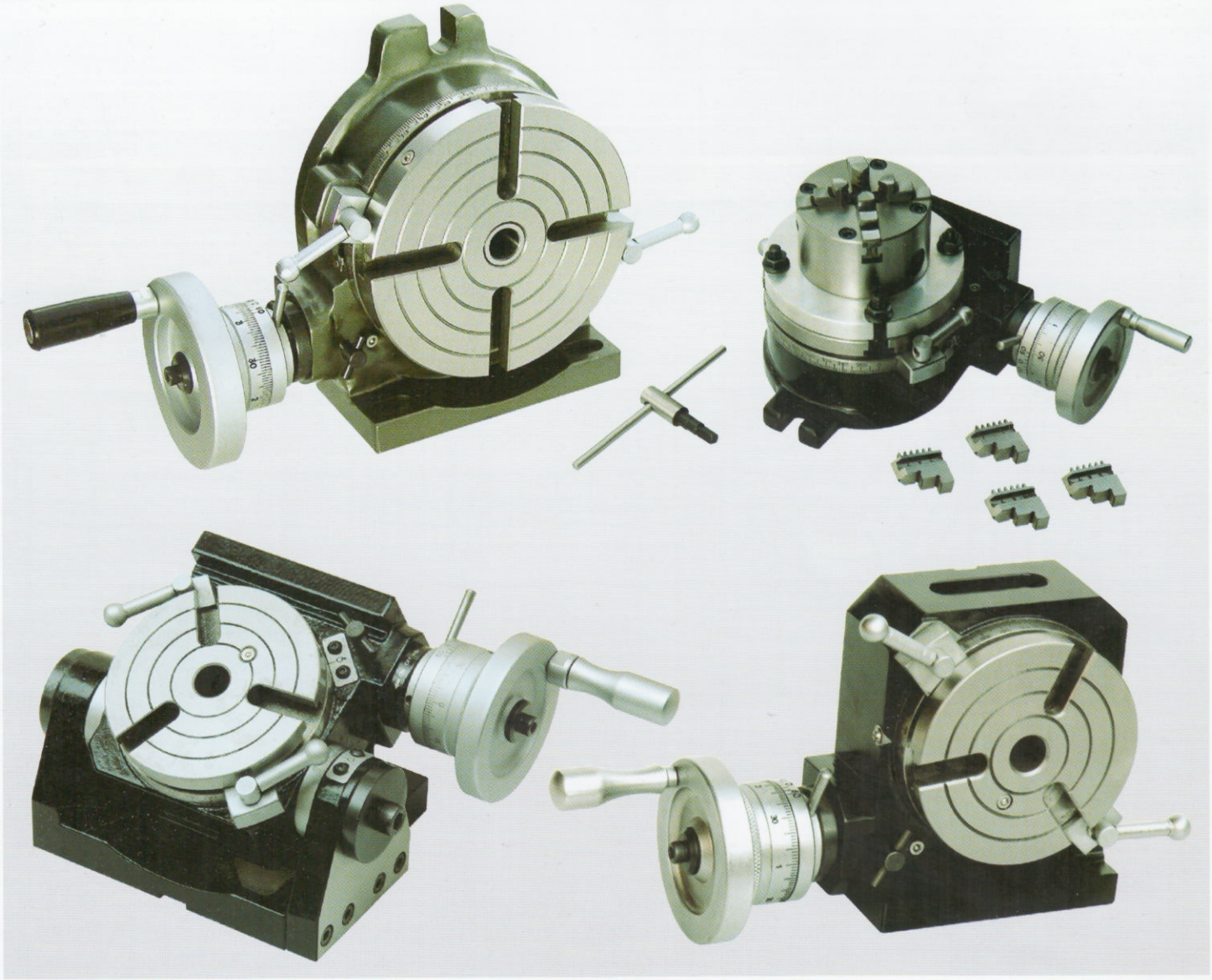


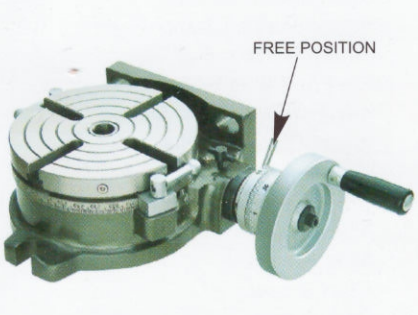
Part No.	Parts Names
HVRT - 01	Main Body
HVRT - 02	Worm Wheel
HVRT - 03	Ball Bearing - 6208
HVRT - 04	Table
HVRT - 05	Thrust Ball Bearing - 51207
HVRT - 06	Threaded Collar

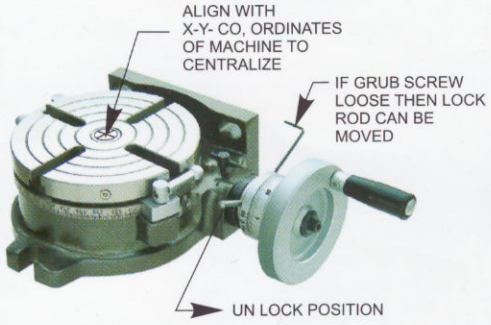
Part No.	Parts Names
HVRT - 07	Worm
HVRT - 08	Thrust Ball Bearing - 51103
HVRT - 09	Worm Metal
HVRT - 10	Collar
HVRT - 11	Vernier Ring
HVRT - 12	Hand Wheel
HVRT - 13	Micro Collar

