PRECISION GEARHEADS

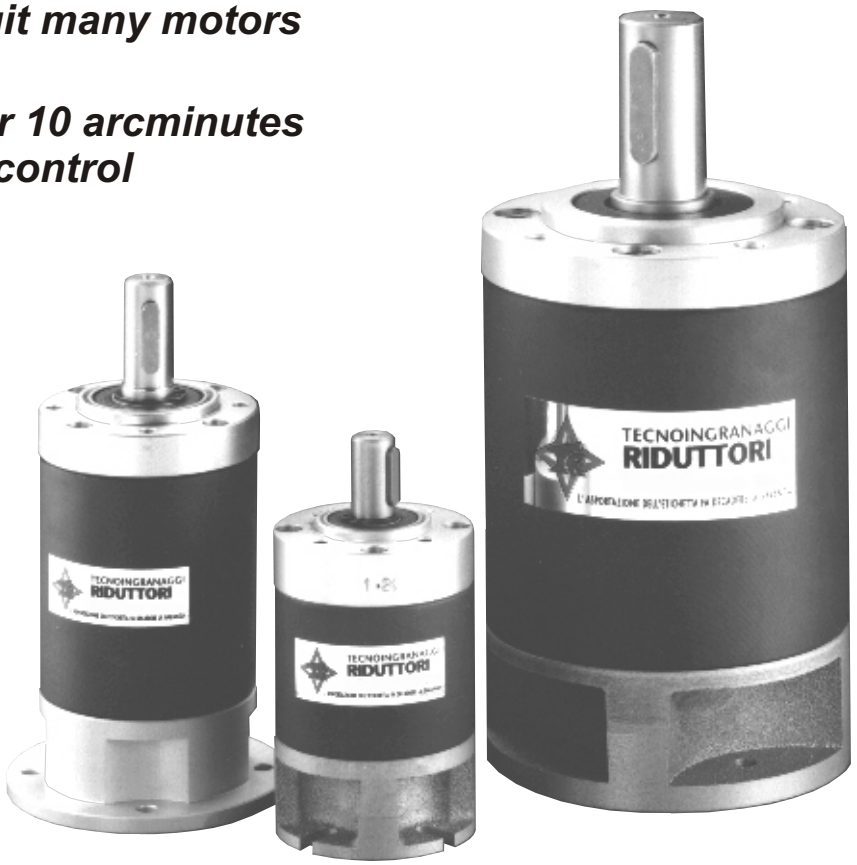
Adapter flanges to suit many motors

Low backlash of 15 or 10 arcminutes for precision motion control

Mounts directly onto stepper & servo motors

48 different ratios 3:1 to 1000:1

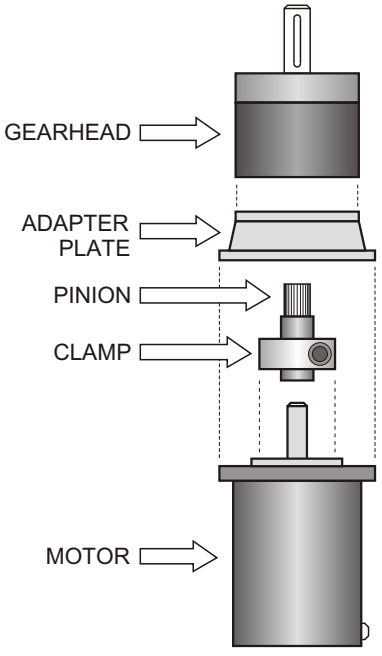
High output torque



Motion control systems often require gear reduction to increase motor torque, decrease speed and match load inertia to the motor. Often the appropriate reduction selected at design stage can reduce motor size resulting in cost savings. The TR gearheads are high precision, low backlash planetary gearboxes which are designed to mount directly onto a large variety of stepper and servo motors. This is achieved by manufacturing six basic sizes and offering a large range of adapter flanges to suit the numerous motors on the market.

The standard backlash is 15 arc minutes while optional backlash of 10' is also available. This makes them ideal for precision motion control applications such as XY tables. They offer compact size, high power and efficiency compared to other methods of reduction such as belts, pulleys and gears. There is no need to machine mounting brackets and fit flexible shaft couplings between the motor and gearbox.

