

CYLINDRICAL CAM  
INDEXING ROTARY TABLES

# IR TABLES

## HEAVY SERIES

IR 1601 - IR 1801 - IR 2001



COLOMBO FILIPPETTI SPA

- Sealed electrowelding gear housing.
- Indexing output plate with fixed central through hole.
- Input shaft and worm screw on opposite taper roller bearings.
- Rotary plate with thrust bearing.
- Worm gear reducer directly mounted on housing.
- Precise and repeatable index motion.
- Self-locking dwell position ensuring no clearance in station.
- Smooth movement and noiseless drive.
- Bi-directional sense of motion.
- High load bearing capacity.
- Absolutely regular operation at any speed.
- Possibility of mounting the unit in any plane.
- Very low maintenance.
- Wide range of standard movements.

### THE RATIONAL MECHANICS

Via Rossini, 26 - 24040 CASIRATE D'ADDA [BG] - ITALY - TEL.0363/3251 - TELEFAX 0363/325252  
E-mail: [cofil@cofil.it](mailto:cofil@cofil.it) - Sito Internet: <http://www.cofil.it>



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COLOMBO FILIPPETTI may make any changes they feel necessary for the improvement of their products without advance notice.

COLOMBO FILIPPETTI may change any market components and accessories mentioned in this catalogue as they feel necessary.

The units of measurement correspond with *Système International/Severity Index (SI)*.

Drawings herein are first angle European Projection Din 6 (ISO 128)  .

This catalogue supersedes all earlier ones.



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## 1. General information

### Variants / Number of stations

Tab. 1

Variants	Series IR1601 / IR 1801 / IR 2001							
Number of stations	18	20	24	26	28*	30*	32*	34*

For the number of stations marked with (\*), each complete cycle is achieved in 180° of the cam rotation

It is possible to realise IR tables with different number of stations on request.

Installation: - Position on face **A**. Clamp by 6 screw for IR1601 and 10 screws for IR1801 and 2001.

Motion input: - Direct on cam shaft using conical lockers.

## 2. Faces designation

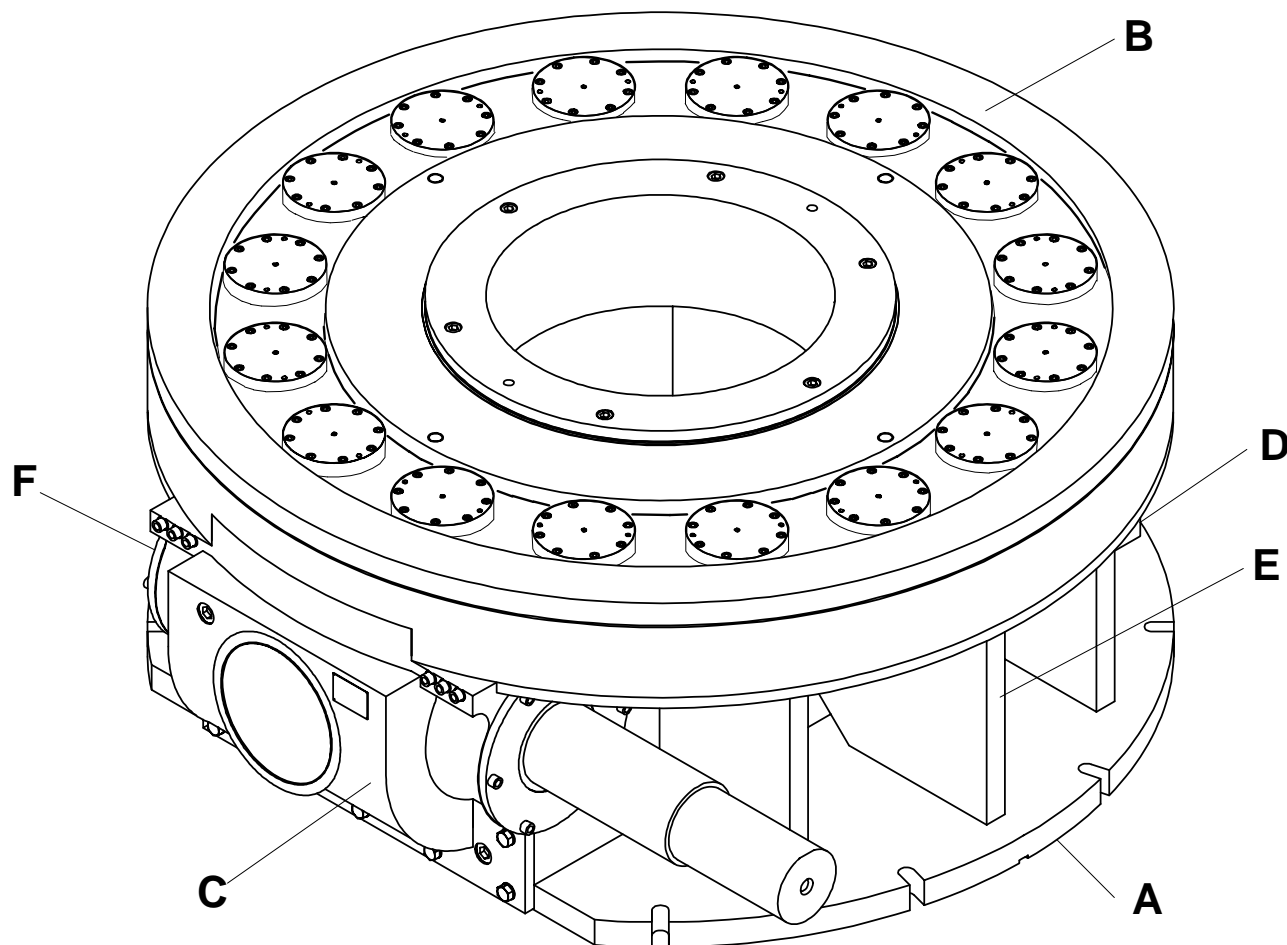


Fig. 1

**3. Main technical data****Serie IR 1601**

Tab. 2

Variants	1	2	3	4	5	6	7	8
Stations	18	20	24	26	28	30	32	34
Rollers diameter	115	115	100	100	115	115	115	115
Number of rollers	18	20	24	26	14	15	16	17
Displacement angle (°)	300	300	300	300	2x135	2x135	2x135	2x135
Motion law	1	1	1	1	1	1	1	1

**Series IR 1801**

Tab. 3

Variants	1	2	3	4	5	6	7	8
Stations	18	20	24	26	28	30	32	34
Rollers diameter	115	115	115	115	130	130	130	130
Number of rollers	18	20	24	26	14	15	16	17
Displacement angle (°)	300	300	300	300	2x135	2x135	2x135	2x135
Motion law	1	1	1	1	1	1	1	1

