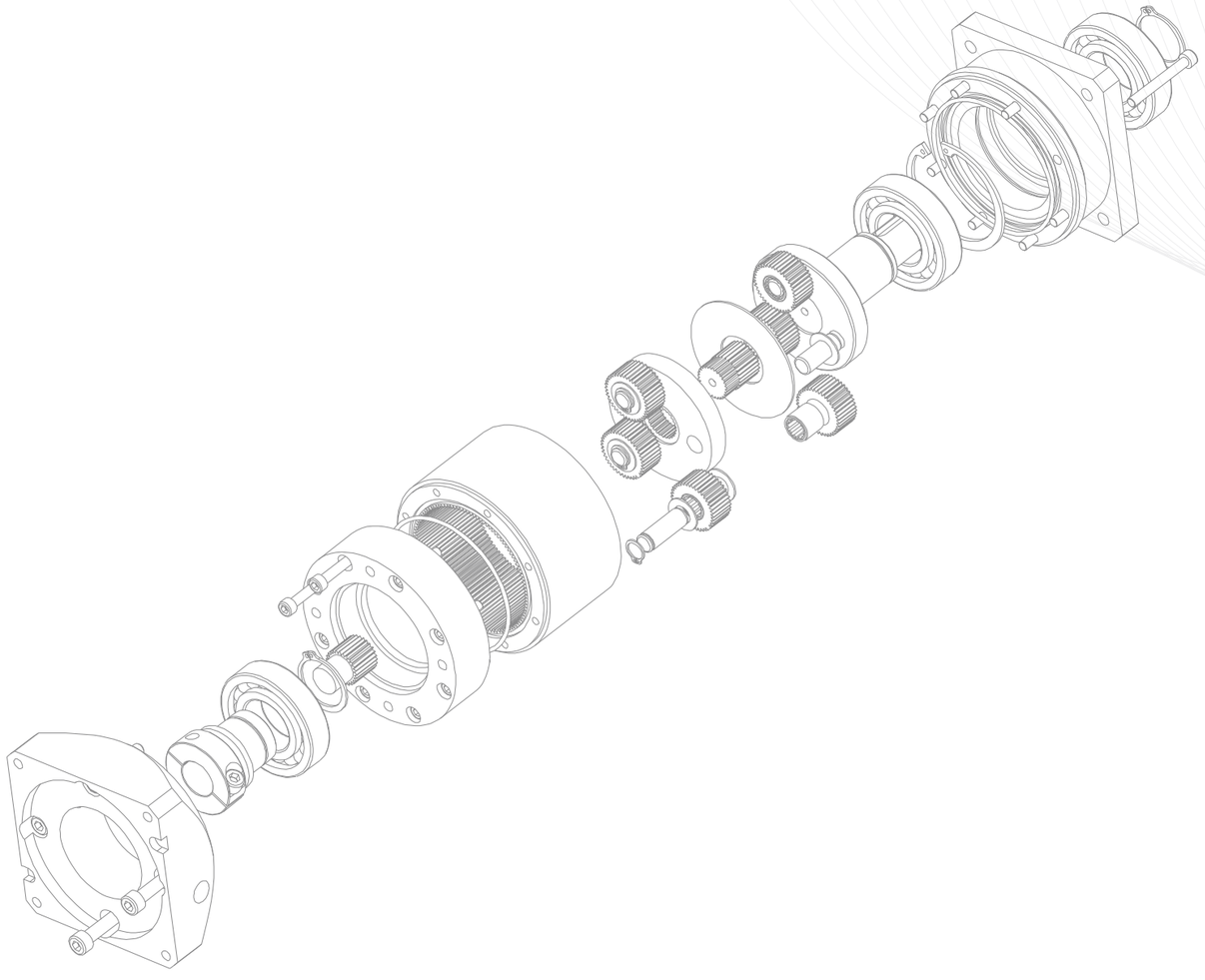
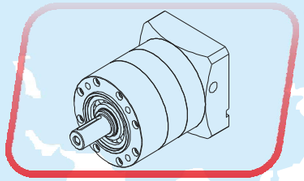
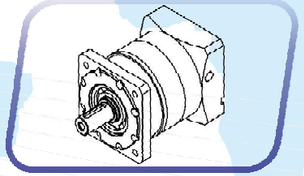
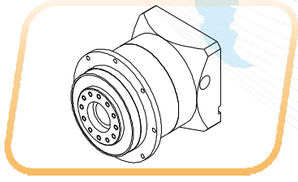
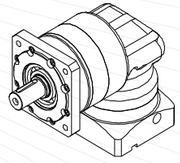
HNC Electric

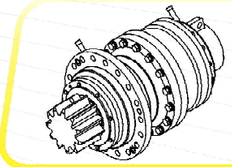












HNC Electric

Thanks for choosing HNC product
Any technique support,please feel to contact our support team

URL:www. hncelectric. com
Email:support@hncelectric.com

HNC Helical Tooth Gearbox Catalog

Version: V2.0

目录

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ABOUT US

关于我们

HNC ELECTRIC LIMITED is a company dedicated to the development and production of intelligent industrial automation solutions based on national strategic needs.

Supported by its outstanding electrical and electronic technology and strong control technology, it provides control, display, drive and system solutions and other related products and services to customers worldwide.

With 29 years of hard work, we have developed and produced professional CNC systems, industrial robots, servo drives, servo motors, reducers, inverters, PLCs, HMIs, etc.

In more than 80 countries and regions around the world, we have established a comprehensive agent system and after-sales service system. In the future, we will, as always, provide more professional services for global industrial automation.

HNC ELECTRIC LIMITED是一家立足国家战略需求，致力于智能工业自动化解决方案研发和生产的公司。

以其卓越的电气电子技术和强大的控制技术为支撑，为全球客户提供控制、显示、驱动和系统解决方案等相关产品和服务。

经过29年的努力，我们研发生产了专业数控系统、工业机器人、伺服驱动器、伺服电机、减速机、变频器、PLC、HMI等。

在全球80多个国家和地区建立了完善的代理体系和售后服务体系。未来，我们将一如既往，为全球工业自动化提供更专业的服务。

Development History

发展历程

1994

HNC Group established, which is the research and industrialization base of CNC system in China.

2006

HS Robotics established.

2010-2013

2010
HNC Group was listed.

2011
HNC Electric established to vigorouslydevelop overseas market.

2012
HNC Electric integrated a full range of industrial automation product lines to achieve one-stop service.

2014-2015

2014
HNC Electric India branch established.

2015
HNC Electric Mexico branch established.

2016-2018

2016
HNC Electric South Africa branch was established .

Established agency in: Iran (General Inverter)

2018
Established agency in:USA/Pakistan/ Brazil/Lithuania

2019-2020

2019
HNC Electric Malaysia branch established .

Established agency in: Kenya/Iran (Elevator Inverter)

2020
Established agency in: Venezuela/ Dominica/Panama

2021-2022

2021
Established agency in: Romania

2022
HNC Electric Bulgaria branch established

Established agency in: Spain/Portugal/ USA/Jordan/ Costa Rica/UAE/ Russia/Turkey/ Egypt/KSA

企业历程是企业所走过的历史足迹，回首过去，展望未来，我们一直在不断地创新、学习、并从中成长。风雨无阻，携手同行。

Corporate history is the historical footprint of enterprises, looking back and looking forward, We are constantly innovating, learning, and growing from it. Rain or shine, go hand in hand.