Precisely machined recesses for motor pilot flange ensure that the gearbox and motor are concentric. A suitable pinion and clamp are supplied to fit onto the motor shaft.



TR1

AUTOMATED MOTION SYSTEMS PTY. LTD. - PERTH - WESTERN AUSTRALIA - PH: (08) 9309 1896 FAX: (08) 9309 5671

BASIC SIZES

MODEL NUMBER	MP053	MP060	MP080	MP105	MP130	MP160	MP190
NOMINAL DIAMETER	53mm	60mm	80mm	105mm	130mm	160mm	190mm

GENERAL SPECIFICATIONS

PROTECTION	IP65
OPERATING TEMPERATURE	-10 to 70° C
LUBRICANT	Synthetic oil of viscosity ISO VG220
NOISE	≤ 70 dB (A)
OUTPUT FLANGE MATERIAL	Aluminium
BODY MATERIAL	Steel
ADAPTER PLATE MATERIAL	Aluminium

RATIOS, STAGES & EFFICIENCIES

STAGES	EFFICIENCY	MODEL MP053	MODELS MP060, 080, 105, 130, 160
1	97%	3 - 4 - 5 - 6 - 7 - 9	3 - 4 - 5 - 6 - 7 - 10
2	94%	12 - 15 - 16 - 18 - 20 - 24 - 25 - 28 30 - 35 - 36 - 42 - 45 - 54 - 81	9 - 12 - 15 - 16 - 18 - 20 - 24 - 25 - 28 - 30 35 - 36 - 40 - 42 - 50 - 60 - 70 - 100
3	90%	48 - 60 - 64 - 75 - 80 - 84 - 100 - 112 - 125 140 - 144 - 162 - 175 - 180 - 216 - 225 245 - 252 - 324 - 405 - 567 - 729	48 - 64 - 75 - 80 - 84 - 90 - 120 - 125 - 140 - 144 150 - 160 - 175 - 180 - 200 - 210 - 216 - 250 280 - 350 - 400 - 500 - 700 - 1000

BACKLASH (arcminutes)

NOMINAL BACKLASH	1 STAGE	2 STAGE	3 STAGE
15 arcminutes	≤ 15'	≤ 15'	≤ 17'
10 arcminutes	≤ 10'	≤ 10'	≤ 12'

Output backlash is tested by applying a torque at input corresponding to 2% of the rated output torque.

OUTPUT TORQUE (Nm)

RATIOS		TORQUE TYPE	MODEL SIZE						
SIZE 053	**SIZES 060 to 190**		**053**	**060**	**080**	**105**	**130**	**160**	**190**
3 - 9 - 81 - 729	3 - 9 - 10 - 90 - 100 - 1000	Rated	12	18	40	100	215	350	500
		Starting	22	35	80	180	400	660	800
		Emergency	40	70	180	360	800	1200	1400
4 - 5 - 6 - 7 - 18 - 30 - 36	4 - 5 - 6 - 7 - 18 - 30 - 36	Rated	15	25	50	140	380	500	700
		Starting	28	40	80	210	600	750	950
		Emergency	45	90	200	450	1100	1400	1800
12 - 15 - 16 - 29 - 24 - 25 28 - 32 - 42 - 45 - 48 - 54 60 - 64 - 75 - 80 - 84 - 100 112 - 125 - 140 - 144 - 162 175 - 180 - 216 - 225 - 245 252 - 324 - 405 - 567	12 - 15 - 16 - 20 - 24 - 25 28 - 35 - 40 - 42 - 48 - 50 60 - 64 - 70 - 75 - 80 - 84 120 - 125 - 140 - 144 - 150 160 - 175 - 180 - 200 - 210 216 - 250 - 280 - 350 - 400 500 - 700	Rated	20	30	70	170	450	700	1000
		Starting	30	45	100	250	700	950	1200
		Emergency	60	100	250	600	1300	1800	2200

Rated Torque = continuous torque output at rated maximum input speed with gearhead life >10000 hours.
Starting Torque = starting torque allowed during duty cycle.
Emergency Torque = static torque applied to output shaft occuring less than 1000 times over life of gearhead.