**Series IR 2001**

Tab. 4

Variants	1	2	3	4	5	6	7	8
Stations	18	20	24	26	28	30	32	34
Rollers diameter	150	150	130	115	150	150	150	150
Number of rollers	18	20	24	26	14	15	16	17
Displacement angle (°)	330	310	300	300	2x150	2x150	2x150	2x150
Motion law	1	1	1	1	1	1	1	1

**Motion laws:**

Tab. 5

Number - Name	Symbol	Cv	Ca	Cc
1 - Modified sine curve	MS	1.76	5.53	± 0.99
2 - Modified sine with 1/3 constant velocity	MS33	1.40	6.62	± 0.79
3 - Modified sine with 1/2 constant velocity	MS50	1.27	8.01	± 0.72
4 - Generic motion law G_R_U	GRU	Max 2.00	Min 4.00	--

#### 4. Overall dimensions

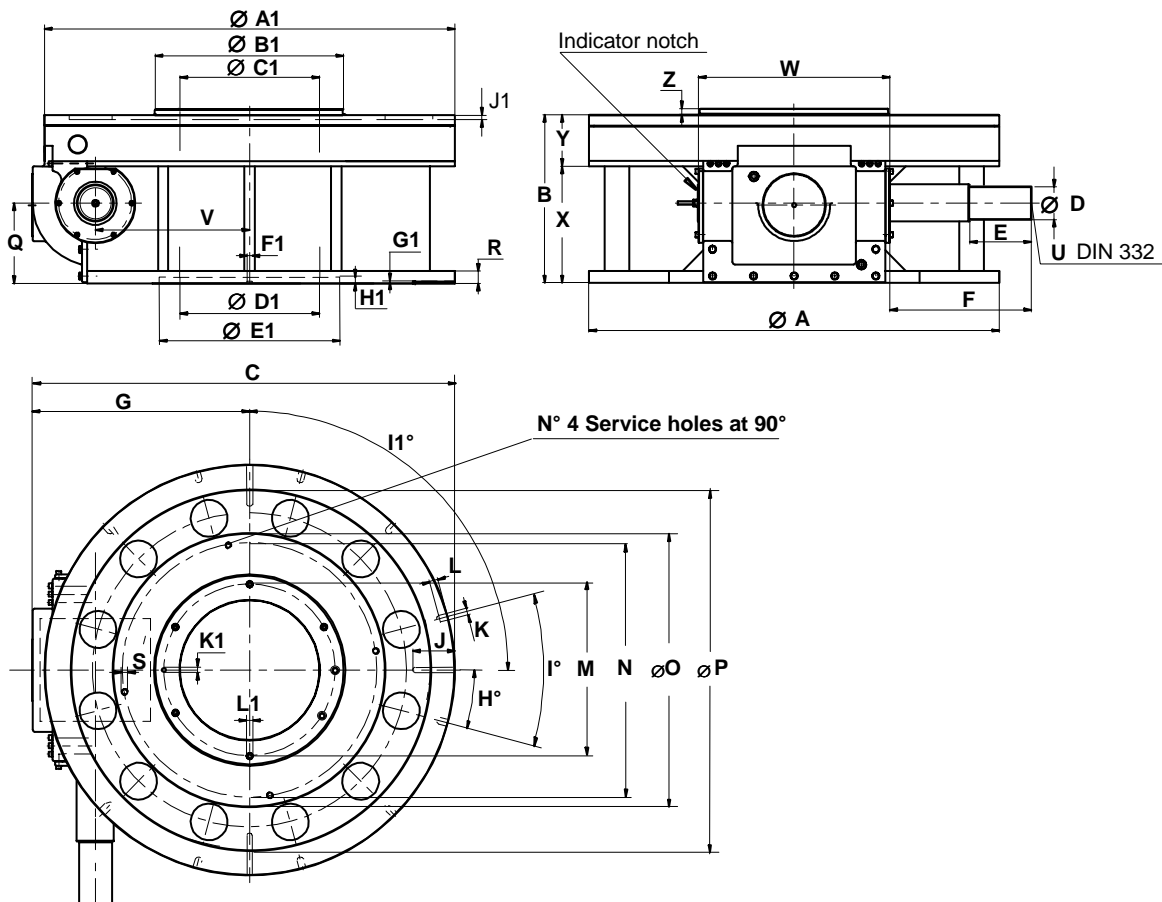


Fig. 2

For standard holes on indexing plate see Pag. 6.

An Indicator notch executed on the opposite front of the input shaft will be in the vertical position when the table is in the middle of cam dwell period. See Pag 8.

The reducers are connected on the input shaft with conical lockers in substitution of feather key.

Tab. 6

Series	A	B	C	D <sup>j6 (2)</sup>	E <sup>(2)</sup>	F <sup>(2)</sup>	G	H°	I°	J	K	L	M	N
IR 1601	1600	685	1723	120	210	493	923	15	30	200	33	57	580	800
IR 1801	1800	744	1868	140	250	618	968	15	30	205	33	57	680	980
IR 2001	2000	820	2075	160	300	641	1075	15	30	205	33	57	750	1160

Series	O <sup>(3)</sup>	P <sup>(3)</sup>	Q	R	S	U <sup>(2)</sup>	V	W	X	Y	Z
IR 1601	1155	1540	300	45	M30x40	M24x50	662.5	814	445	240	15
IR 1801	1190	1620	338	50	M30x40	M24x50	680	900	502	242	20
IR 2001	1390	1820	390	60	M30x40	M24x50	767	1028	570	250	30