High Precision Right Inclined Tooth Series

高精密直角斜齿系列

- AF SERIES
- ALF SERIES
- AL SERIES
- ALE SERIES
- AH SERIES
- ZAF SERIES
- ZAL SERIES

Advanced Manufacturing Platform

先进的制造平台

精益化的组装制程，追求完美品质意识，已深入世华人心中。生产效率及品质严格以高标准执行。

从技术到实力，到产业配套，再到制造规模，世华始终走在行业的最前端，继续保持若行业领先，并不断扩大行业优势。

The lean assembly process and the pursuit of perfect qualityawareness have been deeply rooted in HNC people.Production efficiency and quality are strictly implemented to high standards.

From technology to strength, to industrial support, tomanufacturing scale, HNC has always been at the forefrontof the industry, continues to maintain industry leadership, and continues to expand its industry advantages.

Provide a solid guarantee
for innovative research and
development

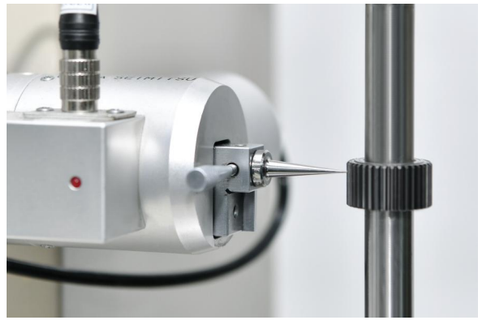
为创新研发提供坚实保障

我们有一支专业的品质管理团队，运用科学的品质管理标准，借助先进的检测设备，对产品在各个环节的质量实行严格管控，确保为客户提供优质产品。

We have a professional quality management team, using scientific quality management standards, with advanced testing equipment, strict quality control of the quality of products in all aspects, to ensure that customers provide quality products.

Precision Testing Center

精密的检测中心



Product features

产品特点

精密行星齿轮减速机是我公司自主研发的新一代实用性产品，具有以下一些主要特点

Precision planetary gear reducer is a new generation of practical products independently developed by our company, which has the following main characteristics

低噪音
Low noise

低于65db。
below 65db.

高输入转速
High input speed

可达5000RPM。
Up to 5000RPM.

低间隙
Low Backlash

单级可达3弧分内，双级可达5弧分内。
One stage within 3 arc minutes, Two stage with 5 arcmin.

高扭矩
High torque

比一般行星减速机扭矩高。
Higher than conventional planetary gearbox.

高效率
High efficiency

单段式在97%以上，双段式在95%以上。
One stage is exceed 97%, Two stage is exceed 95%.

高稳定性
High stability

采用高强度合金钢材，整个齿轮经硬化处理，非只有表面硬化，确保使用寿命及长期使用仍保持最初的精密度。

Using high-strength steel alloy materal .Not just hardening on gear surface, but hardening entire gear to insure the gear life time and maintain high accuracy.

Product application

产品用途

精密行星齿轮减速机被广泛应用于以下领域

Precision planetary gear reducer is widely used in the following fields

01 航空航天、军事产业。
Aerospace, military industries.

02 医疗卫生、电子信息技术产业。
Medical health care, electronic information technology industry.

03 工业机器人、生产自动化、数控机床制造产业。
Industrial robot, production automation, CNC machine tool manufacturing industry.

04 汽车制造、纺织、印刷、食品、冶金、环保工程、仓储物流等产业。
Motor, textile, printing, food, metallurgical, environmental protection engineering, warehouse and logistics industry.

Description Reducer

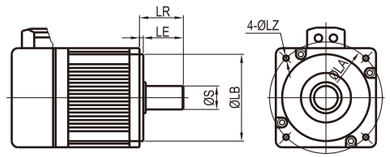
减速机订货说明

减速机型号说明 Reducer model description

A F 060 L1 7 K 3 16 001 YT 14

- 14: 电机输入轴径 Motor input shaft diameter
- YT: 法兰种类 The flange species (YT: 一体法兰 Integral flange FT: 分体法兰Split flange)
- 001: 连接法兰编号 Connecting flange serial number
- 16: 输出轴径 Output shaft diameter
- 3: 背隙 Backlash (3:3 弧分3arc/min 5:5 弧分5arc/min)
- K: 输出方式 Output style (K: 附带输出轴键Shaft with key S: 无输出轴键Smooth shaft)
- 7: 减速比 Ratio (详情请参阅内页 Refer to the inside page for details)
- L1: 级数 Stage (L1:一级1Stage L2:二级2Stage)
- 060: 规格 Model (060/090/115/140/180)
- F: 系列名称 Series name
- A: A减速机的名称 Model name for A reducer

电机输出安装尺寸说明 Motor output installation dimension description



(ΦS×LR / ΦLB×LE / 4-ΦLZ-ΦLA)

电机“安装孔“相关尺寸
4: 安装孔数量，一般为4个
ΦLZ: 安装孔的直径（注意螺纹孔时为M）
ΦLA: 安装孔分度圆（虚拟圆）直径

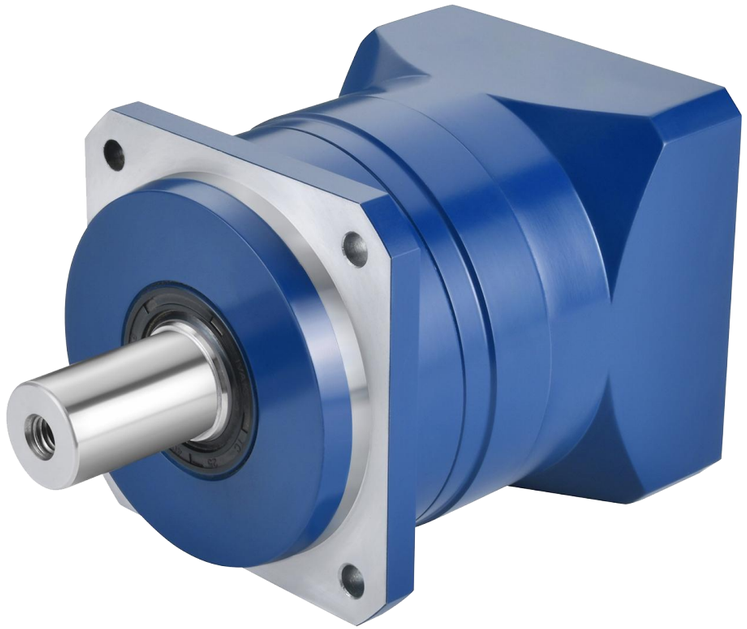
Dimensions related to motor “mounting hole”
Number of mounting holes, usually is 4
Φ LZ: diameter of mounting holes (M for threaded holes)
Φ LA: Diameter of mounting hole reference circle (virtual circle)

电机”安装凸台”相关尺寸
ΦLB: 凸台直径 LE: 凸台深度
Dimensions related to motor “mounting boss”
Φ LB: Boss diameter Φ LE: boss depth

电机“输出轴“相关尺寸
ΦS: 电机轴直径 LR: 包括凸台后的长度
Dimensions related to motor “output shaft”
Φ S: Motor shaft diameter Φ LR: includes the length behind the boss

AF Series

- AF060
- AF090
- AF115
- AF140
- AF180



AF

Series

AF系列减速机核心特性

The Core Characteristics of AF Series Reducer

1. 采用斜齿齿轮传动，经渗碳淬火处理，齿向齿廓修形处理，确保运行低噪音、平稳；承载能力较直齿提高20%；
2. 整体式输出轴，行星轮两端轴承支撑，实现高精度、强度；
3. 回程间隙小，精密型单级可以做到3arcmin以内。

1. Helical gear transmission, carburizing and quenching treatment, tooth profile modification treatment, to ensure low noise and smooth operation. The bearing capacity is 20% higher than that of straight teeth.
2. Integral output shaft and bearing support at both ends of planetary wheel to achieve high precision and strength.
3. The backhaul clearance is small, and the precision single stage can achieve less than 3 arcmin.