TR2

BACKDRIVING TORQUE (Nm)

STAGES	MP053	MP060	MP080	MP105	MP130	MP160	MP190
1	0.3	0.4	0.5	0.9	1.2	1.3	3.0
2	0.5	0.6	0.8	2.5	5.0	6.0	7.5
3	3.0	3.5	5.0	10.0	20.0	23.0	28.0

MAXIMUM OUTPUT SHAFT LOADS (N)

MODEL NUMBER	MP053	MP060	MP080	MP105	MP130	MP160	MP190
RADIAL LOAD	500	600	1300	1500	5500	6500	14000
AXIAL LOAD	600	700	1400	1600	6500	7500	15000

TORSIONAL RIGIDITY (Nm/arc minute)

STAGES	MP053	MP060	MP080	MP105	MP130	MP160	MP190
1	1.0	3.0	7.0	22.0	43.0	90.0	130.0
2	0.9	2.5	5.9	20.5	37.5	83.0	100.0
3	0.7	1.8	5.4	17.5	29.5	60.0	90.0

CONTINUOUS INPUT SHAFT SPEED (rpm)

RATIOS		MODEL SIZE						
SIZE 053	SIZES 060 to 190	053	060	080	105	130	160	190
3 - 12 - 15 - 18	3 - 9 - 12 - 15 - 18	3000		2500	2200	1900	1200	1000
4 - 5 - 6	4 - 5 - 6	3300		2900	2500	2100	1500	1200
7 - 9 - 216	7 - 10 - 36 - 216	4000		3100	2800	2600	2300	1700
16 - 20 - 24 - 25 - 30 - 48 64 - 75 - 80 - 100 - 125	16 - 20 - 24 - 25 - 28 - 30 - 48 60 - 64 - 75 - 80 - 144 - 180	4400		3500	3100	2900	2700	2100
28 - 35 - 36 - 42 - 45 - 54 - 60 - 84 112 - 140 - 144 - 162 - 175 - 180 225 - 245 - 252 - 324 - 405 - 567	35 - 40 - 42 - 50 - 70 - 80 - 84 90 - 120 - 125 - 140 - 150 - 160 175 - 200 - 210 - 250 - 280 - 350 400 - 500 - 700	4800		3800	3500	3200	2900	2300
81 - 729	100 - 1000	5500		4500	4200	3900	3400	2500
These values are valid for greater than 60% duty cycle								

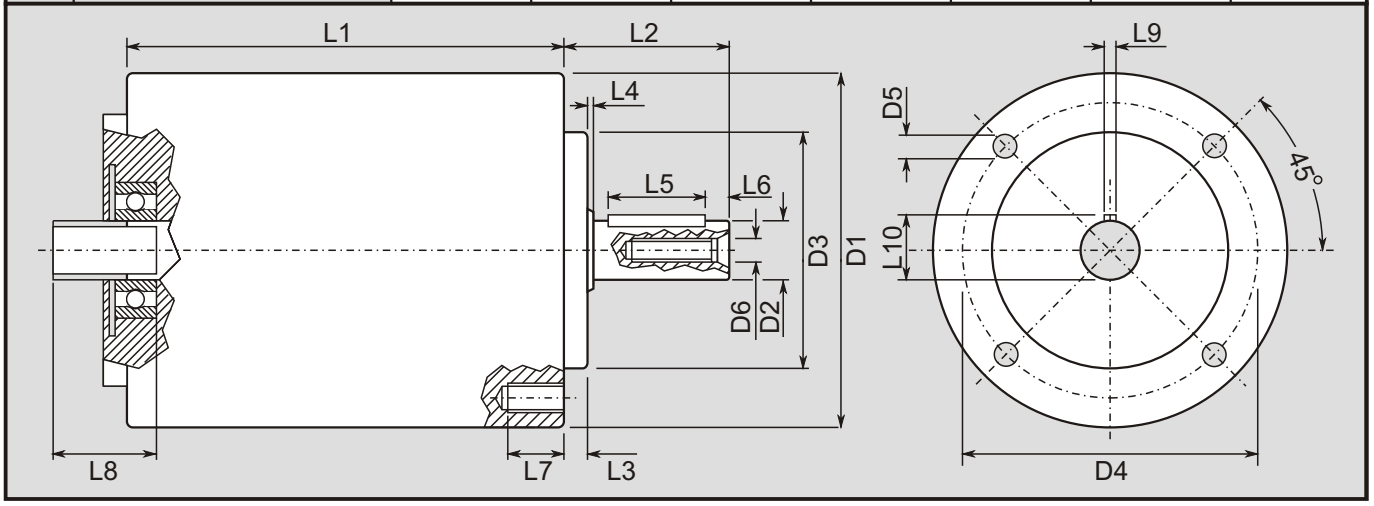
INTERMITTENT INPUT SHAFT SPEED (rpm)

