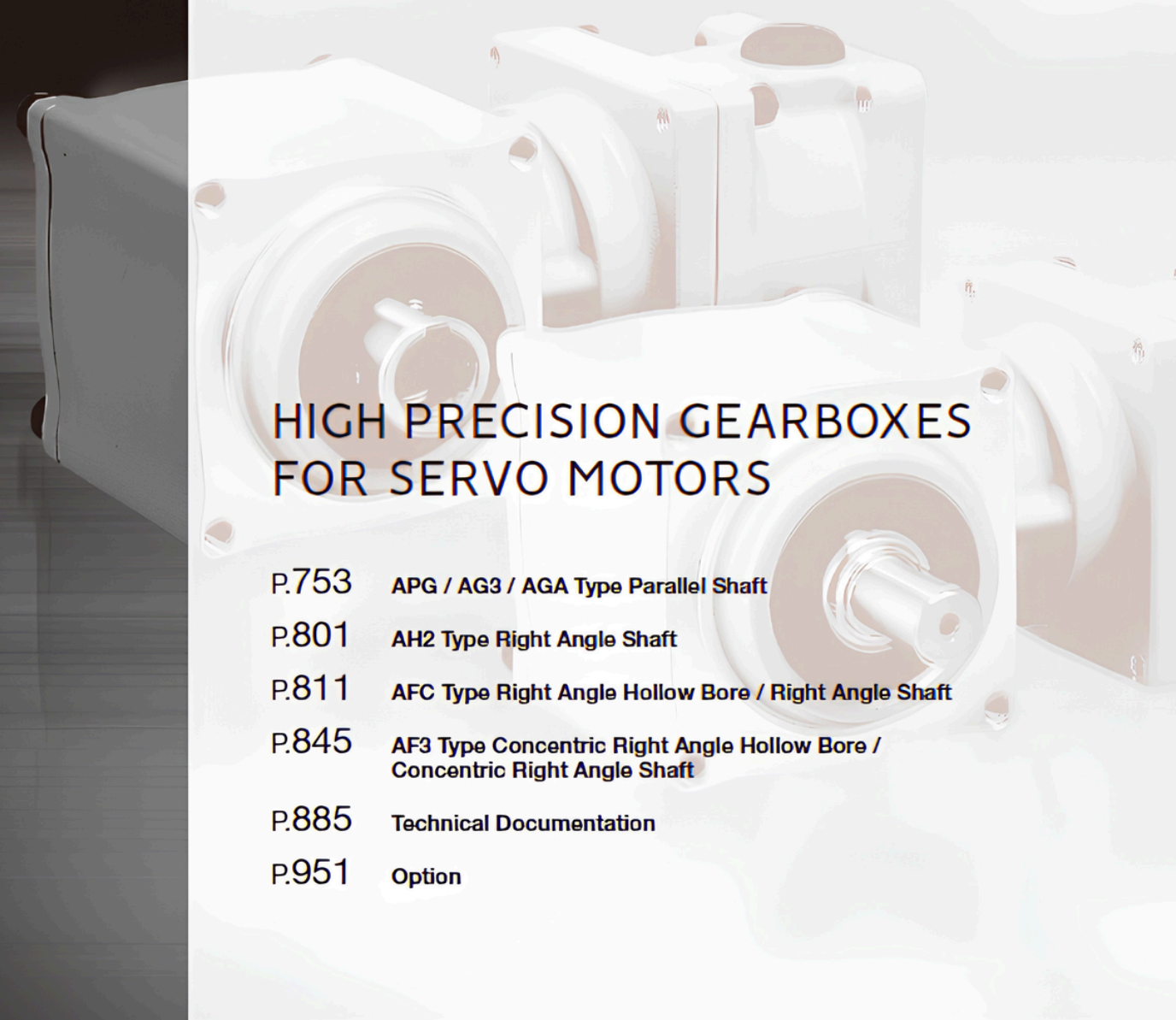
Gearmotors General Catalog



HIGH PRECISION GEARBOXES FOR SERVO MOTORS

P.753 APG / AG3 / AGA Type Parallel Shaft
P.801 AH2 Type Right Angle Shaft
P.811 AFC Type Right Angle Hollow Bore / Right Angle Shaft
P.845 AF3 Type Concentric Right Angle Hollow Bore / Concentric Right Angle Shaft
P.885 Technical Documentation
P.951 Option

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APG/ AG3/ AGA Type

Parallel Shaft

Model and Type Codes
Standard Model Lineup

P.760

HIGH PRECISION GEARBOXES FOR SERVO MOTORS

1. Compact High Precision Gearboxes for Servo Motors

1-1. Performance Tables

1-2. Drawings

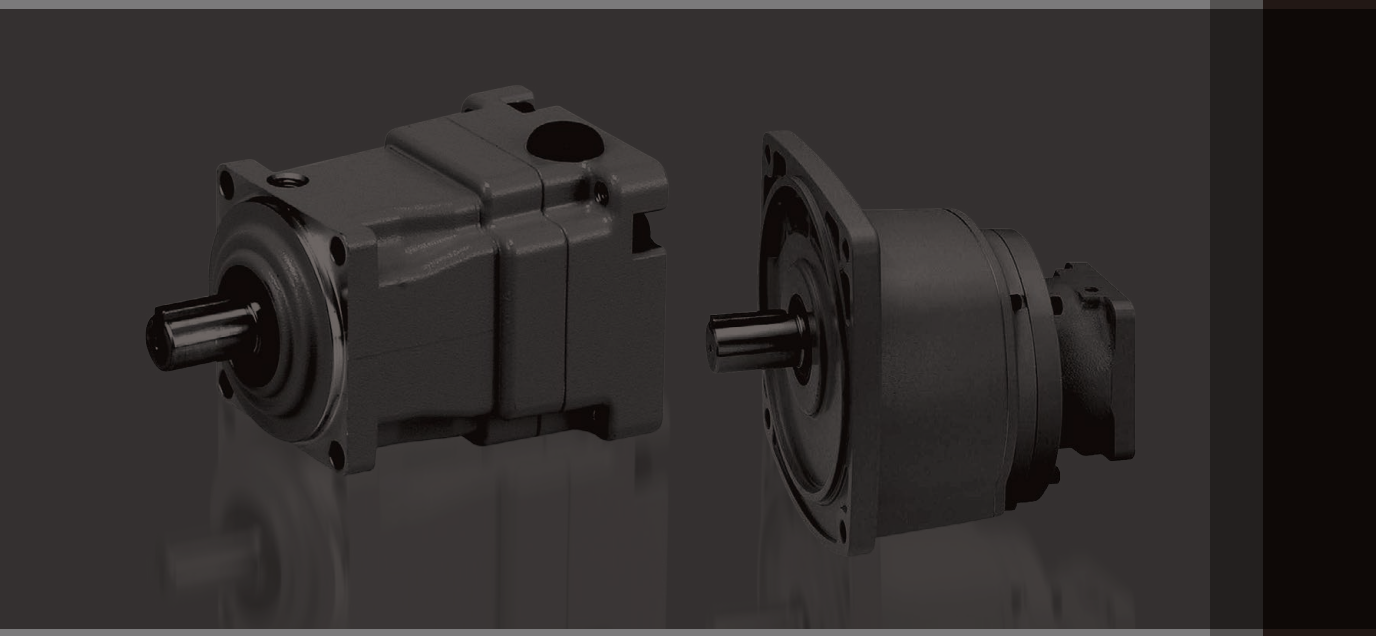
1-3. Low Temperature Startup Characteristics (No Load Running Torque (Input Shaft))

P.784

2. Low Backlash High Precision Gearboxes for Servo Motors

2-1. Performance Tables

2-2. Drawings



Model and Type Codes

APG Type

Mounting Type	Motor Type	Frame Size	Shaft Arrangement		Reduction Ratio	Backlash	Motor Power Class	Type	IP Protection Rating	Option
APG	Z	12	K	–	3	M	100	S1	N	X
APG	Z	18	J	–	30	Q	150	S1	N	
APG	Z	28	K	–	20	M	2000	K31	W	
①	②	③	④		⑤	⑥	⑦	⑧	⑨	⑩

①Mounting Type	APG : Parallel Shaft/Planetary Type (Compact Flange Mount)
②Motor Type	Z : High Precision Gearboxes for Servo Motor (Z Type Gearbox)
③Frame Size and Output Shaft Diameter	Output Shaft Diameter
④Shaft Arrangement	K : Output shaft with key and shaft end tapped
	J : Straight Shaft
⑤Reduction Ratio	3:1/3 20:1/20 100:1/100
⑥Backlash	M : Backlash 3 arc min
	Q : Backlash 15 arc min
⑦Motor Power Class	100 : 100 W Class
	150 : 150 W Class
	200 : 200 W Class
	400 : 400 W Class
	600 : 600 W Class
	750 : 750 W Class
	1000 : 1000 W Class
	1500 : 1500 W Class
	2000 : 2000 W Class
	3000 : 3000 W Class
⑧Flange Type for Servo Motor Mounting	S1/K13, etc.
⑨IP Protection Rating	N : IP44 Class
	W : IP65 Class
⑩Option	Blank : Standard Specification
	X : Special Specification Code

AG3 Type

Mounting Type	Motor Type	Frame Size	Shaft Arrangement		Reduction Ratio	Backlash	Motor Power Class	Type	Option	Option Code
AG3L	Z	22		–	30	L	200	S1		
AG3K	Z	32		–	30	L	750	S4		
AG3F	Z	40		–	60	L	2000	K21	X	B3
①	②	③	④		⑤	⑥	⑦	⑧	⑨	⑩

①Mounting Type	AG3L : Parallel Shaft (Foot Mount)
	AG3F : Parallel Shaft (Flange Mount)
	AG3K : Parallel Shaft (Small Flange Mount, Up to Frame Sizes 32)
②Motor Type	Z : High Precision Gearboxes for Servo Motor (Z Type Gearbox)
③Frame Size and Output Shaft Diameter	Output Shaft Diameter
④Shaft Arrangement	Blank
⑤Reduction Ratio	5:1/5 to 240:1/240
⑥Backlash	L : Low Backlash
⑦Motor Power Class	100 : 100 W Class
	200 : 200 W Class
	400 : 400 W Class
	750 : 750 W Class
	2000 : 2000 W Class
⑧Flange Type for Servo Motor Mounting	F1/S1/K31, etc.
⑨Option	Blank : Standard Specification
	X : Special Specification Code
⑩Option Code (Note 1)	Position Code of Wrench Hole for Input Shaft Joint Tightening For details, please refer to the list of option codes on page 949.

Note 1: The option code will not be shown in the nomenclature on the nameplate. But it will be shown in the Option code row of the nameplate.

AGA Type

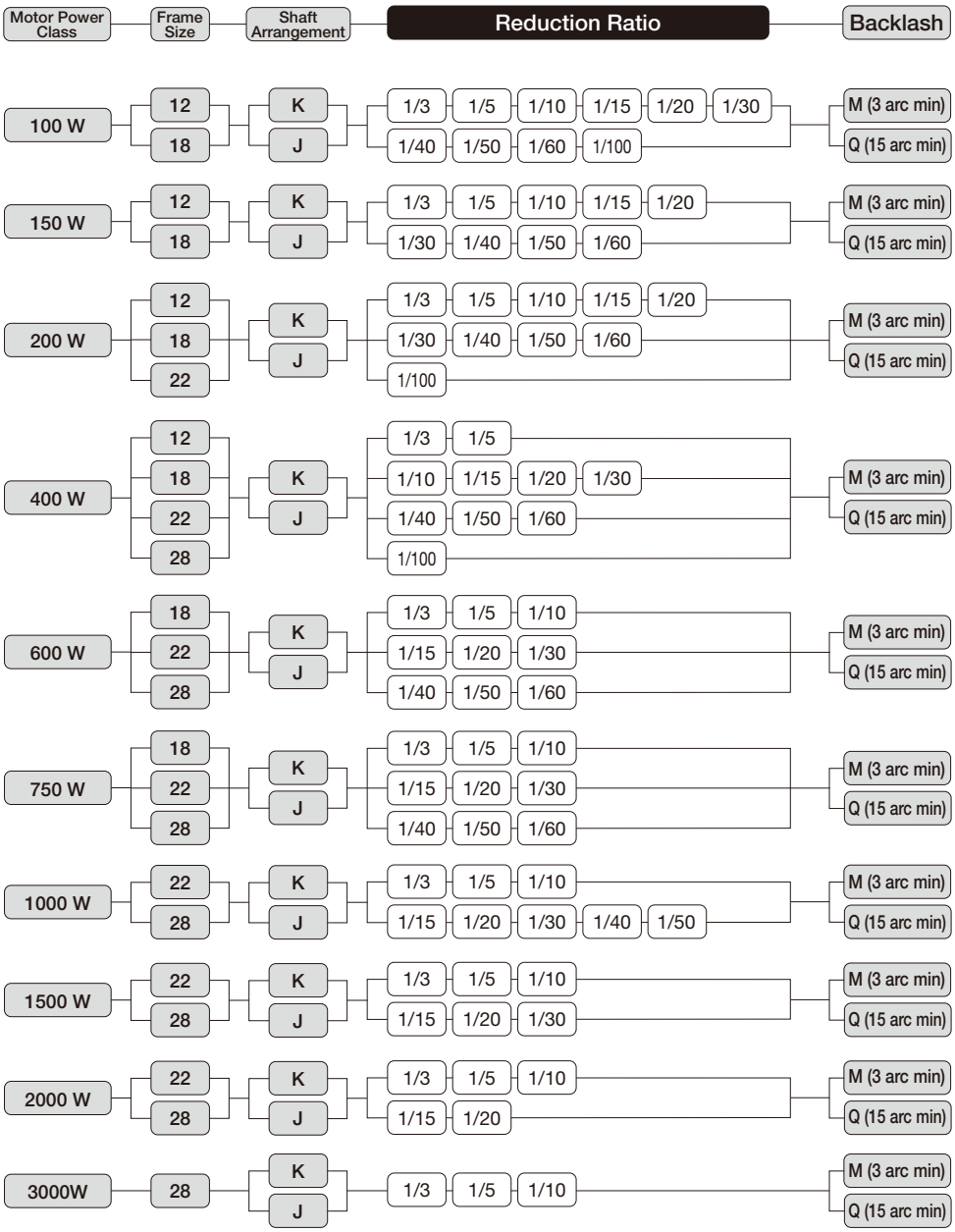
Mounting Type	Motor Type	Frame Size	Shaft Arrangement		Reduction Ratio	Backlash	Motor Power Class	Type	Option	Option Code
AGAL	Z	50		–	100	L	2000	K21		
AGAL	Z	50		–	160	L	2000	K32	X	B3
①	②	③	④		⑤	⑥	⑦	⑧	⑨	⑩

①Mounting Type	AGAL : Parallel Shaft (Foot Mount) (50-frame only)
②Motor Type	Z : High Precision Gearboxes for Servo Motor (Z Type Gearbox)
③Frame Size and Output Shaft Diameter	Output Shaft Diameter
④Shaft Arrangement	Blank
⑤Reduction Ratio	100:1/100 to 200:1/200
⑥Backlash	L : Low Backlash
⑦Motor Power Class	2000 : 2000 W Class
⑧Flange Type for Servo Motor Mounting	F1/S1/K31, etc.
⑨Option	Blank : Standard Specification
	X : Special Specification Code
⑩Option Code (Note 1)	Position Code of Wrench Hole for Input Shaft Joint Tightening For details, please refer to the list of option codes on page 949.

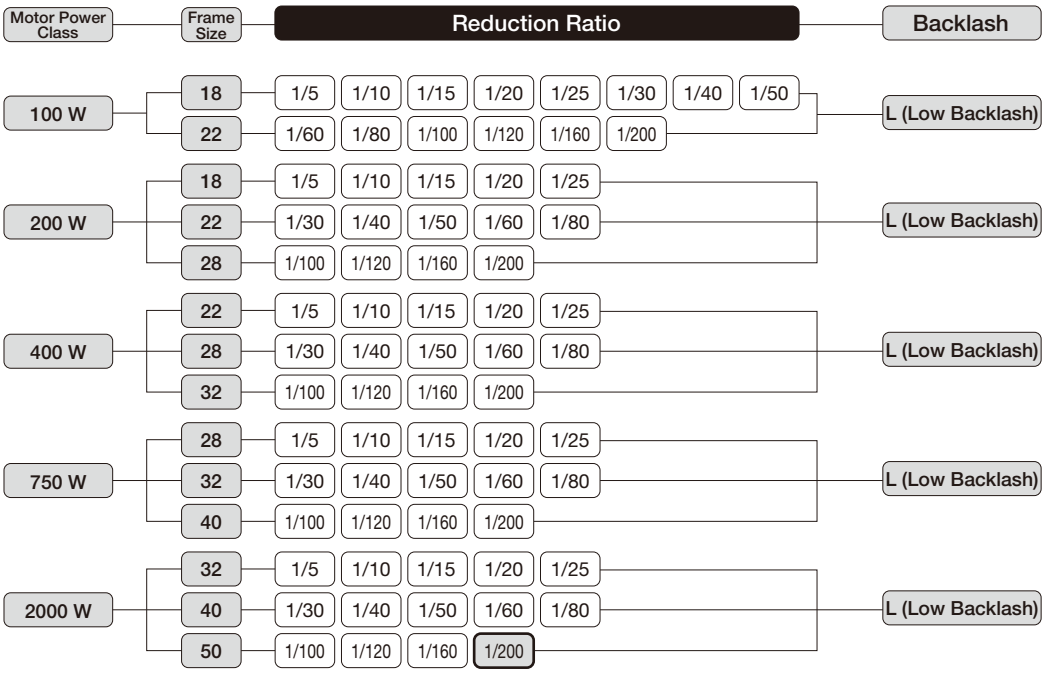
Note 1: The option code will not be shown in the nomenclature on the nameplate. But it will be shown in the Option code row of the nameplate.

Standard Model Lineup

APG Type Backlash 3 arc min/15 arc min Specifications

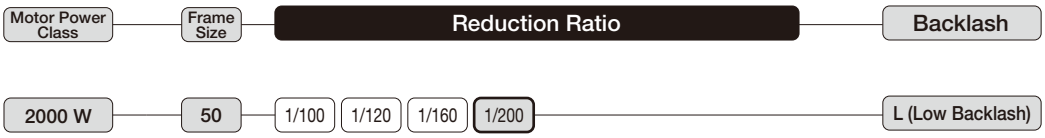


AG3 Type Low Backlash Specification



Note 1: ( ) indicates a limited torque type. Please make sure to check the allowable torque in the performance table.
Note 2: For the precision of low backlash types, refer to the performance table.
Note 3: Select a 2000 W class gearbox for 1000 W and 1500 W servo motors.
Note 4: AG3 is not available in 1 arc min and 3 arc min specifications.
Note 5: Please note that small flange mount (AG3K) is available only for frame sizes 18 to 32.

AG3 Type Low Backlash Specification



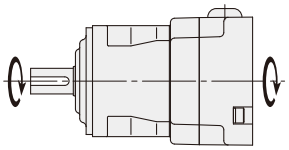
Note 1: ( ) indicates a limited torque type. Please make sure to check the allowable torque in the performance table.
Note 2: For the precision of low backlash types, refer to the performance table.
Note 3: Select a 2000 W class gearbox for 1000 W and 1500 W servo motors.
Note 4: AG3 is not available in 1 arc min and 3 arc min specifications.

1. Compact High Precision Gearboxes for Servo Motors

1-1. Performance Tables

APG Type <Backlash 3 arc min/15 arc min Specifications> Performance Table by Reduction Ratio

[Notes]
- The instantaneous input speed is 7000 r/min. The rated input speed is 3000 r/min.
- Allowable output shaft O.H.L. is the value at the middle of the output shaft.
- The rotational direction of the output shaft is the same as the input rotational direction of the motor.
- For the continuous rated input torque, please refer to page 948. In addition, for the servo motor-based motor rated output torque, please refer to page 920.
- The key dimensions and tolerances for output shafts conform to JIS B 1301-1996 (plain form).
- The internal moment of inertia (input shaft equivalent) is the value for the gearbox alone, and does not include the motor's moment of inertia.
- The allowable average torque is the continuous allowable torque value.
- Adjust the gain so that the inertial load on the output shaft side does not vibrate during acceleration and deceleration.
- M in the Precision column means backlash 3 arc min, and Q means backlash 15 arc min.
- When the gearbox is used at low temperature, the no load running torque at a startup will increase. Please refer to page 781 for cold start characteristics.



■ At an input speed of 3000 r/min

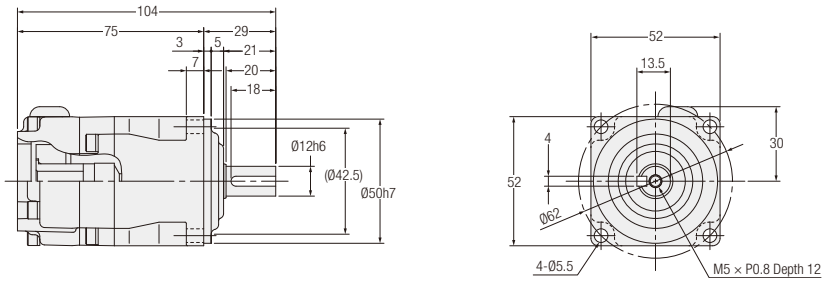
Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	$\times 10^{-4}$kg·m^2	
APGZ	12	K/J	1/3	1/3	M/Q	100	3.4	11.9	420	210	0.163	P.762, P.763
APGZ	12	K/J	1/3	1/3	M/Q	150	3.4	11.9	420	210	0.163	
APGZ	12	K/J	1/3	1/3	M/Q	200	3.4	11.9	420	210	0.158	
APGZ	12	K/J	1/3	1/3	M/Q	400	3.4	11.9	420	210	0.158	
APGZ	18	K/J	1/3	1/3	M/Q	600	6.4	22	820	410	0.768	P.766 to P.769
APGZ	18	K/J	1/3	1/3	M/Q	750	6.4	22	820	410	0.898	
APGZ	22	K/J	1/3	1/3	M/Q	1000	17.2	60	1000	500	3.233	P.773
APGZ	22	K/J	1/3	1/3	M/Q	1500	17.2	60	1000	500	3.188	
APGZ	22	K/J	1/3	1/3	M/Q	2000	17.2	60	1000	500	3.188	
APGZ	28	K/J	1/3	1/3	M/Q	3000	25.8	90	1450	725	4.213	P.776, P.778 to P.780
APGZ	12	K/J	1/5	1/5	M/Q	100	5.7	20	510	255	0.142	P.762, P.763
APGZ	12	K/J	1/5	1/5	M/Q	150	5.7	20	510	255	0.142	
APGZ	12	K/J	1/5	1/5	M/Q	200	5.7	20	510	255	0.137	
APGZ	12	K/J	1/5	1/5	M/Q	400	5.7	20	510	255	0.137	
APGZ	18	K/J	1/5	1/5	M/Q	600	10.7	37	980	490	0.610	P.766 to P.769
APGZ	18	K/J	1/5	1/5	M/Q	750	10.7	37	980	490	0.740	
APGZ	22	K/J	1/5	1/5	M/Q	1000	28.6	100	1200	600	2.693	P.773
APGZ	22	K/J	1/5	1/5	M/Q	1500	28.6	100	1200	600	2.649	
APGZ	22	K/J	1/5	1/5	M/Q	2000	28.6	100	1200	600	2.649	
APGZ	28	K/J	1/5	1/5	M/Q	3000	43.0	151	1700	850	2.875	P.776, P.778 to P.780
APGZ	12	K/J	1/10	1/10	M/Q	100	5.1	18	650	325	0.135	P.762, P.763
APGZ	12	K/J	1/10	1/10	M/Q	150	5.1	18	510	255	0.135	
APGZ	12	K/J	1/10	1/10	M/Q	200	5.1	18	650	325	0.130	
APGZ	18	K/J	1/10	1/10	M/Q	400	21.5	75	1200	600	0.145	P.766 to P.769
APGZ	18	K/J	1/10	1/10	M/Q	600	21.5	75	1200	600	0.558	
APGZ	18	K/J	1/10	1/10	M/Q	750	21.5	75	1200	600	0.687	
APGZ	22	K/J	1/10	1/10	M/Q	1000	57.3	186	1300	650	2.534	P.773
APGZ	22	K/J	1/10	1/10	M/Q	1500	57.3	186	1300	650	2.489	
APGZ	22	K/J	1/10	1/10	M/Q	2000	57.3	186	1300	650	2.489	
APGZ	28	K/J	1/10	1/10	M/Q	3000	85.9	258	2150	1075	2.502	P.776, P.778 to P.780
APGZ	12	K/J	1/15	1/15	M/Q	100	7.6	25	784	392	0.134	P.764, P.765
APGZ	12	K/J	1/15	1/15	M/Q	150	7.6	25	784	392	0.134	
APGZ	12	K/J	1/15	1/15	M/Q	200	7.6	25	784	392	0.128	
APGZ	18	K/J	1/15	1/15	M/Q	400	16.2	57	1470	735	0.142	P.766 to P.769
APGZ	22	K/J	1/15	1/15	M/Q	600	30.4	106	1950	975	0.210	P.770 to P.772
APGZ	22	K/J	1/15	1/15	M/Q	750	30.4	106	1950	975	0.693	
APGZ	28	K/J	1/15	1/15	M/Q	1000	81.2	284	2450	1225	2.796	P.776, P.778 to P.780

Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	$\times 10^{-4}$kg·m^2	
APGZ	28	K/J	1/15	1/15	M/Q	1500	81.2	284	2450	1225	2.752	P.776, P.778 to P.780
APGZ	28	K/J	1/15	1/15	M/Q	2000	81.2	284	2450	1225	2.752	
APGZ	12	K/J	1/20	1/20	M/Q	100	10.2	31	840	420	0.133	P.764, P.765
APGZ	12	K/J	1/20	1/20	M/Q	150	10.2	31	840	420	0.133	
APGZ	12	K/J	1/20	1/20	M/Q	200	10.2	31	840	420	0.128	
APGZ	18	K/J	1/20	1/20	M/Q	400	21.6	76	1570	785	0.137	P.766 to P.769
APGZ	22	K/J	1/20	1/20	M/Q	600	40.6	142	2150	1075	0.192	P.770 to P.772
APGZ	22	K/J	1/20	1/20	M/Q	750	40.6	142	2150	1075	0.675	
APGZ	28	K/J	1/20	1/20	M/Q	1000	108.2	379	2700	1350	2.751	P.776, P.778 to P.780
APGZ	28	K/J	1/20	1/20	M/Q	1500	108.2	379	2700	1350	2.706	P.776, P.778 to P.780
APGZ	28	K/J	1/20	1/20	M/Q	2000	108.2	379	2700	1350	2.706	
APGZ	12	K/J	1/30	1/30	M/Q	100	6.7	20	910	455	0.132	P.764, P.765
APGZ	18	K/J	1/30	1/30	M/Q	150	32.5	97	1750	875	0.139	P.766 to P.769
APGZ	18	K/J	1/30	1/30	M/Q	200	32.5	97	1750	875	0.134	
APGZ	18	K/J	1/30	1/30	M/Q	400	32.5	97	1750	875	0.134	
APGZ	22	K/J	1/30	1/30	M/Q	600	60.9	183	2450	1225	0.183	P.770 to P.772
APGZ	22	K/J	1/30	1/30	M/Q	750	60.9	183	2450	1225	0.666	
APGZ	28	K/J	1/30	1/30	M/Q	1000	121.8	365	3100	1550	2.728	P.776, P.778 to P.780
APGZ	28	K/J	1/30	1/30	M/Q	1500	121.8	365	3100	1550	2.684	P.766 to P.769
APGZ	18	K/J	1/40	1/40	M/Q	100	19.1	67	1860	930	0.133	P.770 to P.772
APGZ	18	K/J	1/40	1/40	M/Q	150	19.1	67	1860	930	0.133	
APGZ	18	K/J	1/40	1/40	M/Q	200	19.1	67	1860	930	0.128	
APGZ	22	K/J	1/40	1/40	M/Q	400	40.7	142	2550	1275	0.143	P.775, P.777
APGZ	28	K/J	1/40	1/40	M/Q	600	108.2	379	3450	1725	0.148	P.766 to P.769
APGZ	28	K/J	1/40	1/40	M/Q	750	108.2	379	3450	1725	0.660	
APGZ	28	K/J	1/40	1/40	M/Q	1000	108.2	379	3450	1725	2.610	
APGZ	18	K/J	1/50	1/50	M/Q	100	25.5	89	1860	930	0.133	P.770 to P.772
APGZ	18	K/J	1/50	1/50	M/Q	150	25.5	89	1860	930	0.133	
APGZ	18	K/J	1/50	1/50	M/Q	200	25.5	89	1860	930	0.128	
APGZ	22	K/J	1/50	1/50	M/Q	400	50.9	178	2550	1275	0.141	P.775, P.777
APGZ	28	K/J	1/50	1/50	M/Q	600	135.3	406	2550	1275	0.144	P.776, P.778 to P.780
APGZ	28	K/J	1/50	1/50	M/Q	750	135.3	406	3520	1760	0.656	
APGZ	28	K/J	1/50	1/50	M/Q	1000	135.3	406	3520	1760	2.606	
APGZ	18	K/J	1/60	1/60	M/Q	100	28.6	93	1860	930	0.133	P.766 to P.769
APGZ	18	K/J	1/60	1/60	M/Q	150	28.6	93	1860	930	0.133	
APGZ	18	K/J	1/60	1/60	M/Q	200	28.6	93	1860	930	0.127	
APGZ	22	K/J	1/60	1/60	M/Q	400	61.1	189	2550	1275	0.141	P.770 to P.772
APGZ	28	K/J	1/60	1/60	M/Q	600	121.8	365	3520	1760	0.143	P.775, P.777
APGZ	28	K/J	1/60	1/60	M/Q	750	121.8	365	3520	1760	0.654	
APGZ	18	K/J	1/100	1/100	M/Q	100	20.7	62	1860	930	0.132	P.766 to P.769
APGZ	22	K/J	1/100	1/100	M/Q	200	44.6	134	2550	1275	0.140	P.770 to P.772
APGZ	28	K/J	1/100	1/100	M/Q	400	95.5	286	3520	1760	0.140	P.775, P.777

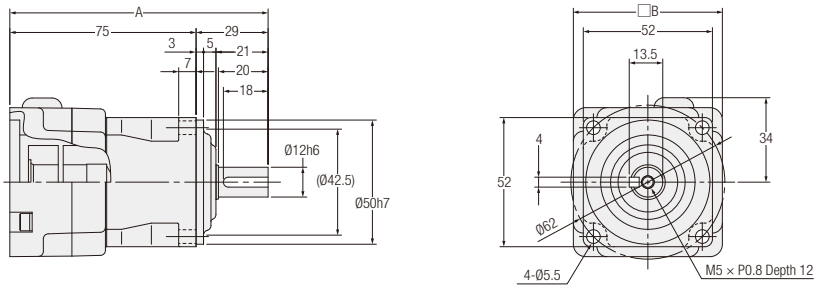
1-2. Drawings

APG Type Parallel Shaft Shaft Diameter 12 Backlash 3 arc min/15 arc min Specifications

<Figure 1>



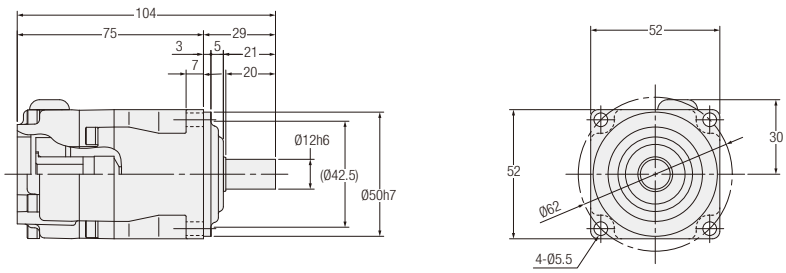
<Figure 2>



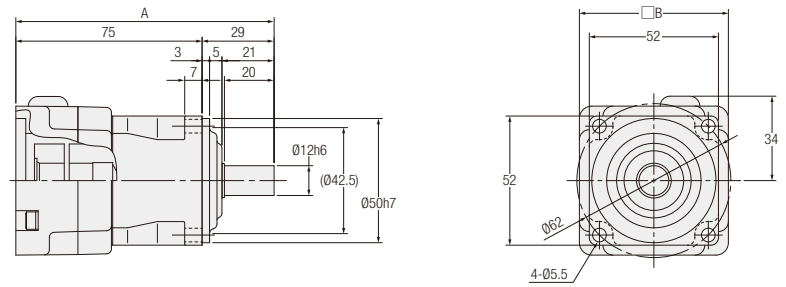
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B
100 W	K: Output shaft with Shaft end tapped	APGZ12K-***□100△N	APGZ12K-***□100△W	3, 5, 10	S1/S3	1	0.8	—	—
100 W		APGZ12K-***□100△N	APGZ12K-***□100△W	3, 5, 10	S6	2	0.8	104	55
150 W		APGZ12K-***□150△N	APGZ12K-***□150△W	3, 5, 10	S1	1	0.8	—	—
200 W		APGZ12K-***□200△N	APGZ12K-***□200△W	3, 5, 10	S1/S2/S3/S5	2	0.8	104	60
200 W		APGZ12K-***□200△N	APGZ12K-***□200△W	3, 5, 10	S6	2	0.8	104	55
200 W		APGZ12K-***□200△N	APGZ12K-***□200△W	3, 5, 10	S7	2	0.8	104	70
400 W		APGZ12K-***□400△N	APGZ12K-***□400△W	3, 5	S1/S3	2	0.8	104	60
400 W		APGZ12K-***□400△N	APGZ12K-***□400△W	3, 5	S6	2	0.8	104	55
400 W		APGZ12K-***□400△N	APGZ12K-***□400△W	3, 5	S7	2	0.8	104	70

Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

<Figure 3>



<Figure 4>

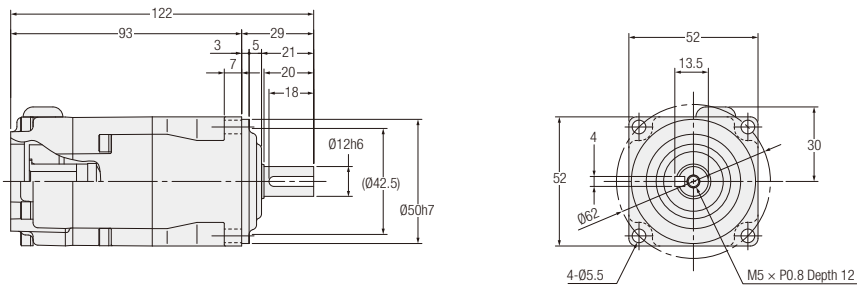


Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B
100 W	J: Straight shaft	APGZ12J-∗∗∗□100△N	APGZ12J-∗∗∗□100△W	3, 5, 10	S1/S3	3	0.8	—	—
100 W		APGZ12J-∗∗∗□100△N	APGZ12J-∗∗∗□100△W	3, 5, 10	S6	4	0.8	104	55
150 W		APGZ12J-∗∗∗□150△N	APGZ12J-∗∗∗□150△W	3, 5, 10	S1	3	0.8	—	—
200 W		APGZ12J-∗∗∗□200△N	APGZ12J-∗∗∗□200△W	3, 5, 10	S1/S2/S3/S5	4	0.8	104	60
200 W		APGZ12J-∗∗∗□200△N	APGZ12J-∗∗∗□200△W	3, 5, 10	S6	4	0.8	104	55
200 W		APGZ12J-∗∗∗□200△N	APGZ12J-∗∗∗□200△W	3, 5, 10	S7	4	0.8	104	70
400 W		APGZ12J-∗∗∗□400△N	APGZ12J-∗∗∗□400△W	3, 5	S1/S3	4	0.8	104	60
400 W		APGZ12J-∗∗∗□400△N	APGZ12J-∗∗∗□400△W	3, 5	S6	4	0.8	104	55
400 W		APGZ12J-∗∗∗□400△N	APGZ12J-∗∗∗□400△W	3, 5	S7	4	0.8	104	70

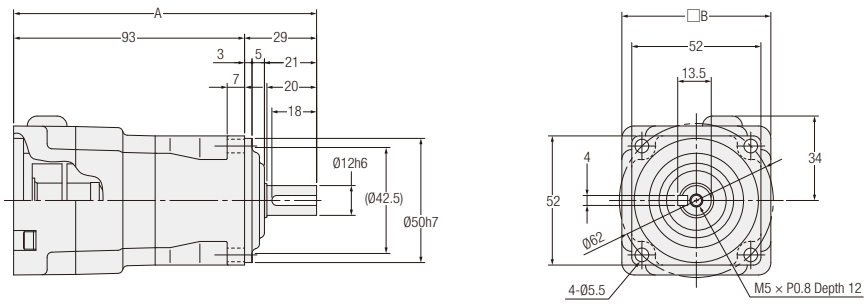
Note: A reduction ratio will be indicated as ∗∗∗ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

APG Type Parallel Shaft Shaft Diameter 12 Backlash 3 arc min/15 arc min Specifications

<Figure 1>



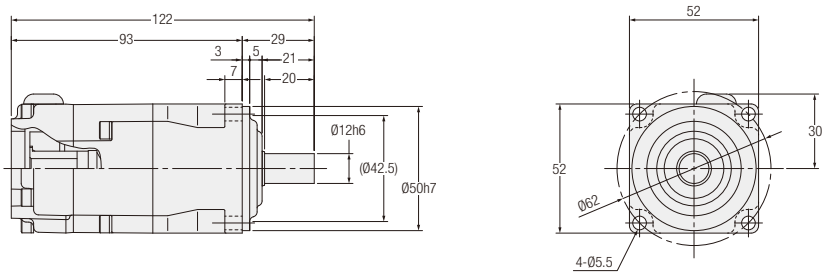
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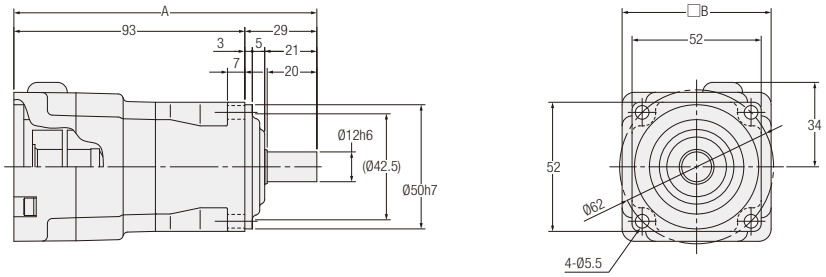
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B
100 W	K: Output shaft with Shaft end tapped	APGZ12K-✻✻✻□100△N	APGZ12K-✻✻✻□100△W	15, 20, 30	S1/S3	1	0.9	—	—
100 W		APGZ12K-✻✻✻□100△N	APGZ12K-✻✻✻□100△W	15, 20, 30	S6	2	0.9	122	55
150 W		APGZ12K-✻✻✻□150△N	APGZ12K-✻✻✻□150△W	15, 20	S1	1	0.9	—	—
200 W		APGZ12K-✻✻✻□200△N	APGZ12K-✻✻✻□200△W	15, 20	S1/S2/S3/S5	2	0.9	122	60
200 W		APGZ12K-✻✻✻□200△N	APGZ12K-✻✻✻□200△W	15, 20	S6	2	0.9	122	55
200 W		APGZ12K-✻✻✻□200△N	APGZ12K-✻✻✻□200△W	15, 20	S7	2	0.9	122	70

Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

<Figure 3>



<Figure 4>

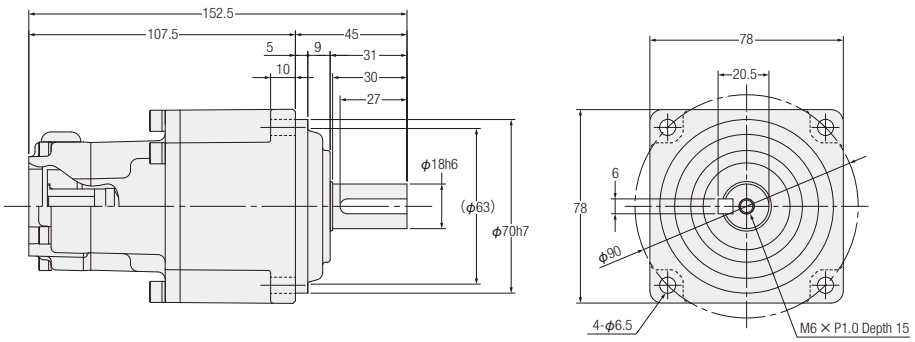


Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B
100 W	J: Straight shaft	APGZ12J-✻✻✻□100△N	APGZ12J-✻✻✻□100△W	15, 20, 30	S1/S3	3	0.9	—	—
100 W		APGZ12J-✻✻✻□100△N	APGZ12J-✻✻✻□100△W	15, 20, 30	S6	4	0.9	122	55
150 W		APGZ12J-✻✻✻□150△N	APGZ12J-✻✻✻□150△W	15, 20	S1	3	0.9	—	—
200 W		APGZ12J-✻✻✻□200△N	APGZ12J-✻✻✻□200△W	15, 20	S1/S2/S3/S5	4	0.9	122	60
200 W		APGZ12J-✻✻✻□200△N	APGZ12J-✻✻✻□200△W	15, 20	S6	4	0.9	122	55
200 W		APGZ12J-✻✻✻□200△N	APGZ12J-✻✻✻□200△W	15, 20	S7	4	0.9	122	70

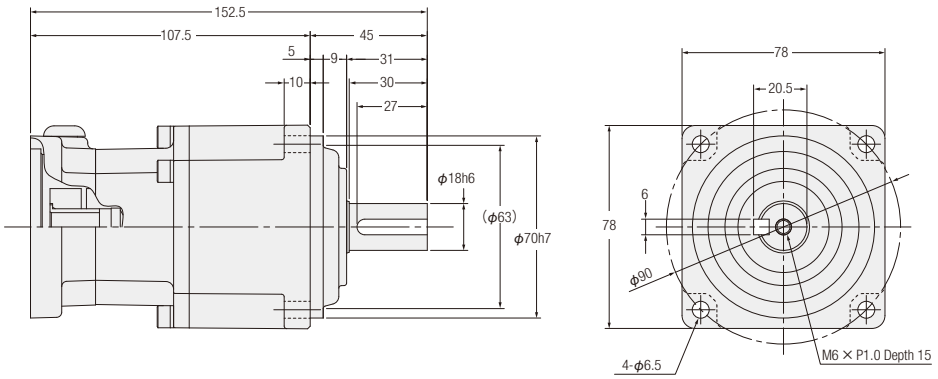
Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

APG Type Parallel Shaft Shaft Diameter 18 Backlash 3 arc min/15 arc min Specifications

<Figure 1>



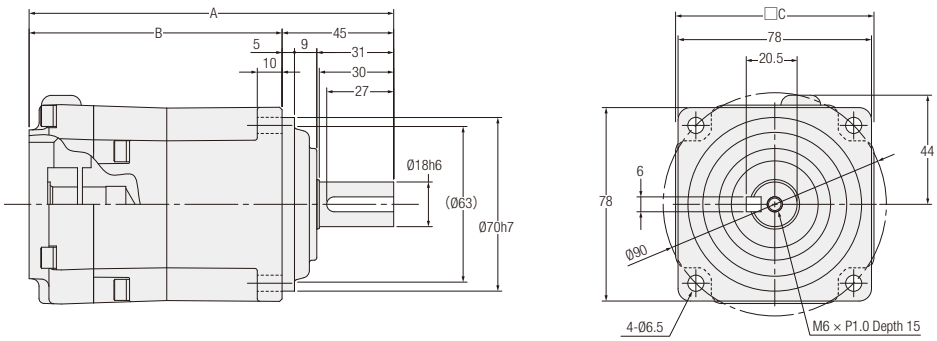
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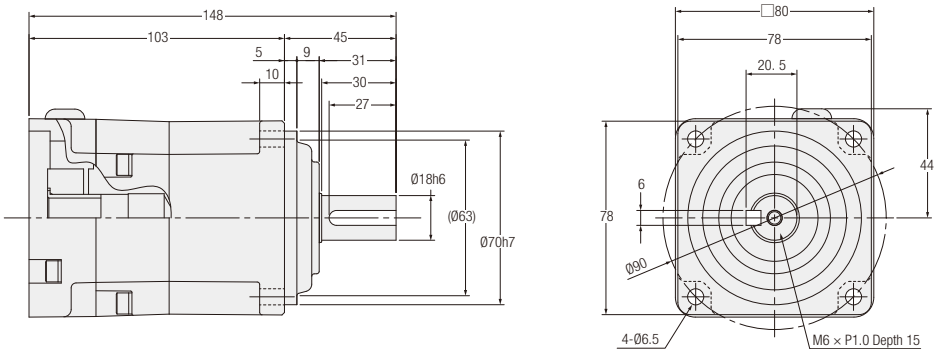
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)
100 W	K: Output shaft with Shaft end tapped	APGZ18K-∗∗∗□100△N	APGZ18K-∗∗∗□100△W	40, 50, 60, 100	S1/S3/S6	1	2.0
150 W		APGZ18K-∗∗∗□150△N	APGZ18K-∗∗∗□150△W	30, 40, 50, 60	S1	1	2.0
200 W		APGZ18K-∗∗∗□200△N	APGZ18K-∗∗∗□200△W	30, 40, 50, 60	S1/S2/S3/S5/S6	1	2.0
200 W		APGZ18K-∗∗∗□200△N	APGZ18K-∗∗∗□200△W	30, 40, 50, 60	S7	2	2.0
400 W		APGZ18K-∗∗∗□400△N	APGZ18K-∗∗∗□400△W	15, 20, 30	S1/S3/S6	1	2.0
400 W		APGZ18K-∗∗∗□400△N	APGZ18K-∗∗∗□400△W	15, 20, 30	S7	2	2.0

Note: A reduction ratio will be indicated as ∗∗∗ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

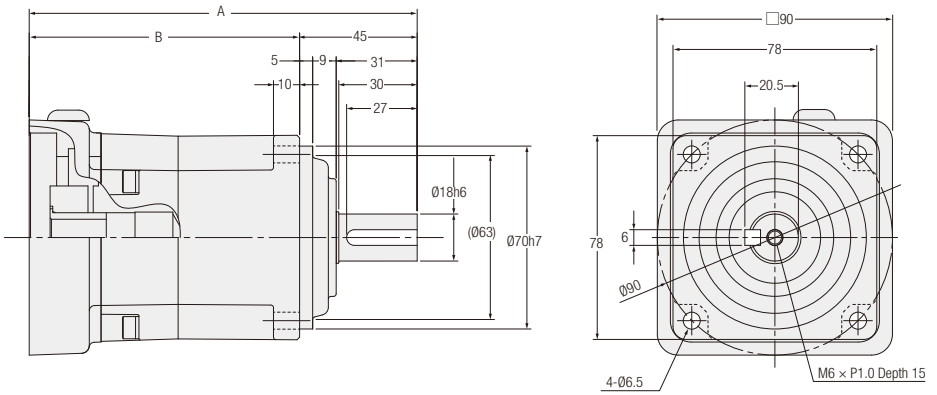
<Figure 3>



<Figure 4>



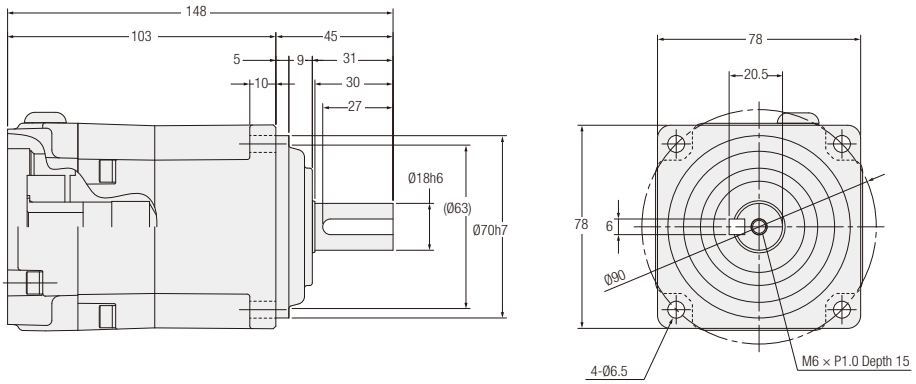
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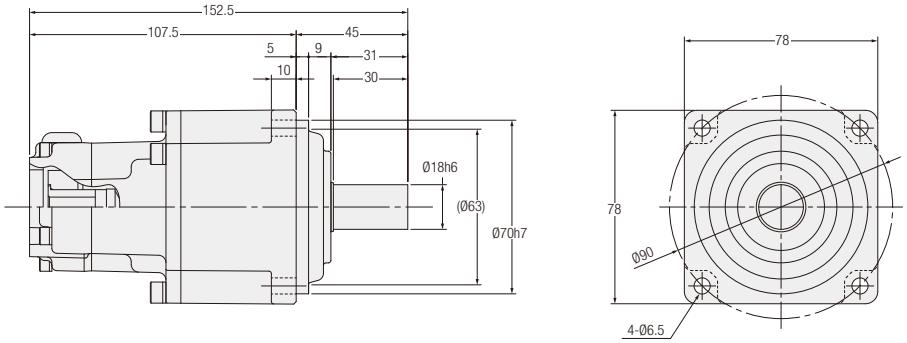
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B	C
400 W	K: Output shaft with Shaft end tapped	APGZ18K-✱✱✱□400△N	APGZ18K-✱✱✱□400△W	10	S1/S3	3	1.7	128	102	80
400 W		APGZ18K-✱✱✱□400△N	APGZ18K-✱✱✱□400△W	10	S6/S7	3	1.7	128	83	60
600 W		APGZ18K-✱✱✱□600△N	APGZ18K-✱✱✱□600△W	3, 5, 10	S1	3	2.0	147	103	60
750 W		APGZ18K-✱✱✱□750△N	APGZ18K-✱✱✱□750△W	3, 5, 10	S1/S2/S3/S4	4	2.2	—	—	—
750 W		APGZ18K-✱✱✱□750△N	APGZ18K-✱✱✱□750△W	3, 5, 10	F6/F7	5	2.2	153.5	108.5	—
750 W		APGZ18K-✱✱✱□750△N	APGZ18K-✱✱✱□750△W	3, 5, 10	S6	5	2.2	148.5	103.5	—
750 W		APGZ18K-✱✱✱□750△N	APGZ18K-✱✱✱□750△W	3, 5, 10	S9	5	2.2	148	103	—

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

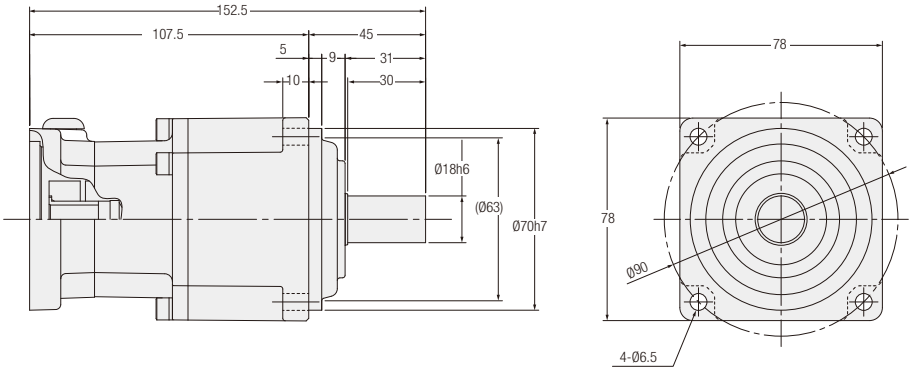
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<Figure 7>



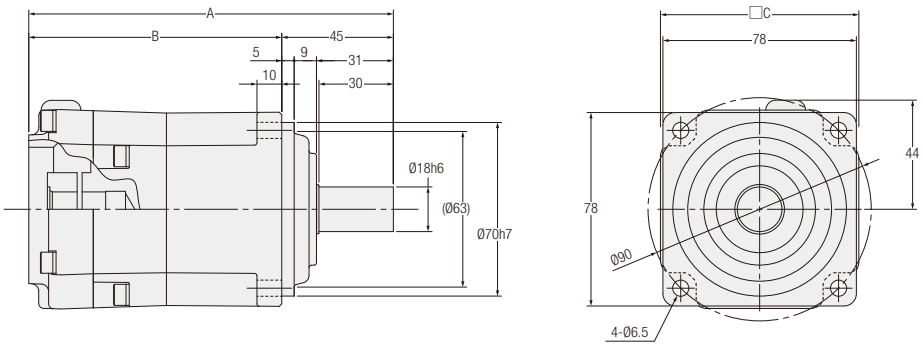
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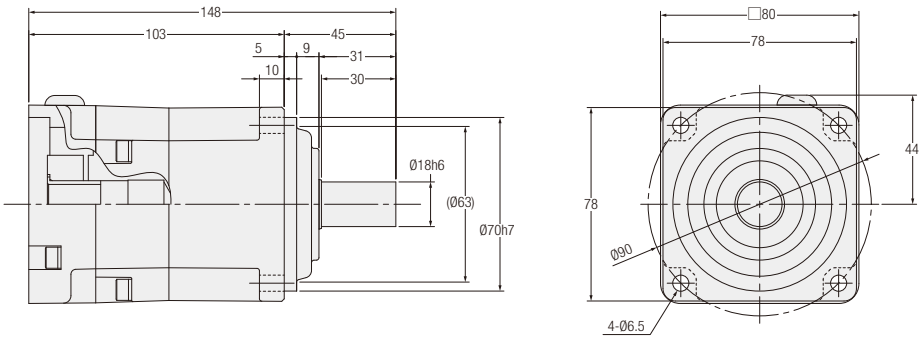
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)
750 W	K: Output shaft with Shaft end tapped	APGZ18K-✱✱✱□750△N	APGZ18K-✱✱✱□750△W	3, 5, 10	S8	6	2.2
100 W	J: Straight shaft	APGZ18J-✱✱✱□100△N	APGZ18J-✱✱✱□100△W	40, 50, 60, 100	S1/S3/S6	7	2.0
150 W		APGZ18J-✱✱✱□150△N	APGZ18J-✱✱✱□150△W	30, 40, 50, 60	S1	7	2.0
200 W		APGZ18J-✱✱✱□200△N	APGZ18J-✱✱✱□200△W	30, 40, 50, 60	S1/S2/S3/S5/S6	7	2.0
200 W		APGZ18J-✱✱✱□200△N	APGZ18J-✱✱✱□200△W	30, 40, 50, 60	S7	8	2.0
400 W		APGZ18J-✱✱✱□400△N	APGZ18J-✱✱✱□400△W	15, 20, 30	S1/S3/S6	7	2.0
400 W		APGZ18J-✱✱✱□400△N	APGZ18J-✱✱✱□400△W	15, 20, 30	S7	8	2.0

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

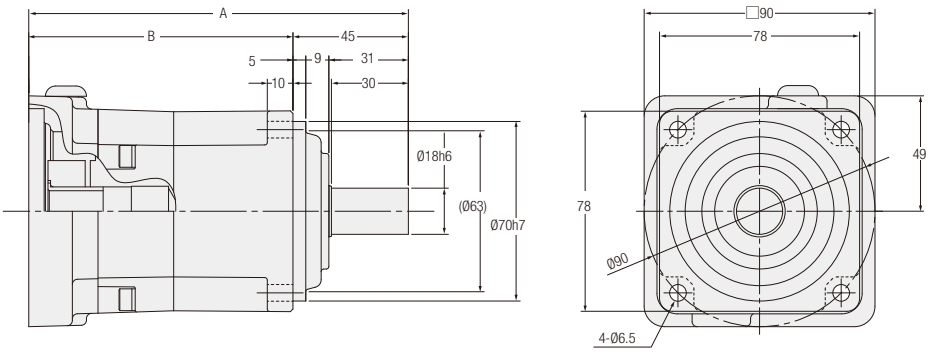
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<Figure 11>



<Figure 11>

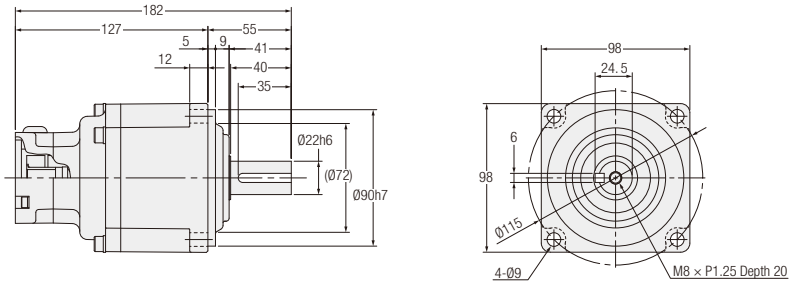


Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B	C
400 W	J: Straight shaft	APGZ18J-***□400△N	APGZ18J-***□400△W	10	S1/S3	9	1.7	128	83	80
400 W		APGZ18J-***□400△N	APGZ18J-***□400△W	10	S6/S7	9	1.7	128	83	60
600 W		APGZ18J-***□600△N	APGZ18J-***□600△W	3, 5, 10	S1	9	2.0	147	103	60
750 W		APGZ18J-***□750△N	APGZ18J-***□750△W	3, 5, 10	S1/S2/S3/S4	10	2.2	—	—	—
750 W		APGZ18J-***□750△N	APGZ18J-***□750△W	3, 5, 10	S8	9	2.2	148	103	80
750 W		APGZ18J-***□750△N	APGZ18J-***□750△W	3, 5, 10	F6/F7	11	2.2	153.5	108.5	—
750 W		APGZ18J-***□750△N	APGZ18J-***□750△W	3, 5, 10	S6	11	2.2	—	—	—
750 W		APGZ18J-***□750△N	APGZ18J-***□750△W	3, 5, 10	S9	11	2.2	148	103	—

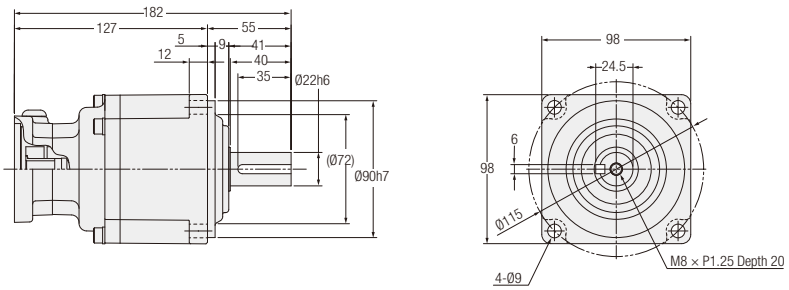
Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

APG Type Parallel Shaft Shaft Diameter 22 Backlash 3 arc min/15 arc min Specifications

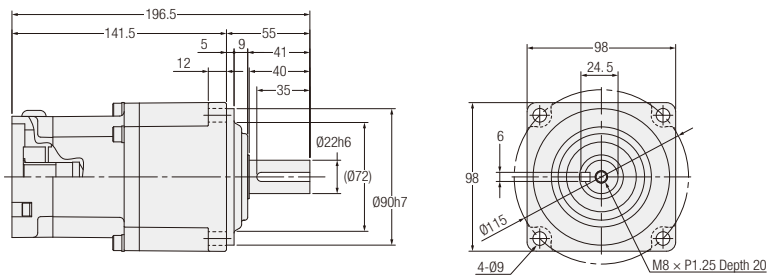
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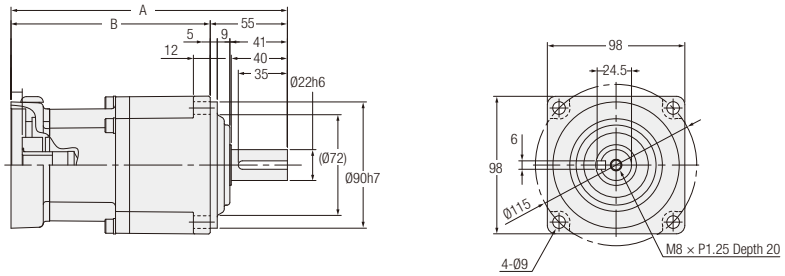
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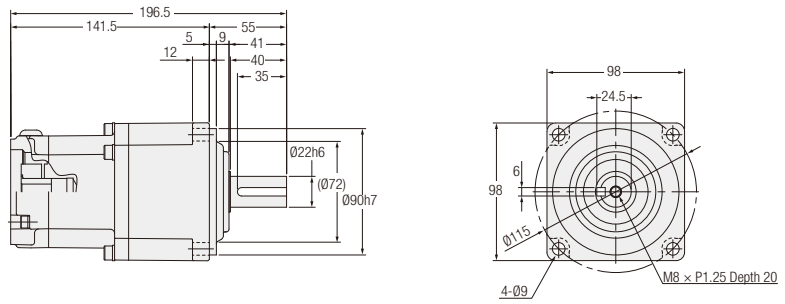
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)
200 W	K: Output shaft with Shaft end tapped	APGZ22K-***□200△N	APGZ22K-***□200△W	100	S1/S2/S3/S5/S6	1	3.9
200 W		APGZ22K-***□200△N	APGZ22K-***□200△W	100	S7	2	3.9
400 W		APGZ22K-***□400△N	APGZ22K-***□400△W	40, 50, 60	S1/S3/S6	1	3.9
400 W		APGZ22K-***□400△N	APGZ22K-***□400△W	40, 50, 60	S7	2	3.9
600 W		APGZ22K-***□600△N	APGZ22K-***□600△W	15, 20, 30	S1	1	3.9
750 W		APGZ22K-***□750△N	APGZ22K-***□750△W	15, 20, 30	S1/S2/S3/S4	3	4.0

Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

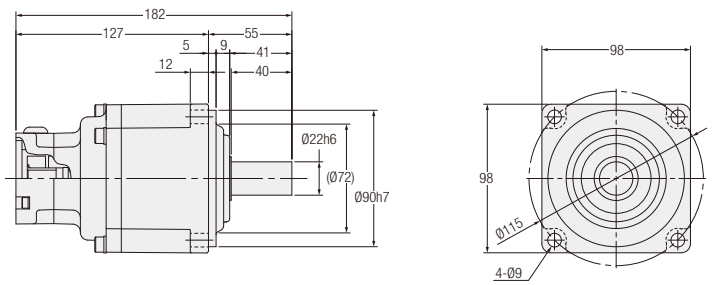
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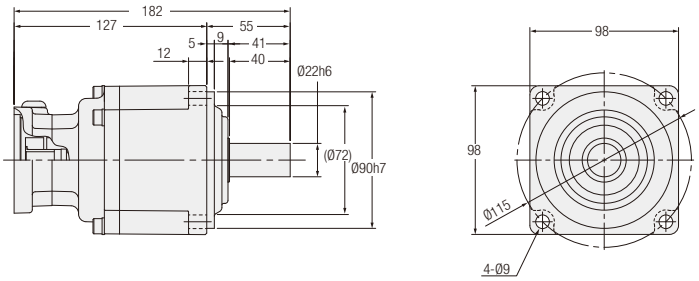
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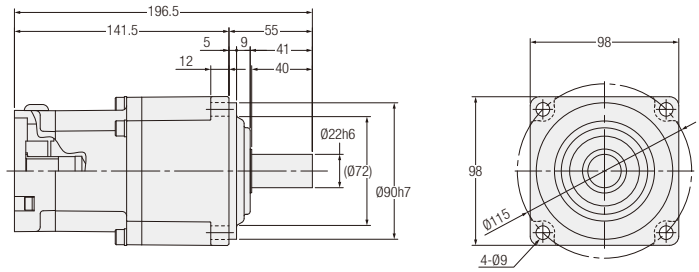
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B
750 W	K: Output shaft with Shaft end tapped	APGZ22K-✱✱✱□750△N	APGZ22K-✱✱✱□750△W	15, 20, 30	S6	4	4.0	197	142
750 W		APGZ22K-✱✱✱□750△N	APGZ22K-✱✱✱□750△W	15, 20, 30	S9	4	4.0	196.5	141.5
750 W		APGZ22K-✱✱✱□750△N	APGZ22K-✱✱✱□750△W	15, 20, 30	F6/F7	4	4.0	202	147
750 W		APGZ22K-✱✱✱□750△N	APGZ22K-✱✱✱□750△W	15, 20, 30	S8	5	4.0	—	—
200 W	J: Straight shaft	APGZ22J-✱✱✱□200△N	APGZ22J-✱✱✱□200△W	100	S1/S2/S3/ S5/S6	6	3.9	—	—
400 W		APGZ22J-✱✱✱□400△N	APGZ22J-✱✱✱□400△W	40, 50, 60	S1/S3/S6	6	3.9	—	—
600 W		APGZ22J-✱✱✱□600△N	APGZ22J-✱✱✱□600△W	15, 20, 30	S1	6	3.9	—	—

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

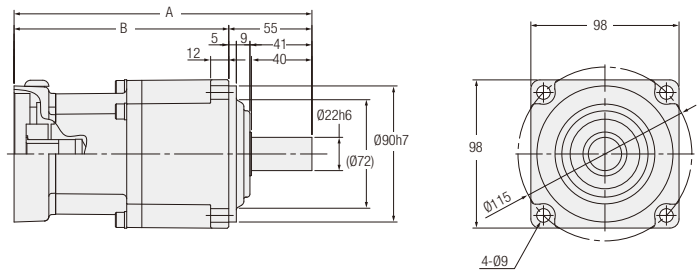
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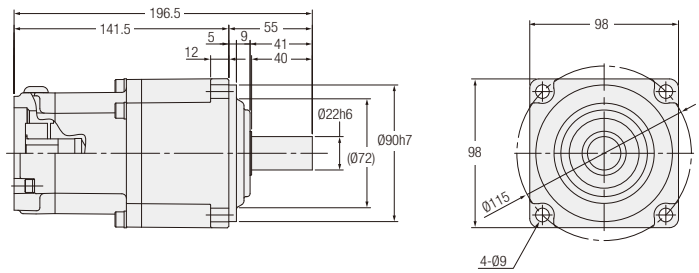
<Figure 8>



<Figure 9>



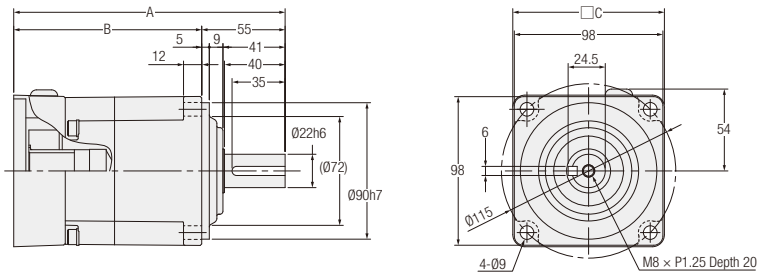
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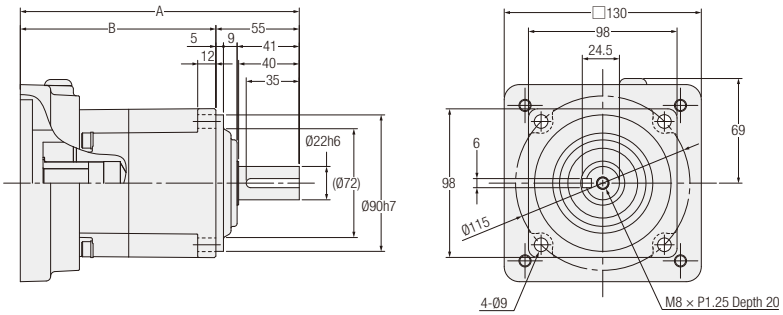
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B	C
200 W	J: Straight shaft	APGZ22J-✻✻✻□200△N	APGZ22J-✻✻✻□200△W	100	S7	7	3.9	—	—	—
400 W		APGZ22J-✻✻✻□400△N	APGZ22J-✻✻✻□400△W	40, 50, 60	S7	7	3.9	—	—	—
750 W		APGZ22J-✻✻✻□750△N	APGZ22J-✻✻✻□750△W	15, 20, 30	S1/S2/S3/S4	8	4.0	—	—	—
750 W		APGZ22J-✻✻✻□750△N	APGZ22J-✻✻✻□750△W	15, 20, 30	S6	9	4.0	197	142	—
750 W		APGZ22J-✻✻✻□750△N	APGZ22J-✻✻✻□750△W	15, 20, 30	S8	10	4.0	—	—	—
750 W		APGZ22J-✻✻✻□750△N	APGZ22J-✻✻✻□750△W	15, 20, 30	S9	9	4.0	196.5	141.5	—
750 W		APGZ22J-✻✻✻□750△N	APGZ22J-✻✻✻□750△W	15, 20, 30	F6/F7	9	4.0	202	147	—

Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

<Figure 11>



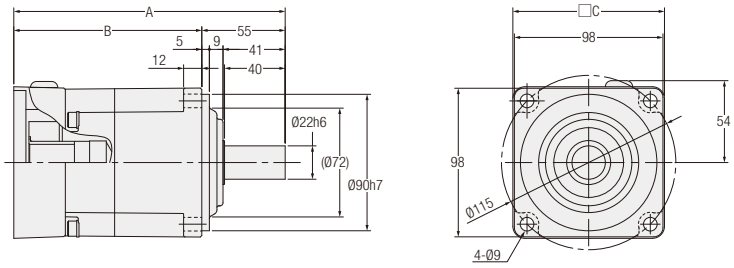
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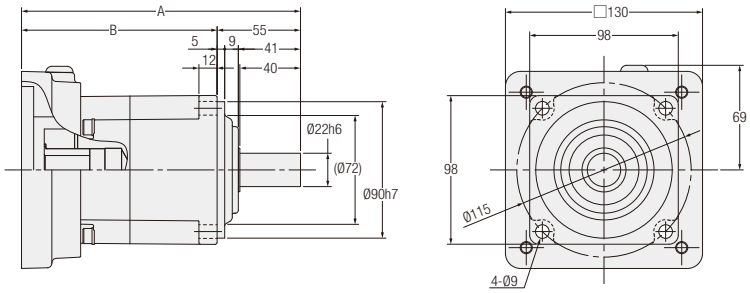
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B	C
1000 W	K: Output shaft with Shaft end tapped	APGZ22K-***□1000△N	APGZ22K-***□1000△W	3, 5, 10	K13/K21/K22/ K23	11	4.0	179	124	100
1000 W		APGZ22K-***□1000△N	APGZ22K-***□1000△W	3, 5, 10	K67/K6E/K61	11	4.0	180	125	95
					K81	11	4.0	180	125	100
1000 W		APGZ22K-***□1000△N	APGZ22K-***□1000△W	3, 5, 10	K99	11	4.0	179	124	95
1000 W		APGZ22K-***□1000△N	APGZ22K-***□1000△W	3, 5, 10	K33	12	4.5	184	129	95
1000 W		APGZ22K-***□1000△N	APGZ22K-***□1000△W	3, 5, 10	F31	12	4.5	188	133	95
1500 W		APGZ22K-***□1500△N	APGZ22K-***□1500△W	3, 5, 10	K13/K21/K22/ K23/KAA	11	4.0	179	124	100
1500 W		APGZ22K-***□1500△N	APGZ22K-***□1500△W	3, 5, 10	K61/K67	11	4.0	180	125	95
1500 W		APGZ22K-***□1500△N	APGZ22K-***□1500△W	3, 5, 10	K99	11	4.0	179	124	95
1500 W		APGZ22K-***□1500△N	APGZ22K-***□1500△W	3, 5, 10	K31/K32/K33	12	4.5	184	129	—
1500 W		APGZ22K-***□1500△N	APGZ22K-***□1500△W	3, 5, 10	F31	12	4.5	188	133	—
2000 W		APGZ22K-***□2000△N	APGZ22K-***□2000△W	3, 5, 10	K13/K21/K22/ K23/KAA	11	4.0	179	124	100
2000 W		APGZ22K-***□2000△N	APGZ22K-***□2000△W	3, 5, 10	K61/K67	11	4.0	180	125	95
2000 W		APGZ22K-***□2000△N	APGZ22K-***□2000△W	3, 5, 10	K31/K32/K33	12	4.5	184	129	—
2000 W		APGZ22K-***□2000△N	APGZ22K-***□2000△W	3, 5, 10	F31/F32/F33	12	4.5	188	133	—

Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

<Figure 13>



<Figure 14>

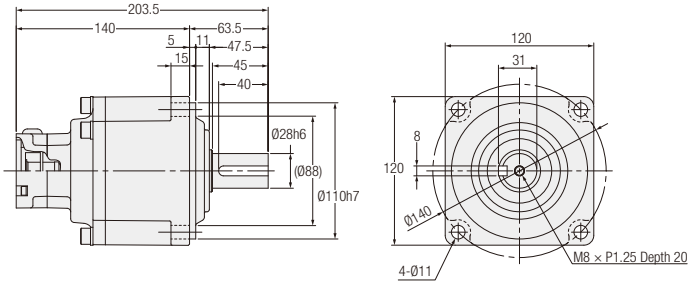


Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B	C
1000 W	J: Straight shaft	APGZ22J-***□1000△N	APGZ22J-***□1000△W	3, 5, 10	K13/K21/K22/K23	13	4.0	179	124	100
1000 W		APGZ22J-***□1000△N	APGZ22J-***□1000△W	3, 5, 10	K67/K6E/K61	13	4.0	180	125	95
					K81	13	4.0	180	125	100
1000 W		APGZ22J-***□1000△N	APGZ22J-***□1000△W	3, 5, 10	K99	13	4.0	179	124	95
1000 W		APGZ22J-***□1000△N	APGZ22J-***□1000△W	3, 5, 10	K33	14	4.0	184	129	—
1000 W		APGZ22J-***□1000△N	APGZ22J-***□1000△W	3, 5, 10	F31	14	4.5	188	133	—
1500 W		APGZ22J-***□1500△N	APGZ22J-***□1500△W	3, 5, 10	K13/K21/K22/K23/KAA	13	4.0	179	124	100
1500 W		APGZ22J-***□1500△N	APGZ22J-***□1500△W	3, 5, 10	K61/K67	13	4.0	180	125	95
1500 W		APGZ22J-***□1500△N	APGZ22J-***□1500△W	3, 5, 10	K99	13	4.0	179	124	95
1500 W		APGZ22J-***□1500△N	APGZ22J-***□1500△W	3, 5, 10	K31/K32/K33	14	4.5	184	129	—
1500 W		APGZ22J-***□1500△N	APGZ22J-***□1500△W	3, 5, 10	F31	14	4.5	188	133	—
2000 W		APGZ22J-***□2000△N	APGZ22J-***□2000△W	3, 5, 10	K13/K21/K22/K23/KAA	13	4.0	179	124	100
2000 W		APGZ22J-***□2000△N	APGZ22J-***□2000△W	3, 5, 10	K61/K67	13	4.0	180	125	95
2000 W		APGZ22J-***□2000△N	APGZ22J-***□2000△W	3, 5, 10	K31/K32/K33	14	4.5	184	129	—
2000 W		APGZ22J-***□2000△N	APGZ22J-***□2000△W	3, 5, 10	F31/F32/F33	14	4.5	188	133	—

