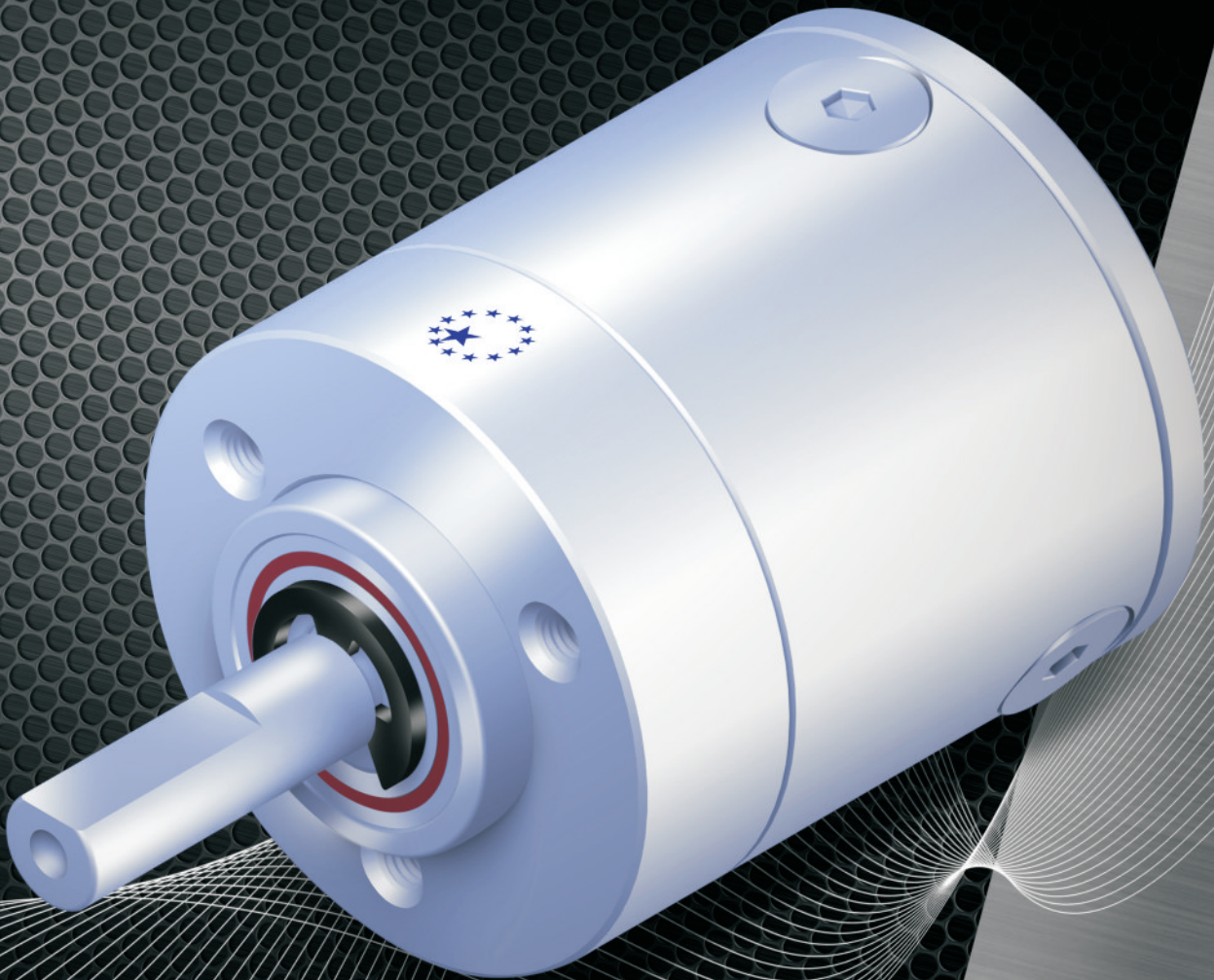




APEX DYNAMICS, INC.

