



Reliance[®]

Precision Mechatronics



**Standard and Customised
Components and Assemblies**

A complete source for precise motion control

Planetary and Right Angle Gearboxes

3

Precision gearboxes

Economical precision gearboxes.
Can be supplied with interfaces to complement the intelligent Reliance Cool Muscle Motor.



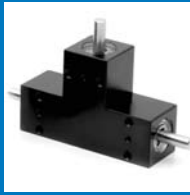
Planetary Gearboxes

Standard backlash $24'/16'$ (single stage)
40/60mm square
Ratios 3:1 to 512:1
Lubricated for life
Suits NEMA 17 or 23 motor



Planetary Gearboxes

Low backlash $3'/5'$
70mm square
Ratios 3:1 to 100:1
Lubricated for life
Suits NEMA 23 motor



Hypoid & Bevel Gearboxes

Single and double shaft
Ratios 1:1 and 2:1



Epicyclic Modules

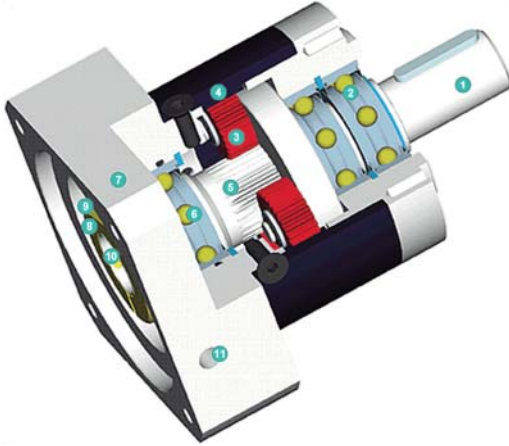
A selection of Matex epicyclic modules.
Units range from 1 to 45Nm. 75mm outside diameter with an output torque upto 120Nm

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RGP40, RGP60



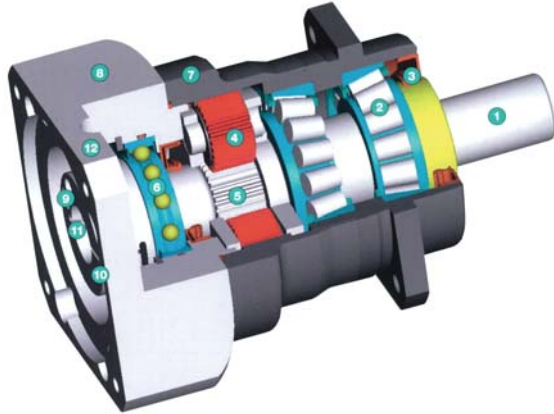
- standard backlash (RGP40 from <math><24'</math>)
(RGP60 from <math><16'</math>)
- high output torque
- novel motor clamp system
- high efficiency (96%)
- ratios $i=3, \dots, 512$
- low noise
- high quality
- any mounting position
- easy motor mounting
- lifetime lubrication
- direction of rotation equidirectional
- options available

3

- 1 Output shaft**
High strength one piece planet carrier and output shaft
- 2 Output shaft bearing**
Deep groove ball bearings with contact seals
- 3 Planet gear**
Precision zero helix angle gear with optimised profile modification and crowning, case hardened and hard finished by honing
- 4 Housing with integrated ring gear**
Ring gear case hardened for high load capacity, minimum wear, consistent backlash
- 5 Sun gear**
Precision machined optimised gear profile, case hardened and honed for higher load capacity, low noise, minimum wear and consistent backlash
- 6 Bearing for sun gear**
High speed, deep groove ball bearings eliminating thrust loads from thermal expansion, whilst providing exact sun gear position for easy mounting
- 7 Motor adaptor plate**
Allows matching up of the gear head with NEMA 17 and 23 motors, made of aluminium for enhanced thermal conductivity (other adaptors and motors on request)
- 8 Clamping ring**
Balanced ring suitable for high rpm, made from steel to allow greater clamping forces for safe torque transfer
- 9 Clamping screw**
High strength steel with special low pitch thread to generate a greater clamping force
- 10 Motor shaft clamp**
Multiple closed slot precision clamping system for improved reliability
- 11 Assembly hole**
Access bore for the clamping screw

RGPN70

- low backlash (<math><3'</math>)
- high output torque
- novel motor clamp system
- high efficiency (98%)
- honed gearing
- ratios $i=3, \dots, 100$
- low noise (<math>< 58 \text{ dB}</math>)
- high quality
- any mounting position
- easy motor mounting
- lifetime lubrication
- direction of rotation equidirectional
- options available



3

1 Output shaft

High strength, one piece planet carrier and output shaft

2 Output shaft bearing

High precision, preloaded taper roller bearings for zero clearance

3 Sealing ring

Dedicated double lip seal. The lubricant is kept in while contaminants remain outside the gearbox; IP65

4 Planet gear

Precision zero helix angle gear with optimised profile modification and crowning, case hardened and hard finished by honing

5 Sun gear

Precision machined optimised gear profile, case hardened and honed for higher load capacity, low noise, minimum wear and consistent backlash

6 Bearing for sun gear

High speed, deep groove ball bearings eliminating thrust loads from thermal expansion, whilst providing exact sun gear position for easy mounting

7 Housing with integrated ring gear

Ring gear case hardened for high load capacity, minimum wear, consistent backlash

8 Motor adaptor plate

Allows matching up of the gearhead with NEMA 23 motors, made of aluminium for enhanced thermal conductivity (other adaptors and motors on request)

9 Clamping ring

Balanced ring suitable for high rpm, made from steel to allow greater clamping forces for safe torque transfer

10 Clamping screw

High strength steel with special low pitch thread to generate a greater clamping force

11 Motor shaft clamp

Precision clamping system for improved reliability

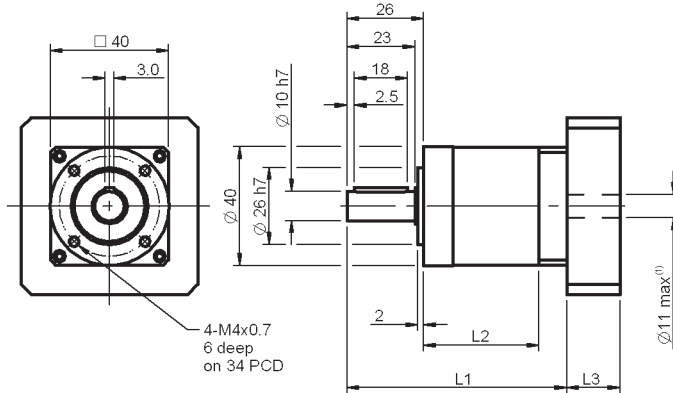
12 Assembly hole

Access bore for the clamping screw



All dimensions in mm

Associated Products
 Reliance Cool Muscle: [page 2-2](#)
 Couplings: [page 8-1](#)
 Hardware: [page 13-1](#)



See [page 3-10](#) for motor mount details

Part number selection table

Example Part No:- RGP40 - 60 - NEMA17									
Basic Part Number	Ratio	Number of Stages	L1 mm	L2 mm	L3		Output Torque		Inertia kgcm ²
					NEMA 17 mm	NEMA 23 mm	Nominal Nm ⁽²⁾	Max Nm	
RGP40	3	1	74.5	39	19	15	11	17.6	0.031
	4						15	24	0.022
	5						14	22	0.019
	8						6	10	0.017
RGP40	9	2	87.5	52	19	15	16.5	26	0.030
	12						20	32	0.029
	15						18	29	0.023
	16						20	32	0.022
	20						20	32	0.019
	25						18	29	0.019
	32						20	32	0.017
	40						18	29	0.016
	64						7.5	12	0.016
RGP40	60	3	100	64.5	19	15	20	32	0.029
	80						20	32	0.019
	100						20	32	0.019
	120						18	29	0.029
	160						20	32	0.016
	200						18	29	0.016
	256						20	32	0.016
	320						18	29	0.016
	512						7.5	12	0.016

