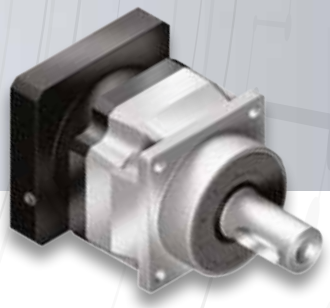
APEX DYNAMICS



KATALOG

PRECIZNÍ PLANETOVÉ PŘEVODOVKY

APEX DYNAMICS

VÁŠ SPECIALISTA

pro přesné mechanické převody.

Společnost APEX DYNAMICS, INC., založena v roce 1987, je známa po celém světě pro svůj vysoký standard kvality precizních planetových převodovek, ozubených hřebenů a pastorků. Silná orientace na spokojenost zákazníků z technického a servisního hlediska, ale i velký objem inovací ve svých produktech, kterými je společnost proslulá, dostaly společnost APEX DYNAMICS na světovou špičku v oblasti pohonné techniky. Aby byla společnost co nejblíže svým zákazníkům, má k dispozici 34 světových poboček, jejichž odborně školení a zkušení pracovníci vám vždy ochotně pomohou s výběrem toho nejvhodnějšího produktu s ohledem na požadavky jakékoliv specifické aplikace. **Víme, o čem mluvíme.** Naši širokou škálu precizních převodovek lze kombinovat s motory nejznámějších a nejběžnějších výrobců servopohonů a jsou rovněž zaměnitelné se systémy jiných výrobců. Neustálými inovacemi vyhovují naše produkty potřebám moderních aplikací, které jsou stále náročnější a složitější. Na našem webu naleznete velmi praktický nástroj s názvem **"DESIGN TOOL" (Konfigurátor)**, který vám zjednoduší hledání vhodného produktu z více jak 25.000 možných kombinací. Rozmanitost a složitost volitelných možností produktů je kombinována s efektivním systémem řízení výroby, který po objednání zaručuje rychlou výrobu s **krátkými dodacími termíny**, a to jak v případě jednotek kusů, tak i při velkých objemech. S námi jste vždy o krok na před!

Sídlo Apex Dynamics Inc.

GARANCE PŘESNOSTI A SPOLEHLIVOSTI!

K dispozici máte přes 25.000 variant převodovek.

VÝHODY NA PRVNÍ POHLED

- Vysoká kvalita, spolehlivost a přesnost je zaručena díky použití nejmodernějších technologií a kontrolních procesů při výrobě.
- Krátké dodací lhůty 3 týdny i pro kusové dodávky.
- Plná kompatibilita a snadná instalace s většinou servomotorů.
- **On-line konfigurátor s databází servomotorů většiny výrobců vám zjednoduší výběr spojení správného reduktoru.**

Design Tool link

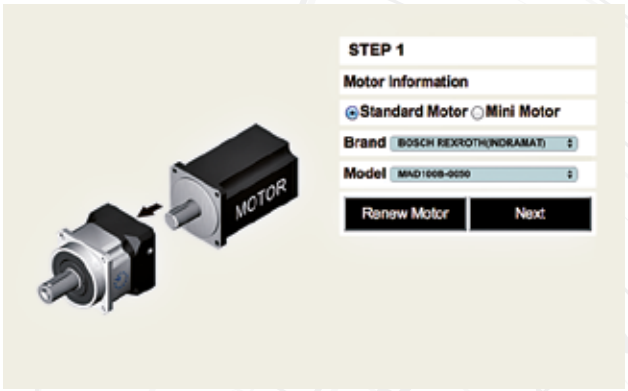
- Technické poradenství od zkušených specialistů.
- Celosvětová podpora díky rozsáhlé síti poboček.
- Vynikající poměr cena/výkon.

PŘEVODOVKY APEX DYNAMICS JSOU ...

- Rozměrově zaměnitelné s převodovkami jiných značek.
- Spolehlivé a odolné.
- Inovativní a vysoké kvality.
- Kompaktní a dynamické.
- S nízkou hlučností.
- Bezúdržbové.

▶ NÁSTROJ DESIGN TOOL

Výběr správného produktu ve třech krocích.

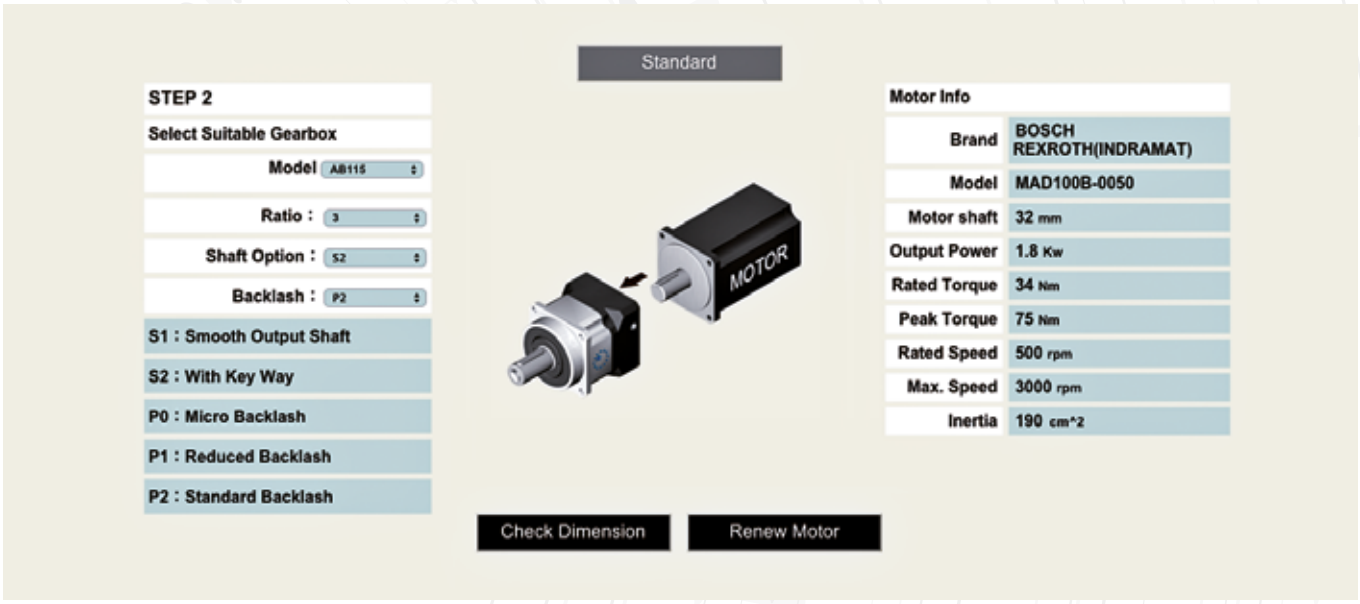


KROK 1

Nejprve vyberte požadovaný motor.

KROK 2

Zadejte typ převodovky, převodový poměr a požadovanou přesnost.



KROK 3

Nyní si můžete prohlédnout podrobné technické informace o kombinaci motor/převodovka včetně možnosti stažení 3D modelů nebo 2D výkresů.

Nástroj Design Tool naleznete na webu www.apexdyna.com.

Zde si můžete stáhnout spoustu dalších informací – výkresy, katalogy, návody či 3D modely.

PLANETARY GEARBOX

NEW GENERATION P-SERIES

PEII - PGII - PAII - PSII - PNII - PD PL - PEIIR - PGIIR - PAIIR - PSIIR PNIIR - PDR - PLR

Kompaktní převodovka s redukovanou vůlí a momenty setrvačnosti. Vynikající kompromis cena/výkon.

str. **15**

HIGH POWER

PLANETARY GEARBOX

AE - AER SERIES AES - AERS SERIES

Výkonná převodovka se šikmým ozubením. Ideální pro aplikace s požadavkem vysokého výkonu nebo kontinuálních otáček. K dispozici i v celonerezovém provedení (AES/AERS).

str. **49**

HIGH PRECISION

PLANETARY GEARBOX

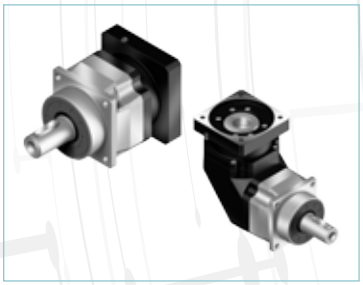
AB - ABR SERIES

Univerzální převodovka se šikmým ozubením, charakteristická vysokým výkonem, přesností a tichým chodem. K dispozici v různých třídách přesnosti a 3 druhy výstupních hřídelí.

str. **69**

HIGH PRECISION

PLANETARY GEARBOX



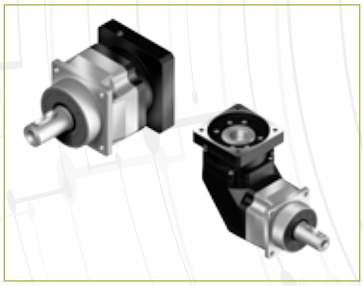
AF - AFR SERIES

Univerzální převodovka se šikmým ozubením, charakteristická vysokou tuhostí, dynamikou, radiálním zatížením a prodlouženou životností. K dispozici v různých třídách přesnosti a 3 druhy výstupních hřídelí.

str. **81**

HIGH PRECISION HIGH SPEED

PLANETARY GEARBOX



AFX - AFXR SERIES

Univerzální převodovka se šikmým ozubením, charakteristická nízkým třením, optimalizovaná pro kontinuální provoz, vysoké otáčky a teploty. K dispozici v různých třídách přesnosti a 3 druhy výstupních hřídelí.

str. **93**

HIGH PRECISION HIGH TORQUE

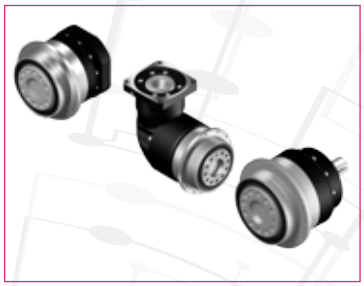
PLANETARY GEARBOX

AFH - AFHK SERIES

High-torque převodovka s vysokou přesností i v úhlovém provedení, stabilitou a s možností až 4 druhů výstupních hřídelí vč. duté. Vhodná pro aplikace s vysokou dynamikou a točivými momenty.

str. **105**

HIGH PRECISION
PLANETARY GEARBOX

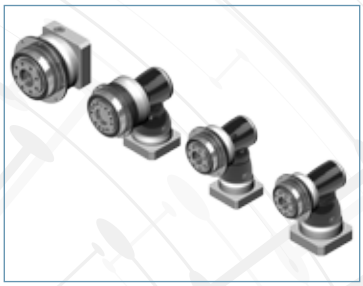


AD - ADR - ADS SERIES

Výkonná a tichá převodovka s ISO přírubou a s různými stupni přesnosti. Ideální pro aplikace s požadavkem vysokého výkonu, přesnosti a velkými klopnými momenty nebo s ozubenými pastorky.

str. **123**

HIGH TORQUE HIGH PRECISION
PLANETARY GEARBOX



AH - AHK SERIES

High-torque převodovka s vysokou přesností i v úhlovém provedení, limitovaným vzestupem teploty a výstupní ISO přírubou. Ideální pro aplikace s velkou dynamikou střídajících se pohybů a velkými klopnými momenty.

str. **139**

HIGH TORQUE HIGH PRECISION
PLANETARY GEARBOX

AP - APK - APC - APCK - SERIES

High-torque převodovka, pro velmi vysoké točivé momenty a s maximální přesností i v úhlovém provedení. Díky patentovanému systém pro přímé připojení pastorku vytváří výkonný a přesný lineární systém.

str. **157**

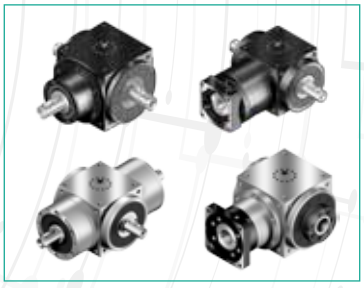
HIGH PERFORMANCE
HYPOID GEARBOX

KH - KF SERIES

Úhlová převodovka s hypoidním převodem, kompaktní v montáži, pro aplikace s vysokou dynamikou a přesností. Různé typu výstupu vč. duté průchozí hřídele nebo ISO příruby.

str. **177**

HIGH PRECISION
SPIRAL BEVEL GEARBOX



AT - ATB SERIES

Úhlová převodovka se speciálně upraveným kuželovým soukolím, vyniká vysokou přesností a vysokým točivým momentem. Velká variabilita výstupních hřídelí vč. duté. Rovněž v nerezovém provedení (AT).

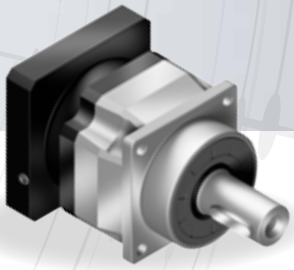
str. **191**

HIGH PRECISION LINEAR SYSTEM
RACK AND PINION

Samostatný katalog přesných ozubených hřebenů a pastorků kompatibilních pro planetové převodovky k vytvoření výkonných a přesných lineárních systémů. K dispozici na vyžádání.

→ apexdyna.com

PRŮVODCE VÝBĚREM PRODUKTŮ



APEX DYNAMICS

		High-End přímé planetové převodovky							
									
Produktová řada		**AB**	**AD**	**ADS**	**AE**	**AES**	**AF**	**AFX**	**AFH**
High Torque		-	-	-	-	-	-	-	x
Vysoké rychlosti		-	-	-	-	-	-	x	-
Převodový poměr	Min.	3	4	4	3	3	3	3	3
	Max.	100	100	91	100	100	100	100	100
Vůle [arcmin] [a]	Standardní	≤ 5	≤ 5	≤ 5	≤ 8	≤ 8	≤ 5	≤ 5	≤ 2
	Redukovaná	≤ 3	≤ 3	≤ 3	-	-	≤ 3	≤ 3	-
	Micro	≤ 1	≤ 1 [b]	≤ 1	-	-	≤ 1	≤ 1	-
Typ vnitřního ozubení		Šikmé	Šikmé	Šikmé	Šikmé	Šikmé	Šikmé	Šikmé	Šikmé
Možnosti výstupů									
Hladká hřídel		x	-	-	-	-	x	x	x
Hřídel s perem (DIN 6885)		x	-	-	x	x	x	x	x
Drážkovaná hřídel (DIN 5480)		o	-	-	-	-	o	o	o
Dutá hřídel (zaslepená)		-	-	-	-	-	-	-	o
Dutá hřídel se svěrným kroužkem (průchozí)		-	-	-	-	-	-	-	-
Dutá hřídel s drážkou pro pero (průchozí)		-	-	-	-	-	-	-	-
Příruba pro řemenici		-	-	-	-	-	-	-	-
Dutá hřídel s přírubou (ISO 9409)		-	-	-	-	-	-	-	-
Zubová spojka (curvic interface)		-	-	-	-	-	-	-	-
Robotická příruba (ISO 9409)		-	x	x	-	-	-	-	-
Oboustranný výstup (synchronní)		-	-	-	-	-	-	-	-
Možnosti vstupů									
Vstup pro motor (příruba)		x	x	-	x	x	x	x	x
Vstupní plná hřídel		-	-	x	-	-	-	-	-
Vlastnosti									
ATEX (certifikace do výbušného prostředí)		o	o	o	o	o	o	o	o
Potravinářské mazivo		o	o	o	o	x	o	o	o
Nerez	Tělo a výst. hřídel/příruba	x	x	x	x	x	x	x	-
	Celonerezové provedení	o	o	-	o	x	o	o	-
Systémová řešení									
Lineární systém (Hřeben / Pastorek) [c]		o	o	o	o	o	o	o	o
Příslušenství									
Svěrný disk		-	-	-	-	-	-	-	o
Řemenice		-	-	-	-	-	-	-	-
Cena									
Cenová hladina		++	++	++	+	+++	++	++	+++

Vysvětlivky:
- x standard
- o volitelně (za příplatek)
- - nelze

[a] Platí pro jednostupňové verze
[b] Kontaktujte Apex Dynamics
[c] Lineární systém omezen rozměry převodovky
[d] Verze C této převodovky má kuželový úhlový převod
[e] Rovněž dostupná s kuželovým převodem
[f] Vícestupňové verze mají planetový předstupeň s přímým ozubením
[g] Všechny tři hřídele mohou být použity jako vstupní nebo výstupní
[h] Všechny čtyři hřídele mohou být použity jako vstupní nebo výstupní

			Standardní přímé planetové převodovky					
								
AH	**AP**	**APC**	**PAII**	**PEII**	**PGII**	**PSII**	**PD**	**PL**
-	x	x	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
4	5,5	5,5	3	3	3	3	3	3
100	220	220	100	100	1.000	100	100	100
≤ 1	≤ 1	≤ 1	≤ 6 - ≤ 8	≤ 6 - ≤ 8	≤ 6 - ≤ 8	≤ 6 - ≤ 8	≤ 6 - ≤ 8	≤ 6 - ≤ 7
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Šikmé	Šikmé	Šikmé	Přímé	Přímé	Přímé	Přímé	Přímé	Přímé
-	-	-	x	-	-	-	-	-
-	-	-	x	x	x	x	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	x
-	-	-	-	-	-	-	-	-
-	-	x	-	-	-	-	-	-
x	x	-	-	-	-	-	x	-
-	-	-	-	-	-	-	-	-
x	x	x	x	x	x	x	x	x
-	-	-	-	-	-	-	-	-
o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
o	o	x	o	o	o	o	o	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	o
+++	+++	+++	+	+	+	+	+	+

APEX DYNAMICS

		High-End úhlové planetové převodovky						High-End	
									
Produktová řada		ABR	ADR	AER	AERS	AFR	AFXR	AFHK	AHK
High Torque		-	-	-	-	-	-	-	x
Vysoké rychlosti		-	-	-	-	-	x	-	-
Převodový poměr	Min.	3	4	3	3	3	3	4	4
	Max.	200	200	200	200	200	200	10.000	10.000
Vůle [arcmin] [a]	Standardní	≤ 6	≤ 6	≤ 10	≤ 10	≤ 6	≤ 6	≤ 2	≤ 2
	Redukovaná	≤ 4	≤ 4	-	-	≤ 4	≤ 4	-	-
	Micro	≤ 2	≤ 2	-	-	≤ 2	≤ 2	-	-
Typ vnitřního ozubení		Šikmé	Šikmé	Šikmé	Šikmé	Šikmé	Šikmé	Hypoid [d]	Hypoid [d]
Možnosti výstupů									
Hladká hřídel		x	-	-	-	x	x	x	-
Hřídel s perem (DIN 6885)		x	-	x	x	x	x	x	-
Drážkovaná hřídel (DIN 5480)		o	-	-	-	o	o	o	-
Dutá hřídel (zaslepená)		-	-	-	-	-	-	o	-
Dutá hřídel se svěrným kroužkem (průchozí)		-	-	-	-	-	-	-	-
Dutá hřídel s drážkou pro pero (průchozí)		-	-	-	-	-	-	-	-
Příruba pro řemenici		-	-	-	-	-	-	-	-
Dutá hřídel s přírubou (ISO 9409)		-	-	-	-	-	-	-	-
Zubová spojka (curvic interface)		-	-	-	-	-	-	-	-
Robotická příruba (ISO 9409)		-	x	-	-	-	-	-	x
Oboustranný výstup (synchronní)		-	-	-	-	-	-	-	-
Možnosti vstupů									
Vstup pro motor (příruba)		x	x	x	x	x	x	x	x
Vstupní plná hřídel		-	-	-	-	-	-	-	-
Vlastnosti									
ATEX (certifikace do výbušného prostředí)		o	o	o	o	o	o	o	o
Potravinářské mazivo		o	o	o	x	o	o	o	o
Nerez	Tělo a výst. hřídel/příruba	x	x	x	x	x	x	-	-
	Celonerezové provedení	-	-	-	x	-	-	-	-
Systémová řešení									
Lineární systém (Hřeben / Pastorek) [c]		o	o	o	o	o	o	o	o
Příslušenství									
Svěrný disk		-	-	-	-	-	-	o	-
Řemenice		-	-	-	-	-	-	-	-
Cena									
Cenová hladina		++	++	+	+++	++	++	+++	+++

Vysvětlivky:
x standard
o volitelně (za příplatek)
- nelze

[a] Platí pro jednostupňové verze
[b] Kontaktujte Apex Dynamics
[c] Lineární systém omezen rozměry převodovky
[d] Verze C této převodovky má kuželový úhlový převod
[e] Rovněž dostupná s kuželovým převodem
[f] Vícestupňové verze mají planetový předstupeň s přímým ozubením
[g] Všechny tři hřídele mohou být použity jako vstupní nebo výstupní
[h] Všechny čtyři hřídele mohou být použity jako vstupní nebo výstupní

úhlové hypoidní planetové p.				Standardní úhlové planetové převodovky					
									
APK	APCK	KF	KH	PAIIR	PEIIR	PGIIR	PSIIR	PDR	PLR
x	x	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
22	22	1	3	3	3	3	3	3	3
5.500	5.500	100	100	100	100	1.000	100	100	100
≤ 1.2	≤ 1.2	≤ 3	≤ 3	≤ 10 - ≤ 12	≤ 10 - ≤ 12	≤ 10 - ≤ 12	≤ 10 - ≤ 12	≤ 10 - ≤ 12	≤ 10 - ≤ 11
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
Hypoid	Hypoid	Hypoid [e]	Hypoid	Přímé	Přímé	Přímé	Přímé	Přímé	Přímé
-	-	x	-	x	-	-	-	-	-
-	-	x	-	x	x	x	x	-	-
-	-	o	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	x	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	x
-	-	-	x	-	-	-	-	-	-
-	x	-	-	-	-	-	-	-	-
x	-	-	x	-	-	-	-	x	-
-	-	-	-	-	-	-	-	-	-
x	x	x	x	x	x	x	x	x	x
-	-	-	-	-	-	-	-	-	-
o	o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o	o
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
o	o	o	o	o	o	o	o	o	-
-	-	o	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	x
+++	+++	++	++	+	+	+	+	+	+

APEX DYNAMICS

		High-End kuželové nerezové převodovky							
									
Produktová řada		**AT-L**	**AT-L1/ R1**	**AT-H**	**AT-C**	**AT-LM/ RM**	**AT-4M**	**AT-FL**	**AT-FL1/ FR1**
High Torque		-	-	-	-	-	-	-	-
Vysoké rychlosti		-	-	-	-	-	-	-	-
Převodový poměr	Min.	1	1	1	1	1	1	1	1
	Max.	5	5	5	5	1	1	500	500
Vůle [arcmin] [a]	Standardní	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6
	Redukovaná	-	-	-	-	-	-	-	-
	Micro	-	-	-	-	-	-	-	-
Typ vnitřního ozubení		Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]
Možnosti výstupů									
Hladká hřídel		x	x	-	-	x	x	x	x
Hřídel s perem (DIN 6885)		x	x	-	-	x	x	x	x
Drážkovaná hřídel (DIN 5480)		-	-	-	-	-	-	-	-
Dutá hřídel (zaslepená)		-	-	-	-	-	-	-	-
Dutá hřídel se svěrným kroužkem (průchozí)		-	-	-	x	-	-	-	-
Dutá hřídel s drážkou pro pero (průchozí)		-	-	x	-	-	-	-	-
Příruba pro řemenici		-	-	-	-	-	-	-	-
Dutá hřídel s přírubou (ISO 9409)		-	-	-	-	-	-	-	-
Zubová spojka (curvic interface)		-	-	-	-	-	-	-	-
Robotická příruba (ISO 9409)		-	-	-	-	-	-	-	-
Oboustranný výstup (synchronní)		x	-	x	x	x [g]	x [h]	x	-
Možnosti vstupů									
Vstup pro motor (příruba)		-	-	-	-	-	-	x	x
Vstupní plná hřídel		x	x	x	x	x	x	-	-
Vlastnosti									
ATEX (certifikace do výbušného prostředí)		o	o	o	o	o	o	o	o
Potravinářské mazivo		o	o	o	o	o	o	o	o
Nerez	Tělo a výst. hřídel/příruba	x	x	x	x	x	x	x	x
	Celonerezové provedení	x	x	x	x	x	x	o	o
Systémová řešení									
Lineární systém (Hřeben / Pastorek) [c]		o	o	o	o	o	o	o	o
Příslušenství									
Svěrný disk		-	-	-	o	-	-	-	-
Řemenice		-	-	-	-	-	-	-	-
Cena									
Cenová hladina		++	++	++	+++	++	++	++	++

Vysvětlivky:
- x standard
- o volitelně (za příplatek)
- - nelze

[a] Platí pro jednostupňové verze
[b] Kontaktujte Apex Dynamics
[c] Lineární systém omezen rozměry převodovky
[d] Verze C této převodovky má kuželový úhlový převod
[e] Rovněž dostupná s kuželovým převodem
[f] Vícestupňové verze mají planetový předstupeň s přímým ozubením
[g] Všechny tři hřídele mohou být použity jako vstupní nebo výstupní
[h] Všechny čtyři hřídele mohou být použity jako vstupní nebo výstupní

		High-End kuželové převodovky - černěné ocelové tělo									
											
AT-FH	**AT-FC**	**ATB-L**	**ATB-L1/ R1**	**ATB-H**	**ATB-C**	**ATB-LM/ RM**	**ATB-4M**	**ATB-FL**	**ATB-FL1/FR1**	**ATB-FH**	**ATB-FC**
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
1	1	1	1	1	1	1	1	1	1	1	1
500	500	5	5	5	5	1	1	500	500	500	500
≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]	Spiral [f]
-	-	x	x	-	-	x	x	x	x	-	-
-	-	x	x	-	-	x	x	x	x	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	x	-	-	-	x	-	-	-	-	-	x
x	-	-	-	x	-	-	-	-	-	x	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
x	x	x	-	[x]	[x]	x [g]	x [h]	x	-	x	x
x	x	-	-	-	-	-	-	x	x	x	x
-	-	x	x	x	x	x	x	-	-	-	-
o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o	o	o	o
x	x	-	-	-	-	-	-	-	-	-	-
o	o	-	-	-	-	-	-	-	-	-	-
o	o	o	o	o	o	o	o	o	o	o	o
-	o	-	-	-	o	-	-	-	-	-	o
-	-	-	-	-	-	-	-	-	-	-	-
++	+++	+	+	+	++	+	+	+	+	+	++

PLANETARY GEARBOX

NEW GENERATION P-SERIES

PEII - PGII - PAII - PSII - PNII Series
PD - PL - PEIIR - PGIIR - PAIIR Series
PSIIR - PNIIR - PDR - PLR Series

New Generation P Series

Features:

Economic
High efficiency
Low noise
Reduced backlash
Optimized Inertia moment
Limited temperature rise
Long service life
Flexible mounting diameters
Minimized size and weight

The perfect servo planetary gearbox !
The brand new APEX PII / PIIR series. The PII / PIIR series is an economic high precision planetary gearbox with excellent performance and quality. Our innovative PII / PIIR series design features minimal size, light weight and high efficiency.


PEII


PEIIR


PGII


PGIIR


PAII


PAIIR


PSII


PSIIR


PNII


PNIIR


PD


PDR


PL


PLR

▶ Ordering Code

PEⅡ090	—	**010**[(1)]	—	**( )**[(2)]	/	**MOTOR**
PEⅡR090	—	**010**[(1)]	—	**( )**[(2)]	/	**MOTOR**

Motor Type :
Manufacturer and Model

Ratio[(1)]:
1-stage: 3, 4, 5, 7 ,9[(3)] ,10
2-stage: 12[(5)],15, 16, 20, 25, 30, 35, 40, 50, 70, 81[(3)], 100
3-stage[(4)]: 120, 160, 200, 280, 350, 500, 700, 1000

Gearbox Size:
PEⅡ : PEⅡ 050, PEⅡ 070, PEⅡ 090, PEⅡ 120, PEⅡ 155
PGⅡ : PGⅡ 040, PGⅡ 060, PGⅡ 080, PGⅡ 120, PGⅡ 160
PAⅡ : PAⅡ 042, PAⅡ 060, PAⅡ 090, PAⅡ 115, PAⅡ 142
PSⅡ : PSⅡ A, PSⅡ B, PSⅡ C, PSⅡ D, PSⅡ E
PNⅡ : PNⅡ 017, PNⅡ 023, PNⅡ 034, PNⅡ 042, PNⅡ 056
PD : PD 053, PD 064, PD 090, PD 110
PL : PL 070, PL 090, PL 120,

Ordering Example : PEⅡ 090 - 010 / SIEMENS 1FT6 041 - 4AF71
PAⅡ 090 - 010 - S1 / SIEMENS 1FT6 041 - 4AF71

Gearbox Size:
PEⅡR : PEⅡR 050, PEⅡR 070, PEⅡR 090, PEⅡR 120, PEⅡR 155
PGⅡR : PGⅡR 040, PGⅡR 060, PGⅡR 080, PGⅡR 120, PGⅡR 160
PAⅡR : PAⅡR 042, PAⅡR 060, PAⅡR 090, PAⅡR 115, PAⅡR 142
PSⅡR : PSⅡR A, PSⅡR B, PSⅡR C, PSⅡR D, PSⅡR E
PNⅡR : PNⅡR 017, PNⅡR 023, PNⅡR 034, PNⅡR 042, PNⅡR 056
PDR : PDR 053, PDR 064, PDR 090, PDR 110
PLR : PLR 070, PLR 090, PLR 120

Ordering Example : PEⅡR 090 - 010 / SIEMENS 1FT6 041 - 4AF71
PAⅡR 090 - 010 - S1 / SIEMENS 1FT6 041 - 4AF71

(1) Ratio (i= N_{in} / N_{out}) .
(2) S1 = Smooth Output Shaft. S1 shaft is only provided for PAⅡ / PAⅡR series.
S2 = Output Shaft with Key. This is the standard shaft for PⅡ / PⅡR gearbox.
(3) Only provided for PSⅡ/PSⅡR and PAⅡ/PAⅡR series.
(4) Only provided for PGⅡ and PGⅡR series.
(5) Only provided for PL and PLR series.

▶ Performance - PEII/PEIIR Gearbox

Model No.		Stages	Ratio(1)	Type	PEII 050	PEII 070	PEII 090	PEII 120	PEII 155
					PEIIR 050	PEIIR 070	PEIIR 090	PEIIR 120	PEIIR 155
Nominal Output Torque T_{2N}	Nm	1	3	All	16	42	110	217	430
			4		16	42	113	223	440
			5		15	40	118	220	435
			7		12	35	96	198	366
			10		10	27	68	155	295
		2	15		15	40	109	213	424
			16		16	42	116	228	452
			20		16	42	116	230	454
			25		15	40	123	228	450
			30		15	40	108	212	422
			35		12	35	100	206	382
			40		16	43	117	232	459
			50		15	40	123	228	450
			70		12	35	100	206	382
			100		10	27	70	162	308
Emergency Stop Torque T_{2NOT}	Nm	1,2	3~100	All	3 times T_{2N}				
Max. Acceleration Torque T_{2B}	Nm	1,2	3~100	All	T_{2B} = 60% of T_{2NOT}				
No Load Running Torque(4)	Nm	1	3~10	PEII	0.05	0.10	0.40	0.80	2.50
				PEIIR	0.10	0.15	0.45	0.85	2.55
		2	15~100	PEII	0.05	0.10	0.30	0.40	0.80
				PEIIR	0.10	0.15	0.35	0.45	0.85
Backlash(2)	arcmin	1	3~10	PEII	≦ 8	≦ 7	≦ 6	≦ 6	≦ 6
				PEIIR	≦ 12	≦ 11	≦ 10	≦ 10	≦ 10
		2	15~100	PEII	≦ 10	≦ 9	≦ 8	≦ 8	≦ 8
				PEIIR	≦ 14	≦ 13	≦ 12	≦ 12	≦ 12
Torsional Rigidity	Nm/arcmin	1,2	3~100	All	0.9	2.2	8	12	16
Nominal Input Speed n_{1N}	rpm	1,2	3~100	All	4,500	4,000	3,600	3,600	2,500
Max. Input Speed n_{1B}	rpm	1,2	3~100	All	8,000	6,000	6,000	4,800	3,600
Max. Radial Load F_{2rB}(3)	N	1,2	3~100	All	810	1,150	1,530	3,260	4,550
Max. Axial Load F_{2aB}(3)	N	1,2	3~100	All	405	575	765	1,630	2,275
Operating Temp	° C	1,2	3~100	All	0° C~ +90° C				
Degree of Gearbox Protection		1,2	3~100	All	IP65				
Lubrication		1,2	3~100	All	Synthetic lubrication grease				
Mounting Position		1,2	3~100	All	All directions				
Running Noise(4)	dB(A)	1,2	3~100	PEII	≦ 60	≦ 62	≦ 64	≦ 66	≦ 68
				PEIIR	≦ 70	≦ 72	≦ 74	≦ 75	≦ 77
Max. bending moment based on the gearbox input flange Mb(5)	Nm	1,2	3~100	PEII	5	12	22	45	54
				PEIIR	3	6	10	17	19
Efficiency η	%	1	3~10	PEII	≧ 97%				
				PEIIR	≧ 93%				
		2	15~100	PEII	≧ 94%				
				PEIIR	≧ 90%				

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(3) Applied to the output shaft center at 100 rpm.

(4) The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(5) Max. motor weight* (kg) = $\frac{0.1 \times Mb}{\text{motor length (m)}}$

*with symmetrically distributed motor weight
*with horizontal and stationary mounting

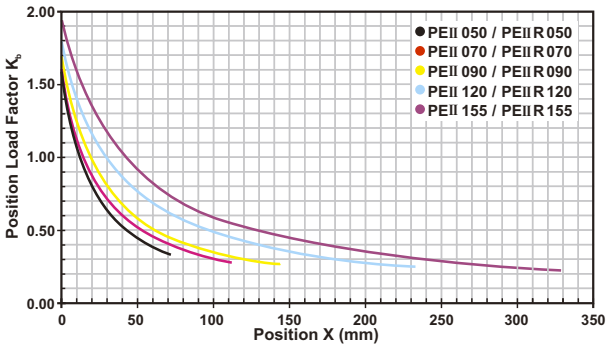
▶ Inertia - PEII Gearbox

Model No.		PEII 050		PEII 070		PEII 090		PEII 120		PEII 155	
Ø[A] (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.10	0.10	0.12	0.10	-	-	-	-	-	-
11		0.16	0.16	0.19	0.16	-	-	-	-	-	-
14		-	-	0.22	0.20	0.36	0.24	-	-	-	-
19		-	-	1.53	1.51	1.70	1.58	2.20	1.73	-	2.18
24		-	-	-	-	2.24	2.12	2.74	2.27	4.52	2.73
28		-	-	-	-	2.68	2.55	3.17	2.70	4.94	3.15
32		-	-	-	-	-	-	7.77	7.30	9.70	7.91
35		-	-	-	-	-	-	10.80	10.30	12.80	11.00
38		-	-	-	-	-	-	14.00	13.50	16.00	14.20
42		-	-	-	-	-	-	-	-	24.50	-

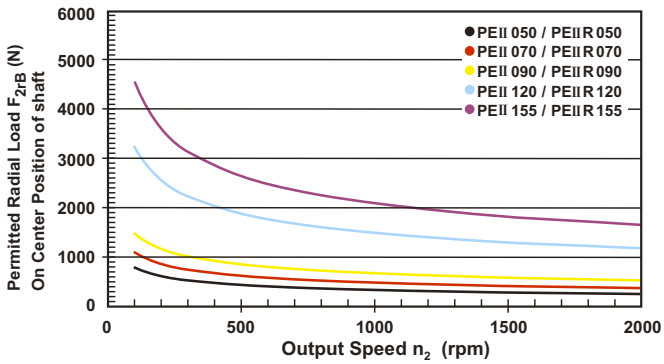
▶ Inertia - PEIIR Gearbox

Model No.		PEIIR 050		PEIIR 070		PEIIR 090		PEIIR 120		PEIIR 155	
Ø[A] (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.18	0.18	0.36	0.36	-	-	-	-	-	-
11		0.20	0.20	0.39	0.39	-	-	-	-	-	-
14		-	-	0.43	0.43	1.87	1.87	-	-	-	-
19		-	-	1.24	1.24	2.67	2.67	6.80	6.80	-	13.57
24		-	-	-	-	2.97	2.97	7.10	7.10	13.87	13.87
28		-	-	-	-	3.47	3.47	7.59	7.59	14.36	14.36
32		-	-	-	-	-	-	10.56	10.56	17.33	17.33
35		-	-	-	-	-	-	11.97	11.97	18.74	18.74
38		-	-	-	-	-	-	13.95	13.95	20.79	20.79
42		-	-	-	-	-	-	-	-	26.54	-

▶ Permitted Radial And Axial Loads[B]



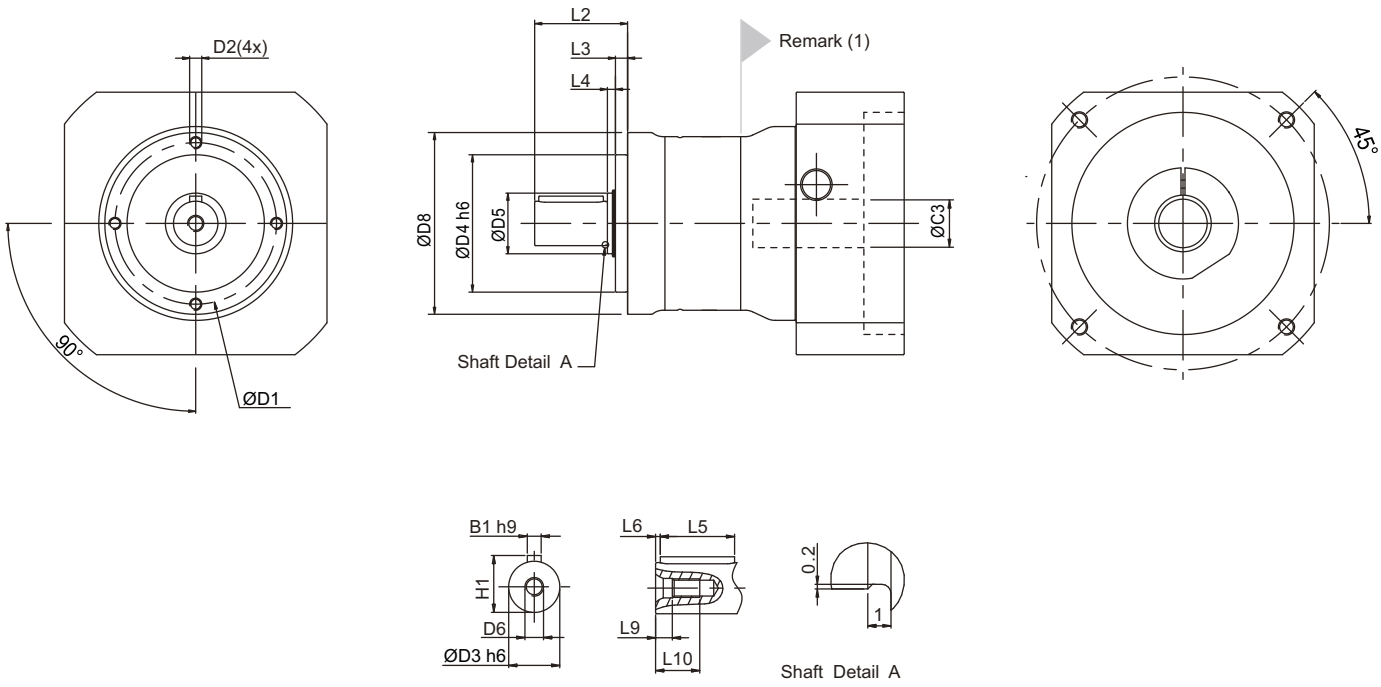
If radial force F_{2r} is not exerted on the center of the output shaft X<1/2 L or X>1/2 L, the permitted radial and axial loads can be calculated by the position load factor K_b on the above diagram.



Permitted radial load F_{2r} on center of output shaft X=1/2 L for various output speeds.

(A) Ø = Input shaft diameter.
(B) Permitted loading values on the output shaft. Please refer to P. 33 glossary.

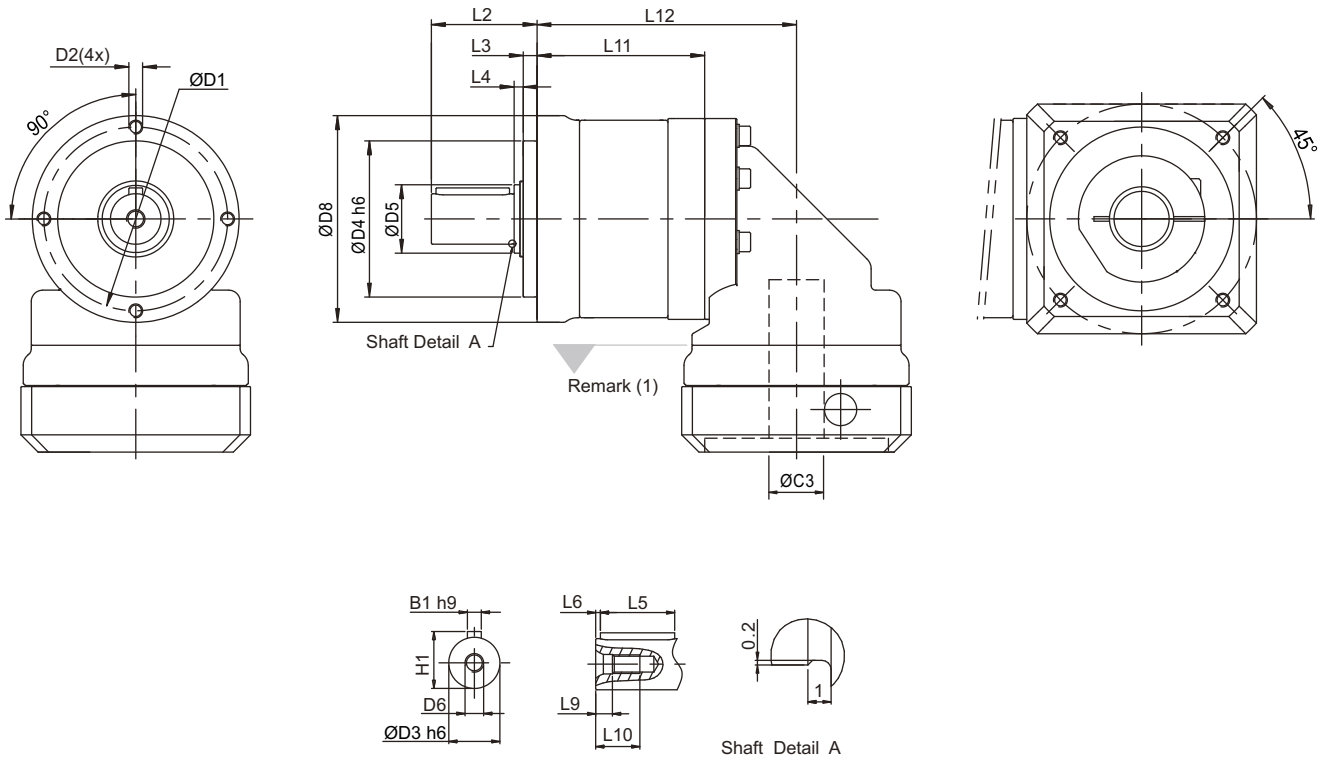
PEII Series Dimensions



Dimension		PEII 050		PEII 070		PEII 090		PEII 120		PEII 155	
		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1		44		62		80		108		140	
D2		M4X9		M5X10		M6X12		M8X15		M10X18	
D3	h6	12		16		22		32		40	
D4	h6	35		52		68		90		120	
D5		17		22		30		40		55	
D6		M4X0.7P		M5X0.8P		M8X1.25P		M12X1.75P		M16X2P	
D8		50		70		90		120		155	
L2		24.5		36		46		70		97	
L3		4		4.5		6		7		9.5	
L4		2.5		3.5		4		5		5.5	
L5		14		25		32		50		70	
L6		2		2		2		4		6	
L9		4.5		4.8		7.2		10		12	
L10		10		12.5		19		28		36	
B1	h9	4		5		6		10		12	
H1		13.5		18		24.5		35		43	

(1) Dimensions are related to motor interface. Please contact APEX for details.

PEIIR Series Dimensions



Dimension		PEIIR 050		PEIIR 070		PEIIR 090		PEIIR 120		PEIIR 155	
		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1		44		62		80		108		140	
D2		M4X9		M5X10		M6X12		M8X15		M10X18	
D3	h6	12		16		22		32		40	
D4	h6	35		52		68		90		120	
D5		17		22		30		40		55	
D6		M4X0.7P		M5X0.8P		M8X1.25P		M12X1.75P		M16X2P	
D8		50		70		90		120		155	
L2		24.5		36		46		70		97	
L3		4		4.5		6		7		9.5	
L4		2.5		3.5		4		5		5.5	
L5		14		25		32		50		70	
L6		2		2		2		4		6	
L9		4.5		4.8		7.2		10		12	
L10		10		12.5		19		28		36	
L11		49.5	64.5	60	80	73	99.5	101	137	121	168.5
L12		74.5	89.5	89.5	109.5	113	139.5	152	188	178	225.5
B1	h9	4		5		6		10		12	
H1		13.5		18		24.5		35		43	

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Performance - PGII / PGIIR Gearbox

Model No.		Stages[6]	Ratio[1]	Type	PGII 040	PGII 060	PGII 080	PGII 120	PGII 160
					PGIIR 040	PGIIR 060	PGIIR 080	PGIIR 120	PGIIR 160
Nominal Output Torque T_{2N}	Nm	1	3	All	16	42	110	217	430
			4		16	42	113	223	440
			5		15	40	118	220	435
			7		12	35	96	198	366
			10		10	27	68	155	295
		2	15		15	40	109	213	424
			16		16	42	116	228	452
			20		16	42	116	230	454
			25		15	40	123	228	450
			30		15	40	108	212	422
			35		12	35	100	206	382
			40		16	43	117	232	459
			50		15	40	123	228	450
			70		12	35	100	206	382
			100		10	27	70	162	308
		3	120		19	50	137	-	-
			160		16	43	118	-	-
			200		16	43	118	-	-
			280		12	35	99	-	-
			350		12	35	99	-	-
			500		15	40	122	-	-
			700		12	35	99	-	-
			1000		10	27	70	-	-
Emergency Stop Torque T_{2NOT}	Nm	1,2,3	3~1000	All	3 times T_{2N}				
Max. Acceleration Torque T_{2B}	Nm	1,2,3	3~1000	All	T_{2B} = 60% of T_{2NOT}				
No Load Running Torque[4]	Nm	1	3~10	PGII	0.05	0.10	0.40	0.80	2.50
				PGIIR	0.10	0.15	0.45	0.85	2.55
		2	15~100	PGII	0.05	0.10	0.30	0.40	0.80
				PGIIR	0.10	0.15	0.35	0.45	0.85
		3	120~1000	PGII	0.05	0.10	0.40	-	-
				PGIIR	0.10	0.15	0.45	-	-
Backlash[2]	arcmin	1	3~10	PGII	≦ 8	≦ 7	≦ 6	≦ 6	≦ 6
				PGIIR	≦ 12	≦ 11	≦ 10	≦ 10	≦ 10
		2	15~100	PGII	≦ 10	≦ 9	≦ 8	≦ 8	≦ 8
				PGIIR	≦ 14	≦ 13	≦ 12	≦ 12	≦ 12
		3	120~1000	PGII	≦ 12	≦ 11	≦ 10	-	-
				PGIIR	≦ 16	≦ 15	≦ 14	-	-
Torsional Rigidity	Nm/arcmin	1,2,3	3~1000	All	0.5	2	8	12	16
Nominal Input Speed n_{1N}	rpm	1,2,3	3~1000	All	4,500	4,000	3,600	3,600	2,500
Max. Input Speed n_{1B}	rpm	1,2,3	3~1000	All	8,000	6,000	6,000	4,800	3,600
Max. Radial Load F_{2rB}[3]	N	1,2,3	3~1000	All	520	1,030	1,570	3,590	4,690
Max. Axial Load F_{2aB}[3]	N	1,2,3	3~1000	All	260	515	785	1,795	2,345
Operating Temp	° C	1,2,3	3~1000	All	0° C~ +90° C				
Degree of Gearbox Protection		1,2,3	3~1000	All	IP65				
Lubrication		1,2,3	3~1000	All	Synthetic lubrication grease				
Mounting Position		1,2,3	3~1000	All	All directions				
Running Noise[4]	dB(A)	1,2,3	3~1000	PGII	≦ 60	≦ 62	≦ 64	≦ 66	≦ 68
				PGIIR	≦ 70	≦72	≦ 74	≦ 75	≦ 77
Max. bending moment based on the gearbox input flange Mb[5]	Nm	1,2,3	3~1000	PGII	5	12	22	45	54
				PGIIR	3	6	10	17	19
Efficiency η	%	1	3~10	PGII	≧ 97%				
				PGIIR	≧ 93%				
		2	15~100	PGII	≧ 94%				
				PGIIR	≧ 90%				
		3	120~1000	PGII	≧ 91%				
				PGIIR	≧ 87%				

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(3) Applied to the output shaft center at 100 rpm.

(4) The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), or ratio 1,000 (3-stage) no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(5) Max. motor weight* (kg) = $\frac{0.1 \times Mb}{\text{motor length (m)}}$

*with symmetrically distributed motor weight
*with horizontal and stationary mounting

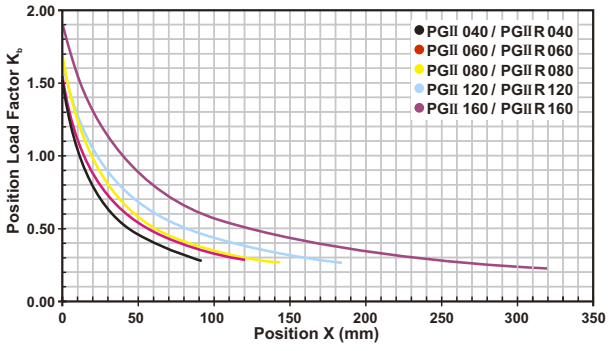
▶ Inertia - PGII Gearbox

Model No.		PGII 040			PGII 060			PGII 080			PGII 120		PGII 160	
Ø(A) (C3)		1-st.	2-st.	3-st.	1-st.	2-st.	3-st.	1-st.	2-st.	3-st.	1-st.	2-st.	1-st.	2-st.
8	kg.cm²	0.10	0.10	0.10	0.12	0.10	0.10	-	-	-	-	-	-	-
11		0.16	0.16	0.16	0.19	0.16	0.16	-	-	-	-	-	-	-
14		-	-	-	0.22	0.20	0.20	0.36	0.24	0.20	-	-	-	-
19		-	-	-	1.53	1.51	1.51	1.70	1.58	1.54	2.20	1.73	-	2.18
24		-	-	-	-	-	-	2.24	2.12	2.09	2.74	2.27	4.52	2.73
28		-	-	-	-	-	-	2.68	2.55	2.52	3.17	2.70	4.94	3.15
32		-	-	-	-	-	-	-	-	-	7.77	7.30	9.70	7.91
35		-	-	-	-	-	-	-	-	-	10.80	10.30	12.80	11.00
38		-	-	-	-	-	-	-	-	-	14.00	13.50	16.00	14.20
42		-	-	-	-	-	-	-	-	-	-	-	24.50	-

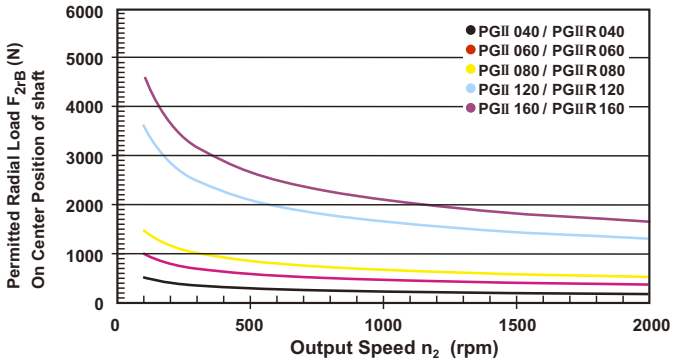
▶ Inertia - PGIIR Gearbox

Model No.		PGII R 040			PGII R 060			PGII R 080			PGII R 120		PGII R 160	
Ø(A) (C3)		1-st.	2-st.	3-st.	1-st.	2-st.	3-st.	1-st.	2-st.	3-st.	1-st.	2-st.	1-st.	2-st.
8	kg.cm²	0.18	0.18	0.18	0.36	0.36	0.36	-	-	-	-	-	-	-
11		0.20	0.20	0.20	0.39	0.39	0.39	-	-	-	-	-	-	-
14		-	-	-	0.43	0.43	0.43	1.87	1.87	1.87	-	-	-	-
19		-	-	-	1.24	1.24	1.24	2.67	2.67	2.67	6.80	6.80	-	13.57
24		-	-	-	-	-	-	2.97	2.97	2.97	7.10	7.10	13.87	13.87
28		-	-	-	-	-	-	3.47	3.47	3.47	7.59	7.59	14.36	14.36
32		-	-	-	-	-	-	-	-	-	10.56	10.56	17.33	17.33
35		-	-	-	-	-	-	-	-	-	11.97	11.97	18.74	18.74
38		-	-	-	-	-	-	-	-	-	13.95	13.95	20.79	20.79
42		-	-	-	-	-	-	-	-	-	-	-	26.54	-

▶ Permitted Radial And Axial Loads(B)



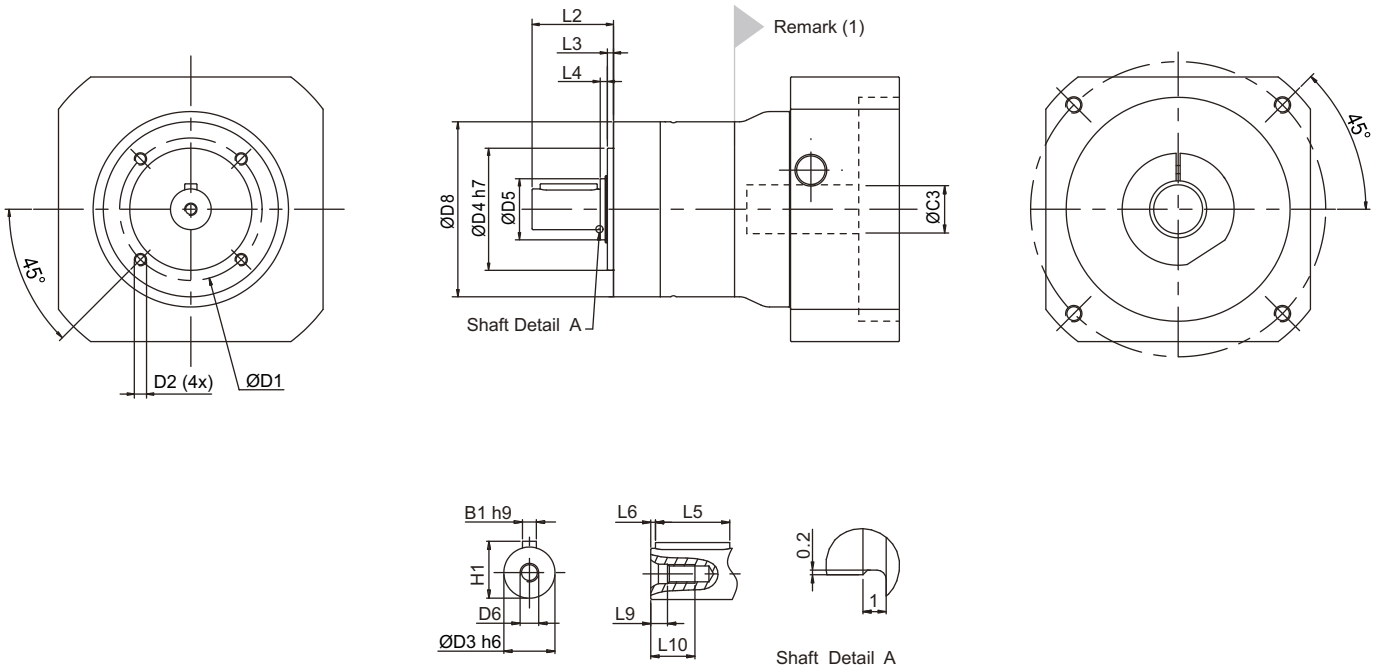
If radial force F_{2r} is not exerted on the center of the output shaft X<1/2 L or X>1/2 L, the permitted radial and axial loads can be calculated by the position load factor K_b on the above diagram.



Permitted radial load F_{2r} on center of output shaft X=1/2 L for various output speeds.

(A) Ø = Input shaft diameter.
(B) Permitted loading values on the output shaft. Please refer to P. 33 glossary.

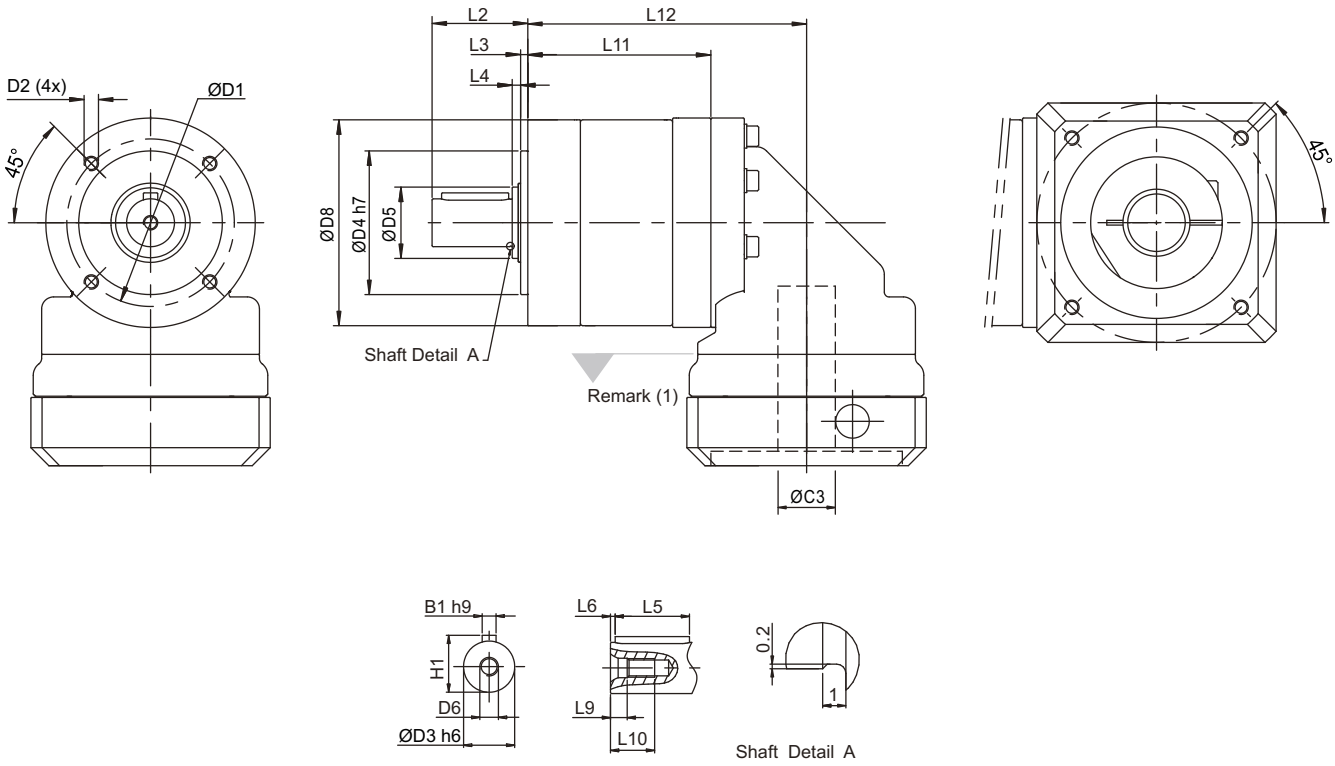
PGII Series Dimensions



Dimension		PGII 040			PGII 060			PGII 080			PGII 120			PGII 160		
		1-st.	2-st.	3-st.	1-st.	2-st.	3-st.	1-st.	2-st.	3-st.	1-st.	2-st.	-	1-st.	2-st.	-
D1		34			52			70			100			145		
D2		M4X9			M5X10			M6X12			M10X18			M12X22		
D3	h6	10			14			20			25			40		
D4	h7	26			40			60			80			130		
D5		17			17			30			40			55		
D6		M3X0.5P			M5X0.8P			M6X1P			M10X1.5P			M16X2P		
D8		44			60			86			114			160		
L2		26			35			40			55			87		
L3		2			3			3			4			5		
L4		1			2			3.5			5			5.5		
L5		18			25			28			40			65		
L6		2.5			2.5			4			5			8		
L9		2.6			4.8			5			7.5			12		
L10		9			12.5			16.5			22			36		
B1	h9	3			5			6			8			12		
H1		11.2			16			22.5			28			43		

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ PGIIR Series Dimensions



Dimension		PGII R 040			PGII R 060			PGII R 080			PGII R 120			PGII R 160		
		1-st.	2-st.	3-st.	1-st.	2-st.	3-st.	1-st.	2-st.	3-st.	1-st.	2-st.	-	1-st.	2-st.	-
D1		34			52			70			100			145		
D2		M4X9			M5X10			M6X12			M10X18			M12X22		
D3	h6	10			14			20			25			40		
D4	h7	26			40			60			80			130		
D5		17			17			30			40			55		
D6		M3X0.5P			M5X0.8P			M6X1P			M10X1.5P			M16X2P		
D8		44			60			86			114			160		
L2		26			35			40			55			87		
L3		2			3			3			4			5		
L4		1			2			3.5			5			5.5		
L5		18			25			28			40			65		
L6		2.5			2.5			4			5			8		
L9		2.6			4.8			5			7.5			12		
L10		9			12.5			16.5			22			36		
L11		53	68	82	66.5	86.5	105.5	76.5	103	128.5	104	140	-	125.5	173	-
L12		78	93	107	96	116	135	116.5	143	168.5	155	191	-	182.5	230	-
B1	h9	3			5			6			8			12		
H1		11.2			16			22.5			28			43		

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Performance - PAII / PAIIR Gearbox

Model No.		Stages	Ratio(1)	Type	PAII 042 / PAIIR 042	PAII 060 / PAIIR 060	PAII 090 / PAIIR 090	PAII 115 / PAIIR 115	PAII 142 / PAIIR 142
Nominal Output Torque T_{2N}	Nm	1	3	All	16	42	110	217	430
			4		16	42	113	223	440
			5		15	40	118	220	435
			7		12	35	96	198	366
			9		8	24	60	125	273
			10		10	27	68	155	295
		2	15		15	40	109	213	424
			16		16	42	116	228	452
			20		16	42	116	230	454
			25		15	40	123	228	450
			30		15	40	108	212	422
			35		12	35	100	206	382
			40		16	43	117	232	459
			50		15	40	123	228	450
			70		12	35	100	206	382
			81		8	24	59	131	285
			100		10	27	70	162	308
Emergency Stop Torque T_{2NOT}	Nm	1,2	3~100	All	3 times T_{2N}				
Max. Acceleration Torque T_{2B}	Nm	1,2	3~100	All	T_{2B} = 60% of T_{2NOT}				
No Load Running Torque(4)	Nm	1	3~10	PAII	0.05	0.10	0.40	0.80	2.50
				PAIIR	0.10	0.15	0.45	0.85	2.55
		2	15~100	PAII	0.05	0.10	0.30	0.40	0.80
				PAIIR	0.10	0.15	0.35	0.45	0.85
Backlash(2)	arcmin	1	3~10	PAII	≦ 8	≦ 7	≦ 6	≦ 6	≦ 6
				PAIIR	≦ 12	≦ 11	≦ 10	≦ 10	≦ 10
		2	15~100	PAII	≦ 10	≦ 9	≦ 8	≦ 8	≦ 8
				PAIIR	≦ 14	≦ 13	≦ 12	≦ 12	≦ 12
Torsional Rigidity	Nm/arcmin	1,2	3~100	All	0.9	2.2	8	12	16
Nominal Input Speed n_{1N}	rpm	1,2	3~100	All	4,500	4,000	3,600	3,600	2,500
Max. Input Speed n_{1B}	rpm	1,2	3~100	All	8,000	6,000	6,000	4,800	3,600
Max. Radial Load F_{2rB}(3)	N	1,2	3~100	All	810	1,150	1,530	3,470	4,640
Max. Axial Load F_{2aB}(3)	N	1,2	3~100	All	405	575	765	1,735	2,320
Operating Temp	° C	1,2	3~100	All	0° C~ +90° C				
Degree of Gearbox Protection		1,2	3~100	All	IP65				
Lubrication		1,2	3~100	All	Synthetic lubrication grease				
Mounting Position		1,2	3~100	All	All directions				
Running Noise(4)	dB(A)	1,2	3~100	PAII	≦ 60	≦ 62	≦ 64	≦ 66	≦ 68
				PAIIR	≦ 70	≦ 72	≦ 74	≦ 75	≦ 77
Max. bending moment based on the gearbox input flange Mb(5)	Nm	1,2	3~100	PAII	5	12	22	45	54
				PAIIR	3	6	10	17	19
Efficiency η	%	1	3~10	PAII	≧ 97%				
				PAIIR	≧ 93%				
		2	15~100	PAII	≧ 94%				
				PAIIR	≧ 90%				

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(3) Applied to the output shaft center at 100 rpm.

(4) The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(5) Max. motor weight* (kg) = $\frac{0.1 \times Mb}{\text{motor length (m)}}$

*with symmetrically distributed motor weight
*with horizontal and stationary mounting

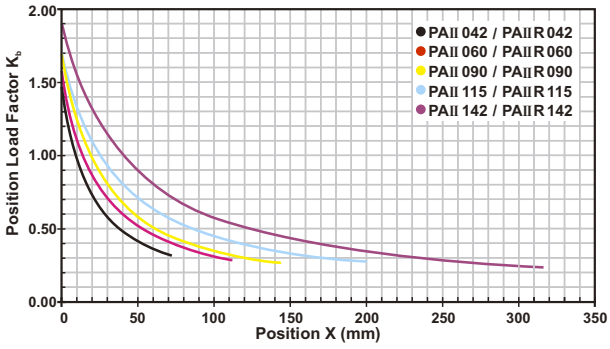
▶ Inertia - PAII Gearbox

Model No.		PAII 042		PAII 060		PAII 090		PAII 115		PAII 142	
Ø[A] (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.10	0.10	0.12	0.10	-	-	-	-	-	-
11		0.16	0.16	0.19	0.16	-	-	-	-	-	-
14		-	-	0.22	0.20	0.36	0.24	-	-	-	-
19		-	-	1.53	1.51	1.70	1.58	2.20	1.73	-	2.18
24		-	-	-	-	2.24	2.12	2.74	2.27	4.52	2.73
28		-	-	-	-	2.68	2.55	3.17	2.70	4.94	3.15
32		-	-	-	-	-	-	7.77	7.30	9.70	7.91
35		-	-	-	-	-	-	10.80	10.30	12.80	11.00
38		-	-	-	-	-	-	14.00	13.50	16.00	14.20
42		-	-	-	-	-	-	-	-	24.50	-

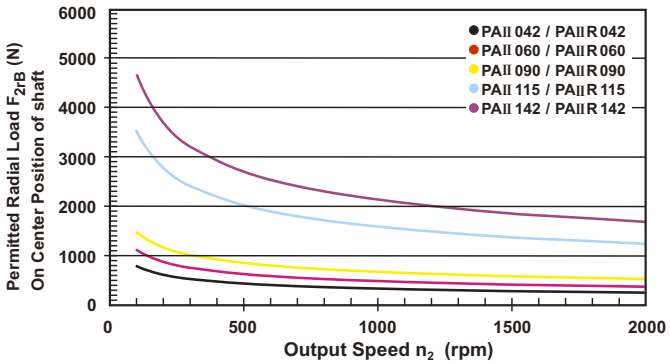
▶ Inertia - PAIIR Gearbox

Model No.		PAIIR 042		PAIIR 060		PAIIR 090		PAIIR 115		PAIIR 142	
Ø[A] (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.18	0.18	0.36	0.36	-	-	-	-	-	-
11		0.20	0.20	0.39	0.39	-	-	-	-	-	-
14		-	-	0.43	0.43	1.87	1.87	-	-	-	-
19		-	-	1.24	1.24	2.67	2.67	6.80	6.80	-	13.57
24		-	-	-	-	2.97	2.97	7.10	7.10	13.87	13.87
28		-	-	-	-	3.47	3.47	7.59	7.59	14.36	14.36
32		-	-	-	-	-	-	10.56	10.56	17.33	17.33
35		-	-	-	-	-	-	11.97	11.97	18.74	18.74
38		-	-	-	-	-	-	13.95	13.95	20.79	20.79
42		-	-	-	-	-	-	-	-	26.54	-

▶ Permitted Radial And Axial Loads(B)



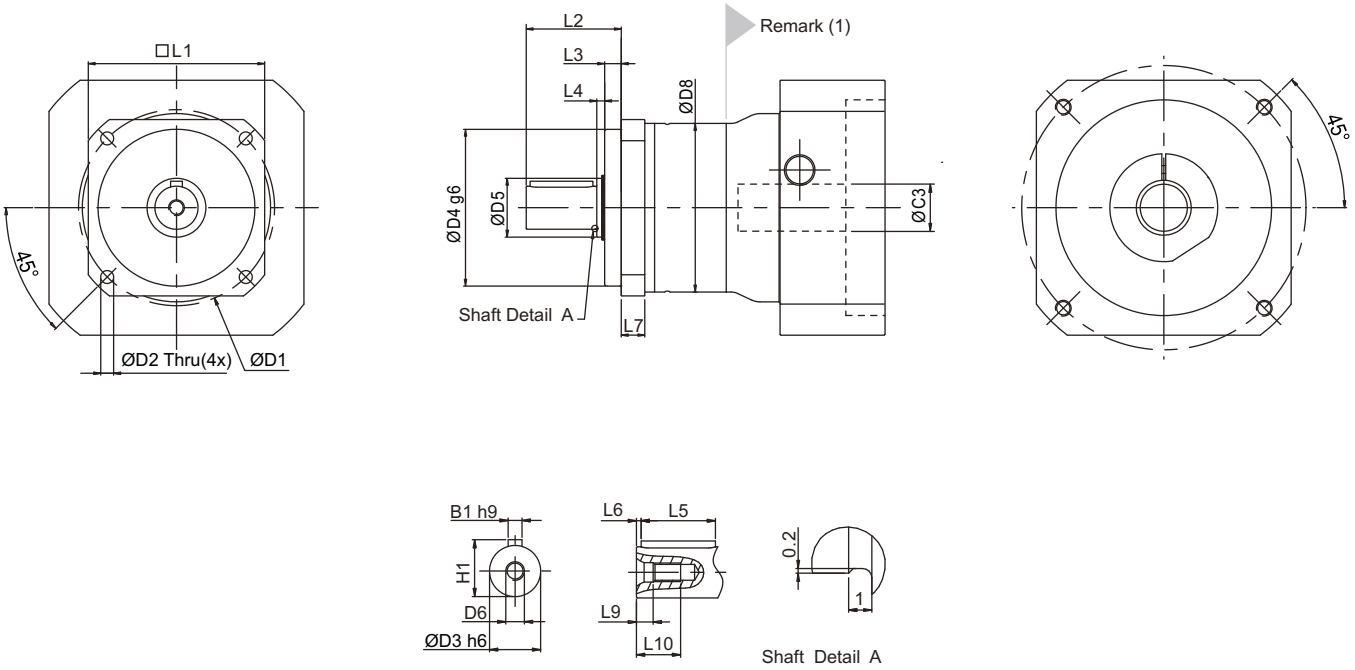
If radial force F_{2r} is not exerted on the center of the output shaft X<1/2 L or X>1/2 L, the permitted radial and axial loads can be calculated by the position load factor K_b on the above diagram.



Permitted radial load F_{2r} on center of output shaft X=1/2 L for various output speeds.

(A) Ø = Input shaft diameter.
(B) Permitted loading values on the output shaft. Please refer to P. 33 glossary.

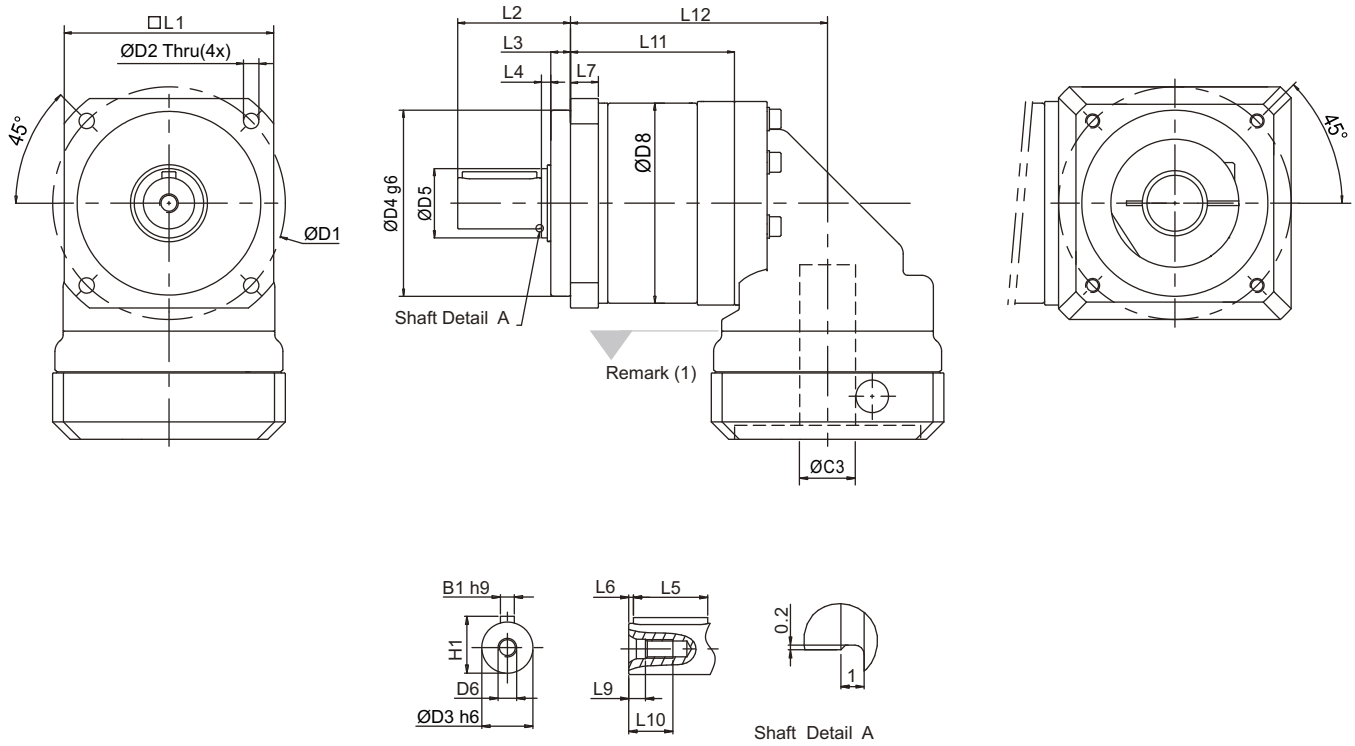
▶ PAII Series Dimensions



Dimension		PAII 042		PAII 060		PAII 090		PAII 115		PAII 142	
		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1		50		70		100		130		165	
D2		3.4		5.5		6.6		9		11	
D3	h6	13		16		22		32		40	
D4	g6	35		50		80		110		130	
D5		17		22		30		40		55	
D6		M4X0.7P		M5X0.8P		M8X1.25P		M12X1.75P		M16X2P	
D8		44		60		86		114		140	
L1		42		60		90		115		142	
L2		26		37		48.5		65		97	
L3		5.5		5.5		8.5		10		12.5	
L4		2.5		3.5		4		5		5.5	
L5		14		25		32		40		63	
L6		2		2		2		5		5	
L7		6.5		10		12		16		20	
L9		4.5		4.8		7.2		10		12	
L10		10		12.5		19		28		36	
B1	h9	5		5		6		10		12	
H1		15		18		24.5		35		43	

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ PAIIR Series Dimensions



Dimension		PAIIR 042		PAIIR 060		PAIIR 090		PAIIR 115		PAIIR 142	
		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1		50		70		100		130		165	
D2		3.4		5.5		6.6		9		11	
D3	h6	13		16		22		32		40	
D4	g6	35		50		80		110		130	
D5		17		22		30		40		55	
D6		M4X0.7P		M5X0.8P		M8X1.25P		M12X1.75P		M16X2P	
D8		44		60		86		114		140	
L1		42		60		90		115		142	
L2		26		37		48.5		65		97	
L3		5.5		5.5		8.5		10		12.5	
L4		2.5		3.5		4		5		5.5	
L5		14		25		32		40		63	
L6		2		2		2		5		5	
L7		6.5		10		12		16		20	
L9		4.5		4.8		7.2		10		12	
L10		10		12.5		19		28		36	
L11		48	63	59	79	70.5	97	98	134	118	165.5
L12		73	88	88.5	108.5	110.5	137	149	185	175	222.5
B1	h9	5		5		6		10		12	
H1		15		18		24.5		35		43	

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Performance - PSII / PSIIR Gearbox

Model No.		Stages	Ratio[1]	Type	PSII A / PSIIR A	PSII B / PSIIR B	PSII C / PSIIR C	PSII D / PSIIR D	PSII E / PSIIR E
Nominal Output Torque T_{2N}	Nm	1	3	All	16	42	110	217	430
			4		16	42	113	223	440
			5		15	40	118	220	435
			7		12	35	96	198	366
			9		8	24	60	125	273
			10		10	27	68	155	295
		2	15		15	40	109	213	424
			16		16	42	116	228	452
			20		16	42	116	230	454
			25		15	40	123	228	450
			30		15	40	108	212	422
			35		12	35	100	206	382
			40		16	43	117	232	459
			50		15	40	123	228	450
			70		12	35	100	206	382
			81		8	24	59	131	285
			100		10	27	70	162	308
Emergency Stop Torque T_{2NOT}	Nm	1,2	3~100	All	3 times T_{2N}				
Max. Acceleration Torque T_{2B}	Nm	1,2	3~100	All	T_{2B} = 60% of T_{2NOT}				
No Load Running Torque[4]	Nm	1	3~10	PSII	0.05	0.10	0.40	0.80	2.50
				PSIIR	0.10	0.15	0.45	0.85	2.55
		2	15~100	PSII	0.05	0.10	0.30	0.40	0.80
				PSIIR	0.10	0.15	0.35	0.45	0.85
Backlash[2]	arcmin	1	3~10	PSII	≦ 8	≦ 7	≦ 6	≦ 6	≦ 6
				PSIIR	≦ 12	≦ 11	≦ 10	≦ 10	≦ 10
		2	15~100	PSII	≦ 10	≦ 9	≦ 8	≦ 8	≦ 8
				PSIIR	≦ 14	≦ 13	≦ 12	≦ 12	≦ 12
Torsional Rigidity	Nm/arcmin	1,2	3~100	All	0.6	1.5	6	10.5	18
Nominal Input Speed n_{1N}	rpm	1,2	3~100	All	4,500	4,000	3,600	3,600	2,500
Max. Input Speed n_{1B}	rpm	1,2	3~100	All	8,000	6,000	6,000	4,800	3,600
Max. Radial Load F_{2rB}[3]	N	1,2	3~100	All	840	1,290	1,510	3,780	5,420
Max. Axial Load F_{2aB}[3]	N	1,2	3~100	All	420	645	755	1,890	2,710
Operating Temp	° C	1,2	3~100	All	0° C~ +90° C				
Degree of Gearbox Protection		1,2	3~100	All	IP65				
Lubrication		1,2	3~100	All	Synthetic lubrication grease				
Mounting Position		1,2	3~100	All	All directions				
Running Noise[4]	dB(A)	1,2	3~100	PSII	≦ 60	≦ 62	≦ 64	≦ 66	≦ 68
				PSIIR	≦ 70	≦ 72	≦ 74	≦ 75	≦ 77
Max. bending moment based on the gearbox input flange Mb[5]	Nm	1,2	3~100	PSII	5	12	22	45	54
				PSIIR	3	6	10	17	19
Efficiency η	%	1	3~10	PSII	≧ 97%				
				PSIIR	≧ 93%				
		2	15~100	PSII	≧ 94%				
				PSIIR	≧ 90%				

(1) Ratio (i= N_{in} / N_{out}) .
(2) Backlash is measured at 2% of Nominal Output Torque T_{2N}.
(3) Applied to the output shaft center at 100 rpm.
(4) The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(5) Max. motor weight* (kg) = $\frac{0.1 \times Mb}{\text{motor length (m)}}$

*with symmetrically distributed motor weight
*with horizontal and stationary mounting

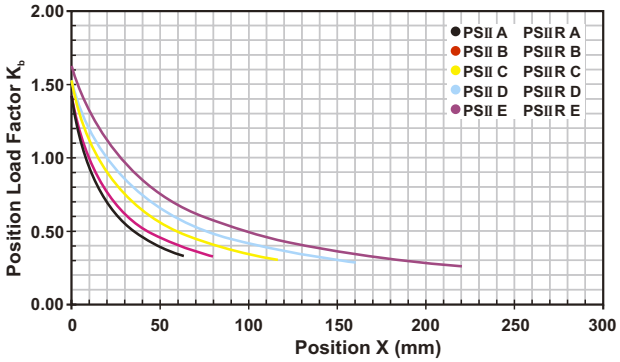
▶ Inertia - PSII Gearbox

Model No.		PSII A		PSII B		PSII C		PSII D		PSII E	
Ø(A) (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.10	0.10	0.12	0.10	-	-	-	-	-	-
11		0.16	0.16	0.19	0.16	-	-	-	-	-	-
14		-	-	0.22	0.20	0.36	0.24	-	-	-	-
19		-	-	1.53	1.51	1.70	1.58	2.20	1.73	-	2.18
24		-	-	-	-	2.24	2.12	2.74	2.27	4.52	2.73
28		-	-	-	-	2.68	2.55	3.17	2.70	4.94	3.15
32		-	-	-	-	-	-	7.77	7.30	9.70	7.91
35		-	-	-	-	-	-	10.80	10.30	12.80	11.00
38		-	-	-	-	-	-	14.00	13.50	16.00	14.20
42		-	-	-	-	-	-	-	-	24.50	-

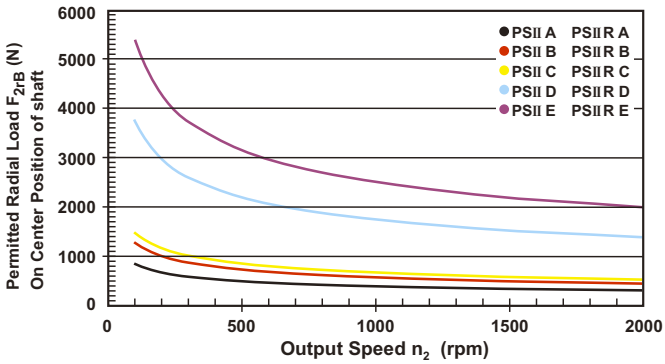
▶ Inertia - PSIIR Gearbox

Model No.		PSIIR A		PSIIR B		PSIIR C		PSIIR D		PSIIR E	
Ø(A) (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.18	0.18	0.36	0.36	-	-	-	-	-	-
11		0.20	0.20	0.39	0.39	-	-	-	-	-	-
14		-	-	0.43	0.43	1.87	1.87	-	-	-	-
19		-	-	1.24	1.24	2.67	2.67	6.80	6.80	-	13.57
24		-	-	-	-	2.97	2.97	7.10	7.10	13.87	13.87
28		-	-	-	-	3.47	3.47	7.59	7.59	14.36	14.36
32		-	-	-	-	-	-	10.56	10.56	17.33	17.33
35		-	-	-	-	-	-	11.97	11.97	18.74	18.74
38		-	-	-	-	-	-	13.95	13.95	20.79	20.79
42		-	-	-	-	-	-	-	-	26.54	-

▶ Permitted Radial And Axial Loads(B)



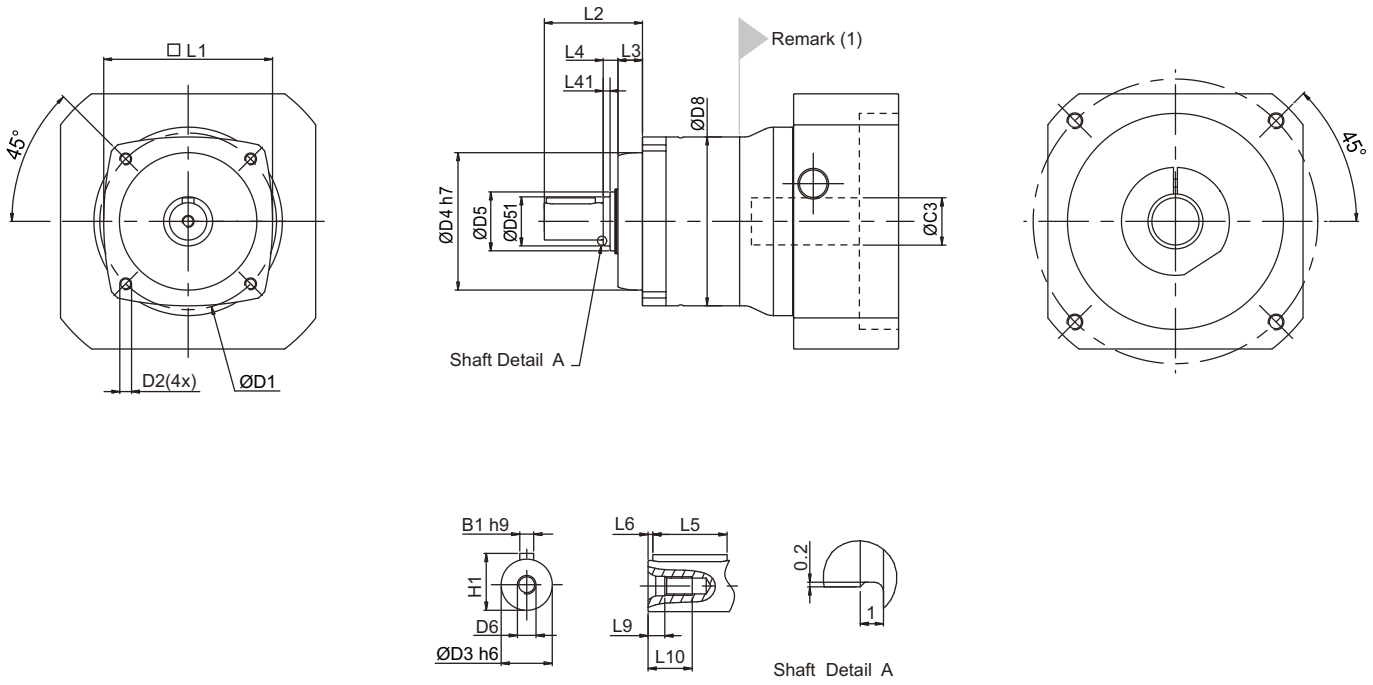
If radial force F_{2r} is not exerted on the center of the output shaft X<1/2 L or X>1/2 L, the permitted radial and axial loads can be calculated by the position load factor K_b on the above diagram.