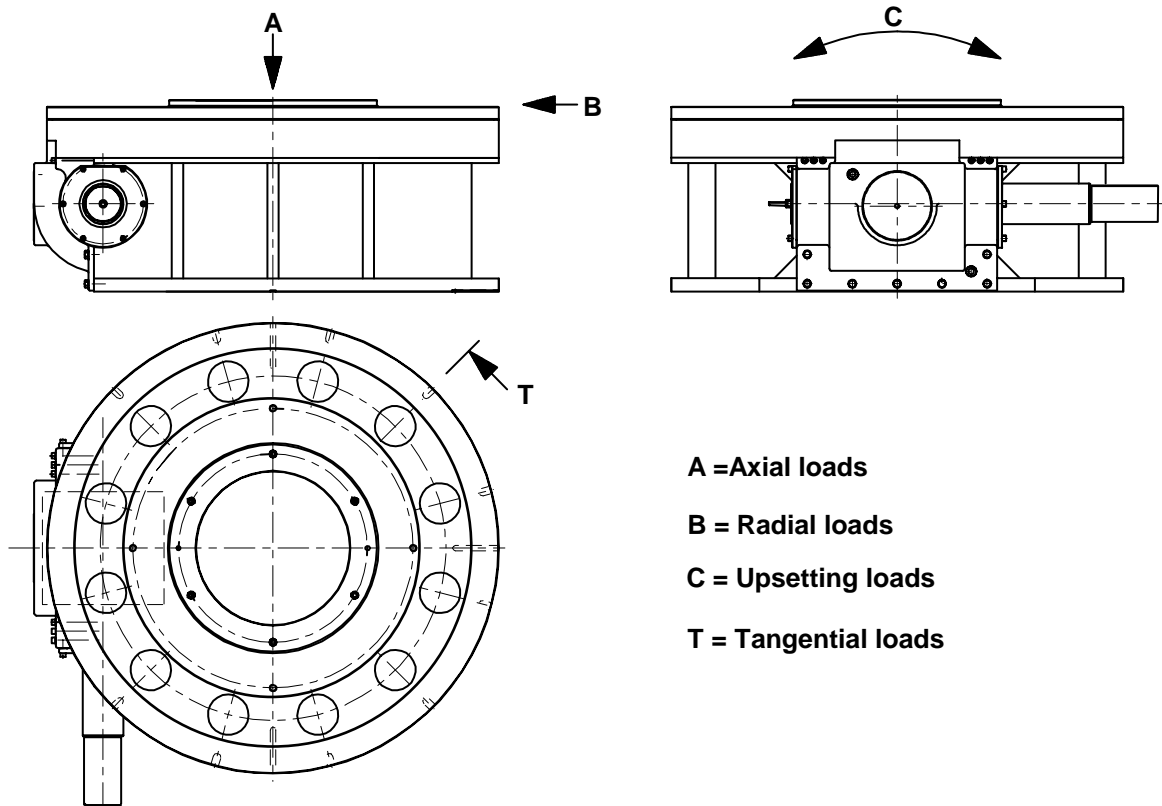
Series	A1	B1 <sup>h9</sup>	C1	D1 <sup>H8</sup>	E1 <sup>H7</sup>	F1 <sup>H7</sup>	G1	H1	I1°	K1 <sup>H7</sup>	J1	L1	Weight [kg] <sup>1)</sup>
IR 1601	1600	740	530	550	680	24	7	20	90	14	32	M20x30	~ 3500
IR 1801	1800	800	620	620	760	24	7	25	90	14	34	M20x30	~ 6500
IR 2001	2000	918	680	730	880	24	7	30	90	14	34	M20x40	~ 9200

1) Housing without oil.

2) This dimensions are depending of the used motoreducer.

3) Dimensions depending of the rollers pitch circle.

**5. Load types on thrust bearing**



- A = Axial loads**
- B = Radial loads**
- C = Upsetting loads**
- T = Tangential loads**

Fig. 3

Tab. 7

Series	Load coefficients [kN]			
	Static		Dynamic	
	Axiale C <sub>oa</sub>	Radial C <sub>or</sub>	Axial C <sub>a</sub>	Radial C <sub>r</sub>
<b>IR 1601</b>	4581	1832	706	564
<b>IR 1801</b>	4581	1832	706	564
<b>IR 2001</b>	5394	2157	764	611

Tab. 7 shows load coefficients of indexing plate thrust bearing.

Various types of loads with different strength apply contemporary on rotary tables in displacement and dwell periods.

Therefore actual admissible axial and radial loads are not to be compared simply with table data. In any case our technical office may verify loads conditions and bearing endurance on request.

**6. Indexing plate precision**

Tab. 8

Series	Plate concentricity [mm]	Plate flatness (B) [mm]	Indexing precision (1 cycle) [deg]	Indexing precision (2 cycles) [deg]
<b>IR 1601</b>	on $\varnothing 740 \div 0.1$	on $\varnothing 1600 \div 0.1$	$\pm 0.008^\circ$	$\pm 0.016^\circ$
<b>IR 1801</b>	on $\varnothing 802 \div 0.1$	on $\varnothing 1800 \div 0.1$	$\pm 0.008^\circ$	$\pm 0.016^\circ$
<b>IR 2001</b>	on $\varnothing 920 \div 0.1$	on $\varnothing 2000 \div 0.1$	$\pm 0.008^\circ$	$\pm 0.016^\circ$