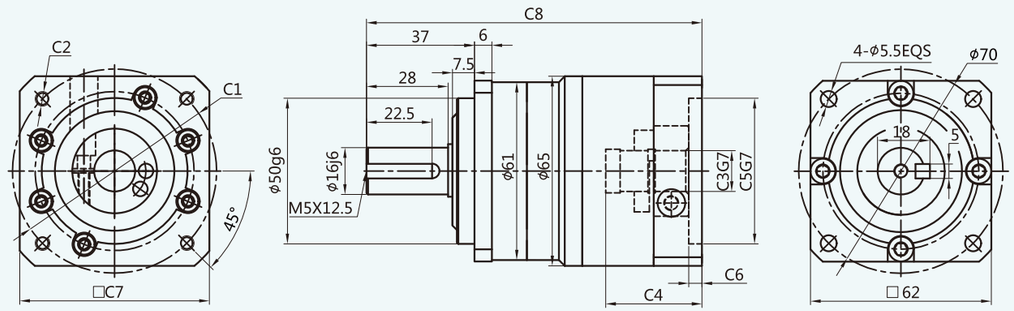
减速机性能资料

Gear box performance information

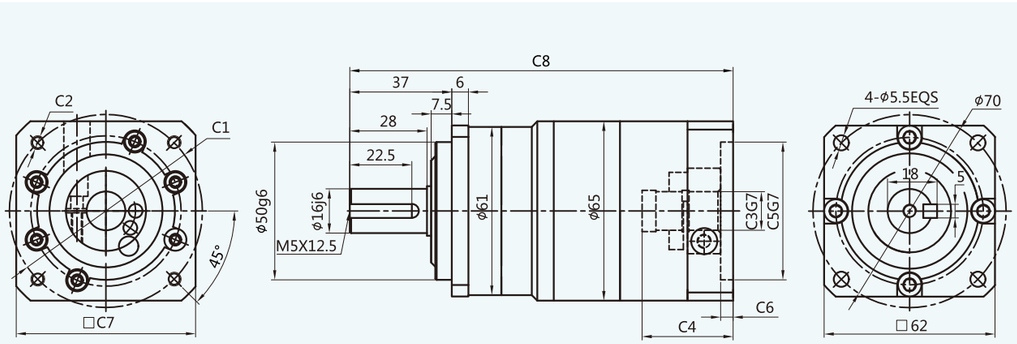
型号 Model	单位 Unit	AF060	AF090	AF115	AF140	AF180	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	18	50	120	240	600	3	1
		27	75	180	360	750	4	
		27	75	180	360	750	5	
		27	75	180	360	750	7	
		18	50	120	240	500	10	
		35	90	180	450	650	15	2
		37	96	230	450	1050	16	
		37	96	230	564	1000	20	
		37	96	255	585	1000	25	
		37	96	230	564	1050	28	
		27	87	180	360	800	30	
		37	96	255	585	1000	35	
		37	96	230	564	1000	40	
		37	96	255	585	1000	50	
		27	87	180	360	800	70	
		18	50	120	240	710	100	
故障停滞扭矩 Emergency stop torque	N·m	3倍额定输出扭矩 3 times Rated output torque						
额定输入转速 Norminal input speed	rmp	3000	3000	3000	2000	1500		
最大输入转速 Maximum input speed	rmp	6000	6000	6000	3500	3000		
最大径向力 Maximum radial force	N	1200	2400	4300	9100	15000		
最大轴向力 Maximum axial force	N	1100	2200	3900	8200	14000		
效率 Efficiency	%	Single [97%]			Double [95%]			
平均寿命 Average lifetime	h	20000						
重量 Weight	kg	1.4	3.7	8	16	36		1
		1.6	4.2	8.9	18	39		2
转动惯量 Moment of inertia	$kgcm^2$	0.16	0.61	3.25	12.31	28.98	3	1
		0.14	0.48	2.74	7.54	23.67	4	
		0.13	0.47	2.71	7.42	22.75	5	
		0.13	0.47	2.62	7.25	22.48	7	
		0.13	0.44	2.57	7.14	22.55	10	
		0.127	0.72	2.56	12.35	12.35	15	2
		0.088	0.5	1.75	7.47	7.54	16	
		0.075	0.44	1.5	6.65	7.42	20	
		0.075	0.44	1.49	5.81	7.54	25	
		0.064	0.39	1.3	6.34	7.14	28	
		0.064	0.39	1.3	6.34	7.14	30	
		0.064	0.39	1.3	6.34	7.14	35	
		0.064	0.39	1.3	4.08	7.14	40	
		0.075	0.39	1.5	7.5	7.54	50	
		0.075	0.39	1.5	7.5	7.54	70	
		0.075	0.39	1.5	7.5	7.54	100	
回程间隙 Backlash	arcmin	≦3	≦3	≦3	≦3	≦3	Precise[1]	
		≦5	≦5	≦5	≦5	≦5	Standard[1]	
		≦5	≦5	≦5	≦5	≦5	Precise[2]	
		≦7	≦7	≦7	≦7	≦7	Standard[2]	
抗扭刚性 Torsional rigidity	N·m/arc min	7	14	25	50	145		
噪音 Noise	dB	60	62	62	68	70		
润滑 lubricating		合成油脂润滑 Synthetic grease lubrication						
防护等级 levels of protection		IP65						

外形尺寸图表
Outline dimensional

AF060-L1[Single]



AF060-L2[Double]