Permitted radial load F_{2r} on center of output shaft X=1/2 L for various output speeds.

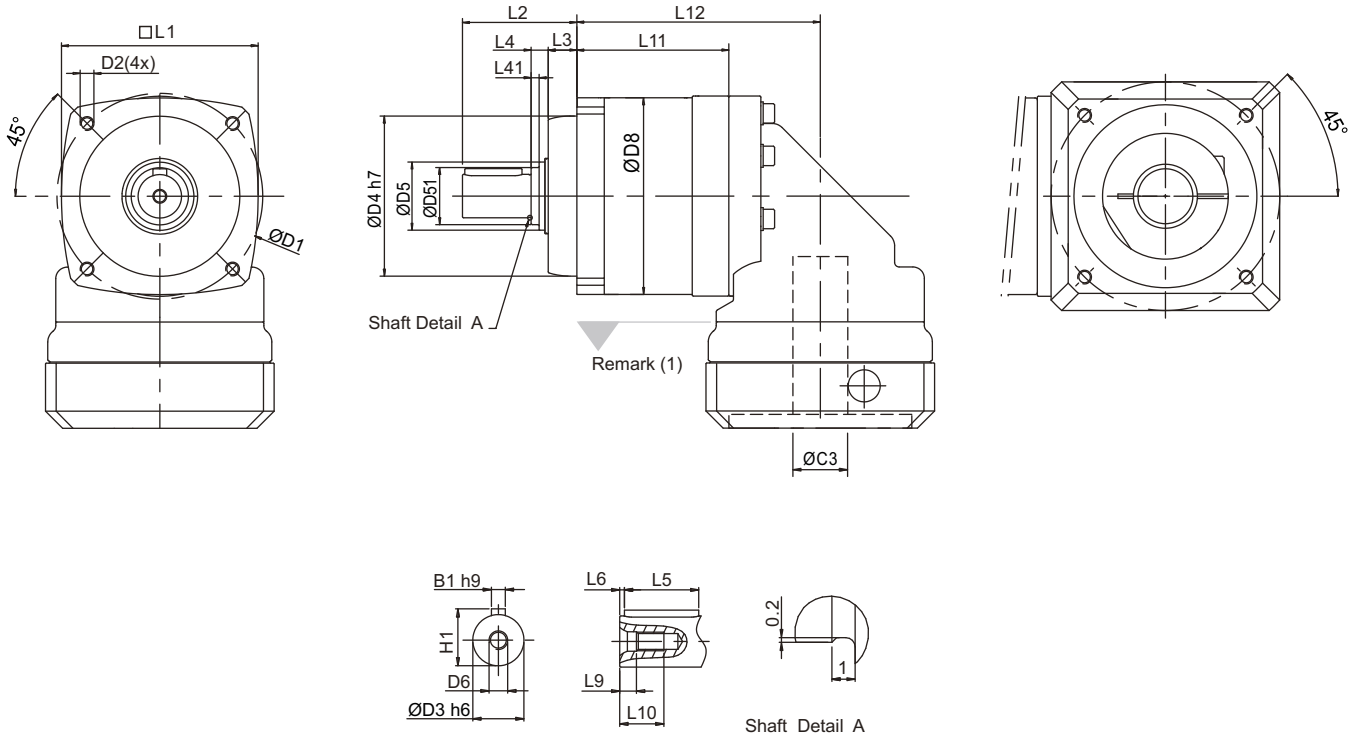
(A) Ø = Input shaft diameter.
(B) Permitted loading values on the output shaft. Please refer to P. 33 glossary.

PSII Series Dimensions



Dimension		PSII A		PSII B		PSII C		PSII D		PSII E	
		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1		47		60		90		115		135	
D2		M4X9		M5X10		M6X12		M8X18.5		M10X18	
D3	h6	10		12		19		24		32	
D4	h7	38		50		70		90		110	
D5		17		22		30		40		55	
D51		-		-		25		-		-	
D6		M3X0.5P		M4X0.7P		M6X1P		M8X1.25P		M12X1.75P	
D8		44		60		86		114		140	
L1		44		60		86		114		140	
L2		25		32		50		61		75	
L3		6.5		8.5		12.5		16		14.5	
L4		2.5		3.5		7.5		5		5.5	
L41		-		-		3.5		-		-	
L5		10		16		25		32		50	
L6		3		2		1		3		2	
L9		2.6		4.5		5		7.2		10	
L10		9		10		16.5		19		28	
B1	h9	3		4		6		8		10	
H1		11.2		13.5		21.5		27		35	

▶ PSIIR Series Dimensions



Dimension		PSIIR A		PSIIR B		PSIIR C		PSIIR D		PSIIR E	
		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1		47		60		90		115		135	
D2		M4X9		M5X10		M6X12		M8X18.5		M10X18	
D3	h6	10		12		19		24		32	
D4	h7	38		50		70		90		110	
D5		17		22		30		40		55	
D51		-		-		25		-		-	
D6		M3X0.5P		M4X0.7P		M6X1P		M8X1.25P		M12X1.75P	
D8		44		60		86		114		140	
L1		44		60		86		114		140	
L2		25		32		50		61		75	
L3		6.5		8.5		12.5		16		14.5	
L4		2.5		3.5		7.5		5		5.5	
L41		-		-		3.5		-		-	
L5		10		16		25		32		50	
L6		3		2		1		3		2	
L9		2.6		4.5		5		7.2		10	
L10		9		10		16.5		19		28	
L11		47	62	56	76	66.5	93	92	128	116	163.5
L12		72	87	85.5	105.5	106.5	133	143	179	173	220.5
B1	h9	3		4		6		8		10	
H1		11.2		13.5		21.5		27		35	

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Performance - PNII / PNIIR Gearbox

Model No.		Stages	Ratio[1]	Type	PNII 017 / PNIIR 017	PNII 023 / PNIIR 023	PNII 034 / PNIIR 034	PNII 042 / PNIIR 042	PNII 056 / PNIIR 056
Nominal Output Torque T_{2N}	Nm	1	3	All	16	42	110	217	430
			4		16	42	113	223	440
			5		15	40	118	220	435
			7		12	35	96	198	366
			10		10	27	68	155	295
		2	15		15	40	109	213	424
			16		16	42	116	228	452
			20		16	42	116	230	454
			25		15	40	123	228	450
			30		15	40	108	212	422
			35		12	35	100	206	382
			40		16	43	117	232	459
			50		15	40	123	228	450
			70		12	35	100	206	382
			100		10	27	70	162	308
Emergency Stop Torque T_{2NOT}	Nm	1,2	3~100	All	3 times T_{2N}				
Max. Acceleration Torque T_{2B}	Nm	1,2	3~100	All	T_{2B} = 60% of T_{2NOT}				
No Load Running Torque[4]	Nm	1	3~10	PNII	0.05	0.10	0.40	0.80	2.50
				PNIIR	0.10	0.15	0.45	0.85	2.55
		2	15~100	PNII	0.05	0.10	0.30	0.40	0.80
				PNIIR	0.10	0.15	0.35	0.45	0.85
Backlash[2]	arcmin	1	3~10	PNII	≦ 8	≦ 7	≦ 6	≦ 6	≦ 6
				PNIIR	≦ 12	≦ 11	≦ 10	≦ 10	≦ 10
		2	15~100	PNII	≦ 10	≦ 9	≦ 8	≦ 8	≦ 8
				PNIIR	≦ 14	≦ 13	≦ 12	≦ 12	≦ 12
Torsional Rigidity	Nm/arcmin	1,2	3~100	All	0.90	1.50	6	12	14
Nominal Input Speed n_{1N}	rpm	1,2	3~100	All	4,500	4,000	3,600	3,600	2,500
Max. Input Speed n_{1B}	rpm	1,2	3~100	All	8,000	6,000	6,000	4,800	3,600
Max. Radial Load F_{2rB}[3]	N	1,2	3~100	All	480	1,100	1,580	3,500	5,420
Max. Axial Load F_{2aB}[3]	N	1,2	3~100	All	240	550	790	1,750	2,710
Operating Temp	° C	1,2	3~100	All	0° C~ +90° C				
Degree of Gearbox Protection		1,2	3~100	All	IP65				
Lubrication		1,2	3~100	All	Synthetic lubrication grease				
Mounting Position		1,2	3~100	All	All directions				
Running Noise[4]	dB(A)	1,2	3~100	PNII	≦ 60	≦ 62	≦ 64	≦ 66	≦ 68
				PNIIR	≦ 70	≦ 72	≦ 74	≦ 75	≦ 77
Max. bending moment based on the gearbox input flange Mb[5]	Nm	1,2	3~100	PNII	5	12	22	45	54
				PNIIR	3	6	10	17	19
Efficiency η	%	1	3~10	PNII	≧ 97%				
				PNIIR	≧ 93%				
		2	15~100	PNII	≧ 94%				
				PNIIR	≧ 90%				

(1) Ratio (i= N_{in} / N_{out}) .
(2) Backlash is measured at 2% of Nominal Output Torque T_{2N}.
(3) Applied to the output shaft center at 100 rpm.
(4) The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(5) Max. motor weight* (kg) = $\frac{0.1 \times Mb}{\text{motor length (m)}}$

*with symmetrically distributed motor weight
*with horizontal and stationary mounting

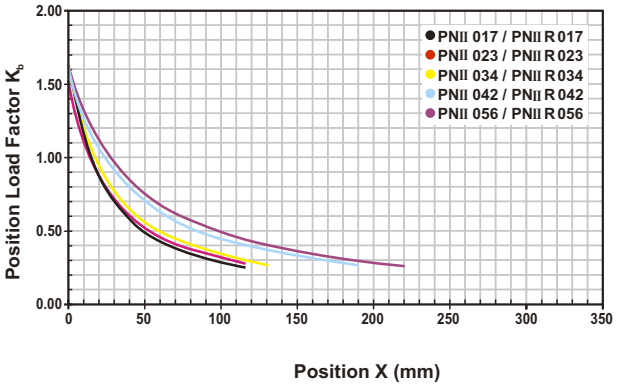
▶ Inertia - PNII Gearbox

Model No.		PNII 017		PNII 023		PNII 034		PNII 042		PNII 056	
Ø(A) (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.10	0.10	0.12	0.10	-	-	-	-	-	-
11		0.16	0.16	0.19	0.16	-	-	-	-	-	-
14		-	-	0.22	0.20	0.36	0.24	-	-	-	-
19		-	-	1.53	1.51	1.70	1.58	2.20	1.73	-	2.18
24		-	-	-	-	2.24	2.12	2.74	2.27	4.52	2.73
28		-	-	-	-	2.68	2.55	3.17	2.70	4.94	3.15
32		-	-	-	-	-	-	7.77	7.30	9.70	7.91
35		-	-	-	-	-	-	10.80	10.30	12.80	11.00
38		-	-	-	-	-	-	14.00	13.50	16.00	14.20
42		-	-	-	-	-	-	-	-	24.50	-

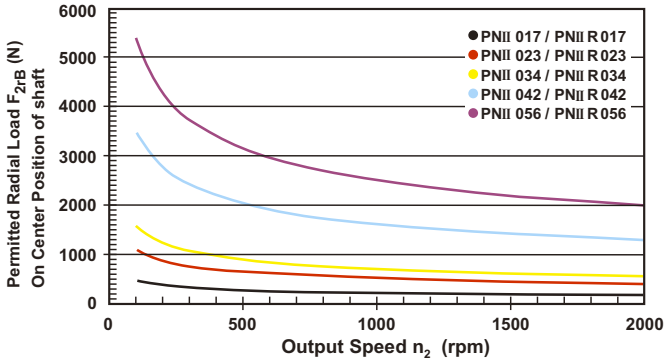
▶ Inertia - PNIIR Gearbox

Model No.		PNII R 017		PNII R 023		PNII R 034		PNII R 042		PNII R 056	
Ø(A) (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.18	0.18	0.36	0.36	-	-	-	-	-	-
11		0.20	0.20	0.39	0.39	-	-	-	-	-	-
14		-	-	0.43	0.43	1.87	1.87	-	-	-	-
19		-	-	1.24	1.24	2.67	2.67	6.80	6.80	-	13.57
24		-	-	-	-	2.97	2.97	7.10	7.10	13.87	13.87
28		-	-	-	-	3.47	3.47	7.59	7.59	14.36	14.36
32		-	-	-	-	-	-	10.56	10.56	17.33	17.33
35		-	-	-	-	-	-	11.97	11.97	18.74	18.74
38		-	-	-	-	-	-	13.95	13.95	20.79	20.79
42		-	-	-	-	-	-	-	-	26.54	-

▶ Permitted Radial And Axial Loads(B)



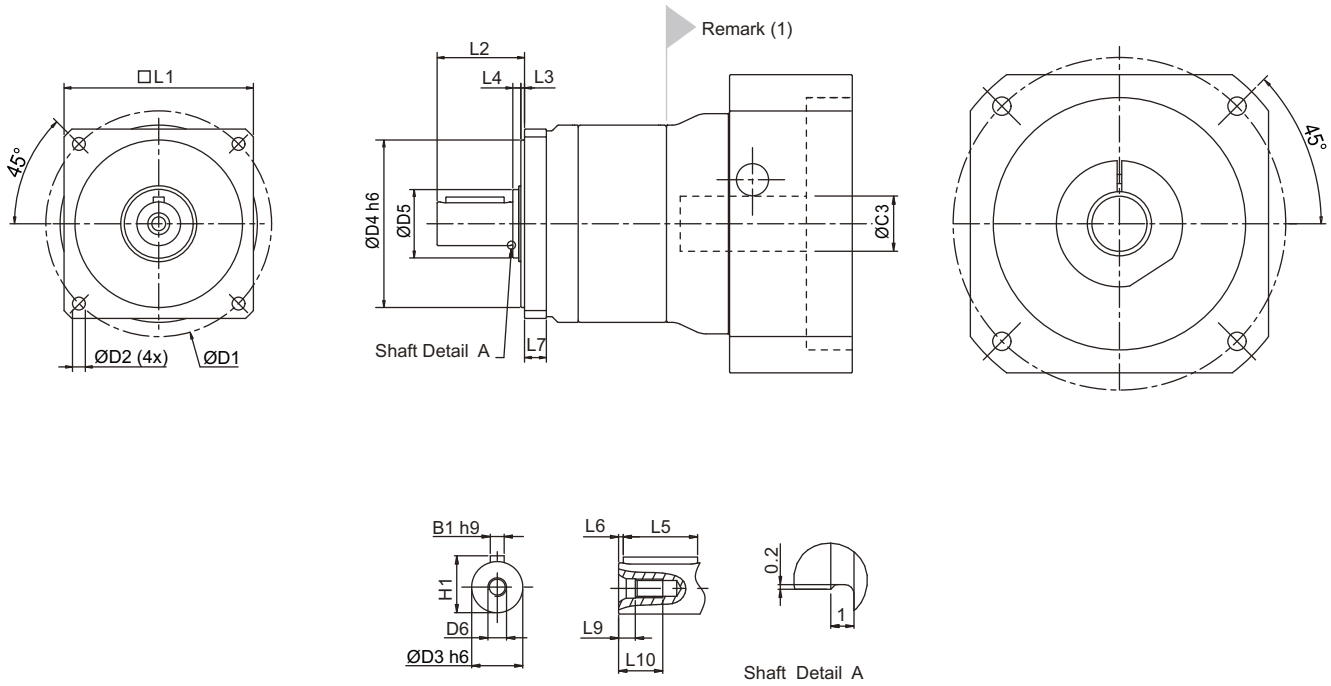
If radial force F_{2r} is not exerted on the center of the output shaft X<1/2xL or X>1/2xL, the permitted radial and axial loads can be calculated by the position load factor Kb on the above diagram.



Permitted radial load F_{2r} on center of output shaft X=1/2 x L for various output speeds.

(A) Ø = Input shaft diameter.
(B) Permitted loading values on the output shaft. Please refer to P. 33 glossary.

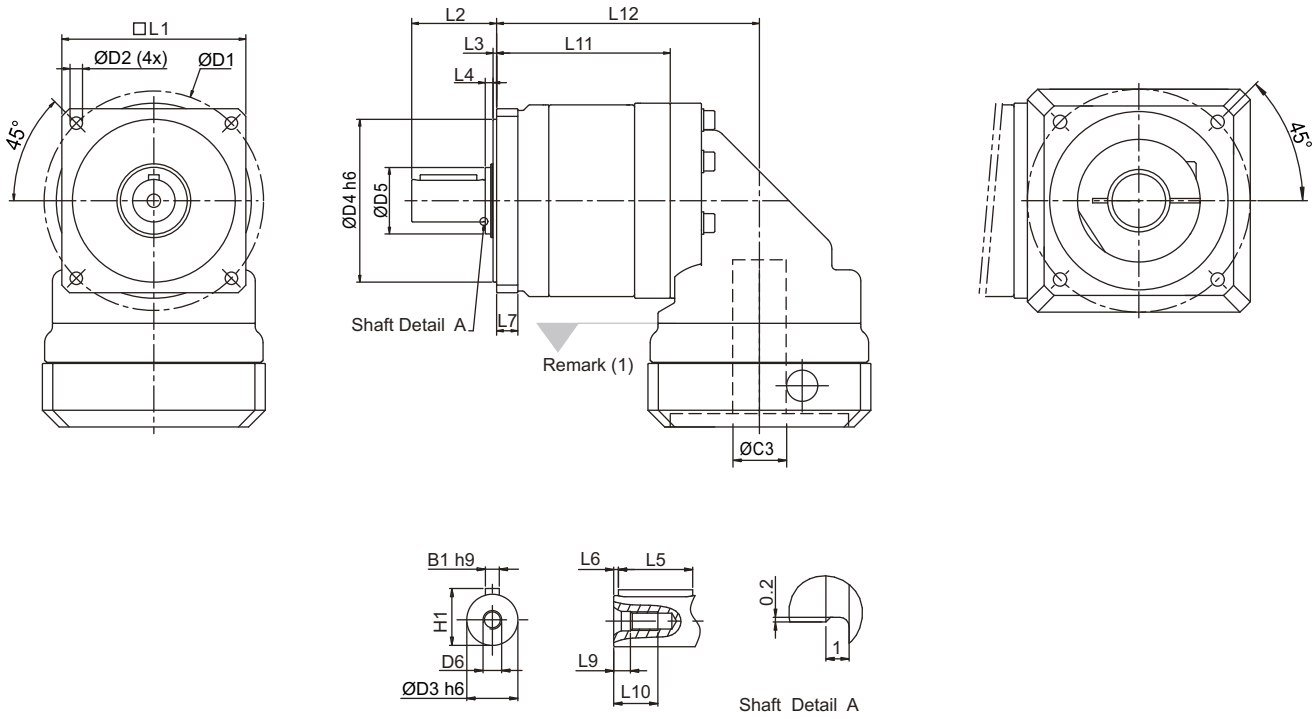
PNII Series Dimensions



Dimension		PNII 017		PNII 023		PNII 034		PNII 042		PNII 056	
		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1		43.815		66.675		98.425		125.73		177.8	
D2		3.4		5.2		5.6		7.2		10.5	
D3	h6	12.7		12.7		19.05		25.4		38.1	
D4	h6	22		38.1		73.025		55.55		114.3	
D5		17		17		30		35		55	
D6		M4X0.7P		M4X0.7P		M6X1P		M10X1.5P		M16X2P	
L1		41.91		57.15		82.55		106.68		146.05	
L2		31.75		31.75		38.1		50.8		63.5	
L3		1.6		1.6		1.6		1.6		3.2	
L4		1		1		3.5		1.5		5.5	
L5		19.05		19.05		25.4		31.75		38.1	
L6		3.788		3.788		3.807		5.175		8.563	
L7		6.35		9.525		9.525		12.7		19.05	
L9		4.5		4.5		5		7.5		12	
L10		10		10		16.5		22		36	
B1	h9	3.175		3.175		4.763		6.35		9.525	
H1		14.125		14.125		21.163		28.2		42.275	

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ PNIIR Series Dimensions



Dimension		PNIIR 017		PNIIR 023		PNIIR 034		PNIIR 042		PNIIR 056	
		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1		43.815		66.675		98.425		125.73		177.8	
D2		3.4		5.2		5.6		7.2		10.5	
D3	h6	12.7		12.7		19.05		25.4		38.1	
D4	h6	22		38.1		73.025		55.55		114.3	
D5		17		17		30		35		55	
D6		M4X0.7P		M4X0.7P		M6X1P		M10X1.5P		M16X2P	
L1		41.91		57.15		82.55		106.68		146.05	
L2		31.75		31.75		38.1		50.8		63.5	
L3		1.6		1.6		1.6		1.6		3.2	
L4		1		1		3.5		1.5		5.5	
L5		19.05		19.05		25.4		31.75		38.1	
L6		3.788		3.788		3.807		5.715		8.563	
L7		6.35		9.525		9.525		12.7		19.05	
L9		4.5		4.5		5		7.5		12	
L10		10		10		16.5		22		36	
L11		53.4	68.4	67.9	87.9	77.9	104.4	111.4	147.4	127.3	174.8
L12		78.4	93.4	97.4	117.4	117.9	144.4	162.4	198.4	184.3	231.8
B1	h9	3.175		3.175		4.763		6.35		9.525	
H1		14.125		14.125		21.163		28.2		42.275	

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Performance - PD / PDR Gearbox

Model No.		Stages	Ratio(1)	Type	PD 053	PD 064	PD 090	PD 110
					PDR 053	PDR 064	PDR 090	PDR 110
Nominal Output Torque T_{2N}	Nm	1	3	All	16	42	110	217
			4		16	42	113	223
			5		15	40	118	220
			7		12	35	96	198
			10		10	27	68	155
		2	15		15	40	109	213
			16		16	42	116	228
			20		16	42	116	230
			25		15	40	123	228
			30		15	40	108	212
			35		12	35	100	206
			40		16	43	117	232
			50		15	40	123	228
			70		12	35	100	206
			100		10	27	70	162
Emergency Stop Torque T_{2NOT}	Nm	1,2	3~100	All	3 times T_{2N}			
Max. Acceleration Torque T_{2B}	Nm	1,2	3~100	All	T_{2B} = 60% of T_{2NOT}			
No Load Running Torque(4)	Nm	1	3~10	PD	0.05	0.10	0.40	0.80
				PDR	0.10	0.15	0.45	0.85
		2	15~100	PD	0.05	0.10	0.30	0.40
				PDR	0.10	0.15	0.35	0.45
Backlash(2)	arcmin	1	3~10	PD	≦ 8	≦ 7	≦ 6	≦ 6
				PDR	≦ 12	≦ 11	≦ 10	≦ 10
		2	15~100	PD	≦ 10	≦ 9	≦ 8	≦ 8
				PDR	≦ 14	≦ 13	≦ 12	≦ 12
Torsional Rigidity	Nm/arcmin	1,2	3~100	All	1.2	3	10.8	16.2
Nominal Input Speed n_{1N}	rpm	1,2	3~100	All	4,500	4,000	3,600	3,600
Max. Input Speed n_{1B}	rpm	1,2	3~100	All	8,000	6,000	6,000	4,800
Max. Radial Load F_{2rB}(3)	N	1,2	3~100	All	1,045	880	1,615	3,675
Max. Axial Load F_{2aB}(3)	N	1,2	3~100	All	523	440	808	1,838
Max. Tilting Moment M_{2K}	Nm	1,2	3~100	All	22	17	44	140
Operating Temp	° C	1,2	3~100	All	0° C~ +90° C			
Degree of Gearbox Protection		1,2	3~100	All	IP65			
Lubrication		1,2	3~100	All	Synthetic lubrication grease			
Mounting Position		1,2	3~100	All	All directions			
Running Noise(4)	dB(A)	1,2	3~100	PD	≦ 60	≦ 62	≦ 64	≦ 66
				PDR	≦ 70	≦ 72	≦ 74	≦ 75
Max. bending moment based on the gearbox input flange Mb(5)	Nm	1,2	3~100	PD	7	16	31	56
				PDR	4	9	16	25
Efficiency η	%	1	3~10	PD	≧ 97%			
				PDR	≧ 93%			
		2	15~100	PD	≧ 94%			
				PDR	≧ 90%			

(1) Ratio (i= N_{in} / N_{out}) .
(2) Backlash is measured at 2% of Nominal Output Torque T_{2N}.
(3) Applied to the output shaft center at 100 rpm.
(4) The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(5) Max. motor weight* (kg) = $\frac{0.1 \times Mb}{\text{motor length (m)}}$

*with symmetrically distributed motor weight
*with horizontal and stationary mounting

▶ Inertia - PD Gearbox

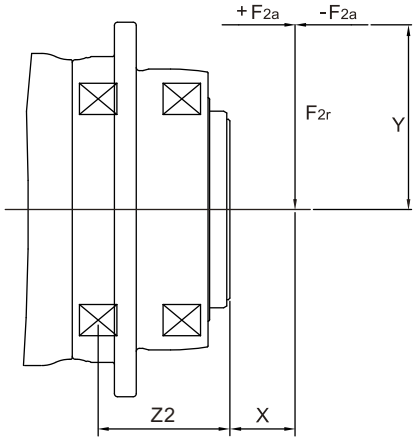
Model No.		PD 053		PD 064		PD 090		PD 110	
Ø(A) (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.10	0.10	0.12	0.10	-	-	-	-
11		0.16	0.16	0.19	0.16	-	-	-	-
14		-	-	0.22	0.20	0.36	0.24	-	-
19		-	-	1.53	1.51	1.70	1.58	2.20	1.73
24		-	-	-	-	2.24	2.12	2.74	2.27
28		-	-	-	-	2.68	2.55	3.17	2.70
32		-	-	-	-	-	-	7.77	7.30
35		-	-	-	-	-	-	10.80	10.30
38		-	-	-	-	-	-	14.00	13.50
42		-	-	-	-	-	-	-	-

▶ Inertia - PDR Gearbox

Model No.		PDR 053		PDR 064		PDR 090		PDR 110	
Ø(A) (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.18	0.18	0.36	0.36	-	-	-	-
11		0.20	0.20	0.39	0.39	-	-	-	-
14		-	-	0.43	0.43	1.87	1.87	-	-
19		-	-	1.24	1.24	2.67	2.67	6.80	6.80
24		-	-	-	-	2.97	2.97	7.10	7.10
28		-	-	-	-	3.47	3.47	7.59	7.59
32		-	-	-	-	-	-	10.56	10.56
35		-	-	-	-	-	-	11.97	11.97
38		-	-	-	-	-	-	13.95	13.95
42		-	-	-	-	-	-	-	-

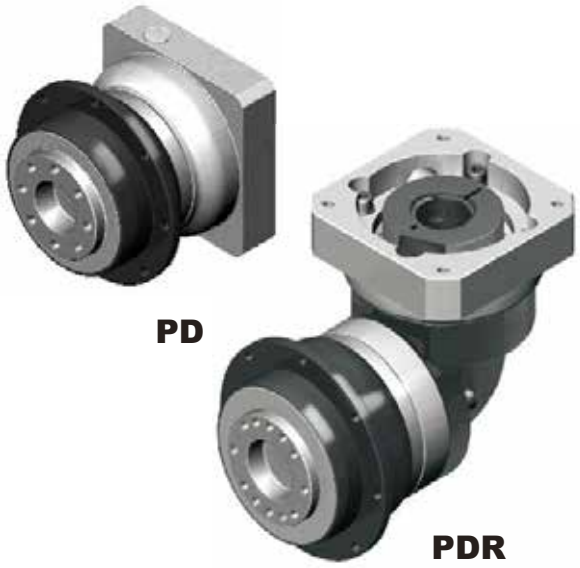
(A) Ø = Input shaft diameter.

▶ Max. Tilting Moment M2K



$$M_{2K} = \frac{F_{2a} * Y + F_{2r} * (X+Z2)}{1000}$$

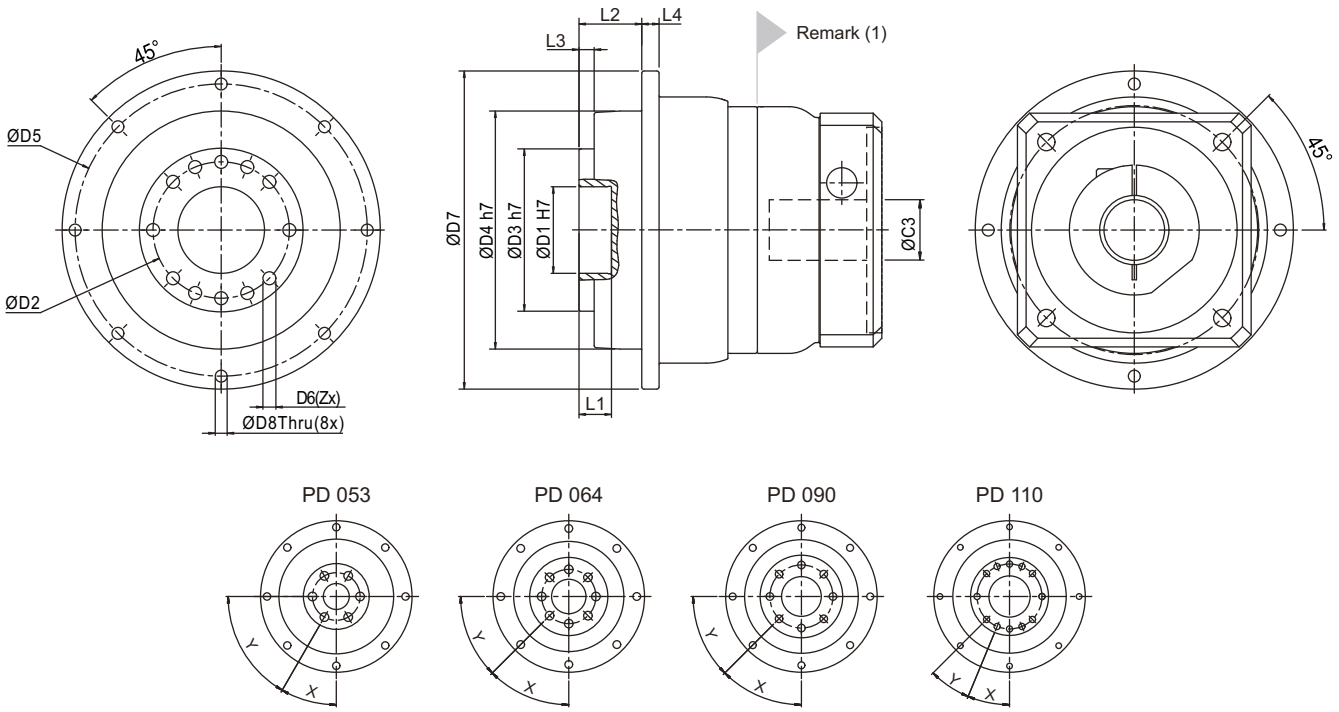
M_{2K} : 【Nm】
F_{2a}, F_{2r} : 【N】
X, Y, Z2 : 【mm】



PD / PDR	053	064	090	110
Z2【mm】	23.8	21.5	30.1	42.1

Note :Applied to the output flange center at 100 rpm.

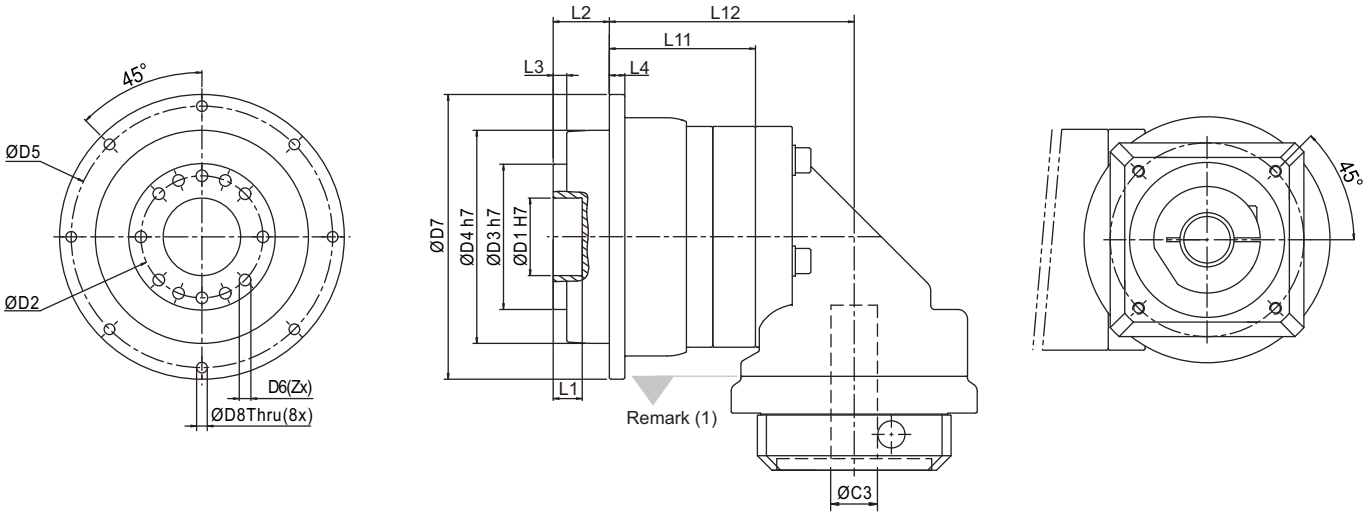
PD Series Dimensions

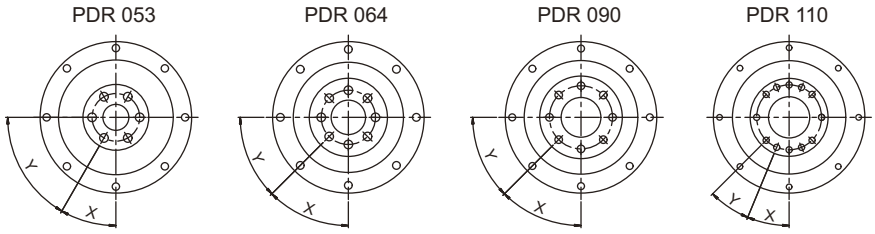


Dimension	PD 053		PD 064		PD 090		PD 110	
	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1 H7	12		20		31.5		40	
D2	22		31.5		50		63	
D3 h7	28		40		63		75	
D4 h7	53		64		90		110	
D5	64		79		109		135	
D6	M4x0.7Px8L		M5xX0.8Px8L		M6x1Px13.5L		M6x1Px13.5L	
D7	70		88		120		147	
D8	3.4		4.5		5.5		5.5	
L1	4		8		15		15	
L2	14.5		19.5		30		29	
L3	3		4		7		7	
L4	5		5		7		8	
X in Degree	30°		45°		45°		22.5°	
Y in Degree	60°		45°		45°		22.5°	
Z	6		8		8		12	

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ PDR Series Dimensions





Dimension		PDR 053		PDR 064		PDR 090		PDR 110	
		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1	H7	12		20		31.5		40	
D2		22		31.5		50		63	
D3	h7	28		40		63		75	
D4	h7	53		64		90		110	
D5		64		79		109		135	
D6		M4x0.7Px8L		M5X0.8Px8L		M6x1Px13.5L		M6X1Px13.5L	
D7		70		88		120		147	
D8		3.4		4.5		5.5		5.5	
L1		4		8		15		15	
L2		14.5		19.5		30		29	
L3		3		4		7		7	
L4		5		5		7		8	
L11		42.8	57.8	39.5	59.5	49.6	76.1	75.4	111.4
L12		67.8	82.8	69	89	89.6	116.1	126.4	162.4
X	in Degree	30°		45°		45°		22.5°	
Y	in Degree	60°		45°		45°		22.5°	
Z		6		8		8		12	

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Performance - PL / PLR Gearbox

Model No.		Stages	Ratio[1]	Type	PL 070	PL 090	PL 120
					PLR 070	PLR 090	PLR 120
Nominal Output Torque T_{2N}	Nm	1	3	All	30	67	107
			4		39	86	137
			5		40	89	140
			7		37	80	128
			10		27	59	93
		2	12		31	69	109
			15		31	70	110
			16		39	86	137
			20		39	88	141
			25		40	89	140
			30		32	72	111
			35		36	80	130
			40		41	92	143
			50		42	90	143
			70		37	81	131
			100		27	59	93
Emergency Stop Torque T_{2NOT}	Nm	1,2	3~10	All	3 times T_{2N}		
Max. Acceleration Torque T_{2B}	Nm	1,2	3~10	All	T_{2B} = 60% of T_{2NOT}		
No Load Running Torque[4]	Nm	1	3~10	PL	0.10	0.40	0.80
				PLR	0.15	0.45	0.85
		2	12~100	PL	0.10	0.30	0.40
				PLR	0.15	0.35	0.45
Backlash[2]	arcmin	1	3~10	PL	≦ 7	≦ 6	≦ 6
				PLR	≦ 11	≦ 10	≦ 10
		2	12~100	PL	≦ 9	≦ 8	≦ 8
				PLR	≦ 13	≦ 12	≦ 12
Torsional Rigidity	Nm/arcmin	1,2	3~100	All	2.2	8	12
Nominal Input Speed n_{1N}	rpm	1,2	3~100	All	4,000	3,600	3,600
Max. Input Speed n_{1B}	rpm	1,2	3~100	All	6,000	6,000	4,800
Max. Radial Load F_{2rB}[3]	N	1,2	3~100	All	2,600	3,100	6,550
Max. Axial Load F_{2aB}[3]	N	1,2	3~100	All	1,300	1,550	3,275
Operating Temp	° C	1,2	3~100	All	0° C~ +90° C		
Degree of Gearbox Protection		1,2	3~100	All	IP65		
Lubrication		1,2	3~100	All	Synthetic lubrication grease		
Mounting Position		1,2	3~100	All	All directions		
Running Noise[4]	dB(A)	1,2	3~100	PL	≦ 62	≦ 64	≦ 66
				PLR	≦ 72	≦ 74	≦ 75
Max. belt tension	N	1,2	3~100	All	560	950	1200
Max. bending moment based on the gearbox input flange Mb[5]	Nm	2	12~100	PL	19	38	45
		2		PLR	10	17	14
Efficiency η	%	1	3~10	PL	≧ 97%		
				PLR	≧ 93%		
		2	12~100	PL	≧ 94%		
				PLR	≧ 90%		

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(3) Applied to the output shaft center at 100 rpm.

(4) The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(5) Max. motor weight* (kg) = $\frac{0.1 \times Mb}{\text{motor length (m)}}$

*with symmetrically distributed motor weight
*with horizontal and stationary mounting

▶ Inertia - PL Gearbox

Model No.		PL 070		PL 090		PL 120	
Ø[A] (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.12	0.10	-	-	-	-
11		0.19	0.16	-	-	-	-
14		0.22	0.20	0.36	0.24	-	-
19		1.53	1.51	1.70	1.58	2.20	1.73
24		-	-	2.24	2.12	2.74	2.27
28		-	-	2.68	2.55	3.17	2.70
32		-	-	-	-	7.77	7.30
35		-	-	-	-	10.80	10.30
38		-	-	-	-	14.00	13.50
42		-	-	-	-	-	-

▶ Inertia - PLR Gearbox

Model No.		PLR 070		PLR 090		PLR 120	
Ø[A] (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.36	0.36	-	-	-	-
11		0.39	0.39	-	-	-	-
14		0.43	0.43	1.87	1.87	-	-
19		1.24	1.24	2.67	2.67	6.80	6.80
24		-	-	2.97	2.97	7.10	7.10
28		-	-	3.47	3.47	7.59	7.59
32		-	-	-	-	10.56	10.56
35		-	-	-	-	11.97	11.97
38		-	-	-	-	13.95	13.95
42		-	-	-	-	-	-

(A) Ø = Input shaft diameter.

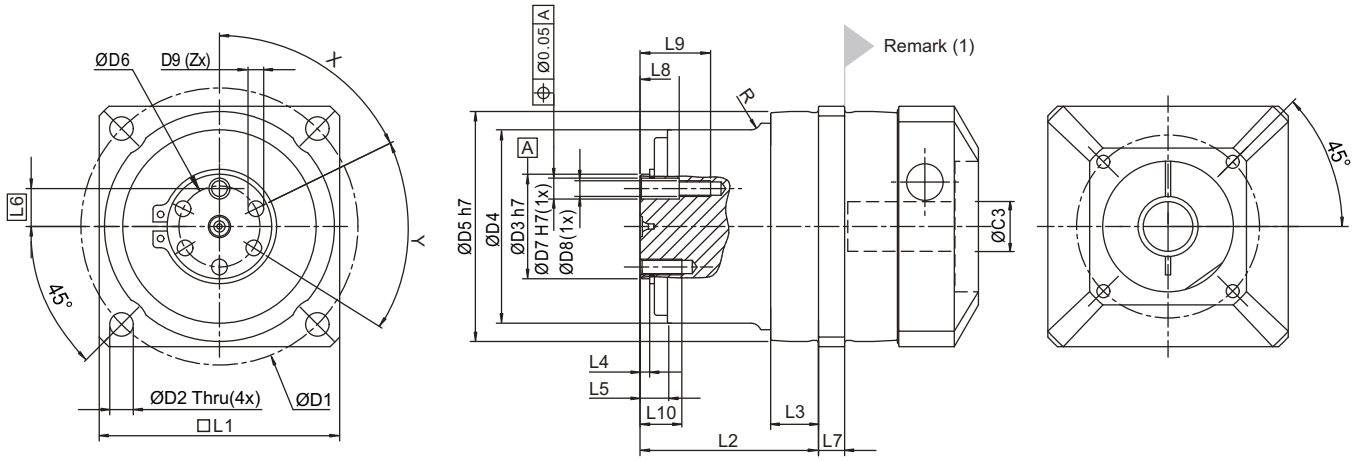
PL

PLR

PL+Pulley

PLR+Pulley

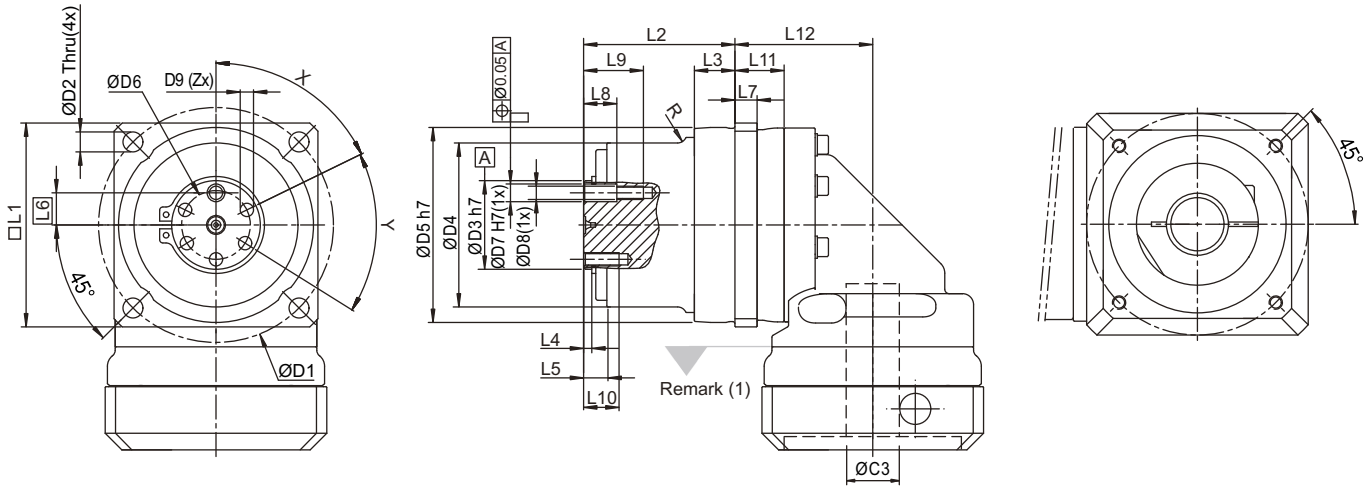
PL Series Dimensions



Dimension	PL 070		PL 090		PL 120	
	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1	82		106		144	
D2	6.6		9		13	
D3 h7	25		40		50	
D4	58		74		100	
D5 h7	68		88		118	
D6	18		31		37	
D7 H7	6		8		8	
D8	M5X0.8P		M6X1P		M6X1P	
D9	M5X0.8P		M6X1P		M8X1.25P	
R	-		4		2	
L1	70		92		122	
L2	60.2		68.3		82.2	
L3	12.7		18.3		15.7	
L4	3.8		3.7		4.5	
L5	10		10.5		12.5	
L6	8.8		14.5		18.5	
L7	8		10		12	
L8	10		15		16	
L9	18.5		27		28	
L10	12		16		16	
X in Degree	64°		45°		45°	
Y in Degree	58°		45°		45°	
Z	5		7		7	

(1) Dimensions are related to motor interface. Please contact APEX for details.

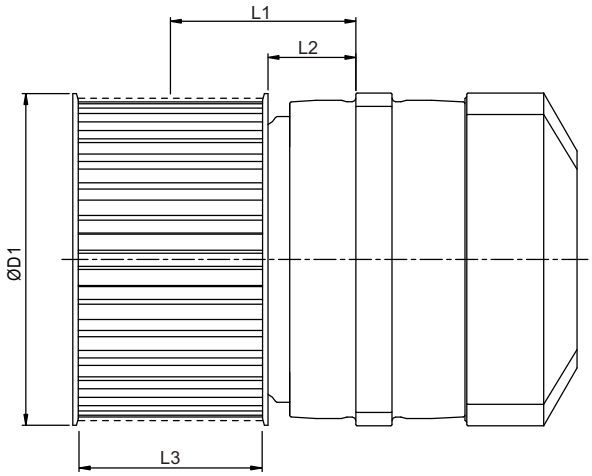
PLR Series Dimensions



Dimension	PLR 070		PLR 090		PLR 120	
	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
D1	82		106		144	
D2	6.6		9		13	
D3 h7	25		40		50	
D4	58		74		100	
D5 h7	68		88		118	
D6	18		31		37	
D7 H7	6		8		8	
D8	M5X0.8P		M6X1P		M6X1P	
D9	M5X0.8P		M6X1P		M8X1.25P	
R	-		4		2	
L1	70		92		122	
L2	60.2		68.3		82.2	
L3	12.7		18.3		15.7	
L4	3.8		3.7		4.5	
L5	10		10.5		12.5	
L6	8.8		14.5		18.5	
L7	8		10		12	
L8	10		15		16	
L9	18.5		27		28	
L10	12		16		16	
L11	16.8	36.8	22.2	48.9	34.8	71.1
L12	46.3	66.3	62.2	88.9	85.8	122.1
X in Degree	64°		45°		45°	
Y in Degree	58°		45°		45°	
Z	5		7		7	

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ PL+PULLEY Dimensions



Reducer	Belt Pulley	D1	L1	L2	L3	Pitch P	No.of Teeth Z	Circumference Z*P	Interia J	Mass m
						mm		mm/rotation	$kgcm^2$	kg
PL 070 PLR 070	AT05-W50-T43	71	41.8	14.8	51	5	43	215	4.68	0.57
	HTD 5M-W50-T44	72.9	41.8	14.8	51	5	44	220	5.58	0.65
	5GT-W50-T44	72.9	41.8	14.8	51	5	44	220	5.58	0.65
PL 090 PLR 090	AT10-W50-T28	91.7	51.3	24.3	51	10	28	280	14.07	1.00
	HTD 8M-W50-T36	98.4	51.3	24.3	51	8	36	288	17.78	1.18
	8YU-W50-T36	98.4	51.3	24.3	51	8	36	288	17.78	1.18
PL 120 PLR 120	AT20-W75-T19	124.6	57.7	17.7	76	20	19	380	69.55	2.71
	HTD 14M-W75-T28	137	57.7	17.7	76	14	28	392	87.83	3.20

▶ PULLEY ORDERING CODE

PUL070(1) – AT05(2) – B(3)

Pulley size corresponds to gearbox size:
PUL 070: PL 070, PLR 070
PUL 090: PL 090, PLR 090
PUL 120: PL 120, PLR 120

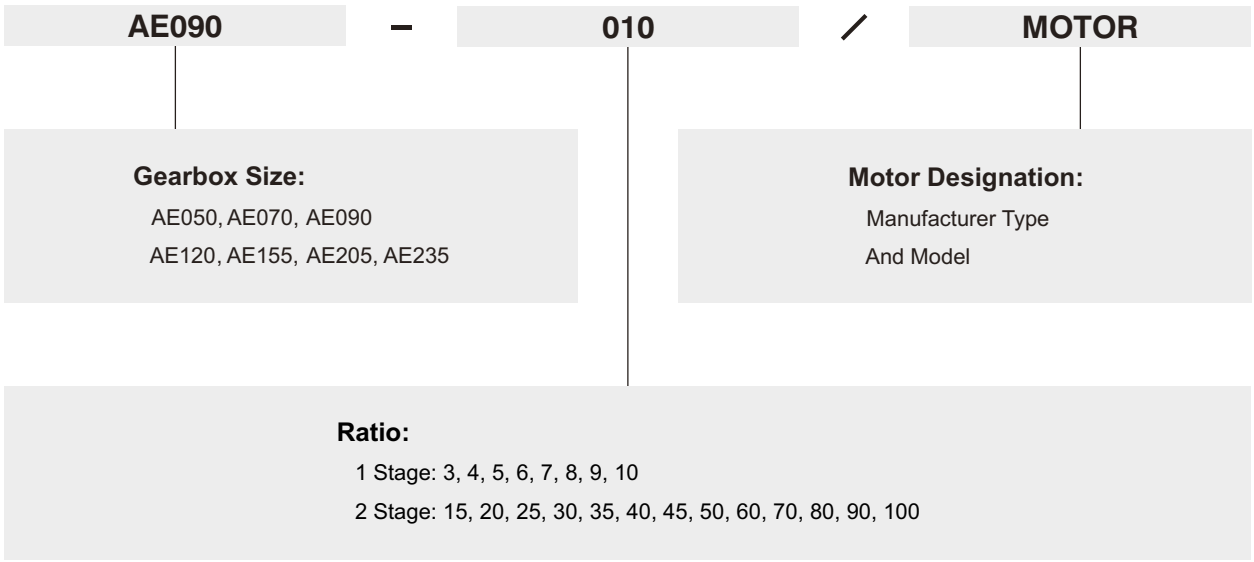
Ordering Example : PUL 070 - AT05 - B
PUL 090 - 8YU - N

(1) Pulley size.
(2) Pulley specification.
(3) Pulley appearance. B = Manganese phosphate blackening (Standard)
N = Nickel plating

HIGH POWER
PLANETARY GEARBOX

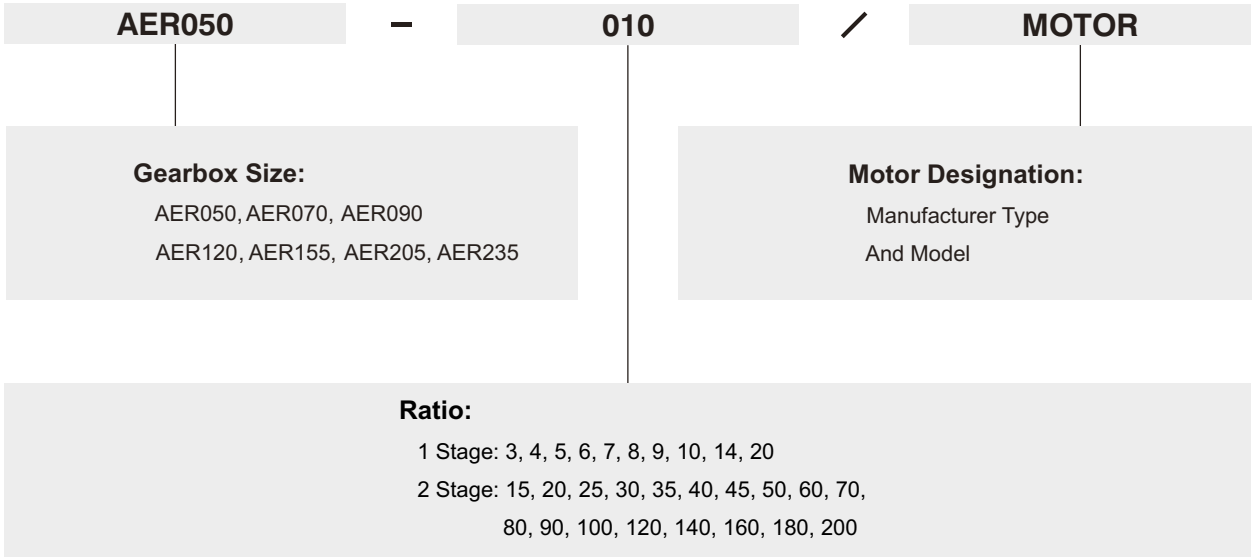
AE - AER Series
AES - AERS Series
Stainless

AE Series



Ordering Example: AE090-010 / SIEMENS 1FT6 041-4AF71

AER Series



Ordering Example: AER050-010 / SIEMENS 1FT5 034-0AK71

▶ Performance - AE Gearbox

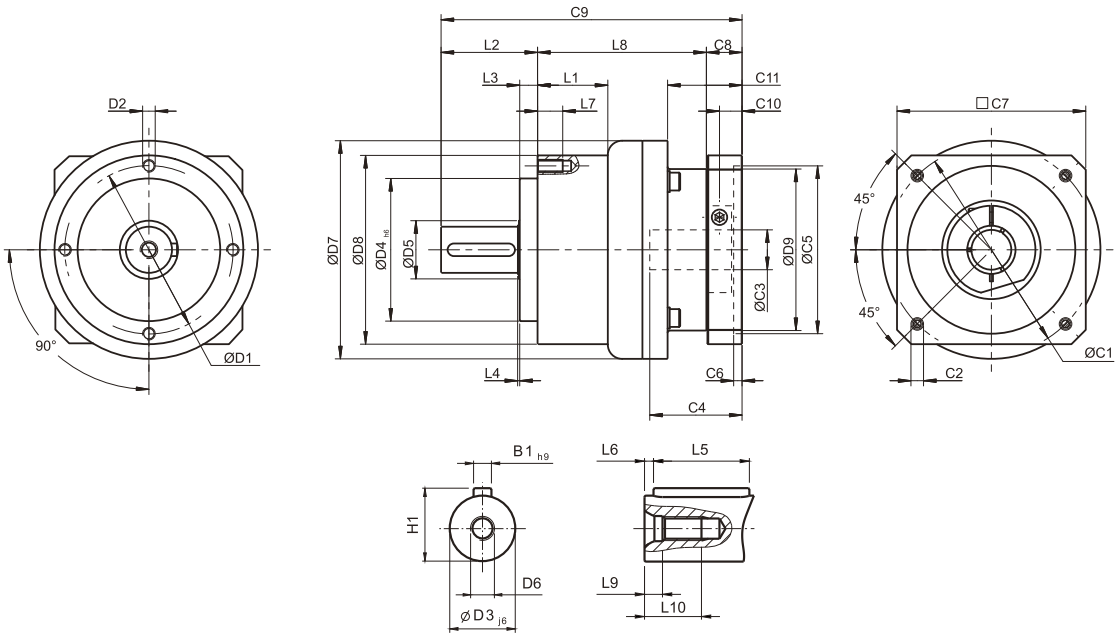
Model No.		Stage	Ratio[A]	AE050	AE070	AE090	AE120	AE155	AE205	AE235
Nominal output torque T_{2N}	Nm	1	3	20	55	130	208	342	588	1,140
			4	19	50	140	290	542	1,050	1,700
			5	22	60	160	330	650	1,200	2,000
			6	20	55	150	310	600	1,100	1,900
			7	19	50	140	300	550	1,100	1,800
			8	17	45	120	260	500	1,000	1,600
			9	14	40	100	230	450	900	1,500
			10	14	40	100	230	450	900	1,500
		2	15	20	55	130	208	342	588	1,140
			20	19	50	140	290	542	1,050	1,700
			25	22	60	160	330	650	1,200	2,000
			30	20	55	150	310	600	1,100	1,900
			35	19	50	140	300	550	1,100	1,800
			40	17	45	120	260	500	1,000	1,600
			45	14	40	100	230	450	900	1,500
			50	22	60	160	330	650	1,200	2,000
			60	20	55	150	310	600	1,100	1,900
			70	19	50	140	300	550	1,100	1,800
			80	17	45	120	260	500	1,000	1,600
			90	14	40	100	230	450	900	1,500
			100	14	40	100	230	450	900	1,500
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	3~100	3 times of nominal output torque						
Nominal input speed n_{1N}	rpm	1,2	3~100	5,000	5,000	4,000	4,000	3,000	3,000	2,000
Max. input speed n_{1B}	rpm	1,2	3~100	10,000	10,000	8,000	8,000	6,000	6,000	4,000
Backlash	arcmin	1	3~10	≦8	≦8	≦8	≦8	≦8	≦8	≦8
		2	15~100	≦12	≦12	≦12	≦12	≦12	≦12	≦12
Torsional rigidity	Nm/arcmin	1,2	3~100	3	7	14	25	50	145	225
Max. Radial Load F_{2rB}[C]	N	1,2	3~100	702	1,377	2,985	6,100	8,460	13,050	8,700
Max. Axial Load F_{2aB}[C]	N	1,2	3~100	390	765	1,625	3,350	4,700	7,250	5,400
Efficiency η	%	1	3~10	≧97%						
		2	15~100	≧94%						
Weight	kg	1	3~10	0.6	1.4	3.3	6.9	13	31	53
		2	15~100	0.9	1.6	4.7	8.7	17	35	66
Operating temp	°C	1,2	3~100	-10°C~90°C						
Lubrication				Synthetic lubrication oils						
Degree of gearbox protection		1,2	3~100	IP65						
Mounting position		1,2	3~100	all directions						
Noise[D]	dB(A)	1,2	3~100	≦56	≦58	≦60	≦63	≦65	≦67	≦70

▶ Inertia - AE Gearbox

Model No.		Stage	Ratio[A]	AE050	AE070	AE090	AE120	AE155	AE205	AE235
Mass moments of inertia J_1	kg • cm^2	1	3	0.03	0.16	0.61	3.25	9.21	28.98	69.61
			4	0.03	0.14	0.48	2.74	7.54	23.67	54.37
			5	0.03	0.13	0.47	2.71	7.42	23.29	53.27
			6	0.03	0.13	0.45	2.65	7.25	22.75	51.72
			7	0.03	0.13	0.45	2.62	7.14	22.48	50.97
			8	0.03	0.13	0.44	2.58	7.07	22.59	50.84
			9	0.03	0.13	0.44	2.57	7.04	22.53	50.63
			10	0.03	0.13	0.44	2.57	7.03	22.51	50.56
		2	15	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			20	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			25	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			30	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			35	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			40	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			45	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			50	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			60	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			70	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			80	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			90	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			100	0.03	0.03	0.13	0.44	2.57	7.03	22.51

A. Ratio ($i=N_{in}/N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm

▶ Dimensions (1-stage, Ratio i=3~10) / AE Series

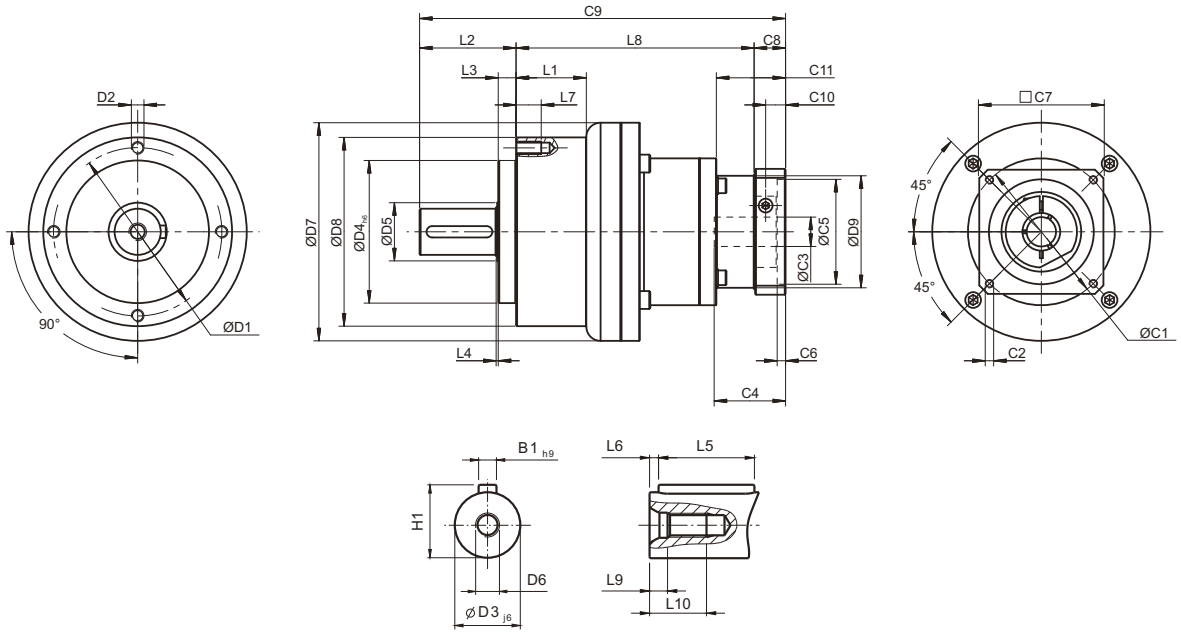


[unit: mm]

Dimension	AE050	AE070	AE090	AE120	AE155	AE205	AE235
D1	44	62	80	108	140	184	210
D2	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M16 x 2P
D3 j6	12	16	22	32	40	55	75
D4 h6	35	52	68	90	120	160	180
D5	22	22	30	40	75	95	115
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P
D7	53	70	104	130	162	205	260
D8	50	70	90	120	155	205	235
D9	45.5	53.4	77	102	125	160	205
L1	--	--	33.5	38	50	--	70
L2	24.5	36	46	70	97	100	126
L3	4	6.5	8.5	17.5	15	15	18
L4	1	1	1	1.5	3	3	3
L5	14	25	32	40	63	70	90
L6	2	2	3	5	5	6	7
L7	8	10	12	16	20	22	28
L8	47	62	80.5	97	119.5	159	175.5
L9	4.5	4.8	7.2	10	12	15	15
L10	10	12.5	19	28	36	42	42
C1[1]	46	70	100	130	165	215	235
C2[1]	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M12 x 1.75P
C3[1]	≦11 / ≦12[2]	≦14 / ≦16[2]	≦19 / ≦24	≦32	≦38	≦48	≦55
C4[1]	30	34	40	50	60	85	116
C5[1]	30	50	80	110	130	180	200
C6[1]	3.5	8	4	5	6	6	6
C7[1]	48	60	90	115	142	190	220
C8[1]	19.5	19	17	19.5	22.5	29	63
C9[1]	91	117	143.5	186.5	239	288	364.5
C10[1]	13.25	13.5	10.75	13	15	20.75	53.5
C11[1]	19.5	37	35.5	46	53.5	79.5	106.5
B1 h9	4	5	6	10	12	16	20
H1	14	18	24.5	35	43	59	79.5

1. C1~C11 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.
2. AE050 ratio 5, 10 offers C3 ≤ 12 option; AE070 ratio 5, 10 offers C3 ≤ 16 option.

▶ Dimensions (2-stage, Ratio i=15~100) / AE Series



[unit: mm]

Dimension	AE050	AE070	AE090	AE120	AE155	AE205	AE235
D1	44	62	80	108	140	184	210
D2	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M16 x 2P
D3 j6	12	16	22	32	40	55	75
D4 h6	35	52	68	90	120	160	180
D5	22	22	30	40	75	95	115
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P
D7	53	70	104	130	162	205	260
D8	50	70	90	120	155	205	235
D9	45.5	45.5	53.4	77	102	125	160
L1	--	--	33.5	38	50	--	70
L2	24.5	36	46	70	97	100	126
L3	4	6.5	8.5	17.5	15	15	18
L4	1	1	1	1.5	3	3	3
L5	14	25	32	40	63	70	90
L6	2	2	3	5	5	6	7
L7	8	10	12	16	20	22	28
L8	74	87.5	113.5	138.5	176	214.5	260
L9	4.5	4.8	7.2	10	12	15	15
L10	10	12.5	19	28	36	42	42
C1[3]	46	46	70	100	130	165	215
C2[3]	M4 x 0.7P	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P
C3[3]	≦11 / ≦12	≦11 / ≦12	≦14 / ≦15.875 / ≦16	≦19 / ≦24	≦32	≦38	≦48
C4[3]	30	30	34	40	50	60	85
C5[3]	30	30	50	80	110	130	180
C6[3]	3.5	3.5	8	4	5	6	6
C7[3]	48	48	60	90	115	142	190
C8[3]	19.5	19.5	19	17	19.5	22.5	29
C9[3]	118	143	178.5	225.5	292.5	337	415
C10[3]	13.25	13.25	13.5	10.75	13	15	20.75
C11[3]	19.5	19.5	37	35.5	46	53.5	79.5
B1 h9	4	5	6	10	12	16	20
H1	14	18	24.5	35	43	59	79.5

3. C1~C11 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.

▶ Performance - AER Gearbox

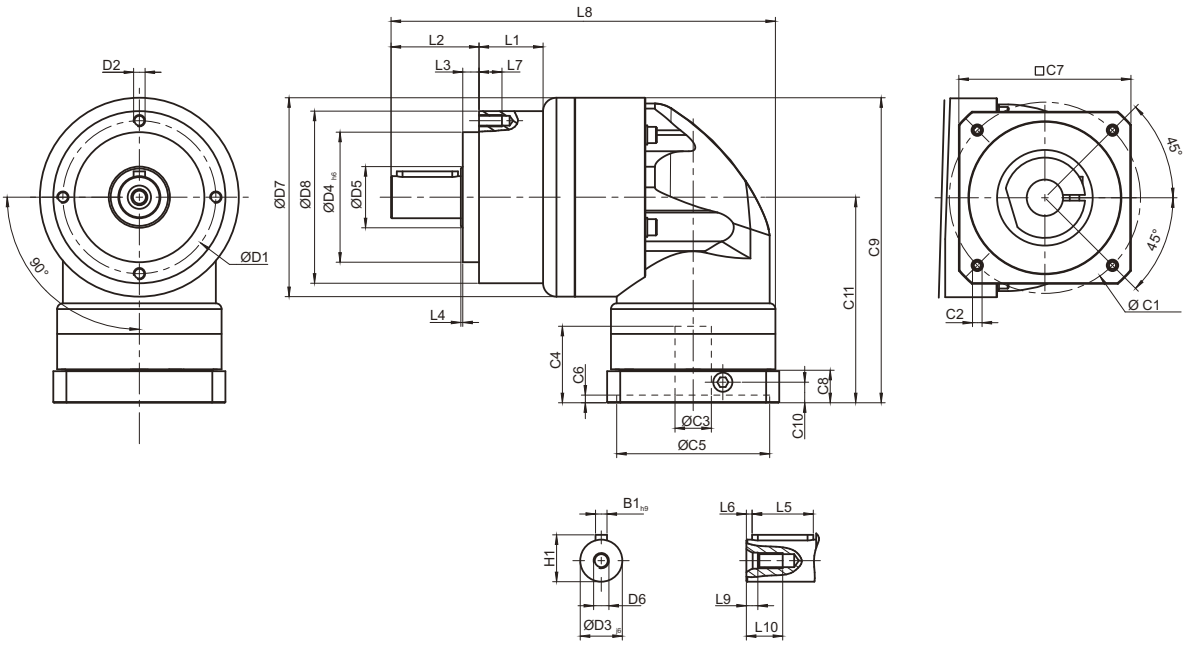
Model No.		Stage	Ratio[A]	AER050	AER070	AER090	AER120	AER155	AER205	AER235
Nominal output torque T_{2N}	Nm	1	3	9	36	90	195	342	588	1,140
			4	12	48	120	260	520	1,040	1,680
			5	15	60	150	325	650	1,200	2,000
			6	18	55	150	310	600	1,100	1,900
			7	19	50	140	300	550	1,100	1,800
			8	17	45	120	260	500	1,000	1,600
			9	14	40	100	230	450	900	1,500
			10	14	60	150	325	650	1,200	2,000
			14	–	42	140	300	550	1,100	1,800
			20	–	40	100	230	450	900	1,500
		2	15	14	–	–	–	–	–	–
			20	14	–	–	–	–	–	–
			25	15	60	150	325	650	1,200	2,000
			30	20	55	150	310	600	1,100	1,900
			35	19	50	140	300	550	1,100	1,800
			40	17	45	120	260	500	1,000	1,600
			45	14	40	100	230	450	900	1,500
			50	14	60	150	325	650	1,200	2,000
			60	20	55	150	310	600	1,100	1,900
			70	19	50	140	300	550	1,100	1,800
			80	17	45	120	260	500	1,000	1,600
			90	14	40	100	230	450	900	1,500
			100	14	40	100	230	450	900	1,500
			120	–	–	150	310	600	1,100	1,900
			140	–	–	140	300	550	1,100	1,800
			160	–	–	120	260	550	1,000	1,600
			180	–	–	100	230	450	900	1,500
			200	–	–	100	230	450	900	1,500
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	3~200	3 times of nominal output torque						
Nominal Input Speed n_{1N}	rpm	1,2	3~200	5,000	5,000	4,000	4,000	3,000	3,000	2,000
Max. Input Speed n_{1B}	rpm	1,2	3~200	10,000	10,000	8,000	8,000	6,000	6,000	4,000
Backlash	arcmin	1	3~20	≦10	≦10	≦10	≦10	≦10	≦10	≦10
		2	25~200	≦14	≦14	≦14	≦14	≦14	≦14	≦14
Torsional Rigidity	Nm/arcmin	1,2	3~200	3	7	14	25	50	145	225
Max. Radial Load F_{2rB}[C]	N	1,2	3~200	702	1,377	2,985	6,100	8,460	13,050	8,700
Max. Axial Load F_{2aB}[C]	N	1,2	3~200	390	765	1,625	3,350	4,700	7,250	5,400
Efficiency η	%	1	3~20	≧95%						
		2	25~200	≧92%						
Weight	kg	1	3~20	1.0	2.1	5.8	11.2	22.4	46.8	78.0
		2	25~200	1.3	2.0	4.6	11.1	21.8	43.7	81.9
Operating temp	°C	1,2	3~200	-10°C~90°C						
Lubrication				Synthetic lubrication oils						
Degree of gearbox protection		1,2	3~200	IP65						
Mounting position		1,2	3~200	all directions						
Noise[D]	dB(A)	1,2	3~200	≦61	≦63	≦65	≦68	≦70	≦72	≦74

▶ Inertia - AER Gearbox

Model No.		Stage	Ratio[A]	AER050	AER070	AER090	AER120	AER155	AER205	AER235
Mass Moments of Inertia J_1	kg • cm^2	1	3~10	0.09	0.35	2.25	6.84	23.4	68.9	135.4
			14	–	0.07	1.87	6.25	21.8	65.6	119.8
			20	–	0.07	1.87	6.25	21.8	65.6	119.8
		2	15	0.09	–	–	–	–	–	–
			20	0.09	–	–	–	–	–	–
			25~100	0.09	0.09	0.35	2.25	6.84	23.4	68.9
			120~200	–	–	0.31	1.87	6.25	21.8	65.6

A. Ratio ($i=N_{in}/N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm
D. The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

▶ Dimensions (1-stage, Ratio i=3~20) / AER Series

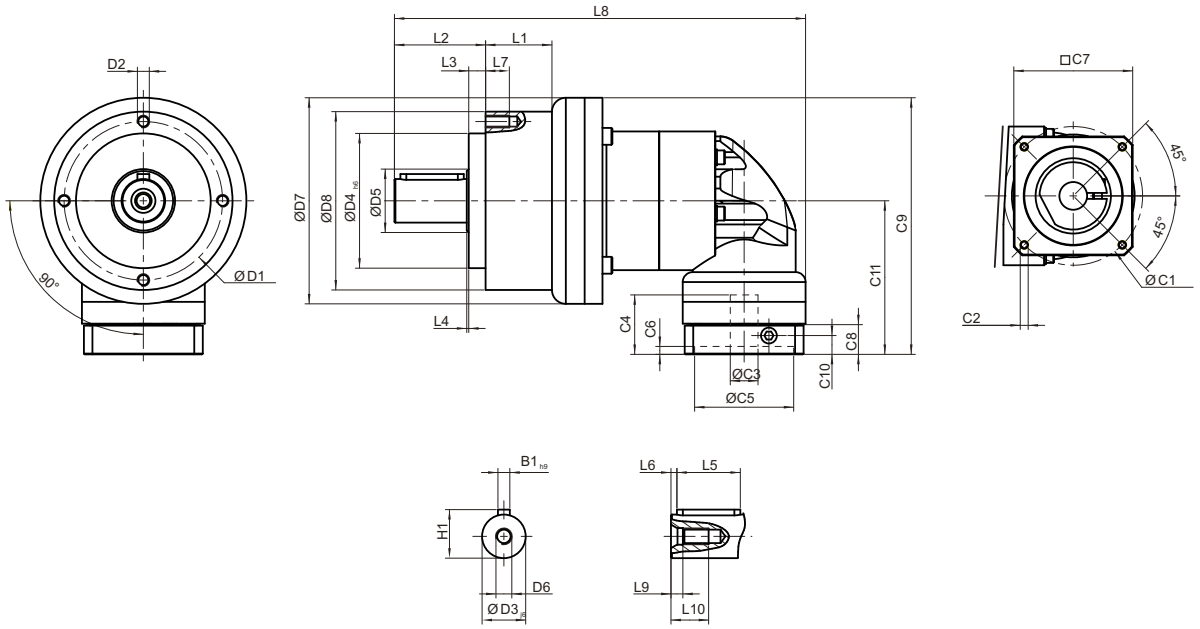


[unit: mm]

Dimension	AER050	AER070	AER090	AER120	AER155	AER205	AER235
D1	44	62	80	108	140	184	210
D2	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M16 x 2P
D3 j6	12	16	22	32	40	55	75
D4 h6	35	52	68	90	120	160	180
D5	22	22	30	40	75	95	115
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P
D7	53	70	104	130	162	205	260
D8	50	70	90	120	155	205	235
L1	--	--	33.5	38	50	--	70
L2	24.5	36	46	70	97	100	126
L3	4	6.5	8.5	17.5	15	15	18
L4	1	1	1	1.5	3	3	3
L5	14	25	32	40	63	70	90
L6	2	2	3	5	5	6	7
L7	8	10	12	16	20	22	28
L8	115.5	146	201	252	324.5	379.5	461.5
L9	4.5	4.8	7.2	10	12	15	15
L10	10	12.5	19	28	36	42	42
C1[1]	46	70	100	130	165	215	235
C2[1]	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M12 x 1.75P
C3[1]	≦11 / ≦12	≦14 / ≦16	≦19 / ≦24	≦32	≦38	≦48	≦55
C4[1]	30	34	40	50	60	85	116
C5[1]	30	50	80	110	130	180	200
C6[1]	3.5	8	4	5	6	6	6
C7[1]	48	60	90	115	142	190	220
C8[1]	19.5	19	17	19.5	22.5	29	63
C9[1]	100.5	116.5	159.5	199	245.5	316	398.5
C10[1]	13.25	13.5	10.75	13	15	20.75	53.5
C11[1]	74	81.5	107.5	134	164.5	213.5	268.5
B1 h9	4	5	6	10	12	16	20
H1	14	18	24.5	35	43	59	79.5

1. C1~C11 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.

▶ Dimensions (2-stage, Ratio i=15~200) / AER Series

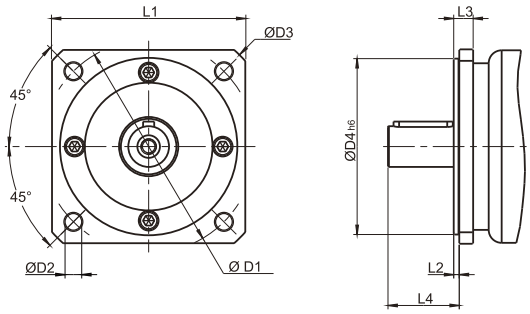


[unit: mm]

Dimension	AER050	AER070	AER090	AER120	AER155	AER205	AER235
D1	44	62	80	108	140	184	210
D2	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M16 x 2P
D3 j6	12	16	22	32	40	55	75
D4 h6	35	52	68	90	120	160	180
D5	22	22	30	40	75	95	115
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P
D7	53	70	104	130	162	205	260
D8	50	70	90	120	155	205	235
L1	--	--	33.5	38	50	--	70
L2	24.5	36	46	70	97	100	126
L3	4	6.5	8.5	17.5	15	15	18
L4	1	1	1	1.5	3	3	3
L5	14	25	32	40	63	70	90
L6	2	2	3	5	5	6	7
L7	8	10	12	16	20	22	28
L8	142.5	167.5	207.5	283	358	422.5	506.5
L9	4.5	4.8	7.2	10	12	15	15
L10	10	12.5	19	28	36	42	42
C1[2]	46	46	70	100	130	165	215
C2[2]	M4 x 0.7P	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P
C3[2]	≦11 / ≦12	≦11 / ≦12	≦14 / ≦15.875 / ≦16	≦19 / ≦24	≦32	≦38	≦48
C4[2]	30	30	34	40	50	60	85
C5[2]	30	30	50	80	110	130	180
C6[2]	3.5	3.5	8	4	5	6	6
C7[2]	48	48	60	90	115	142	190
C8[2]	19.5	19.5	19	17	19.5	22.5	29
C9[2]	100.5	109	133.5	172.5	215	267	343.5
C10[2]	13.25	13.25	13.5	10.75	13	15	20.75
C11[2]	74	74	81.5	107.5	134	164.5	213.5
B1 h9	4	5	6	10	12	16	20
H1	14	18	24.5	35	43	59	79.5

2. C1~C11 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.

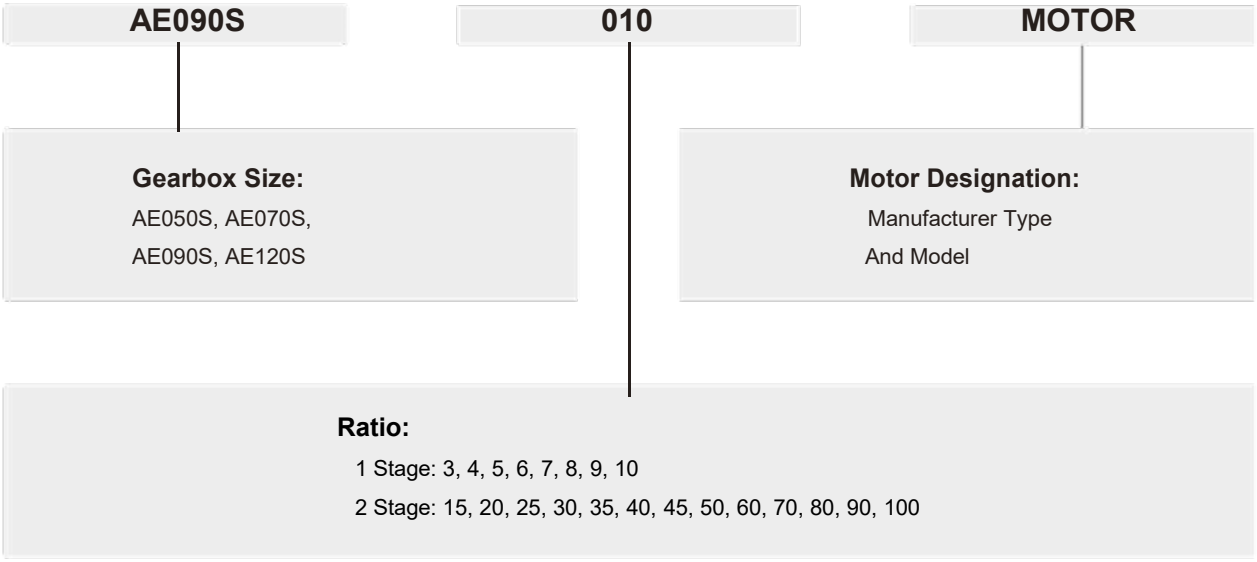
▶ Front Plate Option



[unit: mm]

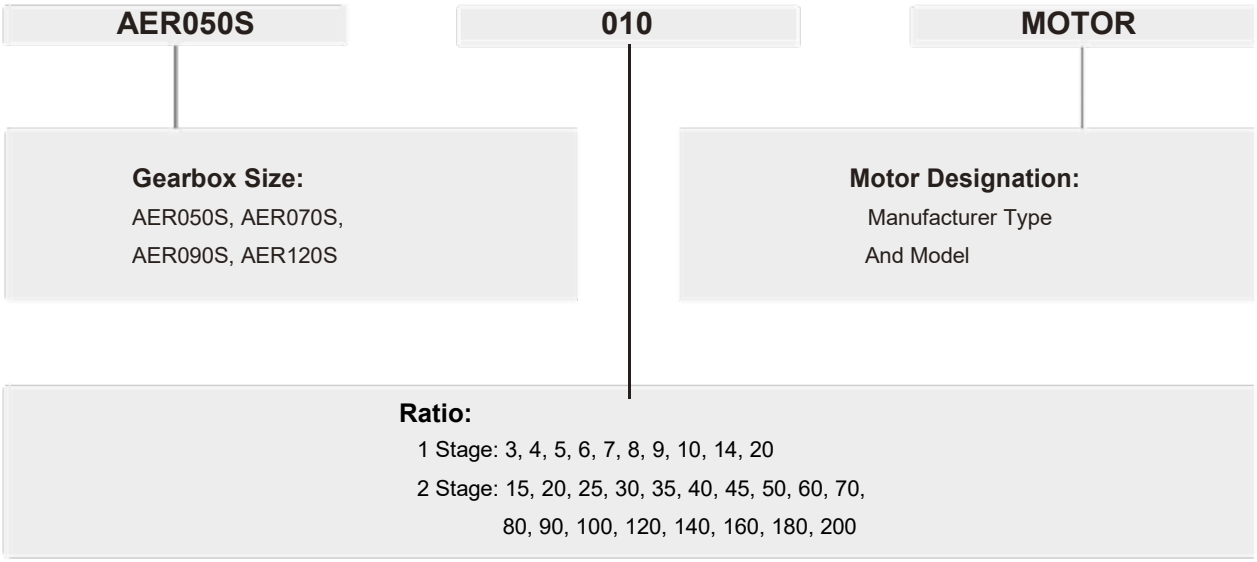
Dimension	D1	D2	D3	D4^{h6}	L1	L2	L3	L4
AE050(AER050)-NEMA 23	66.675	6	77	38.1	57.2	2	8	18.5
AE050(AER050)-PX60	70	5.6	80.5	50	60	2.5	8.5	18.5
AE070(AER070)-Metric	90	6.6	106	50	80	3	11	28
AE070(AER070)-NEMA 34	98.425	5.5	115	73.025	86	2.5	8	30.5
AE070(AER070)-DT90 / PX90	100	6.6	120	80	90	3	8	31
AE090(AER090)-IEC 63D5 B5	115	9	140	95	105	3	10.5	38.5
AE090(AER090)-NEMA 34	98.425	5.5	120	73.025	92	2.5	12.5	36
AE090(AER090)-DT90 / PX90	100	6.5	120	80	92	2.5	12.5	36
AE090(AER090)-NEMA 42	125.73	7	144	55.58	107	4	14.5	35.5
AE120(AER120)-NEMA 42	125.73	7.1	170	55.499	127	1.5	21.5	50
AE120(AER120)-NEMA 56	149.225	6.6	170	114.3	127	3	17.5	55.5
AE155(AER155)-B5	175	11	196	130	160	5	20	82
AE205(AER205)-B5	230	13	277	180	210	5	23	82
AE235(AER235)-B5	275	17	317	235	240	5	23	108

AES SERIES



Ordering Example: AE090S-010-FG / KOLLMORGEN AKMH41C-CN

AERS SERIES



Ordering Example: AER090S-010-FG / KOLLMORGEN AKMH41C-CN

▶ Performance - AES Gearbox

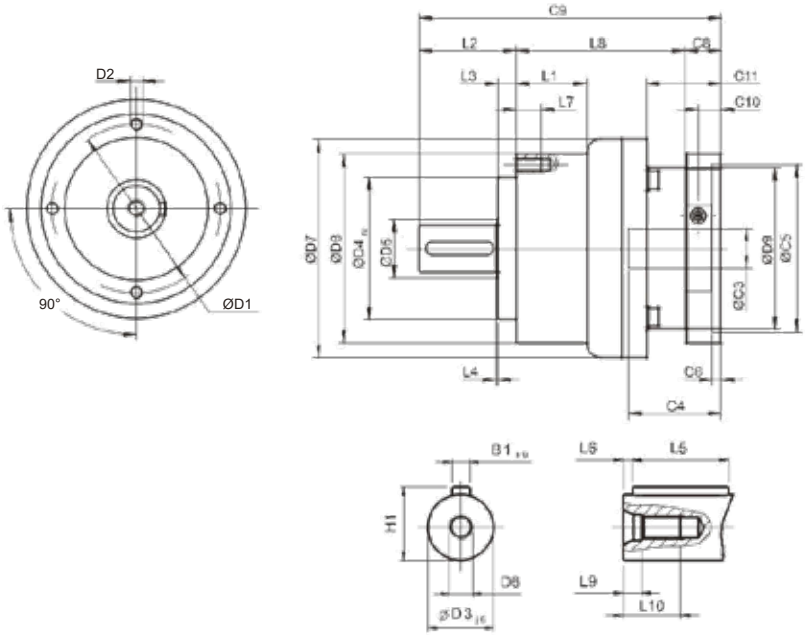
Model No.		Stage	Ratio[A]	AE050S	AE070S	AE090S	AE120S
Nominal output torque T_{2N}	Nm	1	3	20	55	130	208
			4	19	50	140	290
			5	22	60	160	330
			6	20	55	150	310
			7	19	50	140	300
			8	17	45	120	260
			9	14	40	100	230
			10	14	40	100	230
		2	15	20	55	130	208
			20	19	50	140	290
			25	22	60	160	330
			30	20	55	150	310
			35	19	50	140	300
			40	17	45	120	260
			45	14	40	100	230
			50	22	60	160	330
			60	20	55	150	310
			70	19	50	140	300
			80	17	45	120	260
			90	14	40	100	230
			100	14	40	100	230
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	3~100	3 times of nominal output torque			
Nominal input speed n_{1N}	rpm	1,2	3~100	5,000	5,000	4,000	4,000
Max. input speed n_{1B}	rpm	1,2	3~100	10,000	10,000	8,000	8,000
Backlash	arcmin	1	3~10	≤ 8	≤ 8	≤ 8	≤ 8
		2	15~100	≤ 12	≤ 12	≤ 12	≤ 12
Torsional rigidity	Nm/arcmin	1,2	3~100	3	8	14	25
Max. Radial Load F_{2rB}[C]	N	1,2	3~100	702	1,377	2,985	6,100
Max. Axial Load F_{2aB}[C]	N	1,2	3~100	390	765	1,625	3,350
Service Life[D]	hr	1,2	3~100	20,000			
Efficiency Ƞ	%	1	3~10	≥ 97%			
		2	15~100	≥ 94%			
Weight	kg	1	3~10	0.6	1.4	3.3	6.9
		2	15~100	0.9	1.6	4.7	8.7
Operating temp	ºC	1,2	3~100	-10 ºC ~ 90 ºC			
Lubrication				Synthetic lubrication oils / Foodgrade			
Degree of gearbox protection		1,2	3~100	IP65			
Mounting position		1,2	3~100	all directions			
Noise (n_1=3000rpm,i=10,No load)[E]	dB (A)	1,2	3~100	≤ 56	≤ 58	≤ 60	≤ 63

Gearbox Inertia

Model No.		Stage	Ratio[A]	AE050S	AE070S	AE090S	AE120S
Mass moments of inertia J_1	kg · cm^2	1	3	0.03	0.16	0.61	3.25
			4	0.03	0.14	0.48	2.74
			5	0.03	0.13	0.47	2.71
			6	0.03	0.13	0.45	2.65
			7	0.03	0.13	0.45	2.62
			8	0.03	0.13	0.44	2.58
			9	0.03	0.13	0.44	2.57
			10	0.03	0.13	0.44	2.57
		2	15	0.03	0.03	0.13	0.47
			20	0.03	0.03	0.13	0.47
			25	0.03	0.03	0.13	0.47
			30	0.03	0.03	0.13	0.47
			35	0.03	0.03	0.13	0.47
			40	0.03	0.03	0.13	0.47
			45	0.03	0.03	0.13	0.47
			50	0.03	0.03	0.13	0.44
			60	0.03	0.03	0.13	0.44
			70	0.03	0.03	0.13	0.44
			80	0.03	0.03	0.13	0.44
			90	0.03	0.03	0.13	0.44
			100	0.03	0.03	0.13	0.44

A. Ratio ($i=N_{in} / N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm
D. For continuous operation, the service life time is less than 10,000 hrs
E. These values are measured by gearbox with ratio = 10 (1-stage) or ratio = 100 (2-stage) at 3,000 rpm no loading. By less smaller than 10, the noise value would be 3~5 dB higher

▶ Dimensions (1-stage, Ratio i=3~10) / AES Series

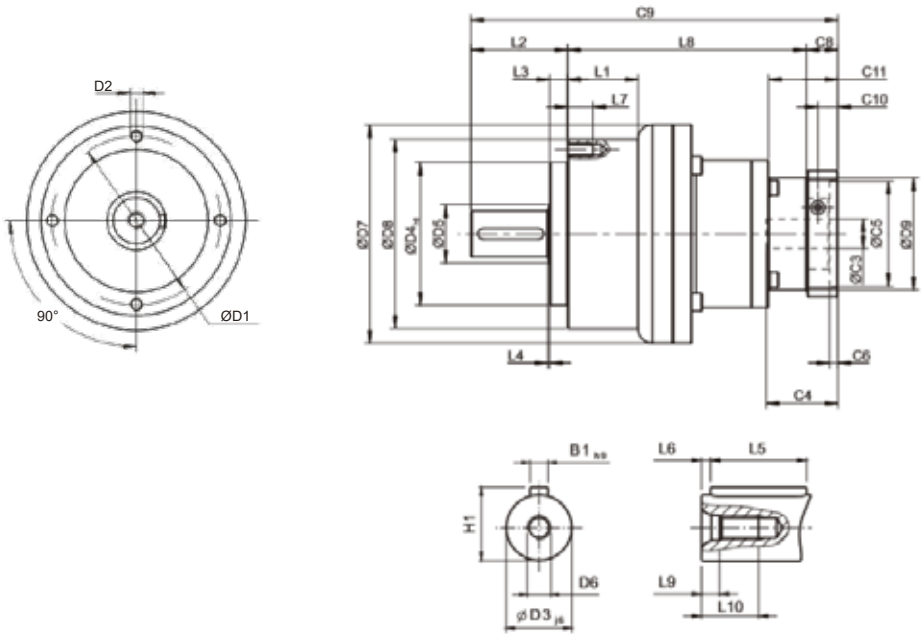


[unit: mm]

Dimension	AE050S	AE070S	AE090S	AE120S
D1	44	62	80	108
D2	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P
D3 $_{j6}$	12	16	22	32
D4 $_{h6}$	35	52	68	90
D5	22	22	30	40
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P
D7	53	70	104	130
D8	50	70	90	120
D9	45.5	53.4	77	102
L1	--	--	33.5	38
L2	24.5	36	46	70
L3	4	6.5	8.5	17.5
L4	1	1	1	1.5
L5	14	25	32	40
L6	2	2	3	5
L7	8	10	12	16
L8	47	62	80.5	97
L9	4.5	4.8	7.2	10
L10	10	12.5	19	28
C3[1]	≤ 11 / ≤ 12[2]	≤ 14 / ≤ 16[2]	≤ 19 / ≤ 24[2]	≤ 32
B1 $_{h9}$	4	5	6	10
H1	14	18	24.5	35

1. C1~C11 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.
2. AE050S ratio 5, 10 offers C3 ≤ 12 option; AE070S ratio 5, 10 offers C3 ≤ 16 option.