Technical information

Specification	Unit	RGP40	Stage
Backlash	arcmin	<24	1
		<28	2
		<30	3
Torsional stiffness	Nm/arcmin	1.0	1
		1.1	2
		1.0	3
Efficiency with full load	%	96	1
		94	2
		90	3
Weight	kg	0.35	1
		0.45	2
		0.55	3
Lifetime⁽³⁾	h	30,000	
Radial load for 10,000h⁽⁴⁾	N	200	
Axial load for 10,000h⁽⁴⁾	N	200	
Running noise⁽⁵⁾	dB(A)	58	
Maximum input speed	rpm	18,000	
Input speed at >50% torque		5,000	
Operating temperature	max °C	90	
	min °C	-25	
Motor mounting clamp torque	M2.5 M3	2	
		4.5	
Lubrication		Greased for life	
Degree of protection		IP54	

⁽¹⁾ NEMA 17 and 23 motors are supplied with a mounting adaptor plate and a motor output shaft bush

⁽²⁾ Emergency stop torque equals twice nominal torque, maximum 500 times

⁽³⁾ Based on nominal torque and output shaft speed 100 rpm

⁽⁴⁾ Based on output shaft speed 100 rpm, centrally positioned along shaft

⁽⁵⁾ Distance 1 metre, idle running, input speed 3,000 rpm, ratio 5

- Gearbox may be used in any mounting orientation
- Housing material: Steel - black
- Input and output flanges material: Aluminium - untreated
- Optional smooth output shaft if required
- Other motors may be utilised, please contact our sales team
- For detailed duty cycle and life calculation, please contact our sales team

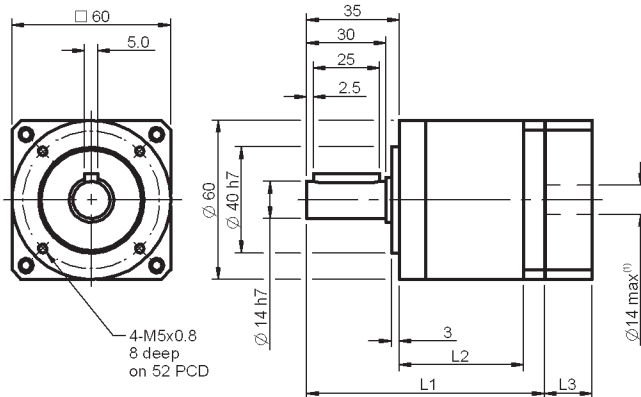


Gearbox designed to suit Reliance Cool Muscle intelligent integrated AC servo system, see pages 3-10 & 3-11



All dimensions in mm

Associated Products
 Reliance Cool Muscle: [page 2-2](#)
 Couplings: [page 8-1](#)
 Hardware: [page 13-1](#)



See [page 3-10](#) for motor mount details

Part number selection table

Example Part No:- **RGP60 - 60 - NEMA17**

Basic Part Number	Ratio	Stage	L1	L2	L3		Output Torque		Inertia
					NEMA 17	NEMA 23	Nominal	Max	
					mm	mm	mm	mm	Nm ⁽²⁾
RGP60	3	1	90	47	18.1	16.1	28	45	0.135
	4						38	61	0.093
	5						40	64	0.078
	8						18	29	0.065
RGP60	9	2	102.5	59.5	18.1	16.1	44	70	0.131
	12						44	70	0.127
	15						44	70	0.077
	16						44	70	0.088
	20						44	70	0.075
	25						40	64	0.075
	32						44	70	0.064
	40						40	64	0.064
	64						18	29	0.064
RGP60	60	3	115.5	72	18.1	16.1	44	70	0.076
	80						44	70	0.075
	100						44	70	0.075
	120						44	70	0.064
	160						44	70	0.064
	200						40	64	0.064
	256						44	70	0.064
	320						40	64	0.064
	512						18	29	0.064

Technical information

Specification	Unit	RGP60	Stage
Backlash	arcmin	<16	1
		<20	2
		<22	3
Torsional stiffness	Nm/arcmin	2.3	1
		2.5	2
		2.5	3
Efficiency with full load	%	96	1
		94	2
		90	3
Weight	kg	0.9	1
		1.1	2
		1.3	3
Lifetime⁽³⁾	h	30,000	
Radial load for 10,000h⁽⁴⁾	N	500	
Axial load for 10,000h⁽⁴⁾	N	600	
Running noise⁽⁵⁾	dB(A)	58	
Maximum input speed	rpm	13,000	
Input speed at >50% Torque		4,500	
Operating temperature	max °C	90	
	min °C	-25	
Motor mounting clamp torque	M3	4.5	
	M4	9.5	
Lubrication		Greased for life	
Degree of protection		IP54	

⁽¹⁾ NEMA 17 and 23 motors are supplied with a mounting adaptor plate and a motor output shaft bush

⁽²⁾ Emergency stop torque equals twice nominal torque, maximum 500 times

⁽³⁾ Based on nominal torque and output shaft speed 100 rpm

⁽⁴⁾ Based on output shaft speed 100 rpm, centrally positioned along shaft

⁽⁵⁾ Distance 1 metre, idle running, input speed 3,000 rpm, ratio 5

- Gearbox may be used in any mounting orientation
- Housing material: Steel - black
- Input and output flanges material: Aluminium - untreated
- Optional smooth output shaft if required
- Other motors may be utilised, please contact our sales team
- For detailed duty cycle and life calculation, please contact our sales team

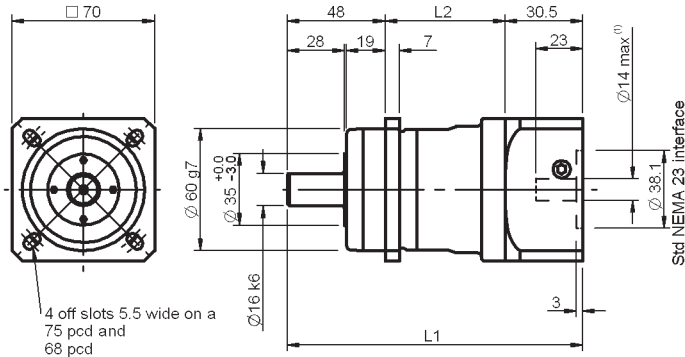


Gearbox designed to suit Reliance Cool Muscle intelligent integrated AC servo system, see pages 3-10 & 3-11



All dimensions in mm

Associated Products
 Reliance Cool Muscle: [page 2-2](#)
 Couplings: [page 8-1](#)
 Hardware: [page 13-1](#)



4 off slots 5.5 wide on a 75 pcd and 68 pcd

See [page 3-10](#) for motor mount details

Part number selection table

Example Part No:- RGN70 - 40 - NEMA23									
Basic Part Number	Ratio	Stage	L1 mm	L2 mm	Output Torque		Inertia kgcm ²	Input Speed at 50% Torque rpm	Input Speed at 100% Torque rpm
					Nominal Nm ⁽²⁾	Max Nm			
RGN70	3	1	137.5	59	45	72	0.40	2,580	2,020
	4				60	96	0.32	2,800	2,090
	5				65	104	0.28	3,100	2,300
	8				40	64	0.25	4,480	3,720
	10				27	43	0.25	5,210	4,610
RGN70	12	2	166.5	88	68	109	0.40	3,960	2,990
	15				68	109	0.38	4,420	3,410
	16				77	123	0.35	4,220	3,240
	20				77	123	0.33	4,690	3,670
	25				65	104	0.30	5,210	4,300
	32				77	123	0.32	5,640	4,620
	40				65	104	0.29	6,000	5,260
	64				40	64	0.26	6,000	6,000
	100				27	43	0.25	6,000	6,000

Technical information

Specification	Unit	RGPN70	Stage
Backlash	arcmin	<3	1
		<5	2
Torsional stiffness	Nm/arcmin	6	1
		7	2
Efficiency with full load	%	98	1
		95	2
Weight	kg	1.9	1
		2.4	2
Lifetime⁽³⁾	h	20,000	
Radial load for 20,000h⁽⁴⁾	N	3,200	
Axial load for 20,000h⁽⁴⁾	N	4,400	
Running noise⁽⁵⁾	dB(A)	58	
Maximum input speed	rpm	14,000	
Operating temperature	max °C	90	
	min °C	-25	
Motor mounting clamp torque	M3	Nm	4.5
	M4		9.5
Lubrication		Greased for life	
Degree of protection		IP65	