RATIOS		MODEL SIZE						
SIZE 053	SIZES 060 to 190	053	060	080	105	130	160	190
3 - 12 - 15 - 18	3 - 9 - 12 - 15 - 18	3500				3000		2000
4 - 5 - 6	4 - 5 - 6	6000			4500	4000	3500	2500
7 - 9 - 216	7 - 10 - 36 - 216							
16 - 20 - 24 - 25 - 30 - 48 64 - 75 - 80 - 100 - 125	16 - 20 - 24 - 25 - 28 - 30 - 48 60 - 64 - 75 - 80 - 144 - 180						4000	3500
28 - 35 - 36 - 42 - 45 - 54 - 60 - 84 112 - 140 - 144 - 162 - 175 - 180 225 - 245 - 252 - 324 - 405 - 567	35 - 40 - 42 - 50 - 70 - 80 - 84 90 - 120 - 125 - 140 - 150 - 160 175 - 200 - 210 - 250 - 280 - 350 400 - 500 - 700							
81 - 729	100 - 1000							
Maximum velocity values valid for less than 1000 cycles per hour.								

TR3

DIMENSIONS (mm)

DIMENSION			MP053	MP060	MP080	MP105	MP130	MP160	MP190
L1	Body length	1 stage	53.0	57.6	83.5	107.5	126.0	130.0	171.7
		2 stage	66.8	74.3	108.0	140.0	165.5	169.5	223.4
		3 stage	80.6	90.9	132.5	172.5	205.0	209.0	275.1
L2	Shaft & pilot		24.5	36.5	46.0	57.5	69.5	93.0	96.0
L3	Pilot face thickness		3.0	3.0	5.0	5.0	7.0	9.0	13.0
L4	Bearing Protrusion		2.5	3.5	2.0	2.0	8.0	2.0	2.0
L5	Keyway		16.0	20.0	30.0	35.0	50.0	70.0	60.0
L6	Shaft end to keyway		2.5	5.0	5.0	5.0	3.0	6.0	11.0
L7	Mounting hole depth		10.0	10.0	12.0	12.0	18.0	18.0	15.0
L8	Pinion shaft hole		21.5	21.5	34.0	35.5	40.0	40.0	50.0
L9	Key thickness		4.0	5.0	6.0	8.0	10.0	12.0	16.0
L10	Shaft & key		13.5	16.0	21.5	28.0	35.0	43.0	59.0
D1	Body diameter		55.0	65.0	85.0	106.0	138.0	155.0	185.0
D2	Shaft diameter (h7)		12.0	14.0	19.0	25.0	32.0	40.0	55.0
D3	Pilot face (h7)		32.0	40.0	50.0	70.0	80.0	110.0	180.0
D4	Bolt P.C.D.(0.05)		40.0	52.0	65.0	85.0	110.0	130.0	215.0
D5	Mounting bolt diameter		M5	M5	M6	M8	M12	M12	13.0
D6	Shaft bolt		M4 x 10	M5 x 13	M6 x 16	M10 x 25	M12 x 32	M12 x 32	M14 x 36



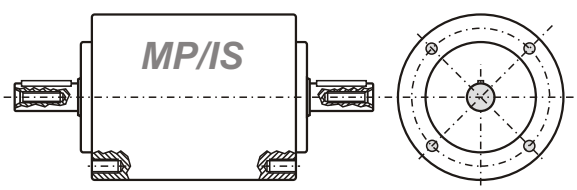
WEIGHT (kg)

STAGES	MP053	MP060	MP080	MP105	MP130	MP160	MP190
1	0.8	1.2	4.0	6.5	12.0	17.0	25.0
2	1.0	1.7	4.6	8.5	15.5	21.0	29.0
3	1.3	2.0	5.2	10.5	18.5	28.0	34.0
Not including adapter plate weight. Allow extra 15% approx for adapter plate.							