▶ Dimensions (2-stage, Ratio i=15~100) / AES Series



[unit: mm]

Dimension	AE050S	AE070S	AE090S	AE120S
D1	44	62	80	108
D2	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P
D3 $_{j6}$	12	16	22	32
D4 $_{h6}$	35	52	68	90
D5	22	22	30	40
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P
D7	53	70	104	130
D8	50	70	90	120
D9	45.5	53.4	77	102
L1	--	--	33.5	38
L2	24.5	36	46	70
L3	4	6.5	8.5	17.5
L4	1	1	1	1.5
L5	14	25	32	40
L6	2	2	3	5
L7	8	10	12	16
L8	74	87.5	113.5	138.5
L9	4.5	4.8	7.2	10
L10	10	12.5	19	28
C3[1]	≤ 11 / ≤ 12	≤ 11 / ≤ 12	≤ 14 / ≤ 15.875 / ≤ 16	≤ 19 / ≤ 24
B1 $_{h9}$	4	5	6	10
H1	14	18	24.5	35

3. C1~C11 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system

Performance - AERS Gearbox

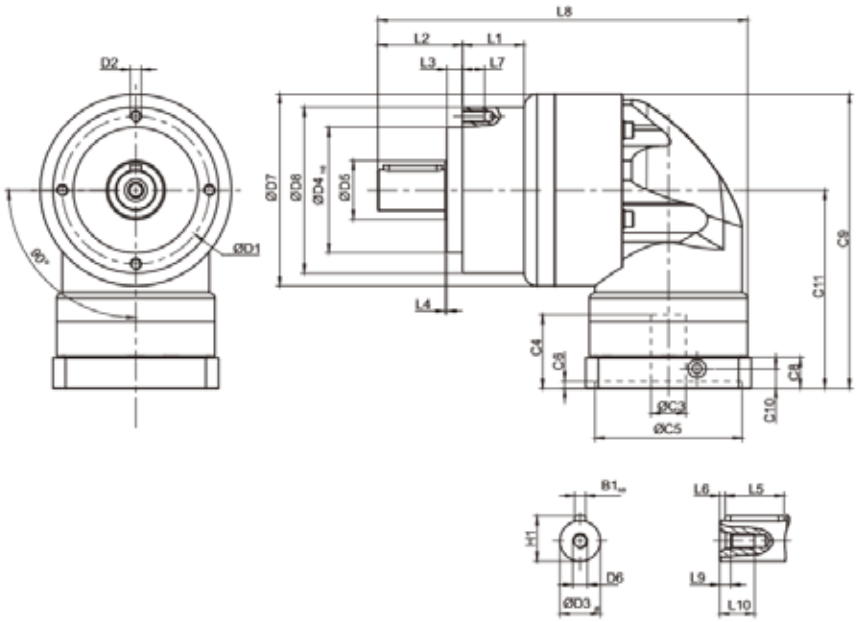
Model No.		Stage	Ratio[A]	AER050S	AER070S	AER090S	AER120S
Nominal output torque T_{2N}	Nm	1	3	9	36	90	195
			4	12	48	120	260
			5	15	60	150	325
			6	18	55	150	310
			7	19	50	140	300
			8	17	45	120	260
			9	14	40	100	230
			10	14	60	150	325
			14	-	42	140	300
			20	-	40	100	230
		2	15	14	-	-	-
			20	14	-	-	-
			25	15	60	150	325
			30	20	55	150	310
			35	19	50	140	300
			40	17	45	120	260
			45	14	40	100	230
			50	14	60	100	230
			60	20	55	150	310
			70	19	50	140	300
			80	17	45	120	260
			90	14	40	100	230
			100	14	40	100	230
			120	-	-	150	310
			140	-	-	140	300
			160	-	-	120	260
			180	-	-	100	230
			200	-	-	100	230
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	3~200	3 times of nominal output torque			
Nominal input speed n_{1N}	rpm	1,2	3~200	5,000	5,000	4,000	4,000
Max. input speed n_{1B}	rpm	1,2	3~200	10,000	10,000	10,000	8,000
Backlash	arcmin	1	3~20	≤ 10	≤ 10	≤ 10	≤ 10
		2	25~200	≤ 14	≤ 14	≤ 14	≤ 14
Torsional rigidity	Nm/arcmin	1,2	3~200	3	7	14	25
Max. Radial Load F_{2rB}[C]	N	1,2	3~200	702	1,377	2,985	6,100
Max. Axial Load F_{2aB}[C]	N	1,2	3~200	390	765	1,625	3,350
Service Life[D]	hr	1,2	3~200	20,000 *			
Efficiency Ƞ	%	1	3~20	≥ 95%			
		2	25~200	≥ 92%			
Weight	kg	1	3~20	1.0	2.1	5.8	11.2
		2	25~200	1.3	2.0	4.6	11.1
Operating temp	ºC	1,2	3~200	-10 ºC ~ 90 ºC			
Lubrication				Synthetic lubrication oils / Foodgrade			
Degree of gearbox protection		1,2	3~200	IP65			
Mounting position		1,2	3~200	all directions			
Noise (n_1=3000rpm,i=10,No load)[E]	dB (A)	1,2	3~200	≤ 61	≤ 63	≤ 65	≤ 68

Inertia - AERS Gearbox

Model No.		Stage	Ratio[A]	AER050S	AER070S	AER090S	AER120S
Mass Moments of Inertia J_1	kg · cm^2	1	3~10	0.09	0.35	2.25	6.84
			14	-	0.07	1.87	6.25
			20	-	0.07	1.87	6.25
		2	15	0.09	-	-	-
			20	0.09	-	-	-
			25~100	0.09	0.09	0.35	2.25
			120~200	-	-	0.31	1.87

A. Ratio ($i=N_{in} / N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm
D. For continuous operation, the service life time is less than 10,000 hrs
E. These values are measured by gearbox with ratio = 10 (1-stage) or ratio = 100 (2-stage) at 3,000 rpm no loading. By less smaller than 10, the noise value would be 3~5 dB higher

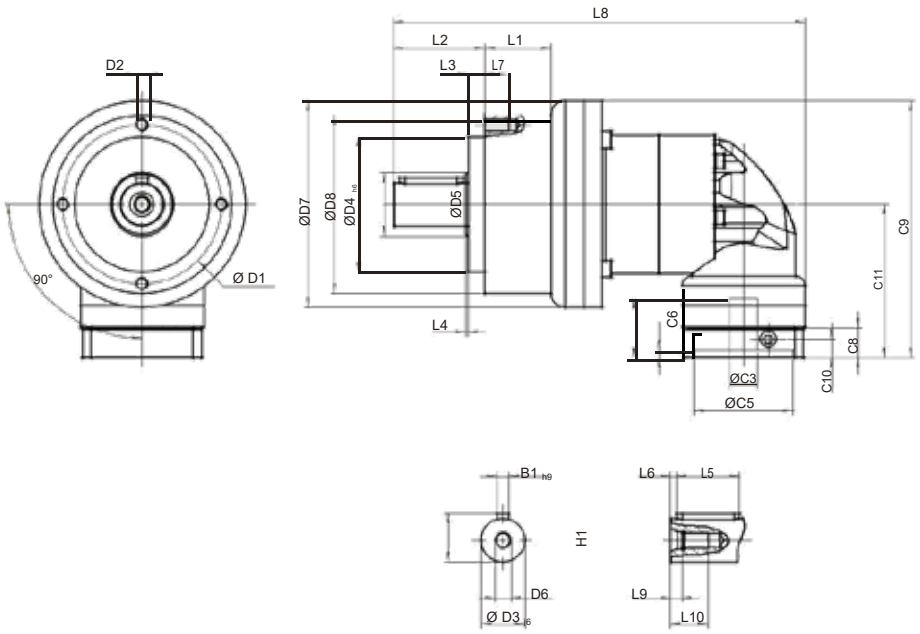
▶ Dimensions (1-stage, Ratio i=3~20) / AERS Series



Dimension	AER050S	AER070S	AER090S	AER120S
D1	44	62	80	108
D2	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P
D3 $_{j6}$	12	16	22	32
D4 $_{h6}$	35	52	68	90
D5	22	22	30	40
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P
D7	53	70	104	130
D8	50	70	90	120
L1	--	--	33.5	38
L2	24.5	36	46	70
L3	4	6.5	8.5	17.5
L4	1	1	1	1.5
L5	14	25	32	40
L6	2	2	3	5
L7	8	10	12	16
L8	115.5	146	201	252
L9	4.5	4.8	7.2	10
L10	10	12.5	19	28
C3[1]	≤11 / ≤ 12	≤ 14 / ≤ 16	≤ 19 / ≤ 24	≤ 32
B1 $_{h9}$	4	5	6	10
H1	14	18	24.5	35

1. C1~C11 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.

▶ Dimensions (2-stage, Ratio i=15~200) / AERS Series



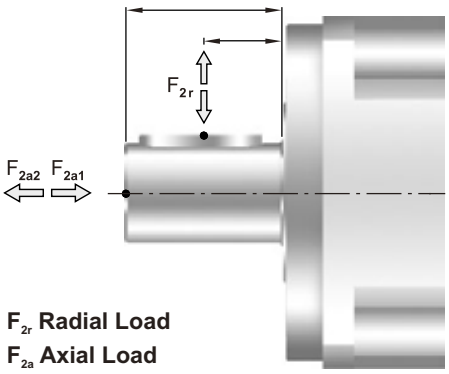
Dimension	AER050S	AER070S	AER090S	AER120S
D1	44	62	80	108
D2	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P
D3 $_{j6}$	12	16	22	32
D4 $_{h6}$	35	52	68	90
D5	22	22	30	40
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P
D7	53	70	104	130
D8	50	70	90	120
L1	--	--	33.5	38
L2	24.5	36	46	70
L3	4	6.5	8.5	17.5
L4	1	1	1	1.5
L5	14	25	32	40
L6	2	2	3	5
L7	8	10	12	16
L8	142.5	167.5	207.5	283
L9	4.5	4.8	7.2	10
L10	10	12.5	19	28
C3[2]	≤ 11 / ≤ 12	≤ 11 / ≤ 12	≤ 14 / ≤ 15.875 / ≤ 16	≤ 19 / ≤ 24
B1 $_{h9}$	4	5	6	10
H1	14	18	24.5	35

2. C1~C11 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.

▶ Materials AES - AERS

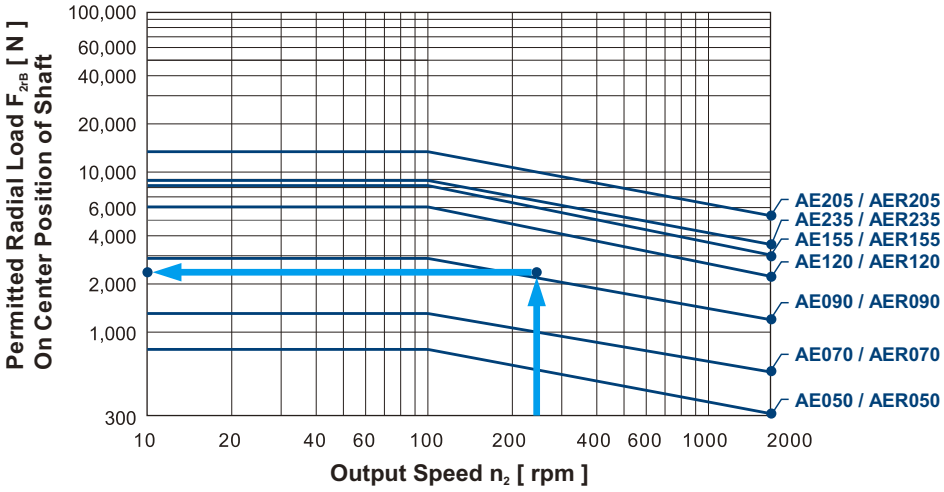
Material AES - AERS	
Component	**Material**
Housing	SUS416
Right-Angle housing (AERS only)	SUS304
Adapter (Round)	SUS304
PK cover (Input part)	SUS304
Output shaft	SUS416
Bolts	SUS304
Key	SUS304
Standard lubrication	Synthetic lubrication oils / Foodgrade

Permitted Radial and Axial Loads

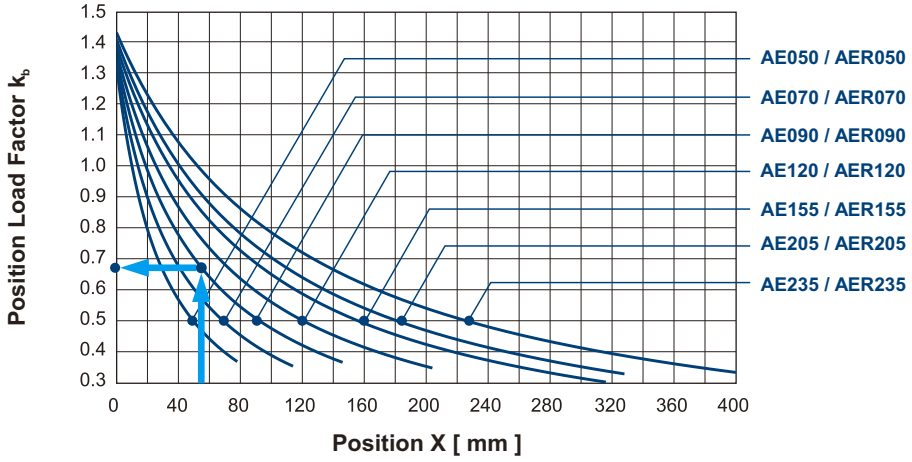


F_{2r} Radial Load
F_{2a} Axial Load

The permitted radial and axial loads on output shaft of the gearbox depend on the design of the gearbox supporting bearings.
APEX use the extension straddle oversized ball bearing design.
It can take heavy load from both axes.

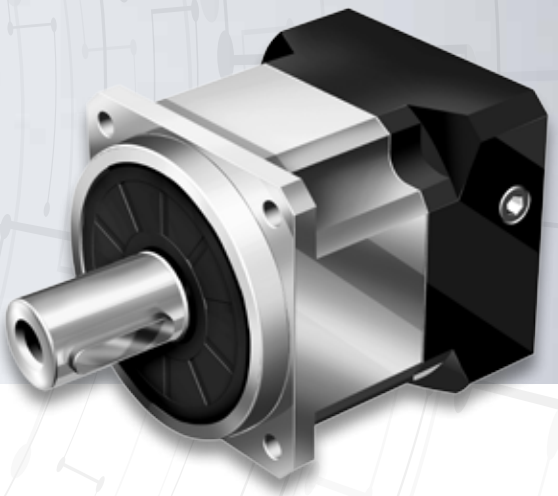


If radial force F_{2r} exert on the center of the output shaft X=1/2 x L.
The permitted radial load is given on left diagram.



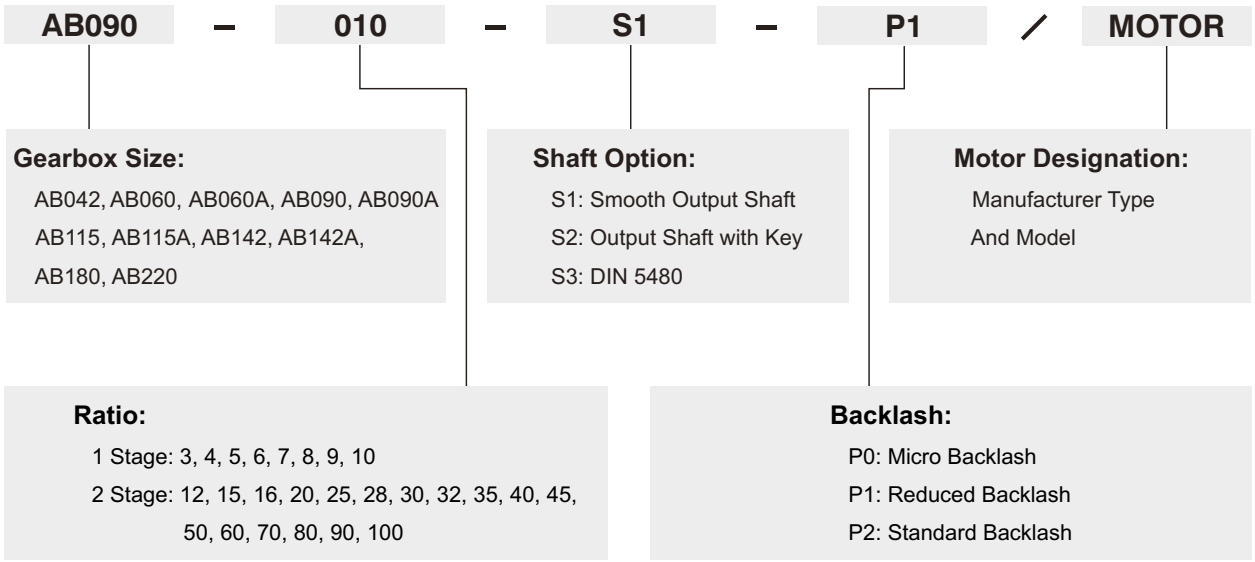
If radial force F_{2r} not exert on the center of the output shaft X<1/2 x L or X>1/2 x L
The permitted radial and axial load can be calculated by the position load factor K_b on the left diagram.

HIGH PRECISION
PLANETARY GEARBOX



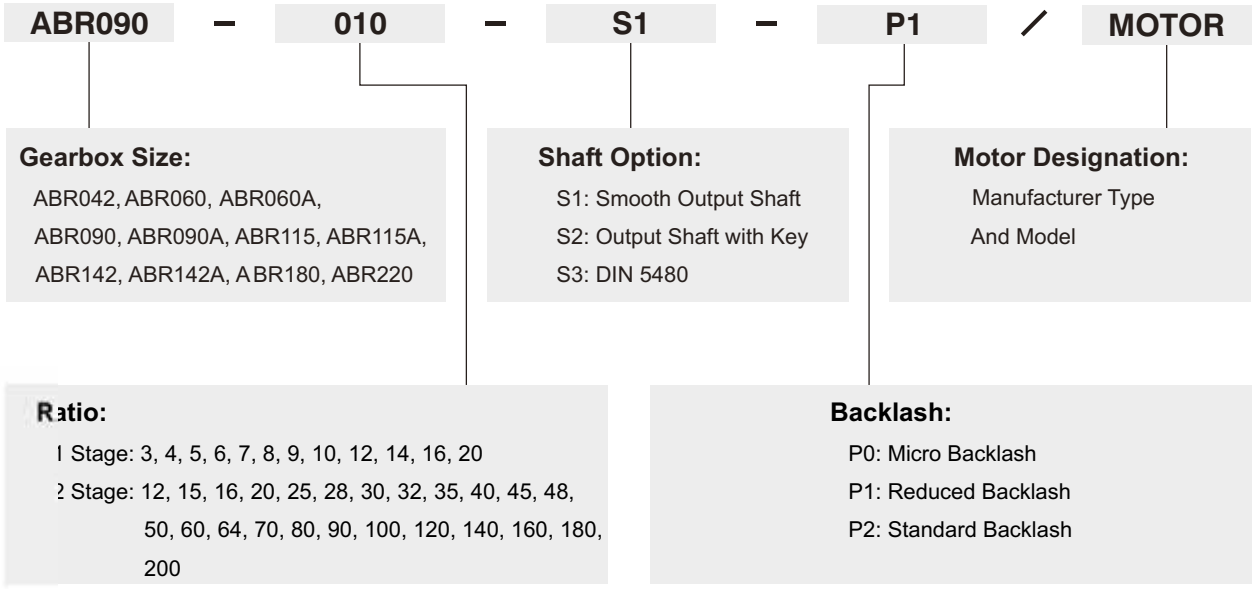
AB - ABR Series

AB Series



Ordering Example: AB090-010-S1-P1 / SIEMENS 1FT6 041-4AF71

ABR Series



Ordering Example: ABR090-010-S1-P1 / SIEMENS 1FT6 041-4AF71

▶ Performance - AB Gearbox

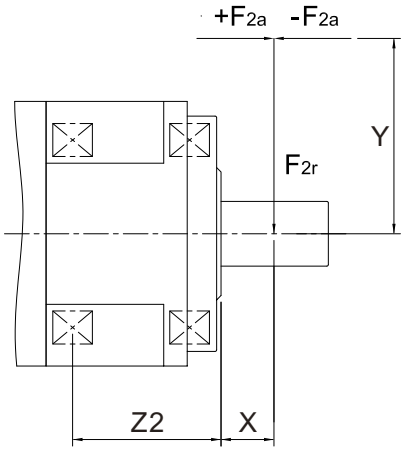
Model No.		Stage	Ratio[A]	AB042	AB060	AB060A	AB090	AB090A	AB115	AB115A	AB142	AB142A	AB180	AB220
Nominal Output Torque T_{2N}	Nm	1	3	20	55	–	130	–	208	–	342	–	588	1,140
			4	19	50	–	140	–	290	–	542	–	1,050	1,700
			5	22	60	–	160	–	330	–	650	–	1,200	2,000
			6	20	55	–	150	–	310	–	600	–	1,100	1,900
			7	19	50	–	140	–	300	–	550	–	1,100	1,800
			8	17	45	–	120	–	260	–	500	–	1,000	1,600
			9	14	40	–	100	–	230	–	450	–	900	1,500
			10	14	40	–	100	–	230	–	450	–	900	1,500
		2	12	19	50	50	140	140	290	290	542	542	1,050	1,700
			15	20	55	55	130	130	208	208	342	342	588	1,140
			16	19	50	50	140	140	290	290	542	542	1,050	1,700
			20	19	50	50	140	140	290	290	542	542	1,050	1,700
			25	22	60	60	160	160	330	330	650	650	1,200	2,000
			28	19	50	50	140	140	300	300	550	550	1,100	1,800
			30	20	55	55	150	150	310	310	600	600	1,100	1,900
			32	17	45	45	120	120	260	260	500	500	1,000	1,600
			35	19	50	50	140	140	300	300	550	550	1,100	1,800
			40	17	45	45	120	120	260	260	500	500	1,000	1,600
			45	14	40	40	100	100	230	230	450	450	900	1,500
			50	22	60	60	160	160	330	330	650	650	1,200	2,000
			60	20	55	55	150	150	310	310	600	600	1,100	1,900
			70	19	50	50	140	140	300	300	550	550	1,100	1,800
			80	17	45	45	120	120	260	260	500	500	1,000	1,600
			90	14	40	40	100	100	230	230	450	450	900	1,500
			100	14	40	40	100	100	230	230	450	450	900	1,500
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	3~100	3 times of Nominal Output Torque										
Nominal Input Speed n_{1N}	rpm	1,2	3~100	5,000	5,000	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000	2,000
Max. Input Speed n_{1B}	rpm	1,2	3~100	10,000	10,000	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000	4,000
Micro Backlash P0	arcmin	1	3~10	–	–	–	≤1	–	≤1	–	≤1	–	≤1	≤1
		2	12~100	–	–	–	–	–	≤3	≤3	≤3	≤3	≤3	≤3
Reduced Backlash P1	arcmin	1	3~10	≤3	≤3	–	≤3	–	≤3	–	≤3	–	≤3	≤3
		2	12~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5
Standard Backlash P2	arcmin	1	3~10	≤5	≤5	–	≤5	–	≤5	–	≤5	–	≤5	≤5
		2	12~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	7	7	14	14	25	25	50	50	145	225
Max. Radial Load F_{2rB}[C]	N	1,2	3~100	780	1,530	1,530	3,250	3,250	6,700	6,700	9,400	9,400	14,500	50,000
Max. Axial Load F_{2aB}[C]	N	1,2	3~100	390	765	765	1,625	1,625	3,350	3,350	4,700	4,700	7,250	25,000
Max. Tilting Moment M_{2K}	Nm	1,2	3~100	25	70	70	200	200	550	550	990	990	1,760	7,630
Efficiency η	%	1	3~10	≥97%										
		2	12~100	≥94%										
Weight	kg	1	3~10	0.6	1.3	–	3.7	–	7.8	–	13	–	26	45
		2	12~100	0.8	1.5	1.9	4.1	5.3	9	11.4	17.5	20.7	32	57
Operating Temp	°C	1,2	3~100	-10°C~90°C										
Lubrication		1,2	3~100	Synthetic lubrication oils										
Degree of Gearbox Protection		1,2	3~100	IP65										
Mounting Position		1,2	3~100	all directions										
Noise[D]	dB(A)	1,2	3~100	≤56	≤58	≤60	≤60	≤63	≤63	≤65	≤65	≤67	≤67	≤70

A. Ratio ($i=N_{in}/N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm
D. The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

▶ Inertia - AB Gearbox

Model No.		Stage	Ratio[A]	AB042	AB060	AB060A	AB090	AB090A	AB115	AB115A	AB142	AB142A	AB180	AB220
Mass Moments of Inertia J_1	kg • cm²	1	3	0.03	0.16	–	0.61	–	3.25	–	9.21	–	28.98	69.61
			4	0.03	0.14	–	0.48	–	2.74	–	7.54	–	23.67	54.37
			5	0.03	0.13	–	0.47	–	2.71	–	7.42	–	23.29	53.27
			6	0.03	0.13	–	0.45	–	2.65	–	7.25	–	22.75	51.72
			7	0.03	0.13	–	0.45	–	2.62	–	7.14	–	22.48	50.97
			8	0.03	0.13	–	0.44	–	2.58	–	7.07	–	22.59	50.84
			9	0.03	0.13	–	0.44	–	2.57	–	7.04	–	22.53	50.63
			10	0.03	0.13	–	0.44	–	2.57	–	7.03	–	22.51	50.56
		2	12	0.03	0.03	0.16	0.16	0.61	0.61	3.25	3.25	9.21	9.21	28.98
			15	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			16	0.03	0.03	0.14	0.14	0.48	0.48	2.74	2.74	7.54	7.54	23.67
			20	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			25	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			28	0.03	0.03	0.14	0.14	0.48	0.48	2.74	2.74	7.54	7.54	23.67
			30	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			32	0.03	0.03	0.14	0.14	0.48	0.48	2.74	2.74	7.54	7.54	23.67
			35	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			40	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			45	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			50	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			60	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			70	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			80	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			90	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			100	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51

▶ Max. Tilting Moment M_{2K}



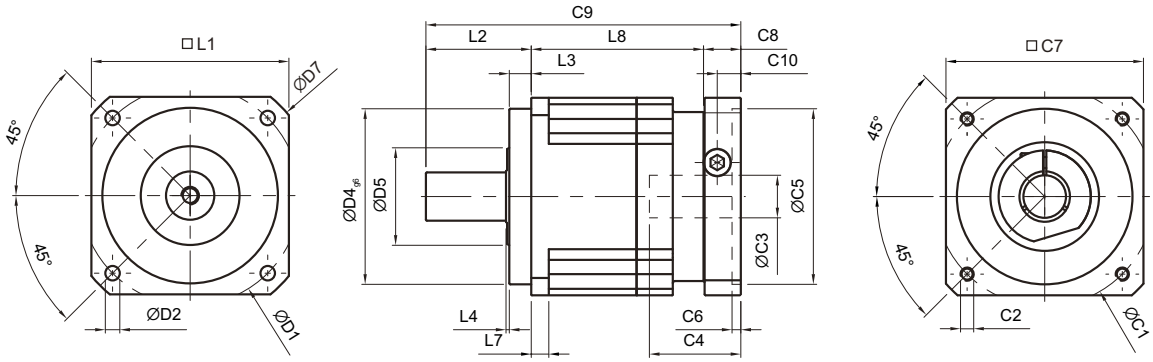
$$M_{2K} = \frac{F_{2a} * Y + F_{2r} * (X+Z2)}{1000}$$

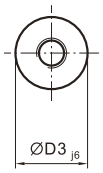
M_{2K} : 【Nm】
F_{2a}, F_{2r} : 【N】
X, Y, Z2 : 【mm】

AB / ABR	042	060	090	115	142	180	220
Z2 【mm】	31	42	56.5	71.5	85.5	102.5	127.1

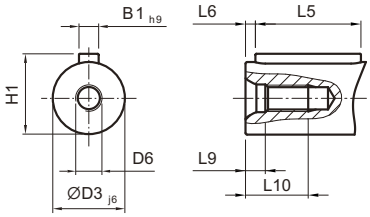
Note : Applied to the output shaft center at 100 rpm.

▶ Dimensions (1-stage, Ratio i=3~10) / AB Series

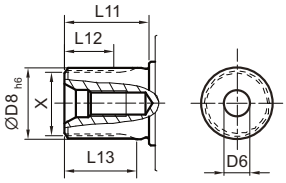




Shaft Option S1



Shaft Option S2



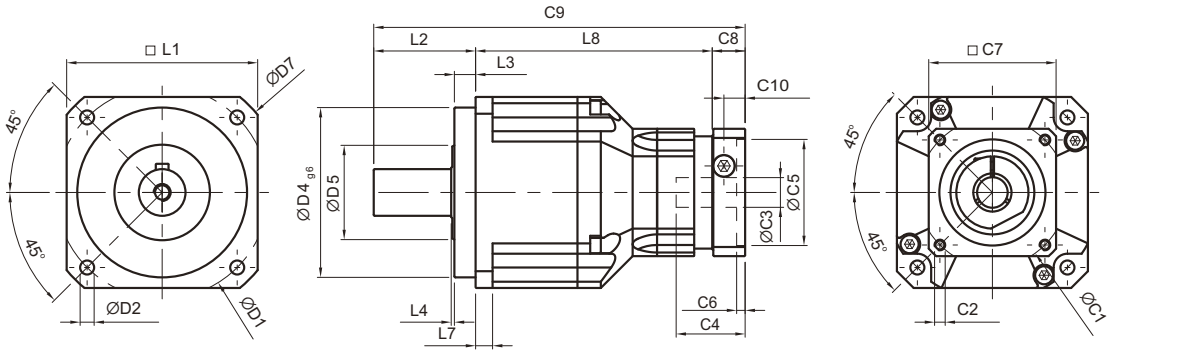
Shaft Option S3

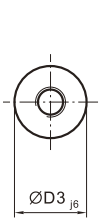
[unit: mm]

Dimension	AB042	AB060	AB090	AB115	AB142	AB180	AB220
D1	50	70	100	130	165	215	250
D2	3.4	5.5	6.6	9	11	13	17
D3 j6	13	16	22	32	40	55	75
D4 g6	35	50	80	110	130	160	180
D5	22	45	65	95	75	95	115
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P
D7	56	80	116	152	185	240	292
D8 h6	-	16	22	32	40	55	75
L1	42	60	90	115	142	180	220
L2	26	37	48	65	97	105	138
L3	5.5	7	10	12	15	20	30
L4	1	1.5	1.5	2	3	3	3
L5	16	25	32	40	63	70	90
L6	2	2	3	5	5	6	7
L7	4	6	8	10	12	15	20
L8	31	61	78.5	102	119.5	154	163.5
L9	4.5	4.8	7.2	10	12	15	15
L10	10	12.5	19	28	36	42	42
L11	-	26	26	26	40	41.5	52
L12	-	15	15	15	20	21.5	28
L13	-	21	22.5	23	33.5	33.5	45
C1[1]	46	70	100	130	165	215	235
C2[1]	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M12 x 1.75P
C3[1]	≤11 / ≤12[2]	≤14 / ≤16[2]	≤19 / ≤24	≤32	≤38	≤48	≤55
C4[1]	25	34	40	50	60	85	116
C5[1]	30	50	80	110	130	180	200
C6[1]	3.5	8	4	5	6	6	6
C7[1]	42	60	90	115	142	190	220
C8[1]	29.5	19	17	19.5	22.5	29	63
C9[1]	86.5	117	143.5	186.5	239	288	364.5
C10[1]	8.75	13.5	10.75	13	15	20.75	53
B1 h9	5	5	6	10	12	16	20
H1	15	18	24.5	35	43	59	79.5
X DIN5480	-	W16x0.8x 30x18x6m	W22x1.25x 30x16x6m	W32x1.25x 30x24x6m	W40x2x 30x18x6m	W55x2x 30x26x6m	W70x2x 30x34x6m

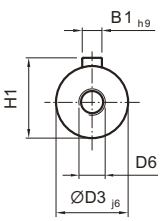
1. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.
2. AB042 ratio 5, 10 offers C3 ≤ 12 option; AB060 ratio 5, 10 offers C3 ≤ 16 option.

▶ Dimensions (2-stage, Ratio i=12~100) / AB Series

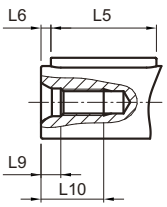


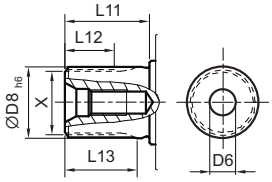


Shaft Option S1



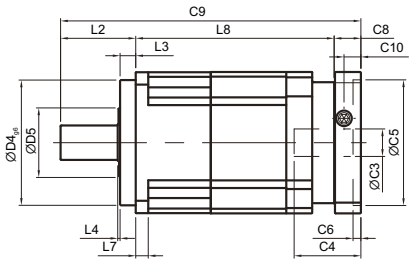
Shaft Option S2





Shaft Option S3

AB060A / AB090A / AB115A / AB142A



[unit: mm]

Dimension	AB042	AB060	AB060A	AB090	AB090A	AB115	AB115A	AB142	AB142A	AB180	AB220
D1	50	70		100		130		165		215	250
D2	3.4	5.5		6.6		9		11		13	17
D3 j6	13	16		22		32		40		55	75
D4 g6	35	50		80		110		130		160	180
D5	22	45		65		95		75		95	115
D6	M4 x 0.7P	M5 x 0.8P		M8 x 1.25P		M12 x 1.75P		M16 x 2P		M20 x 2.5P	M20 x 2.5P
D7	56	80		116		152		185		240	292
D8 h6	-	16		22		32		40		55	75
L1	42	60		90		115		142		180	220
L2	26	37		48		65		97		105	138
L3	5.5	7		10		12		15		20	30
L4	1	1.5		1.5		2		3		3	3
L5	16	25		32		40		63		70	90
L6	2	2		3		5		5		6	7
L7	4	6		8		10		12		15	20
L8	58.5	72	98	111.5	126.5	143.5	163	176	191	209.5	248
L9	4.5	4.8		7.2		10		12		15	15
L10	10	12.5		19		28		36		42	42
L11	-	26		26		26		40		41.5	52
L12	-	15		15		15		20		21.5	28
L13	-	21		22.5		23		33.5		33.5	45
C1[3]	46	46	70	70	100	100	130	130	165	165	215
C2[3]	M4 x 0.7P	M4 x 0.7P	M5 x 0.8P	M5 x 0.8P	M6 x 1P	M6 x 1P	M8 x 1.25P	M8 x 1.25P	M10 x 1.5P	M10 x 1.5P	M12 x 1.75P
C3[3]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤16	≤14 / ≤15.875 / ≤16	≤19 / ≤24	≤19 / ≤24	≤32	≤32	≤38	≤38	≤48
C4[3]	25	25	34	34	40	40	50	50	60	60	85
C5[3]	30	30	50	50	80	80	110	110	130	130	180
C6[3]	3.5	3.5	8	8	4	4	5	5	6	6	6
C7[3]	42	42	60	60	90	90	115	115	142	142	190
C8[3]	29.5	29.5	19	19	17	17	19.5	19.5	22.5	22.5	29
C9[3]	114	138.5	154	178.5	191.5	225.5	247.5	292.5	310.5	337	415
C10[3]	8.75	8.75	13.5	13.5	10.75	10.75	13	13	15	15	20.75
B1 h9	5	5		6		10		12		16	20
H1	15	18		24.5		35		43		59	79.5
X DIN5480	-	W16x0.8x 30x18x6m		W22x1.25x 30x16x6m		W32x1.25x 30x24x6m		W40x2x 30x18x6m		W55x2x 30x26x6m	W70x2x 30x34x6m

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

▶ Performance - ABR Gearbox

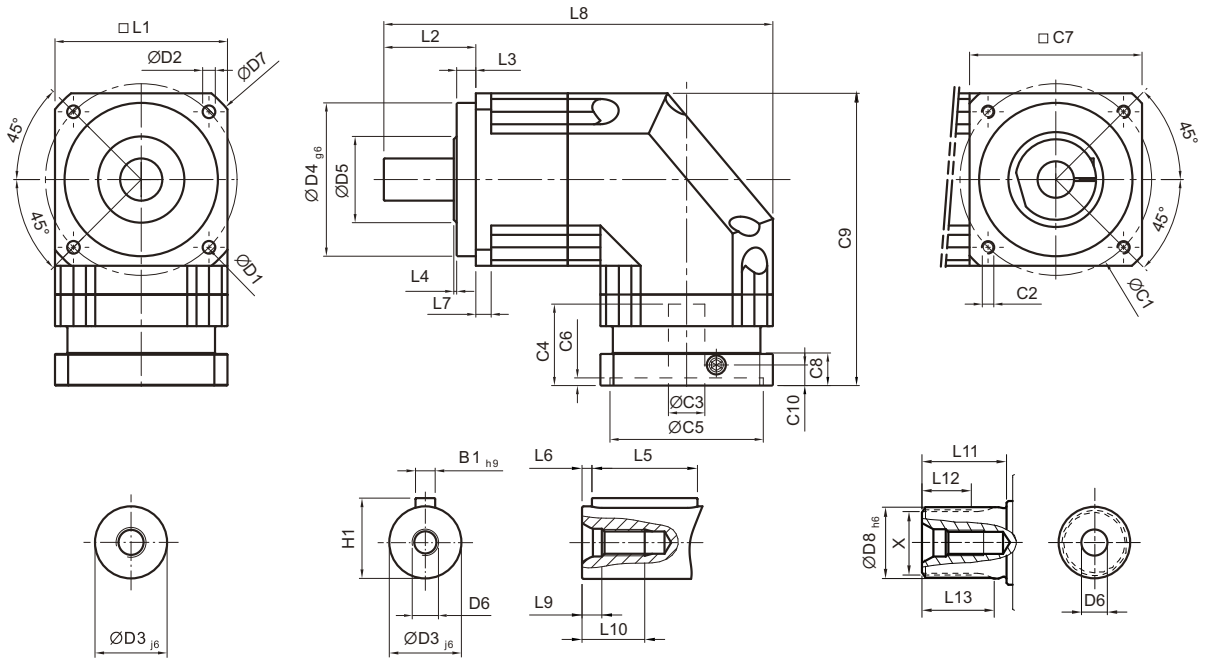
Model No.		Stage	Ratio[A]	ABR042	ABR060	ABR060A	ABR090	ABR090A	ABR115	ABR115A	ABR142	ABR142A	ABR180	ABR220
Nominal Output Torque T_{2N}	Nm	1	3	9	36	–	90	–	195	–	342	–	588	1,140
			4	12	48	–	120	–	260	–	520	–	1,040	1,680
			5	15	60	–	150	–	325	–	650	–	1,200	2,000
			6	18	55	–	150	–	310	–	600	–	1,100	1,900
			7	19	50	–	140	–	300	–	550	–	1,100	1,800
			8	17	45	–	120	–	260	–	500	–	1,000	1,600
			9	14	40	–	100	–	230	–	450	–	900	1,500
			10	14	60	–	150	–	325	–	650	–	1,200	2,000
			12	–	55	–	150	–	310	–	600	–	1,100	1,900
			14	–	42	–	140	–	300	–	550	–	1,100	1,800
			16	–	45	–	120	–	260	–	500	–	1,000	1,600
			20	–	40	–	100	–	230	–	450	–	900	1,500
		2	12	12	–	–	–	–	–	–	–	–	–	–
			15	14	–	–	–	–	–	–	–	–	–	–
			16	15	–	–	–	–	–	–	–	–	–	–
			20	14	–	–	–	–	–	–	–	–	–	–
			25	15	60	60	150	150	325	325	650	650	1,200	2,000
			28	19	50	50	140	140	300	300	550	550	1,100	1,800
			30	20	55	55	150	150	310	310	600	600	1,100	1,900
			32	17	45	45	120	120	260	260	500	500	1,000	1,600
			35	19	50	50	140	140	300	300	550	550	1,100	1,800
			40	17	45	45	120	120	260	260	500	500	1,000	1,600
			45	14	40	40	100	100	230	230	450	450	900	1,500
			48	–	–	55	150	150	310	310	600	600	1,100	1,900
			50	14	60	60	150	150	325	325	650	650	1,200	2,000
			60	20	55	55	150	150	310	310	600	600	1,100	1,900
			64	–	–	45	120	120	260	260	500	500	1,000	1,600
			70	19	50	50	140	140	300	300	550	550	1,100	1,800
			80	17	45	45	120	120	260	260	500	500	1,000	1,600
			90	14	40	40	100	100	230	230	450	450	900	1,500
			100	14	40	60	150	150	325	325	650	650	1,200	2,000
			120	–	–	55	150	150	310	310	600	600	1,100	1,900
			140	–	–	50	140	140	300	300	550	550	1,100	1,800
			160	–	–	45	120	120	260	260	550	550	1,000	1,600
			180	–	–	40	100	100	230	230	450	450	900	1,500
			200	–	–	40	100	100	230	230	450	450	900	1,500
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	3~200	3 times of Nominal Output Torque										
Nominal Input Speed n_{1N}	rpm	1,2	3~200	5,000	5,000	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000	2,000
Max. Input Speed n_{1B}	rpm	1,2	3~200	10,000	10,000	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000	4,000
Micro Backlash P0	arcmin	1	3~20	–	–	–	≤2	–	≤2	–	≤2	–	≤2	≤2
		2	12~200	–	–	–	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4
Reduced Backlash P1	arcmin	1	3~20	≤4	≤4	–	≤4	–	≤4	–	≤4	–	≤4	≤4
		2	12~200	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Standard Backlash P2	arcmin	1	3~20	≤6	≤6	–	≤6	–	≤6	–	≤6	–	≤6	≤6
		2	12~200	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9
Torsional Rigidity	Nm/arcmin	1,2	3~200	3	7	7	14	14	25	25	50	50	145	225
Max. Radial Load F_{2rB}[C]	N	1,2	3~200	780	1,530	1,530	3,250	3,250	6,700	6,700	9,400	9,400	14,500	50,000
Max. Axial Load F_{2aB}[C]	N	1,2	3~200	390	765	765	1,625	1,625	3,350	3,350	4,700	4,700	7,250	25,000
Max. Tilting Moment M_{2K}	Nm	1,2	3~200	25	70	70	200	200	550	550	990	990	1,760	7,630
Efficiency η	%	1	3~20	≥95%										
		2	12~200	≥92%										
Weight	kg	1	3~20	0.9	2.1	–	6.4	–	12.1	–	23	–	44.5	77
		2	12~200	1.2	1.8	2.7	4.8	7.9	11.5	15.9	21.5	29.6	41.5	75
Operating Temp	°C	1,2	3~200	-10°C~+90°C										
Lubrication		1,2	3~200	Synthetic lubrication oils										
Degree of Gearbox Protection		1,2	3~200	IP65										
Mounting Position		1,2	3~200	all directions										
Noise[D]	dB(A)	1,2	3~200	≤61	≤63	≤65	≤65	≤68	≤68	≤70	≤70	≤72	≤72	≤74

A. Ratio ($i=N_{in}/N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm
D. The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

▶ Inertia - ABR Gearbox

Model No.		Stage	Ratio	ABR042	ABR060	ABR060A	ABR090	ABR090A	ABR115	ABR115A	ABR142	ABR142A	ABR180	ABR220
Mass Moments of Inertia J_1	kg • cm^2	1	3~10	0.09	0.35	–	2.25	–	6.84	–	23.4	–	68.9	135.4
			12~20	–	0.07	–	1.87	–	6.25	–	21.8	–	65.6	119.8
		2	12~20	0.09	–	–	–	–	–	–	–	–	–	–
			25~90	0.09	0.09	0.35	0.35	2.25	2.25	6.84	6.84	23.4	23.4	68.9
			48, 64	–	–	0.07	0.31	1.87	1.87	6.25	6.25	21.8	21.8	65.6
			100~200	–	–	0.07	0.31	1.87	1.87	6.25	6.25	21.8	21.8	65.6

▶ Dimensions (1-stage, Ratio i=3~20) / ABR Series



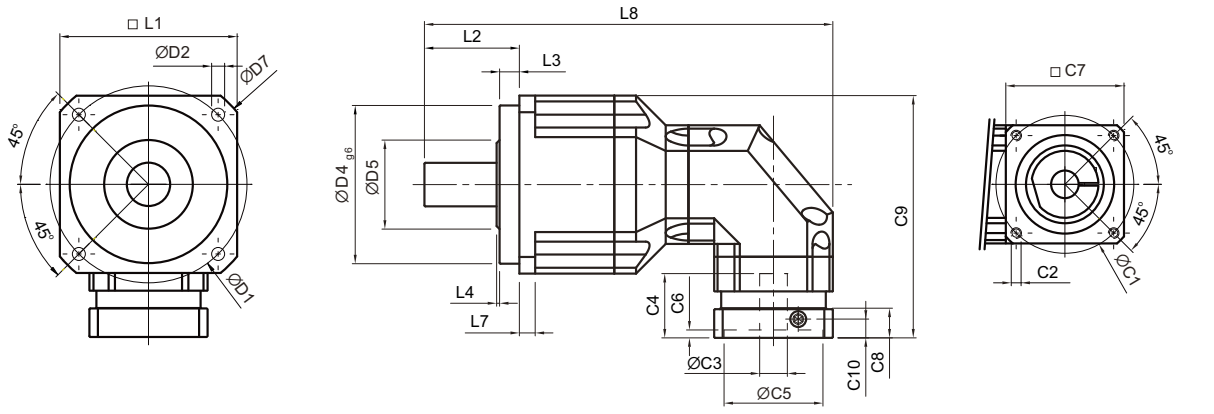
Shaft Option S1 **Shaft Option S2** **Shaft Option S3**

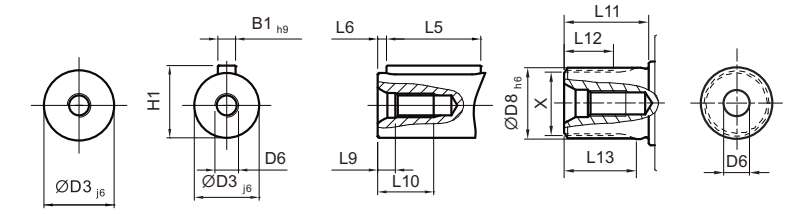
[unit: mm]

Dimension	ABR042	ABR060	ABR090	ABR115	ABR142	ABR180	ABR220
D1	50	70	100	130	165	215	250
D2	3.4	5.5	6.6	9	11	13	17
D3 j6	13	16	22	32	40	55	75
D4 g6	35	50	80	110	130	160	180
D5	22	45	65	95	75	95	115
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P
D7	56	80	116	152	185	240	292
D8 h6	-	16	22	32	40	55	75
L1	42	60	90	115	142	180	220
L2	26	37	48	65	97	105	138
L3	5.5	7	10	12	15	20	30
L4	1	1.5	1.5	2	3	3	3
L5	16	25	32	40	63	70	90
L6	2	2	3	5	5	6	7
L7	4	6	8	10	12	15	20
L8	111.5	145	203	259	333	394	484
L9	4.5	4.8	7.2	10	12	15	15
L10	10	12.5	19	28	36	42	42
L11	-	26	26	26	40	41.5	52
L12	-	15	15	15	20	21.5	28
L13	-	21	22.5	23	33.5	33.5	45
C1[1]	46	70	100	130	165	215	235
C2[1]	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M12 x 1.75P
C3[1]	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24	≤32	≤38	≤48	≤55
C4[1]	25	34	40	50	60	85	116
C5[1]	30	50	80	110	130	180	200
C6[1]	3.5	8	4	5	6	6	6
C7[1]	42	60	90	115	142	190	220
C8[1]	29.5	19	17	19.5	22.5	29	63
C9[1]	90.5	111.5	152.5	191.5	235.5	303.5	378.5
C10[1]	8.75	13.5	10.75	13	15	20.75	53
B1 h9	5	5	6	10	12	16	20
H1	15	18	24.5	35	43	59	79.5
X DIN5480	-	W16x0.8x 30x18x6m	W22x1.25x 30x16x6m	W32x1.25x 30x24x6m	W40x2x 30x18x6m	W55x2x 30x26x6m	W70x2x 30x34x6m

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

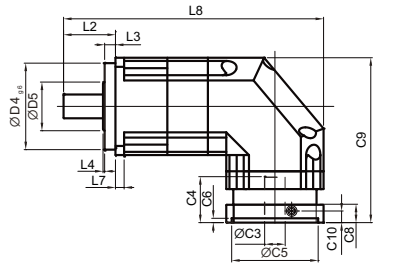
▶ Dimensions (2-stage, Ratio i=12~200) / ABR Series





Shaft Option S1 **Shaft Option S2** **Shaft Option S3**

ABR060A / ABR090A / ABR115A / ABR142A

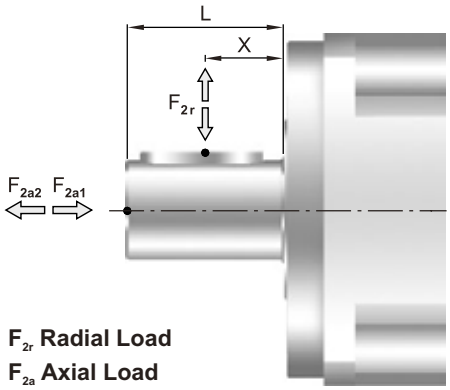


[unit: mm]

Dimension	ABR042	ABR060	ABR060A	ABR090	ABR090A	ABR115	ABR115A	ABR142	ABR142A	ABR180	ABR220
D1	50	70		100		130		165		215	250
D2	3.4	5.5		6.6		9		11		13	17
D3 j6	13	16		22		32		40		55	75
D4 g6	35	50		80		110		130		160	180
D5	22	45		65		95		75		95	115
D6	M4 x 0.7P	M5 x 0.8P		M8 x 1.25P		M12x1.75P		M16x2P		M20x2.5P	M20x2.5P
D7	56	80		116		152		185		240	292
D8 h6	-	16		22		32		40		55	75
L1	42	60		90		115		142		180	220
L2	26	37		48		65		97		105	138
L3	5.5	7		10		12		15		20	30
L4	1	1.5		1.5		2		3		3	3
L5	16	25		32		40		63		70	90
L6	2	2		3		5		5		6	7
L7	4	6		8		10		12		15	20
L8	139	163.5	182	206.5	251	285	320	365	404.5	431	521
L9	4.5	4.8		7.2		10		12		15	15
L10	10	12.5		19		28		36		42	42
L11	-	26		26		26		40		41.5	52
L12	-	15		15		15		20		21.5	28
L13	-	21		22.5		23		33.5		33.5	45
C1[2]	46	46	70	70	100	100	130	130	165	165	215
C2[2]	M4 x 0.7P	M4 x 0.7P	M5 x 0.8P	M5x0.8P	M6x1P	M6x1P	M8x1.25P	M8x1.25P	M10x1.5P	M10x1.5P	M12x1.75P
C3[2]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤16	≤14 / ≤15.875 / ≤16	≤19 / ≤24	≤19 / ≤24	≤32	≤32	≤38	≤38	≤48
C4[2]	25	25	34	34	40	40	50	50	60	60	85
C5[2]	30	30	50	50	80	80	110	110	130	130	180
C6[2]	3.5	3.5	8	8	4	4	5	5	6	6	6
C7[2]	42	42	60	60	90	90	115	115	142	142	190
C8[2]	29.5	29.5	19	19	17	17	19.5	19.5	22.5	22.5	29
C9[2]	90.5	99.5	111.5	126.5	152.5	165	191.5	205	235.5	254.5	323.5
C10[2]	8.75	8.75	13.5	13.5	10.75	10.75	13	13	15	15	20.75
B1 h9	5	5		6		10		12		16	20
H1	15	18		24.5		35		43		59	79.5
X DIN5480	-	W16x0.8x 30x18x6m		W22x1.25x 30x16x6m		W32x1.25x 30x24x6m		W40x2x 30x18x6m		W55x2x 30x26x6m	W70x2x 30x34x6m

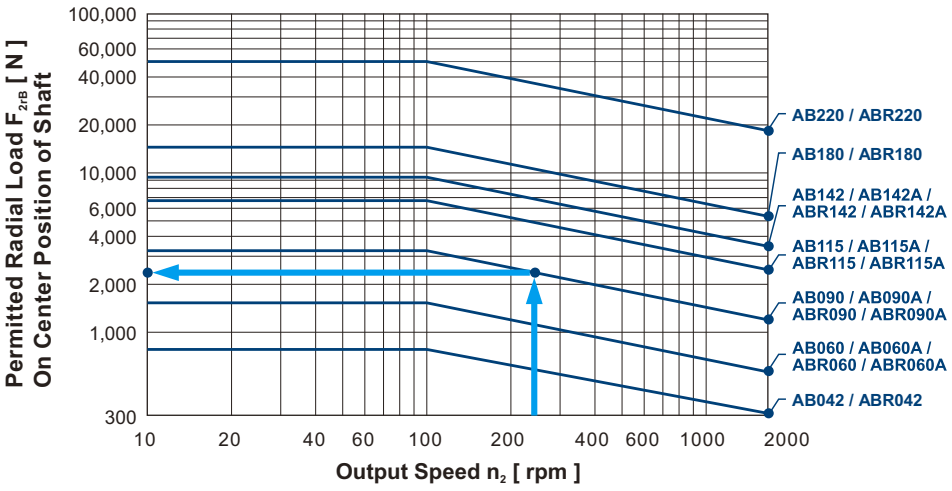
2. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.

Permitted Radial and Axial Loads

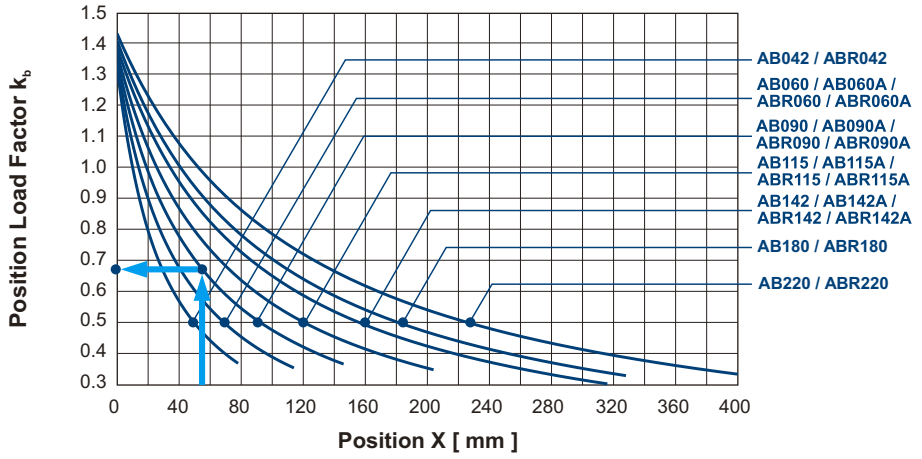


F_{2r} Radial Load
F_{2a} Axial Load

The permitted radial and axial loads on output shaft of the gearbox depend on the design of the gearbox supporting bearings.
APEX use the extension straddle oversized ball bearing design.
It can take heavy load from both axes.

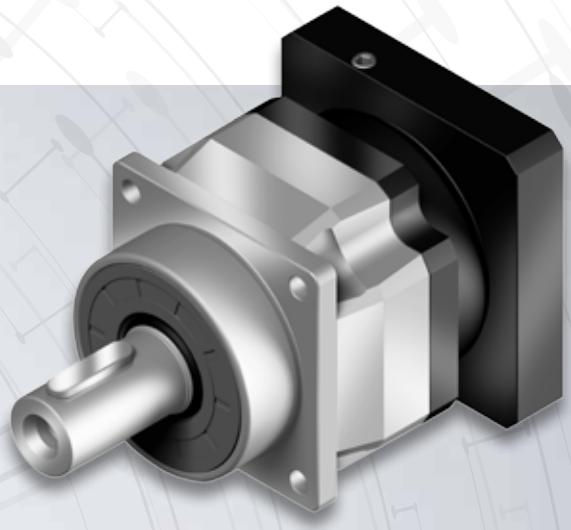


If radial force F_{2r} exert on the center of the output shaft X=1/2 x L.
The permitted radial load is given on left diagram.



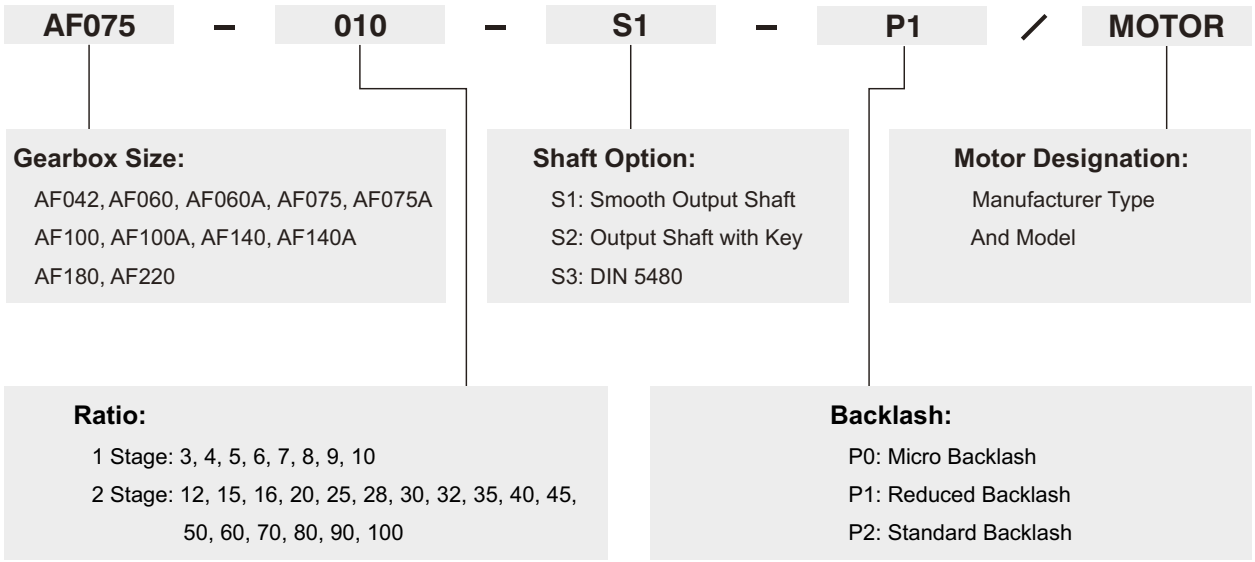
If radial force F_{2r} not exert on the center of the output shaft X<1/2 x L or X>1/2 x L
The permitted radial and axial load can be calculated by the position load factor K_b on the left diagram.

HIGH PRECISION
PLANETARY GEARBOX



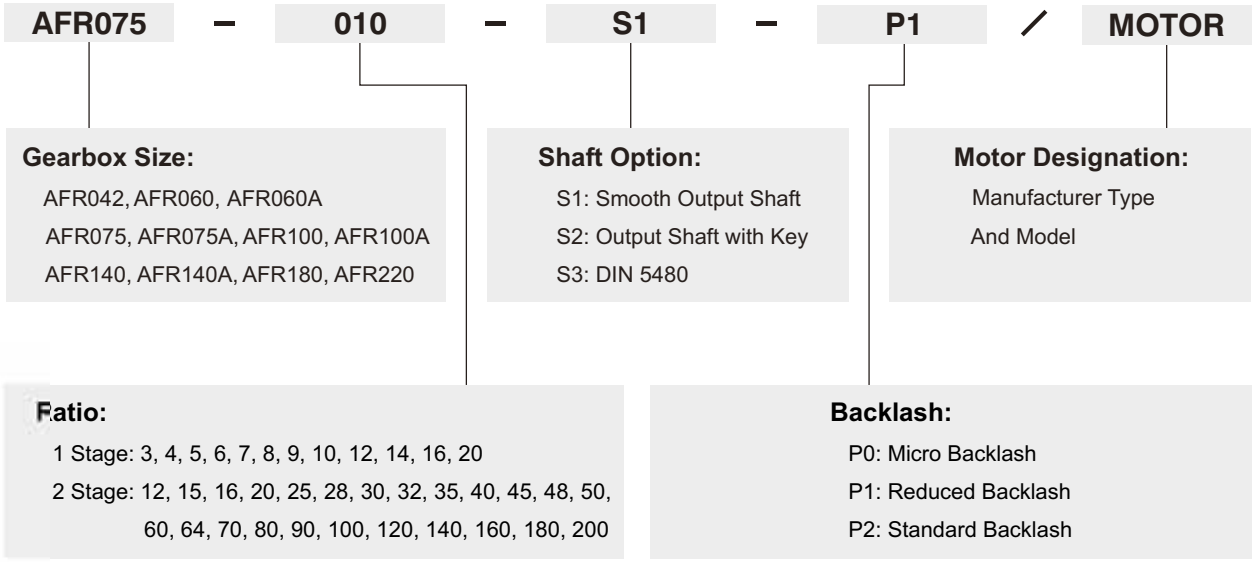
AF - AFR Series

AF Series



Ordering Example: AF075-010-S1-P1 / SIEMENS 1FT6 041-4AF71

AFR Series



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

▶ Performance - AF Gearbox

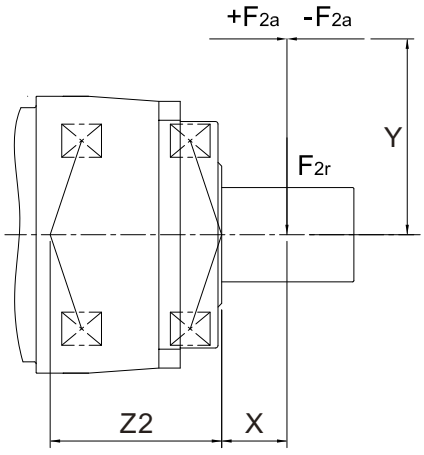
Model No.		Stage	Ratio[A]	AF042	AF060	AF060A	AF075	AF075A	AF100	AF100A	AF140	AF140A	AF180	AF220
Nominal Output Torque T_{2N}	Nm	1	3	20	55	–	130	–	208	–	342	–	588	1,140
			4	19	50	–	140	–	290	–	542	–	1,050	1,700
			5	22	60	–	160	–	330	–	650	–	1,200	2,000
			6	20	55	–	150	–	310	–	600	–	1,100	1,900
			7	19	50	–	140	–	300	–	550	–	1,100	1,800
			8	17	45	–	120	–	260	–	500	–	1,000	1,600
			9	14	40	–	100	–	230	–	450	–	900	1,500
			10	14	40	–	100	–	230	–	450	–	900	1,500
		2	12	19	50	50	140	140	290	290	542	542	1,050	1,700
			15	20	55	55	130	130	208	208	342	342	588	1,140
			16	19	50	50	140	140	290	290	542	542	1,050	1,700
			20	19	50	50	140	140	290	290	542	542	1,050	1,700
			25	22	60	60	160	160	330	330	650	650	1,200	2,000
			28	19	50	50	140	140	300	300	550	550	1,100	1,800
			30	20	55	55	150	150	310	310	600	600	1,100	1,900
			32	17	45	45	120	120	260	260	500	500	1,000	1,600
			35	19	50	50	140	140	300	300	550	550	1,100	1,800
			40	17	45	45	120	120	260	260	500	500	1,000	1,600
			45	14	40	40	100	100	230	230	450	450	900	1,500
			50	22	60	60	160	160	330	330	650	650	1,200	2,000
			60	20	55	55	150	150	310	310	600	600	1,100	1,900
			70	19	50	50	140	140	300	300	550	550	1,100	1,800
			80	17	45	45	120	120	260	260	500	500	1,000	1,600
			90	14	40	40	100	100	230	230	450	450	900	1,500
			100	14	40	40	100	100	230	230	450	450	900	1,500
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	3~100	3 times of Nominal Output Torque										
Nominal Input Speed n_{1N}	rpm	1,2	3~100	5,000	5,000	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000	2,000
Max. Input Speed n_{1B}	rpm	1,2	3~100	10,000	10,000	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000	4,000
Micro Backlash P0	arcmin	1	3~10	–	–	–	≤1	–	≤1	–	≤1	–	≤1	≤1
		2	12~100	–	–	–	–	–	≤3	≤3	≤3	≤3	≤3	≤3
Reduced Backlash P1	arcmin	1	3~10	≤3	≤3	–	≤3	–	≤3	–	≤3	–	≤3	≤3
		2	12~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5
Standard Backlash P2	arcmin	1	3~10	≤5	≤5	–	≤5	–	≤5	–	≤5	–	≤5	≤5
		2	12~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	7	7	14	14	25	25	50	50	145	225
Max. Radial Load F_{2rB}[C]	N	1,2	3~100	610	1,400	1,400	4,100	4,100	9,200	9,200	14,000	14,000	18,000	33,000
Max. Axial Load F_{2aB}[C]	N	1,2	3~100	320	1,100	1,100	3,700	3,700	5,820	5,820	11,400	11,400	19,500	16,300
Max. Tilting Moment M_{2K}	Nm	1,2	3~100	20	85	85	380	380	970	970	1,840	1,840	2,740	5,030
Efficiency η	%	1	3~10	≥97%										
		2	12~100	≥94%										
Weight	kg	1	3~10	0.6	1.3	–	3.7	–	6.9	–	12.6	–	25.5	45
		2	12~100	0.8	1.5	2	4.1	5.5	8.1	10.6	16.6	20.2	31.5	57
Operating Temp	°C	1,2	3~100	-10°C~90°C										
Lubrication		1,2	3~100	Synthetic lubrication oils										
Degree of Gearbox Protection		1,2	3~100	IP65										
Mounting Position		1,2	3~100	all directions										
Noise[D]	dB(A)	1,2	3~100	≤56	≤58	≤60	≤60	≤63	≤63	≤65	≤65	≤67	≤67	≤70

A. Ratio ($i=N_{in}/N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm
D. The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

▶ Inertia - AF Gearbox

Model No.		Stage	Ratio	AF042	AF060	AF060A	AF075	AF075A	AF100	AF100A	AF140	AF140A	AF180	AF220
Mass Moments of Inertia J_1	kg • cm²	1	3	0.03	0.16	–	0.61	–	3.25	–	9.21	–	28.98	69.61
			4	0.03	0.14	–	0.48	–	2.74	–	7.54	–	23.67	54.37
			5	0.03	0.13	–	0.47	–	2.71	–	7.42	–	23.29	53.27
			6	0.03	0.13	–	0.45	–	2.65	–	7.25	–	22.75	51.72
			7	0.03	0.13	–	0.45	–	2.62	–	7.14	–	22.48	50.97
			8	0.03	0.13	–	0.44	–	2.58	–	7.07	–	22.59	50.84
			9	0.03	0.13	–	0.44	–	2.57	–	7.04	–	22.53	50.63
			10	0.03	0.13	–	0.44	–	2.57	–	7.03	–	22.51	50.56
		2	12	0.03	0.03	0.16	0.16	0.61	0.61	3.25	3.25	9.21	9.21	28.98
			15	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			16	0.03	0.03	0.14	0.14	0.48	0.48	2.74	2.74	7.54	7.54	23.67
			20	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			25	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			28	0.03	0.03	0.14	0.14	0.48	0.48	2.74	2.74	7.54	7.54	23.67
			30	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			32	0.03	0.03	0.14	0.14	0.48	0.48	2.74	2.74	7.54	7.54	23.67
			35	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			40	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			45	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42	23.29
			50	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			60	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			70	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			80	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			90	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51
			100	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03	22.51

▶ Max. Tilting Moment M_{2K}



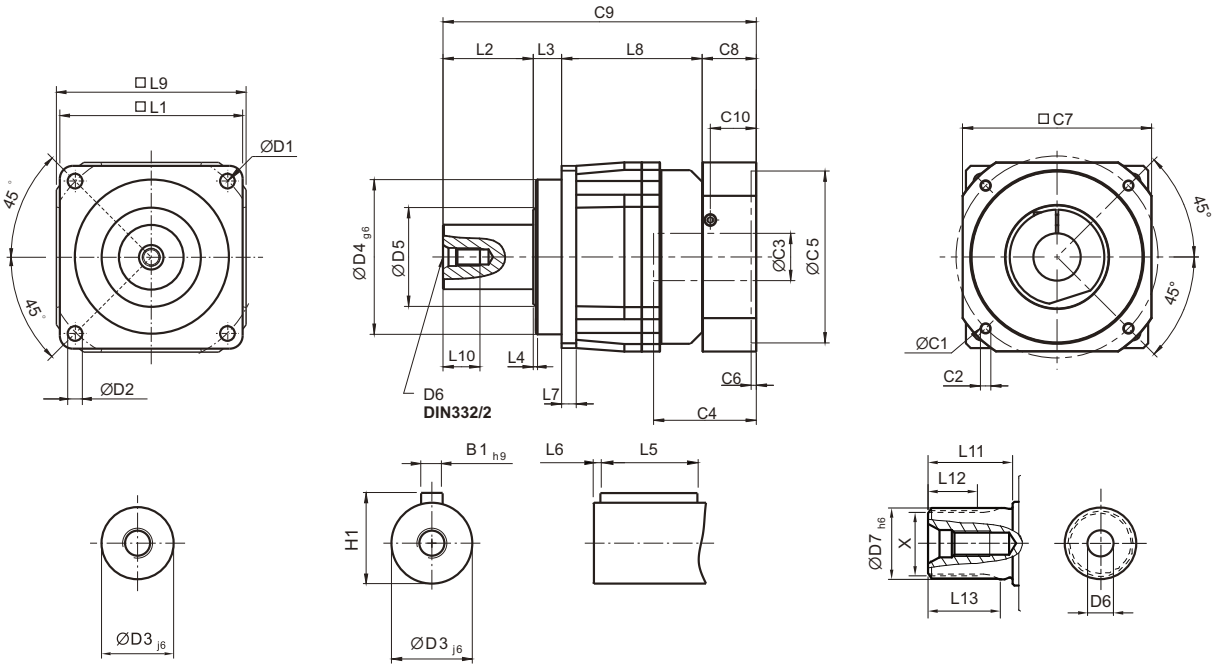
$$M_{2K} = \frac{F_{2a} * Y + F_{2r} * (X+Z2)}{1000}$$

M_{2K} : 【Nm】
F_{2a}, F_{2r} : 【N】
X, Y, Z2 : 【mm】

AF / AFR	042	060	075	100	140	180	220
Z2【mm】	31	66.5	88.7	96	114.2	138.7	127.1

Note : Applied to the output shaft center at 100 rpm.

▶ Dimensions (1-stage, Ratio i=3~10) / AF Series



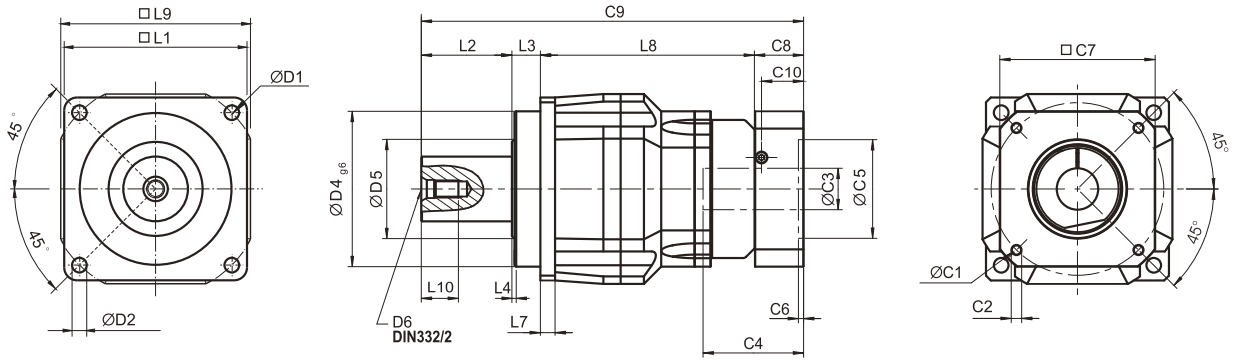
Shaft Option S1 **Shaft Option S2** **Shaft Option S3**

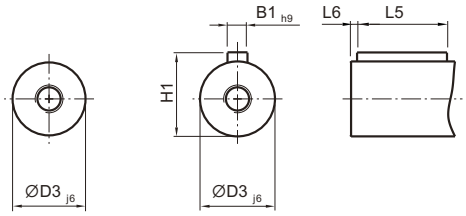
[unit: mm]

Dimension	AF042	AF060	AF075	AF100	AF140	AF180	AF220
D1	50	68	85	120	165	215	250
D2	3.4	5.5	6.8	9	11	13	17
D3 j6	13	16	22	32	40	55	75
D4 g6	35	60	70	90	130	160	180
D5	22	45	60	80	75	95	115
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P
D7 h6	-	16	22	32	40	55	75
L1	42	62	76	105	142	180	220
L2	19.5	28.5	36	58	82	82	105
L3	6.5	20	20	30	30	30	33
L4	1	1.5	2	2	3	3	3
L5	16	25	32	40	63	70	90
L6	2	2	3	5	5	6	7
L7	4	6	7	10	12	15	20
L8	31	54.5	86.5	89.5	110	150	163.5
L9	42	60	90	115	142	180	220
L10	10	12.5	19	28	36	42	42
L11	-	26	26	26	40	41.5	52
L12	-	15	15	15	20	21.5	28
L13	-	21	22.5	23	33.5	33.5	45
C1[1]	46	70	100	130	165	215	235
C2[1]	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M12 x 1.75P
C3[1]	≤11 / ≤12[2]	≤14 / ≤16[2]	≤19 / ≤24	≤32	≤38	≤48	≤55
C4[1]	25	34	40	50	60	85	116
C5[1]	30	50	80	110	130	180	200
C6[1]	3.5	8	4	5	6	6	6
C7[1]	42	60	90	115	142	190	220
C8[1]	29.5	19	17	19.5	22.5	29	63
C9[1]	86.5	122	159.5	197	244.5	291	364.5
C10[1]	8.75	13.5	10.75	13	15	20.75	53
B1 h9	5	5	6	10	12	16	20
H1	15	18	24.5	35	43	59	79.5
X DIN5480	-	W16x0.8x 30x18x6m	W22x1.25x 30x16x6m	W32x1.25x 30x24x6m	W40x2x 30x18x6m	W55x2x 30x26x6m	W70x2x 30x34x6m

1. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.
2. AF042 ratio 5, 10 offers C3 ≤ 12 option; AF062 ratio 5, 10 offers C3 ≤ 16 option.