3

⁽¹⁾ NEMA 17 and 23 motors are supplied with an integrated mounting adaptor plate and a motor output shaft bush
⁽²⁾ Emergency stop torque equals twice nominal torque, maximum 500 times
⁽³⁾ Based on nominal torque and output shaft speed 100 rpm
⁽⁴⁾ Based on output shaft speed 100 rpm, centrally positioned along shaft
⁽⁵⁾ Distance 1 metre, idle running, input speed 3,000 rpm, ratio 5

- Gearbox may be used in any mounting orientation
- Housing material: Steel - black
- Input flange material: Aluminium - untreated
- Optional keyway output shaft if required
- Other motors may be utilised, please contact our sales team
- For detailed duty cycle and life calculation, please contact our sales team

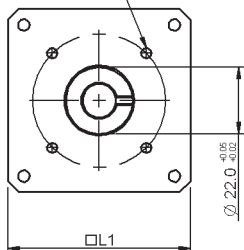


Gearbox designed to suit Reliance Cool Muscle intelligent integrated AC servo system, see pages 3-10 & 3-11



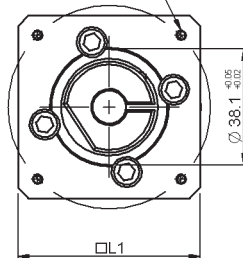
Interface detail

4 off holes $\varnothing 3.4$ on a 43.8 PCD, c/bore $\varnothing L2$ L3 deep from other side



NEMA size 17 interface
L3 = 18.1±0.1

4 off holes M4x0.7 L4 deep on a 66.7 PCD



NEMA size 23 interface
L3 = 16.1±0.1

3

Gearbox	NEMA 17		NEMA 23	
	L1	L2	L3	L4
RGP40	60	6.0	7	14
RGP60	60	6.4	10	16
RGPN70	70	N/A	N/A	12

The Reliance gearboxes use adaptor plates for low quantity orders of the RGP40 and RGP60 range. The adaptor plate allows for upgrade of the motor without the need to replace the gearbox. The RGP40 will be mounted at 45° to the NEMA size 17 motor (Fig 1). If an in-line mount is needed specifically for your requirements, please contact our sales team. The RGP60 will be mounted in-line with the motor using the adaptor plate.

For larger quantities the RGP40 and RGP60 are supplied as a complete unit with an integrated motor interface. The RGP40 will be mounted in-line with the motor (Fig 2) and L1 will be 40mm. The RGP60 will be mounted in-line with the motor.

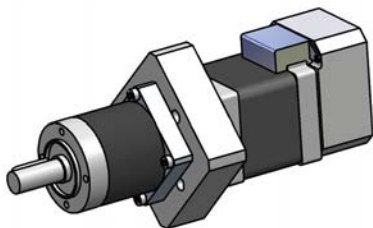


Fig1

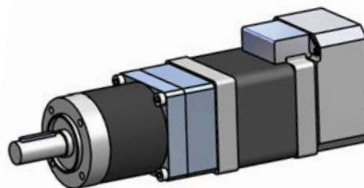
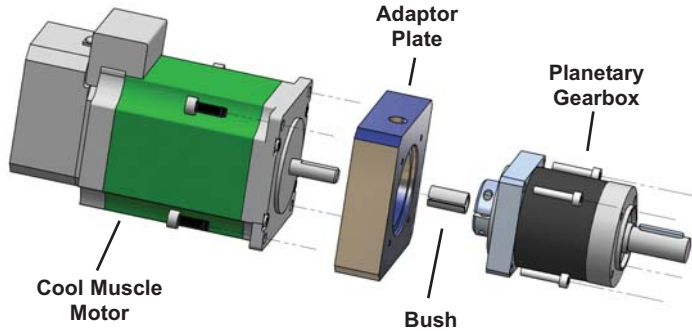


Fig2



Part number selection table

3

Example Part No:- RGP60 - 60 - C - 17S30-RT3		
Required Gearbox and Ratio	Reliance Cool Muscle	
	Motor Control	Motor Size & Length
Chosen from Gearbox Product Pages	C (computer) P (pulse)	17S30-RT3 17L30-RT3 23S30-RT3 23L20-RT3

Please note that the RGPW70 is only available for the NEMA23 Reliance Cool Muscle Motor

Reliance also offers the RGPW40, RGPW60 and RGPW70 angular gearbox range.

Designed at 90°, this angular gearbox range has been specially developed as a space saving installation method of gearbox to motor.

Contact our sales team or visit www.rpmechatronics.co.uk for more information



3

HY 70 R - 005
 BS 45 L - 001
 BS 80 T - 002
 BSH 140 L - 001
 BE 40 L - 001
 BE 70 L - 002 B

Gearbox Type	Overall Length	Gearbox Shape	Gear Ratio	Shaft Diameter Identification
HY - Hypoid Gearbox BS - Bevel Gearbox BSH - Bevel Gearbox BE - Bevel Gear Set	Distance from back face to shaft end	R = Square L = L shape T = T shape	001 = 1:1 002 = 2:1 005 = 5:1	A = Smaller output/input shaft option B = Larger output/input shaft option

* See bore type designator in part number, - or +

Reliance bevel boxes

Reliance bevel boxes are a space saving solution to difficult design restraints or a restricted space envelope.

Utilising a compact and simple design the B-Box series has a completely sealed casing providing a dust free and safe operation. The bevel box uses a lightweight aluminium casing with stainless steel and carbon steels for the gears and shafting. Using AQ10 quality bevel gears, when assembled the backlash of the assembly is as low as <20 arcmins. All the units come with pre-tapped holes for alternative easy mounting and the enclosed units are lubricated with a high quality grease before sealing, offering lifetime lubrication and low maintenance.

Utilising bevel gearing the bevel box range offers an economic solution to right angular motion.



Hy-Box

A fully sealed unit with an aluminium alloy casing, stainless steel shafting and carbon steel bevel gears. Offering ratios of 5:1 or 10:1



B-Box

The simplistic design allows for a slimline unit available in three designs, to offer a complete solution to design space saving solutions, with ratios of 2:1 and 1:1 available. Utilises a aluminium housing with stainless steel bevel gears and shafting.



B-Set

The most economical bevel gearbox, simple and functional. Available with 1:1 and 2:1 ratios this unit comes with a removable cover which simply clips on to provide safe operation.





All dimensions in mm

Materials:

Body - Anodised aluminium
(ISO AlMg0.7Si, AlMg1SiCu)

Pinion shaft - SCM435

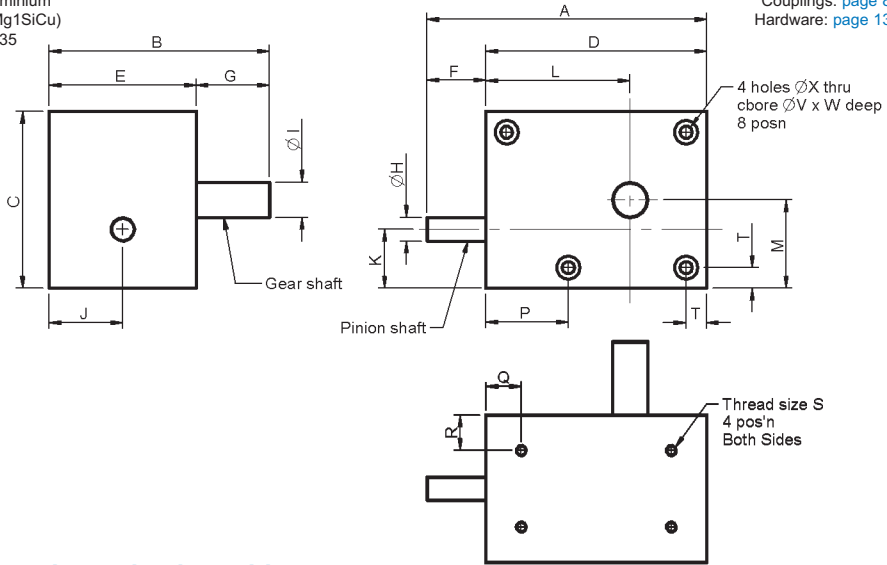
Gear shaft - S45C

Associated Products

Motors: [page 2-1](#)

Couplings: [page 8-1](#)

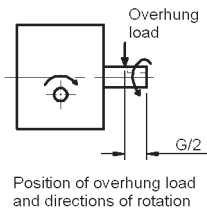
Hardware: [page 13-1](#)



