



APEX DYNAMICS, INC.

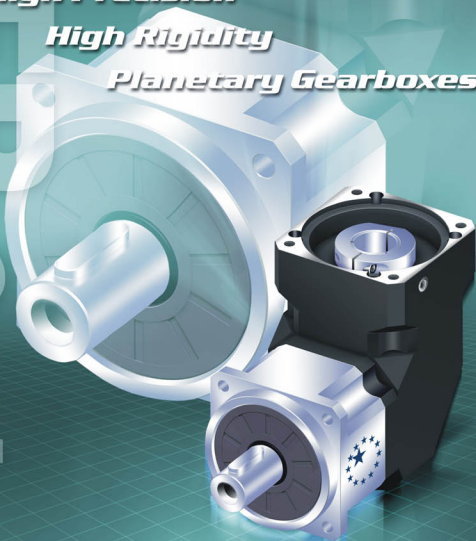
AFR-Series



High Precision

High Rigidity

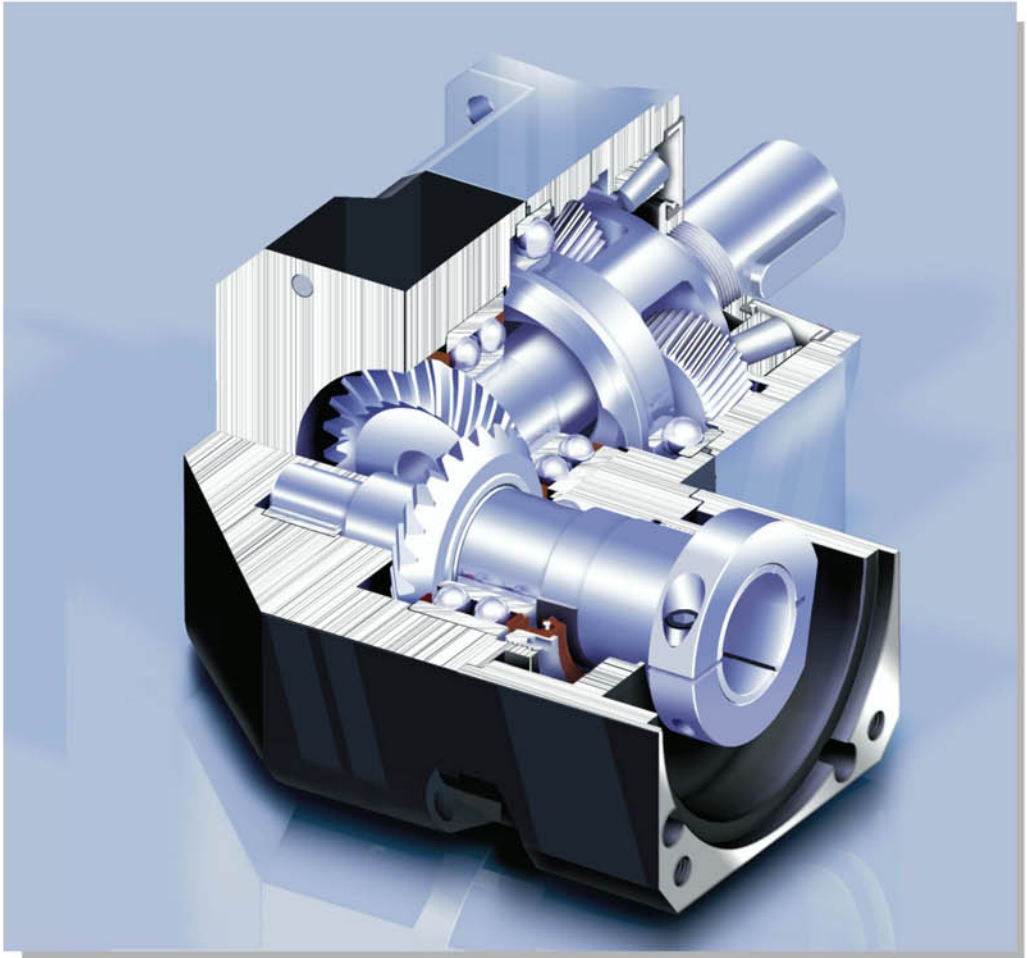
Planetary Gearboxes



Stainless

Characteristic Highlights

- Higher output torque rating by using spiral bevel gear design. 30% more than straight bevel gear.
- Allows input speeds up to 8 times than with straight bevel gearing.
- Improved load sharing through precision tooth design and longer service life.
- Ground gears verified with sophisticated software, ensures smooth, quiet operation with reduced backlash (≤ 2 arcmin).