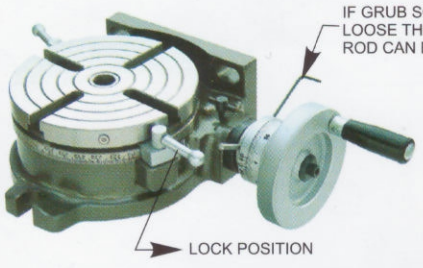
Part No.	Parts Names
HVRT - 14	Worm Ring
HVRT - 15	Washer
HVRT - 16	Cap Screw
HVRT - 17	Metal Setting Screw
HVRT - 18	Vernier Ring Handle
HVRT - 19	Clamp Screw
HVRT - 20	Clamp Piece
HVRT - 21	Clamp Handle
HVRT - 22	Handle

Horizontal & Vertical Rotary Table



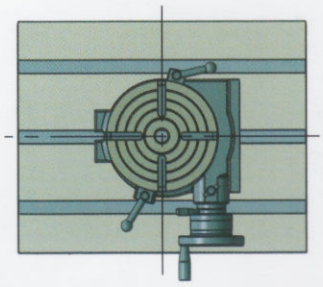






ALIGNMENT

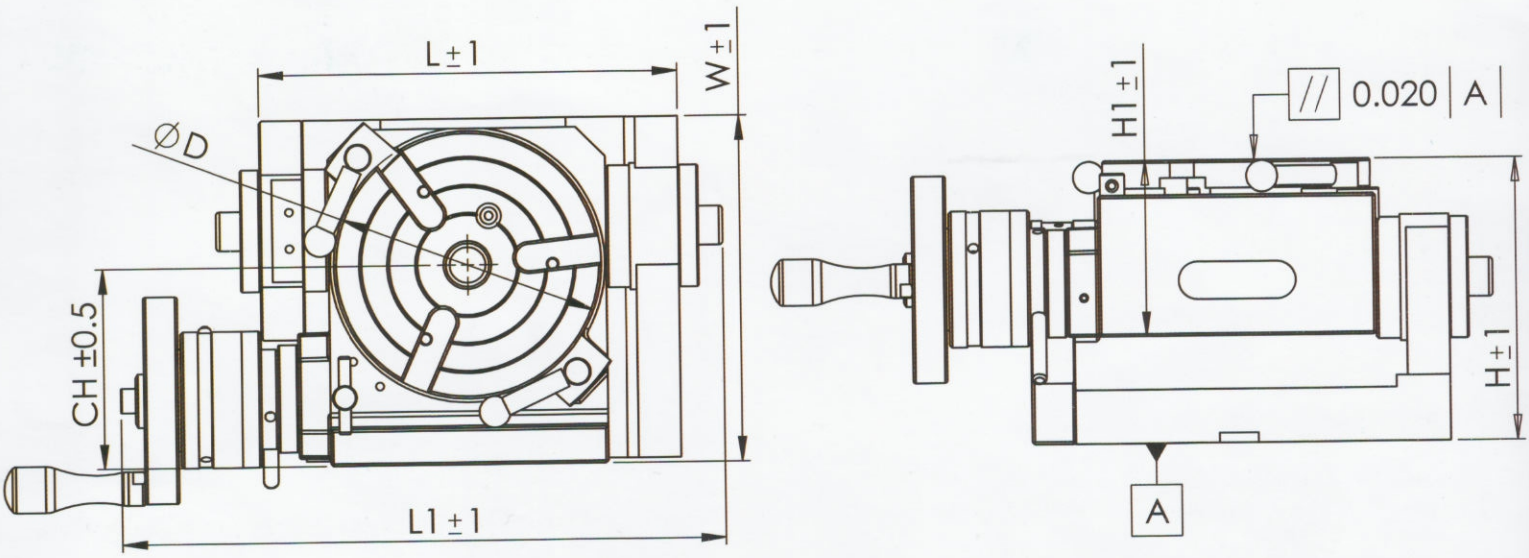
Aligning the center of the Rotary Table to the spindle is essential for achieving quality results. Position the spindle over center of the Rotary Table and touch all four sides (inside outside) until all sides read "0" on the indicator (to rotate the Spindle and not the Rotary Table).

