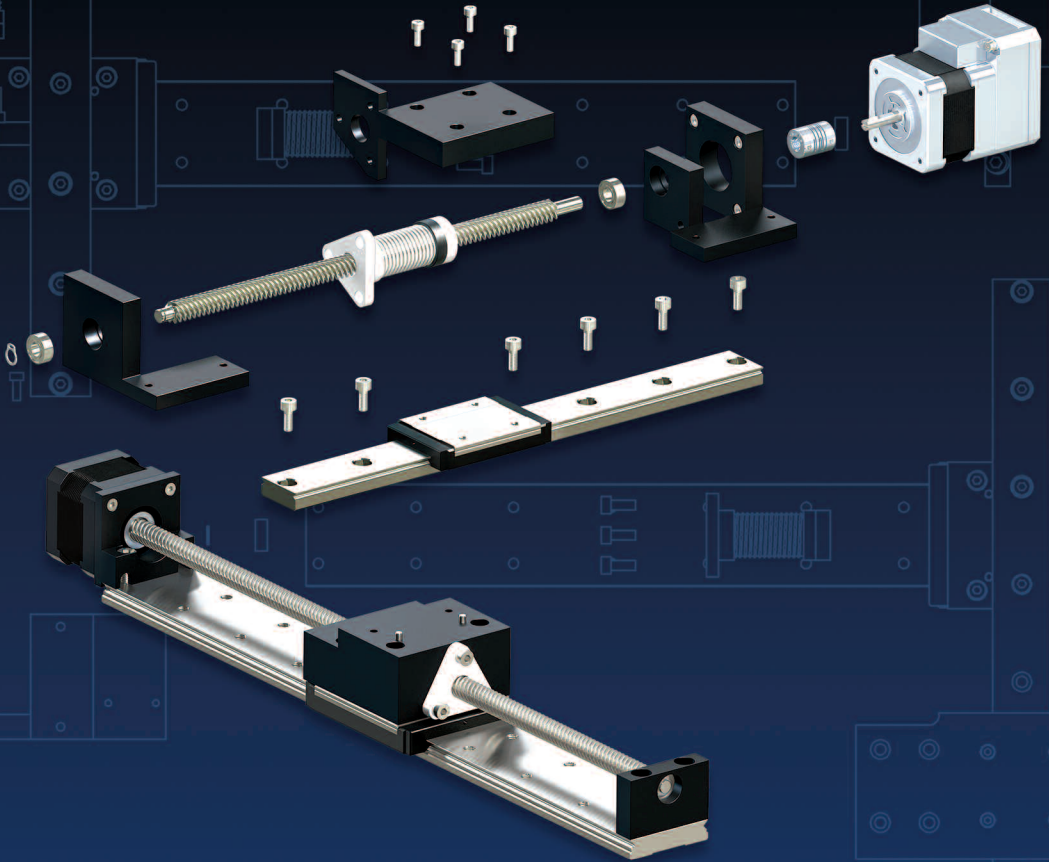




Reliance[®] Precision Limited



Precise Motion Control Solutions
Planetary and Right Angle Gearboxes

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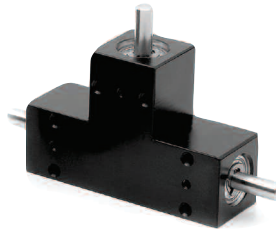
Introduction to the range

Our standard product range includes planetary, bevel and hypoid gearboxes, which provide housed, modular solutions, as well as an epicyclic gear module, which can be used in single or multiple stacks to build a customised gearbox. We also provide design, manufacturing, assembly and test services to create custom gearbox solutions, designed to specification.

Standard gearboxes



Planetary gearboxes



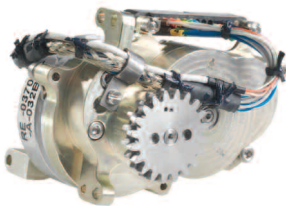
Bevel gearboxes



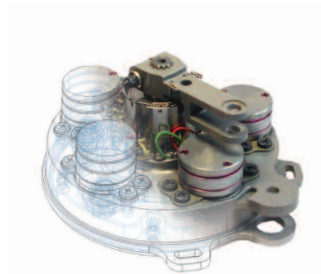
Epicyclic modules

Gearboxes

Custom gearboxes



Custom-designed gearboxes



Concept development and prototype



Gearboxes for harsh environments

Planetary gearboxes

Planetary gearboxes give the ability to increase the torque and lower the speed of an electric motor, such as a stepper motor, thereby transforming the power and improving control of an electro-mechanical system.

The Reliance planetary gearboxes offer low backlash, high torsional stiffness, and high levels of efficiency, suitable for industrial automation applications. They are ideally suited to working with the Reliance Cool Muscle intelligent servo system in high torque applications where positional feedback is important.

We offer 3 planetary gearboxes – the RGP40 and RGP60 provide a compact solution for integration with Reliance Cool Muscle, whilst the RGPN70 is for higher precision, higher stiffness, higher torque and lower backlash applications.