- High tensile low weight single piece aluminum alloy housing for highest stiffness.
- Maintenance free lifetime lubrication.
- Patented sealing design for high speed and continuous running.
- High efficiency up to 95%. Low noise level down to 61 dB.
- Most ratios available from 3~200.

Specifications

Gearbox Performance

Model No.	Stages	Ratio	AFR042	AFR060	AFR075	AFR100	AFR140	AFR180	AFR220
Nominal Output Torque T_{2N}	1	3	9	36	90	195	342	588	1,140
		4	12	48	120	260	520	1,040	1,680
		5	15	60	150	325	650	1,200	2,000
		6	20	55	150	310	600	1,100	1,900
		7	19	50	140	300	550	1,100	1,800
		8	17	45	120	260	500	1,000	1,600
		9	14	40	100	230	450	900	1,500
		10	14	40	100	230	450	900	1,500
		14	-	42	140	300	550	1,100	1,800
		20	-	40	100	230	450	900	1,500
		15	14	-	-	-	-	-	-
		20	14	-	-	-	-	-	-
		25	15	60	150	325	650	1,200	2,000
		30	20	55	150	310	600	1,100	1,900
		35	19	50	140	300	550	1,100	1,800
	2	40	17	45	120	260	500	1,100	1,600
		45	14	40	100	230	450	900	1,500
		50	14	60	100	230	650	1,200	2,000
		60	20	55	150	310	600	1,100	1,900
		70	19	50	140	300	550	1,100	1,800
		80	17	45	120	260	500	1,000	1,600
		90	14	40	100	230	450	900	1,500
		100	14	40	100	230	450	900	1,500
		120	-	-	150	310	600	1,100	1,900
		140	-	-	140	300	550	1,100	1,800
		160	-	-	120	260	550	1,000	1,600
		180	-	-	100	230	450	900	1,500
		200	-	-	100	230	450	900	1,500
Max. Output Torque T_{2B}	Nm	1,2	3~200	3 times of Nominal Output Torque					
Nominal Input Speed n_{1N}	rpm	1,2	3~200	5,000	5,000	4,000	4,000	3,000	3,000
Max. Input Speed n_{1B}	rpm	1,2	3~200	10,000	10,000	8,000	8,000	6,000	6,000
Micro Backlash $P0$	arcmin	1	3~20	-	-	≤2	≤2	≤2	≤2
		2	25~200	-	-	≤4	≤4	≤4	≤4
Reduced Backlash $P1$	arcmin	1	3~20	≤4	≤4	≤4	≤4	≤4	≤4
		2	25~200	≤7	≤7	≤7	≤7	≤7	≤7
Standard Backlash $P2$	arcmin	1	3~20	≤6	≤6	≤6	≤6	≤6	≤6
		2	25~200	≤9	≤9	≤9	≤9	≤9	≤9
Torsional Rigidity	Nm/arcmin	1,2	3~200	3	7	14	25	50	145
Max. Radial Load F_{2R}^{*2}	N	1,2	3~200	610	1,400	4,100	9,200	14,000	33,000
Max. Axial Load F_{2A}^{*2}	N	1,2	3~200	302	605	3,700	5,800	11,400	25,000
Service Life	hr	1,2	3~200	30,000*					
Efficiency η	%	1	3~20	≥95%					
		2	25~200	≥92%					
Weight	kg	1	3~20	0.9	2.1	6.4	13.9	23.7	50
		2	25~200	1.2	1.5	7.8	15.1	26.7	54
Operating Temp	°C	1,2	3~200	-10°C~+90°C					
Lubrication		1,2	3~200	synthetic gear grease (NYOGEL 792D)					
Degree of Gearbox Protection		1,2	3~200	IP65					
Mounting Position		1,2	3~200	all directions					
Noise Level ($n_1=3000$ rpm)	dB	1,2	3~200	≤61	≤63	≤65	≤68	≤70	≤74