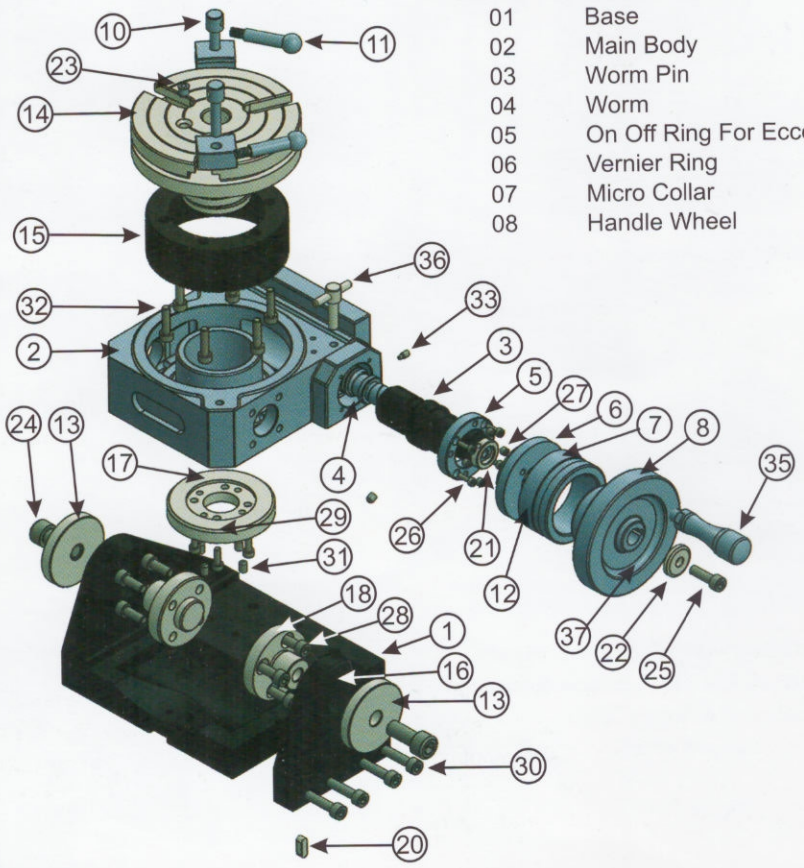


SOBA® Horizontal & Vertical Tilting Rotary Table

Dimensions

Order No.	TABLE DIMENSION										BASE DIMENSION													
	TABLE		HIGHT		OVERALL LENGTH		OVERALL HEIGHT		CENTER HEIGHT		BASE LENGTH		BASE WIDTH		BODY HEIGHT		TYPE OF SLOT	T-BOLT SIZE	CENTER BORE	TILT BODY HEIGHT		Weight Kg/lb		Gear ratio
	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm		mm		Inch	mm	Kg	lb	
111325	4.5/16	110	2.3/8	63	9.3/4	248	4.9/16	116	3.1/4	82	6.3/4	172	5.5/8	142	2.7/8	72		M8	MT-2	6/7/16	164	12	26.4	90:1
111335	6	150	2.13/16	81	11.1/2	291	5	124	4.1/8	105	8.7/16	214	7.1/16	180	3.1/8	80		M8	MT-2	8	204	20	44	90:1





Part No.	Parts Names
01	Base
02	Main Body
03	Worm Pin
04	Worm
05	On Off Ring For Eccentric Pin
06	Vernier Ring
07	Micro Collar
08	Handle Wheel

Part No.	Parts Names
09	Clamp For Table
10	Clamp Screw 1/4" X 20"
11	Clamping Handle
12	Vernier Ring Handle
13	Side Clamping Piece
14	Table
15	Helix Gear Part
16	Side Mounted Piece
17	Bottom Table Clamp. Plate
18	Pin With Mark. For Tilting Body
19	Pin For Tilting Body
20	Key For Base
21	Worm Clamping Nut
22	Washer
23	1/4" Oil Nipple
24	Allen Screw
25	Allen Screw
26	Allen Screw
27	Grub Screw
28	Allen Screw
29	Allen Screw
30	Allen Screw
31	Grub Screw
32	Allen Screw
33	Grub Screw
34	Allen Screw
35	Handle
36	Spl. Bolt 1/4" X 20"
37	Key For Handle

Horizontal & Vertical Rotary Table

OPERATING INSTRUCTION AND FUNCTION OF EACH UNIT

1. The worm gear is 90:1.
   - One turn of the handle moves the table by 4°
   - Micro - collar is graduated in steps of 1 min.
   - Vernier scale makes settings down to 10 seconds possible 110243, 110244 (20 seconds for 110239, 110241, 110242)
2. Dividing of 2 to 100 can be carried out quickly and accurately by attaching a Dividing Mechanism.
3. Center work can also be carried out by using the base in the vertical Position in conjunction with a tailstock.

THERE ARE THREE METHODS OF SETTING POSITIONS USING A ROTARY TABLE

1. Use the degree scale on the outer edge of the table (scale reading = 1 degree)

a To use the degree scale on the table top, disengage the worm by unlocking the T screw and rotating the pin on the worm collar clockwise. The table can be rotated by hand and can be locked in any position using the lock clamps.

2. Use the degree handwheel (scale on handwheel = degrees and minutes)

a To use the handwheel, unlock or loosen the T screw and rotate the pin on the worm collar anti-clockwise and when the worm has engaged, lock or tighten the T screw. If the worm collar will not rotate easily, it may be necessary to rotate the handwheel while keeping pressure on the pin so the worm will mesh or engage.
The hand wheel is divided into degrees and minutes eg: 4 degrees per revolution or ratio of 90:1. The minute divisions on the handwheel can be further divided into 20 seconds using the vernier scale.