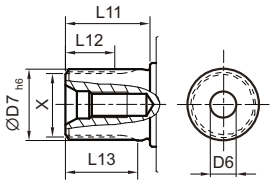
▶ Dimensions (2-stage, Ratio i=12~100) / AF Series





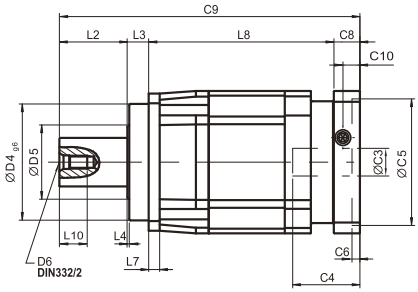
Shaft Option S1

Shaft Option S2



Shaft Option S3

AF060A / AF075A / AF100A / AF140A



[unit: mm]

Dimension	AF042	AF060	AF060A	AF075	AF075A	AF100	AF100A	AF140	AF140A	AF180	AF220
D1	50	68		85		120		165		215	250
D2	3.4	5.5		6.8		9		11		13	17
D3 j6	13	16		22		32		40		55	75
D4 g6	35	60		70		90		130		160	180
D5	22	45		60		80		75		95	115
D6	M4x0.7P	M5 x 0.8P		M8 x 1.25P		M12 x 1.75P		M16 x 2P		M20x2.5P	M20x2.5P
D7	56	16		22		32		40		55	75
L1	42	62		76		105		142		180	220
L2	19.5	28.5		36		58		82		82	105
L3	6.5	20		20		30		30		30	33
L4	1	1.5		2		2		3		3	3
L5	16	25		32		40		63		70	90
L6	2	2		3		5		5		6	7
L7	4	6		7		10		12		15	20
L8	58.5	65.5	91.5	119.5	134.5	131	150.5	166.5	181.5	205.5	248
L9	42	60		90		115		142		180	220
L10	10	12.5		19		28		36		42	42
L11	-	26		26		26		40		41.5	52
L12	-	15		15		15		20		21.5	28
L13	-	21		22.5		23		33.5		33.5	45
C1[3]	46	46	70	70	100	100	130	130	165	165	215
C2[3]	M4x0.7P	M4x0.7P	M5 x 0.8P	M5 x 0.8P	M6 x 1P	M6 x 1P	M8x1.25P	M8x1.25P	M10x1.5P	M10x1.5P	M12x1.75P
C3[3]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤16	≤14 / ≤15.875 / ≤16	≤19 / ≤24	≤19 / ≤24	≤32	≤32	≤38	≤38	≤48
C4[3]	25	25	34	34	40	40	50	50	60	60	85
C5[3]	30	30	50	50	80	80	110	110	130	130	180
C6[3]	3.5	3.5	8	8	4	4	5	5	6	6	6
C7[3]	42	42	60	60	90	90	115	115	142	142	190
C8[3]	29.5	29.5	19	19	17	17	19.5	19.5	22.5	22.5	29
C9[3]	114	143.5	159	194.5	207.5	207.5	258	298	316	340	415
C10[3]	8.75	8.75	13.5	13.5	10.75	10.75	13	13	15	15	20.75
B1 h9	5	5		6		10		12		16	20
H1	15	18		24.5		35		43		59	79.5
X DIN5480	-	W16x0.8x 30x18x6m		W22x1.25x 30x16x6m		W32x1.25x 30x24x6m		W40x2x 30x18x6m		W55x2x 30x26x6m	W70x2x 30x34x6m

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

▶ Performance - AFR Gearbox

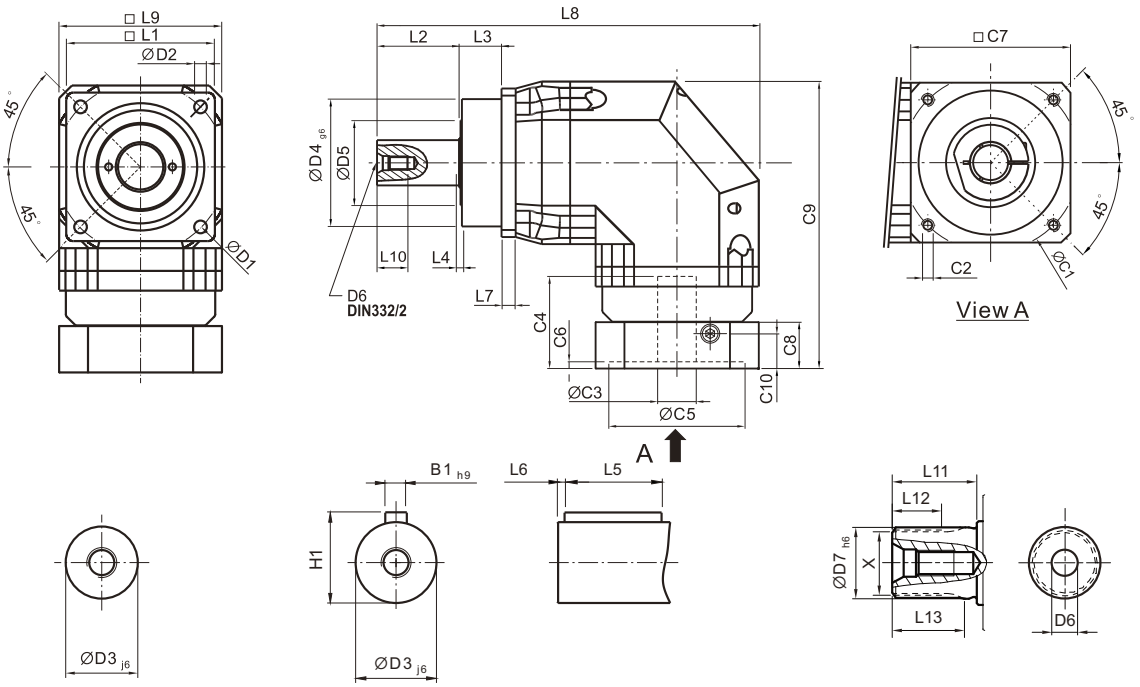
Model No.		Stage	Ratio[A]	AFR042	AFR060	AFR060A	AFR075	AFR075A	AFR100	AFR100A	AFR140	AFR140A	AFR180	AFR220
Nominal Output Torque T_{2N}	Nm	1	3	9	36	–	90	–	195	–	342	–	588	1,140
			4	12	48	–	120	–	260	–	520	–	1,040	1,680
			5	15	60	–	150	–	325	–	650	–	1,200	2,000
			6	18	55	–	150	–	310	–	600	–	1,100	1,900
			7	19	50	–	140	–	300	–	550	–	1,100	1,800
			8	17	45	–	120	–	260	–	500	–	1,000	1,600
			9	14	40	–	100	–	230	–	450	–	900	1,500
			10	14	60	–	150	–	325	–	650	–	1,200	2,000
			12	–	55	–	150	–	310	–	600	–	1,100	1,900
			14	–	42	–	140	–	300	–	550	–	1,100	1,800
			16	–	45	–	120	–	260	–	500	–	1,000	1,600
			20	–	40	–	100	–	230	–	450	–	900	1,500
		2	12	12	–	–	–	–	–	–	–	–	–	–
			15	14	–	–	–	–	–	–	–	–	–	–
			16	15	–	–	–	–	–	–	–	–	–	–
			20	14	–	–	–	–	–	–	–	–	–	–
			25	15	60	60	150	150	325	325	650	650	1,200	2,000
			28	19	50	50	140	140	300	300	550	550	1,100	1,800
			30	20	55	55	150	150	310	310	600	600	1,100	1,900
			32	17	45	45	120	120	260	260	500	500	1,000	1,600
			35	19	50	50	140	140	300	300	550	550	1,100	1,800
			40	17	45	45	120	120	260	260	500	500	1,000	1,600
			45	14	40	40	100	100	230	230	450	450	900	1,500
			48	–	–	55	150	150	310	310	600	600	1,100	1,900
			50	14	60	60	150	150	325	325	650	650	1,200	2,000
			60	20	55	55	150	150	310	310	600	600	1,100	1,900
			64	–	–	45	120	120	260	260	500	500	1,000	1,600
			70	19	50	50	140	140	300	300	550	550	1,100	1,800
			80	17	45	45	120	120	260	260	500	500	1,000	1,600
			90	14	40	40	100	100	230	230	450	450	900	1,500
			100	14	40	60	150	150	325	325	650	650	1,200	2,000
			120	–	–	55	150	150	310	310	600	600	1,100	1,900
			140	–	–	50	140	140	300	300	550	550	1,100	1,800
			160	–	–	45	120	120	260	260	550	550	1,000	1,600
			180	–	–	40	100	100	230	230	450	450	900	1,500
			200	–	–	40	100	100	230	230	450	450	900	1,500
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	3~200	3 times of Nominal Output Torque										
Nominal Input Speed n_{1N}	rpm	1,2	3~200	5,000	5,000	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000	2,000
Max. Input Speed n_{1B}	rpm	1,2	3~200	10,000	10,000	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000	4,000
Micro Backlash P0	arcmin	1	3~20	–	–	–	≤2	–	≤2	–	≤2	–	≤2	≤2
		2	12~200	–	–	–	≤4	≤4	≤4	≤4	≤4	≤4	≤4	≤4
Reduced Backlash P1	arcmin	1	3~20	≤4	≤4	–	≤4	–	≤4	–	≤4	–	≤4	≤4
		2	12~200	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Standard Backlash P2	arcmin	1	3~20	≤6	≤6	–	≤6	–	≤6	–	≤6	–	≤6	≤6
		2	12~200	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9
Torsional Rigidity	Nm/arcmin	1,2	3~200	3	7	7	14	14	25	25	50	50	145	225
Max. Radial Load F_{2rB}[C]	N	1,2	3~200	610	1,400	1,400	4,100	4,100	9,200	9,200	14,000	14,000	18,000	33,000
Max. Axial Load F_{2aB}[C]	N	1,2	3~200	320	1,100	1,100	3,700	3,700	5,800	5,800	11,400	11,400	19,500	16,300
Max. Tilting Moment M_{2K}	Nm		3~200	20	85	85	380	380	970	970	1,840	1,840	2,740	5,030
Efficiency η	%	1	3~20	≥95%										
		2	12~200	≥92%										
Weight	kg	1	3~20	0.9	2.1	–	6.4	–	11.3	–	22.5	–	44	77
		2	12~200	1.2	1.9	2.8	4.8	8	10.6	15.1	21	29.2	41	75
Operating Temp	°C	1,2	3~200	-10°C~+90°C										
Lubrication		1,2	3~200	Synthetic lubrication oils										
Degree of Gearbox Protection		1,2	3~200	IP65										
Mounting Position		1,2	3~200	all directions										
Noise[D]	dB(A)	1,2	3~200	≤61	≤63	≤65	≤65	≤68	≤68	≤70	≤70	≤72	≤72	≤74

A. Ratio ($i=N_{in}/N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm
D. The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

▶ Inertia - AFR Gearbox

Model No.		Stage	Ratio	AFR042	AFR060	AFR060A	AFR075	AFR075A	AFR100	AFR100A	AFR140	AFR140A	AFR180	AFR220
Mass Moments of Inertia J_1	kg • cm^2	1	3~10	0.09	0.35	–	2.25	–	6.84	–	23.4	–	68.9	135.4
			12~20	–	0.07	–	1.87	–	6.25	–	21.8	–	65.6	119.8
		2	12~20	0.09	–	–	–	–	–	–	–	–	–	–
			25~90	0.09	0.09	0.35	0.35	2.25	2.25	6.84	6.84	23.4	23.4	68.9
			48, 64	–	–	0.07	0.31	1.87	1.87	6.25	6.25	21.8	21.8	65.6
			100~200	–	–	0.07	0.31	1.87	1.87	6.25	6.25	21.8	21.8	65.6

▶ Dimensions (1-stage, Ratio i=3~20) / AFR Series



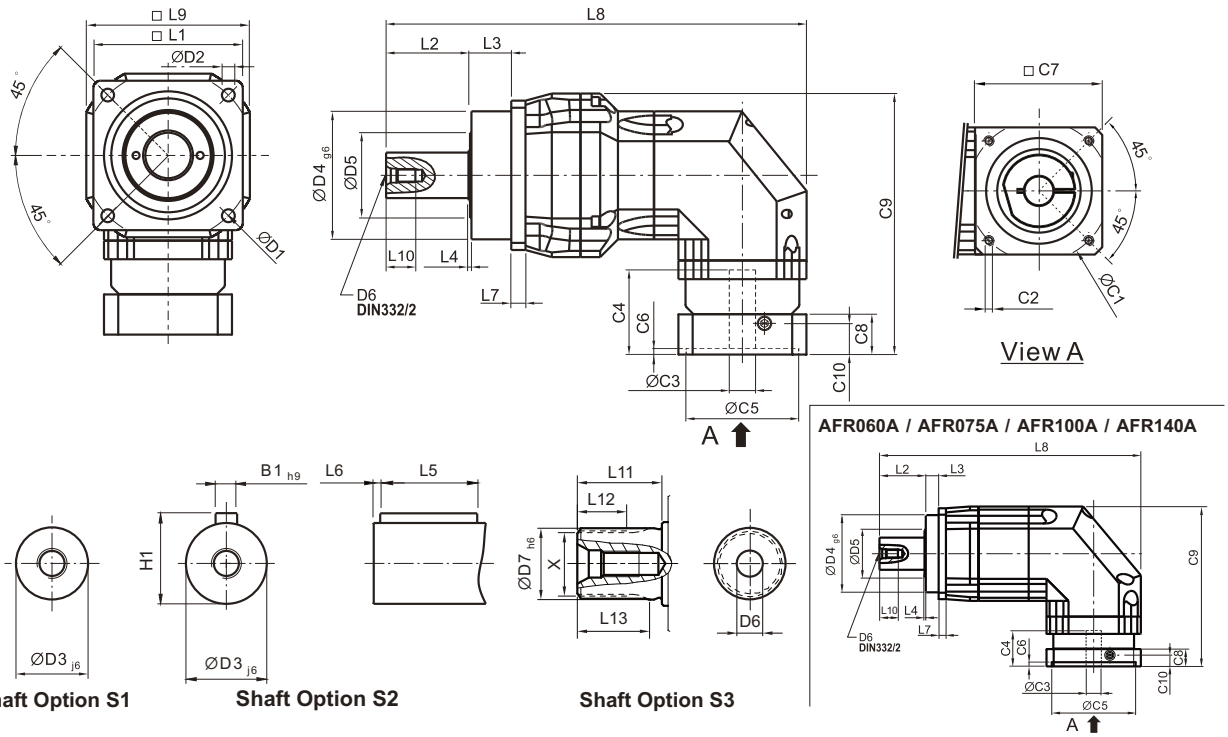
Shaft Option S1 **Shaft Option S2** **Shaft Option S3**

[unit: mm]

Dimension	AFR042	AFR060	AFR075	AFR100	AFR140	AFR180	AFR220
D1	50	68	85	120	165	215	250
D2	3.4	5.5	6.8	9	11	13	17
D3 j6	13	16	22	32	40	55	75
D4 g6	35	60	70	90	130	160	180
D5	22	45	60	80	75	95	115
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P
D7 h6	-	16	22	32	40	55	75
L1	42	62	76	105	142	180	220
L2	19.5	28.5	36	58	82	82	105
L3	6.5	20	20	30	30	30	33
L4	1	1.5	2	2	3	3	3
L5	16	25	32	40	63	70	90
L6	2	2	3	5	5	6	7
L7	4	6	7	10	12	15	20
L8	111.5	150	219	269.5	338.5	397	484
L9	42	60	90	115	142	180	220
L10	10	12.5	19	28	36	42	42
L11	-	26	26	26	40	41.5	52
L12	-	15	15	15	20	21.5	28
L13	-	21	22.5	23	33.5	33.5	45
C1[1]	46	70	100	130	165	215	235
C2[1]	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M12 x 1.75P
C3[1]	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24	≤32	≤38	≤48	≤55
C4[1]	25	34	40	50	60	85	116
C5[1]	30	50	80	110	130	180	200
C6[1]	3.5	8	4	5	6	6	6
C7[1]	42	60	90	115	142	190	220
C8[1]	29.5	19	17	19.5	22.5	29	63
C9[1]	90.5	111.5	152.5	191.5	235.5	303.5	378.5
C10[1]	8.75	13.5	10.75	13	15	20.75	53
B1 h9	5	5	6	10	12	16	20
H1	15	18	24.5	35	43	59	79.5
X DIN5480	-	W16x0.8x 30x18x6m	W22x1.25x 30x16x6m	W32x1.25x 30x24x6m	W40x2x 30x18x6m	W55x2x 30x26x6m	W70x2x 30x34x6m

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

▶ Dimensions (2-stage, Ratio i=12~200) / AFR Series

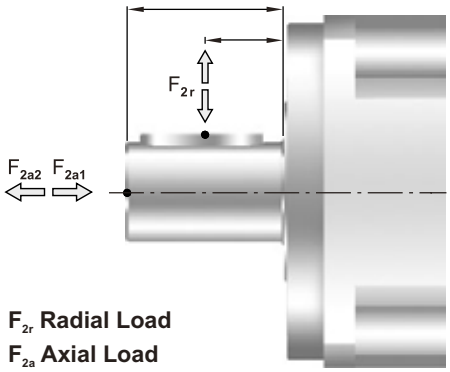


[unit: mm]

Dimension	AFR042	AFR060	AFR060A	AFR075	AFR075A	AFR100	AFR100A	AFR140	AFR140A	AFR180	AFR220
D1	50	68		85		120		165		215	250
D2	3.4	5.5		6.8		9		11		13	17
D3 j6	13	16		22		32		40		55	75
D4 g6	35	60		70		90		130		160	180
D5	22	45		60		80		75		95	115
D6	M4x0.7P	M5 x 0.8P		M8 x 1.25P		M12 x 1.75P		M16 x 2P		M20x2.5P	M20x2.5P
D7	-	16		22		32		40		55	75
L1	42	62		76		105		142		180	220
L2	19.5	28.5		36		58		82		82	105
L3	6.5	20		20		30		30		30	33
L4	1	1.5		2		2		3		3	3
L5	16	25		32		40		63		70	90
L6	2	2		3		5		5		6	7
L7	4	6		7		10		12		15	20
L8	139	168.5	187	222.5	267	295.5	330.5	370.5	410	434	521
L9	42	60		90		115		142		180	220
L10	10	12.5		19		28		36		42	42
L11	-	26		26		26		40		41.5	52
L12	-	15		15		15		20		21.5	28
L13	-	21		22.5		23		33.5		33.5	45
C1[2]	46	46	70	70	100	100	130	130	165	165	215
C2[2]	M4x0.7P	M4x0.7P	M5 x 0.8P	M5 x 0.8P	M6 x 1P	M6 x 1P	M8x1.25P	M8x1.25P	M10x1.5P	M10x1.5P	M12x1.75P
C3[2]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤16	≤14 / ≤15.875 / ≤16	≤19 / ≤24	≤19 / ≤24	≤32	≤32	≤38	≤38	≤48
C4[2]	25	25	34	34	40	40	50	50	60	60	85
C5[2]	30	30	50	50	80	80	110	110	130	130	180
C6[2]	3.5	3.5	8	8	4	4	5	5	6	6	6
C7[2]	42	42	60	60	90	90	115	115	142	142	190
C8[2]	29.5	29.5	19	19	17	17	19.5	19.5	22.5	22.5	29
C9[2]	90.5	99.5	111.5	126.5	152.5	165	191.5	205	235.5	254.5	323.5
C10[2]	8.75	8.75	13.5	13.5	10.75	10.75	13	13	15	15	20.75
B1 h9	5	5		6		10		12		16	20
H1	15	18		24.5		35		43		59	79.5
X DIN5480	-	W16x0.8x 30x18x6m		W22x1.25x 30x16x6m		W32x1.25x 30x24x6m		W40x2x 30x18x6m		W55x2x 30x26x6m	W70x2x 30x34x6m

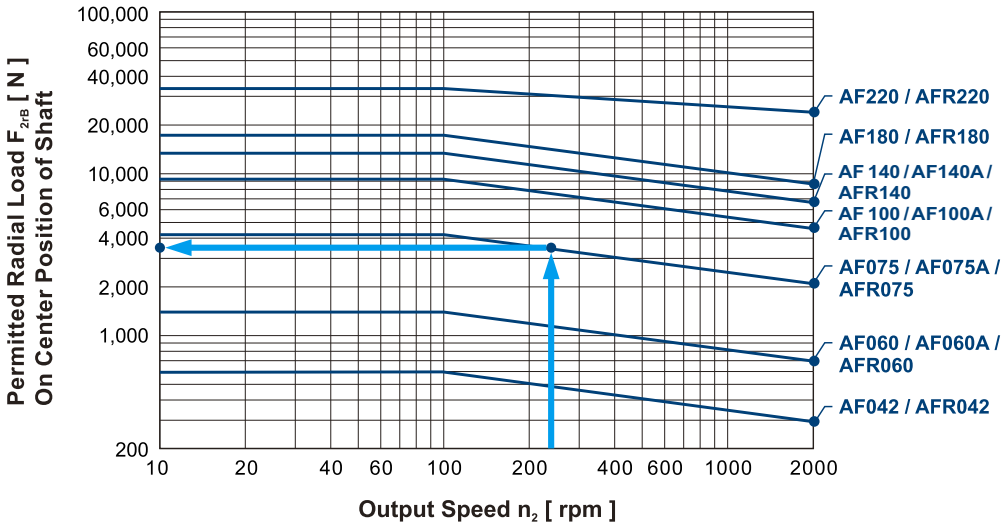
2. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.

Permitted Radial and Axial Loads

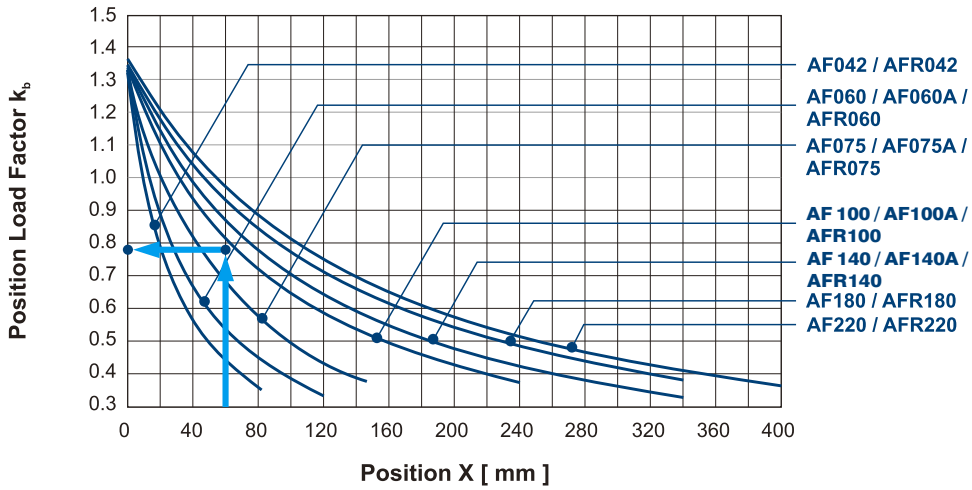


F_{2r} Radial Load
F_{2a} Axial Load

The permitted radial and axial loads on output shaft of the gearbox depend on the design of the gearbox supporting bearings.
APEX use the extension straddle oversized ball bearing design.
It can take heavy load from both axes.



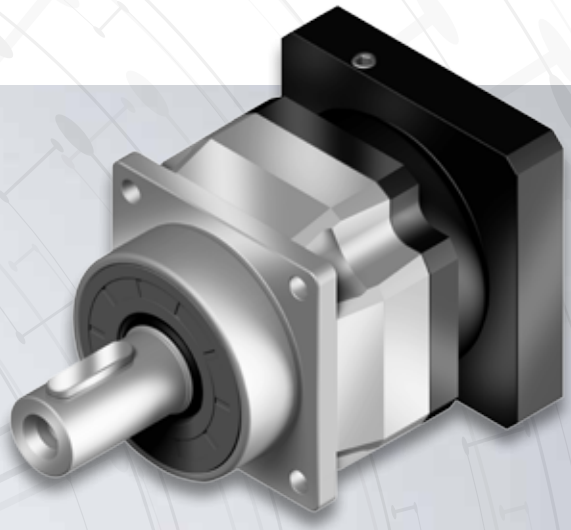
If radial force F_{2r} is exerted on the center of the output shaft X=1/2 x L.
The permitted radial load is given on left diagram.



If radial force F_{2r} is not exerted on the center of the output shaft X<1/2 x L or X>1/2 x L
The permitted radial and axial loads can be calculated by the position load factor K_b on the left diagram.

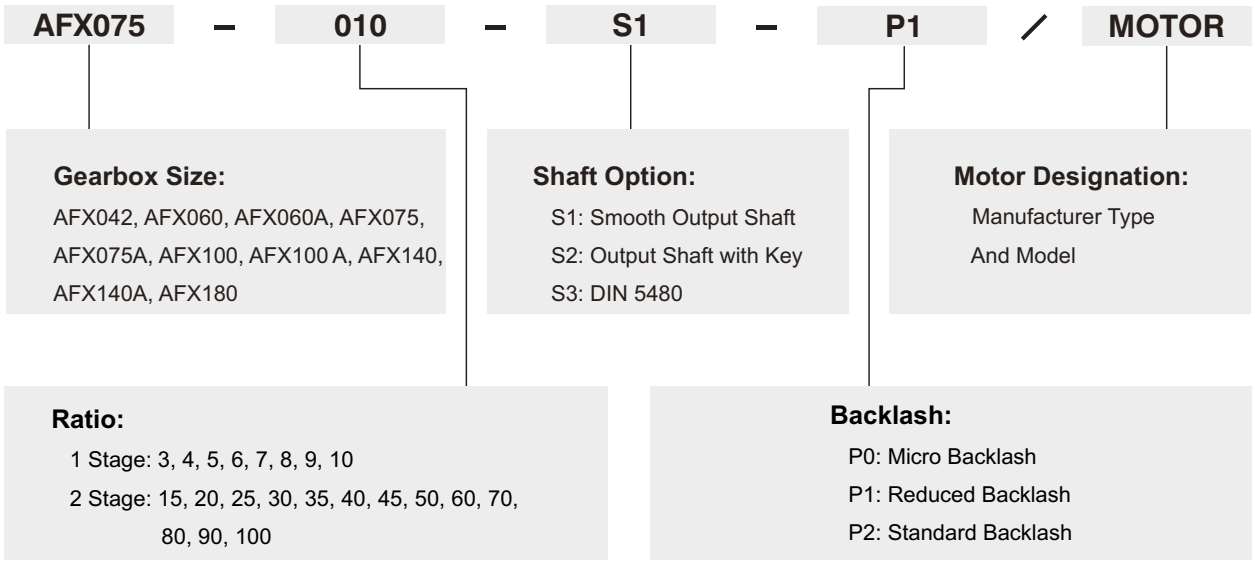
HIGH PRECISION-HIGH SPEED

PLANETARY GEARBOX



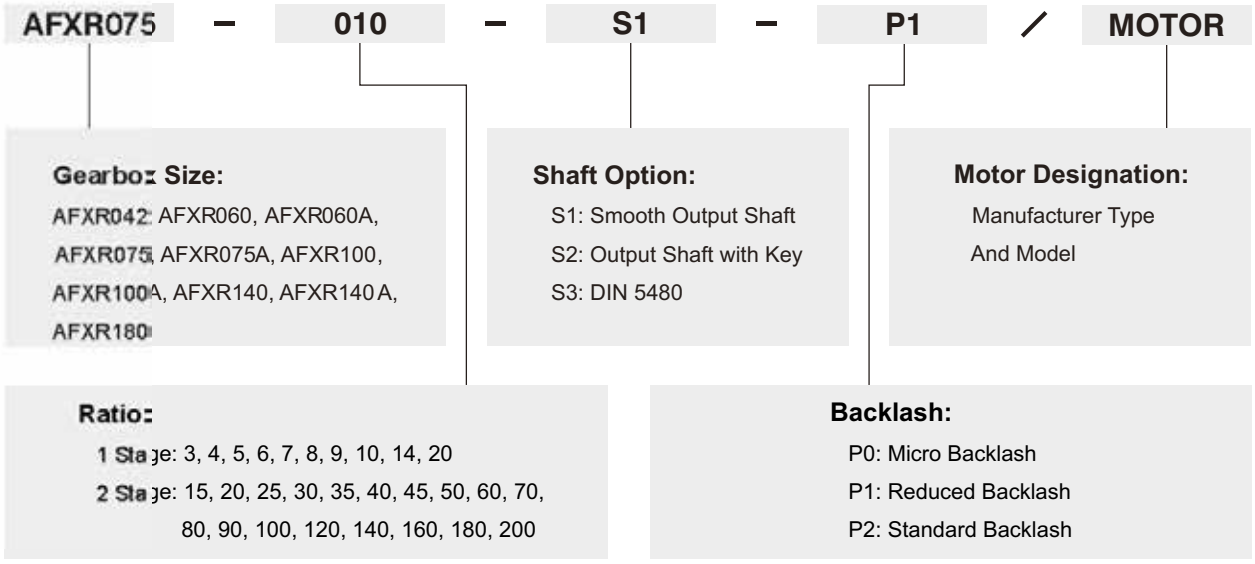
AFX - AFXR Series

AFX Series



Ordering Example: AFX075-010-S1-P1 / SIEMENS 1FT6 041-4AF71

AFXR Series



Ordering Example: AFXR075-010-S1-P1 / SIEMENS 1FT6 041-4AF71

Performance - AFX Gearbox

Model No.		Stages	Ratio[A]	AFX042[E]	AFX060	AFX060A	AFX075	AFX075A	AFX100	AFX100A	AFX140	AFX140A	AFX180
Nominal Output Torque T_{2N}	Nm	1	3	20	55	–	130	–	208	–	342	–	588
			4	19	50	–	140	–	290	–	542	–	1,050
			5	22	60	–	160	–	330	–	650	–	1,200
			6	20	55	–	150	–	310	–	600	–	1,100
			7	19	50	–	140	–	300	–	550	–	1,100
			8	17	45	–	120	–	260	–	500	–	1,000
			9	14	40	–	100	–	230	–	450	–	900
			10	14	40	–	100	–	230	–	450	–	900
		2	12	19	50	50	140	140	290	290	542	542	1,050
			15	20	55	55	130	130	208	330	342	650	588
			16	19	50	50	140	140	290	290	542	542	1,050
			20	19	50	50	140	140	290	330	542	650	1,050
			25	22	60	60	160	160	330	330	650	650	1,200
			28	19	50	50	140	140	300	300	550	550	1,100
			30	20	55	55	150	150	310	310	600	600	1,100
			32	17	45	45	120	120	260	260	500	500	1,000
			35	19	50	50	140	140	300	300	550	550	1,100
			40	17	45	45	120	120	260	260	500	500	1,000
			45	14	40	40	100	100	230	230	450	450	900
			50	22	60	60	160	160	330	330	650	650	1,200
			60	20	55	55	150	150	310	310	600	600	1,100
			70	19	50	50	140	140	300	300	550	550	1,100
			80	17	45	45	120	120	260	260	500	500	1,000
			90	14	40	40	100	100	230	230	450	450	900
			100	14	40	40	100	100	230	230	450	450	900
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	3~100	3 times of Nominal Output Torque									
Nominal Input Speed n_{1N}	rpm	1,2	3~100	5,000	5,000	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000
Max. Input Speed n_{1B}	rpm	1,2	3~100	10,000	10,000	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000
Micro Backlash P0	arcmin	1	3~10	–	–	–	≤1	–	≤1	–	≤1		≤1
		2	15~100	–	–	–	–	–	≤3	≤3	≤3	≤3	≤3
Reduced Backlash P1	arcmin	1	3~10	≤3	≤3	–	≤3	–	≤3	–	≤3		≤3
		2	15~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤5
Standard Backlash P2	arcmin	1	3~10	≤5	≤5	–	≤5	–	≤5	–	≤5		≤5
		2	15~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	7	7	14	14	25	25	50	50	145
Max. Radial Load F_{2rB}[C]	N	1,2	3~100	610	2,900	2,900	4,500	4,500	7,800	9,200	9,450	14,000	15,600
Max. Axial Load F_{2aB}[C]	N	1,2	3~100	320	1,450	1,450	2,250	2,250	3,900	5,820	4,725	11,400	7,800
Efficiency η	%	1	3~10	≥97%									
		2	15~100	≥94%									
Weight	kg	1	3~10	0.6	1.7	1.5	3.5	4.1	7.4	11.3	15.8	22.5	32.7
		2	15~100	0.8	2	2	4	5.5	9	10.6	19.1	20.2	37.6
Operating Temperature	°C	1,2	3~100	-10°C~+90°C									
Lubrication		1,2	3~100	Synthetic lubrication oils									
Degree of Gearbox Protection		1,2	3~100	IP65									
Mounting Position		1,2	3~100	all directions									
Noise[D]	dB	1,2	3~100	≤56	≤58	≤60	≤60	≤63	≤63	≤65	≤65	≤67	≤67

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

B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}

C. Applied to the output shaft center at 100 rpm

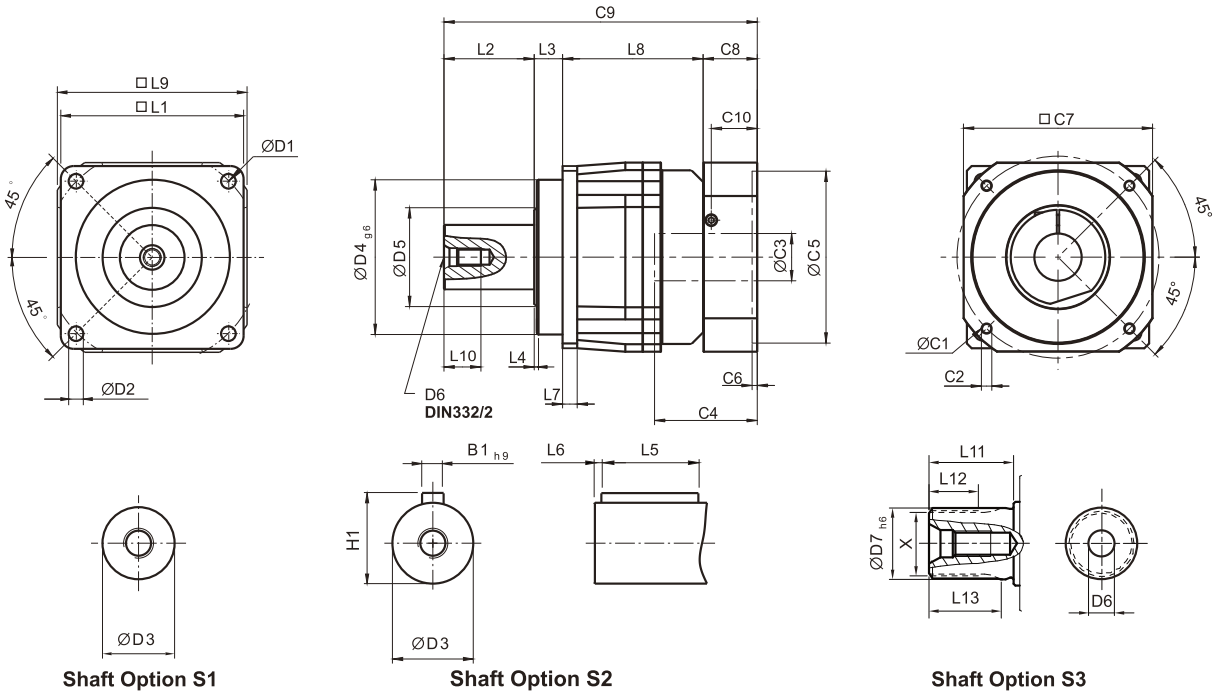
D. The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

E. Continuous operation is not supported.

▶ Inertia - AFX Gearbox

Model No.		Stages	Ratio[1]	AFX042	AFX060	AFX060A	AFX075	AFX075A	AFX100	AFX100A	AFX140	AFX140A	AFX180
Mass Moments of Inertia J_1	kg • cm^2	1	3	0.03	0.16	–	0.61	–	3.25	–	9.21	–	28.98
			4	0.03	0.14	–	0.48	–	2.74	–	7.54	–	23.67
			5	0.03	0.13	–	0.47	–	2.71	–	7.42	–	23.29
			6	0.03	0.13	–	0.45	–	2.65	–	7.25	–	22.75
			7	0.03	0.13	–	0.45	–	2.62	–	7.14	–	22.48
			8	0.03	0.13	–	0.44	–	2.58	–	7.07	–	22.59
			9	0.03	0.13	–	0.44	–	2.57	–	7.04	–	22.53
			10	0.03	0.13	–	0.44	–	2.57	–	7.03	–	22.51
		2	12	0.03	0.03	0.16	0.16	0.61	0.61	3.25	3.25	9.21	9.21
			15	0.03	0.03	0.13	0.13	0.47	0.47	3.25	2.71	9.21	7.42
			16	0.03	0.03	0.14	0.14	0.48	0.48	2.74	2.74	7.54	7.54
			20	0.03	0.03	0.13	0.13	0.47	0.47	2.74	2.71	7.54	7.42
			25	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42
			28	0.03	0.03	0.14	0.14	0.48	0.48	2.74	2.74	7.54	7.54
			30	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42
			32	0.03	0.03	0.14	0.14	0.48	0.48	2.74	2.74	7.54	7.54
			35	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42
			40	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42
			45	0.03	0.03	0.13	0.13	0.47	0.47	2.71	2.71	7.42	7.42
			50	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03
			60	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03
			70	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03
			80	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03
			90	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03
			100	0.03	0.03	0.13	0.13	0.44	0.44	2.57	2.57	7.03	7.03

▶ Dimensions (1-stage, Ratio i=3~10) / AFX Series



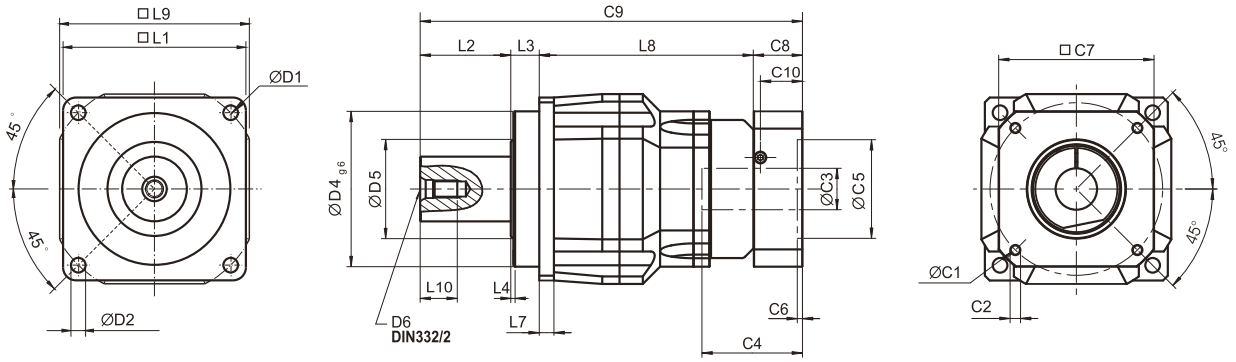
Shaft Option S1 **Shaft Option S2** **Shaft Option S3**

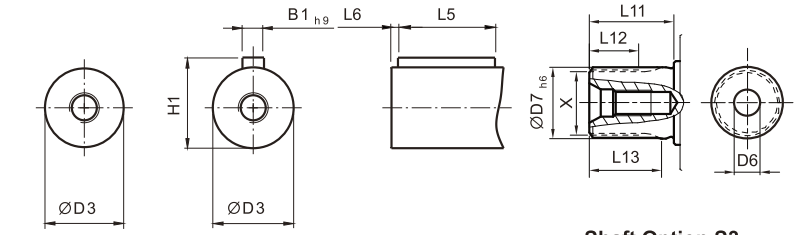
[unit: mm]

Dimension	AFX042	AFX060	AFX075	AFX100	AFX140	AFX180
D1	50	68	85	120	165	215
D2	3.4	5.5	6.8	9	11	13
D3	12 $_{j6}$	16 $_{h6}$	22 $_{h6}$	32 $_{h6}$	40 $_{h6}$	55 $_{h6}$
D4 g6	35	60	70	90	130	160
D5	22	21	30	40	75	95
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P
D7 h6	-	16	22	32	40	55
L1	42	62	76	105	142	180
L2	19.5	28.5	36.5	58	82	82
L3	6.5	20	19.5	30	30	30
L4	1	1.5	1.5	2	3	3
L5	14	25	32	40	63	70
L6	2	2	3	5	5	6
L7	4	6	7	10	12	15
L8	31	62	84	103.5	132	180.5
L9	42	70	90	115	142	180
L10	10	12.5	19	28	36	42
L11	-	26	26	26	40	41.5
L12	-	15	15	15	20	21.5
L13	-	21	22.5	23	33.5	33.5
C1[1]	46	70	100	130	165	215
C2[1]	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P
C3[1]	≤11 / ≤12[2]	≤14 / ≤16[2]	≤19 / ≤24	≤32	≤38	≤48
C4[1]	25	34	40	50	60	85
C5[1]	30	50	80	110	130	180
C6[1]	3.5	8	4	5	6	6
C7[1]	42	60	90	115	142	190
C8[1]	29.5	19	17	19.5	22.5	29
C9[1]	86.5	129.5	157	211	266.5	321.5
C10[1]	8.75	13.5	10.75	13	15	20.75
B1 h9	4	5	6	10	12	16
H1	13.5	18	24.5	35	43	59
X DIN5480	-	W16x0.8x 30x18x6m	W22x1.25x 30x16x6m	W32x1.25x 30x24x6m	W40x2x 30x18x6m	W55x2x 30x26x6m

1. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.
2. AFX042 ratio 5, 10 offers C3 ≤ 12 option. AFX060 ratio 5, 10 offers C3 ≤ 16 option

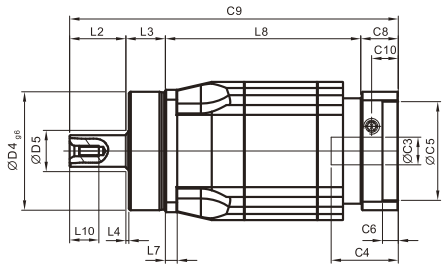
▶ Dimensions (2-stage, Ratio i=15~100) / AFX Series





Shaft Option S1 **Shaft Option S2** **Shaft Option S3**

AFX060A / AFX075A / AFX100A / AFX140A



[unit: mm]

Dimension	AFX042	AFX060	AFX060A	AFX075	AFX075A	AFX100	AFX100A	AFX140	AFX140A	AFX180
D1	50	68		85		120		165		215
D2	3.4	5.5		6.8		9		11		13
D3	12 $_{j6}$	16 $_{h6}$		22 $_{h6}$		32 $_{h6}$		40 $_{h6}$		55 $_{h6}$
D4 g6	35	60		70		90		130		160
D5	22	21		30		40		75		95
D6	M4x0.7P	M5x0.8P		M8x1.25P		M12x1.75P		M16x2P		M20x2.5P
D7 h6	-	16		22		32		40		55
L1	42	62		76		105		142		180
L2	19.5	28.5		36.5		58		82		82
L3	6.5	20		19.5		30		30		30
L4	1	1.5		1.5		2		3		3
L5	14	25		32		40		63		70
L6	2	2		3		5		5		6
L7	4	6		7		10		12		15
L8	58.5	73	99	117	132	145	164.5	188.5	203.5	236
L9	42	70		90		115		142		180
L10	10	12.5		19		28		36		42
L11	-	26		26		26		40		41.5
L12	-	15		15		15		20		21.5
L13	-	21		22.5		23		33.5		33.5
C1[3]	46	46	70	70	100	100	130	130	165	165
C2[3]	M4x0.7P	M4x0.7P	M5x0.8P	M5x0.8P	M6x1P	M6x1P	M8x1.25P	M8x1.25P	M10x1.5P	M10x1.5P
C3[3]	≤11/≤12	≤11/≤12	≤14/≤16	≤14/≤15.875/≤16	≤19/≤24	≤19/≤24	≤32	≤32	≤38	≤38
C4[3]	25	25	34	34	40	40	50	50	60	60
C5[3]	30	30	50	50	80	80	110	110	130	130
C6[3]	3.5	3.5	8	8	4	4	5	5	6	6
C7[3]	42	42	60	60	90	90	115	115	142	142
C8[3]	29.5	29.5	19	19	17	17	19.5	19.5	22.5	22.5
C9[3]	114	151	166.5	192	205	250	272	320	338	370.5
C10[3]	8.75	8.75	13.5	13.5	10.75	10.75	13	13	15	15
B1 h9	4	5		6		10		12		16
H1	13.5	18		24.5		35		43		59
X DIN5480	-	W16x0.8x 30x18x6m		W22x1.25x 30x16x6m		W32x1.25x 30x24x6m		W40x2x 30x18x6m		W55x2x 30x26x6m

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

▶ Performance - AFXR Gearbox

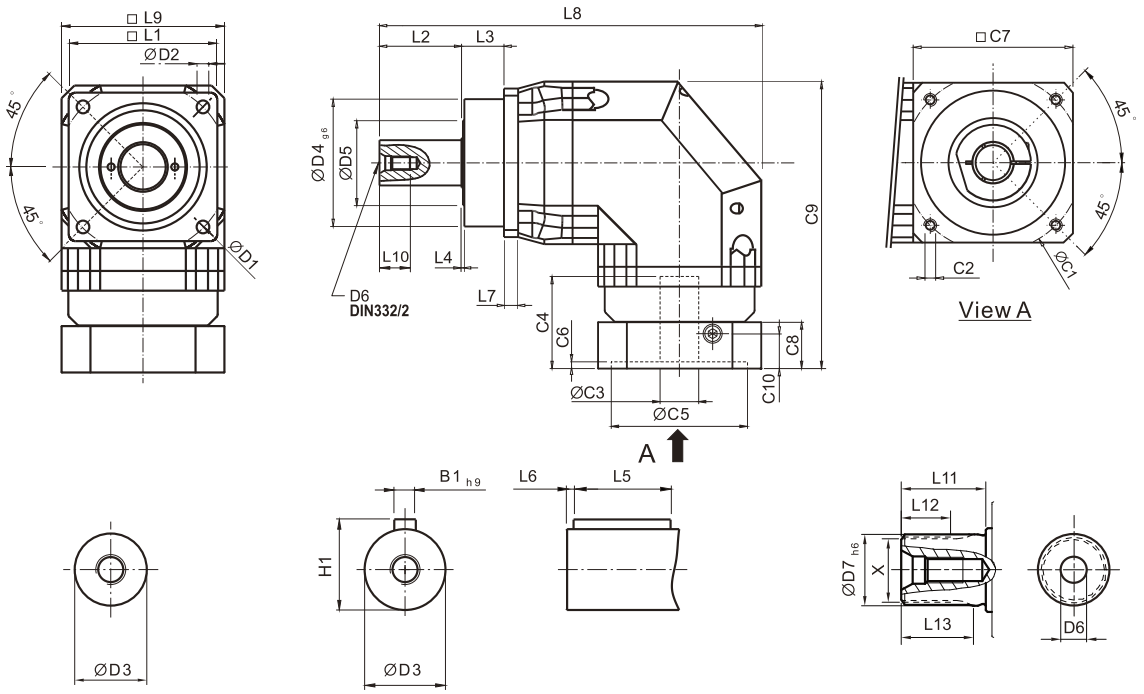
Model No.		Stages	Ratio[A]	AFXR042[E]	AFXR060	AFXR060A	AFXR075	AFXR075A	AFXR100	AFXR100A	AFXR140	AFXR140A	AFXR180
Nominal Output Torque T_{2N}	Nm	1	3	9	36	–	90	–	195	–	342	–	588
			4	12	48	–	120	–	260	–	520	–	1,040
			5	15	60	–	150	–	325	–	650	–	1,200
			6	18	55	–	150	–	310	–	600	–	1,100
			7	19	50	–	140	–	300	–	550	–	1,100
			8	17	45	–	120	–	260	–	500	–	1,000
			9	14	40	–	100	–	230	–	450	–	900
			10	14	60	–	150	–	325	–	450	–	1,200
			12	–	55	–	150	–	310	–	600	–	1,100
			14	–	42	–	140	–	300	–	550	–	1,100
			16	–	45	–	120	–	260	–	500	–	1,000
			20	–	40	–	100	–	230	–	450	–	900
		2	12	12	–	–	–	–	–	–	–	–	–
			15	14	–	–	–	–	–	–	–	–	–
			16	15	–	–	–	–	–	–	–	–	–
			20	14	–	–	–	–	–	–	–	–	–
			25	15	60	60	150	150	325	325	650	650	1,200
			28	19	50	50	140	140	300	300	550	550	1,100
			30	20	55	55	150	150	310	310	600	600	1,100
			32	17	45	45	120	120	260	260	500	500	1,000
			35	19	50	50	140	140	300	300	550	550	1,100
			40	17	45	45	120	120	260	260	500	500	1,100
			45	14	40	40	100	100	230	230	450	450	900
			50	14	60	60	150	150	325	325	650	650	1,200
			60	20	55	55	150	150	310	310	600	600	1,100
			70	19	50	50	140	140	300	300	550	550	1,100
			80	17	45	45	120	120	260	260	500	500	1,000
			90	14	40	40	100	100	230	230	450	450	900
			100	14	40	60	100	150	230	325	450	650	900
			120	–	–	55	150	150	310	310	600	600	1,100
			140	–	–	50	140	140	300	300	550	550	1,100
			160	–	–	45	120	120	260	260	550	550	1,000
			180	–	–	40	100	100	230	230	450	450	900
			200	–	–	40	100	100	230	230	450	450	900
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	3~200	3 times of Nominal Output Torque									
Nominal Input Speed n_{1N}	rpm	1,2	3~200	5,000	5,000	5,000	4,000	4,000	4,000	4,000	3,000	3,000	3,000
Max. Input Speed n_{1B}	rpm	1,2	3~200	10,000	10,000	10,000	8,000	8,000	8,000	8,000	6,000	6,000	6,000
Micro Backlash P0	arcmin	1	3~20	–	–	–	≤2	–	≤2	–	≤2	–	≤2
		2	25~200	–	–	–	≤4	≤4	≤4	≤4	≤4	≤4	≤4
Reduced Backlash P1	arcmin	1	3~20	≤4	≤4	–	≤4	–	≤4	–	≤4	–	≤4
		2	25~200	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Standard Backlash P2	arcmin	1	3~20	≤6	≤6	–	≤6	–	≤6	–	≤6	–	≤6
		2	25~200	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9	≤9
Torsional Rigidity	Nm/arcmin	1,2	3~200	3	7	7	14	14	25	25	50	50	145
Max. Radial Load F_{2rB}[C]	N	1,2	3~200	610	2,900	1,400	4,500	4,100	7,800	9,200	9,450	14,000	15,600
Max. Axial Load F_{2aB}[C]	N	1,2	3~200	320	1,450	1,100	2,250	3,700	3,900	5,800	4,725	11,400	7,800
Efficiency η	%	1	3~20	≥95%									
		2	25~200	≥92%									
Weight	kg	1	3~20	0.9	2.7	3.7	6.1	7.9	12.2	16	25.3	32	50.2
		2	25~200	1.2	2.4	2.8	4.8	8	11.6	15.1	24	29.2	47.4
Operating Temperature	°C	1,2	3~200	-10°C~+90°C									
Lubrication		1,2	3~200	Synthetic lubrication oils									
Degree of Gearbox Protection		1,2	3~200	IP65									
Mounting Position		1,2	3~200	all directions									
Noise[D]	dB	1,2	3~200	≤61	≤63	≤65	≤65	≤68	≤68	≤70	≤70	≤72	≤72

A. Ratio ($i=N_{in}/N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm
D. The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.
E. Continuous operation is not supported.

Inertia - AFXR Gearbox

Model No.		Stages	Ratio[A]	AFXR042	AFXR060	AFXR060A	AFXR075	AFXR075A	AFXR100	AFXR100A	AFXR140	AFXR140A	AFXR180
Mass Moments of Inertia J_1	kg • cm^2	1	3~10	0.09	0.35	–	2.25	–	6.84	–	23.4	–	68.9
			12~20	–	0.07	–	1.87	–	6.25	–	21.8	–	65.6
		2	12~20										
			15	0.09	–	–	–	–	–	–	–	–	–
			20	0.09	–	–	–	–	–	–	–	–	–
			25~100	0.09	0.09	0.35	0.35	2.25	2.25	6.84	6.84	23.4	23.4
			120~200	–	–	0.07	0.31	1.87	1.87	6.25	6.25	21.8	21.8

▶ Dimensions (1-stage, Ratio i=3~20) / AFXR Series



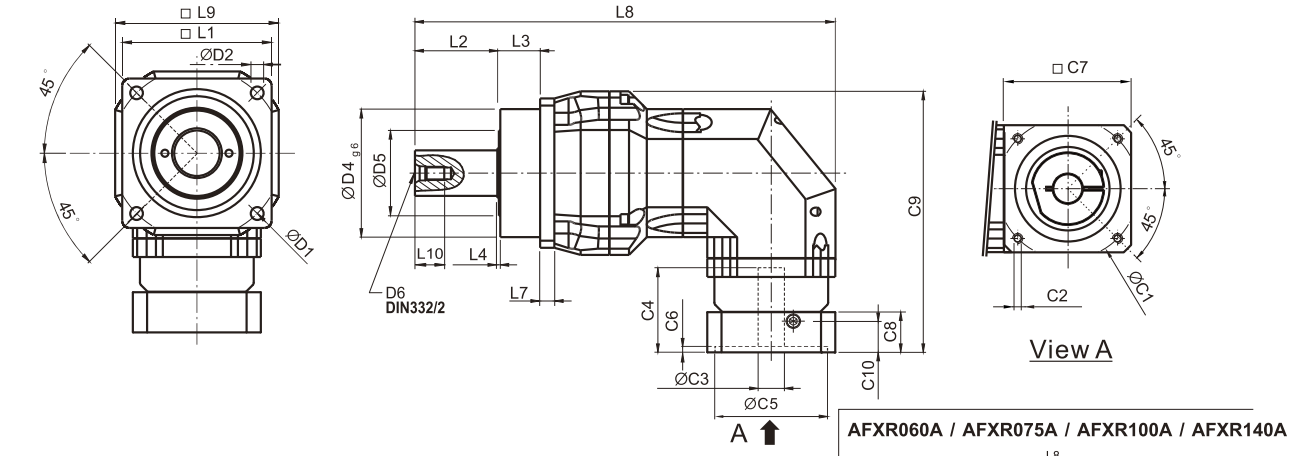
Shaft Option S1 **Shaft Option S2** **Shaft Option S3**

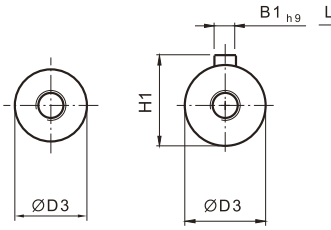
[unit: mm]

Dimension	AFXR042	AFXR060	AFXR075	AFXR100	AFXR140	AFXR180
D1	50	68	85	120	165	215
D2	3.4	5.5	6.8	9	11	13
D3	12 $_{j6}$	16 $_{h6}$	22 $_{h6}$	32 $_{h6}$	40 $_{h6}$	55 $_{h6}$
D4 g6	35	60	70	90	130	160
D5	22	21	30	40	75	95
D6	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P
D7 h6	-	16	22	32	40	55
L1	42	62	76	105	142	180
L2	19.5	28.5	36.5	58	82	82
L3	6.5	20	19.5	30	30	30
L4	1	1.5	1.5	2	3	3
L5	14	25	32	40	63	70
L6	2	2	3	5	5	6
L7	4	6	7	10	12	15
L8	111.5	171.5	216.5	283.5	360.5	427.5
L9	42	70	90	115	142	180
L10	10	12.5	19	28	36	42
L11	-	26	26	26	40	41.5
L12	-	15	15	15	20	21.5
L13	-	21	22.5	23	33.5	33.5
C1[1]	46	70	100	130	165	215
C2[1]	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P
C3[1]	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24	≤32	≤38	≤48
C4[1]	25	34	40	50	60	85
C5[1]	30	50	80	110	130	180
C6[1]	3.5	8	4	5	6	6
C7[1]	42	60	90	115	142	190
C8[1]	29.5	19	17	19.5	22.5	29
C9[1]	90.5	116.5	152.5	191.5	235.5	303.5
C10[1]	8.75	13.5	10.75	13	15	20.75
B1 h9	4	5	6	10	12	16
H1	13.5	18	24.5	35	43	59
X DIN5480	-	W16x0.8x 30x18x6m	W22x1.25x 30x16x6m	W32x1.25x 30x24x6m	W40x2x 30x18x6m	W55x2x 30x26x6m

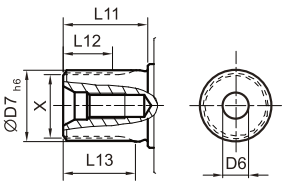
1. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.

▶ Dimensions (2-stage, Ratio i=15~200) / AFXR Series



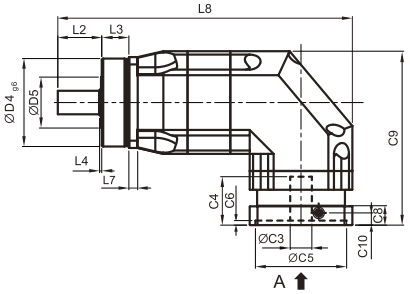


Shaft Option S1 Shaft Option S2



Shaft Option S3

AFXR060A / AFXR075A / AFXR100A / AFXR140A

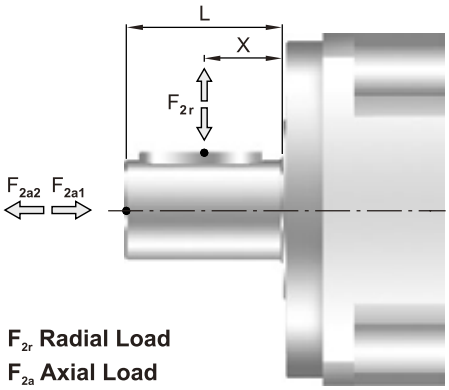


[unit: mm]

Dimension	AFXR042	AFXR060	AFXR060A	AFXR075	AFXR075A	AFXR100	AFXR100A	AFXR140	AFXR140A	AFXR180
D1	50	68		85		120		165		215
D2	3.4	5.5		6.8		9		11		13
D3	12 $_{j6}$	16 $_{h6}$		22 $_{h6}$		32 $_{h6}$		40 $_{h6}$		55 $_{h6}$
D4 g6	35	60		70		90		130		160
D5	22	21		30		40		75		95
D6	M4x0.7P	M5x0.8P		M8x1.25P		M12x1.75P		M16x2P		M20x2.5P
D7 h6	-	16		22		32		40		55
L1	42	62		76		105		142		180
L2	19.5	28.5		36.5		58		82		82
L3	6.5	20		19.5		30		30		30
L4	1	1.5		1.5		2		3		3
L5	14	25		32		40		63		70
L6	2	2		3		5		5		6
L7	4	6		7		10		12		15
L8	139	176	208.5	220	264.5	309.5	344.5	392.5	432	464.5
L9	42	70		90		115		142		180
L10	10	12.5		19		28		36		42
L11	-	26		26		26		40		41.5
L12	-	15		15		15		20		21.5
L13	-	21		22.5		23		33.5		33.5
C1[2]	46	46	70	70	100	100	130	130	165	165
C2[2]	M4x0.7P	M4x0.7P	M5 x 0.8P	M5x0.8P	M6 x 1P	M6x1P	M8x1.25P	M8x1.25P	M10x1.5P	M10x1.5P
C3[2]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤16	≤14 / ≤15.875 / ≤16	≤19 / ≤24	≤19/ ≤24	≤32	≤32	≤38	≤38
C4[2]	25	25	34	34	40	40	50	50	60	60
C5[2]	30	30	50	50	80	80	110	110	130	130
C6[2]	3.5	3.5	8	8	4	4	5	5	6	6
C7[2]	42	42	60	60	90	90	115	115	142	142
C8[2]	29.5	29.5	19	19	17	17	19.5	19.5	22.5	22.5
C9[2]	90.5	104.5	116.5	126.5	152.5	165	191.5	205	235.5	254.5
C10[2]	8.75	8.75	13.5	13.5	10.75	10.75	13	13	15	15
B1 h9	4	5		6		10		12		16
H1	13.5	18		24.5		35		43		59
X DIN5480	-	W16x0.8x 30x18x6m		W22x1.25x 30x16x6m		W32x1.25x 30x24x6m		W40x2x 30x18x6m		W55x2x 30x26x6m

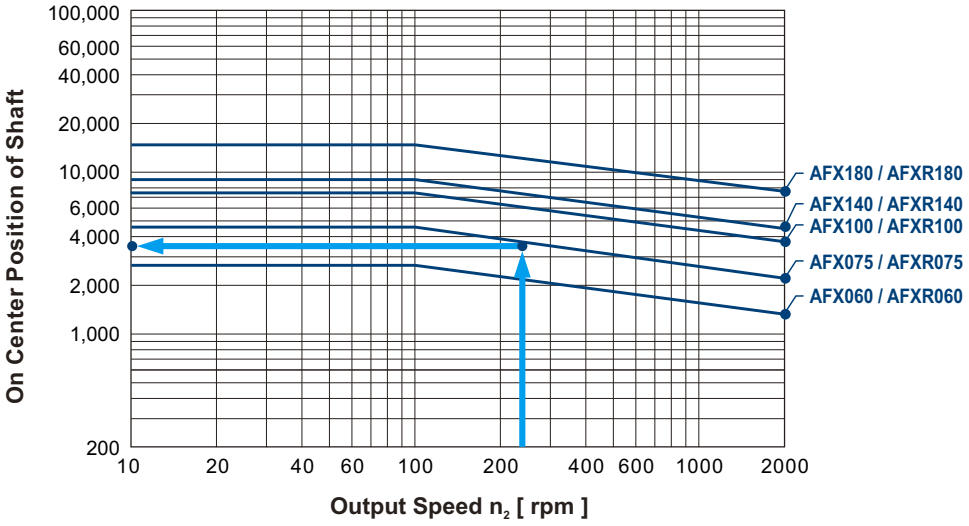
2. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.

Permitted Radial and Axial Loads

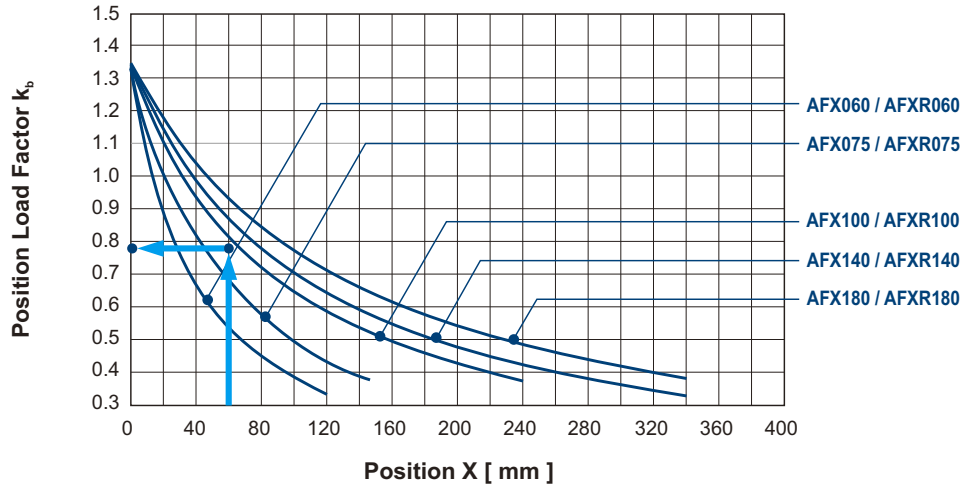


F_{2r} Radial Load
F_{2a} Axial Load

The permitted radial and axial loads on output shaft of the gearbox depend on the design of the gearbox supporting bearings.
APEX use the extension straddle oversized ball bearing design.
It can take heavy load from both axes.



If radial force F_{2r} is exerted on the center of the output shaft X=1/2 x L.
The permitted radial load is given on left diagram.



If radial force F_{2r} is not exerted on the center of the output shaft X<1/2 x L or X>1/2 x L
The permitted radial and axial loads can be calculated by the position load factor K_b on the left diagram.

HIGH TORQUE-HIGH PRECISION

PLANETARY GEARBOX

AFH - AFHK Series

▶ Ordering Code - AFH / AFHK Series

AFH090	—	003	—	S1	/	MOTOR
						Motor Type
						Shaft Type
						Ratio
						Gearbox Size

Gearbox Size

AFH	060 / 075 / 100 / 140 / 180 / 210 / 240
AFHK	060 / 075 / 100 / 140 / 180 / 210 / 240

Ratio[1]

AFH	(1 Stg.)	3 / 4 / 5 / 7 / 10
	(2 Stg.)	16 / 20 / 25 / 28 / 35 / 40 / 50 / 70 / 100
AFHK	(2 Stg.)	12 / 16 / 20 / 25 / 28 / 35 / 40 / 50 / 70 / 100
AFHKA	(3 Stg.)	100 / 125 / 140 / 175 / 200 / 250 / 350 / 400 / 500 / 700 / 1,000
AFHKB	(3 Stg.)	48 / 64 / 84 / 100 / 125 / 140 / 175 / 200 / 250 / 280 / 350 / 400 / 500 700 / 1,000
AFHK	(4 Stg.)	1,225 / 1,400 / 1,750 / 2,000 / 2,800 / 3,500 / 5,000 / 7,000 / 10,000
AFHKC	(2 Stg.)	4 / 5 / 7 / 8 / 10

Shaft Type : S1 = Smooth Output Shaft
S2 = Output Shaft with Key
S3 = DIN5480 Output Shaft
S4 = Hollow Output Shaft

Motor Type : Manufacturer and Model

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

▶ Performance - AFH Gearbox

Model No.		Stage	Ratio(1)	AFH 060	AFH 075	AFH 100	AFH 140	AFH 180	AFH 210	AFH 240
Nominal Output Torque T_{2N}	Nm	1	3	85	150	415	630	1,485	2,255	4,090
			4	95	195	350	600	1,290	1,960	3,715
			5	80	165	305	525	1,145	1,745	3,285
			7	60	130	250	435	980	1,495	2,525
			10	24	55	160	305	700	1,070	1,810
		2	16	95	195	360	615	1,320	2,000	3,785
			20	95	200	360	615	1,320	2,000	3,800
			25	80	165	310	535	1,165	1,770	3,330
			28	60	200	360	615	1,325	2,000	3,800
			35	70	170	310	535	1,165	1,775	3,335
			40	40	96	220	615	1,215	2,000	3,805
			50	50	120	275	535	1,170	1,775	3,340
			70	60	130	250	440	990	1,510	2,550
			100	24	55	160	295	660	1,005	1,700
Emergency Stop Torque T_{2NOT}	Nm	1,2	3~100	3 times T_{2N}						
Max. Acceleration Torque T_{2B}	Nm	1,2	3~100	1.5 times T_{2N}						
No Load Running Torque(2)	Nm	1	3~10	0.3	0.6	1.4	2.5	5	7	11
		2	16~100	0.2	0.3	0.5	1.2	1.7	3	4
Backlash(3)	arcmin	1	3~10	≦ 2	≦ 1	≦ 1	≦ 1	≦ 1	≦ 1	≦ 1
		2	16~100	≦ 3	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2
Torsional Rigidity	Nm/arcmin	1,2	3~100	4.6	10	30	55	175	400	550
Nominal Input Speed n_{1N}	rpm	1	3~10	5,000	3,600	3,600	3,000	2,700	2,400	2,100
		2	16~100	5,000	4,600	4,600	4,000	3,700	3,400	3,100
Max. Input Speed n_1	rpm	1	3~10	7,000	6,000	6,000	5,000	4,500	4,000	3,500
		2	16~100	7,000	7,000	7,000	6,000	5,500	5,000	4,500
Max. Radial Load F_{2r} (4)	N	1,2	3~100	3,000	4,500	6,700	10,000	15,000	22,000	30,000
Max. Axial Load F_{2a} (4)	N	1,2	3~100	1,500	2,250	3,350	5,000	7,500	11,000	15,000
Max. Tilting Moment M_{2K} (4)	Nm	1,2	3~100	160	270	550	1,050	1,740	3,350	5,420
Operating Temp.	° C	1,2	3~100	-10° C~ 90° C						
Degree of Gearbox Protection		1,2	3~100	IP65						
Lubrication		1,2	3~100	Synthetic lubrication grease						
Mounting Position		1,2	3~100	All directions						
Running Noise(5)	dB(A)	1	3~10	≦ 58	≦ 59	≦ 64	≦ 65	≦ 66	≦ 66	≦ 66
		2	16~100	≦ 58	≦ 59	≦ 60	≦ 63	≦ 66	≦ 66	≦ 66
Efficiency η	%	1	3~10	≧ 97%						
		2	16~100	≧ 94%						

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

(2) These values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage) at 3,000 rpm no loading.

(3) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(4) Applied to the output shaft center at 100 rpm.

(5) The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger r
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

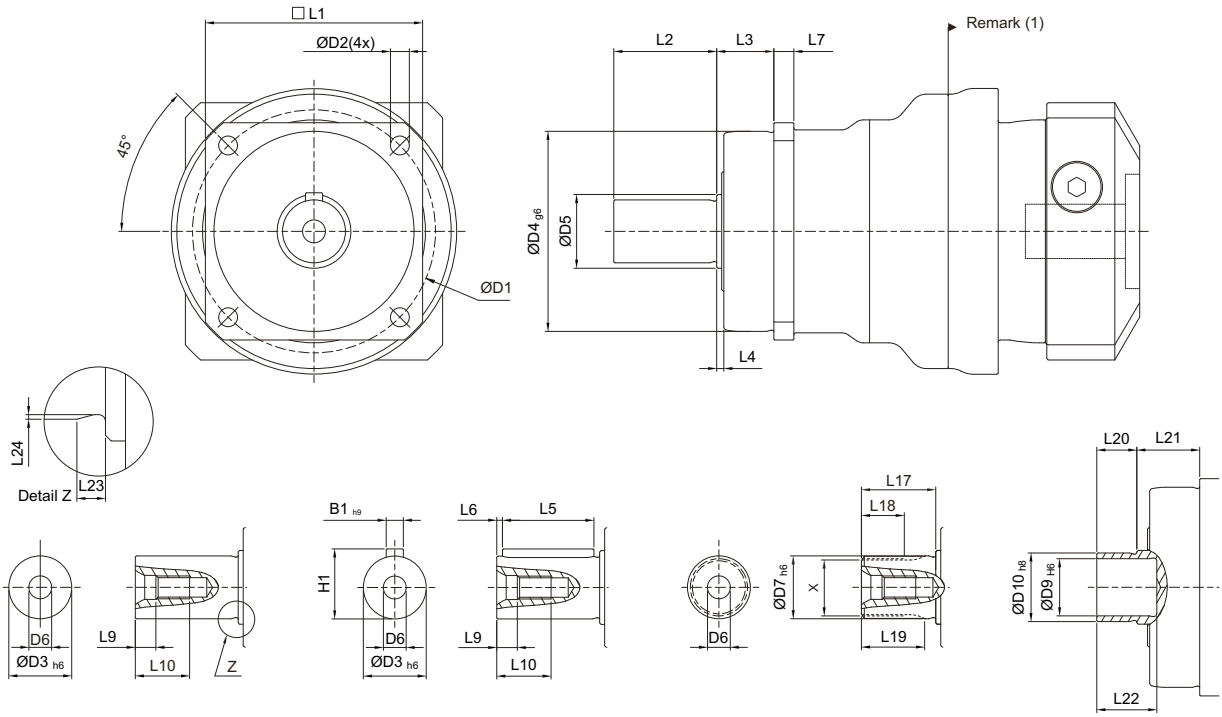
Inertia - AFH Gearbox

Model No.		AFH 060		AFH 075		AFH 100		AFH 140	
(C3) Ø (A)	Stage	1	2	1	2	1	2	1	2
8	kg.cm²	–	0.1	–	–	–	–	–	–
11		0.21	0.16	–	0.17	–	–	–	–
14		0.24	0.2	0.54	0.21	–	0.42	–	–
19		0.64	–	0.79	0.6	2.51	0.66	–	1.83
24		–	–	4.06	–	4.78	3.94	6.85	4.11
28		–	–	–	–	6.15	–	8.38	5.48
32		–	–	–	–	8.03	–	10.41	7.36
35		–	–	–	–	14.72	–	15.56	14.04
38		–	–	–	–	17.38	–	20.43	16.71
42		–	–	–	–	–	–	25.44	–
48		–	–	–	–	–	–	54.66	–
55		–	–	–	–	–	–	–	–
60		–	–	–	–	–	–	–	–

Model No.		AFH 180		AFH 210		AFH 240	
(C3) Ø (A)	Stage	1	2	1	2	1	2
8	kg.cm²	–	–	–	–	–	–
11		–	–	–	–	–	–
14		–	–	–	–	–	–
19		–	–	–	–	–	–
24		–	4.61	–	–	–	–
28		–	6.14	–	–	–	–
32		19.5	8.17	–	10.55	–	–
35		26.71	15.54	39.6	17.75	86.48	20.8
38		29.11	18.19	42.43	20.17	86.48	23.66
42		34.35	23.20	47.65	25.4	92.61	28.88
48		64.13	52.42	77.41	55.18	122.26	58.64
55		–	–	111.26	–	156.7	92.48
60		–	–	–	–	180.17	–

(A) Ø = Input shaft diameter.

Dimensions - AFH Gearbox

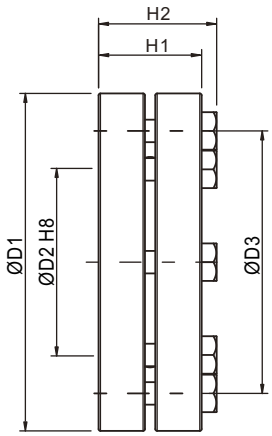


Shaft Option S1 **Shaft Option S2** **Shaft Option S3** **Shaft Option S4**

Dimension	AFH 060	AFH 075	AFH 100	AFH 140	AFH 180	AFH 210	AFH 240
D1	68	85	120	165	215	250	290
D2	5.5	7	9	11	13.5	17	17
D3 h6	16	22	32	40	55	75	85
D4 g6	60	70	90	130	160	180	200
D5	18.5	25.8	36.8	55.2	69.2	82.2	92.2
D6	M5x0.8P	M8x1.25P	M12x1.75P	M16x2P	M20x2.5P	M20x2.5P	M20x2.5P
D7 h6	16	22	32	40	55	75	85
D9 H6	15	20	30	40	55	-	-
D10 h8	18	24	36	50	68	-	-
L1	62	76	101	141	182	215	245
L2	28	36	58	82	82	105	130
L3	20	20	30	30	30	38	40
L4	2	2.5	3	3	3	3	3
L5	25	32	50	63	70	90	125
L6	2	2	4	5	6	7	3
L7	6	7	10	12	15	17	22
L9	4.8	7.2	10	12	15	15	15
L10	12.5	19	28	36	42	42	42
L17	26	26	26	40	41.5	52	60
L18	15	15	15	20	21.5	28	36
L19	21	22.5	23	33.5	33.5	45	53
L20	12	14	18	22	23	-	-
L21	22	22	32	33	32	-	-
L22	19	21	25	30	30	-	-
L23	2	2.5	2.5	2.5	2.5	2.5	4
L24	0.3	0.4	0.4	0.4	0.4	0.4	0.5
B1 h9	5	6	10	12	16	20	22
H1	18	24.5	35	43	59	79.5	90
X DIN5480	W16x0.8x30x 18x6m	W22x1.25x30x 16x6m	W32x1.25x30x 24x6m	W40x2x30x 18x6m	W55x2x30x 26x6m	W70x2x30x 34x6m	W80x2x30x 38x6m

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Shrink Disc Power Lock



SHRINK DISC POWER LOCK

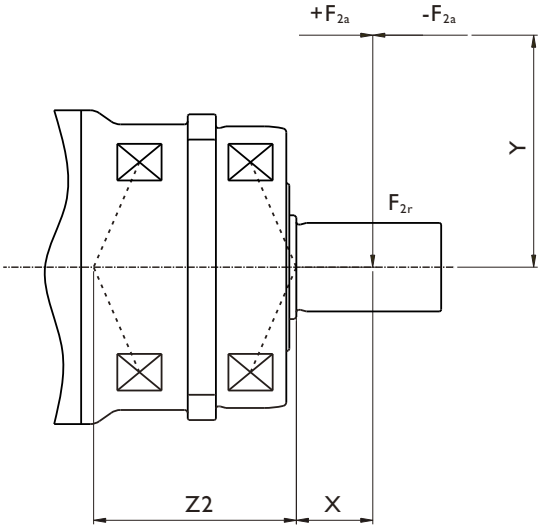
Diameter	Tolerance
≦ 30	H6 / j6
> 30 ~ 50	H6 / h6
> 50 ~ 80	H6 / g6

* For surface roughness Ra≦3.2 um

Model No. AFH / AFHK	D1	D2	D3	H1	H2	Screw(1) No x type	TA(2) [Nm]	J [Kg.cm²]	Order code
060	44	18	30	15	18.5	5 x M5	4	0.4	SSD-18
075	50	24	36	19.5	23	6 x M5	4	0.8	SSD-24
100	72	36	52	23.5	27.5	5 x M6	12	3.9	SSD-36
140	90	50	70	27.5	31.5	8 x M6	12	11.2	SSD-50
180	115	68	86	30.5	34.5	10 x M6	12	30.9	SSD-68

(1) 10.9 Class, DIN 931 (2) Tightening Torque

▶ Max. Tilting Moment M_{2K}



$$\text{Max.Tilting Moment } M_{2K} = \frac{F_{2a} * Y + F_{2r} * (X+Z2)}{1000}$$

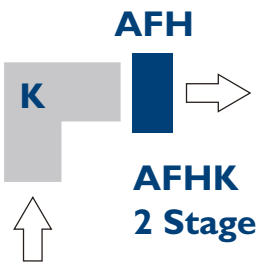
M_{2K} : 【Nm】
F_{2a}, F_{2r} : 【N】
X, Y, Z2 : 【mm】

AFH / AFHK	060	075	100	140	180	210	240
Z2【mm】	41.3	50.1	58.9	72.7	93.7	98.5	112.2

Note : Applied to the output shaft center at 100 rpm.

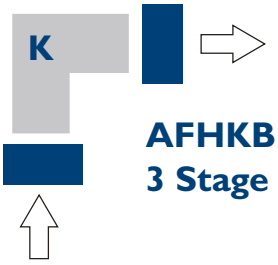
▶ AFHK Gearbox Structure

(I)

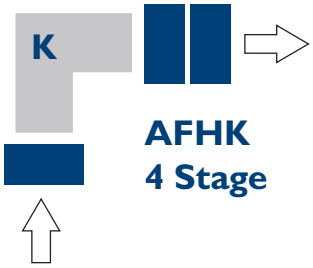


(II)

(III)



(IV)



Performance - AFHK (2-Stage) Gearbox

Model No.		Stage	Ratio(1)	AFHK 060	AFHK 075	AFHK 100	AFHK 140	AFHK 180	AFHK 210	AFHK 240
Nominal Output Torque T_{2N}	Nm	2	12	95	195	360	615	1,315	1,680	3,280
			16	95	200	360	615	1,320	1,680	3,280
			20	95	200	360	615	1,320	1,775	3,335
			25	80	170	310	535	1,165	1,775	3,335
			28	92	200	360	615	1,325	1,560	3,000
			35	80	170	310	535	1,170	1,775	3,340
			40	60	160	340	615	1,325	1,440	2,400
			50	50	170	310	535	1,170	1,775	3,000
			70	60	130	250	440	990	1,510	2,550
			100	24	55	160	290	655	1,005	1,685
Emergency Stop Torque T_{2NOT}	Nm	2	12~100	2 times T_{2N}						
Max. Acceleration Torque T_{2B}	Nm	2	12~100	1.5 times T_{2N}						
No Load Running Torque(2)	Nm	2	12~100	1	1.3	2	3.1	6	13	16
Backlash(3)	arcmin	2	12~100	≦ 3	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2
Torsional Rigidity	Nm/arcmin	2	12~100	4.6	10	30	55	175	300	510
Nominal Input Speed n_{1N}	rpm	2	12~100	3,000	3,000	2,800	2,700	2,200	2,100	2,000
Max. Input Speed n_{1B}	rpm	2	12~100	6,000	6,000	6,000	4,500	4,500	4,000	3,000
Max. Radial Load F_{2r}(4)	N	2	12~100	3,000	4,500	6,700	10,000	15,000	22,000	30,000
Max. Axial Load F_{2a}(4)	N	2	12~100	1,500	2,250	3,350	5,000	7,500	11,000	15,000
Max. Tilting Moment M_{2K}(4)	Nm	2	12~100	160	270	550	1,050	1,740	3,350	5,420
Operating Temp.	° C	2	12~100	-10° C~ 90° C						
Degree of Gearbox Protection		2	12~100	IP65						
Lubrication		2	12~100	Synthetic lubrication grease						
Mounting Position		2	12~100	All directions						
Running Noise(5)	dB(A)	2	12~100	≦ 64	≦ 66	≦ 68	≦ 68	≦ 70	≦ 70	≦ 72
Efficiency η	%	2	12~100	≧ 94%						

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

(2) These values are measured by gearbox with ratio 100 (2-stage) at 3,000 rpm no loading.

(3) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(4) Applied to the output shaft center at 100 rpm.

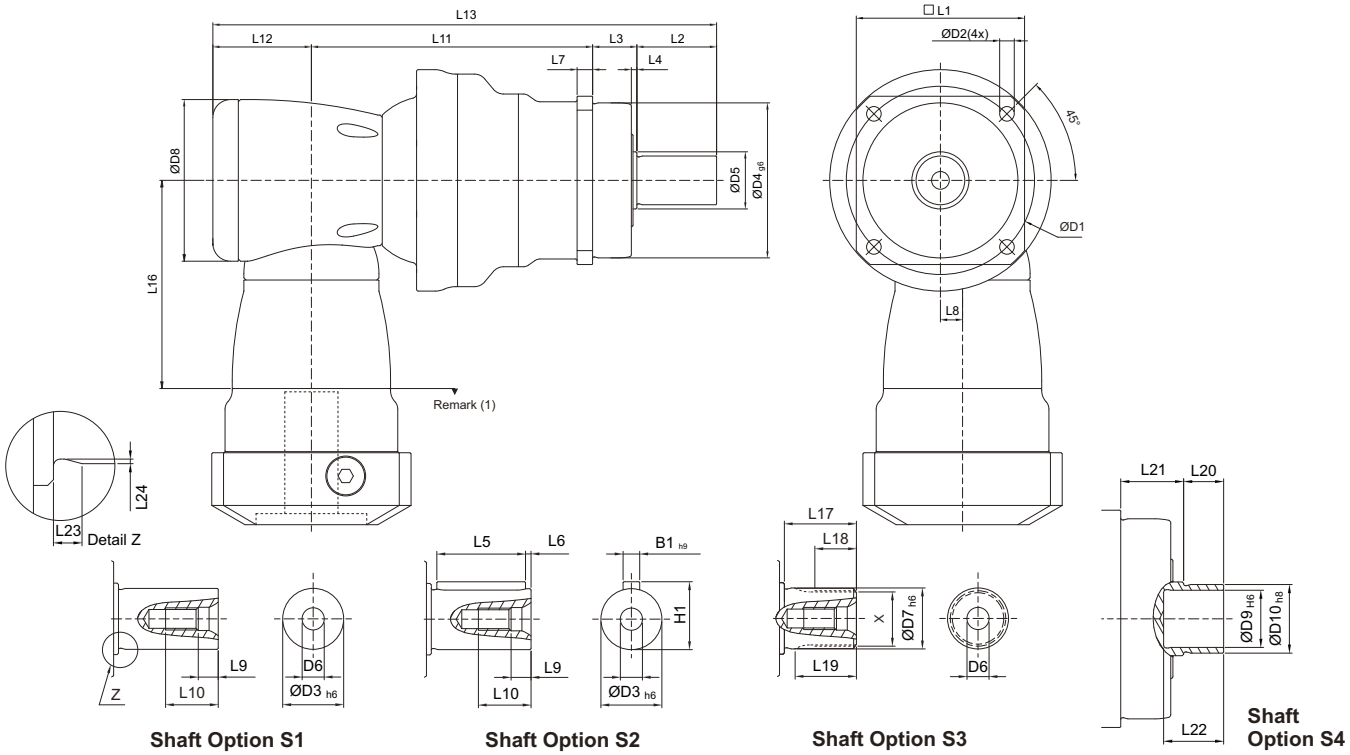
(5) The dB values are measured by gearbox with 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size. By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

Inertia - AFHK (2-Stage) Gearbox

(C3) Ø(A) \ Model No.		AFHK 060	AFHK 075	AFHK 100	AFHK 140	AFHK 180	AFHK 210	AFHK 240
8	kg.cm²	0.1	–	–	–	–	–	–
11		0.16	0.17	–	–	–	–	–
14		0.2	0.37	0.41	–	–	–	–
19		–	0.6	1.61	1.61	–	–	–
24		–	–	3.9	4.01	5.62	–	–
28		–	–	–	5.53	5.62	–	–
32		–	–	–	7.57	8.11	8.11	–
35		–	–	–	14.95	15.32	15.32	15.68
38		–	–	–	17.58	17.72	17.72	18.52
42		–	–	–	–	22.95	22.95	23.74
48		–	–	–	–	52.74	52.74	53.49
55		–	–	–	–	–	–	87.34

(A) Ø = Input shaft diameter.

▶ Dimensions - AFHK (2-Stage) Gearbox (Ratio i = 12~100)



Shaft Option S1 **Shaft Option S2** **Shaft Option S3** **Shaft Option S4**

Dimension	AFHK 060	AFHK 075	AFHK 100	AFHK 140	AFHK 180	AFHK 210	AFHK 240
D1	68	85	120	165	215	250	290
D2	5.5	7	9	11	13.5	17	17
D3 h6	16	22	32	40	55	75	85
D4 g6	60	70	90	130	160	180	200
D5	18.5	25.8	36.8	55.2	69.2	82.2	92.2
D6	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P	M20 x 2.5P
D7 h6	16	22	32	40	55	75	85
D8	73	94	116	163	210	210	255
D9 H6	15	20	30	40	55	-	-
D10 h8	18	24	36	50	68	-	-
L1	62	76	101	141	182	215	245
L2	28	36	58	82	82	105	130
L3	20	20	30	30	30	38	40
L4	2	2.5	3	3	3	3	3
L5	25	32	50	63	70	90	125
L6	2	2	4	5	6	7	3
L7	6	7	10	12	15	17	22
L8	10	13	17	25	31	31	36
L9	4.8	7.2	10	12	15	15	15
L10	12.5	19	28	36	42	42	42
L11	118.5	135.5	152.5	191	248	270	336
L12	44.5	53	68.3	89	115	115	131
L13	211	244.5	308.8	392	475	528	637
L16	94	114.5	129	173.5	228	228	265.5
L17	26	26	26	40	41.5	52	60
L18	15	15	15	20	21.5	28	36
L19	21	22.5	23	33.5	33.5	45	53
L20	12	14	18	22	23	-	-
L21	22	22	32	33	32	-	-
L22	19	21	25	30	30	-	-
L23	2	2.5	2.5	2.5	2.5	2.5	4
L24	0.3	0.4	0.4	0.4	0.4	0.4	0.5
B1 h9	5	6	10	12	16	20	22
H1	18	24.5	35	43	59	79.5	90
X DIN5480	W16 x 0.8 x 30 x 18 x 6m	W22 x 1.25 x 30 x 16 x 6m	W32 x 1.25 x 30 x 24 x 6m	W40 x 2 x 30 x 18 x 6m	W55 x 2 x 30 x 26 x 6m	W70 x 2 x 30 x 34 x 6m	W80 x 2 x 30 x 38 x 6m

(1) Dimensions are related to motor interface. Please contact APEX for details.

Performance - AFHKA (3-Stage) Gearbox

Model No.		Stage	Ratio(1)	AFHKA 240
Nominal Output Torque T_{2N}	Nm	3	100	3,800
			125	3,345
			140	3,800
			175	3,345
			200	3,800
			250	3,345
			350	3,345
			500	3,345
			700	2,555
			1,000	1,650
Emergency Stop Torque T_{2NOT}	Nm	3	100~1,000	2 times T_{2N}
Max. Acceleration Torque T_{2B}	Nm	3	100~1,000	1.5 times T_{2N}
No Load Running Torque(2)	Nm	3	100~1,000	6
Backlash(3)	arcmin	3	100~1,000	≦ 2
Torsional Rigidity	Nm/arcmin	3	100~1,000	510
Nominal Input Speed n_{1N}	rpm	3	100~1,000	2,100
Max. Input Speed n_{1B}	rpm	3	100~1,000	4,000
Max. Radial Load F_{2r}(4)	N	3	100~1,000	30,000
Max. Axial Load F_{2a}(4)	N	3	100~1,000	15,000
Max. Tilting Moment M_{2K}(4)	Nm	3	100~1,000	5,420
Operating Temp.	° C	3	100~1,000	-10° C~ 90° C
Degree of Gearbox Protection		3	100~1,000	IP65
Lubrication		3	100~1,000	Synthetic lubrication grease
Mounting Position		3	100~1,000	All directions
Running Noise(5)	dB(A)	3	100~1,000	≦ 72
Efficiency η	%	3	100~1,000	≧ 92%

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

(2) These values are measured by gearbox with ratio 1,000 (3-stage) at 3,000 rpm no loading.