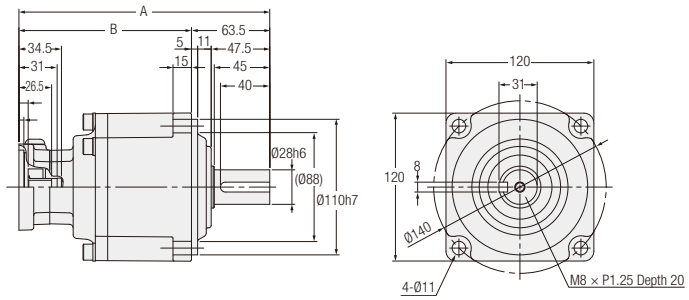
Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

APG Type Parallel Shaft Shaft Diameter 28 Backlash 3 arc min/15 arc min Specifications

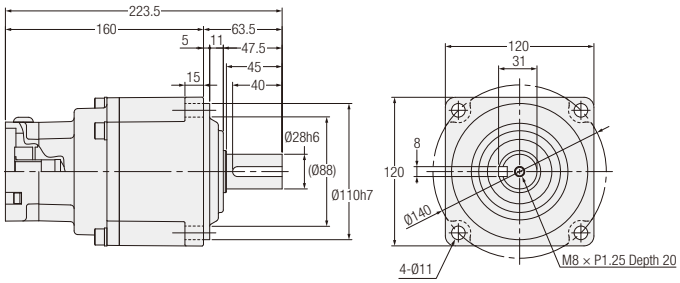
<Figure 1>



<Figure 2>



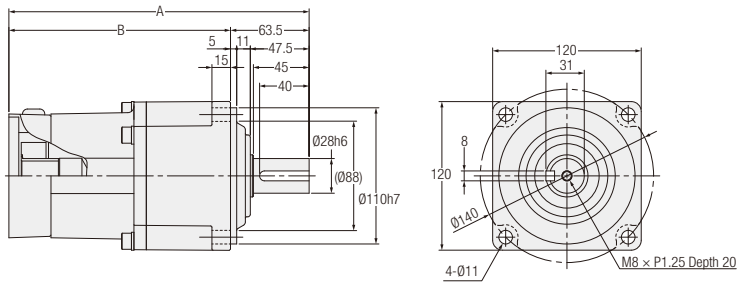
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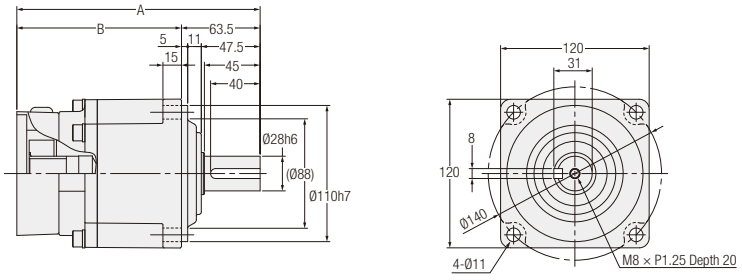
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B
400 W	K: Output shaft with Shaft end tapped	APGZ28K-***□400△N	APGZ28K-***□400△W	100	S1/S3/S6	1	8.0	—	—
400 W		APGZ28K-***□400△N	APGZ28K-***□400△W	100	S7	2	8.0	203.5	140
600 W		APGZ28K-***□600△N	APGZ28K-***□600△W	40, 50, 60	S1	1	8.0	—	—
750 W		APGZ28K-***□750△N	APGZ28K-***□750△W	40, 50, 60	S1/S2/S3/S4	3	8.0	—	—
750 W		APGZ28K-***□750△N	APGZ28K-***□750△W	40, 50, 60	S6	2	8.0	224	160.5
750 W		APGZ28K-***□750△N	APGZ28K-***□750△W	40, 50, 60	S8	3	8.0	—	—
750 W		APGZ28K-***□750△N	APGZ28K-***□750△W	40, 50, 60	S9	2	8.0	223.5	160
750 W		APGZ28K-***□750△N	APGZ28K-***□750△W	40, 50, 60	F6/F7	2	8.0	229	165.5

Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

<Figure 4>



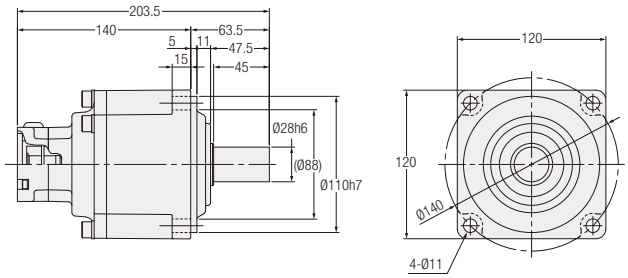
<Figure 5>



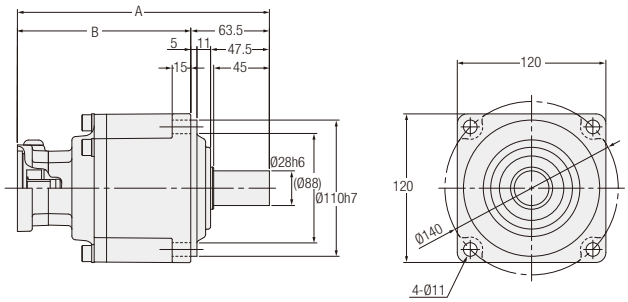
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B
1000 W	K: Output shaft with Shaft end tapped	APGZ28K-✱✱✱□1000△N	APGZ28K-✱✱✱□1000△W	15, 20, 30, 40, 50	K13/K21/K22/ K23/K99	4	8.5	242.5	179
1000 W		APGZ28K-✱✱✱□1000△N	APGZ28K-✱✱✱□1000△W	15, 20, 30, 40, 50	K61/K67/K6E/ K81	4	8.5	243.5	180
1500 W		APGZ28K-✱✱✱□1500△N	APGZ28K-✱✱✱□1500△W	15, 20, 30	K13/K21/K22/ K23/K99/KAA	4	8.5	242.5	179
1500 W		APGZ28K-✱✱✱□1500△N	APGZ28K-✱✱✱□1500△W	15, 20, 30	K61/K67	4	8.5	243.5	180
2000 W		APGZ28K-✱✱✱□2000△N	APGZ28K-✱✱✱□2000△W	15, 20	K13/K21/K22/ K23/K99/KAA	4	8.5	242.5	179
2000 W		APGZ28K-✱✱✱□2000△N	APGZ28K-✱✱✱□2000△W	15, 20	K61/K67	4	8.5	243.5	180
3000 W		APGZ28K-✱✱✱□3000△N	APGZ28K-✱✱✱□3000△W	3, 5, 10	K13/K21/K22/ K23	5	6.3	196.5	133
3000 W		APGZ28K-✱✱✱□3000△N	APGZ28K-✱✱✱□3000△W	3, 5, 10	K61	5	6.3	197.5	134

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

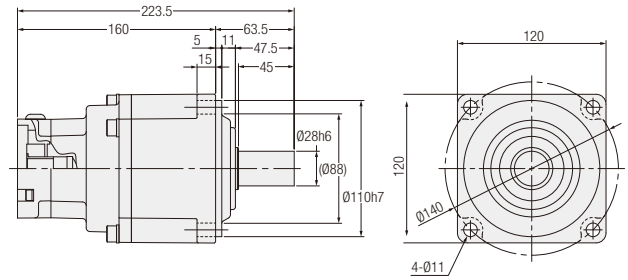
<Figure 6>



<Figure 7>



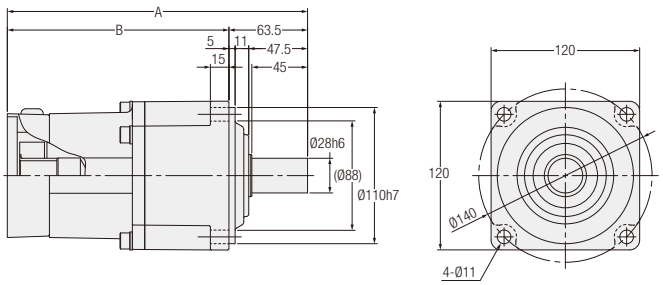
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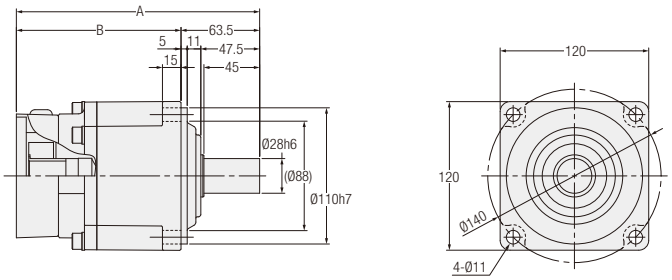
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B
400 W	J: Straight shaft	APGZ28J-***□400△N	APGZ28J-***□400△W	100	S1/S3/S6	6	8.0	—	—
400 W		APGZ28J-***□400△N	APGZ28J-***□400△W	100	S7	7	8.0	203.5	140
600 W		APGZ28J-***□600△N	APGZ28J-***□600△W	40, 50, 60	S1	6	8.0	—	—
750 W		APGZ28J-***□750△N	APGZ28J-***□750△W	40, 50, 60	S1/S2/S3/S4	8	8.0	—	—
750 W		APGZ28J-***□750△N	APGZ28J-***□750△W	40, 50, 60	S6	7	8.0	224	160.5
750 W		APGZ28J-***□750△N	APGZ28J-***□750△W	40, 50, 60	S8	8	8.0	—	—
750 W		APGZ28J-***□750△N	APGZ28J-***□750△W	40, 50, 60	S9	7	8.0	223.5	160
750 W		APGZ28J-***□750△N	APGZ28J-***□750△W	40, 50, 60	F6/F7	7	8.0	229	165.5

Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

<Figure 9>



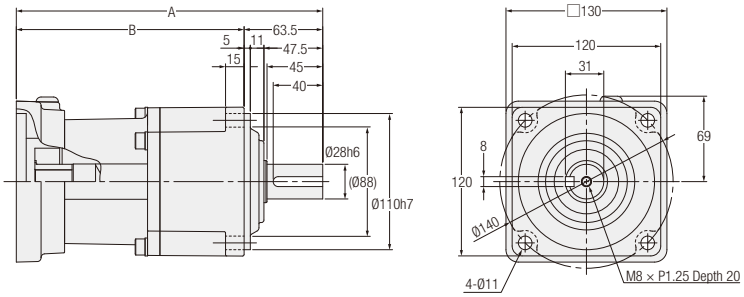
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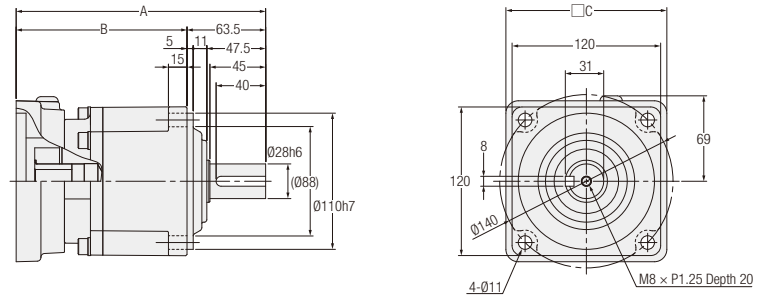
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B
1000 W	J: Straight shaft	APGZ28J-∗∗∗□1000△N	APGZ28J-∗∗∗□1000△W	15, 20, 30, 40, 50	K13/K21/K22/ K23/K99	9	8.5	242.5	179
1000 W		APGZ28J-∗∗∗□1000△N	APGZ28J-∗∗∗□1000△W	15, 20, 30, 40, 50	K61/K67/K6E/ K81	9	8.5	243.5	180
1500 W		APGZ28J-∗∗∗□1500△N	APGZ28J-∗∗∗□1500△W	15, 20, 30	K13/K21/K22/ K23/K99/KAA	9	8.5	242.5	179
1500 W		APGZ28J-∗∗∗□1500△N	APGZ28J-∗∗∗□1500△W	15, 20, 30	K61/K67	9	8.5	243.5	180
2000 W		APGZ28J-∗∗∗□2000△N	APGZ28J-∗∗∗□2000△W	15, 20	K13/K21/K22/ K23/KAA	9	8.5	242.5	179
2000 W		APGZ28J-∗∗∗□2000△N	APGZ28J-∗∗∗□2000△W	15, 20	K61/K67	9	8.5	243.5	180
3000 W		APGZ28J-∗∗∗□3000△N	APGZ28J-∗∗∗□3000△W	3, 5, 10	K13/K21/K22/ K23	10	6.3	196.5	133
3000 W		APGZ28J-∗∗∗□3000△N	APGZ28J-∗∗∗□3000△W	3, 5, 10	K61	10	6.3	197.5	134

Note: A reduction ratio will be indicated as ∗∗∗ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

<Figure 11>



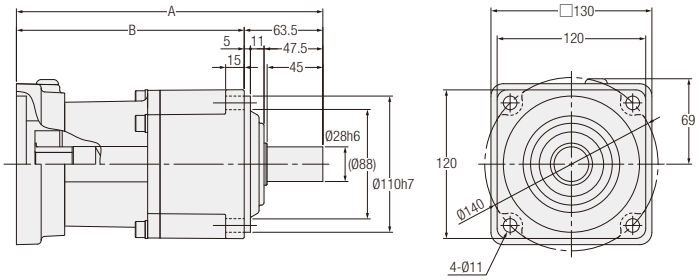
<Figure 12>



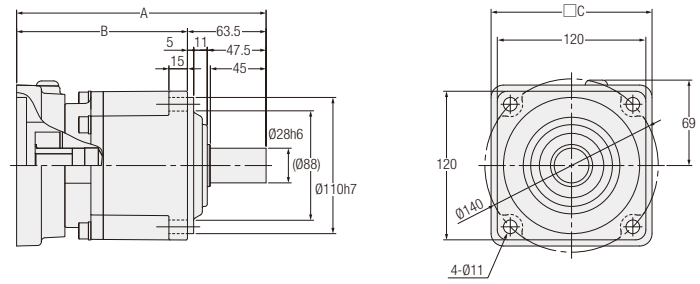
Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B	C
1000 W	K: Output shaft with Shaft end tapped	APGZ28K-✱✱✱□1000△N	APGZ28K-✱✱✱□1000△W	15, 20, 30, 40, 50	K33	11	9.0	247.5	184	—
1000 W		APGZ28K-✱✱✱□1000△N	APGZ28K-✱✱✱□1000△W	15, 20, 30, 40, 50	F31	11	9.0	251.5	188	—
1500 W		APGZ28K-✱✱✱□1500△N	APGZ28K-✱✱✱□1500△W	15, 20, 30	K31/K32/K33	11	9.0	247.5	184	—
1500 W		APGZ28K-✱✱✱□1500△N	APGZ28K-✱✱✱□1500△W	15, 20, 30	F31	11	9.0	251.5	188	—
2000 W		APGZ28K-✱✱✱□2000△N	APGZ28K-✱✱✱□2000△W	15, 20	F31/F32/F33	11	9.0	251.5	188	—
2000 W		APGZ28K-✱✱✱□2000△N	APGZ28K-✱✱✱□2000△W	15, 20	K31/K32/K33	11	9.0	247.5	184	—
3000 W		APGZ28K-✱✱✱□3000△N	APGZ28K-✱✱✱□3000△W	3, 5, 10	K31/K32/K33/ K34	12	6.8	201.5	138	130
3000 W		APGZ28K-✱✱✱□3000△N	APGZ28K-✱✱✱□3000△W	3, 5, 10	KBC	12	6.3	201.5	138	120
3000 W		APGZ28K-✱✱✱□3000△N	APGZ28K-✱✱✱□3000△W	3, 5, 10	F31/F32/F33	11	6.8	205.5	142	—

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

<Figure 13>



<Figure 14>

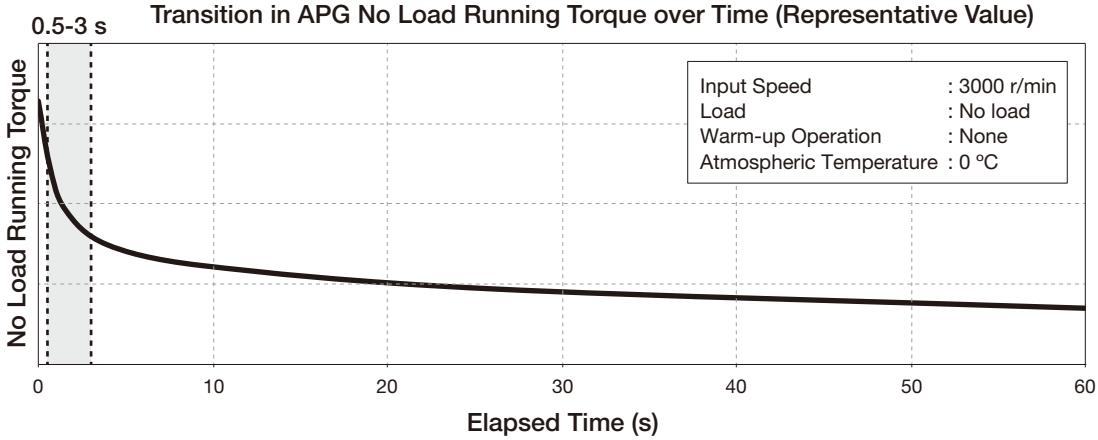


Motor Power Class	Shaft Arrangement	Ingress Protection Rating: IP44 Class	Ingress Protection Rating: IP65 Class	Reduction Ratio	Flange Type	Figure Number	Approx. Weight (kg)	A	B	C
1000 W	J: Straight shaft	APGZ28J-***□1000△N	APGZ28J-***□1000△W	15, 20, 30, 40, 50	K33	13	9.0	247.5	184	—
1000 W		APGZ28J-***□1000△N	APGZ28J-***□1000△W	15, 20, 30, 40, 50	F31	13	9.0	251.5	188	—
1500 W		APGZ28J-***□1500△N	APGZ28J-***□1500△W	15, 20, 30	K31/K32/K33	13	9.0	247.5	184	—
1500 W		APGZ28J-***□1500△N	APGZ28J-***□1500△W	15, 20, 30	F31	13	9.0	251.5	188	—
2000 W		APGZ28J-***□2000△N	APGZ28J-***□2000△W	15, 20	K31/K32/K33	13	9.0	247.5	184	—
2000 W		APGZ28J-***□2000△N	APGZ28J-***□2000△W	15, 20	F31/F32/F33	13	9.0	251.5	188	—
3000 W		APGZ28J-***□3000△N	APGZ28J-***□3000△W	3, 5, 10	K31/K32/K33/ K34	14	6.8	201.5	138	130
3000 W		APGZ28J-***□3000△N	APGZ28J-***□3000△W	3, 5, 10	KBC	14	6.3	201.5	138	120
3000 W		APGZ28J-***□3000△N	APGZ28J-***□3000△W	3, 5, 10	F31/F32/F33	13	6.8	205.5	142	—

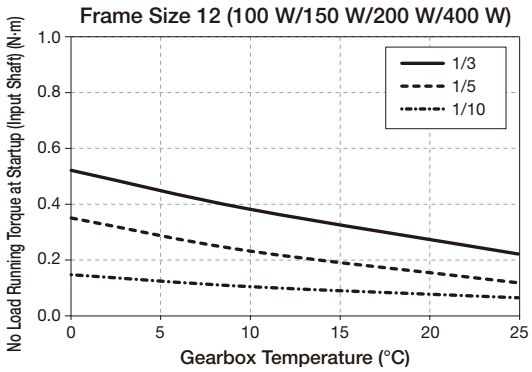
Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 892 to 900 for the detailed dimensions of the input shaft area.
Note: Please refer to page 760 for the performance table.

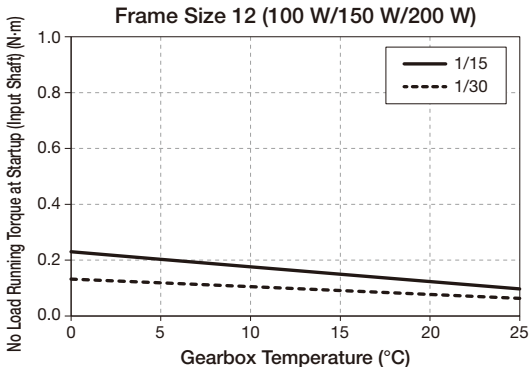
1-3. Low Temperature Startup Characteristics (No Load Running Torque (Input Shaft))

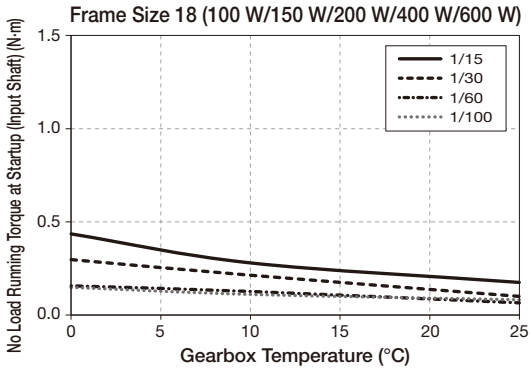
No load running torque means the input shaft torque required to run the gearbox at the rated input speed (3000 r/min) under no load state.
When the gearbox is used at low temperature, the no load running torque at a startup will increase.
When the operation is continued, the no load running torque will decrease with the temperature rise of the gearbox.
The rate of decrease differs depending on the model and the usage environment.
The figure below shows a representative value in a state where a warm-up operation is not performed.

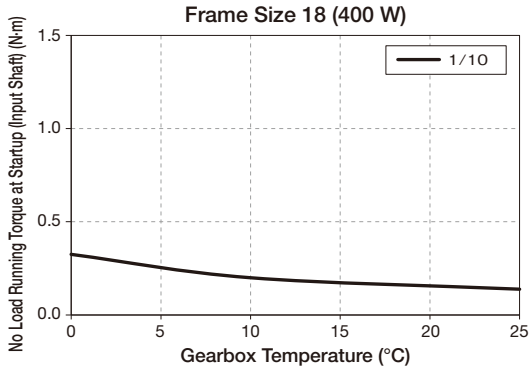


Input Speed: 3000 r/min
No Load Running Torque (Input Shaft): Average value between 0.5 and 3 seconds
The figure below shows a representative value in a state where a warm-up operation is not performed.

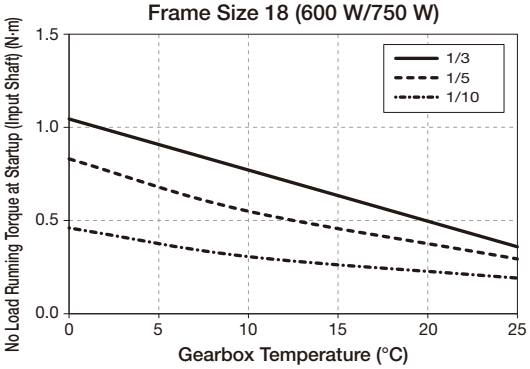




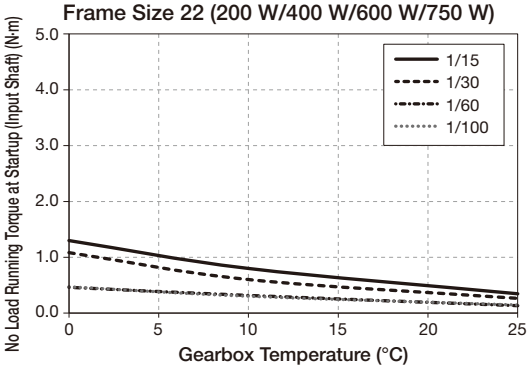




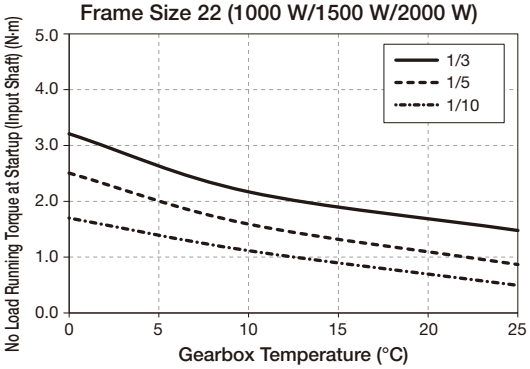
Frame Size 18 (600 W/750 W)



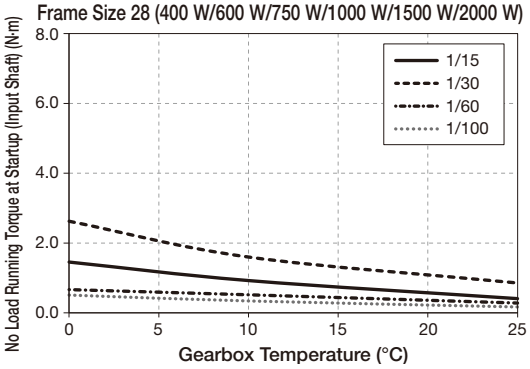
Frame Size 22 (200 W/400 W/600 W/750 W)



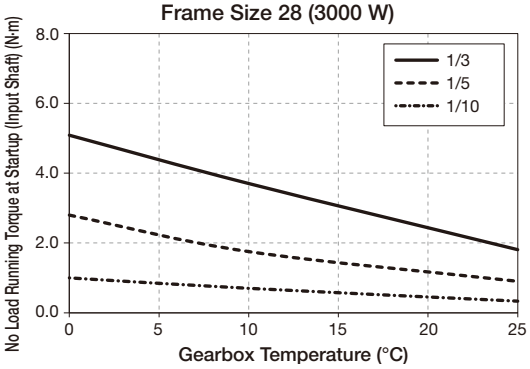
Frame Size 22 (1000 W/1500 W/2000 W)



Frame Size 28 (400 W/600 W/750 W/1000 W/1500 W/2000 W)



Frame Size 28 (3000 W)



MEMO

2. Low Backlash High Precision Gearboxes for Servo Motors

2-1. Performance Tables

AG3 Type <Low Backlash> Performance Table by Reduction Ratio

[Notes]
- The input speed is 3000 r/min.
- The "*" mark indicates a limited torque type. Please make sure to check the allowable average torque in the performance table.
- Allowable output shaft O.H.L. is the value at the middle of the output shaft.
- For the continuous rated input torque, please refer to page 948. In addition, for the servo motor-based motor rated output torque, please refer to page 922.
- When the output shaft faces upward, the life of backlash may decrease depending on the state of use.
- The key dimensions and tolerances for output shafts conform to JIS B 1301-1996 (plain form).
- The internal moment of inertia (input shaft equivalent) is the value for the gearbox alone, and does not include the motor's moment of inertia.
- The allowable average torque is the continuous allowable torque value.
- Adjust the gain so that the inertial load on the output shaft side does not vibrate during acceleration and deceleration.
- ▭ in the performance table indicates that the input shaft and the output shaft rotate in the opposite directions. (It does not limit the rotational directions of the input shaft and the output shaft.)
- L in the Mounting Type column means foot mount, F means flange mount, and K means small flange mount (up to frame size 32).

■ At an input speed of 3000 r/min

Mounting Type	Output Shaft Diameter	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
						N·m	N·m	N	N	×10^{-4}kg·m^2	
AG3LZ/KZ	18	1/5	33/164	L (60 arc min)	100	0.9	1.7	250	29	0.395	P.787/P.794
AG3LZ/KZ	18	1/5	33/164	L (60 arc min)	200	1.9	3.8	250	39	0.697	
AG3LZ/KZ	22	1/5	7/34	L (60 arc min)	400	4.0	8	390	69	0.744	P.788/P.795
AG3LZ/KZ	28	1/5	91/459	L (50 arc min)	750	9.6	19	900	78	1.452	P.789/P.796
AG3LZ/KZ	32	1/5	1/5	L (40 arc min)	2000	25	51	1240	147	4.889	P.790/P.797
AG3LZ/KZ	18	1/10	77/779	L (40 arc min)	100	1.9	3.9	540	78	0.382	P.787/P.794
AG3LZ/KZ	18	1/10	77/779	L (40 arc min)	200	3.9	7.7	540	88	0.683	
AG3LZ/KZ	22	1/10	7/68	L (40 arc min)	400	8.0	16	780	127	0.712	P.788/P.795
AG3LZ/KZ	28	1/10	1/10	L (30 arc min)	750	19	38	1240	167	1.377	P.789/P.796
AG3LZ/KZ	32	1/10	1/10	L (30 arc min)	2000	51	102	1720	294	4.733	P.790/P.797
AG3LZ/KZ	18	1/15	119/1804	L (40 arc min)	100	2.9	5.8	690	118	0.379	P.787/P.794
AG3LZ/KZ	18	1/15	119/1804	L (40 arc min)	200	5.8	12	690	127	0.680	
AG3LZ/KZ	22	1/15	49/748	L (30 arc min)	400	13	25	960	177	0.702	P.788/P.795
AG3LZ/KZ	28	1/15	91/1360	L (30 arc min)	750	29	57	1510	226	1.358	P.789/P.796
AG3LZ/KZ	32	1/15	1/15	L (30 arc min)	2000	76	153	1990	422	4.674	P.790/P.797
AG3LZ/KZ	18	1/20	49/984	L (30 arc min)	100	3.8	7.7	830	167	0.377	P.787/P.794
AG3LZ/KZ	18	1/20	49/984	L (30 arc min)	200	7.7	15	830	177	0.678	
AG3LZ/KZ	22	1/20	7/136	L (30 arc min)	400	16	32	1030	226	0.698	P.788/P.795
AG3LZ/KZ	28	1/20	5/102	L (30 arc min)	750	39	78	1650	294	1.345	P.789/P.796
AG3LZ/KZ	32	1/20	1/20	L (30 arc min)	2000	102	204	2270	461	4.650	P.790/P.797
AG3LZ/KZ	18	1/25	28/697	L (30 arc min)	100	4.8	10	900	196	0.376	P.787/P.794
AG3LZ/KZ	18	1/25	28/697	L (30 arc min)	200	10	19	900	196	0.677	
AG3LZ/KZ	22	1/25	7/170	L (30 arc min)	400	20	40	1170	245	0.695	P.788/P.795
AG3LZ/KZ	28	1/25	7/170	L (30 arc min)	750	46	93	1720	324	1.343	P.789/P.796
AG3LZ/KZ	32	1/25	9/230	L (30 arc min)	2000	130	260	2680	490	4.633	P.790/P.797
AG3LZ/KZ	18	1/30	35/1066	L (30 arc min)	100	5.8	12	960	226	0.375	P.787/P.794
AG3LZ/KZ	22	1/30	7/216	L (30 arc min)	200	12	24	1240	255	0.680	P.788/P.795
AG3LZ/KZ	28	1/30	1/30	L (30 arc min)	400	25	50	1790	363	0.711	P.789/P.796
AG3LZ/KZ	32	1/30	3/92	L (30 arc min)	750	59	117	2820	667	1.378	P.790/P.797
AG3LZ/FZ	40	1/30	1/30	L (30 arc min)	2000	153	305	3570	853	4.718	P.791/P.798
AG3LZ/KZ	18	1/40	35/1404	L (30 arc min)	100	7.7	15	1030	245	0.371	P.787/P.794
AG3LZ/KZ	22	1/40	91/3600	L (30 arc min)	200	16	33	1310	265	0.679	P.788/P.795
AG3LZ/KZ	28	1/40	221/8610	L (30 arc min)	400	35	69	1990	373	0.708	P.789/P.796
AG3LZ/KZ	32	1/40	13/516	L (30 arc min)	750	71	142	2950	696	1.372	P.790/P.797
AG3LZ/FZ	40	1/40	13/540	L (30 arc min)	2000	211	423	4120	883	4.694	P.791/P.798
AG3LZ/KZ	18	1/50	7/351	L (30 arc min)	100	10	19	1100	265	0.370	P.787/P.794
AG3LZ/KZ	22	1/50	11/540	L (30 arc min)	200	20	41	1380	275	0.678	P.788/P.795
AG3LZ/KZ	28	1/50	187/9030	L (30 arc min)	400	43	86	2200	392	0.705	P.789/P.796
AG3LZ/KZ	32	1/50	11/540	L (30 arc min)	750	88	176	3230	716	1.366	P.790/P.797
AG3LZ/FZ	40	1/50	11/564	L (30 arc min)	2000	261	522	4940	912	4.681	P.791/P.798

Mounting Type	Output Shaft Diameter	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
						N·m	N·m	N	N	$\times 10^{-4}$kg·m^2	
AG3LZ/KZ	22	1/60	11/684	L (30 arc min)	100	13	26	1510	275	0.372	P.788/P.795
AG3LZ/KZ	22	1/60	637/39600	L (30 arc min)	200	26	51	1510	275	0.678	
AG3LZ/KZ	28	1/60	169/9840	L (30 arc min)	400	52	104	2410	412	0.706	P.789/P.796
AG3LZ/KZ	32	1/60	13/774	L (30 arc min)	750	107	213	3850	735	1.368	P.790/P.797
AG3LZ/FZ	40	1/60	91/5400	L (30 arc min)	2000	302	604	4940	980	4.688	P.791/P.798
AG3LZ/KZ	22	1/80	21/1634	L (30 arc min)	100	16	32	1720	275	0.371	P.788/P.795
AG3LZ/KZ	22	1/80	91/7200	L (30 arc min)	200	33	65	1720	284	0.678	
AG3LZ/KZ	28	1/80	65/5166	L (30 arc min)	400	71	142	2410	422	0.705	P.789/P.796
AG3LZ/KZ	32	1/80	13/1032	L (30 arc min)	750	142	284	4120	755	1.367	P.790/P.797
AG3LZ/FZ	40	1/80	13/1080	L (30 arc min)	2000	423	846	4940	1030	4.684	P.791/P.798
AG3LZ/KZ	22	1/100	7/684	L (30 arc min)	100	20	40	1720	294	0.371	P.788/P.795
AG3LZ/KZ	28	1/100	13/1353	L (30 arc min)	200	43	86	1990	422	0.690	P.789/P.796
AG3LZ/KZ	32	1/100	7/688	L (30 arc min)	400	88	175	3430	765	0.734	P.790/P.797
AG3LZ/FZ	40	1/100	91/9000	L (30 arc min)	750	177	354	4940	1079	1.438	P.791/P.798
AG3LZ/FZ	50	1/100	25/2618	L (30 arc min)	2000	533	1066	6860	1471	4.856	P.792/P.799
AG3LZ/KZ	22	1/120	147/17974	L (30 arc min)	100	25	51	1720	294	0.371	P.788/P.795
AG3LZ/KZ	28	1/120	91/11000	L (30 arc min)	200	50	100	2340	431	0.689	P.789/P.796
AG3LZ/KZ	32	1/120	77/9360	L (30 arc min)	400	108	217	4120	785	0.731	P.790/P.797
AG3LZ/FZ	40	1/120	77/9400	L (30 arc min)	750	218	437	4940	1079	1.431	P.791/P.798
AG3LZ/FZ	50	1/120	77/8993	L (30 arc min)	2000	594	1189	6860	1471	4.896	P.792/P.799
AG3LZ/KZ	22	1/160	21/3268	L (30 arc min)	100	32	64	1720	294	0.371	P.788/P.795
AG3LZ/KZ	28	1/160	1/165	L (30 arc min)	200	68	136	2410	451	0.688	P.789/P.796
AG3LZ/KZ	32	1/160	21/3328	L (30 arc min)	400	141	282	4120	834	0.728	P.790/P.797
AG3LZ/FZ	40	1/160	9/1400	L (30 arc min)	750	278	557	4940	1128	1.425	P.791/P.798
AG3LZ/FZ	50	1/160	33/5474	L (30 arc min)	2000	844	1688	6860	1520	4.821	P.792/P.799
AG3LZ/KZ	22	1/200	21/4085	L (30 arc min)	100	40	80	1720	294	0.371	P.788/P.795
AG3LZ/KZ	28	1/200	7/1375	L (30 arc min)	200	81	162	2410	461	0.688	P.789/P.796
AG3LZ/KZ	32	1/200	189/38272	L (30 arc min)	400	180	361	4120	853	0.728	P.790/P.797
AG3LZ/FZ	40	1/200	9/1750	L (30 arc min)	750	348	696	4940	1177	1.425	P.791/P.798
AG3LZ/FZ	50	1/200	30/5831	L (30 arc min)	2000	* 862	1725	6860	1569	4.820	P.792/P.799

AGA Type <Low Backlash> Performance Table by Reduction Ratio

[Notes]
- The input speed is 3000 r/min.
- The "*" mark indicates a limited torque type. Please make sure to check the allowable average torque in the performance table.
- Allowable output shaft O.H.L. is the value at the middle of the output shaft.
- For the continuous rated input torque, please refer to page 948. In addition, for the servo motor-based motor rated output torque, please refer to page 922.
- When the output shaft faces upward, the life of backlash may decrease depending on the state of use.
- The key dimensions and tolerances for output shafts conform to JIS B 1301-1996 (plain form).
- The internal moment of inertia (input shaft equivalent) is the value for the gearbox alone, and does not include the motor's moment of inertia.
- The allowable average torque is the continuous allowable torque value.
- Adjust the gain so that the inertial load on the output shaft side does not vibrate during acceleration and deceleration.
- ☐ in the performance table indicates that the input shaft and the output shaft rotate in the opposite directions. (It does not limit the rotational directions of the input shaft and the output shaft.)
- L in the Mounting Tyoe column means foot mount.

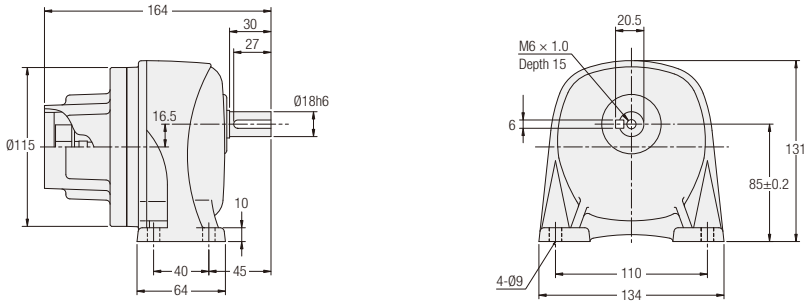
■ At an input speed of 3000 r/min

Mounting Type	Output Shaft Diameter	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
						N·m	N·m	N	N	$\times 10^{-4}$kg·m^2	
AGALZ	50	1/100	25/2618	L (30 arc min)	2000	533	1066	6860	1471	4.856	P.793
AGALZ	50	1/120	77/8993	L (30 arc min)	2000	594	1189	6860	1471	4.896	P.793
AGALZ	50	1/160	33/5474	L (30 arc min)	2000	844	1688	6860	1520	4.821	P.793
AGALZ	50	1/200	30/5831	L (30 arc min)	2000	* 862	1725	6860	1569	4.820	P.793

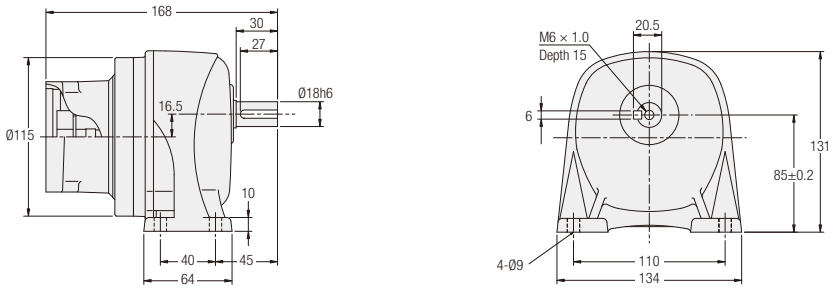
2-2. Drawings

AG3 Type Parallel Shaft | Shaft Diameter **18** | **Foot** Mounting | Low Backlash

<Figure 1>



<Figure 2>

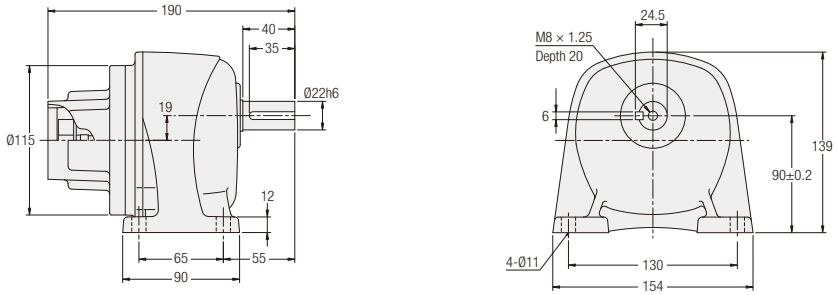


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
100 W	AG3LZ18-✱✱✱□100△	5, 10, 15, 20, 25, 30, 40, 50	1	F1/F3/S1/S3	4
200 W	AG3LZ18-✱✱✱□200△	5, 10, 15, 20, 25	2	F1/F2/F3/S1/S2/S3	4

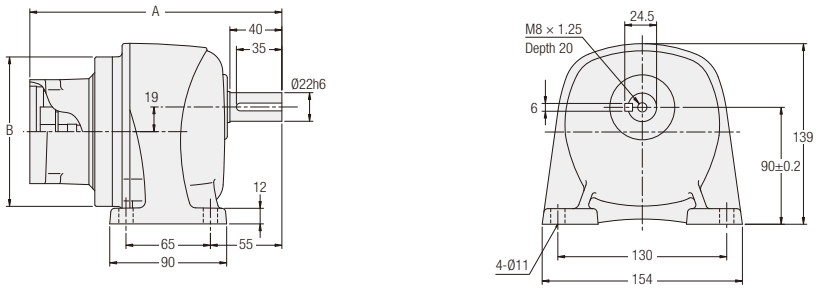
Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 784 for the performance table.

AG3 Type Parallel Shaft | Shaft Diameter 22 | Foot Mounting | Low Backlash

<Figure 1>



<Figure 2>

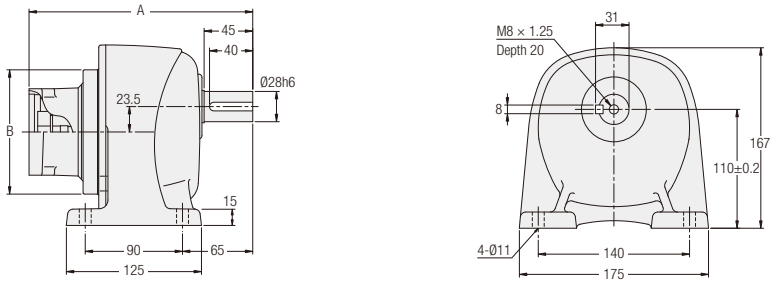


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A	B
100 W	AG3LZ22-✱✱✱□100△	60, 80, 100, 120, 160, 200	1	F1/F3/S1/S3	5	—	—
200 W	AG3LZ22-✱✱✱□200△	30, 40, 50, 60, 80	2	F1/F2/F3/S1/S2/S3	5	194	Ø115
400 W	AG3LZ22-✱✱✱□400△	5, 10, 15, 20, 25	2	F1/F3/S1/S3	5.5	195.5	Ø128

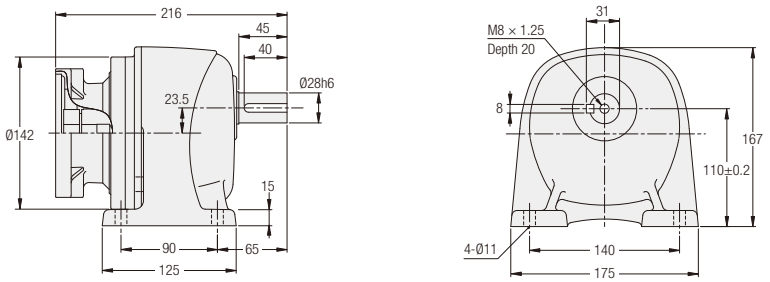
Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 784 for the performance table.

AG3 Type Parallel Shaft | Shaft Diameter 28 | Foot Mounting | Low Backlash

<Figure 1>



<Figure 2>

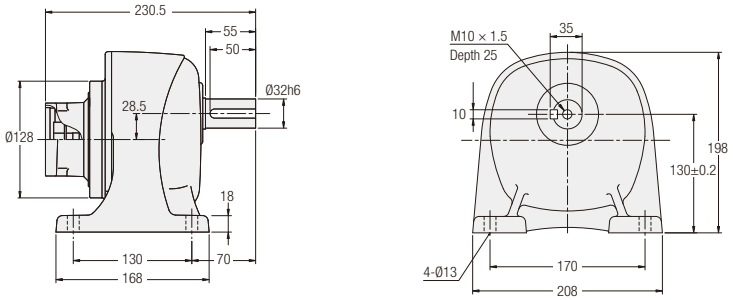


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A	B
200 W	AG3LZ28-***□200△	100, 120, 160, 200	1	F1/F2/F3/S1/S2/S3	7	207	Ø115
400 W	AG3LZ28-***□400△	30, 40, 50, 60, 80	1	F1/F3/S1/S3	7.5	211.5	Ø128
750 W	AG3LZ28-***□750△	5, 10, 15, 20, 25	2	F1/F2/S1/S2/S3/S4	7	—	—

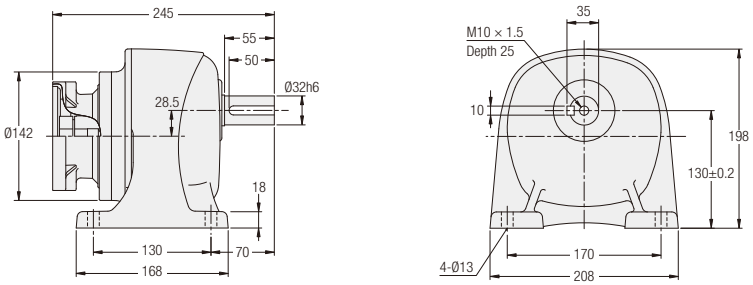
Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 784 for the performance table.

AG3 Type Parallel Shaft | Shaft Diameter 32 | Foot Mounting | Low Backlash

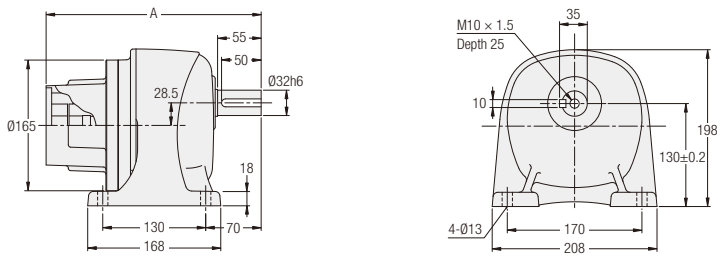
<Figure 1>



<Figure 2>



<Figure 3>

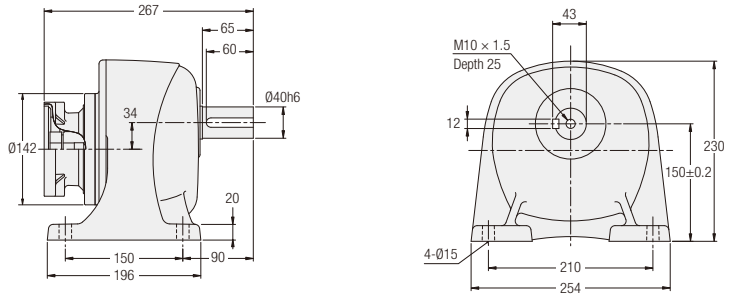


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	A	Approx. Weight (kg)
400 W	AG3LZ32-***□400△	100, 120, 160, 200	1	F1/F3/S1/S3	—	10.5
750 W	AG3LZ32-***□750△	30, 40, 50, 60, 80	2	F1/F2/S1/S2/S3/S4	—	10.5
2000 W	AG3LZ32-***□2000△	5, 10, 15, 20, 25	3	K21/K22/K23	271.5	12
				K31/K32/K33	271.5	
				F31/F33	281.5	

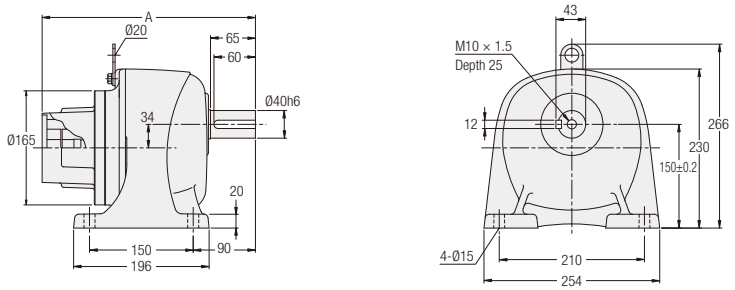
Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 784 for the performance table.

AG3 Type Parallel Shaft | Shaft Diameter **40** | **Foot** Mounting | Low Backlash

<Figure 1>



<Figure 2>

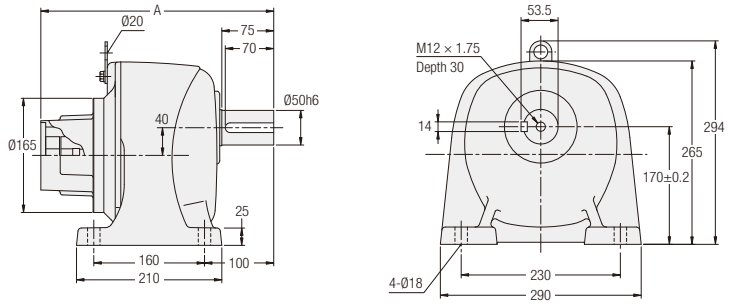


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	A	Approx. Weight (kg)
750 W	AG3LZ40-✻✻✻□750△	100, 120, 160, 200	1	F1/F2/S1/S2/S3/S4	—	18
2000 W	AG3LZ40-✻✻✻□2000△	30, 40, 50, 60, 80	2	K21/K22/K23	308.5	20
				K31/K32/K33	308.5	
				F31/F33	318.5	

Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 784 for the performance table.

AG3 Type Parallel Shaft | Shaft Diameter 50 | Foot Mounting | Low Backlash

<Figure 1>

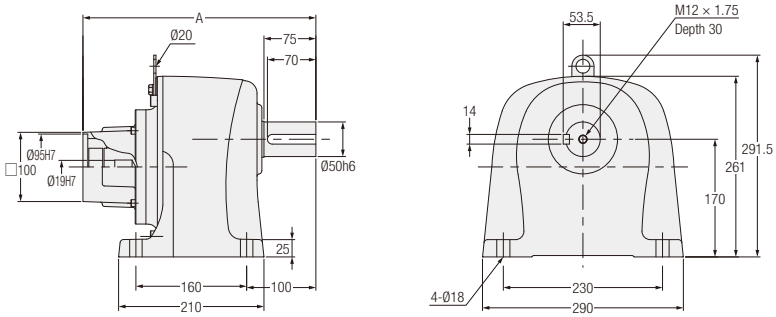


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	A	Approx. Weight (kg)
2000 W	AG3LZ50-✻✻✻□2000△	100, 120, 160, 200	1	K21/K22/K23	336.5	53
				K31/K32/K33	336.5	
				F31/F33	346.5	

Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 785 for the performance table.

AGA Type Parallel Shaft | Shaft Diameter 50 | Foot Mounting | Low Backlash

<Figure 1>

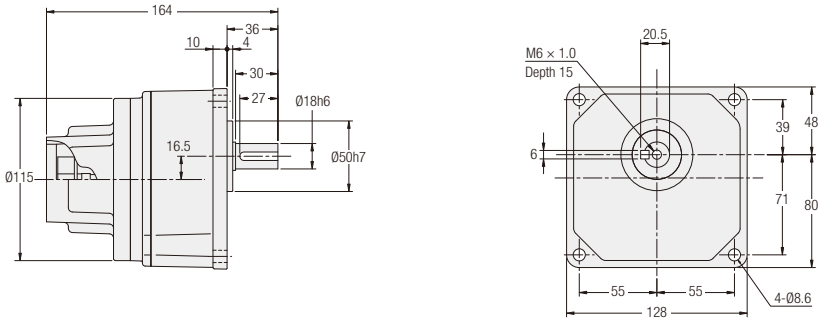


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	A	Approx. Weight (kg)
2000 W	AGALZ50-✻✻✻□2000△	100, 120, 160, 200	1	K21/K22/K23	336.5	33.5
				K31/K32/K33	336.5	
				F31/F33	346.5	

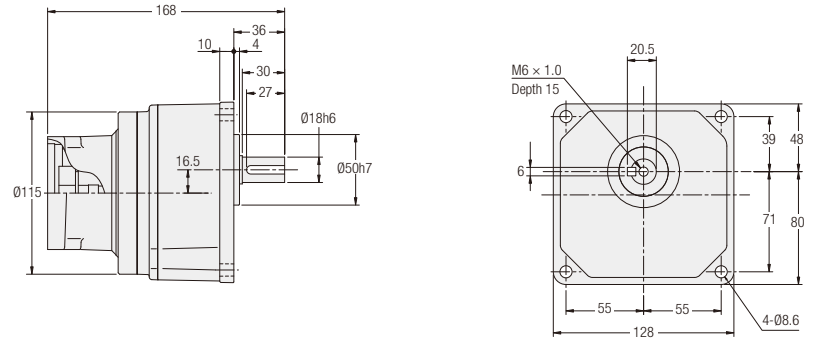
Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 786 for the performance table.

AG3 Type Parallel Shaft | Shaft Diameter 18 | Small Flange Mounting | Low Backlash

<Figure 1>



<Figure 2>

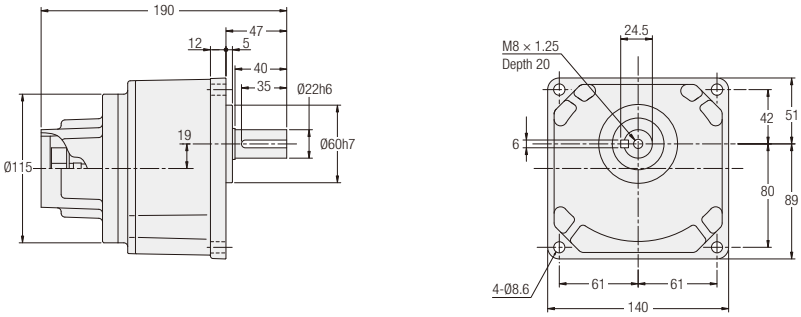


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
100 W	AG3KZ18-✻✻✻□100△	5, 10, 15, 20, 25, 30, 40, 50	1	F1/F3/S1/S3	4
200 W	AG3KZ18-✻✻✻□200△	5, 10, 15, 20, 25	2	F1/F2/F3/S1/S2/S3	4

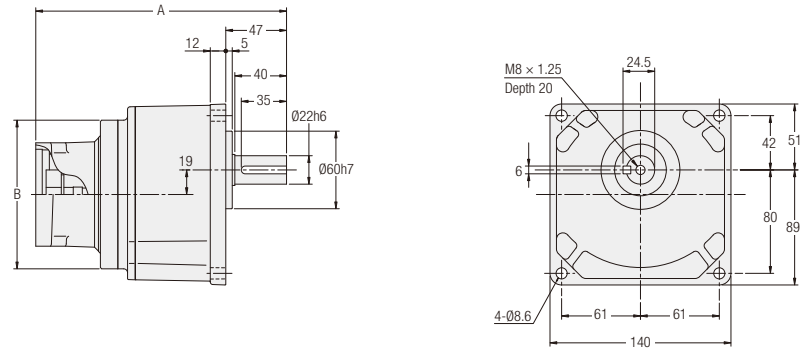
Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 784 for the performance table.

AG3 Type Parallel Shaft | Shaft Diameter **22** | **Small Flange** Mounting | Low Backlash

<Figure 1>



<Figure 2>

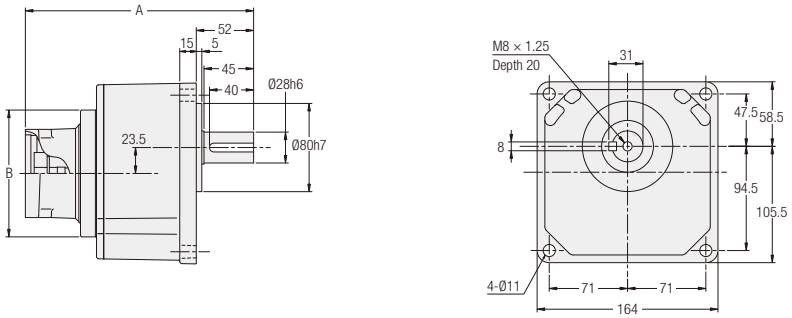


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A	B
100 W	AG3KZ22-✻✻✻□100△	60, 80, 100, 120, 160, 200	1	F1/F3/S1/S3	5	—	—
200 W	AG3KZ22-✻✻✻□200△	30, 40, 50, 60, 80	2	F1/F2/F3/S1/S2/S3	5	194	Ø115
400 W	AG3KZ22-✻✻✻□400△	5, 10, 15, 20, 25	2	F1/F3/S1/S3	5.5	195.5	Ø128

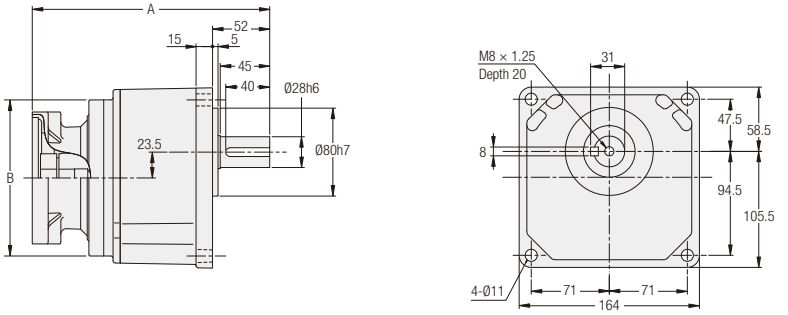
Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 784 for the performance table.

AG3 Type Parallel Shaft | Shaft Diameter 28 | Small Flange Mounting | Low Backlash

<Figure 1>



<Figure 2>

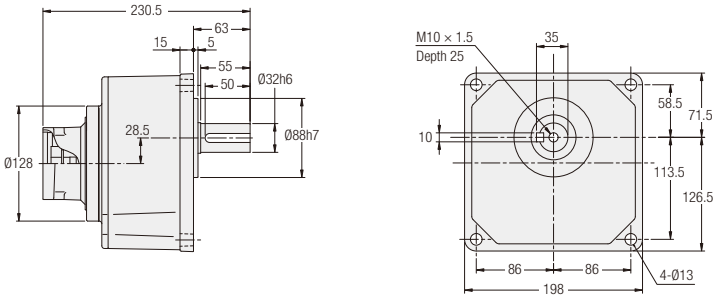


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A	B
200 W	AG3KZ28-✻✻✻□200△	100, 120, 160, 200	1	F1/F2/F3/S1/S2/S3	7	207	Ø115
400 W	AG3KZ28-✻✻✻□400△	30, 40, 50, 60, 80	1	F1/F3/S1/S3	7.5	211.5	Ø128
750 W	AG3KZ28-✻✻✻□750△	5, 10, 15, 20, 25	2	F1/F2/S1/S2/S3/S4	7	216	Ø142

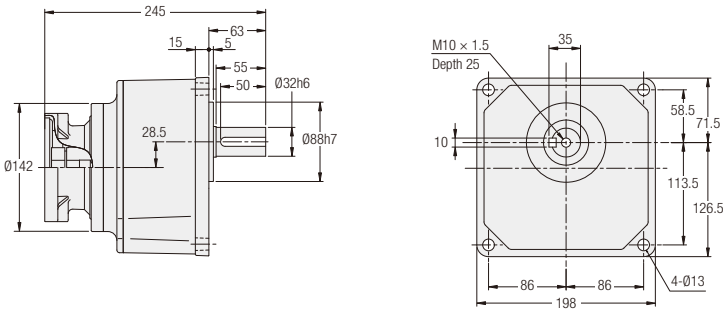
Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 784 for the performance table.

AG3 Type Parallel Shaft | Shaft Diameter **32** | **Small Flange** Mounting | Low Backlash

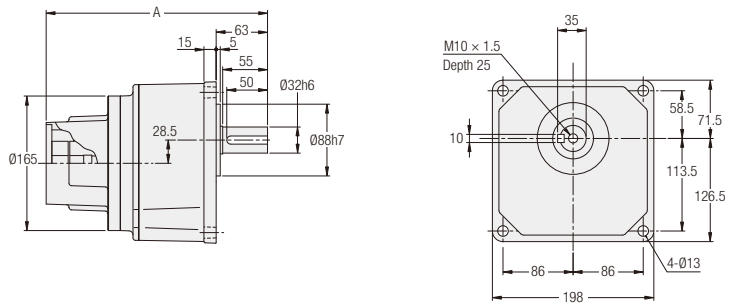
<Figure 1>



<Figure 2>



<Figure 3>

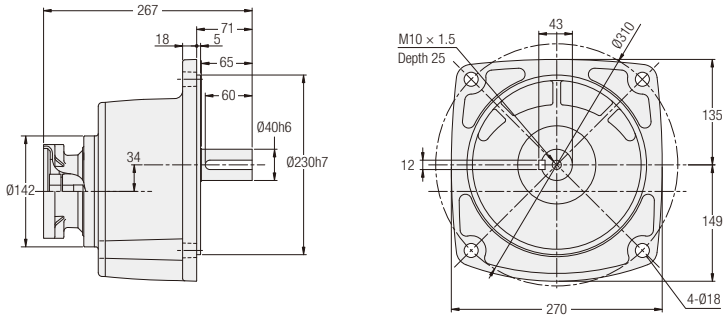


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	A	Approx. Weight (kg)
400 W	AG3KZ32-✻✻✻□400△	100, 120, 160, 200	1	F1/F3/S1/S3	—	10.5
750 W	AG3KZ32-✻✻✻□750△	30, 40, 50, 60, 80	2	F1/F2/S1/S2/S3/S4	—	10.5
2000 W	AG3KZ32-✻✻✻□2000△	5, 10, 15, 20, 25	3	K21/K22/K23	271.5	12
				K31/K32/K33	271.5	
				F31/F33	281.5	

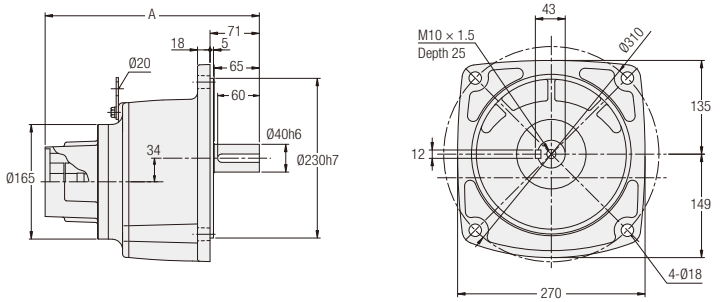
Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 784 for the performance table.

AG3 Type Parallel Shaft | Shaft Diameter 40 | Flange Mounting | Low Backlash

<Figure 1>



<Figure 2>

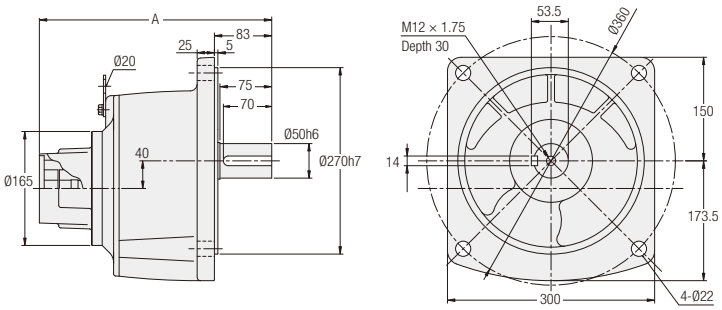


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	A	Approx. Weight (kg)
750 W	AG3FZ40-***□750△	100, 120, 160, 200	1	F1/F2/S1/S2/S3/S4	—	19.5
2000 W	AG3FZ40-***□2000△	30, 40, 50, 60, 80	2	K21/K22/K23	308.5	21.5
				K31/K32/K33	308.5	
				F31/F33	318.5	

Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 784 for the performance table.

AG3 Type Parallel Shaft | Shaft Diameter **50** | **Flange** Mounting | Low Backlash

<Figure 1>



Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	A	Approx. Weight (kg)
2000 W	AG3FZ50-***□2000△	100, 120, 160, 200	1	K21/K22/K23	336.5	58
				K31/K32/K33	336.5	
				F31/F33	346.5	

Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 785 for the performance table.

MEMO

AH2 Type
Right Angle Shaft

Model and Type Codes
Standard Model Lineup

P.804

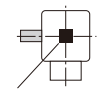
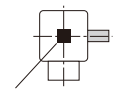
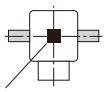
HIGH PRECISION GEARBOXES FOR SERVO MOTORS
1. Low Backlash High Precision Gearboxes for Servo Motors
1-1. Performance Tables
1-2. Drawings



Model and Type Codes

AH2 Type

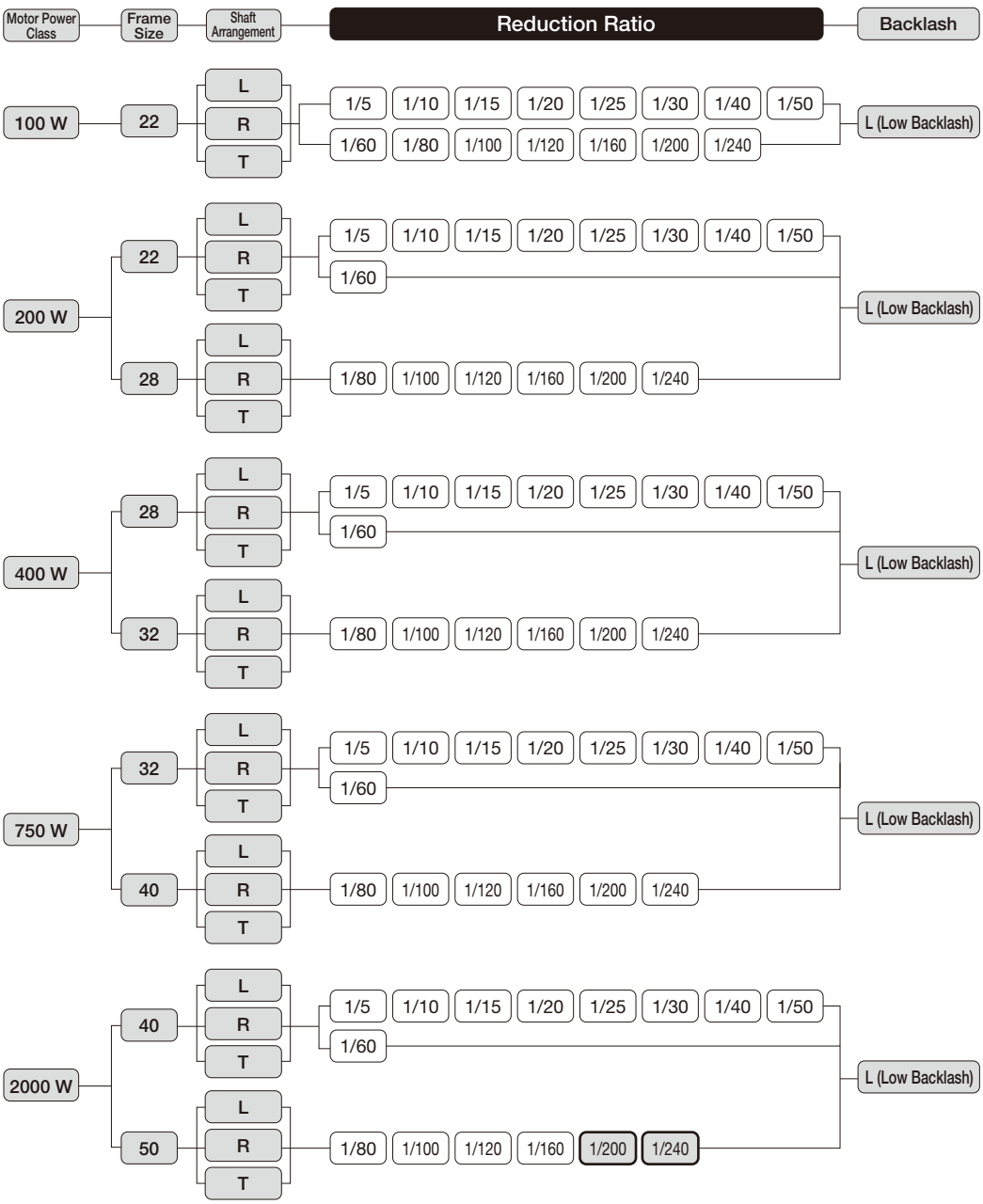
Mounting Type	Motor Type	Frame Size	Shaft Arrangement		Reduction Ratio	Backlash	Motor Power Class	Type	Option	Option Code
AH2L	Z	22	R	–	30	L	200	S1		
AH2L	Z	32	L	–	30	L	750	S4		
AH2L	Z	40	T	–	60	L	2000	K21	X	B3
①	②	③	④		⑤	⑥	⑦	⑧	⑨	⑩

①Mounting Type	AH2L : Right Angle Shaft (Foot Mount)		
②Motor Type	Z : High Precision Gearboxes for Servo Motor (Z Type Gearbox)		
③Frame Size and Output Shaft Diameter	Output Shaft Diameter		
④Shaft Arrangement	Output shaft on the left side when viewed from the input shaft side	Output shaft on the right side when viewed from the input shaft side	Output shaft on both sides when viewed from the input shaft side
			
	L	R	T
⑤Reduction Ratio	5:1/5 240 :1/240		
⑥Backlash	L : Low Backlash		
⑦Motor Power Class	100 : 100 W Class		
	200 : 200 W Class		
	400 : 400 W Class		
	750 : 750 W Class		
	2000 : 2000 W Class		
⑧Flange Type for Servo Motor Mounting	F1/S1/K31, etc.		
⑨Option	Blank : Standard Specification		
	X : Special Specification Code		
⑩Option code (Note 1)	Position Code of Wrench Hole for Input Shaft Joint Tightening For details, please refer to the list of option codes on page 949.		

Note 1: The option code will not be shown in the nomenclature on the nameplate. But it will be shown in the Option code row of the nameplate.

Standard Model Lineup

AH2 Type <Low Backlash Specification>



Note 1: ( ) indicates a limited torque type. Please make sure to check the allowable torque in the performance table.
Note 2: For the precision of low backlash types, refer to the performance table.
Note 3: AH2 is not available in 1 arc min and 3 arc min specifications.

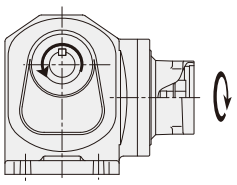
1. Low Backlash High Precision Gearboxes for Servo Motors

1-1. Performance Tables

AH2 Type <Low Backlash> Performance Table by Reduction Ratio

[Notes]

- The input speed is 3000 r/min.
- The "*" mark indicates a limited torque type. Please make sure to check the allowable average torque in the performance table.
- Allowable output shaft O.H.L. is the value at the middle of the output shaft.
- For the continuous rated input torque, please refer to page 948. In addition, for the servo motor-based motor rated output torque, please refer to page 922.
- The key dimensions and tolerances for output shafts conform to JIS B 1301-1996 (plain form).
- The internal moment of inertia (input shaft equivalent) is the value for the gearbox alone, and does not include the motor's moment of inertia.
- The allowable average torque is the continuous allowable torque value.
- Adjust the gain so that the inertial load on the output shaft side does not vibrate during acceleration and deceleration.
- In the performance table, ▭ indicates that for a clockwise (CW) motor input, the output rotates counterclockwise (CCW) as viewed from the output shaft under the conditions shown in the figure on the right. (The arrows indicate the rotational directions of the input and output shafts, and do not limit the actual direction of rotation.)