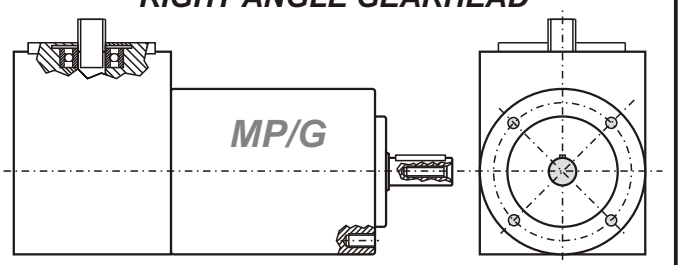
ALTERNATIVE CONFIGURATIONS

IN LINE GEARHEAD

Contact office for further details



RIGHT ANGLE GEARHEAD

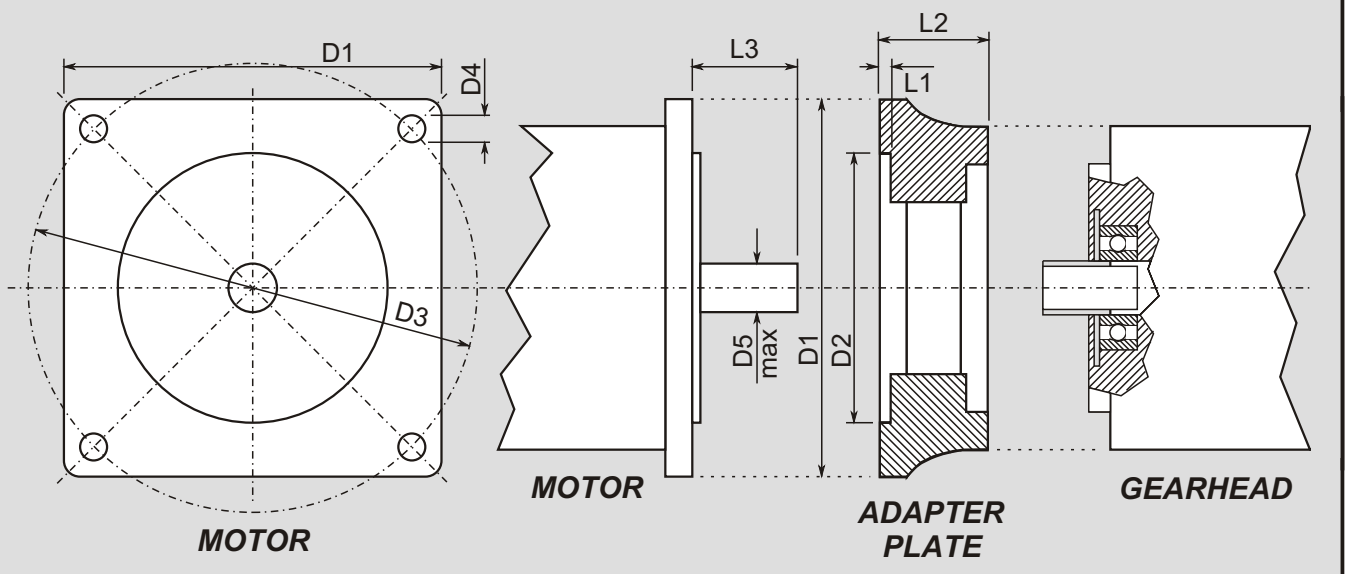


TR4

INPUT INERTIA ($kg.m^2 \times 10^{-6}$)