3. Use the index method (use index plates and refer index table)

a To use the index method first refer to the index table to select the index plate with the correct holes on the circle. (See Index table located on the Page-8 back of this manual)

b To use the index plates, the hand wheel must be removed by loosening the centre retaining screw and washer.

c Mount the appropriate index plate with the correct number of holes to the collar with 3 screws.

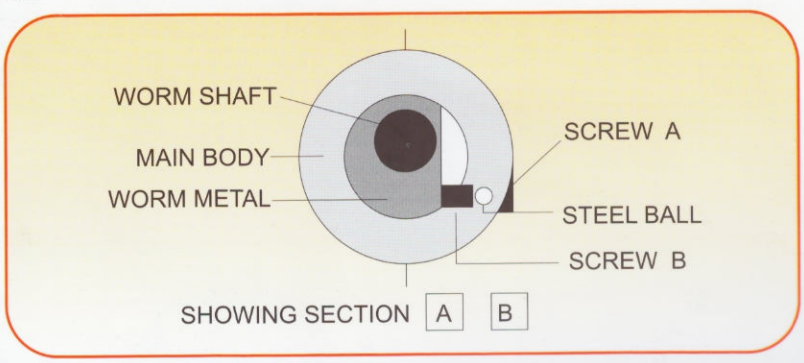
d Next fit the sector arms (the brass pieces) and adjust the sector arms for the correct number of holes. Holes are counted after the pin or first hole. So for six holes, sector arms are actually set for seven holes ie; pin + 6 holes.

e Fit the retaining washer in the groove in front of the sector arms.

f Fit the crank with the spring loaded handle, adjusting so the plunger lines up with the correct circle of holes. Tighten with the screw and washer that held the handwheel.

g To index, rotate the handle the correct number of full turns anf then using the sector arms to measuer the number of holes. After the handle is locked in, rotate the arms ready for the next cycle or index.

Eg: For 21 tooth gear or 21 divisions, Use the 21 hole plate. Set the sector arms for 6 holes then rotate the handle 4 full turns plus 6 holes. If in doubt, have a practice run



1. **Adjusting Mesh of worm Gear:-** Loosen the metal clamp handle and turn the switch metal clockwise until it touches the stopper. The worm gear has now been disengaged. Turn it counterclockwise until it touches the stopper, the worm and gear wheel will engage. Tighten the metal clamp handle after engagement. An additional adjustment can be obtained by removing the screw A and steel ball and turning the inner screw B counter clock-wise so bringing the worm in closer engagement with the gear wheel. Turning clock-wise brings the worm away from the wheel. After adjustment insert the steel ball and tighten screw A

2. **Axial Adjustment of Worm shaft:-** When axial slack occurs gear adjustment is carried out by tightening the inside worm shaft nut after the handle, vernier ring and switch metal have been removed. After adjustment, lock the nut on the shaft by means of the set screw. (The ROTARY TABLE has an adjustment, nut, which can be used after removal of the handle.)

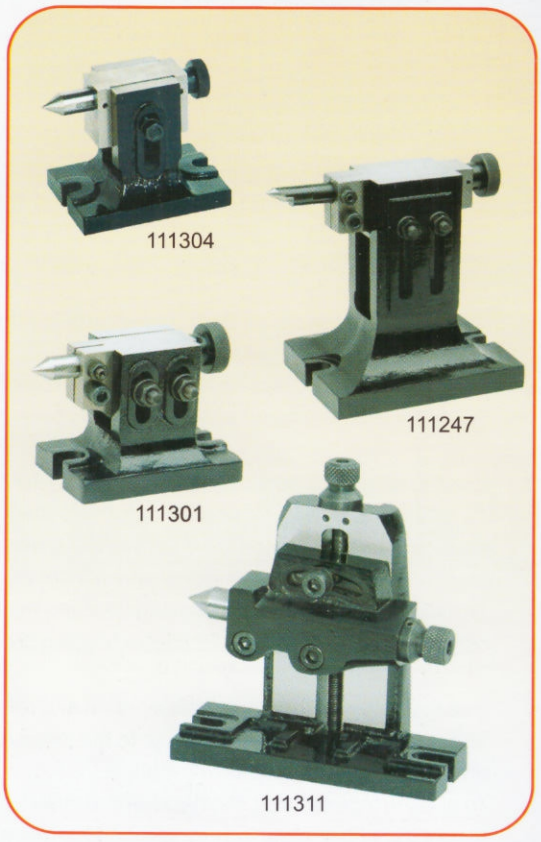
Adjustable Tail Stock

SPECIAL ACCESSORIES

The height can be varied when working with different index centers, while the angle of inclination can be changed for various machining applications. In addition, the tip of the center is finely rotatable. Clamping is made by tighting of bolts

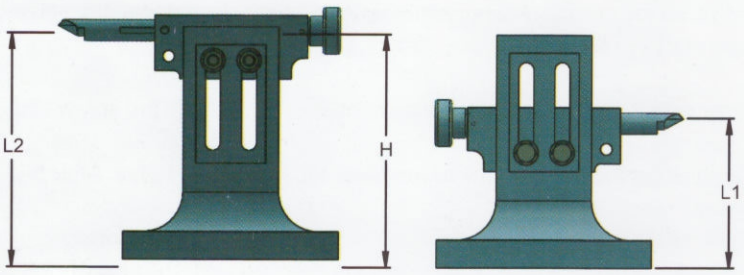
Order No. & Dimensions for Tail Stock Unit mm/in.