CPM *SERIES*



Micro-Planetary Gearboxes

Stainless

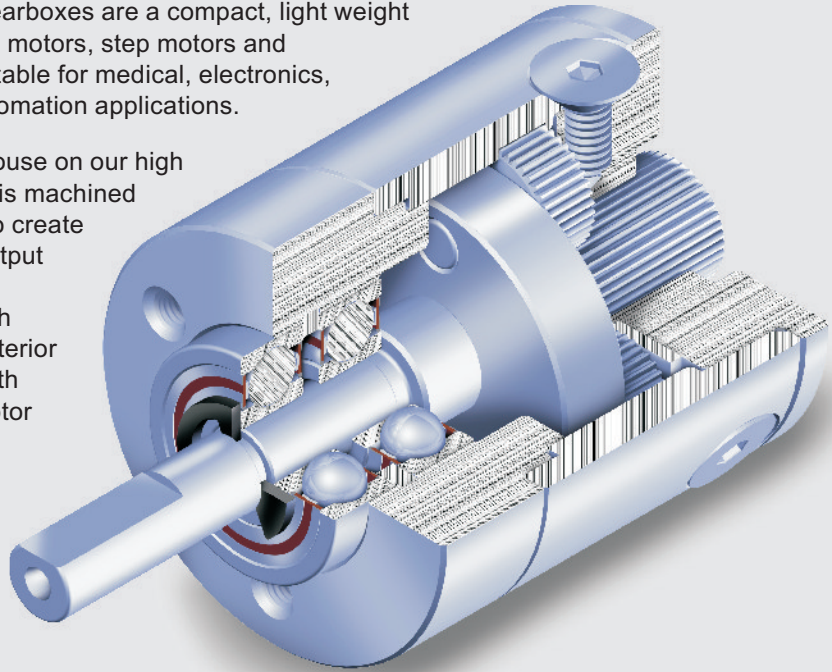
AM Series

Characteristic Highlights

The AM series Micro-Planetary Gearboxes are a compact, light weight Planetary, ideal for adapting to DC motors, step motors and servomotors. The AM series is suitable for medical, electronics, food, packaging, robotics and automation applications.

All components are produced in house on our high precision machine tools. Gearing is machined from alloy steel and heat treated to create a system that can transmit high output torque with extended service life, smooth rotation, low backlash, high efficiency, and low noise level. Exterior is constructed of stainless steel with aluminum alloy front cover and motor adapter.

A wide selection of size / ratio combinations are available to mount to your motors with a simple, efficient design for ease of installation. No special tooling is required.



Micro Planetary Gearbox Installation Manual

» AM013 Assemble Procedures:

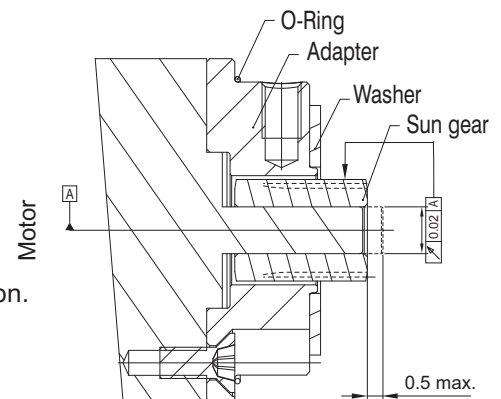
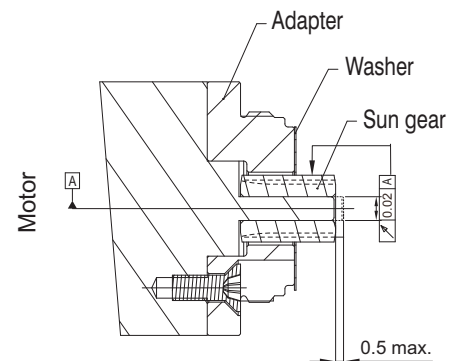
1. Check motor shaft runout. $\sqrt{0.02A}$
2. Clean the grease or oil on motor shaft. Apply Loctite 638 on motor shaft (please see bonding procedures).
3. Slide and rotate the sun gear on motor shaft.
4. Bolt the adapter on motor.
5. Apply Epoxy on single surface of washer.
6. Put washer with Epoxy on adapter surface.
7. Screw the gear box on adapter all the way and verify it is tight.