■ At an input speed of 3000 r/min

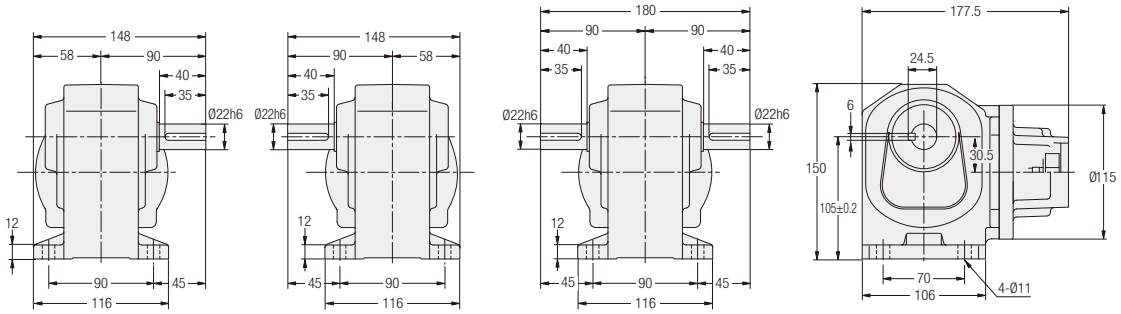
Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	$\times 10^{-4}$kg·m^2	
AH2LZ	22	L/R/T	1/5	1/5	L (60 arc min)	100	0.9	1.8	490	147	0.377	P.806
AH2LZ	22	L/R/T	1/5	1/5	L (60 arc min)	200	2.0	3.9	590	147	0.722	
AH2LZ	28	L/R/T	1/5	1/5	L (50 arc min)	400	3.9	7.8	930	235	0.789	P.807
AH2LZ	32	L/R/T	1/5	1/5	L (50 arc min)	750	7.8	16	1520	382	1.643	P.808
AH2LZ	40	L/R/T	1/5	1/5	L (30 arc min)	2000	24	47	2650	667	7.315	P.809
AH2LZ	22	L/R/T	1/10	1/10	L (40 arc min)	100	2.2	4.3	590	235	0.359	P.806
AH2LZ	22	L/R/T	1/10	1/10	L (40 arc min)	200	4.3	8.6	930	235	0.704	
AH2LZ	28	L/R/T	1/10	1/10	L (30 arc min)	400	8.4	17	1470	373	0.769	P.807
AH2LZ	32	L/R/T	1/10	1/10	L (30 arc min)	750	16	31	2010	500	1.513	P.808
AH2LZ	40	L/R/T	1/10	1/10	L (30 arc min)	2000	47	94	3530	883	6.838	P.809
AH2LZ	22	L/R/T	1/15	1/15	L (30 arc min)	100	3.4	6.9	930	235	0.353	P.806
AH2LZ	22	L/R/T	1/15	1/15	L (30 arc min)	200	7.1	14	1030	255	0.698	
AH2LZ	28	L/R/T	1/15	1/15	L (30 arc min)	400	14	27	1670	422	0.756	P.807
AH2LZ	32	L/R/T	1/15	1/15	L (30 arc min)	750	26	53	2210	549	1.481	P.808
AH2LZ	40	L/R/T	1/15	1/15	L (30 arc min)	2000	73	145	4410	1108	6.660	P.809
AH2LZ	22	L/R/T	1/20	1/20	L (30 arc min)	100	4.6	9.1	1030	294	0.359	P.806
AH2LZ	22	L/R/T	1/20	1/20	L (30 arc min)	200	9.4	19	1180	294	0.695	
AH2LZ	28	L/R/T	1/20	1/20	L (30 arc min)	400	19	37	1860	471	0.753	P.807
AH2LZ	32	L/R/T	1/20	1/20	L (30 arc min)	750	35	71	2450	618	1.467	P.808
AH2LZ	40	L/R/T	1/20	1/20	L (30 arc min)	2000	98	196	4710	1177	6.603	P.809
AH2LZ	22	L/R/T	1/25	1/25	L (30 arc min)	100	5.6	11	1180	324	0.349	P.806
AH2LZ	22	L/R/T	1/25	1/25	L (30 arc min)	200	12	24	1270	324	0.694	
AH2LZ	28	L/R/T	1/25	1/25	L (30 arc min)	400	25	49	2010	500	0.750	P.807
AH2LZ	32	L/R/T	1/25	1/25	L (30 arc min)	750	45	90	2740	686	1.462	P.808
AH2LZ	40	L/R/T	1/25	1/25	L (30 arc min)	2000	122	243	5100	1275	6.567	P.809
AH2LZ	22	L/R/T	1/30	1/30	L (30 arc min)	100	6.9	14	1270	343	0.349	P.806
AH2LZ	22	L/R/T	1/30	1/30	L (30 arc min)	200	15	29	1370	343	0.693	
AH2LZ	28	L/R/T	1/30	1/30	L (30 arc min)	400	29	59	2210	549	0.749	P.807
AH2LZ	32	L/R/T	1/30	1/30	L (30 arc min)	750	56	112	2940	735	1.454	P.808
AH2LZ	40	L/R/T	1/30	1/30	L (30 arc min)	2000	145	290	5300	1324	6.531	P.809
AH2LZ	22	L/R/T	1/40	1/40	L (30 arc min)	100	9.2	18	1370	392	0.347	P.806
AH2LZ	22	L/R/T	1/40	1/40	L (30 arc min)	200	20	39	1570	392	0.692	
AH2LZ	28	L/R/T	1/40	1/40	L (30 arc min)	400	39	78	2450	618	0.745	P.807
AH2LZ	32	L/R/T	1/40	1/40	L (30 arc min)	750	74	149	3430	863	1.447	P.808
AH2LZ	40	L/R/T	1/40	1/40	L (30 arc min)	2000	196	392	5590	1402	6.511	P.809
AH2LZ	22	L/R/T	1/50	1/50	L (30 arc min)	100	11	23	1570	431	0.347	P.806
AH2LZ	22	L/R/T	1/50	1/50	L (30 arc min)	200	25	49	1720	431	0.691	
AH2LZ	28	L/R/T	1/50	1/50	L (30 arc min)	400	49	98	2650	667	0.744	P.807
AH2LZ	32	L/R/T	1/50	1/50	L (30 arc min)	750	94	188	3820	961	1.443	P.808
AH2LZ	40	L/R/T	1/50	1/50	L (30 arc min)	2000	243	486	5880	1471	6.504	P.809

Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	$\times 10^{-4}$kg·m^2	
AH2LZ	22	L/R/T	1/60	1/59	L (30 arc min)	100	14	27	1570	441	0.346	P.806
AH2LZ	22	L/R/T	1/60	1/59	L (30 arc min)	200	27	55	1810	451	0.691	
AH2LZ	28	L/R/T	1/60	1/59	L (30 arc min)	400	55	110	2740	686	0.744	P.807
AH2LZ	32	L/R/T	1/60	1/59	L (30 arc min)	750	110	220	4120	1030	1.441	P.808
AH2LZ	40	L/R/T	1/60	1/60	L (30 arc min)	2000	292	584	6080	1520	6.500	P.809
AH2LZ	22	L/R/T	1/80	1/80	L (30 arc min)	100	19	37	1570	441	0.343	P.806
AH2LZ	28	L/R/T	1/80	1/80	L (30 arc min)	200	34	69	2450	618	0.691	P.807
AH2LZ	32	L/R/T	1/80	1/80	L (30 arc min)	400	71	141	3430	863	0.746	P.808
AH2LZ	40	L/R/T	1/80	1/80	L (30 arc min)	750	141	282	5780	1422	1.447	P.809
AH2LZ	50	L/R/T	1/80	1/80	L (30 arc min)	2000	380	760	8530	2108	5.839	P.810
AH2LZ	22	L/R/T	1/100	1/100	L (30 arc min)	100	24	47	1570	441	0.343	P.806
AH2LZ	28	L/R/T	1/100	1/100	L (30 arc min)	200	43	86	2650	667	0.691	P.807
AH2LZ	32	L/R/T	1/100	1/100	L (30 arc min)	400	88	176	3820	961	0.746	P.808
AH2LZ	40	L/R/T	1/100	1/100	L (30 arc min)	750	172	345	6080	1520	1.446	P.809
AH2LZ	50	L/R/T	1/100	1/100	L (30 arc min)	2000	476	953	8820	2206	5.835	P.810
AH2LZ	22	L/R/T	1/120	1/120	L (30 arc min)	100	30	61	1570	441	0.343	P.806
AH2LZ	28	L/R/T	1/120	1/120	L (30 arc min)	200	57	114	2740	686	0.691	P.807
AH2LZ	32	L/R/T	1/120	1/120	L (30 arc min)	400	110	220	4120	1030	0.745	P.808
AH2LZ	40	L/R/T	1/120	1/120	L (30 arc min)	750	212	423	6270	1569	1.445	P.809
AH2LZ	50	L/R/T	1/120	1/120	L (30 arc min)	2000	584	1168	9020	2256	5.833	P.810
AH2LZ	22	L/R/T	1/160	1/160	L (30 arc min)	100	40	80	1570	441	0.343	P.806
AH2LZ	28	L/R/T	1/160	1/160	L (30 arc min)	200	75	151	2840	716	0.691	P.807
AH2LZ	32	L/R/T	1/160	1/160	L (30 arc min)	400	149	298	4120	1030	0.745	P.808
AH2LZ	40	L/R/T	1/160	1/160	L (30 arc min)	750	282	564	6470	1618	1.444	P.809
AH2LZ	50	L/R/T	1/160	3/470	L (30 arc min)	2000	775	1550	9310	2305	5.831	P.810
AH2LZ	22	L/R/T	1/200	1/200	L (30 arc min)	100	50	100	1570	441	0.343	P.806
AH2LZ	28	L/R/T	1/200	1/200	L (30 arc min)	200	94	188	2840	716	0.691	P.807
AH2LZ	32	L/R/T	1/200	1/200	L (30 arc min)	400	188	376	4120	1030	0.744	P.808
AH2LZ	40	L/R/T	1/200	1/200	L (30 arc min)	750	353	706	6660	1667	1.443	P.809
AH2LZ	50	L/R/T	1/200	1/196	L (30 arc min)	2000	* 862	1725	9510	2354	5.829	P.810
AH2LZ	22	L/R/T	1/240	1/236	L (30 arc min)	100	60	120	1570	441	0.343	P.806
AH2LZ	28	L/R/T	1/240	1/236	L (30 arc min)	200	110	220	2840	716	0.691	P.807
AH2LZ	32	L/R/T	1/240	1/236	L (30 arc min)	400	221	441	4120	1030	0.744	P.808
AH2LZ	40	L/R/T	1/240	1/240	L (30 arc min)	750	423	847	6660	1667	1.443	P.809
AH2LZ	50	L/R/T	1/240	1/240	L (30 arc min)	2000	* 862	1725	9510	2354	5.828	P.810

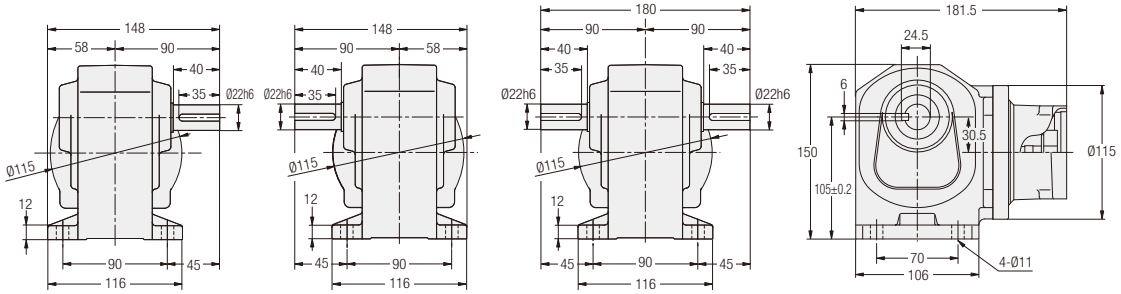
1-2. Drawings

AH2 Type Right Angle Shaft | Shaft Diameter 22 | **Foot** Mounting | Low Backlash

<Figure 1>



<Figure 2>



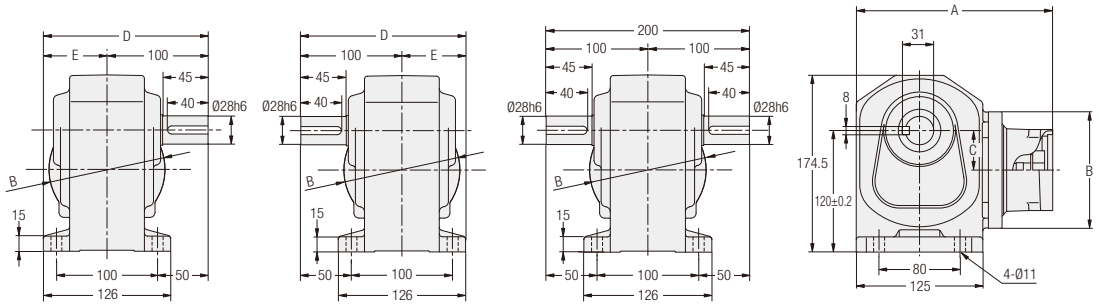
L Shaft R Shaft T Shaft

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
100 W	AH2LZ22#-✱✱✱□100△	5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 100, 120, 160, 200, 240	1	F1/F3/S1/S3	4.5
200 W	AH2LZ22#-✱✱✱□200△	5, 10, 15, 20, 25, 30, 40, 50, 60	2	F1/F2/F3/S1/S2/S3	4.5

Note: A shaft arrangement (L, R, T) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ✱✱✱, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 804 for the performance table.

AH2 Type Right Angle Shaft | Shaft Diameter **28** | **Foot** Mounting | Low Backlash

<Figure 1>



L Shaft R Shaft T Shaft

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A	B	C	D	E
200 W	AH2LZ28#-***□200△	80, 100, 120, 160, 200, 240	1	F1/F2/F3/S1/S2/S3	6.5	194	Ø115	39	163	63
400 W	AH2LZ28#-***□400△	5, 10, 15, 20, 25, 30, 40, 50, 60	1	F1/F3/S1/S3	6.5	207	Ø128	36	164	64

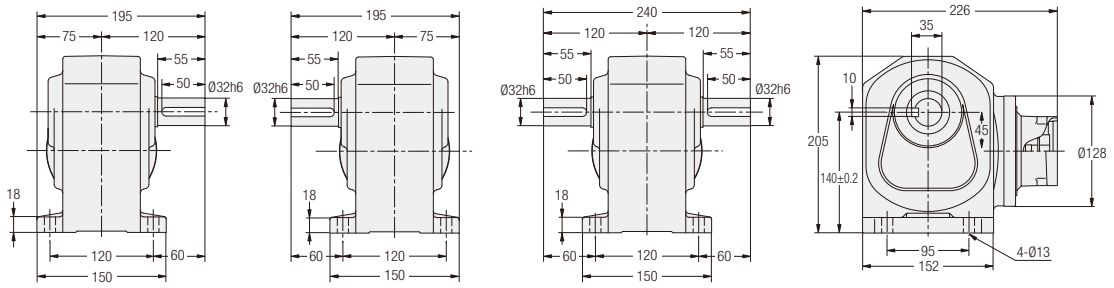
Note: A shaft arrangement (L, R, T) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.

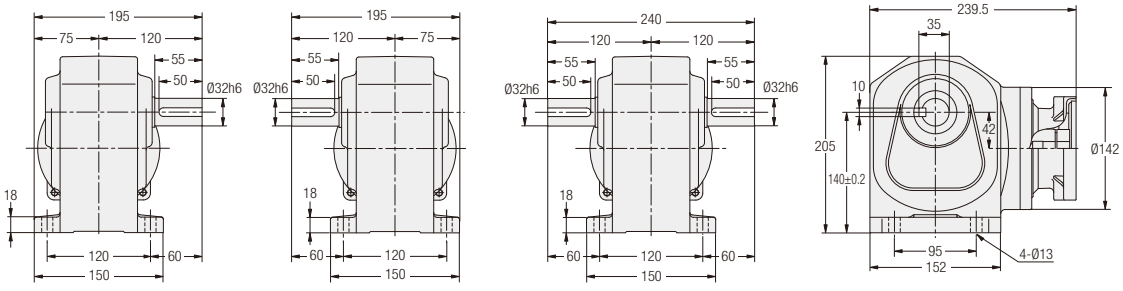
Note: Please refer to page 804 for the performance table.

AH2 Type Right Angle Shaft | Shaft Diameter 32 | Foot Mounting | Low Backlash

<Figure 1>



<Figure 2>



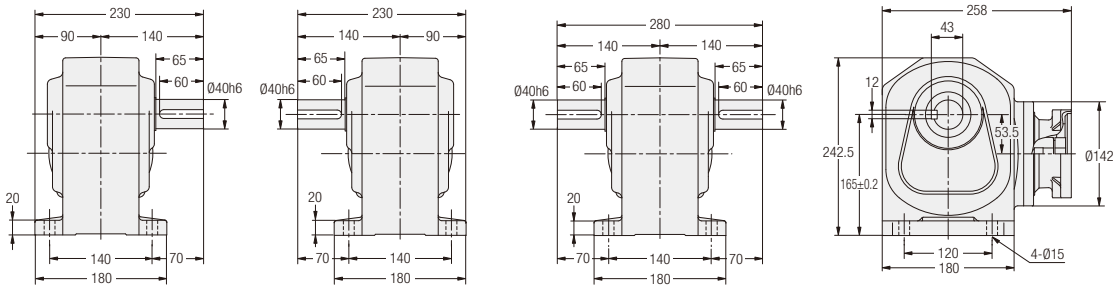
L Shaft R Shaft T Shaft

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
400 W	AH2LZ32#-***□400△	80, 100, 120, 160, 200, 240	1	F1/F3/S1/S3	9.5
750 W	AH2LZ32#-***□750△	5, 10, 15, 20, 25, 30, 40, 50, 60	2	F1/F2/S1/S2/S3/S4	9

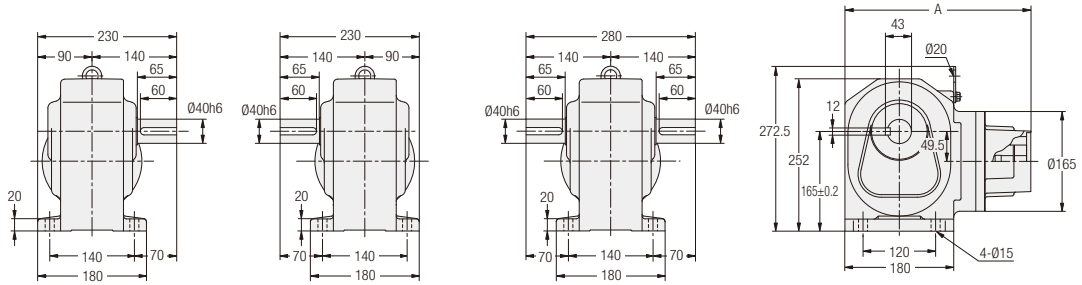
Note: A shaft arrangement (L, R, T) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 804 for the performance table.

AH2 Type Right Angle Shaft | Shaft Diameter **40** | **Foot** Mounting | Low Backlash

<Figure 1>



<Figure 2>



L Shaft R Shaft T Shaft

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	A	Approx. Weight (kg)
750 W	AH2LZ40#-∗∗∗□750△	80, 100, 120, 160, 200, 240	1	F1/F2/S1/S2/S3/S4	—	17.5
2000 W	AH2LZ40#-∗∗∗□2000△	5, 10, 15, 20, 25, 30, 40, 50, 60	2	K21/K22/K23	307.5	19.5
				K31/K32/K33	307.5	
				F31/F33	317.5	

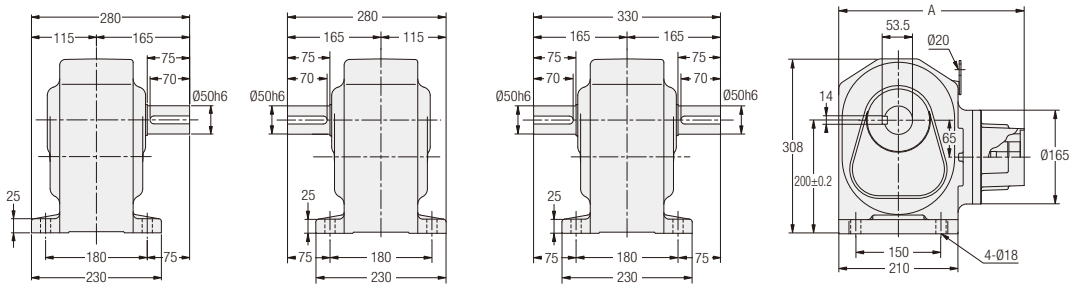
Note: A shaft arrangement (L, R, T) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ∗∗∗, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.

Note: Please refer to page 804 for the performance table.

AH2 Type Right Angle Shaft | Shaft Diameter 50 | Foot Mounting | Low Backlash

<Figure 1>



L Shaft R Shaft T Shaft

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	A	Approx. Weight (kg)
2000 W	AH2LZ50#-✱✱✱□2000△	80, 100, 120, 160, 200, 240	1	K21/K22/K23	326.5	49.5
				K31/K32/K33	326.5	
				F31/F33	336.5	

Note: A shaft arrangement (L, R, T) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ✱✱✱, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 901 to 904 for the detailed dimensions of the input shaft area.
Note: Please refer to page 805 for the performance table.

AFC Type

Right Angle Hollow Bore/ Right Angle Shaft

Model and Type Codes

Standard Model Lineup

P.816

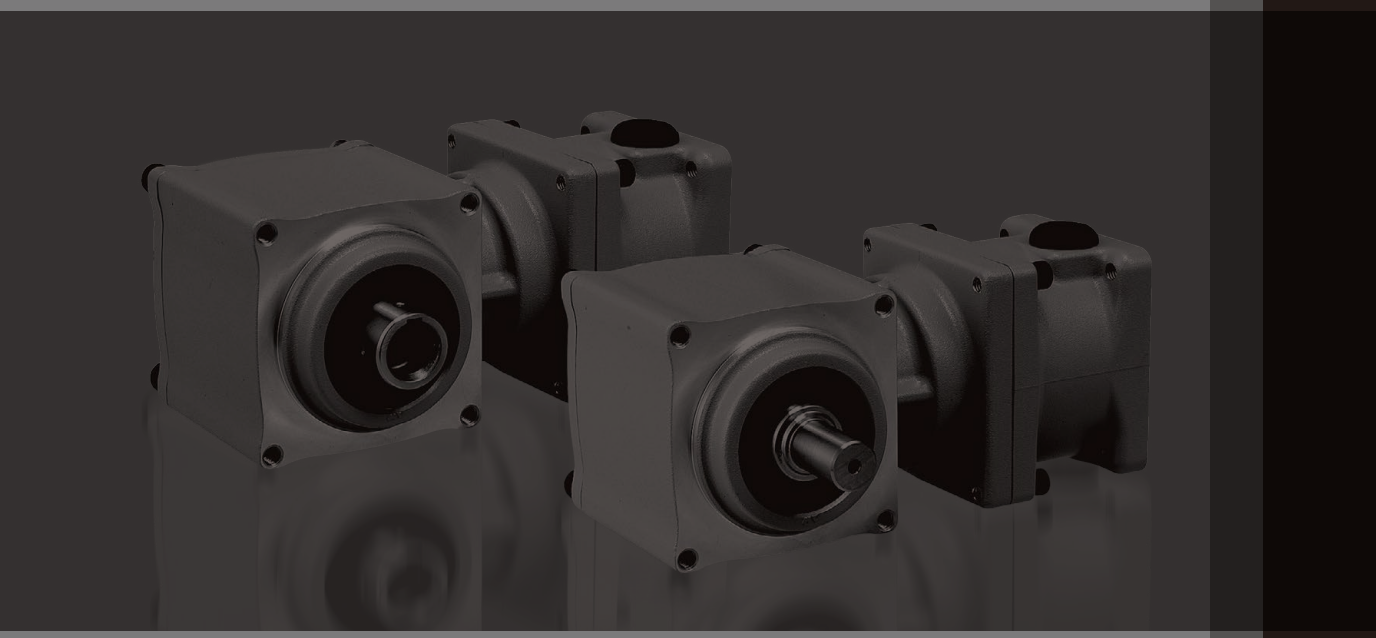
HIGH PRECISION GEARBOXES FOR SERVO MOTORS

1. Compact High Precision Gearboxes for Servo Motors

1-1. Performance Tables

1-2. Drawings

1-3. Low Temperature Startup Characteristics (No Load Running Torque (Input Shaft))



Model and Type Codes

AFC Type

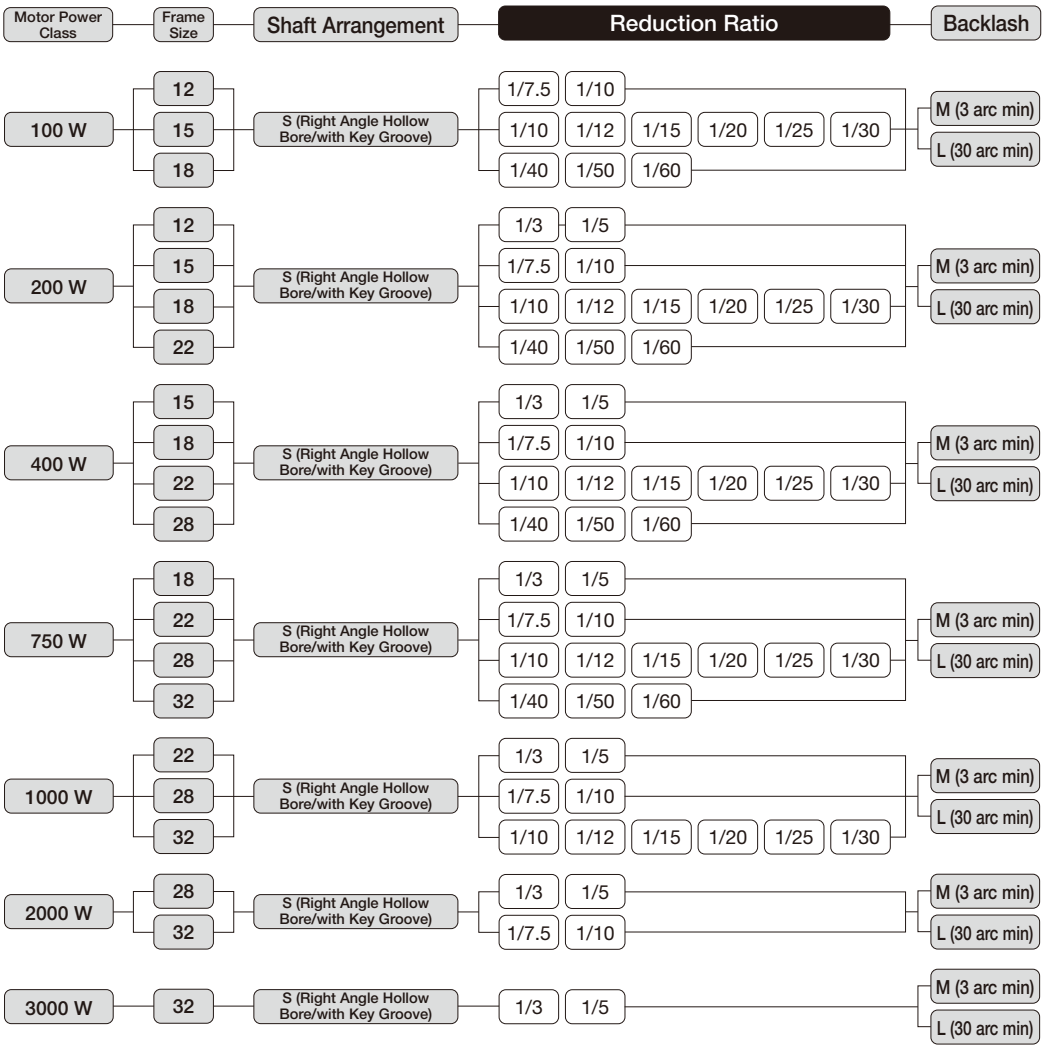
Mounting Type	Motor Type	Frame Size	Shaft Arrangement		Reduction Ratio	Backlash	Motor Power Class	Type	Option	Option Code
AFC	Z	18	S	–	7.5	M	400	S3		
AFC	Z	32	H	–	60	M	750	S4	X	B3
①	②	③	④		⑤	⑥	⑦	⑧	⑨	⑩

①Mounting Type	AFC : Right Angle Shaft (Compact Flange Mount)		
②Motor Type	Z : High Precision Gearboxes for Servo Motor (Z Type Gearbox)		
③Frame Size and Output Shaft Diameter	Output Shaft Diameter (Inner diameter is used for Right Angle Hollow Bore Type and outer diameter for Right Angle Shaft Type)		
④Shaft Arrangement	Right Angle Hollow Bore	Right Angle Shaft	
	S : Right Angle Hollow Bore (with Key Groove)	Output shaft on the left side when viewed from the input shaft side (with a key and shaft end tapped)  Nameplate	Output shaft on the left side when viewed from the input shaft side (without a key)  Nameplate
		L	H
⑤Reduction Ratio	3:1/3 7.5:1/7.5 60:1/60		
⑥Backlash	M : Backlash 3 arc min		
	L : Backlash 30 arc min		
⑦Motor Power Class	100 : 100 W Class		
	200 : 200 W Class		
	400 : 400 W Class		
	750 : 750 W Class		
	1000 : 1000 W Class		
	2000 : 2000 W Class		
	3000 : 3000 W Class		
⑧Flange Type for Servo Motor Mounting	S1/K13/K61, etc.		
⑨Option	Blank : Standard Specification		
	X : Special Specification Code		
⑩Option Code (Note 1)	Position Code of Wrench Hole for Input Shaft Joint Tightening For details, please refer to the list of option codes on page 949.		

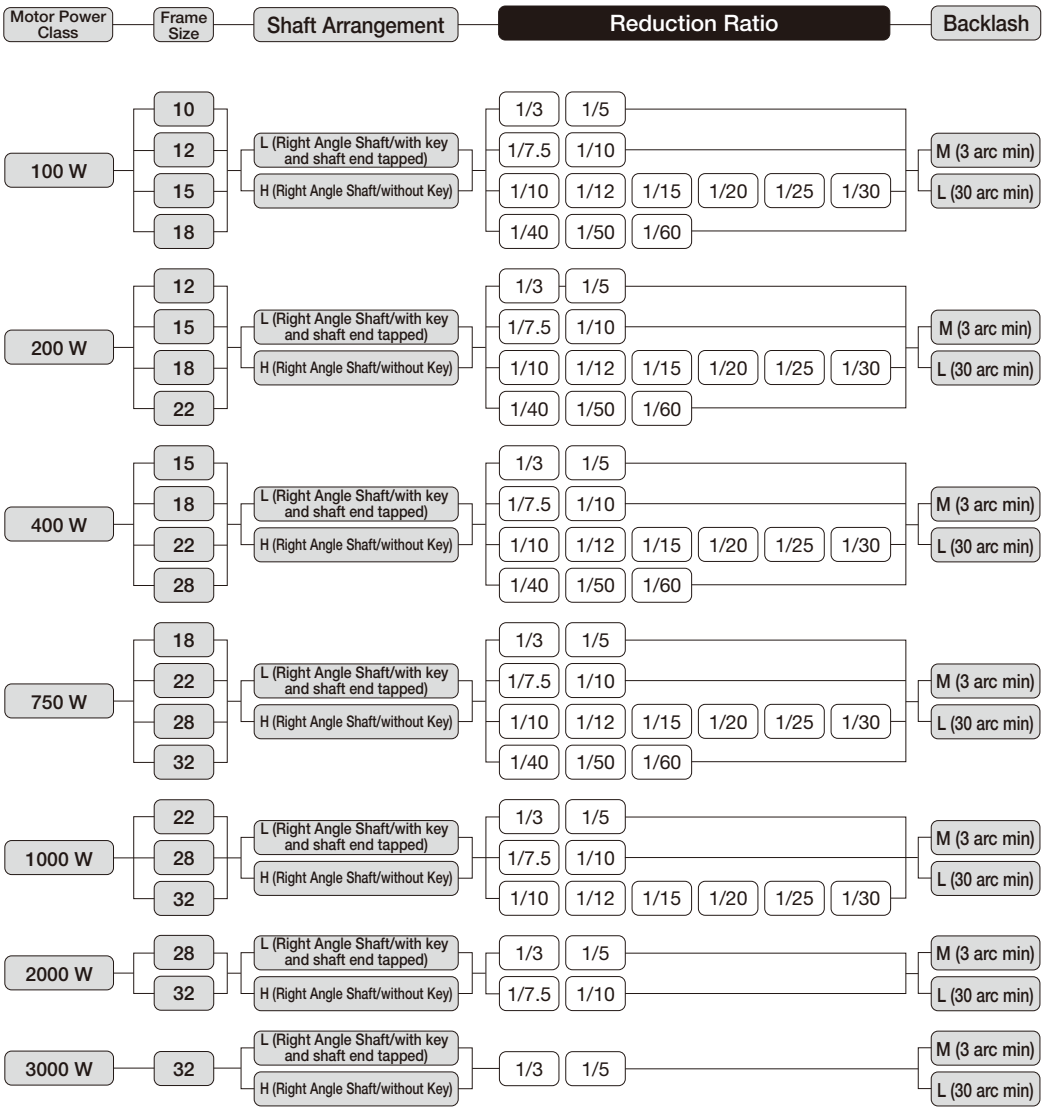
Note 1: The option code will not be shown in the nomenclature on the nameplate. But it will be shown in the Option code row of the nameplate.

Standard Model Lineup

AFC Type <Right Angle Hollow Bore>



AFC Type <Right Angle Shaft>



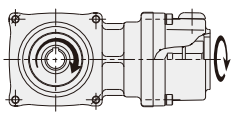
MEMO

1. Compact High Precision Gearboxes for Servo Motors

1-1. Performance Tables

AFC Type <Right Angle Hollow Bore Backlash 3 arc min/30 arc min Specifications> Performance Table by Reduction Ratio

[Notes]



- The instantaneous input speed is 7000 r/min. The rated input speed is 3000 r/min.
- Allowable output shaft O.H.L. is the value at the load point of the O.H.L. shown on page 945.
- For the continuous rated input torque, please refer to page 948. In addition, for the servo motor-based motor rated output torque, please refer to page 927.
- The key dimensions and tolerances for output shafts conform to JIS B 1301-1996 (plain form).
- The key for the output shaft is not supplied with right angle hollow bore types.
- The internal moment of inertia (input shaft equivalent) is the value for the gearbox alone, and does not include the motor's moment of inertia.
- The allowable average torque is the continuous allowable torque value.
- Adjust the gain so that the inertial load on the output shaft side does not vibrate during acceleration and deceleration.
- In the performance table, ▭ indicates that for a clockwise (CW) motor input, the output rotates clockwise (CW) as viewed from the output shaft under the conditions shown in the figure on the right. (The arrows indicate the rotational directions of the input and output shafts, and do not limit the actual direction of rotation.)
- M in the Precision column means backlash 3 arc min, and L means backlash 30 arc min.
- When the gearbox is used at low temperature, the no load running torque at a startup will increase. Please refer to page 842 for cold start characteristics.

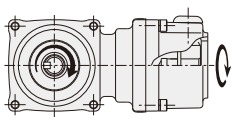
■ At an input speed of 3000 r/min

Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)		Drawings
											Other than Flange Type K75	Flange Type K75	
							N·m	N·m	N	N	×10^{-4}kg·m^2		
AFCZ	12	S	1/3	1/3	M/L	200	2.37	4.6	500	200	0.288	—	P.820
AFCZ	15	S	1/3	1/3	M/L	400	3.80	10.4	785	314	0.378	—	P.821
AFCZ	18	S	1/3	1/3	M/L	750	7.23	19.4	980	392	1.236	—	P.823
AFCZ	22	S	1/3	1/3	M/L	1000	12.42	25.9	1050	420	5.700	—	P.825
AFCZ	28	S	1/3	1/3	M/L	2000	31.90	54.4	1200	480	7.190	11.11	P.827
AFCZ	32	S	1/3	1/3	M/L	3000	42.41	81.6	1370	548	9.449	12.95	P.829
AFCZ	12	S	1/5	1/5	M/L	200	3.21	7.7	650	250	0.263	—	P.820
AFCZ	15	S	1/5	1/5	M/L	400	6.62	17.3	980	377	0.333	—	P.821
AFCZ	18	S	1/5	1/5	M/L	750	10.43	32.4	1180	454	1.101	—	P.823
AFCZ	22	S	1/5	1/5	M/L	1000	22.99	43.1	1250	481	5.459	—	P.825
AFCZ	28	S	1/5	1/5	M/L	2000	37.93	90.7	1470	565	6.215	10.14	P.827
AFCZ	32	S	1/5	1/5	M/L	3000	53.96	136.0	1670	642	8.770	12.27	P.829
AFCZ	12	S	1/7.5	2/15	M/L	100	2.31	4.6	560	215	0.132	—	P.820
AFCZ	15	S	1/7.5	2/15	M/L	200	5.70	11.1	800	308	0.290	—	P.821
AFCZ	18	S	1/7.5	2/15	M/L	400	8.34	22.2	1120	431	0.391	—	P.822/ P.823
AFCZ	22	S	1/7.5	2/15	M/L	750	19.75	41.6	1370	527	1.311	—	P.824/ P.825
AFCZ	28	S	1/7.5	2/15	M/L	1000	33.07	64.7	1480	569	5.509	—	P.826
AFCZ	32	S	1/7.5	2/15	M/L	2000	51.70	116.6	1670	642	7.229	10.73	P.829
AFCZ	12	S	1/10	1/10	M/L	100	2.90	6.1	650	232	0.130	—	P.820
AFCZ	15	S	1/10	1/10	M/L	200	6.34	14.8	980	350	0.281	—	P.821
AFCZ	18	S	1/10	1/10	M/L	400	10.30	29.6	1250	446	0.379	—	P.822/ P.823
AFCZ	22	S	1/10	1/10	M/L	750	23.83	55.5	1550	554	1.229	—	P.824/ P.825
AFCZ	28	S	1/10	1/10	M/L	1000	33.65	73.9	1750	625	5.291	—	P.826
AFCZ	32	S	1/10	1/10	M/L	2000	62.17	155.5	1960	700	6.849	10.35	P.829

Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)		Drawings
											Other than Flange Type K75	Flange Type K75	
							N·m	N·m	N	N	×10^{-4}kg·m^2		
AFCZ	15	S	1/10	1/10	M/L	100	3.76	6.4	980	350	0.136	—	P.821
AFCZ	18	S	1/10	1/10	M/L	200	6.42	16.4	1250	446	0.274	—	P.822
AFCZ	22	S	1/10	1/10	M/L	400	13.24	32.7	1550	554	0.359	—	P.824
AFCZ	28	S	1/10	1/10	M/L	750	20.86	63.0	1960	700	1.091	—	P.826
AFCZ	32	S	1/10	1/10	M/L	1000	45.98	86.3	2350	839	5.656	—	P.829
AFCZ	15	S	1/12	2/25	M/L	100	4.75	8.0	1020	364	0.133	—	P.821
AFCZ	18	S	1/12	2/25	M/L	200	8.03	20.5	1350	482	0.269	—	P.822
AFCZ	22	S	1/12	2/25	M	400	16.55	40.9	1640	586	0.347	—	P.824
AFCZ	22	S	1/12	19/235	L	400	16.55	40.9	1640	586	0.347	—	
AFCZ	28	S	1/12	2/25	M	750	26.08	78.8	2110	754	1.062	—	P.826
AFCZ	28	S	1/12	19/235	L	750	26.08	78.8	2110	754	1.062	—	
AFCZ	32	S	1/12	2/25	M	1000	57.48	107.8	2530	904	5.592	—	P.829
AFCZ	32	S	1/12	19/235	L	1000	57.48	107.8	2530	904	5.592	—	P.829
AFCZ	15	S	1/15	1/15	M/L	100	5.68	9.6	1060	379	0.132	—	P.821
AFCZ	18	S	1/15	1/15	M/L	200	9.63	24.6	1470	525	0.266	—	P.822
AFCZ	22	S	1/15	1/15	M/L	400	19.86	49.1	1720	614	0.339	—	P.824
AFCZ	28	S	1/15	1/15	M/L	750	31.29	94.6	2250	804	1.042	—	P.826
AFCZ	32	S	1/15	1/15	M/L	1000	68.97	129.4	2700	964	5.558	—	P.829
AFCZ	15	S	1/20	1/20	M/L	100	7.59	12.8	1180	421	0.130	—	P.821
AFCZ	18	S	1/20	1/20	M/L	200	12.84	32.7	1570	561	0.263	—	P.822
AFCZ	22	S	1/20	1/20	M/L	400	26.48	65.5	2010	718	0.330	—	P.824
AFCZ	28	S	1/20	1/20	M/L	750	41.72	126.1	2500	893	1.021	—	P.826
AFCZ	32	S	1/20	1/20	M/L	1000	91.96	172.5	3000	1071	5.514	—	P.829
AFCZ	15	S	1/25	1/25	M/L	100	9.44	16.0	1250	446	0.129	—	P.821
AFCZ	18	S	1/25	1/25	M/L	200	16.05	40.9	1670	596	0.260	—	P.822
AFCZ	22	S	1/25	1/25	M/L	400	33.10	81.8	2160	771	0.323	—	P.824
AFCZ	28	S	1/25	1/25	M/L	750	52.15	135.1	2740	979	1.008	—	P.826
AFCZ	32	S	1/25	1/25	M/L	1000	101.08	215.7	3280	1171	5.487	—	P.829
AFCZ	15	S	1/30	1/30	M/L	100	10.23	19.2	1330	475	0.128	—	P.821
AFCZ	18	S	1/30	1/30	M/L	200	17.74	49.1	1810	646	0.259	—	P.822
AFCZ	22	S	1/30	1/30	M/L	400	33.27	98.2	2300	821	0.319	—	P.824
AFCZ	28	S	1/30	1/30	M/L	750	60.37	162.1	2940	1050	0.999	—	P.826
AFCZ	32	S	1/30	1/30	M/L	1000	91.32	258.8	3520	1257	5.468	—	P.829
AFCZ	18	S	1/40	1/40	M/L	100	11.75	26.5	1650	550	0.128	—	P.822
AFCZ	22	S	1/40	1/40	M/L	200	25.21	56.1	2250	750	0.277	—	P.824
AFCZ	28	S	1/40	1/40	M/L	400	41.20	115.3	2900	967	0.369	—	P.826
AFCZ	32	S	1/40	1/40	M/L	750	95.32	227.5	3480	1160	1.220	—	P.828
AFCZ	18	S	1/50	1/50	M/L	100	14.72	33.2	1750	583	0.128	—	P.822
AFCZ	22	S	1/50	1/50	M/L	200	31.55	70.2	2480	827	0.275	—	P.824
AFCZ	28	S	1/50	1/50	M/L	400	63.89	144.1	3150	1050	0.366	—	P.826
AFCZ	32	S	1/50	1/50	M/L	750	101.08	237	3630	1210	1.209	—	P.828
AFCZ	18	S	1/60	1/60	M/L	100	17.62	39.8	1850	617	0.127	—	P.822
AFCZ	22	S	1/60	1/60	M/L	200	33.27	84.2	2700	900	0.274	—	P.824
AFCZ	28	S	1/60	1/60	M/L	400	61.10	144.1	3380	1127	0.364	—	P.826
AFCZ	32	S	1/60	1/60	M/L	750	118.90	284.4	3780	1260	1.204	—	P.828

AFC Type <Right Angle Shaft Backlash 3 arc min/30 arc min Specifications> Performance Table by Reduction Ratio

[Notes]



- The instantaneous input speed is 7000 r/min. The rated input speed is 3000 r/min.
- Allowable output shaft O.H.L. is the value at the load point of the O.H.L. shown on page 945.
- For the continuous rated input torque, please refer to page 948. In addition, for the servo motor-based motor rated output torque, please refer to page 929.
- The key dimensions and tolerances for output shafts conform to JIS B 1301-1996 (plain form).
- The key for the output shaft is not supplied with the H shaft (without a key) of right angle shaft types.
- The internal moment of inertia (input shaft equivalent) is the value for the gearbox alone, and does not include the motor's moment of inertia.
- The allowable average torque is the continuous allowable torque value.
- Adjust the gain so that the inertial load on the output shaft side does not vibrate during acceleration and deceleration.
- In the performance table, ▭ indicates that for a clockwise (CW) motor input, the output rotates clockwise (CW) as viewed from the output shaft under the conditions shown in the figure on the right. (The arrows indicate the rotational directions of the input and output shafts, and do not limit the actual direction of rotation.)
- M in the Precision column means backlash 3 arc min, and L means backlash 30 arc min.
- When the gearbox is used at low temperature, the no load running torque at a startup will increase. Please refer to page 842 for cold start characteristics.

■ At an input speed of 3000 r/min

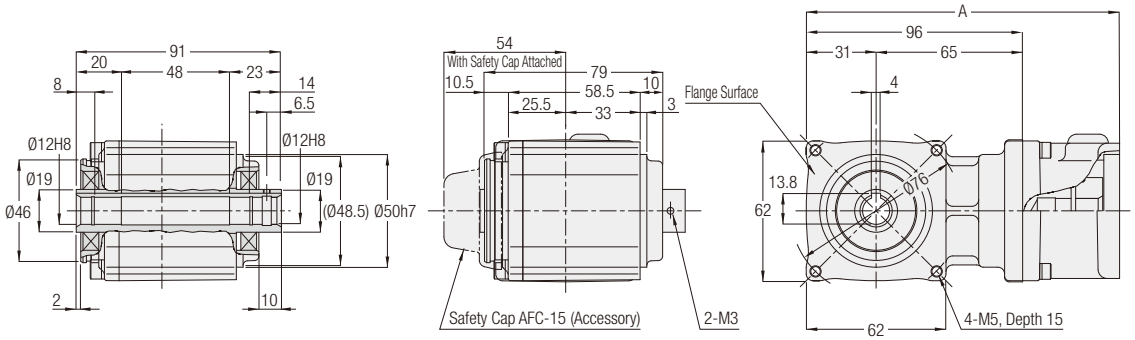
Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)		Drawings
											Other than Flange Type K75	Flange Type K75	
							N·m	N·m	N	N	$\times 10^{-4}$kg·m^2		
AFCZ	10	L/H	1/3	1/3	M/L	100	1.49	2.0	395	158	0.138	—	P.830
AFCZ	12	L/H	1/3	1/3	M/L	200	2.37	4.6	500	200	0.288	—	P.831
AFCZ	15	L/H	1/3	1/3	M/L	400	3.80	10.4	785	314	0.378	—	P.833
AFCZ	18	L/H	1/3	1/3	M/L	750	7.23	19.4	980	392	1.236	—	P.835
AFCZ	22	L/H	1/3	1/3	M/L	1000	12.42	25.9	1050	420	5.700	—	P.837
AFCZ	28	L/H	1/3	1/3	M/L	2000	31.90	54.4	1200	480	7.190	11.11	P.839
AFCZ	32	L/H	1/3	1/3	M/L	3000	42.41	81.6	1370	548	9.449	12.95	P.841
AFCZ	10	L/H	1/5	1/5	M/L	100	2.34	3.3	490	188.5	0.132	—	P.830
AFCZ	12	L/H	1/5	1/5	M/L	200	3.21	7.7	650	250	0.263	—	P.831
AFCZ	15	L/H	1/5	1/5	M/L	400	6.62	17.3	980	377	0.333	—	P.833
AFCZ	18	L/H	1/5	1/5	M/L	750	10.43	32.4	1180	454	1.101	—	P.835
AFCZ	22	L/H	1/5	1/5	M/L	1000	22.99	43.1	1250	481	5.459	—	P.837
AFCZ	28	L/H	1/5	1/5	M/L	2000	37.93	90.7	1470	565	6.215	10.14	P.839
AFCZ	32	L/H	1/5	1/5	M/L	3000	53.96	136.0	1670	642	8.770	12.27	P.841
AFCZ	12	L/H	1/7.5	2/15	M/L	100	2.31	4.6	560	215	0.132	—	P.816
AFCZ	15	L/H	1/7.5	2/15	M/L	200	5.70	11.1	800	308	0.290	—	P.833
AFCZ	18	L/H	1/7.5	2/15	M/L	400	8.34	22.2	1120	431	0.391	—	P.834/ P.835
AFCZ	22	L/H	1/7.5	2/15	M/L	750	19.75	41.6	1370	527	1.311	—	P.836/ P.837
AFCZ	28	L/H	1/7.5	2/15	M/L	1000	33.07	64.7	1480	569	5.509	—	P.839
AFCZ	32	L/H	1/7.5	2/15	M/L	2000	51.70	116.6	1670	642	7.229	10.73	P.841
AFCZ	12	L/H	1/10	1/10	M/L	100	2.90	6.1	650	232	0.130	—	P.820
AFCZ	15	L/H	1/10	1/10	M/L	200	6.34	14.8	980	350	0.281	—	P.833
AFCZ	18	L/H	1/10	1/10	M/L	400	10.30	29.6	1250	446	0.379	—	P.834/ P.835
AFCZ	22	L/H	1/10	1/10	M/L	750	23.83	55.5	1550	554	1.229	—	P.836/ P.837
AFCZ	28	L/H	1/10	1/10	M/L	1000	33.65	73.9	1750	625	5.291	—	P.839
AFCZ	32	L/H	1/10	1/10	M/L	2000	62.17	155.5	1960	700	6.849	10.35	P.841

Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)		Drawings
											Other than Flange Type K75	Flange Type K75	
							N·m	N·m	N	N	$\times 10^{-4}$kg·m^2		
AFCZ	15	L/H	1/10	1/10	M/L	100	3.76	6.4	980	350	0.136	—	P.832
AFCZ	18	L/H	1/10	1/10	M/L	200	6.42	16.4	1250	446	0.274	—	P.834
AFCZ	22	L/H	1/10	1/10	M/L	400	13.24	32.7	1550	554	0.359	—	P.836
AFCZ	28	L/H	1/10	1/10	M/L	750	20.86	63.0	1960	700	1.091	—	P.838
AFCZ	32	L/H	1/10	1/10	M/L	1000	45.98	86.3	2350	839	5.656	—	P.840/ P.841
AFCZ	15	L/H	1/12	2/25	M/L	100	4.75	8.0	1020	364	0.133	—	P.832
AFCZ	18	L/H	1/12	2/25	M/L	200	8.03	20.5	1350	482	0.269	—	P.834
AFCZ	22	L/H	1/12	2/25	M	400	16.55	40.9	1640	586	0.347	—	P.836
AFCZ	22	L/H	1/12	19/235	L	400	16.55	40.9	1640	586	0.347	—	
AFCZ	28	L/H	1/12	2/25	M	750	26.08	78.8	2110	754	1.062	—	P.838
AFCZ	28	L/H	1/12	19/235	L	750	26.08	78.8	2110	754	1.062	—	
AFCZ	32	L/H	1/12	2/25	M	1000	57.48	107.8	2530	904	5.592	—	P.840/ P.841
AFCZ	32	L/H	1/12	19/235	L	1000	57.48	107.8	2530	904	5.592	—	P.840/ P.841
AFCZ	15	L/H	1/15	1/15	M/L	100	5.68	9.6	1060	379	0.132	—	P.832
AFCZ	18	L/H	1/15	1/15	M/L	200	9.63	24.6	1470	525	0.266	—	P.834
AFCZ	22	L/H	1/15	1/15	M/L	400	19.86	49.1	1720	614	0.339	—	P.836
AFCZ	28	L/H	1/15	1/15	M/L	750	31.29	94.6	2250	804	1.042	—	P.838
AFCZ	32	L/H	1/15	1/15	M/L	1000	68.97	129.4	2700	964	5.558	—	P.840/ P.841
AFCZ	15	L/H	1/20	1/20	M/L	100	7.59	12.8	1180	421	0.130	—	P.832
AFCZ	18	L/H	1/20	1/20	M/L	200	12.84	32.7	1570	561	0.263	—	P.834
AFCZ	22	L/H	1/20	1/20	M/L	400	26.48	65.5	2010	718	0.330	—	P.836
AFCZ	28	L/H	1/20	1/20	M/L	750	41.72	126.1	2500	893	1.021	—	P.838
AFCZ	32	L/H	1/20	1/20	M/L	1000	91.96	172.5	3000	1071	5.514	—	P.840/ P.841
AFCZ	15	L/H	1/25	1/25	M/L	100	9.44	16.0	1250	446	0.129	—	P.832
AFCZ	18	L/H	1/25	1/25	M/L	200	16.05	40.9	1670	596	0.260	—	P.834
AFCZ	22	L/H	1/25	1/25	M/L	400	33.10	81.8	2160	771	0.323	—	P.836
AFCZ	28	L/H	1/25	1/25	M/L	750	52.15	135.1	2740	979	1.008	—	P.838
AFCZ	32	L/H	1/25	1/25	M/L	1000	101.08	215.7	3280	1171	5.487	—	P.840/ P.841
AFCZ	15	L/H	1/30	1/30	M/L	100	10.23	19.2	1330	475	0.128	—	P.832
AFCZ	18	L/H	1/30	1/30	M/L	200	17.74	49.1	1810	646	0.259	—	P.834
AFCZ	22	L/H	1/30	1/30	M/L	400	33.27	98.2	2300	821	0.319	—	P.836
AFCZ	28	L/H	1/30	1/30	M/L	750	60.37	162.1	2940	1050	0.999	—	P.838
AFCZ	32	L/H	1/30	1/30	M/L	1000	91.32	258.8	3520	1257	5.468	—	P.840/ P.841
AFCZ	18	L/H	1/40	1/40	M/L	100	11.75	26.5	1650	550	0.128	—	P.834
AFCZ	22	L/H	1/40	1/40	M/L	200	25.21	56.1	2250	750	0.277	—	P.836
AFCZ	28	L/H	1/40	1/40	M/L	400	41.20	115.3	2900	967	0.369	—	P.838
AFCZ	32	L/H	1/40	1/40	M/L	750	95.32	227.5	3480	1160	1.220	—	P.840
AFCZ	18	L/H	1/50	1/50	M/L	100	14.72	33.2	1750	583	0.128	—	P.834
AFCZ	22	L/H	1/50	1/50	M/L	200	31.55	70.2	2480	827	0.275	—	P.836
AFCZ	28	L/H	1/50	1/50	M/L	400	63.89	144.1	3150	1050	0.366	—	P.838
AFCZ	32	L/H	1/50	1/50	M/L	750	101.08	237.0	3630	1210	1.209	—	P.840
AFCZ	18	L/H	1/60	1/60	M/L	100	17.62	39.8	1850	617	0.127	—	P.834
AFCZ	22	L/H	1/60	1/60	M/L	200	33.27	84.2	2700	900	0.274	—	P.836
AFCZ	28	L/H	1/60	1/60	M/L	400	61.10	144.1	3380	1127	0.364	—	P.838
AFCZ	32	L/H	1/60	1/60	M/L	750	118.90	284.4	3780	1260	1.204	—	P.840

1-2. Drawings

AFC Type Right Angle Hollow Bore — Shaft Diameter 12 — Backlash 3 arc min/30 arc min

<Figure 1>

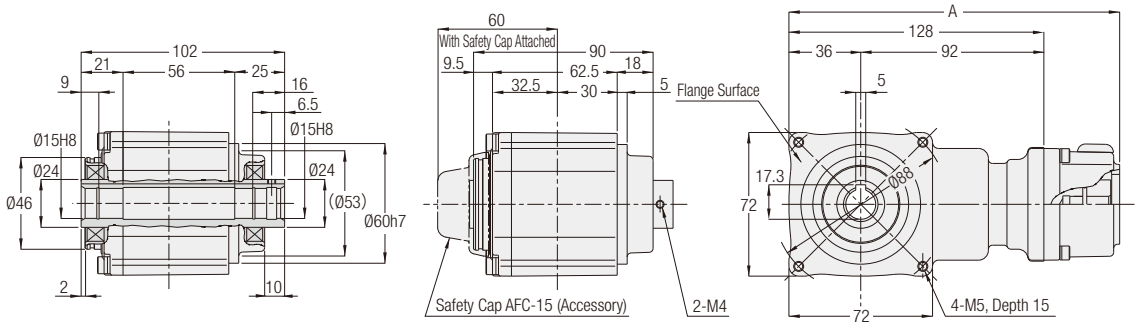


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
100 W	AFCZ12S-✱✱✱□100△	7.5, 10	1	S1/S3	1.5	134
100 W	AFCZ12S-✱✱✱□100△	7.5, 10	1	S6	1.5	133
200 W	AFCZ12S-✱✱✱□200△	3, 5	1	S1/S2/S3	1.5	139
200 W	AFCZ12S-✱✱✱□200△	3, 5	1	S6	1.5	135
200 W	AFCZ12S-✱✱✱□200△	3, 5	1	S7	1.5	138

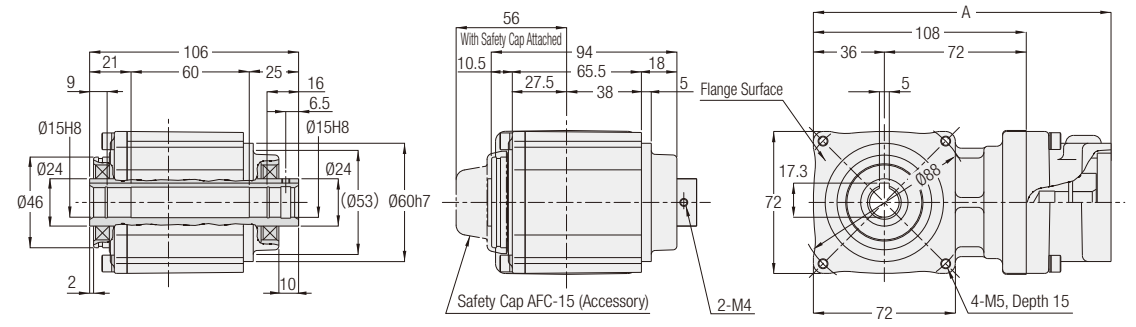
Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: Please refer to page 816 for the performance table.

AFC Type Right Angle Hollow Bore | Shaft Diameter **15** Backlash 3 arc min/30 arc min

<Figure 1>



<Figure 2>

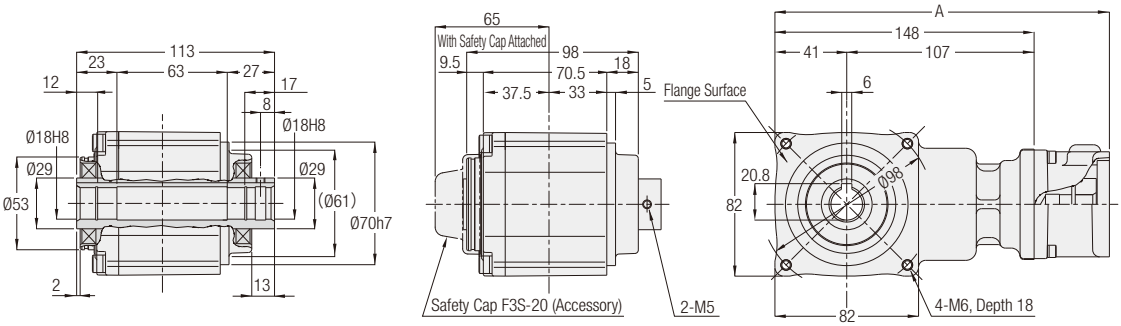


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
100 W	AFCZ15S-***□100△	10, 12, 15, 20, 25, 30	1	S1/S3	1.9	166
100 W	AFCZ15S-***□100△	10, 12, 15, 20, 25, 30	1	S6	1.9	165
200 W	AFCZ15S-***□200△	7.5, 10	2	S1/S2/S3	2.5	151
200 W	AFCZ15S-***□200△	7.5, 10	2	S6	2.5	147
200 W	AFCZ15S-***□200△	7.5, 10	2	S7	2.5	150
400 W	AFCZ15S-***□400△	3,5	2	S1/S3	2.5	151
400 W	AFCZ15S-***□400△	3,5	2	S6	2.5	147
400 W	AFCZ15S-***□400△	3,5	2	S7	2.5	150

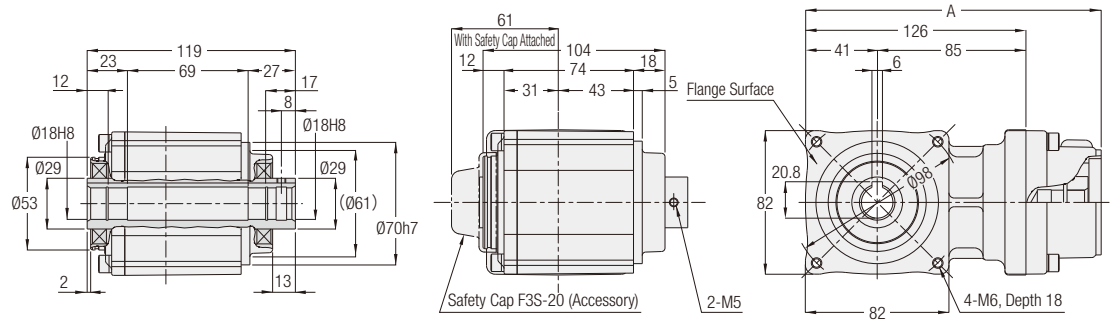
Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: Please refer to page 816 for the performance table.

AFC Type Right Angle Hollow Bore Shaft Diameter 18 Backlash 3 arc min/30 arc min

<Figure 1>



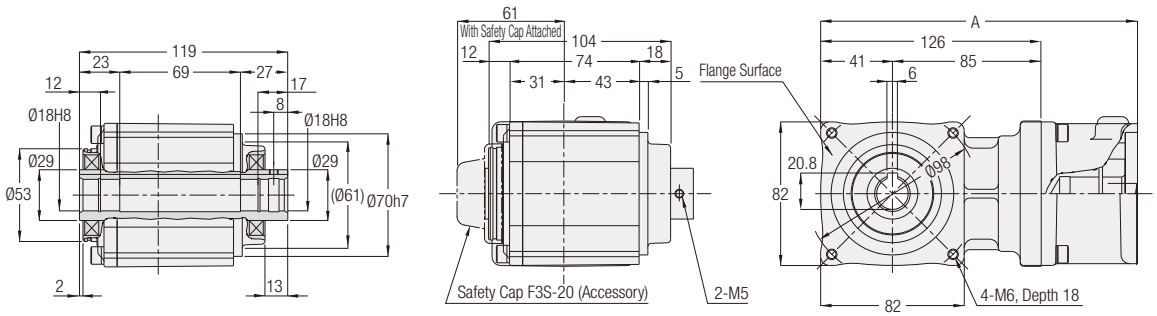
<Figure 2>



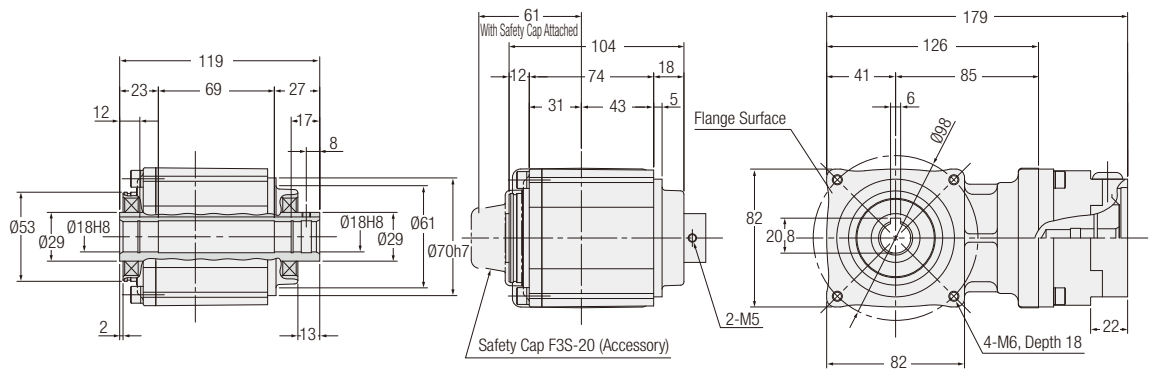
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
100 W	AFCZ18S-***□100△	40, 50, 60	1	S1/S3	2.7	186
100 W	AFCZ18S-***□100△	40, 50, 60	1	S6	2.7	185
200 W	AFCZ18S-***□200△	10, 12, 15, 20, 25, 30	1	S1/S2/S3	2.7	191
200 W	AFCZ18S-***□200△	10, 12, 15, 20, 25, 30	1	S6	2.7	187
200 W	AFCZ18S-***□200△	10, 12, 15, 20, 25, 30	1	S7	2.7	190
400 W	AFCZ18S-***□400△	7.5, 10	2	S1/S3	3.2	169
400 W	AFCZ18S-***□400△	7.5, 10	2	S7	3.2	168

Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: Please refer to page 816 for the performance table.

<Figure 3>



<Figure 4>

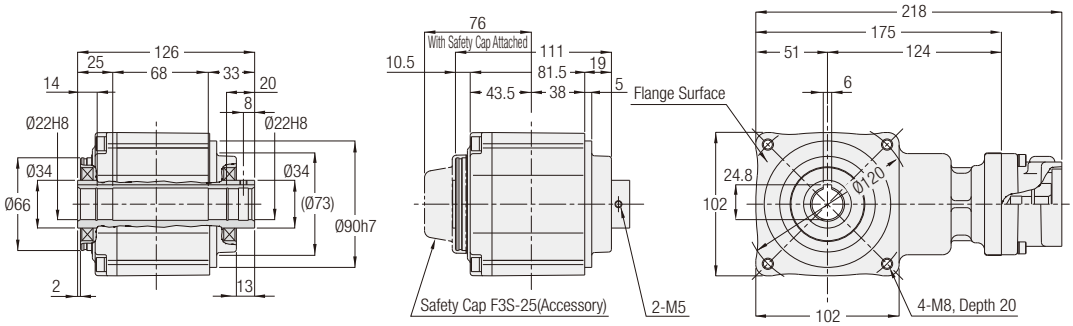


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
400 W	AFCZ18S-✻✻✻□400△	7.5, 10	3	S6	3.2	165
750 W	AFCZ18S-✻✻✻□750△	3, 5	3	S1/S2/S3/S4/S9	3.2	181
750 W	AFCZ18S-✻✻✻□750△	3, 5	4	SA	3.2	—

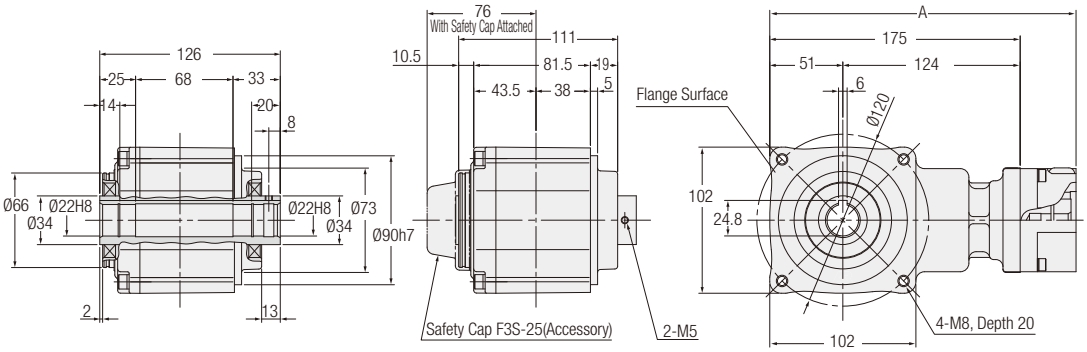
Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: Please refer to page 816 for the performance table.

AFC Type Right Angle Hollow Bore — Shaft Diameter 22 — Backlash 3 arc min/30 arc min

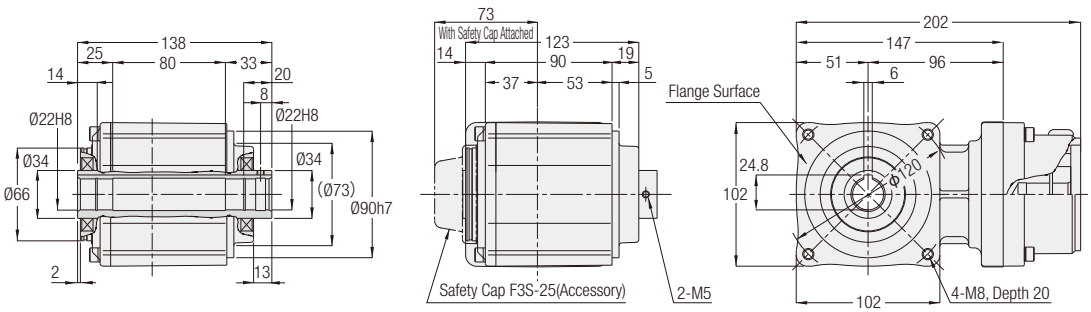
<Figure 1>



<Figure 2>



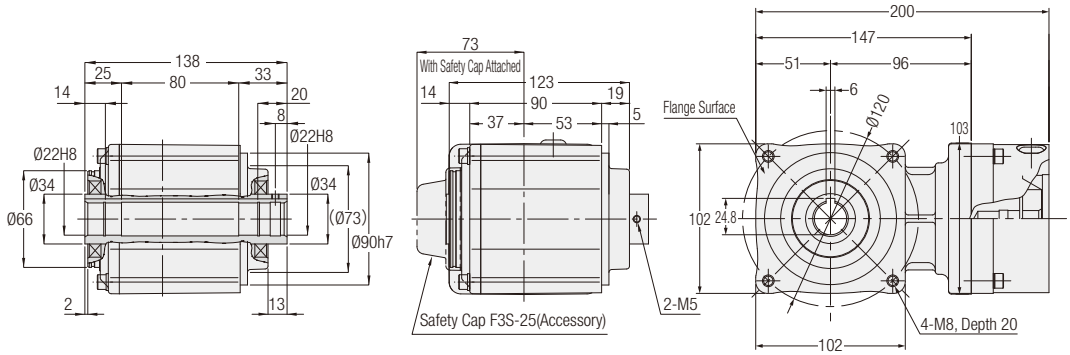
<Figure 3>



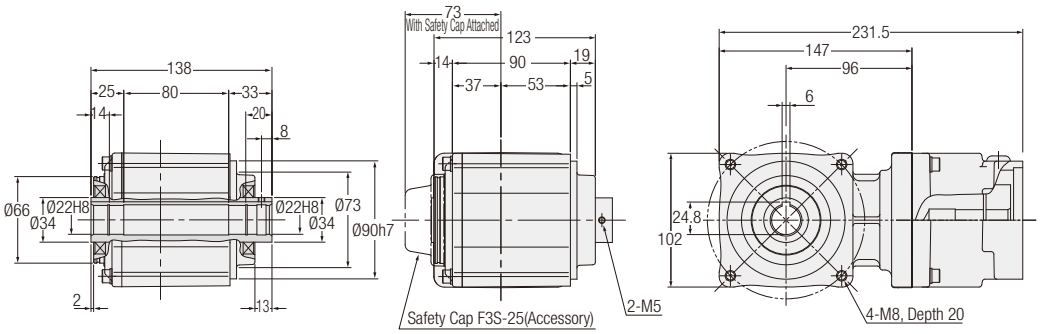
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
200 W	AFCZ22S-✱✱✱□200△	40, 50, 60	1	S1/S2/S3	4.3	—
200 W	AFCZ22S-✱✱✱□200△	40, 50, 60	2	S6	4.3	214
200 W	AFCZ22S-✱✱✱□200△	40, 50, 60	2	S7	4.3	217
400 W	AFCZ22S-✱✱✱□400△	10, 12, 15, 20, 25, 30	1	S1/S3	4.3	—
400 W	AFCZ22S-✱✱✱□400△	10, 12, 15, 20, 25, 30	2	S6	4.3	214
400 W	AFCZ22S-✱✱✱□400△	10, 12, 15, 20, 25, 30	2	S7	4.3	217
750 W	AFCZ22S-✱✱✱□750△	7.5, 10	3	S1/S2/S3/S4/S9	5.4	—

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: Please refer to page 816 for the performance table.

<Figure 4>



<Figure 5>



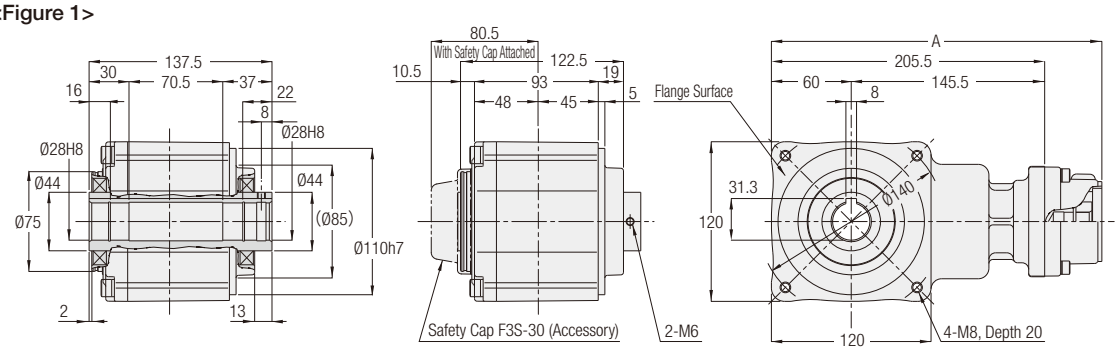
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
750 W	AFCZ22S-***□750△	7.5, 10	4	SA	5.4	200
1000 W	AFCZ22S-***□1000△	3, 5	4	K13/K22/K23/K61	6.2	231.5
1000 W	AFCZ22S-***□1000△	3, 5	5	KC9	6.2	—

Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: Please refer to page 816 for the performance table.

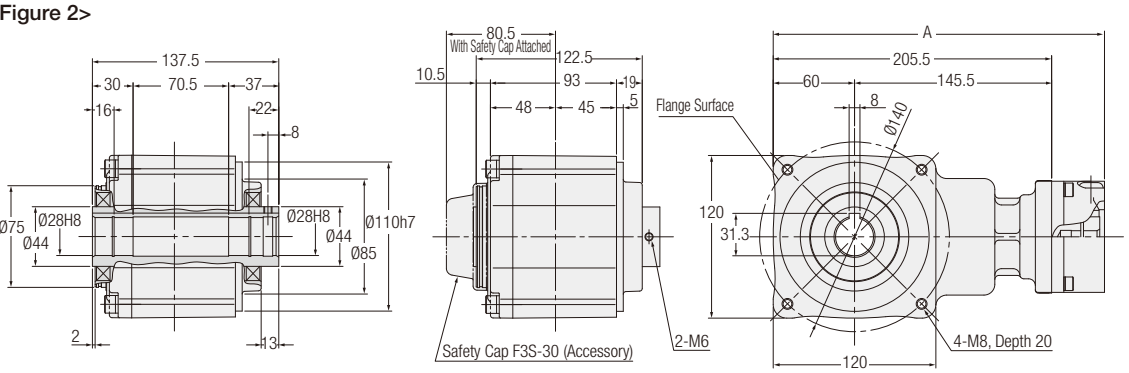
AFC Type Right Angle Hollow Bore — Shaft Diameter 28 — Backlash 3 arc min/30 arc min

The values in parentheses ( ) are the indications for flange type K75.