Part number selection table

Part Number	Gear Ratio	A	B	C	D	E	F	G	ØH (h7)	ØI (h7)	J	K	L	M	T	P	Q	R
HY70R-005	5	70	58	45	55	40	15	18	6	8	20.0	17.5	36	22.5	5	14	10	10
HY90R-010	10	90	68	60	75	50	15	18	6	8	25.0	20.0	47	30.0	7	26	12	12
HY95R-005	5	95	75	60	75	50	20	25	8	12	25.0	20.0	49	30.0	7	28	12	12
HY120R-010	10	120	80	80	100	55	20	25	8	12	27.5	25.0	62	40.0	10	27	15	12

Part Number	Hole Dims		Drilled Holes & C/Bores			Maximum Overhang Load (N)	Weight (kg)
	S	Depth	Drill Hole ØX	Counter Bore ØV	C/Bore Depth W		
HY70R-005	M3	5	3.2	6.5	3.2	19	0.3
HY90R-010	M4	6	4.2	8.0	4.3	19	0.6
HY95R-005	M4	6	4.2	8.0	4.3	39	0.7
HY120R-010	M5	8	5.2	9.5	5.3	39	1.3



Allowable rated torque table

Part Number	Module	Teeth	Input Torque Ncm at:							
			100RPM	250RPM	500RPM	800RPM	1000RPM	1500RPM	2000RPM	2500RPM
HY70R-005	0.75	8/40	76.0	71.8	66.0	59.0	53.9	44.2	36.6	28.4
HY90R-010	0.71	7/70	75.8	70.8	63.8	56.0	50.7	41.3	34.3	27.3
HY95R-005	1.1	8/40	247.4	232.1	211.8	187.7	170.3	137.7	112.6	86.0
HY120R-010	1.0	7/70	186.3	172.7	155.7	136.6	123.5	100.0	82.7	65.0



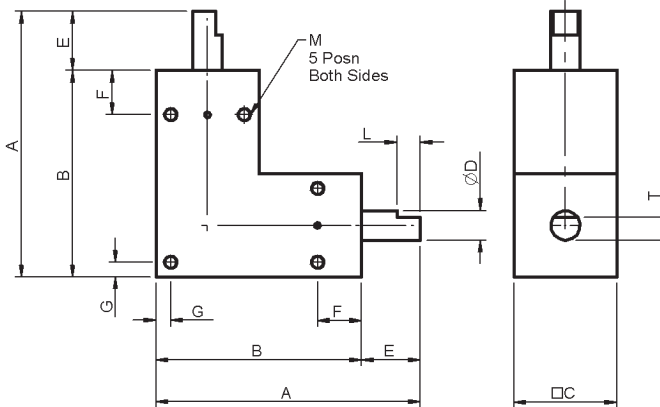
Associated Products

Motors: [page 2-1](#)
Couplings: [page 8-1](#)
Hardware: [page 13-1](#)

All dimensions in mm

Materials:

Body - Anodised aluminium
(ISO AlMg0.7Si, AlMg1SiCu)
Shaft - Stainless steel (SUS303)



Part number selection table

Part Number	Gear Ratio	C	A	B	ØD (h7)	E	F	G	Shaft End		Hole Dims		Backlash (arcmin)	Weight (g)
									T	L	M	Depth		
BS35L-001	1	14	35	27	3	8	4	2	2.7	5	M2	4	20	27
BS45L-001		18	45	33	4	12	5	3	3.3	8	M3	4	15	55
BS65L-001		25	65	50	6	15	12	3.5	-	-	M4	6	15	175
BS80L-001		30	80	60	8	20	15	5	-	-	M5	6	15	290
BS90L-001		35	90	70	10	20	15	5	-	-	M5	7	15	496
BS105L-001		40	105	80	12	25	20	5	-	-	M6	7	15	725
BS65L-002	2	25	65	50	6	15	12	3.5	-	-	M4	6	15	175
BS80L-002		30	80	60	8	20	15	5	-	-	M5	6		290
BS90L-002		35	90	70	10	20	15	5	-	-	M5	7		496
BS105L-002		40	105	80	12	25	20	5	-	-	M6	7		725

Allowable rated torque table

Part Number	Module	Teeth	Input Torque Ncm at:							
			50rpm	100rpm	250rpm	500rpm	800rpm	1000rpm	1500rpm	2000rpm
BS35L-001	0.4	20	7.1	7.0	6.8	6.5	6.2	6.0	5.5	5.3
BS45L-001	0.5		18.7	18.6	18.1	17.3	16.5	16.0	15.0	14.0
BS65L-001	0.8		73.7	72.6	69.8	65.6	61.0	58.4	52.6	47.9
BS80L-001	1.0		137.9	135.6	129.1	119.5	109.7	104.0	92.0	82.6
BS90L-001	1.25		271.8	266.1	250.4	228.0	205.8	193.3	167.8	148.2
BS105L-001	1.5		442.6	431.6	401.6	360.0	320.1	298.1	254.3	221.9
BS65L-002	0.6	14/28	20.2	20.1	19.7	19.0	18.3	17.8	16.7	15.7
BS80L-002	0.8	13/26	39.8	39.5	38.4	36.8	35.1	34.0	31.5	29.5
BS90L-002	1.0	13/26	77.6	76.7	74.3	70.5	66.4	64.0	58.6	54.4
BS105L-002	1.25	13/26	141.5	139.6	134.0	125.7	116.9	111.7	100.7	91.5



All dimensions in mm

Material:

Body - Anodised aluminium
(ISO AlMg0.7Si, AlMg1SiCu)

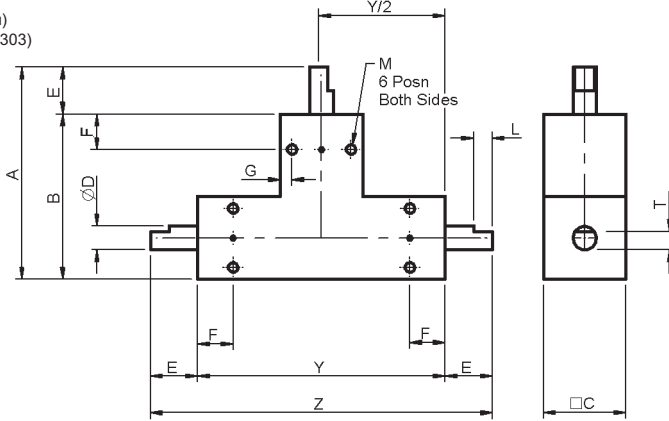
Shaft - Stainless steel (SUS303)

Associated Products

Motors: [page 2-1](#)

Couplings: [page 8-1](#)

Hardware: [page 13-1](#)



3

Part number selection table

Part Number	Gear Ratio	Z	Y	C	A	B	ØD (h7)	E	F	G	Shaft End		Set Screw		Backlash (arcmin)	Weight (g)
											T	L	M	Depth		
BS45T-001	1	72	48	18	45	33	4	12	5	3.0	3.3	8	M3	4	15	75
BS65T-001		105	75	25	65	50	6	15	12	3.5	-	-	M4	6		246
BS80T-001		130	90	30	80	60	8	20	15	5.0	-	-	M5	6		410
BS90T-001		145	105	35	90	70	10	20	15	5.0	-	-	M5	7		679
BS65T-002	2	105	75	25	65	50	6	15	12	3.5	-	-	M4	6	15	246
BS80T-002		130	90	30	80	60	8	20	15	5.0	-	-	M5	6		410
BS90T-002		145	105	35	90	70	10	20	15	5.0	-	-	M5	7		679

Allowable rated torque table

Part Number	Module	Teeth	Input Torque Ncm at:							
			50rpm	100rpm	250rpm	500rpm	800rpm	1000rpm	1500rpm	2000rpm
BS45T-001	0.5	20	18.7	18.6	18.1	17.3	16.5	16.0	15.0	14.0
BS65T-001	0.8		73.7	72.6	69.8	65.6	61.0	58.4	52.6	47.9
BS80T-001	1.0		137.9	135.6	129.1	119.5	109.7	104.0	92.0	82.6
BS90T-001	1.25		271.8	266.1	250.4	228.0	205.8	193.3	167.8	148.2
BS65T-002	0.6	14/28	20.2	20.1	19.7	19.0	18.3	17.8	16.7	15.7
BS80T-002	0.8	13/26	39.8	39.5	38.4	36.8	35.1	34.0	31.5	29.5
BS90T-002	1.0	13/26	77.6	76.7	74.3	70.5	66.4	64.0	58.6	54.0