Gearbox Inertia

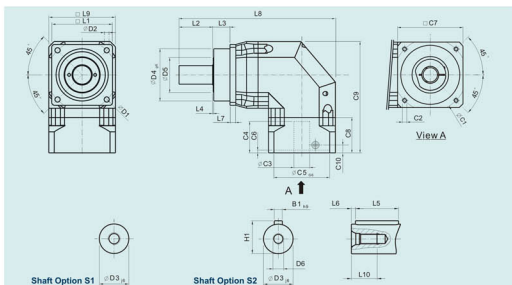
Model No.	Stages	Ratio	AFR042	AFR060	AFR075	AFR100	AFR140	AFR180	AFR220
Mass Moments of Inertia J_1	1	3~10	0.09	0.35	2.25	6.84	23.4	68.9	135.4
		14	-	0.07	1.87	6.25	21.8	65.6	119.8
		20	-	0.07	1.87	6.25	21.8	65.6	119.8
		15	0.09	-	-	-	-	-	-
	2	20	0.09	-	-	-	-	-	-
		25~100	0.09	0.09	0.35	2.25	6.84	23.4	68.9
		120~200	-	-	0.31	1.87	6.25	21.8	65.6

1. Ratio ($i=N_1/N_2$)

* S1 service life 15,000 hrs

2. F_{2R} : F_{2A} applied to the output shaft center @ 100 rpm

Dimensions (1-stage, Ratio i=3~20)



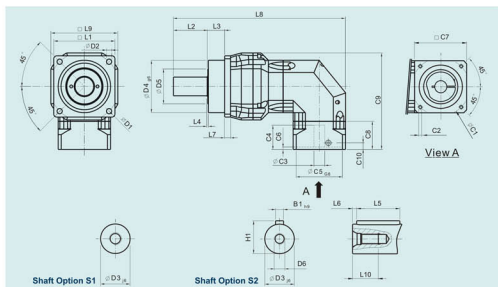
[unit: mm]

Dimension	AFR042	AFR060	AFR075	AFR100	AFR140	AFR180	AFR220
D1	50	68	85	120	165	215	250
D2	3.4	5.5	6.8	9	11	13	17
D3 ϕ	13	16	22	32	40	55	75
D4 ϕ	35	60	70	90	130	160	180
D5	22	30	45	60	75	95	115
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P
L1	42	62	76	105	142	180	220
L2	19.5	28.5	36	58	82	82	105
L3	6.5	20	20	30	30	30	33
L4	1	1.5	2	2	3	3	3
L5	16	25	32	40	63	70	90
L6	2	2	3	5	5	6	7
L7	4	6	7	10	12	15	20
L8	111.5	145	219	269.5	338.5	397	484
L9	42	60	90	115	142	180	220
L10	10	12.5	19	28	36	42	42
C1 ³	46	70	100	130	165	215	235
C2 ³	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M12 x 1.75P
C3 ³	≤11	*≤14 / ≤16	*≤19 / ≤24	≤32	≤38	≤48	≤55
C4 ³	25	30	40	50	60	82	82
C5 ³	30	50	80	110	130	180	200
C6 ³	3.5	4	4	5	6	6	6
C7 ³	42	60	90	115	142	190	220
C8 ³	29.5	41.5	48	61	71	96	100
C9 ³	90.5	108	153	192	236	301	345
C10 ³	8.75	10	11.25	13.5	16	18.25	20
B1 ϕ	5	5	6	10	12	16	20
H1	15	18	24.5	35	43	59	79.5

3. C1~C10 are motor specific dimensions (metric std shown). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

* AFR060 C3 option ≤ 16. * AFR075 C3 option = 24 without ceramic bushing.