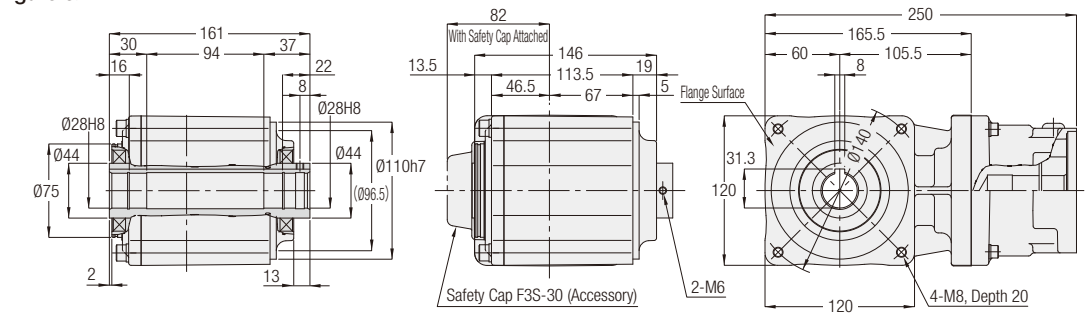
<Figure 1>



<Figure 2>



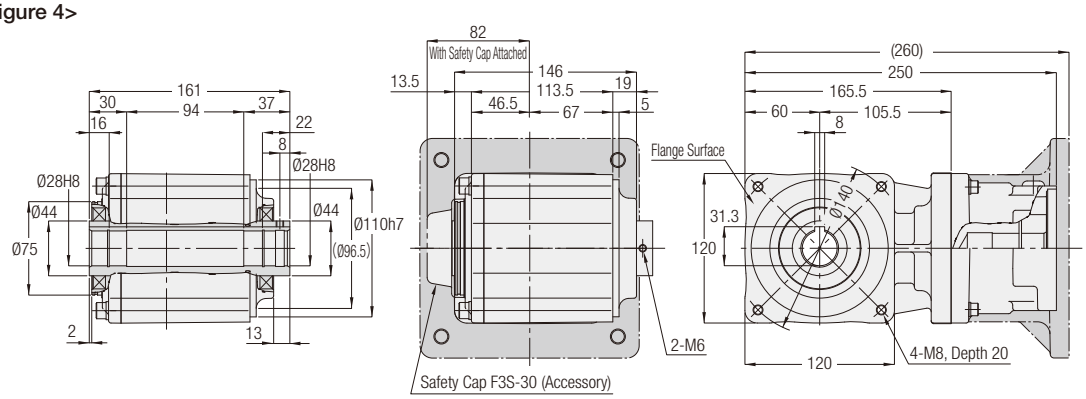
<Figure 3>



Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
400 W	AFCZ28S-***□400△	40, 50, 60	1	S1/S3	6.6	248.5
400 W	AFCZ28S-***□400△	40, 50, 60	2	S6	6.6	244.5
400 W	AFCZ28S-***□400△	40, 50, 60	2	S7	6.6	247.5
750 W	AFCZ28S-***□750△	10, 12, 15, 20, 25, 30	1	S1/S2/S3/S4/S9	6.6	260.5
750 W	AFCZ28S-***□750△	10, 12, 15, 20, 25, 30	1	SA	6.6	258.5
1000 W	AFCZ28S-***□1000△	7.5, 10	3	K13/K22/K23/K61/KC9	8.8	—

Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: The drawings shown in the dark color are outline drawings of flange type K75.
Note: Please refer to page 816 for the performance table.

<Figure 4>



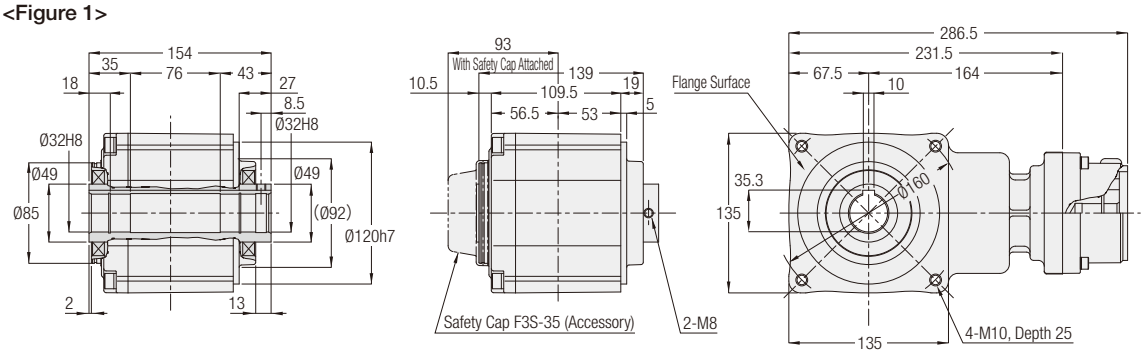
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
2000 W	AFCZ28S-***□2000△	3, 5	4	K13/K21/K22/K23/K31/K32/K33/ K41	8.8
2000 W	AFCZ28S-***□2000△	3, 5	4	K75	9.8

Note: A reduction ratio will be indicated as *** in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: The drawings shown in the dark color are outline drawings of flange type K75.
Note: Please refer to page 816 for the performance table.

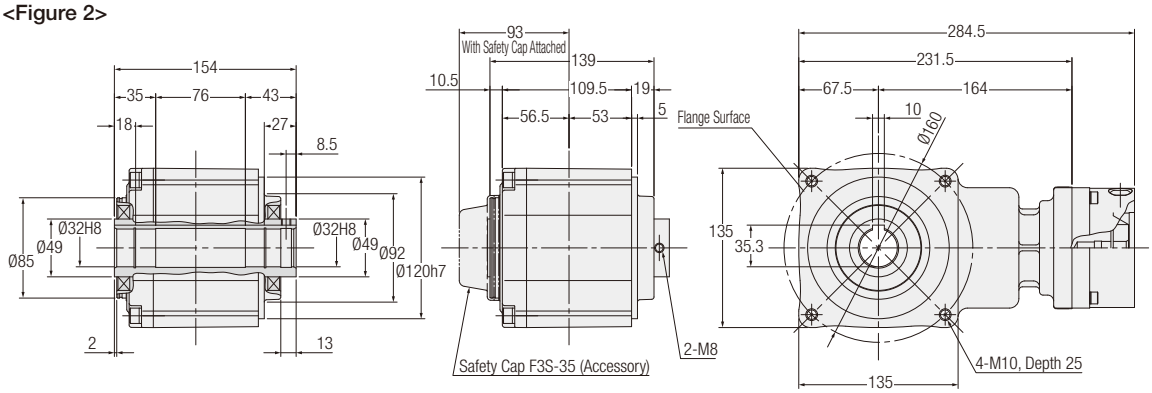
AFC Type Right Angle Hollow Bore — Shaft Diameter 32 — Backlash 3 arc min/30 arc min

The values in parentheses ( ) are the indications for flange type K75.

<Figure 1>



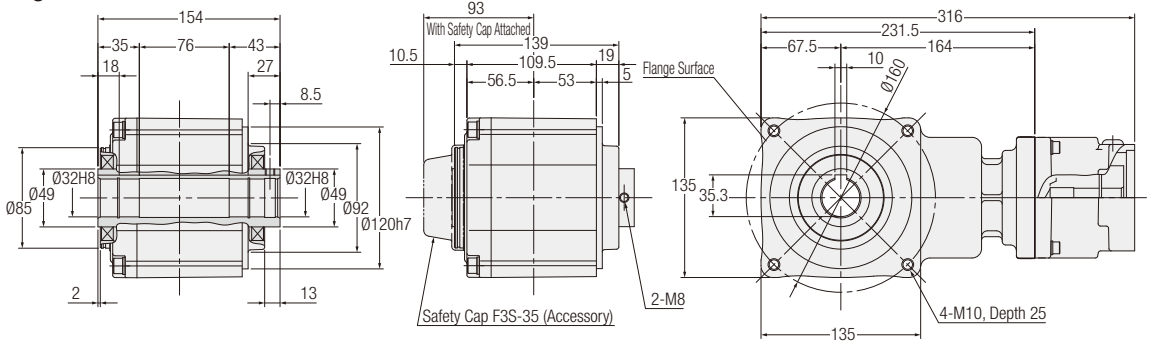
<Figure 2>



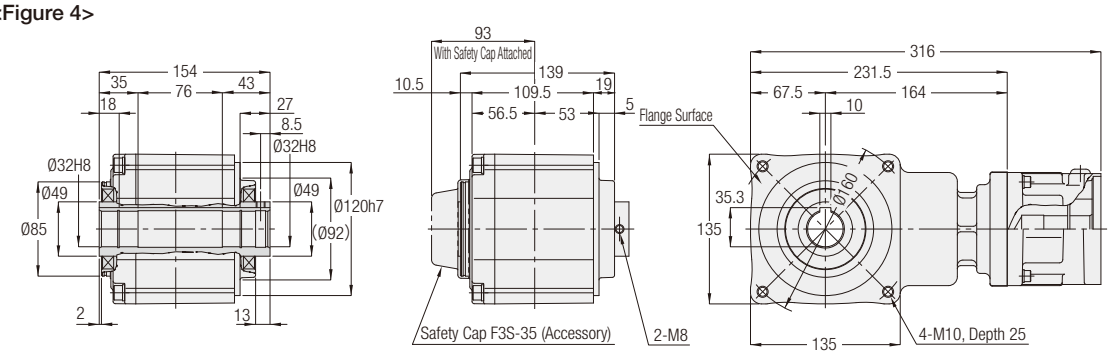
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
750 W	AFCZ32S-✻✻✻□750△	40, 50, 60	1	S1/S2/S3/S4/S9	10
750 W	AFCZ32S-✻✻✻□750△	40, 50, 60	2	SA	10

Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: The drawings shown in the dark color are outline drawings of flange type K75.
Note: Please refer to page 816 for the performance table.

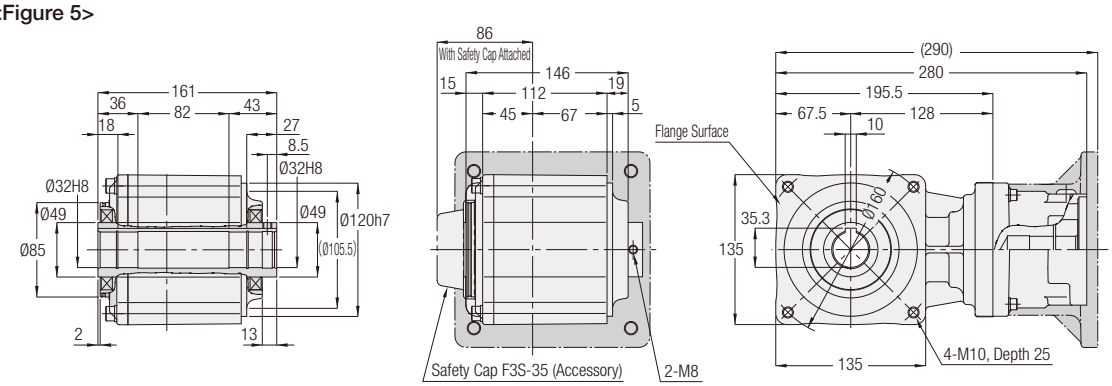
<Figure 3>



<Figure 4>



<Figure 5>

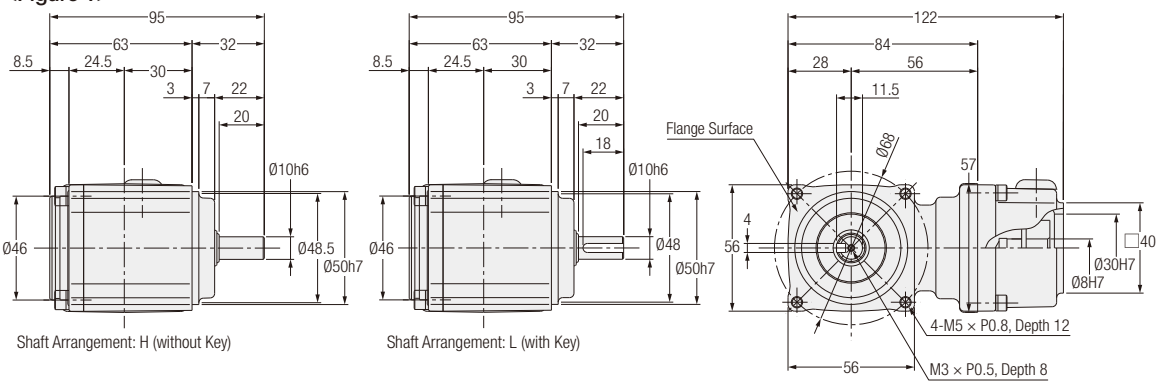


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
1000 W	AFCZ32S-✱✱✱□1000△	10, 12, 15, 20, 25, 30	3	KC9	10.5
1000 W	AFCZ32S-✱✱✱□1000△	10, 12, 15, 20, 25, 30	4	K13/K22/K23/K61	10.5
2000 W	AFCZ32S-✱✱✱□2000△	7.5, 10	5	K13/K21/K22/K23/K31/K32/K33/K41	11
2000 W	AFCZ32S-✱✱✱□2000△	7.5, 10	5	K75	9.8
3000 W	AFCZ32S-✱✱✱□3000△	3, 5	5	K13/K21/K22/K23/K32/K33/K34/K52	11
3000 W	AFCZ32S-✱✱✱□3000△	3, 5	5	K75/KBC	12

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: The drawings shown in the dark color are outline drawings of flange type K75.
Note: Please refer to page 816 for the performance table.

AFC Type Right Angle Shaft | Shaft Diameter 10 | Backlash 3 arc min/30 arc min

<Figure 1>



Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
100 W	AFCZ10#-***□100△	3, 5	1	S1/S3/S6	1.5

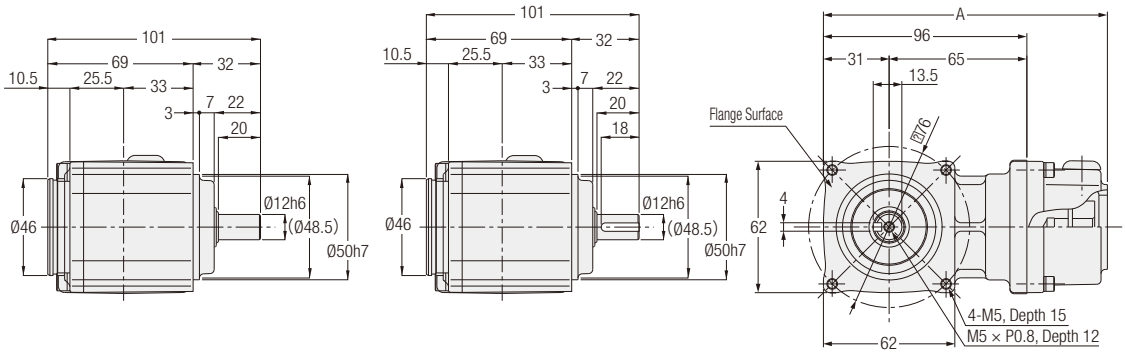
Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.

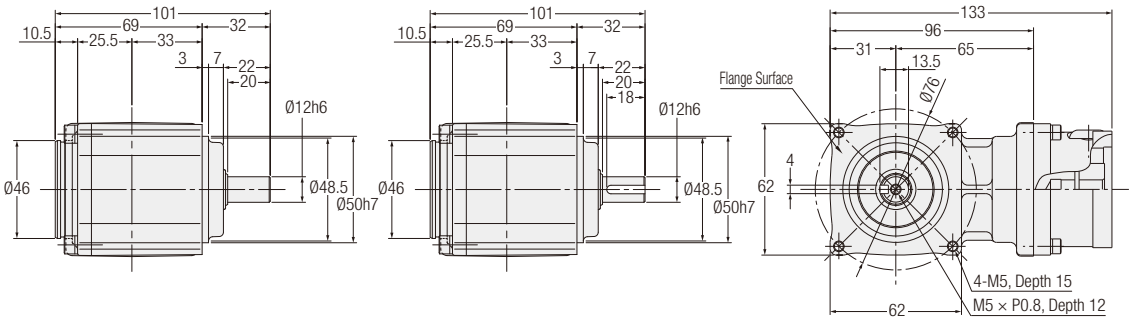
Note: Please refer to page 818 for the performance table.

AFC Type Right Angle Shaft | Shaft Diameter 12 | Backlash 3 arc min/30 arc min

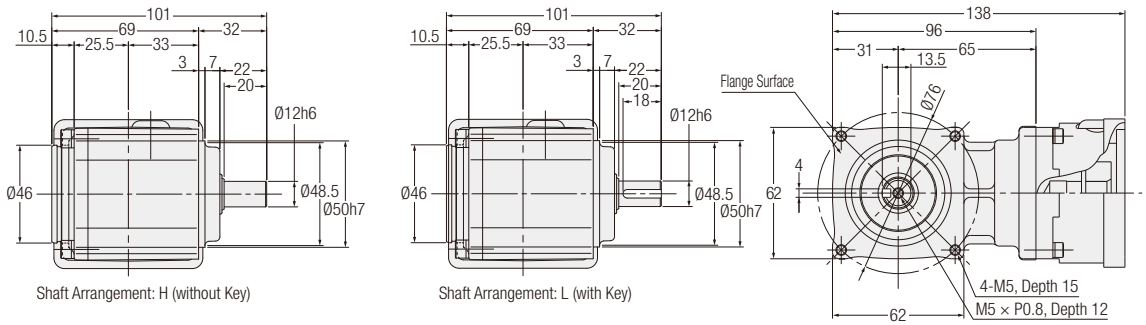
<Figure 1>



<Figure 2>



<Figure 3>



Shaft Arrangement: H (without Key)

Shaft Arrangement: L (with Key)

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
100 W	AFCZ12#-***□100△	7.5, 10	1	S1/S3	1.5	134
100 W	AFCZ12#-***□100△	7.5, 10	2	S6	1.5	—
200 W	AFCZ12#-***□200△	5	1	S1/S2/S3	1.5	139
200 W	AFCZ12#-***□200△	5	1	S6	1.5	135
200 W	AFCZ12#-***□200△	5	3	S7	1.5	—

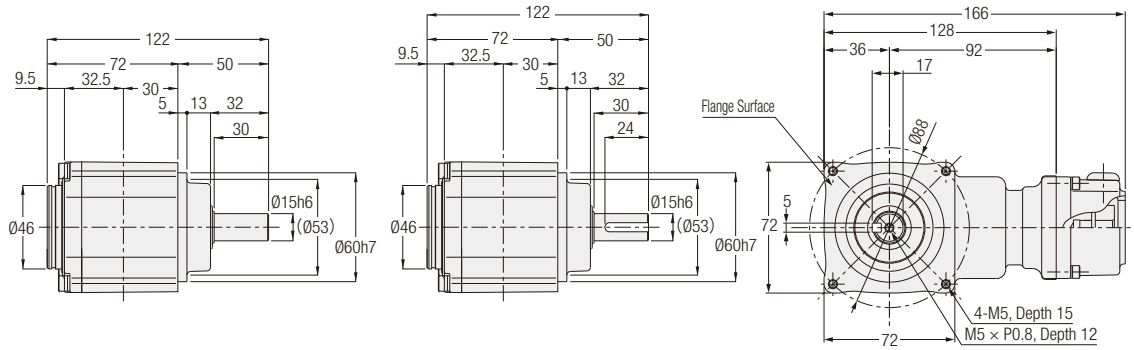
Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.

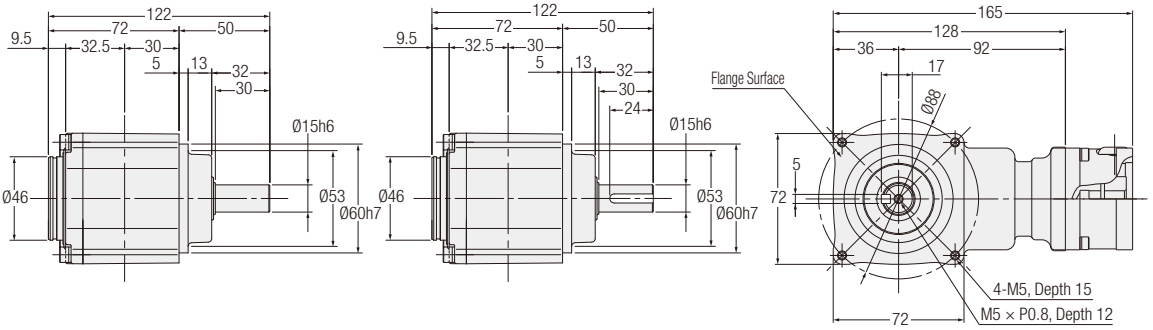
Note: Please refer to page 818 for the performance table.

AFC Type Right Angle Shaft Shaft Diameter 15 Backlash 3 arc min/30 arc min

<Figure 1>



<Figure 2>



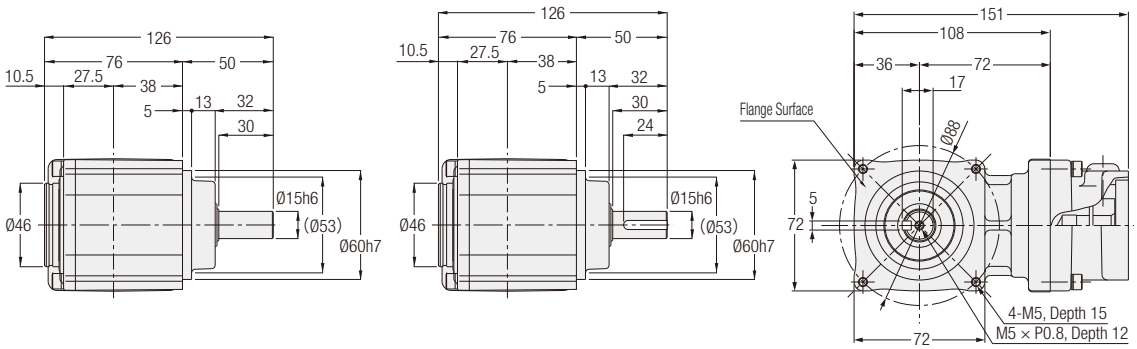
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
100 W	AFCZ15#-✱✱✱□100△	10, 12, 15, 20, 25, 30	1	S1/S3	2.0
100 W	AFCZ15#-✱✱✱□100△	10, 12, 15, 20, 25, 30	2	S6	2.0

Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ✱✱✱, backlash will be indicated as □, and a flange type will be indicated as △.

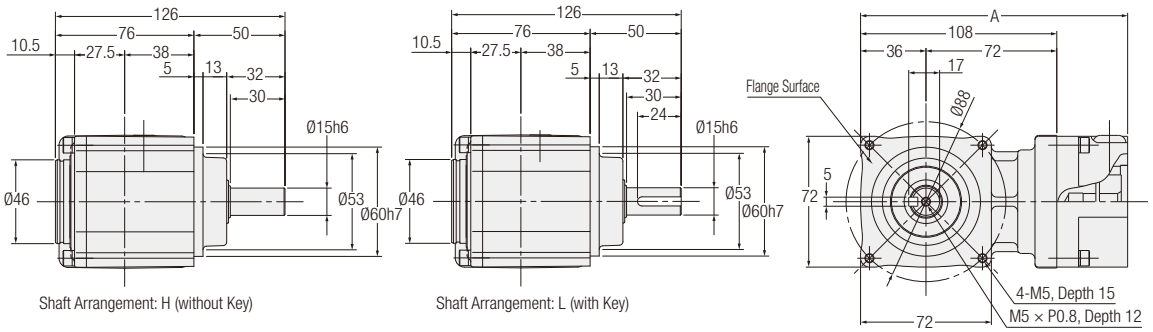
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.

Note: Please refer to page 818 for the performance table.

<Figure 3>



<Figure 4>

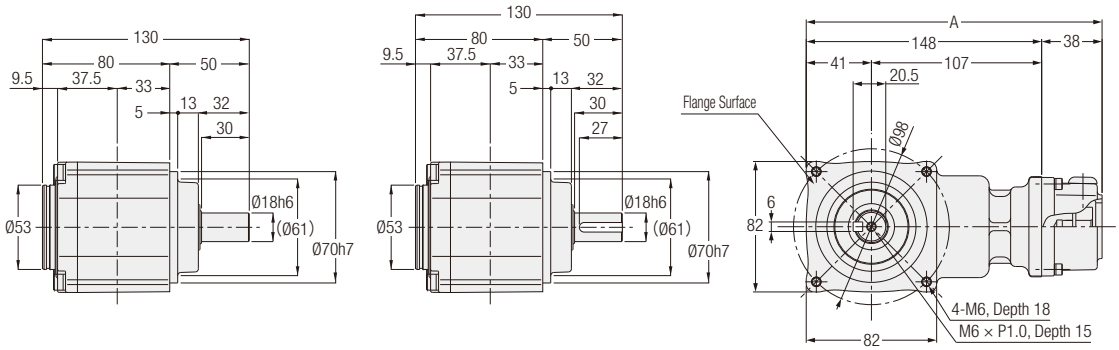


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
200 W	AFCZ15#-***□200△	7.5, 10	3	S1/S2/S3	2.6	—
200 W	AFCZ15#-***□200△	7.5, 10	4	S6	2.6	147
200 W	AFCZ15#-***□200△	7.5, 10	4	S7	2.6	150
400 W	AFCZ15#-***□400△	3, 5	3	S1/S3	2.6	—
400 W	AFCZ15#-***□400△	3, 5	4	S6	2.6	147
400 W	AFCZ15#-***□400△	3, 5	4	S7	2.6	150

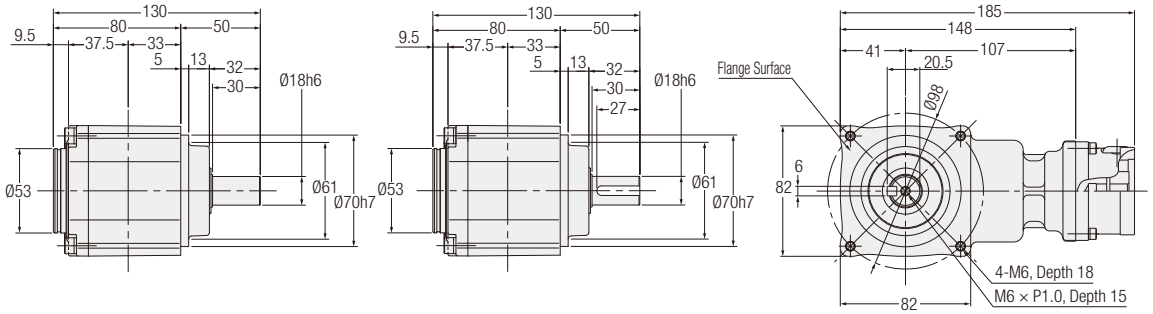
Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: Please refer to page 818 for the performance table.

AFC Type Right Angle Shaft Shaft Diameter 18 Backlash 3 arc min/30 arc min

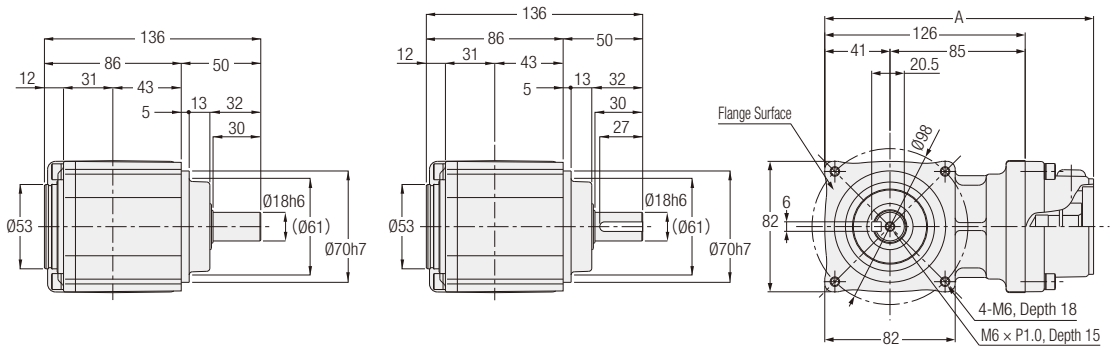
<Figure 1>



<Figure 2>



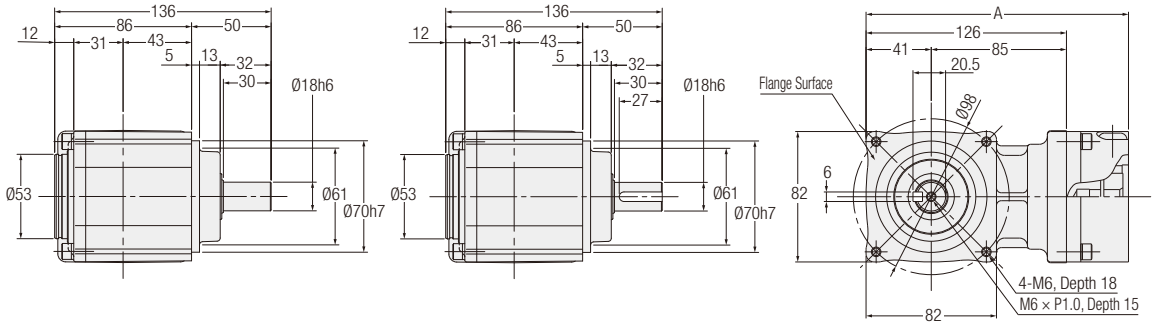
<Figure 3>



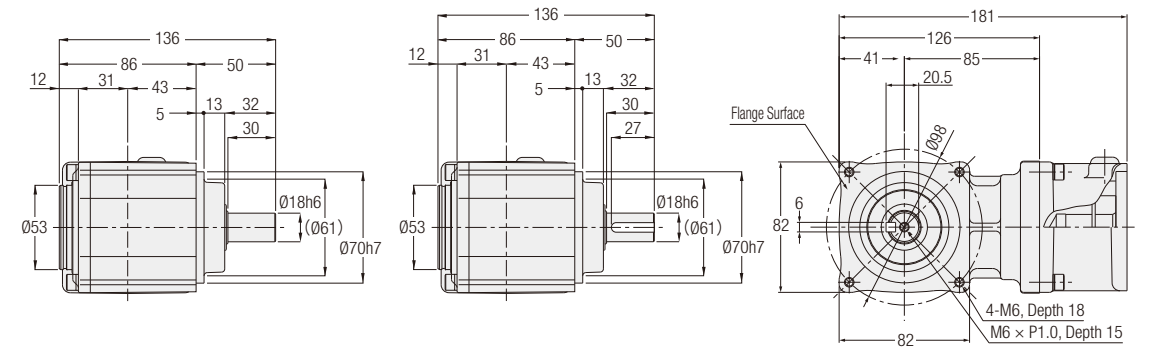
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
100 W	AFCZ18#-***□100△	40, 50, 60	1	S1/S3	2.8	186
100 W	AFCZ18#-***□100△	40, 50, 60	2	S6	2.8	—
200 W	AFCZ18#-***□200△	10, 12, 15, 20, 25, 30	1	S1/S2/S3	2.8	191
200 W	AFCZ18#-***□200△	10, 12, 15, 20, 25, 30	1	S6	2.8	187
200 W	AFCZ18#-***□200△	10, 12, 15, 20, 25, 30	1	S7	2.8	190
400 W	AFCZ18#-***□400△	7.5, 10	3	S1/S3	3.3	169
400 W	AFCZ18#-***□400△	7.5, 10	3	S7	3.3	168

Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: Please refer to page 818 for the performance table.

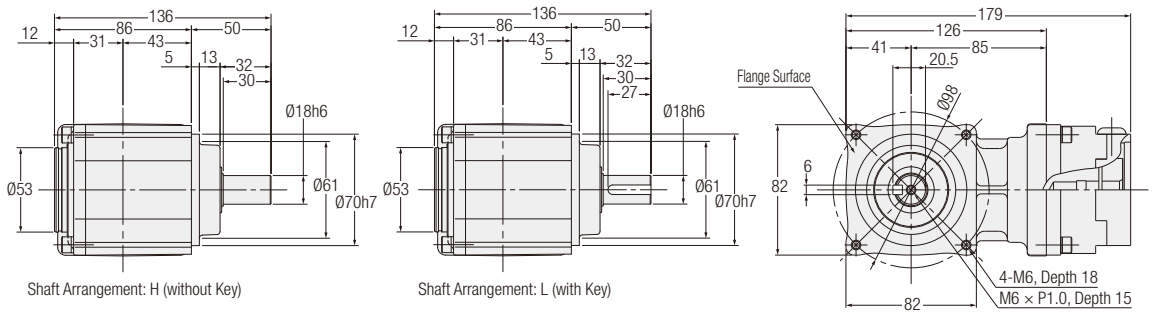
<Figure 4>



<Figure 5>



<Figure 6>



Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
400 W	AFCZ18#-***□400△	7.5, 10	4	S6	3.3	165
750 W	AFCZ18#-***□750△	3, 5	5	S1/S2/S3/S4/S9	3.3	—
750 W	AFCZ18#-***□750△	3, 5	6	SA	3.3	—

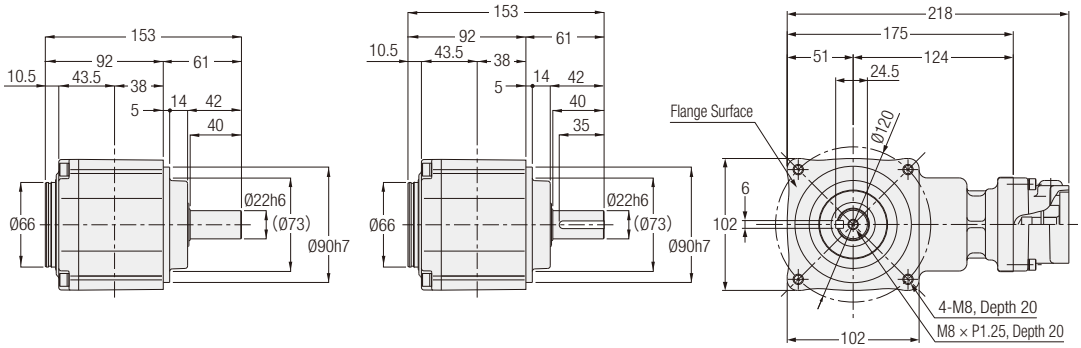
Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.

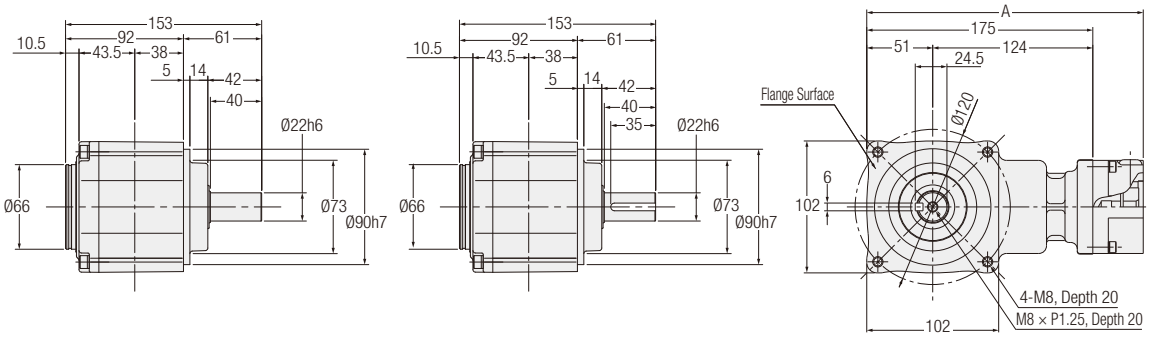
Note: Please refer to page 818 for the performance table.

AFC Type Right Angle Shaft | Shaft Diameter 22 | Backlash 3 arc min/30 arc min

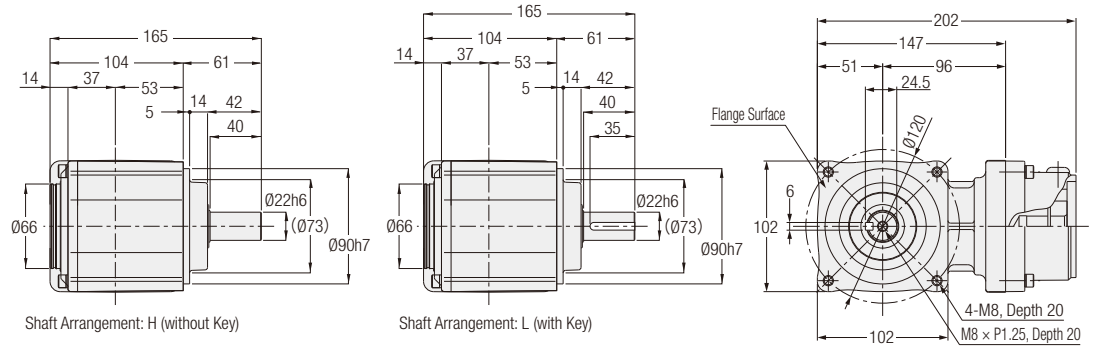
<Figure 1>



<Figure 2>



<Figure 3>



Shaft Arrangement: H (without Key)

Shaft Arrangement: L (with Key)

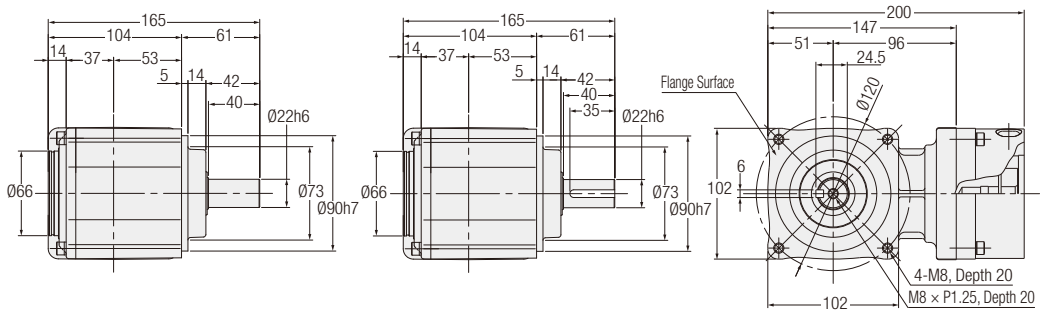
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
200 W	AFCZ22#-***□200△	40, 50, 60	1	S1/S2/S3	4.6	—
200 W	AFCZ22#-***□200△	40, 50, 60	2	S6	4.6	214
200 W	AFCZ22#-***□200△	40, 50, 60	2	S7	4.6	217
400 W	AFCZ22#-***□400△	10, 12, 15, 20, 25, 30	1	S1/S3	4.6	—
400 W	AFCZ22#-***□400△	10, 12, 15, 20, 25, 30	2	S6	4.6	214
400 W	AFCZ22#-***□400△	10, 12, 15, 20, 25, 30	2	S7	4.6	217
750 W	AFCZ22#-***□750△	7.5, 10	3	S1/S2/S3/S4/S9	5.7	—

Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

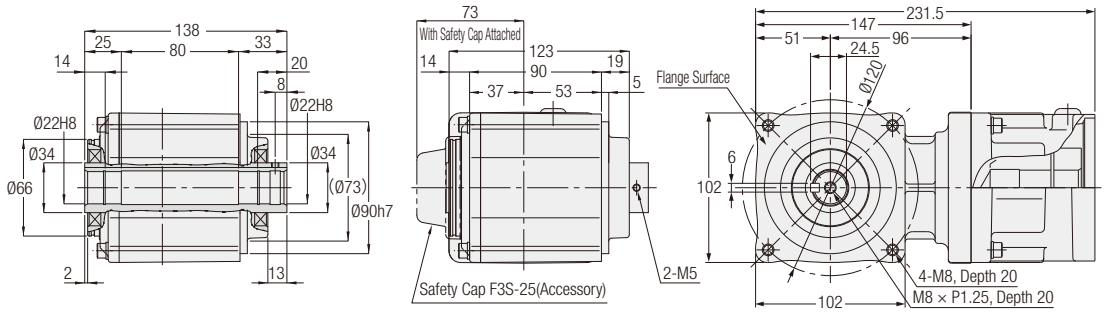
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.

Note: Please refer to page 818 for the performance table.

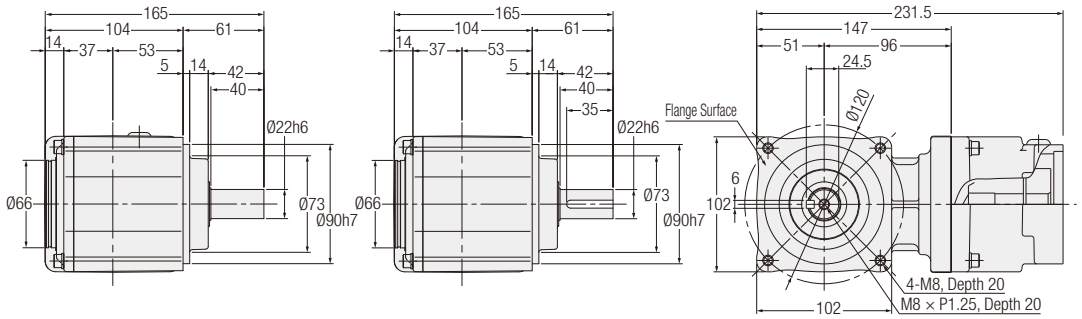
<Figure 4>



<Figure 5>



<Figure 6>



Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
750 W	AFCZ22#-***□750△	7.5, 10	4	SA	5.7
1000 W	AFCZ22#-***□1000△	3, 5	5	K13/K22/K23/K61	6.5
1000 W	AFCZ22#-***□1000△	3, 5	6	KC9	6.5

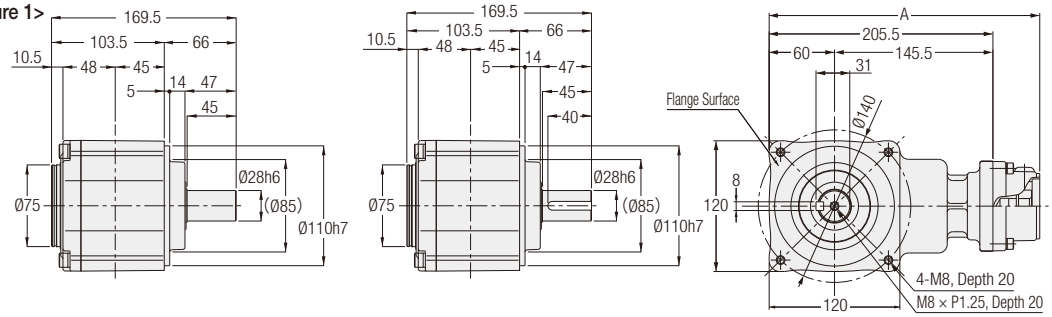
Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.

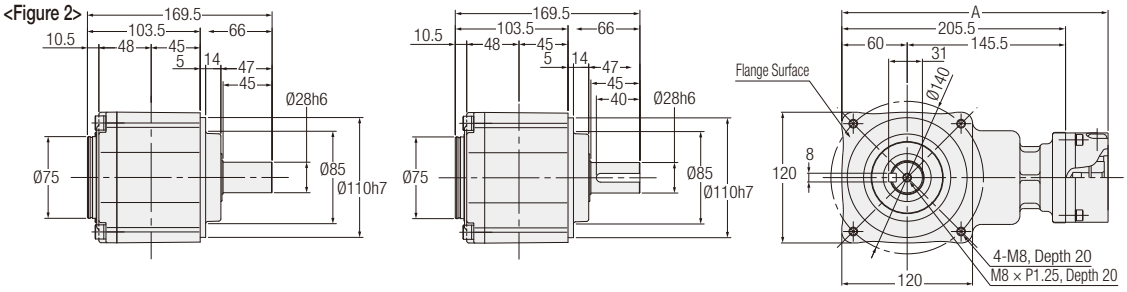
Note: Please refer to page 818 for the performance table.

AFC Type Right Angle Shaft Shaft Diameter 28 Backlash 3 arc min/30 arc min

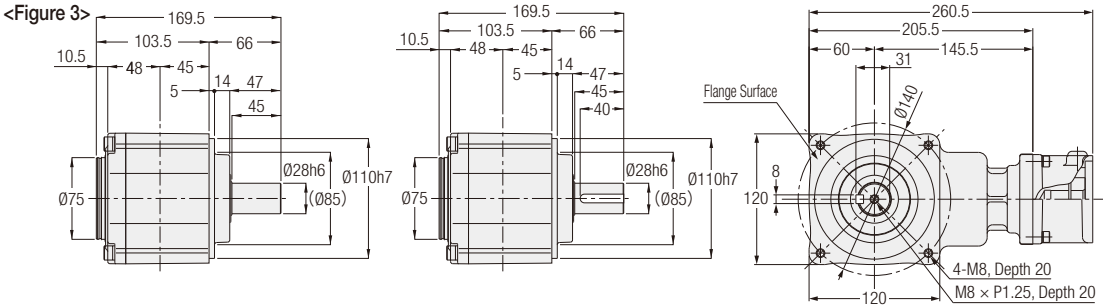
<Figure 1>



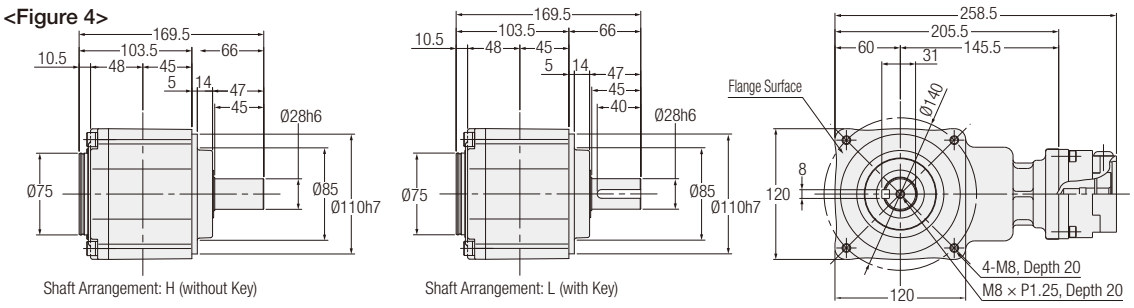
<Figure 2>



<Figure 3>



<Figure 4>



Shaft Arrangement: H (without Key)

Shaft Arrangement: L (with Key)

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
400 W	AFCZ28#-***□400△	40, 50, 60	1	S1/S3	7.2	248.5
400 W	AFCZ28#-***□400△	40, 50, 60	2	S6	7.2	244.5
400 W	AFCZ28#-***□400△	40, 50, 60	1	S7	7.2	247.5
750 W	AFCZ28#-***□750△	10, 12, 15, 20, 25, 30	3	S1/S2/S3/S4/S9	7.2	—
750 W	AFCZ28#-***□750△	10, 12, 15, 20, 25, 30	4	SA	7.2	—

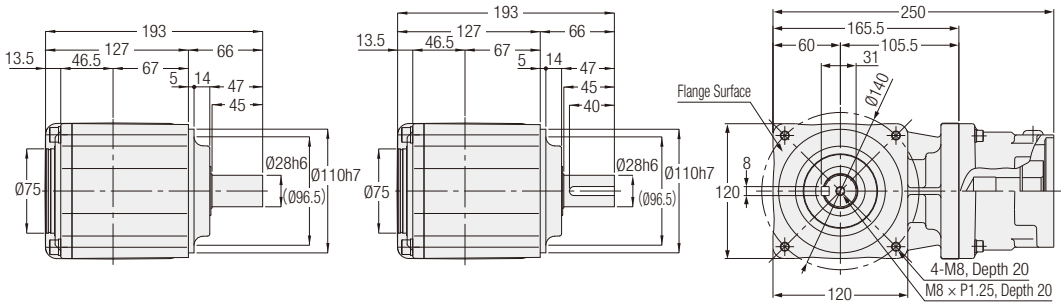
Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.

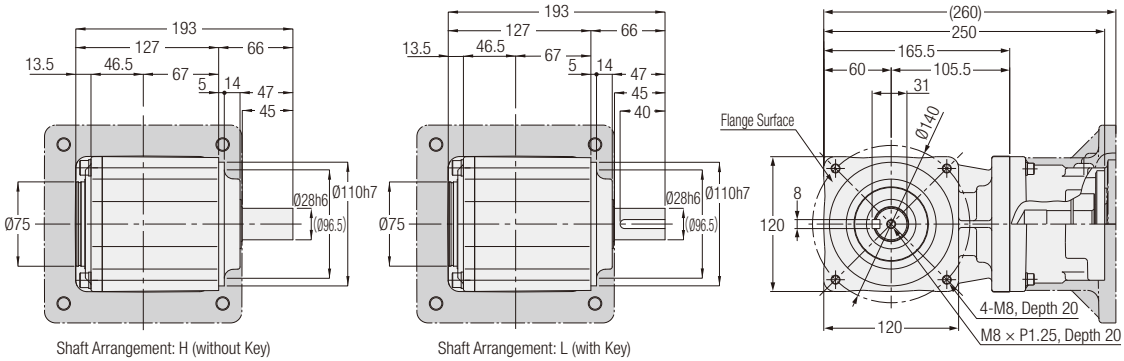
Note: Please refer to page 818 for the performance table.

The values in parentheses ( ) are the indications for flange type K75.

<Figure 5>



<Figure 6>



Shaft Arrangement: H (without Key)

Shaft Arrangement: L (with Key)

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
1000 W	AFCZ28#-***□1000△	7.5, 10	5	K13/K22/K23/K61/KC9	9.5
2000 W	AFCZ28#-***□2000△	3, 5	6	K13/K21/K22/K23/K31/K32/K33/ K41	9.5
2000 W	AFCZ28#-***□2000△	3, 5	6	K75	10.5

Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.

Note: The drawings shown in the dark color are outline drawings of flange type K75.

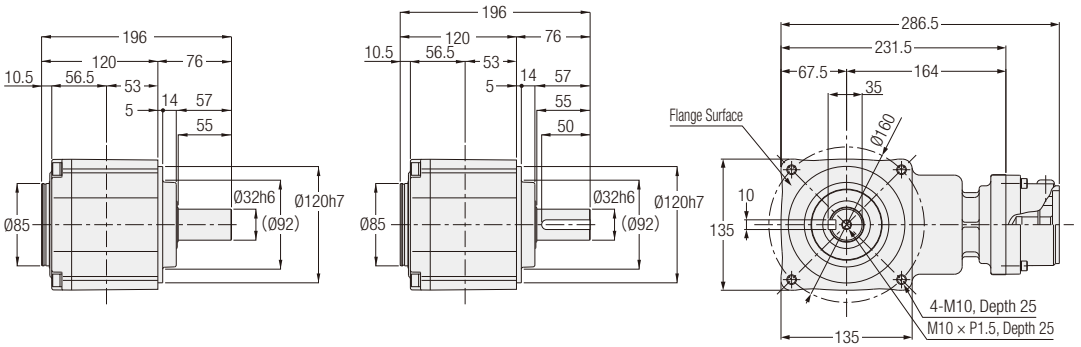
Note: Please refer to page 818 for the performance table.

AFC Type Right Angle Shaft

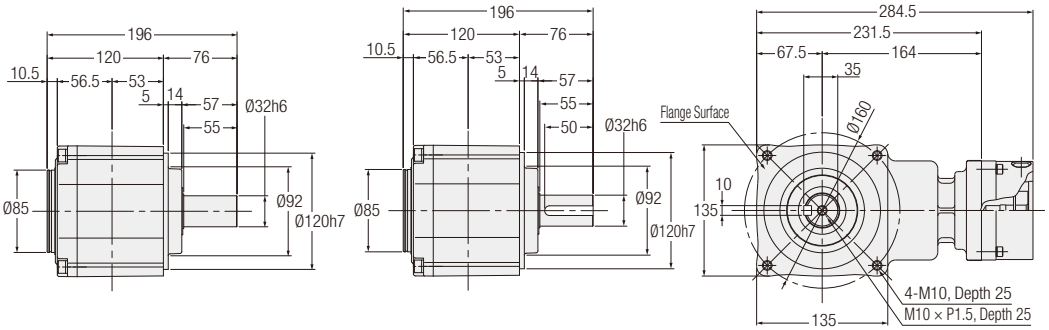
Shaft Diameter 32 Backlash 3 arc min/30 arc min

The values in parentheses ( ) are the indications for flange type K75.

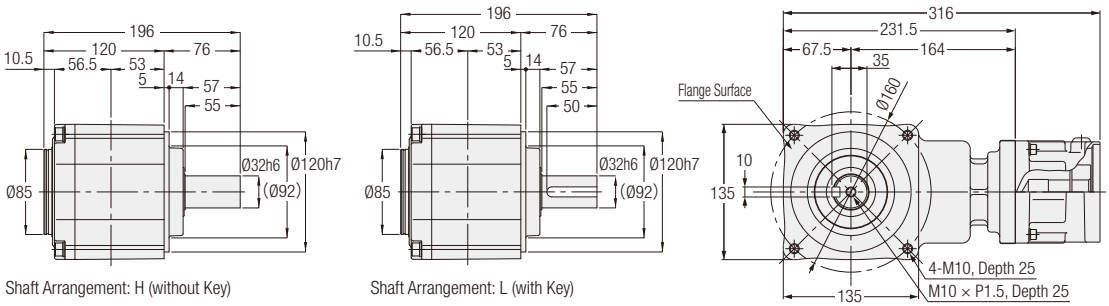
<Figure 1>



<Figure 2>



<Figure 3>



Shaft Arrangement: H (without Key)

Shaft Arrangement: L (with Key)

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
750 W	AFCZ32#-***□750△	40, 50, 60	1	S1/S2/S3/S4/S9	11
750 W	AFCZ32#-***□750△	40, 50, 60	2	SA	11
1000 W	AFCZ32#-***□1000△	10, 12, 15, 20, 25, 30	3	K13/K22/K23/K61	11.5

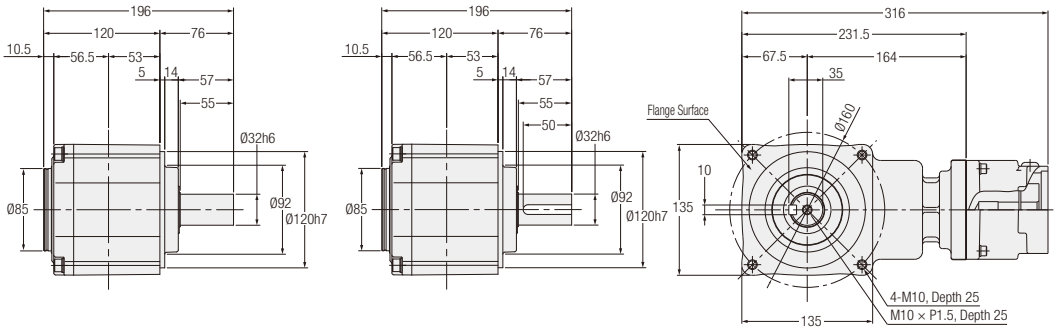
Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.

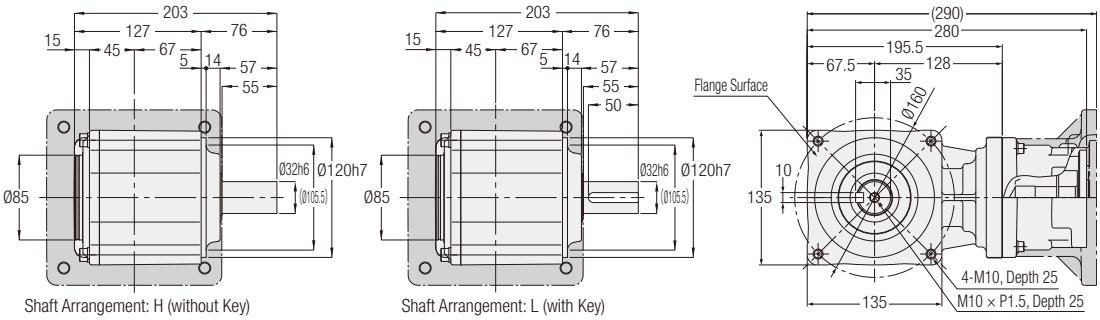
Note: The drawings shown in the dark color are outline drawings of flange type K75.

Note: Please refer to page 818 for the performance table.

<Figure 4>



<Figure 5>



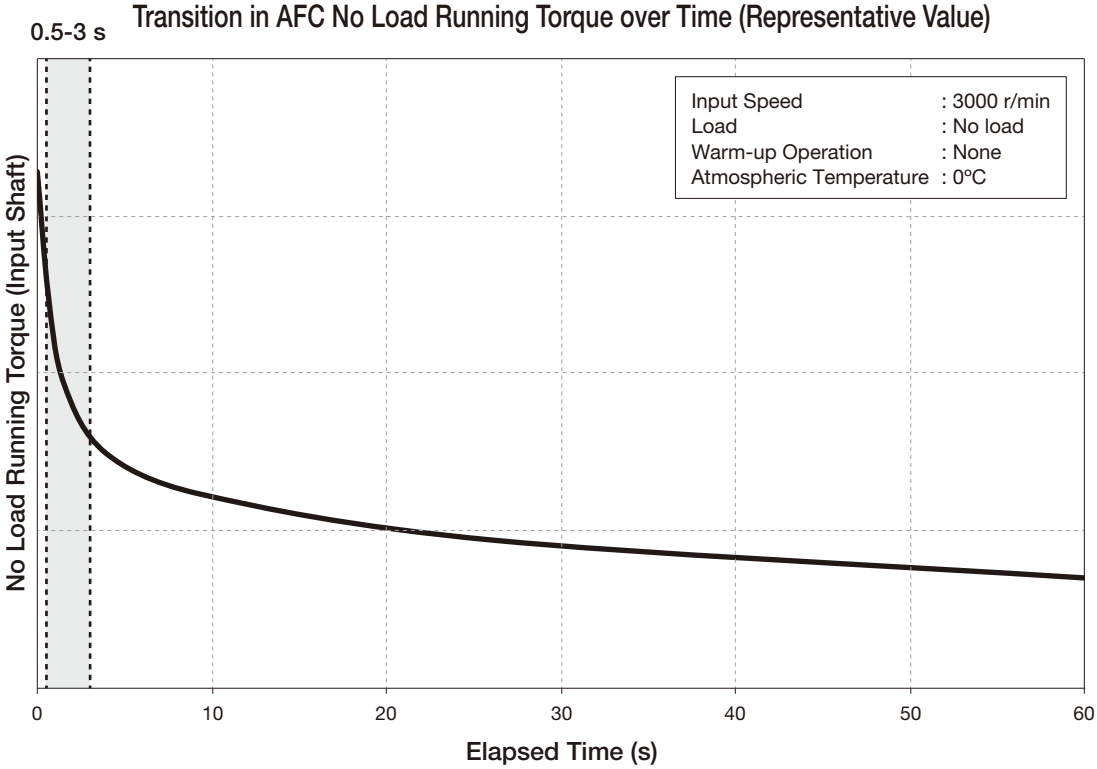
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
1000 W	AFCZ32#-***□1000△	10, 12, 15, 20, 25, 30	4	KC9	11.5
2000 W	AFCZ32#-***□2000△	7.5, 10	5	K13/K21/K22/K23/K31/K32/K33/ K41	12
2000 W	AFCZ32#-***□2000△	7.5, 10	5	K75	13
3000 W	AFCZ32#-***□3000△	3, 5	5	K13/K21/K22/K23/K32/K33/K34/ K52/KBC	12
3000 W	AFCZ32#-***□3000△	3, 5	5	K75	13

Note: A shaft arrangement (H, L) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 905 to 911 for the detailed dimensions of the input shaft area.
Note: The drawings shown in the dark color are outline drawings of flange type K75.
Note: Please refer to page 818 for the performance table.

1-3. Low Temperature Startup Characteristics (No Load Running Torque (Input Shaft))

No load running torque means the input shaft torque required to run the gearbox at the rated input speed (3000 r/min) under no load state.

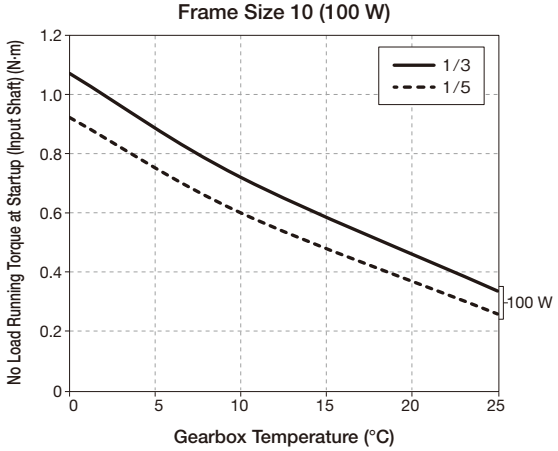
When the gearbox is used at low temperature, the no load running torque at a startup will increase.
When the operation is continued, the no load running torque will decrease with the temperature rise of the gearbox.
The rate of decrease differs depending on the model and the usage environment.
The figure below shows a representative value in a state where a warm-up operation is not performed.



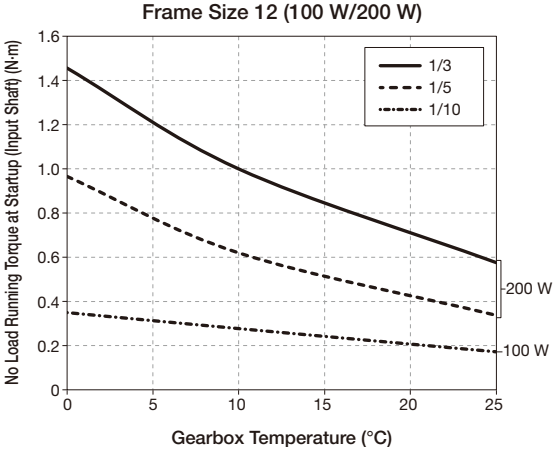
The figures on the pages that follow show the average value of the no load running torque of each type between 0.5 and 3 seconds.

Input Speed: 3000 r/min
No Load Running Torque (Input Shaft): Average value between 0.5 and 3 seconds
Each figure shows a representative value in a state where a warm-up operation is not performed.

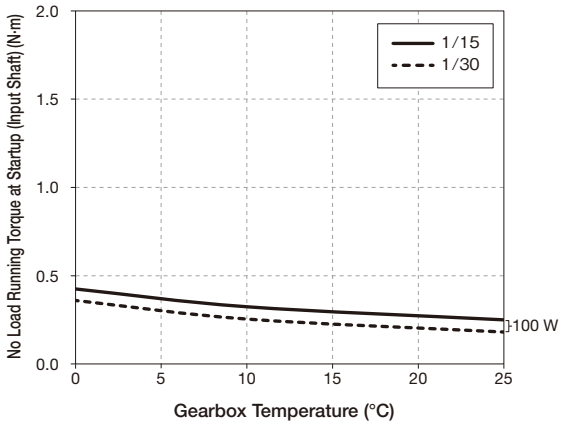
Frame Size 10 (100 W)



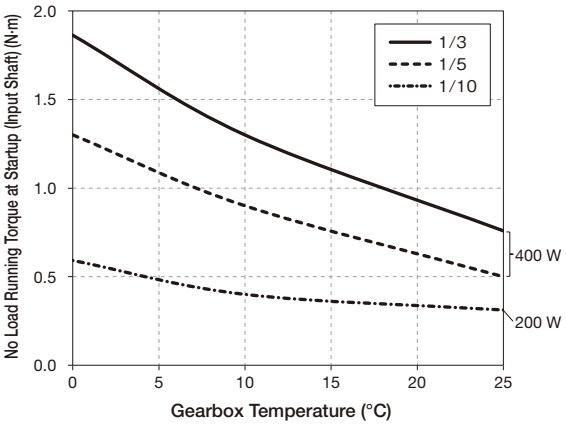
Frame Size 12 (100 W/200 W)



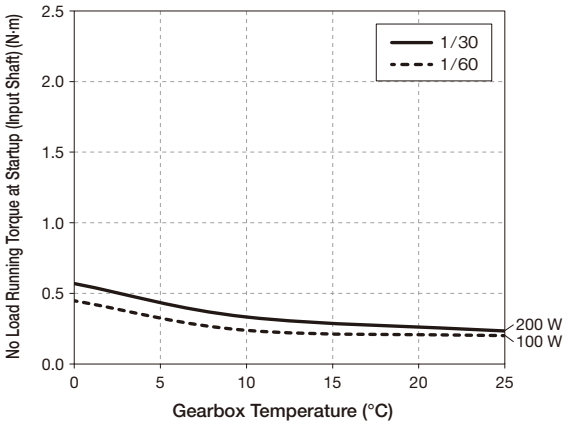
Frame Size 15 (100 W)



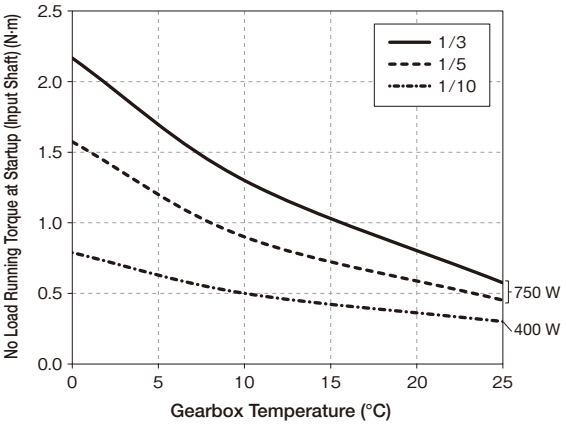
Frame Size 15 (200 W/400 W)



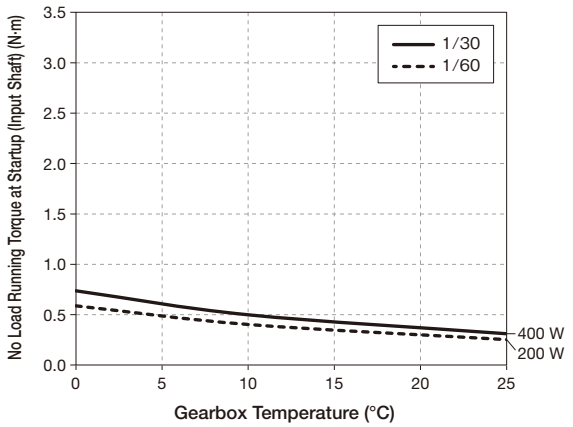
Frame Size 18 (100 W/200 W)



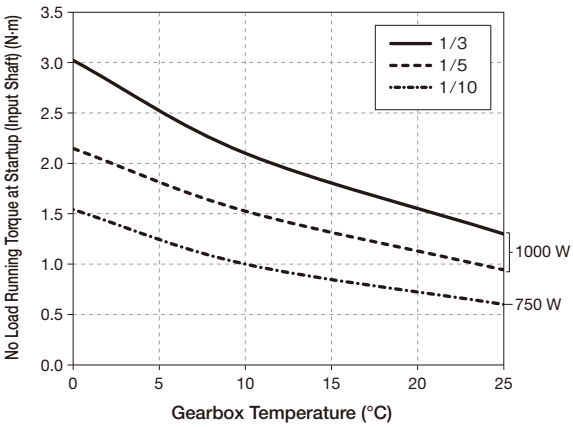
Frame Size 18 (400 W/750 W)



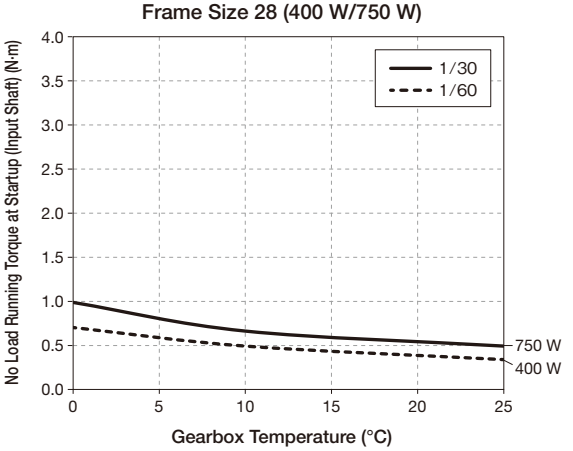
Frame Size 22 (200 W/400 W)



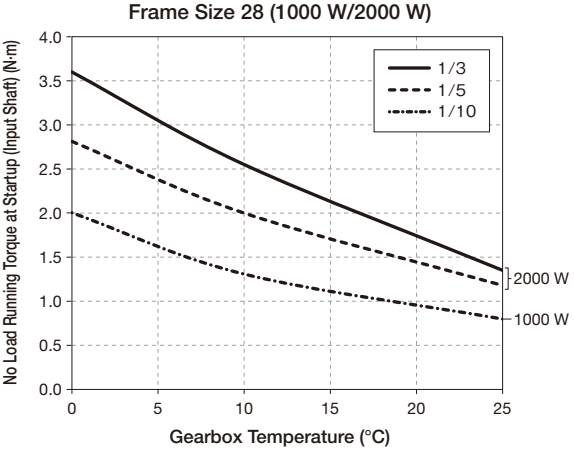
Frame Size 22 (750 W/1000 W)



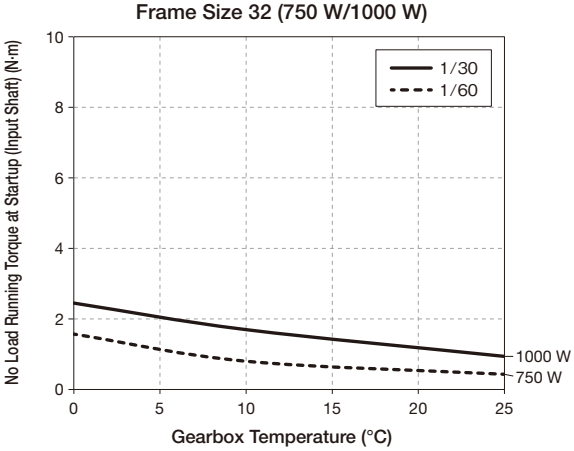
Frame Size 28 (400 W/750 W)



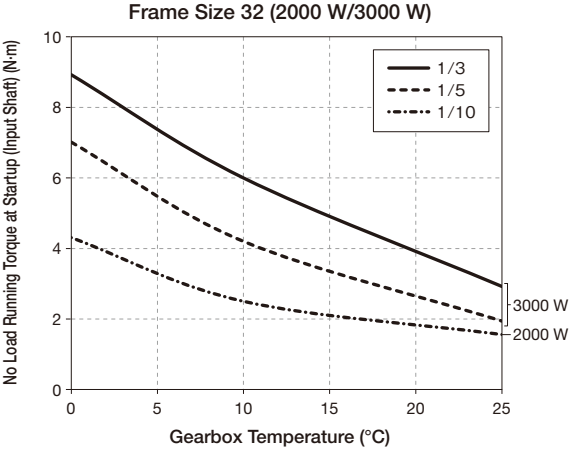
Frame Size 28 (1000 W/2000 W)



Frame Size 32 (750 W/1000 W)



Frame Size 32 (2000 W/3000 W)



AF3 Type

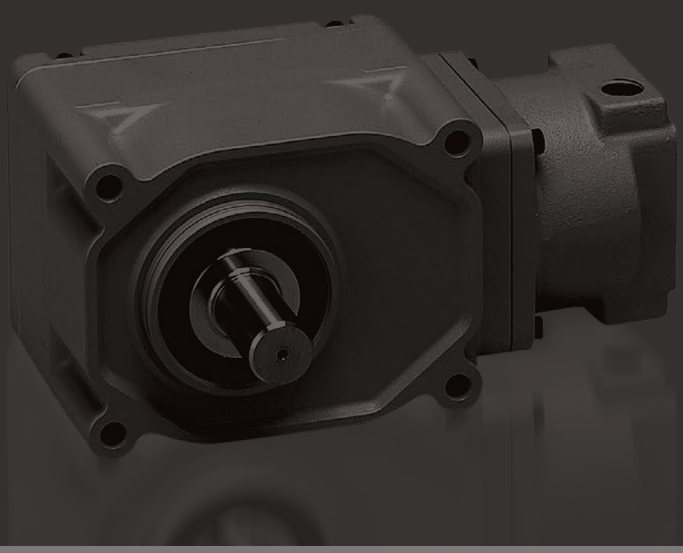
Concentric Right Angle Hollow Bore/ Concentric Right Angle Shaft

Model and Type Codes
Standard Model Lineup

P.852
P.866

HIGH PRECISION GEARBOXES FOR SERVO MOTORS

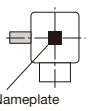
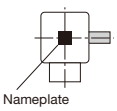
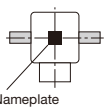
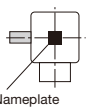
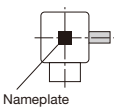
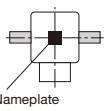
1. High Precision Gearboxes for Servo Motors Backlash 1 arc min/3 arc min Specifications
1-1. Performance Tables
1-2. Drawings
2. Low Backlash High Precision Gearboxes for Servo Motors
2-1. Performance Tables
2-2. Drawings



Model and Type Codes

AF3 Type

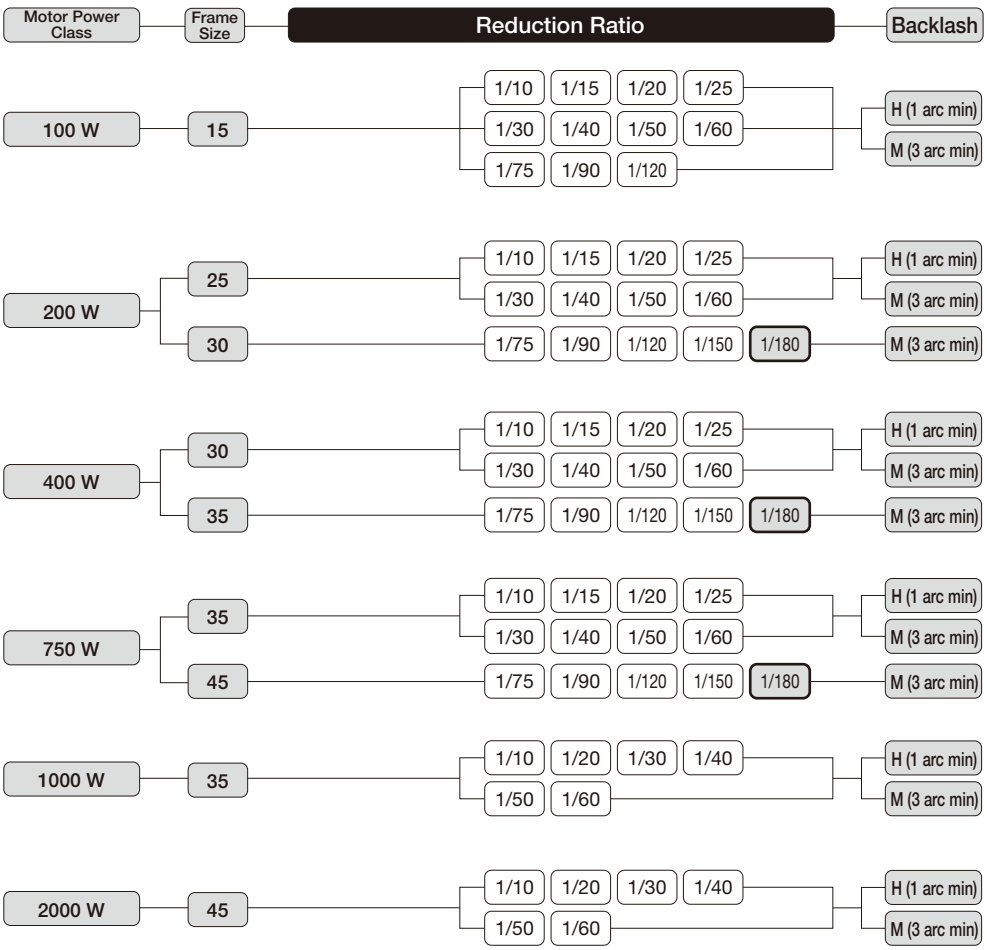
Mounting Type	Motor Type	Frame Size	Shaft Arrangement		Reduction Ratio	Backlash	Motor Power Class	Type	Option	Option Code
AF3S	Z	25		–	30	H	200	S1		
AF3S	Z	30		–	30	M	400	F3		
AF3F	Z	40	R	–	60	L	2000	K21	X	B3
①	②	③	④		⑤	⑥	⑦	⑧	⑨	⑩

①Mounting Type	AF3S : Concentric Right Angle Hollow Bore				
	AF3F : Concentric Right Angle Shaft				
②Motor Type	Z : High Precision Gearboxes for Servo Motor (Z Type Gearbox)				
③Frame Size and Output Shaft Diameter	Output Shaft Diameter				
④Shaft Arrangement	Concentric Right Angle Hollow Bore	Blank			
	Concentric Right Angle Shaft	1 arc min and 3 arc min specifications	Output shaft on the left side when viewed from the input shaft side  Nameplate	Output shaft on the right side when viewed from the input shaft side  Nameplate	Output shaft on both sides when viewed from the input shaft side  Nameplate
			H	M	F
		Low Backlash	Output shaft on the left side when viewed from the input shaft side  Nameplate	Output shaft on the right side when viewed from the input shaft side  Nameplate	Output shaft on both sides when viewed from the input shaft side  Nameplate
			L	R	T
⑤Reduction Ratio	5:1/5 to 240:1/240				
⑥Backlash	H : Backlash 1 arc min				
	M : Backlash 3 arc min				
	L : Backlash 30 arc min (excluding some models)				
⑦Motor Power Class	100 : 100 W Class				
	200 : 200 W Class				
	400 : 400 W Class				
	750 : 750 W Class				
	1000 : 1000 W Class (only 1 arc min and 3 arc min specifications)				
	2000 : 2000 W Class				
⑧Flange Type for Servo Motor Mounting	F1, S1, K31, etc.				
⑨Option	Blank : Standard Specification				
	X : Special Specification Code				
⑩Option Code (Note 1)	Position Code of Wrench Hole for Input Shaft Joint Tightening For details, please refer to the list of option codes on page 949.				