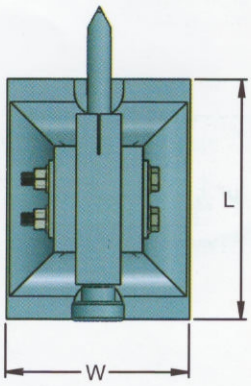
Order No. R	Center Height				Suitable for
	Maximum		Minimum		
	Inch	mm	Inch	mm	
111301	6.1/4	108	3.3/16	80	110242, 110239, 110241
110247	8	200	4.3/4	120	110243, 110244
111304	3.3/8	85	1.1/2	38	111300. 111305, 111310, 110239, 110275, 110280
111311	3.3/8	85	1.1/2	38	111300. 111305, 111310, 110239, 110275, 110280

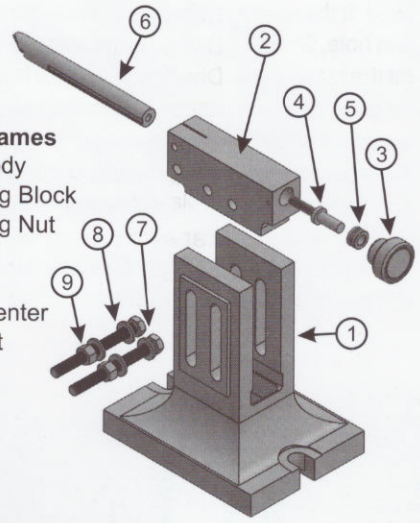


To install the Tailstock to your Milling Table:

- Secure the Rotary Table in the vertical position on the Milling Table.
- Install the Tailstock onto the milling table so the dead center of the Tailstock is inline with the center of the Rotary Table. Slots are provided for keys to help with alignment of centers.
- Align the dead center of the Tailstock by loosening the hex bolts located on the side of the Tailstock. With a precision level or indicator (depending on tolerance of work being performed), make the dead center parallel to the horizontal plane and on center with Rotary Table center.



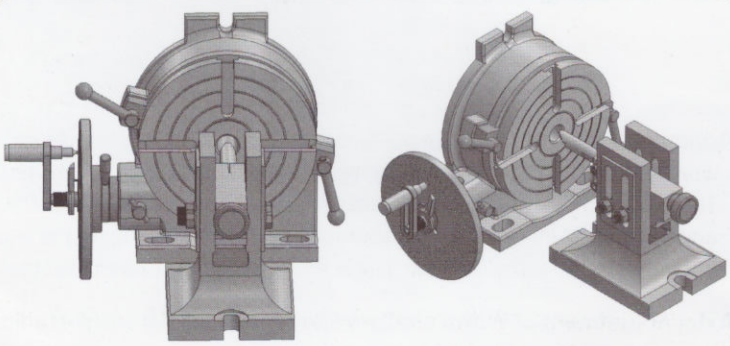




Part No.	Parts Names
01	Main Body
02	Adjusting Block
03	Adjusting Nut
04	Stud
05	Ring
06	Dead Center
07	Hex Bolt
08	Washer
09	Hex Nut

Dimensions (inches)

	111301	110247
Base Length (L)	5-1/2	7-1/4
Base Width (W)	3-1/2	5-1/2
Base Height (H)	4-3/8	7-7/8
Height min/max (L1/L2)	3-1/8 / 4-1/8	5-1/4 / 7-7/8
Spindle Horizontal Displacement	1	1-1/16



Alignment of Y axis

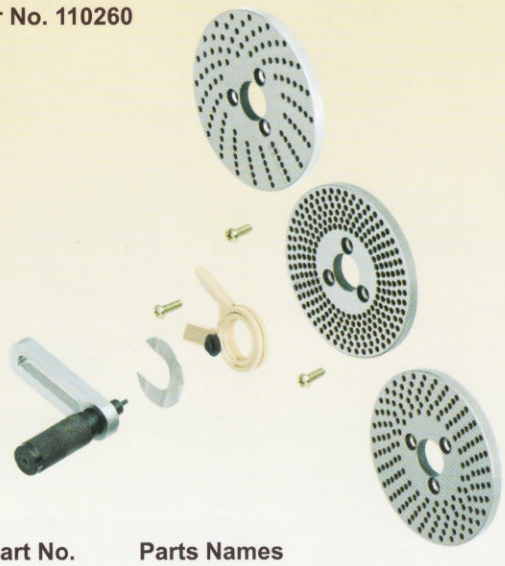
Alignment of Z axis.