(3) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(4) Applied to the output shaft center at 100 rpm.

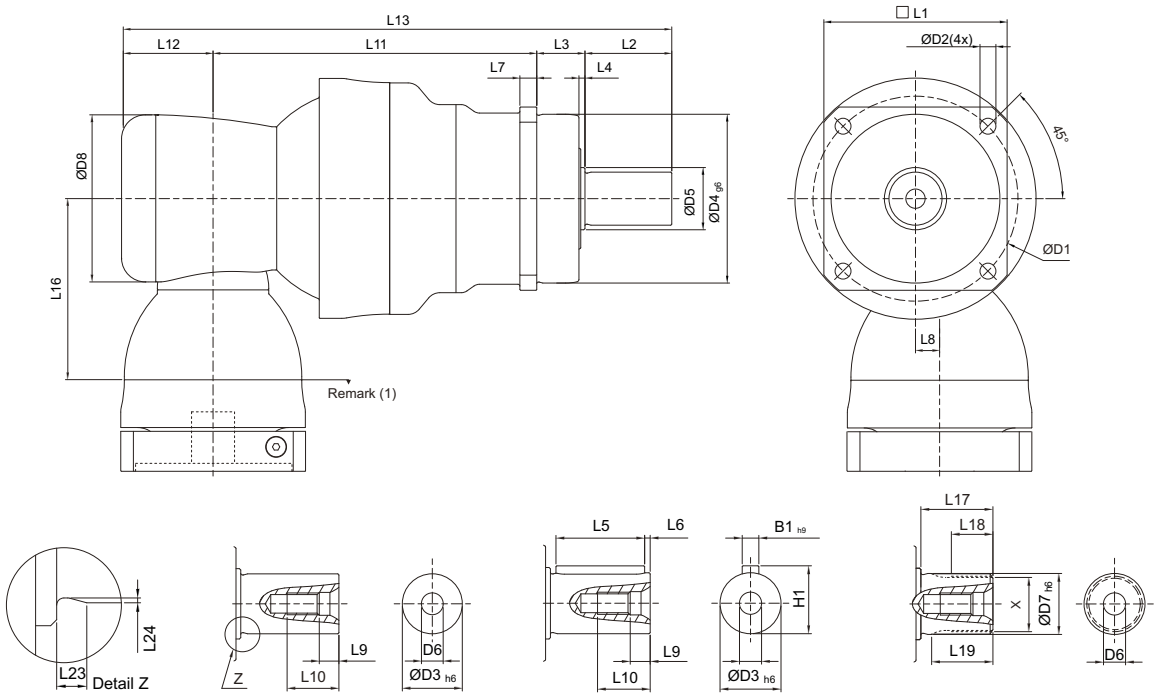
(5) The dB values are measured by gearbox with 1,000 (3-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size. By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

Inertia - AFHKA (3-Stage) Gearbox

(C3) Ø(A) \ Model No.		AFHKA 240
32	$kg.cm^2$	8.11
35		15.32
38		17.72
42		22.95
48		52.74

(A) Ø = Input shaft diameter.

▶ Dimensions - AFHKA (3-Stage) Gearbox (Ratio i = 100~1,000)



Shaft Option S1 **Shaft Option S2** **Shaft Option S3**

Dimension	AFHKA 240
D1	290
D2	17
D3 h6	85
D4 g6	200
D5	92.2
D6	M20 x 2.5P
D7 h6	85
D8	210
L1	245
L2	130
L3	40
L4	3
L5	125
L6	3
L7	22
L8	31
L9	15
L10	42
L11	378
L12	115
L13	663
L16	228
L17	60
L18	36
L19	53
L23	4
L24	0.5
B1 h9	22
H1	90
X DIN5480	W80 x 2 x 30 x 38 x 6m

(1) Dimensions are related to motor interface. Please contact APEX for details.

Performance - AFHKB (3-Stage) Gearbox

Model No.		Stage	Ratio(1)	AFHKB 075	AFHKB 100	AFHKB 140	AFHKB 180	AFHKB 210	AFHKB 240
Nominal Output Torque T_{2N}	Nm	3	48	–	–	–	–	–	3,280
			64	200	360	615	1,325	1,680	3,280
			84	200	360	620	1,325	1,680	–
			100	200	360	620	1,330	1,780	3,345
			125	170	310	535	1,170	1,780	3,345
			140	200	360	620	1,330	1,780	3,345
			175	170	310	535	1,170	1,780	3,345
			200	200	360	620	1,330	1,780	3,345
			250	170	310	535	1,170	1,780	3,345
			280	200	360	620	1,330	1,510	3,000
			350	170	310	535	1,170	1,775	3,345
			400	160	340	620	1,330	1,440	2,400
			500	170	310	535	1,170	1,780	3,000
			700	130	250	440	990	1,510	2,555
			1,000	55	160	290	640	980	1,655
Emergency Stop Torque T_{2NOT}	Nm	3	48~1,000	2 times T_{2N}					
Max. Acceleration Torque T_{2B}	Nm	3	48~1,000	1.5 times T_{2N}					
No Load Running Torque(2)	Nm	3	48~1,000	0.2	0.2	0.3	0.4	1	1.2
Backlash(3)	arcmin	3	48~1,000	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2
Torsional Rigidity	Nm/arcmin	3	48~1,000	10	30	55	175	300	510
Nominal Input Speed n_{1N}	rpm	3	48~1,000	5,500	4,600	4,600	4,000	3,700	3,400
Max. Input Speed n_{1B}	rpm	3	48~1,000	7,000	7,000	7,000	6,000	5,500	5,000
Max. Radial Load F_{2r}(4)	N	3	48~1,000	4,500	6,700	10,000	15,000	22,000	30,000
Max. Axial Load F_{2a}(4)	N	3	48~1,000	2,250	3,350	5,000	7,500	11,000	15,000
Max. Tilting Moment M_{2K}(4)	Nm	3	48~1,000	270	550	1,050	1,740	3,350	5,420
Operating Temp.	° C	3	48~1,000	-10° C~ 90° C					
Degree of Gearbox Protection		3	48~1,000	IP65					
Lubrication		3	48~1,000	Synthetic lubrication grease					
Mounting Position		3	48~1,000	All directions					
Running Noise(5)	dB(A)	3	48~1,000	≦ 66	≦ 68	≦ 68	≦ 70	≦ 70	≦ 72
Efficiency η	%	3	48~1,000	≧ 92%					

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

(2) These values are measured by gearbox with ratio 1,000 (3-stage) at 3,000 rpm no loading.

(3) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(4) Applied to the output shaft center at 100 rpm.

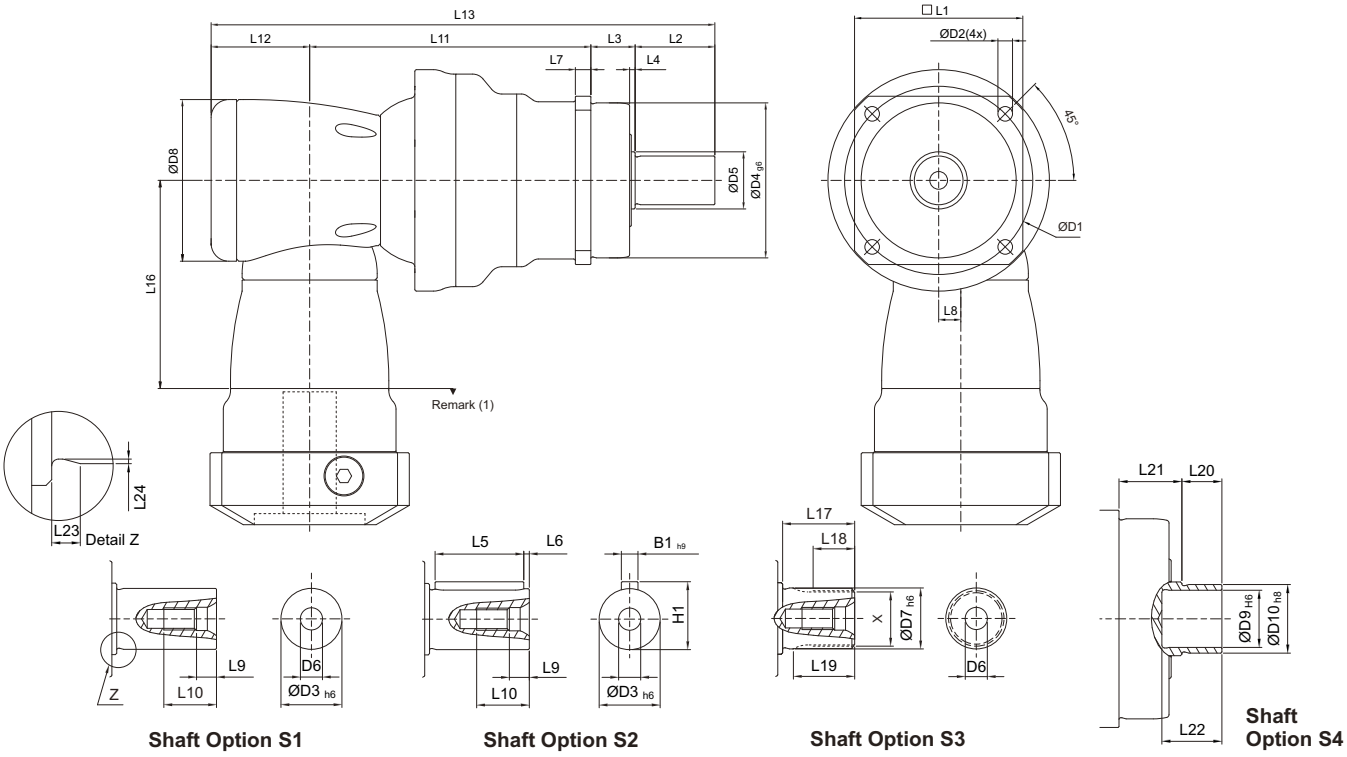
(5) The dB values are measured by gearbox with 1,000 (3-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size. By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

Inertia - AFHKB (3-Stage) Gearbox

(C3) Ø(A) \ Model No.		AFHKB 075	AFHKB 100	AFHKB 140	AFHKB 180	AFHKB 210	AFHKB 240
8	kg.cm²	0.17	–	–	–	–	–
11		0.17	0.42	–	–	–	–
14		0.21	0.42	1.83	–	–	–
19		–	0.66	1.83	4.61	–	–
24		–	–	4.11	4.61	4.61	–
28		–	–	–	6.14	6.14	–
32		–	–	–	8.17	8.17	10.55
35		–	–	–	15.56	15.56	17.76
38		–	–	–	18.19	18.19	20.17
42		–	–	–	–	23.2	25.4
48		–	–	–	–	52.42	55.18

(A) Ø = Input shaft diameter.

▶ Dimensions - AFHKB (3-Stage) Gearbox (Ratio i = 48~1,000)



Dimension	AFHKB 075	AFHKB 100	AFHKB 140	AFHKB 180	AFHKB 210	AFHKB 240
D1	85	120	165	215	250	290
D2	7	9	11	13.5	17	17
D3 h6	22	32	40	55	75	85
D4 g6	70	90	130	160	180	200
D5	25.8	36.8	55.2	69.2	82.2	92.2
D6	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P	M20 x 2.5P
D7 h6	22	32	40	55	75	85
D8	94	116	163	210	210	255
D9 H6	20	30	40	55	-	-
D10 h8	24	36	50	68	-	-
L1	76	101	141	182	215	245
L2	36	58	82	82	105	130
L3	20	30	30	30	38	40
L4	2.5	3	3	3	3	3
L5	32	50	63	70	90	125
L6	2	4	5	6	7	3
L7	7	10	12	15	17	22
L8	13	17	25	31	31	36
L9	7.2	10	12	15	15	15
L10	19	28	36	42	42	42
L11	135.5	152.5	191	248	270	336
L12	53	68.3	89	115	115	131
L13	244.5	308.8	392	475	528	637
L16	114.5	129	173.5	228	228	265.5
L17	26	26	40	41.5	52	60
L18	15	15	20	21.5	28	36
L19	22.5	23	33.5	33.5	45	53
L20	14	18	22	23	-	-
L21	22	32	33	32	-	-
L22	21	25	30	30	-	-
L23	2.5	2.5	2.5	2.5	2.5	4
L24	0.4	0.4	0.4	0.4	0.4	0.5
B1 h9	6	10	12	16	20	22
H1	24.5	35	43	59	79.5	90
X DIN5480	W22 x 1.25 x 30 x 16 x 6m	W32 x 1.25 x 30 x 24 x 6m	W40 x 2 x 30 x 18 x 6m	W55 x 2 x 30 x 26 x 6m	W70 x 2 x 30 x 34 x 6m	W80 x 2 x 30 x 38 x 6m

(1) Dimensions are related to motor interface. Please contact APEX for details.

Performance - AFHK (4-Stage) Gearbox

Model No.		Stage	Ratio (1)	AFHK 240
Nominal Output Torque T_{2N}	Nm	4	1,225	3,350
			1,400	3,800
			1,750	3,350
			2,000	3,800
			2,800	2,555
			3,500	3,350
			5,000	3,350
			7,000	2,625
			10,000	1,975
Emergency Stop Torque T_{2NOT}	Nm	4	1,225~10,000	2 times T_{2N}
Max. Acceleration Torque T_{2B}	Nm	4	1,225~10,000	1.5 times T_{2N}
No Load Running Torque(2)	Nm	4	1,225~10,000	0.4
Backlash(3)	arcmin	4	1,225~10,000	≦ 2
Torsional Rigidity	Nm/arcmin	4	1,225~10,000	510
Nominal Input Speed n_{1N}	rpm	4	1,225~10,000	3,700
Max. Input Speed n_{1B}	rpm	4	1,225~10,000	5,500
Max. Radial Load F_{2r}(4)	N	4	1,225~10,000	30,000
Max. Axial Load F_{2a}(4)	N	4	1,225~10,000	15,000
Max. Tilting Moment M_{2K}(4)	Nm	4	1,225~10,000	5,420
Operating Temp.	° C	4	1,225~10,000	-10° C~ 90° C
Degree of Gearbox Protection		4	1,225~10,000	IP65
Lubrication		4	1,225~10,000	Synthetic lubrication grease
Mounting Position		4	1,225~10,000	All directions
Running Noise(5)	dB(A)	4	1,225~10,000	≦ 72
Efficiency η	%	4	1,225~10,000	≧ 90%

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

(2) These values are measured by gearbox with ratio 10,000 (4-stage) at 3,000 rpm no loading.

(3) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(4) Applied to the output shaft center at 100 rpm.

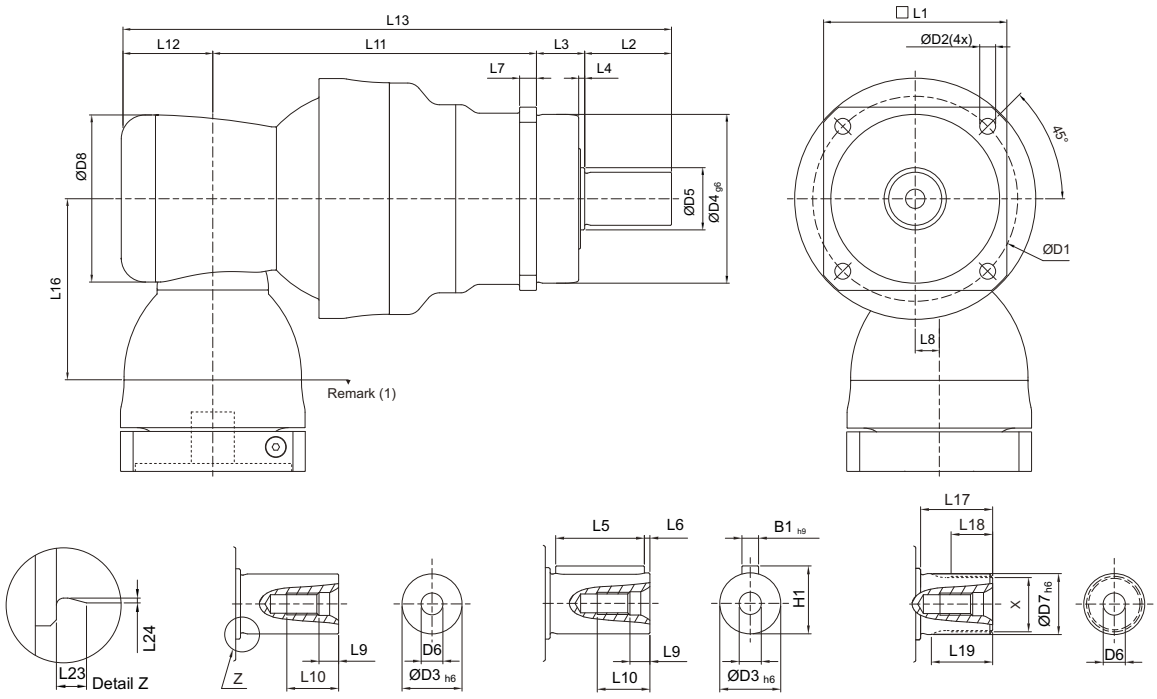
(5) The dB values are measured by gearbox with 10,000 (4-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size. By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

Inertia - AFHK (4-Stage) Gearbox

Model No. / (C3) Ø (A)		AFHK 240
24	$kg.cm^2$	4.61
28		6.14
32		8.17
35		15.56
38		18.19

(A) Ø = Input shaft diameter.

▶ Dimensions - AFHK (4-Stage) Gearbox (Ratio i = 1,225~10,000)



Shaft Option S1 **Shaft Option S2** **Shaft Option S3**

Dimension	AFHK 240
D1	290
D2	17
D3 h6	85
D4 g6	200
D5	92.2
D6	M20 x 2.5P
D7 h6	85
D8	210
L1	245
L2	130
L3	40
L4	3
L5	125
L6	3
L7	22
L8	31
L9	15
L10	42
L11	378
L12	115
L13	663
L16	228
L17	60
L18	36
L19	53
L23	4
L24	0.5
B1 h9	22
H1	90
X DIN5480	W80 x 2 x 30 x 38 x 6m

(1) Dimensions are related to motor interface. Please contact APEX for details.

Performance - AFHKC Gearbox

Model No.		Stage	Ratio(1)	AFHKC 060	AFHKC 075	AFHKC 100	AFHKC 140	AFHKC 180	AFHKC 210	AFHKC 240
Nominal Output Torque T_{2N}	Nm	2	4	95	195	355	605	1,300	1,975	3,750
			5	80	165	305	525	1,150	1,755	3,305
			7	60	130	250	440	985	1,500	2,535
			8	95	195	360	610	1,315	1,995	3,785
			10	80	165	310	530	1,160	1,765	3,325
Emergency Stop Torque T_{2NOT}	Nm	2	4~10	2 times T_{2N}						
Max. Acceleration Torque T_{2B}	Nm	2	4~10	1.5 times T_{2N}						
No Load Running Torque(2)	Nm	2	4~10	2	2.5	5.8	12	25	48	95
Backlash(3)	arcmin	2	4~10	≦ 3	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2
Torsional Rigidity	Nm/arcmin	2	4~10	4.6	10	30	55	175	300	510
Nominal Input Speed n_{1N}	rpm	2	4~10	5,000	3,600	3,000	2,300	1,800	1,500	1,100
Max. Input Speed n_{1B}	rpm	2	4~10	7,000	6,000	5,500	4,500	3,500	3,000	2,200
Max. Radial Load F_{2r}(4)	N	2	4~10	3,000	4,500	6,700	10,000	15,000	22,000	30,000
Max. Axial Load F_{2a}(4)	N	2	4~10	1,500	2,250	3,350	5,000	7,500	11,000	15,000
Max. Tilting Moment M_{2K}(4)	Nm	2	4~10	160	270	550	1,050	1,740	3,350	5,420
Operating Temp.	° C	2	4~10	-10° C~ 90° C						
Degree of Gearbox Protection		2	4~10	IP65						
Lubrication		2	4~10	Synthetic lubrication grease						
Mounting Position		2	4~10	All directions						
Running Noise(5)	dB(A)	2	4~10	≦ 68	≦ 68	≦ 68	≦ 70	≦ 70	≦ 72	≦ 74
Efficiency η	%	2	4~10	≧ 95%						

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

(2) These values are measured by gearbox with ratio 10 (2-stage) at 3,000 rpm no loading.

(3) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(4) Applied to the output shaft center at 100 rpm.

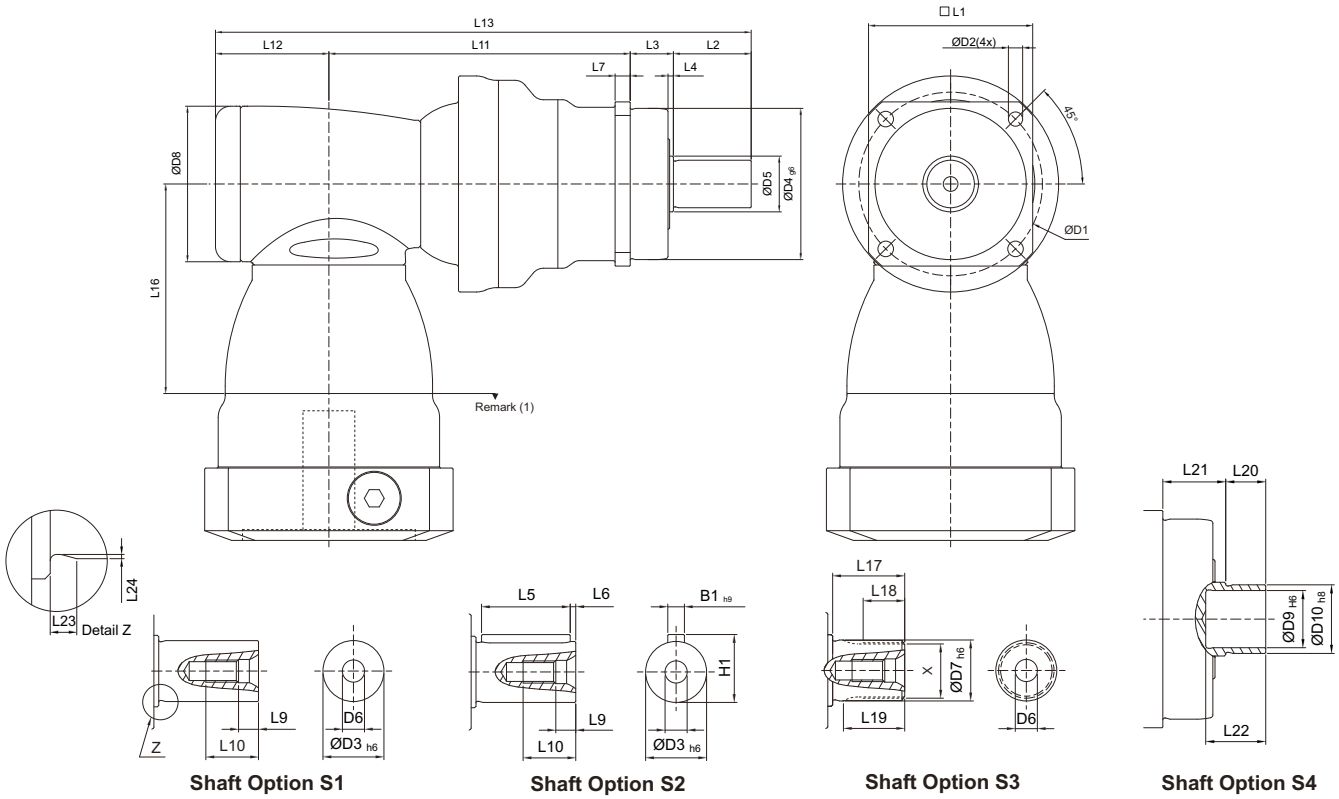
(5) The dB values are measured by gearbox with 10 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size. By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

Inertia - AFHKC Gearbox

(C3) Ø(A) \ Model No.		AFHKC 060	AFHKC 075	AFHKC 100	AFHKC 140	AFHKC 180	AFHKC 210	AFHKC 240
8	kg.cm²	0.1	–	–	–	–	–	–
11		0.16	0.41	–	–	–	–	–
14		0.20	0.41	–	–	–	–	–
19		0.58	1.61	1.61	–	–	–	–
24		–	3.9	4.01	5.62	–	–	–
28		–	–	5.53	5.62	–	–	–
32		–	–	7.57	8.11	8.11	–	–
35		–	–	14.95	15.32	15.32	15.68	19.37
38		–	–	17.58	17.72	17.72	18.52	19.37
42		–	–	–	22.95	22.95	23.74	25.5
48		–	–	–	52.74	52.74	53.49	55.14
55		–	–	–	–	–	87.34	89.59
60		–	–	–	–	–	–	113.06

(A) Ø = Input shaft diameter.

▶ Dimensions - AFHKC Gearbox (Ratio i = 4~10)



Shaft Option S1 **Shaft Option S2** **Shaft Option S3** **Shaft Option S4**

Dimension	AFHKC 060	AFHKC 075	AFHKC 100	AFHKC 140	AFHKC 180	AFHKC 210	AFHKC 240
D1	68	85	120	165	215	250	290
D2	5.5	7	9	11	13.5	17	17
D3 h6	16	22	32	40	55	75	85
D4 g6	60	70	90	130	160	180	200
D5	18.5	25.8	36.8	55.2	69.2	82.2	92.2
D6	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P	M20 x 2.5P	M20 x 2.5P
D7 h6	16	22	32	40	55	75	85
D8	64	92	116	156	156	195	240
D9 H6	15	20	30	40	55	-	-
D10 h8	18	24	36	50	68	-	-
L1	62	76	101	141	182	215	245
L2	28	36	58	82	82	105	130
L3	20	20	30	30	30	38	40
L4	2	2.5	3	3	3	3	3
L5	25	32	50	63	70	90	125
L6	2	2	4	5	6	7	3
L7	6	7	10	12	15	17	22
L9	4.8	7.2	10	12	15	15	15
L10	12.5	19	28	36	42	42	42
L11	121.5	145.5	163	219	258	277.5	352
L12	46.5	61.5	76	97.5	97.5	105.5	141
L13	216	263	327	428.5	467.5	526	663
L16	81.5	113.5	147.5	196.5	196.5	229	260
L17	26	26	26	40	41.5	52	60
L18	15	15	15	20	21.5	28	36
L19	21	22.5	23	33.5	33.5	45	53
L20	12	14	18	22	23	-	-
L21	22	22	32	33	32	-	-
L22	19	21	25	30	30	-	-
L23	2	2.5	2.5	2.5	2.5	2.5	4
L24	0.3	0.4	0.4	0.4	0.4	0.4	0.5
B1 h9	5	6	10	12	16	20	22
H1	18	24.5	35	43	59	79.5	90
X DIN5480	W16 x 0.8 x 30 x 18 x 6m	W22 x 1.25 x 30 x 16 x 6m	W32 x 1.25 x 30 x 24 x 6m	W40 x 2 x 30 x 18 x 6m	W55 x 2 x 30 x 26 x 6m	W70 x 2 x 30 x 34 x 6m	W80 x 2 x 30 x 38 x 6m

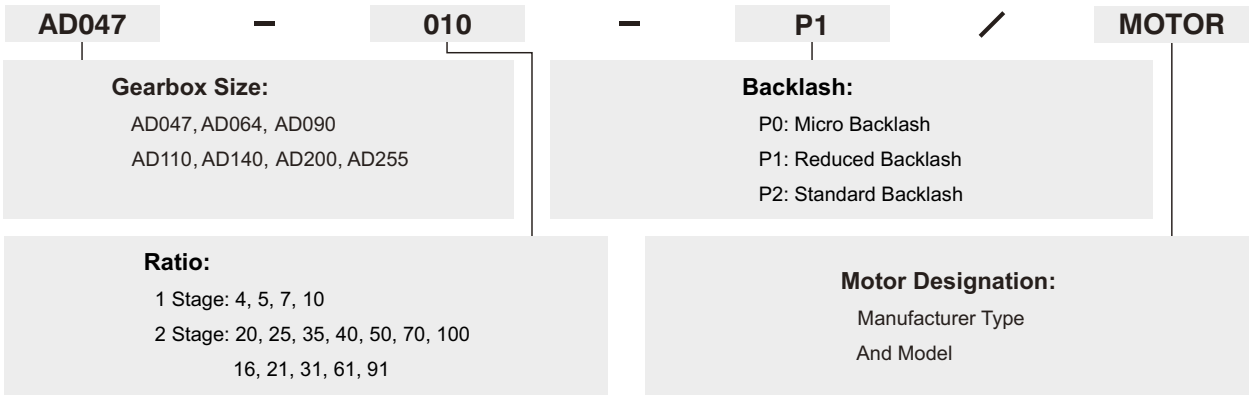
(1) Dimensions are related to motor interface. Please contact APEX for details.

HIGH PRECISION

PLANETARY GEARBOX

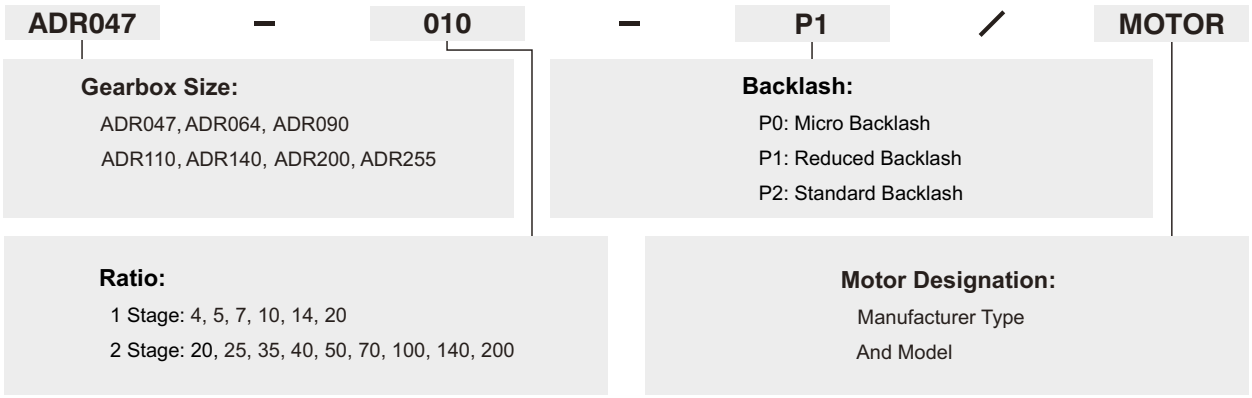
AD - ADR - ADS Series

AD Series Ordering Code



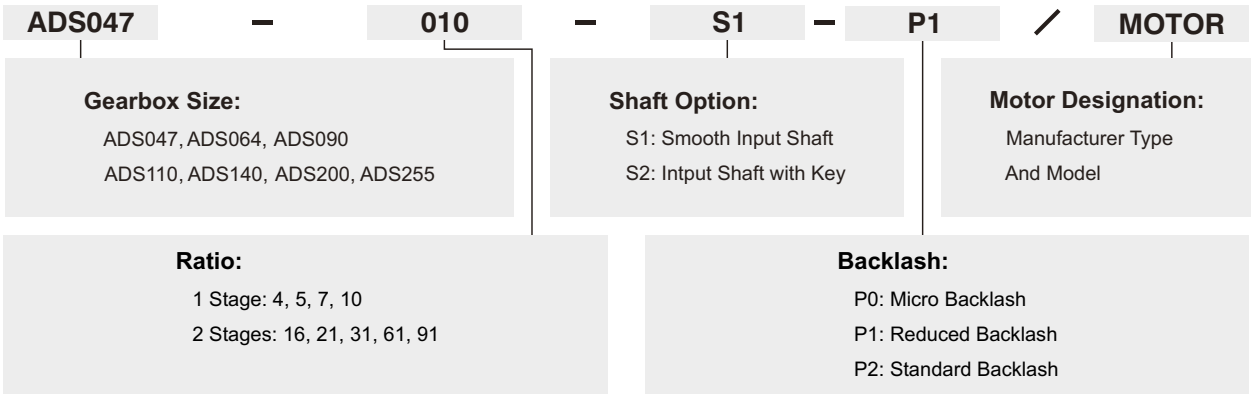
Ordering Example: AD047-010-P1 / SIEMENS 1FT6 041-4AF71

ADR Series Ordering Code



Ordering Example: ADR047-010-P1 / SIEMENS 1FT5 034-0AK71

ADS Series Ordering Code



Ordering Example: ADS047-010-S1-P1 / SIEMENS 1FT5 034-0AK71

▶ Performance - AD Gearbox

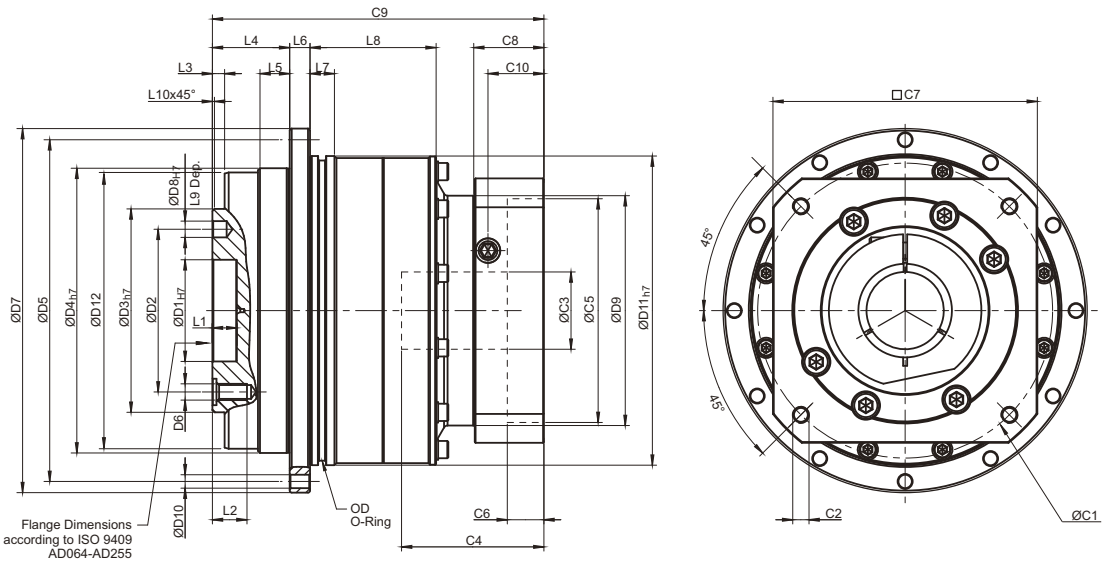
Model No.		Stage	Ratio[A]	AD047	AD064	AD090	AD110	AD140	AD200	AD255
Nominal Output Torque T_{2N}	Nm	1	4	19	48	130	270	560	1,100	1,700
			5	22	60	160	330	650	1,200	2,000
			7	19	50	140	300	550	1,100	1,800
			10	14	40	100	230	450	900	1,500
		2	20	19	48	130	270	560	1,100	1,700
			25	22	60	160	330	650	1,200	2,000
			35	19	50	140	300	550	1,100	1,800
			40	19	48	130	270	560	1,100	1,700
			50	22	60	160	330	650	1,200	2,000
			70	19	50	140	300	550	1,100	1,800
			100	14	40	100	230	450	900	1,500
			16	19	48	130	270	560	1,100	1,700
			21	22	60	160	330	650	1,200	2,000
			31	19	50	140	300	550	1,100	1,800
			61	19	50	140	300	550	1,100	1,800
			91	14	40	100	230	450	900	1,500
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	4~100	3 times of Nominal Output Torque						
Nominal Input Speed n_{1N}	rpm	1,2	4~100	5,000	5,000	4,000	4,000	3,000	3,000	2,000
Max. Input Speed n_{1B}	rpm	1,2	4~100	10,000	10,000	8,000	8,000	6,000	6,000	4,000
Micro Backlash P0	arcmin	1	4~10	-	-	≤1	≤1	≤1	≤1	≤1
		2	20~100	-	-	-	≤3	≤3	≤3	≤3
Reduced Backlash P1	arcmin	1	4~10	≤3	≤3	≤3	≤3	≤3	≤3	≤3
		2	20~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5
Standard Backlash P2	arcmin	1	4~10	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	20~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional Rigidity	Nm/arcmin	1,2	4~100	7	13	31	82	151	440	1,006
Max. Tilting Moment M_{2K}	Nm	1,2	4~100	55	75	190	300	1,300	2,930	5,500
Max. Axial Load F_{2aB}[C]	N	1,2	4~100	990	1,050	2,850	2,990	10,590	16,660	29,430
Efficiency η	%	1	4~10	≥97%						
		2	20~100	≥94%						
Weight	kg	1	4~10	0.7	1.2	3.0	5.6	11.9	31.6	56.1
		2	20~100	1.0	1.6	3.7	7.3	15.9	36.9	70.4
			16~91	1.0	1.4	3.5	6.5	15.5	34.2	67.2
Operating Temp	°C	1,2	4~100	-10°C~90°C						
Lubrication				Synthetic lubrication oils						
IP Level		1,2	4~100	IP65						
Mounting Position		1,2	4~100	all directions						
Noise[D]	dB(A)	1,2	4~100	≤56	≤58	≤60	≤63	≤65	≤67	≤70

▶ Inertia - AD Gearbox

Model No.		Stage	Ratio[A]	AD047	AD064	AD090	AD110	AD140	AD200	AD255
Moments of Inertia J_1	kg • cm^2	1	4	0.03	0.14	0.51	2.87	7.54	25.03	58.31
			5	0.03	0.13	0.47	2.71	7.42	23.29	53.27
			7	0.03	0.13	0.45	2.62	7.14	22.48	50.97
			10	0.03	0.13	0.44	2.57	7.03	22.51	50.56
		2	20	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			25	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			35	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			40	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			50	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			70	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			100	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			16	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			21	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			31	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			61	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			91	0.03	0.03	0.13	0.44	2.57	7.03	22.51

A. Ratio ($i=N_{in} / N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm
D. The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

▶ Dimensions - AD Series (1-Stage, Ratio i = 4,~10)

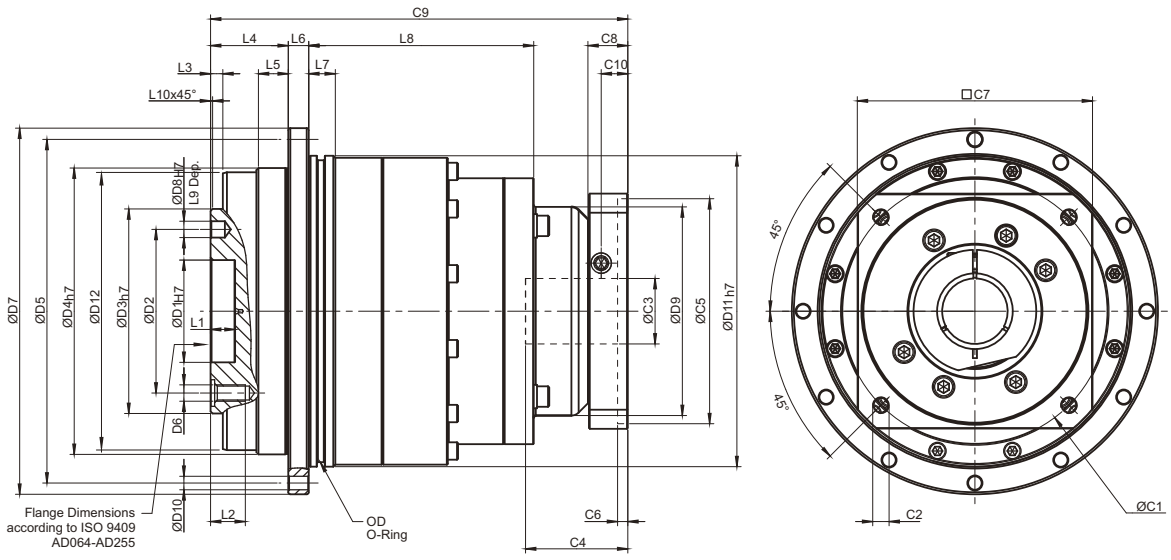


[unit: mm]

Dimension	AD047	AD064	AD090	AD110	AD140	AD200	AD255
D1 H7	12	20	31.5	40	50	80	100
D2	20	31.5	50	63	80	125	140
D3 h7	28	40	63	80	100	160	180
D4 h7	47	64	90	110	140	200	255
D5	67	79	109	135	168	233	280
D6	4 x M3 x 0.5P	7 x M5 x 0.8P	7 x M6 x 1P	11 x M6 x1P	11 x M8 x 1.25P	11 x M10 x 1.5P	12 x M16 x 2P
D7	72	86	118	145	179	247	300
D8 H7	3	5	6	6	8	10	12
D9	45.5	55	77	90	113	138	175
D10	8 x 3.4	8 x 4.5	8 x 5.5	8 x 5.5	12 x 6.6	12 x 9	16 x 13.5
D11 h7	60	70	95	120	152	212	255
D12	46.2	63.2	89.2	109.2	139.2	199.2	254.2
L1	4	8	12	12	12	16	20
L2	6.5	8	13.5	13.5	17	22.5	30.5
L3	3	3	6	6	6	8	12
L4	19.5	19.5	30	29	38	50	66
L5	7	7	10	10	14.6	15	20
L6	4	4	7	8	10	12	18
L7	5	7.7	8	10	12	15	20
L8	18.5	28.5	27	37	62	69.5	82
L9	4	6	7	7	7	10	10
L10	0.5	0.5	1	1	1	1	1
C1[1]	46	70	100	130	165	215	235
C2[1]	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M12 x 1.75P
C3[1]	≤11 / ≤12[2]	≤14 / ≤16[2]	≤19 / ≤24	≤32	≤38	≤48	≤55
C4[1]	30	34	40	50	60	85	116
C5[1]	30	50	80	110	130	180	200
C6[1]	3.5	8	4	5	6	6	6
C7[1]	48	60	90	115	142	190	220
C8[1]	19.5	19	17	19.5	22.5	29	63
C9[1]	70	82.5	99.5	121.5	151	199.5	256.5
C10[1]	13.25	13.5	10.75	13	15	20.75	53.5
OD	56 x 2	66 x 2	90 x 3	110 x 3	145 x 3	200 x 5	238 x 5

1. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and Design Tool to view your specific motor mounting system.
2. AD047 ratio 5, 10 offers C3 ≤ 12 option; AD064 ratio 5, 10 offers C3 ≤ 16 option.

▶ Dimensions - AD Series (2-Stage, Ratio i = 20,~100)

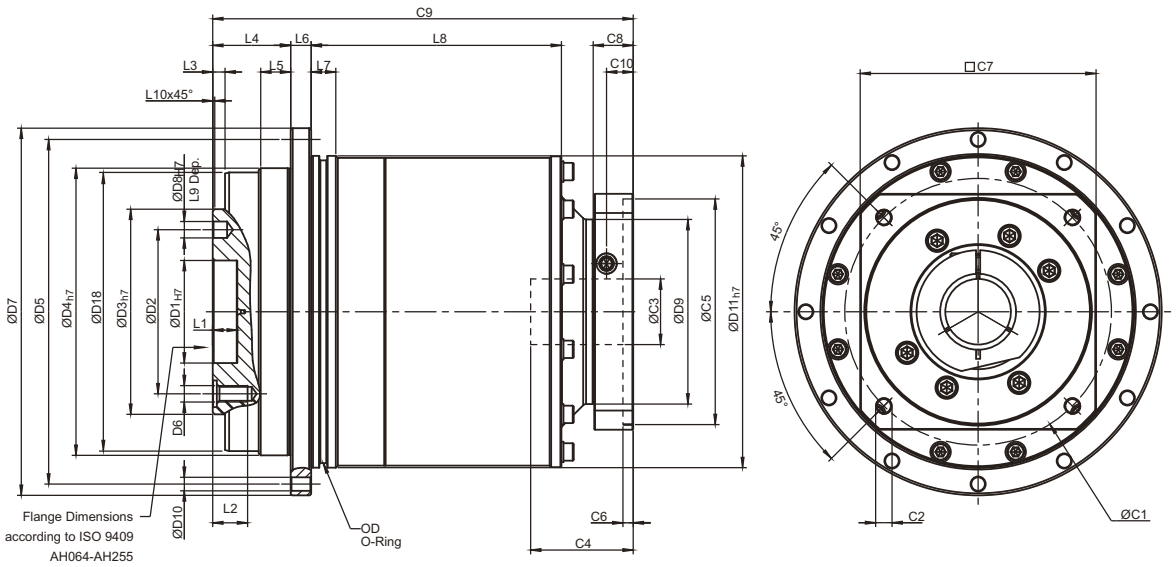


[unit: mm]

Dimension	AD047	AD064	AD090	AD110	AD140	AD200	AD255
D1 H7	12	20	31.5	40	50	80	100
D2	20	31.5	50	63	80	125	140
D3 h7	28	40	63	80	100	160	180
D4 h7	47	64	90	110	140	200	255
D5	67	79	109	135	168	233	280
D6	4 x M3 x 0.5P	7 x M5 x 0.8P	7 x M6 x 1P	11 x M6 x1P	11 x M8 x 1.25P	11 x M10 x 1.5P	12 x M16 x 2P
D7	72	86	118	145	179	247	300
D8 H7	3	5	6	6	8	10	12
D9	45.5	45.5	53.4	77	102	125	160
D10	8 x 3.4	8 x 4.5	8 x 5.5	8 x 5.5	12 x 6.6	12 x 9	16 x 13.5
D11 h7	60	70	95	120	152	212	255
D12	46.2	63.2	89.2	109.2	139.2	199.2	254.2
L1	4	8	12	12	12	16	20
L2	6.5	8	13.5	13.5	17	22.5	30.5
L3	3	3	6	6	6	8	12
L4	19.5	19.5	30	29	38	50	66
L5	7	7	10	10	14.6	15	20
L6	4	4	7	8	10	12	18
L7	5	7.7	8	10	12	15	20
L8	54.5	65	60	87.5	110	132.5	148
L9	4	6	7	7	7	10	10
L10	0.5	0.5	1	1	1	1	1
C1[3]	46	46	70	100	130	165	215
C2[3]	M4 x 0.7P	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P
C3[3]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤15.875 / ≤16	≤19 / ≤24	≤32	≤38	≤48
C4[3]	30	30	34	40	50	60	85
C5[3]	30	30	50	80	110	130	180
C6[3]	3.5	3.5	8	4	5	6	6
C7[3]	48	48	60	90	115	142	190
C8[3]	19.5	19.5	19	17	19.5	22.5	29
C9[3]	97.5	108	134	160	204	248	311.5
C10[3]	13.25	13.25	13.5	10.75	13	15	20.75
OD	56 x 2	66 x 2	90 x 3	110 x 3	145 x 3	200 x 5	238 x 5

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

Dimensions - AD Series (2-Stage, Ratio i = 16~91)



[unit: mm]

Dimension	AD047	AD064	AD090	AD110	AD140	AD200	AD255
D1 H7	12	20	31.5	40	50	80	100
D2	20	31.5	50	63	80	125	140
D3 h7	28	40	63	80	100	160	180
D4 h7	47	64	90	110	140	200	255
D5	67	79	109	135	168	233	280
D6	4 x M3 x 0.5P	7 x M5 x 0.8P	7 x M6 x 1P	11 x M6 x1P	11 x M8 x 1.25P	11 x M10 x 1.5P	12 x M16 x 2P
D7	72	86	118	145	179	247	300
D8 H7	3	5	6	6	8	10	12
D9	45.5	45.5	55	77	90	113	138
D10	8 x 3.4	8 x 4.5	8 x 5.5	8 x 5.5	12 x 6.6	12 x 9	16 x 13.5
D11 h7	60	70	95	120	152	212	255
D18	46.2	63.2	89.2	109.2	139.2	199.2	254.2
L1	4	8	12	12	12	16	20
L2	6.5	8	13.5	13.5	17	22.5	30.5
L3	3	3	6	6	6	8	12
L4	19.5	19.5	30	29	38	50	66
L5	7	7	10	10	14.6	15	20
L6	4	4	7	8	10	12	18
L7	5	7.7	8	10	12	15	20
L8	52.5	28.5	32	37	122	79.5	82
L9	4	6	7	7	7	10	10
L10	0.5	0.5	1	1	1	1	1
C1[4]	46	46	70	100	130	165	215
C2[4]	M4 x 0.7P	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P
C3[4]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤15.875 / ≤16	≤19 / ≤24	≤32	≤38	≤48
C4[4]	30	30	34	40	50	60	85
C5[4]	30	30	50	80	110	130	180
C6[4]	3.5	3.5	8	4	5	6	6
C7[4]	48	48	60	90	115	142	190
C8[4]	19.5	19.5	19	17	19.5	22.5	29
C9[4]	100	106	130.5	149	205	247.5	323
C10[4]	13.25	13.25	13.5	10.75	13	15	20.75
OD	56 x 2	66 x 2	90 x 3	110 x 3	145 x 3	200 x 5	238 x 5

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

▶ Performance - ADR Gearbox

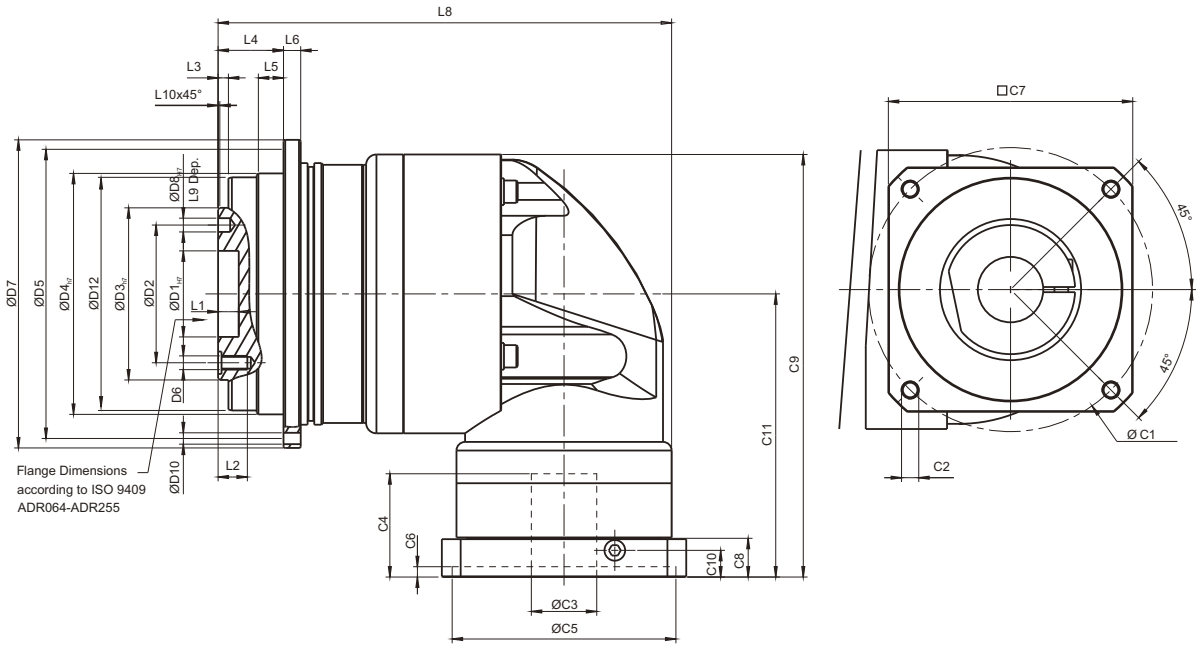
Model No.		Stage	Ratio[A]	ADR047	ADR064	ADR090	ADR110	ADR140	ADR200	ADR255
Nominal Output Torque T_{2N}	Nm	1	4	19	48	130	270	560	1,100	1,700
			5	22	60	160	330	650	1,200	2,000
			7	19	50	140	300	550	1,100	1,800
			10	14	60	160	325	650	1,200	2,000
			14	-	42	140	300	550	1,100	1,800
			20	-	40	100	230	450	900	1,500
		2	20	19	-	-	-	-	-	-
			25	22	60	160	330	650	1,200	2,000
			35	19	50	140	300	550	1,100	1,800
			40	19	48	130	270	560	1,100	1,700
			50	22	60	160	330	650	1,200	2,000
			70	19	50	140	300	550	1,100	1,800
			100	14	40	100	230	450	900	1,500
			140	-	-	140	300	550	1,100	1,800
			200	-	-	100	230	450	900	1,500
Emergency Stop Torque T_{2NOTB}[B]	Nm	1,2	4~200	3 times of Nominal Output Torque						
Nominal Input Speed n_{1N}	rpm	1,2	4~200	5,000	5,000	4,000	4,000	3,000	3,000	2,000
Max. Input Speed n_{1B}	rpm	1,2	4~200	10,000	10,000	8,000	8,000	6,000	6,000	4,000
Micro Backlash P0	arcmin	1	4~20	-	-	≤2	≤2	≤2	≤2	≤2
		2	25~200	-	-	≤4	≤4	≤4	≤4	≤4
Reduced Backlash P1	arcmin	1	4~20	≤4	≤4	≤4	≤4	≤4	≤4	≤4
		2	25~200	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Standard Backlash P2	arcmin	1	4~20	≤6	≤6	≤6	≤6	≤6	≤6	≤6
		2	25~200	≤9	≤9	≤9	≤9	≤9	≤9	≤9
Torsional Rigidity	Nm/arcmin	1,2	4~200	7	13	31	82	151	440	1,006
Max. Tilting Moment M_{2K}	Nm	1,2	4~200	55	75	190	300	1,300	2,930	5,500
Max. Axial Load F_{2aB}[C]	N	1,2	4~200	990	1,050	2,850	2,990	10,590	16,660	29,430
Efficiency η	%	1	4~20	≥95%						
		2	25~200	≥92%						
Weight	kg	1	4~20	1.1	2.1	5.9	10.5	21.9	50.9	85.4
		2	25~200	1.4	1.9	4.5	9.8	20.1	45.4	85.9
Operating Temp	°C	1,2	4~200	-10°C~90°C						
Lubrication				Synthetic lubrication oils						
IP Level		1,2	4~200	IP65						
Mounting Position		1,2	4~200	all directions						
Noise[D]	dB(A)	1,2	4~200	≤61	≤63	≤65	≤68	≤70	≤72	≤74

▶ Inertia - ADR Gearbox

Model No.		Stage	Ratio[A]	ADR047	ADR064	ADR090	ADR110	ADR140	ADR200	ADR255
Moments of Inertia J_1	kg • cm^2	1	4~10	0.09	0.35	2.25	6.84	23.4	68.9	135.4
			14	–	0.07	1.87	6.25	21.8	65.6	119.8
			20	–	0.07	1.87	6.25	21.8	65.6	119.8
		2	20	0.09	–	–	–	–	–	–
			25~100	0.09	0.09	0.35	2.25	6.84	23.4	68.9
			140~200	–	–	0.31	1.87	6.25	21.8	65.6

A. Ratio ($i=N_{in}/N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm
D. The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

▶ Dimensions - ADR Series (1-Stage, Ratio i = 4~20)

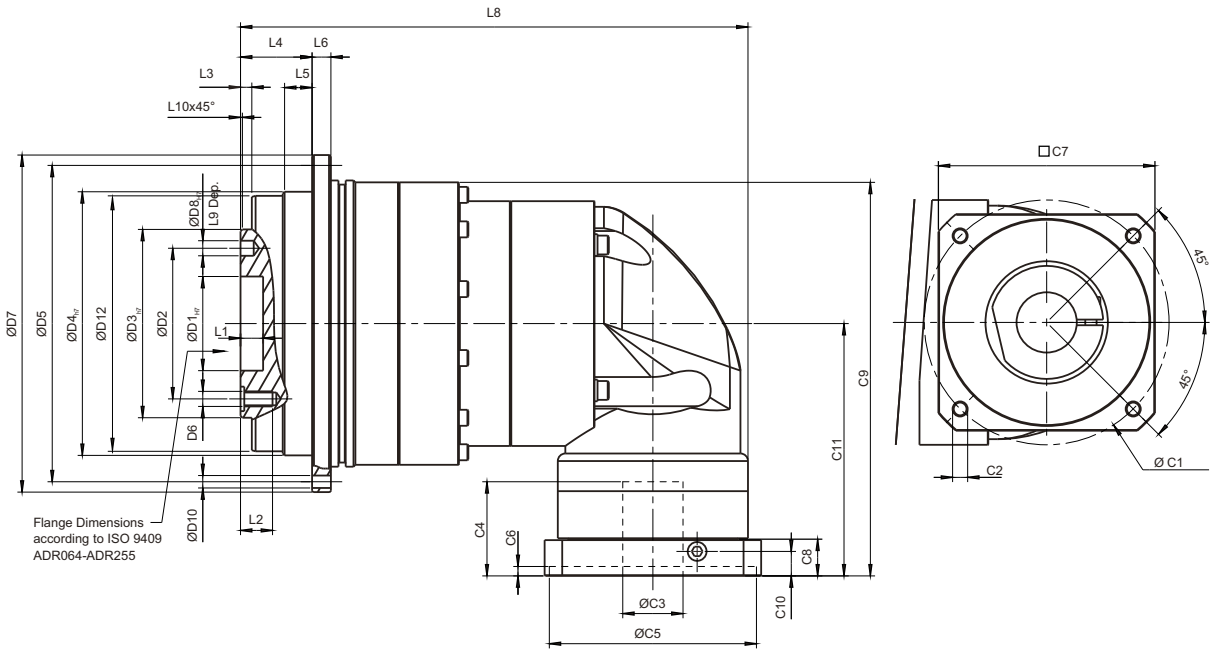


[unit: mm]

Dimension	ADR047	ADR064	ADR090	ADR110	ADR140	ADR200	ADR255
D1 H7	12	20	31.5	40	50	80	100
D2	20	31.5	50	63	80	125	140
D3 h7	28	40	63	80	100	160	180
D4 h7	47	64	90	110	140	200	255
D5	67	79	109	135	168	233	280
D6	4 x M3 x 0.5P	7 x M5 x 0.8P	7 x M6 x 1P	11 x M6 x1P	11 x M8 x 1.25P	11 x M10 x 1.5P	12 x M16 x 2P
D7	72	86	118	145	179	247	300
D8 H7	3	5	6	6	8	10	12
D10	8 x 3.4	8 x 4.5	8 x 5.5	8 x 5.5	12 x 6.6	12 x 9	16 x 13.5
D12	46.2	63.2	89.2	109.2	139.2	199.2	254.2
L1	4	8	12	12	12	16	20
L2	6.5	8	13.5	13.5	17	22.5	30.5
L3	3	3	6	6	6	8	12
L4	19.5	19.5	30	29	38	50	66
L5	7	7	10	10	14.6	15	20
L6	4	4	7	8	10	12	18
L8	107.5	126	172.5	201	263.5	334.5	392
L9	4	6	7	7	7	10	10
L10	0.5	0.5	1	1	1	1	1
C1[1]	46	70	100	130	165	215	235
C2[1]	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P	M12 x 1.75P
C3[1]	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24	≤32	≤38	≤48	≤55
C4[1]	30	34	40	50	60	85	116
C5[1]	30	50	80	110	130	180	200
C6[1]	3.5	8	4	5	6	6	6
C7[1]	48	60	90	115	142	190	220
C8[1]	19.5	19	17	19.5	22.5	29	63
C9[1]	104.25	116.5	159.5	199	245.5	316	398.5
C10[1]	13.25	13.5	10.75	13	15	20.75	53.5
C11[1]	74	81.5	107.5	134	164.5	213.5	268.5

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

▶ Dimensions - ADR Series (2-Stage, Ratio i = 25~200)



[unit: mm]

Dimension	ADR047	ADR064	ADR090	ADR110	ADR140	ADR200	ADR255
D1 H7	12	20	31.5	40	50	80	100
D2	20	31.5	50	63	80	125	140
D3 h7	28	40	63	80	100	160	180
D4 h7	47	64	90	110	140	200	255
D5	67	79	109	135	168	233	280
D6	4 x M3 x 0.5P	7 x M5 x 0.8P	7 x M6 x 1P	11 x M6 x1P	11 x M8 x 1.25P	11 x M10 x 1.5P	12 x M16 x 2P
D7	72	86	118	145	179	247	300
D8 H7	3	5	6	6	8	10	12
D10	8 x 3.4	8 x 4.5	8 x 5.5	8 x 5.5	12 x 6.6	12 x 9	16 x 13.5
D12	46.2	63.2	89.2	109.2	139.2	199.2	254.2
L1	4	8	12	12	12	16	20
L2	6.5	8	13.5	13.5	17	22.5	30.5
L3	3	3	6	6	6	8	12
L4	19.5	19.5	30	29	38	50	66
L5	7	7	10	10	14.6	15	20
L6	4	4	7	8	10	12	18
L8	122	132.5	163	217.5	269.5	333.5	403
L9	4	6	7	7	7	10	10
L10	0.5	0.5	1	1	1	1	1
C1[2]	46	46	70	100	130	165	215
C2[2]	M4 x 0.7P	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M12 x 1.75P
C3[2]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤15.875 / ≤16	≤19 / ≤24	≤32	≤38	≤48
C4[2]	30	30	34	40	50	60	85
C5[2]	30	30	50	80	110	130	180
C6[2]	3.5	3.5	8	4	5	6	6
C7[2]	48	48	60	90	115	142	190
C8[2]	19.5	19.5	19	17	19.5	22.5	29
C9[2]	103.25	108.25	128.25	166.5	209	269.5	340
C10[2]	13.25	13.25	13.5	10.75	13	15	20.75
C11[2]	74	74	81.5	107.5	134	164.5	213.5

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

Performance - ADS Gearbox

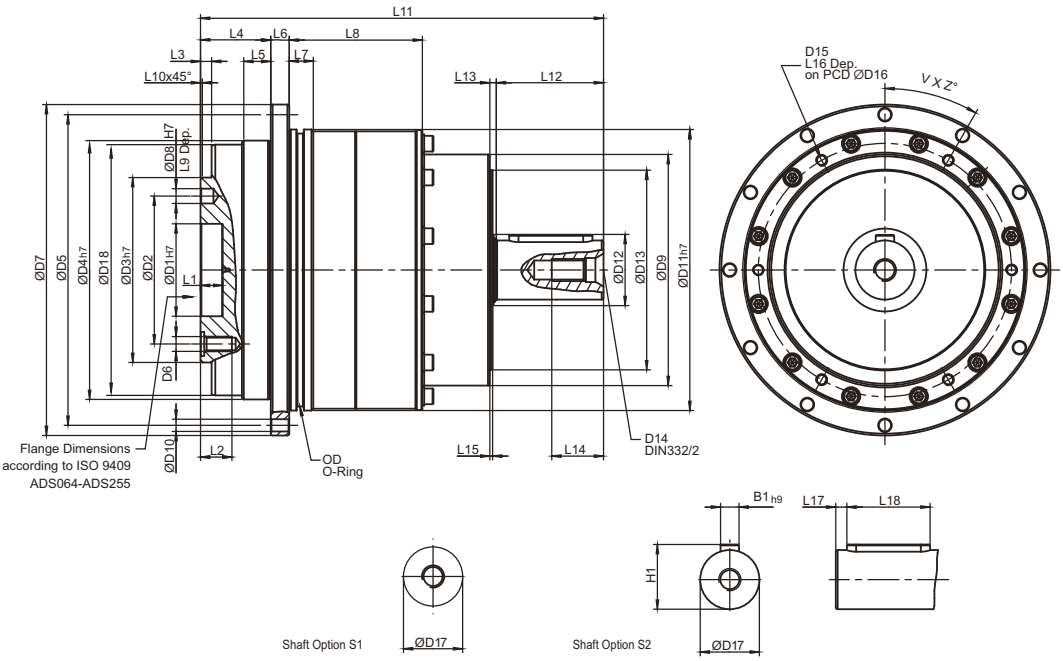
Model No.		Stage	Ratio[A]	ADS047	ADS064	ADS090	ADS110	ADS140	ADS200	ADS255
Nominal Output Torque T_{2N}	Nm	1	4	19	48	130	270	560	1,100	1,700
			5	22	60	160	330	650	1,200	2,000
			7	19	50	140	300	550	1,100	1,800
			10	14	40	100	230	450	900	1,500
		2	16	19	48	130	270	560	1,100	1,700
			21	22	60	160	330	650	1,200	2,000
			31	19	50	140	300	550	1,100	1,800
			61	19	50	140	300	550	1,100	1,800
			91	14	40	100	230	450	900	1,500
Emergency Stop Torque T_{2NOT}[B]	Nm	1,2	4~91	3 times of Nominal Output Torque						
Nominal Input Speed n_{1N}	rpm	1,2	4~91	5,000	5,000	4,000	4,000	3,000	3,000	2,000
Max. Input Speed n_{1B}	rpm	1,2	4~91	10,000	10,000	8,000	7,500	4,500	4,500	3,800
Micro Backlash P0	arcmin	1	4~10	-	-	≤1	≤1	≤1	≤1	≤1
		2	16~91	-	-	-	≤3	≤3	≤3	≤3
Reduced Backlash P1	arcmin	1	4~10	≤3	≤3	≤3	≤3	≤3	≤3	≤3
		2	16~91	≤5	≤5	≤5	≤5	≤5	≤5	≤5
Standard Backlash P2	arcmin	1	4~10	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	16~91	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional Rigidity	Nm/arcmin	1,2	4~91	3	7	14	25	50	145	225
Max. Tilting Moment M_{2K}	Nm	1,2	4~91	55	75	190	300	1,300	2,930	5,500
Max. Axial Load	N	1,2	4~91	990	1,050	2,850	2,990	10,590	16,660	29,430
Input Max. Radial Load F_{1rB}[C]	N	1	4~10	165	395	1,300	1,525	2,800	4,500	12,500
		2	16~91	165	165	395	1,300	1,525	2,800	4,500
Input Max. Axdial Load F_{1aB}[C]	N	1	4~10	580	1,000	1,100	980	2,700	4,700	8,000
		2	16~91	580	580	1,000	1,100	980	2,700	4,700
Efficiency η	%	1	4~10	≥97%						
		2	16~91	≥94%						
Weight	kg	1	4~10	0.8	1.4	3.4	6.7	13.5	35.0	63.8
		2	16~91	1.1	1.6	4.0	7.3	16.6	36.4	74.7
Operating Temp	°C	1,2	4~91	-10°C~90°C						
Lubrication				Synthetic lubrication oils						
IP Level		1,2	4~91	IP65						
Mounting Position		1,2	4~91	all directions						
Noise[D]	dB(A)	1,2	4~91	≤56	≤58	≤60	≤63	≤65	≤67	≤70

Inertia - ADS Gearbox

Model No.		Stage	Ratio[A]	ADS047	ADS064	ADS090	ADS110	ADS140	ADS200	ADS255
Moments of Inertia J_1	kg • cm^2	1	4	0.06	0.21	0.87	3.65	10.27	43.05	102.68
			5	0.06	0.21	0.83	3.53	10.17	41.76	99.12
			7	0.06	0.21	0.82	3.47	9.99	41.15	97.41
			10	0.06	0.21	0.81	3.45	9.93	40.97	97.03
		2	16	0.06	0.06	0.21	0.83	3.53	10.17	41.76
			21	0.06	0.06	0.21	0.83	3.53	10.17	41.76
			31	0.06	0.06	0.21	0.83	3.53	10.17	41.76
			61	0.06	0.06	0.21	0.81	3.45	9.93	40.97
			91	0.06	0.06	0.21	0.81	3.45	9.93	40.97

A. Ratio ($i=N_{in}/N_{out}$)
B. Max. acceleration torque T_{2B} = 60% of T_{2NOT}
C. Applied to the output shaft center at 100 rpm
D. The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

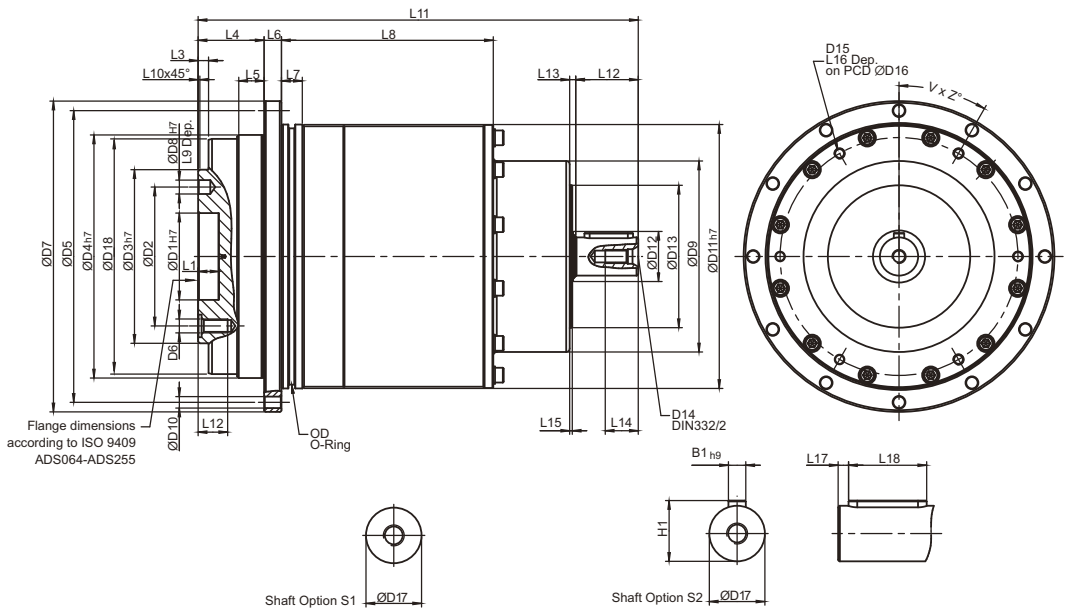
▶ Dimensions - ADS Series (1-Stage, Ratio i = 4~10)



[unit: mm]

Dimension	ADS047	ADS064	ADS090	ADS110	ADS140	ADS200	ADS255
D1 H7	12	20	31.5	40	50	80	100
D2	20	31.5	50	63	80	125	140
D3 h7	28	40	63	80	100	160	180
D4 h7	47	64	90	110	140	200	255
D5	67	79	109	135	168	233	280
D6	4 x M3 x 0.5P	7 x M5 x 0.8P	7 x M6 x 1P	11 x M6 x 1P	11 x M8 x 1.25P	11 x M10 x 1.5P	12 x M16 x 2P
D7	72	86	118	145	179	247	300
D8 H7	3	5	6	6	8	10	12
D9	43	55	78	100	125	175	210
D10	8 x 3.4	8 x 4.5	8 x 5.5	8 x 5.5	12 x 6.6	12 x 9	16 x 13.5
D11 h7	60	70	95	120	152	212	255
D12	31	22	22	30	40	75	95
D13	37	50	62	82	108	145	172
D14	M4 x 0.7P	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P	M20 x 2.5P
D15	M3 x 0.5P	M3 x 0.5P	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M8 x 1.25P
D16	51.5	61.5	84	107	137	193	235
D17 K6	11	14	16	22	32	40	55
D18	46.2	63.2	89.2	109.2	139.2	199.2	254.2
L1	4	8	12	12	12	16	20
L2	6.5	8	13.5	13.5	17	22.5	30.5
L3	3	3	6	6	6	8	12
L4	19.5	19.5	30	29	38	50	66
L5	7	7	10	10	14.6	15	20
L6	4	4	7	8	10	12	18
L7	5	7.7	8	10	12	15	20
L8	32.5	43.5	47	62	72	89.5	112
L9	4	6	7	7	7	10	10
L10	0.5	0.5	1	1	1	1	1
L11	89.5	110.5	138.5	170	218	296	372.5
L12	18	22	28	36	58	82	115
L13	2.5	2.5	3.5	3.5	3.5	4.5	4.5
L14	10	10	12.5	19	28	36	42
L15	1.5	1.5	1.5	1.5	1.5	1.5	1.5
L16	5.5	5.5	7	9	11	14	14
L17	2	2	3	3	6	6	7
L18	14	18	22	28	45	70	90
B1 h9	4	5	5	6	10	12	16
H1	12.5	16	18	24.5	35	43	59
OD	56 x 2	66 x 2	90 x 3	110 x 3	145 x 3	200 x 5	238 x 5
V	4	4	4	4	6	6	6
Z	45	45	45	45	30	30	30

▶ Dimensions - ADS Series (2-Stage, Ratio i = 16~91)

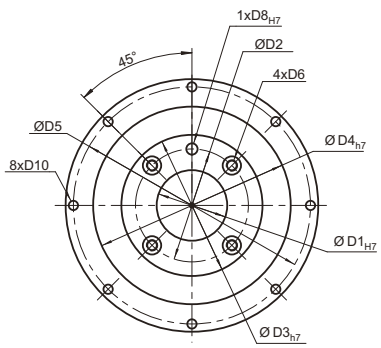


[unit: mm]

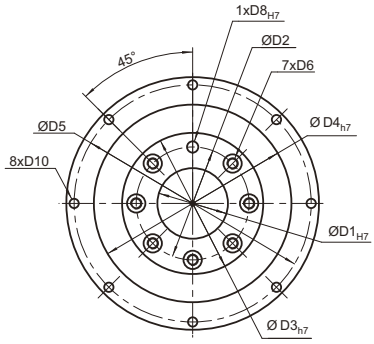
Dimension	ADS047	ADS064	ADS090	ADS110	ADS140	ADS200	ADS255
D1 H7	12	20	31.5	40	50	80	100
D2	20	31.5	50	63	80	125	140
D3 h7	28	40	63	80	100	160	180
D4 h7	47	64	90	110	140	200	255
D5	67	79	109	135	168	233	280
D6	4 x M3 x 0.5P	7 x M5 x 0.8P	7 x M6 x 1P	11 x M6 x 1P	11 x M8 x 1.25P	11 x M10 x 1.5P	12 x M16 x 2P
D7	72	86	118	145	179	247	300
D8 H7	3	5	6	6	8	10	12
D9	43	48	68	86	110	132	182
D10	8 x 3.4	8 x 4.5	8 x 5.5	8 x 5.5	12 x 6.6	12 x 9	16 x 13.5
D11 h7	60	70	95	120	152	212	255
D12	22	22	22	22	30	40	75
D13	37	37	50	62	82	108	145
D14	M4 x 0.7P	M4 x 0.7P	M4 x 0.7P	M5 x 0.8P	M8 x 1.25P	M12 x 1.75P	M16 x 2P
D15	M3 x 0.5P	M3 x 0.5P	M4 x 0.7P	M5 x 0.8P	M6 x 1P	M8 x 1.25P	M10 x 1.5P
D16	51.5	61.5	84	107	137	193	235
D17 K6	11	11	14	16	22	32	40
D18	46.2	63.2	89.2	109.2	139.2	199.2	254.2
L1	4	8	12	12	12	16	20
L2	6.5	8	13.5	13.5	17	22.5	30.5
L3	3	3	6	6	6	8	12
L4	19.5	19.5	30	29	38	50	66
L5	7	7	10	10	14.6	15	20
L6	4	4	7	8	10	12	18
L7	5	7.7	8	10	12	15	20
L8	62.5	63.5	67	82	122	79.5	177
L9	4	6	7	7	7	10	10
L10	0.5	0.5	1	1	1	1	1
L11	119.5	125.5	158.5	188	253.5	314.5	419.5
L12	18	18	22	28	36	58	82
L13	2.5	2.5	2.5	3.5	3.5	3.5	4.5
L14	10	10	10	12.5	19	28	36
L15	1.5	1.5	1.5	1.5	1.5	1.5	1.5
L16	5.5	5.5	7	9	11	14	18
L17	2	2	2	3	3	6	6
L18	14	14	18	22	28	45	70
B1 h9	4	4	5	5	6	10	12
H1	12.5	12.5	16	18	24.5	35	43
OD	56 x 2	66 x 2	90 x 3	110 x 3	145 x 3	200 x 5	238 x 5
V	4	4	4	4	6	6	6
Z	45	45	45	45	30	30	30

Output Dimensions

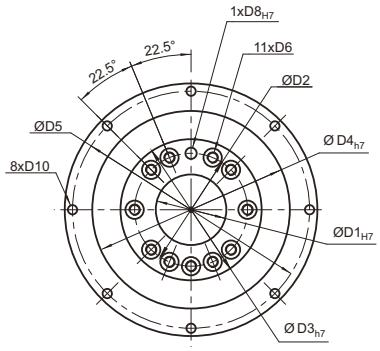
AD 047
ADR 047
ADS 047



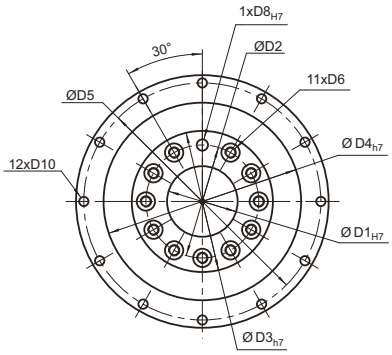
AD 064 / AD 090
ADR 064 / ADR 090
ADS 064 / ADS 090



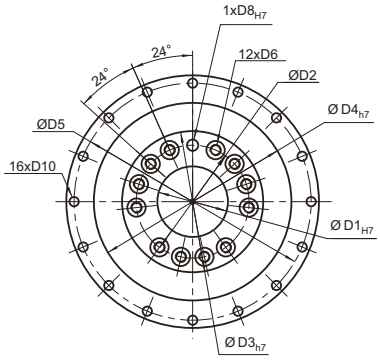
AD 110
ADR 110
ADS 110



AD 140 / AD 200
ADR 140 / ADR 200
ADS 140 / ADS 200



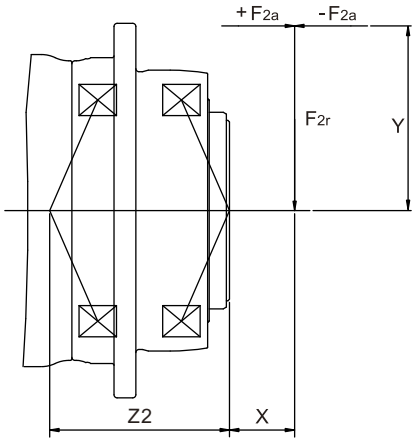
AD 255
ADR 255
ADS 255



[unit: mm]

Dimension	AD047	AD064	AD090	AD110	AD140	AD200	AD255
	ADR047	ADR064	ADR090	ADR110	ADR140	ADR200	ADR255
	ADS047	ADS064	ADS090	ADS110	ADS140	ADS200	ADS255
D1 H7	12	20	31.5	40	50	80	100
D2	20	31.5	50	63	80	125	140
D3 h7	28	40	63	80	100	160	180
D4 h7	47	64	90	110	140	200	255
D5	67	79	109	135	168	233	280
D6	M3 x 0.5P	M5 x 0.8P	M6 x 1P	M6 x 1P	M8 x 1.25P	M10 x 1.5P	M16 x 2P
D8 H7	3	5	6	6	8	10	12
D10	3.4	4.5	5.5	5.5	6.6	9	13.5

Max. Tilting Moment M2K



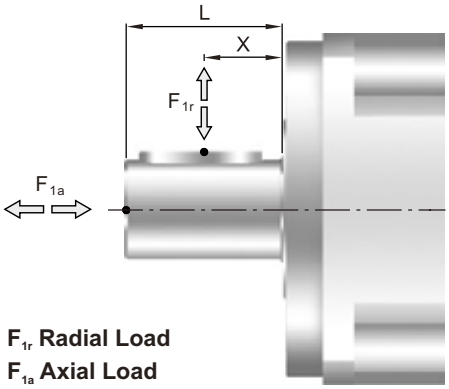
$$M_{2K} = \frac{F_{2a} * Y + F_{2r} * (X+Z2)}{1000}$$

M_{2K} : 【Nm】
F_{2a}, F_{2r} : 【N】
X, Y, Z2 : 【mm】

AD / ADR / ADS	047	064	090	110	140	200	255
Z2 【mm】	37.9	46.2	63.1	75.5	92.2	119.2	148.8

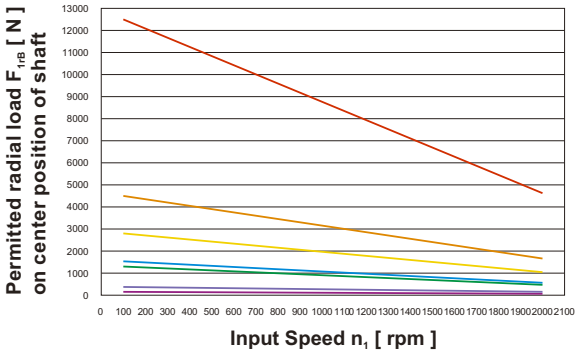
Note : Applied to the output flange center at 100 rpm.

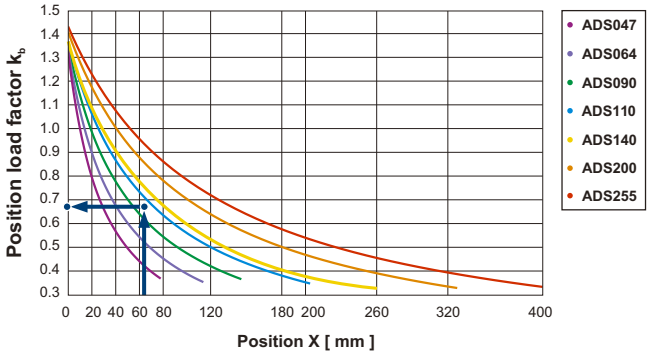
Permitted Radial and Axial Loads



F_{1r} Radial Load
F_{1a} Axial Load

The permitted radial and axial loads on input shaft of the gearbox depend on the design of the gearbox supporting bearings.
APEX use the extension straddle oversized ball bearing design.
It can take heavy load from both axes.





∗Continuous running reduces service life by 50%

If radial force F_{1r} is exert on the center of the output shaft X=1/2 x L.
The permitted radial load is given on above diagram.

If radial force F_{1r} is not exert on the center of the output shaft X<1/2 x L or X>1/2 x L
The permitted radial and axial loads can be calculated by the position load factor K_b on the above diagram.

HIGH TORQUE-HIGH PRECISION

PLANETARY GEARBOX

AH - AHK Series

▶ Ordering Code - AH / AHK Gearbox

AH090	—	**005**(1)	/	**MOTOR**
AHK090	—	**005**(1)	/	**MOTOR**
AHKA285(3)				**Motor Type**
AHKB090(3)				
				Ratio
				Gearbox Size

Gearbox Size

AH	**064 / 090 / 110 / 140 / 200 / 255 / 285 / 355 / 450**
AHK	**064 / 090 / 110 / 140 / 200 / 255 / 285 / 355 / 450**

Ratio(2)

AH	**4 / 5 / 7 / 10**
	16 / 20 / 21 / 25 / 28 / 31 / 35 / 40 / 46 / 50 / 61 / 70 / 91 / 100
AHK (2 Stg.)	**12 / 15 / 16 / 20 / 25 / 28 / 35 / 40 / 49 / 50 / 70 / 100**
AHKA (3 Stg.)	**100 / 125 / 140 / 175 / 200 / 250 / 350 / 500 / 700 / 1,000**
AHKB (3 Stg.)	**64 / 84 / 100 / 125 / 140 / 175 / 200 / 250 / 280 / 350 / 400 / 500 / 700 / 1,000**
AHK (4 Stg.)	**1,225 / 1,400 / 1,750 / 2,000 / 2,800 / 3,500 / 5,000 / 7,000 / 10,000**
AHKC	**4 / 5 / 7 / 8 / 10 / 21 / 31 / 46 / 61 / 91**

Motor Type
Manufacturer and Model

(1) Ratio ($i= N_{in} / N_{out}$) .
(2) Please refer to the specifications for the ratios provided in each series.
(3) Please refer to page 06.