Note 1: The option code will not be shown in the nomenclature on the nameplate. But it will be shown in the Option code row of the nameplate.

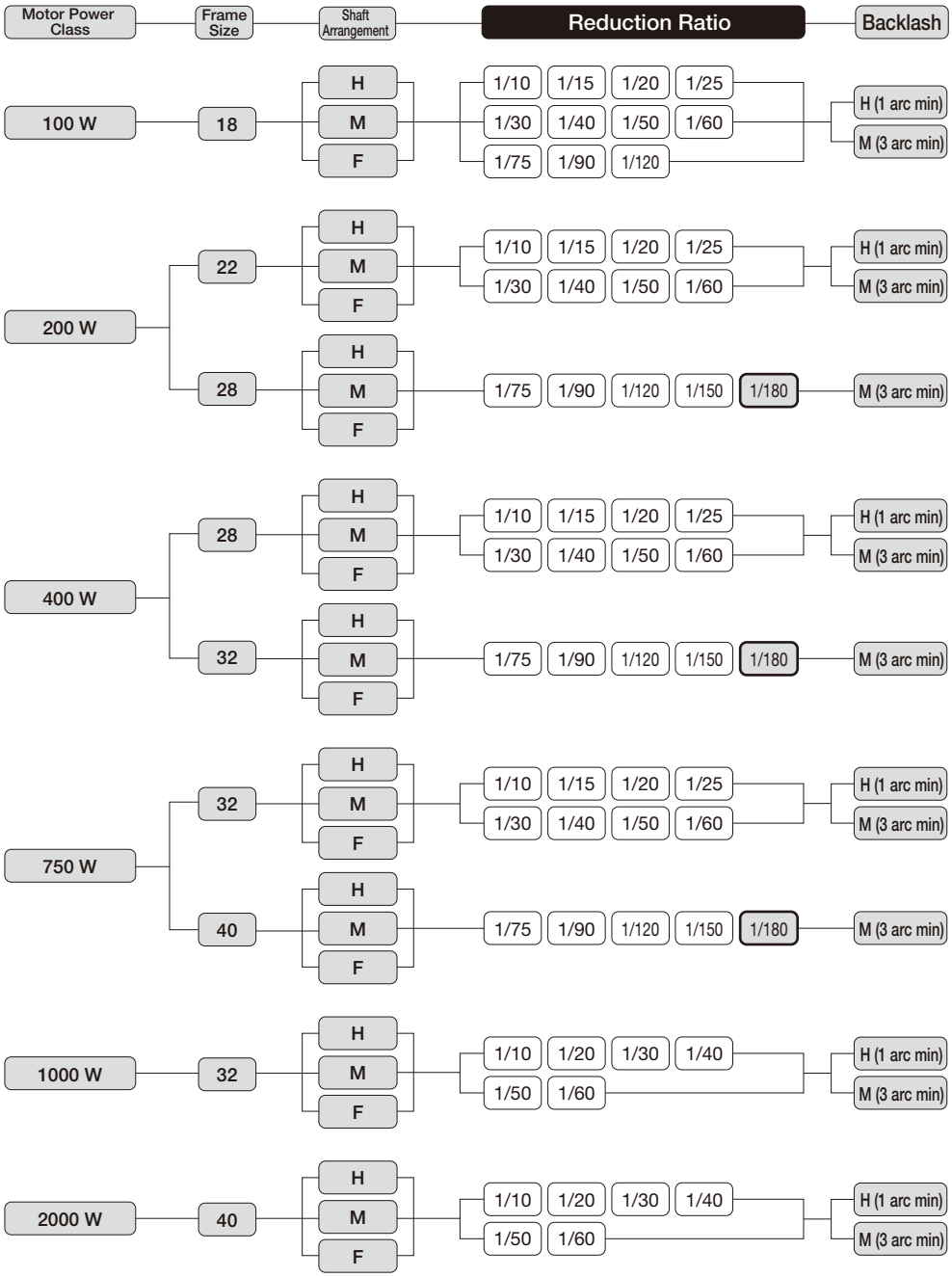
Standard Model Lineup

AF3 Type <AF3S> Backlash 1 arc min/3 arc min Specifications



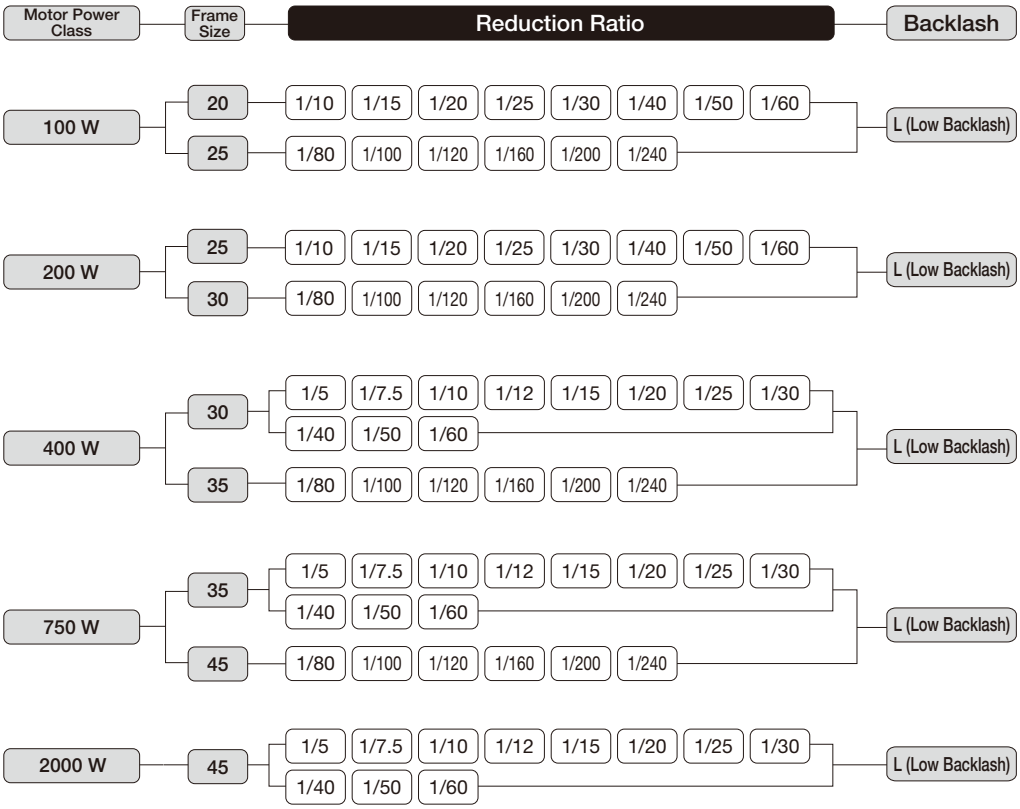
Note 1: ▭ indicates a limited torque type. Please make sure to check the allowable torque in the performance table.
Note 2: For the model lineup of low backlash types (precision: 30 arc min or more), refer to page 849.
Note 3: The details of output and other specifications are different between products with precision codes H and M (backlash: 1 arc min and 3 arc min) and products with precision code L (low backlash type). Please check them on drawings.

AF3 Type <AF3F> Backlash 1 arc min/3 arc min Specifications



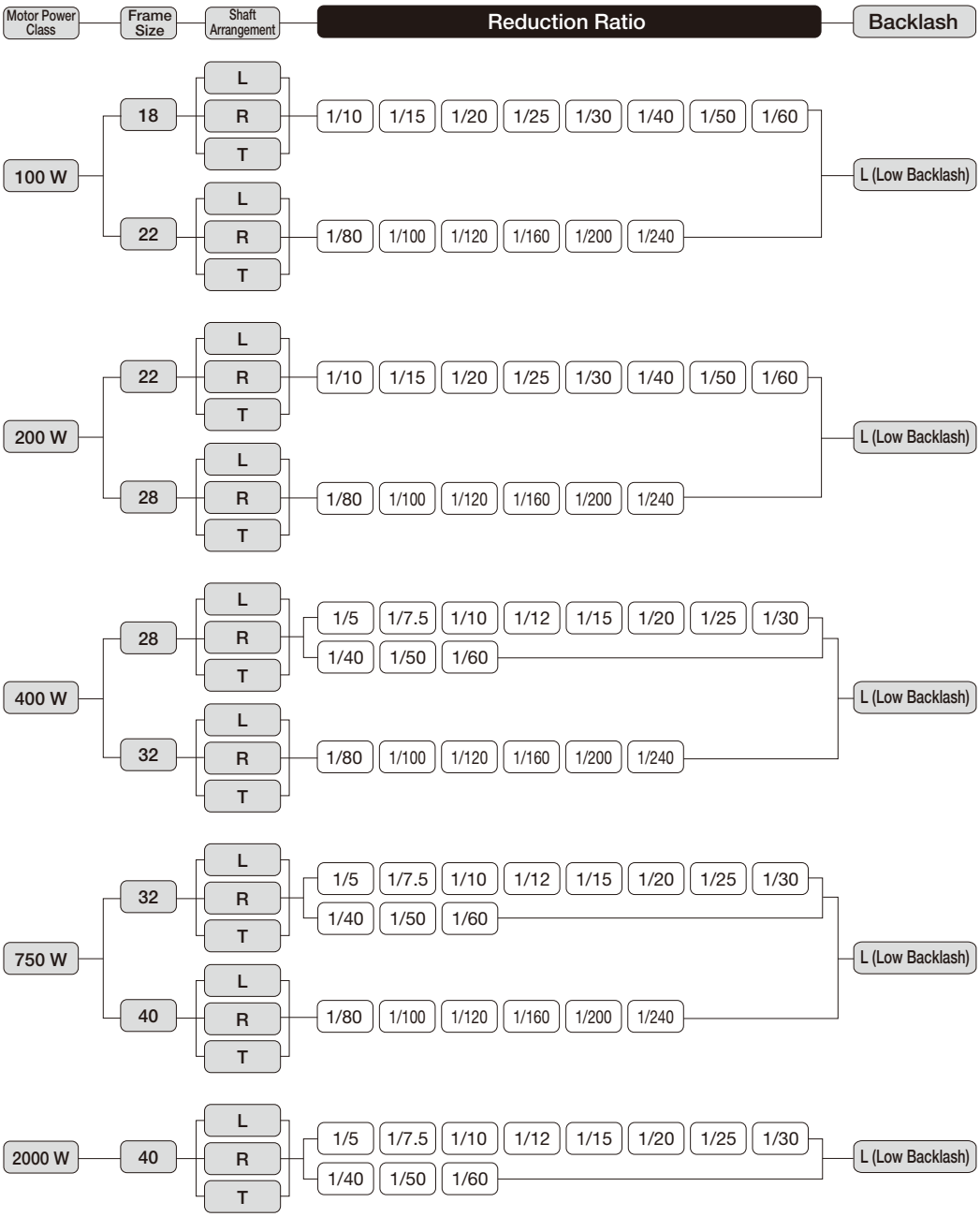
Note 1: ▭ indicates a limited torque type. Please make sure to check the allowable torque in the performance table.
Note 2: For the model lineup of low backlash types (precision: 30 arc min or more), refer to page 850.
Note 3: The details of output and other specifications are different between products with precision codes H and M (backlash: 1 arc min and 3 arc min) and products with precision code L (low backlash type). Please check them on drawings.

AF3 Type <AF3S> Low Backlash Specification



Note 1: For the precision of low backlash types, refer to the performance table.
Note 2: For the model lineup of gearboxes with 1 arc min and 3 arc min specifications, refer to page 847.
Note 3: The details of output and other specifications are different between products with precision codes H and M (backlash: 1 arc min and 3 arc min) and products with precision code L (low backlash type). Please check them on drawings.

AF3 Type <AF3F> Low Backlash Specification



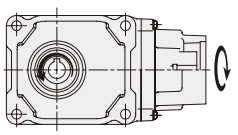
Note 1: For the precision of low backlash types, refer to the performance table.
Note 2: For the model lineup of gearboxes with 1 arc min and 3 arc min specifications, refer to page 848.
Note 3: The details of output and other specifications are different between products with precision codes H and M (backlash: 1 arc min and 3 arc min) and products with precision code L (low backlash type). Please check them on drawings.

MEMO

1. High Precision Gearboxes for Servo Motors Backlash 1 arc min/3 arc min Specifications

1-1. Performance Tables

AF3S Type <Backlash 1 arc min/3 arc min Specifications> Performance Table by Reduction Ratio



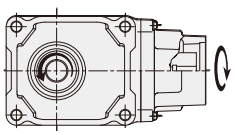
[Notes]
- The input speed is 3000 r/min.
- The "*" mark indicates a limited torque type. Please make sure to check the allowable average torque in the performance table.
- Allowable output shaft O.H.L. is the value at 20 mm from the flange surface.
- For the continuous rated input torque, please refer to page 948. In addition, for the servo motor-based motor rated output torque, please refer to page 931.
- The key dimensions and tolerances for output shafts conform to JIS B 1301-1996 (plain form).
- The key for the output shaft is not supplied with backlash 1 arc min and 3 arc min specifications and concentric right angle hollow bore types.
- The internal moment of inertia (input shaft equivalent) is the value for the gearbox alone, and does not include the motor's moment of inertia.
- The allowable average torque is the continuous allowable torque value.
- Adjust the gain so that the inertial load on the output shaft side does not vibrate during acceleration and deceleration.
- In the performance table, ▭ indicates that for a clockwise (CW) motor input, the output rotates clockwise (CW) as viewed from the output shaft under the conditions shown in the figure on the right. (The arrows indicate the rotational directions of the input and output shafts, and do not limit the actual direction of rotation.)
- H in the Precision column means backlash 1 arc min, and M means backlash 3 arc min.

■ At an input speed of 3000 r/min

Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	$\times 10^{-4}$kg·m^2	
AF3SZ	15	—	1/10	1/10	H/M	100	2.2	6.5	340	108	0.373	P.856
AF3SZ	25	—	1/10	1/10	H/M	200	3.8	11	1230	380	0.721	
AF3SZ	30	—	1/10	1/10	H/M	400	7.8	23	1520	475	0.799	P.857
AF3SZ	35	—	1/10	1/10	H/M	750	16	48	1960	613	1.547	P.858
AF3SZ	35	—	1/10	1/10	H/M	1000	22	44	1960	613	4.737	
AF3SZ	45	—	1/10	1/10	H/M	2000	44	88	3140	967	6.339	P.859
AF3SZ	15	—	1/15	1/15	H/M	100	3.5	10	440	147	0.371	P.856
AF3SZ	25	—	1/15	1/15	H/M	200	6.4	19	1370	429	0.706	
AF3SZ	30	—	1/15	1/15	H/M	400	13	40	1720	539	0.774	P.857
AF3SZ	35	—	1/15	1/15	H/M	750	26	79	2250	686	1.501	P.858
AF3SZ	15	—	1/20	1/20	H/M	100	5.0	15	540	186	0.370	P.856
AF3SZ	25	—	1/20	1/20	H/M	200	8.9	27	1520	466	0.700	
AF3SZ	30	—	1/20	1/20	H/M	400	18	53	2010	600	0.764	P.857
AF3SZ	35	—	1/20	1/20	H/M	750	36	109	2500	747	1.482	P.858
AF3SZ	35	—	1/20	1/20	H/M	1000	45	90	2500	747	4.641	
AF3SZ	45	—	1/20	1/20	H/M	2000	90	179	4070	1067	6.049	P.859
AF3SZ	15	—	1/25	1/25	H/M	100	6.4	19	640	226	0.369	P.856
AF3SZ	25	—	1/25	1/25	H/M	200	12	35	1670	502	0.697	
AF3SZ	30	—	1/25	1/25	H/M	400	23	68	2160	637	0.759	P.857
AF3SZ	35	—	1/25	1/25	H/M	750	46	137	2740	796	1.469	P.858
AF3SZ	15	—	1/30	1/30	H/M	100	7.6	23	740	245	0.369	P.856
AF3SZ	25	—	1/30	1/30	H/M	200	14	43	1810	527	0.695	
AF3SZ	30	—	1/30	1/30	H/M	400	27	82	2300	662	0.754	P.857
AF3SZ	35	—	1/30	1/30	H/M	750	55	166	2940	821	1.462	P.858
AF3SZ	35	—	1/30	1/30	H/M	1000	67	134	2940	821	4.616	
AF3SZ	45	—	1/30	1/30	H/M	2000	144	288	4360	1067	5.972	P.859
AF3SZ	15	—	1/40	1/40	H/M	100	10	25	780	275	0.368	P.856
AF3SZ	25	—	1/40	1/40	H/M	200	19	48	1960	576	0.693	
AF3SZ	30	—	1/40	1/40	H/M	400	36	91	2600	711	0.750	P.857
AF3SZ	35	—	1/40	1/40	H/M	750	76	191	3140	870	1.453	P.858
AF3SZ	35	—	1/40	1/40	H/M	1000	96	192	3140	870	4.606	
AF3SZ	45	—	1/40	1/40	H/M	2000	191	382	4360	1067	5.934	P.859

Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	×10⁻⁴kg·m²	
AF3SZ	15	—	1/50	1/50	H/M	100	13	31	880	294	0.368	P.856
AF3SZ	25	—	1/50	1/50	H/M	200	24	48	2160	613	0.691	
AF3SZ	30	—	1/50	1/50	H/M	400	45	91	2840	747	0.747	P.857
AF3SZ	35	—	1/50	1/50	H/M	750	95	191	3280	870	1.448	P.858
AF3SZ	35	—	1/50	1/50	H/M	1000	120	239	3280	870	4.597	
AF3SZ	45	—	1/50	1/50	H/M	2000	239	473	4360	1067	5.913	P.859
AF3SZ	15	—	1/60	1/60	H/M	100	15	31	880	294	0.367	P.856
AF3SZ	25	—	1/60	1/60	H/M	200	29	57	2350	637	0.690	
AF3SZ	30	—	1/60	1/60	H/M	400	54	109	3040	767	0.746	P.857
AF3SZ	35	—	1/60	1/60	H/M	750	115	229	3430	870	1.444	P.858
AF3SZ	35	—	1/60	1/60	H/M	1000	143	286	3430	870	4.596	
AF3SZ	45	—	1/60	1/60	H/M	2000	287	574	4360	1067	5.899	P.859
AF3SZ	15	—	1/75	1/75	H/M	100	18	36	980	324	0.368	P.856
AF3SZ	30	—	1/75	1/75	M	200	31	62	3090	775	0.692	P.857
AF3SZ	35	—	1/75	1/75	M	400	63	127	3330	873	0.747	P.858
AF3SZ	45	—	1/75	1/75	M	750	135	271	4460	1177	1.452	P.859
AF3SZ	15	—	1/90	1/90	H/M	100	22	44	1030	324	0.368	P.856
AF3SZ	30	—	1/90	1/90	M	200	37	74	3090	775	0.692	P.857
AF3SZ	35	—	1/90	1/90	M	400	75	150	3380	873	0.747	P.858
AF3SZ	45	—	1/90	1/90	M	750	162	325	4460	1177	1.452	P.859
AF3SZ	15	—	1/120	1/120	H/M	100	29	58	1030	343	0.367	P.856
AF3SZ	30	—	1/120	1/120	M	200	50	99	3140	785	0.692	P.857
AF3SZ	35	—	1/120	1/120	M	400	100	200	3380	883	0.746	P.858
AF3SZ	45	—	1/120	1/120	M	750	217	433	4460	1177	1.449	P.859
AF3SZ	30	—	1/150	1/150	M	200	57	86	3140	785	0.692	P.857
AF3SZ	35	—	1/150	1/150	M	400	124	186	3380	883	0.746	P.858
AF3SZ	45	—	1/150	1/150	M	750	251	377	4460	1177	1.447	P.859
AF3SZ	30	—	1/180	1/180	M	200	* 57	86	3140	785	0.691	P.857
AF3SZ	35	—	1/180	1/180	M	400	* 124	186	3580	912	0.745	P.858
AF3SZ	45	—	1/180	1/180	M	750	* 251	377	4850	1275	1.445	P.859

AF3F Type <Backlash 1 arc min/3 arc min Specifications> Performance Table by Reduction Ratio



[Notes]

- The input speed is 3000 r/min.
- The "*" mark indicates a limited torque type. Please make sure to check the allowable average torque in the performance table.
- Allowable output shaft O.H.L. is the value at the middle of the output shaft.
- For the continuous rated input torque, please refer to page 948. In addition, for the servo motor-based motor rated output torque, please refer to page 933.
- The key dimensions and tolerances for output shafts conform to JIS B 1301-1996 (plain form).
- The key for the output shaft is not supplied with backlash 1 arc min and 3 arc min specifications and concentric right angle hollow bore types.
- The internal moment of inertia (input shaft equivalent) is the value for the gearbox alone, and does not include the motor's moment of inertia.
- The allowable average torque is the continuous allowable torque value.
- Adjust the gain so that the inertial load on the output shaft side does not vibrate during acceleration and deceleration.
- In the performance table, ▭ indicates that for a clockwise (CW) motor input, the output rotates clockwise (CW) as viewed from the output shaft under the conditions shown in the figure on the right. (The arrows indicate the rotational directions of the input and output shafts, and do not limit the actual direction of rotation.)
- H in the Precision column means backlash 1 arc min, and M means backlash 3 arc min.

■ At an input speed of 3000 r/min

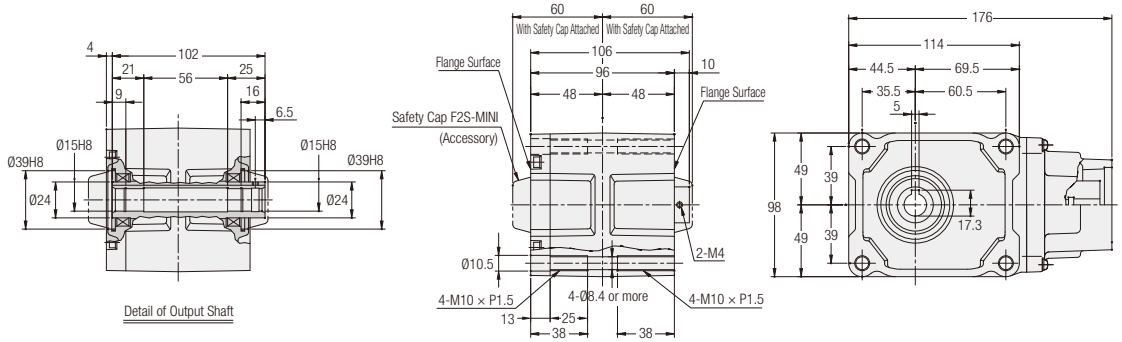
Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	×10^{-4}kg·m^2	
AF3FZ	18	H/M/F	1/10	1/10	H/M	100	2.2	6.5	340	108	0.373	P.860
AF3FZ	22	H/M/F	1/10	1/10	H/M	200	3.8	11	1230	380	0.721	
AF3FZ	28	H/M/F	1/10	1/10	H/M	400	7.8	23	1520	475	0.799	P.861
AF3FZ	32	H/M/F	1/10	1/10	H/M	750	16	48	1960	613	1.547	P.862/ P.863
AF3FZ	32	H/M/F	1/10	1/10	H/M	1000	22	44	1960	613	4.737	
AF3FZ	40	H/M/F	1/10	1/10	H/M	2000	44	88	3140	967	6.339	P.864
AF3FZ	18	H/M/F	1/15	1/15	H/M	100	3.5	10	440	147	0.371	P.860
AF3FZ	22	H/M/F	1/15	1/15	H/M	200	6.4	19	1370	429	0.706	
AF3FZ	28	H/M/F	1/15	1/15	H/M	400	13	40	1720	539	0.774	P.861
AF3FZ	32	H/M/F	1/15	1/15	H/M	750	26	79	2210	686	1.501	P.862/P.863
AF3FZ	18	H/M/F	1/20	1/20	H/M	100	5.0	15	540	186	0.370	P.860
AF3FZ	22	H/M/F	1/20	1/20	H/M	200	8.9	27	1470	466	0.700	
AF3FZ	28	H/M/F	1/20	1/20	H/M	400	18	53	1860	600	0.764	P.861
AF3FZ	32	H/M/F	1/20	1/20	H/M	750	36	109	2350	747	1.482	P.863
AF3FZ	32	H/M/F	1/20	1/20	H/M	1000	45	90	2350	747	4.641	
AF3FZ	40	H/M/F	1/20	1/20	H/M	2000	90	179	4070	1067	6.049	P.864
AF3FZ	18	H/M/F	1/25	1/25	H/M	100	6.4	19	640	226	0.369	P.860
AF3FZ	22	H/M/F	1/25	1/25	H/M	200	12	35	1620	502	0.697	
AF3FZ	28	H/M/F	1/25	1/25	H/M	400	23	68	2010	637	0.759	P.861
AF3FZ	32	H/M/F	1/25	1/25	H/M	750	46	137	2500	796	1.469	P.862/P.863
AF3FZ	18	H/M/F	1/30	1/30	H/M	100	7.6	23	740	245	0.369	P.860
AF3FZ	22	H/M/F	1/30	1/30	H/M	200	14	43	1720	527	0.695	P.861
AF3FZ	28	H/M/F	1/30	1/30	H/M	400	27	82	2210	662	0.754	P.862/P.863
AF3FZ	32	H/M/F	1/30	1/30	H/M	750	55	166	2650	821	1.462	P.863
AF3FZ	32	H/M/F	1/30	1/30	H/M	1000	67	134	2650	821	4.616	
AF3FZ	40	H/M/F	1/30	1/30	H/M	2000	144	288	4360	1067	5.972	P.864
AF3FZ	18	H/M/F	1/40	1/40	H/M	100	10	25	780	275	0.368	P.860
AF3FZ	22	H/M/F	1/40	1/40	H/M	200	19	48	1860	576	0.693	
AF3FZ	28	H/M/F	1/40	1/40	H/M	400	36	91	2450	711	0.750	P.861
AF3FZ	32	H/M/F	1/40	1/40	H/M	750	76	191	2790	870	1.453	P.862/P.863
AF3FZ	32	H/M/F	1/40	1/40	H/M	1000	96	192	2790	870	4.606	P.863
AF3FZ	40	H/M/F	1/40	1/40	H/M	2000	191	382	4360	1067	5.934	P.864

Mounting Type	Output Shaft Diameter	Shaft Arrangement	Nominal Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	$\times 10^{-4}$kg·m^2	
AF3FZ	18	H/M/F	1/50	1/50	H/M	100	13	31	880	294	0.368	P.860
AF3FZ	22	H/M/F	1/50	1/50	H/M	200	24	48	2060	613	0.691	
AF3FZ	28	H/M/F	1/50	1/50	H/M	400	45	91	2740	747	0.747	P.861
AF3FZ	32	H/M/F	1/50	1/50	H/M	750	95	191	2940	870	1.448	P.862/P.863
AF3FZ	32	H/M/F	1/50	1/50	H/M	1000	120	239	2940	870	4.597	P.863
AF3FZ	40	H/M/F	1/50	1/50	H/M	2000	239	473	4360	1067	5.913	P.864
AF3FZ	18	H/M/F	1/60	1/60	H/M	100	15	31	880	294	0.367	P.860
AF3FZ	22	H/M/F	1/60	1/60	H/M	200	29	57	2250	637	0.690	
AF3FZ	28	H/M/F	1/60	1/60	H/M	400	54	109	2900	767	0.746	P.861
AF3FZ	32	H/M/F	1/60	1/60	H/M	750	115	229	3040	870	1.444	P.862/P.863
AF3FZ	32	H/M/F	1/60	1/60	H/M	1000	143	286	3040	870	4.596	P.863
AF3FZ	40	H/M/F	1/60	1/60	H/M	2000	287	574	4360	1067	5.899	P.864
AF3FZ	18	H/M/F	1/75	1/75	H/M	100	18	36	980	324	0.368	P.860
AF3FZ	28	H/M/F	1/75	1/75	M	200	31	62	3090	775	0.692	P.861
AF3FZ	32	H/M/F	1/75	1/75	M	400	63	127	3330	873	0.747	P.862
AF3FZ	40	H/M/F	1/75	1/75	M	750	135	271	4460	1177	1.452	P.864
AF3FZ	18	H/M/F	1/90	1/90	H/M	100	22	44	1030	324	0.368	P.860
AF3FZ	28	H/M/F	1/90	1/90	M	200	37	74	3090	775	0.692	P.861
AF3FZ	32	H/M/F	1/90	1/90	M	400	75	150	3380	873	0.747	P.862
AF3FZ	40	H/M/F	1/90	1/90	M	750	162	325	4460	1177	1.452	P.864
AF3FZ	18	H/M/F	1/120	1/120	H/M	100	29	58	1030	343	0.367	P.860
AF3FZ	28	H/M/F	1/120	1/120	M	200	50	99	3140	785	0.692	P.861
AF3FZ	32	H/M/F	1/120	1/120	M	400	100	200	3380	883	0.746	P.862
AF3FZ	40	H/M/F	1/120	1/120	M	750	217	433	4460	1177	1.449	P.864
AF3FZ	28	H/M/F	1/150	1/150	M	200	57	86	3140	785	0.692	P.861
AF3FZ	32	H/M/F	1/150	1/150	M	400	124	186	3380	883	0.746	P.862
AF3FZ	40	H/M/F	1/150	1/150	M	750	251	377	4460	1177	1.447	P.864
AF3FZ	28	H/M/F	1/180	1/180	M	200	* 57	86	3140	785	0.691	P.861
AF3FZ	32	H/M/F	1/180	1/180	M	400	* 124	186	3580	912	0.745	P.862
AF3FZ	40	H/M/F	1/180	1/180	M	750	* 251	377	4850	1275	1.445	P.864

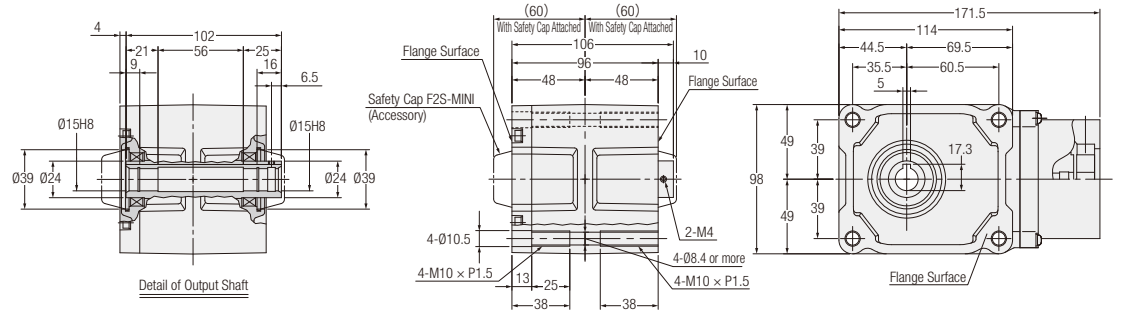
1-2. Drawings

AF3S Type Concentric Right Angle Hollow Bore — Shaft Diameter 15 — Backlash 1 arc min/3 arc min Specifications

<Figure 1>



<Figure 2>

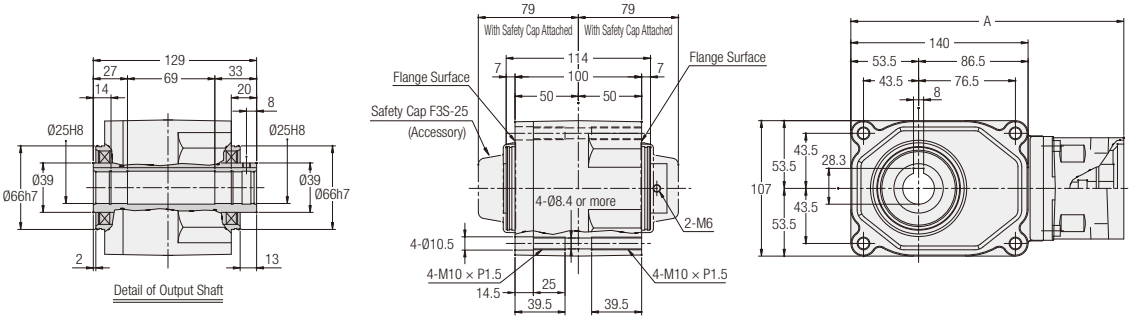


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
100W	AF3SZ15-✱✱✱□100△	10,15,20,25,30,40,50,60,75,90,120	1	F1･F3･S1･S3	3
100W	AF3SZ15-✱✱✱□100△	10,15,20,25,30,40,50,60,75,90,120	2	S6	3

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 852 for the performance table.

AF3S Type Concentric Right Angle Hollow Bore — Shaft Diameter 25 — Backlash 1 arc min/3 arc min Specifications

<Figure 3>

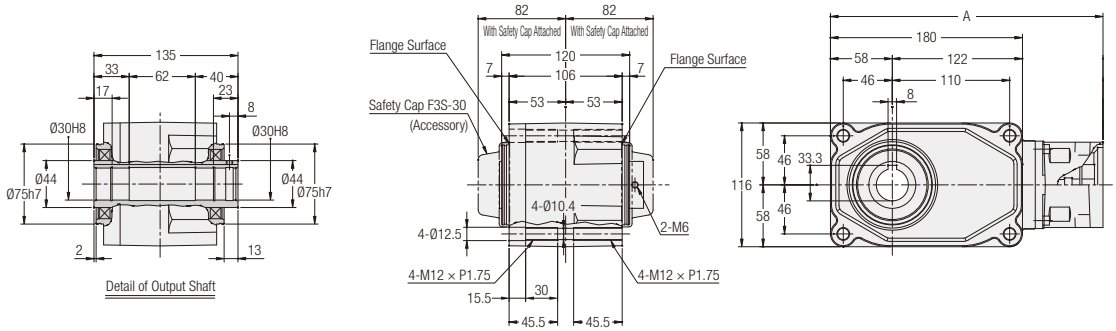


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
200 W	AF3SZ25-✱✱✱□200△	10, 15, 20, 25, 30, 40, 50, 60	3	F1/F2/F3/S1/S2/S3/S5	5.5	216
200 W	AF3SZ25-✱✱✱□200△	10, 15, 20, 25, 30, 40, 50, 60	3	S6	5.5	211.5
200 W	AF3SZ25-✱✱✱□200△	10, 15, 20, 25, 30, 40, 50, 60	3	S7	5.5	214.5

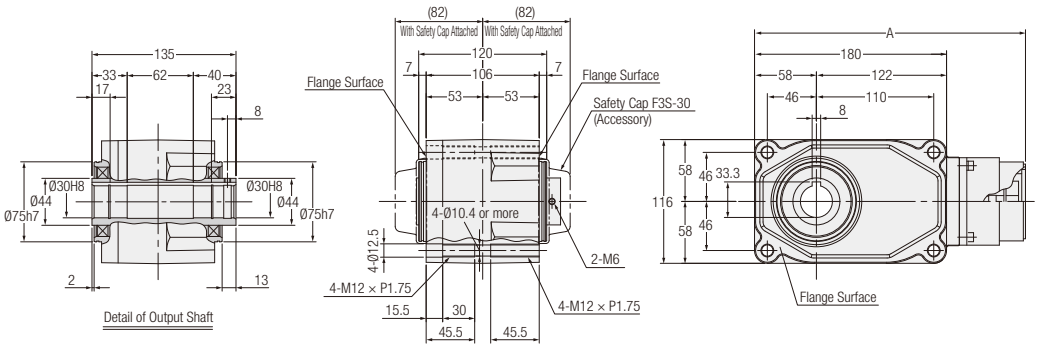
Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 852 for the performance table.

AF3S Type Concentric Right Angle Hollow Bore — Shaft Diameter 30 — Backlash 1 arc min/3 arc min Specifications

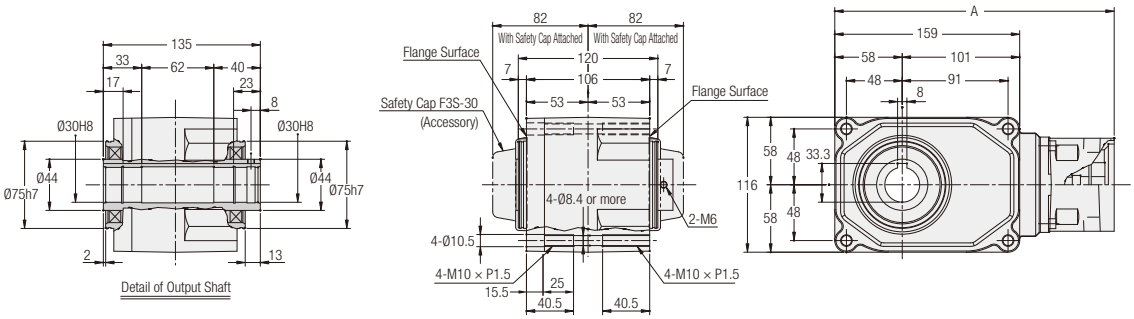
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<Figure 2>



<Figure 3>

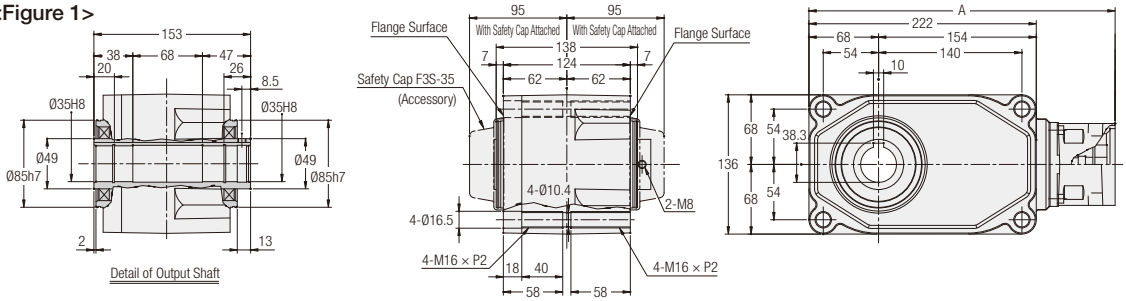


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
200 W	AF3SZ30-✱✱✱□200△	75, 90, 120, 150, 180	1	F1/F2/F3/S1/S2/S3/S5	8	255.5
200 W	AF3SZ30-✱✱✱□200△	75, 90, 120, 150, 180	1	S6	8	251
200 W	AF3SZ30-✱✱✱□200△	75, 90, 120, 150, 180	2	S7	8	254
400 W	AF3SZ30-✱✱✱□400△	10, 15, 20, 25, 30, 40, 50, 60	3	F1/F3/S1/S3	7.5	240.5
400 W	AF3SZ30-✱✱✱□400△	10, 15, 20, 25, 30, 40, 50, 60	3	S6	7.5	236
400 W	AF3SZ30-✱✱✱□400△	10, 15, 20, 25, 30, 40, 50, 60	3	S7	7.5	239

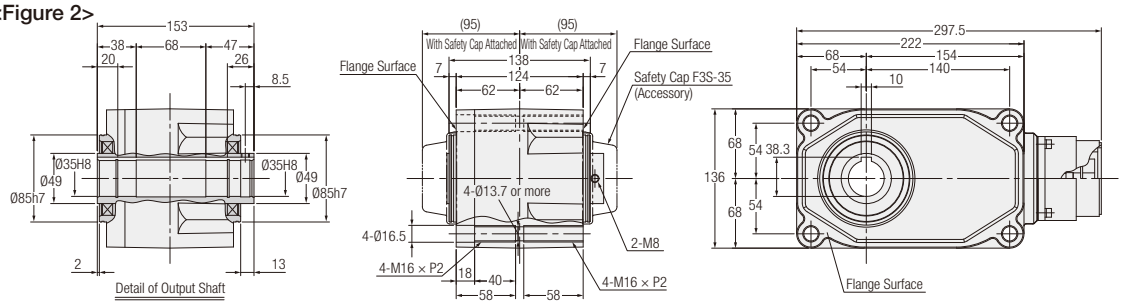
Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 852 for the performance table.

AF3S Type Concentric Right Angle Hollow Bore — Shaft Diameter 35 — Backlash 1 arc min/3 arc min Specifications

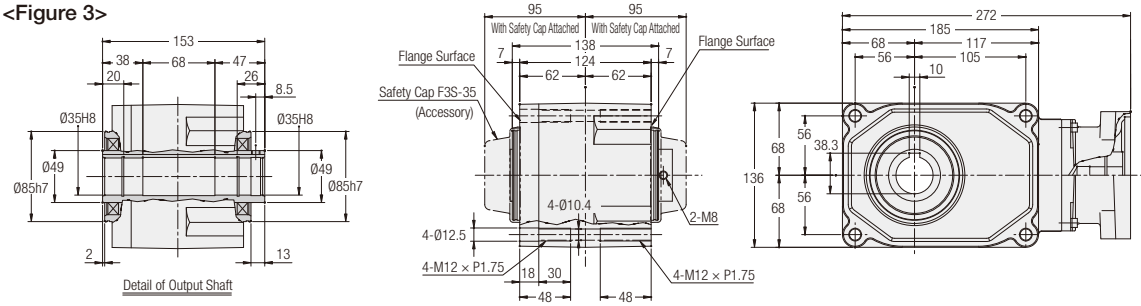
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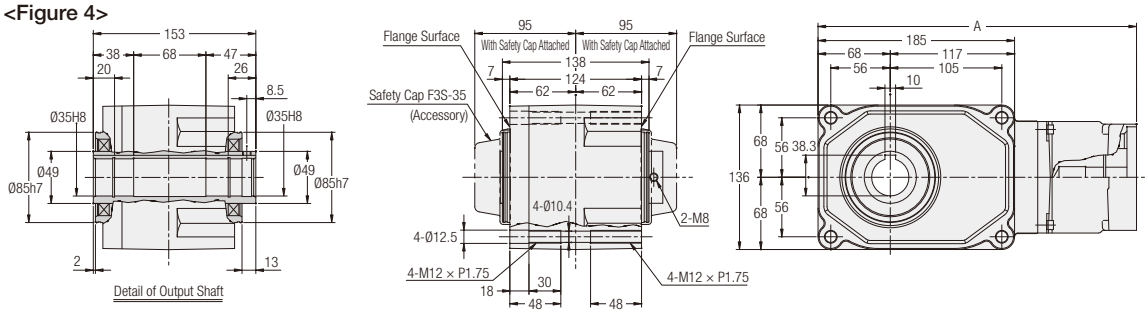
<Figure 2>



<Figure 3>



<Figure 4>

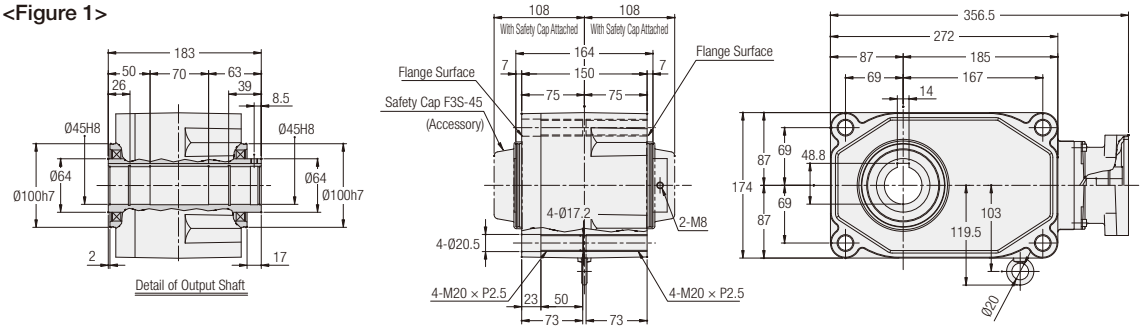


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
400 W	AF3SZ35-✻✻✻□400△	75, 90, 120, 150, 180	1	F1/F3/S1/S3	13.5	299
400 W	AF3SZ35-✻✻✻□400△	75, 90, 120, 150, 180	1	S6	13.5	294.5
400 W	AF3SZ35-✻✻✻□400△	75, 90, 120, 150, 180	2	S7	13.5	—
750 W	AF3SZ35-✻✻✻□750△	10, 15, 20, 25, 30, 40, 50, 60	3	F1/F2/S1/S2/S3/S4/S6	10	—
750 W	AF3SZ35-✻✻✻□750△	10, 15, 20, 25, 30, 40, 50, 60	4	SA	10	268
750 W	AF3SZ35-✻✻✻□750△	10, 15, 20, 25, 30, 40, 50, 60	4	S9	10	272
1000 W	AF3SZ35-✻✻✻□1000△	10, 20, 30, 40, 50, 60	4	K21/K22/K23/K31/K32/ K33/K43/KC9	10.5	300

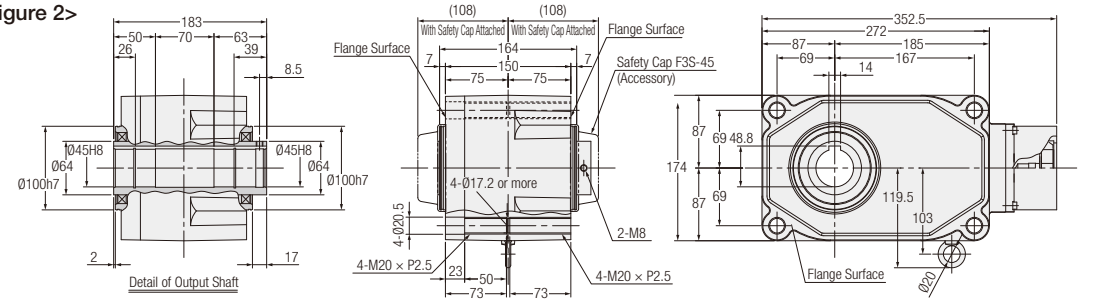
Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 852 for the performance table.

AF3S Type Concentric Right Angle Hollow Bore — Shaft Diameter 45 — Backlash 1 arc min/3 arc min Specifications

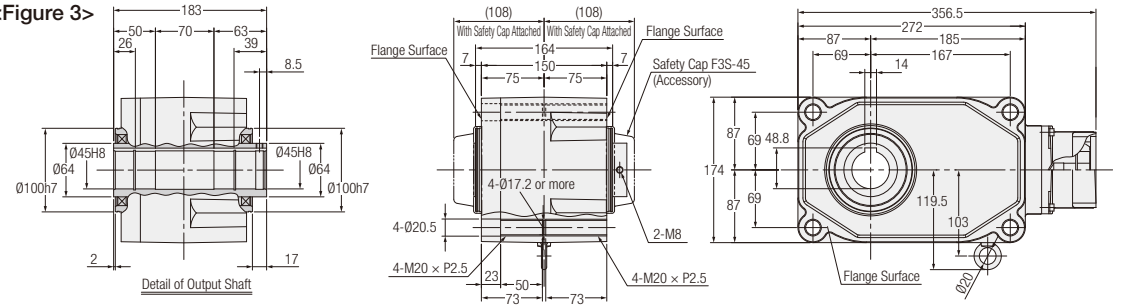
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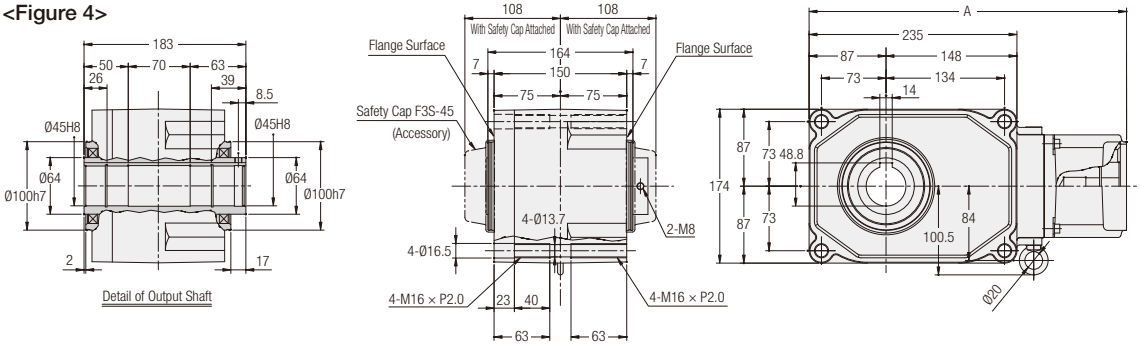
<Figure 2>



<Figure 3>



<Figure 4>

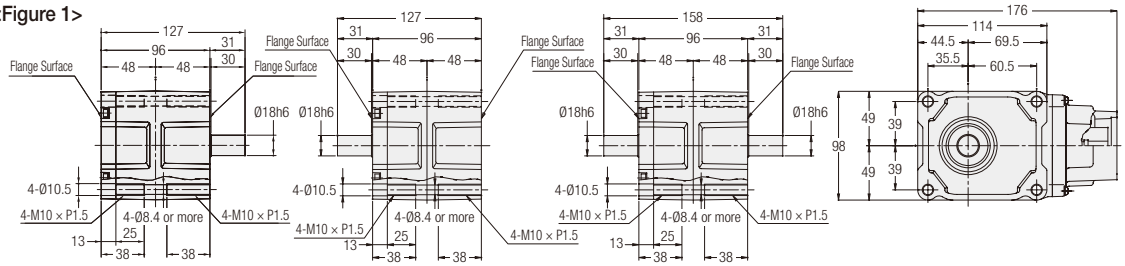


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
750 W	AF3SZ45-✱✱✱□750△	75, 90, 120, 150, 180	1	F1/F2/S1/S2/S3/S4/S6	18.5	—
750 W	AF3SZ45-✱✱✱□750△	75, 90, 120, 150, 180	2	SA	18.5	—
750 W	AF3SZ45-✱✱✱□750△	75, 90, 120, 150, 180	3	S9	18.5	—
2000 W	AF3SZ45-✱✱✱□2000△	10, 20, 30, 40, 50, 60	4	K21/K22/K23/K31/K32/ K33/K43	18	359
				F31/F33	18	369

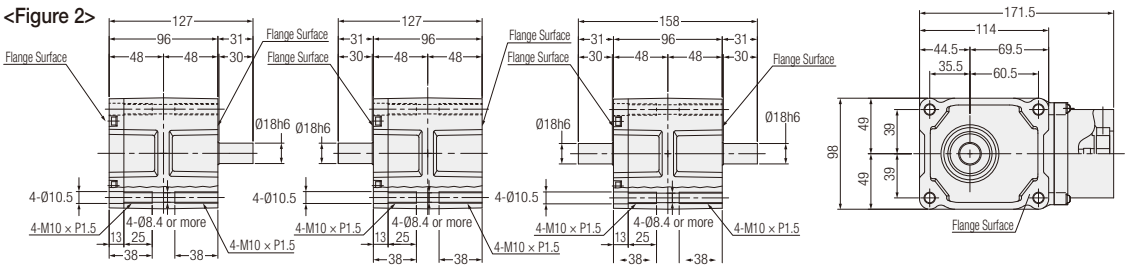
Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 852 for the performance table.

AF3F Type Concentric Right Angle Shaft — Shaft Diameter 18 — Backlash 1 arc min/3 arc min Specifications

<Figure 1>



<Figure 2>



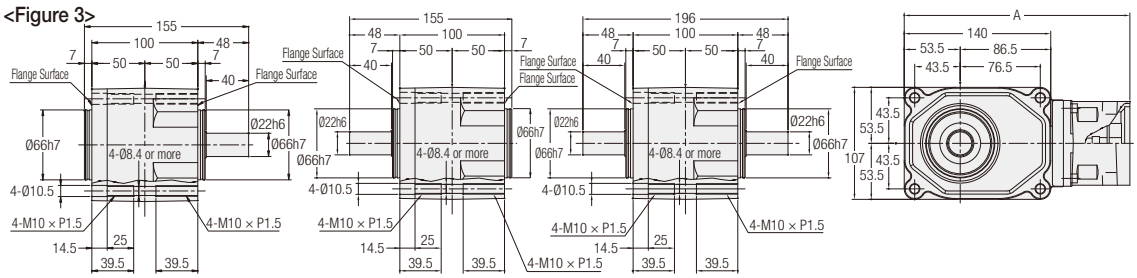
H Shaft M Shaft F Shaft

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
100 W	AF3FZ18#-✱✱✱□100△	10,15,20,25,30,40,50,60,75,90,120	1	F1·F3·S1·S3	3
100 W	AF3FZ18#-✱✱✱□100△	10,15,20,25,30,40,50,60,75,90,120	2	S6	3

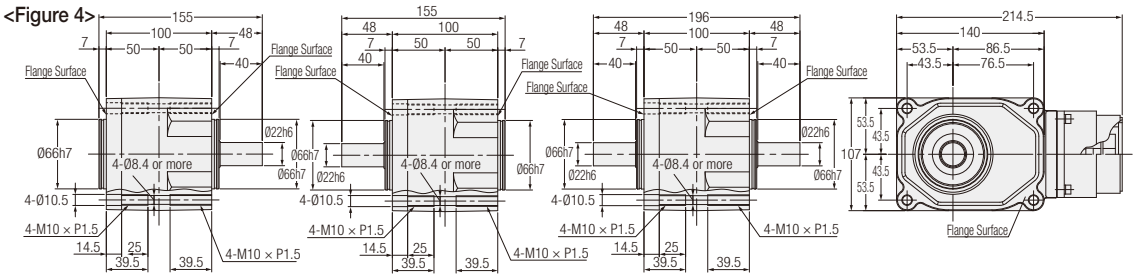
Note: A shaft arrangement (H, M, F) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ✱✱✱, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 854 for the performance table.

AF3F Type Concentric Right Angle Shaft — Shaft Diameter 22 — Backlash 1 arc min/3 arc min Specifications

<Figure 3>



<Figure 4>



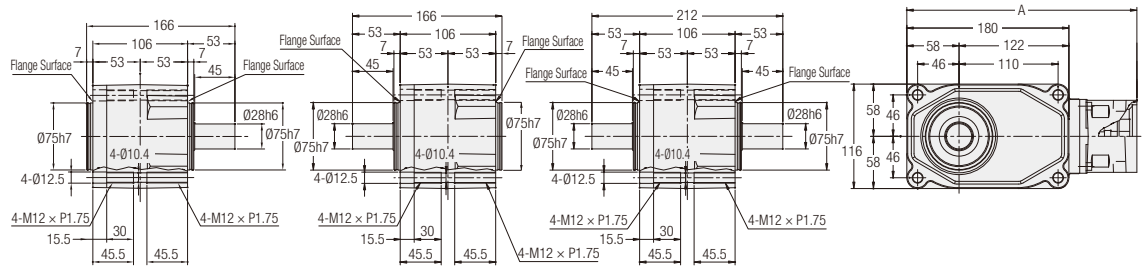
H Shaft M Shaft F Shaft

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
200 W	AF3FZ22#-✱✱✱□200△	10,15,20,25,30,40,50,60	3	F1·F2·F3·S1·S2·S3·S5	6	216
200 W	AF3FZ22#-✱✱✱□200△	10,15,20,25,30,40,50,60	3	S6	6	211.5
200 W	AF3FZ22#-✱✱✱□200△	10,15,20,25,30,40,50,60	4	S7	6	—

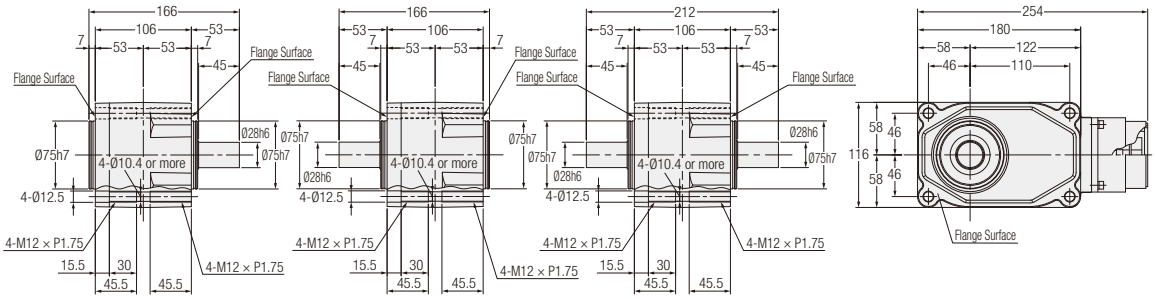
Note: A shaft arrangement (H, M, F) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ✱✱✱, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 854 for the performance table.

AF3F Type Concentric Right Angle Shaft — Shaft Diameter 28 — Backlash 1 arc min/3 arc min Specifications

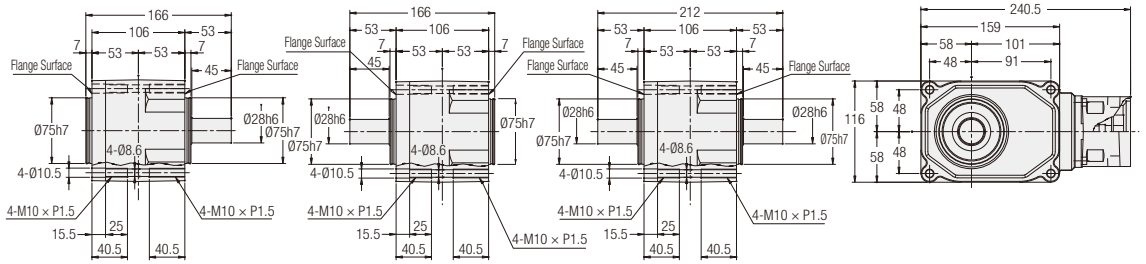
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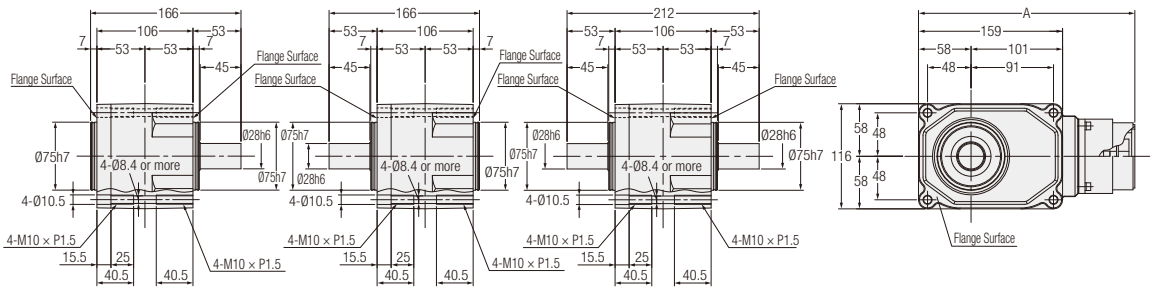
<Figure 2>



<Figure 3>



<Figure 4>



H Shaft M Shaft F Shaft

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
200 W	AF3FZ28#-✱✱✱□200△	75, 90, 120, 150, 180	1	F1/F2/F3/S1/S2/S3/S5	8.5	255.5
200 W	AF3FZ28#-✱✱✱□200△	75, 90, 120, 150, 180	1	S6	8.5	251
200 W	AF3FZ28#-✱✱✱□200△	75, 90, 120, 150, 180	2	S7	8.5	—
400 W	AF3FZ28#-✱✱✱□400△	10, 15, 20, 25, 30, 40, 50, 60	3	F1/F3/S1/S3	8.5	—
400 W	AF3FZ28#-✱✱✱□400△	10, 15, 20, 25, 30, 40, 50, 60	4	S6	8.5	236
400 W	AF3FZ28#-✱✱✱□400△	10, 15, 20, 25, 30, 40, 50, 60	4	S7	8.5	239

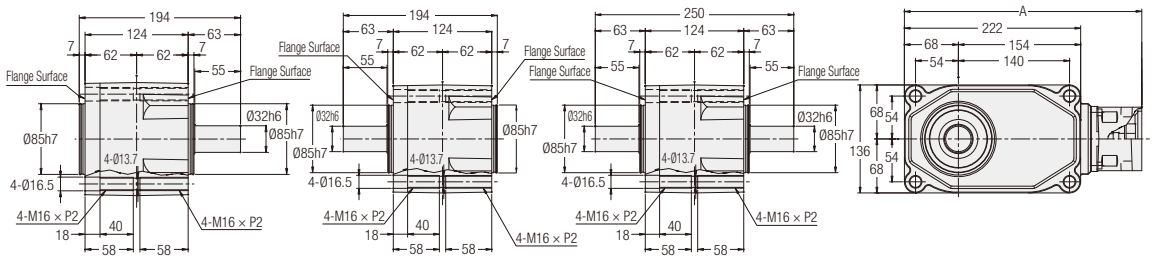
Note: A shaft arrangement (H, M, F) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ✱✱✱, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.

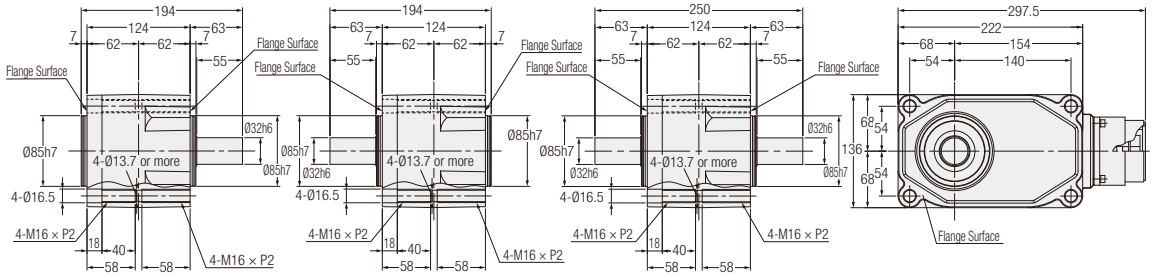
Note: Please refer to page 854 for the performance table.

AF3F Type Concentric Right Angle Shaft — Shaft Diameter 32 — Backlash 1 arc min/3 arc min Specifications

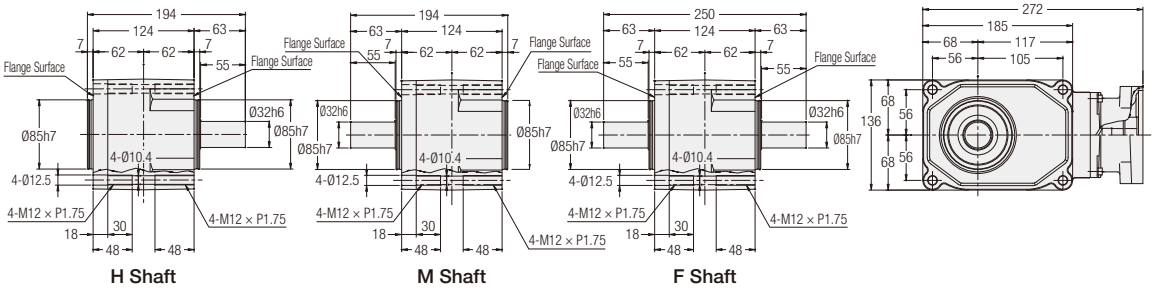
<Figure 1>



<Figure 1>



<Figure 1>

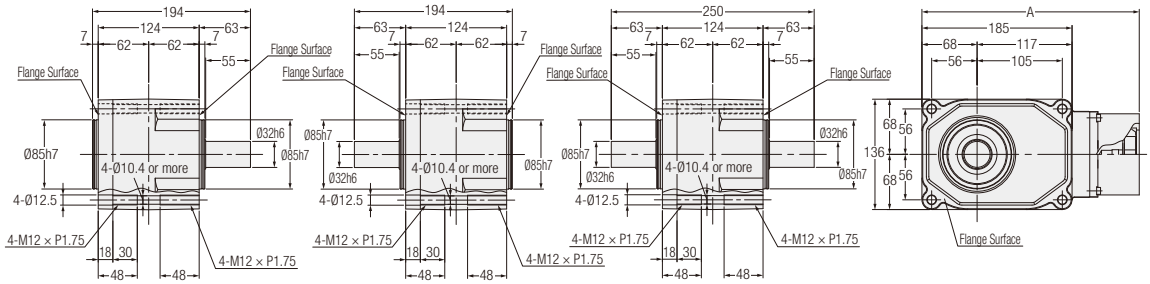


H Shaft M Shaft F Shaft

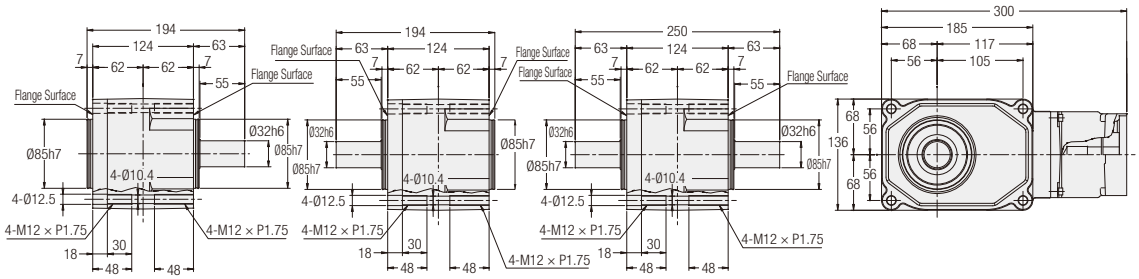
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
400 W	AF3FZ32#-***□400△	75, 90, 120, 150, 180	1	F1/F3/S1/S3	14.5	299
400 W	AF3FZ32#-***□400△	75, 90, 120, 150, 180	1	S6	14.5	294.5
400 W	AF3FZ32#-***□400△	75, 90, 120, 150, 180	2	S7	14.5	—
750 W	AF3FZ32#-***□750△	10, 15, 20, 25, 30, 40, 50, 60	3	F1/F2/S1/S2/S3/S4/S6	11.5	—

Note: A shaft arrangement (H, M, F) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 854 for the performance table.

<Figure 4>



<Figure 5>

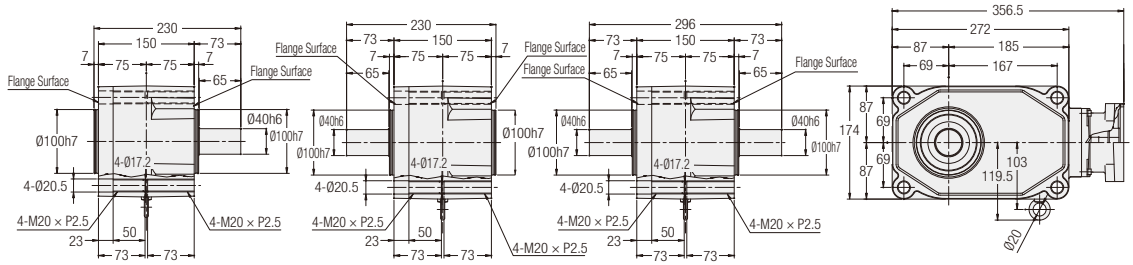


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
750 W	AF3FZ32#-***□750△	10, 15, 20, 25, 30, 40, 50, 60	4	SA	11.5	268
750 W	AF3FZ32#-***□750△	10, 15, 20, 25, 30, 40, 50, 60	4	S9	11.5	272
1000 W	AF3FZ32#-***□1000△	10, 20, 30, 40, 50, 60	5	K21/K22/K23/K31/K32/ K33/K43/KC9	12	—

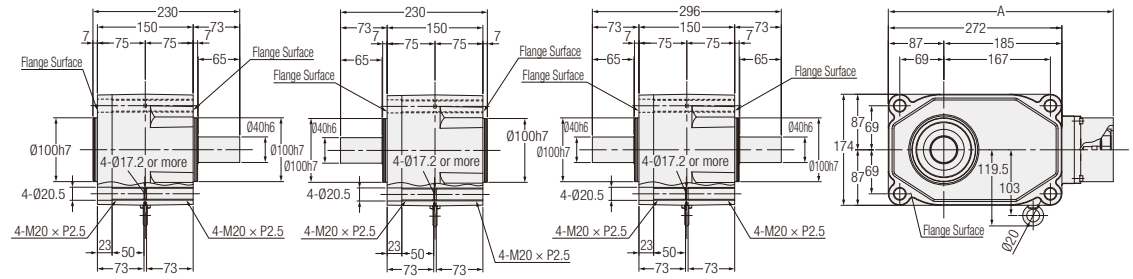
Note: A shaft arrangement (H, M, F) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 854 for the performance table.

AF3F Type Concentric Right Angle Shaft — Shaft Diameter 40 — Backlash 1 arc min/3 arc min Specifications

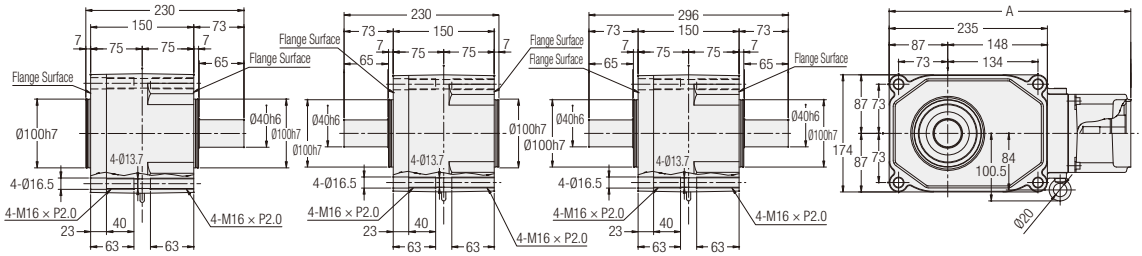
<Figure 1>



<Figure 2>



<Figure 3>



H Shaft M Shaft F Shaft

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
750 W	AF3FZ40#-✱✱✱□750△	75, 90, 120, 150, 180	1	F1/F2/S1/S2/S3/S4/S6	20	—
750 W	AF3FZ40#-✱✱✱□750△	75, 90, 120, 150, 180	2	SA	20	352.5
750 W	AF3FZ40#-✱✱✱□750△	75, 90, 120, 150, 180	2	S9	20	356.5
2000 W	AF3FZ40#-✱✱✱□2000△	10, 20, 30, 40, 50, 60	3	K21/K22/K23/K31/K32/ K33/K43	21	359
				F31/F33	21	369

Note: A shaft arrangement (H, M, F) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ✱✱✱, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 854 for the performance table.

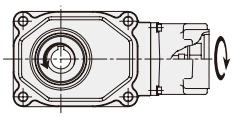
MEMO

2. Low Backlash High Precision Gearboxes for Servo Motors

2-1. Performance Tables

AF3S Type <Low Backlash> Performance Table by Reduction Ratio

[Notes]



- The input speed is 3000 r/min.
- Allowable output shaft O.H.L. is the value at 20 mm from the end of the output shaft.
- For the continuous rated input torque, please refer to page 948. In addition, for the servo motor-based motor rated output torque, please refer to page 935.
- The key dimensions and tolerances for output shafts conform to JIS B 1301-1996 (plain form).
- The key for the output shaft is not supplied with concentric right angle hollow bore types.
- The internal moment of inertia (input shaft equivalent) is the value for the gearbox alone, and does not include the motor's moment of inertia.
- The allowable average torque is the continuous allowable torque value.
- Adjust the gain so that the inertial load on the output shaft side does not vibrate during acceleration and deceleration.
- In the performance table, ▭ indicates that for a clockwise (CW) motor input, the output rotates clockwise (CW) as viewed from the output shaft under the conditions shown in the figure on the right. (The arrows indicate the rotational directions of the input and output shafts, and do not limit the actual direction of rotation.)