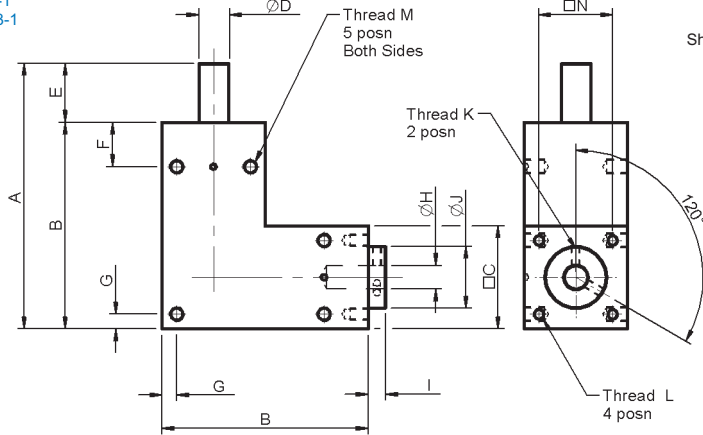
Associated Products

Motors: [page 2-1](#)
Couplings: [page 8-1](#)
Hardware: [page 13-1](#)

All dimensions in mm

Material:

Body - Anodised aluminium
(ISO AlMg0.7Si, AlMg1SiCu)
Shaft - Stainless steel (SUS303)



Part number selection table

Part Number	Gear Ratio	C	A	B	Bore			E	I	ØJ	K	F	G	M	Depth	Set Screw		Weight (g)
					ØH (H7)	Depth	L									N		
BSB65L-001A	1	25	65	50	6	5	15	15	5	16	M3	12	3.5	M4	6	M3	19	169
BSB65L-001B		25	65	50	6	6	15	15	5	16	M3	12	3.5	M4	6	M3	19	167
BSB80L-001A		30	80	60	8	6	19	20	5	19	M3	15	5	M5	6	M3	23	293
BSB80L-001B		30	80	60	8	8	19	20	5	19	M3	15	5	M5	6	M3	23	289
BSB90L-001A		35	90	70	10	8	19	20	6	21	M4	15	5	M5	7	M4	25	465
BSB90L-001B		35	90	70	10	10	19	20	6	21	M4	15	5	M5	7	M4	25	460
BSB105L-001A		40	105	80	12	10	23	25	6	26	M4	20	5	M6	7	M4	30	722
BSB105L-001B		40	105	80	12	12	23	25	6	26	M4	20	5	M6	7	M4	30	713

Backlash: 15arcmin

Allowable rated torque table

Part Number	Module	Teeth	Input Torque Ncm at:							
			50rpm	100rpm	250rpm	500rpm	800rpm	1000rpm	1500rpm	2000rpm
BSB65L-001A/B	0.8	20	73.7	72.6	69.8	65.6	61.0	58.4	52.6	47.9
BSB80L-001A/B	1.0		137.9	135.6	129.1	119.5	109.7	104.0	92.0	82.6
BSB90L-001A/B	1.25		271.8	266.1	250.4	228.0	205.8	193.3	167.8	148.2
BSB105L-001A/B	1.5		442.6	431.6	401.6	360.0	320.1	298.1	254.3	221.9

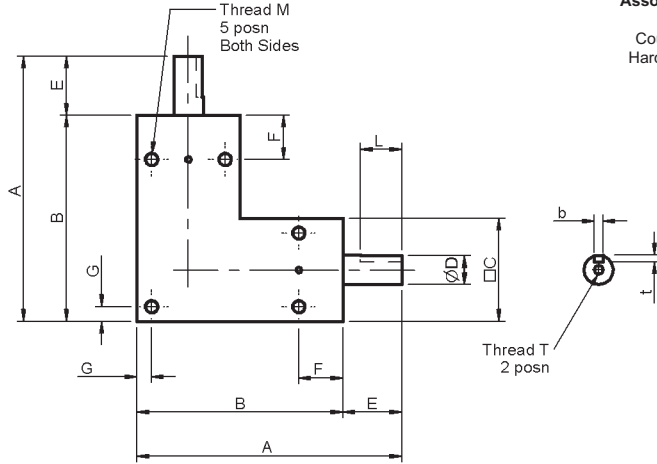


All dimensions in mm

Material:
 Body - Aluminium (ISO AlMg0.7Si, AlMg1SiCu) and
 Cast iron castings (JIS G5501)
 Shaft - Stainless and carbon steels
 (SUS303, S45C)

Associated Products

Motors: [page 2-1](#)
 Couplings: [page 8-1](#)
 Hardware: [page 13-1](#)



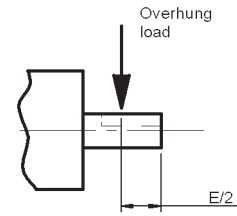
3

Part number selection table

Part Number	Gear Ratio	Body Matl*	C	A	B	ØD	h7	E	F	G	Keyway			Set Screw		Shaft End	
											b	t	L	M	Depth	T	Depth
BSH70L-001	1	AL	27	70	54	6	16	9	4	-	-	-	M4	6	-	-	
BSH85L-001		AL	32	85	64	8	21	10	5	3	1.8	14	M5	7	-	-	
BSH95L-001		AL	36	95	72	10	23	13	5	3	1.8	15	M5	8	-	-	
BSH115L-001		FC	45	115	90	12	25	20	5	4	2.5	20	M5	12	M4	8	

Part Number	Backlash (arcmin)	Maximum Overhang Load (N)	Weight (Kg)
BSH70L-001	15	25	0.2
BSH85L-001	15	36	0.4
BSH95L-001	15	58	0.5
BSH115L-001	10	83	1.8

*Body material and surface treatments
 (AL) Al Alloy: A6063, A6061, black anodised
 (FC) Cast iron: FC200, FC250, black oxide



Position of overhang load

Allowable rated torque table

Part Number	Module	Teeth	Input Torque Nm at:							
			250rpm	500rpm	800rpm	1000rpm	1500rpm	2000rpm	2500rpm	3000rpm
BSH70L-001	0.8	19	0.89	0.89	0.89	0.89	0.86	0.81	0.77	0.73
BSH85L-001	1.0	19	1.95	1.95	1.95	1.95	1.81	1.69	1.59	1.50
BSH95L-001	1.25	18	3.68	3.68	3.68	3.58	3.30	3.04	2.85	2.77
BSH115L-001	1.5	19	5.23	5.23	5.15	5.01	4.69	4.40	4.25	4.13



Associated Products

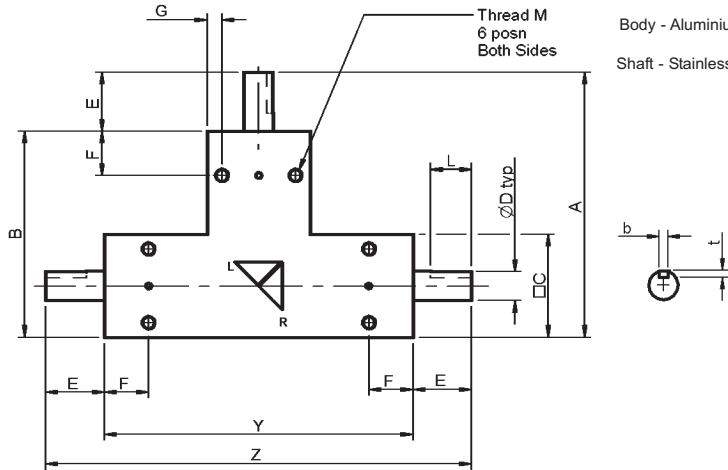
Motors: [page 2-1](#)
Couplings: [page 8-1](#)
Hardware: [page 13-1](#)

All dimensions in mm

Material:

Body - Aluminium (ISO AlMg0.7Si, AlMg1SiCu)

Shaft - Stainless and carbon steels (SUS303, S45C)