**7. Standard drilling scheme of indexing plate**

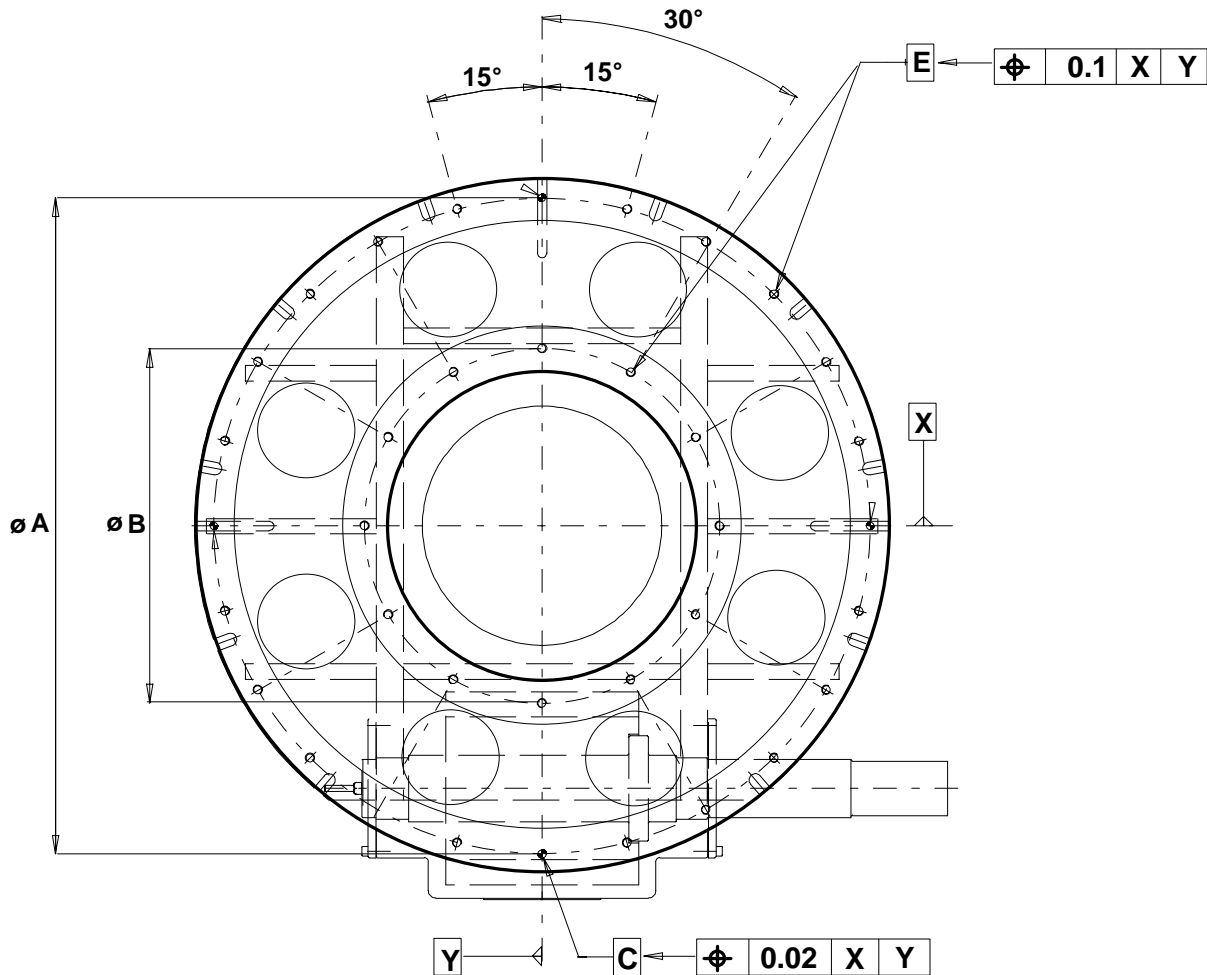


Fig. 4

**N.B.** IR table is represented in the middle of a dwell in a station.

Tab. 9

Serie	ØA	ØB	FORI C	N°	FORI E	N°
IR 1601	1070	800	Ø20H7 x 25	4	M24 x 40	32
IR 1801	1700	920	Ø20H7 x 25	4	M24 x 40	32
IR 2001	1900	1100	Ø20H7 x 25	4	M24 x 40	32

On demand, can be supplied, INDEXING TABLE with special holes.

**8. Motorizations**

COLOMBO FILIPPETTI SPA can also supply the motorization and overload protection systems for this rotary table.

Other than the different possible solutions, depending on customer requirements and applications, a more defined and dimensional motorization can be used.

Please contact our technical office for more informations.



**9. Anchoring system**

Indexing tables of this series are built with a centring diameter obtained in the lower side of the table aligned with the rotation axis of indexing plate.

Three radial slots, also on the underside and perpendicular to the axis of rotation, enable the use of precision blocks (DIN 6322/B). By centring at least one block a very rigid torsional anchorage and a quick and accurate alignment of the table to the structure is obtained without any need of control equipment.

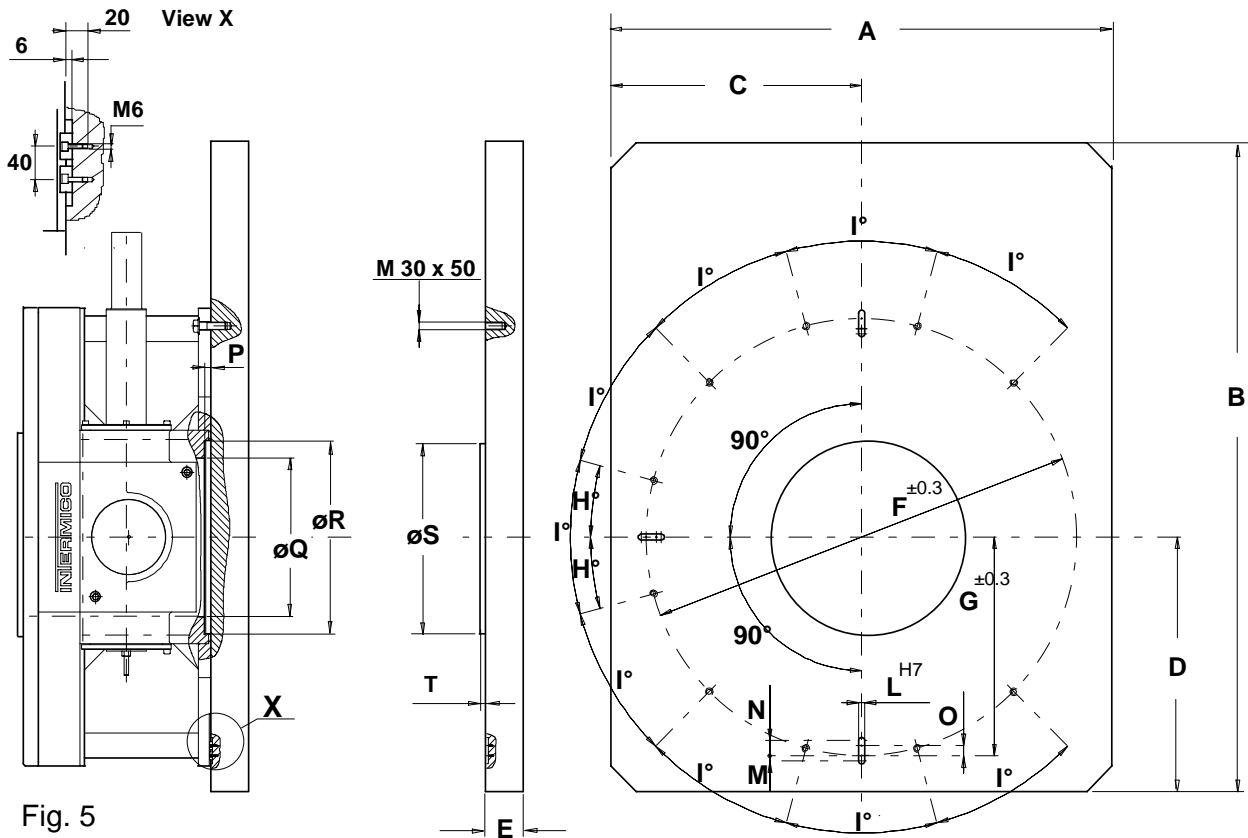


Fig. 5

Tab. 10

Series	A	B	C	D	E	F	G	H	I	L <sup>H7</sup>	M	N	O	P	Q <sup>H8</sup>	R <sup>H7</sup>
IR 1601	1800	2200	900	850	60	1520	760	15	30	24	20	60	40	20	550	680
IR 1801	2000	2400	1000	950	70	1720	860	15	30	24	20	60	40	25	620	760
IR 2001	2200	2700	1100	1100	70	1920	960	15	30	24	20	60	40	30	730	880

**BLOCKS TABLE**

Tab. 11

Series	BLOCKS				CENTERING		ANCHORING BOLTS		
	b	h	l	t	S <sup>g7</sup>	T	Ø	L	N°.
IR1601	24	12	32	7 N°3	680 <sup>h8</sup>	18	M 30	90	10
IR 1801	24	12	32	7 N°3	760 <sup>h8</sup>	23	M 30	95	10
IR 2001	24	12	32	7 N°3	880 <sup>h8</sup>	28	M 30	100	10

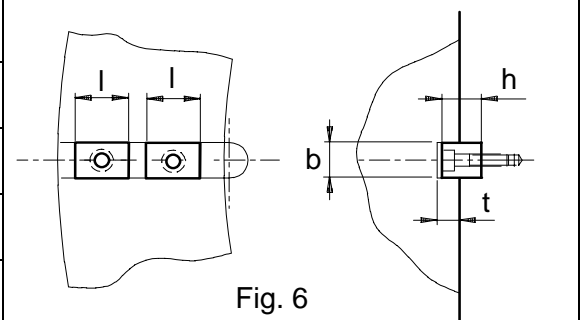


Fig. 6

**10. Assembly of control cam for microswitches**

The applications for INDEXING TABLES frequently require a cam-limit switch unit to interrupt the motor drive at each cycle.