Dimensions (2-stage, Ratio i=25~200)



[unit: mm]

Dimension	AFR042	AFR060	AFR075	AFR100	AFR140	AFR180	AFR220
D1	50	68	85	120	165	215	250
D2	3.4	5.5	6.8	9	11	13	17
D3 ϕ	13	16	22	32	40	55	75
D4 ϕ	35	60	70	90	130	160	180
D5	22	30	45	60	75	95	115
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P
L1	42	62	76	105	142	180	220
L2	19.5	28.5	36	58	82	82	105
L3	6.5	20	20	30	30	30	33
L4	1	1.5	2	2	3	3	3
L5	16	25	32	40	63	70	90
L6	2	2	3	5	5	6	7
L7	4	6	7	10	12	15	20
L8	139	163.5	222.5	295.5	370.5	434	521
L9	42	60	90	115	142	180	220
L10	10	12.5	19	28	36	42	42
C1 ¹	46	46	70	100	130	165	215
C2 ²	M4 x 0.7P	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P
C3 ³	≤ 11	$\leq 11 / \leq 12$	$\leq 14 / \leq 15.875 / \leq 16$	$\leq 19 / \leq 24$	≤ 32	≤ 38	≤ 48
C4 ⁴	25	25	30	40	50	60	82
C5 ⁵ ϕ	30	30	50	80	110	130	180
C6 ⁴	3.5	3.5	4	4	5	6	6
C7 ⁴	42	42	60	90	115	142	190
C8 ⁴	29.5	29.5	41.5	48	61	71	96
C9 ⁴	90.5	99.5	123	165.5	205.5	255	321
C10 ⁴	8.75	8.75	10	11.25	13.5	16	18.25
B1 ϕ	5	5	6	10	12	16	20
H1	15	18	24.5	35	43	59	79.5

4. C1~C10 are motor specific dimensions (metric std shown). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

* AFR060 C3 option ≤ 12 . * AFR075 C3 option $\leq 15.875 / < 16$. * AFR100 C3 option = 24 without ceramic bushing.

Ordering Code

AFR075

010

S1

P1

/ MOTOR

Gearbox Size:

AFR042, AFR060, AFR075
AFR100, AFR140, AFR180
AFR220

Shaft Option:

S1: Smooth Output Shaft
S2: Output Shaft with Key

Motor Designation:

Manufacturer Type
And Model

Ratio:

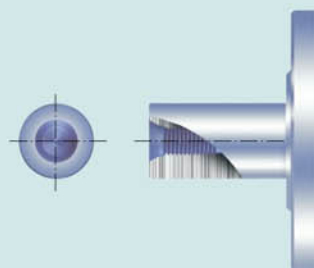
1 Stage: 3, 4, 5, 6, 7, 8, 9, 10, 14, 20
2 Stages: 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100,
120, 140, 160, 180, 200

Backlash:

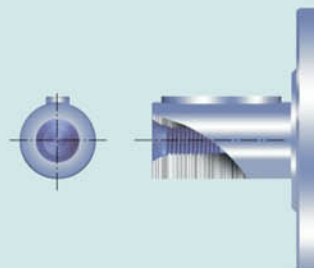
P0: Micro Backlash
P1: Reduced Backlash
P2: Standard Backlash

Ordering Example: AFR075-010-S1-P1 / SIEMENS 1FT6 041-4AF71

S1 and S2 shaft options are shown below:

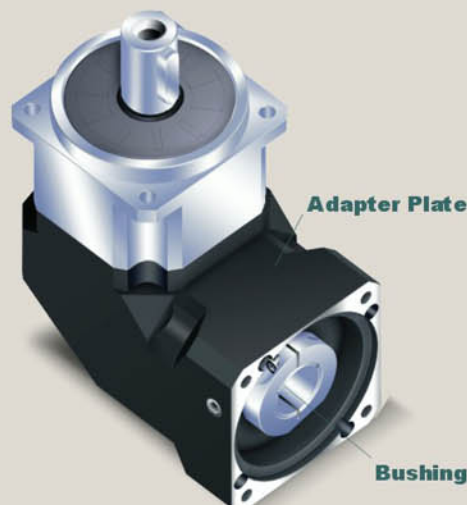


S1: Standard Output Shaft



S2: Output Shaft With Key

Keyway: Standard DIN 6885, Sheet 1

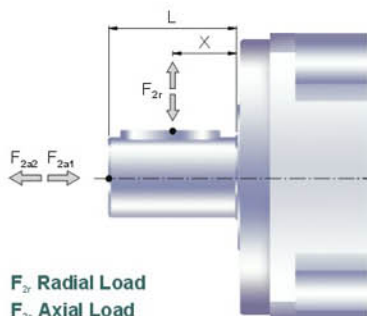


The dimensions of adapter plate depend on the motor.

Design on-line at www.apexdyna.com.

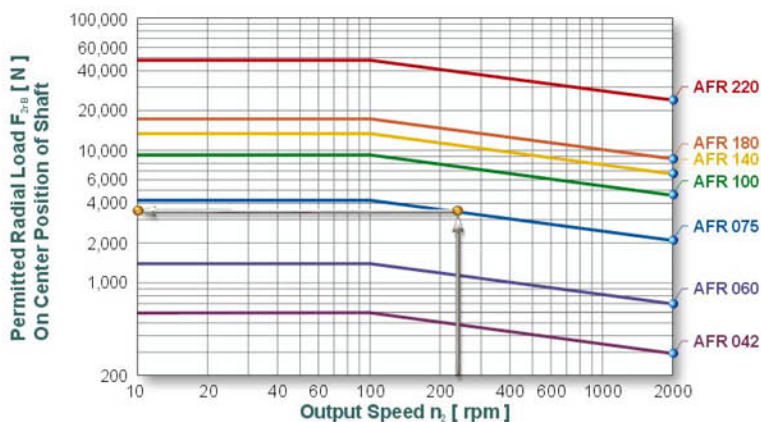
Download the specific motor / gearhead dxf or pdf.

Permitted Radial and Axial Loads on Output Shaft of the Gearbox



The permitted radial and axial loads on the output shaft of the gearbox depend on the design of the gearbox supporting bearings.

The oversized taper roller bearing straddle mount design accommodates high radial and axial loads with extensive life. Over 50% more load capacity than a standard angular contact bearing design.



If radial force F_{2r} is exerted on the center of the output shaft $X=1/2 \times L$.

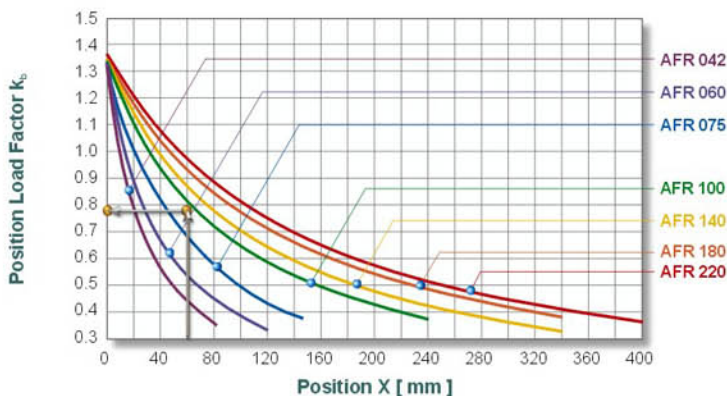
Under various operating condition the lifetime is over 30,000 hours*.

The permitted radial load is given on left diagram.

The permitted axial load can be calculated by using the formula:

$$F_{2a1B} = 0.2 \times F_{2rB}$$

$$F_{2a2B} = 0.1 \times F_{2rB}$$



If radial force F_{2r} is not exerted on the center of the output shaft $X < 1/2 \times L$ or $X > 1/2 \times L$.

The permitted radial and axial loads can be calculated by the position load factor k_0 on the left diagram.

Radial load:

$$F'_{2rB} = k_0 \times F_{2rB}$$

Axial load:

$$F'_{2a1B} = 0.2 \times F'_{2rB}$$

$$F'_{2a2B} = 0.1 \times F'_{2rB}$$

* S1 service life 15,000 hrs



AFR Series

www.apexdyna.com



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