MODEL	MOTOR SHAFT DIAMETER	RATIOS									
		3	4	5	6-7	9-10	15-20	24-30	35-48	50-100	>100
MP053	6 to 11mm	28	18	17	16	35	16	15	12	11	11
	12 to 14mm	32	19	18	17	39	20	19	16	14	14
MP060	6 to 11mm	28	18	17	16	15	16	15	12	11	11
	12 to 14mm	32	19	18	17	16	20	19	16	14	14
MP080	9 to 11mm	74	54	46	40	37	48	47	36	35	35
	12 to 14mm	85	59	51	45	42	54	52	41	39	39
	15 to 19mm	92	65	57	51	48	61	58	48	46	46
MP105	12.7 to 14mm	255	172	146	112	105	171	171	112	112	112
	15 to 19mm	335	183	154	128	118	182	182	123	123	123
	22 to 24mm	453	258	228	191	183	254	254	190	190	190
	28mm	582	334	303	276	267	332	332	271	271	271
	32mm	692	446	416	385	372	442	442	381	381	381
MP130	14mm	541	505	392	233	189	342	341	197	195	195
	15 to 19mm	615	575	385	311	258	415	414	294	292	292
	22 to 24mm	862	821	636	558	510	662	660	498	496	496
	28 to 32mm	1012	842	657	576	522	682	682	487	485	485
	38mm	1242	1000	818	738	681	848	847	647	645	645
MP160	14mm	2645	1654	1010	936	846	1536	1008	916	766	766
	15 to 19mm	2982	1978	1287	1122	935	1796	1264	1102	855	855
	22 to 24mm	3181	2336	1658	1277	1028	2152	1632	1256	962	962
	28 to 32mm	3364	2518	1835	1451	1260	2378	1815	1428	1181	1181
	38mm	3765	2869	2218	1612	1432	2692	2196	1588	1352	1352
MP190	19 to 32mm	4033	3220	2644	2068	1846	3024	2622	2042	1762	1762
	35 to 38mm	4253	3483	2886	2132	1955	3288	2876	2115	1852	1852
	42 to 48mm	4682	3885	3293	2672	2360	3688	3282	2646	2233	2233

ADAPTER PLATES



TR5

SIZE	ADAPTER CODE	D1	D2	D3	D4	D5max	L1	L2	L3
053	STD053	55	25/40	36/56	4.5	9		25	25
	NEMA23.053	60	38.1	66.6	M4	12	4	18	25
	40/63.053	60	40	63	M4	12	4	18	25
	50/60.053	60	50	60	M4	12	4	18	25
	56B14.053	60	50	65	M5	14	4	23	30
	50/70.053	60	50	70	M5	14	4	23	30
	63B14.053	65	60	75	M5	14	4	23	30
	60/90.053	75	60	90	M5	14	4	23	30
	71B14.053	75	70	85	M6	14	4	23	30
	70/90.053	75	70	90	M5	14	4	23	30
	NEMA34.053	85	73	98.4	M5	14	4	25	32
	56B5.053	85	80	100	M6	14	4	23	30
060	STD060	65	25/40	36/56	4.5	9		25	25
	NEMA23.060	60	38.1	66.6	M4	12	4	18	25
	40/63.060	60	40	63	M4	12	4	18	25
	50/60.060	60	50	60	M4	12	4	18	25
	56B14.060	60	50	65	M5	14	4	23	30
	50/70.060	60	50	70	M5	14	4	23	30
	63B14.060	65	60	75	M5	14	4	23	30
	60/90.060	75	60	90	M5	14	4	23	30
	71B14.060	75	70	85	M6	14	4	23	30
	70/90.060	75	70	90	M5	14	4	23	30
	NEMA34.060	85	73	98.4	M5	14	4	25	32
	56B5.060	85	80	100	M6	14	4	23	30
080	56B14.080	80	50	65	M5	14	5	34	40
	50/70.080	80	50	70	M5	14	5	34	40
	50/95.080	80	50	95	M6	14	5	34	40
	NEMA42B.080	105	55.5	125.7	M6	19	5	34	40
	63B14.080	80	60	75	M5	19	5	34	40
	60/90.080	80	60	90	M5	16	5	34	40
	71B14.080	80	70	85	M6	19	5	34	40
	PAM70.080	80	70	90	M5	19	5	34	40
	NEMA34.080	85	73	98.4	M5	14	5	34	40
	78/63.5.080	85	78	63.5	M6	14	5	34	40
	56B5.080	90	80	100	M6	19	5	34	40
	63B5.080	100	95	115	M8	19	5	34	40
	95/130.080	115	95	130	M8	19	5	34	40
	71B5.080	115	110	130	M8	19	5	34	40
	S4000.080.50	120	110	145	M8	19	6.5	44	50
	S4000.080.60	120	110	145	M8	19	6.5	54	60
105	50/95.105	100	50	95	M6	19	5	28	40
	NEMA42B.105	105	55.5	125.7	M6	19	5	28	40
	63B14.105	100	60	75	M6	19	5	28	40
	71B15.105	100	70	85	M6	19	5	28	40
	PAM70.105	100	70	90	M5	19	5	28	40
	56B5.105	100	80	100	M6	19	5	28	40
	63B5.105.40	100	95	115	M8	19	5	28	40
	63B5.105.50	100	95	115	M8	24	5	38	50
	95/130.105	115	95	130	M8	19	5	28	40
	71B5.105.40	115	110	130	M8	19	5	28	40
	71B5.105.50	115	110	130	M8	24	6.5	38	50
	S4000.105.50	120	110	145	M8	24	6.5	38	50
	S4000.105.60	120	110	145	M8	24	6.5	48	60
	90B5.105.50	140	130	165	M10	24	5	38	50