The stop can have the function of extending the rest period of the cycle and/or of reversing the sense of rotation of the motor and consequently of the INDEXING TABLE and in which case will operate as a rocker unit.

Limit switch cams are available in three standard shapes, each suitable for a particular type of limit switch as follows:

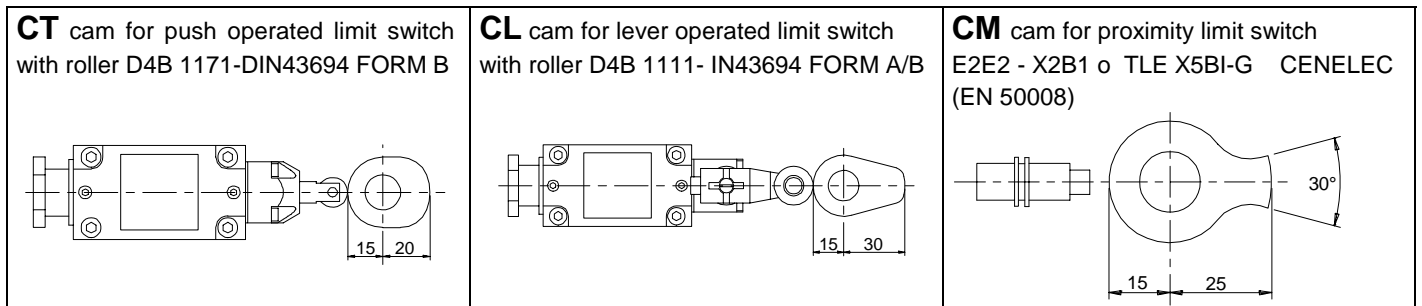


Fig. 7

On INDEXING TABLES, an "indicator notch" executed on both exposed front and rear end faces of the input shaft reveals its position, halfway along the cam's rest period, and makes it possible to identify the exact point where the limit switch must be operated.

A plate is used as a support for the limit switch, while a pin screwed into the main shaft head end thread serves as a holder for one or more limit switch operating cams.

These cams are secured to the pin and kept in place by means of grub screws.

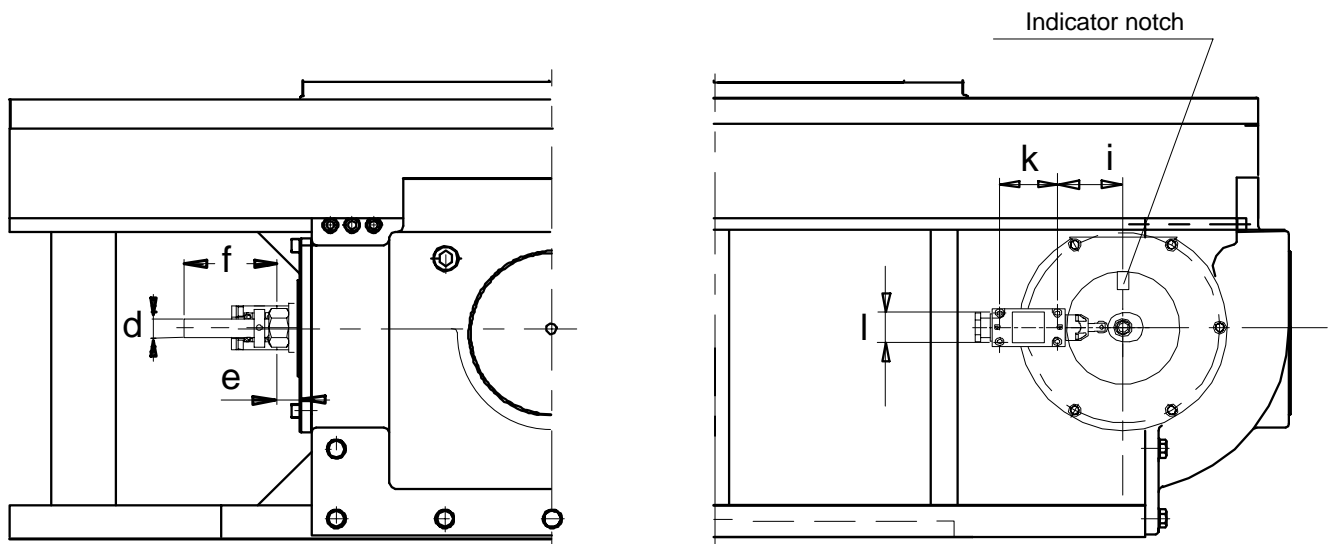


Fig. 8

Tab. 12

Series	d <sub>h9</sub>	e	f	i	k	l
IR 1601	16	15	90	48	60	30
IR 1801	16	15	90	48	60	30
IR 2001	16	15	90	48	60	30

**11.FC and FCR Micro Groups**

This simple micro groups permit identification only of the fact that the cam is in a certain position. If this position be the dwell period, the IR table must be in any one of perhaps several stations. It is sometimes necessary to know which particular station e.g. tables where oscillation between stations is required which is achieved by motor reversal.

For machine start-up and for prevention of possible over-run, extra positional information is needed.

One may also need several separate control signals for processes which are to be synchronised with the IR cam position.

**FC** are micro groups driven by the camshaft in ratio 1:1. These groups cannot distinguish particular station positions but can provide up to 6 control microcams as standard; each of which is synchronised with the IR camshaft.

Tab .13

FC Type	N. Push Switches	A	B	C	D
FC2	2	46	200	66	125
FC3	3	60	200	66	125
FC4	4	95	200	66	125
FC5	5	95	200	66	125
FC6	6	95	200	66	125

**FC micro groups  
Overall Dimensions**

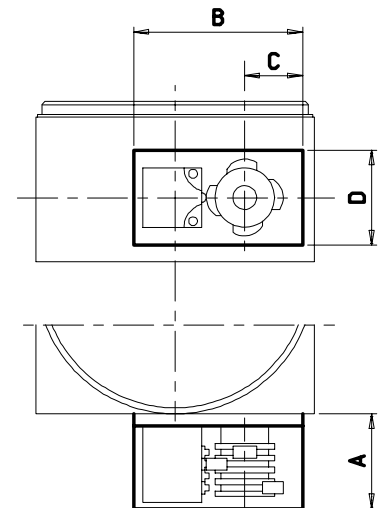


Fig. 9

**FCR** are microgroups driven by the camshaft in various ratio; none of which is 1:1, the result is that these can identify particular stations and detect oscillator over-run. Standard types are shown in the following table. Other possibilities exist to satisfy individual needs.