▶ Performance - AH Gearbox

Model No.		Stage	Ratio[1]	AH064	AH090	AH110	AH140	AH200	AH255	AH285	AH355	AH450
Nominal Output Torque T_{2N}	Nm	1	4	95	195	350	600	1,290	-	-	-	-
			5	80	165	305	525	1,145	1,745	3,285	-	-
			7	60	130	250	435	980	1,495	2,525	-	-
			10	24	55	160	305	700	1,070	1,810	-	-
		2	16	95	195	360	615	1,320	-	-	-	-
			20	95	200	360	615	1,320	1,770	3,325	-	-
			21	80	165	310	535	1,165	1,770	3,330	5,595	10,915
			25	80	165	310	535	1,165	1,770	3,330	-	-
			28	60	200	360	615	1,325	-	-	-	-
			31	60	130	250	440	990	1,510	2,550	4,810	9,565
			35	70	170	310	535	1,165	1,775	3,335	-	-
			40	40	96	220	615	1,215	-	-	-	-
			46	24	55	160	295	660	1,005	1,700	3,400	7,125
			50	50	120	275	535	1,170	1,775	3,340	-	-
			61	60	130	250	440	990	1,510	2,550	4,820	9,585
			70	60	130	250	440	990	1,510	2,550	-	-
			91	24	55	160	295	660	1,005	1,700	3,345	7,000
			100	24	55	160	295	660	1,005	1,700	-	-
Emergency Stop Torque T_{2NOT}	Nm	1,2	4~100	3 times T_{2N}								
Max. Acceleration Torque T_{2B}	Nm	1,2	4~100	1.5 times T_{2N}								
No Load Running Torque[3]	Nm	1	4~10	0.45	0.7	1.4	3.5	7	11	14	-	-
		2	16~100	0.2	0.3	0.6	1.3	2.2	3.5	4.5	13	21
Backlash[2]	arcmin	1	4~10	≦ 2	≦ 1	≦ 1	≦ 1	≦ 1	≦ 1	≦ 1	-	-
		2	16~100	≦ 3	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2
Torsional Rigidity	Nm/arcmin	1,2	4~100	8	22	60	115	395	650	1,050	2,850	5,700
Nominal Input Speed n_{1N}	rpm	1	4~10	5,000	3,600	3,600	3,000	2,700	2,400	2,100	-	-
		2	16~100	5,000	4,600	4,600	4,000	3,700	3,400	3,100	2,500	2,000
Max. Input Speed n_{1B}	rpm	1	4~10	7,000	6,000	6,000	5,000	4,500	4,000	3,500	-	-
		2	16~100	7,000	7,000	7,000	6,000	5,500	5,000	4,500	4,000	3,500
Max. Axial Load F_{2a}[4]	N	1,2	4~100	1,690	2,220	4,070	8,530	17,000	26,900	39,200	101,500	143,700
Max. Tilting Moment M_{2K}[4]	Nm	1,2	4~100	120	280	480	1,310	3,530	5,920	9,230	29,100	63,300
Operating Temp	° C	1,2	4~100	-10° C~ 90° C								
Degree of Gearbox Protection		1,2	4~100	IP65								
Lubrication		1,2	4~100	Synthetic lubrication grease								
Mounting Position		1,2	4~100	All directions								
Running Noise[3]	dB(A)	1	4~10	≦ 58	≦ 59	≦ 64	≦ 65	≦ 66	≦ 66	≦ 66	-	-
		2	16~100	≦ 58	≦ 59	≦ 60	≦ 63	≦ 66	≦ 66	≦ 66	≦ 68	≦ 70
Efficiency η	%	1	4~10	≧ 97%								
		2	16~100	≧ 94%								

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N} .

(3) The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(4) Applied to the output flange center at 100 rpm.

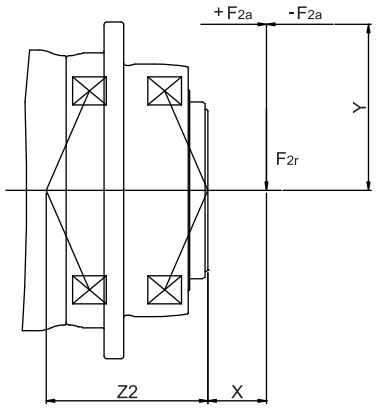
(5) Continuous operation is not recommended.

Inertia - AH Gearbox

Model No.		AH064		AH090		AH110		AH140		AH200		AH255		AH285		AH355	AH450
Ø(A) (C3)		1-st.	2-st.	1-st.	2-st.	1-st.	2-st.	1-st.	2-st.	1-st.	2-st.	1-st.	2-st.	1-st.	2-st.	2-st.	2-st.
8	kg.cm^2	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11		0.17	0.16	-	0.17	-	-	-	-	-	-	-	-	-	-	-	-
14		0.21	0.2	0.53	0.21	-	0.53	-	-	-	-	-	-	-	-	-	-
19		0.63	-	0.68	0.63	1.83	0.68	-	1.83	-	-	-	-	-	-	-	-
24		-	-	4.52	-	5.04	4.52	5.63	5.04	-	5.63	-	-	-	-	-	-
28		-	-	-	-	6.33	-	7.18	6.33	-	7.18	-	-	-	-	-	-
32		-	-	-	-	8.73	-	10.1	8.73	12.63	10.1	-	12.63	-	-	-	-
35		-	-	-	-	14.04	-	15.54	14.04	17.75	15.54	17.35	17.75	28.18	20.8	-	-
38		-	-	-	-	19.05	-	21.32	19.05	23.26	21.32	23.61	23.26	28.18	27.05	23.6	-
42		-	-	-	-	-	-	23.2	-	25.4	23.2	25.5	25.4	30.52	28.95	25.37	30.37
48		-	-	-	-	-	-	56.07	-	61.02	56.07	61.22	61.02	66.85	64.66	89.35	96.45
55		-	-	-	-	-	-	-	-	-	-	88.86	-	94.91	-	102	109.06
60		-	-	-	-	-	-	-	-	-	-	-	-	117.73	-	-	117.75

(A) Ø = Input shaft diameter.

Max. Tilting Moment M2K



$$M_{2K} = \frac{F_{2a} * Y + F_{2r} * (X+Z2)}{1000}$$

M_{2K} : 【Nm】

F_{2a}, F_{2r} : 【N】

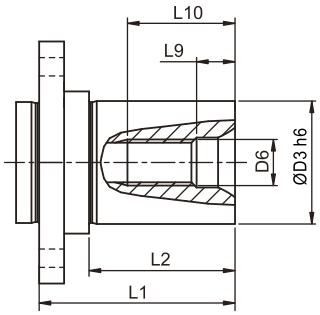
X, Y, Z2 : 【mm】

M2K

AH / AHK	064	090	110	140	200	255	285	355	450
Z2 【mm】	63.7	84.5	106.2	90	122.8	133.2	175.5	220.6	275.3

Note : Applied to the output flange center at 100 rpm

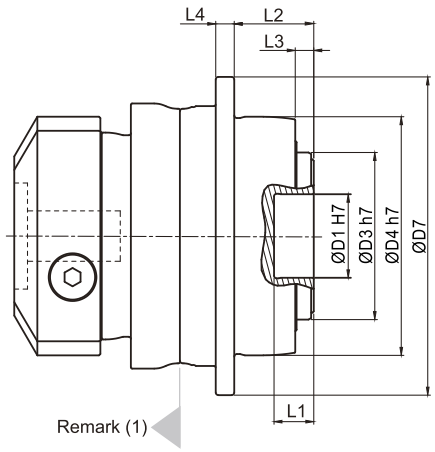
▶ Flange Shaft - AH

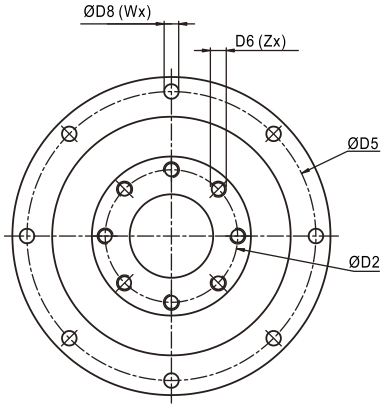


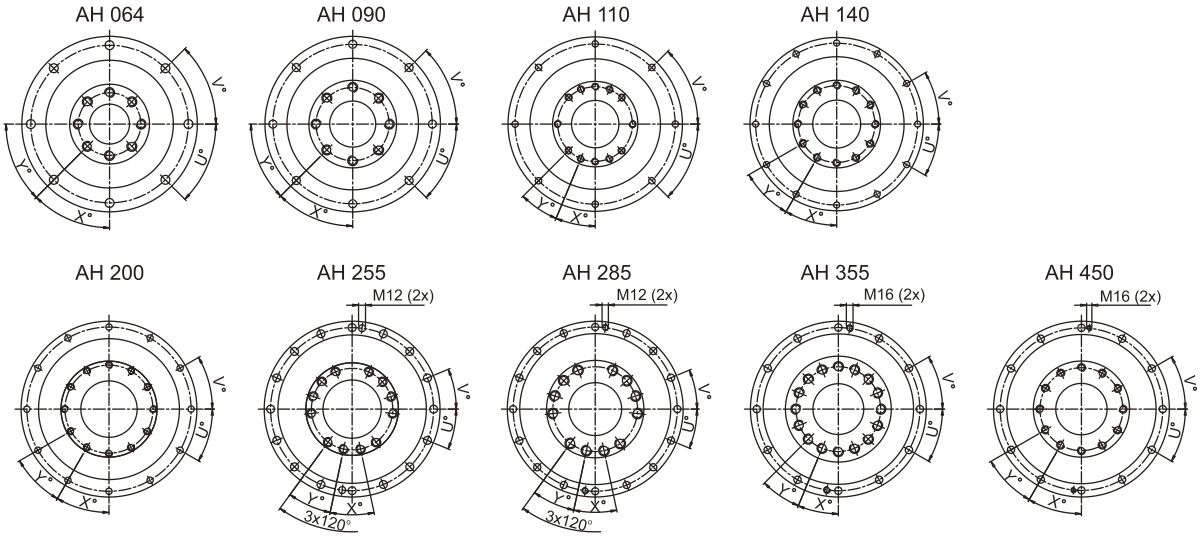
Dimension	L1	L2	D3 h6	D6	L9	L10	Order Code
AH064	33	23	16	M5	4.8	12.5	FLS-AH064-S16
			22	M8	7.2	19	FLS-AH064-S22
AH090	41	30	22	M8	7.2	19	FLS-AH090-S22
			32	M12	10	28	FLS-AH090-S32
AH110	51	38	32	M12	10	28	FLS-AH110-S32
			40	M16	12	36	FLS-AH110-S40
AH140	54	38	40	M16	12	36	FLS-AH140-S40
			55	M20	15	42	FLS-AH140-S55
AH200	73	52	55	M20	15	42	FLS-AH200-S55
			75	M20	15	42	FLS-AH200-S75
AH255	150	123	90	M24	18	50	FLS-AH255-S90

Note: Dimensions are related to gearbox flange interface.

Dimensions - AH Gearbox





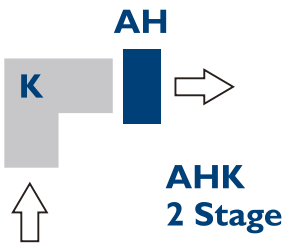


Dimension	AH064	AH090	AH110	AH140	AH200	AH255	AH285	AH355	AH450
D1 H7	20	31.5	40	50	80	100	100	120	155
D2	31.5	50	63	80	125	140	160	200	250
D3 h7	40	63	80	100	160	180	200	250	315
D4 h7	64	90	110	140	200	255	285	355	450
D5	79	109	135	168	233	280	310	385	490
D6 x Pitch x Deep	M5x0.8Px8	M6x1Px10	M6x1Px11	M8x1.25Px15	M10x1.5Px20	M16x2Px25	M20x2.5Px31	M24x3Px32	M30x3.5Px40
D7	88	120	147	180	249.5	302	332	415	530
D8	4.5	5.5	5.5	6.6	9	13.5	13.5	17.5	22
L1	8	15	15	15	16	16	16	35	24
L2	19.5	30	29	38	50	66	75	80	85
L3	4	7	7	7.5	8.5	13.5	16.5	20	20
L4	5	7	8	10	12	18	20	45	60
X in Degree	45	45	22.5	30	30	24	24	22.5	30
Y in Degree	45	45	22.5	30	30	24	24	22.5	30
Z	8	8	12	12	12	12	12	16	12
U in Degree	45	45	45	30	30	22.5	22.5	30	30
V in Degree	45	45	45	30	30	22.5	22.5	30	30
W	8	8	8	12	12	16	16	12	12

Note: Dimensions are related to motor interface. Please contact APEX for details.

▶ AHK Gearbox Structure

(I)



(II)

(III)

(IV)

Performance - AHK (2 stage) Gearbox

Model No.		Stage	Ratio(1)	AHK064	AHK090	AHK110	AHK140	AHK200	AHK255	AHK285	AHK355
Nominal Output Torque T_{2N}	Nm	2	12	95	195	360	615	1,315	-	-	-
			15	-	-	-	-	-	1,770	3,330	5,595
			16	95	200	360	615	1,320	-	-	-
			20	95	200	360	615	1,320	1,775	3,335	5,605
			25	80	170	310	535	1,165	1,775	3,335	5,610
			28	92	200	360	615	1,325	-	-	-
			35	80	170	310	535	1,170	1,775	3,340	5,615
			40	60	160	340	615	1,325	-	-	-
			49	60	130	250	440	990	1,510	2,550	4,820
			50	50	170	310	535	1,170	1,775	3,000	5,500
			70	60	130	250	440	990	1,510	2,550	4,820
			100	24	55	160	290	655	1,005	1,685	3,315
Emergency Stop Torque T_{2NOT}	Nm	2	12~100	2 times T_{2N}							
Max. Acceleration Torque T_{2B}	Nm	2	12~100	1.5 times T_{2N}							
No Load Running Torque(3)	Nm	2	12~100	1	1.3	2	3.1	6	13	16	20
Backlash(2)	arcmin	2	12~100	≦ 3	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2
Torsional Rigidity	Nm/arcmin	2	12~100	12	27	56	112	389	642	1,275	2,500
Nominal Input Speed n_{1N}	rpm	2	12~100	3,000	3,000	2,800	2,700	2,200	2,100	2,000	1,600
Max. Input Speed n_{1B}	rpm	2	12~100	6,000	6,000	6,000	4,500	4,500	4,000	3,000	2,500
Max. Axial Load F_{2a}(4)	N	2	12~100	1,690	2,220	4,070	8,530	17,000	26,900	39,200	101,500
Max. Tilting Moment M_{2K}(4)	Nm	2	12~100	120	280	480	1,310	3,530	5,920	9,230	29,100
Operating Temp	° C	2	12~100	-10° C~ 90° C							
Degree of Gearbox Protection		2	12~100	IP65							
Lubrication		2	12~100	Synthetic lubrication grease							
Mounting Position		2	12~100	All directions							
Running Noise(3)	dB(A)	2	12~100	≦ 64	≦ 66	≦ 68	≦ 68	≦ 70	≦ 70	≦ 72	≦ 74
Efficiency η	%	2	12~100	≧ 94%							

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N} .

(3) The dB values are measured by gearbox with ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(4) Applied to the output flange center at 100 rpm.

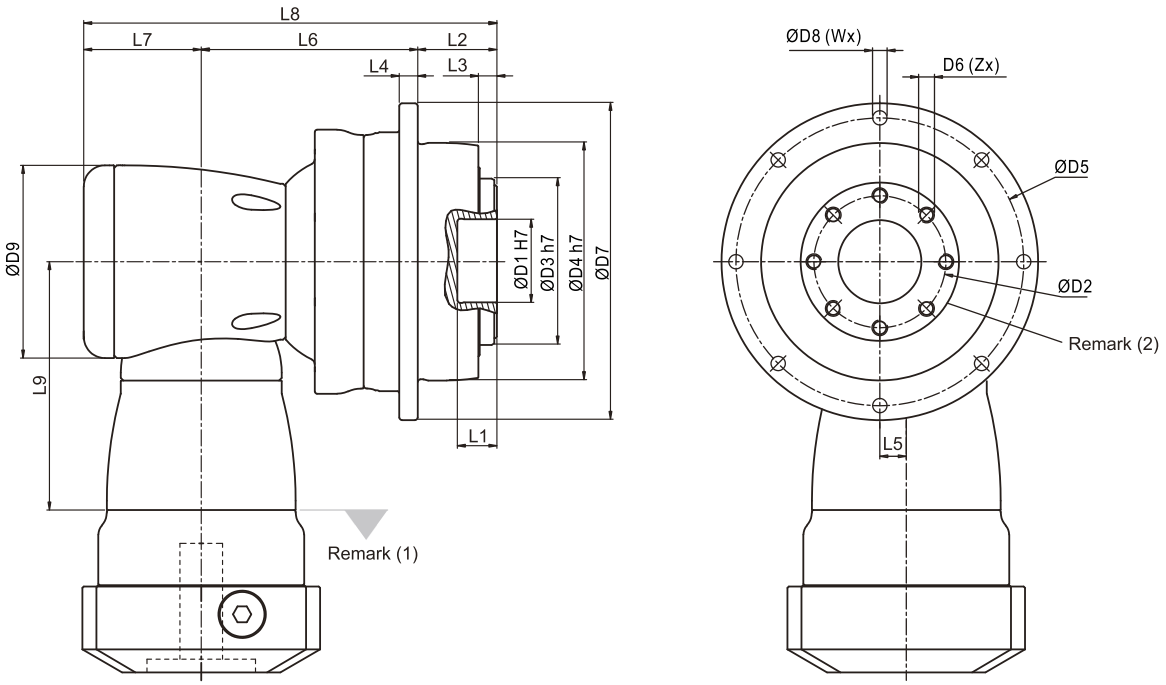
(5) Continuous operation is not recommended.

Inertia - AHK (2 stage) Gearbox

Input Shaft (C3) Ø(A) \ Model No.		AHK064	AHK090	AHK110	AHK140	AHK200	AHK255	AHK285	AHK355
8	kg.cm²	0.1	-	-	-	-	-	-	-
11		0.17	0.18	-	-	-	-	-	-
14		0.21	0.5	0.52	-	-	-	-	-
19		-	0.65	1.69	1.71	-	-	-	-
24		-	-	4.89	5.05	6.92	-	-	-
28		-	-	-	6.55	6.98	-	-	-
32		-	-	-	9.47	10.18	10.18	-	-
35		-	-	-	14.91	15.21	15.21	15.68	-
38		-	-	-	20.69	20.7	20.7	21.69	23.46
42		-	-	-	-	22.83	22.83	23.59	25.28
48		-	-	-	-	58.45	58.45	59.3	61.61
55		-	-	-	-	-	-	-	89.67

(A) Ø = Input shaft diameter.

▶ Dimensions - AHK (2 stage) Gearbox (Ratio i = 12~100)



Dimension	AHK064	AHK090	AHK110	AHK140	AHK200	AHK255	AHK285	AHK355
D1 H7	20	31.5	40	50	80	100	100	120
D2	31.5	50	63	80	125	140	160	200
D3 h7	40	63	80	100	160	180	200	250
D4 h7	64	90	110	140	200	255	285	355
D5	79	109	135	168	233	280	310	385
D6 x Pitch x Deep	M5x0.8Px8	M6x1Px10	M6x1Px11	M8x1.25Px15	M10x1.5Px20	M16x2Px25	M20x2.5Px31	M24x3Px32
D7	88	120	147	180	249.5	302	332	415
D8	4.5	5.5	5.5	6.6	9	13.5	13.5	17.5
D9	73	94	116	163	210	210	255	300
L1	8	15	15	15	16	16	16	35
L2	19.5	30	29	38	50	66	75	80
L3	4	7	7	7.5	8.5	13.5	16.5	20
L4	5	7	8	10	12	18	20	45
L5	10	13	17	25	31	31	36	43
L6	87	90.5	114	147.5	175	191.5	249.5	290
L7	44.5	53	68.3	89	115	115	131	165
L8	151	173.5	211.3	274.5	340	372.5	455.5	535
L9	94	114.5	129	173.5	228	228	265.5	294.5
X in Degree	45	45	22.5	30	30	24	24	22.5
Y in Degree	45	45	22.5	30	30	24	24	22.5
Z	8	8	12	12	12	12	12	16
U in Degree	45	45	45	30	30	22.5	22.5	30
V in Degree	45	45	45	30	30	22.5	22.5	30
W	8	8	8	12	12	16	16	12

(1) Dimensions are related to motor interface. Please contact APEX for details.
(2) Refer to the AH series(Page 05) for flange interface.

▶ Performance - AHKA (3 stage) Gearbox

Model No.		Stage	Ratio(1)	AHKA285	AHKA355	AHKA450
Nominal Output Torque T_{2N}	Nm	3	100	3,345	5,620	10,965
			125	3,345	5,625	10,970
			140	3,345	5,625	10,970
			175	3,345	5,625	10,970
			200	3,345	5,625	10,975
			250	3,345	5,625	10,975
			350	3,345	5,630	10,975
			500	3,345	5,350	9,050
			700	2,555	4,825	9,600
			1,000	1,650	3,250	6,785
Emergency Stop Torque T_{2NOT}	Nm	3	100~1,000	2 times T_{2N}		
Max. Acceleration Torque T_{2B}	Nm	3	100~1,000	1.5 times T_{2N}		
No Load Running Torque(3)	Nm	3	100~1,000	6	6	13
Backlash(2)	arcmin	3	100~1,000	≦ 2	≦ 2	≦ 2
Torsional Rigidity	Nm/arcmin	3	100~1,000	1,275	2,500	5,100
Nominal Input Speed n_{1N}	rpm	3	100~1,000	2,100	2,100	2,000
Max. Input Speed n_{1B}	rpm	3	100~1,000	4,000	4,000	3,000
Max. Axial Load F_{2a}(4)	N	3	100~1,000	39,200	101,500	143,700
Max. Tilting Moment M_{2K}(4)	Nm	3	100~1,000	9,230	29,100	63,300
Operating Temp	° C	3	100~1,000	-10° C~ 90° C		
Degree of Gearbox Protection		3	100~1,000	IP65		
Lubrication		3	100~1,000	Synthetic lubrication grease		
Mounting Position		3	100~1,000	All directions		
Running Noise(3)	dB(A)	3	100~1,000	≦ 72	≦ 74	≦ 76
Efficiency η	%	3	100~1,000	≧ 92%		

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N} .

(3) The dB values are measured by gearbox with ratio 1,000 (3-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(4) Applied to the output flange center at 100 rpm.

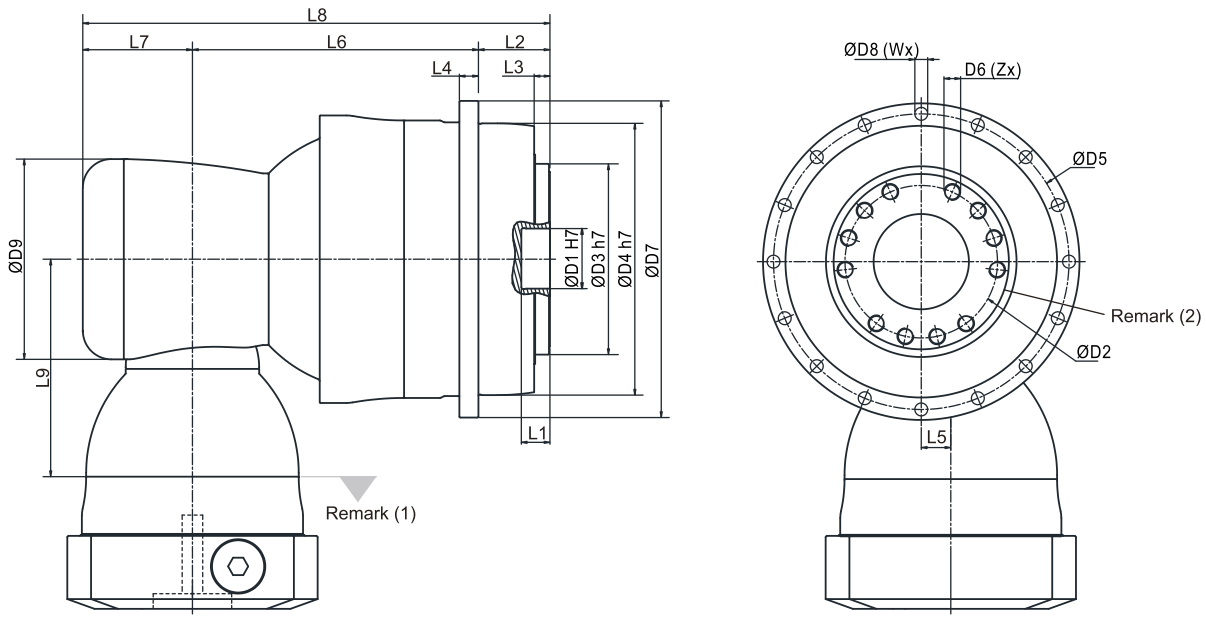
(5) Continuous operation is not recommended.

▶ Inertia - AHKA (3 stage) Gearbox

Input Shaft (C3) Ø(A) \ Model No.		AHKA285	AHKA355	AHKA450
32	kg.cm²	10.18	10.18	-
35		15.21	15.21	15.68
38		20.7	20.7	21.69
42		22.83	22.83	23.59
48		58.45	58.45	59.3
55		-	-	86.95

(A) Ø = Input shaft diameter.

▶ Dimensions - AHKA (3 stage) Gearbox (Ratio i = 100~1000)



Dimension	AHKA285	AHKA355	AHKA450
D1 H7	100	120	155
D2	160	200	250
D3 h7	200	250	315
D4 h7	285	355	450
D5	310	385	490
D6 x Pitch x Deep	M20x2.5Px31	M24x3Px32	M30x3.5Px40
D7	332	415	530
D8	13.5	17.5	22
D9	210	210	255
L1	16	35	24
L2	75	80	85
L3	16.5	20	20
L4	20	45	60
L5	31	31	36
L6	300	332	447.5
L7	115	115	131
L8	490	527	663.5
L9	228	228	265.5
X in Degree	24	22.5	30
Y in Degree	24	22.5	30
Z	12	16	12
U in Degree	22.5	30	30
V in Degree	22.5	30	30
W	16	12	12

(1) Dimensions are related to motor interface. Please contact APEX for details.
(2) Refer to the AH series(Page 05) for flange interface.

▶ Performance - AHKB (3 stage) Gearbox

Model No.		Stage	Ratio(1)	AHKB090	AHKB110	AHKB140	AHKB200	AHKB255	AHKB285	AHKB355
Nominal Output Torque T_{2N}	Nm	3	64	200	360	615	1,325	-	-	-
			84	200	360	620	1,325	-	-	-
			100	200	360	620	1,330	1,780	3,345	5,620
			125	170	310	535	1,170	1,780	3,345	5,625
			140	200	360	620	1,330	1,780	3,345	5,625
			175	170	310	535	1,170	1,780	3,345	5,625
			200	200	360	620	1,330	1,780	3,345	5,625
			250	170	310	535	1,170	1,780	3,345	5,625
			280	200	360	620	1,330	1,510	-	-
			350	170	310	535	1,170	1,775	3,345	5,630
			400	160	340	620	1,330	-	-	-
			500	170	310	535	1,170	1,780	3,000	5,500
			700	130	250	440	990	1,510	2,555	4,825
			1,000	55	160	290	640	980	1,655	3,250
Emergency Stop Torque T_{2NOT}	Nm	3	64~1,000	2 times T_{2N}						
Max. Acceleration Torque T_{2B}	Nm	3	64~1,000	1.5 times T_{2N}						
No Load Running Torque(3)	Nm	3	64~1,000	0.2	0.2	0.3	0.4	1	1.2	1.5
Backlash(2)	arcmin	3	64~1,000	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2
Torsional Rigidity	Nm/arcmin	3	64~1,000	27	56	112	389	642	1,275	2,500
Nominal Input Speed n_{1N}	rpm	3	64~1,000	5,500	4,600	4,600	4,000	3,700	3,400	3,100
Max. Input Speed n_{1B}	rpm	3	64~1,000	7,000	7,000	7,000	6,000	5,500	5,000	4,500
Max. Axial Load F_{2a}(4)	N	3	64~1,000	2,220	4,070	8,530	17,000	26,900	39,200	101,500
Max. Tilting Moment M_{2K}(4)	Nm	3	64~1,000	280	480	1,310	3,530	5,920	9,230	29,100
Operating Temp	° C	3	64~1,000	-10° C~ 90° C						
Degree of Gearbox Protection		3	64~1,000	IP65						
Lubrication		3	64~1,000	Synthetic lubrication grease						
Mounting Position		3	64~1,000	All directions						
Running Noise(3)	dB(A)	3	64~1,000	≦ 66	≦ 68	≦ 68	≦ 70	≦ 70	≦ 72	≦ 74
Efficiency η	%	3	64~1,000	≧ 92%						

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N} .

(3) The dB values are measured by gearbox with ratio 1,000 (3-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(4) Applied to the output flange center at 100 rpm.

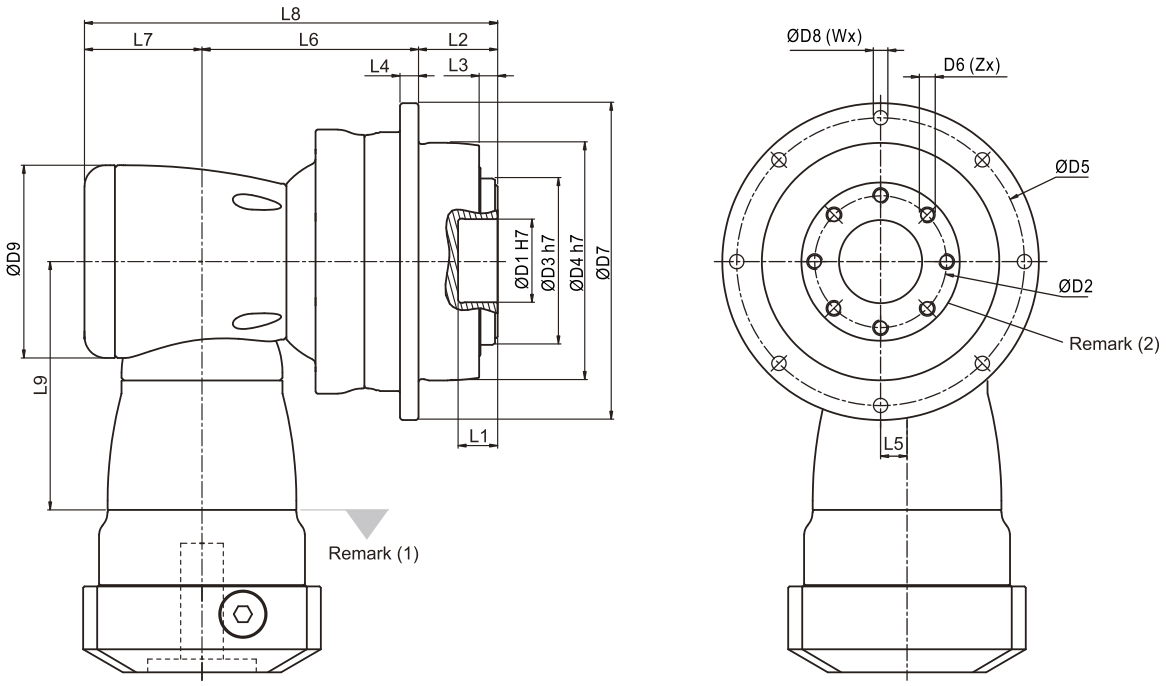
(5) Continuous operation is not recommended.

▶ Inertia - AHKB (3 stage) Gearbox

Input Shaft (C3) Ø(A) \ Model No.		AHKB090	AHKB110	AHKB140	AHKB200	AHKB255	AHKB285	AHKB355
8	kg.cm²	0.17	-	-	-	-	-	-
11		0.17	0.52	-	-	-	-	-
14		0.21	0.53	1.83	-	-	-	-
19		-	0.68	1.83	5.6	-	-	-
24		-	-	5.04	5.63	5.63	-	-
28		-	-	-	7.18	7.18	-	-
32		-	-	-	10.1	10.1	12.63	-
35		-	-	-	15.54	15.54	17.75	17.35
38		-	-	-	21.32	21.32	23.26	23.61
42		-	-	-	-	23.2	25.4	25.5
48		-	-	-	-	56.07	61.02	61.22

(A) Ø = Input shaft diameter.

▶ Dimensions - AHKB (3 stage) Gearbox (Ratio i = 64~1000)



Dimension	AHKB090	AHKB110	AHKB140	AHKB200	AHKB255	AHKB285	AHKB355
D1 H7	31.5	40	50	80	100	100	120
D2	50	63	80	125	140	160	200
D3 h7	63	80	100	160	180	200	250
D4 h7	90	110	140	200	255	285	355
D5	109	135	168	233	280	310	385
D6 x Pitch x Deep	M6x1Px10	M6x1Px11	M8x1.25Px15	M10x1.5Px20	M16x2Px25	M20x2.5Px31	M24x3Px32
D7	120	147	180	249.5	302	332	415
D8	5.5	5.5	6.6	9	13.5	13.5	17.5
D9	94	116	163	210	210	255	300
L1	15	15	15	16	16	16	35
L2	30	29	38	50	66	75	80
L3	7	7	7.5	8.5	13.5	16.5	20
L4	7	8	10	12	18	20	45
L5	13	17	25	31	31	36	43
L6	90.5	114	147.5	175	191.5	249.5	290
L7	53	68.3	89	115	115	131	165
L8	173.5	211.3	274.5	340	372.5	455.5	535
L9	114.5	129	173.5	228	228	265.5	294.5
X in Degree	45	22.5	30	30	24	24	22.5
Y in Degree	45	22.5	30	30	24	24	22.5
Z	8	12	12	12	12	12	16
U in Degree	45	45	30	30	22.5	22.5	30
V in Degree	45	45	30	30	22.5	22.5	30
W	8	8	12	12	16	16	12

(1) Dimensions are related to motor interface. Please contact APEX for details.
(2) Refer to the AH series(Page 05) for flange interface.

Performance - AHK (4 stage) Gearbox

Model No.		Stage	Ratio(1)	AHK285	AHK355	AHK450
Nominal Output Torque T_{2N}	Nm	4	1,225	3,350	5,630	10,980
			1,400	3,350	5,630	10,980
			1,750	3,350	5,630	10,980
			2,000	3,350	5,630	10,980
			2,800	2,555	4,825	9,600
			3,500	3,350	5,630	10,980
			5,000	3,350	5,350	9,050
			7,000	2,625	4,960	10,115
			10,000	1,975	3,870	8,325
Emergency Stop Torque T_{2NOT}	Nm	4	1,225~10,000	2 times T_{2N}		
Max. Acceleration Torque T_{2B}	Nm	4	1,225~10,000	1.5 times T_{2N}		
No Load Running Torque(3)	Nm	4	1,225~10,000	0.4	0.4	1
Backlash(2)	arcmin	4	1,225~10,000	≦ 2	≦ 2	≦ 2
Torsional Rigidity	Nm/arcmin	4	1,225~10,000	1,275	2,500	5,100
Nominal Input Speed n_{1N}	rpm	4	1,225~10,000	3,700	3,700	3,400
Max. Input Speed n_{1B}	rpm	4	1,225~10,000	5,500	5,500	5,000
Max. Axial Load F_{2a}(4)	N	4	1,225~10,000	39,200	101,500	143,700
Max. Tilting Moment M_{2K}(4)	Nm	4	1,225~10,000	9,230	29,100	63,300
Operating Temp	° C	4	1,225~10,000	-10° C~ 90° C		
Degree of Gearbox Protection		4	1,225~10,000	IP65		
Lubrication		4	1,225~10,000	Synthetic lubrication grease		
Mounting Position		4	1,225~10,000	All directions		
Running Noise(3)	dB(A)	4	1,225~10,000	≦ 72	≦ 74	≦ 76
Efficiency η	%	4	1,225~10,000	≧ 90%		

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N} .

(3) The dB values are measured by gearbox with ratio 10,000 (4-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(4) Applied to the output flange center at 100 rpm.

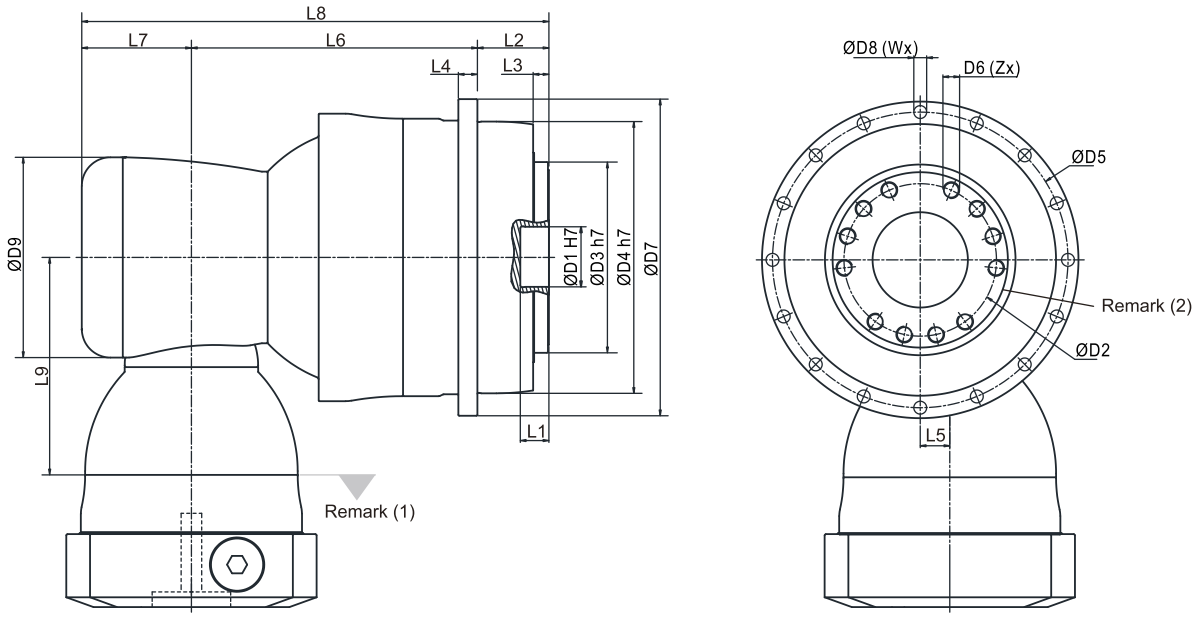
(5) Continuous operation is not recommended.

Inertia - AHK (4 stage) Gearbox

Input Shaft (C3) Ø(A) \ Model No.		AHK285	AHK355	AHK450
24	kg.cm²	5.63	5.63	-
28		7.18	7.18	-
32		10.1	10.1	12.63
35		15.54	15.54	17.75
38		21.32	21.32	23.26

(A) Ø = Input shaft diameter.

▶ Dimensions - AHK (4 stage) Gearbox (Ratio i = 1,225~10,000)



Dimension	AHK285	AHK355	AHK450
D1 H7	100	120	155
D2	160	200	250
D3 h7	200	250	315
D4 h7	285	355	450
D5	310	385	490
D6 x Pitch x Deep	M20x2.5Px31	M24x3Px32	M30x3.5Px40
D7	332	415	530
D8	13.5	17.5	22
D9	210	210	255
L1	16	35	24
L2	75	80	85
L3	16.5	20	20
L4	20	45	60
L5	31	31	36
L6	300	332	447.5
L7	115	115	131
L8	490	527	663.5
L9	228	228	265.5
X in Degree	24	22.5	30
Y in Degree	24	22.5	30
Z	12	16	12
U in Degree	22.5	30	30
V in Degree	22.5	30	30
W	16	12	12

(1) Dimensions are related to motor interface. Please contact APEX for details.
(2) Refer to the AH series(Page 05) for flange interface.

Performance - AHKC Gearbox

Model No.		Stage	Ratio[1]	AHKC064	AHKC090	AHKC110	AHKC140	AHKC200	AHKC255	AHKC285	AHKC355	AHKC450
Nominal Output Torque T_{2N}	Nm	2	4	35	80	210	415	1,005	-	-	-	-
			5	35	80	210	415	1,005	2,050	3,250	-	-
			7	30	70	180	350	820	1,750	2,410	-	-
			8	35	80	210	415	1,005	-	-	-	-
			10	35	80	210	415	1,005	2,050	3,250	-	-
		3	21	-	85	220	430	1,065	2,100	3,340	5,320	10,750
			31	-	70	185	365	860	1,790	2,470	5,720	9,100
			46	-	60	155	305	675	1,080	1,890	3,460	7,800
			61	-	70	185	365	860	1,790	2,470	5,720	9,100
			91	-	60	155	305	675	1,080	1,890	3,460	7,800
Emergency Stop Torque T_{2NOT}	Nm	2,3	4~91	2 times T_{2N}								
Max. Acceleration Torque T_{2B}	Nm	2,3	4~91	1.5 times T_{2N}								
No Load Running Torque[3]	Nm	2	4~10	2	2.5	5.8	12	25	48	95	-	-
		3	21~91	1	1.5	2.5	4	9	18.5	35	75	148
Backlash[2]	arcmin	2	4~10	≦ 3	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	-	-
		3	21~91	-	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2	≦ 2
Torsional Rigidity	Nm/arcmin	2,3	4~91	12	27	56	112	389	642	1,275	2,500	5,100
Nominal Input Speed n_{1N}	rpm	2	4~10	5,000	3,600	3,000	2,300	1,800	1,500	1,100	-	-
		3	21~91	-	4,600	4,000	3,000	2,300	1,800	1,500	1,500	1,100
Max. Input Speed n_{1B}	rpm	2	4~10	7,000	6,000	5,500	4,500	3,500	3,000	2,200	-	-
		3	21~91	-	7,000	6,500	5,500	4,500	3,500	3,000	3,000	2,200
Max. Axial Load F_{2a}[4]	N	2,3	4~91	1,690	2,220	4,070	8,530	17,000	26,900	39,200	101,500	143,700
Max. Tilting Moment M_{2K}[4]	Nm	2,3	4~91	120	280	480	1,310	3,530	5,920	9,230	29,100	63,300
Operating Temp	° C	2,3	4~91	-10° C~ 90° C								
Degree of Gearbox Protection		2,3	4~91	IP65								
Lubrication		2,3	4~91	Synthetic lubrication grease								
Mounting Position		2,3	4~91	All directions								
Running Noise[3]	dB(A)	2	4~10	≦68	≦ 68	≦ 68	≦ 70	≦ 70	≦ 72	≦ 74	-	-
		3	21~91	-	≦ 68	≦ 68	≦ 70	≦ 70	≦ 72	≦ 74	≦ 74	≦ 76
Efficiency η	%	2	4~10	≧ 95%								
		3	21~91	≧ 93%								

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N} .

(3) The dB values are measured by gearbox with ratio 10 (2-stage) or ratio 91 (3-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(4) Applied to the output flange center at 100 rpm.

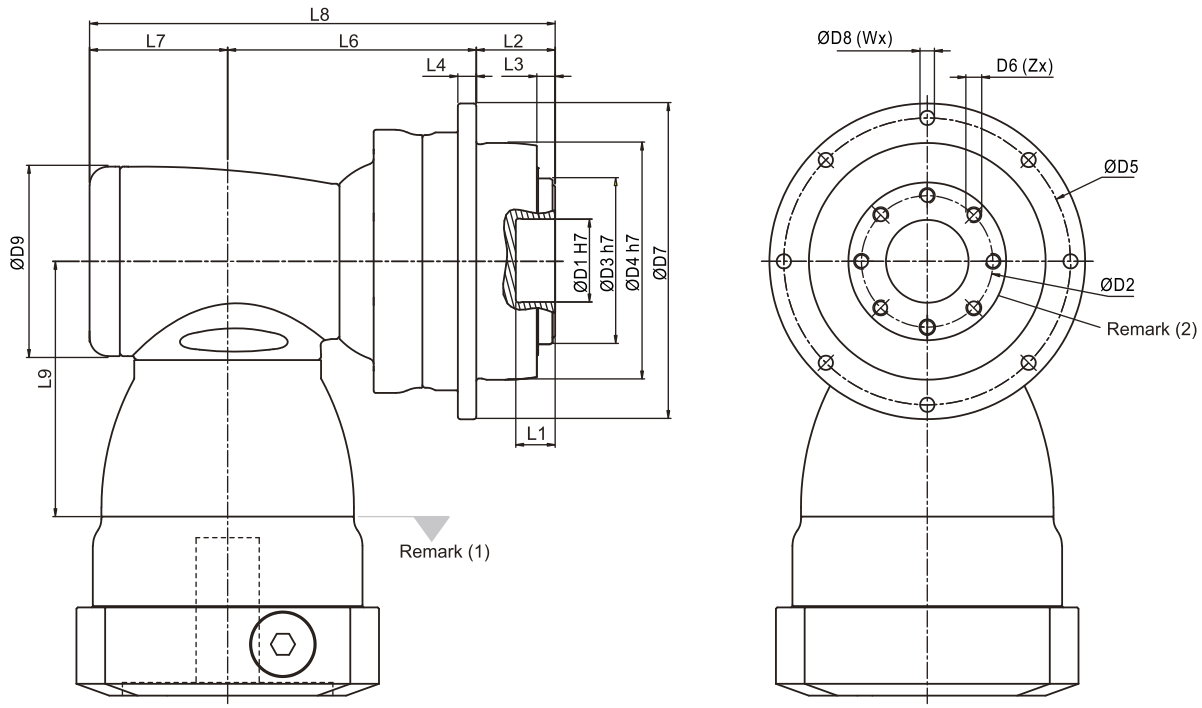
(5) Continuous operation is not recommended.

Inertia - AHKC Gearbox (Ratio i = 4~10 / 21~91)

Model No.		AHKC064	AHKC090		AHKC110		AHKC140		AHKC200		AHKC255		AHKC285		AHKC355	AHKC450
Ø[A] (C3)		2-st.	2-st.	3-st.	2-st.	3-st.	2-st.	3-st.	2-st.	3-st.	2-st.	3-st.	2-st.	3-st.	3-st.	3-st.
8	kg.cm²	0.1	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-
11		0.17	0.52	0.17	-	-	-	-	-	-	-	-	-	-	-	-
14		0.21	0.52	0.21	-	0.52	-	-	-	-	-	-	-	-	-	-
19		0.62	1.69	0.62	1.71	1.69	-	1.71	-	-	-	-	-	-	-	-
24		-	4.89	-	5.05	4.89	6.92	5.05	-	6.92	-	-	-	-	-	-
28		-	-	-	6.55	-	6.98	6.55	-	6.98	-	-	-	-	-	-
32		-	-	-	9.47	-	10.18	9.47	10.18	10.18	-	10.18	-	-	-	-
35		-	-	-	14.91	-	15.21	14.91	15.21	15.21	15.68	15.21	23.46	15.68	-	-
38		-	-	-	20.69	-	20.7	20.69	20.7	20.7	21.69	20.7	23.46	21.69	21.69	-
42		-	-	-	-	-	22.83	-	22.83	22.83	23.59	22.83	25.28	23.59	23.59	25.28
48		-	-	-	-	-	58.45	-	58.45	58.45	59.3	58.45	61.61	59.3	59.3	61.61
55		-	-	-	-	-	-	-	-	-	86.95	-	89.67	-	86.95	89.67
60		-	-	-	-	-	-	-	-	-	-	-	112.49	-	-	112.49

(A) Ø = Input shaft diameter.

▶ Dimensions - AHKC Gearbox (Ratio i = 4~10 / 21~91)



Dimension	AHKC064	AHKC090		AHKC110		AHKC140		AHKC200		AHKC255		AHKC285		AHKC355	AHKC450
	2-st.	2-st.	3-st.	2-st.	3-st.	2-st.	3-st.	2-st.	3-st.	2-st.	3-st.	2-st.	3-st.	3-st.	3-st.
D1 H7	20	31.5		40		50		80		100		100		120	155
D2	31.5	50		63		80		125		140		160		200	250
D3 h7	40	63		80		100		160		180		200		250	315
D4 h7	64	90		110		140		200		255		285		355	450
D5	79	109		135		168		233		280		310		385	490
D6 x Pitch x Deep	M5x0.8Px8	M6x1Px10		M6x1Px11		M8x1.25Px15		M10x1.5Px20		M16x2Px25		M20x2.5Px31		M24x3Px32	M30x3.5Px40
D7	88	120		147		180		249.5		302		332		415	530
D8	4.5	5.5		5.5		6.6		9		13.5		13.5		17.5	22
D9	64	92	64	116	92	156	116	156	156	195	156	240	195	195	240
L1	8	15		15		15		16		16		16		35	24
L2	19.5	30		29		38		50		66		75		80	85
L3	4	7		7		7.5		8.5		13.5		16.5		20	20
L4	5	7		8		10		12		18		20		45	60
L6	92	100.5	121.5	124.5	142	175.5	174.5	185	244.5	199	264.5	265.5	307.5	339.5	463.5
L7	46.5	61.5	46.5	76	61.5	97.5	76	97.5	97.5	105.5	97.5	141	105.5	105.5	141
L8	158	192	198	229.5	232.5	311	288.5	332.5	392	370.5	428	481.5	488	525	689.5
L9	81.5	113.5	81.5	147.5	113.5	196.5	147.5	196.5	196.5	229	196.5	260	229	229	260
X in Degree	45	45		22.5		30		30		24		24		22.5	30
Y in Degree	45	45		22.5		30		30		24		24		22.5	30
Z	8	8		12		12		12		12		12		16	12
U in Degree	45	45		45		30		30		22.5		22.5		30	30
V in Degree	45	45		45		30		30		22.5		22.5		30	30
W	8	8		8		12		12		16		16		12	12

(1) Dimensions are related to motor interface. Please contact APEX for details.
(2) Refer to the AH series(Page 05) for flange interface.

HIGH TORQUE-HIGH PRECISION

PLANETARY GEARBOX / LINEAR SYSTEM

AP - APK Series
APC - APCK Series

▶ Order Code

AP090	**—**	**005.5(1)**	**/**	**MOTOR**
APK090	**—**	**005.5(1)**	**/**	**MOTOR**

Motor Type

Ratio

Gearbox Size

Gearbox Size

AP	**090 / 110 / 140 / 200 / 255 / 285 / 355 / 450**
APC	**090 / 110 / 140 / 200 / 255 / 285 / 355 / 450**
APK	**090 / 110 / 140 / 200 / 255 / 285 / 355 / 450**
APCK	**090 / 110 / 140 / 200 / 255 / 285 / 355 / 450**

Ratio

AP/APC	**(1 Stg.)**	**4 / 5.5**
AP/APC	**(2 Stg.)**	**16 / 20 / 22 / 27.5 / 28 / 38.5 / 40 / 55**
AP/APC	**(3 Stg.)**	**64 / 88 / 100 / 110 / 140 / 154 / 160 / 200 / 220 / 280 / 400**
APK/APCK	**(2 Stg.)**	**4 / 5.5 / 8 / 11**
APK/APCK	**(2 Stg.)**	**16 / 20 / 22 / 27.5 / 28 / 38.5 / 40 / 55**
APK/APCK	**(3 Stg.)**	**64 / 88 / 100 / 110 / 137.5 / 140 / 154 / 160 / 200 / 220 / 280 / 385**
APK/APCK	**(4 Stg.)**	**400 / 440 / 500 / 550 / 700 / 770 / 1000 / 1078 / 1400 / 1540 / 1600 2000 / 2695 / 2800 / 3850 / 4000 / 5500**

Motor Type : Manufacturer and Model

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

▶ Performance - AP / APC Gearbox

Model No.		Stage	Ratio(1)	AP 090 APC 090	AP 110 APC 110	AP 140 APC 140	AP 200 APC 200	AP 255 APC 255	AP 285 APC 285	AP 355 APC 355	AP 450 APC 450
Nominal Output Torque T_{2N}	Nm	1	4	205	460	790	1,700	2,580	4,875	–	–
			5.5	200	370	645	1,430	2,175	4,060	–	–
		2	16	255	470	800	1,730	2,625	4,955	–	–
			20	255	470	805	1,735	2,630	4,965	–	–
			22	200	375	650	1,445	2,200	4,100	6,995	13,810
			27.5	200	375	655	1,445	2,200	4,105	7,000	13,825
			28	250	470	805	1,735	2,635	4,970	–	–
			38.5	200	375	655	1,450	2,200	4,110	7,010	13,845
			40	95	225	650	1,610	2,640	4,980	–	–
			55	130	315	655	1,450	2,205	4,110	7,020	13,855
		3	64	260	470	805	1,740	2,640	4,985	–	–
			88	200	380	655	1,450	2,205	4,115	7,025	13,865
			100	260	470	805	1,745	2,645	4,990	–	–
			110	200	380	655	1,450	2,205	4,115	7,025	13,870
			140	260	470	810	1,745	2,645	4,990	–	–
			154	200	380	655	1,450	2,205	4,120	7,030	13,875
			160	210	385	810	1,745	2,645	4,990	–	–
			200	260	475	810	1,745	2,645	4,990	–	–
			220	200	380	655	1,450	2,205	4,120	7,030	13,875
			280	260	475	810	1,745	2,645	4,990	–	–
			400	95	225	650	1,610	2,645	4,995	–	–
Emergency Stop Torque T_{2NOT}	Nm	1,2,3	4~400	3 times T_{2N}							
Max. Acceleration Torque T_{2B}	Nm	1,2,3	4~400	1.5 times T_{2N}							
No Load Running Torque(2)	Nm	1	4~5.5	1.5	2.5	7.1	14	22	28	–	–
		2	16~55	0.6	1.1	3.7	8	12	18	17	26
		3	64~400	0.35	0.7	1.6	4	4.5	6.5	6	12
Backlash(3)	arcmin	1	4~5.5	≤ 1							
		2,3	16~400	≤ 2							
Torsional Rigidity	Nm/arcmin	1,2,3	4~400	42	95	205	650	1,200	1,800	2,850	5,700
Nominal Input Speed n_{1N}	rpm	1	4~5.5	3,600	3,600	3,000	2,700	2,400	2,100	–	–
		2	16~55	4,600	4,600	4,000	3,700	3,400	3,100	2,500	2,000
		3	64~400	5,000	5,000	4,600	4,000	3,700	3,400	3,100	2,500
Max. Input Speed n_{1B}	rpm	1	4~5.5	6,000	6,000	5,000	4,500	4,000	3,500	–	–
		2	16~55	7,000	7,000	6,000	5,500	5,000	4,500	4,000	3,500
		3	64~400	7,000	7,000	7,000	6,000	5,500	5,000	4,500	4,000
Max. Axial Load F_{2a}(4)	N	1,2,3	4~400	2,220	4,070	8,530	17,000	26,900	39,200	101,500	143,700
Max. Tilting Moment M_{2K}(4)	Nm	1,2,3	4~400	280	480	1,310	3,530	5,920	9,230	29,100	63,300
Operating Temp.	° C	1,2,3	4~400	-10° C~ 90° C							
Degree of Gearbox Protection		1,2,3	4~400	IP65							
Lubrication		1,2,3	4~400	Synthetic lubrication grease							
Mounting Position		1,2,3	4~400	All directions							
Running Noise(2)	dB(A)	1	4~5.5	≤ 59	≤ 64	≤ 66	≤ 66	≤ 68	≤ 68	–	–
		2	16~55	≤ 60	≤ 62	≤ 64	≤ 66	≤ 67	≤ 67	≤ 68	≤ 70
		3	64~400	≤ 60	≤ 62	≤ 64	≤ 66	≤ 66	≤ 67	≤ 67	≤ 68
Efficiency η	%	1	4~5.5	≥ 97%							
		2	16~55	≥ 94%							
		3	64~400	≥ 92%							

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

(2) The dB values are measured by gearbox with ratio 5.5 (1-stage), 55 (2-stage) or ratio 220 (3-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(3) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(4) Applied to the output flange/curvic center at 100 rpm. The calculation formula please refer to Fig. 1.

(5) Continuous operation is not recommended.

▶ Inertia - AP / APC Gearbox

Model No.		AP/APC 090			AP/APC 110			AP/APC 140			AP/APC 200			AP/APC 255		
Ø(A)	Stage	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
11	kg.cm²	-	-	0.16												
14		0.42	0.21	0.19	-	-	0.21	-	-	-	-	-	-	-	-	-
19		0.66	0.6	-	1.84	0.66	0.6	-	-	0.66	-	-	-	-	-	-
24		3.94	-	-	4.11	3.94	-	4.61	4.11	3.94	-	-	4.11	-	-	-
28		-	-	-	5.48	-	-	6.14	5.48	-	-	-	5.48	-	-	6.14
32		-	-	-	7.36	-	-	8.17	7.36	-	-	8.17	7.36	-	-	8.17
35		-	-	-	14.04	-	-	15.54	14.04	-	17.75	15.54	14.04	-	17.75	15.54
38		-	-	-	16.71	-	-	18.19	16.71	-	20.17	18.19	16.71	-	20.17	18.19
42		-	-	-	-	-	-	23.2	-	-	25.4	23.2	-	28.88	25.4	-
48		-	-	-	-	-	-	52.42	-	-	55.18	52.42	-	58.64	55.18	-
55		-	-	-	-	-	-	-	-	-	-	-	-	92.48	-	-
60		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Model No.		AP/APC 285			AP/APC 355		AP/APC 450	
Ø(A)	Stage	1	2	3	2	3	2	3
11	kg.cm²							
14		-	-	-	-	-	-	-
19		-	-	-	-	-	-	-
24		-	-	-	-	-	-	-
28		-	-	-	-	-	-	-
32		-	-	-	-	-	-	-
35		-	-	17.75	-	-	-	-
38		-	23.66	20.17	-	20.17	-	23.66
42		-	28.88	25.4	28.79	25.4	-	28.95
48		69.78	58.64	55.18	92.76	55.18	106.06	58.64
55		104.22	92.48	-	105.41	-	118.67	-
60		127.69	-	-	-	-	127.37	-

(A) Ø = Input shaft diameter.

▶ Max. Tilting Moment M2K

$$\text{Max.Tilting Moment } M_{2K} = \frac{F_{2a} * Y + F_{2r} * (X+Z2)}{1000}$$

M_{2K} : 【Nm】
F_{2a}, F_{2r} : 【N】
X, Y, Z2 : 【mm】

AP / APK	090	110	140	200	255	285	355	450
Z2【mm】	84.5	106.2	90	122.8	133.2	175.5	220.6	275.3

Note : Applied to the output flange center at 100 rpm.

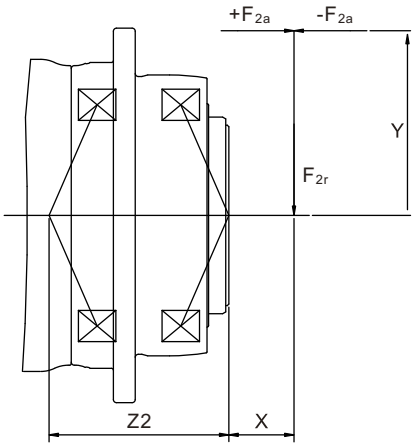
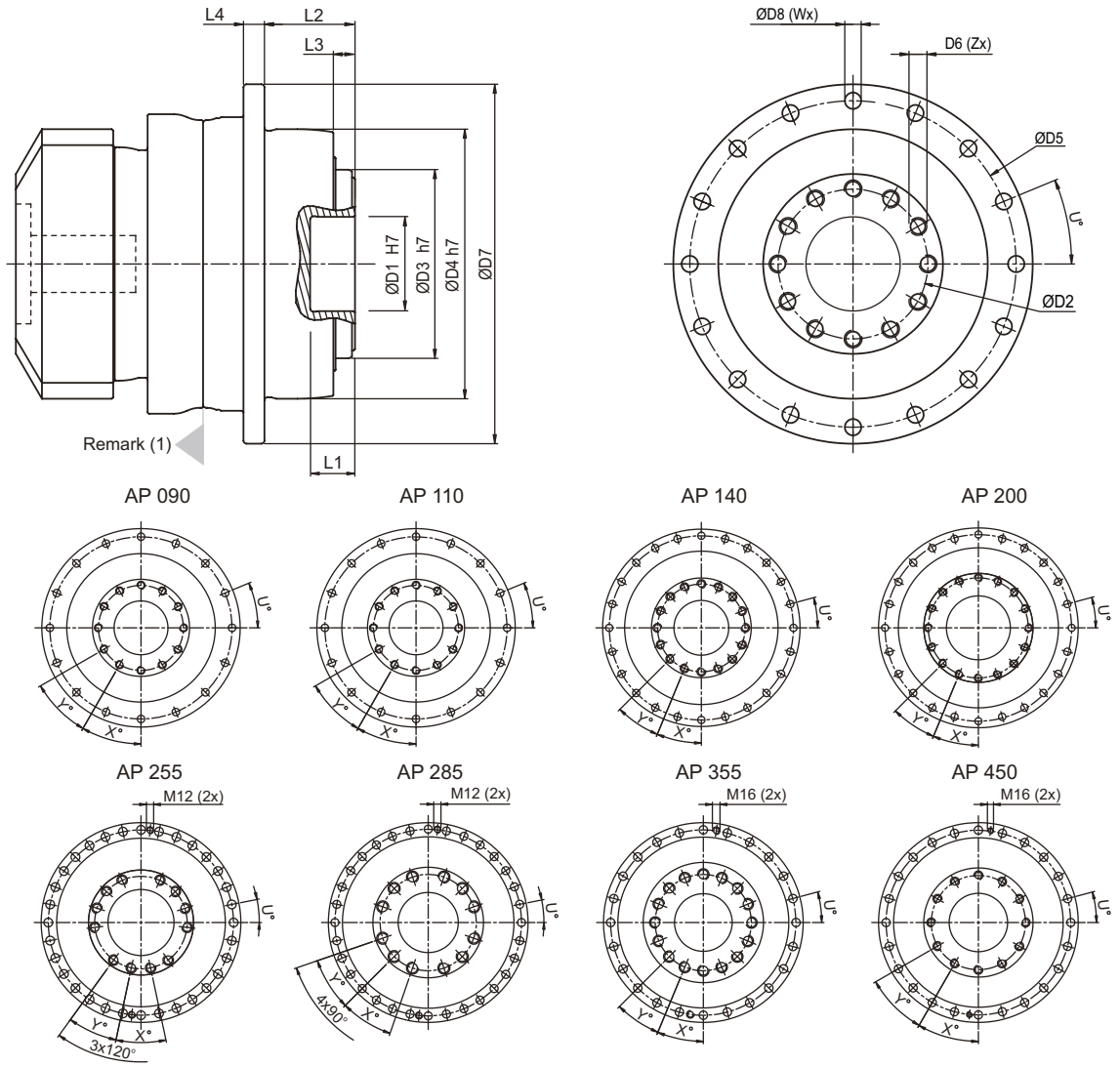


Fig. 1

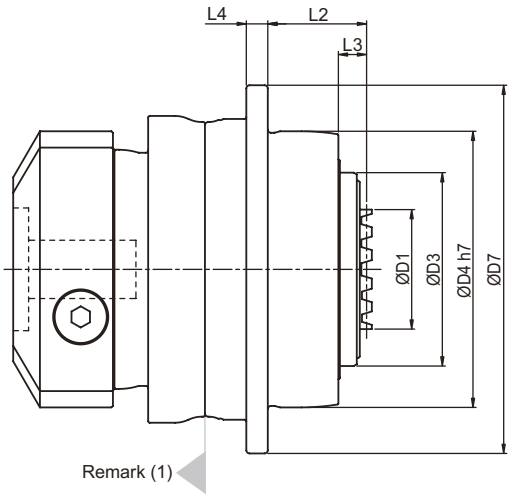
Dimensions - AP Gearbox

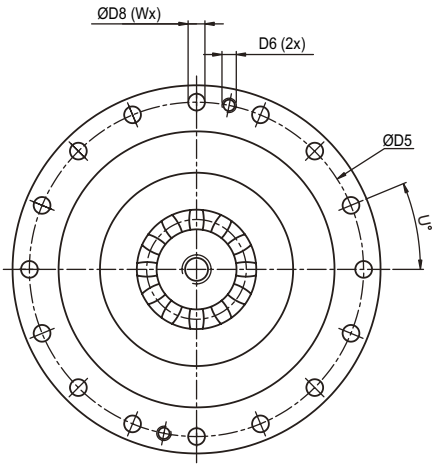


Dimension	AP 090	AP 110	AP 140	AP 200	AP 255	AP 285	AP 355	AP 450
D1 H7	31.5	40	50	80	100	100	120	155
D2	50	63	80	125	140	160	200	250
D3 h7	63	80	100	160	180	200	250	315
D4 h7	90	110	140	200	255	285	355	450
D5	109	135	168	233	280	310	385	490
D6 x Pitch x Deep	M6x1Px11	M8x1.25Px12	M8x1.25Px15	M10x1.5Px20	M16x2Px25	M24x3Px37	M24x3Px32	M30x3.5Px40
D7	120	147	180	249.5	302	332	415	530
D8	5.5	5.5	6.6	9	13.5	13.5	17.5	22
L1	15	15	15	16	16	16	35	24
L2	30	29	38	50	66	75	80	85
L3	7	7	7.5	8.5	13.5	16.5	20	20
L4	7	8	10	12	18	20	45	60
X in Degree	30	30	22.5	22.5	24	26	22.5	30
Y in Degree	30	30	22.5	22.5	24	26	22.5	30
Z	12	12	16	16	12	12	16	12
U in Degree	22.5	22.5	15	15	11.25	11.25	15	15
W	16	16	24	24	32	32	24	24

(1) Dimensions are related to motor interface. Please contact APEX for details.

Dimensions - APC Gearbox





Dimension	APC 090	APC 110	APC 140	APC 200	APC 255	APC 285	APC 355	APC 450
D1	36	46	60	80	90	120	120	132
D3	63	80	100	160	180	200	250	315
D4 h7	90	110	140	200	255	285	355	450
D5	109	135	168	233	280	310	385	490
D6	-	-	-	-	M12	M12	M16	M16
D7	120	147	180	249.5	302	332	415	530
D8	5.5	5.5	6.6	9	13.5	13.5	17.5	22
L2	32.5	31.5	40.5	52.5	68.5	77.5	82.5	87.5
L3	9.5	9.5	10	11	16	19	22.5	22.5
L4	7	8	10	12	18	20	45	60
U in Degree	22.5	22.5	15	15	11.25	11.25	15	15
W	16	16	24	24	32	32	24	24

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Performance - APK / APCK Gearbox

Model No.		Stage	Ratio[1]	APK 090 APCK 090	APK 110 APCK 110	APK 140 APCK 140	APK 200 APCK 200	APK 255 APCK 255	APK 285 APCK 285	APK 355 APCK 355	APK 450 APCK 450
Nominal Output Torque T_{2N}		2	16	255	470	805	1,735	2,015	3,935	–	–
			20	255	470	805	1,735	2,015	3,935	–	–
			22	200	375	655	1,445	2,200	4,110	7,010	–
			27.5	200	375	655	1,445	2,200	4,110	7,015	–
			28	240	470	805	1,740	1,870	3,600	–	–
			38.5	200	375	655	1,450	2,200	4,110	7,020	–
			40	95	225	650	1,610	1,725	2,880	–	–
			55	130	315	655	1,450	2,205	3,960	7,025	–
		3	64	–	470	805	1,740	2,640	4,985	–	–
			88	–	380	655	1,450	2,205	4,115	7,025	13,870
			100	–	470	810	1,745	2,645	4,990	–	–
			110	–	380	655	1,450	2,205	4,115	7,025	13,870
			137.5	–	380	655	1,450	2,205	4,120	7,030	13,875
			140	–	470	810	1,745	2,645	4,990	–	–
			154	–	380	655	1,450	2,205	4,120	7,030	13,875
			160	–	475	810	1,745	2,645	4,990	–	–
			200	–	475	810	1,745	2,645	4,990	–	–
			220	–	380	655	1,450	2,205	4,120	7,030	13,200
			280	–	475	810	1,745	2,645	4,995	–	–
			385	–	380	655	1,450	2,205	4,120	7,030	13,880
		4	400	–	475	810	1,745	2,645	4,995	–	–
			440	–	380	655	1,450	2,205	4,120	7,030	13,880
			500	–	475	810	1,745	2,645	4,995	–	–
			550	–	380	655	1,450	2,210	4,120	7,030	13,880
			700	–	475	810	1,745	2,645	4,995	–	–
			770	–	380	655	1,450	2,210	4,120	7,030	13,880
			1,000	–	475	810	1,745	2,645	4,995	–	–
			1,078	–	380	655	1,450	2,210	4,120	7,035	13,880
			1,400	–	475	810	1,745	2,645	4,995	–	–
			1,540	–	380	655	1,450	2,210	4,120	7,035	13,200
			1,600	–	475	810	1,745	2,645	4,995	–	–
			2,000	–	475	810	1,745	2,645	4,995	–	–
			2,695	–	380	655	1,450	2,210	4,120	7,035	13,885
			2,800	–	475	810	1,745	2,645	4,995	–	–
			3,850	–	380	655	1,450	2,210	4,120	7,035	13,885
			4,000	–	225	650	1,610	2,645	4,995	–	–
			5,500	–	315	655	1,450	2,210	4,120	7,035	14,010
Emergency Stop Torque T_{2NOT}	Nm	2,3,4	16~5,500	2 times T_{2N}							
Max. Acceleration Torque T_{2B}	Nm	2,3,4	16~5,500	1.5 times T_{2N}							
No Load Running Torque[2]	Nm	2	16~55	1.3	2	3.1	6	13	16	20	–
		3	64~385	–	1.4	2.4	4.6	7	8.5	10.5	13
		4	400~5,500	–	0.2	0.3	0.6	0.9	1.2	1.8	2.5
Backlash[3]	arcmin	2,3,4	16~5,500	≤ 2							
Torsional Rigidity	Nm/arcmin	2	16~55	27	56	112	389	642	1,275	2,500	–
		3	64~385	–	56	112	389	642	1,275	2,500	5,100
		4	400~5,500	–	45	85	310	535	1,050	1,700	2,700
Nominal Input Speed n_{1N}	rpm	2	16~55	3,000	2,800	2,700	2,200	2,100	2,000	1,600	–
		3	88~385	3,000	3,000	2,800	2,700	2,200	2,100	2,100	2,000
		4	400~5,500	5,500	5,500	4,600	4,600	4,000	3,700	3,700	3,400
Max. Input Speed n_{1B}	rpm	2	16~55	6,000	6,000	4,500	4,500	4,000	3,000	2,500	–
		3	64~385	6,000	6,000	6,000	4,500	4,500	4,000	4,000	3,000
		4	400~5,500	7,000	7,000	7,000	7,000	6,000	5,500	5,500	5,000
Max. Axial Load F_{2a}[4]	N	2,3,4	16~5,500	2,220	4,070	8,530	17,000	26,900	39,200	101,500	143,700
Max. Tilting Moment M_{2K}[4]	Nm	2,3,4	16~5,500	280	480	1,310	3,530	5,920	9,230	29,100	63,300
Operating Temp.	° C	2,3,4	16~5,500	-10° C~ 90° C							
Degree of Gearbox Protection		2,3,4	16~5,500	IP65							
Lubrication		2,3,4	16~5,500	Synthetic lubrication grease							
Mounting Position		2,3,4	16~5,500	All directions							
Running Noise[2]	dB(A)	2,3,4	16~5,500	≤ 68	≤ 68	≤ 68	≤ 70	≤ 70	≤ 72	≤ 74	≤ 76
Efficiency η	%	2	16~55	≥ 94%							
		3	64~385	≥ 92%							
		4	400~5,500	≥ 90%							

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

(2) The dB values are measured by gearbox with ratio 55 (2-stage), 385 (3-stage) or ratio 5,500 (4-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(3) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(4) Applied to the output flange/curvic center at 100 rpm. The calculation formula please refer to page (3)

(5) Continuous operation is not recommended.

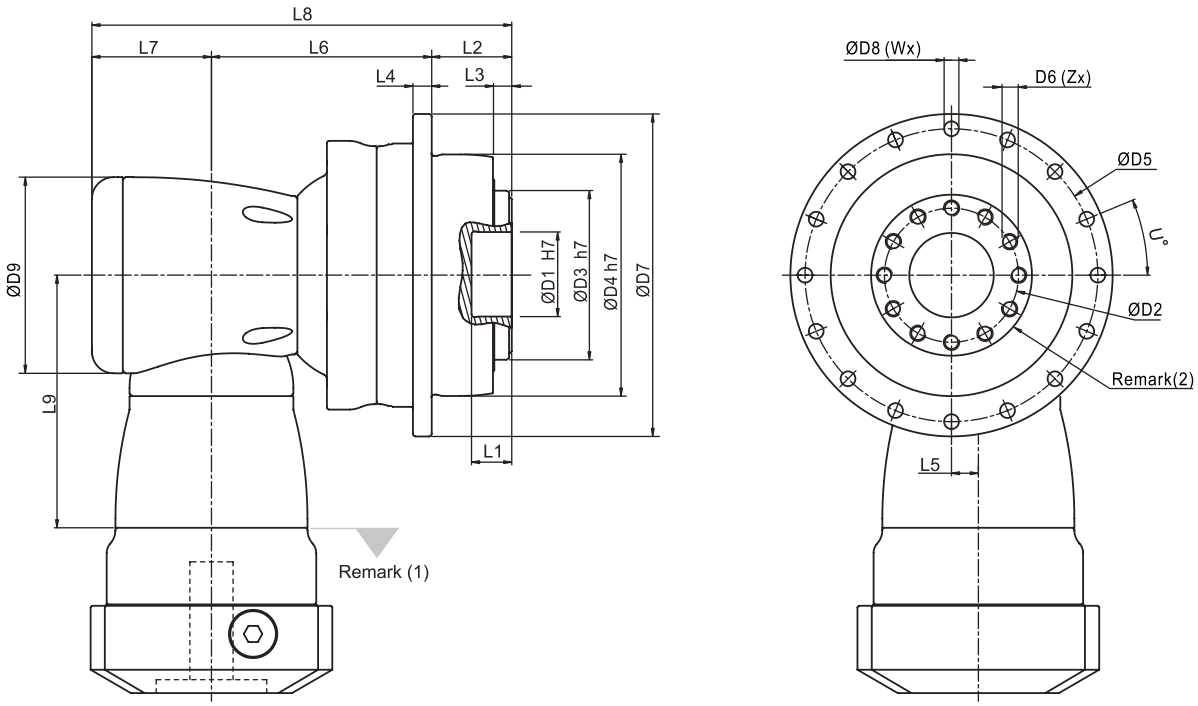
▶ Inertia - APK / APCK Gearbox

Model No.		APK/APCK 090	APK/APCK 110			APK/APCK 140			APK/APCK 200			APK/APCK 255			APK/APCK 285		
Ø[A]	Stage	2	2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
8		-	-	-	0.17	-	-	-	-	-	-	-	-	-	-	-	-
11		-	-	-	0.17	-	-	-	-	-	-	-	-	-	-	-	-
14		0.37	-	0.37	-	-	-	0.42	-	-	-	-	-	-	-	-	-
19		0.6	1.61	0.6	-	-	1.61	0.66	-	-	1.83	-	-	-	-	-	-
24		-	3.9	-	-	4.01	3.9	3.94	-	4.01	4.11	-	-	4.61	-	-	-
28	kg.cm^2	-	-	-	-	5.53	5.15	-	-	5.53	-	-	5.61	6.14	-	-	-
32		-	-	-	-	7.57	-	-	8.11	7.57	-	-	8.11	8.17	-	-	-
35		-	-	-	-	14.95	-	-	15.32	14.95	-	15.32	15.32	15.54	-	15.32	15.54
38		-	-	-	-	17.58	-	-	17.72	17.58	-	17.72	17.72	18.19	18.52	17.72	18.19
42		-	-	-	-	-	-	-	22.95	-	-	22.95	-	-	23.74	22.95	23.2
48		-	-	-	-	-	-	-	52.74	-	-	52.74	-	-	53.49	52.74	52.42
55		-	-	-	-	-	-	-	-	-	-	-	-	-	87.34	-	-

Model No.		APK/APCK 355			APK/APCK 450	
Ø[A]	Stage	2	3	4	3	4
8		-	-	-	-	-
11		-	-	-	-	-
14		-	-	-	-	-
19		-	-	-	-	-
24		-	-	-	-	-
28	kg.cm^2	-	-	-	-	-
32		-	-	-	-	-
35		-	-	15.54	-	17.76
38		-	17.72	18.19	18.52	20.17
42		25.5	22.95	23.2	23.74	25.4
48		55.14	52.74	52.42	53.49	55.18
55		89.59	-	-	-	-

(A) Ø = Input shaft diameter.

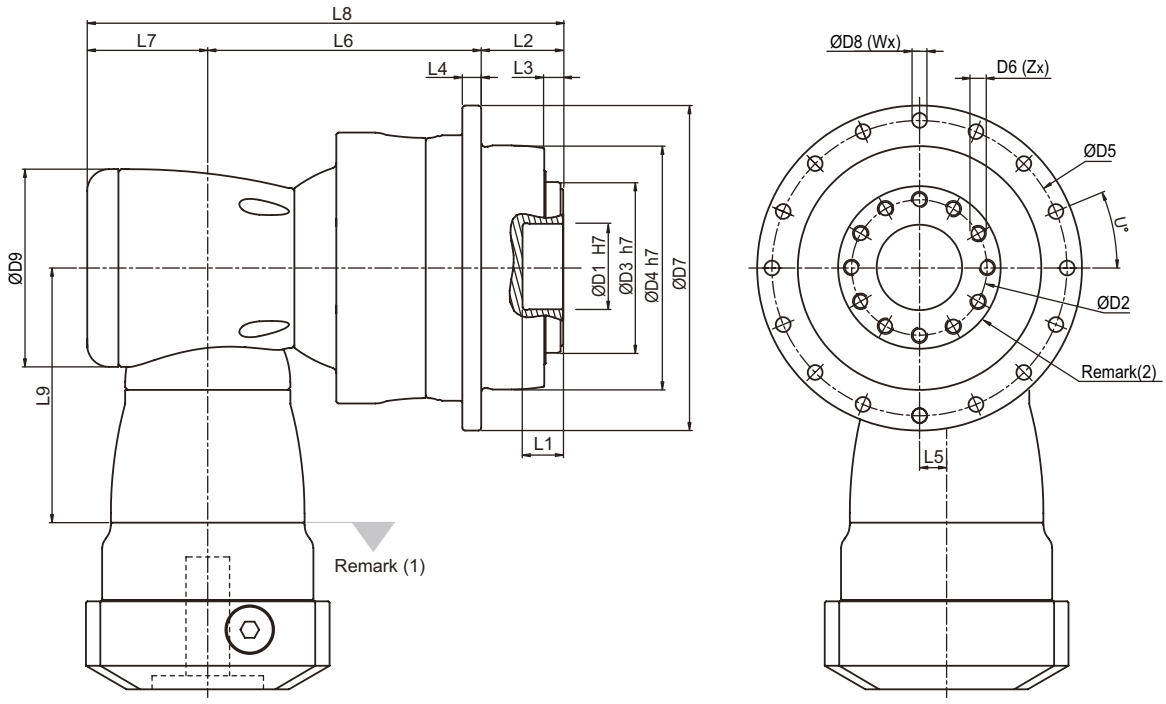
▶ Dimensions - APK (2 Stage) Gearbox (Ratio i = 16~55)



Dimension	APK 090	APK 110	APK 140	APK 200	APK 255	APK 285	APK 355
D1 H7	31.5	40	50	80	100	100	120
D2	50	63	80	125	140	160	200
D3 h7	63	80	100	160	180	200	250
D4 h7	90	110	140	200	255	285	355
D5	109	135	168	233	280	310	385
D6 x Pitch x Deep	M6x1Px11	M8x1.25Px12	M8x1.25Px15	M10x1.5Px20	M16x2Px25	M24x3Px37	M24x3Px32
D7	120	147	180	249.5	302	332	415
D8	5.5	5.5	6.6	9	13.5	13.5	17.5
D9	94	116	163	210	210	255	300
L1	15	15	15	16	16	16	35
L2	30	29	38	50	66	75	80
L3	7	7	7.5	8.5	13.5	16.5	20
L4	7	8	10	12	18	20	45
L5	13	17	25	31	31	36	43
L6	90.5	114	147.5	175	191.5	249.5	290
L7	53	68.3	89	115	115	131	165
L8	173.5	211.3	274.5	340	372.5	455.5	535
L9	114.5	129	173.5	228	228	265.5	294.5
X in Degree	30	30	22.5	22.5	24	26	22.5
Y in Degree	30	30	22.5	22.5	24	26	22.5
Z	12	12	16	16	12	12	16
U in Degree	22.5	22.5	15	15	11.25	11.25	15
W	16	16	24	24	32	32	24

(1) Dimensions are related to motor interface. Please contact APEX for details.
(2) Flange Interface, please refer to page (5).

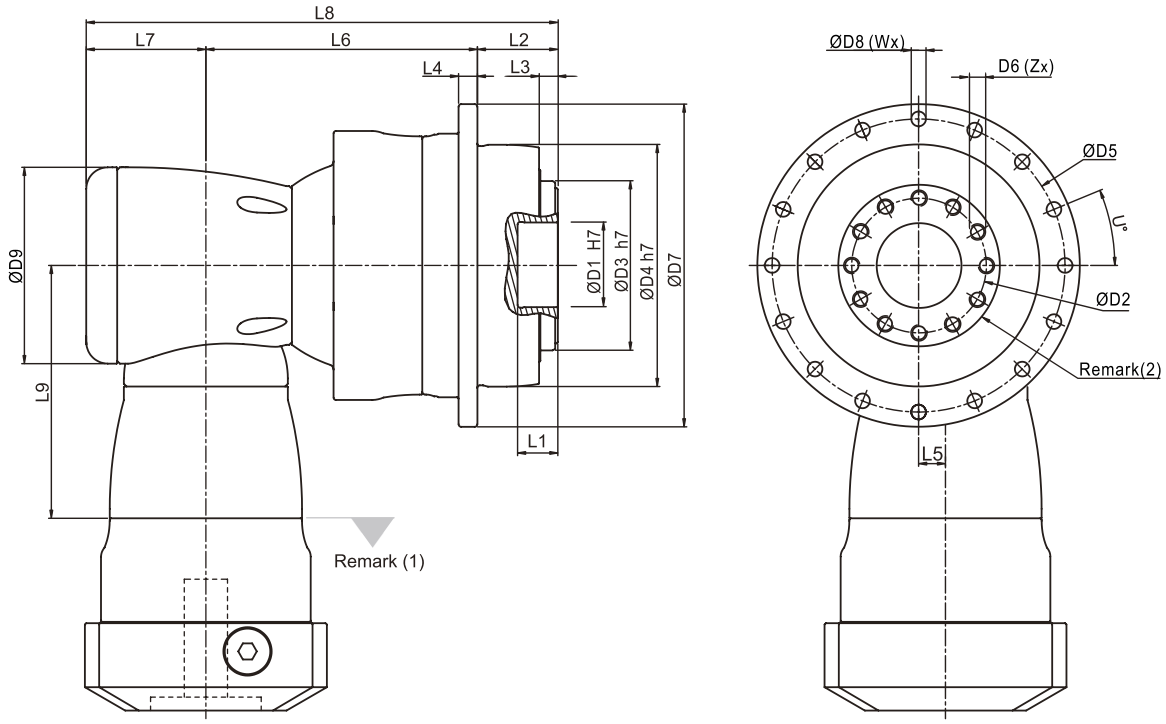
Dimensions - APK (3 Stage) Gearbox (Ratio i = 64~385)



Dimension	APK 110	APK 140	APK 200	APK 255	APK 285	APK 355	APK 450
D1 H7	40	50	80	100	100	120	155
D2	63	80	125	140	160	200	250
D3 h7	80	100	160	180	200	250	315
D4 h7	110	140	200	255	285	355	450
D5	135	168	233	280	310	385	490
D6 x Pitch x Deep	M8x1.25Px12	M8x1.25Px15	M10x1.5Px20	M16x2Px25	M24x3Px37	M24x3Px32	M30x3.5Px40
D7	147	180	249.5	302	332	415	530
D8	5.5	6.6	9	13.5	13.5	17.5	22
D9	94	116	163	210	210	210	255
L1	15	15	16	16	16	35	24
L2	29	38	50	66	75	80	85
L3	7	7.5	8.5	13.5	16.5	20	20
L4	8	10	12	18	20	45	60
L5	13	17	25	31	31	31	36
L6	132	164	216.5	254.5	300	332	447.5
L7	53	68.3	89	115	115	115	131
L8	214	270.3	355.5	435.5	490	527	663.5
L9	114.5	129	173.5	228	228	228	265.5
X in Degree	30	22.5	22.5	24	26	22.5	30
Y in Degree	30	22.5	22.5	24	26	22.5	30
Z	12	16	16	12	12	16	12
U in Degree	22.5	15	15	11.25	11.25	15	15
W	16	24	24	32	32	24	24

(1) Dimensions are related to motor interface. Please contact APEX for details.
(2) Flange Interface, please refer to page (5).

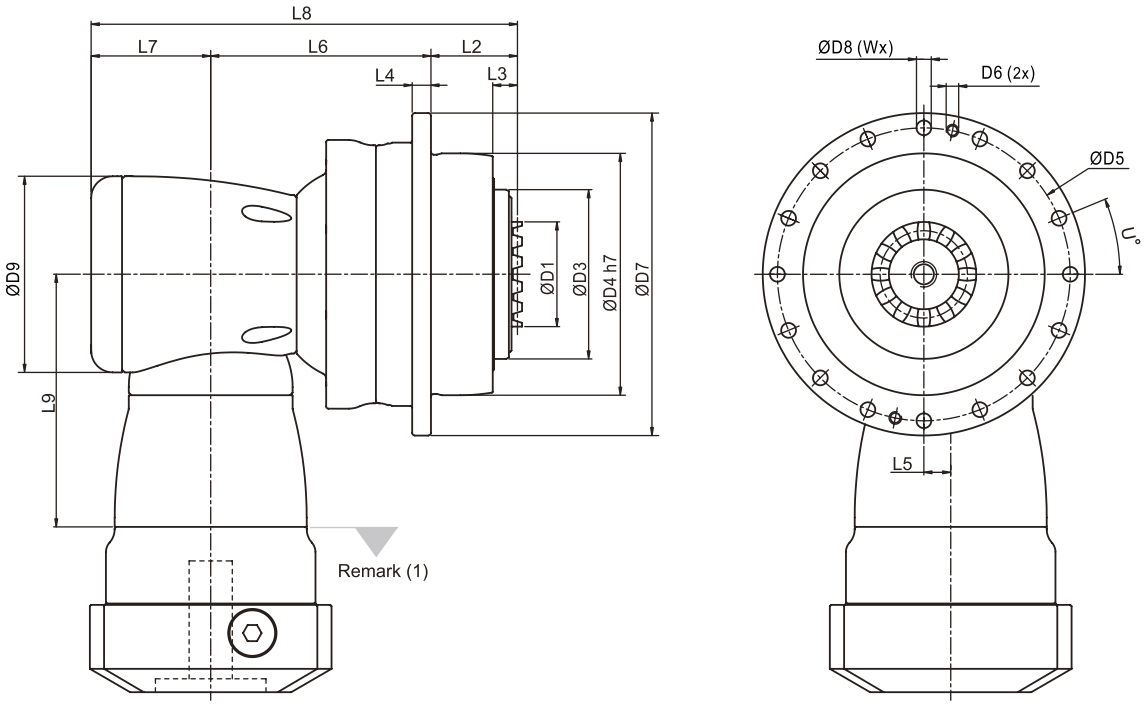
▶ Dimensions - APK (4 Stage) Gearbox (Ratio i = 400~5,500)



Dimension	APK 110	APK 140	APK 200	APK 255	APK 285	APK 355	APK 450
D1 H7	40	50	80	100	100	120	155
D2	63	80	125	140	160	200	250
D3 h7	80	100	160	180	200	250	315
D4 h7	110	140	200	255	285	355	450
D5	135	168	233	280	310	385	490
D6 x Pitch x Deep	M8x1.25Px12	M8x1.25Px15	M10x1.5Px20	M16x2Px25	M24x3Px37	M24x3Px32	M30x3.5Px40
D7	147	180	249.5	302	332	415	530
D8	5.5	6.6	9	13.5	13.5	17.5	22
D9	94	116	163	210	210	210	255
L1	15	15	16	16	16	35	24
L2	29	38	50	66	75	80	85
L3	7	7.5	8.5	13.5	16.5	20	20
L4	8	10	12	18	20	45	60
L5	13	17	25	31	31	31	36
L6	132	164	216.5	254.5	300	332	447.5
L7	53	68.3	89	115	115	115	131
L8	214	270.3	355.5	435.5	490	527	663.5
L9	114.5	129	173.5	228	228	228	265.5
X in Degree	30	22.5	22.5	24	26	22.5	30
Y in Degree	30	22.5	22.5	24	26	22.5	30
Z	12	16	16	12	12	16	12
U in Degree	22.5	15	15	11.25	11.25	15	15
W	16	24	24	32	32	24	24

(1) Dimensions are related to motor interface. Please contact APEX for details.
(2) Flange Interface, please refer to page (5).