Dividing Mechanism & Indexing Plates

SPECIAL ACCESSORIES

Simple indexing consists of a series of preset holes in a backing plate, these divisions are provided for the most common angles (such as 90°, 45° and 30°). The remaining divisions of a circle are provided by manually rotating the dividing arm using index plates. Calculations are required to use this method.

Order No. 110260



Part No.	Parts Names
01	Sector Arm
02	Screw M5 - 8x10
03	Set Screw M4 - 7x6
04	Flat Washer 4mm
05	Crank Handle
06	Sector Arm Spring
07	Dividing Plate 15-20
08	Dividing Plate 21-33
09	Dividing Plate 37-49

Order No. 110265

Part No.	Parts Names
01	Sector Arm
02	Screw 3/16" - 32
03	Set Screw M4 - 7x6
04	Flat Washer 4mm
05	Crank Handle
06	Sector Arm Spring
07	Dividing Plate 26-57 / 28-59
08	Dividing Plate 61-97 / 63-99

Description of In the index table.
This table is the one being calculated for the index plate with hole number shown below.

NUMBER OF HOLES

DP-110260
A Plate.....15, 16, 17, 18, 19, 20
B Plate.....21, 23, 27, 29, 31, 33
C Plate.....37, 39, 41, 43, 47, 49

DP-110265
A Plate.....26, 28, 30, 32, 34, 37, 38, 39, 41, 43, 44, 46, 47, 49, 51, 53, 57, 59
B Plate.....61, 63, 67, 69, 71, 73, 77, 79, 81, 83, 87, 89, 91, 93, 97, 99

Dimensions

Order No.	Major dimension of DM							Weight		Shipping Measurement ft	Indexing Plates	Suitable for
	Dividing plate set screw	Inner diameter of sector arm		Outer diameter of spring clip		Grove width in handle plate						
		Inch	mm	Inch	mm	Inch	mm	Kg	lb			
110260	32 PCD. 1.26Ø	0.83	21	0.71	18	0.03	9	2.5	5.51	0.12	3	110239, 110241, 110242, 111325, 111335
110265	(3holes) 46 PCD. 1.81	1.12	28.7	1.73	44	0.39	10	4	8.82	0.12	2	110243, 110244

SOME POSSIBLE USES OF A ROTARY TABLE

- Cutting gears
- Machining hex or square on a shaft
- Drilling holes equal distance around a circle eg holes in a flywheel
- Used as an adjustable angle plate - eg machine one face then rotate 90° degrees and machine the next face
- Milling a radius or an arc
- Create wheels with spokes by using the rotary table to machine out the triangular shaped holes in a wheel

IN CASE OF AN OPTIONAL DM DEVICE ATTACHED

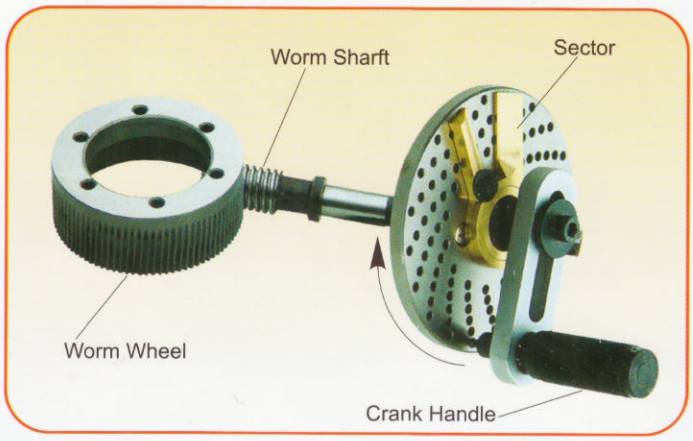
Indexing of 2 to 100 can be made accurately and quickly.

Equation of Indexing

Since the worm ratio is 1 : 90, when the handle is made to rotate a 360° revolution, the table therefore will rotate a 1/90 revolution. The relationships between handle revolution 'N' and dividual number 'T" to be sought are shown in the following equation:

$$N=\frac{90}{T}$$

Remarks: The index table on Page-8 is made on the basis of this equation.



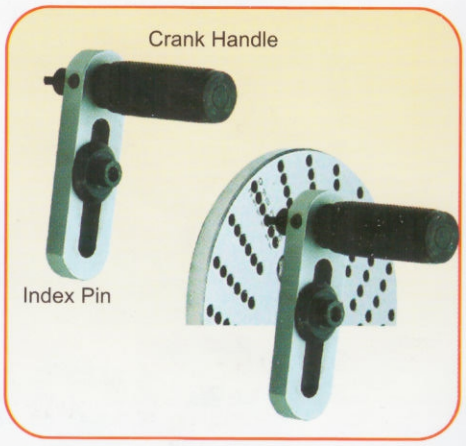
(Example)