Reliance Cool Muscle servo system



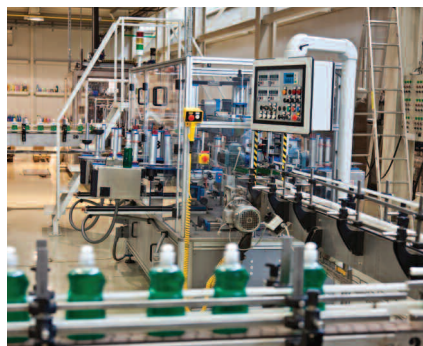
RGP40 series



RGP60 series

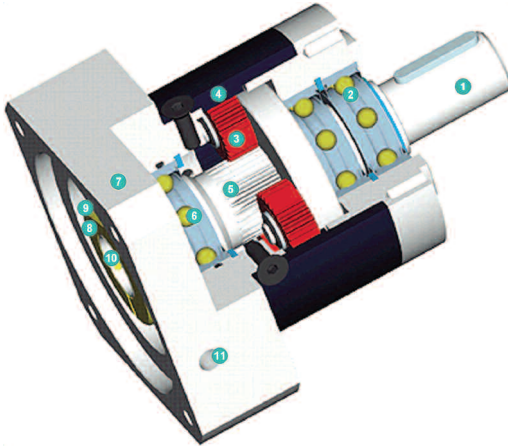


Pharmaceutical testing equipment



Industrial automation

Gearboxes



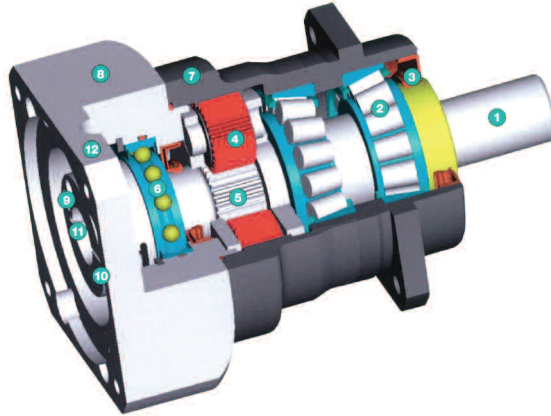
RGP40, RGP60

- standard backlash (RGP40 from <math><22'</math>)
(RGP60 from <math><18'</math>)
- high output torque
- novel motor clamp system
- high efficiency (up to 96%)
- ratios $i=3, \dots, 512$
- low noise
- high quality
- any mounting position
- easy motor mounting
- lifetime lubrication
- direction of rotation equidirectional

- 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 modifications 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 from 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 hole for the clamping screw

RGPN70

- low backlash (<math><5'</math>)
- high output torque
- novel motor clamp system
- high efficiency (up to 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



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 rated

4 Planet gear

Precision zero helix angle gear with optimised profile modifications 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 from 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

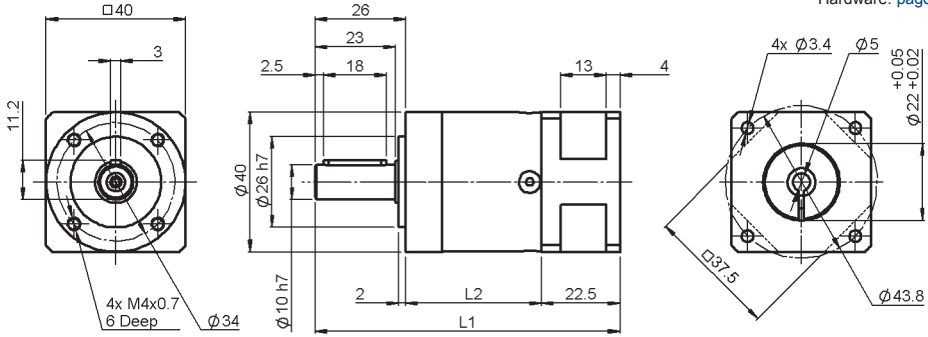
12 Assembly hole

Access hole for the clamping screw



All dimensions in mm

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



Part number selection table

Example Part No:- **RGP40 - 60 - NEMA17**

Basic Part Number	Ratio	Stage	L1 mm	L2 mm	Output Torque		Inertia kgcm ²	Efficiency ⁽⁶⁾ with full load %
					Nominal Nm ⁽²⁾	Max Nm		
RGP40	3	1	87.5	39	11	17.6	0.031	98
	4				15	24	0.022	98
	5				14	22	0.019	98
	7				8.5	13.6	0.018	97
	8				6	10	0.017	96
	10				5	8	0.016	95
RGP40	9	2	100.5	52	16.5	26	0.030	97
	12				20	32	0.029	96
	15				18	29	0.023	96
	16				20	32	0.022	96
	20				20	32	0.019	96
	25				18	29	0.019	95
	32				20	32	0.017	95
	40				18	29	0.016	94
RGP40	64	3	113	64.5	7.5	12	0.016	86
	60				20	32	0.029	92
	80				20	32	0.019	90
	100				20	32	0.019	89
	120				18	29	0.029	87
	160				20	32	0.016	86
	200				18	29	0.016	82
	256				20	32	0.016	81
	320				18	29	0.016	76
512	7.5	12	0.016	48				

Technical information

Specification	Unit	RGP40	Stage
Backlash	arcmin	<15	1
		<19	2
		<22	3
Torsional stiffness	Nm/arcmin	1.0	1
		1.1	2
		1.0	3
Weight	kg	0.35	1
		0.45	2
		0.55	3
Lifetime⁽³⁾	h	30,000	
Radial load for 20,000h⁽⁴⁾	N	200	
Axial load for 20,000h⁽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	Nm	2
Lubrication		Greased for life	
Degree of protection		IP54	

⁽¹⁾ Gearboxes for use with NEMA motors are supplied with 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

⁽⁶⁾ Degree of efficiency at nominal output torque, reference temperature 70°C at 1,000 rpm

? Technical support

- Product overview - see [page 3-3](#)
- Technical information - see [pages T3-1 to T3-3](#)
- Section view - see [page 3-4](#)
- For detailed duty cycle and life calculation, please contact us
- Gearbox complements the Reliance Cool Muscle servo system - see [page 2-2](#)
- For system design information when using the RGP40 series with Reliance Cool Muscle, please contact us

i Features and options

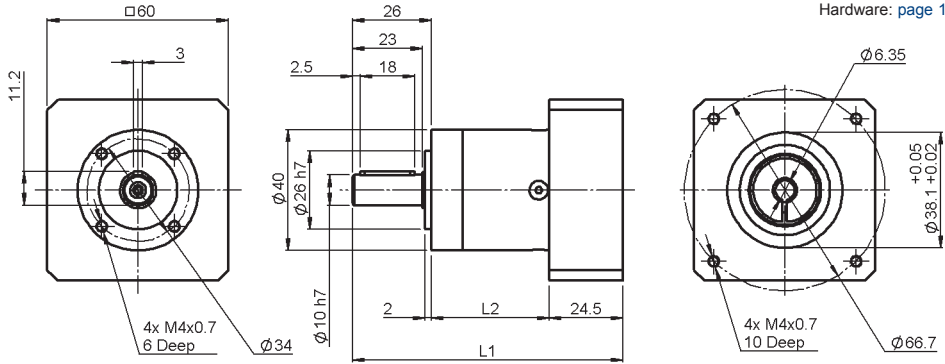
- Gearbox may be used in any mounting orientation
- Housing material: Steel - black
- Input and output flanges material: Aluminium - untreated
- Optional smooth output shaft if required
- Other motors may be utilised, please contact us