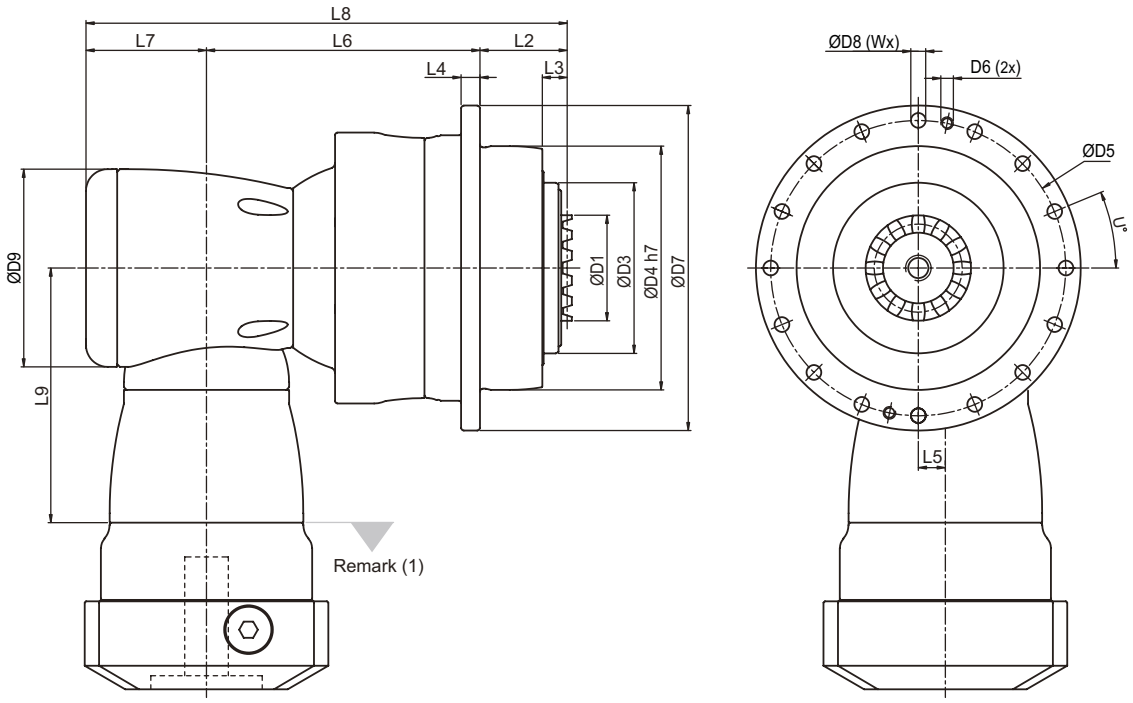
▶ Dimensions - APCK (2 Stage) Gearbox (Ratio i = 16~55)



Dimension	APCK 090	APCK 110	APCK 140	APCK 200	APCK 255	APCK 285	APCK 355
D1	36	46	60	80	90	120	120
D3	63	80	100	160	180	200	250
D4 h7	90	110	140	200	255	285	355
D5	109	135	168	233	280	310	385
D6	-	-	-	-	M12	M12	M16
D7	120	147	180	249.5	302	332	415
D8	5.5	5.5	6.6	9	13.5	13.5	17.5
D9	94	116	163	210	210	255	300
L2	32.5	31.5	40.5	52.5	68.5	77.5	82.5
L3	9.5	9.5	10	11	16	19	22.5
L4	7	8	10	12	18	20	45
L5	13	17	25	31	31	36	43
L6	90.5	114	147.5	175	191.5	249.5	290
L7	53	68.3	89	115	115	131	165
L8	176	213.8	277	342.5	375	458	537.5
L9	114.5	129	173.5	228	228	265.5	294.5
U in Degree	22.5	22.5	15	15	11.25	11.25	15
W	16	16	24	24	32	32	24

(1) Dimensions are related to motor interface. Please contact APEX for details.

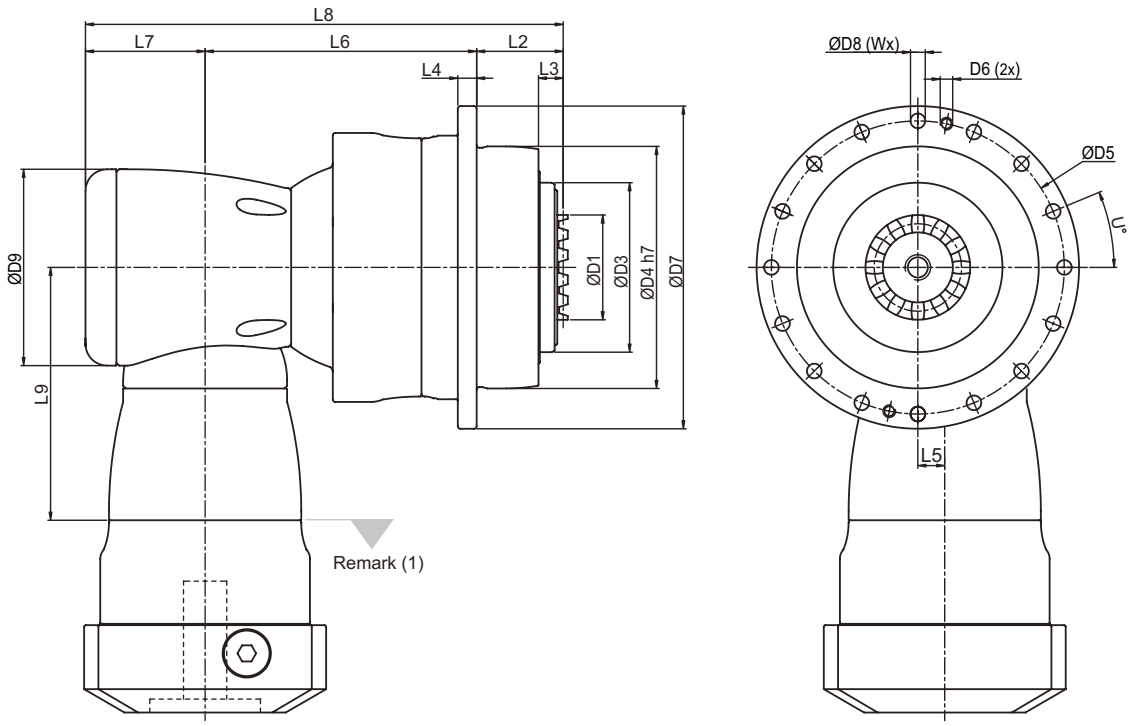
▶ Dimensions - APCK (3 Stage) Gearbox (Ratio i = 64~385)



Dimension	APCK 110	APCK140	APCK 200	APCK 255	APCK 285	APCK 355	APCK 450
D1	46	60	80	90	120	120	132
D3	80	100	160	180	200	250	315
D4 h7	110	140	200	255	285	355	450
D5	135	168	233	280	310	385	490
D6	-	-	-	M12	M12	M16	M16
D7	147	180	249.5	302	332	415	530
D8	5.5	6.6	9	13.5	13.5	17.5	22
D9	94	116	163	210	210	210	255
L2	31.5	40.5	52.5	68.5	77.5	82.5	87.5
L3	9.5	10	11	16	19	22.5	22.5
L4	8	10	12	18	20	45	60
L5	13	17	25	31	31	31	36
L6	132	164	216.5	254.5	300	332	447.5
L7	53	68.3	89	115	115	115	131
L8	216.5	272.8	358	438	492.5	529.5	666
L9	114.5	129	173.5	228	228	228	265.5
U in Degree	22.5	15	15	11.25	11.25	15	15
W	16	24	24	32	32	24	24

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Dimensions - APCK (4 Stage) Gearbox (Ratio i = 400~5,500)



Dimension	APCK 110	APCK140	APCK 200	APCK 255	APCK 285	APCK 355	APCK 450
D1	46	60	80	90	120	120	132
D3	80	100	160	180	200	250	315
D4 h7	110	140	200	255	285	355	450
D5	135	168	233	280	310	385	490
D6	-	-	-	M12	M12	M16	M16
D7	147	180	249.5	302	332	415	530
D8	5.5	6.6	9	13.5	13.5	17.5	22
D9	94	116	163	210	210	210	255
L2	31.5	40.5	52.5	68.5	77.5	82.5	87.5
L3	9.5	10	11	16	19	22.5	22.5
L4	8	10	12	18	20	45	60
L5	13	17	25	31	31	31	36
L6	132	164	216.5	254.5	300	332	447.5
L7	53	68.3	89	115	115	115	131
L8	216.5	272.8	358	438	492.5	529.5	666
L9	114.5	129	173.5	228	228	228	265.5
U in Degree	22.5	15	15	11.25	11.25	15	15
W	16	24	24	32	32	24	24

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Performance - APK/APCK (2 Stage) Gearbox (Ratio i = 4~11)

Model No.		Stage	Ratio(1)	APK 090 APCK 090	APK 110 APCK 110	APK 140 APCK 140	APK 200 APCK 200	APK 255 APCK 255	APK 285 APCK 285
Nominal Output Torque T_{2N}	Nm	2	4	75	465	790	1,710	2,595	4,920
			5.5	105	370	645	1,435	2,180	4,080
			8	150	470	800	1,580	2,610	4,955
			11	205	375	650	1,440	2,195	4,100
Emergency Stop Torque T_{2NOT}	Nm	2	4~11	2 times T_{2N}					
Max. Acceleration Torque T_{2B}	Nm	2	4~11	1.5 times T_{2N}					
No Load Running Torque(2)	Nm	2	4~11	2.5	5.8	12	25	48	95
Backlash(3)	arcmin	2	4~11	≤ 2					
Torsional Rigidity	Nm/arcmin	2	4~11	27	56	112	389	642	1,275
Nominal Input Speed n_{1N}	rpm	2	4~11	3,600	3,000	2,300	1,800	1,500	1,100
Max. Input Speed n_{1B}	rpm	2	4~11	6,000	5,500	4,500	3,500	3,000	2,200
Max. Axial Load F_{2a}(4)	N	2	4~11	2,220	4,070	8,530	17,000	26,900	39,200
Max. Tilting Moment M_{2K}(4)	Nm	2	4~11	280	480	1,310	3,530	5,920	9,230
Operating Temp.	° C	2	4~11	-10° C~ 90° C					
Degree of Gearbox Protection		2	4~11	IP65					
Lubrication		2	4~11	Synthetic lubrication grease					
Mounting Position		2	4~11	All directions					
Running Noise(2)	dB(A)	2	4~11	≤ 68	≤ 68	≤ 70	≤ 70	≤ 72	≤ 74
Efficiency η	%	2	4~11	≥ 95%					

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

(2) The dB values are measured by gearbox with ratio 11 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size. By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

(3) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(4) Applied to the output flange/curvic center at 100 rpm. The calculation formula please refer to page (3).

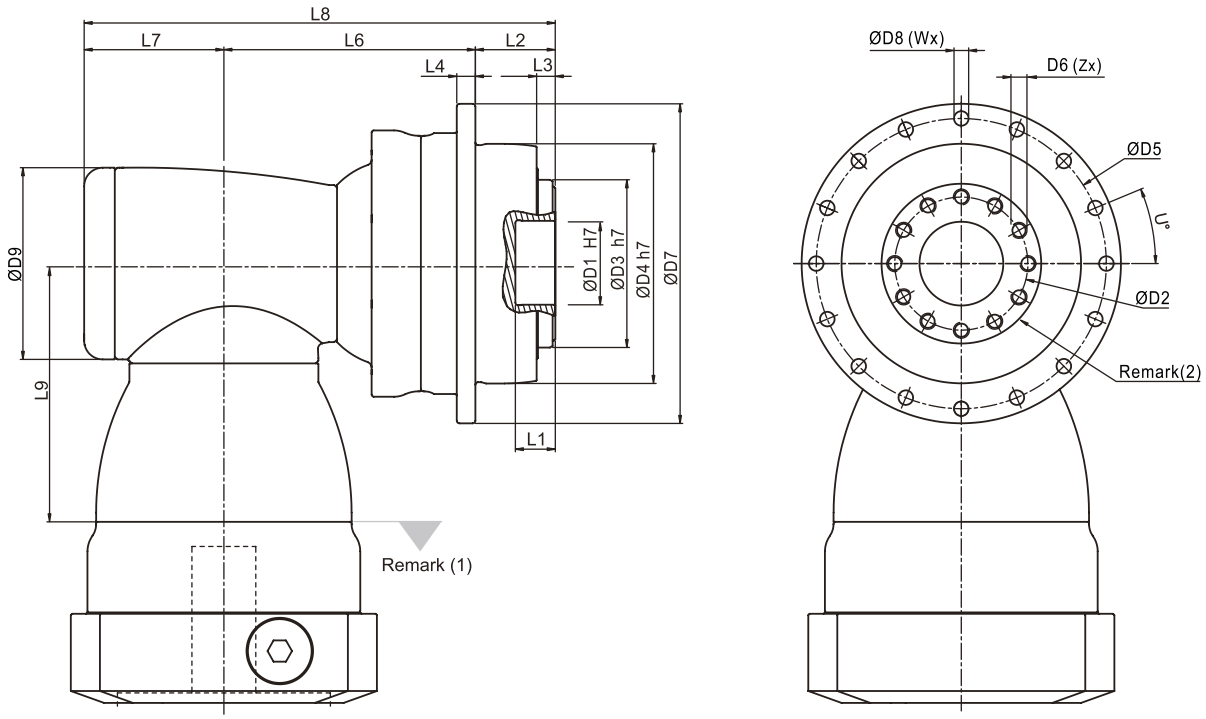
(5) Continuous operation is not recommended.

▶ Inertia - APK/APCK (2 Stage) Gearbox (Ratio i = 4~11)

Model No.		APK/APCK 090	APK/APCK 110	APK/APCK 140	APK/APCK 200	APK/APCK 255	APK/APCK 285
Ø(A)	Stage	2st	2st	2st	2st	2st	2st
11	kg.cm²	0.41	-	-	-	-	-
14		0.41	-	-	-	-	-
19		1.61	1.61	-	-	-	-
24		3.9	4.01	5.61	-	-	-
28		-	5.53	5.61	-	-	-
32		-	7.57	8.11	-	-	-
35		-	14.95	15.32	15.32	-	-
38		-	17.58	17.72	17.72	-	-
42		-	-	22.95	22.95	23.74	-
48		-	-	52.74	52.74	53.49	55.14
55		-	-	-	-	87.34	89.59
60		-	-	-	-	-	113.06

(A) Ø = Input shaft diameter.

Dimensions - APK (2 Stage) Gearbox (Ratio i = 4~11)

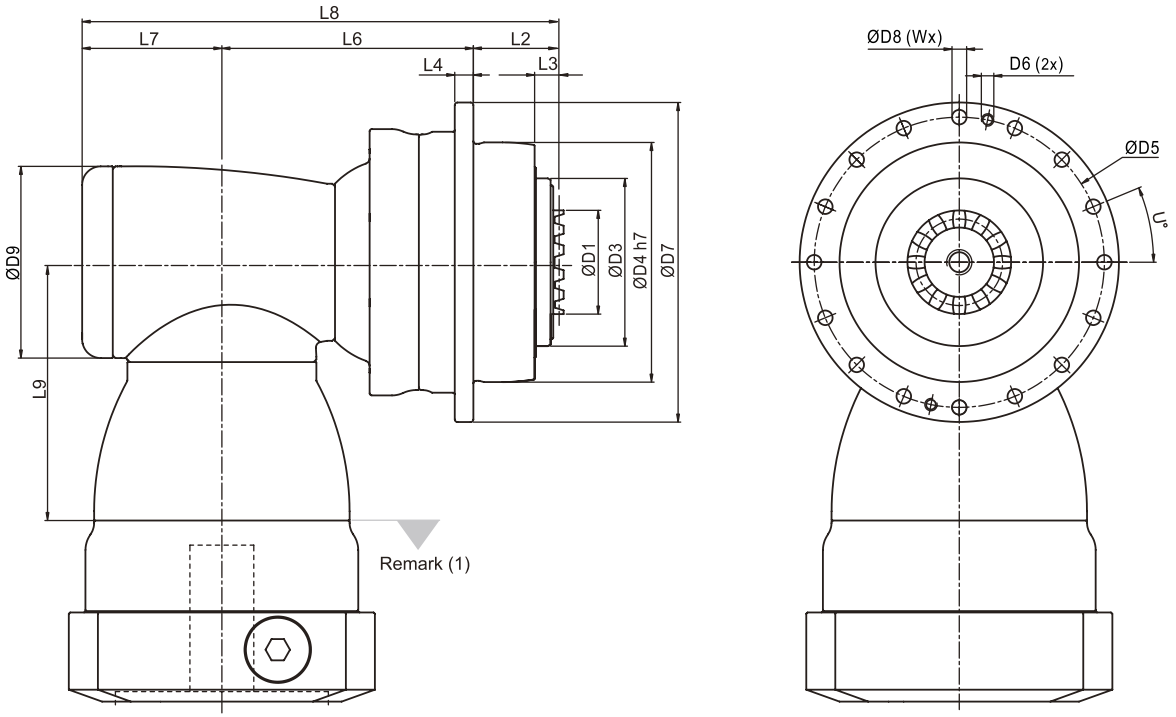


Dimension	APK 090	APK 110	APK 140	APK 200	APK 255	APK 285
D1 H7	31.5	40	50	80	100	100
D2	50	63	80	125	140	160
D3 h7	63	80	100	160	180	200
D4 h7	90	110	140	200	255	285
D5	109	135	168	233	280	310
D6 x Pitch x Deep	M6x1Px11	M8x1.25Px12	M8x1.25Px15	M10x1.5Px20	M16x2Px25	M24x3Px37
D7	120	147	180	249.5	302	332
D8	5.5	5.5	6.6	9	13.5	13.5
D9	92	116	156	156	195	240
L1	15	15	15	16	16	16
L2	30	29	38	50	66	75
L3	7	7	7.5	8.5	13.5	16.5
L4	7	8	10	12	18	20
L6	100.5	124.5	175.5	185	199	265.5
L7	61.5	76	97.5	97.5	105.5	141
L8	192	229.5	311	332.5	370.5	481.5
L9	113.5	147.5	196.5	196.5	229	260
X in Degree	30	30	22.5	22.5	24	26
Y in Degree	30	30	22.5	22.5	24	26
Z	12	12	16	16	12	12
U in Degree	22.5	22.5	15	15	11.25	11.25
W	16	16	24	24	32	32

(1) Dimensions are related to motor interface. Please contact APEX for details.

(2) Flange Interface, please refer to page (5).

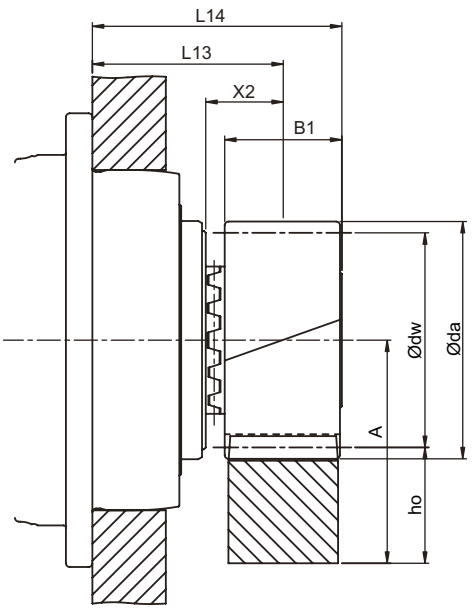
▶ Dimensions - APCK (2 Stage) Gearbox (Ratio i = 4~11)



Dimension	APCK 090	APCK 110	APCK 140	APCK 200	APCK 255	APCK 285
D1	36	46	60	80	90	120
D3	63	80	100	160	180	200
D4 h7	90	110	140	200	255	285
D5	109	135	168	233	280	310
D6	-	-	-	-	M12	M12
D7	120	147	180	249.5	302	332
D8	5.5	5.5	6.6	9	13.5	13.5
D9	92	116	156	156	195	240
L2	32.5	31.5	40.5	52.5	68.5	77.5
L3	9.5	9.5	10	11	16	19
L4	7	8	10	12	18	20
L6	100.5	124.5	175.5	185	199	265.5
L7	61.5	76	97.5	97.5	105.5	141
L8	194.5	232	313.5	335	373	484
L9	113.5	147.5	196.5	196.5	229	260
U in Degree	22.5	22.5	15	15	11.25	11.25
W	16	16	24	24	32	32

(1) Dimensions are related to motor interface. Please contact APEX for details.

Pinion with Curvic Coupling



Quality DIN4 / Alloy Steel

Tooth Thickness Tolerance : e24
Left - Hand Helical
Helical Angle β = 19° 31'42"(19.5283°)
Pressure Angle α = 20°
Case - Hardened and Teeth Ground

$$A = ho + \frac{Ødw}{2}$$

Gearbox Model	Mn	Z(1)	X(2)	da(3)	d(4)	dw(5)	B1	X2	L13	L14	L(6)	Order Code
APC/APCK 090	3	17	0.441	62.76	54.113	56.76	31	20.5	50.5	66	170	A03L17
APC/APCK 110	3	20	0.3897	72	63.662	66	31	20.5	49.5	65	200	A03L20
APC/APCK 140	4	19	0.4102	91.92	80.639	83.92	41	25.5	63.5	84	253.335	A04L19
APC/APCK 200	5	19	0.4002	114.8	100.798	104.8	51	30.5	80.5	106	316.666	A05L19
APC/APCK 255	6	19	0.4035	137.8	120.958	125.8	61	35.5	101.5	132	380	A06L19
APC/APCK 285	8	19	0.4108	183.85	161.277	167.85	81	45.5	120.5	161	506.667	A08L19
APC/APCK 355	8	19	0.4108	183.85	161.277	167.85	81	45.5	125.5	166	506.667	A08L19
APC/APCK 450	10	18	0.4257	219.5	190.986	199.5	101	55.5	140.5	191	600	A10L18

(1) Number of teeth (2) Profile modification factor (3) Diameter of addendum circle (4) Pitch circle diameter (5) Working pitch circle diameter
(6) Pitch circle length L = π x d

Pinion material carburized and quenched, surface hardness reached 60 HRc.
Teeth surface ground to reduce noise and improve wear resistance.

■ Table 1.The max permitted torque and feed-force of rack and pinion.

Unit / Gearbox Model	Mn	Z(1)	dw(2)	F_{2T}(3)	T_{2B}(4)	M
	【mm】		【mm】	【N】	【Nm】	【kg】
APC/APCK 090	3	17	56.76	18,110	390	0.7
APC/APCK 110	3	20	66	18,535	590	0.92
APC/APCK 140	4	19	83.92	31,003	1,250	1.98
APC/APCK 200	5	19	104.8	48,612	2,450	3.81
APC/APCK 255	6	19	125.8	63,907	3,865	6.61
APC/APCK 285	8	19	167.85	131,265	10,585	15.49
APC/APCK 355(5)	8	19	167.85	131,761	10,625	15.49
APC/APCK 450(5)	10	18	199.5	204,308	19,510	28.13

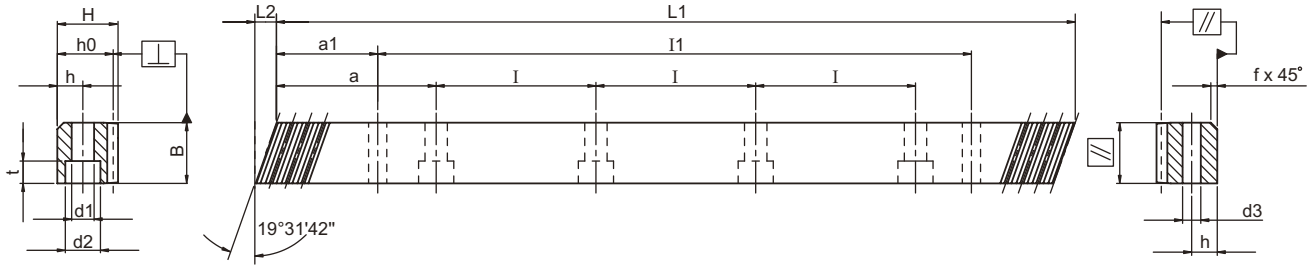
(1) Number of teeth (2) Working pitch circle diameter (3) Maximal Feed-Force (4) Maximal Driving Torque (5) Calculated under the basis of speed 1.5 m/s

- In Table 1, the max. permissible torque of the curvic plate pinion and the rack is calculated under the basis of speed 3 m/s. This condition is under providing good lubrication (using the automatic lubrication system or applied grease manually every day), the tooth root strength factor SF ≧ 1.4, teeth surface strength coefficient SH ≧ 1, the safety factor SB ≒ 1and the required service life of 20,000 hours. By higher speed, the max. permissible torque reduced. The user needs to increase the safety factor for the application. Please visit APEX website (www.apexdyna.com/) for the backlash value by different center height.

▶ Rack with Helical Teeth

Quality 5 / Alloy Steel

Tooth Thickness Tolerance : -15 ~ 0 μm
Right - Hand Helical
Helical Angle β = 19° 31'42"(19.5283°)
Pressure Angle α = 20°
Material Carburized, Induction Hardened
Teeth Ground and all Sides Ground



Mn	P_t (1)	L1	L2	Teeth No.	B	H	ho	f	a	l	Holes No.	h	d1	d2	t	a1	l1	d3	fp (2)	Fp (3)	Order Code
3	10.00002	500	10.3	50	29	29	26	2	62.5	125	4	9	10	15	9	35	430	7.7	0.006	0.023	0305R050M10
3	10.00002	1,000	10.3	100	29	29	26	2	62.5	125	8	9	10	15	9	35	930	7.7	0.006	0.026	0305R100M10
3	10.00002	1,250	10.3	125	29	29	26	2	62.5	125	10	9	10	15	9	35	1,180	7.7	0.006	0.026	0305R125M10
3	10.00002	1,500	10.3	150	29	29	26	2	62.5	125	12	9	10	15	9	35	1,430	7.7	0.006	0.026	0305R150M10
3	10.00002	1,750	10.3	175	29	29	26	2	62.5	125	14	9	10	15	9	35	1,680	7.7	0.006	0.026	0305R175M10
3	10.00002	2,000	10.3	200	29	29	26	2	62.5	125	16	9	10	15	9	35	1,930	7.7	0.007	0.03	0305R200M10
4	13.33335	506.67	13.8	38	39	39	35	3	62.5	125	4	12	10	15	9	33.3	433	7.7	0.007	0.025	0405R050C10
4	13.33335	1,000	13.8	75	39	39	35	3	62.5	125	8	12	10	15	9	33.3	933.4	7.7	0.007	0.028	0405R100C10
4	13.33335	1,000	13.8	75	39	39	35	3	62.5	125	8	12	14	20	13	33.3	933.4	11.7	0.007	0.028	0405R100CS0
4	13.33335	1,253.34	13.8	94	39	39	35	3	62.5	125	10	12	10	15	9	33.3	1186.7	7.7	0.007	0.028	0405R125C10
4	13.33335	1,506.67	13.8	113	39	39	35	3	62.5	125	12	12	10	15	9	33.3	1,433.4	7.7	0.007	0.028	0405R150C10
4	13.33335	1,506.67	13.8	113	39	39	35	3	62.5	125	12	12	14	20	13	33.3	1,433.4	11.7	0.007	0.028	0405R150CS0
4	13.33335	1,760	13.8	132	39	39	35	3	62.5	125	14	12	10	15	9	33.3	1,693.4	7.7	0.007	0.028	0405R175C10
4	13.33335	2,000	13.8	150	39	39	35	3	62.5	125	16	12	10	15	9	33.3	1,933.4	7.7	0.008	0.032	0405R200C10
4	13.33335	2,000	13.8	150	39	39	35	3	62.5	125	16	12	14	20	13	33.3	1,933.4	11.7	0.008	0.032	0405R200CS0
5	16.66669	1,000	17.4	60	49	39	34	3	62.5	125	8	12	14	20	13	37.5	925	11.7	0.007	0.028	0505R100C10
6	20.00003	1,000	20.9	50	59	49	43	3	62.5	125	8	16	18	26	17	37.5	925	15.7	0.007	0.028	0605R100C10
8	26.66671	960	28	36	79	79	71	3	60	120	8	25	22	33	21	120	720	19.7	0.008	0.031	0805R100C10
10	33.33339	1,000	35.1	30	99	99	89	3	62.5	125	8	32	33	48	32	125	750	19.7	0.008	0.031	1005R100C10

(1) Teeth Pitch Pt = Module x π / cos ß (2) fp = Single Pitch Error (3) Fp = Total Pitch Error

■ Please refer to APEX Rack & Pinion catalog for other models

HIGH PERFORMANCE

HYPOID GEARBOX

KH - KF Series

▶ ORDERING CODE

KF	–	010(1)	–	S1 (2)	/	MOTOR
KH	–	010(1)			/	MOTOR

Motor Type :
Manufacturer and Model

Ratio(1):
1-stage: 3, 4, 5, 7,10
2-stage: 12, 16, 20, 25, 28, 35, 40, 50, 70, 100

Spiral Bevel
Ratio(1):
1-stage: 1, 2

Gear Size:
KF ： KF060, KF075, KF100, KF140, KF180, KF210, KF240
KF(Spiral Bevel) ： KF060, KF075, KF100, KF140, KF180, KF210, KF240
KH ： KH064, KH090, KH110, KH140, KH200, KH255, KH285

Ordering Example : KF100 - 010 - S1 / SIEMENS 1FT6 041 - 4AF71

(1) Ratio (i= N_{in} / N_{out}) .
(2) S1 = Smooth Output Shaft.
S2 = Output Shaft with Key.
S3 = DIN 5480 Output Shaft.
S4 = Hollow Output Shaft.

▶ Performance - KH Gearbox

Model No.		Stages	Ratio(1)	KH 064	KH 090	KH 110	KH 140	KH 200	KH 255	KH 285
Nominal Output Torque T_{2N}	Nm	1	3	25	50	110	210	420	820	1,600
			4	25	60	110	210	420	820	1,600
			5	25	60	110	210	420	820	1,600
			7	23	50	100	200	390	750	1,400
			10	18	40	85	170	360	600	1,100
		2	12	25	60	110	210	420	820	1,600
			16	25	60	110	210	420	820	1,600
			20	25	60	110	210	420	820	1,600
			25	25	60	110	210	420	820	1,600
			28	25	60	110	210	420	820	1,600
			35	25	60	110	210	420	820	1,600
			40	25	60	110	210	420	820	1,600
			50	25	60	110	210	420	820	1,600
			70	23	50	100	200	390	750	1,400
			100	18	40	85	170	360	600	1,100
Emergency Stop Torque T_{2NOT}	Nm	1,2	3~100	2 times T_{2N}						
Max. Acceleration Torque T_{2B}	Nm	1,2	3~100	1,5 times T_{2N}						
No Load Running Torque(4)	Nm	1	3~10	0.9	1.6	3.2	4.2	9.6	16.5	26.4
		2	12~100	0.1	0.1	0.2	0.4	1.1	1.9	3
Backlash(2)	arcmin	1	3~10	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3
		2	12~100	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3
Torsional Rigidity	Nm/arcmin	1,2	3~100	1.1	4.5	10	23	54	90	170
Nominal Input Speed n_{1N}	rpm	1	3~10	3,000	2,800	2,700	2,000	2,000	2,000	1,500
		2	12~100	5,500	4,600	4,600	4,000	3,700	3,400	3,100
Max. Input Speed n_{1B}	rpm	1	3~10	6,000	6,000	4,500	4,500	4,000	3,000	2,500
		2	12~100	7,000	7,000	7,000	6,000	5,500	5,000	4,500
Max. Radial Load F_{2rB}(3)	N	1,2	3~100	2,400	4,500	5,100	13,000	28,700	36,200	58,300
Max. Axial Load F_{2aB}(3)	N	1,2	3~100	1,200	2,250	2,550	6,500	14,350	18,100	29,150
Operating Temp	° C	1,2	3~100	0° C~ +90° C						
Degree of Gearbox Protection		1,2	3~100	IP65						
Lubrication		1,2	3~100	Synthetic lubrication grease						
Mounting Position		1,2	3~100	All directions						
Running Noise(4)	dB(A)	1,2	3~100	≦ 64	≦ 66	≦ 66	≦ 68	≦ 68	≦ 70	≦ 72
Efficiency η	%	1	3~10	≧ 96%						
		2	12~100	≧ 94%						

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(3) Applied to the output shaft center at 100 rpm.

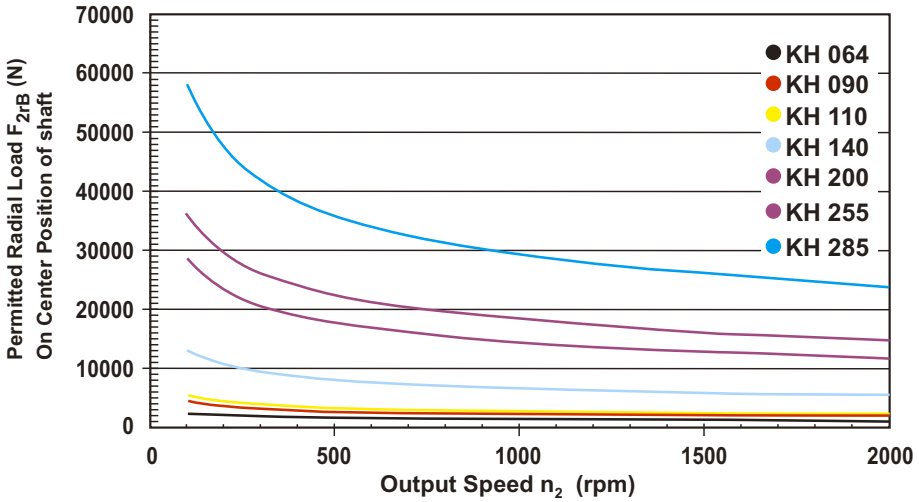
(4) The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

Inertia - KH Gearbox

Model No.		KH 064		KH 090		KH 110		KH 140		KH 200		KH 255		KH 285	
Ø[A] (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-
11		0.17	0.16	0.18	0.17	-	-	-	-	-	-	-	-	-	-
14		0.21	0.2	0.5	0.21	-	0.53	-	-	-	-	-	-	-	-
19		0.62	-	0.65	0.63	1.69	0.68	-	1.83	-	-	-	-	-	-
24		-	-	4.49	-	4.89	4.52	5.05	5.04	-	5.63	-	-	-	-
28		-	-	-	-	6.14	-	6.55	6.33	-	7.18	-	-	-	-
32		-	-	-	-	8.54	-	9.47	8.73	10.18	10.1	-	12.63	-	-
35		-	-	-	-	13.86	-	14.91	14.04	15.21	15.54	15.68	17.75	23.46	20.8
38		-	-	-	-	18.87	-	20.69	19.05	20.7	21.32	21.69	23.26	23.46	27.05
42		-	-	-	-	-	-	22.58	-	22.83	23.2	23.59	25.4	25.28	28.95
48		-	-	-	-	-	-	55.45	-	58.45	56.07	59.3	61.02	61.61	64.66
55		-	-	-	-	-	-	-	-	-	-	86.95	-	89.67	-
60		-	-	-	-	-	-	-	-	-	-	-	-	112.49	-

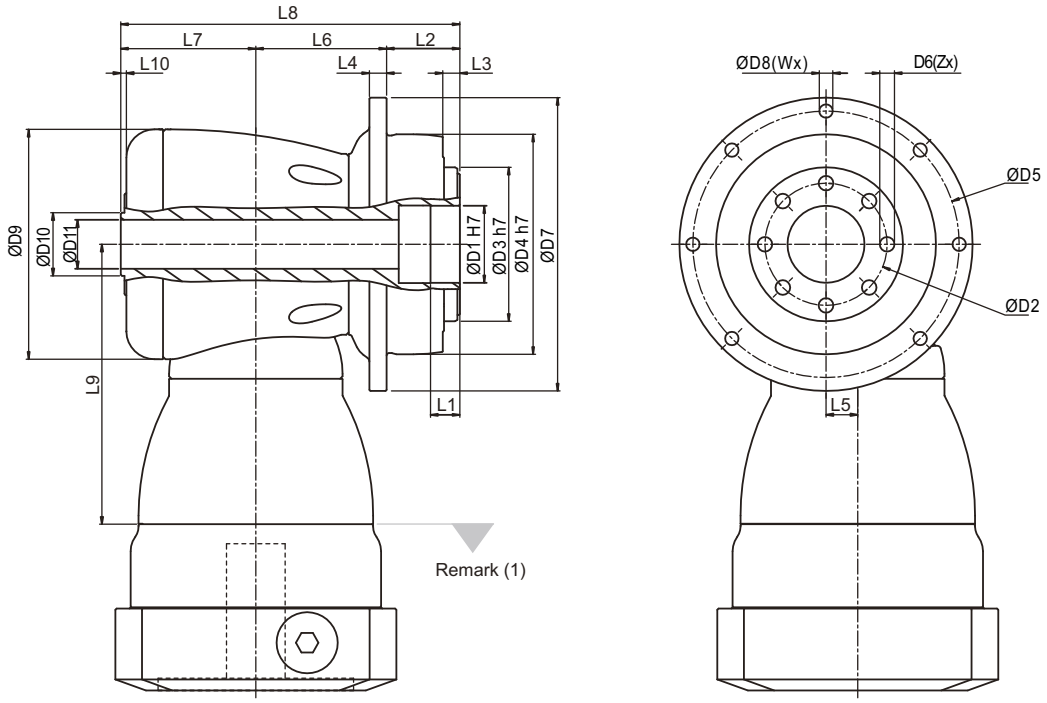
(A) Ø = Input shaft diameter.

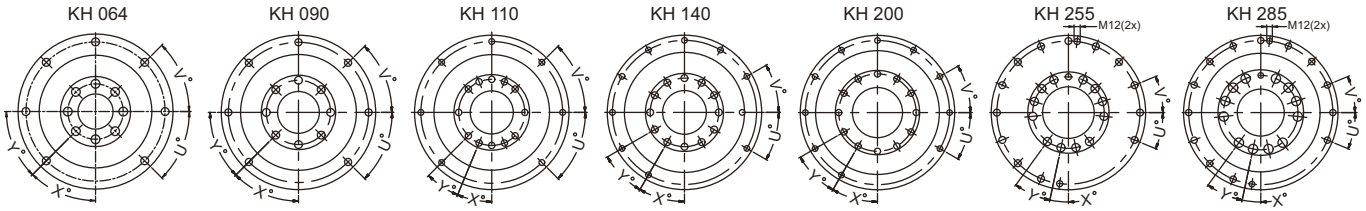
Permitted Radial And Axial Loads



Permitted radial load F_{2r} on center of output flange on various output speeds.

Dimensions - KH Series





Dimension	KH 064	KH 090	KH 110	KH 140	KH 200	KH 255	KH 285
	1~2-stage	1~2-stage	1~2-stage	1~2-stage	1~2-stage	1~2-stage	1~2-stage
D1 H7	20	31.5	40	50	80	100	100
D2	31.5	50	63	80	125	140	160
D3 h7	40	63	80	100	160	180	200
D4 h7	64	90	110	140	200	255	285
D5	79	109	135	168	233	280	310
D6	M5x0.8Px8	M6x1Px10	M6x1Px12	M8x1.25Px15	M10x1.5Px20	M16x2Px25	M20x2.5Px31
D7	88	120	147	180	249.5	302	332
D8	4.5	5.5	5.5	6.6	9	13.5	13.5
D9	73	94	116	163	210	255	300
D10	18.5	25.8	36.8	55.2	69.2	82.2	92.2
D11 +0.5 / 0(2)	10	20	28	40	55	62	70
L1	8	12	12	12	16	20	20
L2	19.5	30	29	38	50	66	75
L3	4	7	7	7.5	8.5	13.5	16.5
L4	5	7	8	10	12	18	20
L5	10	13	17	25	31	36	43
L6	43	53.5	67	81	117	132	160.5
L7	46	55.3	71.3	91.8	118	134	168
L8	108.5	138.8	167.3	210.8	285	332	403.5
L9	94	114.5	129	173.5	228	265.5	294.5
L10	1.5	2.3	3	2.8	3	3	3
X in Degree	45°	45°	22.5°	30°	30°	12°	12°
Y in Degree	45°	45°	22.5°	30°	30°	24°	24°
Z	8	8	12	12	12	12	12
U in Degree	45°	45°	45°	30°	30°	22.5°	22.5°
V in Degree	45°	45°	45°	30°	30°	22.5°	22.5°
W	7	7	7	10	10	13	13

(1) Dimensions are related to motor interface. Please contact APEX for details.
(2) Led through element max. Ø(D11-0.2)mm.

Performance - KF Gearbox

Model No.		Stages	Ratio(1)	KF 060	KF 075	KF 100	KF 140	KF 180	KF 210	KF 240
Nominal Output Torque T_{2N}	Nm	1	3	25	50	110	210	420	820	1,600
			4	25	60	110	210	420	820	1,600
			5	25	60	110	210	420	820	1,600
			7	23	50	100	200	390	750	1,400
			10	18	40	85	170	360	600	1,100
		2	12	25	60	110	210	420	820	1,600
			16	25	60	110	210	420	820	1,600
			20	25	60	110	210	420	820	1,600
			25	25	60	110	210	420	820	1,600
			28	25	60	110	210	420	820	1,600
			35	25	60	110	210	420	820	1,600
			40	25	60	110	210	420	820	1,600
			50	25	60	110	210	420	820	1,600
			70	23	50	100	200	390	750	1,400
			100	18	40	85	170	360	600	1,100
Emergency Stop Torque T_{2NOT}	Nm	1,2	3~100	2 times T_{2N}						
Max. Acceleration Torque T_{2B}	Nm	1,2	3~100	1,5 times T_{2N}						
No Load Running Torque(4)	Nm	1	3~10	0.8	1.3	2.6	3.5	8	11	17.6
		2	12~100	0.1	0.1	0.2	0.3	0.9	1.2	1.9
Backlash(2)	arcmin	1	3~10	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3
		2	12~100	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3
Torsional Rigidity	Nm/arcmin	1,2	3~100	0.8	3.5	9	20.5	44	80	168
Nominal Input Speed n_{1N}	rpm	1	3~10	3,000	2,800	2,700	2,000	2,000	2,000	1,500
		2	12~100	5,500	4,500	4,200	3,900	3,400	2,800	2,200
Max. Input Speed n_{1B}	rpm	1	3~10	6,000	6,000	4,500	4,500	4,000	3,000	2,500
		2	12~100	7,000	7,000	7,000	6,000	5,500	5,000	4,500
Max. Radial Load F_{2rB}(3)	N	1,2	3~100	5,700	8,200	12,200	20,100	30,700	40,900	51,900
Max. Axial Load F_{2aB}(3)	N	1,2	3~100	2,850	4,100	6,100	10,050	15,350	20,450	20,950
Service Life(5)	hr	1,2	3~100	20,000						
Operating Temp	° C	1,2	3~100	0° C~ +90° C						
Degree of Gearbox Protection		1,2	3~100	IP65						
Lubrication		1,2	3~100	Synthetic lubrication grease						
Mounting Position		1,2	3~100	All directions						
Running Noise(4)	dB(A)	1,2	3~100	≦ 64	≦ 66	≦ 66	≦ 68	≦ 68	≦ 70	≦ 72
Efficiency η	%	1	3~10	≧ 96%						
		2	12~100	≧ 94%						

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(3) Applied to the output shaft center at 100 rpm.

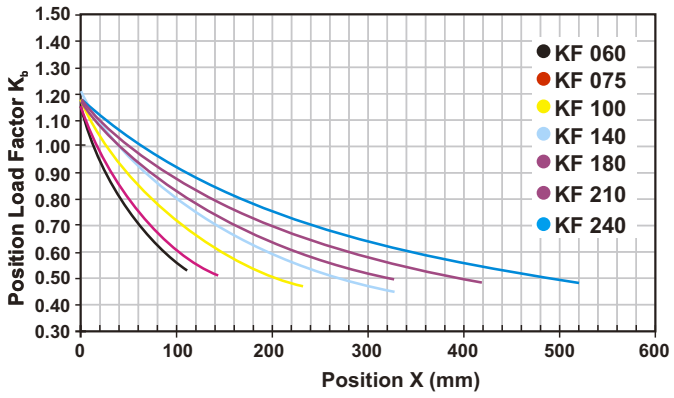
(4) The dB values are measured by gearbox with ratio 10 (1-stage) or ratio 100 (2-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

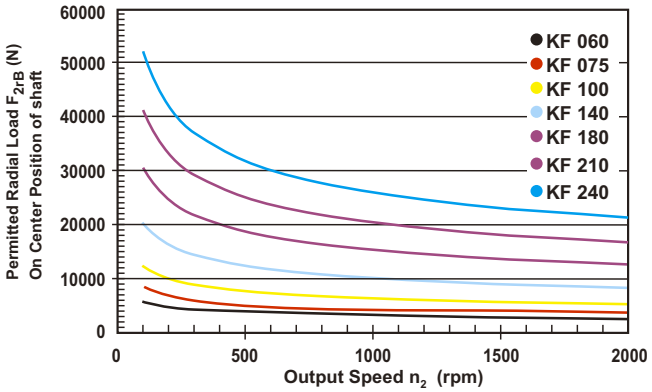
Inertia - KF Gearbox

Model No.		KF 060		KF 075		KF 100		KF 140		KF 180		KF 210		KF 240	
Ø(A) (C3)		1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage	1-stage	2-stage
8	kg.cm²	0.1	0.1	-		-	-	-	-	-	-	-	-	-	-
11		0.17	0.16	0.18	0.17	-	-	-	-	-	-	-	-	-	-
14		0.21	0.2	0.5	0.21	-	0.53	-	-	-	-	-	-	-	-
19		0.62	-	0.65	0.63	1.69	0.68	-	1.83	-	-	-	-	-	-
24		-	-	4.49	-	4.89	4.52	5.05	5.04	-	5.63	-	-	-	-
28		-	-	-	-	6.14	-	6.55	6.33	-	7.18	-	-	-	-
32		-	-	-	-	8.54	-	9.47	8.73	10.18	10.1	-	12.63	-	-
35		-	-	-	-	13.86	-	14.91	14.04	15.21	15.54	15.68	17.75	23.46	20.8
38		-	-	-	-	18.87	-	20.69	19.05	20.7	21.32	21.69	23.26	23.46	27.05
42		-	-	-	-	-	-	22.58	-	22.83	23.2	23.59	25.4	25.28	28.95
48		-	-	-	-	-	-	55.45	-	58.45	56.07	59.3	61.02	61.61	64.66
55		-	-	-	-	-	-	-	-	-	-	86.95	-	89.67	-
60		-	-	-	-	-	-	-	-	-	-	-	-	112.49	-

(A) Ø = Input shaft diameter.

Permitted Radial And Axial Loads(A)



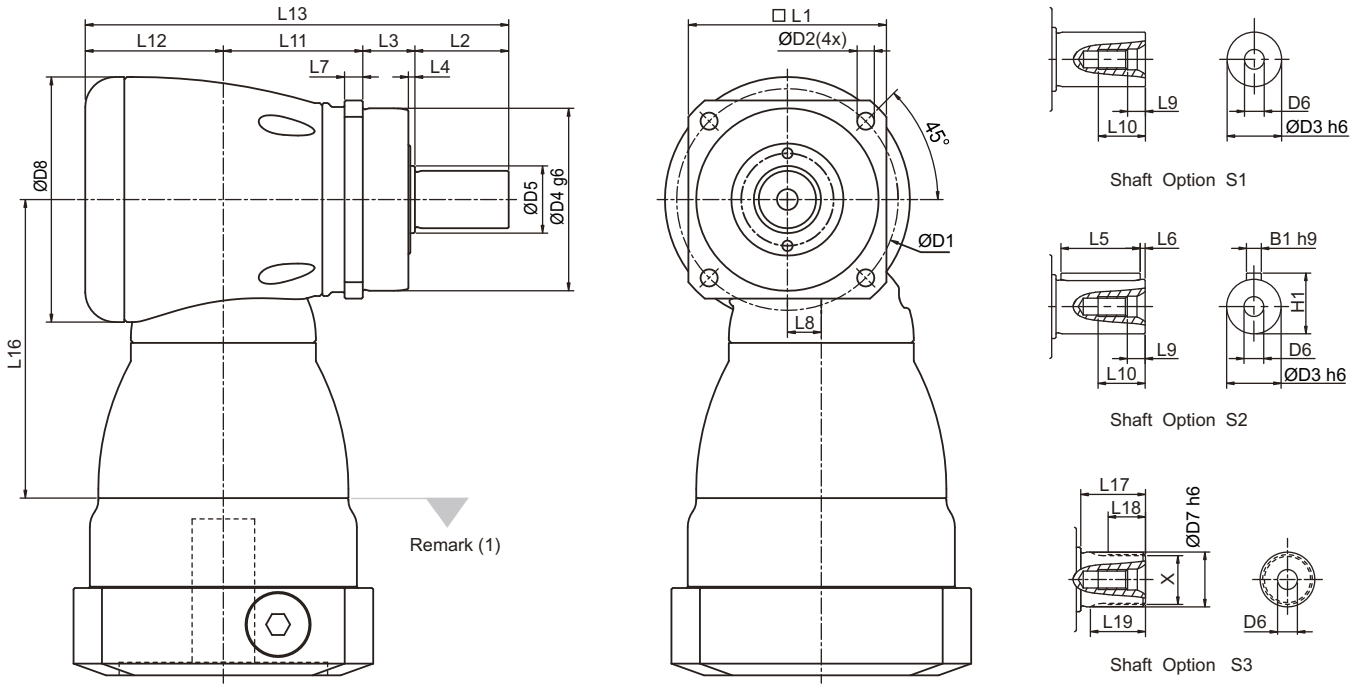


If radial force F_{2r} is not exerted on the center of the output shaft X<1/2 L or X>1/2 L, the permitted radial and axial loads can be calculated by the position load factor K_b on the above diagram.

Permitted radial load F_{2r} on center of output shaft. X=1/2 L for various output speeds.

(A) Permitted loading values on the output shaft. Please refer to P. 16 glossary.

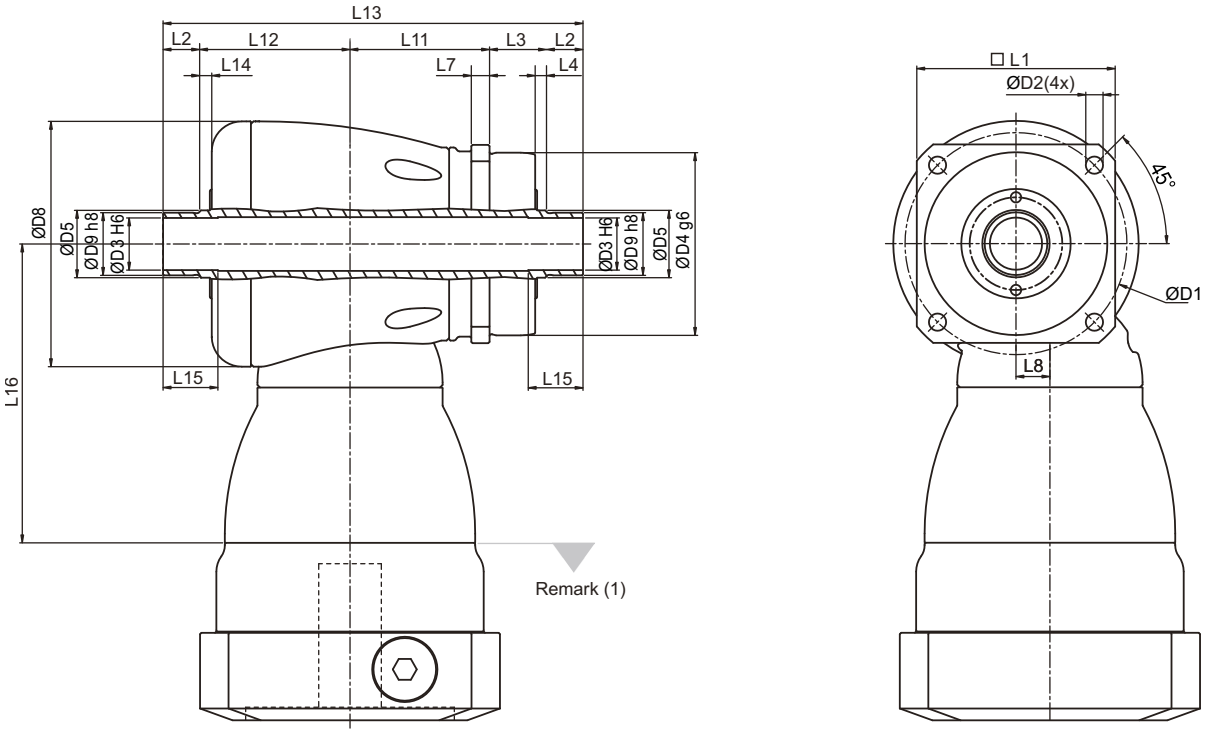
Dimensions - KF-S1 / S2 / S3 Gearbox



Dimension	KF 060	KF 075	KF 100	KF 140	KF 180	KF 210	KF 240
	1~2-stage	1~2-stage	1~2-stage	1~2-stage	1~2-stage	1~2-stage	1~2-stage
D1	68	85	120	165	215	250	290
D2	5.5	6.6	9	11	13.5	17	17
D3 h6	16	22	32	40	55	75	85
D4 g6	60	70	90	130	160	180	200
D5	18.5	25.8	36.8	55.2	69.2	82.2	92.2
D6	M5X0.8P	M8X1.25P	M12X1.75P	M16X2P	M20X2.5P	M20X2.5P	M20X2.5P
D7 h6	16	22	32	40	55	75	85
D8	73	94	116	163	210	255	300
L1	62	76	101	141	182	215	245
L2	28	36	58	82	82	105	130
L3	20	20	30	30	30	38	40
L4	2	2.5	3	3	3	3	3
L5	25	32	50	63	70	90	125
L6	2	2	4	5	6	7	3
L7	6	7	10	12	15	17	20
L8	10	13	17	25	31	36	43
L9	4.8	7.2	10	12	15	15	15
L10	12.5	19	28	36	42	42	42
L11	43	53.5	67	90	119	141	176
L12	44.5	53	68.3	89	115	131	165
L13	135.5	162.5	223.3	291	346	415	511
L16	94	114.5	129	173.5	228	265.5	294.5
L17	26	26	26	40	41.5	52	60
L18	15	15	15	20	21.5	28	36
L19	21	22.5	23	33.5	33.5	45	53
B1 h9	5	6	10	12	16	20	22
H1	18	24.5	35	43	59	79.5	90
X DIN 5480	W16x0.8x30x18x6m	W22x1.25x30x16x6m	W32x1.25x30x24x6m	W40x2x30x18x6m	W55x2x30x26x6m	W70x2x30x34x6m	W80x2x30x38x6m

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Dimensions - KF-S4 Gearbox



Dimension	KF 060	KF 075	KF 100	KF 140	KF 180
	1~2-stage	1~2-stage	1~2-stage	1~2-stage	1~2-stage
D1	68	85	120	165	215
D2	5.5	6.6	9	11	13.5
D3 H6	15	20	30	40	55
D4 g6	60	70	90	130	160
D5	18.5	25.8	36.8	55.2	69.2
D8	73	94	116	163	210
D9 h8	18	24	36	50	68
L1	62	76	101	141	182
L2	12	14	18	22	23
L3	22	21.8	32	33	34
L4	4	4.3	5	6	7
L7	6	7	10	12	15
L8	10	13	17	25	31
L11	43	53.5	67	90	119
L12	48.5	57.7	73.3	95	122
L13	137.5	161	208.3	262	321
L14	4	4.7	5	6	7
L15	19	21	25	30	30
L16	94	114.5	129	173.5	228

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ Dimensions - KF Gearbox (Spiral Bevel)

Model No.		Stages	Ratio(1)	KF 060	KF 075	KF 100	KF 140	KF 180	KF 210	KF 240
Nominal Output Torque T_{2N}	Nm	1	1	25	45	78	150	360	585	1,300
			2	24	42	68	150	330	544	1,220
Emergency Stop Torque T_{2NOT}	Nm	1	1~2	2 times T_{2N}						
Max. Acceleration Torque T_{2B}	Nm	1	1~2	1,5 times T_{2N}						
No Load Running Torque(4)	Nm	1	1~2	0.3	0.3	1.5	1.7	5.5	9	20
Backlash(2)	arcmin	1	1~2	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3
Torsional Rigidity	Nm/arcmin	1	1~2	0.8	3.5	9	20.5	44	80	168
Nominal Input Speed n_{1N}	rpm	1	1~2	6,500	4,500	3,500	2,000	1,500	1,200	1,000
Max. Input Speed n_{1B}	rpm	1	1~2	7,500	6,500	5,500	4,500	3,500	3,000	2,200
Max. Radial Load F_{2rB}(3)	N	1	1~2	5,400	7,700	11,100	18,100	29,100	36,400	46,900
Max. Axial Load F_{2aB}(3)	N	1	1~2	2,700	3,850	5,550	9,050	14,550	18,200	23,450
Operating Temp	° C	1	1~2	0° C~ +90° C						
Degree of Gearbox Protection		1	1~2	IP65						
Lubrication		1	1~2	Synthetic lubrication grease						
Mounting Position		1	1~2	All directions						
Running Noise(4)	dB(A)	1	1~2	≦ 68	≦ 70	≦ 74	≦ 76	≦ 77	≦ 78	≦ 80
Efficiency η	%	1	1~2	≧ 97%						

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

(2) Backlash is measured at 2% of Nominal Output Torque T_{2N}.

(3) Applied to the output shaft center at 100 rpm.

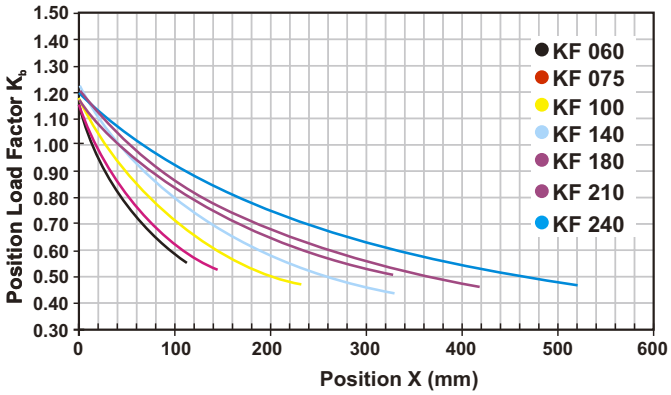
(4) The dB values are measured by gearbox with ratio 2 (1-stage), no loading at 3,000 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

▶ Inertia - KF Gearbox

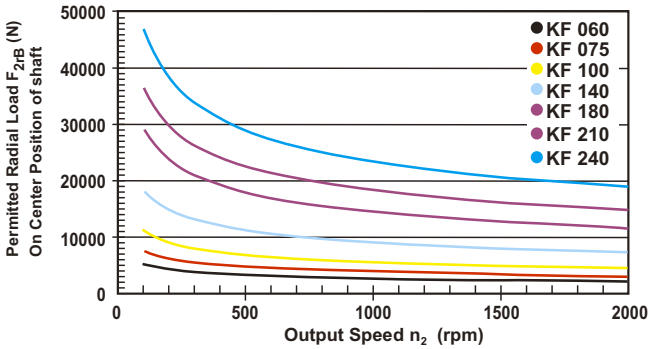
Model No.		KF 060	KF 075	KF 100	KF 140	KF 180	KF 210	KF 240
Ø(A) (C3)		1-stage	1-stage	1-stage	1-stage	1-stage	1-stage	1-stage
8	kg.cm²	0.1	-	-	-	-	-	-
11		0.17	0.18	-	-	-	-	-
14		0.21	0.5	-	-	-	-	-
19		0.62	0.65	1.69	-	-	-	-
24		-	4.49	4.89	5.05	-	-	-
28		-	-	6.14	6.55	-	-	-
32		-	-	8.54	9.47	10.18	-	-
35		-	-	13.86	14.91	15.21	15.68	23.46
38		-	-	18.87	20.69	20.7	21.69	23.46
42		-	-	-	22.58	22.83	23.59	25.28
48		-	-	-	55.45	58.45	59.3	61.61
55		-	-	-	-	-	86.95	89.67
60		-	-	-	-	-	-	112.49

(A) Ø = Input shaft diameter.

Permitted Radial And Axial Loads(A)



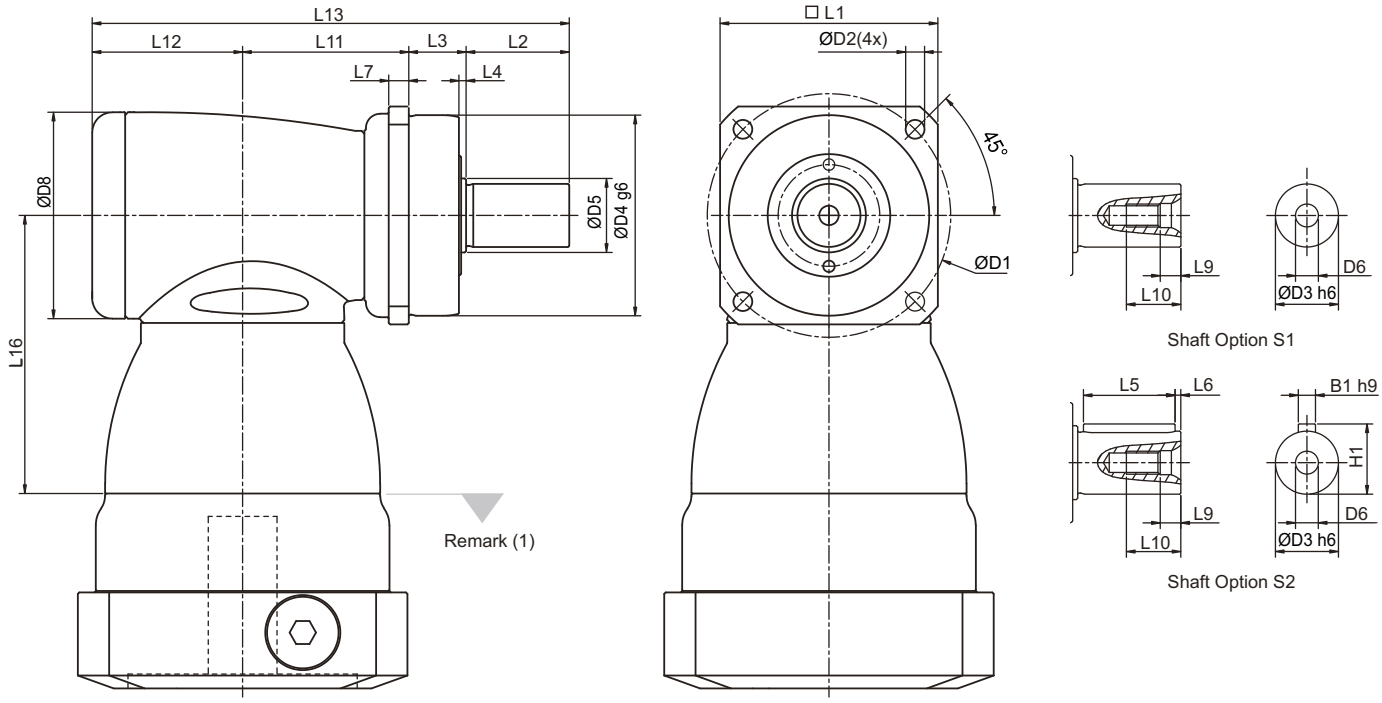
If radial force F_{2r} is not exerted on the center of the output shaft X<1/2 L or X>1/2 L, the permitted radial and axial loads can be calculated by the position load factor K_b on the above diagram.



Permitted radial load F_{2r} on center of output shaft. X=1/2 L for various output speeds.

(A) Permitted loading values on the output shaft. Please refer to P. 16 glossary.

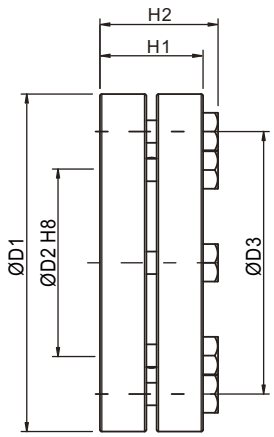
Dimensions - KF Gearbox (Spiral Bevel)



Dimension	KF 060	KF 075	KF 100	KF 140	KF 180	KF 210	KF 240
	1-stage	1-stage	1-stage	1-stage	1-stage	1-stage	1-stage
D1	68	85	120	165	215	250	290
D2	5.5	6.6	9	11	13.5	17	17
D3 h6	16	22	32	40	55	75	85
D4 g6	60	70	90	130	160	180	200
D5	18.5	25.8	36.8	55.2	69.2	82.2	92.2
D6	M5X0.8P	M8X1.25P	M12X1.75P	M16X2P	M20X2.5P	M20X2.5P	M20X2.5P
D8	64	72	92	116	156	195	240
L1	62	76	101	141	182	215	245
L2	28	36	58	82	82	105	130
L3	20	20	30	30	30	38	40
L4	2	2.5	3	3	3	3	3
L5	25	32	50	63	70	90	125
L6	2	2	4	5	6	7	3
L7	6	7	10	12	15	17	20
L9	4.8	7.2	10	12	15	15	15
L10	12.5	19	28	36	42	42	42
L11	50	58	67.5	88	127	131.5	169
L12	46.5	52.5	61.5	76	97.5	105.5	141
L13	144.5	166.5	217	276	336.5	380	480
L16	81.5	97	113.5	147.5	196.5	229	260
B1 h9	5	6	10	12	16	20	22
H1	18	24.5	35	43	59	79.5	90

(1) Dimensions are related to motor interface. Please contact APEX for details.

▶ SHRINK DISC POWER LOCK



SHRINK DISC POWER LOCK

Model No.	Dimension	D1	D2	D3	H1	H2	Screew(1) No. x Type	T_A(2) (Nm)	J ($kg.cm^2$)	Order code
KF 060	SSD-d18xdw15	44	18	30	15	18.5	5 x M5	4	0.4	SSD-18
KF 075	SSD-d24xdw20	50	24	36	19.5	23	6 x M5	4	0.8	SSD-24
KF 100	SSD-d36xdw30	72	36	52	23.5	27.5	5 x M6	12	3.9	SSD-36
KF 140	SSD-d50xdw40	90	50	70	27.5	31.5	8 x M6	12	11.2	SSD-50
KF 180	SSD-d68xdw55	115	68	86	30.5	34.5	10 x M6	12	30.9	SSD-68

(1) 10.9 Class, DIN 931
(2) Tightening Torque

HIGH PRECISION

SPIRAL BEVEL GEARBOX

AT - ATB Series

▶ Gearbox Series - AT / ATB

Features:

Various housing design
- Stainless - AT
- Carbon Steel - ATB

Various output options

High torque

High efficiency

Long service life

Reduced backlash

Maintenance free

Flexible mounting dimensions

AT-L/-L1/-R1

ATB-L/-L1/-R1

AT-FL/-FL1/-FR1

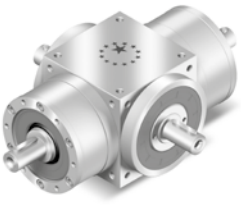
ATB-FL/-FL1/-FR1

AT-H/-C

ATB-H/-C

AT-FH/-FC

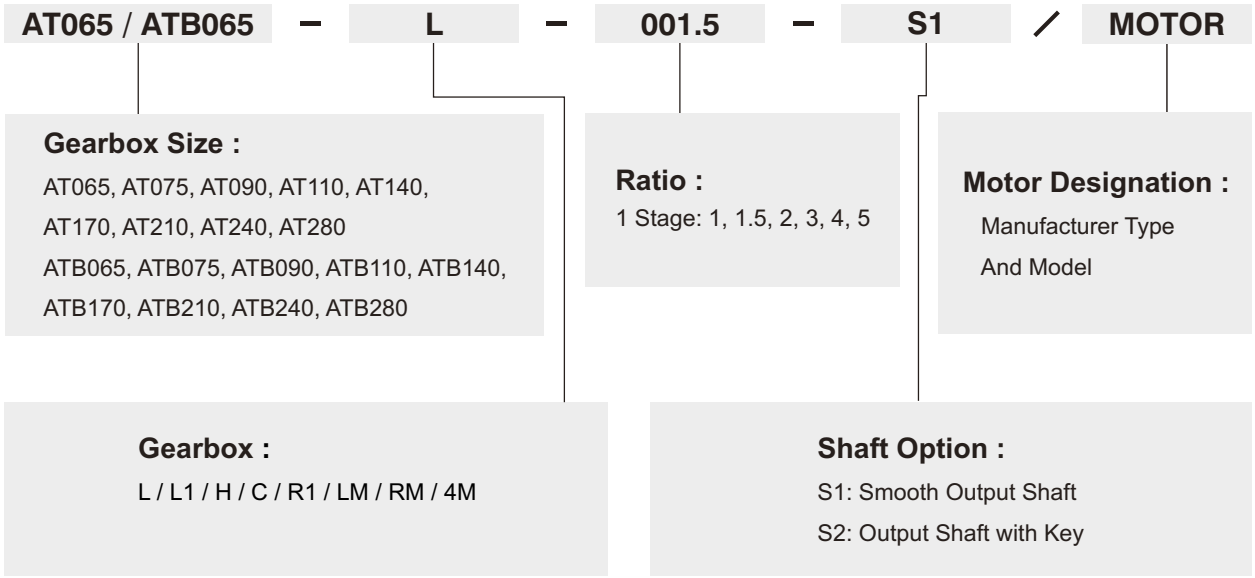
ATB-FH/-FC



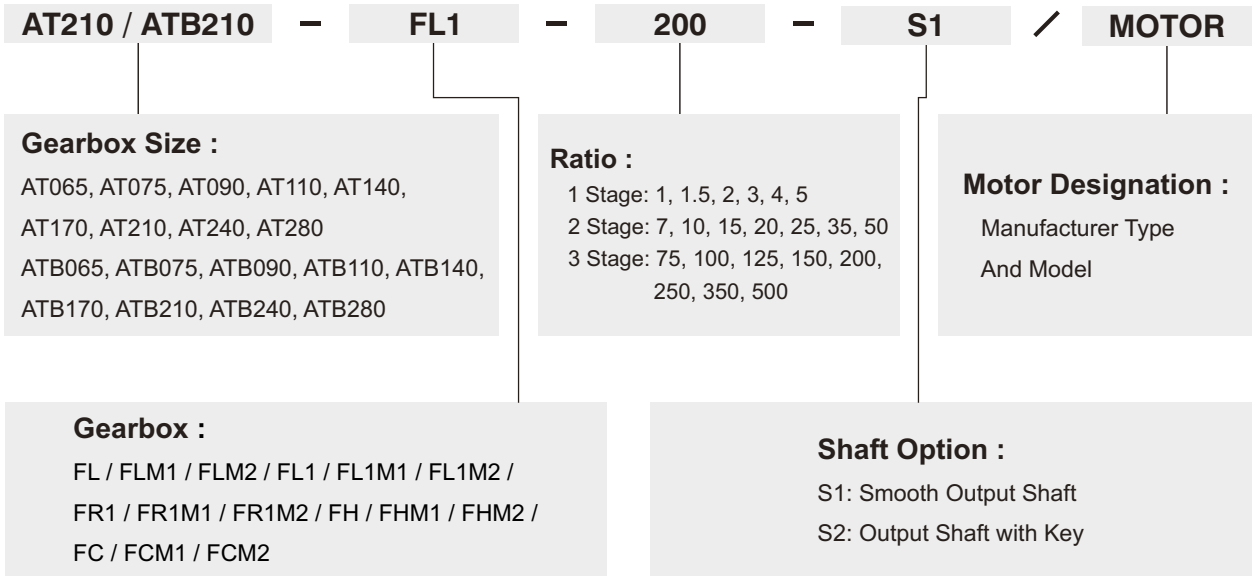
AT-4M/-LM/-RM

ATB-4M/-LM/-RM

▶ Ordering Code

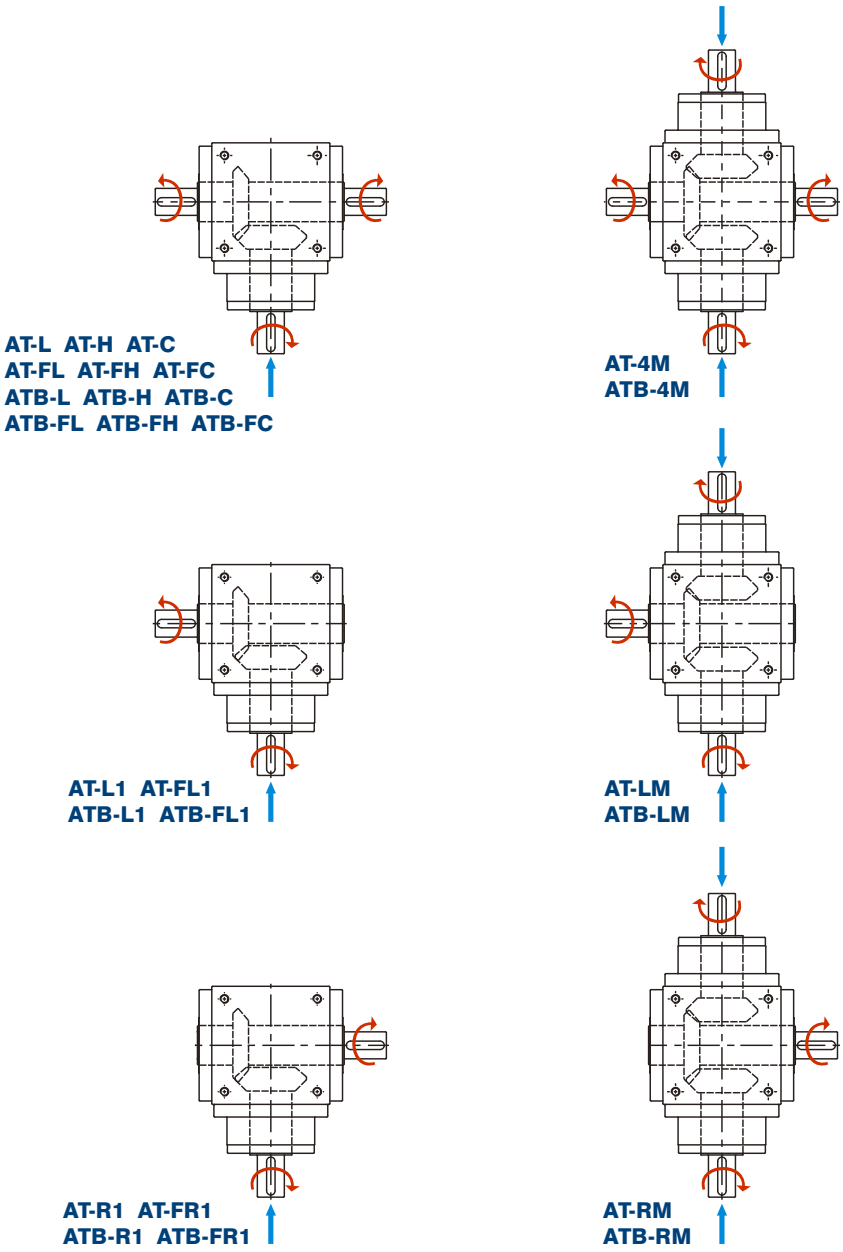


Ordering Example: AT065-L-001.5-S1 / SIEMENS 1FK6 032-6AK71
ATB065-L-001.5-S1 / SIEMENS 1FK6 032-6AK71

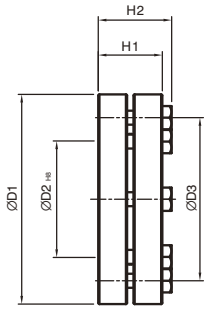


Ordering Example: AT210-FL1-200-S1 / SIEMENS 1FK6 032-6AK71
ATB210-FL1-200-S1 / SIEMENS 1FK6 032-6AK71

Rotate Directions of AT / ATB Series



Accessories - Shrink Disc Power Lock



C / FC Series	D1	D2	D3	H1	H2
SSD-d16xdw14	41	16	26	15	18.5
SSD-d22xdw18	50	22	36	19.5	23
SSD-d25xdw22	50	25	38	19.5	23
SSD-d44xdw32	80	44	61	25.5	29.5
SSD-d50xdw40	90	50	70	27.5	31.5
SSD-d62xdw50	110	62	86	30.5	34.5
SSD-d68xdw55	115	68	86	30.5	34.5
SSD-d75xdw60	138	75	100	32.5	38

▶ Performance - AT/ATB Gearbox

Model No.		Stage	Ratio[A]	AT065 L AT065 L1 AT065 H AT065 C AT065 R1 AT065 LM AT065 RM AT065 4M	AT075 L AT075 L1 AT075 H AT075 C AT075 R1 AT075 LM AT075 RM AT075 4M	AT090 L AT090 L1 AT090 H AT090 C AT090 R1 AT090 LM AT090 RM AT090 4M	AT110 L AT110 L1 AT110 H AT110 C AT110 R1 AT110 LM AT110 RM AT110 4M	AT140 L AT140 L1 AT140 H AT140 C AT140 R1 AT140 LM AT140 RM AT140 4M	AT170 L AT170 L1 AT170 H AT170 C AT170 R1 AT170 LM AT170 RM AT170 4M	AT210 L AT210 L1 AT210 H AT210 C AT210 R1 AT210 LM AT210 RM AT210 4M	AT240 L AT240 L1 AT240 H AT240 C AT240 R1 AT240 LM AT240 RM AT240 4M	AT280 L AT280 L1 AT280 H AT280 C AT280 R1 AT280 LM AT280 RM AT280 4M
Nominal Output Torque T_{2N}	Nm	1	1	25	45	78	150	360	585	1,300	2,150	3,200
			1.5	25	45	78	150	360	585	1,300	2,150	3.200
			2	24	42	68	150	330	544	1,220	2,010	3,050
			3	18	33	54	120	270	450	1,020	1,650	2,850
			4	13	28	48	100	224	376	860	1,410	2,300
			5	12	25	40	85	196	320	740	1,210	2,000
Max. Acceleration Torque T_{2B}	Nm	1	1~5	1.5 times of Nominal Output Torque								
Max. Acceleration Input Speed n_{1B}	rpm	1	1~5	7,500	6,500	5,500	4,500	3,500	3,000	2,200	2,000	1,700
Standard Backlash[B]	arcmin	1	1~5	≤6	≤6	≤6	≤6	≤6	≤6	≤6	≤6	≤6
Max. Radial Load F_{1rB}[C] Input d1	N	1	1~5	700	950	1,450	2,100	2,700	3,800	7,800	9,600	10,500
Max. Radial Load F_{2rB}[D] Output d2	N	1	1~5	900	1,100	1,700	2,700	4,800	6,600	11,500	16,000	18,000
Max. Axial Load F_{1aB}[C] Input d1	N	1	1~5	350	425	725	1,050	1,350	1,900	3,900	4,800	5,250
Max. Axial Load F_{2aB}[D] Output d2	N	1	1~5	450	550	850	1,350	2,400	3,300	5,750	8,500	9,000
Efficiency η	%	1	1~5	≥98%								
Operating Temp	°C	1	1~5	-10°C ~ 90°C								
Lubrication				Synthetic lubrication oils								
Noise Level[E]	dB (A)	1	1~5	≤68	≤70	≤74	≤76	≤77	≤78	≤80	≤82	≤83

▶ Gearbox Inertia

Model No.		Stage	Ratio[A]	AT065 L AT065 L1 AT065 H AT065 C AT065 R1 AT065 LM AT065 RM AT065 4M	AT075 L AT075 L1 AT075 H AT075 C AT075 R1 AT075 LM AT075 RM AT075 4M	AT090 L AT090 L1 AT090 H AT090 C AT090 R1 AT090 LM AT090 RM AT090 4M	AT110 L AT110 L1 AT110 H AT110 C AT110 R1 AT110 LM AT110 RM AT110 4M	AT140 L AT140 L1 AT140 H AT140 C AT140 R1 AT140 LM AT140 RM AT140 4M	AT170 L AT170 L1 AT170 H AT170 C AT170 R1 AT170 LM AT170 RM AT170 4M	AT210 L AT210 L1 AT210 H AT210 C AT210 R1 AT210 LM AT210 RM AT210 4M	AT240 L AT240 L1 AT240 H AT240 C AT240 R1 AT240 LM AT240 RM AT240 4M	AT280 L AT280 L1 AT280 H AT280 C AT280 R1 AT280 LM AT280 RM AT280 4M
Mass Moments of Inertia J_1	kg • cm^2	1	1	0.51	1.30	3.16	7.70	23.57	58.99	195.40	369.34	799.12
			1.5	0.64	1.16	2.82	6.74	19.37	49.28	155.45	283.58	595.78
			2	0.44	1.11	2.70	6.31	17.75	45.35	140.24	249.74	511.76
			3	0.43	1.09	2.66	6.17	17.18	44.01	134.95	237.71	483.06
			4	0.43	1.09	2.65	6.13	17.06	43.70	133.58	234.72	476.26
			5	0.43	1.09	2.65	6.12	17.02	43.60	133.14	233.67	473.58

▶ Weight

Model No.		Stage	Ratio[A]	AT065	AT075	AT090	AT110	AT140	AT170	AT210	AT240	AT280
L Series	kg	1	1~5	2.6	4.2	6.8	11.6	19.8	34.8	66.2	98.1	155.7
L1 Series		1	1~5	2.6	4.1	6.7	11.5	19.5	34.2	65.1	96.6	153.4
H Series		1	1~5	2.5	3.9	6.4	11.0	18.1	31.6	60.0	89.4	143.4
C Series		1	1~5	2.8	4.2	6.9	11.4	19.6	33.7	63.3	97.9	149.1
R1 Series		1	1~5	2.6	4.1	6.7	11.5	19.5	34.2	65.1	96.6	153.4
LM Series		1	1	3.5	5.6	9.0	15.2	24.1	42.4	81.4	122.0	190.9
RM Series		1	1	3.5	5.6	9.0	15.2	24.1	42.4	81.4	122.0	190.9
4M Series		1	1	3.5	5.6	9.1	15.4	24.8	42.6	82.5	123.5	193.3

A. Ratio (i= N_{in} / N_{out}). AT-LM / RM / 4M offer ratio 1 : 1 only.

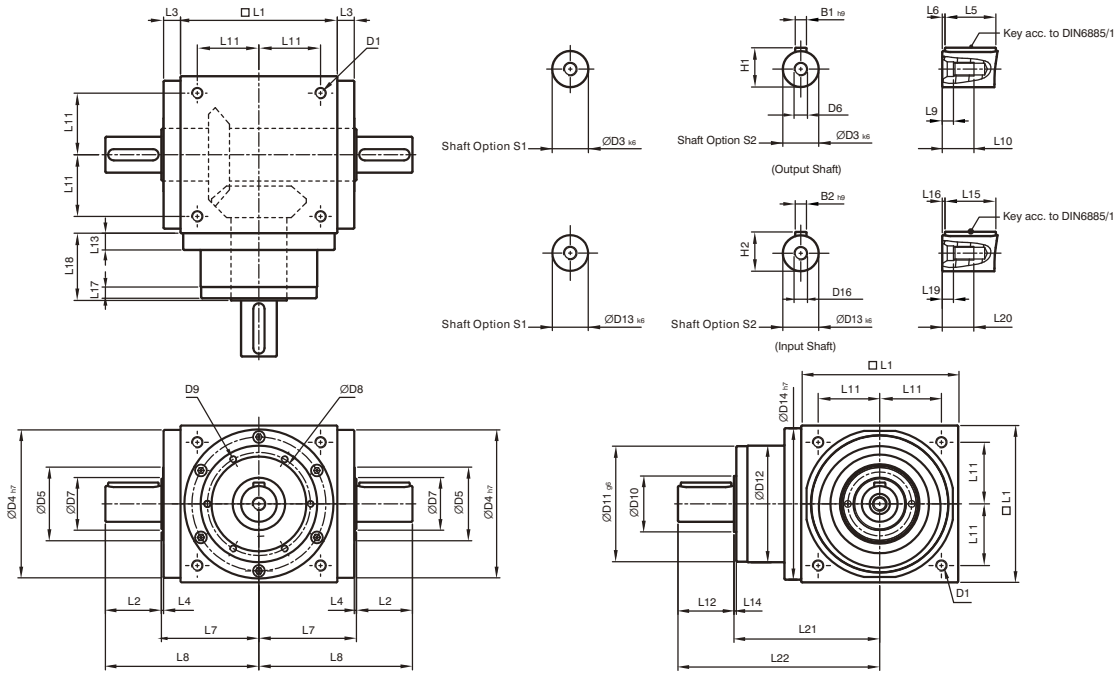
B. Backlash is measured at 2% Nominal Torque T_{2N}.