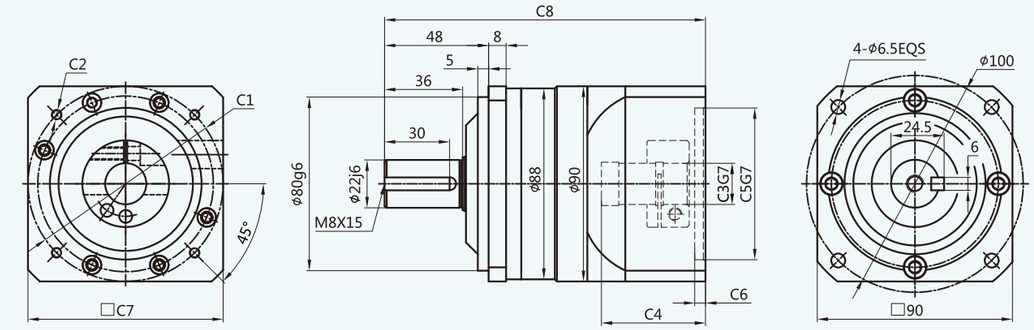


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

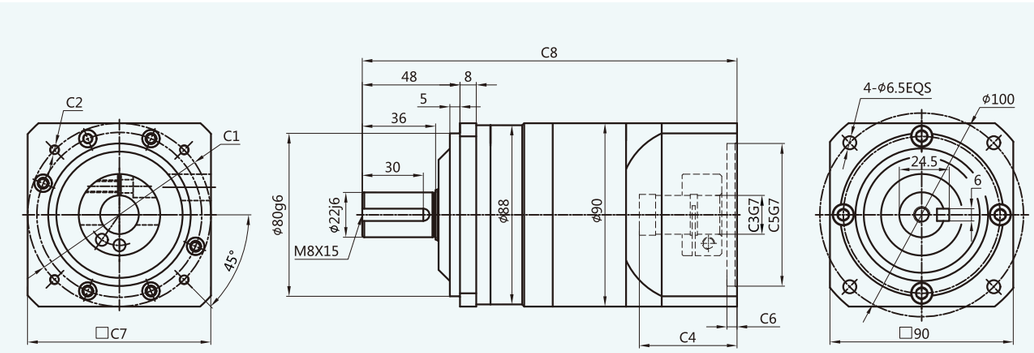
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AF-060-L1	□47.14	4-M4	Φ8	30	Φ38.1	4.5	65	112
	Φ46	4-M4	Φ8	30	Φ30	4.5	65	112
	Φ45	4-M3	Φ8	30	Φ30	4.5	65	112
	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	115
AF-060-L2	□47.14	4-M4	Φ8	30	Φ38.1	4.5	65	136
	Φ46	4-M4	Φ8	30	Φ30	4.5	65	136
	Φ45	4-M3	Φ8	30	Φ30	4.5	65	136
	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	139

外形尺寸图表
Outline dimensional

AF090-L1[Single]



AF090-L2[Double]

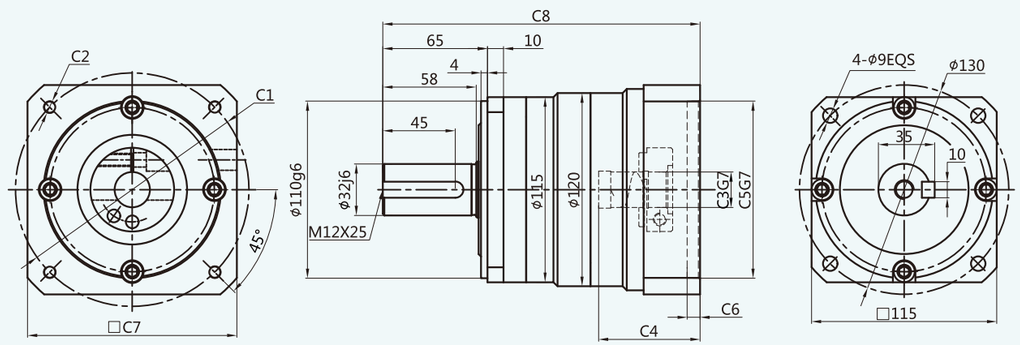


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

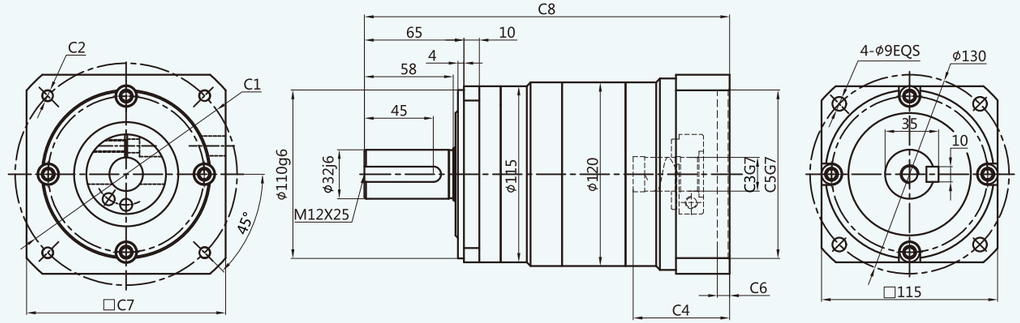
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AF-090-L1	Φ70	4-M4/4-M5	Φ14	47	Φ50	4.5	90	147
	□69.6	4-M6	Φ14	48	Φ73	4.5	90	148
	Φ90	4-M5/4-M6	Φ19	48	Φ70	5.5	90	148
	Φ115	4-M8	Φ19/Φ22	60	Φ95	7.5	130	160
	Φ130	4-M8	Φ19/Φ22	60	Φ95	7.5	130	160
	Φ145	4-M8	Φ19/Φ22/Φ24	63	Φ110	13	130	163.5
AF-090-L2	Φ70	4-M4/4-M5	Φ14	47	Φ50	4.5	90	183
	□69.6	4-M6	Φ14	48	Φ73	4.5	90	184
	Φ90	4-M5/4-M6	Φ19	48	Φ70	5.5	90	184

外形尺寸图表
Outline dimensional

AF115-L1[Single]



AF115-L2[Double]