All dimensions in mm

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



Part number selection table

Example Part No:- **RG40 - 60 - NEMA23**

Basic Part Number	Ratio	Stage	L1 mm	L2 mm	Output Torque		Inertia kgcm ²	Efficiency ⁽⁶⁾ with full load %
					Nominal Nm ⁽²⁾	Max Nm		
RG40	3	1	89.5	39	11	17.6	0.031	98
	4				15	24	0.022	98
	5				14	22	0.019	98
	7				8.5	13.6	0.018	97
	8				6	10	0.017	96
	10				5	8	0.016	95
RG40	9	2	102.5	52	16.5	26	0.030	97
	12				20	32	0.029	96
	15				18	29	0.023	96
	16				20	32	0.022	96
	20				20	32	0.019	96
	25				18	29	0.019	95
	32				20	32	0.017	95
	40				18	29	0.016	94
	64				7.5	12	0.016	86
RG40	60	3	115	64.5	20	32	0.029	92
	80				20	32	0.019	90
	100				20	32	0.019	89
	120				18	29	0.029	87
	160				20	32	0.016	86
	200				18	29	0.016	82
	256				20	32	0.016	81
	320				18	29	0.016	76
	512				7.5	12	0.016	48

Technical information

Specification	Unit	RGP40	Stage
Backlash	arcmin	<15	1
		<19	2
		<22	3
Torsional stiffness	Nm/arcmin	1.0	1
		1.1	2
		1.0	3
Weight	kg	0.35	1
		0.45	2
		0.55	3
Lifetime⁽³⁾	h	30,000	
Radial load for 20,000h⁽⁴⁾	N	200	
Axial load for 20,000h⁽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	Nm	2
Lubrication		Greased for life	
Degree of protection		IP54	

⁽¹⁾ Gearboxes for use with NEMA motors are supplied with 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

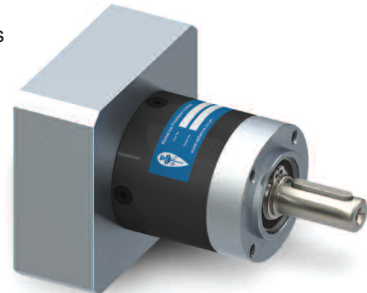
⁽⁶⁾ Degree of efficiency at nominal output torque, reference temperature 70°C at 1,000 rpm

? Technical support

- Product overview - see [page 3-3](#)
- Technical information - see [pages T3-1 to T3-3](#)
- Section view - see [page 3-4](#)
- For detailed duty cycle and life calculation, please contact us
- Gearbox complements the Reliance Cool Muscle servo system - see [page 2-2](#)
- For system design information when using the RGP40 series with Reliance Cool Muscle, please contact us

i Features and options

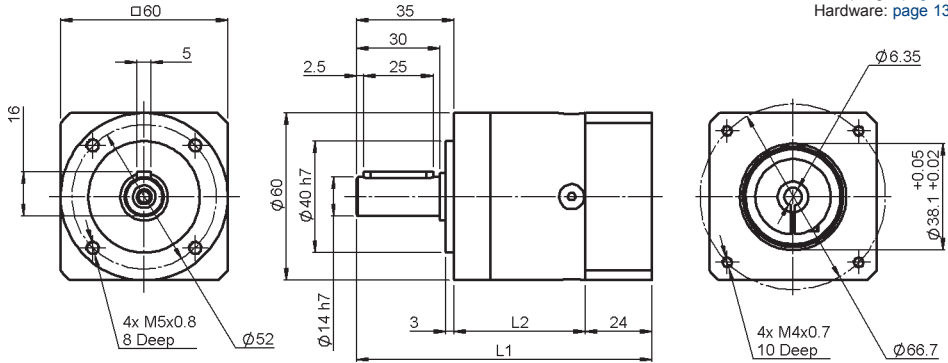
- Gearbox may be used in any mounting orientation
- Housing material: Steel - black
- Input and output flanges material: Aluminium - untreated
- Optional smooth output shaft if required
- Other motors may be utilised, please contact us
- Available as a right angle gearbox, please contact us





All dimensions in mm

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



Part number selection table

Example Part No:- **RGP60 - 60 - NEMA23**

Basic Part Number	Ratio	Stage	L1	L2	Output Torque		Inertia	Efficiency ⁽⁶⁾ with full load
					Nominal	Max		
					Nm ⁽²⁾	Nm		
RGP60	3	1	106	47	28	45	0.135	98
	4				38	61	0.093	98
	5				40	64	0.078	98
	7				25	40	0.072	97
	8				18	29	0.065	97
	10				15	24	0.064	96
RGP60	9	2	118.5	59.5	44	70	0.131	97
	12				44	70	0.127	96
	15				44	70	0.077	96
	16				44	70	0.088	96
	20				44	70	0.075	96
	25				40	64	0.075	95
	32				44	70	0.064	95
	40				40	64	0.064	94
	64				18	29	0.064	87
RGP60	60	3	131	72	44	70	0.076	92
	80				44	70	0.075	91
	100				44	70	0.075	89
	120				44	70	0.064	88
	160				44	70	0.064	86
	200				40	64	0.064	83
	256				44	70	0.064	81
	320				40	64	0.064	77
	512				18	29	0.064	51

Gearboxes

Technical information

Specification	Unit	RGP60	Stage
Backlash	arcmin	<12	1
		<15	2
		<18	3
Torsional stiffness	Nm/arcmin	2.3	1
		2.5	2
		2.5	3
Weight	kg	0.9	1
		1.1	2
		1.3	3
Lifetime⁽³⁾	h	30,000	
Radial load for 20,000h⁽⁴⁾	N	400	
Axial load for 20,000h⁽⁴⁾	N	500	
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	Nm	4.5
Lubrication	Greased for life		
Degree of protection	IP54		

⁽¹⁾ Gearboxes for use with NEMA motors are supplied with 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

⁽⁶⁾ Degree of efficiency at nominal output torque, reference temperature 70°C at 1,000 rpm