» AM016 / 022 / 026 / 032 Assemble Procedures:

1. Check motor shaft runout. $\sqrt{0.02A}$
2. Clean the grease or oil on motor shaft. Apply Loctite 638 on motor shaft (please see bonding procedures).
3. Slide and rotate the sun gear on motor shaft.
4. Bolt the adapter on motor.
5. Apply Epoxy on single surface of washer.
6. Put washer with Epoxy on adapter surface, and check o-ring position.
7. Bolt the gearbox and motor together, and verify it is tight.

» Sun Gear Bonding Procedures:

1. Check motor shaft and sun gear hole tolerance within 0.02mm. (sun gear hole tolerance is H7).
2. Clean the grease or oil in sun gear hole and motor shaft.
3. Sun gear can rotate or slide on motor shaft.
4. Minimum dry time for Loctite 638 is 4 hours. Keep the assembly in horizontal position.
5. After dried, under no-load test run for 15 minutes. (Attention: Dried Absolutely)



AM013 Series

Specifications

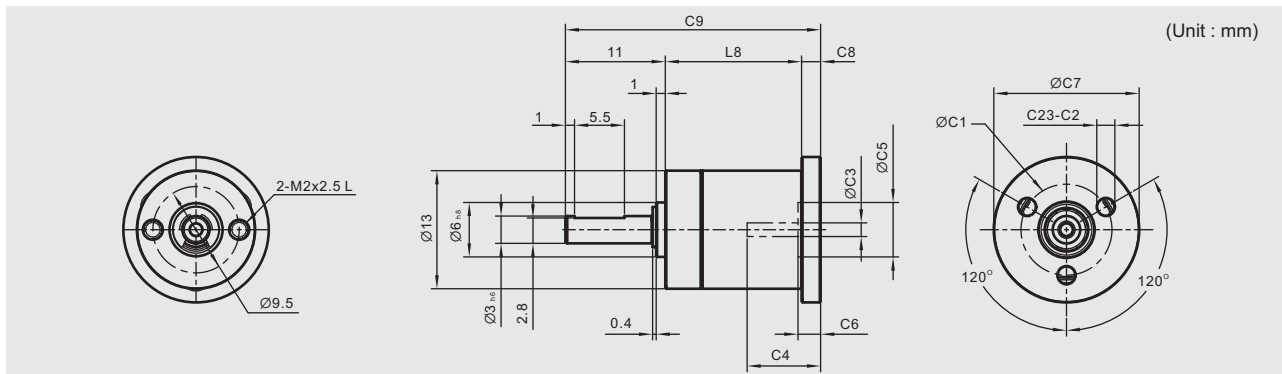
Gearbox Performance

Model No.		1-Stage		2-Stage		3-Stage		4-Stage		5-Stage	
Nominal Output Torque T_{2N}	Nm	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque
		Absolute Ratios		Absolute Ratios		Absolute Ratios		Absolute Ratios		Absolute Ratios	
		4.1	0.2	17	0.2	67	0.3	275	0.3	1119	0.35
		57/14		3249/196		185193/2744		10556001/38416		601692057/537824	
		5.1	0.2	26	0.2	131	0.3	664	0.3	3373	0.35
66/13	4356/169	287496/2197		18974736/28561		1252332576/371293					
Max. Acceleration Torque T_{2B}	Nm	1.5 times of Nominal Output Torque									
Nominal Input Speed n_{1N}	rpm	8,000		8,000		8,000		8,000		8,000	
Max. Acceleration Input Speed n_{1B}	rpm	12,000		12,000		12,000		12,000		12,000	
Backlash (No-Load)	Deg	≤ 1		≤ 1.2		≤ 1.5		≤ 1.8		≤ 2	
Max. Radial Load F_{2rB} ²	N	10									
Max. Axial Load F_{2aB} ²	N	5									
Mass Moment of Inertia J_1	g.cm ²	4.1	0.007	17	0.007	67	0.007	275	0.007	1119	0.007
		5.1	0.003	26	0.003	131	0.003	664	0.003	3373	0.003
Service Life	hr	10,000*									
Efficiency η (MAX)	%	91		83		75		69		62	
Weight	g	11		16		21		26		31	
Operating Temperature	°C	-10°C~90°C									
Degree of Gearbox Protection		IP44									
Mounting Position		all directions									