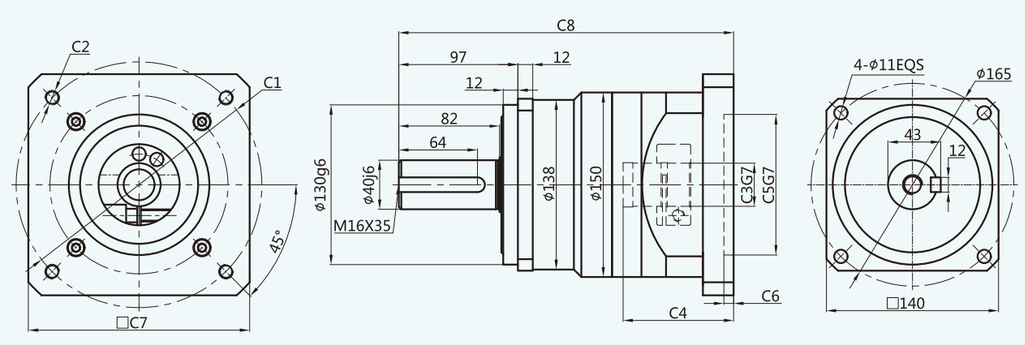


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

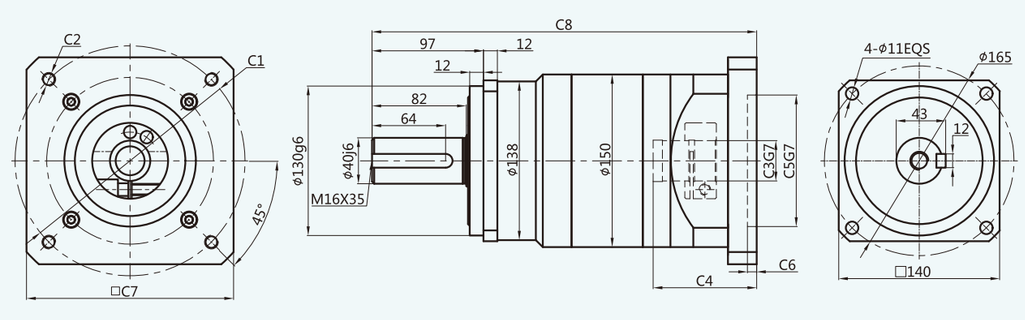
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AF-115-L1	Φ115	4-M8	Φ19/Φ22	60	Φ95	7	130	194
	Φ130	4-M8	Φ19/Φ22	60	Φ95	7	130	194
	Φ145	4-M8	Φ19/Φ22/Φ24	62	Φ110	7	130	197
	Φ200	4-M12	Φ35	82	Φ114.3	7	180	215.5
AF-115-L2	Φ90	4-M5/4-M6	Φ19	55	Φ70	5.5	90	230.5
	Φ115	4-M8	Φ19/Φ22	60	Φ95	7	130	235.5
	Φ130	4-M8	Φ19/Φ22	60	Φ95	7	130	235.5
	Φ145	4-M8	Φ19/Φ22/Φ24	62	Φ110	7	180	238.5

外形尺寸图表
Outline dimensional

AF140-L1[Single]



AF140-L2[Double]

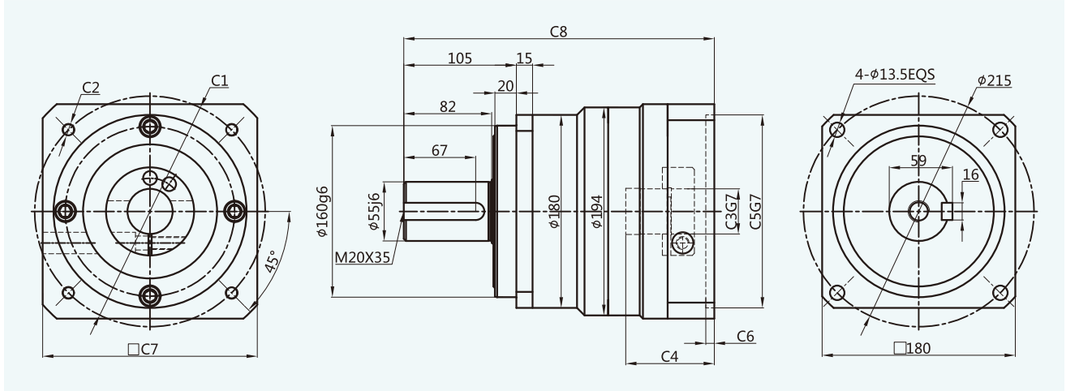


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

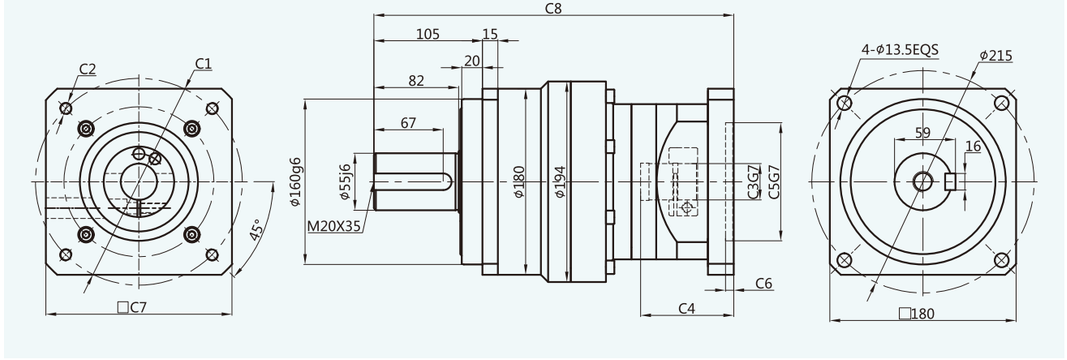
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AF-140-L1	Φ130	4-M8	Φ22	65	Φ95	7	150	247.5
	Φ145	4-M8	Φ22/Φ24	65	Φ110	7	150	247.5
	Φ165	4-M10	Φ32	90	Φ130	7	150	272.5
	Φ200	4-M12	Φ35	90	Φ114.3	7	180	272.5
	Φ200	4-M12	Φ35	115	Φ114.3	7	180	297.5
	Φ215	4-M12	Φ38/Φ42	90	Φ180	7	190	272.5
AF-140-L2	Φ130	4-M8	Φ22	65	Φ95	7	150	309.5
	Φ145	4-M8	Φ22/Φ24	65	Φ110	7	150	309.5
	Φ200	4-M12	Φ35	90	Φ114.3	7	180	334.5

外形尺寸图表
Outline dimensional

AF180-L1[Single]



AF180-L2[Double]



适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AF-180-L1	Φ200	4-M12	Φ35	83	Φ114.3	7	180	289.5
	Φ215	4-M12	Φ42	83	Φ180	7	190	289.5
AF-180-L2	Φ145	4-M8	Φ22/Φ24	65	Φ110	7	130	323
	Φ200	4-M12	Φ35	90	Φ114.3	7	180	348
	Φ200	4-M12	Φ35	115	Φ114.3	7	180	373
	Φ215	4-M12	Φ42	90	Φ180	7	190	348

- ALF060
- ALF090

ALF
Series

ALF系列减速机核心特性
The Core Characteristics of ALF Series Reducer

1. 采用斜齿齿轮传动，经渗碳淬火处理，齿向齿廓修形处理，确保运行低噪音、平稳；承载能力较直齿提高20%；
2. 整体式输出轴，行星轮两端轴承支撑，实现高精度、强度；
3. 回程间隙小，精密型单级可以做到5arcmin以内。

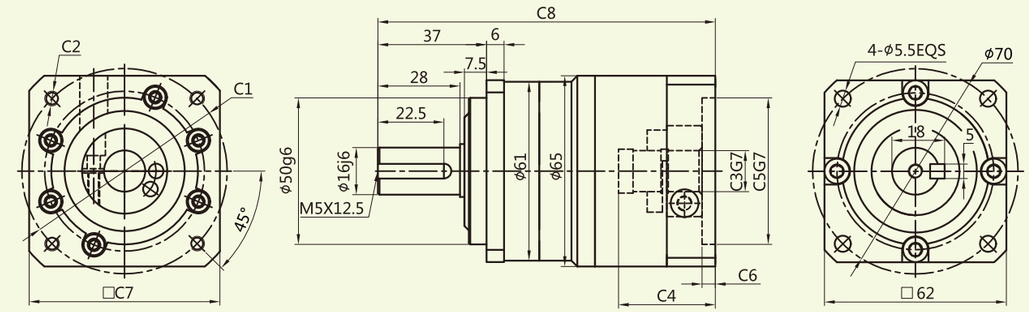
1. Helical gear transmission, carburizing and quenching treatment, tooth profile modification treatment, to ensure low noise and smooth operation. The bearing capacity is 20% higher than that of straight teeth.
2. Integral output shaft and bearing support at both ends of planetary wheel to achieve high precision and strength.
3. The backhaul clearance is small, and the precision single stage can achieve less than 3 arcmin.