? Technical support

- Product overview - see [page 3-3](#)
- Technical information - see [pages T3-1 to T3-3](#)
- Section view - see [page 3-4](#)
- For detailed duty cycle and life calculation, please contact us
- Gearbox complements the Reliance Cool Muscle servo system - see [page 2-2](#)
- For system design information when using the RGP60 series with Reliance Cool Muscle, please contact us

i Features and options

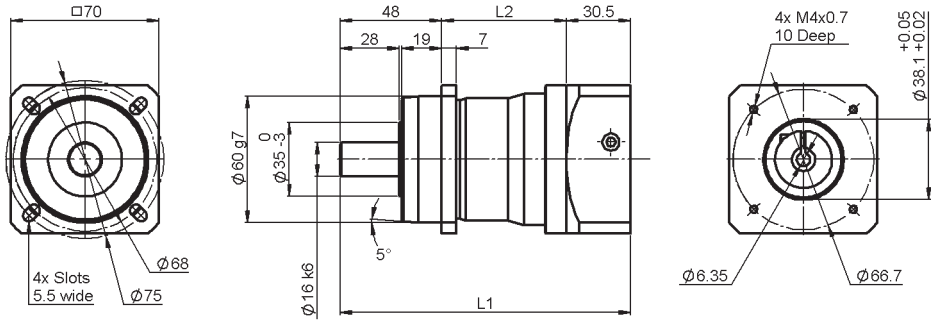
- Gearbox may be used in any mounting orientation
- Housing material: Steel - black
- Input and output flanges material: Aluminium - untreated
- Optional smooth output shaft if required
- Other motors may be utilised, please contact us
- Available as a right angle gearbox, please contact us





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:- **RGN70 - 40 - NEMA23**

Basic Part Number	Ratio	Stage	L1	L2	Output Torque		Inertia	Input Speed at 50% Torque	Input Speed at 100% Torque
					Nominal	Max			
					mm	mm	Nm ⁽²⁾	Nm	kgcm ²
RGN70	3	1	137.5	59	45	72	0.40	1,900	1,650
	4				60	96	0.32	2,200	1,800
	5				65	104	0.28	2,500	2,000
	7				45	72	0.26	3,200	2,800
	8				40	64	0.25	3,500	3,100
	10				27	43	0.25	4,000	3,700
RGN70	12	2	166.5	88	68	109	0.40	3,350	2,750
	15				68	109	0.38	3,800	3,150
	16				77	123	0.35	3,600	3,000
	20				77	123	0.33	4,000	3,350
	25				65	104	0.30	4,400	3,800
	32				77	123	0.32	4,500	4,200
	40				65	104	0.29	4,500	4,500
	64				40	64	0.26	4,500	4,500
	100				27	43	0.25	4,500	4,500

Technical information

Specification	Unit	RGP70	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	

⁽¹⁾ Gearboxes for use with NEMA motors are supplied with 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

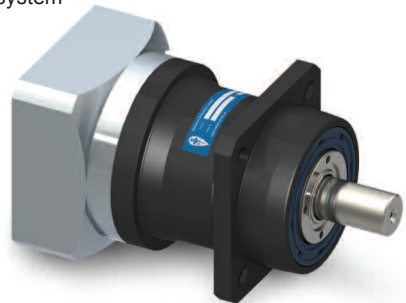
⁽⁵⁾ Distance 1 metre, idle running, input speed 3,000 rpm, ratio 5

? Technical support

- Product overview - see [page 3-3](#)
- Technical information - see [pages T3-1 to T3-3](#)
- Section view - see [page 3-5](#)
- For detailed duty cycle and life calculation, please contact us
- Gearbox complements the Reliance Cool Muscle servo system - see [page 2-2](#)
- For system design information when using the RGP70 series with Reliance Cool Muscle, please contact us

i Features and options

- Gearbox may be used in any mounting orientation
- Housing material: Steel - black
- Input and output flanges material: Aluminium - untreated
- Optional keyway output shaft if required
- Other motors may be utilised, please contact us
- Available as a right angle gearbox, please contact us





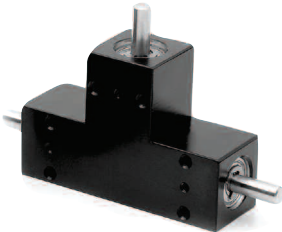
Economic, space saving solutions

The Reliance bevel and hypoid gearboxes provide an economic, space saving solution for right angle motion in a restricted space envelope. There are 3 types of gearbox available:



The BE series

The BE series is the most economical choice, offered with stainless steel bevel gears mounted in plain bearings, with either 1:1 or 2:1 ratios. It is a small, compact, anodised aluminium unit, with a removable, plastic, clip-on cover. The unit can be easily mounted into an assembly to provide a 90° drive where space prevents a direct layout.



The BS series

The BS series is a one-piece, slim-line aluminium housing with stainless steel bevel gears and shafting, offered in single or double output configurations with either 1:1 or 2:1 ratios. Using ISO 8 quality bevel gears, when assembled the backlash of the assembly is as low as <math><20</math> arcmins. It has a completely sealed casing providing a dust free and safe operation, with pre-tapped holes for alternative easy mounting. It is lubricated with high quality grease before sealing, providing lifetime lubrication and low maintenance.



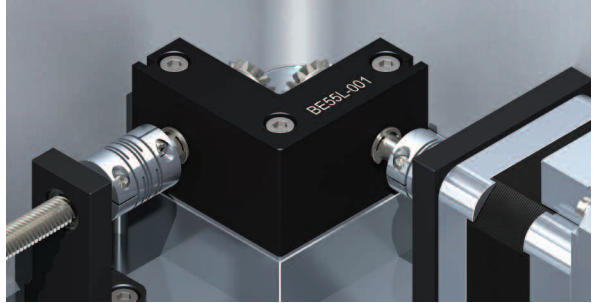
The HY series

The BS and BE series bevel gearboxes are suited to low-load industrial applications. For higher ratio requirements, between 5:1 and 10:1, we offer the HY series hypoid gearbox, also with a fully sealed aluminium housing and carbon steel gears and shafting. The hypoid gear pass allows for a high torque transmission coupled with a high ratio all within a compact package. Mounted in ball bearings the unit is fully lubricated and sealed for life. The variation of mounting holes allows the gearbox to be mounted on any face for greater assembly flexibility.



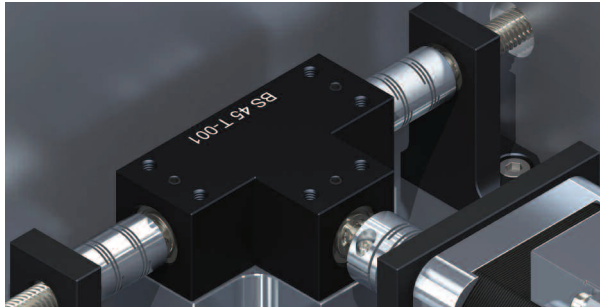
The BE series

Pictured without its removable cover, the BE series gearbox shown with Reli-a-Flex™ couplings, leadscrew and Reliance Cool Muscle motor in a typical right angled drive system.