1. Ratio ($i=N_1/N_{out}$)

2. Apply to the output shaft center @ 100 rpm

* S1 service life 5000 hrs



Dimension		1-Stage		2-Stage		3-Stage		4-Stage		5-Stage	
Length	L8	15		21		27		33		39	
Mounting hole PCD	C1 ³	10									
Mounting hole O.D.	C2 ³	1.8									
Number of mounting hole	C23 ³	3									
Motor shaft O.D.	C3 ³ _{H7}	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.
		4.1	≤ 1.5	17	≤ 1.5	67	≤ 1.5	275	≤ 1.5	1119	≤ 1.5
		5.1	≤ 1.5	26	≤ 1.5	131	≤ 1.5	664	≤ 1.5	3373	≤ 1.5
Motor Shaft Length	C4 ³	8.1									
Motor Pilot O.D.	C5 ³	6									
Motor Pilot Depth	C6 ³	2.5									
Motor adapter O.D.	C7 ³	16									
Motor adapter Thickness	C8 ³	2.1									
Total Length	C9 ³	28.1		34.1		40.1		46.1		52.1	

3. C1 ~ C9 are motor specific dimensions (metric std shown). Refer to apexdyna.com and AM Design Tool to view your specific motor mounting system.

AM016 Series

Specifications

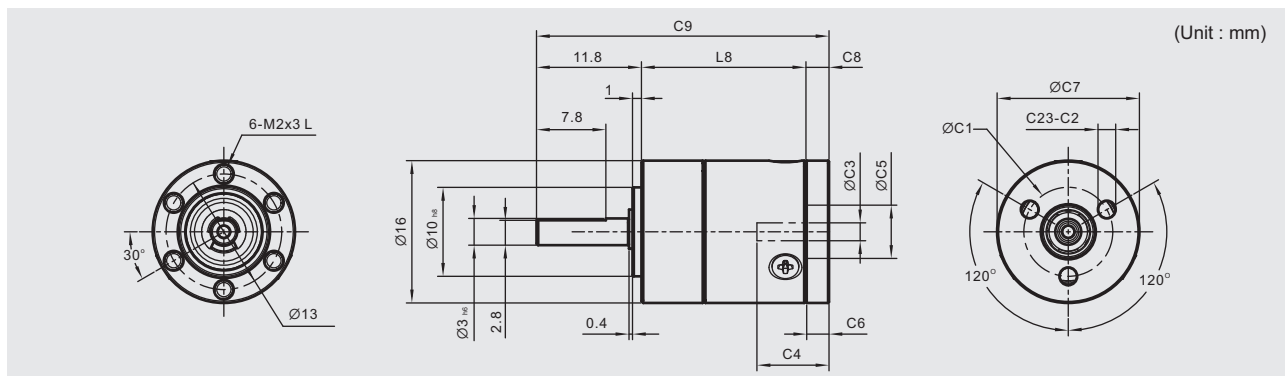
Gearbox Performance

Model No.	1-Stage		2-Stage		3-Stage		4-Stage		5-Stage		
	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	
Nominal Output Torque T _{2N}	Nm	4.4	19	84	370	1621	0.1	0.15	0.2	0.25	0.3
		57/13	3249/169	185193/2197	10556001/28561	601692057/371293					
		5.4	24	104	455	1996	0.1	0.15	0.2	0.25	0.3
		27/5	1539/65	87723/845	5000211/10985	285012027/142805					
			29	128	561	2458					
			729/25	41553/325	2368521/4225	135005697/54925					
				157	690	3027					
				19683/125	1121931/1625	63950067/21125					
					850	3728					
					531441/625	30292137/8125					
				4592						0.3	
				14348907/3125						0.3	
Max. Acceleration Torque T _{2B}	Nm	1.5 times of Nominal Output Torque									
Nominal Input Speed n _{1N}	rpm	8,000									
Max. Acceleration Input Speed n _{1B}	rpm	12,000									
Backlash (No-Load)	Deg	≤ 1.4		≤ 1.6		≤ 2		≤ 2.4		≤ 3	
Max. Radial Load F _{2R} ²	N	25									
Max. Axial Load F _{2AB} ²	N	12.5									
Mass Moment of Inertia J ₁	g.cm ²	4.4	0.01	19	0.01	84	0.01	370	0.01	1621	0.01
		5.4	0.005	24	0.01	104	0.01	455	0.01	1996	0.01
				29	0.005	128	0.01	561	0.01	2458	0.01
						157	0.005	690	0.005	3027	0.005
								850	0.005	3728	0.005
								4592	0.005	0.005	
Service Life	hr	10,000*									
Efficiency η (MAX)	%	90		81		73		65		59	
Weight	g	22		30		35		42		49	
Operating Temperature	°C	-10°C~90°C									
Degree of Gearbox Protection		IP44									
Mounting Position		all directions									