减速机性能资料
Gear box performance information

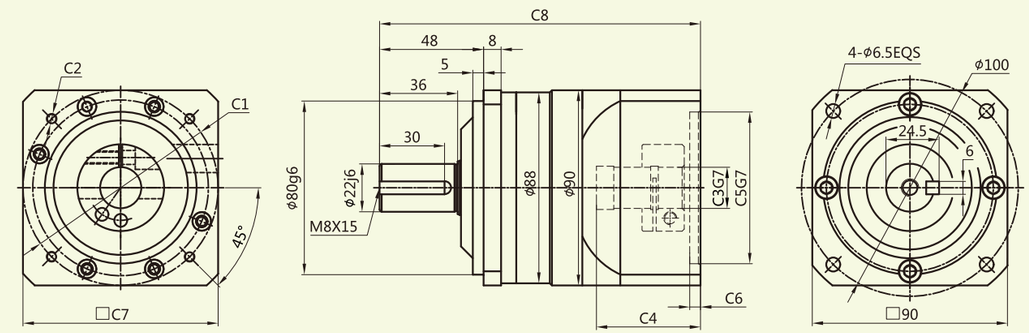
型号 Model	单位 Unit	ALF060	ALF090	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	18	50	3	1
		27	75	4	
		27	75	5	
		27	75	7	
		18	50	10	
故障停滞扭矩 Emergency stop torque	N·m	3倍额定输出扭矩 3 times Rated output torque			
额定输入转速 Norminal input speed	rmp	3000	3000		
最大输入转速 Maximum input speed	rmp	6000	6000		
最大径向力 Maximum radial force	N	1200	2400		
最大轴向力 Maximum axial force	N	1100	2200		
效率 Efficiency	%	Single [97%]			
平均寿命 Average lifetime	h	20000			
重量 Weight	kg	1.4	3.7		1
转动惯量 Moment of inertia	$kgcm^2$	0.16	0.61	3	1
		0.14	0.48	4	
		0.13	0.47	5	
		0.13	0.47	7	
		0.13	0.44	10	
回程间隙 Backlash	arcmin	≦ 5	≦ 5	Standard[1]	
抗扭刚性 Torsional rigidity	N·m/arc min	7	14		
噪音 Noise	dB	60	62		
润滑 lubricating		合成油脂润滑 Synthetic grease lubrication			
防护等级 levels of protection		IP65			

外形尺寸图表
Outline dimensional

ALF-060-L1[Single]



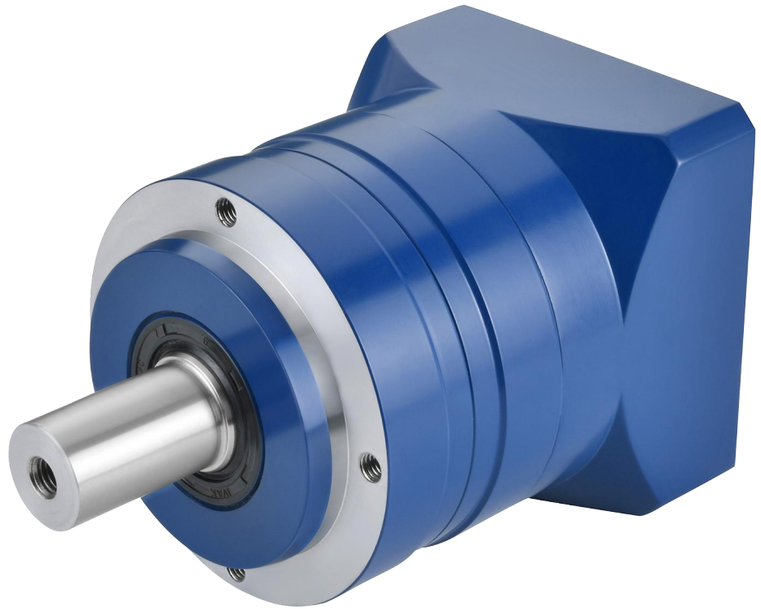
ALF-090-L1[Single]



适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ALF-060-L1	□47.14	4-M4	Φ8	30	Φ38.1	4.5	65	112
	Φ46	4-M4	Φ8	30	Φ30	4.5	65	112
	Φ45	4-M3	Φ8	30	Φ30	4.5	65	112
	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	115
ALF-090-L1	Φ70	4-M4/4-M5	Φ14	47	Φ50	4.5	90	147
	□69.6	4-M6	Φ14	48	Φ73	4.5	90	148
	Φ90	4-M5/4-M6	Φ19	48	Φ70	5.5	90	148
	Φ115	4-M8	Φ19/Φ22	60	Φ95	7.5	130	160
	Φ130	4-M8	Φ19/Φ22	60	Φ95	7.5	130	160
	Φ145	4-M8	Φ19/Φ22/Φ24	63	Φ110	13	130	163.5

- AL070
- AL090
- AL120
- AL155
- AL205



AL

Series

AL系列减速机核心特性

The Core Characteristics of AL Series Reducer

1. 采用斜齿齿轮传动，经渗碳淬火处理，齿向齿廓修形处理，确保运行低噪音、平稳；承载能力较直齿提高20%；
2. 整体式输出轴，行星轮两端轴承支撑，实现高精度、强度；
3. 回程间隙小，精密型单级可以做到3arcmin以内。

1. Helical gear transmission, carburizing and quenching treatment, tooth profile modification treatment, to ensure low noise and smooth operation. The bearing capacity is 20% higher than that of straight teeth.
2. Integral output shaft and bearing support at both ends of planetary wheel to achieve high precision and strength.
3. The backhaul clearance is small, and the precision single stage can achieve less than 3 arcmin.