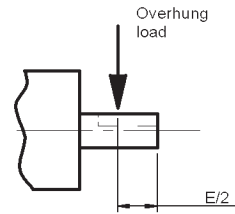


Part number selection table

Part Number	Gear Ratio	Body Matl*	Z	Y	C	A	B	ØD h7	E	F	G	Keyway			Set Screw	
												b	t	L	M	Depth
BSH70T-001	1	AL	113	81	27	70	54	6	16	9	4	-	-	-	M4	6
BSH85T-001			138	96	32	85	64	8	21	10	5	3	1.8	14	M5	7
BSH95T-001			154	108	36	95	72	10	23	13	5	3	1.8	15	M5	8

Part Number	Backlash (arcmin)	Maximum Overhang Load (N)	Weight (Kg)
BSH70T-001	15	25	0.3
BSH85T-001		36	0.5
BSH95T-001		58	0.7

*Body material and surface treatments
(AL) Al Alloy: A6063, A6061, black anodised



Position of overhang load

Allowable rated torque table

Part Number	Module	Teeth	Input Torque Nm at:							
			250rpm	500rpm	800rpm	1000rpm	1500rpm	2000rpm	2500rpm	3000rpm
BSH70T-001	0.8	19	0.89	0.89	0.89	0.89	0.86	0.81	0.77	0.73
BSH85T-001	1.0	19	1.95	1.95	1.95	1.95	1.81	1.69	1.59	1.50
BSH95T-001	1.25	18	3.68	3.68	3.68	3.58	3.30	3.04	2.85	2.77



All dimensions in mm

Material:

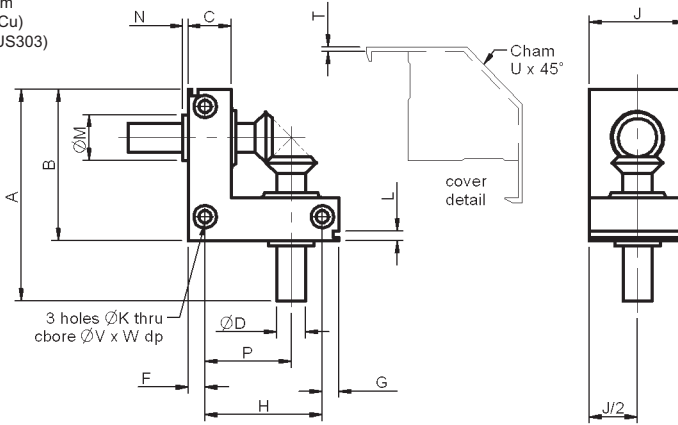
Body - Anodised aluminium
(ISO AlMg0.7Si, AlMg1SiCu)
Shaft - Stainless steel (SUS303)

Associated Products

Motors: [page 2-1](#)

Couplings: [page 8-1](#)

Hardware: [page 13-1](#)



Part number selection table

Part Number	Gear Ratio	A	B	C	ØD h8	E	F	G	H	P	J	Drilled Holes & C/Bores		
												Drill Hole ØK	C/Bore ØV	C/Bore Depth W
BE40L-001	1	40	30	10	4	10	5.0	4.5	20.5	15.0	18	3.4	6.5	3.5
BE55L-001		55	40	13	5	15	6.5	5.0	28.5	21.5	25	3.4	6.5	3.5
BE70L-001A		70	50	16	6	20	8.0	6.0	36	27.0	30	4.3	8.0	4.5
BE70L-001B		70	50	16	8	20	8.0	6.0	36	27.0	30	4.3	8.0	4.5
BE88L-001A		88	63	20	10	25	10.0	7.0	46	33.0	40	5.2	9.5	5.5
BE88L-001B		88	63	20	12	25	10.0	7.0	46	33.0	40	5.2	9.5	5.5

Part Number	L	ØM	N	T	U	Weight (g)
BE40L-001	2.5	7	2.1	1.7	13	30
BE55L-001	4.0	9	1.8	1.9	16	85
BE70L-001A	4.5	11	1.8	2.1	20	155
BE70L-001B	4.5	14	2.0	2.1	20	170
BE88L-001A	5.0	18	2.0	2.1	27	375
BE88L-001B	5.0	19	2.2	2.1	27	380



Allowable rated torque table

Part Number	Module	Teeth	Input Torque Ncm at:			
			50rpm	100rpm	250rpm	500rpm
BE40L-001	0.5	20	9.8	9.7	9.4	9.0
BE55L-001	0.8		38.6	38.0	36.5	34.3
BE70L-001A	1.0		72.3	71.0	67.6	62.6
BE70L-001B	1.0		72.3	71.0	67.6	62.6
BE88L-001A	1.5		232.3	226.5	210.8	188.9
BE88L-001B	1.5		232.3	226.5	210.8	188.9

BE series gearboxes are supplied with a clip on plastic cover.



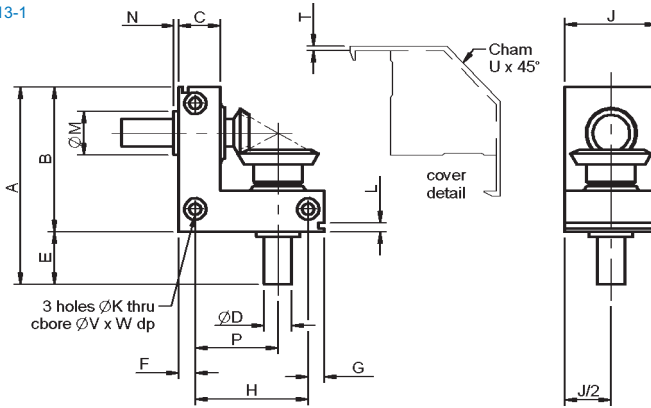
Associated Products

Motors: [page 2-1](#)
Couplings: [page 8-1](#)
Hardware: [page 13-1](#)

All dimensions in mm

Material:

Body - Anodised aluminium
(ISO AlMg0.7Si, AlMg1SiCu)
Shaft - Stainless steel (SUS303)



Part number selection table

Part Number	Gear Ratio	A	B	C	ØD h8	E	F	G	H	P	J	Drilled Holes & C/Bores		
												Drill Hole ØK	C/Bore ØV	C/Bore Depth W
BE55L-002	2	55	40	13	5	15	6.5	5	28.5	21.5	25	3.4	6.5	3.5
BE70L-002A		70	50	16	6	20	8.0	6	36	27.0	30	4.3	8.0	4.5
BE70L-002B		70	50	16	8	20	8.0	6	36	27.0	30	4.3	8.0	4.5
BE88L-002A		88	63	20	10	25	10.0	7	46	33.0	40	5.2	9.5	5.5
BE88L-002B		88	63	20	12	25	10.0	7	46	33.0	40	5.2	9.5	5.5

Part Number	L	ØM	N	T	U	Weight (g)
BE55L-002	4.0	9	1.8	1.9	16	80
BE70L-002A	4.5	11	1.8	2.1	20	140
BE70L-002B	4.5	14	2.0	2.1	20	165
BE88L-002A	5.0	18	2.0	2.1	27	345
BE88L-002B	5.0	19	2.2	2.1	27	375



Allowable rated torque table

Part Number	Module	Teeth	Input Torque Ncm at:			
			50rpm	100rpm	250rpm	500rpm
BE55L-002	0.6	14/28	10.5	10.4	10.2	9.9
BE70L-002A	0.8	13/26	20.7	20.6	20.1	19.3
BE70L-002B	0.8	13/26	20.7	20.6	20.1	19.3
BE88L-002A	1.25	13/26	74.2	73.2	70.3	65.9
BE88L-002B	1.25	13/26	74.2	73.2	70.3	65.9

BE series gearboxes are supplied with a clip on plastic cover.



FEATURES

Transmission Efficiency

98% per single unit, 95% even in double units, the power source may be smaller than with many other reduction gears.

Noise Reduction

Gear noise is reduced by a special construction of disk-sided planetary gears.

Load Equalised Structure

The inherent problem of loadsharing with planetary gear systems is solved by the load equalised construction.