1. Ratio (i=N_{in}/N_{out})

2. Apply to the output shaft center @ 100 rpm

* S1 service life 5000 hrs



Dimension	1-Stage		2-Stage		3-Stage		4-Stage		5-Stage			
Length	L8		24		29.5		35		40.5			
Mounting hole PCD	C1 ³				10							
Mounting hole O.D.	C2 ³				1.8							
Number of mounting hole	C23 ³				3							
Motor shaft O.D.	C3 ³ _{H7}	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	
		4.4	≤ 2	19	≤ 2	84	≤ 2	370	≤ 2	1621	≤ 2	
		5.4	≤ 1.5	24	≤ 2	104	≤ 2	455	≤ 2	1996	≤ 2	
				29	≤ 1.5	128	≤ 2	561	≤ 2	2458	≤ 2	
						157	≤ 1.5	690	≤ 1.5	3027	≤ 1.5	
						850	≤ 1.5	3728	≤ 1.5			
								4592	≤ 1.5			
Motor Shaft Length	C4 ³				8.1							
Motor Pilot O.D.	C5 ³				6							
Motor Pilot Depth	C6 ³				2.5							
Motor adapter O.D.	C7 ³				16							
Motor adapter Thickness	C8 ³				2.6							
Total Length	C9 ³		32.9		38.4		43.9		49.4		51.9	

3. C1 – C9 are motor specific dimensions (metric std shown). Refer to apexdyna.com and AM Design Tool to view your specific motor mounting system.

AM022 Series

Specifications

Gearbox Performance

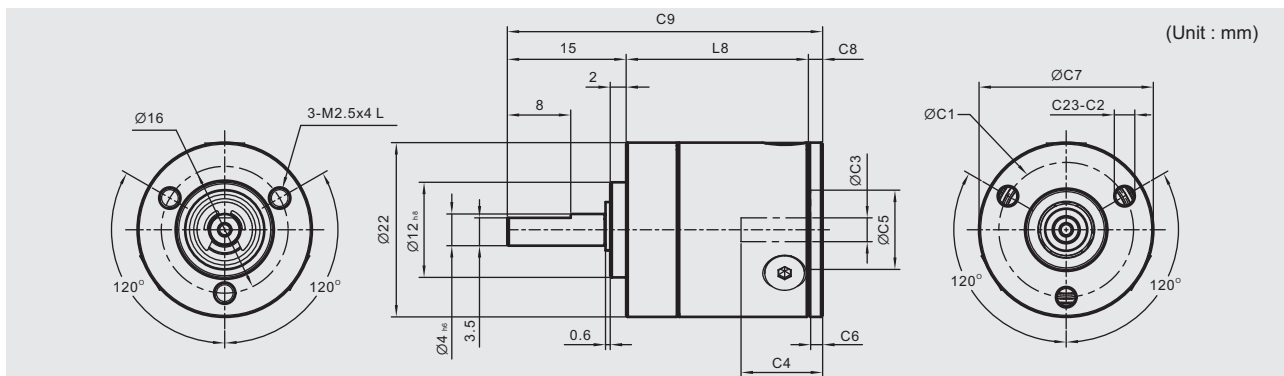
Model No.		1-Stage		2-Stage				3-Stage			
Nominal Output Torque T_{2N}	Nm	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque
		4	0.2	16	1	49	1	64	1.5	196	1.5
		5	0.2	20	1			80	1.5	245	1.5
		7	0.2	28	1			112	1.5	343	1.5
		9	0.2	35	1			140	1.5		
Max. Acceleration Torque T_{2B}	Nm	1.5 times of Nominal Output Torque									
Nominal Input Speed n_{1N}	rpm	6,000		6,000				6,000			
Max. Acceleration Input Speed n_{1B}	rpm	10,000		10,000				10,000			
Backlash*	acrmin	≤ 20		≤ 35				≤ 50			
Max. Radial Load F_{2RB} ²	N	40									
Max. Axial Load F_{2aB} ²	N	20									
Mass Moment of Inertia J_1	g.cm ²	4	0.067	16	0.067	49	0.006	64	0.067	196	0.067
		5	0.024	20	0.024			80	0.067	245	0.024
		7	0.006	28	0.006			112	0.067	343	0.006
		9	0.003	35	0.006			140	0.067		
Service Life	hr	10,000*									
Efficiency η (MAX)	%	96		90				85			
Weight	g	47.38		67.34				84.3			
Operating Temperature	°C	-10°C~90°C									
Degree of Gearbox Protection		IP44									
Mounting Position		all directions									