Tab. 14

SERIES	I	Q	E	F	G	H	L	M	N	P
IR1601	662.5	338	270	142	120	TAB 15	105	110	44.5	6.5
IR 1801	680	338	270	142	120		105	110	44.5	6.5
IR 2001	767	390	270	142	120		105	110	44.5	6.5

Tab. 15

N. MICRO CAMS	WIDTH H	TRANS. RATIO	APPLICATION
4	115	0.75	IR Oscillating Tab. 0°-180°, 0°-120°, 0°- 90°, 0°- 60°
2	115	0.50	IR indexing Table 2 stations
3	115	0.33	IR indexing Table 3 stations
4	115	0.25	IR indexing Table 4 stations
5	115	0.20	IR indexing Table 5 stations
6	115	0.16	IR indexing Table 6 stations

**FCR micro groups  
Overall Dimensions**

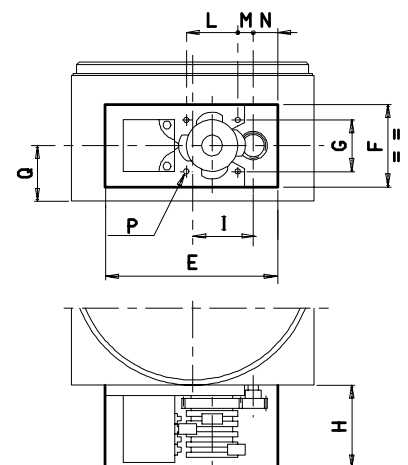


Fig. 10

**12. Example Of Application For Oscillating Rotary Tables**

Ex. : 2 Stations oscillating table (180° rotation) with displacement angle  $\beta^\circ = 330^\circ$

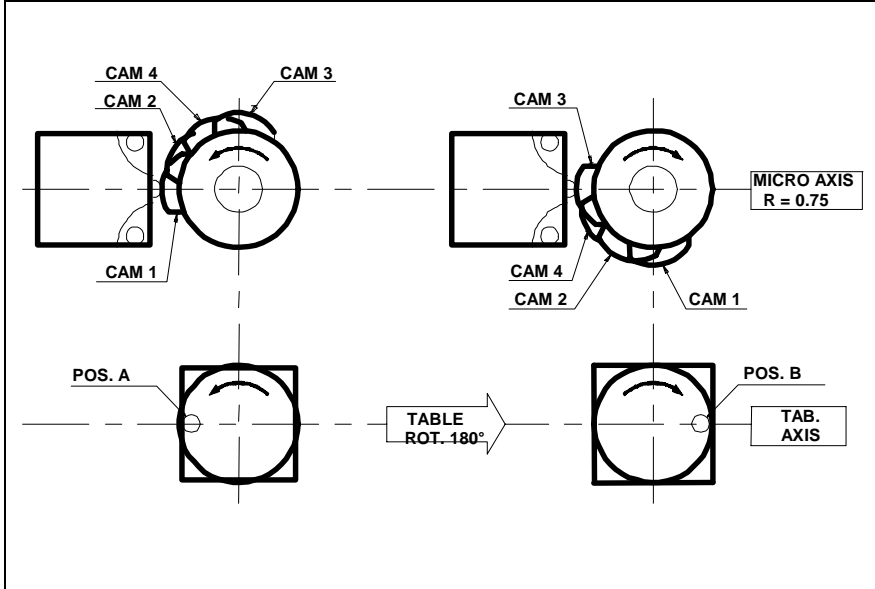


Fig. 11

Tab. 16

MICROSWITCH FUNCTIONS		
1	Micro Stop	POS. A
2	Micro Over stroke	POS. A
3	Micro Stop	POS. B
4	Micro Over stroke	POS. B

**Example Of Application For Indexing Rotary Tables**

Ex. : 4 Stations indexing table (90° rotation) with displacement angle  $\beta^\circ = 270^\circ$

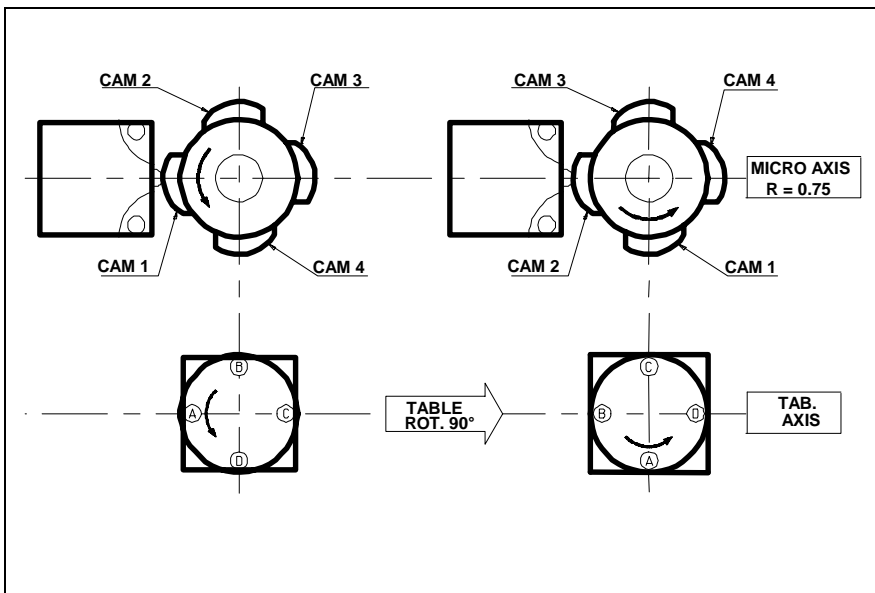


Fig. 12

Tab. 17

MICROSWITCH FUNCTIONS		
1	Micro Stop	POS. A
2	Micro Stop	POS. B
3	Micro Stop	POS. C
4	Micro Stop	POS. D

**13. Lubrication**

The lubrication of IR 1601, IR 1801 and IR 2001 tables is by oil bath, only the rollers are lubricated by conveyance of lubricant.

The recommended lubricant is ISO VG 320 mineral oil or similar.

Lubrication frequency, unless leakage or external pollution have occurred, is as shown in **Tab. 15** and depends on the temperature achieved by the oil under standard operating conditions.

The thrust bearing of indexing plate must be lubricated by specific grease cups every 1600 hours of work with 8 cm<sup>3</sup> of ISO XM 2 grease.

Indexing tables are delivered with this bearing already lubricated, therefore they do not require lubrication for the first 1600 hours of operation.

No other lubricant is provided with the indexing tables before delivery and therefore it will be customer's care to fill up to half of the level plug on the front cover.

When filling, it is best to use a filter to avoid dirt entering into the housing.

For lubrication of reduction gears and other accessory mechanical groups, the manufacturers' directions and instructions should be followed.