The BS series

A single input, dual output BS series shown with Reli-a-Flex™ couplings, leadscrews and Reliance Cool Muscle motor.



Part number structure

BE 70 L - 002 B

Gearbox Type	Overall Length	Gearbox Shape	Gear Ratio	Shaft Diameter Identification
HY - Hypoid Gearbox BS - Bevel Gearbox BSB - Bevel Gearbox BSH - Bevel Gearbox BE - Bevel Gear Set	Distance from back face to shaft end	R = Rectangular L = L shape T = T shape	001 = 1:1 002 = 2:1 005 = 5:1 010 = 10:1	A = Smaller output/input shaft option B = Larger output/input shaft option

Gearboxes



All dimensions in mm

Materials:

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

Pinion shaft - SCM435

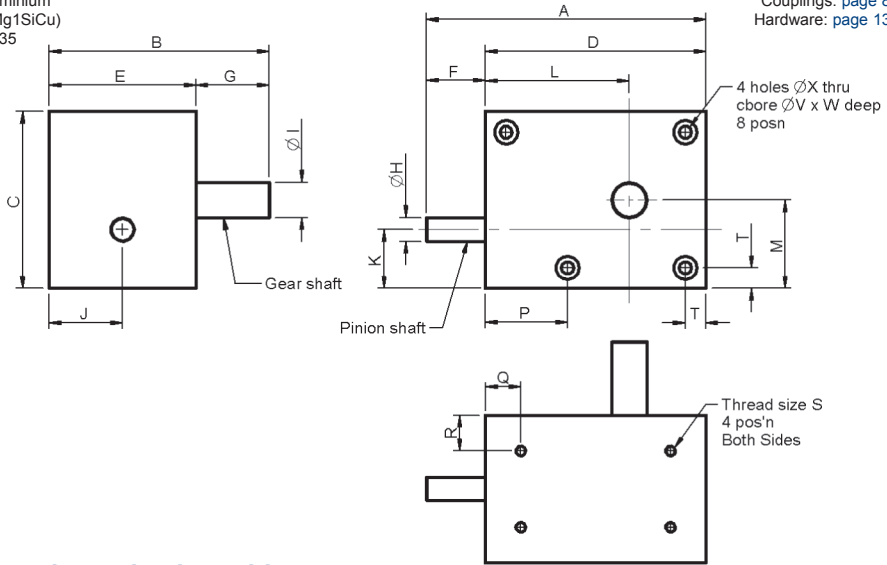
Gear shaft - S45C

Associated Products

Motors: page 2-1

Couplings: page 8-1

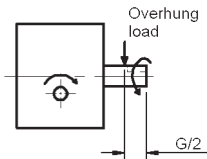
Hardware: page 13-1



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



Position of overhanging load and directions of rotation

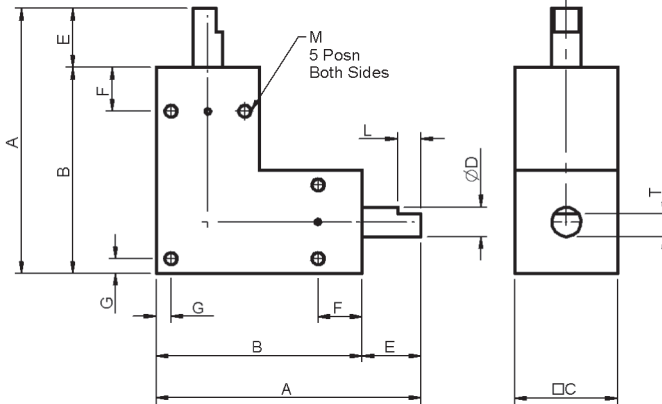
Allowable rated torque table

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)

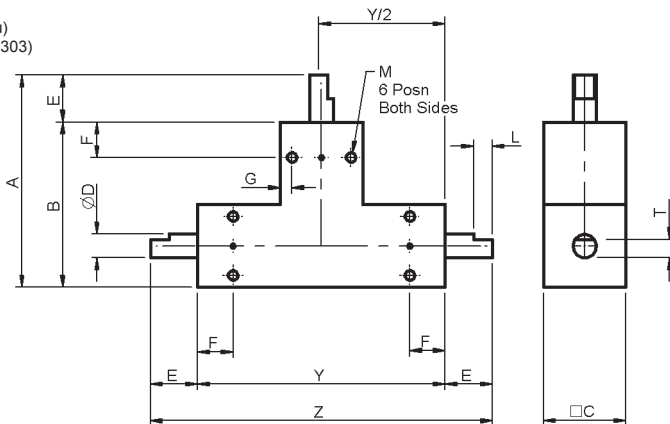
Shaft - Stainless steel (SUS303)

Associated Products

Motors: page 2-1

Couplings: page 8-1

Hardware: page 13-1



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

i Features and options

- Product overview - see page 3-14



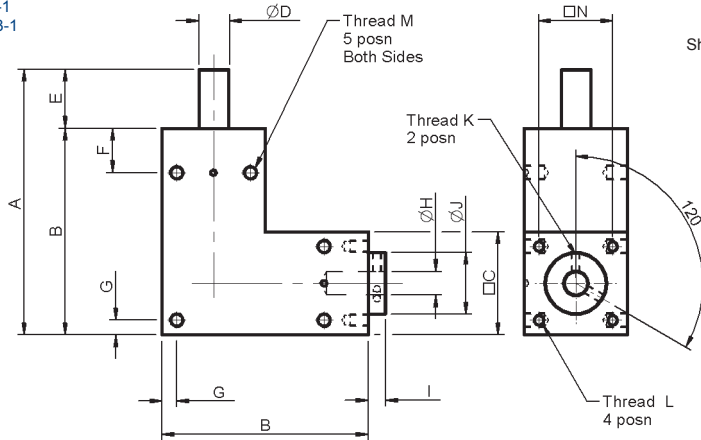
Associated Products

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)
					ØD	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