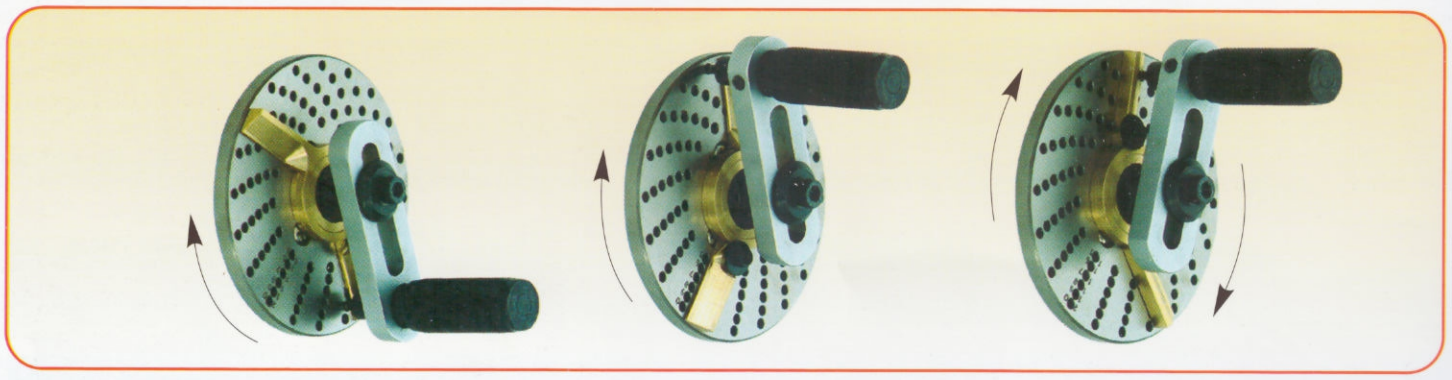
In case where the operator wants to index the position divided into 29 equal parts. Hints on operation As for 29 dividual numbers, the number of crank handle revolutions (N) is 9/87 as shown in the table on Page-8 so that the handle should be rotated a full 360° revolution three times plus an interval of nine holes. (in this time, it means hole intervals not hole numbers). After setting this point as a start point, rotate the handle a full 360° revolution three times plus an interval of nine holes. When the procedure is repeated in turn as many as 29 times, the indexing of dividing into 29 equal parts is thus achieved.

OPERATIONS OF CRANK HANDLE AND SECTOR

In case of Example 'Division into 29 Equal Parts' aforesaid, it is natural that indexing operation should proceed with the intervals of nine holes after setting the index plate (B plate) on which a row of 87 holes are provided. But in this method, the operator has to count nine holes' intervals one by one. In this viewpoint, it is necessary to use a device called 'sector' to avoid such troublesome procedures. The following will describe some necessary procedures for operation of the sector.

a. Loosen the crank handle lock nut, adjust its length so as to cause the index, pin to fall in the train of 87 holes, and retighten it.
b. Loosen the set-screws of the sector, open two arms in accordance with the interval of nine holes (total numbers of holes are ten), and retighten with set-screws.
c. First, bring the left arm of the sector near to the index pin's left side.
d. Next, rotate the crank handle clock-wise to apply it to the right arm of the sector so that the index pin will fall in the hole located at this right arm's left side surface.
e. Rotate the sector clockwise this time, and put the right side surface of the life arm to the side surface of the left arm to the left side of the index pin. In this time, the relationships between the index pin and the sector's left arm in their positions are the same as in Par. c). The index plate hole that actually accommodates the index pin is located at the point where goes across ten holes to the right away from the hole as in Par. c)
f. Repeat the same procedures as necessary.





OPERATORS RESPONSIBILITY:-

Please take the time to read the users instructions.
Descriptive notations in our catalogue and discussions with staff are offered as a guide only. Purchasers must satisfy themselves as to
(a) The suitability of the product for their particular application and
(b) The process by which the product is used.