C. Apply to the Input shaft center at n_{1B}.

D. Apply to the output shaft center at n_{1B}.

E. The dB values are measured by gearbox with ratio 5 (1-stage), no loading at 1,500 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and/or higher RPM, the noise level could be 3 to 5 dB higher.

▶ Dimensions (1-stage, Ratio i=1~5) AT-L / ATB-L Series



* The dimensions of ATB series are identical to AT series.

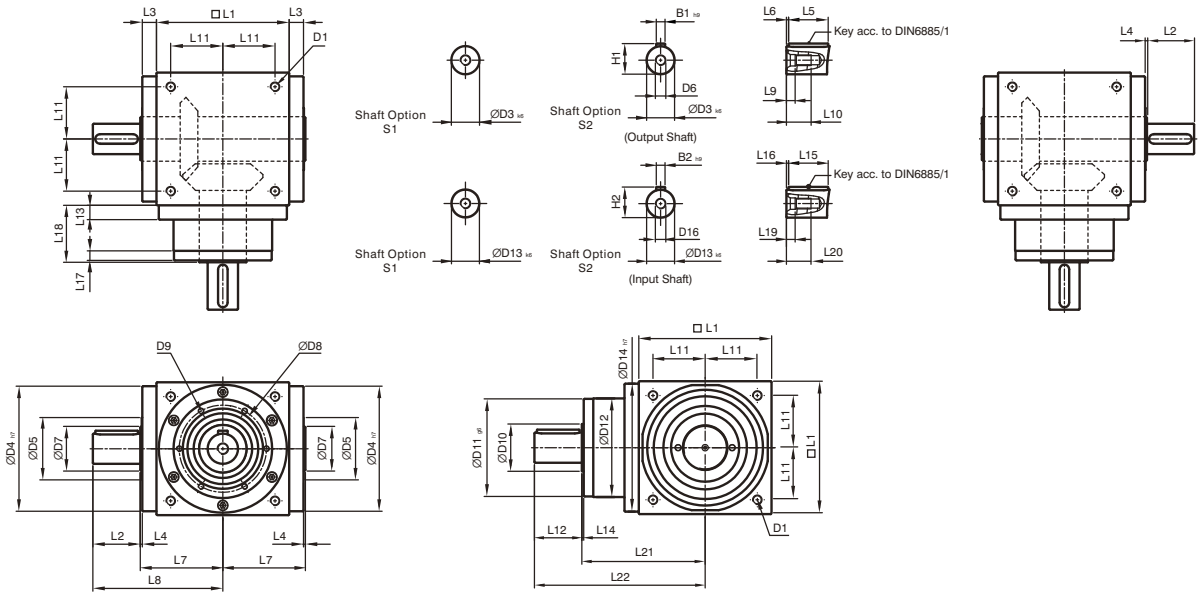
[unit: mm]

Dimension	AT065 L	AT075 L	AT090 L	AT110 L	AT140 L	AT170 L	AT210 L	AT240 L	AT280 L
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 k6	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM6xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 g6	62.9	72.9	87	107	103	127	158	178	198
D12	62	72	86	106	104	128	160	180	200
D13 k6	13	16	18	22	32	40	50	55	60
D14 h7	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
B1 h9	5	5	6	6	10	12	14	16	18
B2 h9	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64
H2	15	18	20.5	24.5	35	43	53.5	59	64

▶ Dimensions (1-stage, Ratio i=1~5) AT-L1/R1 ATB-L1/R1 Series

AT-L1

AT-R1

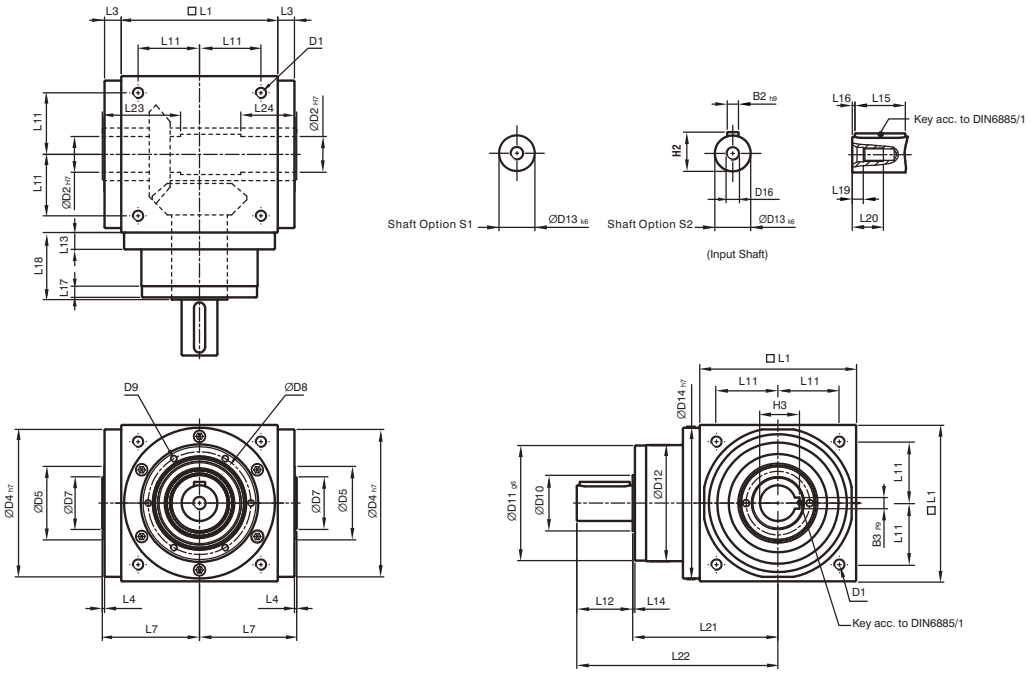


* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT065 L1/R1	AT075 L1/R1	AT090 L1/R1	AT110 L1/R1	AT140 L1/R1	AT170 L1/R1	AT210 L1/R1	AT240 L1/R1	AT280 L1/R1
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 k6	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM6xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 g6	62.9	72.9	87	107	103	127	158	178	198
D12	62	72	86	106	104	128	160	180	200
D13 k6	13	16	18	22	32	40	50	55	60
D14 h7	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
B1 h9	5	5	6	6	10	12	14	16	18
B2 h9	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64
H2	15	18	20.5	24.5	35	43	53.5	59	64

▶ Dimensions (1-stage, Ratio i=1~5) AT-H / ATB-H Series

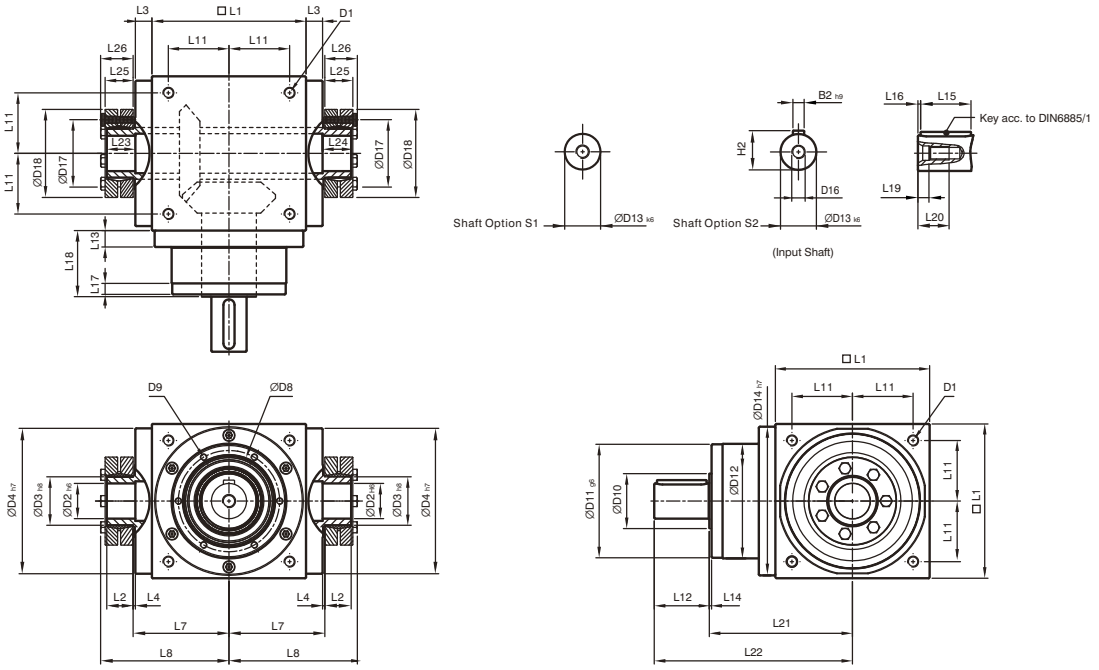


* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT065 H	AT075 H	AT090 H	AT110 H	AT140 H	AT170 H	AT210 H	AT240 H	AT280 H
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D2 H7	13	14	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D7	21	22	28	33	47	55	75	85	110
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM6xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 g6	62.9	72.9	87	107	103	127	158	178	198
D12	62	72	86	106	104	128	160	180	200
D13 k6	13	16	18	22	32	40	50	55	60
D14 h7	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
L1	65	75	90	110	140	170	210	240	280
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L7	47.5	54	62	72	87	102	127	147	167
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
L23	40	47	52	53	70	80	95	115	115
L24	30	32	35	35	50	55	65	80	80
B2 h9	5	5	6	6	10	12	14	16	18
B3 P9	5	5	6	6	10	12	14	16	18
H2	15	18	20.5	24.5	35	43	53.5	59	64
H3	15.3	16.3	20.8	24.8	35.3	43.3	53.8	59.3	64.4

▶ Dimensions (1-stage, Ratio i=1~5) AT-C / ATB-C Series



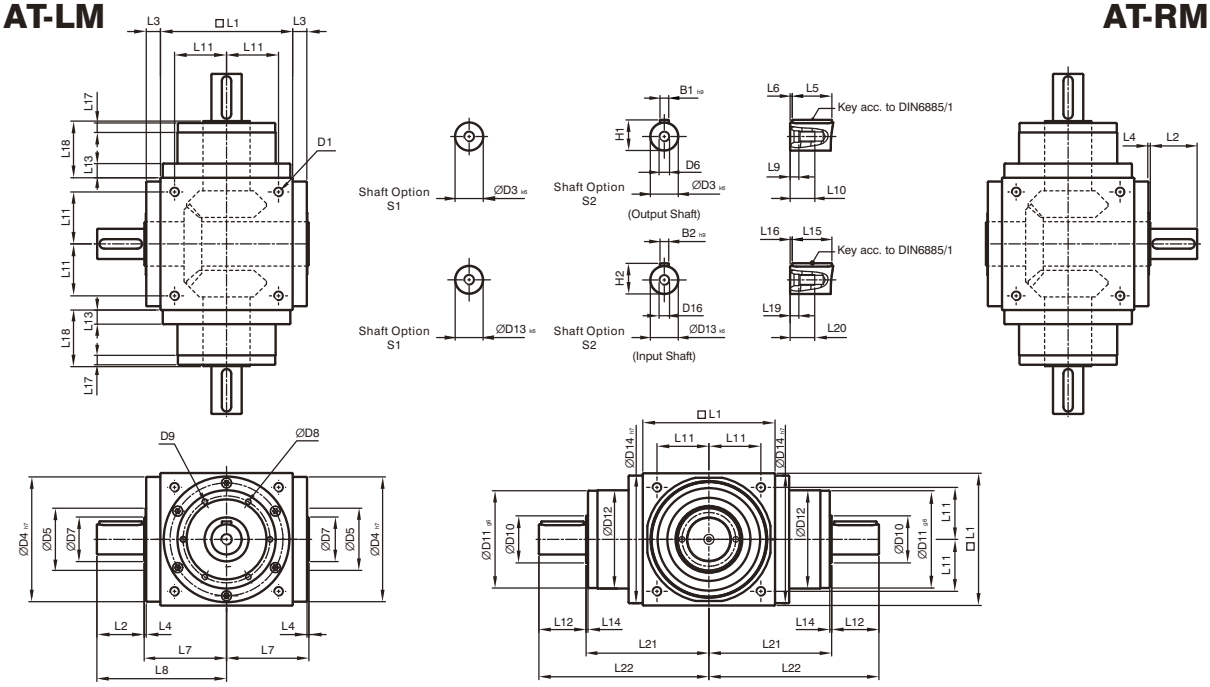
* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT065 C	AT075 C	AT090 C	AT110 C	AT140 C	AT170 C	AT210 C	AT240 C	AT280 C
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D2 H6	13	14	18	22	32	40	50	55	60
D3 h8	16	16	22	25	44	50	62	68	75
D4 h7	63	73	88	108	135	165	205	235	275
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM6xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 g6	62.9	72.9	87	107	103	127	158	178	198
D12	62	72	86	106	104	128	160	180	200
D13 k6	13	16	18	22	32	40	50	55	60
D14 h7	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
D17	26	26	36	38	61	70	86	86	100
D18	41	41	50	50	80	90	110	115	138
L1	65	75	90	110	140	170	210	240	280
L2	14	14	18	18	24	26	29	29	30.5
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L7	47.5	54	62	72	87	102	127	147	167
L8	66	72.5	85	95	116.5	133.5	161.5	181.5	205
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
L23	15	15	20	20	26	28	31	31	32.5
L24	15	15	20	20	26	28	31	31	32.5
L25	15	15	19.5	19.5	25.5	27.5	30.5	30.5	32.5
L26	18.5	18.5	23	23	29.5	31.5	34.5	34.5	38
B2 h9	5	5	6	6	10	12	14	16	18
H2	15	18	20.5	24.5	35	43	53.5	59	64

▶ Dimensions (1-stage, Ratio i=1) AT-LM/RM ATB-LM/RM Series

AT-LM



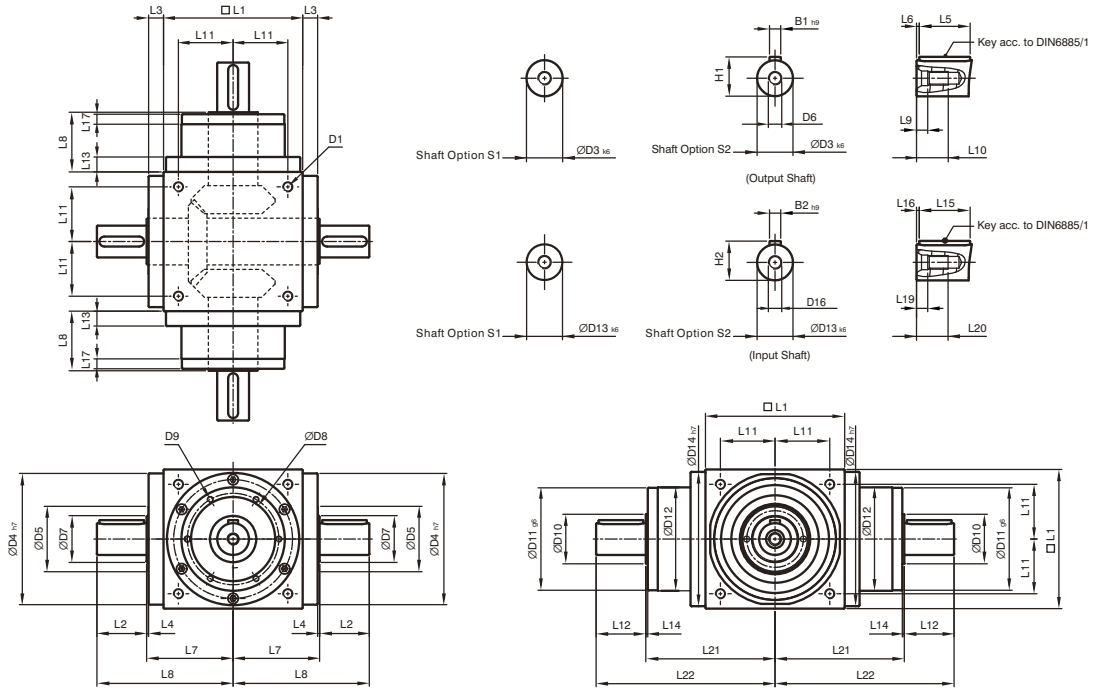
AT-RM

* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT065LM/RM	AT075LM/RM	AT090LM/RM	AT110LM/RM	AT140LM/RM	AT170LM/RM	AT210LM/RM	AT240LM/RM	AT280LM/RM
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 k6	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM6xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 g6	62.9	72.9	87	107	103	127	158	178	198
D12	62	72	86	106	104	128	160	180	200
D13 k6	13	16	18	22	32	40	50	55	60
D14 h7	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
B1 h9	5	5	6	6	10	12	14	16	18
B2 h9	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64
H2	15	18	20.5	24.5	35	43	53.5	59	64

▶ Dimensions (1-stage, Ratio i=1) AT-4M / ATB-4M Series



* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT065 4M	AT075 4M	AT090 4M	AT110 4M	AT140 4M	AT170 4M	AT210 4M	AT240 4M	AT280 4M
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 k6	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM6xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 g6	62.9	72.9	87	107	103	127	158	178	198
D12	62	72	86	106	104	128	160	180	200
D13 k6	13	16	18	22	32	40	50	55	60
D14 h7	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
B1 h9	5	5	6	6	10	12	14	16	18
B2 h9	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64
H2	15	18	20.5	24.5	35	43	53.5	59	64

Performance - AT/ATB Gearbox

Model No.		Stage	Ratio[A]	AT065 FL AT065 FL1 AT065 FH AT065 FC AT065 FR1	AT075 FL AT075 FL1 AT075 FH AT075 FC AT075 FR1	AT090 FL AT090 FL1 AT090 FH AT090 FC AT090 FR1	AT110 FL AT110 FL1 AT110 FH AT110 FC AT110 FR1	AT140 FL AT140 FL1 AT140 FH AT140 FC AT140 FR1	AT170 FL AT170 FL1 AT170 FH AT170 FC AT170 FR1	AT210 FL AT210 FL1 AT210 FH AT210 FC AT210 FR1	AT240 FL AT240 FL1 AT240 FH AT240 FC AT240 FR1	AT280 FL AT280 FL1 AT280 FH AT280 FC AT280 FR1
Nominal Output Torque T_{2N}	Nm	1	1	25	45	78	150	360	585	1,300	2,150	3,200
			1.5	25	45	78	150	360	585	1,300	2,150	3,200
			2	24	42	68	150	330	544	1,220	2,010	3,050
			3	18	33	54	120	270	450	1,020	1,650	2,850
			4	13	28	48	100	224	376	860	1,410	2,300
			5	12	25	40	85	196	320	740	1,210	2,000
		2	7	12	12	33	91	91	91	195	358	358
			10	24	28	68	150	208	208	430	846	846
			15	18	33	54	120	270	312	645	1,269	1,269
			20	13	28	48	100	224	376	860	1,410	1,692
			25	12	25	40	85	196	320	740	1,210	2,000
			35	12	25	40	85	196	320	740	1,210	1,790
			50	12	25	40	85	196	320	740	1,210	1,465
		3	75	-	-	-	120	210	312	585	1,269	1,269
			100	-	-	-	100	224	376	780	1,410	1,692
			125	-	-	-	85	196	320	740	1,210	2,000
			150	-	-	-	120	135	312	390	975	975
			200	-	-	-	100	180	376	520	1,300	1,300
			250	-	-	-	85	196	320	650	1,210	1,625
			350	-	-	-	85	196	320	740	1,210	1,790
			500	-	-	-	85	196	320	740	1,210	1,465
Max. Acceleration Torque T_{2B}	Nm	1,2,3	1~500	1.5 times of Nominal Output Torque								
Max. Acceleration Input Speed n_{1B}	rpm	1	1~5	7,500	6,500	5,500	4,500	3,500	3,000	2,200	2,000	1,700
		2	7~50	8,000	8,000	6,000	6,000	6,000	6,000	4,800	3,600	3,600
		3	75~500	-	-	-	8,000	8,000	6,000	6,000	6,000	6,000
Standard Backlash[B]	arcmin	1	1~5	≤6	≤6	≤6	≤6	≤6	≤6	≤6	≤6	≤6
		2	7~50	≤8	≤8	≤8	≤8	≤8	≤8	≤8	≤8	≤8
		3	75~500	-	-	-	≤10	≤10	≤10	≤10	≤10	≤10
Max. Radial Load F_{2rB}[C] Output d2	N	1,2,3	1~500	900	1,100	1,700	2,700	4,800	6,600	11,500	16,000	18,000
Max. Axial Load F_{2aB}[C] Output d2	N	1,2,3	1~500	450	550	850	1,350	2,400	3,300	5,750	8,500	9,000
Efficiency η	%	1	1~5	≥98%								
		2,3	7~500	≥94%								
Operating Temp	°C	1,2,3	1~500	-10°C ~ 90°C								
Lubrication				Synthetic lubrication oils								
Noise Level[D]	dB (A)	1,2,3	1~500	≤71	≤72	≤76	≤77	≤78	≤79	≤81	≤83	≤84

▶ Inertia - AT/ATB Gearbox

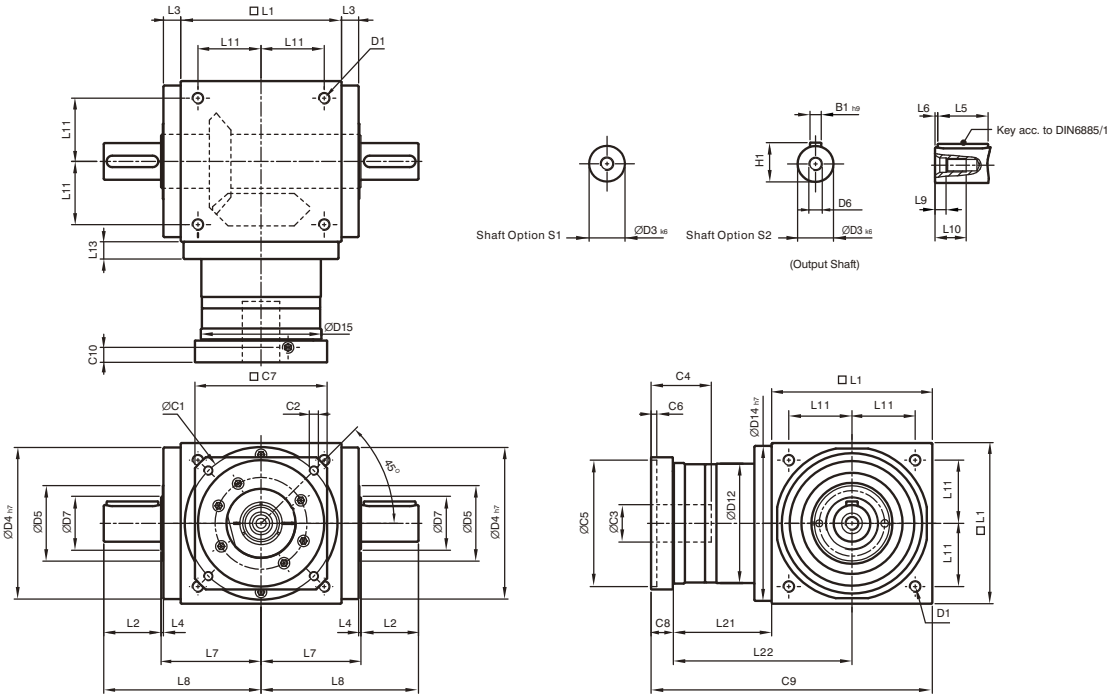
Model No.		Stage	Ratio[A]	AT065 FL AT065 FL1 AT065 FH AT065 FC AT065 FR1	AT075 FL AT075 FL1 AT075 FH AT075 FC AT075 FR1	AT090 FL AT090 FL1 AT090 FH AT090 FC AT090 FR1	AT110 FL AT110 FL1 AT110 FH AT110 FC AT110 FR1	AT140 FL AT140 FL1 AT140 FH AT140 FC AT140 FR1	AT170 FL AT170 FL1 AT170 FH AT170 FC AT170 FR1	AT210 FL AT210 FL1 AT210 FH AT210 FC AT210 FR1	AT240 FL AT240 FL1 AT240 FH AT240 FC AT240 FR1	AT280 FL AT280 FL1 AT280 FH AT280 FC AT280 FR1
Mass Moments of Inertia J_1	kg • cm^2	1	1	0.51	1.30	3.14	7.62	23.54	59.09	195.96	365.38	787.63
			1.5	0.46	1.15	2.80	6.65	19.34	49.38	156.02	279.62	584.28
			2	0.44	1.10	2.68	6.23	17.72	45.44	140.80	245.78	500.26
			3	0.43	1.09	2.64	6.08	17.16	44.11	135.51	233.75	471.56
			4	0.43	1.08	2.63	6.05	17.03	43.79	134.14	230.77	464.76
			5	0.43	1.08	2.63	6.04	16.99	43.69	133.71	229.71	462.08
		2	7	0.15	0.15	0.50	2.79	2.79	2.79	9.91	29.26	29.26
			10	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
			15	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
			20	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
			25	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
			35	0.15	0.15	0.50	2.79	2.79	2.79	9.91	29.26	29.26
			50	0.15	0.15	0.50	2.79	2.79	2.79	9.89	29.20	29.20
		3	75	-	-	-	0.15	0.15	0.50	0.50	2.80	2.80
			100	-	-	-	0.15	0.15	0.50	0.50	2.80	2.80
			125	-	-	-	0.15	0.15	0.50	0.50	2.80	2.80
			150	-	-	-	0.15	0.15	0.50	0.50	2.79	2.79
			200	-	-	-	0.15	0.15	0.50	0.50	2.79	2.79
			250	-	-	-	0.15	0.15	0.50	0.50	2.79	2.79
			350	-	-	-	0.15	0.15	0.50	0.50	2.79	2.79
			500	-	-	-	0.15	0.15	0.50	0.50	2.79	2.79

▶ Weight

Model No.		Stage	Ratio[A]	AT065	AT075	AT090	AT110	AT140	AT170	AT210	AT240	AT280
FL Series	kg	1	1~5	2.8	4.4	7.1	12.1	20.9	36.1	69.4	101.2	158.3
		2	7~50	3.2	4.8	8.1	14.3	24.2	38.5	74.1	112.4	171.0
		3	75~500	-	-	-	13.9	23.7	38.8	73.4	110.2	168.7
FL1 Series		1	1~5	2.7	4.3	7.1	11.9	20.3	35.5	68.3	99.6	156.0
		2	7~50	3.2	4.8	8.0	14.2	23.9	37.9	73.0	110.8	168.6
		3	75~500	-	-	-	13.8	23.4	38.2	72.3	108.6	166.4
FH Series		1	1~5	2.6	4.1	6.7	11.4	18.9	32.9	63.2	92.5	146.0
		2	7~50	3.1	4.6	7.7	13.6	22.4	35.3	67.9	103.7	158.7
		3	75~500	-	-	-	13.3	21.9	35.6	67.2	101.5	156.5
FC Series		1	1~5	2.9	4.4	7.2	11.8	20.4	35.0	66.5	96.0	151.7
		2	7~50	3.3	4.9	8.2	14.1	24.1	37.4	71.2	107.2	164.4
		3	75~500	-	-	-	13.7	23.5	37.5	70.5	105.0	162.2
FR1 Series		1	1~5	2.7	4.3	7.1	11.9	20.3	35.5	68.3	99.6	156.0
		2	7~50	3.2	4.8	8.0	14.2	23.9	37.9	73.0	110.8	168.6
		3	75~500	-	-	-	13.8	23.4	38.2	72.3	108.6	166.4

A. Ratio (i= N_{in} / N_{out}).
B. Backlash is measured at 2% Nominal Torque T_{2N}.
C. Apply to the output shaft center at n_{1B}.
D. The dB values are measured by gearbox with ratio 5 (1-stage) or ratio 50 (2-stage) or ratio 500 (3-stage), no loading at 1,500 RPM or at the respective Nominal Input Speed by bigger model size.
By lower ratio and / or higher RPM, the noise level could be 3 to 5 dB higher.

▶ Dimensions (1-stage, Ratio i=1~5) AT-FL / ATB-FL Series



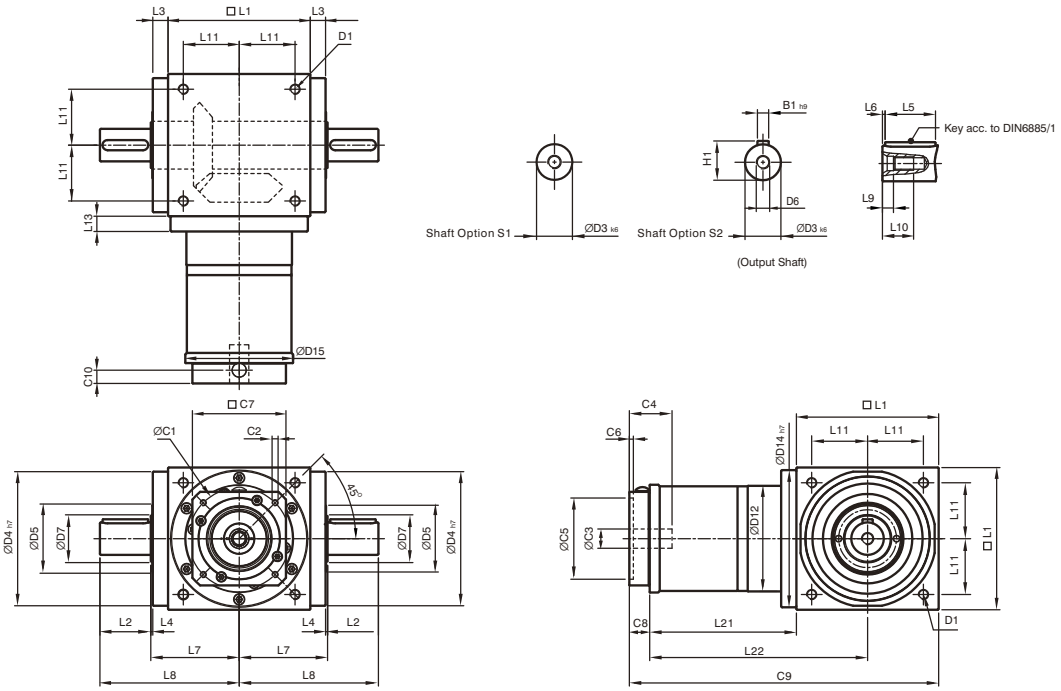
* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT065 FL	AT075 FL	AT090 FL	AT110 FL	AT140 FL	AT170 FL	AT210 FL	AT240 FL	AT280 FL
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 k6	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	105	130	158	178	198
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	49	60.5	63	69.5	85.5	95	130	144.5	135
L22	81.5	98	108	124.5	155.5	180	235	264.5	275
C1[1]	46	70	100	100	130	165	215	215	235
C2[1]	M4	M5	M6	M6	M8	M10	M12	M12	M12
C3[1]	≤11 / ≤12[2]	≤14 / ≤15.875 / ≤16[2]	≤19	≤24	≤32	≤38	≤42	≤48	≤55
C4[1]	30	34	40	40	50	60	85	85	116
C5[1]	30	50	80	80	110	130	180	180	200
C6[1]	3.5	8	4	4	5	6	6	6	6
C7[1]	42	60	90	90	115	142	190	190	220
C8[1]	19.5	19	17	17	19.5	22.5	29	29	63
C9[1]	133.5	154.5	170	196.5	245	287.5	369	413.5	478
C10[1]	13.25	13.5	10.75	10.75	13	15	20.75	20.75	53.5
B1 h9	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64

1. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and design Tool to view your specific motor mounting system.
2. AT065 FLM1 offers C3 ≤12 option; AT075 FLM1 offers C3 ≤16 option; AT075 FLM2 offers C3 ≤15.875 option.

▶ Dimensions (2-stage, Ratio i=7~50) AT-FL / ATB-FL Series



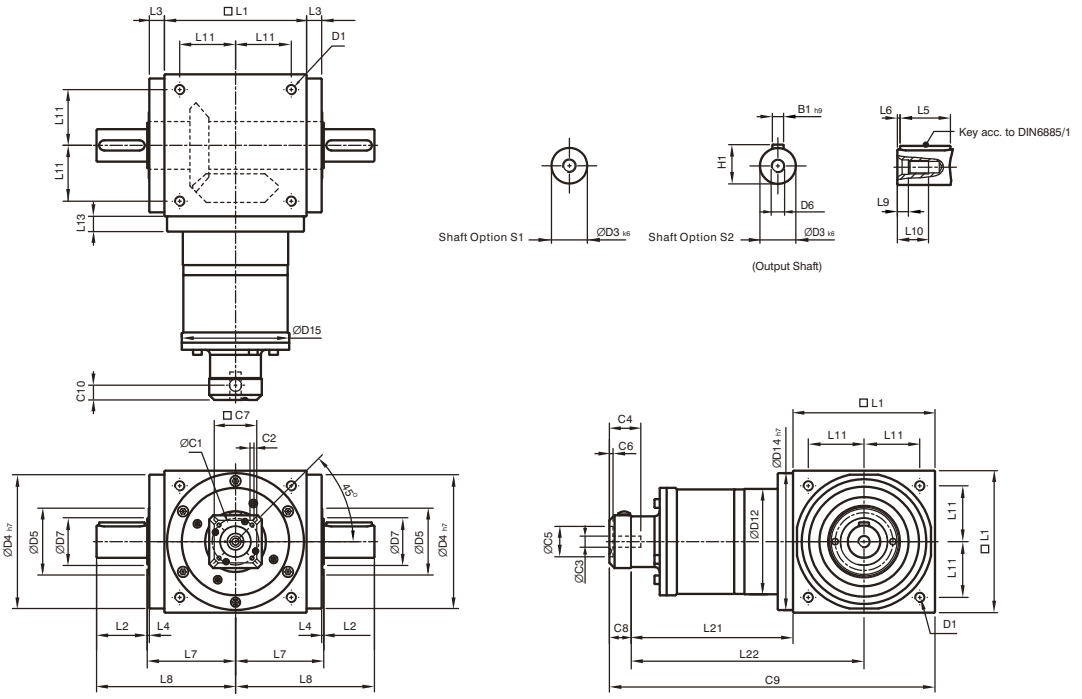
* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT065 FL	AT075 FL	AT090 FL	AT110 FL	AT140 FL	AT170 FL	AT210 FL	AT240 FL	AT280 FL
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 k6	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	106	130	158	178	198
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	75	84.5	99	122	144.5	157.5	206.5	239	248
L22	107.5	122	144	177	214.5	242.5	311.5	359	388
C1[3]	46	46	70	100	100	100	130	165	165
C2[3]	M4	M4	M5	M6	M6	M6	M8	M10	M10
C3[3]	≤12	≤12	≤16	≤24	≤24	≤24	≤32	≤38	≤38
C4[3]	30	30	34	40	40	40	50	60	60
C5[3]	30	30	50	80	80	80	110	130	130
C6[3]	3.5	3.5	8	4	4	4	5	6	6
C7[3]	42	42	60	92	92	92	115	142	142
C8[3]	21.5	21.5	21.5	20	20	20	24	31	31
C9[3]	161.5	181	210.5	252	304.5	347.5	440.5	510	559
C10[3]	14.5	14.5	15.5	13	13	13	16	21	21
B1 h9	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64

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

▶ Dimensions (3-stage, Ratio i=75~500) AT-FL / ATB-FL Series



* The dimensions of ATB series are identical to AT series.

[unit: mm]

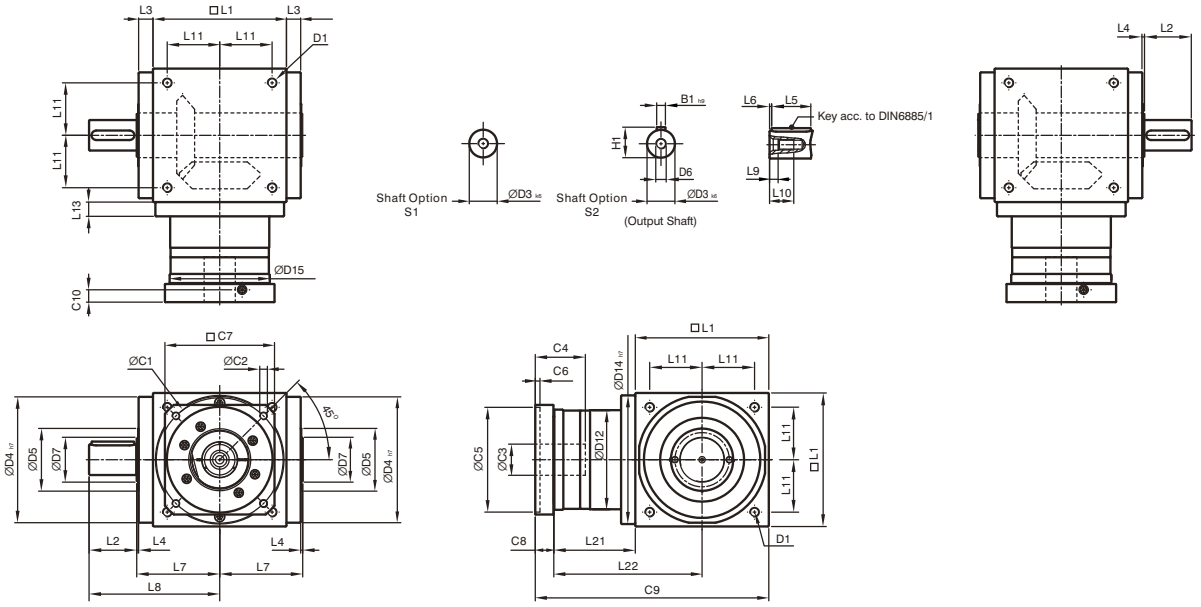
Dimension	AT110 FL	AT140 FL	AT170 FL	AT210 FL	AT240 FL	AT280 FL
D1	M8	M10	M12	M16	M16	M16
D3 k6	22	32	40	50	55	60
D4 h7	108	135	165	205	235	275
D5	53	68	83	104	124	144
D6	M8	M12	M16	M16	M16	M20
D7	33	47	55	75	85	110
D12	106	104	128	160	180	200
D14 h7	108	135	165	205	235	275
D15	107	106	130	158	178	198
L1	110	140	170	210	240	280
L2	40	50	60	75	85	110
L3	15	15	15	20	25	25
L4	2	2	2	2	2	2
L5	32	45	50	70	80	100
L6	4	2.5	5	2.5	2.5	5
L7	72	87	102	127	147	167
L8	112	137	162	202	232	277
L9	7.2	10	12	12	12	15
L10	19	28	36	36	36	42
L11	44	55	67	85	95	110
L13	15	15	15	20	25	25
L21	136.5	159.5	183.5	226	269	278
L22	191.5	229.5	268.5	331	389	418
C1[4]	46	46	70	70	100	100
C2[4]	M4	M4	M5	M5	M6	M6
C3[4]	≤12	≤12	≤16	≤16	≤24	≤24
C4[4]	30	30	34	34	40	40
C5[4]	30	30	50	50	80	80
C6[4]	3.5	3.5	8	8	4	4
C7[4]	42	42	60	60	92	92
C8[4]	21.5	21.5	21.5	21.5	20	20
C9[4]	268	321	375	457.5	529	578
C10[4]	14.5	14.5	15.5	15.5	13	13
B1 h9	6	10	12	14	16	18
H1	24.5	35	43	53.5	59	64

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

▶ Dimensions (1-stage, Ratio i=1~5) AT-FL1/FR1 ATB-FL1/FR1 Series

AT-FL1 / ATB-FL1

AT-FR1 / ATB-FR1



* The dimensions of ATB series are identical to AT series.

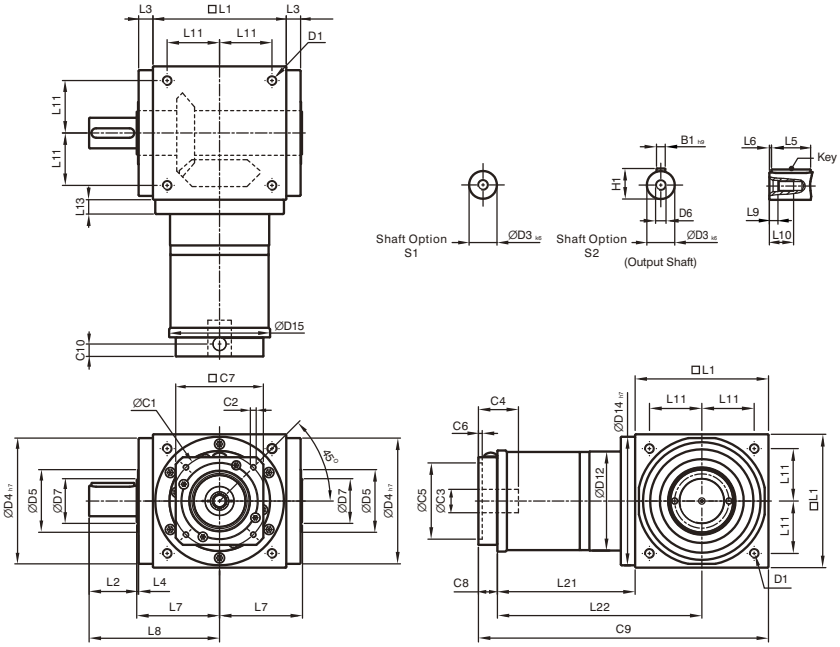
[unit: mm]

Dimension	AT065 FL1/FR1	AT075 FL1/FR1	AT090 FL1/FR1	AT110 FL1/FR1	AT140 FL1/FR1	AT170 FL1/FR1	AT210 FL1/FR1	AT240 FL1/FR1	AT280 FL1/FR1
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 k6	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	105	130	158	178	198
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	49	60.5	63	69.5	85.5	95	130	144.5	135
L22	81.5	98	108	124.5	155.5	180	235	264.5	275
C1[5]	46	70	100	100	130	165	215	215	235
C2[5]	M4	M5	M6	M6	M8	M10	M12	M12	M12
C3[5]	≤11 / ≤12[6]	≤14 / ≤15.875 / ≤16[6]	≤19	≤24	≤32	≤38	≤42	≤48	≤55
C4[5]	30	34	40	40	50	60	85	85	116
C5[5]	30	50	80	80	110	130	180	180	200
C6[5]	3.5	8	4	4	5	6	6	6	6
C7[5]	42	60	90	90	115	142	190	190	220
C8[5]	19.5	19	17	17	19.5	22.5	29	29	63
C9[5]	133.5	154.5	170	196.5	245	287.5	369	413.5	478
C10[5]	13.25	13.5	10.75	10.75	13	15	20.75	20.75	53.5
B1 h9	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64

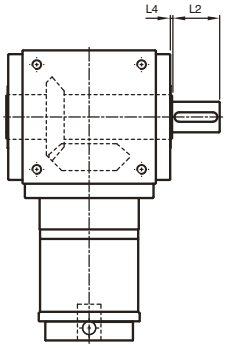
5. C1~C10 are motor specific dimensions (metric std shown). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.
6. AT065 FL1/FR1M1 offers C3 ≤12 option; AT075 FL1/FR1M1 offers C3 ≤16 option; AT075 FL1/FR1M2 offers C3 ≤15.875 option.

▶ Dimensions (2-stage, Ratio i=7~50) AT-FL1/FR1 ATB-FL1/FR1 Series

AT-FL1 / ATB-FL1



AT-FR1 / ATB-FR1



* The dimensions of ATB series are identical to AT series.

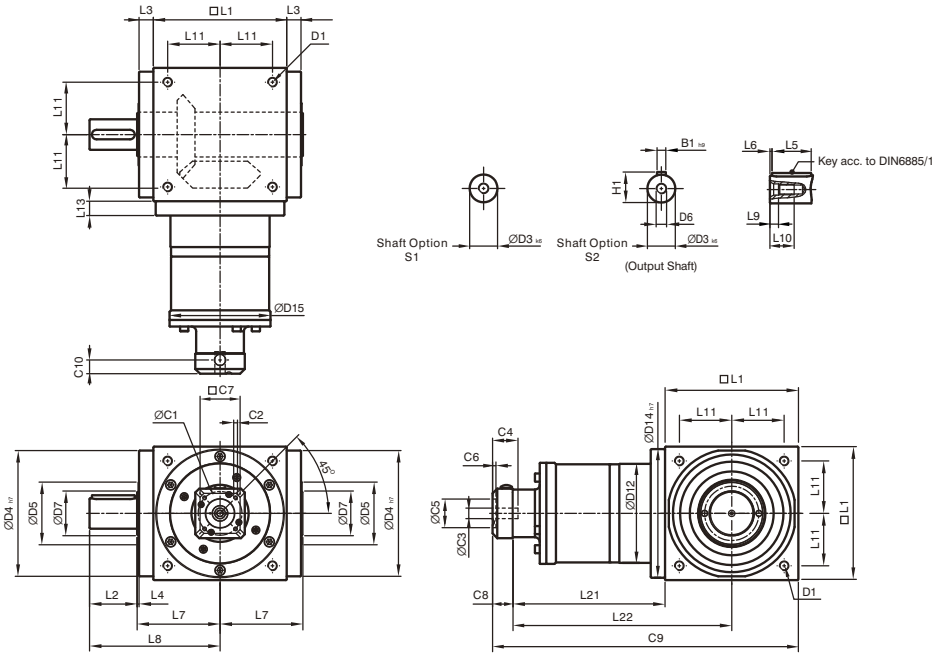
[unit: mm]

Dimension	AT065 FL1/FR1	AT075 FL1/FR1	AT090 FL1/FR1	AT110 FL1/FR1	AT140 FL1/FR1	AT170 FL1/FR1	AT210 FL1/FR1	AT240 FL1/FR1	AT280 FL1/FR1
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 k6	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	106	130	158	178	198
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	75	84.5	99	122	144.5	157.5	206.5	239	248
L22	107.5	122	144	177	214.5	242.5	311.5	359	388
C1[7]	46	46	70	100	100	100	130	165	165
C2[7]	M4	M4	M5	M6	M6	M6	M8	M10	M10
C3[7]	≤12	≤12	≤16	≤24	≤24	≤24	≤32	≤38	≤38
C4[7]	30	30	34	40	40	40	50	60	60
C5[7]	30	30	50	80	80	80	110	130	130
C6[7]	3.5	3.5	8	4	4	4	5	6	6
C7[7]	42	42	60	92	92	92	115	142	142
C8[7]	21.5	21.5	21.5	20	20	20	24	31	31
C9[7]	161.5	181	210.5	252	304.5	347.5	440.5	510	559
C10[7]	14.55	14.5	15.5	13	13	13	16	21	21
B1 h9	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64

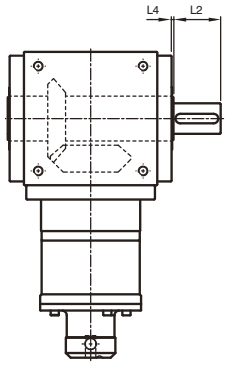
7. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and design Tool to view your specific motor mounting system.

▶ Dimensions (3-stage, Ratio i=75~500) AT-FL1/FR1 ATB-FL1/FR1 Series

AT-FL1 / ATB-FL1



AT-FR1 / ATB-FR1



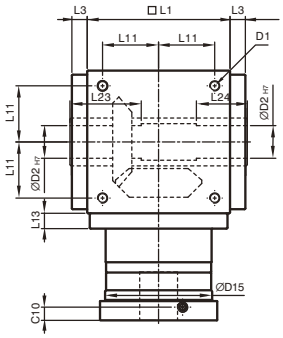
* The dimensions of ATB series are identical to AT series.

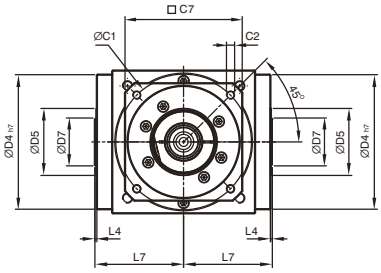
[unit: mm]

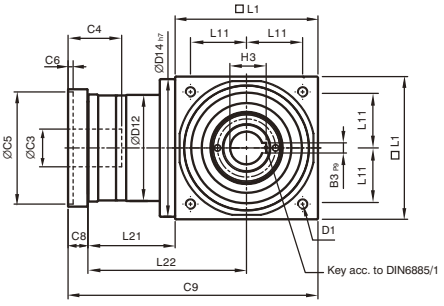
Dimension	AT110 FL1/FR1	AT140 FL1/FR1	AT170 FL1/FR1	AT210 FL1/FR1	AT240 FL1/FR1	AT280 FL1/FR1
D1	M8	M10	M12	M16	M16	M16
D3 k6	22	32	40	50	55	60
D4 h7	108	135	165	205	235	275
D5	53	68	83	104	124	144
D6	M8	M12	M16	M16	M16	M20
D7	33	47	55	75	85	110
D12	106	104	128	160	180	200
D14 h7	108	135	165	205	235	275
D15	107	106	130	158	178	198
L1	110	140	170	210	240	280
L2	40	50	60	75	85	110
L3	15	15	15	20	25	25
L4	2	2	2	2	2	2
L5	32	45	50	70	80	100
L6	4	2.5	5	2.5	2.5	5
L7	72	87	102	127	147	167
L8	112	137	162	202	232	277
L9	7.2	10	12	12	12	15
L10	19	28	36	36	36	42
L11	44	55	67	85	95	110
L13	15	15	15	20	25	25
L21	136.5	159.5	183.5	226	269	278
L22	191.5	229.5	268.5	331	389	418
C1[8]	46	46	70	70	100	100
C2[8]	M4	M4	M5	M5	M6	M6
C3[8]	≤12	≤12	≤16	≤16	≤24	≤24
C4[8]	30	30	34	34	40	40
C5[8]	30	30	50	50	80	80
C6[8]	3.5	3.5	8	8	4	4
C7[8]	42	42	60	60	92	92
C8[8]	21.5	21.5	21.5	21.5	20	20
C9[8]	268	321	375	457.5	529	578
C10[8]	14.5	14.5	15.5	15.5	13	13
B1 h9	6	10	12	14	16	18
H1	24.5	35	43	53.5	59	64

8. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and design Tool to view your specific motor mounting system.

▶ Dimensions (1-stage, Ratio i=1~5) AT-FH / ATB-FH Series







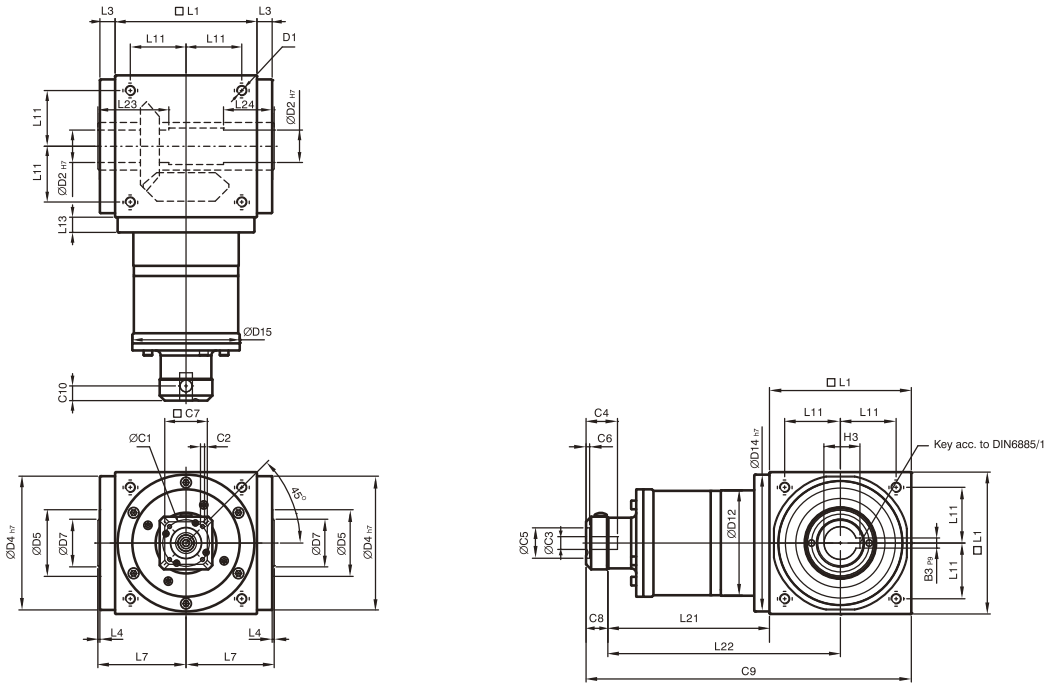
* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT065FH	AT075FH	AT090FH	AT110FH	AT140FH	AT170FH	AT210FH	AT240FH	AT280FH
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D2 H7	13	14	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	105	130	158	178	198
L1	65	75	90	110	140	170	210	240	280
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L7	47.5	54	62	72	87	102	127	147	167
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	49	60.5	63	69.5	85.5	95	130	144.5	135
L22	81.5	98	108	124.5	155.5	180	235	264.5	275
L23	40	47	52	53	70	80	95	115	115
L24	30	32	35	35	50	55	65	80	80
C1[9]	46	70	100	100	130	165	215	215	235
C2[9]	M4	M5	M6	M6	M8	M10	M12	M12	M12
C3[9]	≤11 / ≤12[10]	≤14 / ≤15.875 / ≤16[10]	≤19	≤24	≤32	≤38	≤42	≤48	≤55
C4[9]	30	34	40	40	50	60	85	85	116
C5[9]	30	50	80	80	110	130	180	180	200
C6[9]	3.5	8	4	4	5	6	6	6	6
C7[9]	42	60	90	90	115	142	190	190	220
C8[9]	19.5	19	17	17	19.5	22.5	29	29	63
C9[9]	133.5	154.5	170	196.5	245	287.5	369	413.5	478
C10[9]	13.25	13.5	10.75	10.75	13	15	20.75	20.75	53.5
B3 P9	5	5	6	6	10	12	14	16	18
H3	15.3	16.3	20.8	24.8	35.3	43.3	53.8	59.3	64.4

9. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and design Tool to view your specific motor mounting system.
10. AT065FHM1 offers C3 ≤12 option; AT075FHM1 offers C3 ≤16 option; AT075FHM2 offers C3 ≤15.875 option.

▶ Dimensions (3-stage, Ratio i=75~500) AT-FH / ATB-FH Series



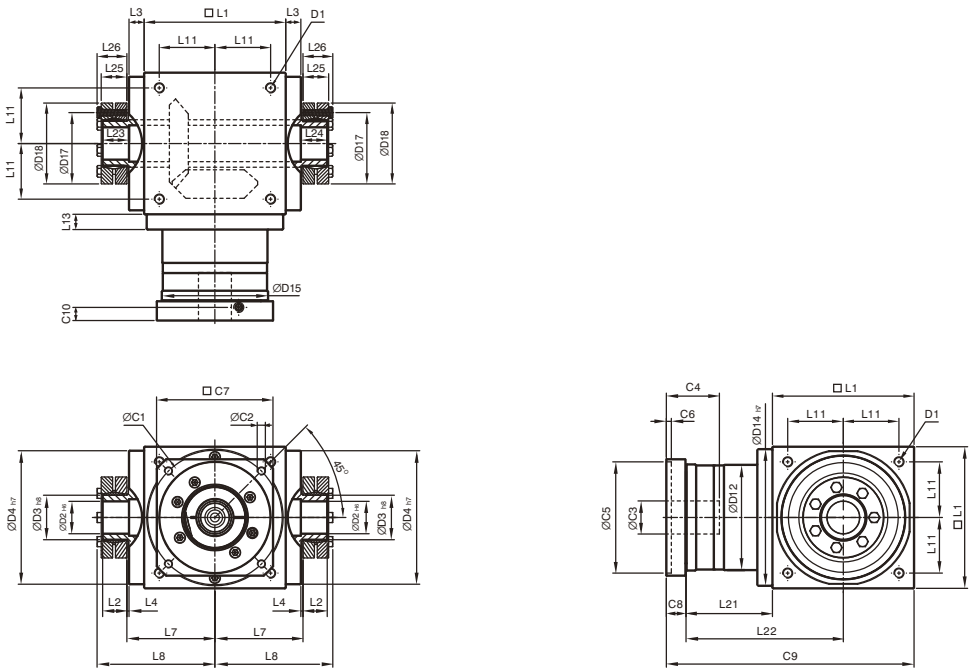
* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT110FH	AT140FH	AT170FH	AT210FH	AT240FH	AT280FH
D1	M8	M10	M12	M16	M16	M16
D2 H7	22	32	40	50	55	60
D4 h7	108	135	165	205	235	275
D5	53	68	83	104	124	144
D7	33	47	55	75	85	110
D12	106	104	128	160	180	200
D14 h7	108	135	165	205	235	275
D15	107	106	130	158	178	198
L1	110	140	170	210	240	280
L3	15	15	15	20	25	25
L4	2	2	2	2	2	2
L7	72	87	102	127	147	167
L11	44	55	67	85	95	110
L13	15	15	15	20	25	25
L21	136.5	159.5	183.5	226	269	278
L22	191.5	229.5	268.5	331	389	418
L23	53	70	80	95	115	115
L24	35	50	55	65	80	80
C1[12]	46	46	70	70	100	100
C2[12]	M4	M4	M5	M5	M6	M6
C3[12]	≤12	≤12	≤16	≤16	≤24	≤24
C4[12]	30	30	34	34	40	40
C5[12]	30	30	50	50	80	80
C6[12]	3.5	3.5	8	8	4	4
C7[12]	42	42	60	60	92	92
C8[12]	21.5	21.5	21.5	21.5	20	20
C9[12]	268	321	375	457.5	529	578
C10[12]	14.5	14.5	15.5	15.5	13	13
B3 P9	6	10	12	14	16	18
H3	24.8	35.3	43.3	53.8	59.3	64.4

12. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and design tool to view your specific motor mounting system.

▶ Dimensions (1-stage, Ratio i=1~5) AT-FC / ATB-FC Series



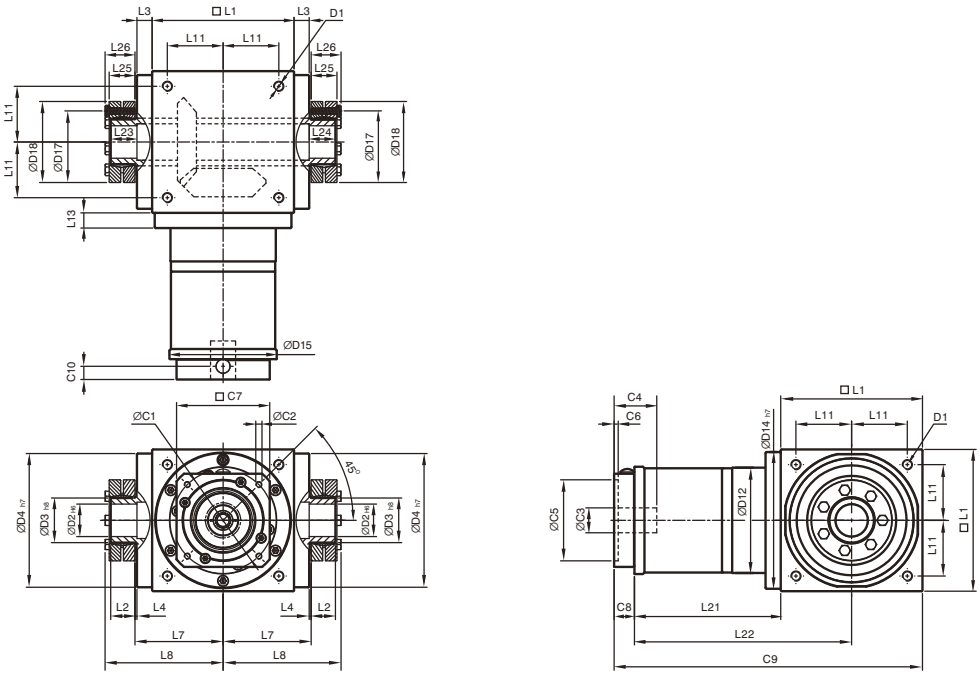
* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT065FC	AT075FC	AT090FC	AT110FC	AT140FC	AT170FC	AT210FC	AT240FC	AT280FC
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D2 H6	13	14	18	22	32	40	50	55	60
D3 h8	16	16	22	25	44	50	62	68	75
D4 h7	63	73	88	108	135	165	205	235	275
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	105	130	158	178	198
D17	26	26	36	38	61	70	86	86	100
D18	41	41	50	50	80	90	110	115	138
L1	65	75	90	110	140	170	210	240	280
L2	14	14	18	18	24	26	29	29	30.5
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L7	47.5	54	62	72	87	102	127	147	167
L8	66	72.5	85	95	116.5	133.5	161.5	181.5	205
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	49	60.5	63	69.5	85.5	95	130	144.5	135
L22	81.5	98	108	124.5	155.5	180	235	264.5	275
L23	15	15	20	20	26	28	31	31	32.5
L24	15	15	20	20	26	28	31	31	32.5
L25	15	15	19.5	19.5	25.5	27.5	30.5	30.5	32.5
L26	18.5	18.5	23	23	29.5	31.5	34.5	34.5	38
C1[13]	46	70	100	100	130	165	215	215	235
C2[13]	M4	M5	M6	M6	M8	M10	M12	M12	M12
C3[13]	≤11 / ≤12[14]	≤14 / ≤15.875 / ≤16[14]	≤19	≤24	≤32	≤38	≤42	≤48	≤55
C4[13]	30	34	40	40	50	60	85	85	116
C5[13]	30	50	80	80	110	130	180	180	200
C6[13]	3.5	8	4	4	5	6	6	6	6
C7[13]	42	60	90	90	115	142	190	190	220
C8[13]	19.5	19	17	17	19.5	22.5	29	29	63
C9[13]	133.5	154.5	170	196.5	245	287.5	369	413.5	478
C10[13]	13.25	13.5	10.75	10.75	13	15	20.75	20.75	53.5

13. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and design tool to view your specific motor mounting system.
14. AT065FCM1 offers C3 ≤12 option; AT075FCM1 offers C3 ≤16 option; AT075FCM2 offers C3 ≤15.875 option.

▶ Dimensions (2-stage, Ratio i=7~50) AT-FC / ATB-FC Series



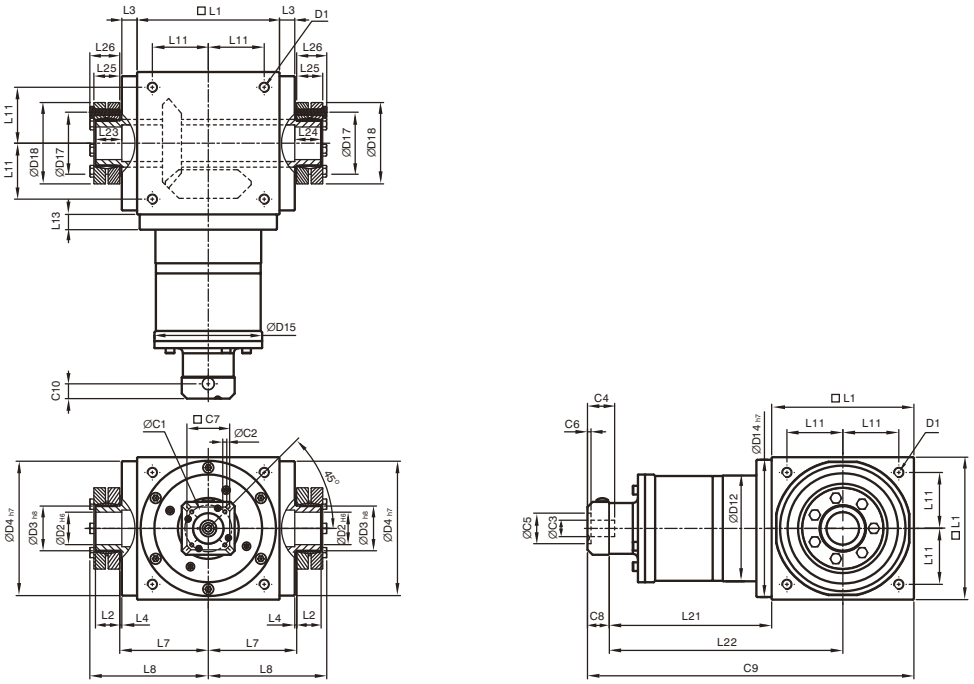
* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT065FC	AT075FC	AT090FC	AT110FC	AT140FC	AT170FC	AT210FC	AT240FC	AT280FC
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D2 H6	13	14	18	22	32	40	50	55	60
D3 h8	16	16	22	25	44	50	62	68	75
D4 h7	63	73	88	108	135	165	205	235	275
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	106	130	158	178	198
D17	26	26	36	38	61	70	86	86	100
D18	41	41	50	50	80	90	110	115	138
L1	65	75	90	110	140	170	210	240	280
L2	14	14	18	18	24	26	29	29	30.5
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L7	47.5	54	62	72	87	102	127	147	167
L8	66	72.5	85	95	116.5	133.5	161.5	181.5	205
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	75	84.5	99	122	144.5	157.5	206.5	239	248
L22	107.5	122	144	177	214.5	242.5	311.5	359	388
L23	15	15	20	20	26	28	31	31	32.5
L24	15	15	20	20	26	28	31	31	32.5
L25	15	15	19.5	19.5	25.5	27.5	30.5	30.5	32.5
L26	18.5	18.5	23	23	29.5	31.5	34.5	34.5	38
C1[15]	46	46	70	100	100	100	130	165	165
C2[15]	M4	M4	M5	M6	M6	M6	M8	M10	M10
C3[15]	≤12	≤12	≤16	≤24	≤24	≤24	≤32	≤38	≤38
C4[15]	30	30	34	40	40	40	50	60	60
C5[15]	30	30	50	80	80	80	110	130	130
C6[15]	3.5	3.5	8	4	4	4	5	6	6
C7[15]	42	42	60	92	92	92	115	142	142
C8[15]	21.5	21.5	21.5	20	20	20	24	31	31
C9[15]	161.5	181	210.5	252	304.5	347.5	440.5	510	559
C10[15]	14.5	14.5	15.5	13	13	13	16	21	21

15. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and design tool to view your specific motor mounting system.

▶ Dimensions (3-stage, Ratio i=75~500) AT-FC / ATB-FC Series



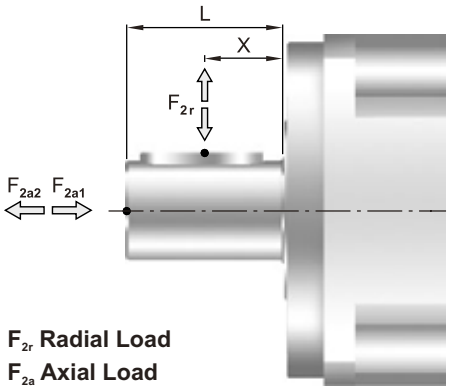
* The dimensions of ATB series are identical to AT series.

[unit: mm]

Dimension	AT110FC	AT140FC	AT170FC	AT210FC	AT240FC	AT280FC
D1	M8	M10	M12	M16	M16	M16
D2 H6	22	32	40	50	55	60
D3 h8	25	44	50	62	68	75
D4 h7	108	135	165	205	235	275
D12	106	104	128	160	180	200
D14 h7	108	135	165	205	235	275
D15	107	106	130	158	178	198
D17	38	61	70	86	86	100
D18	50	80	90	110	115	138
L1	110	140	170	210	240	280
L2	18	24	26	29	29	30.5
L3	15	15	15	20	25	25
L4	2	2	2	2	2	2
L7	72	87	102	127	147	167
L8	95	116.5	133.5	161.5	181.5	205
L11	44	55	67	85	95	110
L13	15	15	15	20	25	25
L21	136.5	159.5	183.5	226	269	278
L22	191.5	229.5	268.5	331	389	418
L23	20	26	28	31	31	32.5
L24	20	26	28	31	31	32.5
L25	19.5	25.5	27.5	30.5	30.5	32.5
L26	23	29.5	31.5	34.5	34.5	38
C1[16]	46	46	70	70	100	100
C2[16]	M4	M4	M5	M5	M6	M6
C3[16]	≤12	≤12	≤16	≤16	≤24	≤24
C4[16]	30	30	34	34	40	40
C5[16]	30	30	50	50	80	80
C6[16]	3.5	3.5	8	8	4	4
C7[16]	42	42	60	60	92	92
C8[16]	21.5	21.5	21.5	21.5	20	20
C9[16]	268	321	375	457.5	529	578
C10[16]	14.5	14.5	15.5	15.5	13	13

16. C1~C10 are motor specific dimensions (metric std shown). Refer to www.apexdyna.com and design tool to view your specific motor mounting system.

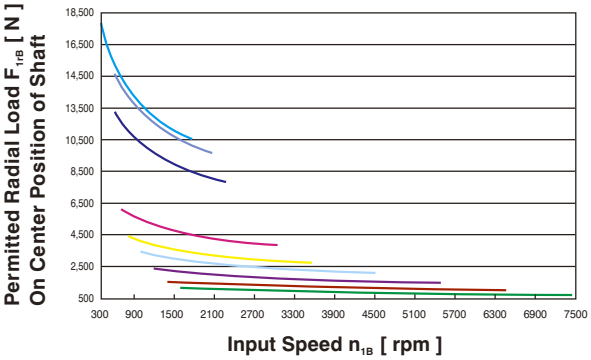
Permitted Radial and Axial Loads



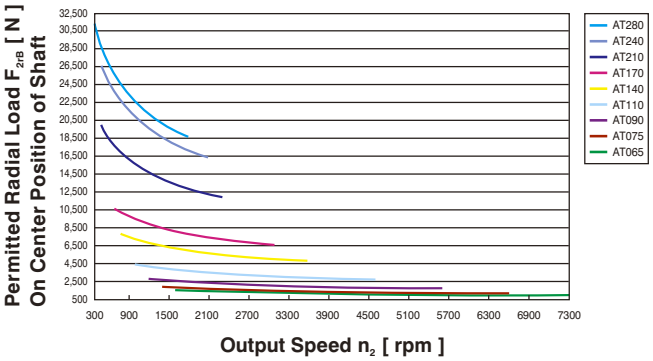
F_{2r} Radial Load
F_{2a} Axial Load

The permitted radial and axial loads on output shaft of the gearbox depend on the design of the gearbox supporting bearings.
APEX use the extension straddle oversized ball bearing design.
It can take heavy load from both axes.

AT / ATB Input
Permitted Radial Load F_{1rB}

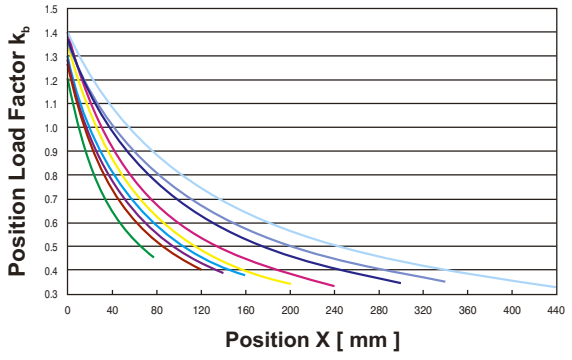


AT / ATB Output
Permitted Radial Load F_{2rB}

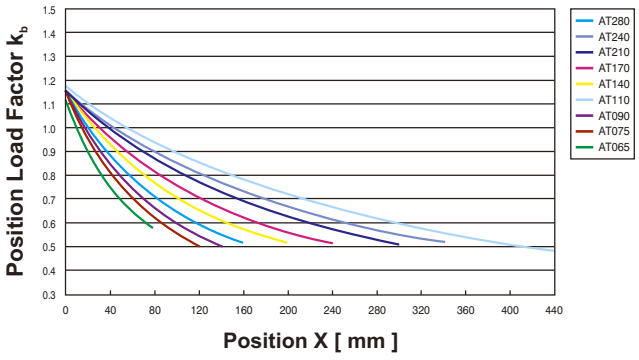


If radial force F_{2r} is exert on the center of the output shaft X=1/2 x L.
The permitted radial load is given on left diagram.

AT / ATB Input

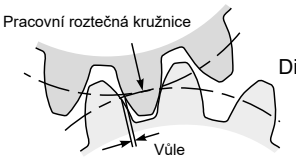
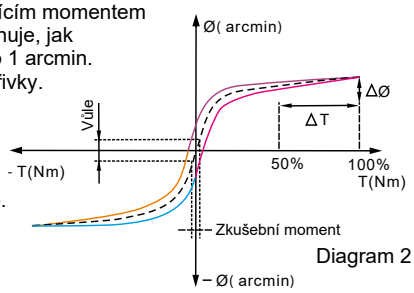
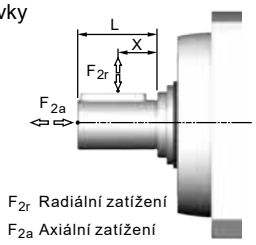


AT / ATB Output



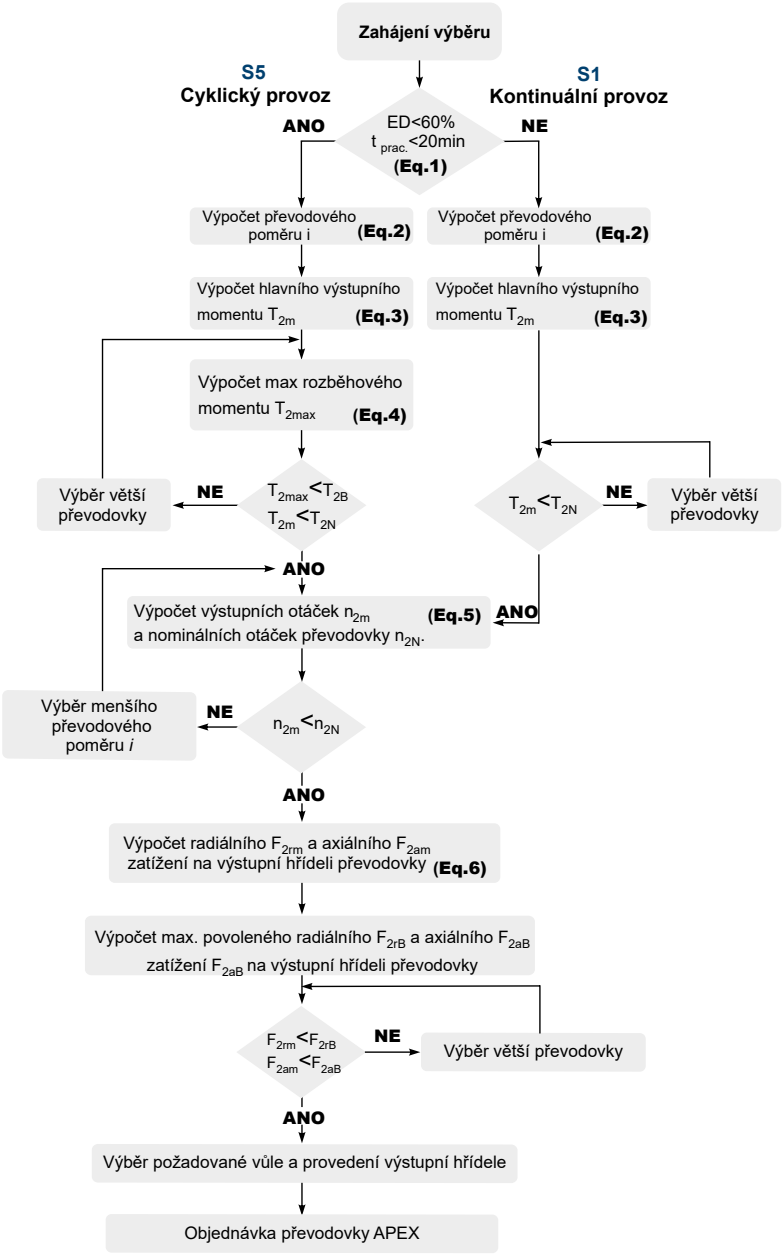
If radial force F_{2r} is not exert on the center of the output shaft X<1/2 x L or X>1/2 x L
The permitted radial and axial loads can be calculated by the position load factor K_b on the left diagram.

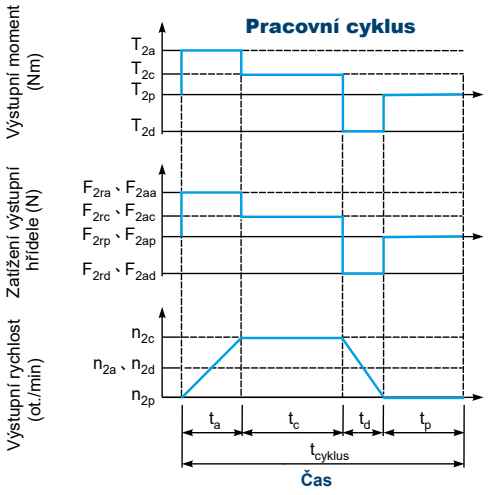
▶ Slovníček pojmů

Bezpečnostní Stop moment T_{2NOT} *Emergency Stop Torque*	Nm	Bezpečnostní Stop Moment je maximální povolený moment na výstupu převodovky. Této hodnoty může být dosaženo pouze výjímečně, maximálně 1000 krát během životonosti převodovky.
Max. akcelerační moment T_{2B} *Max. Acceleration Torque*	Nm	Maximální moment na výstupu převodovky (při cyklickém zatížení S5) přenášený krátkodobě, maximální frekvence 1000 cyklů/hodina.
Moment na prázdno *No Load Running Torque*	Nm	Minimální moment potřebný k pootočení převodovky bez zatížení.
Nominální vstupní otáčky n_{1N} *Nominal Input Speed*	ot/min	Povolené otáčky na vstupu převodovky při kontinuálním zatížení, pokud teplota těla převodovky nepřesáhne 90°C. Hodnota je měřena při teplotě 25°C.
Maximální vstupní otáčky n_{1B} *Max. Input Speed*	ot/min	Maximální povolené otáčky na vstupu převodovky při cyklickém zatížení (S5). Tato hodnota je měřena při teplotě 25°C a slouží jako absolutní limit převodovky.
Vůle *Backlash*	arcmin	Vůle je maximální úhlová míra mezi dvěma zuby ozubených kol v příčné ose při záběru. Použitá jednotka je arcus minuta (úhlová minuta) rovna 1/60 stupně.  Diagram 1
Torzní tuhost *Torsional Rigidity*	Nm/arcmin	Torzní tuhost je poměr (ΔT/ΔØ) mezi aplikovaným kroutícím momentem a výsledným torzním úhlem natočení. Tato hodnota definuje, jak velký moment je potřeba k pootočení výstupní hřídele o 1 arcmin. Torzní tuhost může být definována pomocí hysterezní křivky. Hysterezní křivka: Při zablokované vstupní hřídeli pomalu navyšujeme moment na výstupní hřídeli v obou směrech až do hodnoty T_{2B} a následně pozvolna napětí uvolňujeme. Dle naměřeného momentu a torzního úhlu získáme křivku viz Diagram 2.  Diagram 2
Radiální a axiální zatížení *Radial Load and Axial Load*	N	Povolené radiální a axiální zatížení výstupní hřídele převodovky závisí na použitých podpůrných ložiscích. Udává se hodnota působící na střed výstupní hřídele v ose (F_{2a}) i délce (F_{2r}). X = ½ L 
Účinnost η *Efficiency*	%	Účinnost ozubených převodů uvnitř převodovky (bez tření).
Provozní teplota *Operating Temperature*	°C	Teplota skříně převodovky při provozu.
Třída krytí *Degree of Protection*		Označení IP dle mezinárodních ochranných standardů. Příklad IP 65. První číslo označuje ochranu proti prachu; druhá číslice označuje ochranu proti tekutinám.
Mazání *Lubrication*		Apex používá syntetická maziva. Alternativní maziva jsou k dispozici. Kontaktujte APEX.
Hlučnost *Running Noise*	dB(A)	Hlučnost převodovky závisí na velikosti převodovky, převodovém poměru a rychlosti *. Větší rychlost obvykle způsobí větší hlučnost. Větší převodový poměr snižuje hlučnost.
Moment setrvačnosti J_1 *Moment of Inertia*	kg.cm²	Moment setrvačnosti J1 je hodnota zátěže, působící na objekt pro zachování momentálního stavu v klidu nebo otáčení.
Rozjezdový moment *Breakaway Torque*	Nm	Minimální moment potřebný k pootočení vstupní hřídele. Malé převodovky nebo velké převodové poměry potřebují nižší rozjezdový moment.
Zpětný moment *Back Driving Torque*	Nm	Minimální moment potřebný k pootočení výstupní hřídele / příruby. Velké převodovky nebo velké převodové poměry vyžadují velký zpětný moment.

* Tato hodnota je měřena při teplotě 25 °C a při vstupních otáčkách 3000 ot/min. Pokud jsou nominální vstupní otáčky převodovky větší než 3000 ot/min bude hodnota měřena při nominálních otáčkách dané převodovky.

▶ Výběr optimální převodovky





Eq.1 $ED = \frac{t_a + t_c + t_d}{t_{cyklus}} \times 100\%, \; t_{prac.} = t_a + t_c + t_d$

Vysvětlivky: a: zrychlení, c: konstanta,
d: zpomalení, p: pauza

Eq.2 $i \cong \frac{n_m}{n_{prac.}}$

n_m výstupní otáčky motoru

$n_{prac.}$ pracovní otáčky

Eq.3 $T_{2m} = \sqrt[3]{\frac{n_{2a} \times t_a \times T_{2a}^{\,3} + n_{2c} \times t_c \times T_{2c}^{\,3} + n_{2d} \times t_d \times T_{2d}^{\,3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$

Eq.4 $T_{2max} = T_{mB} \times i \times K_s \times \eta$

kde K_s je

K_s	Počet cyklů / hod
1.0	0 ~ 1.000
1.1	1.000 ~ 1.500
1.3	1.500 ~ 2.000
1.6	2.000 ~ 3.000
1.8	3.000 ~ 5.000

T_{mB} maximální výstupní moment motoru

η účinnost převodovky

Eq.5
$n_{2a} = n_{2d} = \frac{1}{2} \times n_{2c}$

$n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{t_a + t_c + t_d}$

$n_{2N} = \frac{n_{1N}}{i}$

Eq.6

$F_{2rm} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2ra}^{\,3} + n_{2c} \times t_c \times F_{2rc}^{\,3} + n_{2d} \times t_d \times F_{2rd}^{\,3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$

$F_{2am} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2aa}^{\,3} + n_{2c} \times t_c \times F_{2ac}^{\,3} + n_{2d} \times t_d \times F_{2ad}^{\,3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$

Doporučení pro S5 cyklické operace

a) standardní řešení: $\frac{J_L}{i^2} \leq 4 \times J_m$

b) optimální řešení: $\frac{J_L}{i^2} \cong J_m$

Vysvětlivky

- i převodový poměr
- T_{2B} maximální akcelerační moment převodovky
- T_{2N} jmenovitý výstupní moment převodovky
- J_L moment setrvačnosti při zatížení
- J_m moment setrvačnosti motoru

Poznámky

Poznámky

Poznámky

Poznámky

APEX DYNAMICS

VÁŠ SPECIALISTA

pro precizní mechanické převody.

Společnost APEX DYNAMICS INC. je světově nejproduktivnější výrobce precizních planetových převodovek pro servopohony. Je znám po celém světě pro svůj vysoký standard kvality, spolehlivosti a široké portfolio produktů. Zákazníci a partneři oceňují naši vysokou technickou odbornost a poradenství spolu s komplexními nabídkami včetně konkrétních řešení jejich požadavků na aplikace. Jsme specialisté v oblasti přesné automatizační techniky a své práci rozumíme.

V našem ISO 9001 a ISO 14001 certifikovaném výrobním závodě se sídlem v Taichungu, Tchaj-wan, vyrábíme převodovky za použití nejnovějších přesných obráběcích strojů, zkoušek kvality a kontrolních procesů na více jak 80.000 m^2 s měsíční kapacitu 50.000ks. Díky tomu dosahujeme bezkonkurenčně nejkratších dodacích termínů i pro dodávky v jednotkách kusů.

Kompletní zaměření na kvalitu a preciznost nám umožňuje vyrábět vysoce kvalitní převodovky s vůlí v převodech do méně než 1 arcmin (1/60 stupně), s konzistencí a vysokou spolehlivostí. Na základech více jak třicet let nashromážděných zkušeností s výrobou a odbytem, doplněných o nejvyšší úroveň technické způsobilosti, my v Apex Dynamics navrhujeme a vyrábíme technicky pokročilé planetové převodovky pro servo aplikace s vysokou rychlostí a nízkou vůlí. Naše průlomové patentované technologie (přes 6 patentů) poskytují zákazníkovi optimální vysoce přesné reduktory za rozumnou cenu. Neustále zlepšujeme procesy, nalézáme správné a efektivní metody, abychom vám zákazníkům mohli nabídnout nová řešení náročných aplikací a vyvíjet nové produkty. V každodenním provozu se primárně zaměřujeme na kvalitu. Jsme hrdí na naši oddanost kvalitě; naší povinností – je spokojenost zákazníka.

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