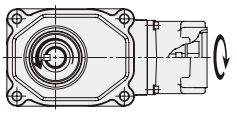
■ At an input speed of 3000 r/min

Mounting Type	Output Shaft Diameter	Shaft Arrangement	Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	$\times 10^{-4}$kg·m^2	
AF3SZ	30	—	1/5	1/5	L (30 arc min)	400	3.8	7.6	980	375	1.063	P.874
AF3SZ	35	—	1/5	1/5	L (30 arc min)	750	7.4	15	1760	500	2.258	P.876
AF3SZ	45	—	1/5	1/5	L (30 arc min)	2000	24	47	2550	800	8.078	P.877
AF3SZ	30	—	1/7.5	2/15	L (30 arc min)	400	5.9	12	1180	438	0.968	P.874
AF3SZ	35	—	1/7.5	2/15	L (30 arc min)	750	11	22	1860	567	1.998	P.876
AF3SZ	45	—	1/7.5	2/15	L (30 arc min)	2000	35	71	2940	900	7.395	P.877
AF3SZ	20	—	1/10	1/10	L (40 arc min)	100	2.0	3.9	940	294	0.354	P.870
AF3SZ	25	—	1/10	1/10	L (40 arc min)	200	3.8	7.6	1230	380	0.723	P.872
AF3SZ	30	—	1/10	1/10	L (30 arc min)	400	7.8	16	1520	475	0.930	P.874
AF3SZ	35	—	1/10	1/10	L (30 arc min)	750	15	29	1960	613	1.905	P.876
AF3SZ	45	—	1/10	1/10	L (30 arc min)	2000	47	94	3140	967	7.099	P.877
AF3SZ	30	—	1/12	19/235	L (30 arc min)	400	11	22	1620	500	0.909	P.874
AF3SZ	35	—	1/12	19/235	L (30 arc min)	750	20	39	2110	666	1.851	P.876
AF3SZ	45	—	1/12	19/235	L (30 arc min)	2000	57	114	3340	1034	6.954	P.877
AF3SZ	20	—	1/15	1/15	L (30 arc min)	100	3.1	6.3	1060	333	0.349	P.870
AF3SZ	25	—	1/15	1/15	L (30 arc min)	200	6.4	13	1370	429	0.708	P.872
AF3SZ	30	—	1/15	1/15	L (30 arc min)	400	13	25	1720	539	0.893	P.874
AF3SZ	35	—	1/15	1/15	L (30 arc min)	750	25	49	2250	686	1.803	P.876
AF3SZ	45	—	1/15	1/15	L (30 arc min)	2000	69	137	3630	1067	6.810	P.877
AF3SZ	20	—	1/20	1/20	L (30 arc min)	100	4.7	9.4	1180	373	0.347	P.870
AF3SZ	25	—	1/20	1/20	L (30 arc min)	200	8.8	18	1520	466	0.702	P.872
AF3SZ	30	—	1/20	1/20	L (30 arc min)	400	17	33	2010	600	0.873	P.874
AF3SZ	35	—	1/20	1/20	L (30 arc min)	750	34	69	2500	747	1.765	P.876
AF3SZ	45	—	1/20	1/20	L (30 arc min)	2000	92	184	4070	1067	6.701	P.877
AF3SZ	20	—	1/25	1/25	L (30 arc min)	100	5.9	12	1250	392	0.346	P.870
AF3SZ	25	—	1/25	19/470	L (30 arc min)	200	12	24	1670	502	0.699	P.872
AF3SZ	30	—	1/25	1/25	L (30 arc min)	400	23	45	2160	637	0.865	P.874
AF3SZ	35	—	1/25	1/25	L (30 arc min)	750	44	88	2740	796	1.744	P.876
AF3SZ	45	—	1/25	1/25	L (30 arc min)	2000	120	239	4310	1067	6.627	P.877
AF3SZ	20	—	1/30	1/30	L (30 arc min)	100	7.1	14	1330	422	0.345	P.870
AF3SZ	25	—	1/30	1/30	L (30 arc min)	200	14	27	1810	527	0.697	P.872
AF3SZ	30	—	1/30	1/30	L (30 arc min)	400	27	55	2300	662	0.857	P.874
AF3SZ	35	—	1/30	1/30	L (30 arc min)	750	53	106	2940	821	1.726	P.876
AF3SZ	45	—	1/30	1/30	L (30 arc min)	2000	144	288	4360	1067	6.587	P.877
AF3SZ	20	—	1/40	1/40	L (30 arc min)	100	9.4	19	1450	451	0.344	P.870
AF3SZ	25	—	1/40	1/40	L (30 arc min)	200	19	37	1960	576	0.694	P.872
AF3SZ	30	—	1/40	1/40	L (30 arc min)	400	36	73	2600	711	0.750	P.874
AF3SZ	35	—	1/40	1/40	L (30 arc min)	750	74	149	3140	870	1.455	P.876
AF3SZ	45	—	1/40	1/40	L (30 arc min)	2000	191	382	4360	1067	5.871	P.877
AF3SZ	20	—	1/50	1/50	L (30 arc min)	100	12	24	1490	471	0.344	P.870
AF3SZ	25	—	1/50	1/50	L (30 arc min)	200	24	47	2160	613	0.693	P.872
AF3SZ	30	—	1/50	1/50	L (30 arc min)	400	45	90	2840	747	0.748	P.874
AF3SZ	35	—	1/50	1/50	L (30 arc min)	750	94	188	3280	870	1.450	P.876
AF3SZ	45	—	1/50	1/50	L (30 arc min)	2000	239	478	4360	1067	5.853	P.877

Mounting Type	Output Shaft Diameter	Shaft Arrangement	Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	$\times 10^{-4}$kg·m^2	
AF3SZ	20	—	1/60	1/59	L (30 arc min)	100	14	27	1490	471	0.344	P.870
AF3SZ	25	—	1/60	1/60	L (30 arc min)	200	27	55	2350	637	0.692	P.872
AF3SZ	30	—	1/60	1/60	L (30 arc min)	400	55	110	3040	767	0.746	P.874
AF3SZ	35	—	1/60	1/60	L (30 arc min)	750	113	225	3430	870	1.445	P.876
AF3SZ	45	—	1/60	1/60	L (30 arc min)	2000	287	574	4360	1067	5.843	P.877
AF3SZ	25	—	1/80	1/80	L (30 arc min)	100	17	33	2550	637	0.344	P.871
AF3SZ	30	—	1/80	1/80	L (30 arc min)	200	34	69	3090	775	0.692	P.873
AF3SZ	35	—	1/80	1/80	L (30 arc min)	400	71	141	3330	873	0.747	P.875
AF3SZ	45	—	1/80	1/80	L (30 arc min)	750	141	282	4460	1177	1.452	P.877
AF3SZ	25	—	1/100	19/1880	L (30 arc min)	100	22	43	2550	637	0.343	P.871
AF3SZ	30	—	1/100	19/1880	L (30 arc min)	200	44	88	3140	785	0.692	P.873
AF3SZ	35	—	1/100	19/1880	L (30 arc min)	400	86	172	3380	883	0.746	P.875
AF3SZ	45	—	1/100	19/1880	L (30 arc min)	750	172	345	4460	1177	1.449	P.877
AF3SZ	25	—	1/120	1/120	L (30 arc min)	100	28	57	2550	637	0.343	P.871
AF3SZ	30	—	1/120	1/120	L (30 arc min)	200	55	110	3140	785	0.692	P.873
AF3SZ	35	—	1/120	1/120	L (30 arc min)	400	102	204	3380	883	0.746	P.875
AF3SZ	45	—	1/120	1/120	L (30 arc min)	750	212	423	4460	1177	1.447	P.877
AF3SZ	25	—	1/160	1/160	L (30 arc min)	100	37	74	2550	637	0.343	P.871
AF3SZ	30	—	1/160	1/160	L (30 arc min)	200	74	149	3140	785	0.691	P.873
AF3SZ	35	—	1/160	1/160	L (30 arc min)	400	141	282	3580	912	0.745	P.875
AF3SZ	45	—	1/160	1/160	L (30 arc min)	750	282	564	4850	1275	1.445	P.877
AF3SZ	25	—	1/200	1/200	L (30 arc min)	100	47	94	2550	637	0.343	P.871
AF3SZ	30	—	1/200	1/200	L (30 arc min)	200	94	188	3140	785	0.691	P.873
AF3SZ	35	—	1/200	1/200	L (30 arc min)	400	181	363	3630	912	0.745	P.875
AF3SZ	45	—	1/200	1/200	L (30 arc min)	750	353	706	5190	1275	1.444	P.877
AF3SZ	25	—	1/240	1/240	L (30 arc min)	100	57	114	2550	637	0.343	P.871
AF3SZ	30	—	1/240	1/240	L (30 arc min)	200	110	220	3140	785	0.691	P.873
AF3SZ	35	—	1/240	1/240	L (30 arc min)	400	221	441	3630	912	0.745	P.875
AF3SZ	45	—	1/240	1/240	L (30 arc min)	750	423	847	5190	1275	1.444	P.877

AF3F Type <Low Backlash> Performance Table by Reduction Ratio

[Notes]



- The input speed is 3000 r/min.
- Allowable output shaft O.H.L. is the value at the middle of the output shaft.
- For the continuous rated input torque, please refer to page 948. In addition, for the servo motor-based motor rated output torque, please refer to page 937.
- The key dimensions and tolerances for output shafts conform to JIS B 1301-1996 (plain form).
- The internal moment of inertia (input shaft equivalent) is the value for the gearbox alone, and does not include the motor's moment of inertia.
- The allowable average torque is the continuous allowable torque value.
- Adjust the gain so that the inertial load on the output shaft side does not vibrate during acceleration and deceleration.
- In the performance table, ▭ indicates that for a clockwise (CW) motor input, the output rotates clockwise (CW) as viewed from the output shaft under the conditions shown in the figure on the right. (The arrows indicate the rotational directions of the input and output shafts, and do not limit the actual direction of rotation.)

■ At an input speed of 3000 r/min

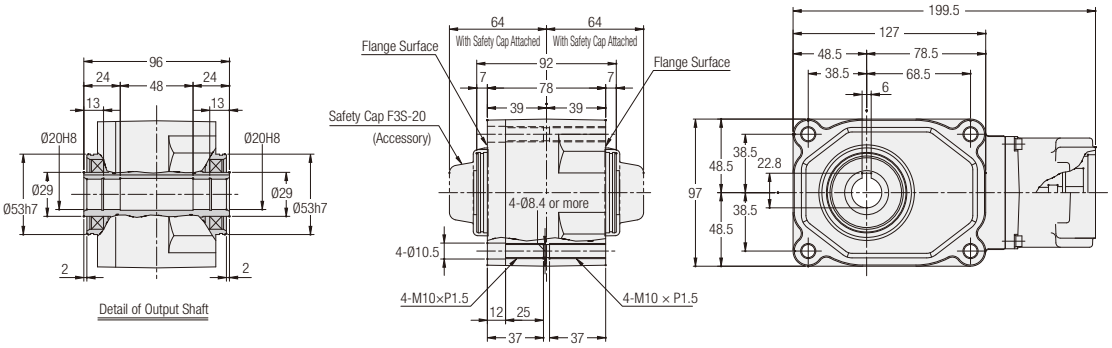
Mounting Type	Output Shaft Diameter	Shaft Arrangement	Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	×10⁻⁴kg·m²	
AF3FZ	28	L/R/T	1/5	1/5	L (30 arc min)	400	3.8	7.6	980	375	1.063	P.880
AF3FZ	32	L/R/T	1/5	1/5	L (30 arc min)	750	7.4	15	1670	500	2.258	P.882
AF3FZ	40	L/R/T	1/5	1/5	L (30 arc min)	2000	24	47	2550	800	8.078	P.883
AF3FZ	28	L/R/T	1/7.5	2/15	L (30 arc min)	400	5.9	12	1180	438	0.968	P.880
AF3FZ	32	L/R/T	1/7.5	2/15	L (30 arc min)	750	11	22	1810	567	1.998	P.882
AF3FZ	40	L/R/T	1/7.5	2/15	L (30 arc min)	2000	35	71	2940	900	7.395	P.883
AF3FZ	18	L/R/T	1/10	1/10	L (40 arc min)	100	2.0	3.9	860	294	0.354	P.878
AF3FZ	22	L/R/T	1/10	1/10	L (40 arc min)	200	3.8	8	1230	380	0.723	P.879
AF3FZ	28	L/R/T	1/10	1/10	L (30 arc min)	400	7.8	16	1520	475	0.930	P.880
AF3FZ	32	L/R/T	1/10	1/10	L (30 arc min)	750	15	29	1960	613	1.905	P.882
AF3FZ	40	L/R/T	1/10	1/10	L (30 arc min)	2000	47	94	3140	967	7.099	P.883
AF3FZ	28	L/R/T	1/12	19/235	L (30 arc min)	400	11	22	1620	500	0.909	P.880
AF3FZ	32	L/R/T	1/12	19/235	L (30 arc min)	750	20	39	2060	666	1.851	P.882
AF3FZ	40	L/R/T	1/12	19/235	L (30 arc min)	2000	57	114	3340	1034	6.954	P.883
AF3FZ	18	L/R/T	1/15	1/15	L (30 arc min)	100	3.1	6.3	980	333	0.349	P.878
AF3FZ	22	L/R/T	1/15	1/15	L (30 arc min)	200	6.4	13	1370	429	0.708	P.879
AF3FZ	28	L/R/T	1/15	1/15	L (30 arc min)	400	13	25	1720	539	0.893	P.880
AF3FZ	32	L/R/T	1/15	1/15	L (30 arc min)	750	25	49	2210	686	1.803	P.882
AF3FZ	40	L/R/T	1/15	1/15	L (30 arc min)	2000	69	137	3630	1067	6.810	P.883
AF3FZ	18	L/R/T	1/20	1/20	L (30 arc min)	100	4.7	9.4	1100	373	0.347	P.878
AF3FZ	22	L/R/T	1/20	1/20	L (30 arc min)	200	8.8	18	1470	466	0.702	P.879
AF3FZ	28	L/R/T	1/20	1/20	L (30 arc min)	400	17	33	1860	600	0.873	P.880
AF3FZ	32	L/R/T	1/20	1/20	L (30 arc min)	750	34	69	2350	747	1.765	P.882
AF3FZ	40	L/R/T	1/20	1/20	L (30 arc min)	2000	92	184	4070	1067	6.701	P.883
AF3FZ	18	L/R/T	1/25	1/25	L (30 arc min)	100	5.9	12	1180	392	0.346	P.878
AF3FZ	22	L/R/T	1/25	19/470	L (30 arc min)	200	12	24	1620	502	0.699	P.879
AF3FZ	28	L/R/T	1/25	1/25	L (30 arc min)	400	23	45	2010	637	0.865	P.880
AF3FZ	32	L/R/T	1/25	1/25	L (30 arc min)	750	44	88	2500	796	1.744	P.882
AF3FZ	40	L/R/T	1/25	1/25	L (30 arc min)	2000	120	239	4310	1067	6.627	P.883
AF3FZ	18	L/R/T	1/30	1/30	L (30 arc min)	100	7.1	14	1250	422	0.345	P.878
AF3FZ	22	L/R/T	1/30	1/30	L (30 arc min)	200	14	27	1720	527	0.697	P.879
AF3FZ	28	L/R/T	1/30	1/30	L (30 arc min)	400	27	55	2210	662	0.857	P.880
AF3FZ	32	L/R/T	1/30	1/30	L (30 arc min)	750	53	106	2650	821	1.726	P.882
AF3FZ	40	L/R/T	1/30	1/30	L (30 arc min)	2000	144	288	4360	1067	6.587	P.883
AF3FZ	18	L/R/T	1/40	1/40	L (30 arc min)	100	9.4	19	1370	451	0.344	P.878
AF3FZ	22	L/R/T	1/40	1/40	L (30 arc min)	200	19	37	1860	576	0.694	P.879
AF3FZ	28	L/R/T	1/40	1/40	L (30 arc min)	400	36	73	2450	711	0.750	P.880
AF3FZ	32	L/R/T	1/40	1/40	L (30 arc min)	750	74	149	2790	870	1.455	P.882
AF3FZ	40	L/R/T	1/40	1/40	L (30 arc min)	2000	191	382	4360	1067	5.871	P.883
AF3FZ	18	L/R/T	1/50	1/50	L (30 arc min)	100	12	24	1490	471	0.344	P.878
AF3FZ	22	L/R/T	1/50	1/50	L (30 arc min)	200	24	47	2060	613	0.693	P.879
AF3FZ	28	L/R/T	1/50	1/50	L (30 arc min)	400	45	90	2740	747	0.748	P.880
AF3FZ	32	L/R/T	1/50	1/50	L (30 arc min)	750	94	188	2940	870	1.450	P.882
AF3FZ	40	L/R/T	1/50	1/50	L (30 arc min)	2000	239	478	4360	1067	5.853	P.883

Mounting Type	Output Shaft Diameter	Shaft Arrangement	Reduction Ratio	Actual Reduction Ratio	Precision	Power Class	Allowable Average Torque (3000 r/min)	Allowable Peak Torque of Startup/ Stop	Allowable Output Shaft O.H.L.	Allowable Output Shaft Thrust Load	Internal Moment of Inertia (Input Shaft Equivalent)	Drawings
							N·m	N·m	N	N	$\times 10^{-4}$kg·m^2	
AF3FZ	18	L/R/T	1/60	1/59	L (30 arc min)	100	14	27	1490	471	0.344	P.878
AF3FZ	22	L/R/T	1/60	1/60	L (30 arc min)	200	27	55	2250	637	0.692	P.879
AF3FZ	28	L/R/T	1/60	1/60	L (30 arc min)	400	55	110	2890	767	0.746	P.880
AF3FZ	32	L/R/T	1/60	1/60	L (30 arc min)	750	113	225	3040	870	1.445	P.882
AF3FZ	40	L/R/T	1/60	1/60	L (30 arc min)	2000	287	574	4360	1067	5.843	P.883
AF3FZ	22	L/R/T	1/80	1/80	L (30 arc min)	100	17	33	2550	637	0.344	P.879
AF3FZ	28	L/R/T	1/80	1/80	L (30 arc min)	200	34	69	3090	775	0.692	P.880
AF3FZ	32	L/R/T	1/80	1/80	L (30 arc min)	400	71	141	3330	873	0.747	P.881
AF3FZ	40	L/R/T	1/80	1/80	L (30 arc min)	750	141	282	4460	1177	1.452	P.883
AF3FZ	22	L/R/T	1/100	19/1880	L (30 arc min)	100	22	43	2550	637	0.343	P.879
AF3FZ	28	L/R/T	1/100	19/1880	L (30 arc min)	200	44	88	3140	785	0.692	P.880
AF3FZ	32	L/R/T	1/100	19/1880	L (30 arc min)	400	86	172	3380	883	0.746	P.881
AF3FZ	40	L/R/T	1/100	19/1880	L (30 arc min)	750	172	345	4460	1177	1.449	P.883
AF3FZ	22	L/R/T	1/120	1/120	L (30 arc min)	100	28	57	2550	637	0.343	P.879
AF3FZ	28	L/R/T	1/120	1/120	L (30 arc min)	200	55	110	3140	785	0.692	P.880
AF3FZ	32	L/R/T	1/120	1/120	L (30 arc min)	400	102	204	3380	883	0.746	P.881
AF3FZ	40	L/R/T	1/120	1/120	L (30 arc min)	750	212	423	4460	1177	1.447	P.883
AF3FZ	22	L/R/T	1/160	1/160	L (30 arc min)	100	37	74	2550	637	0.343	P.879
AF3FZ	28	L/R/T	1/160	1/160	L (30 arc min)	200	74	149	3140	785	0.691	P.880
AF3FZ	32	L/R/T	1/160	1/160	L (30 arc min)	400	141	282	3580	912	0.745	P.881
AF3FZ	40	L/R/T	1/160	1/160	L (30 arc min)	750	282	564	4850	1275	1.445	P.883
AF3FZ	22	L/R/T	1/200	1/200	L (30 arc min)	100	47	94	2550	637	0.343	P.879
AF3FZ	28	L/R/T	1/200	1/200	L (30 arc min)	200	94	188	3140	785	0.691	P.880
AF3FZ	32	L/R/T	1/200	1/200	L (30 arc min)	400	181	363	3630	912	0.745	P.881
AF3FZ	40	L/R/T	1/200	1/200	L (30 arc min)	750	353	706	5190	1275	1.444	P.883
AF3FZ	22	L/R/T	1/240	1/240	L (30 arc min)	100	57	114	2550	637	0.343	P.879
AF3FZ	28	L/R/T	1/240	1/240	L (30 arc min)	200	110	220	3140	785	0.691	P.880
AF3FZ	32	L/R/T	1/240	1/240	L (30 arc min)	400	221	441	3630	912	0.745	P.881
AF3FZ	40	L/R/T	1/240	1/240	L (30 arc min)	750	423	847	5190	1275	1.444	P.883

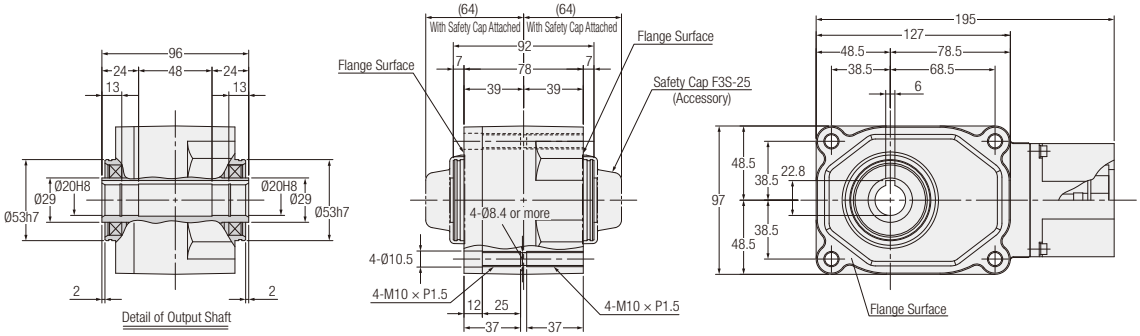
2-2. Drawings

AF3S Type Concentric Right Angle Hollow Bore — Shaft Diameter 20 — Low Backlash

<Figure 1>



<Figure 2>

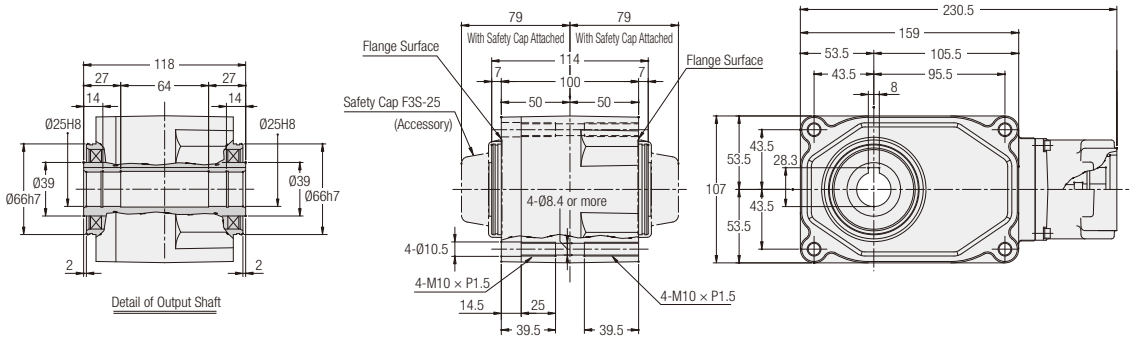


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
100 W	AF3SZ20-✱✱✱□100△	10, 15, 20, 25, 30, 40, 50, 60	1	F1/F3/S1/S3	3.5
100 W	AF3SZ20-✱✱✱□100△	10, 15, 20, 25, 30, 40, 50, 60	2	S6	3.5

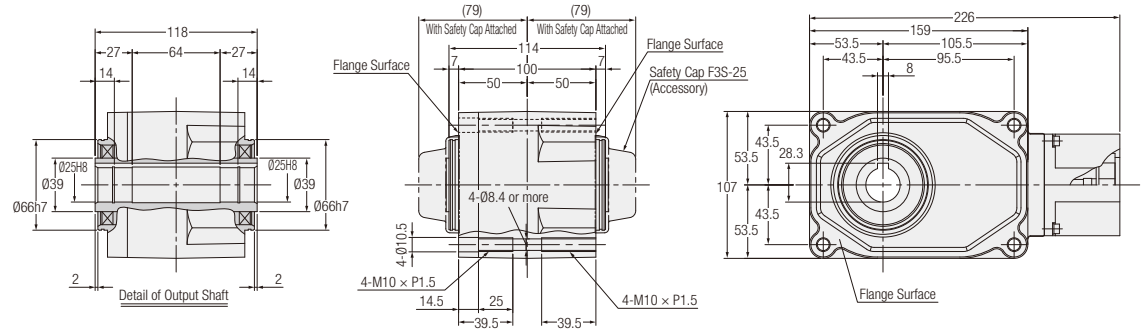
Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 866 for the performance table.

AF3S Type Concentric Right Angle Hollow Bore Shaft Diameter 25 Low Backlash

<Figure 1>



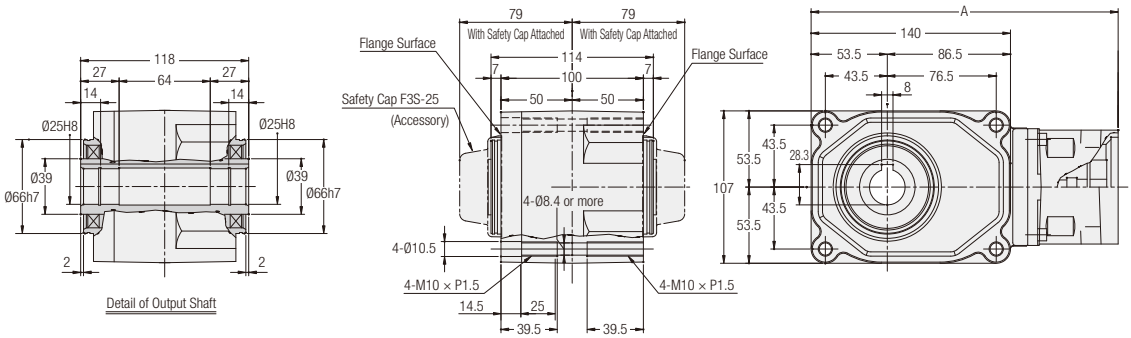
<Figure 2>



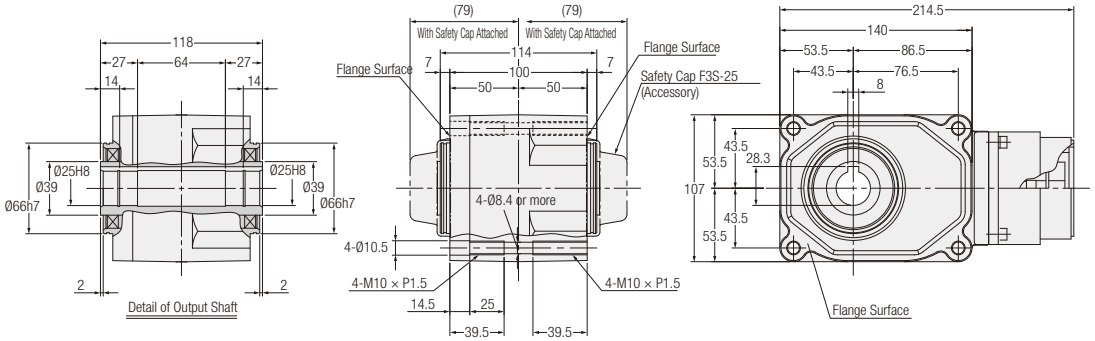
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
100 W	AF3SZ25-✱✱✱□100△	80, 100, 120, 160, 200, 240	1	F1/F3/S1/S3	5
100 W	AF3SZ25-✱✱✱□100△	80, 100, 120, 160, 200, 240	2	S6	5

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 866 for the performance table.

<Figure 3>



<Figure 4>

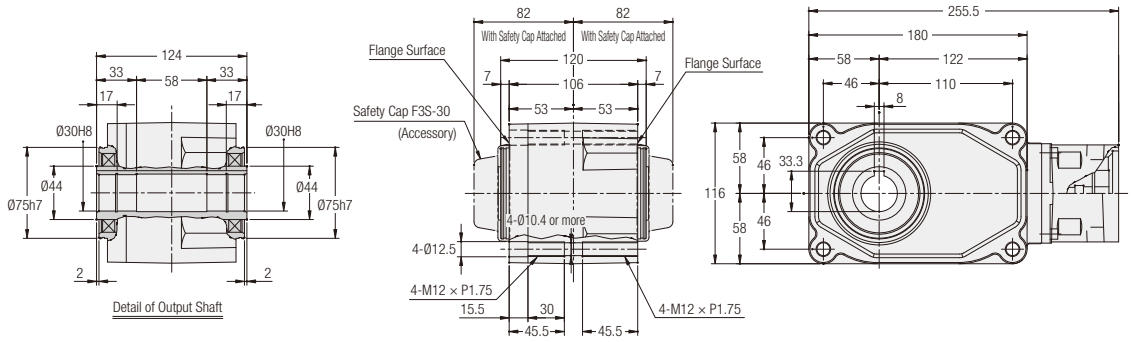


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
200 W	AF3SZ25-✱✱✱□200△	10, 15, 20, 25, 30, 40, 50, 60	3	F1/F2/F3/S1/S2/S3	5.5	216
200 W	AF3SZ25-✱✱✱□200△	10, 15, 20, 25, 30, 40, 50, 60	3	S6	5.5	211.5
200 W	AF3SZ25-✱✱✱□200△	10, 15, 20, 25, 30, 40, 50, 60	4	S7	5.5	—

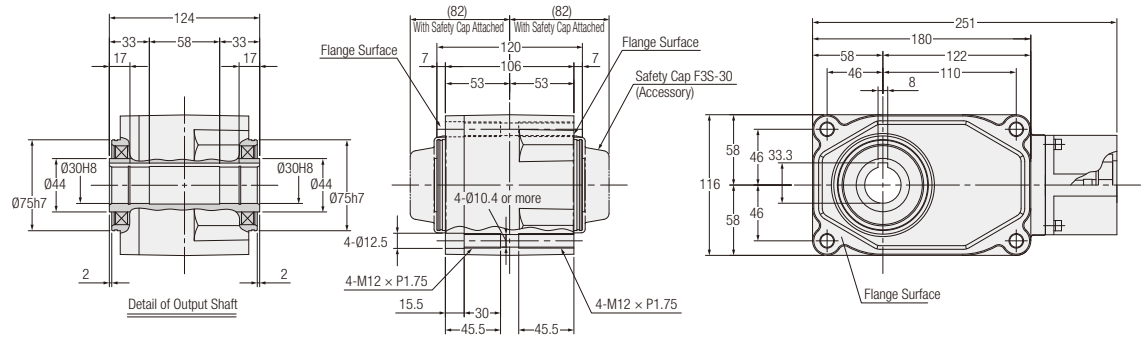
Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 866 for the performance table.

AF3S Type Concentric Right Angle Hollow Bore — Shaft Diameter 30 — Low Backlash

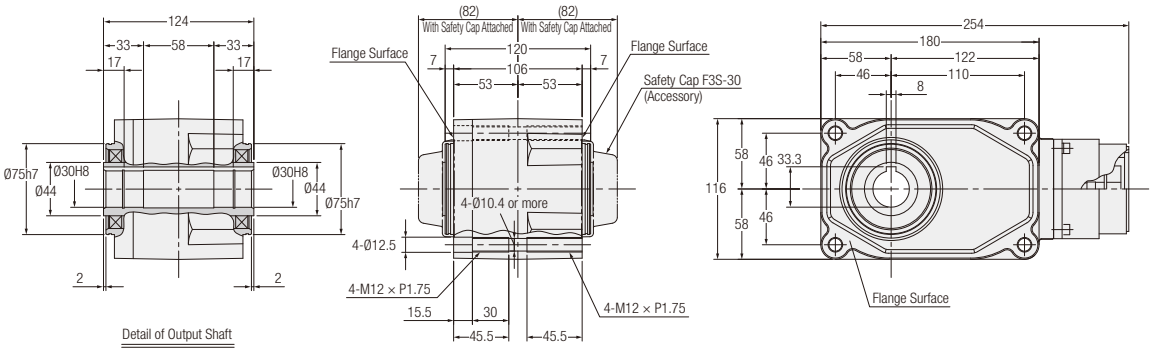
<Figure 1>



<Figure 2>



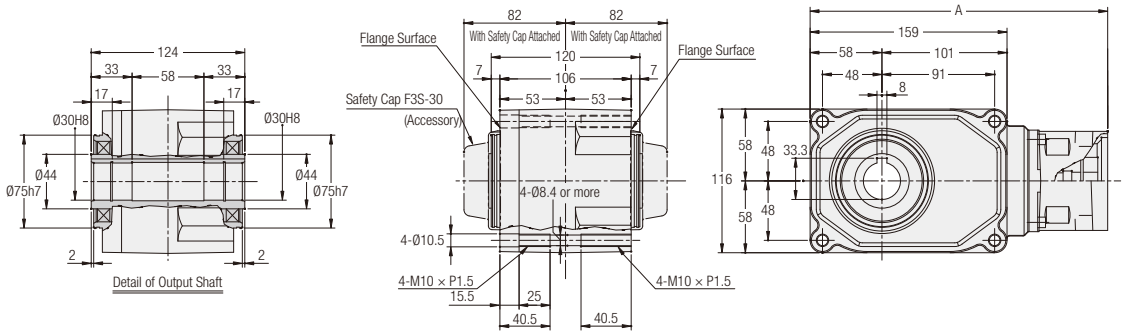
<Figure 3>



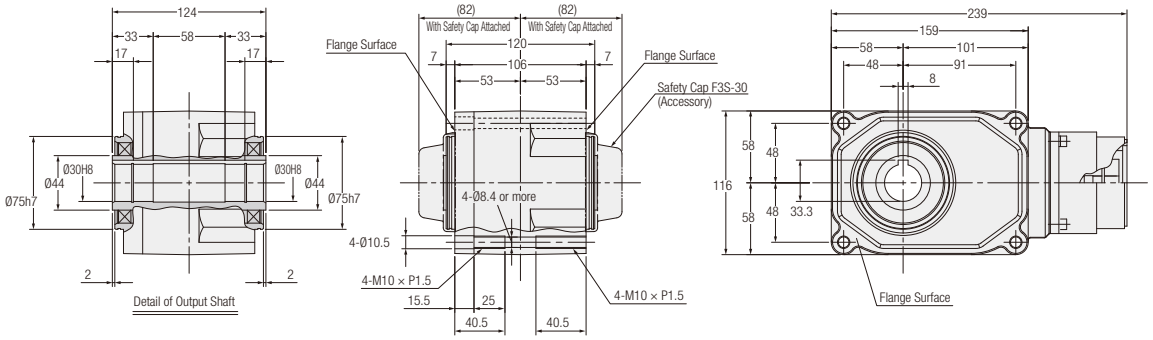
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
200 W	AF3SZ30-✱✱✱□200△	80, 100, 120, 160, 200, 240	1	F1/F2/F3/S1/S2/S3	8
200 W	AF3SZ30-✱✱✱□200△	80, 100, 120, 160, 200, 240	2	S6	8
200 W	AF3SZ30-✱✱✱□200△	80, 100, 120, 160, 200, 240	3	S7	8

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 866 for the performance table.

<Figure 4>



<Figure 5>

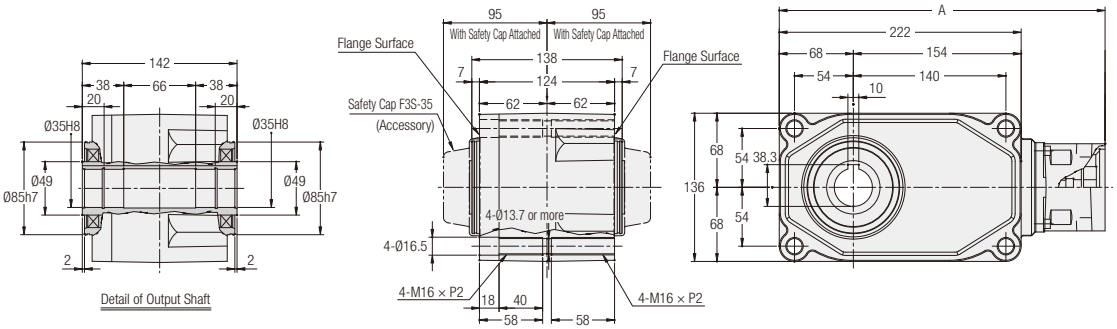


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
400 W	AF3SZ30-✱✱✱□400△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	4	F1/F3/S1/S3	7.5	240.5
400 W	AF3SZ30-✱✱✱□400△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	4	S6	7.5	236
400 W	AF3SZ30-✱✱✱□400△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	5	S7	7.5	—

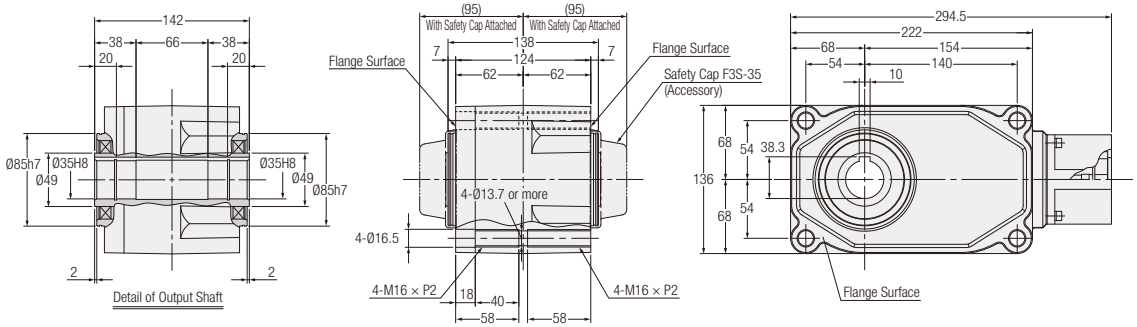
Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 866 for the performance table.

AF3S Type Concentric Right Angle Hollow Bore — Shaft Diameter 35 — Low Backlash

<Figure 1>



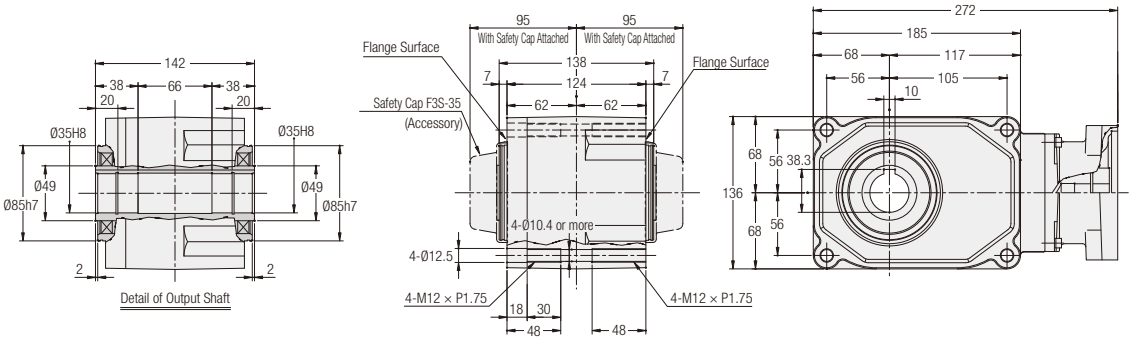
<Figure 2>



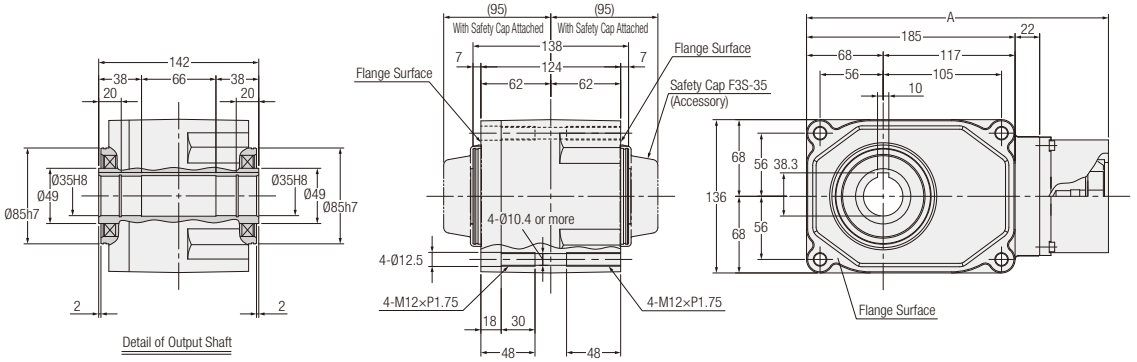
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
400 W	AF3SZ35-✱✱✱□400△	80, 100, 120, 160, 200, 240	1	F1/F3/S1/S3	13.5	299
400 W	AF3SZ35-✱✱✱□400△	80, 100, 120, 160, 200, 240	1	S6	13.5	294.5
400 W	AF3SZ35-✱✱✱□400△	80, 100, 120, 160, 200, 240	2	S7	13.5	—

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 866 for the performance table.

<Figure 3>



<Figure 4>

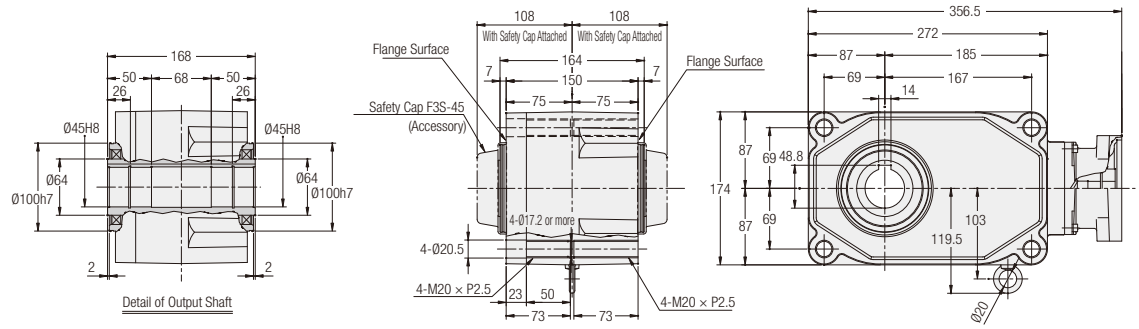


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
750 W	AF3SZ35-✻✻✻□750△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	3	F1/F2/S1/S2/S3/S4	10	—
750 W	AF3SZ35-✻✻✻□750△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	4	SA	10	268
750 W	AF3SZ35-✻✻✻□750△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	4	S9	10	272

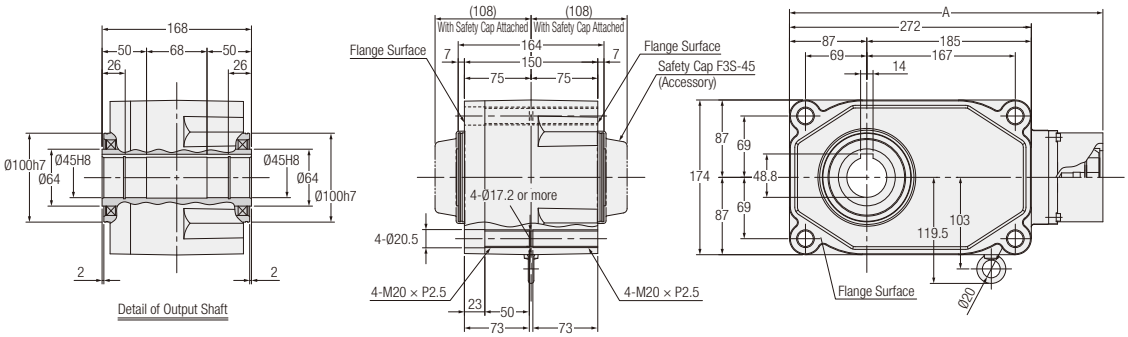
Note: A reduction ratio will be indicated as ✻✻✻ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 866 for the performance table.

AF3S Type Concentric Right Angle Hollow Bore — Shaft Diameter 45 — Low Backlash

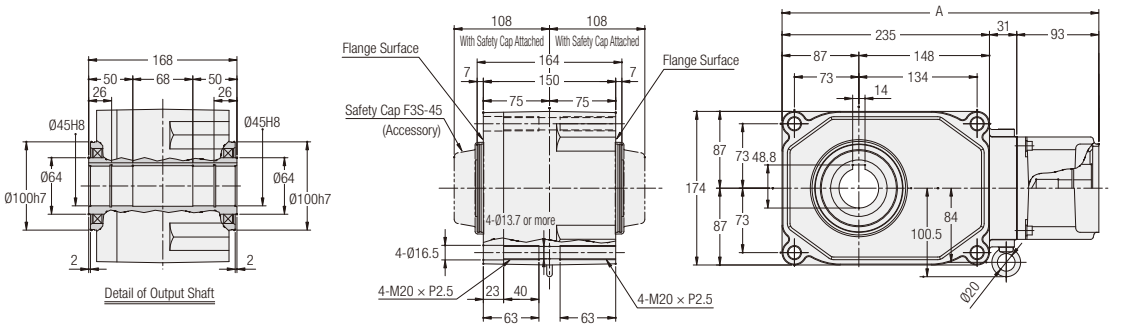
<Figure 1>



<Figure 2>



<Figure 3>

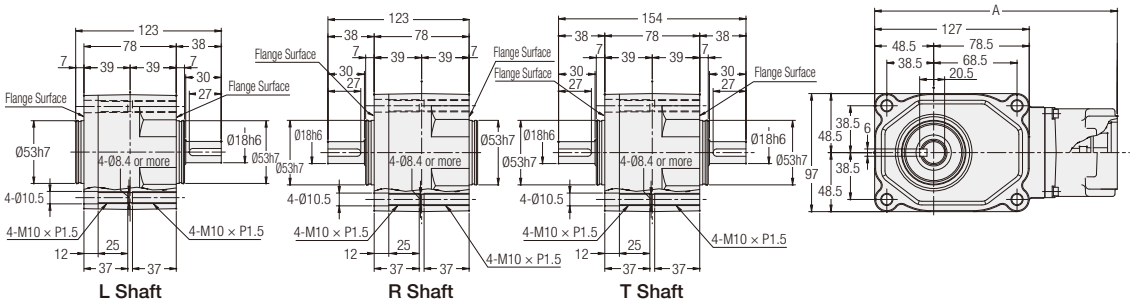


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
750 W	AF3SZ45-✱✱✱□750△	80, 100, 120, 160, 200, 240	1	F1/F2/S1/S2/S3/S4	18.5	—
750 W	AF3SZ45-✱✱✱□750△	80, 100, 120, 160, 200, 240	2	SA	18.5	352.5
750 W	AF3SZ45-✱✱✱□750△	80, 100, 120, 160, 200, 240	2	S9	18.5	356.5
2000 W	AF3SZ45-✱✱✱□2000△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	3	K21/K22/K23	18	359
				K31/K32/K33/K43		359
				F31/F33		369

Note: A reduction ratio will be indicated as ✱✱✱ in the nomenclature. In addition, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 866 for the performance table.

AF3F Type Concentric Right Angle Shaft | Shaft Diameter 18 | Low Backlash

<Figure 1>

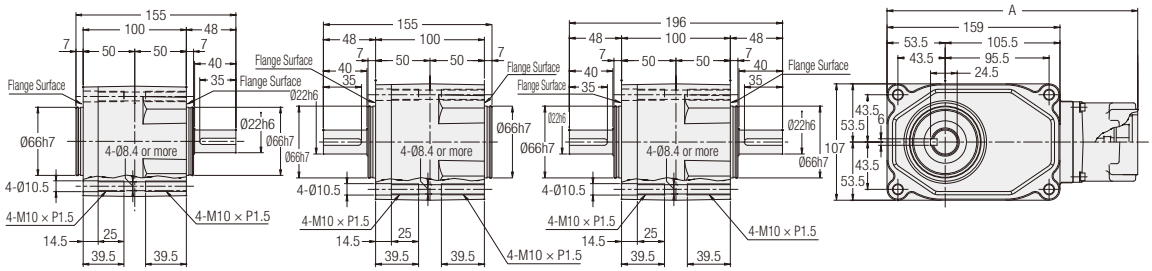


Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
100 W	AF3FZ18#-✱✱✱□100△	10, 15, 20, 25, 30, 40, 50, 60	1	F1/F3/S1/S3	3.5	199.5
100 W	AF3FZ18#-✱✱✱□100△	10, 15, 20, 25, 30, 40, 50, 60	1	S6	3.5	195

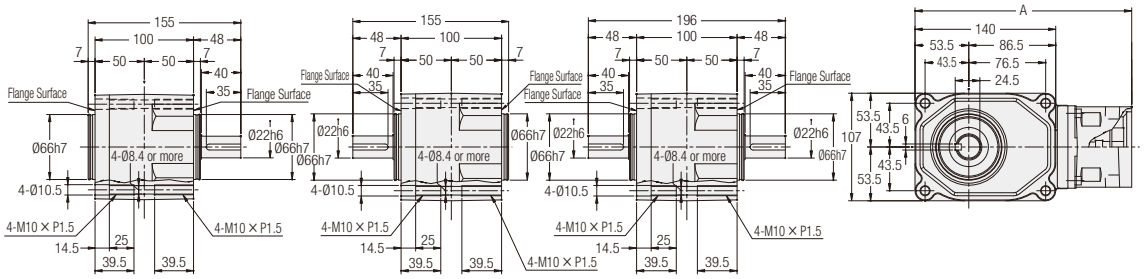
Note: A shaft arrangement (L, R, T) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ✱✱✱, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 868 for the performance table.

AF3F Type Concentric Right Angle Shaft | Shaft Diameter 22 | Low Backlash

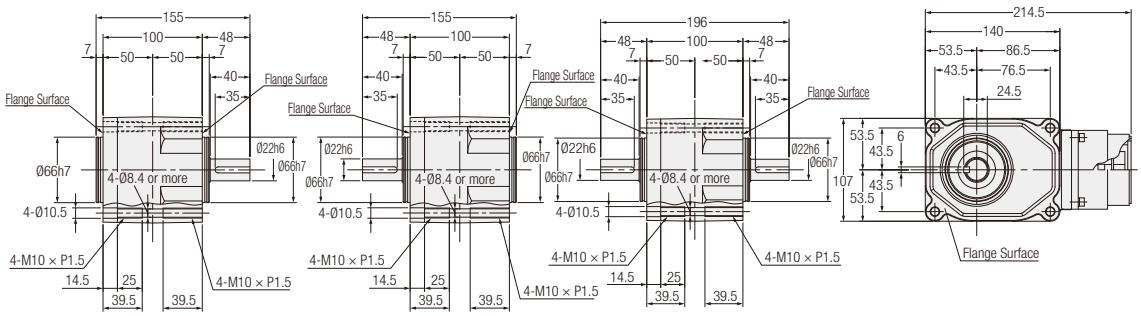
<Figure 1>



<Figure 2>



<Figure 3>



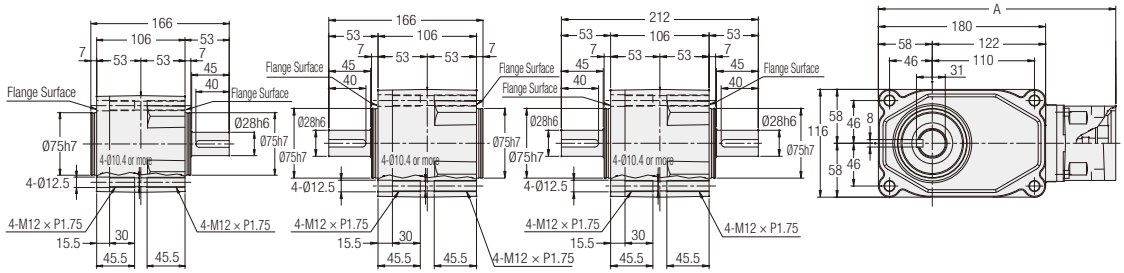
L Shaft R Shaft T Shaft

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
100 W	AF3FZ22#-***□100△	80, 100, 120, 160, 200, 240	1	F1/F3/S1/S3	6	230.5
100 W	AF3FZ22#-***□100△	80, 100, 120, 160, 200, 240	1	S6	6	230.5
200 W	AF3FZ22#-***□200△	10, 15, 20, 25, 30, 40, 50, 60	2	F1/F2/F3/S1/S2/S3	6	216
200 W	AF3FZ22#-***□200△	10, 15, 20, 25, 30, 40, 50, 60	2	S6	6	211.5
200 W	AF3FZ22#-***□200△	10, 15, 20, 25, 30, 40, 50, 60	3	S7	6	—

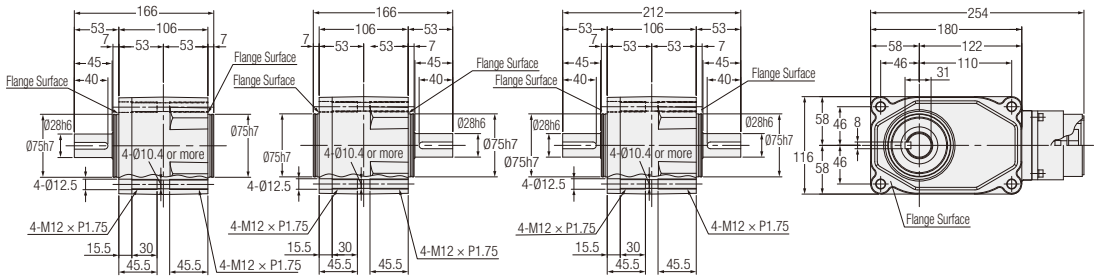
Note: A shaft arrangement (L, R, T) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.
Note: Please refer to page 868 for the performance table.

AF3F Type Concentric Right Angle Shaft — Shaft Diameter 28 — Low Backlash

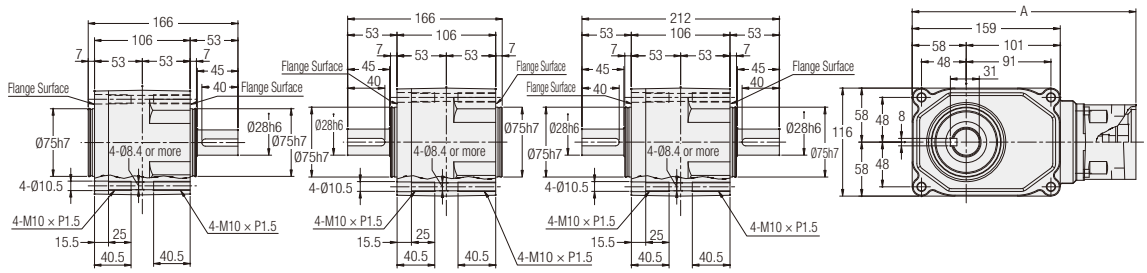
<Figure 1>



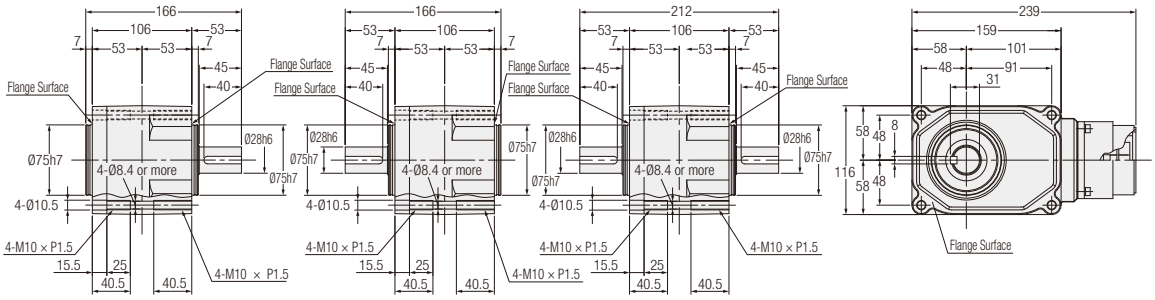
<Figure 2>



<Figure 3>



<Figure 4>



L Shaft R Shaft T Shaft

Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
200 W	AF3FZ28#-***□200△	80, 100, 120, 160, 200, 240	1	F1/F2/F3/S1/S2/S3	8.5	255.5
200 W	AF3FZ28#-***□200△	80, 100, 120, 160, 200, 240	1	S6	8.5	251
200 W	AF3FZ28#-***□200△	80, 100, 120, 160, 200, 240	2	S7	8.5	—
400 W	AF3FZ28#-***□400△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	3	F1/F3/S1/S3	8.5	240.5
400 W	AF3FZ28#-***□400△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	3	S6	8.5	236
400 W	AF3FZ28#-***□400△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	4	S7	8.5	—

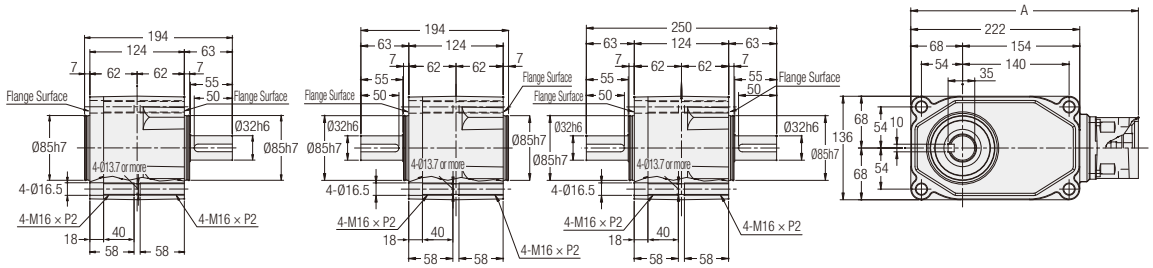
Note: A shaft arrangement (L, R, T) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.

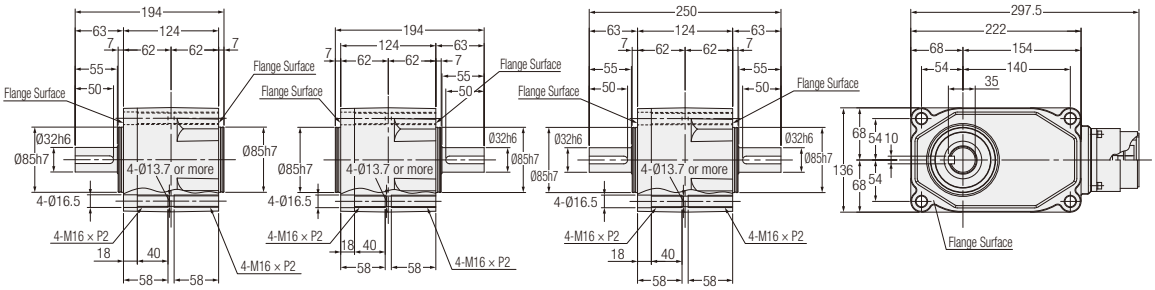
Note: Please refer to page 868 for the performance table.

AF3F Type Concentric Right Angle Shaft — Shaft Diameter 32 — Low Backlash

<Figure 1>



<Figure 2>



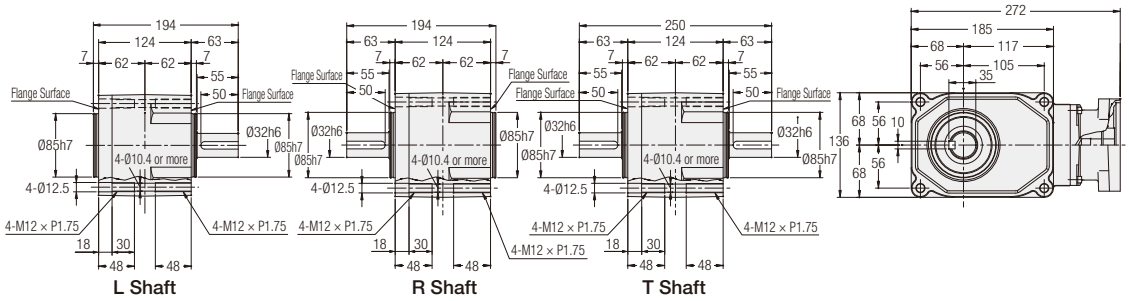
Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
400 W	AF3FZ32#-***□400△	80, 100, 120, 160, 200, 240	1	F1/F3/S1/S3	14.5	299
400 W	AF3FZ32#-***□400△	80, 100, 120, 160, 200, 240	1	S6	14.5	294.5
400 W	AF3FZ32#-***□400△	80, 100, 120, 160, 200, 240	2	S7	14.5	—

Note: A shaft arrangement (L, R, T) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

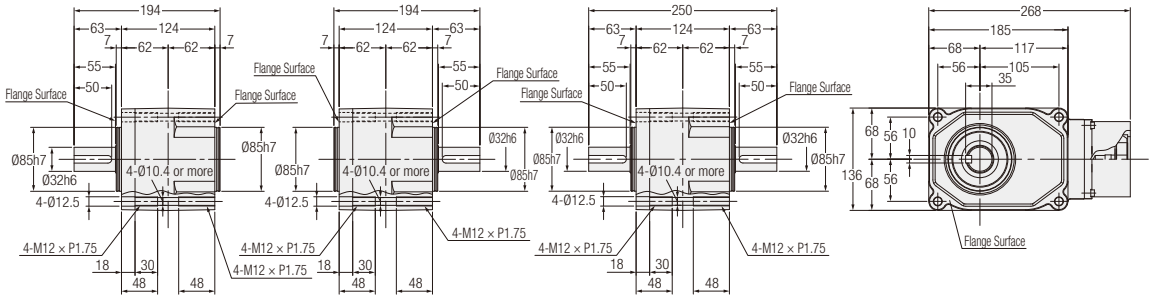
Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.

Note: Please refer to page 868 for the performance table.

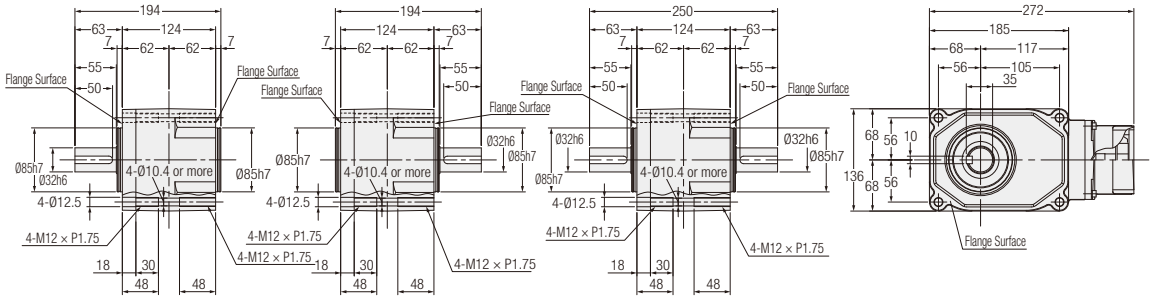
<Figure 3>



<Figure 4>



<Figure 5>



Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)
750 W	AF3FZ32#-***□750△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	3	F1/F2/S1/S2/S3/S4	11.5
750 W	AF3FZ32#-***□750△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	4	SA	11.5
750 W	AF3FZ32#-***□750△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	5	S9	11.5

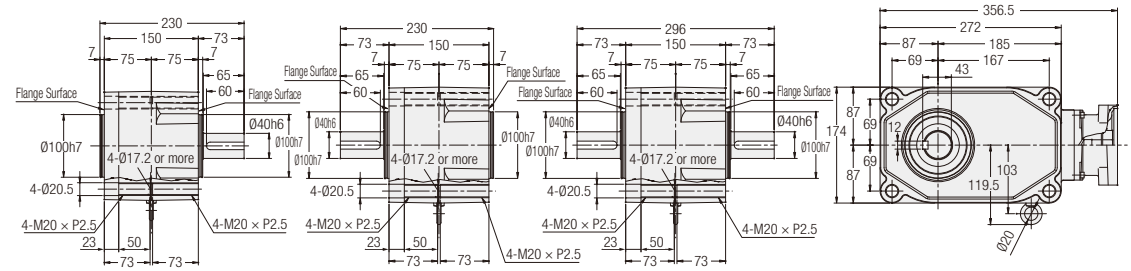
Note: A shaft arrangement (L, R, T) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ***, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.

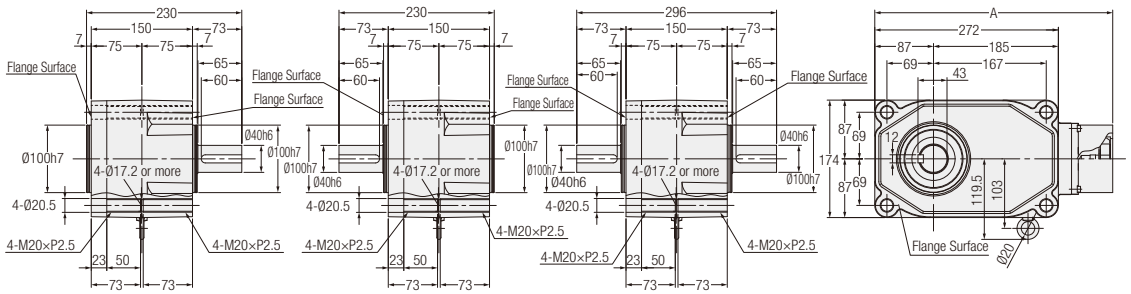
Note: Please refer to page 868 for the performance table.

AF3F Type Concentric Right Angle Shaft | Shaft Diameter 40 | Low Backlash

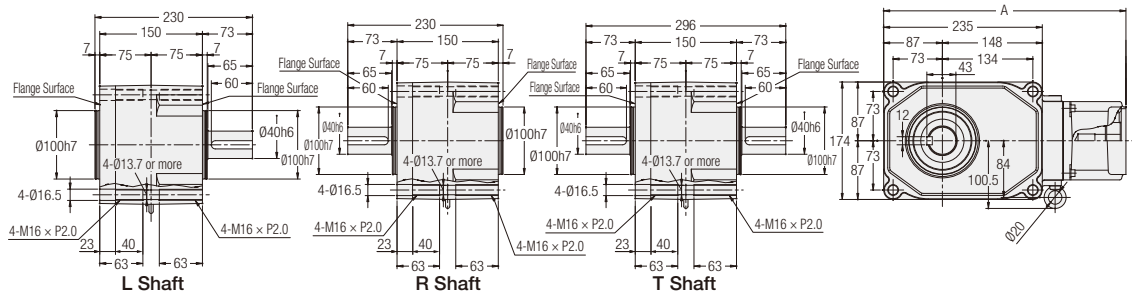
<Figure 1>



<Figure 2>



<Figure 3>



Motor Power Class	Part Number	Reduction Ratio	Figure Number	Flange Type	Approx. Weight (kg)	A
750 W	AF3FZ40#-✱✱✱□750△	80, 100, 120, 160, 200, 240	1	F1/F2/S1/S2/S3/S4	20	—
750 W	AF3FZ40#-✱✱✱□750△	80, 100, 120, 160, 200, 240	2	SA	20	352.5
750 W	AF3FZ40#-✱✱✱□750△	80, 100, 120, 160, 200, 240	2	S9	20	356.5
2000 W	AF3FZ40#-✱✱✱□2000△	5, 7.5, 10, 12, 15, 20, 25, 30, 40, 50, 60	3	K21/K22/K23/K31/ K32/K33/K43	21	359
				F31/F33	21	369

Note: A shaft arrangement (L, R, T) will be indicated as # in the nomenclature. In addition, a reduction ratio will be indicated as ✱✱✱, backlash will be indicated as □, and a flange type will be indicated as △.

Note: Please refer to pages 912 to 918 for the detailed dimensions of the input shaft area.

Note: Please refer to page 868 for the performance table.

MEMO

Technical Documentation

HIGH PRECISION GEARBOXES FOR SERVO MOTORS

P.886 **Motor mounting procedure**

P.891 **Examples of Tightening**

P.892 **Detailed Diagrams of Input Shaft and Flange Shapes**

P.920 **Performance Tables [for Calculation and Selection]**

P.939 **Selection Process Steps and Examples**

P.941 **Service Factor / Allowable Moment of Inertia**

P.943 **Method for Calculating the Moment of Inertia**

P.944 **Overhung Load (O.H.L.)**

P.948 **Continuous Rated Input Torque of Gearboxes**

P.949 **Change of Position of Wrench Hole for Input Shaft Joint Tightening**

P.950 **Precautions for Installation**

Motor mounting procedure

APG Type

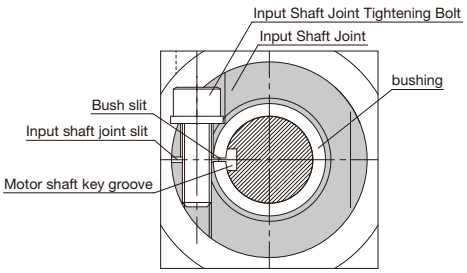
Step 1. Turn the input shaft and align the clamping bolt head to the wrench hole for clamping bolt.

Step 2. Wipe with rust-preventive agent, oil, etc. off the internal surface of the input shaft and the output.

Step 3. Insert the motor shaft.

When a bush is provided, align the position of the slit of the bushing with that of of the input tightening portion as shown in the following figure.

Additionally, when a key groove is provided, align the position of the slit of the bushing with the key groove.
When using an IP65 gearbox, insert a sheet gasket (accessory) between the input flange and the motor before inserting the motor into the gearbox body.



Step 4. Fasten the motor and the flange part of the gearbox with a motor mounting bolt.
Refer to [Table 1] for the tightening torque value.

Step 5. Tighten the input shaft joint tightening bolt to the specified tightening torque.
Refer to [Table 2] for the tightening torque value.

Step 6. Mount the rubber cap (accessory) to the wrench hole.

■ Tightening Torque for Motor Mounting Tightening Bolts (reference values)

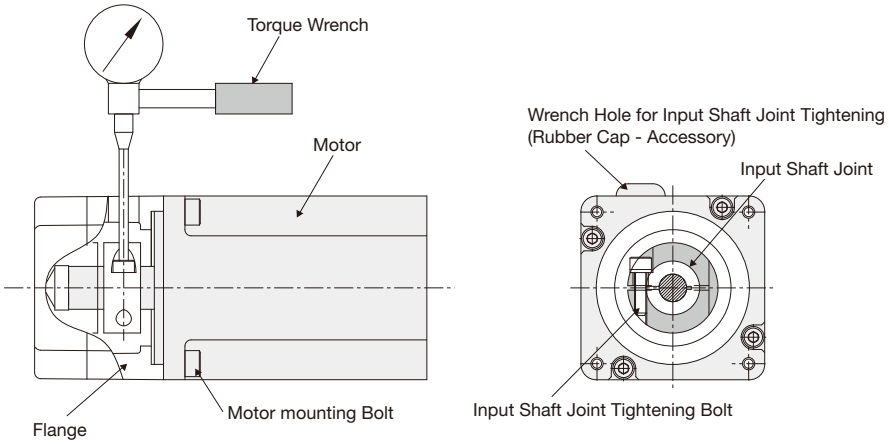
[Table-1]

Tightening Bolt Size	M3	M4	M5	M6	M8
Tightening Torque (N·m)	1.6	4.4	8.3	14.2	29.4
Strength classifications (JIS B 1051)	10.9	10.9	10.9	10.9	10.9

■ Tightening Torque for Input Shat Joint Tightening Bolts (reference values)

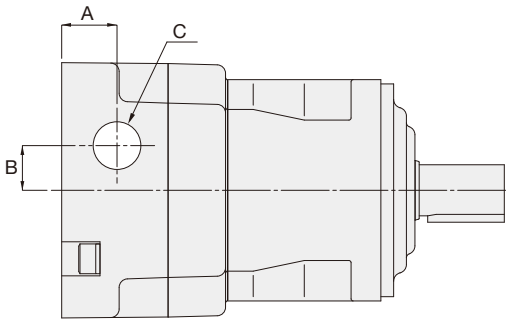
[Table-2]

Power Class	100 W	150 W	200 W	400 W	600 W	750 W	1000 W	1500 W	2000 W	3000 W
Tightening Bolt Size	M4	M4	M4	M4	M4	M5	M8	M8	M8	M8
Tightening Torque (N·m)	5.1	5.1	5.1	5.1	5.1	9	35	35	35	35



Note 1: Do not tighten the tightening bolt with no shaft applicable to the flange type inserted in the input shaft joint. This may cause damage to the input shaft.

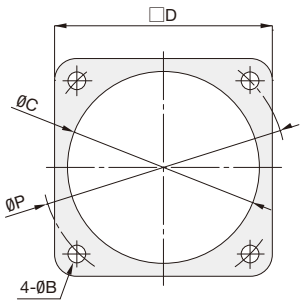
■ Detailed Diagram of Wrench Hole for Input Shaft Joint Tightening



Power Class		Dimension A	Dimension B	Dimension C
100 W	Flange Type Code S1, S3	13	9	Ø10
	Flange Type Code S6	13	10.5	Ø10
150 W		13	9	Ø10
200 W		13	10.5	Ø10
400 W		13	10.5	Ø10
600 W		13	10.5	Ø10
750 W	Flange Type Code S1, S2, S3, S4, S8, S9	14.5	15	Ø10
	Flange Type Code S6	15	15	Ø10
	Flange Type Code F6, F7	20	15	Ø10
1000 W	Flange Type Code K1*, K2*, K9*	20	20	Ø12
	Flange Type Code K3*	25	20	Ø12
	Flange Type Code K6*, K8*	21	20	Ø12
	Flange Type Code F3*	29	20	Ø12
1500 W	Flange Type Code K1*, K2*, K9*, KA*	20	20	Ø12
	Flange Type Code K3*	25	20	Ø12
	Flange Type Code K6*	21	20	Ø12
	Flange Type Code F3*	29	20	Ø12
2000 W	Flange Type Code K1*, K2*, K9*	20	20	Ø12
	Flange Type Code K3*	25	20	Ø12
	Flange Type Code K6*	21	20	Ø12
	Flange Type Code F3*	29	20	Ø12
3000 W	Flange Type Code K1*, K2*	20	20	Ø12
	Flange Type Code K3*, KB*	25	20	Ø12
	Flange Type Code K6*	21	20	Ø12
	Flange Type Code F3*	29	20	Ø12

■ IP65 Specification Motor Assembly Procedure

When using an IP65 gearbox, insert a sheet gasket between the input flange and the motor before inserting the motor into the gearbox body.