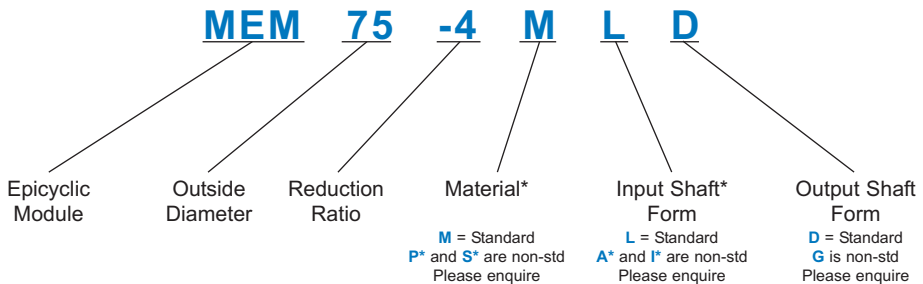
High Torque Transmission

MEM is a compact unit with high torque transmission because it is designed to equalise the loads of each planetary gear.

Many Reduction Ratios

It is possible to obtain many reduction ratios by combining standard units (3:1, 4:1, 5:1).

Part Number Structure



Material

- M** = Metal carrier
Metal housing
Metal internal/planet gears
Metal sun gear
- P*** = Plastic carrier
Plastic housing
Plastic internal/planet gears
Metal sun gear
- S*** = Metal carrier
Plastic housing
Plastic internal/planet gears
Metal sun gear

Input shaft form

- L** = splined shaft 11 teeth 1.0 module 45° P.A. (standard)
- A*** = D shaped shaft 8mm diameter x 7mm
- I*** = splined hole 8mm diameter with 9 splines 0.75 module 20° P.A.

Output shaft form

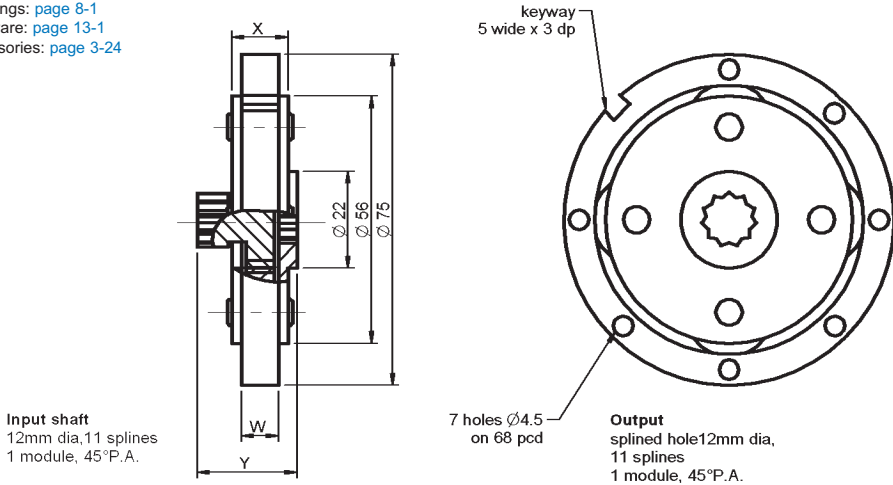
- D** = splined hole 12mm diameter 11 splines 1.0 module 45° P.A. (standard)
- G** = splined hole 19.5mm diameter 25 splines 0.75 module 45° P.A.

Reduction ratios

- Metal units (M) Hybrid units (S) 3:1, 4:1, 5:1
- Plastic units (P) 3.11:1, 3.71:1, 4.8:1
- Insert 3 for 3:1, 4 for 4:1, 5 for 5:1

Associated Products

- Motors: [page 2-1](#)
- Couplings: [page 8-1](#)
- Hardware: [page 13-1](#)
- Accessories: [page 3-24](#)



Part number selection table

Unit Part Number	Ratio	Weight (g)	W	X	Y	Inertia kgcm ²
MEM75-3MLD	3:1	240	8.4	12.8	22.6	4.24
MEM75-4MLD	4:1	248				4.27
MEM75-5MLD	5:1	257				4.39
MEM75-3MLD8	3:1	321	12.4	16.8	26.6	4.53
MEM75-4MLD8	4:1	315				4.44
MEM75-5MLD8	5:1	327				4.58

- For torque graphs, see [page T3-2](#)
- For complete gearhead information, see [page T3-3](#)

Accessories

- Spacer ring for spacing modules at the correct distance
- Retaining rings for accepting through bolts to retain modules
- $\varnothing 12$ output shaft, 10Nm torque rated
- $\varnothing 32$ output shaft for customers to machine to their requirements
- See [page 3-24](#) for the range of accessories



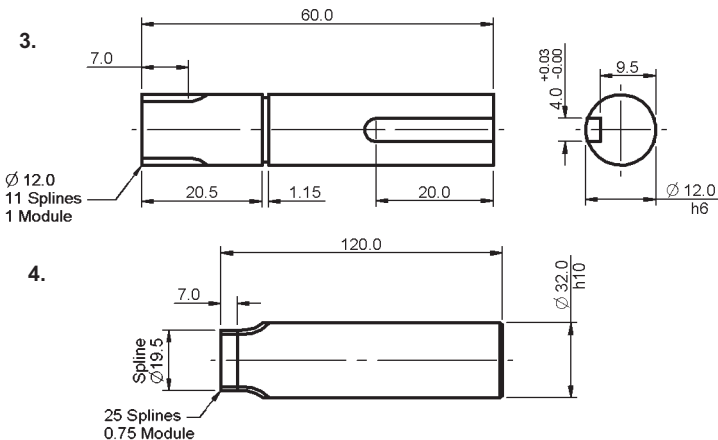
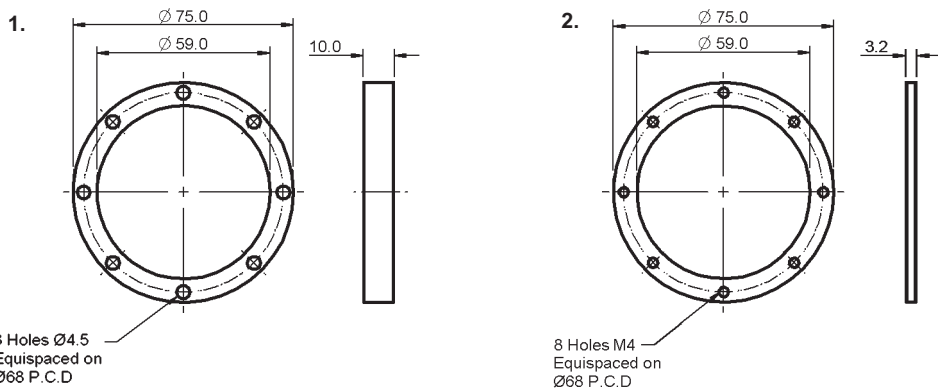


All dimensions in mm

Associated Products
Matex Epicyclic Modules: page 3-22

ACCESSORIES

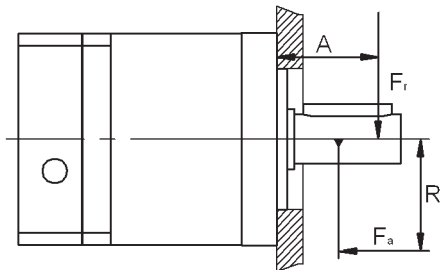
The female module accepts the motor shaft as input, the succeeding male module then plugs in to the output of the female. Successive male modules can then be added as desired.