SIZE	ADAPTER CODE	D1	D2	D3	D4	D5max	L1	L2	L3
130	NEMA42B.130	130	55.5	125.7	M6	19	5	39.5	50
	56B5.130	130	80	100	M6	19	5	39.5	50
	63B5.130	130	95	115	M8	24	5	39.5	50
	71B5.130	130	110	130	M8	24	5	39.5	50
	S4000.130.60	130	110	145	M8	24	6.5	49.5	60
	S6000.130.80	170	114.3	200	M12	38	6.5	69.5	80
	90B5.130.50	140	130	165	M10	24	5	39.5	50
	90B5.130.60	140	130	165	M10	32	5	49.5	60
	100B5.130.60	190	180	215	M14	32	5.5	49.5	60
	100B5.130.80	190	180	215	M14	38	5.5	69.5	80
160	NEMA42B.160	140	55.5	125.7	M6	19	5	39.5	50
	56B5.160	140	80	100	M6	19	5	39.5	50
	63B5.160	140	95	115	M8	24	5	39.5	50
	71B5.160	140	110	130	M8	24	5	39.5	50
	S4000.160.60	140	110	145	M8	24	6.5	49.5	60
	S6000.160.80	170	114.3	200	M12	38	6.5	69.5	80
	90B5.160.50	140	130	165	M10	24	5	39.5	50
	90B5.160.60	140	130	165	M10	32	5	49.5	60
	100B5.160.60	190	180	215	M14	32	5.5	49.5	60
	100B5.160.80	190	180	215	M14	38	5.5	69.5	80
190	NEMA42B.190	140	55.5	125.7	M6	19	5	39.5	50
	56B5.190	140	80	100	M6	19	5	39.5	50
	63B5.190	140	95	115	M8	24	5	39.5	50
	71B5.190	140	110	130	M8	24	5	39.5	50
	S4000.190.60	140	110	145	M8	24	6.5	49.5	60
	S6000.190.80	170	114.3	200	M12	38	6.5	69.5	80
	90B5.190.50	140	130	165	M10	24	5	39.5	50
	90B5.190.60	140	130	165	M10	32	5	49.5	60
	100B5.190.60	190	180	215	M14	32	5.5	49.5	60
	100B5.190.80	190	180	215	M14	38	5.5	69.5	80

ADAPTER PLATES FOR STEPPER MOTORS

MOTOR SIZE	MP053	MP060	MP080	MP105	MP130	MP160	MP190
23	NEMA23.053	NEMA23.060	not possible	not possible	not possible	not possible	not possible
34	NEMA34.053	NEMA34.060	NEMA34.080	not possible	not possible	not possible	not possible
42	not possible	not possible	NEMA42B.080	NEMA42B.105	NEMA42B.130	NEMA42B.160	NEMA42B.190

NON STANDARD MOTORS

Adapter plates are available for most standard motors on the world market. However, if your motor does not match one of these adapter plates, please contact the office, stating the following dimensions. It is possible the factory can modify an existing adapter to suit you.