Tab. 18

<b>SERIES</b>	<b>OIL QUANTITY (dm<sup>3</sup>)</b>
<b>IR 1601</b>	~ 30
<b>IR 1801</b>	~ 47
<b>IR 2001</b>	~ 80

**TABLE OF CORRESPONDING LUBRICANTS**

Tab. 19

<b>ROTARY TABLES IR 1601 - IR 1801 - IR 2001</b>		
	<b>HOUSING (OIL)</b>	<b>BEARING (GREASE)</b>
<b>ISO</b>	VG - 320	XM 2
<b>AGIP</b>	BLASIA 320	GR MU EP2
<b>ESSO</b>	SPARTAN EP - 320	BEACON EP 2
<b>BP</b>	ENERGOL GR-XP-320	ENERGREASE LS-EP 2
<b>MOBIL</b>	MOBILGEAR 630	MOBILUX EP 2
<b>SHELL</b>	OMALA OIL 320	ALVANIA EP2

**TABLE OF LUBRICATION INTERVALS**

Tab. 20

<b>OIL TEMPERATURE (°C)</b>	<b>LUBRICATION INTERVAL (h)</b>
< = 65	5000
65 - 80	2500
80 - 95	1500

**14. Position of lubrication holes**

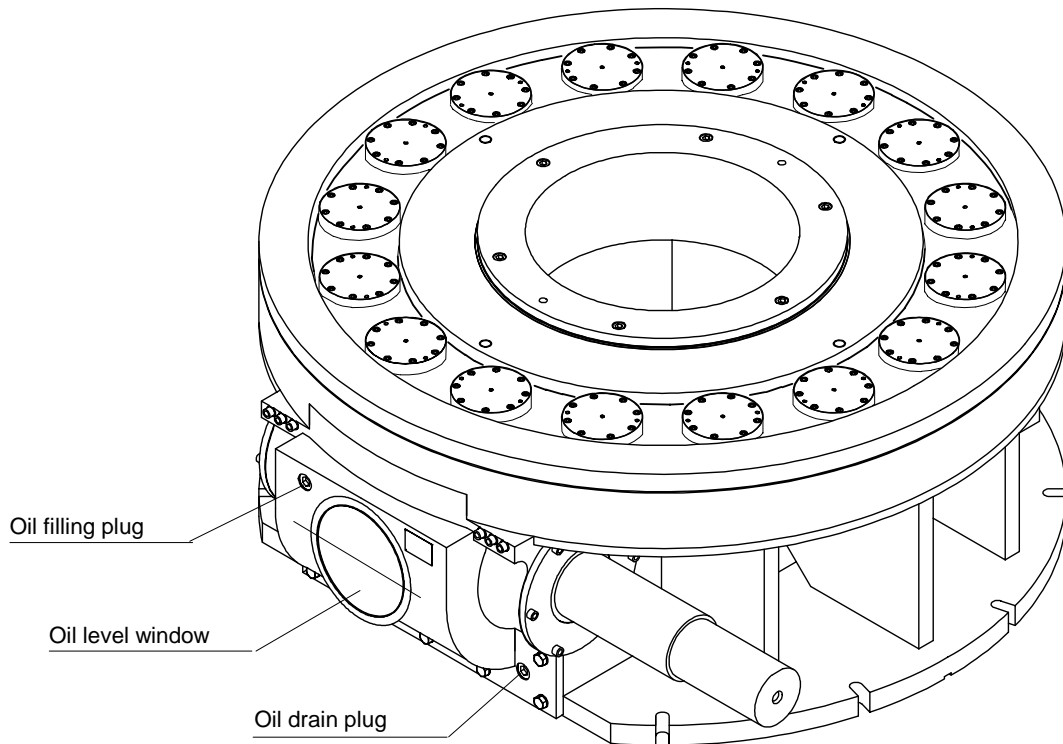


Fig. 13

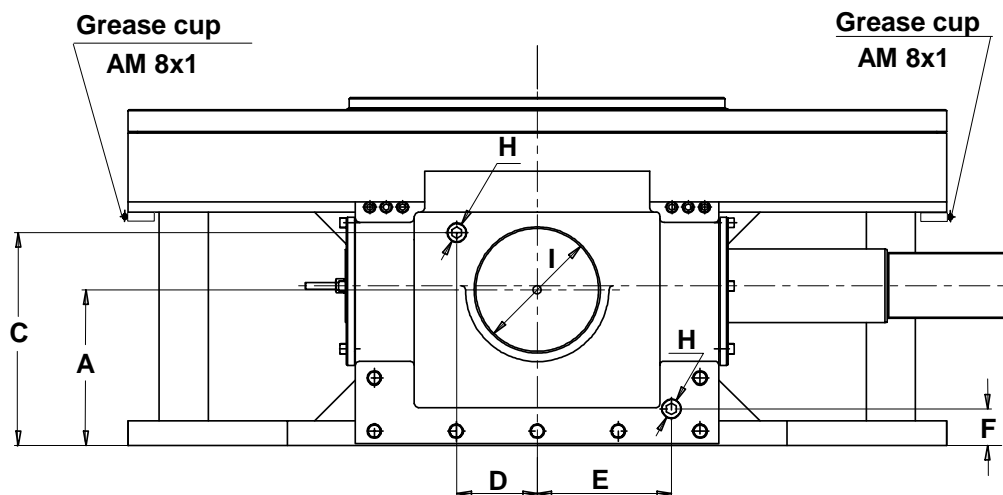


Fig. 14

Tab. 21

Serie	A	C	D	E	F	H	I
IR 1601	292	420	170	293	63	G 1 1/4	260
IR 1801	328	468	210	325	72	G 1 1/2	300
IR 2001	380	520	196	368	82	G 1 1/2	300