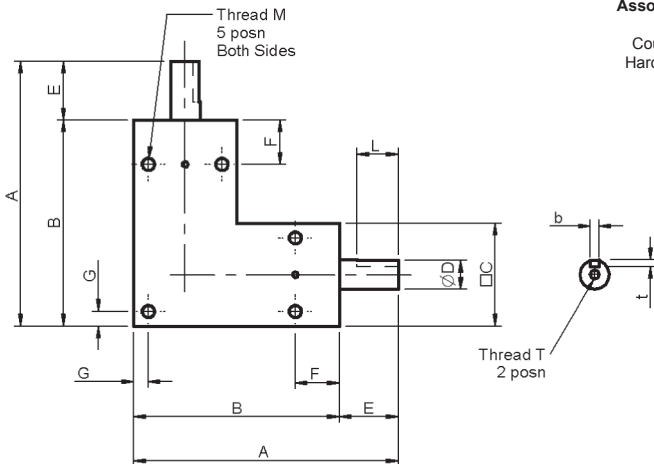
i Features and options

- Product overview - see page 3-14



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](#)

Part number selection table

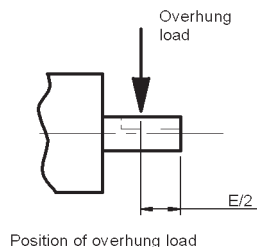
Part Number	Gear Ratio	Body Matl*	C	A	B	ØD	h7	E	F	G	Keyway			Set Screw		Shaft End	
											b	t	L	M	Depth	T	Depth
BSH70L-001	1	AL	27	70	54	6	16	9	4	-	-	-	M4	6	-	-	
BSH85L-001		AL	32	85	64	8	21	10	5	3	1.8	14	M5	7	-	-	
BSH95L-001		AL	36	95	72	10	23	13	5	3	1.8	15	M5	8	-	-	
BSH115L-001		FC	45	115	90	12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

(FC) Cast iron: FC200, FC250, black oxide with carbon steel shaft



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

i Features and options

- Product overview - see [page 3-14](#)



Associated Products

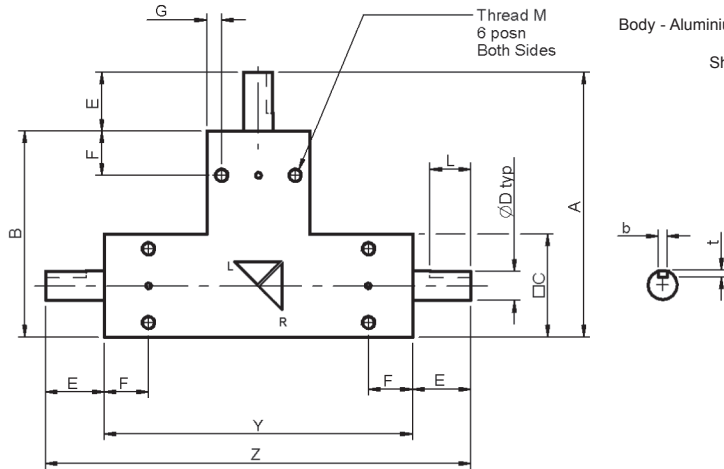
Motors: page 2-1
Couplings: page 8-1
Hardware: page 13-1

All dimensions in mm

Material:

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

Shaft - Stainless steel (SUS303, S45C)

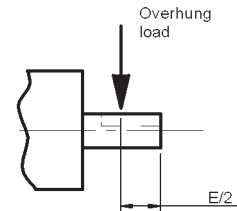


Part number selection table

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

i Features and options

- Product overview - see page 3-14



BE Series Ratio 1:1

Bevel Gearboxes

All dimensions in mm

Material:

Body - Anodised aluminium

(ISO AlMg0.7Si, AlMg1SiCu)

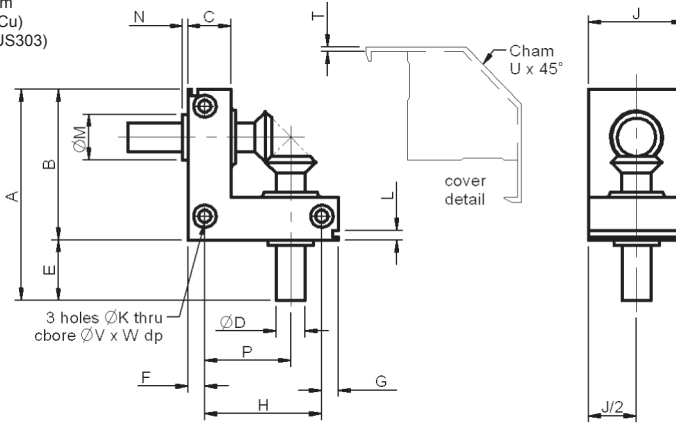
Shaft - Stainless steel (SUS303)

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

i Features and options

- Product overview - see page 3-14
- BE series gearboxes are supplied with a clip-on plastic cover



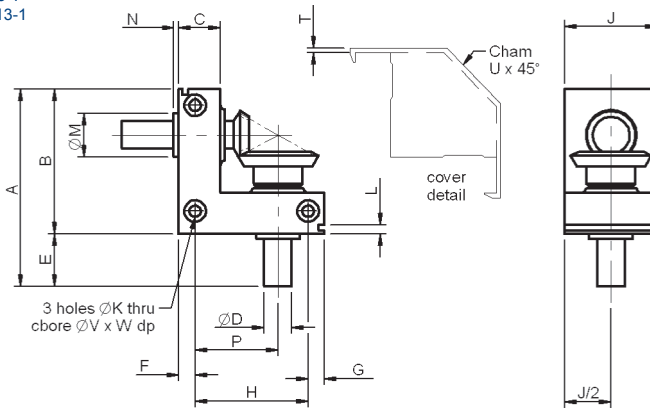
Associated Products

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



Gearboxes

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

i Features and options

- Product overview - see [page 3-14](#)
- BE series gearboxes are supplied with a clip-on plastic cover

Epicyclic Modules

Reliance offers a component gear set with a modular design approach for building a custom gearbox based on standard modules. It can be used as an individual stage, providing ratios of up to 5:1, or the modules can be stacked to create a higher ratio gearbox. It is ideal for heavier duty, or long-life, torque amplification, and speed reduction applications; the units have been used successfully in sealed sub-sea applications and in motorsports mechanisms.

The gear modules can also be supplied mounted in an aluminium housing complete with output shaft and support bearings, or as a housed unit completed with input and output shaft.