D1 Motor flange diameter or square
D2 Motor pilot face diameter
D3 Motor bolt holes PCD
D5 Motor shaft diameter
L3 Motor shaft length

AVAILABLE MOTOR SHAFT SIZES (mm)

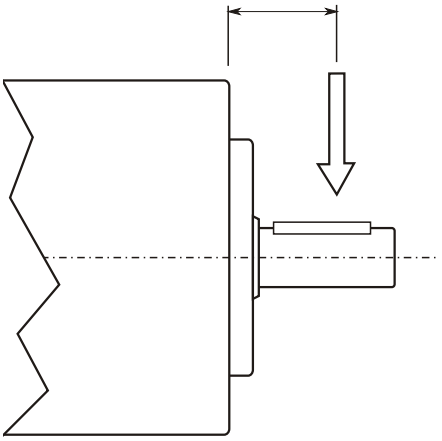
MP053	MP060	MP080	MP105	MP130	MP160	MP190
6 - 6.35 - 7 - 8	6 - 6.35 - 7 - 8	9 - 9.52 - 11	12.7 - 14	14 - 15.875 - 16	14 - 15.875 - 16	19 - 24 - 32
9 - 9.52 - 11	9 - 9.52 - 11	12 - 12.7 - 14	15.875 - 16 - 19	19 - 22 - 24 - 28	19 - 22 - 24 - 28	35 - 38 - 42
12 - 12.7 - 14	12 - 12.7 - 14	15.875 - 16 - 19	22 - 24 - 28 - 32	32 - 35 - 38	32 - 35 - 38	45 - 48

TR7

SELECTING THE CORRECT 'MP' GEARHEAD

Selection of the correct gearhead is dependant on many factors as shown below. The dimensional constraints and gear ratio are determined by the demands of the application whereas the other factors must be calculated before selecting the gearhead. .

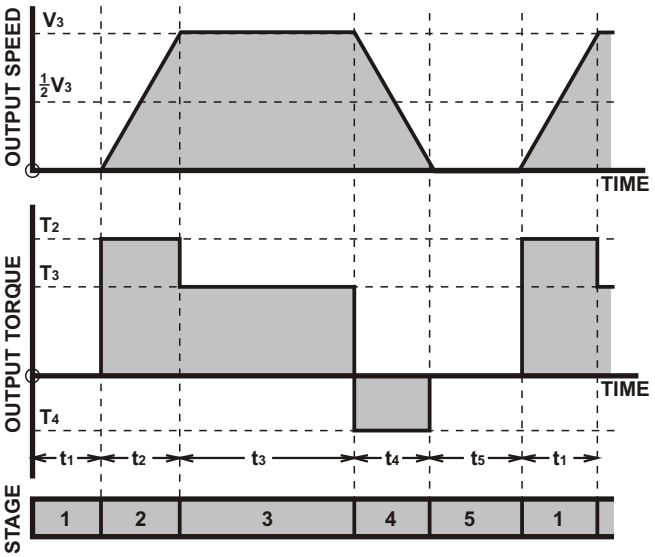
1. ***Dimensional characteristics***
2. ***Motor adapter flange***
3. ***Gear ratio***
4. ***Output power***
5. ***Duty cycle***



POSITION OF RADIAL LOAD

The gearhead life is usually determined by the power, output torque and duty cycle of the load. In some cases the size and position of the radial shaft load on the output shaft may cause gearhead failure before power and torque limitations.

It is recommended that you contact A.M.S. with details of the application and a break down of motion cycle into basic components



BREAKDOWN OF MOTION PROFILE

ORDERING INFORMATION

MP - 080 - 2 - 20 - 15 - 9.53 - 30 + NEMA34.080

- NEMA34.080 — *ADAPTER PLATE*
- 30 — *MOTOR SHAFT LENGTH*
- 9.53 — *MOTOR SHAFT DIA.*
- 15 — *BACKLASH*
- 20 — *RATIO*
- 2 — *STAGES*
- 080 — *SIZE*

When ordering a gearhead, specify either the adapter plate or the motor dimensions.
The critical dimensions are motor shaft diameter, shaft length, pilot face and bolt hole P.C.D.

Stepper motors, transformers, controllers, motion control software and motor couplings also available.
Continuous development may necessitate changes in models and specifications without notice.

AUTOMATED MOTION SYSTEMS PTY.LTD.

MAILING ADDRESS:
P.O.BOX 1240
WANGARA DC
W.A. 6947

PHONE: (08) 9309 1896
FAX: (08) 9309 5671
EMAIL: sales@automotsys.com.au
INTERNET: http://www.automotsys.com.au

OFFICE ADDRESS:
UNIT2, 7 BARETTA RD.
WANGARA, PERTH
WESTERN AUSTRALIA

TR8 A.B.N.: 94 009 232 535