1. Ratio ($i=N_n/N_{out}$)

* S1 service life 5000 hrs

2. Apply to the output shaft center @ 100 rpm

* Backlash is test under 2% of T_{2N}



Dimension		1-Stage		2-Stage				3-Stage			
Length	L8	23		31.5				40			
Mounting hole PCD	C1 ³	17									
Mounting hole O.D.	C2 ³	2.2									
Number of mounting hole	C23 ³	3									
Motor shaft O.D.	C3 ³ ₁₇	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.
		4	≤ 4	16	≤ 4	49	≤ 1.5	64	≤ 4	196	≤ 4
		5	≤ 3	20	≤ 3			80	≤ 4	245	≤ 3
		7	≤ 1.5	28	≤ 4			112	≤ 4	343	≤ 1.5
		9	≤ 1	35	≤ 3			140	≤ 4		
Motor Shaft Length	C4 ³	10.3									
Motor Pilot O.D.	C5 ³	10									
Motor Pilot Depth	C6 ³	1.5									
Motor adapter O.D.	C7 ³	22									
Motor adapter Thickness	C8 ³	1.8									
Total Length	C9 ³	39.8		48.3				56.8			

3. C1 ~ C9 are motor specific dimensions (metric std shown). Refer to apexdyna.com and AM Design Tool to view your specific motor mounting system.

AM026 Series

Specifications

Gearbox Performance

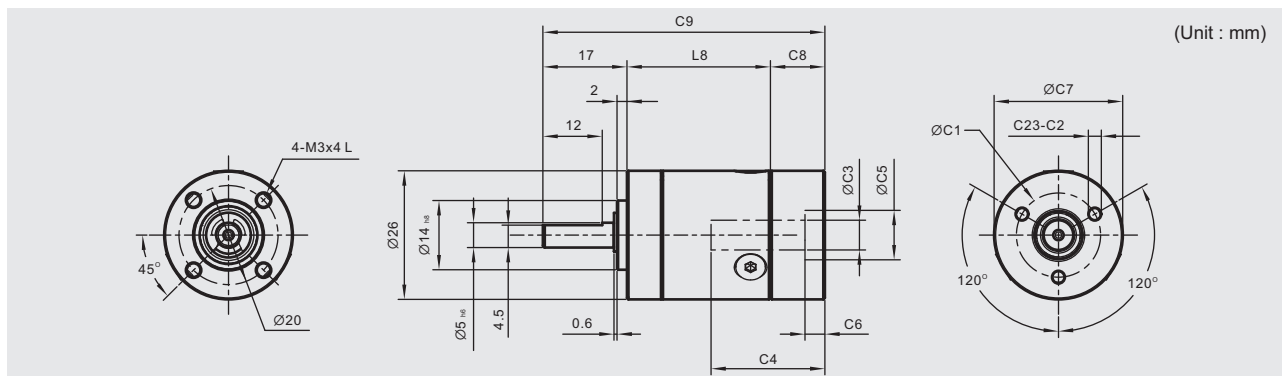
Model No.		1-Stage		2-Stage				3-Stage			
Nominal Output Torque T_{2N}	Nm	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque
		3.5	0.6	12.25	2	46	2	81.37	3	216	3
		4.33	0.6	18.78	2			112.67	3	276	3
		6	0.6	26	2			143.96	3	352.67	3
		7.67	0.6	33.22	2			199.33	3		
Max. Acceleration Torque T_{2B}	Nm	1.5 times of Nominal Output Torque									
Nominal Input Speed n_{1N}	rpm	6,000		6,000				6,000			
Max. Acceleration Input Speed n_{1B}	rpm	10,000		10,000				10,000			
Backlash*	acrmin	≤ 20		≤ 35				≤ 50			
Max. Radial Load F_{2rB} ²	N	55									
Max. Axial Load F_{2aB} ²	N	27.5									
Mass Moment of Inertia J_1	g.cm ²	3.5	0.273	12.25	0.273	46	0.024	81.37	0.117	216	0.024
		4.33	0.117	18.78	0.117			112.67	0.117	276	0.024
		6	0.024	26	0.117			143.96	0.117	352.67	0.024
		7.67	0.011	33.22	0.117			199.33	0.117		
Service Life	hr	10,000*									
Efficiency η (MAX)	%	96		90				85			
Weight	g	98.66		137.83				170.62			
Operating Temperature	°C	-10°C~90°C									
Degree of Gearbox Protection		IP44									
Mounting Position		all directions									