Transmission efficiency

98% per single unit, 95% 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

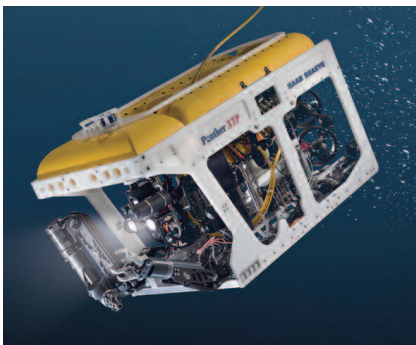
The inherent problem of loadsharing with planetary gear systems is solved by the load equalised construction.

High torque transmission

The epicyclic module 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).



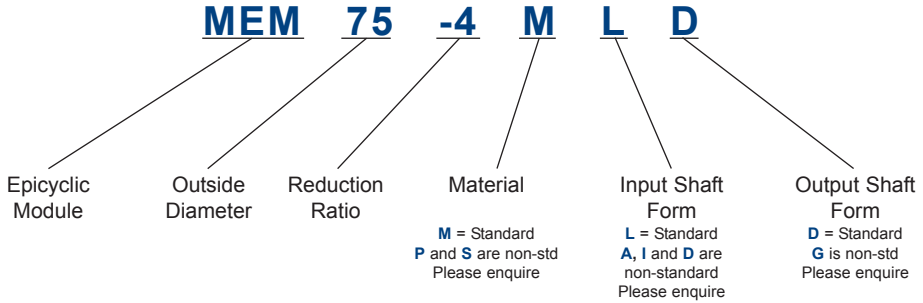
Sub-sea systems



Motorsports industry



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

Output shaft form

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



All dimensions in mm

Associated Products

Motors: [page 2-1](#)

Couplings: [page 8-1](#)

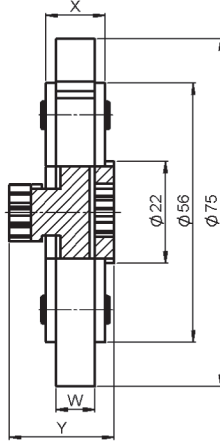
Hardware: [page 13-1](#)

Initial Module - MAD

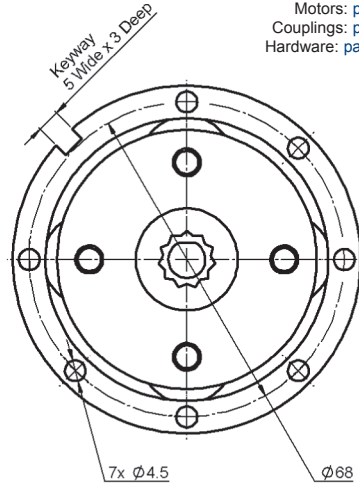


Input Shaft (D Cut Hole)
Ø8 x 7

Subsequent Module - MLD



Input Shaft (External Spline)
Splined hole Ø12
11 Splines
1 Module, 45° P.A.



Output (Internal Spline)
Splined hole Ø12
11 Splines
1 Module, 45° P.A.

Part number selection table

Unit Part Number	Ratio	Weight (g)	W	X	Y	Inertia kg/cm ²
MEM75-3MAD	3:1	231	8.4	12.6	14.8	4.22
MEM75-4MAD	4:1	228				4.25
MEM75-5MAD	5:1	248				4.38
MEM75-3MLD	3:1	240			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	16.6	26.6	4.53
MEM75-4MLD8	4:1	315				4.44
MEM75-5MLD8	5:1	327				4.58
MEM75-4MDG12	4:1	500	16.4	20.8	25	4.96
MEM75-4MLG12					32.5	5.01
MEM75-5MLG12						5.16

? Technical support

- Torque graphs - see [page T3-4](#)
- Complete gearhead information - see [page T3-5](#)
- Handling information - see [page T3-6](#)
- Mounting and assembly - see [page T3-5](#)
- Further technical information - see [page T3-4](#)
- Product overview - see [page 3-24](#)

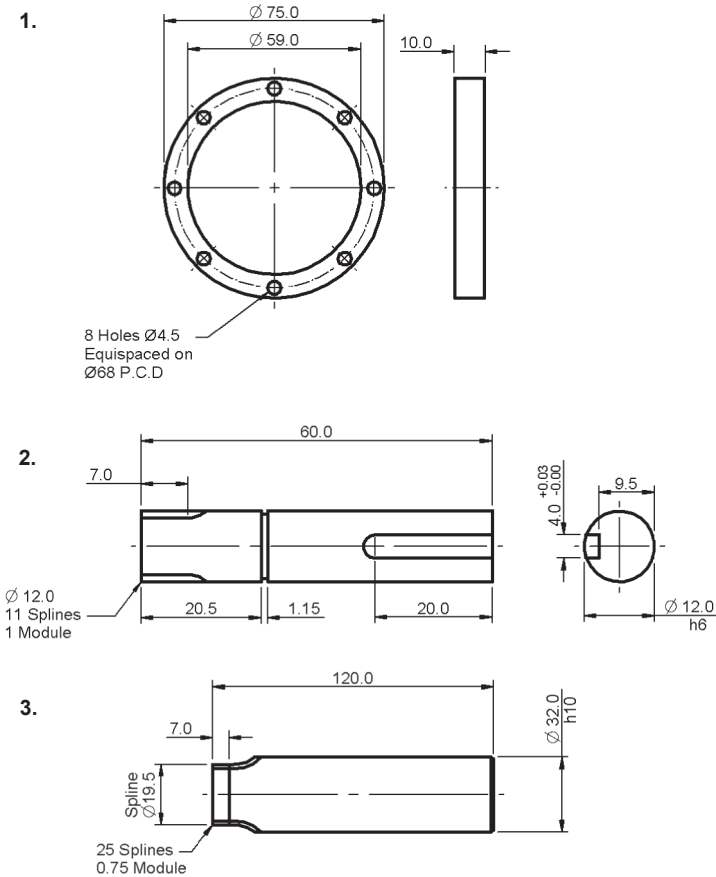
i Product options

- Higher output variants available
- Housed units available (LGH and MEM26) - see [page T3-6](#)
- For range of accessories - see [page 3-27](#)

All dimensions in mm

ACCESSORIES

The initial module accepts a D-shaped motor shaft. Subsequent modules use the input shaft (external spline) to plug into the output (internal spline). Finally, output internal spline adaptors are available, see below, and spacer rings should be inserted between each module as required.