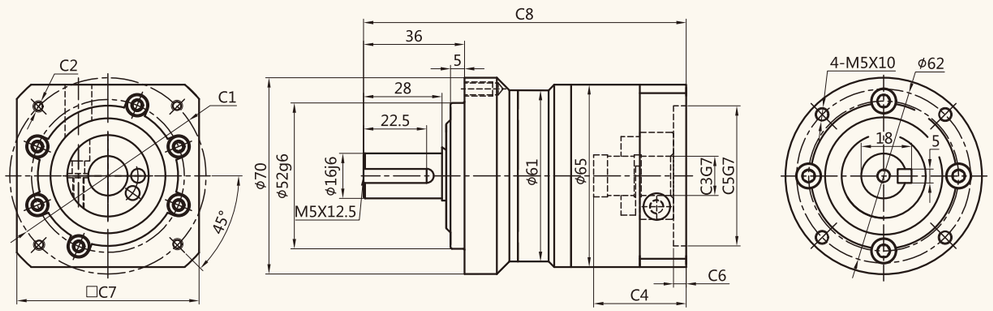
减速机性能资料

Gear box performance information

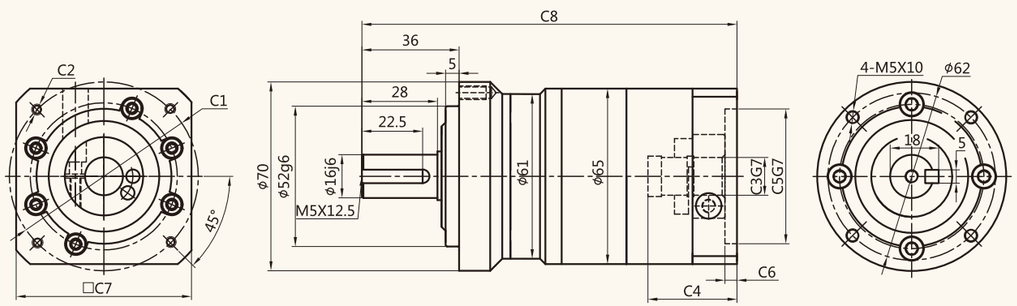
型号 Model	单位 Unit	AL070	AL090	AL120	AL155	AL205	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	18	50	120	240	600	3	1
		27	75	180	360	750	4	
		27	75	180	360	750	5	
		27	75	180	360	750	7	
		18	50	120	240	500	10	
		35	90	180	450	650	15	2
		37	96	230	450	1050	16	
		37	96	230	564	1000	20	
		37	96	255	585	1000	25	
		37	96	230	564	1050	28	
		27	87	180	360	800	30	
		37	96	255	585	1000	35	
		37	96	230	564	1000	40	
		37	96	255	585	1000	50	
		27	87	180	360	800	70	
		18	50	120	240	710	100	
故障停滞扭矩 Emergency stop torque	N·m	3倍额定输出扭矩 3 times Rated output torque						
额定输入转速 Norminal input speed	rmp	3000	3000	3000	2000	1500		
最大输入转速 Maximum input speed	rmp	6000	6000	6000	3500	3000		
最大径向力 Maximum radial force	N	1200	2400	4300	9100	15000		
最大轴向力 Maximum axial force	N	1100	2200	3900	8200	14000		
效率 Efficiency	%	Single [97%]			Double [95%]			
平均寿命 Average lifetime	h	20000						
重量 Weight	kg	1.4	3.5	7.8	16	39		1
		1.7	4.0	8.7	19	45		2
转动惯量 Moment of inertia	$kgcm^2$	0.16	0.61	3.25	12.31	28.98	3	1
		0.14	0.48	2.74	7.54	23.67	4	
		0.13	0.47	2.71	7.42	22.75	5	
		0.13	0.47	2.62	7.25	22.48	7	
		0.13	0.44	2.57	7.14	22.55	10	
		0.127	0.72	2.56	12.35	12.35	15	2
		0.088	0.5	1.75	7.47	7.54	16	
		0.075	0.44	1.5	6.65	7.42	20	
		0.075	0.44	1.49	5.81	7.54	25	
		0.064	0.39	1.3	6.34	7.14	28	
		0.064	0.39	1.3	6.34	7.14	30	
		0.064	0.39	1.3	6.34	7.14	35	
		0.064	0.39	1.3	4.08	7.14	40	
		0.075	0.39	1.5	7.5	7.54	50	
		0.075	0.39	1.5	7.5	7.54	70	
		0.075	0.39	1.5	7.5	7.54	100	
回程间隙 Backlash	arcmin	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	Precise[1]	
		≦ 5	≦ 5	≦ 5	≦ 5	≦ 5	Standard[1]	
		≦ 5	≦ 5	≦ 5	≦5	≦ 5	Precise[2]	
		≦ 7	≦ 7	≦ 7	≦7	≦7	Standard[2]	
抗扭刚性 Torsional rigidity	N·m/arc min	7	14	25	50	145		
噪音 Noise	dB	60	62	62	68	70		
润滑 lubricating		合成油脂润滑 Synthetic grease lubrication						
防护等级 levels of protection		IP65						

外形尺寸图表
Outline dimensional

AL070-L1[Single]



AL070-L2[Double]

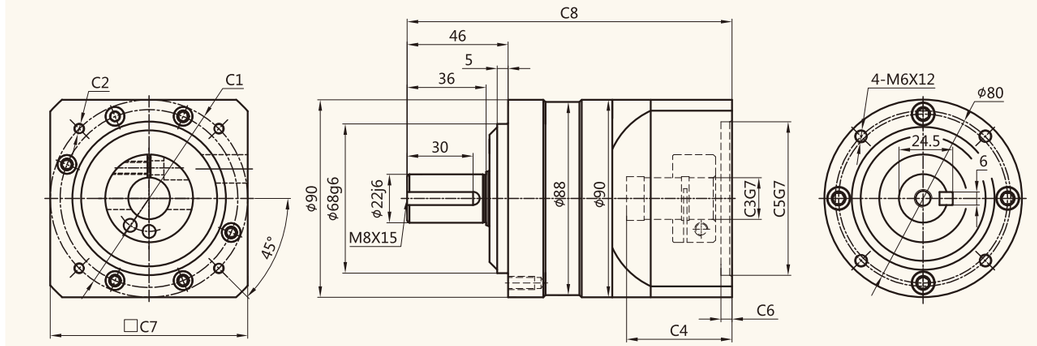


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

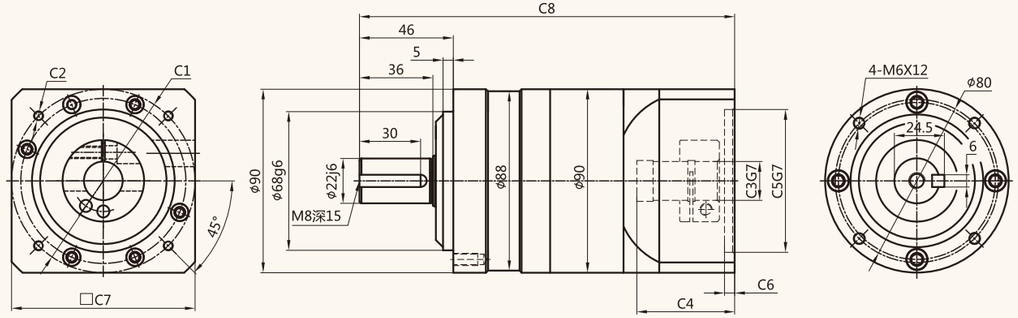
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AL-070-L1	□47.14	4-M4	Φ8	30	Φ38.1	4.5	65	112
	Φ46	4-M4	Φ8	30	Φ30	4.5	65	112
	Φ45	4-M3	Φ8	30	Φ30	4.5	65	112
	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	115
AL-070-L2	□47.14	4-M4	Φ8	30	Φ38.1	4.5	65	136
	Φ46	4-M4	Φ8	30	Φ30	4.5	65	136
	Φ45	4-M3	Φ8	30	Φ30	4.5	65	136
	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	139

外形尺寸图表
Outline dimensional

AL090-L1[Single]



AL090-L2[Double]