1. Ratio ($i=N_{in}/N_{out}$)

* S1 service life 5000 hrs

2. Apply to the output shaft center @ 100 rpm

* Backlash is test under 2% of T_{2N}



Dimension		1-Stage		2-Stage				3-Stage			
Length	L8	29		40.5				52			
Mounting hole PCD	C1 ³	17									
Mounting hole O.D.	C2 ³	2.2									
Number of mounting hole	C23 ³	3									
Motor shaft O.D.	C3 ³ _{HT}	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.
		3.5	≤ 6	12.25	≤ 6	46	≤ 2.5	81.37	≤ 4	216	≤ 2.5
		4.33	≤ 4	18.78	≤ 4			112.67	≤ 4	276	≤ 2.5
		6	≤ 2.5	26	≤ 4			143.96	≤ 4	352.67	≤ 2.5
		7.67	≤ 1.5	33.22	≤ 4			199.33	≤ 4		
Motor Shaft Length	C4 ³	23									
Motor Pilot O.D.	C5 ³	10									
Motor Pilot Depth	C6 ³	4									
Motor adapter O.D.	C7 ³	26									
Motor adapter Thickness	C8 ³	11									
Total Length	C9 ³	57		68.5				80			

3. C1 – C9 are motor specific dimensions (metric std shown). Refer to apexdyna.com and AM Design Tool to view your specific motor mounting system.

AM032 Series

Specifications

Gearbox Performance

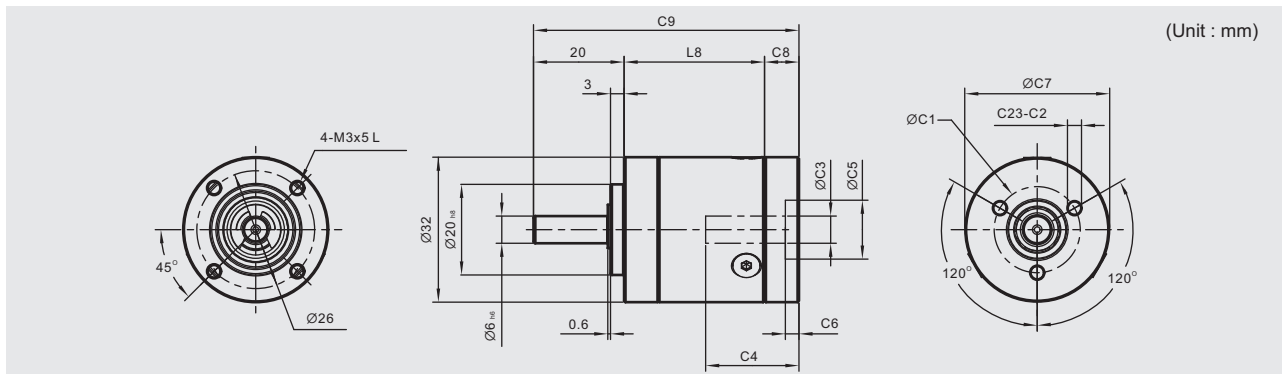
Model No.		1-Stage		2-Stage				3-Stage					
Nominal Output Torque T_{2N}	Nm	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque	Ratio ¹	Torque
		4	0.8	16	4	36	4	64	6	144	6	288	6
		4.5	0.8	18	4	41.6	4	72	6	175.78	6	332.8	6
		5.2	0.8	20.8	4	50	4	81	6	200	6	400	6
		6.25	0.8	25	4	64	4	100	6	225	6	512	6
8	0.8	32	4			130	6	256					
Max. Acceleration Torque T_{2B}	Nm	1.5 times of Nominal Output Torque											
Nominal Input Speed n_{1N}	rpm	5,000		5,000				5,000					
Max. Acceleration Input Speed n_{1B}	rpm	8,000		8,000				8,000					
Backlash*	acrmin	≤20		≤35				≤50					
Max. Radial Load F_{2rB} ²	N	90											
Max. Axial Load F_{2aB} ²	N	45											
Mass Moment of Inertia J_v	g·cm ²	4	0.378	16	0.378	36	0.248	64	0.378	144	0.378	288	0.248
		4.5	0.248	18	0.378	41.6	0.116	72	0.378	175.78	0.248	332.8	0.116
		5.2	0.116	20.8	0.378	50	0.056	81	0.248	200	0.378	100	0.056
		6.25	0.056	25	0.378	64	0.024	100	0.378	225	0.248	512	0.024
		8	0.024	32	0.378			130	0.378	256	0.378		
Service Life	hr	10,000*											
Efficiency η (MAX)	%	96		90				85					
Weight	g	156.3		218.32				265.83					
Operating Temperature	°C	-10°C~90°C											
Degree of Gearbox Protection		IP44											
Mounting Position		all directions											