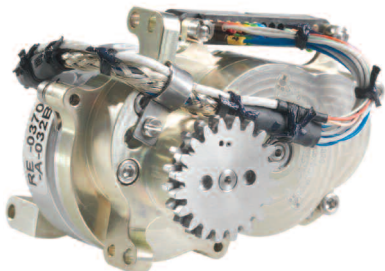


	Function	Part Number	Material	Weight g	Description
1.	Spacer ring	MEM75-903	POM	12	For spacing modules at the correct distance
2.	$\varnothing 12$ O/P shaft	MEM75-907	SCM435	50	10Nm torque rated
3.	$\varnothing 32$ O/P shaft	MEM75-906	S45C	720	For customer to machine to requirements



Custom gearboxes

As well as offering a range of standard gearboxes we also design and manufacture bespoke gearboxes. As with our bespoke gears (see page 4-4) these are typically used in the aerospace and defence markets, and other industries with performance-critical requirements.



With over 50 years' experience in gearbox design, manufacture, assembly and test Reliance's engineers have a wealth of knowledge to draw upon when designing a solution to a customer's specification. We have designed and built gearboxes for prime contractors and leading OEMs in the aerospace industry which are used in flight critical applications on global programmes such as Eurofighter Typhoon, Sea Harrier and Tornado.

We specialise in fine pitch gearing for long-life applications, short-life, high power applications and rotary to linear actuation drive mechanisms.

Our manufacturing capability extends to component cleaning and clean assembly, allowing us to address requirements for geared solutions for vacuum applications.

An extensive suite of test equipment enables thorough validation of the gearbox design and construction. This includes a Transmission Error Measurement System (TEMS) which enables investigation of the accuracy and backlash of the full geared system, environmental test equipment and accelerated life testing, all of which help ensure that the gearbox will perform within specification for the entire life of the product.

Gearboxes



Land defence



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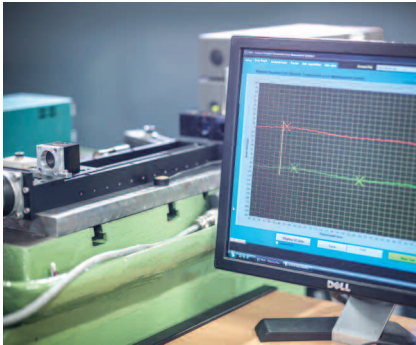
Military aerospace



Design engineering



Environmental testing



Gearbox Transmission Error Measurement (TEMS) trace



Gearbox characterisation



Production



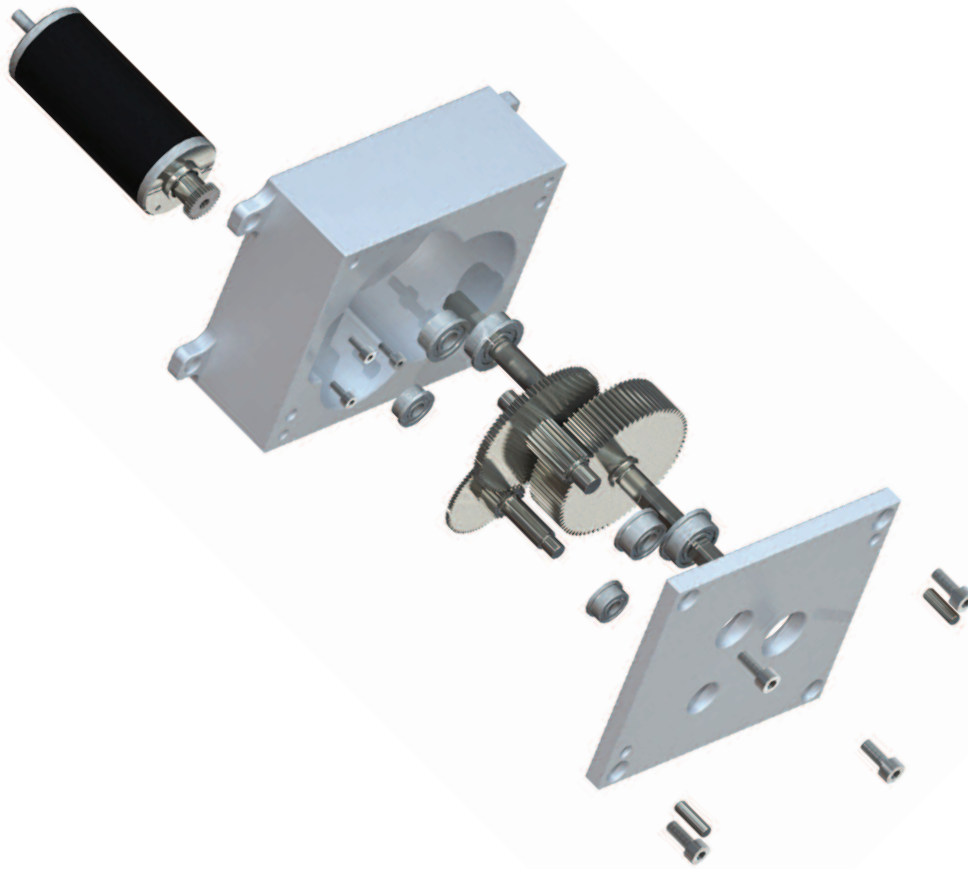
Production testing

Gearboxes



Example modular gearbox

Modular gearbox designed and manufactured to custom specification for system test equipment.





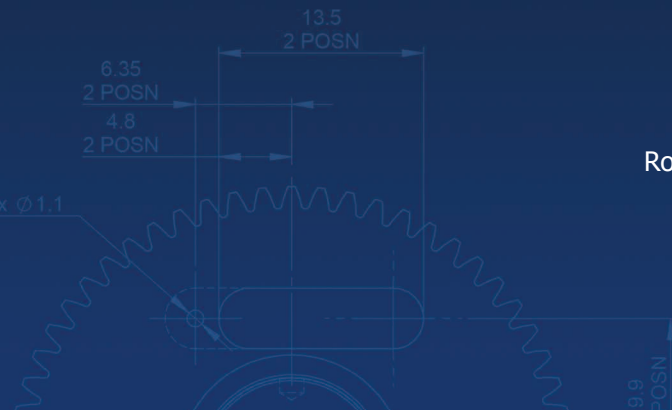
Example planetary gearbox

High performance gearbox designed and manufactured to customer specification for airborne gimbal actuation.



Gearboxes

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Rowley Mills, Penistone Road, Lepton
Huddersfield, HD8 0LE, England

+44 (0) 1484 601002
www.reliance.co.uk
sales@reliance.co.uk