●Dimensions of Sheet gasket for Input Flange Area

Sheet Gasket	ØDimension B	ØDimension C	□ Dimension D	ØDimension P
□40	Ø4.5	Ø30.5	□40	Ø46
□55	Ø5.5	Ø40.5	□55	Ø63
□60	Ø5.5	Ø50.5	□60	Ø70
□70	Ø5.5	Ø60.5	□70	Ø75
□80	Ø6.5	Ø70.5	□80	Ø90
□90	Ø6.5	Ø80.5	□90	Ø100
□100	Ø9	Ø95.5	□100	Ø115
□120	Ø9	Ø110.5	□120	Ø130
□130	Ø9	Ø110.5	□130	Ø145

AFC Type

Step 1. Turn the input shaft and align the clamping bolt head to the wrench hole for clamping bolt.

Step 2. Wipe with rust-preventive agent, oil, etc. off the internal surface of the input shaft and the output.

Step 3. Insert the motor shaft.

Step 4. Fasten the motor and the flange part of the gearbox with a motor mounting bolt.
Refer to [Table 1] for the tightening torque value.

Step 5. Tighten the input shaft joint tightening bolt to the specified tightening torque.
Refer to [Table 2] for the tightening torque value.

Step 6. Mount the rubber cap (accessory) to the wrench hole.

■ Tightening Torque for Motor Mounting Tightening Bolts (reference values)

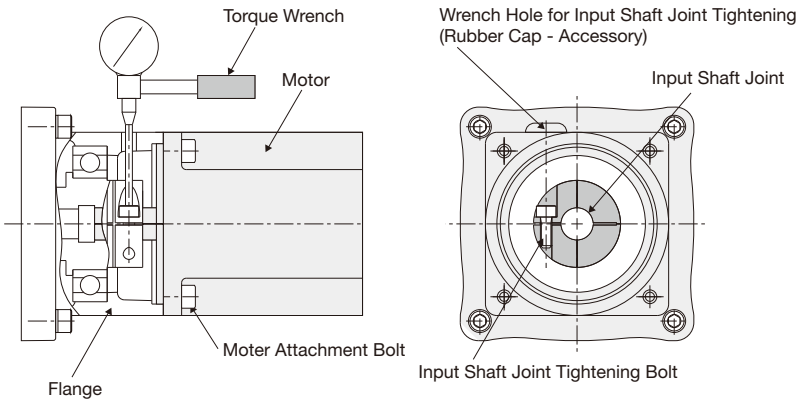
[Table-1]

Tightening Bolt Size	M3	M4	M5	M6	M8
Tightening Torque (N·m)	1.6	4.4	8.3	14.2	29.4
Strength classifications (JIS B 1051)	10.9	10.9	10.9	10.9	10.9

■ Tightening Torque for Input Shat Joint Tightening Bolts (reference values)

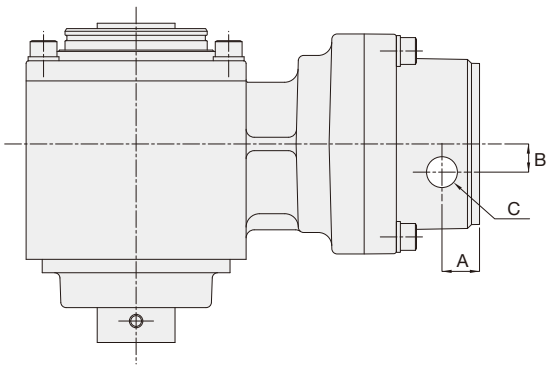
[Table-2]

Power Class	100 W	200 W	400 W	750 W	1000 W	2000 W	3000 W
Tightening Bolt Size	M4	M4	M4	M5	M8	M8	M8
Tightening Torque (N·m)	5.1	5.1	5.1	9	35	35	35



Note 1: Do not tighten the tightening bolt with no shaft applicable to the flange type inserted in the input shaft joint.
This may cause damage to the input shaft.

■ Detailed Diagram of Wrench Hole for Input Shaft Joint Tightening



* For the position of the wrench hole for input shaft joint tightening, refer to page 949.

Power Class	Flange Type	Frame Size	Reduction Ratio	Dimension A	Dimension B	Dimension C
100 W	S1/S3	All	All	12	8	Ø11.5
	S6	10/15	3, 5, 10 to 30	11	8	Ø11.5
		12/18	7.5, 10, 40 to 50	13	8	Ø11.5
200 W	S1 to S3	All	All	14	10.5	Ø11.5
	S6	All	All	10	10.5	Ø11.5
	S7	All	All	13	10.5	Ø11.5
400 W	S1/S3	All	All	14	10.5	Ø11.5
	S6	All	All	10	10.5	Ø11.5
	S7	All	All	13	10.5	Ø11.5
750 W	S1 to S4	All	All	14	15	Ø11.5
	SA	All	All	12	15	Ø11.5
	S9	18/28	3, 5, 10 to 30	15	15	Ø11.5
		22/32	7.5, 10, 40 to 50	13.9	15	Ø11.5
1000 W	K13/K22/K23/K61/KC9	All	All	18.5	20	Ø11.5
2000 W	Other than K75	All	All	18.5	20	Ø11.5
	K75	All	All	18.5	24.5	Ø11.5
3000 W	Other than K75	All	All	18.5	20	Ø11.5
	K75	All	All	18.5	24.5	Ø11.5

AG3/AH2/AF3 Types

Step 1. Turn the input shaft and align the clamping bolt head to the wrench hole for clamping bolt.

Step 2. Wipe with rust-preventive agent, oil, etc. off the internal surface of the input shaft and the output.

Step 3. Insert the motor shaft.

Step 4. Fasten the motor and the flange part of the gearbox with a motor mounting bolt.
Refer to [Table 1] for the tightening torque value.

Step 5. Tighten the input shaft joint tightening bolt to the specified tightening torque.
Refer to [Table 2] for the tightening torque value.

Step 6. Mount the cap screw (accessory) to the wrench hole.

■ Tightening Torque for Motor Mounting Tightening Bolts (reference values)

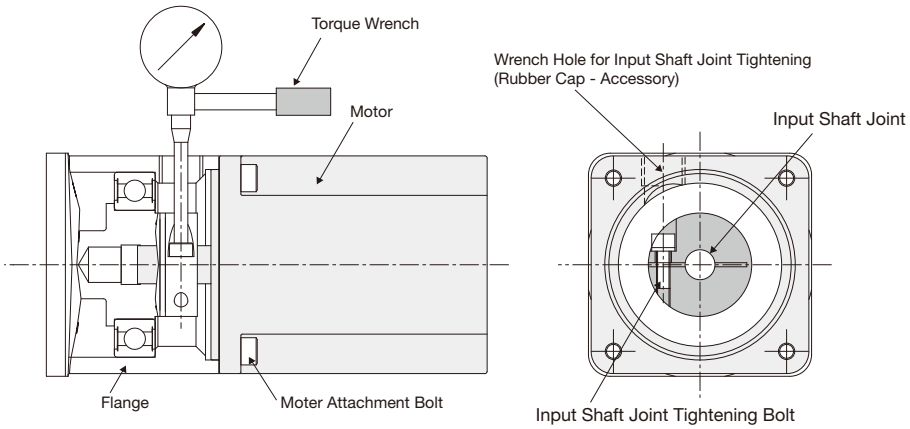
[Table-1]

Tightening Bolt Size	M3	M4	M5	M6	M8
Tightening Torque (N·m)	1.6	4.4	8.3	14.2	29.4
Strength classifications (JIS B 1051)	10.9	10.9	10.9	10.9	10.9

■ Tightening Torque for Input Shat Joint Tightening Bolts (reference values)

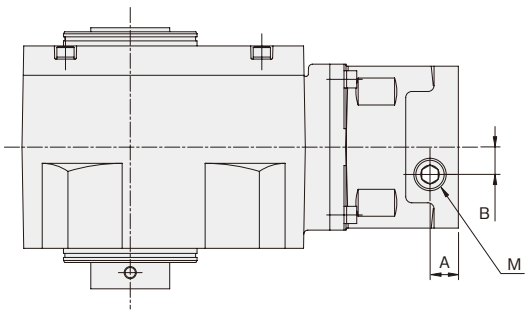
[Table-2]

Power Class	100 W	200 W	400 W	750 W	1000 W	2000 W
Tightening Bolt Size	M5	M5	M5	M6	M8	M8
Tightening Torque (N·m)	8.33	8.33	8.33	12.74	29.40	29.40



Note 1: Do not tighten the tightening bolt with no shaft applicable to the flange type inserted in the input shaft joint. This may cause damage to the input shaft.

■ Detailed Diagram of Wrench Hole for Input Shaft Joint Tightening

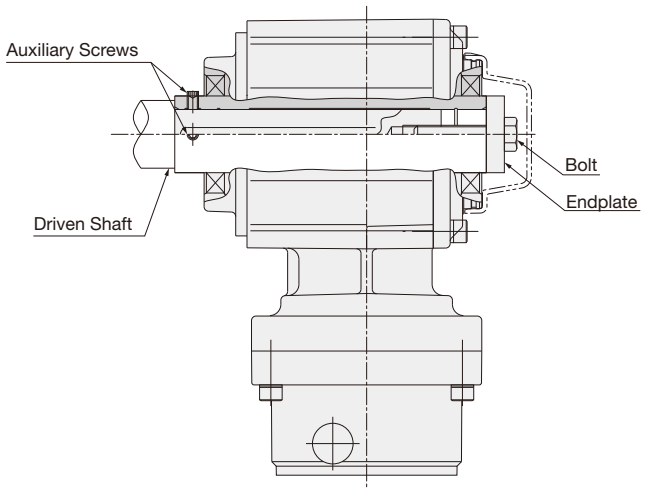


* For the position of the wrench hole for input shaft joint tightening, refer to page 912.

Power Class		Dimension A		Dimension B	Dimension M	
		AF3	AH2/ AG3/ AGA		AF3	AH2/ AG3/ AGA
100 W (Only precision 1 arc min and 3 arc min specifications)		14	14	10	M8	M8
100 W (Only low backlash specifications)		14	14.5	10	M16	M8
200 W		14	14.5	13.5	M16	M8
400 W		14	14.5	13.5	M16	M8
750 W		15	15	16	M16	M10
1000 W		19	19	20	M16	M12
2000 W	Flange Type Code K21/K22/K23 K31/K32/K33	18.5	17	20	M16	M12
2000 W	Flange Type Code F31/F33	28.5	27	20	M16	M12

Examples of Tightening

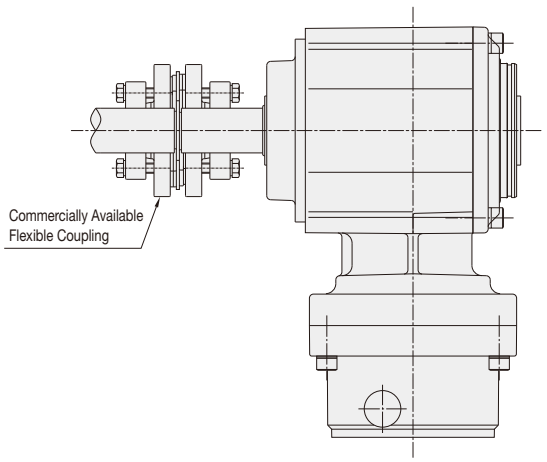
In the case of a right angle hollow bore type



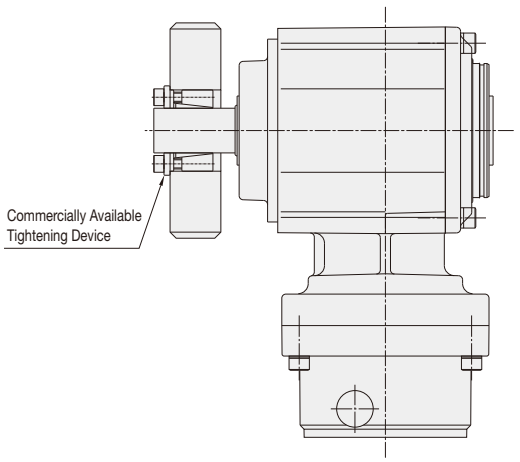
Note 1: This method prevents backlash by inserting a stepped driven shaft with a key into the right angle hollow bore and fixing the shaft on the end face with a screw etc. and then with the two auxiliary screws.

In the case of parallel shaft and right angle shaft types without a key

■ Item to be installed on a shaft
(Tightening with a ball screw etc.)



■ Item to be installed in a hole
(Tightening with a pulley etc.)

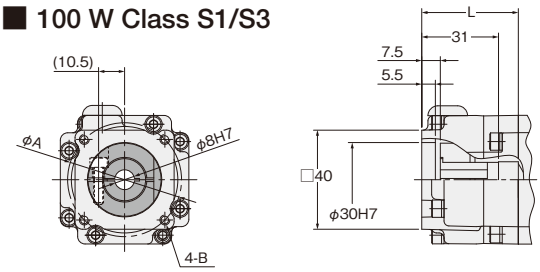


* The figure shows a solid shaft (without a key). The same applies for parallel shafts.
* For solid shafts (without a key), use a friction-type coupling.
* Follow the instruction manual of the commercially available fastening device for the fastening procedure.

Detailed Diagrams of Input Shaft and Flange Shapes

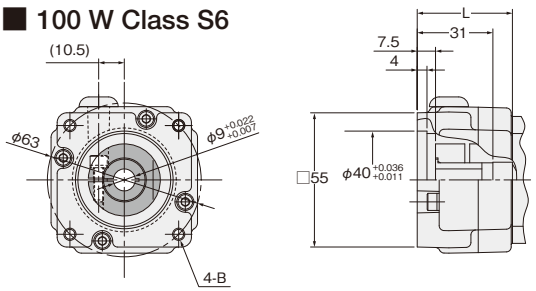
APG Type

■ 100 W Class S1/S3



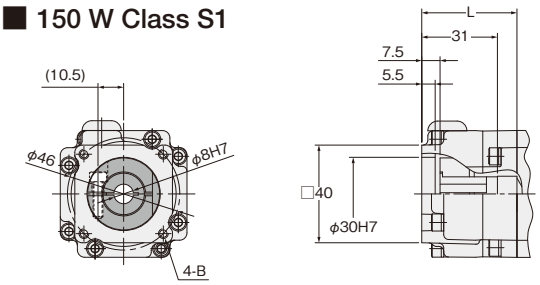
Flange Type	Reduction Ratio	Dimension L	Dimension A	Dimension B	Bushing
S1	Up to 1/10	39	ø46	M4, Depth 10	Yes
	From 1/15	34.5			
S3	Up to 1/10	39	ø45	M3, Depth 10	Yes
	From 1/15	34.5			

■ 100 W Class S6



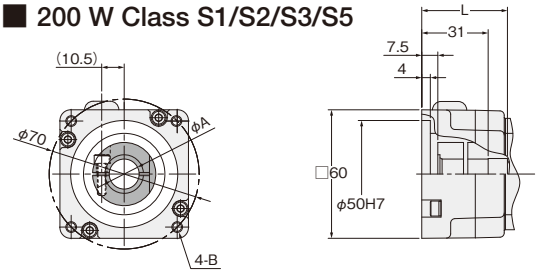
Flange Type	Reduction Ratio	Dimension L	Dimension B	Bushing
S6	Up to 1/10	39	M5, Depth 10	Yes
	From 1/15	34.5		

■ 150 W Class S1



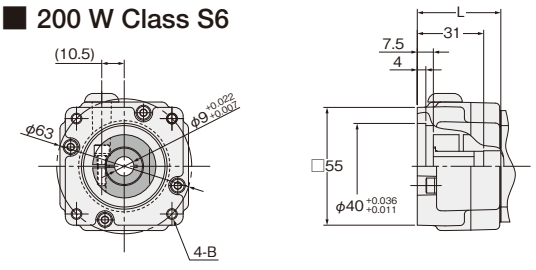
Flange Type	Reduction Ratio	Dimension L	Dimension B	Bushing
S1	Up to 1/10	39	M4, Depth 10	Yes
	From 1/15	34.5		

■ 200 W Class S1/S2/S3/S5



Flange Type	Reduction Ratio	Dimension L	Dimension A	Dimension B	Bushing
S1	Up to 1/10	39	ø11H7	M5, Depth 13.5 (Through)	Yes
	From 1/15	34.5			
S2	Up to 1/10	39	ø14H7	M5, Depth 13.5 (Through)	No
	From 1/15	34.5			
S3	Up to 1/10	39	ø11H7	M4, Depth 13.5 (Through)	Yes
	From 1/15	34.5			
S5	Up to 1/10	39	ø9H7	M5, Depth 13.5 (Through)	Yes
	From 1/15	34.5			

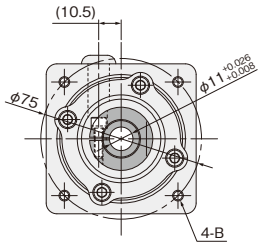
■ 200 W Class S6

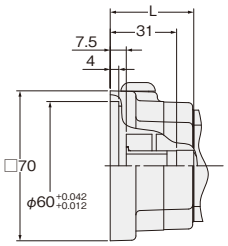


Flange Type	Reduction Ratio	Dimension L	Dimension B	Bushing
S6	Up to 1/10	39	M5, Depth 10	Yes
	From 1/15	34.5		

Detailed Diagrams of Input Shaft and Flange Shapes

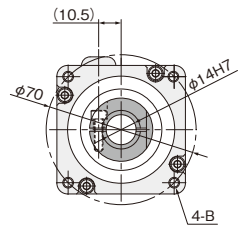
■ 200 W Class S7

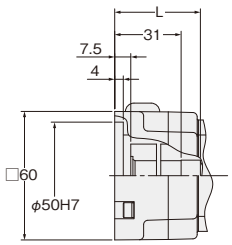




Flange Type	Reduction Ratio	Dimension L	Dimension B	Bushing
S7	Up to 1/10	39	M5, Depth 12 (Through)	Yes
	From 1/15	34.5		

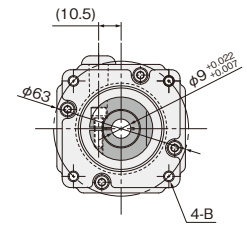
■ 400 W Class S1/S3

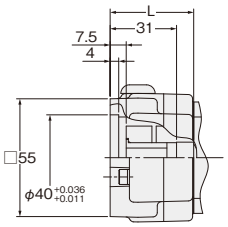




Flange Type	Reduction Ratio	Dimension L	Dimension B	Bushing
S1	Up to 1/5	39	M5, Depth 13.5 (Through)	No
	From 1/15	34.5	M5, Depth 13.5 (Through)	
S3	Up to 1/5	39	M4, Depth 13.5 (Through)	No
	From 1/15	34.5	M4, Depth 13.5 (Through)	

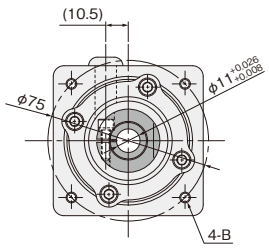
■ 400 W Class S6

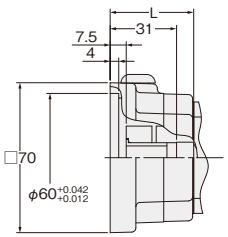




Flange Type	Reduction Ratio	Dimension L	Dimension B	Bushing
S6	Up to 1/10	39	M5, Depth 10	Yes
	From 1/15	34.5		

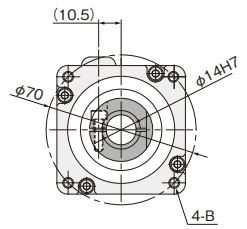
■ 400 W Class S7

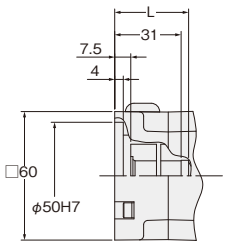




Flange Type	Reduction Ratio	Dimension L	Dimension B	Bushing
S7	Up to 1/10	39	M5, Depth 12(Through)	Yes
	From 1/15	34.5		

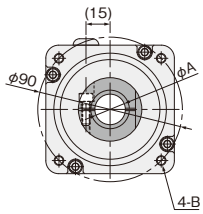
■ 600 W Class S1

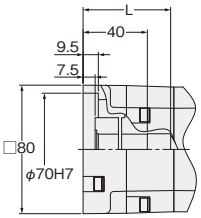




Flange Type	Reduction Ratio	Dimension L	Dimension B	Bushing
S1	Up to 1/10	39	M5, Depth 10	No
	From 1/15	34.5	M5, Depth 13.5 (Through)	

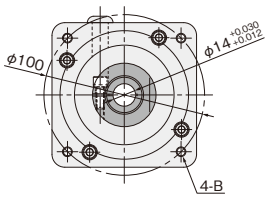
■ 750 W Class S1/S2/S3/S4

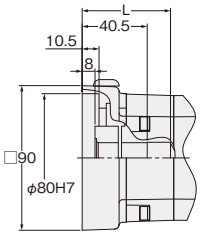




Flange Type	Reduction Ratio	Dimension L	Dimension A	Dimension B	Bushing
S1	Up to 1/10	54.5	Ø16H7	M6, Depth 17 (Through)	Yes
	From 1/15	44.5			
S2	Up to 1/10	54.5	Ø19H7	M6, Depth 17 (Through)	No
	From 1/15	44.5			
S3	Up to 1/10	54.5	Ø19H7	M5, Depth 17 (Through)	No
	From 1/15	44.5			
S4	Up to 1/10	54.5	Ø16H7	M5, Depth 17 (Through)	Yes
	From 1/15	44.5			

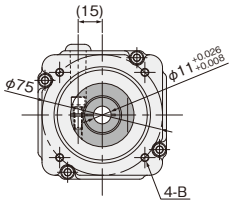
■ 750 W Class S6

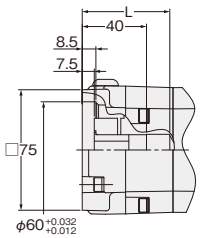




Flange Type	Reduction Ratio	Dimension L	Dimension B	Bushing
S6	Up to 1/10	54.5	M6, Depth 15 (Through)	Yes
	From 1/15	44.5		

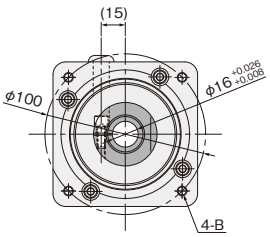
■ 750 W Class S8

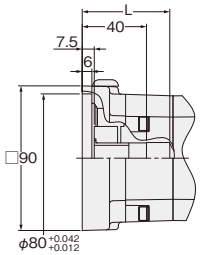




Flange Type	Reduction Ratio	Dimension L	Dimension B	Bushing
S8	Up to 1/10	55	M5, Depth 11	Yes
	From 1/15	45		

■ 750 W Class S9

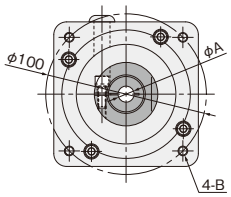


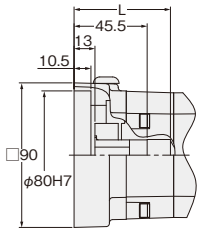


Flange Type	Reduction Ratio	Dimension L	Dimension B	Bushing
S9	Up to 1/10	54.5	M6, Depth 17 (Through)	Yes
	From 1/15	44.5		

Detailed Diagrams of Input Shaft and Flange Shapes

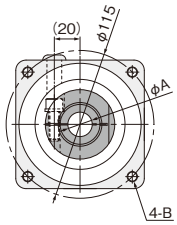
■ 750 W Class F6/F7

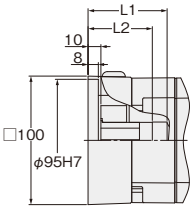




Flange Type	Reduction Ratio	Dimension L	Dimension A	Dimension B	Bushing
F6	Up to 1/10	60	Ø10H7	M6, Depth 15 (Through)	Yes
	From 1/15	50			
F7	Up to 1/10	60	Ø16H7		Yes
	From 1/15	50			

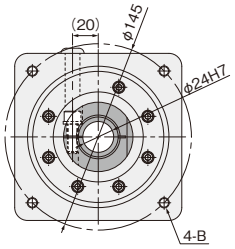
■ 1000 W Class K13/K21/K22/K23

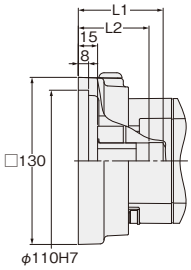




Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Dimension B	Bushing
K13	Up to 1/10	61	50	Ø24H7	M6, Depth 15	Yes
	From 1/15	59	41			
K21	Up to 1/10	61	50	Ø19H7	M8, Depth 16	Yes
	From 1/15	59	41			
K22	Up to 1/10	61	50	Ø22H7	M8, Depth 16	Yes
	From 1/15	59	41			
K23	Up to 1/10	61	50	Ø24H7	M8, Depth 16	Yes
	From 1/15	59	41			

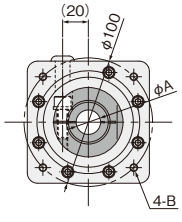
■ 1000 W Class K33

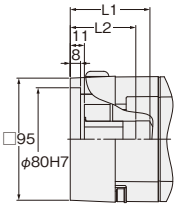




Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension B	Bushing
K33	Up to 1/10	66	55	M8, Depth 20 (Through)	Yes
	From 1/15	64	46		

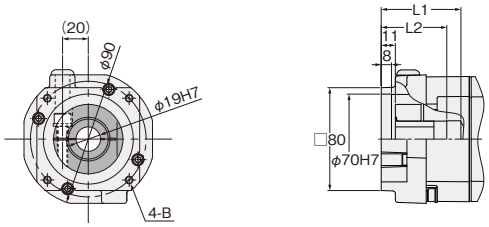
■ 1000 W Class K61/K67/K6E





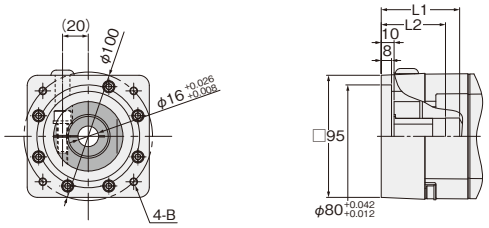
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Dimension B	Bushing
K61	Up to 1/10	62	51	Ø19H7	M6, Depth 15	Yes
	From 1/15	60	42			
K67	Up to 1/10	62	51	Ø16H7		Yes
	From 1/15	60	42			
K6E	Up to 1/10	62	51	$Ø14^{+0.030}_{+0.012}$		Yes
	From 1/15	60	42			

■ 1000 W Class K81



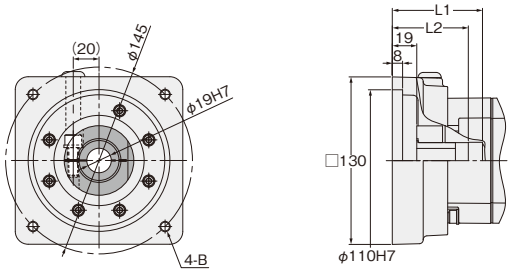
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension B	Bushing
K81	Up to 1/10	62	51	M6, Depth 15	Yes
	From 1/15	60	42		

■ 1000 W Class K99



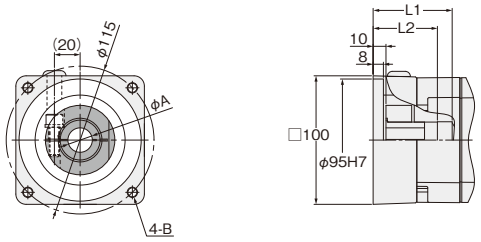
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension B	Bushing
K99	Up to 1/10	61	50	M6, Depth 15	Yes
	From 1/15	59	41		

■ 1000 W Class F31



Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension B	Bushing
F31	Up to 1/10	70	59	M8, Depth 20 (Through)	Yes
	From 1/15	68	50		

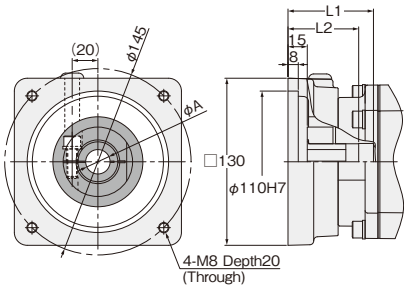
■ 1500 W Class K13/K21/K22/K23



Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Dimension B	Bushing
K13	Up to 1/10	61	50	Ø24H7	M6, Depth 15	Yes
	From 1/15	59	41			
K21	Up to 1/10	61	50	Ø19H7	M8, Depth 16	Yes
	From 1/15	59	41			
K22	Up to 1/10	61	50	Ø22H7	M8, Depth 16	Yes
	From 1/15	59	41			
K23	Up to 1/10	61	50	Ø24H7	M8, Depth 16	Yes
	From 1/15	59	41			

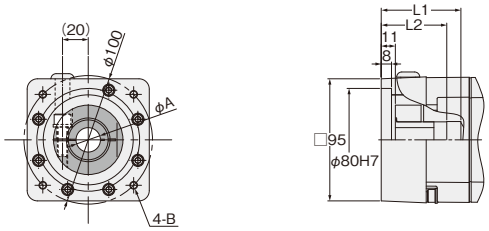
Detailed Diagrams of Input Shaft and Flange Shapes

■ 1500 W Class K31/K32/K33



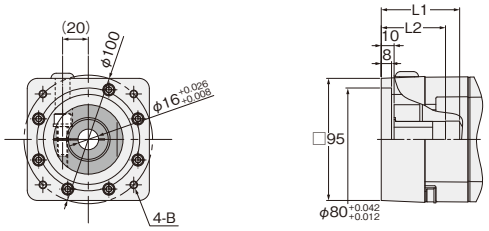
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Bushing
K31	Up to 1/10	66	55	Ø19H7	Yes
	From 1/15	64	46		
K32	Up to 1/10	66	55	Ø22H7	Yes
	From 1/15	64	46		
K33	Up to 1/10	66	55	Ø24H7	Yes
	From 1/15	64	46		

■ 1500 W Class K61/K67



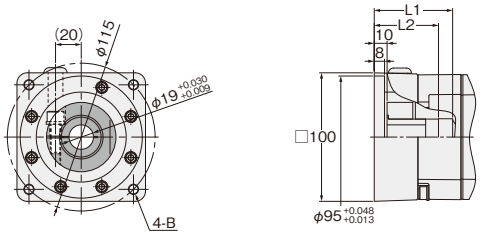
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Dimension B	Bushing
K61	Up to 1/10	62	51	Ø19H7	M6, Depth 15	Yes
	From 1/15	60	42			
K67	Up to 1/10	62	51	Ø16H7		Yes
	From 1/15	60	42			

■ 1500 W Class K99



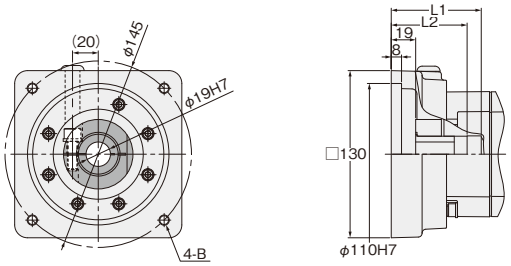
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension B	Bushing
K99	Up to 1/10	61	50	M6, Depth 15	Yes
	From 1/15	59	41		

■ 1500 W Class KAA



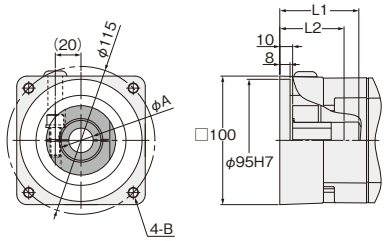
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension B	Bushing
KAA	Up to 1/10	61	50	M8, Depth 16	Yes
	From 1/15	59	41		

■ 1500 W Class F31



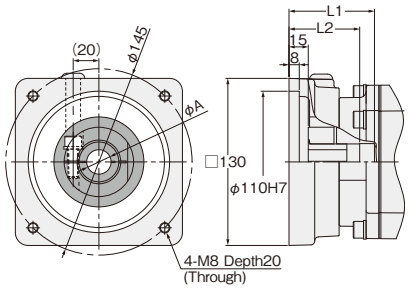
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension B	Bushing
F31	Up to 1/10	70	59	M8, Depth 20 (Through)	Yes
	From 1/15	68	50		

■ 2000 W Class K13/K21/K22/K23



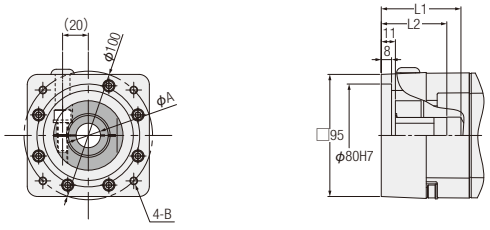
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Dimension B	Bushing
K13	Up to 1/10	61	50	Ø24H7	M6, Depth 15	Yes
	From 1/15	59	41			
K21	Up to 1/10	61	50	Ø19H7	M8, Depth 16	Yes
	From 1/15	59	41			
K22	Up to 1/10	61	50	Ø22H7	M8, Depth 16	Yes
	From 1/15	59	41			
K23	Up to 1/10	61	50	Ø24H7	M8, Depth 16	Yes
	From 1/15	59	41			

■ 2000 W Class K31/K32/K33



Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Bushing
K31	Up to 1/10	66	55	Ø19H7	Yes
	From 1/15	64	46		
K32	Up to 1/10	66	55	Ø22H7	Yes
	From 1/15	64	46		
K33	Up to 1/10	66	55	Ø24H7	Yes
	From 1/15	64	46		

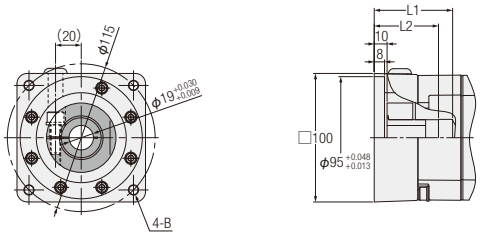
■ 2000 W Class K61/K67



Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Dimension B	Bushing
K61	Up to 1/10	62	51	Ø19H7	M6, Depth 15	Yes
	From 1/15	60	42			
K67	Up to 1/10	62	51	Ø16H7		Yes
	From 1/15	60	42			

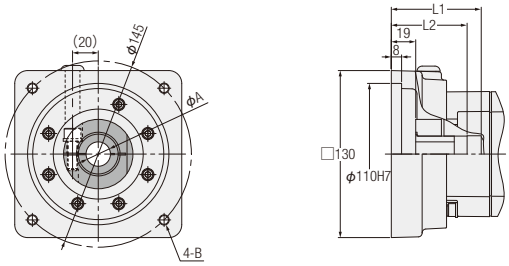
Detailed Diagrams of Input Shaft and Flange Shapes

■ 2000 W Class KAA



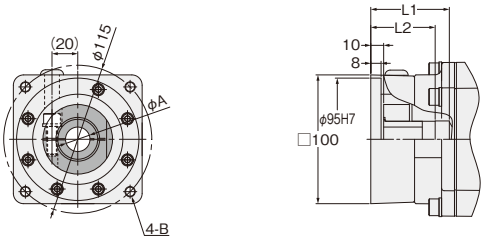
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension B	Bushing
KAA	Up to 1/10	61	50	M8, Depth 16	Yes
	From 1/15	59	41		

■ 2000 W Class F31/F32/F33



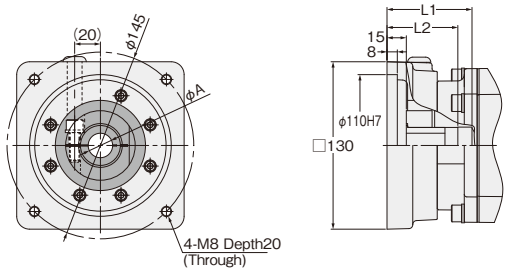
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Dimension B	Bushing
F31	Up to 1/10	70	59	Ø19H7	M8, Depth 20 (Through)	Yes
	From 1/15	68	50			
F32	Up to 1/10	70	59	Ø22H7		Yes
	From 1/15	68	50			
F33	Up to 1/10	70	59	Ø24H7		Yes
	From 1/15	68	50			

■ 3000 W Class K13/K21/K22/K23



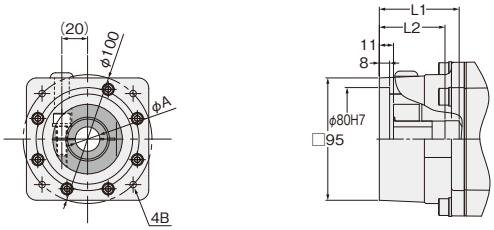
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Dimension B	Bushing
K13	Up to 1/10	61	50	Ø24H7	M6, Depth 15	Yes
K21	Up to 1/10	61	50	Ø19H7	M8, Depth 16	Yes
K22	Up to 1/10	61	50	Ø22H7	M8, Depth 16	Yes
K23	Up to 1/10	61	50	Ø24H7	M8, Depth 16	Yes

■ 3000 W Class K31/K32/K33/K34



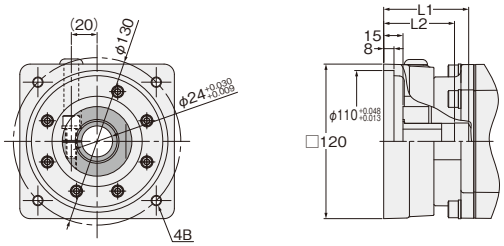
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Bushing
K31	Up to 1/10	66	55	Ø19H7	Yes
K32	Up to 1/10	66	55	Ø22H7	Yes
K33	Up to 1/10	66	55	Ø24H7	Yes
K34	Up to 1/10	66	55	Ø28H7	No

3000 W Class K61



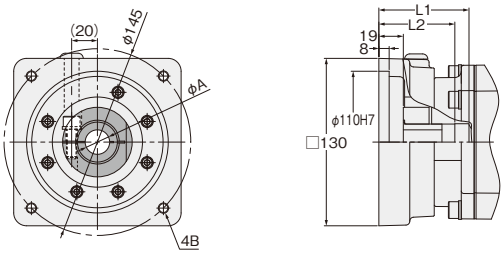
Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension B	Bushing
K61	Up to 1/10	62	51	M6, Depth 15	Yes

3000 W Class KBC



Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension B	Bushing
KBC	Up to 1/10	66	55	M8, Depth 20 (Through)	Yes

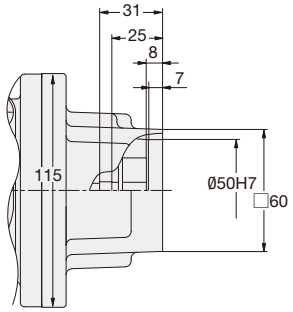
3000 W Class F31/F32/F33

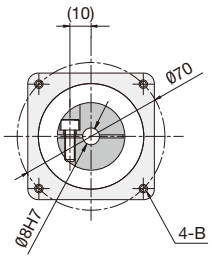


Flange Type	Reduction Ratio	Dimension L1	Dimension L2	Dimension A	Dimension B	Bushing
F31	Up to 1/10	70	59	Ø19H7	M8, Depth 20	Yes
F32	Up to 1/10	70	59	Ø22H7		Yes
F33	Up to 1/10	70	59	Ø24H7		Yes

AG3·AGA·AH2 Type

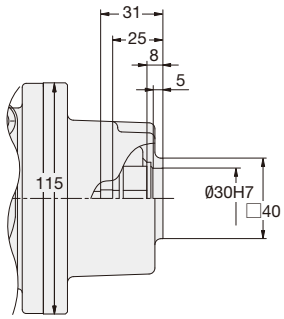
■ 100 W Class (only low backlash specifications) F1/F3

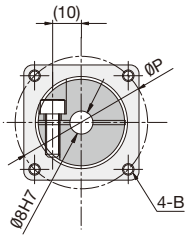




Flange Type	Dimension B
F1	M5, Depth 10
F3	M4, Depth 10

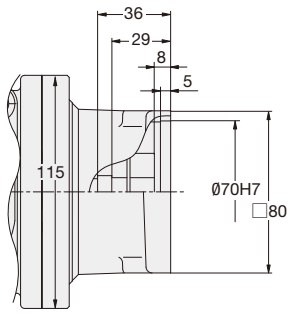
■ 100 W Class (only low backlash specifications) S1/S3

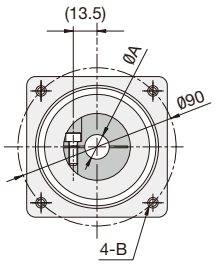




Flange Type	Dimension B	Dimension P
S1	M4, Depth 10	Ø46
S3	M3, Depth 10	Ø45

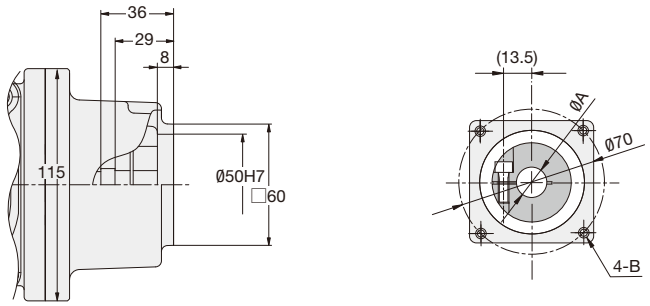
■ 200 W Class F1/F2/F3





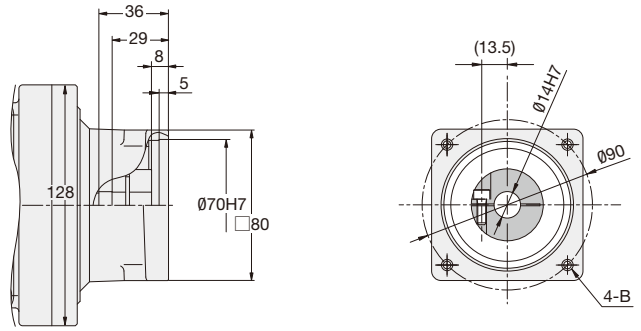
Flange Type	Dimension A	Dimension B
F1	Ø11H7	M6, Depth 12 (Through)
F2	Ø14H7	M6, Depth 12 (Through)
F3	Ø11H7	M5, Depth 12 (Through)

■ 200 W Class S1/S2/S3



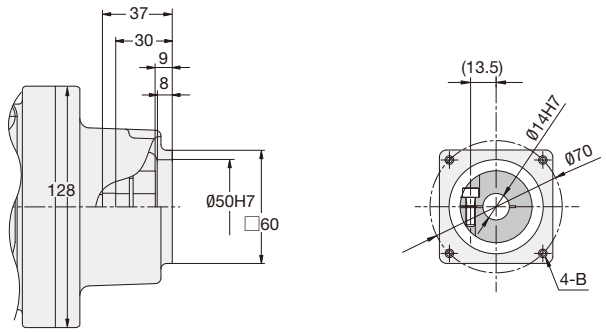
Flange Type	Dimension A	Dimension B
S1	Ø11H7	M5, Depth 10
S2	Ø14H7	M5, Depth 10
S3	Ø11H7	M4, Depth 10

■ 400 W Class F1/F3



Flange Type	Dimension B
F1	M6, Depth 12 (Through)
F3	M5, Depth 12 (Through)

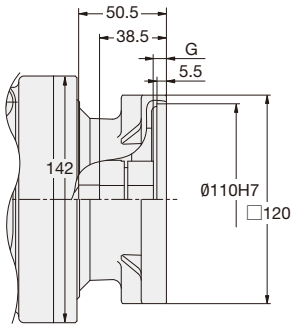
■ 400 W Class S1/S3

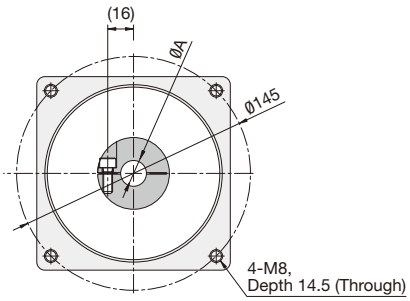


Flange Type	Dimension B
S1	M5, Depth 10
S3	M4, Depth 10

Detailed Diagrams of Input Shaft and Flange Shapes

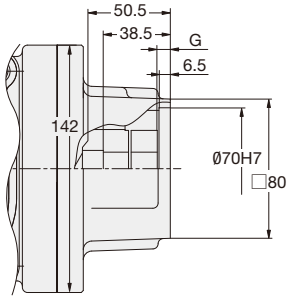
■ 750 W Class F1/F2

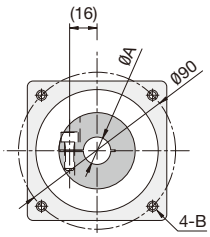




Type	Flange Type	Dimension A	Dimension G
AG3/ AGA	F1	Ø16H7	7.5
	F2	Ø19H7	7.5
AH2	F1	Ø16H7	7.5
	F2	Ø19H7	7.5

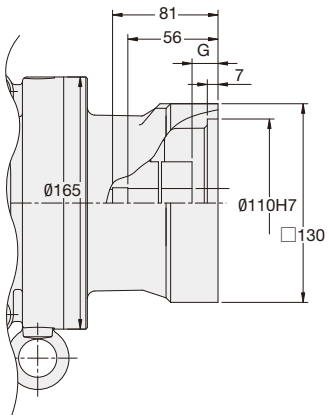
■ 750 W Class S1/S2/S3/S4

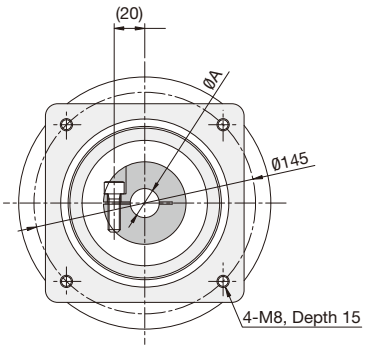




Type	Flange Type	Dimension A	Dimension B	Dimension G
AG3/ AGA	S1	Ø16H7	M6, Depth 12	8.5
	S2	Ø19H7	M6, Depth 12	8.5
	S3	Ø19H7	M5, Depth 10	8.5
	S4	Ø16H7	M5, Depth 10	8.5
AH2	S1	Ø16H7	M6, Depth 12	7.5
	S2	Ø19H7	M6, Depth 12	7.5
	S3	Ø19H7	M5, Depth 10	7.5
	S4	Ø16H7	M5, Depth 10	7.5

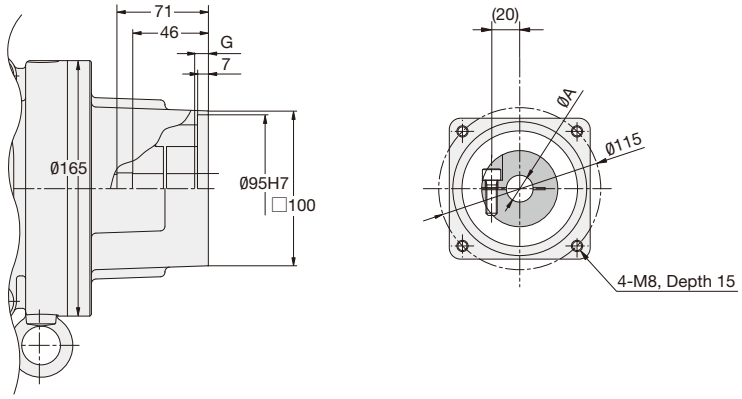
■ 2000 W Class F31/F33





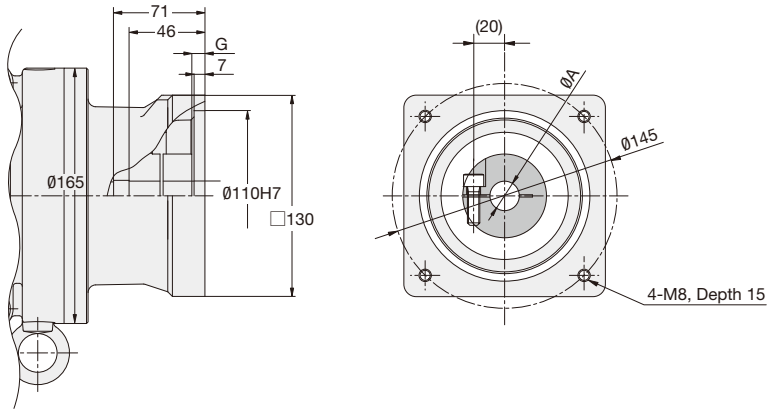
Type	Flange Type	Dimension A	Dimension G
AG3/ AGA	F31	Ø19H7	18.5
	F33	Ø24H7	19.5
AH2	F31	Ø19H7	19.5
	F33	Ø24H7	19.5

■ 2000 W Class K21/K22/K23



Type	Flange Type	Dimension A	Dimension G
AG3/ AGA	K21	Ø19H7	8.5
	K22	Ø22H7	8.5
	K23	Ø24H7	9.5
AH2	K21	Ø19H7	9.5
	K22	Ø22H7	9.5
	K23	Ø24H7	9.5

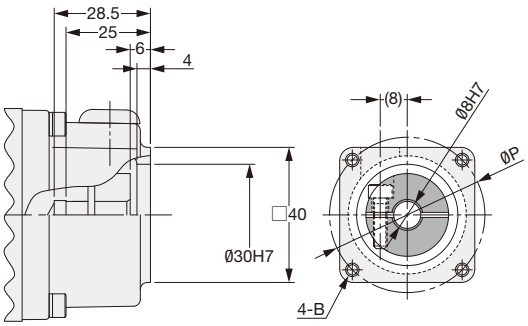
■ 2000 W Class K31/K32/K33



Type	Flange Type	Dimension A	Dimension G
AG3/ AGA	K31	Ø19H7	8.5
	K32	Ø22H7	8.5
	K33	Ø24H7	9.5
AH2	K31	Ø19H7	9.5
	K32	Ø22H7	9.5
	K33	Ø24H7	9.5

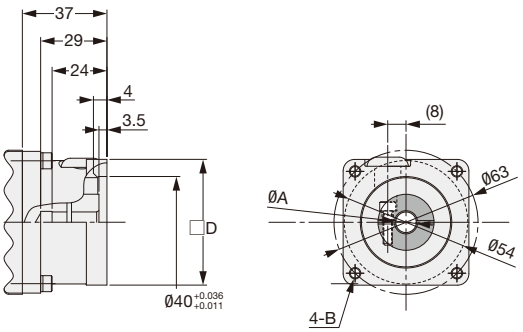
AFC Type (Right Angle Hollow Bore/Right Angle Shaft) Backlash 3 arc min/30 arc min Specifications

■ 100 W Class S1/S3



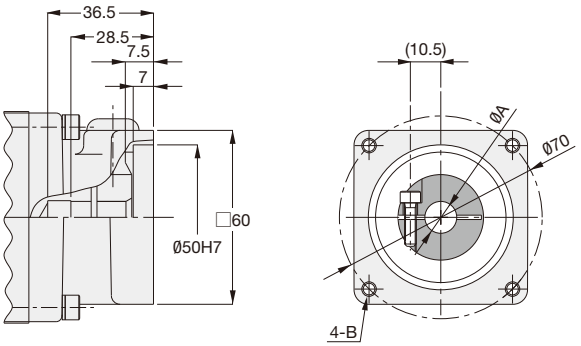
Flange Type	Dimension B	Dimension P
S1	M4, Depth 10	Ø46
S3	M3, Depth 10	Ø45

■ 100 W Class S6



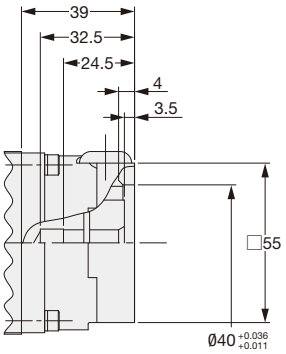
Flange Type	Frame Size	Dimension A	Dimension B	Dimension D
S6	12/18	Ø9 +0.022 +0.007	M5, Depth 8 (Through)	□55
	10/15	Ø9 +0.022 +0.007	M5, Depth 8 (Through)	□56

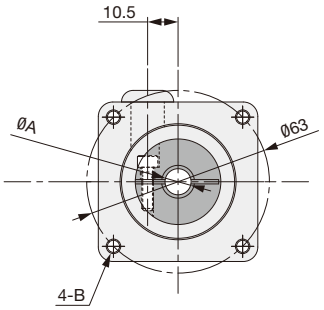
■ 200 W Class S1/S2/S3



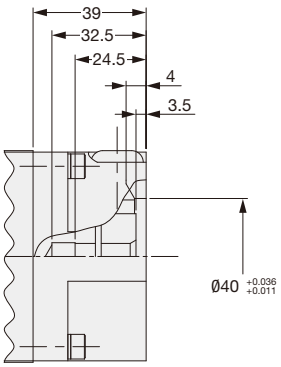
Flange Type	Frame Size	Dimension A	Dimension B
S1	12/18	Ø11 +0.018 +0.008	M5, Depth 10 (Through)
	15/22	Ø11H7	M5, Depth 15 (Through)
S2	12/18	Ø14H7	M5, Depth 10 (Through)
	15/22	Ø14H7	M5, Depth 15 (Through)
S3	12/18	Ø11 +0.018 +0.008	M4, Depth 10 (Through)
	15/22	Ø11H7	M4, Depth 15 (Through)

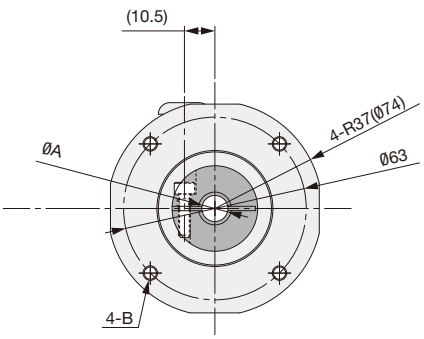
■ 200 W Class S6





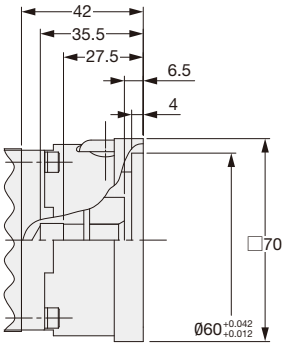
Flange Type	Frame Size	Dimension A	Dimension B
S6	12/18	Ø9 +0.022 +0.007	M5, Depth 10

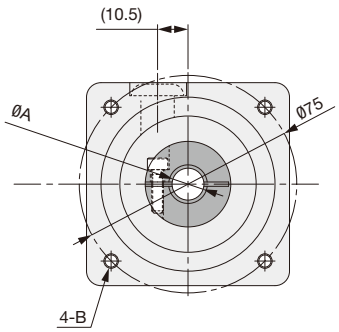




Flange Type	Frame Size	Dimension A	Dimension B
S6	15/22	Ø9 +0.022 +0.007	M5, Depth 10

■ 200 W Class S7

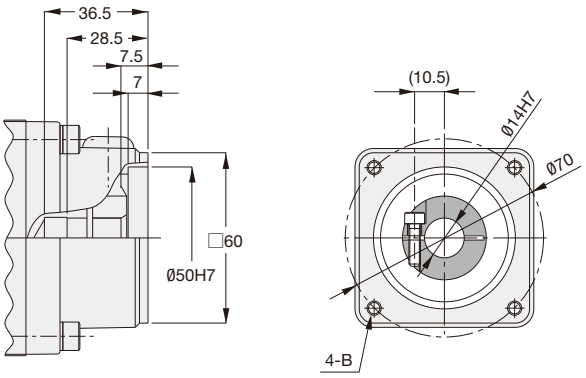




Flange Type	Dimension A	Dimension B
S7	Ø11 +0.018 +0.008	M5, Depth 10 (Through)

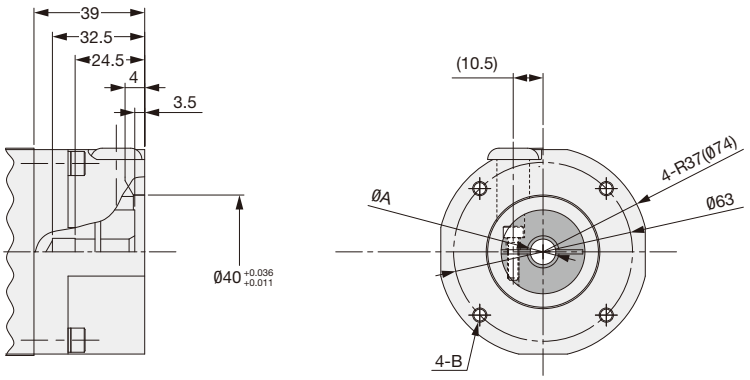
Detailed Diagrams of Input Shaft and Flange Shapes

■ 400 W Class S1/S3

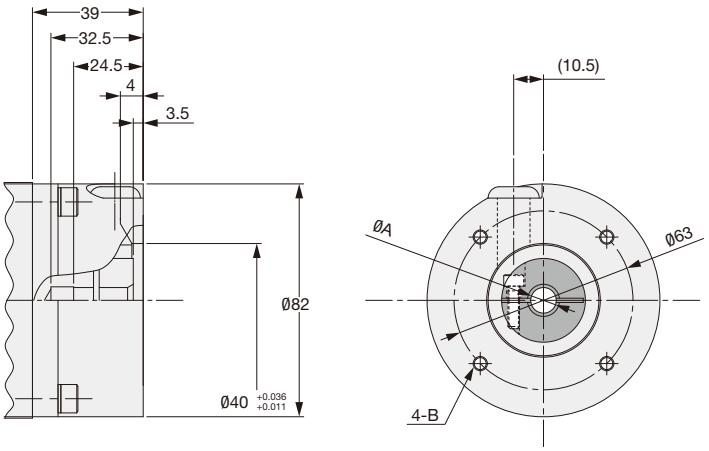


Flange Type	Frame Size	Dimension B
S1	15/22	M5, Depth 15 (Through)
	18/28	M5, Depth 10
S3	15/22	M4, Depth 15 (Through)
	18/28	M4, Depth 10

■ 400 W Class S6

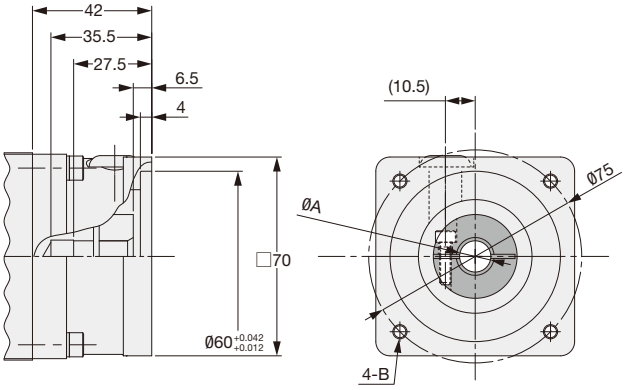


Flange Type	Frame Size	Dimension A	Dimension B
S6	15/22	Ø9 +0.022 +0.007	M5, Depth 10



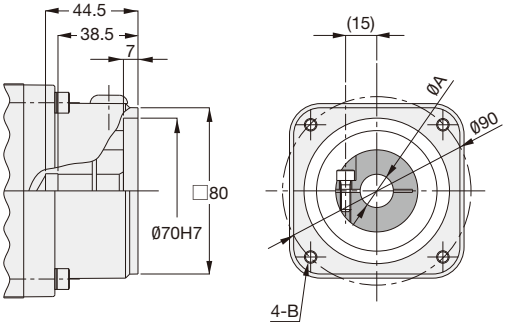
Flange Type	Frame Size	Dimension A	Dimension B
S6	18/28	Ø9 +0.022 +0.007	M5, Depth 10

■ 400 W Class S7



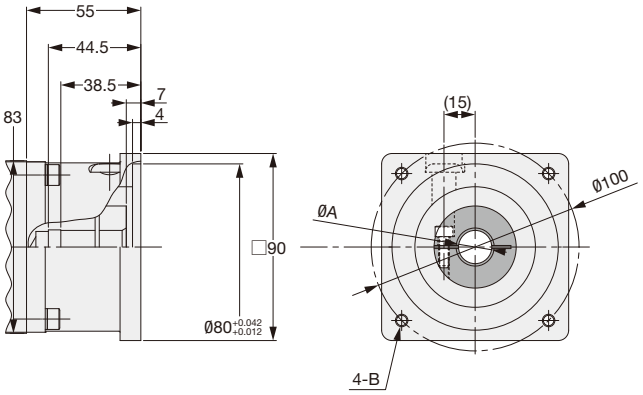
Flange Type	Dimension A	Dimension B
S7	Ø11 +0.026 +0.008	M5, Depth 10 (Through)

■ 750 W Class S1/S2/S3/S4



Flange Type	Frame Size	Dimension A	Dimension B
S1	18/28	Ø16H7	M6, Depth 10 (Through)
	22/32	Ø16H7	M6, Depth 12
S2	18/28	Ø19H7	M6, Depth 10 (Through)
	22/32	Ø19H7	M6, Depth 12
S3	18/28	Ø19H7	M5, Depth 10 (Through)
	22/32	Ø19H7	M5, Depth 12
S4	18/28	Ø16H7	M5, Depth 10 (Through)
	22/32	Ø16H7	M5, Depth 12

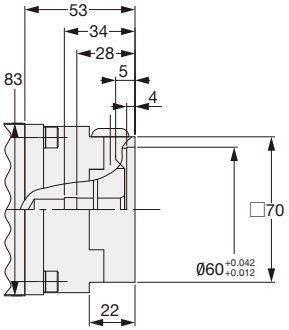
■ 750 W Class S9

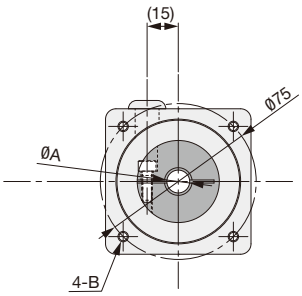


Flange Type	Dimension A	Dimension B
S9	Ø16 +0.018 +0.008	M6, Depth 10 (Through)

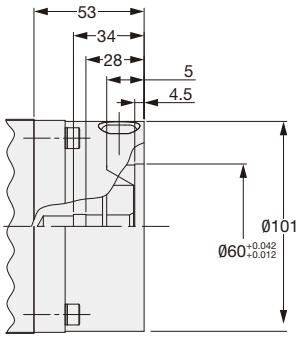
Detailed Diagrams of Input Shaft and Flange Shapes

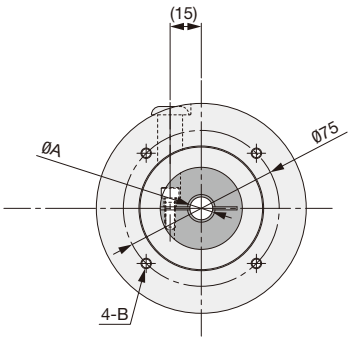
■ 750 W Class SA





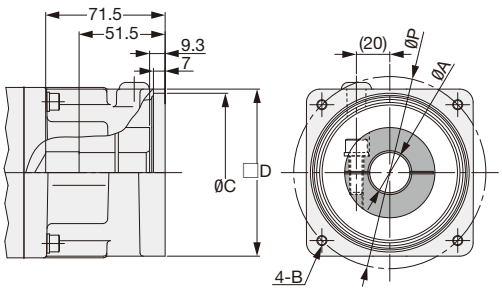
Flange Type	Frame Size	Dimension A	Dimension B
SA	18/28	Ø11 +0.026 +0.008	M5, Depth 12





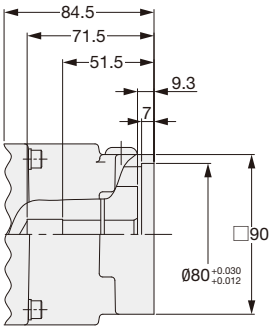
Flange Type	Frame Size	Dimension A	Dimension B
SA	22/32	Ø11 +0.026 +0.008	M5, Depth 12

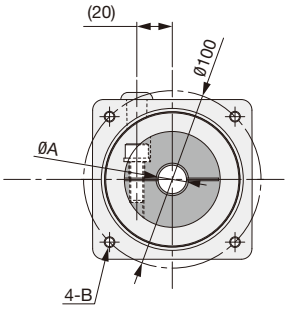
■ 1000 W Class K13/K22/K23/K61



Flange Type	Reduction Ratio	Dimension A	Dimension B	Dimension C	Dimension D	Dimension P
K13	All	Ø24H7	M6, Depth 15 (Through)	Ø95H7	□100	Ø115
K22	3 to 5, 10 to 30	Ø22H7	M8, Depth 15 (Through)	Ø95H7	□100	Ø115
	7.5 to 10, 40 to 60			Ø95 +0.035 +0.013		
K23	3 to 5, 10 to 30	Ø24H7	M8, Depth 15 (Through)	Ø95H7	□100	Ø115
	7.5 to 10, 40 to 60			Ø95 +0.035 +0.013		
K61	All	Ø19H7	M6, Depth 12	Ø80 +0.030 +0.012	□90	Ø100

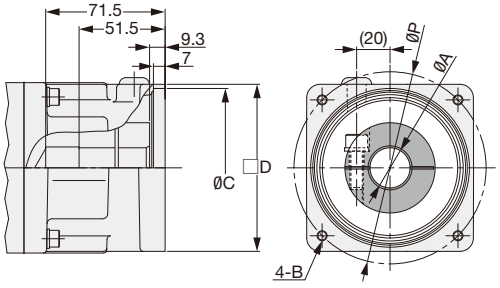
■ 1000 W Class KC9





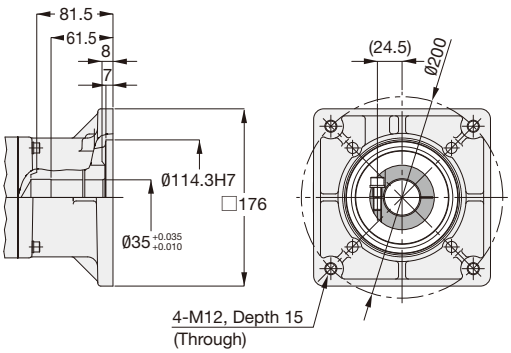
Flange Type	Dimension A	Dimension B
KC9	Ø16 +0.026 +0.008	M6, Depth 12

■ 2000 W Class K13/K21/K22/K23/K31/K32/K33/K41



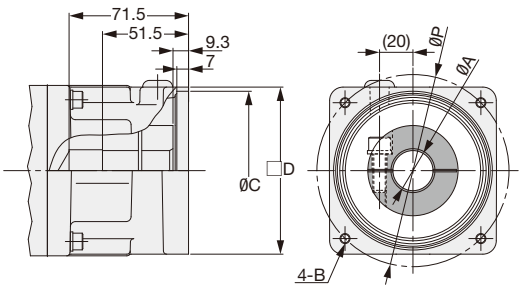
Flange Type	Dimension A	Dimension B	Dimension C	Dimension D	Dimension P
K13	Ø24H7	M6, Depth 15 (Through)	Ø95H7	□100	Ø115
K21	Ø19H7	M8, Depth 15 (Through)	$Ø95^{+0.035}_{+0.013}$	□100	Ø115
K22	Ø22H7	M8, Depth 15 (Through)	$Ø95^{+0.035}_{+0.013}$	□100	Ø115
K23	Ø24H7	M8, Depth 15 (Through)	$Ø95^{+0.035}_{+0.013}$	□100	Ø115
K31	Ø19H7	M8, Depth 15 (Through)	Ø110H7	□130	Ø145
K32	Ø22H7	M8, Depth 15 (Through)	Ø110H7	□130	Ø145
K33	Ø24H7	M8, Depth 15 (Through)	Ø110H7	□130	Ø145
K41	Ø19H7	M8, Depth 15 (Through)	Ø110H7	□120	Ø145

■ 2000 W Class and 3000 W Class K75



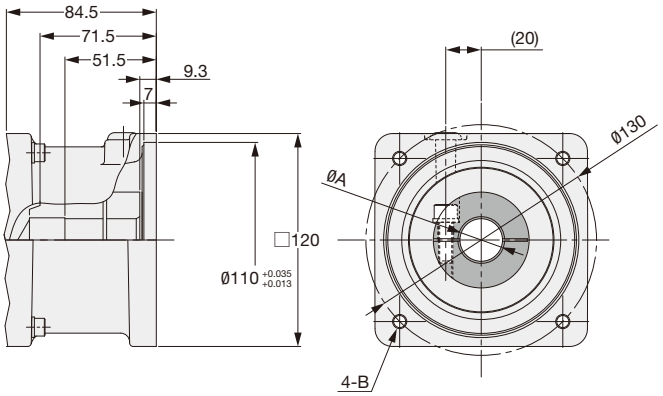
Detailed Diagrams of Input Shaft and Flange Shapes

■ 3000 W Class K13/K21/K22/K23/K32/K33/K34/K52



Flange Type	Dimension A	Dimension B	Dimension C	Dimension D	Dimension P
K13	$Ø24^{+0.021}_{+0.009}$	M6, Depth 15 (Through)	Ø95H7	□100	Ø115
K21	Ø19H7	M8, Depth 15 (Through)	$Ø95^{+0.035}_{+0.013}$	□100	Ø115
K22	Ø22H7	M8, Depth 15 (Through)	$Ø95^{+0.035}_{+0.013}$	□100	Ø115
K23	$Ø24^{+0.021}_{+0.009}$	M8, Depth 15 (Through)	$Ø95^{+0.035}_{+0.013}$	□100	Ø115
K32	Ø22H7	M8, Depth 15 (Through)	Ø110H7	□130	Ø145
K33	$Ø24^{+0.021}_{+0.009}$	M8, Depth 15 (Through)	Ø110H7	□130	Ø145
K34	Ø28H7	M8, Depth 15 (Through)	Ø110H7	□130	Ø145
K52	Ø22H7	M8, Depth 15 (Through)	$Ø110^{+0.035}_{+0.013}$	□120	Ø130

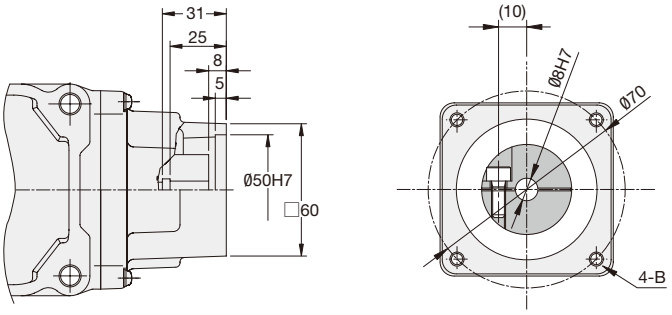
■ 3000 W Class KBC



Flange Type	Dimension A	Dimension B
KBC	$Ø24^{+0.021}_{+0.009}$	M8, Depth 15 (Through)

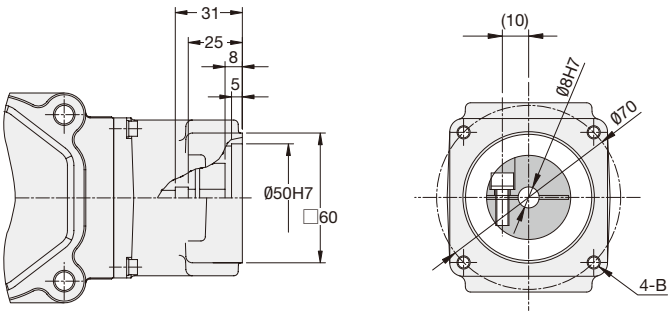
AF3 Type

■ 100 W Class (only backlash 1 arc min/3 arc min specifications) F1/F3



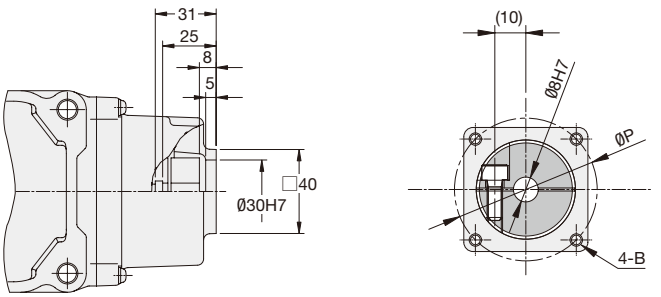
Flange Type	Dimension B
F1	M5, Depth 10
F3	M4, Depth 10

■ 100 W Class (only low backlash specifications) F1/F3



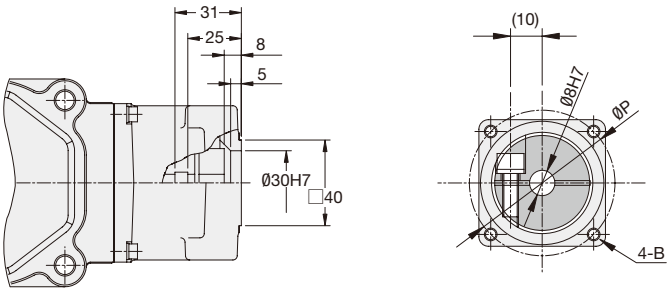
Flange Type	Dimension B
F1	M5, Depth 12
F3	M4, Depth 12

■ 100 W Class (only backlash 1 arc min/3 arc min specifications) F1/F3



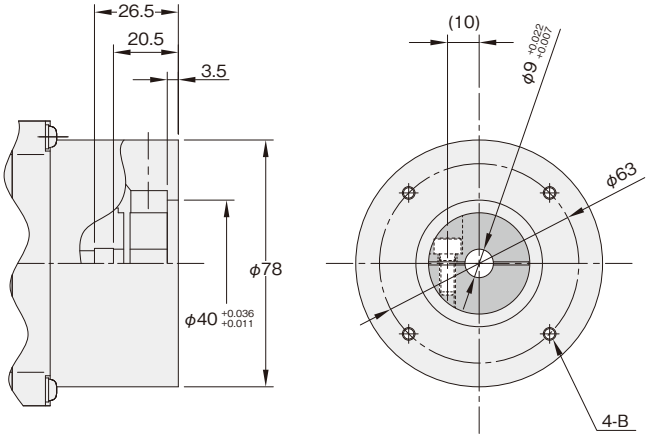
Flange Type	Dimension B	Dimension P
S1	M4, Depth 10	Ø46
S3	M3, Depth 10	Ø45

■ 100 W Class (only low backlash specifications) S1/S3



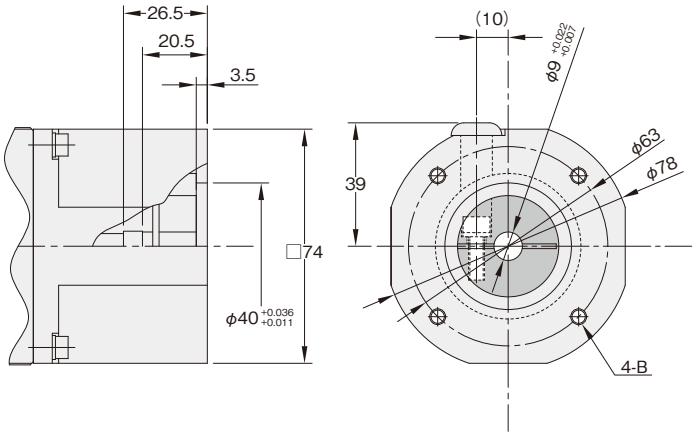
Flange Type	Dimension B	Dimension P
S1	M4, Depth 10	Ø46
S3	M3, Depth 10	Ø45

■ 100 W Class (only backlash 1 arc min/3 arc min specifications) S6



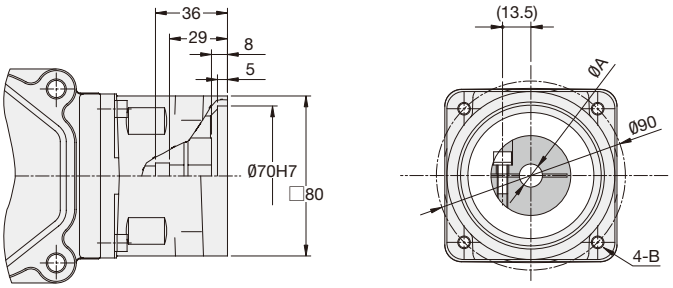
Flange Type	Dimension B
S6	M5, Depth 12

■ 100 W Class (only low backlash specifications) S6



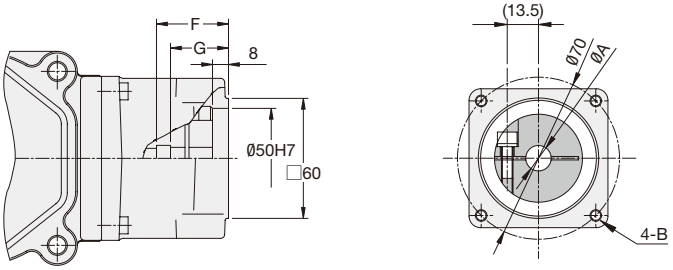
Flange Type	Dimension B
S6	M5, Depth 12

■ 200 W Class F1/F2/F3



Flange Type	Dimension A	Dimension B
F1	Ø11 $^{+0.018}_{+0.008}$	M6, Depth 12 (Through)
F2	Ø14H7	M6, Depth 12 (Through)
F3	Ø11 $^{+0.018}_{+0.008}$	M5, Depth 12 (Through)

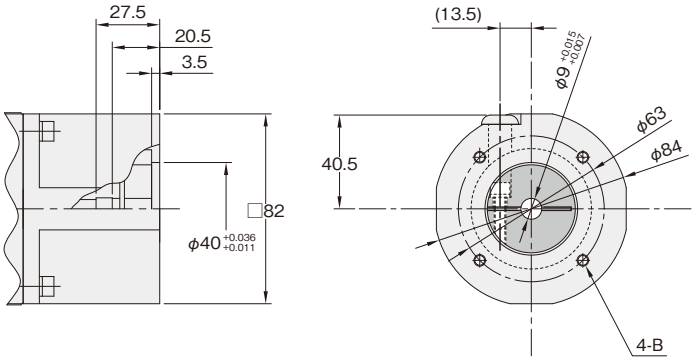
■ 200 W Class S1/S2/S3/S5



Flange Type	Dimension A	Dimension B	Dimension F	Dimension G
S1	Ø11 $^{+0.018}_{+0.008}$	M5, Depth 12	36	29
S2	Ø14H7	M5, Depth 12	36	29
S3	Ø11 $^{+0.018}_{+0.008}$	M4, Depth 12	36	29
S5	Ø9 $^{+0.015}_{+0.007}$	M5, Depth 12	32	25

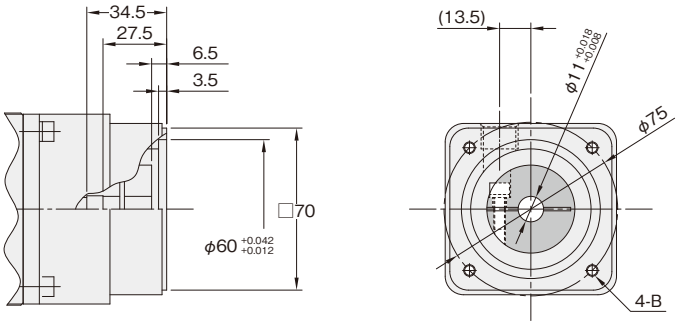
* S5 is available only for backlash 1 arc min and 3 arc min specifications.