1. Ratio ($i=N_n/N_{out}$)

* S1 service life 5000 hrs

2. Apply to the output shaft center @ 100 rpm

* Backlash is test under 2% of T_{2N}



Dimension		1-Stage		2-Stage				3-Stage					
Length	L8	31		43				55					
Mounting hole PCD	C1 ³	19											
Mounting hole O.D.	C2 ³	2.7											
Number of mounting hole	C23 ³	3											
Motor shaft O.D.	C3 ³ ₁₇	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.	Ratio ¹	O.D.
		4	≤6	16	≤6	36	≤5	64	≤6	144	≤6	288	≤5
		4.5	≤5	18	≤6	41.6	≤4	72	≤6	175.78	≤5	332.8	≤4
		5.2	≤4	20.8	≤6	50	≤3	81	≤5	200	≤6	400	≤3
		6.25	≤3	25	≤6	64	≤2	100	≤5	225	≤5	512	≤2
8	≤2	32	≤6			130	≤6	256	≤6				
Motor Shaft Length	C4 ³	20.6											
Motor Pilot O.D.	C5 ³	13											
Motor Pilot Depth	C6 ³	3											
Motor adapter O.D.	C7 ³	32											
Motor adapter Thickness	C8 ³	7.6											
Total Length	C9 ³	58.6		70.6				82.6					

3. C1 ~ C9 are motor specific dimensions (metric std shown). Refer to apexdyna.com and AM Design Tool to view your specific motor mounting system.

Ordering Code



AM013	4.1					MOTOR
Ratios	1-Stage	2-Stage	3-Stage	4-Stage	5-Stage	Motor Designation
AM013	4.1, 5.1	17, 26	67, 131	275, 664	1119, 3373	Manufacturer Type and Model
AM016	4.4, 5.4	19, 24, 29	84, 104, 128, 157	370, 455, 561, 690, 850	1621, 1996, 2458, 3027, 3728, 4592	
AM022	4, 5, 7, 9	16, 20, 28, 35, 49	64, 80, 112, 140, 196, 245, 343			
AM026	3.5, 4.33, 6, 7.67	12.25, 18.78, 26, 33.22, 46	81.37, 112.67, 143.96, 199.33, 216, 276, 352.67			
AM032	4, 4.5, 5.2, 6.25, 8	16, 18, 20.8, 25, 32, 36, 41.6, 50, 64	64, 72, 81, 100, 130, 144, 175.78, 200, 225, 256, 288, 332.8, 400, 512			

Ordering Example : AM032 - 16 / MAXON 283872

AM SERIES
www.apexdyna.com



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