Function	Part Number	Material	Weight g	Description
1. Spacer ring	MEM75-903	POM	12	For spacing modules at the correct distance
2. Retaining ring	MEM75-915	SPCC	38	For accepting through bolts to retain modules
3. $\varnothing 12$ O/P shaft	MEM75-907	SCM435	50	10Nm torque rated
4. $\varnothing 32$ O/P shaft	MEM75-906	S45C	720	For customer to machine to requirements



OUTPUT SHAFT BEARING LIFE



1. Calculate F_{rL} with the following formula

$$F_{rL} = \frac{F_a \times R + F_r \times (A + C_2)}{C_1}$$

2. Calculate the force-proportion

$$e = \frac{F_a}{F_{rL}}$$

Please consult Reliance Precision Mechatronics if $e > 0.22$

3. Calculate F_L with the following formula

$$L_h = \frac{16667}{n} \times \left(\frac{C_L}{F_{rL}} \right)^3$$

FORMULA SYMBOLS

L_h	h	lifetime
F_a	N	axial load at the output shaft
F_r	N	radial load at the output shaft
R	mm	distance, axial load to centre of the gearbox
A	mm	distance, radial load to flange plane
n	min ⁻¹	output shaft speed
C_x	-	gearbox constants from following table

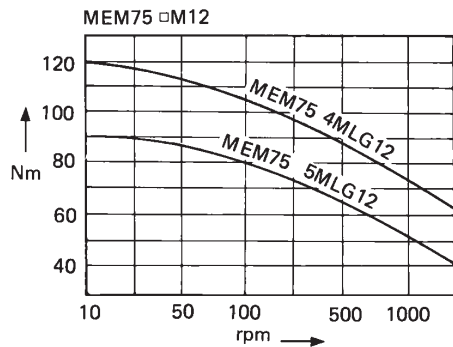
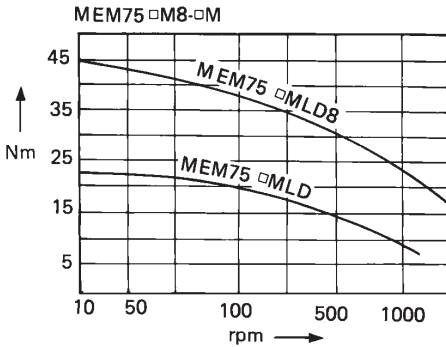
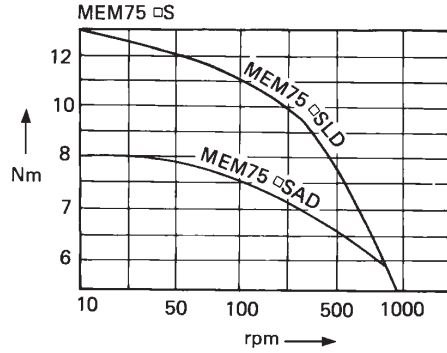
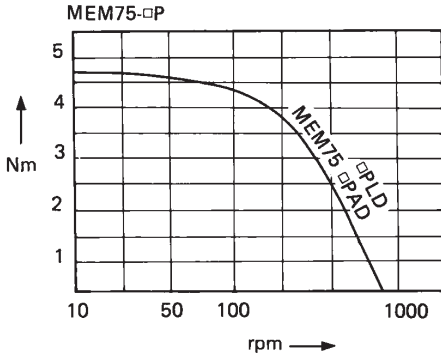
		RGP40	RGP60	RGN70
C_1	mm	10.5	11.5	13.5
C_2	mm	12.9	15.5	23
C_L	N	2250	6050	9950

MAXIMUM LOAD IN CENTRE OF THE OUTPUT SHAFT

		RGP40	RGP60	RGN70
F_r	N	200	500	1000
F_a	N	200	600	1200



TORQUE CURVES



OUTPUT SHAFT TORQUE

This is derived from an eight hour day, continuous unidirectional drive and no impact fluctuating load.

PEAK TORQUE CAPABILITY

Momentarily allowable torque is 250% of rated torque (under the same conditions as output torque).

DYNAMIC LOAD FACTOR

The rated torque has been derated in accordance with the following table:

Dynamic Load Factor (Sf)

Drive	Driven Hrs/day	Load Type		
		Uniform Sf	Medium Impact Sf	Heavy Impact Sf
Electric Motor	<3		1.0	1.5
	3 - 10	1.0	1.25	1.75
	24		1.5	2.0

$$\text{Allowable Torque} = \frac{\text{Rated Torque}}{\text{Sf}}$$



REVERSING MOTION

Should MEMs be used in a reversing drive (eg. servo application) the units should be derated to 80%.

TEMPERATURE RANGE

The unit will operate satisfactorily between -10° and +65°C. For the all metal units, maximum temperature can be 75°C.

MOUNTING POSITION

The standard position is horizontal. For other planes, please contact our sales team for more information.

REQUIREMENTS FOR ASSEMBLING UNITS

- 1. Alignment** - Radial alignment errors, after fitting the input and output shafts, should be within 0.15mm.
- 2. Location of Internal Gear** - A unit should be located in the manner in which the torque distribution is uniform in the internal gear.
- 3. Clearance** - Axial clearance between the unit's revolving parts (Carrier A & B) and casing should be 2mm to 4mm.
- 4. Thrust Support when Mounting Vertically** - When mounting the units with shafts vertically, care must be taken to ensure that the mass of the module is supported by the shaft bearings and not the planet disks containing the internal gear. If the unit is mounted with the output shaft uppermost, then a shoulder will be required on the input shaft and vice versa.
- 5. Lubrication** - In the case of grease lubrication, the casing should be filled with grease to between 50% and 80% of the volume. In the case of oil lubrication, fill the case to between 30% and 50% of the volume.

OVERHANG LOAD (OHL) - Kg

The overhang load is a bending force acting on the shaft generated by torque transmission, which depends on the forces on the output shaft.

Calculate the OHL according to following equation and select an appropriate bearing:

$$O.H.L. \text{ Capacity} = T \times E_f/R$$

T : Driving torque

R : Pitch circle radius of gear or sprocket

E_f : Element factor:

Gear	1.1 - 1.25
Sprocket	1.25
Flat Belt	2.5 - 3.0
V Belt	1.5 - 2.0



NOTES FOR HANDLING

1. **Plastic Unit P** - Lubricated with grease when assembled. (Units without grease lubrication are special to order).
2. **Sintering Alloy Unit S** - Not lubricated with grease when assembled. (Units with grease lubrication are special to order).
3. **Metal Unit M** - Not lubricated with grease or oil.
4. Do not mix strong acid or oil additives and thinners to the lubricant of the plastic units.
5. Do not allow rapid temperature variations. This will generate moisture.
6. Store the MEM units in a dark room below 40°C and keep in a dry, dust-free atmosphere.
7. If a unit is mounted on a surface which acts as a sounding-board, the noise will be amplified above the inherent noise level of the unit. Take care when mounting the unit.

HOUSED UNITS (LGH)

MEM modules can be supplied mounted in an aluminium housing complete with output shaft and support bearings. The complete unit is rated at 10Nm output torque, and can have either one, two or three modules. Maximum reduction ratio is 125:1 with 3x5:1 ratio modules. The accompanying motor must have a 'D' shaped shaft of 8mm diameter and 7mm over the flat.

Also included is the MEM26. This is a housed unit complete with input and output shaft. Actual ratio is 91.125:1 and the unit is capable of handling 2Nm output torque.

Larger modules are available up to 1000Nm output torque. Please enquire.



In addition to these conditions of sale, our standard Conditions of Sale also apply. A copy of these is available on request and from our website www.rpmechatronics.co.uk/en/help

Minimum order charge - Orders are subject to a minimum order charge of £25.00 unless they have been placed on our website at www.rpmechatronics.co.uk

Carriage and packing - Additional charges are made for carriage and packing.

Payment - Payment terms are 30 days. New customers are requested to complete an application form for a credit account. Customers who do not have a credit account with Reliance are requested to supply cheque with order. In addition, orders may be paid for by Visa and Mastercard.

Telephone orders - An order number must be quoted by customers and a written confirmatory order, clearly marked "CONFIRMATION", sent within 7 days. We reserve the right to supply parts against a telephone order. All telephone orders are accepted subject to these conditions of sale and those detailed on the acknowledgement of order. An acknowledgement will normally be sent by Reliance on receipt of order and goods will be supplied in accordance with the order acknowledgement.

Certificates of Conformance - Reliance's quality management system is certified to AS9100 and ISO 9001. A Certificate of Conformance can be supplied at an additional charge of £10.00 per delivery. Alternatively, a Certificate with full material traceability can be supplied at a charge of £20.00 per delivery.

Confirmation - All orders, other than telephone orders with a value of less than £500 and orders placed through our website, are subject to acceptance in writing by Reliance Precision Mechatronics.

Order amendments - Order amendments are subject to our approval and a charge will be made for reasonable compensation for any costs incurred.

Returns - Unused items may, solely at our discretion, be accepted for credit within 90 days of delivery. Any parts so accepted will be subject to a 20% service charge for re-inspection and handling. No credit can be allowed after the above period, or for any used or modified part, or for parts manufactured to a customer's specification.

Additional charges - Reliance reserves the right to charge for all additional expenses and taxes incurred over and above published prices (including without limitation duty, VAT, exchange rate fluctuations etc.)

Alterations - As a result of continuous product development, Reliance reserves the right to alter prices and other details without prior notice and to change dimensions where this does not affect the function of the item.

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