■ 200 W Class S6



Flange Type	Dimension B
S6	M5, Depth 12

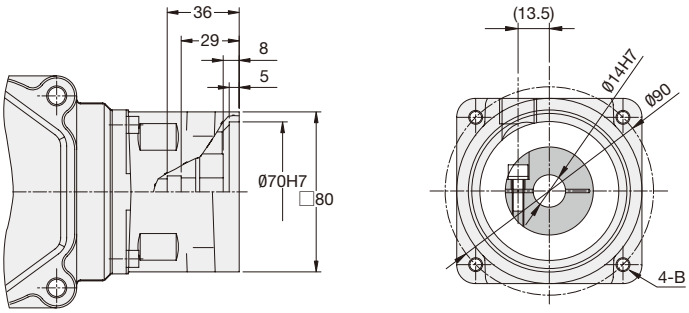
■ 200 W Class S7



Flange Type	Dimension B
S7	M5, Depth 12

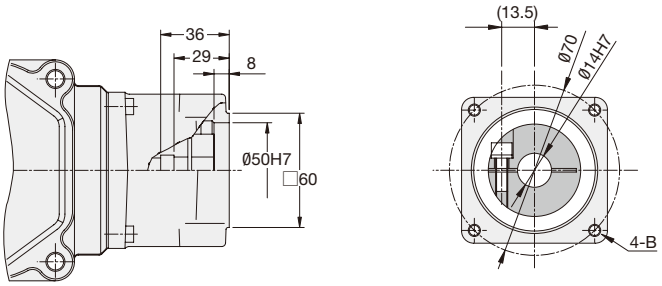
Detailed Diagrams of Input Shaft and Flange Shapes

■ 400 W Class F1/F3



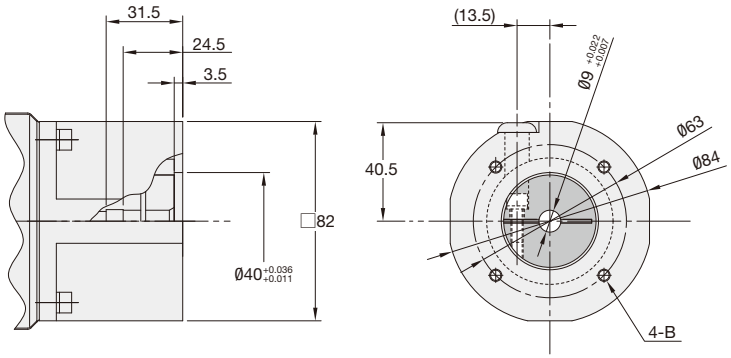
Flange Type	Dimension B
F1	M6, Depth 12 (Through)
F3	M5, Depth 12 (Through)

■ 400 W Class S1/S3



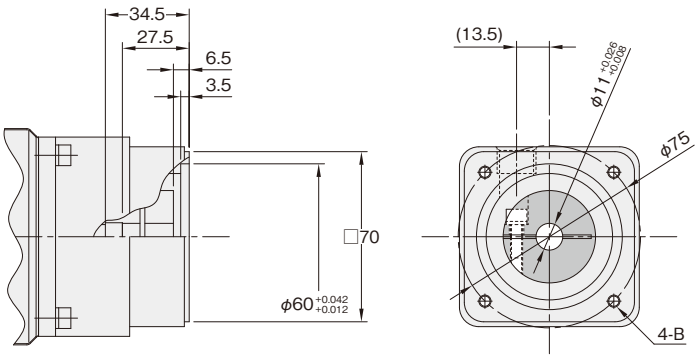
Flange Type	Dimension B
S1	M5, Depth 12
S3	M4, Depth 12

■ 400 W Class S6



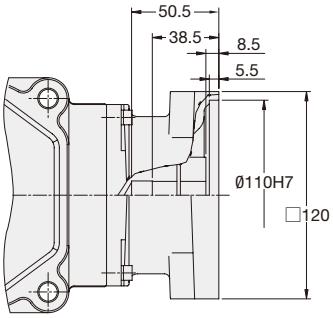
Flange Type	Dimension B
S6	M5, Depth 12

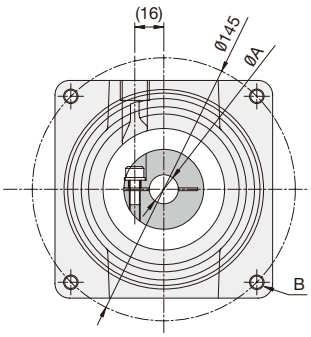
■ 400 W Class S7



Flange Type	Dimension B
S7	M5, Depth 12

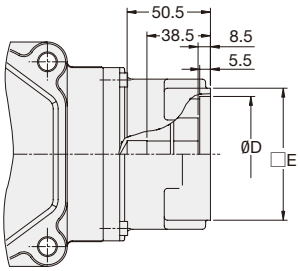
■ 750 W Class F1/F2

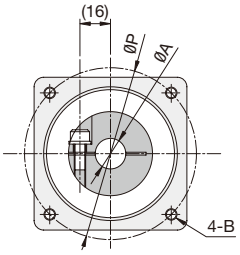




Flange Type	Dimension A	Dimension B
F1	$Ø16^{+0.018}_{+0.008}$	M8, Depth 14 (Through)
F2	Ø19H7	M8, Depth 14 (Through)

■ 750 W Class S1/S2/S3/S4/S6

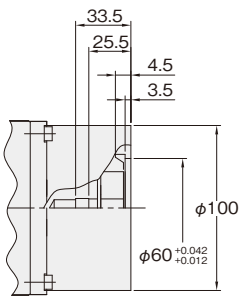


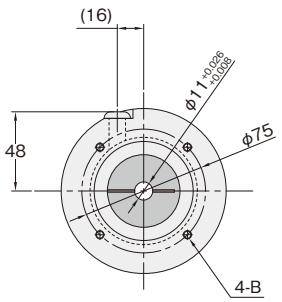


Flange Type	Dimension A	Dimension B	Dimension D	Dimension E	Dimension P
S1	$Ø16^{+0.018}_{+0.008}$	M6, Depth 12	Ø70H7	□80	Ø90
S2	Ø19H7	M6, Depth 12	Ø70H7	□80	Ø90
S3	Ø19H7	M5, Depth 10	Ø70H7	□80	Ø90
S4	$Ø16^{+0.018}_{+0.008}$	M5, Depth 10	Ø70H7	□80	Ø90
S6	$Ø14^{+0.030}_{+0.012}$	M6, Depth 12	$Ø80^{+0.030}_{+0.012}$	□90	Ø100

* S6 is available only for backlash 1 arc min and 3 arc min specifications.

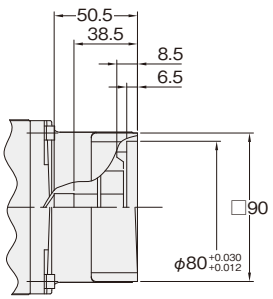
■ 750 W Class SA

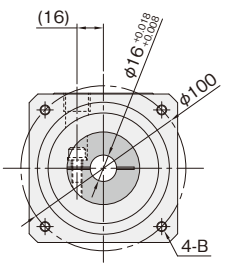




Flange Type	Dimension B
SA	M5, Depth 12

■ 750 W Class S9

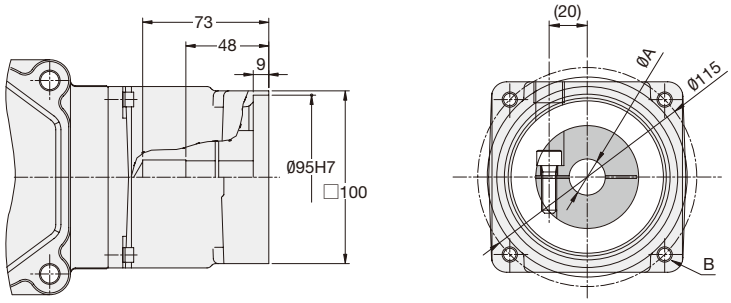




Flange Type	Dimension B
S9	M6, Depth 12

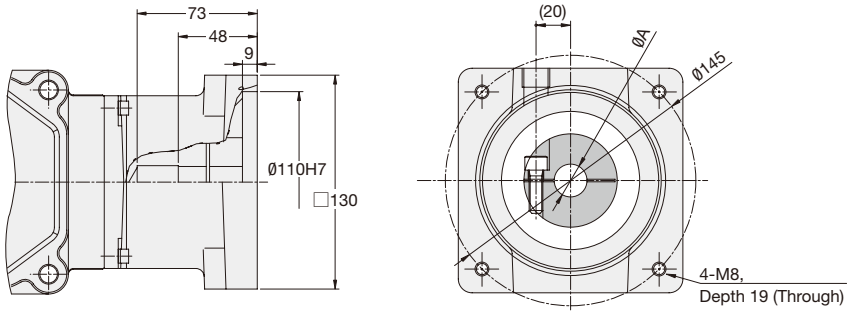
Detailed Diagrams of Input Shaft and Flange Shapes

■ 1000 W Class (only backlash 1 arc min/3 arc min specifications) K21/K22/K23/K43



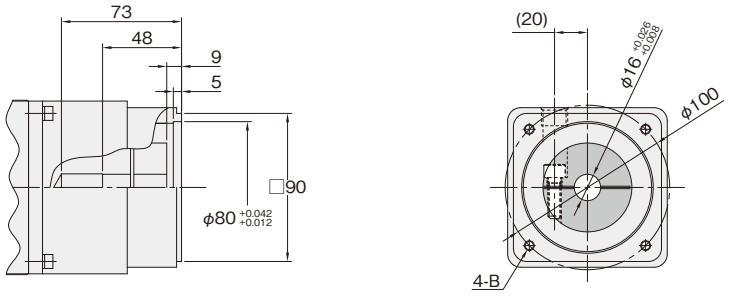
Flange Type	Dimension A	Dimension B
K21	Ø19H7	M8, Depth 15
K22	Ø22H7	M8, Depth 15
K23	Ø24H7	M8, Depth 15
K43	Ø24H7	M6, Depth 15

■ 1000 W Class (only backlash 1 arc min/3 arc min specifications) K31/K32/K33



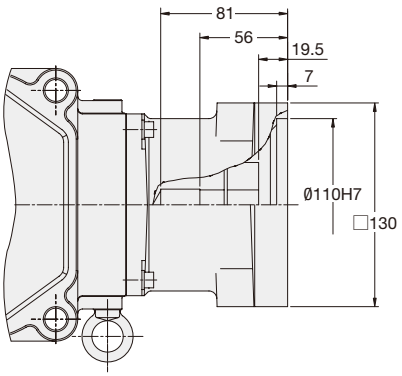
Flange Type	Dimension A
K31	Ø19H7
K32	Ø22H7
K33	Ø24H7

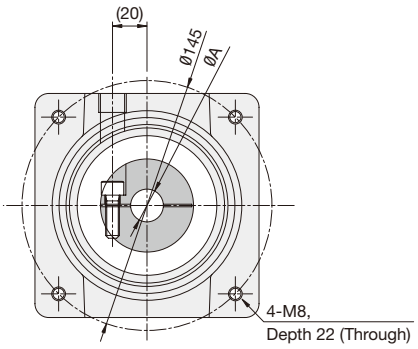
■ 1000 W Class (only backlash 1 arc min/3 arc min specifications) KC9



Flange Type	Dimension B
KC9	M6, Depth 12

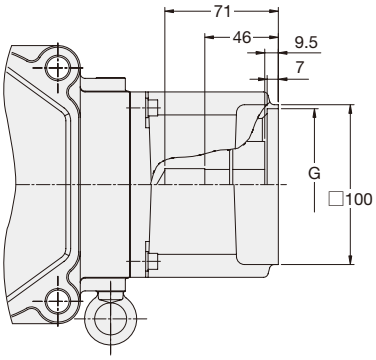
■ 2000 W Class F31/F33

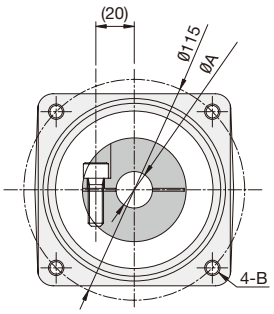




Flange Type	Dimension A
F31	$Ø19^{+0.021}_{+0.009}$
F33	Ø24H7

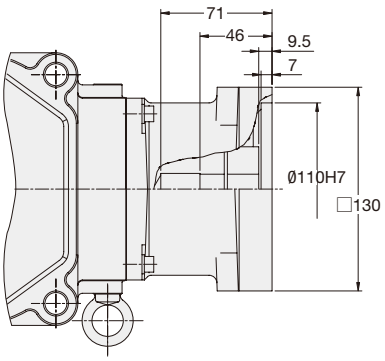
■ 2000 W Class K21/K22/K23/K43

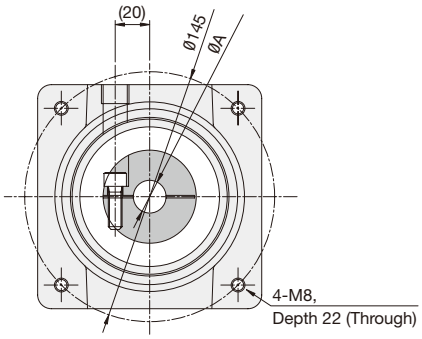




Flange Type	Dimension A	Dimension B	Dimension C
K21	$Ø19^{+0.021}_{+0.009}$	M8, Depth 15	$Ø95^{+0.035}_{+0.013}$
K22	Ø22H7	M8, Depth 15	$Ø95^{+0.035}_{+0.013}$
K23	Ø24H7	M8, Depth 15	$Ø95^{+0.035}_{+0.013}$
K43	Ø24H7	M6, Depth 15	$Ø95H7^{+0.035}_{+0.013}$

■ 2000 W Class K31/K32/K33





Flange Type	Dimension A
K31	$Ø19^{+0.021}_{+0.009}$
K32	Ø22H7
K33	Ø24H7

MEMO

Performance Tables [for Calculation and Selection]

APG Type Backlash 3 arc min/15 arc min Specifications

[Notes]
- This performance table is based on pairing with a servo motor running at the rated input speed of 3000 r/min.
- The motor rated output torque is based on values after a warm-up operation of the unit.
- The transmission efficiency percentage is only a reference value.
- The transmission efficiency varies greatly depending on the input speed and the load on the product. Please be cautious.

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/3	12	100	0.57	60
	12	150	0.93	65
	12	200	1.5	78
	12	400	3.4	86
	18	600	4.9	86
	18	750	6.4	90
	22	1000	7.2	78
	22	1500	11.5	85
	22	2000	17.2	86
	28	3000	25.8	90
1/5	12	100	1.0	60
	12	150	1.7	70
	12	200	2.5	78
	12	400	5.7	86
	18	600	8.2	86
	18	750	10.7	90
	22	1000	12.7	80
	22	1500	21.5	86
	22	2000	28.6	88
	28	3000	43.0	90
1/10	12	100	2.1	68
	12	150	3.5	74
	12	200	5.1	78
	18	400	11.3	88
	18	600	16.8	88
	18	750	21.5	90
	22	1000	26.4	80
	22	1500	43.0	86
	22	2000	57.3	88
	28	3000	85.9	90
1/15	12	100	3.3	65
	12	150	5.0	70
	12	200	7.6	75
	18	400	16.2	82
	22	600	22.9	80
	22	750	30.4	84
	28	1000	40.6	82
	28	1500	60.9	84
	28	2000	81.2	86

Performance Tables [for Calculation and Selection]

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/20	12	100	4.5	65
	12	150	6.7	70
	12	200	10.2	75
	18	400	21.6	82
	22	600	30.6	80
	22	750	40.6	84
	28	1000	54.1	82
	28	1500	81.2	84
	28	2000	108.2	86
1/30	12	100	6.7	65
	18	150	10.0	70
	18	200	15.3	75
	18	400	32.5	82
	22	600	45.8	80
	22	750	60.9	84
	28	1000	81.2	82
	28	1500	121.8	84
1/40	18	100	8.3	65
	18	150	13.8	72
	18	200	19.1	75
	22	400	40.7	80
	28	600	61.1	80
	28	750	81.2	82
	28	1000	108.2	84
1/50	18	100	10.3	65
	18	150	17.2	72
	18	200	25.5	75
	22	400	50.9	80
	28	600	76.4	80
	28	750	95.5	82
	28	1000	135.3	84
1/60	18	100	12.4	65
	18	150	20.6	72
	18	200	28.6	75
	22	400	61.1	80
	28	600	91.7	80
	28	750	121.8	82
1/100	18	100	20.7	64
	22	200	44.6	70
	28	400	95.5	75

AG3 Type Low Backlash Specification

[Notes]

- This performance table is based on pairing with a servo motor running at the rated input speed of 3000 r/min.
- The motor rated output torque is based on values after a warm-up operation of the unit.
- The transmission efficiency percentage is only a reference value.
- The transmission efficiency varies greatly depending on the input speed and the load on the product. Please be cautious.
- The "*" mark indicates a limited torque type. Please make sure to check the motor rated output torque.

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/5	18	100	0.9	55
	18	200	1.9	60
	22	400	4.0	65
	28	750	9.6	80
	32	2000	25	80
1/10	18	100	1.9	60
	18	200	3.9	60
	22	400	8.0	65
	28	750	19	80
	32	2000	51	80
1/15	18	100	2.9	60
	18	200	5.8	60
	22	400	13	65
	28	750	29	80
	32	2000	76	80
1/20	18	100	3.8	60
	18	200	7.7	60
	22	400	16	65
	28	750	39	80
	32	2000	102	80
1/25	18	100	4.8	60
	18	200	10	60
	22	400	20	65
	28	750	46	80
	32	2000	130	80
1/30	18	100	5.8	60
	22	200	12	60
	28	400	25	65
	32	750	59	80
	40	2000	153	80
1/40	18	100	7.7	60
	22	200	16	65
	28	400	35	70
	32	750	71	75
	40	2000	211	80
1/50	18	100	10	60
	22	200	20	65
	28	400	43	70
	32	750	88	75
	40	2000	261	80

Performance Tables [for Calculation and Selection]

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/60	22	100	13	65
	22	200	26	65
	28	400	52	70
	32	750	107	75
	40	2000	302	80
1/80	22	100	16	65
	22	200	33	65
	28	400	71	70
	32	750	142	75
	40	2000	423	80
1/100	22	100	20	65
	28	200	43	65
	32	400	88	70
	40	750	177	75
	50	2000	533	80
1/120	22	100	25	65
	28	200	50	65
	32	400	108	70
	40	750	218	75
	50	2000	594	80
1/160	22	100	32	65
	28	200	68	65
	32	400	141	70
	40	750	278	75
	50	2000	844	80
1/200	22	100	40	65
	28	200	81	65
	32	400	180	70
	40	750	348	75
	50	2000	* 862	80

AGA Type Low Backlash Specification

[Notes]

- This performance table is based on pairing with a servo motor running at the rated input speed of 3000 r/min.
- The motor rated output torque is based on values after a warm-up operation of the unit.
- The transmission efficiency percentage is only a reference value.
- The transmission efficiency varies greatly depending on the input speed and the load on the product. Please be cautious.
- The "*" mark indicates a limited torque type. Please make sure to check the motor rated output torque.

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/100	50	2000	533	80
1/120	50	2000	594	80
1/160	50	2000	844	80
1/200	50	2000	* 862	80

Performance Tables [for Calculation and Selection]

AH2 Type Low Backlash Specification

[Notes]
- This performance table is based on pairing with a servo motor running at the rated input speed of 3000 r/min.
- The motor rated output torque is based on values after a warm-up operation of the unit.
- The transmission efficiency percentage is only a reference value.
- The transmission efficiency varies greatly depending on the input speed and the load on the product. Please be cautious.
- The "*" mark indicates a limited torque type. Please make sure to check the motor rated output torque.

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/5	22	100	0.9	55
	22	200	2.0	60
	28	400	3.9	60
	32	750	7.8	65
	40	2000	24	70
1/10	22	100	2.2	65
	22	200	4.3	65
	28	400	8.4	65
	32	750	16	65
	40	2000	47	70
1/15	22	100	3.4	70
	22	200	7.1	70
	28	400	14	70
	32	750	26	70
	40	2000	73	75
1/20	22	100	4.6	70
	22	200	9.4	70
	28	400	19	70
	32	750	35	70
	40	2000	98	75
1/25	22	100	5.6	70
	22	200	12	70
	28	400	25	75
	32	750	45	75
	40	2000	122	75
1/30	22	100	6.9	70
	22	200	15	75
	28	400	29	75
	32	750	56	75
	40	2000	145	75
1/40	22	100	9.2	70
	22	200	20	75
	28	400	39	75
	32	750	74	75
	40	2000	196	75
1/50	22	100	11	70
	22	200	25	75
	28	400	49	75
	32	750	94	75
	40	2000	243	75

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/60	22	100	14	70
	22	200	27	70
	28	400	55	70
	32	750	110	75
	40	2000	292	75
1/80	22	100	19	70
	22	200	34	65
	28	400	71	65
	32	750	141	70
	40	2000	380	70
1/100	22	100	24	70
	28	200	43	65
	32	400	88	65
	40	750	172	70
	50	2000	476	70
1/120	22	100	30	75
	28	200	57	70
	32	400	110	70
	40	750	212	70
	50	2000	584	75
1/160	22	100	40	75
	28	200	75	70
	32	400	149	70
	40	750	282	70
	50	2000	775	75
1/200	22	100	50	75
	28	200	94	70
	32	400	188	70
	40	750	353	70
	50	2000	* 862	70
1/240	22	100	60	75
	28	200	110	70
	32	400	221	70
	40	750	423	70
	50	2000	* 862	70

Performance Tables [for Calculation and Selection]

AFC Type (Right Angle Hollow Bore) Backlash 3 arc min/30 arc min Specifications

[Notes]
- This performance table is based on pairing with a servo motor running at the rated input speed of 3000 r/min.
- The motor rated output torque is based on values after a warm-up operation of the unit.
- The transmission efficiency percentage is only a reference value.
- The transmission efficiency varies greatly depending on the input speed and the load on the product. Please be cautious.

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/3	12	200	1.3	70
	15	400	3.0	78
	18	750	5.6	78
	22	1000	7.5	78
	28	2000	15.7	82
	32	3000	23.6	82
1/5	12	200	2.2	70
	15	400	5.0	78
	18	750	9.4	78
	22	1000	12.5	78
	28	2000	26.2	82
	32	3000	39.4	82
1/7.5	12	100	1.5	64
	15	200	3.7	78
	18	400	7.5	78
	22	750	14.0	78
	28	1000	18.7	78
	32	2000	39.4	82
1/10	12	100	2.0	64
	15	200	5.0	78
	18	400	10.0	78
	22	750	18.7	78
	28	1000	25.0	78
	32	2000	52.5	82

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/10	15	100	1.9	58
	18	200	4.7	74
	22	400	9.5	74
	28	750	18.2	76
	32	1000	25.0	78
1/12	15	100	2.3	58
	18	200	5.9	74
	22	400	11.8	74
	28	750	22.8	76
	32	1000	31.2	78
1/15	15	100	2.8	58
	18	200	7.1	74
	22	400	14.2	74
	28	750	27.4	76
	32	1000	37.4	78
1/20	15	100	3.7	58
	18	200	9.5	74
	22	400	18.9	74
	28	750	36.5	76
	32	1000	49.9	78
1/25	15	100	4.6	58
	18	200	11.8	74
	22	400	23.7	74
	28	750	45.6	76
	32	1000	62.4	78
1/30	15	100	5.6	58
	18	200	14.2	74
	22	400	28.4	74
	28	750	54.7	76
	32	1000	74.9	78
1/40	18	100	9.0	70
	22	200	18.9	74
	28	400	38.9	76
	32	750	76.8	80
1/50	18	100	11.2	70
	22	200	23.7	74
	28	400	48.6	76
	32	750	96.0	80
1/60	18	100	13.4	70
	22	200	28.4	74
	28	400	58.4	76
	32	750	115.2	80

Performance Tables [for Calculation and Selection]

AFC Type (Right Angle Shaft) Backlash 3 arc min/30 arc min Specifications

[Notes]
- This performance table is based on pairing with a servo motor running at the rated input speed of 3000 r/min.
- The motor rated output torque is based on values after a warm-up operation of the unit.
- The transmission efficiency percentage is only a reference value.
- The transmission efficiency varies greatly depending on the input speed and the load on the product. Please be cautious.

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/3	10	100	0.6	60
	12	200	1.3	70
	15	400	3.0	78
	18	750	5.6	78
	22	1000	7.4	78
	28	2000	15.7	78
	32	3000	23.6	78
1/5	10	100	1.0	60
	12	200	2.2	70
	15	400	5.0	78
	18	750	9.4	78
	22	1000	12.5	78
	28	2000	26.2	82
	32	3000	39.4	82
1/7.5	12	100	1.5	64
	15	200	3.7	78
	18	400	7.5	78
	22	750	14.0	78
	28	1000	18.7	78
	32	2000	39.4	82
1/10	12	100	2.0	64
	15	200	5.0	78
	18	400	10.0	78
	22	750	18.7	78
	28	1000	25.0	78
	32	2000	52.5	82

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/10	15	100	1.9	58
	18	200	4.7	74
	22	400	9.5	74
	28	750	18.2	76
	32	1000	25.0	78
1/12	15	100	2.3	58
	18	200	5.9	74
	22	400	11.8	74
	28	750	22.8	76
	32	1000	31.2	78
1/15	15	100	2.8	58
	18	200	7.1	74
	22	400	14.2	74
	28	750	27.4	76
	32	1000	37.4	78
1/20	15	100	3.7	58
	18	200	9.5	74
	22	400	18.9	74
	28	750	36.5	76
	32	1000	49.9	78
1/25	15	100	4.6	58
	18	200	11.8	74
	22	400	23.7	74
	28	750	45.6	76
	32	1000	62.4	78
1/30	15	100	5.6	58
	18	200	14.2	74
	22	400	28.4	74
	28	750	54.7	76
	32	1000	74.9	78
1/40	18	100	9.0	70
	22	200	18.9	74
	28	400	38.9	76
	32	750	76.8	80
1/50	18	100	11.2	70
	22	200	23.7	74
	28	400	48.6	76
	32	750	96.0	80
1/60	18	100	13.4	70
	22	200	28.4	74
	28	400	58.4	76
	32	750	115.2	80

Performance Tables [for Calculation and Selection]

AF3S Type (Concentric Right Angle Hollow Bore) Backlash 1 arc min/3 arc min Specifications

[Notes]
- This performance table is based on pairing with a servo motor running at the rated input speed of 3000 r/min.
- The motor rated output torque is based on values after a warm-up operation of the unit.
- The transmission efficiency percentage is only a reference value.
- The transmission efficiency varies greatly depending on the input speed and the load on the product. Please be cautious.
- The "*" mark indicates a limited torque type. Please make sure to check the motor rated output torque.

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/10	15	100	2.2	60
	25	200	3.8	60
	30	400	7.8	60
	35	750	16	60
	35	1000	22	70
	45	2000	44	70
1/15	15	100	3.5	65
	25	200	6.4	65
	30	400	13	65
	35	750	26	65
1/20	15	100	5.0	70
	25	200	8.9	65
	30	400	18	65
	35	750	36	70
	35	1000	45	70
	45	2000	90	70
1/25	15	100	6.4	70
	25	200	12	65
	30	400	23	70
	35	750	46	70
1/30	15	100	7.6	75
	25	200	14	65
	30	400	27	70
	35	750	55	70
	35	1000	67	70
	45	2000	144	75
1/40	15	100	10	75
	25	200	19	65
	30	400	36	70
	35	750	76	75
	35	1000	96	75
	45	2000	191	75

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/50	15	100	13	75
	25	200	24	65
	30	400	45	70
	35	750	95	75
	35	1000	120	75
	45	2000	239	75
1/60	15	100	15	75
	25	200	29	65
	30	400	54	70
	35	750	115	75
	35	1000	143	75
	45	2000	287	75
1/75	15	100	18	70
	30	200	31	60
	35	400	63	65
	45	750	135	70
1/90	15	100	22	70
	30	200	37	60
	35	400	75	65
	45	750	162	70
1/120	15	100	29	70
	30	200	50	60
	35	400	100	65
	45	750	217	70
1/150	30	200	57	60
	35	400	124	65
	45	750	251	70
1/180	30	200	* 57	60
	35	400	* 124	65
	45	750	* 251	70

AF3F Type (Concentric Right Angle Shaft) Backlash 1 arc min/3 arc min Specifications

[Notes]
- This performance table is based on pairing with a servo motor running at the rated input speed of 3000 r/min.
- The motor rated output torque is based on values after a warm-up operation of the unit.
- The transmission efficiency percentage is only a reference value.
- The transmission efficiency varies greatly depending on the input speed and the load on the product. Please be cautious.
- The "*" mark indicates a limited torque type. Please make sure to check the motor rated output torque.

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/10	18	100	2.2	60
	22	200	3.8	60
	28	400	7.8	60
	32	750	16	60
	32	1000	22	70
	40	2000	44	70
1/15	18	100	3.5	65
	22	200	6.4	65
	28	400	13	65
	32	750	26	65
1/20	18	100	5.0	70
	22	200	8.9	65
	28	400	18	65
	32	750	36	70
	32	1000	45	70
	40	2000	90	70
1/25	18	100	6.4	70
	22	200	12	65
	28	400	23	70
	32	750	46	70
1/30	18	100	7.6	75
	22	200	14	65
	28	400	27	70
	32	750	55	70
	32	1000	67	70
	40	2000	144	75
1/40	18	100	10	75
	22	200	19	65
	28	400	36	70
	32	750	76	75
	32	1000	96	75
	40	2000	191	75

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/50	18	100	13	75
	22	200	24	65
	28	400	45	70
	32	750	95	75
	32	1000	120	75
	40	2000	239	75
1/60	18	100	15	75
	22	200	29	65
	28	400	54	70
	32	750	115	75
	32	1000	143	75
	40	2000	287	75
1/75	18	100	18	70
	28	200	31	60
	32	400	63	65
	40	750	135	70
1/90	18	100	22	70
	28	200	37	60
	32	400	75	65
	40	750	162	70
1/120	18	100	29	70
	28	200	50	60
	32	400	100	65
	40	750	217	70
1/150	28	200	57	60
	32	400	124	65
	40	750	251	70
1/180	28	200	* 57	60
	32	400	* 124	65
	40	750	* 251	70

Performance Tables [for Calculation and Selection]

AF3S Type (Concentric Right Angle Hollow Bore) Low Backlash Specification

[Notes]
- This performance table is based on pairing with a servo motor running at the rated input speed of 3000 r/min.
- The motor rated output torque is based on values after a warm-up operation of the unit.
- The transmission efficiency percentage is only a reference value.
- The transmission efficiency varies greatly depending on the input speed and the load on the product. Please be cautious.

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/5	30	400	3.8	60
	35	750	7.4	60
	45	2000	24	70
1/7.5	30	400	5.9	60
	35	750	11	60
	45	2000	35	70
1/10	20	100	2.0	60
	25	200	3.8	60
	30	400	7.8	60
	35	750	15	60
	45	2000	47	70
1/12	30	400	11	65
	35	750	20	65
	45	2000	57	70
1/15	20	100	3.1	65
	25	200	6.4	65
	30	400	13	65
	35	750	25	65
	45	2000	69	70
1/20	20	100	4.7	70
	25	200	8.8	65
	30	400	17	65
	35	750	34	70
	45	2000	92	70
1/25	20	100	5.9	70
	25	200	12	70
	30	400	23	70
	35	750	44	70
	45	2000	120	75
1/30	20	100	7.1	70
	25	200	14	70
	30	400	27	70
	35	750	53	70
	45	2000	144	75
1/40	20	100	9.4	70
	25	200	19	70
	30	400	36	70
	35	750	74	75
	45	2000	191	75
1/50	20	100	12	70
	25	200	24	70
	30	400	45	70
	35	750	94	75
	45	2000	239	75

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/60	20	100	14	70
	25	200	27	70
	30	400	55	70
	35	750	113	75
	45	2000	287	75
1/80	25	100	17	65
	30	200	34	65
	35	400	71	65
	45	750	141	70
1/100	25	100	22	65
	30	200	44	65
	35	400	86	65
	45	750	172	70
1/120	25	100	28	70
	30	200	55	70
	35	400	102	65
	45	750	212	70
1/160	25	100	37	70
	30	200	74	70
	35	400	141	65
	45	750	282	70
1/200	25	100	47	70
	30	200	94	70
	35	400	181	70
	45	750	353	70
1/240	25	100	57	70
	30	200	110	70
	35	400	221	70
	45	750	423	70

Performance Tables [for Calculation and Selection]

AF3F Type (Concentric Right Angle Shaft) Low Backlash Specification

[Notes]
- This performance table is based on pairing with a servo motor running at the rated input speed of 3000 r/min.
- The motor rated output torque is based on values after a warm-up operation of the unit.
- The transmission efficiency percentage is only a reference value.
- The transmission efficiency varies greatly depending on the input speed and the load on the product. Please be cautious.

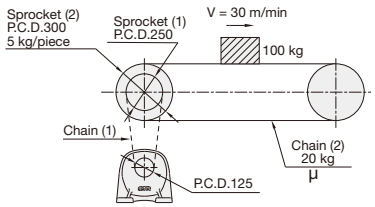
Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/5	28	400	3.8	60
	32	750	7.4	60
	40	2000	24	70
1/7.5	28	400	5.9	60
	32	750	11	60
	40	2000	35	70
1/10	18	100	2.0	60
	22	200	3.8	60
	28	400	7.8	60
	32	750	15	60
	40	2000	47	70
1/12	28	400	11	65
	32	750	20	65
	40	2000	57	70
1/15	18	100	3.1	65
	22	200	6.4	65
	28	400	13	65
	32	750	25	65
	40	2000	69	70
1/20	18	100	4.7	70
	22	200	8.8	65
	28	400	17	65
	32	750	34	70
	40	2000	92	70
1/25	18	100	5.9	70
	22	200	12	70
	28	400	23	70
	32	750	44	70
	40	2000	120	75
1/30	18	100	7.1	70
	22	200	14	70
	28	400	27	70
	32	750	53	70
	40	2000	144	75
1/40	18	100	9.4	70
	22	200	19	70
	28	400	36	70
	32	750	74	75
	40	2000	191	75
1/50	18	100	12	70
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	32	750	94	75
	40	2000	239	75

Reduction Ratio	Output Shaft Diameter	Motor Power Class	Motor Rated Output Torque (3000 r/min)	Transmission Efficiency
		W	N·m	%
1/60	18	100	14	70
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	28	400	55	70
	32	750	113	75
	40	2000	287	75
1/80	22	100	17	65
	28	200	34	65
	32	400	71	65
	40	750	141	70
1/100	22	100	22	65
	28	200	44	65
	32	400	86	65
	40	750	172	70
1/120	22	100	28	70
	28	200	55	70
	32	400	102	65
	40	750	212	70
1/160	22	100	37	70
	28	200	74	70
	32	400	141	65
	40	750	282	70
1/200	22	100	47	70
	28	200	94	70
	32	400	181	70
	40	750	353	70
1/240	22	100	57	70
	28	200	110	70
	32	400	221	70
	40	750	423	70

Selection Process Steps and Examples

Selection Examples High Precision Gearboxes for Servo Motors

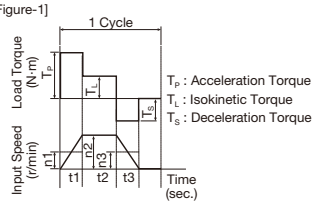
Application .....Conveyor (light shock load)
Connection method .....Chain (located in the center of the shaft)
Conveyance velocity V .....30 m/min
Workpiece weight.....100 kg
Operation time .....12 hours/day
Number of startups and stops ...720 times/day
Friction coefficient of chain and guide μ...0.2
Servo motor rated speed .....3000 r/min



The chain (1), the sprocket (1), and other conditions shall not be included in this calculation.

Please utilize the calculation and selection tool on our website. (https://sentei.nissei-gtr.co.jp/english/servo_calculation)
You may calculate the necessary power by inputting the usage conditions and the series on our website.

Selection Process Steps		Selection Examples
Determining Series and Backlash	Determining a right angle hollow bore, parallel shaft, or right angle shaft - Compact Parallel Shaft/Planetary Type APG - Compact Right Angle Hollow Bore Type AFC - Compact Right Angle Shaft Type AFC - Right Angle Hollow Bore Type AF3 - Right Angle Shaft Type AF3 - Parallel Shaft Type AG3/AGA - Right Angle Shaft Type AH2 *Backlash differs depending on the series.	Based on the mounting space, decide on the compact parallel or planetary type APG. Since repeated stop precision is not required, determine 15 arc min for backlash.
Determining the reduction ratio	Determining the reduction ratio (i) $i = \frac{\text{Required Speed of Output Shaft}}{\text{Input Shaft Speed}}$	Required speed of output shaft $= \frac{30\times1000}{300\times\pi} \times \frac{250}{125} \approx 63.66$ r/min $i = \frac{63.66}{3000} \approx \frac{1}{47.12}$ Select 1/40 for the reduction ratio since the speed will exceed the servo motor rated speed of 3000 r/min if 1/50 is selected for the reduction ratio. Selected reduction ratio $i = \frac{1}{40}$
Examining the load torque	Calculating the actual load torque (T_{LE}) Service factor (Sf) in [Table-1] on page 941	Based on the load condition (light shock load) the service factor (Sf) is 1.25. $T_{LE} = 9.8 \times (100 + 5 \times 2 + 20) \times 0.2 \times \frac{300}{2\times1000} \times \frac{125}{250} \times 1.25 = 23.89$ N·m
Examining the inertia	Calculating the load's moment of inertia of gearbox input shaft equivalent (J_i) Correction coefficient (C) in [Table-1] on page 942	Based on operation conditions, the correction coefficient (C) is 3. $J_i = \left(100 + \frac{1}{2} \times 5 \times 2 + 20\right) \times \left(\frac{300}{2\times1000}\right)^2 \times \left(\frac{125}{250}\right)^2 \times \left(\frac{1}{40}\right)^2 \times 3 = 0.00131836$ kg·m²
Examining the O.H.L.	Calculating the O.H.L. based on the actual load torque (T_{LE}) $\text{O.H.L.} = \frac{T_{LE} \times fb \times fw}{R}$ R : Pitch Circle Radius (m) of sprocket, pulley, gear, etc. attached to gearbox shaft fb: Coefficient for the connection method in [Table-1] on page 944 fw: Coefficient for the load level in [Table-2] on page 944 Correcting the tolerance based on the O.H.L. position [Table-1] on page 945	Based on the operation conditions, the coefficient for the connection method (fb) is 1.3, and the coefficient for the load level (fw) is 1.3. $\text{O.H.L.} = \frac{23.89 \times 1.3 \times 1.3}{\frac{125}{2\times1000}} = 645.99$ N The tolerance does not need to be corrected because the load position of the O.H.L. is at the middle of the shaft. * Please add values as needed if there are other factors that may affect the O.H.L. of the product, such as belt tension.
Tentative selection of a model	Based on the torque, the inertia, and the O.H.L., select a model that meets all conditions.	$T_{LE} \le$ Motor rated output torque (N·m) in the Performance Table [for Calculation and Selection] on page 920 O.H.L. ≤ Allowable output shaft O.H.L. (N) <Performance Table> Select a model that meets these conditions. * When a tolerance for the load's moment of inertia is set for the servo motor itself, check it as well.
		Tentatively selected model **APGZ22K-40Q400△N** * A flange type code for servo motor mounting will be shown in △.

Selection Process Steps		Selection Examples
Examining the acceleration and deceleration torques	Check whether the torques required for accelerating and decelerating the load within the specified time are equal to or lower than the allowable peak torque of startup/stop of the tentatively selected model. [Figure-1]  Acceleration Torque: $T_P = \frac{2\pi \times \frac{J_L}{C} \times n2}{60 \times t1 \times i_z} + \frac{T_{LE}}{Sf}$ Isokinetic Torque: $T_L = \frac{T_{LE}}{Sf}$ Deceleration torque: $T_S = \frac{2\pi \times \frac{J_L}{C} \times n2}{60 \times t3 \times i_z} - \frac{T_{LE}}{Sf}$ i_z: Actual Reduction Ratio <Performance Table>	Since the selected reduction ratio is 1/40, the servo motor speed at V = 30 m/min is 2547 r/min. [Operation conditions] Acceleration time t1: 0.2 sec. Input speed during acceleration n1: 1273.5 r/min Isokinetic time t2: 1.0 sec. Input speed during isokinetic operation n2: 2547 r/min Deceleration t3: 0.1 sec. Input speed during deceleration n3: 1273.5 r/min * The input speed during acceleration n1 and the input speed during deceleration n3 shall be the average value (n2/2) of the input speed during isokinetic operation n2. Performance values of the tentatively selected model APGZ22K-40Q400△N i_z: Actual reduction ratio … 1/40 Acceleration Torque $T_P = \frac{2\pi \times \frac{0.00131836}{3} \times 2547}{\frac{1}{60 \times 0.2 \times 40}} + \frac{23.89}{1.25}$ = 42.6 N·m ≤ 144 N·m Allowable peak torque of startup/stop of the tentatively selected model APGZ22K-40Q400△N <Performance Table> Verdict: Acceptable Isokinetic Torque $T_L = \frac{23.89}{1.25}$ = 19.1 N·m Deceleration Torque $T_P = \frac{2\pi \times \frac{0.00131836}{3} \times 2547}{\frac{1}{60 \times 0.1 \times 40}} - \frac{23.89}{1.25}$ = 27.8 N·m ≤ 144 N·m Allowable peak torque of startup/stop of the tentatively selected model APGZ22K-40Q400△N <Performance Table> Verdict: Acceptable
Examining the average load torque	Check whether the average load torque is equal to or lower than the allowable average torque of the tentatively selected model. Average Load Torque $T_M = \sqrt[3]{\frac{n_1 \times t_1 \times \lvert T_P \rvert^3 + n_2 \times t_2 \times \lvert T_L \rvert^3 + n_3 \times t_3 \times \lvert T_S \rvert^3}{n_1 \times t_1 + n_2 \times t_2 + n_3 \times t_3}}$	Average Load Torque $T_M = \sqrt[3]{\frac{1273.5 \times 0.2 \times \lvert 42.6 \rvert^3 + 2547 \times 1 \times \lvert 19.1 \rvert^3 + 1273.5 \times 0.1 \times \lvert 27.8 \rvert^3}{1273.5 \times 0.2 + 2547 \times 1 + 1273.5 \times 0.1}}$ = 23.9 N·m ≤ 40.7 N·m Allowable average torque of the tentatively selected model APGZ22K-40Q400△N <Performance Table> Verdict: Acceptable
Result of model selection	Decide on the tentatively selected model based on the judgment results of the acceleration, deceleration, and average load torques.	Since the judgment results of all of the acceleration, deceleration, and average load torqued are acceptable, select the model **APGZ22K-40Q400△N**. * A flange type code for servo motor mounting will be shown in △. If even one of the verdicts is unacceptable, reexamine a model with the next higher level of power, or reexamine the tentatively selected model by reducing the load torque and other conditions.

Service Factor/Allowable Moment of Inertia

Service Factor (Sf)

A gearbox is designed under the condition of operating for ten hours/day under a light shock load.
When you use a gearbox under a condition of a longer operation time under a heavier shock load, correct the load torque based on the service factor shown in the table below.

[Table-1]

Load Condition	Service Factor (Sf)			Application Example
	Operating for less than three hours/day	Operating for three to ten hours/day	Operating for more than ten hours/day	
Uniform load	1	1	1	Conveyors (uniform load), screens, agitators (low viscosity), water treatment machines (light load), machine tools (feed shafts), elevators, extruders, distillers
Light shock load	1	1	1.25	Conveyors (nonuniform or heavy load), agitators (high viscosity), machines for vehicles, water treatment machines (moderate load), hoists (light load), paper mills, feeders, food machines, pumps, sugar making machines, textile machines
Heavy shock load	1	1.25	1.5	Hoists (heavy load), hammer mills, metal working machines, crushers, tumblers

Allowable Moment of Inertia J

If a gearbox with a high inertia load is operated intermittently, high torque may be instantaneously produced when it starts to run (or when it stops if it is provided with a brake), resulting in an unexpected accident. Keep the level of the inertia of the application within the allowable value shown in the table below in accordance with the connection method and the frequency of startup.

APG/AFC Types

[Table-2]

Motor Power Class (W)	Allowable Moment of Inertia (Input Shaft Equivalent) ($\times 10^{-4}$kg·m^2)
100	1.6
150	2.4
200	3.2
400	6.4
600	9.6
750	12.0
1000	16.0
1500	24.0
2000	32.0
3000	48.0

Note: The power indicates the power designation of the model and type codes of the gearbox.

The allowable inertia values above are examples under the following conditions.
Inertia can be increased as long as the peak torque during start/stop does not exceed the allowable peak torque of each gearbox.
[Conditions]
・Acceleration from 0 to 5000 r/min
・Motor peak torque at 5000 r/min
・Acceleration time: 0.15 s

AG3/AGA/AH2/AF3 Types

■ Backlash 1 arc min/3 arc min Specifications

Motor Power Class (W)	Frame Size	Reduction Ratio	Allowable Moment of Inertia (Input Shaft Equivalent) ($\times 10^{-4}$kg·m^2)
100	15 (18)	1/10 to 1/120	2.5
200	25 (22)	1/10 to 1/60	5.0
	30 (28)	1/75 to 1/120	3.5
		1/150	2.2
		1/180	1.5
400	30 (28)	1/10 to 1/60	10.0
	35 (32)	1/75 to 1/120	7.0
		1/150	4.5
		1/180	3.1
750	35 (32)	1/10 to 1/60	16.3
	45 (40)	1/75 to 1/120	11.4
		1/150	7.3
		1/180	5.0
1000	35 (32)	1/10 to 1/60	16.3
2000	45 (40)	1/10 to 1/60	32.6

Note: The power indicates the power designation of the model and type codes of the gearbox.

■ Low Backlash

Motor Power Class (W)	Allowable Moment of Inertia (Input Shaft Equivalent) ($\times 10^{-4}$kg·m^2)
100	2.5
200	5
400	10
750	16.3
2000	32.6

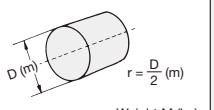
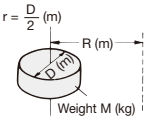
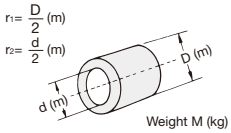
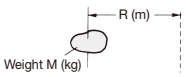
Correction coefficient of moment of inertia J according to operating conditions

[Table-1]

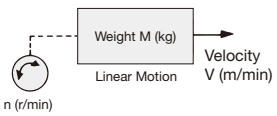
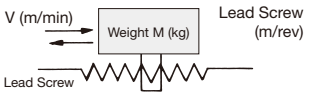
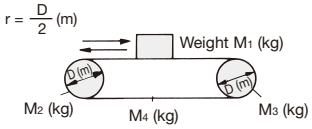
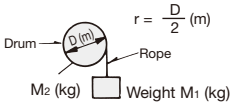
Connection Method	Frequency of Startup	Correction Coefficient
When no looseness occurs because of direct coupling etc.	70 times/day max	1
	More than 70 times/day	1.5
When looseness occurs due to chain fastening etc.	70 times/day max	2
	More than 70 times/day	3

Method for Calculating the Moment of Inertia

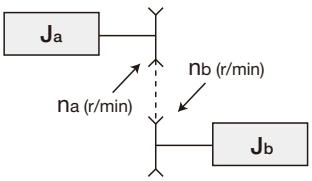
■ Rotor's moment of inertia J

If the center of rotation is aligned with the center of gravity		If the center of rotation is not aligned with the center of gravity	
	SI Units		SI Units
	$J = \frac{1}{2} Mr^2$ (kg·m²)		$J = \frac{1}{2} Mr^2 + MR^2$ (kg·m²)
	$J = \frac{1}{2} M(r_1^2 + r_2^2)$ (kg·m²)		(If the size is negligible) $J = MR^2$ (kg·m²)

■ Moment of inertia J in linear motion

		SI Units
General case		$J = \frac{1}{4} M \cdot \left(\frac{V}{\pi \cdot n}\right)^2$ (kg·m²)
In the case of horizontal linear motion (When moving an object with a lead screw)		$J = \frac{1}{4} M \cdot \left(\frac{P}{\pi}\right)^2$ $= \frac{1}{4} M \cdot \left(\frac{V}{\pi \cdot n}\right)^2$ (kg·m²)
In the case of horizontal linear motion (Conveyor etc.)		$J = M_1r^2 + \frac{1}{2} M_2r^2 + \frac{1}{2} M_3r^2 + M_4r^2$ (kg·m²)
In the case of vertical linear motion (Crane, winch, etc.)		$J = M_1r^2 + \frac{1}{2} M_2r^2$ (kg·m²)

■ Conversion of the moment of inertia J when the speed ratio is available



Convert the load's moment of inertia J_b into the equivalent value on the n_a shaft.

$$J = J_a + \left(\frac{n_b}{n_a}\right)^2 \times J_b$$

Overhung Load (O.H.L.)

Overhung Load (O.H.L.)

An overhung load (O.H.L.) is a suspending load imposed on a shaft. When a chain, belt, gear, etc. are used to couple the gearbox shaft with the machine working with it, this O.H.L. must be taken into consideration.

APG/AFC Types

$$\text{O.H.L.} = \frac{T_{LE}}{R} \times fb \times fw \text{ (N)}$$

- T_{LE} : Equivalent output torque acting on the gearbox shaft (N·m)
- R : Pitch circle radius (m) of the sprocket, pulley, gear, etc. attached to gearbox shaft
- fb : Refer to the coefficient for the connection method [Table-1].
- fw : Refer to the coefficient for the load level [Table-2].

Be sure to make the O.H.L. value calculated from the equation shown above smaller than the corrected O.H.L. Fx (page 945).

■ Connection Coefficient fb [Table-1]

Connection Method	fb
Timing belt	1.2
Gear, chain	1.3
V belt	2
Flat belt (with tension pulley)	3
Flat belt	4

■ Load Factor fw [Table-2]

Load Level	fw
Smooth operation without shock	1.2
Ordinary operation	1.3
Operation with vibration or shock load	2

AG3/GA/AH2/AF3 Types

$$\text{O.H.L.} = \frac{T_{LE} \times K_1 \times K_2}{R} \text{(N)}$$

- T_{LE} : Equivalent output torque acting on the gearbox shaft (N·m)
- R : Pitch circle radius (m) of the sprocket, pulley, gear, etc. attached to gearbox shaft
- K_1 : Refer to the coefficient for the connection method [Table-3].
- K_2 : Refer to the coefficient for the load point [Table-4].

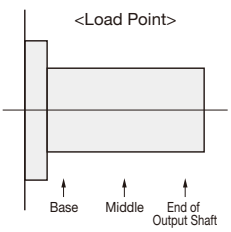
Be sure to make the O.H.L. value calculated from the equation shown above smaller than the allowable O.H.L. value listed in the performance table.

■ Coefficient K_1 [Table-3]

Connection Method	K_1
Chain, timing belt	1.00
Gear	1.25
V belt	1.50

■ Coefficient K_2 [Table-4]

Load Point	K_2
Base of the shaft	0.75
Middle of the shaft	1.00
End of Output Shaft	1.50



Correcting the tolerance based on the O.H.L. position

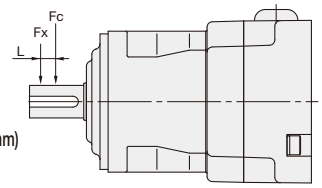
APG Type

(1) Point of O.H.L.
Allowable output shaft O.H.L. of the APG Type is calculated at the middle of the shaft.

(2) Correcting the allowable output shaft O.H.L.
Correct the allowable output shaft O.H.L. with the equation shown below in accordance with the conditions under which the motor will be used.

$$Fx = Fc \times \frac{A}{A+L}$$

- Fx : Corrected O.H.L. (N)
- Fc : Allowable Output Shaft O.H.L. (N)
- A : Parameter (mm)
- L : O.H.L. load point (amount of displacement from the middle of the shaft) (mm)



■ Constant A

[Table-1]

Frame Size	A (mm)
12	23.5
18	32
22	38.5
28	43.5

AFC Type

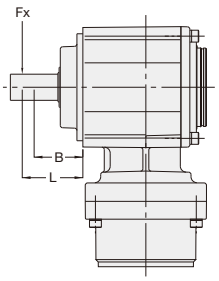
(1) Load point of O.H.L.
Allowable output shaft O.H.L. is calculated at Bmm from the flange surface.

(2) Correcting the load of the allowable output shaft O.H.L.
Correct the allowable output shaft O.H.L. with the equation shown below in accordance with the conditions under which the motor will be used.

a. When one end of the output shaft is not borne by a pillow

$$Fx = Fc \times \frac{C+B}{C+L}$$

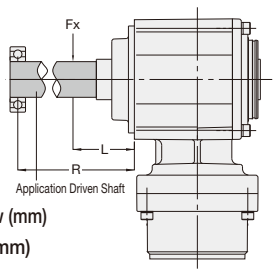
- Fx : Corrected O.H.L. (N)
- Fc : Allowable Output Shaft O.H.L. (N)
- B : Parameter (mm)
- C : Parameter (mm)
- L : O.H.L. load point (distance from the flange surface) (mm)



b. When one end of the output shaft is borne by a pillow

$$Fx = Fc \times \frac{R}{R-L}$$

- Fx : Corrected O.H.L. (N)
- Fc : Allowable Output Shaft O.H.L. (N)
- R : Distance from the flange surface to the center of the pillow (mm)
- L : O.H.L. load point (distance from the flange surface) (mm)



■ Constant B

(Load point of the allowable output shaft O.H.L.)

Frame Size	B (mm)
10	22
12	22
15	35
18	35
22	41
28	43.5
32	48.5

■ Constant C

Frame Size	C (mm)
10	45
12	50
15	52
18	58
22	68
28	78.5
32	91.5

AF3S Type <Backlash 1 arc min/3 arc min Specifications>

(1) Load point of O.H.L.
The load point of the allowable O.H.L. is calculated at 20 mm from the flange surface.

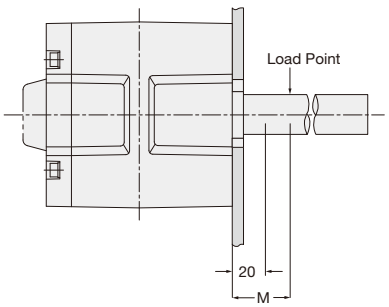
(2) Correcting the load of the allowable output shaft O.H.L.
Correct the allowable output shaft O.H.L. with the equation shown below in accordance with the conditions under which the motor will be used.

a. When one end of the output shaft is not borne by a pillow

If the load point M of the O.H.L. is more than 20 mm, adjust via:

Please correct using the following formula:

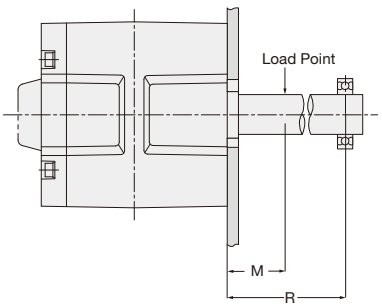
$$\text{Corrected O.H.L. (N)} = \frac{B+20}{B+M} \times \text{Allowable O.H.L. (N)}$$



b. When one end of the output shaft is borne by a pillow

Please correct using the following formula:

$$\text{Corrected O.H.L. (N)} = \frac{R}{R-M} \times \text{Allowable O.H.L. (N)}$$



■ Constant B

Frame Size	B (mm)
15	55
25	56
30	61
35	70
45	85

AF3S Type <Low Backlash Specification>

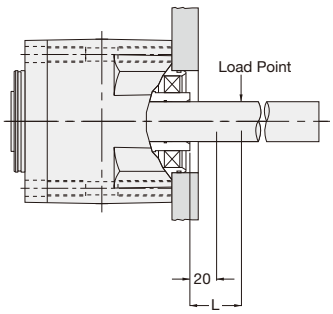
(1) Load point of O.H.L.
The load point of the allowable O.H.L. is calculated to be 20 mm from the end of the output shaft.

(2) Correcting the load of the allowable output shaft O.H.L.
Correct the allowable output shaft O.H.L. with the equation shown below in accordance with the conditions under which the motor will be used.

a. When one end of the output shaft is not borne by a pillow

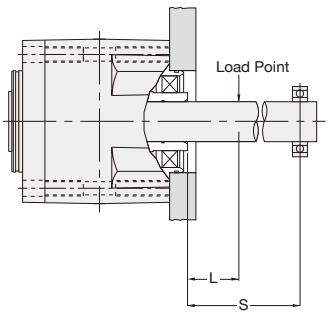
If the load point L of the O.H.L. is more than 20 mm,

$$\text{Corrected O.H.L. (N)} = \frac{A+20}{A+L} \times \text{Allowable O.H.L. (N)}$$



b. When one end of the output shaft is borne by a pillow

$$\text{Corrected O.H.L. (N)} = \frac{S}{S-L} \times \text{Allowable O.H.L. (N)}$$



■ Constant A

Frame Size	A (mm)
20	73.5
25	90.5
30	98
35	114
45	136

Thrust Load

Use the motor under a condition that meets the equation shown below.

Thrust load (N) × fw ≤ Allowable output shaft thrust load (N) [fw: coefficient based on the load level]

■ Load factor fw

Load Level	fw
Smooth operation without shock	1.2
Ordinary operation	1.3
Operation with vibration or shock load	2

If an excessive thrust load is applied under the usage conditions, contact your nearest Sales Office or the CS Center.

Continuous Rated Input Torque of Gearboxes

If the rated speed of the servo motor is below 3000 r/min, be careful with the continuous rated torque of the servo motor. Select a gearbox whose continuous rated input torque (table below) is higher than the continuous rated torque of the servo motor.

Gearbox Power	Continuous Rated Input Torque (N·m)
100 W Class	0.32
150 W Class	0.48
200 W Class	0.64
400 W Class	1.3
600 W Class	1.9
750 W Class	2.4
1000 W Class	3.2
1500 W Class	4.8
2000 W Class	6.4
3000 W Class	9.6

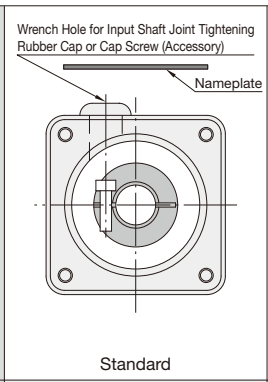
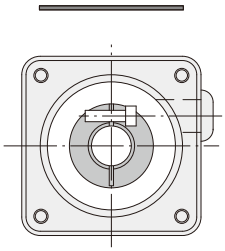
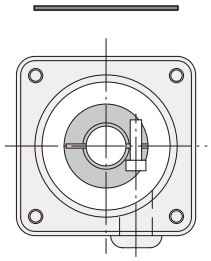
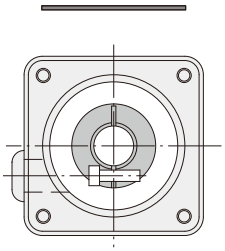
Backlash Value

Backlash value is defined as the amount of return(converted to angle unit) to point zero upon applying a small torque (±5 % of the rated torque) on the output shaft whilst having the input shaft locked in, then releasing the output shaft.

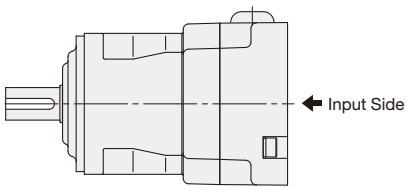
Change of Position of Wrench Hole for Input Shaft Joint Tightening

Order Method

If you intend to use the wrench hole for input shaft joint tightening in a position other than the standard position, order it with the appropriate option code shown below.

Design	Standard	Wrench Hole (Right)	Wrench Hole (Lower)	Wrench Hole (Left)
				
Option Code	Standard	B3	B6	B9

Note 1: All diagrams are views from the input side of the motor.
Note 2: Instructions not necessary if ordered standard.
Note 3: The side in which the nameplate is attached for a standard product shall be the standard position of the wrench hole for input shaft joint tightening.
Note 4: ═ indicates the attachment position of the nameplate.



List of Applicable Models (AFC/AG3/AGA/AF3)

The APG Type can be installed by turning 90 ° because its four mounting holes are provided on the four corners of the square.
The AFC type is available for all models.
For AG3, AGA, and AF3 types, please refer to the table below.

■ Backlash 1 arc min/3 arc min Specifications

Power (W)	Frame Size	AF3 Type
100	18 (15)	△
200	22 (25)	○
	28 (30)	○
400	28 (30)	○
	32 (35)	○
750	32 (35)	○
	40 (45)	○
1000	32 (35)	○
2000	40 (45)	○

Note 1: The figures in the parentheses indicate the frame sizes of right angle hollow bore types.
Note 2: The model marked with "△" in the table is available only for a low wrench hole for input shaft joint tightening.
Note 3: The AGA type is available only in frame size 50.

■ Backlash 30 arc min Specification

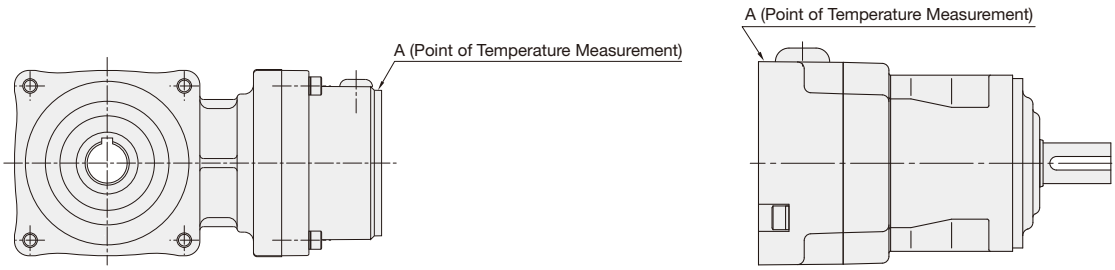
Power (W)	Frame Size	AG3 Type/AGA Type
100	18 (20)	×
	22 (25)	×
200	18	×
	22 (25)	×
	28 (30)	×
400	22	○
	28 (30)	○
	32 (35)	○
750	28	○
	32 (35)	○
	40 (45)	○
2000	32	○
	40 (45)	○
	50	○

Precautions for Installation

Installation Place

Ambient Temperature	0 °C to 40 °C
Ambient Humidity	85 % or less
Altitude	1,000 m or lower
Installation Environment	A place free from corrosive gas, explosive gas, and/or vapor. Well ventilated place with no dust.

Take care to keep the surface temperature (area A) below 90 °C.
If the surface temperature exceeds 90 °C, cool it with an external fan or heat sink to keep it below 90 °C.



Installation Procedure

Fasten the gearmotor to a vibration-free, machined, flat surface using four bolts.
Make sure the flatness of the mounting surface is 0.1 mm or less.
If the foundation is unstable or the mounting surface is not flat enough, vibration may occur during operation and the service life of the gearbox may be shortened.

Installation Orientation

Adopt a grease lubrication method and can therefore be installed in any orientation.

Connection with application

1. H7 fit is recommended for a coupling, sprocket, pulley, gear, etc. to be attached to the gearbox shaft.
2. In direct coupling, accurately align the center of the gearbox shaft and that of the mating shaft.
3. In chain or gear engagement, keep the gearbox shaft and the mating shaft parallel accurately to each other, and install the device so that the line connecting the centers of both shafts is perpendicular to the shafts.
4. When attaching a coupling or application to the output shaft, do not apply strong impacts via hammer or similar tool. The bearing may get damaged and cause an abnormal sound, vibrations, or damage.
5. For solid shafts (without a key), use a friction-type coupling. Follow the instruction manual of the commercially available fastening device for the fastening procedure.

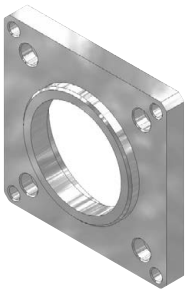
Option

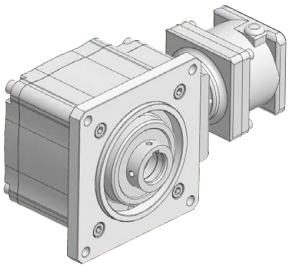
ACCURATE GEARBOX
P.952 **Compact Flange**
P.953 **Output Shaft**

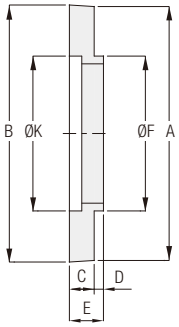
Option

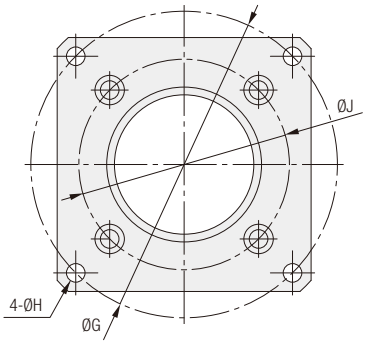
Compact Flange

A compact flange is a flange mount fixture exclusively for right angle hollow bore (AFC). A compact flange is supplied with bolts for mounting it.









Part No.	Applicable Frame Size	A	B	C	D	E	F	G	H	J	K	Mounting Bolt (4 Pieces, Accessory)	Approx. Weight (g)	Material	Surface Treatment
CF-10	10	□76	(□77)	8	3	11	50h7	91	6	68	50H7	Hex Head Cap Screw M5 × 12	85	Aluminum Casting	No
CF-12	12	□82	(□83)	8	3	11	50h7	99	6	76	50H7	Hex Head Cap Screw M5 × 12	105		
CF-15	15	□90	(□91)	10	5	15	60h7	111	6	88	60H7	Hex Head Cap Screw M5 × 12	155		
CF-18	18	□108	(□109)	10.5	5	15.5	70h7	130	7	98	70H7	Hex Head Cap Screw M6 × 15	235		
CF-22	22	□134	(□135)	12.5	5	17.5	90h7	161	9	120	90H7	Hex Head Cap Screw M8 × 20	415		
CF-28	28	□152	(□153)	12.5	5	17.5	110h7	185	9	140	110H7	Hex Head Cap Screw M8 × 20	495		
CF-32	32	□172	(□173)	15	5	20	120h7	209	11	160	120H7	Hex Head Cap Screw M10 × 25	780		

Note 1: The mounting bolts are not provided with a spring washer, and if they become loose, use a screw locking adhesive etc. to keep them securely tightened.

Output Shaft Tapping (Threading)

If you desire output shaft tapping, we will prepare an output shaft manufactured to the dimensions shown in the table below. Designate these dimensions wherever possible at the time of design. To order tapping, enter "X40" at the end of the model name.

Note 1: Water-resistant specification stainless steel output shafts are not tapped.

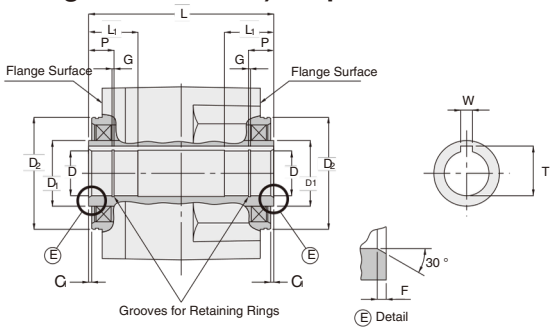


Model example: Standard specification AH2LZ22L-5L200F1 ⇒ Output shaft with standard AH2LZ22L-5L200F1X40

Note 2: The mark "▲" in the table indicates that a lead time of about full 10 days is required.
Note 3: Water-resistant specification stainless steel output shafts and dimensions other than those shown in the table below are custom specifications.
Note 4: For lead time, prices, and other details, please contact your nearest Sales Office.
Note 5: The AH2 and AF3F Types are available only with low backlash specifications and require a delivery period of about full 10 days.
For precision 1 arc min and 3 arc min specifications, please contact your nearest Sales Office or the CS Center

Shaft Diameter (Frame Size)	Size × Pitch × Depth (mm)	AH2 Type (Right Angle Shaft)			AF3F Type (Concentric Right Angle Shaft)		
		L Shaft	R Shaft	T Shaft	L Shaft	R Shaft	T Shaft
18	M6 × 1.0 × 15	Not Available	Not Available	Not Available	▲	▲	▲
22/28	M8 × 1.25 × 20	▲	▲	▲	▲	▲	▲
32/40	M10 × 1.5 × 25	▲	▲	▲	▲	▲	▲
50	M12 × 1.75 × 30	▲	▲	▲	Not Available	Not Available	Not Available

■ AF3S Types (Right Angle Hollow Bore)/Output Shaft Hole Diameter Custom Specifications



• Right Angle Hollow Bore Detailed Dimensions

Frame Size	Internal Diameter of Right Angle Hollow Bore	D (H8)	D_1	D_2 (h7)	W	T	L	L_1	P	C_1	F	G	Option Code
25	Ø20	Ø20	Ø39	Ø66	6	22.8	118	27	14	2	2	1.15	F2
30	Ø25	Ø25	Ø44	Ø75	8	28.3	124	33	17	2	2	1.35	F3
35	Ø30	Ø30	Ø49	Ø85	8	33.3	142	38	20	2	2	1.35	F4
45	Ø35	Ø35	Ø64	Ø100	10	38.3	168	50	26	2	2	1.75	F5
	Ø40	Ø40	Ø64	Ø100	12	43.3	168	50	26	2	2	1.95	F6

Note 4: The AF3S Type is available only with low backlash specifications.
For precision 1 arc min and 3 arc min specification products, please contact your nearest Sales Office or the CS Center.