**15. TABLE OF DYNAMIC CAPACITIES**

Tab. 22

Series	TABLE CODE			Static torque <b>Ms</b> [daN m]	Dynamic torque (at output) cycles/min <b>Mu</b> [daN m]					Coeff. of Velocity <b>Cv</b>	Coeff. of Accel. <b>Ca</b>	Coeff. of Trasm. <b>Kj</b>	Number and type of roller
	Number of Stations <b>S</b>	Angle of displace. <b>B°</b>	Angle of dwell <b>Bn°</b>		cycles/min								
					<b>15</b> cvcles/1'	<b>25</b> cvcles/1'	<b>50</b> cvcles/1'	<b>75</b> cvcles/1'	<b>100</b> cvcles/1'				
<b>IR 1601</b>	<b>18</b>	<b>330</b>	<b>30</b>	9 977	9 061	9 044	8 967	8 838	8 656	<b>1.76</b>	<b>5.53</b>	0.06 / 0.11	18-115H
<b>IR 1801</b>				13 155	11 826	11 803	11 659	11 514	11 261				18-130H
<b>IR 2001</b>				17 711	15 937	15 935	15 917	15 890	15 821				18-150H
<b>IR 1601</b>	<b>20</b>	<b>310</b>	<b>50</b>	10 111	9 183	9 168	9 098	8 980	8 816	<b>1.76</b>	<b>5.53</b>	0.06 / 0.10	20-115H
<b>IR 1801</b>				12 316	10 816	10 795	10 696	10 532	10 303				20-130H
<b>IR 2001</b>				17 925	16 130	16 127	16 110	16 084	16 045				20-150H
<b>IR 1601</b>	<b>24</b>	<b>300</b>	<b>60</b>	9 677	8 790	8 775	8 709	8 599	8 445	<b>1.76</b>	<b>5.53</b>	0.05 / 0.09	24-100H
<b>IR 1801</b>				11 963	10 756	10 738	10 657	10 521	10 331				24-115H
<b>IR 2001</b>				14 440	12 973	12 932	12 737	12 413	11 960				24-130H
<b>IR 1601</b>	<b>26</b>	<b>300</b>	<b>60</b>	8 975	8 129	8 075	7 825	7 405	6 818	<b>1.76</b>	<b>5.53</b>	0.04 / 0.08	26-100H
<b>IR 1801</b>				10 585	9 246	9 500	9 424	9 297	9 119				26-115H
<b>IR 2001</b>				12 255	11 010	10 970	10 793	10 498	10 086				26-115H
<b>IR 1601</b>	<b>28*</b>	<b>300</b>	<b>60</b>	8 579	7 776	7 734	7 538	7 213	6 756	<b>1.76</b>	<b>5.53</b>	0.08 / 0.15	14-115H
<b>IR 1801</b>				11 441	10 264	10 206	9 931	9 476	8 838				14-130H
<b>IR 2001</b>				15 481	13 853	13 713	13 056	11 959	10 428				14-150H
<b>IR 1601</b>	<b>30*</b>	<b>300</b>	<b>60</b>	8 698	7 885	7 846	7 663	7 357	6 929	<b>1.76</b>	<b>5.53</b>	0.08 / 0.14	15-115H
<b>IR 1801</b>				11 583	10 393	10 338	10 081	9 654	9 055				15-130H
<b>IR 2001</b>				17 000	15 226	15 048	14 478	13 452	12 014				15-150H
<b>IR 1601</b>	<b>32*</b>	<b>300</b>	<b>60</b>	9 198	8 341	8 304	8 132	7 844	7 440	<b>1.76</b>	<b>5.53</b>	0.07 / 0.13	16-115H
<b>IR 1801</b>				11 702	10 503	10 450	10 209	9 806	9 242				16-130H
<b>IR 2001</b>				17 423	15 612	15 489	14 913	13 951	12 606				16-150H
<b>IR 1601</b>	<b>34*</b>	<b>300</b>	<b>60</b>	9 288	8 424	8 389	8 226	7 954	7 572	<b>1.76</b>	<b>5.53</b>	0.07 / 0.12	17-115H
<b>IR 1801</b>				11 803	10 595	10 547	10 318	9 936	9 404				17-130H
<b>IR 2001</b>				17 578	15 755	15 639	15 094	14 187	12 918				17-150H

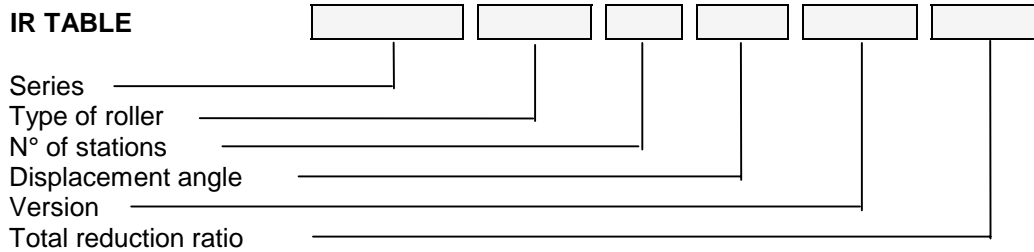
The IR Rotary table denoted by (\*) with a complete rotation of the input shaft produce two complete cycles of the output shaft: "displacement-dwell, displacement-dwell".

On demand INDEXING TABLE with special movement can be supplied.

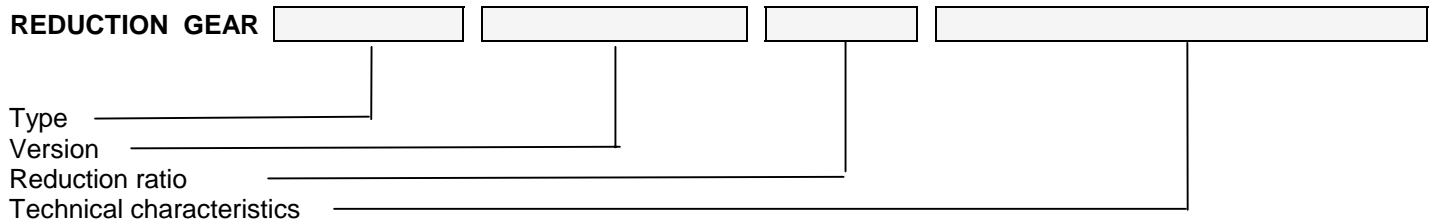
**16. Designation**

La designazione delle tavole rotanti IR è composta da gruppi alfanumerici secondo lo schema sotto rappresentato.

**IR TABLE**



**REDUCTION GEAR**

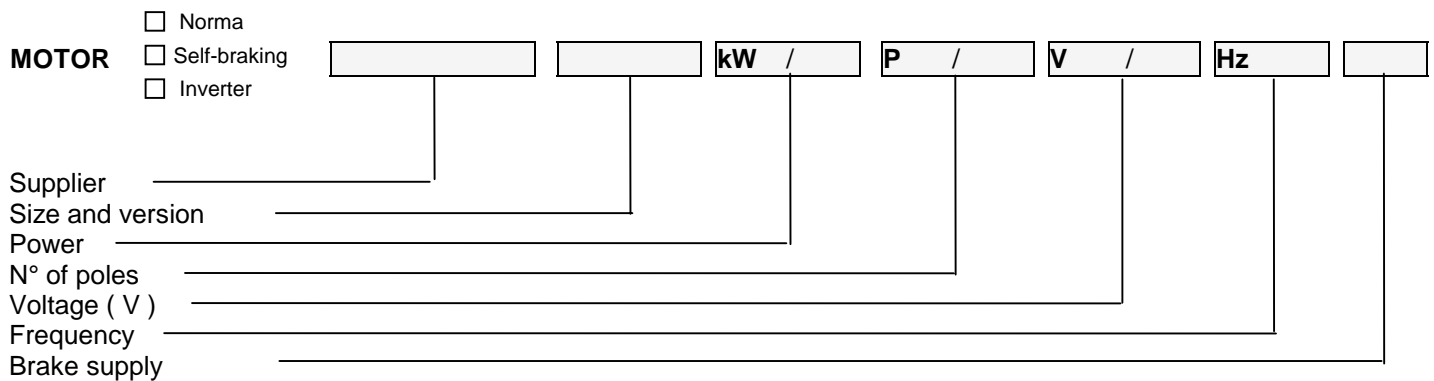


**Torque limiter type:**

**Setting torque:** (daNm)

**Coupling type:**

**Allowable torque:** (daNm)



<b>INVERTER CHARACTERISTICS</b>		<b>kW</b>	<b>V</b>
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