Horizontal & Vertical Rotary Table

SOBA®

INDEX TABLES FOR 6",8",10" & 12" HORIZONTAL / VERTICAL ROTARY TABLE 90:1 RATIO

DP - 1 for HV-6

Number	Plate and Circle	Complete Turns	Part of Turn
1	ANY	90	
2	ANY	45	
3	ANY	30	
4	A20	22	10/20
5	ANY	18	
6	ANY	15	
7	B21	12	18/21
8	A20	11	5/20
9	ANY	10	
10	ANY	9	
11	B33	8	6/33
12	A20	7	10/20
13	C39	6	36/39
14	B21	6	9/21
15	ANY	6	
16	A16	5	10/16
17	A17	5	5/17
18	ANY	5	
19	A19	4	14/19
20	A20	4	10/20
21	B21	4	6/21
22	B33	4	3/33
23	B23	3	21/23
24	A20	3	15/20
25	A20	3	12/20
26	C39	3	18/39
27	A18	3	6/18
28	N/A		
29	B29	3	3/29
30	ANY	3	
31	B31	2	28/31
32	A16	2	13/16
33	B33	2	24/33
34	A17	2	11/17
35	B21	2	12/21
36	A20	2	10/20
37	C37	2	16/37
38	A19	2	7/19
39	C39	2	12/39
40	A20	2	5/20
41	C41	2	8/41
42	B21	2	3/21
43	C43	2	4/43
44	N/A		
45	ANY	2	
46	B23	1	22/23
47	C47	1	43/47
48	A16	1	14/16
49	C49	1	41/49
50	A20	1	16/20
51	N/A		
52	N/A		
53	N/A		
54	A18	1	12/18
55	B33	1	21/33
56	N/A		
57	A19	1	11/19
58	B29	1	16/29
59	N/A		
60	A20	1	10/20
61	N/A		
62	B31	1	14/31
63	B21	1	9/21
64	N/A		
65	C39	1	15/39
66	B33	1	12/33
67	N/A		
68	N/A		
69	B23	1	7/23
70	B21	1	6/21
71	N/A		
72	A20	1	5/20
73	N/A		
74	C37	1	8/37
75	A20	1	4/20
76	N/A		
77	N/A		
78	C39	1	6/39
79	N/A		
80	A16	1	2/16
81	A18	1	2/18
82	C41	1	4/41
83	N/A		
84	N/A		
85	N/A		
86	C43	1	2/43
87	B29	1	1/29
88	N/A		
89	N/A		
90	ANY		
91	N/A		
92	N/A		
93	B31		30/31
94	C47		45/47
95	A19		18/19
96	A16		15/16
97	N/A		
98	C49		45/49
99	B33		30/33
100	A20		18/20

DP - 2 for HV-8 DP - 3 for HV-10, 12

Number	Plate and Circle	Complete Turns	Part of Turn
2	ANY	45	
3	ANY	30	
4	A26	22	13/26
4	A28	22	14/28
5	ANY	18	
6	ANY	15	
7	A28	12	24/28
7	B77	12	66/77
8	A28	11	7/28
8	A44	11	11/44
9	ANY	10	
10	ANY	9	
11	A44	8	8/44
11	B77	8	14/77
12	A26	7	13/26
12	A28	7	14/28
13	A26	6	24/26
13	B91	6	84/91
14	A28	6	12/28
14	B77	6	33/77
15	ANY	6	
16	A32	5	20/32
17	A34	5	10/34
18	ANY	5	
19	A38	4	28/38
20	A26	4	13/26
20	A28	4	14/28
21	A28	4	8/28
21	B77	4	22/77
22	A44	4	4/44
22	B77	4	7/77
23	A46	3	42/46
23	B69	3	63/69
24	A28	3	21/28
24	B44	3	33/44
25	A30	3	18/30
26	A26	3	12/26
26	B91	3	42/91
27	A30	3	10/30
27	B63	3	21/63
28	A28	3	6/28
29	B87	3	9/87
30	ANY	3	
31	B93	2	84/93
32	A32	2	26/32
33	B99	2	72/99
34	A34	2	22/34
35	A28	2	16/28
35	B63	2	36/63
36	A26	2	13/26
36	A28	2	14/28
37	A37	2	16/37
38	A38	2	14/38
39	A26	2	8/26
39	B91	2	28/91
40	A28	2	7/28
40	A44	2	11/44
41	A41	2	8/41
42	A28	2	4/28
42	B63	2	9/63
43	A43	2	4/43
44	A44	2	2/44
45	ANY	2	
46	A46	1	44/46
46	B69	1	66/69
47	A47	1	43/47
48	A32	1	28/32
49	A49	1	41/49
50	A30	1	24/30
51	A34	1	26/34
52	A26	1	19/26
53	A53	1	37/53
54	A30	1	20/30
54	B63	1	42/63
55	A44	1	28/44
55	B77	1	49/77
56	A28	1	17/28
57	A38	1	22/38
58	B87	1	48/87
59	A59	1	31/59
60	A34	1	17/34
60	A32	1	16/32
61	B61	1	29/61
62	B93	1	42/93
63	A49	1	21/49
63	B77	1	33/77
64	A32	1	13/32
65	A26	1	10/26
65	B91	1	35/91
66	A44	1	16/44
66	B99	1	36/99
67	B67	1	23/67
68	A34	1	11/34
69	A46	1	14/46
69	B69	1	21/69
70	A28	1	8/28
70	B63	1	18/63
71	B71	1	19/71
72	A32	1	8/32
72	A44	1	11/44
73	B73	1	17/73
74	A37	1	8/37
75	A30	1	6/30
76	A38	1	7/38
77	B77	1	13/77
78	A39	1	6/39
78	B91	1	14/91
79	B79	1	11/79
80	A32	1	4/32
81	B63	1	7/63
81	B81	1	9/81
82	A41	1	4/41
83	B83	1	7/83
84	A28	1	2/28
85	A34	1	2/34
86	A43	1	2/43
87	B87	1	3/87
88	A44	1	1/44
89	B89	1	1/89
90	ANY	1	
91	B91		90/91
92	A46		45/46
93	B93		90/93
94	A47		45/47
95	A38		36/38
96	A32		30/32
97	B97		90/97
98	A49		45/49
99	A44		40/44
99	B99		90/99
100	A30		27/30

For index numbers greater then 10, use formula