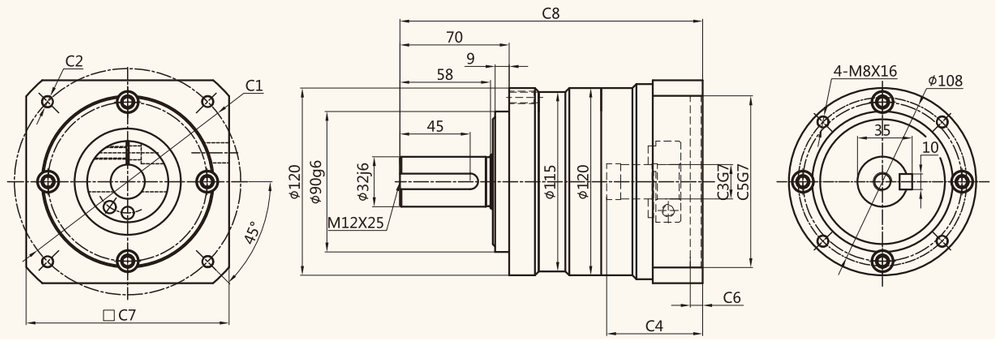


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

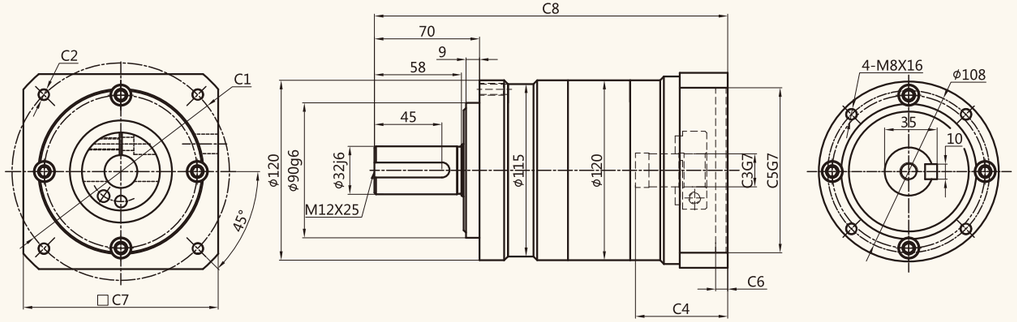
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AL-090-L1	Φ70	4-M4/4-M5	Φ14	47	Φ50	4.5	90	147
	□69.6	4-M6	Φ14	48	Φ73	4.5	90	148
	Φ90	4-M5/4-M6	Φ19	48	Φ70	5.5	90	148
	Φ115	4-M8	Φ19/Φ22	60	Φ95	7.5	130	160
	Φ130	4-M8	Φ19/Φ22	60	Φ95	7.5	130	160
	Φ145	4-M8	Φ19/Φ22/Φ24	63	Φ110	13	130	163.5
AL-090-L2	Φ70	4-M4/4-M5	Φ14	47	Φ50	4.5	90	183
	□69.6	4-M6	Φ14	48	Φ73	4.5	90	184
	Φ90	4-M5/4-M6	Φ19	48	Φ70	5.5	90	184

外形尺寸图表
Outline dimensional

AL120-L1[Single]



AL120-L2[Double]

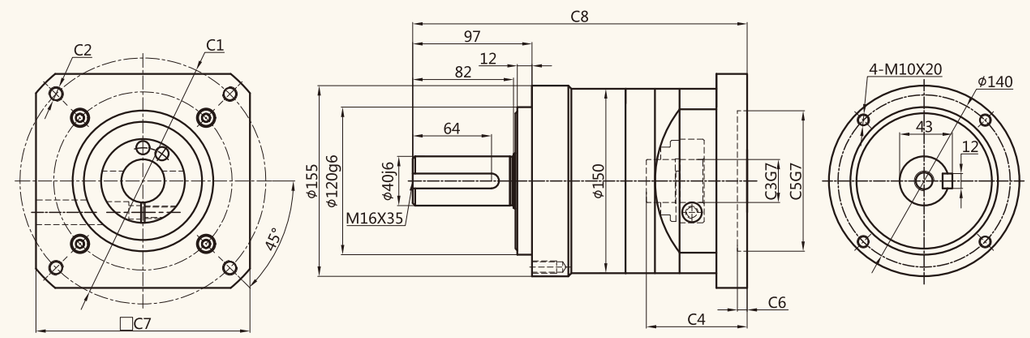


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

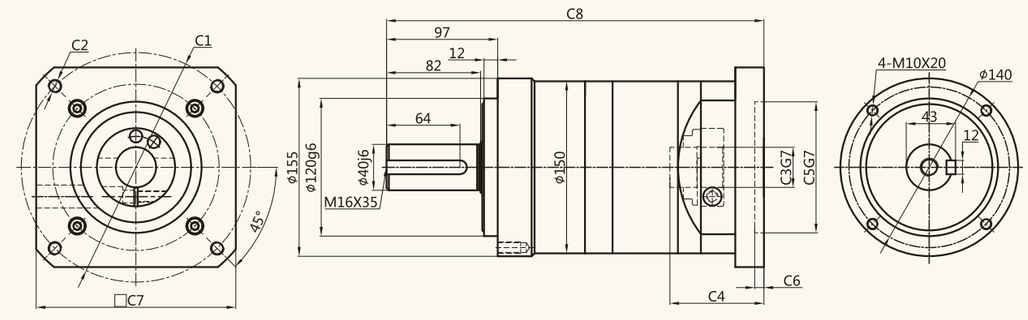
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AL-120-L1	Φ115	4-M8	Φ19/Φ22	60	Φ95	7	130	194
	Φ130	4-M8	Φ19/Φ22	60	Φ95	7	130	194
	Φ145	4-M8	Φ19/Φ22/Φ24	62	Φ110	7	130	197
	Φ200	4-M12	Φ35	82	Φ114.3	7	180	215.5
AL-120-L2	Φ90	4-M5/4-M6	Φ19	55	Φ70	5.5	90	230.5
	Φ115	4-M8	Φ19/Φ22	60	Φ95	7	130	235.5
	Φ130	4-M8	Φ19/Φ22	60	Φ95	7	130	235.5
	Φ145	4-M8	Φ19/Φ22/Φ24	62	Φ110	7	180	238.5

外形尺寸图表
Outline dimensional

AL155-L1[Single]



AL155-L2[Double]

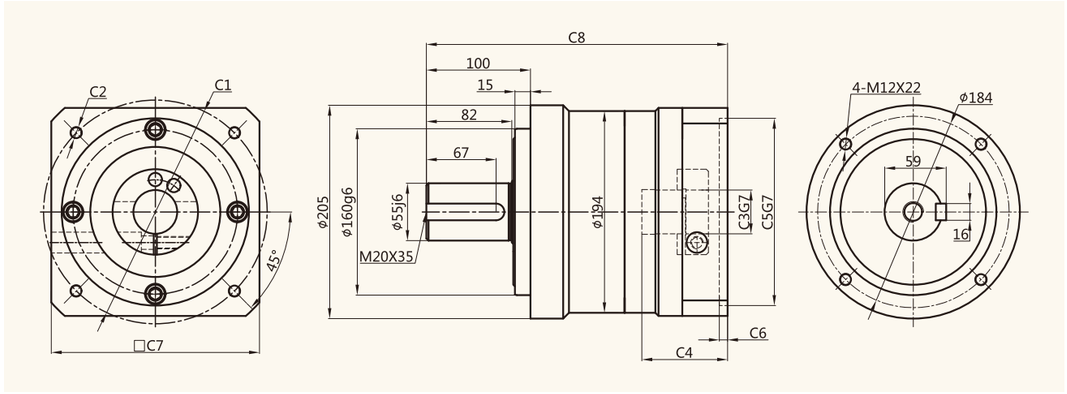


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

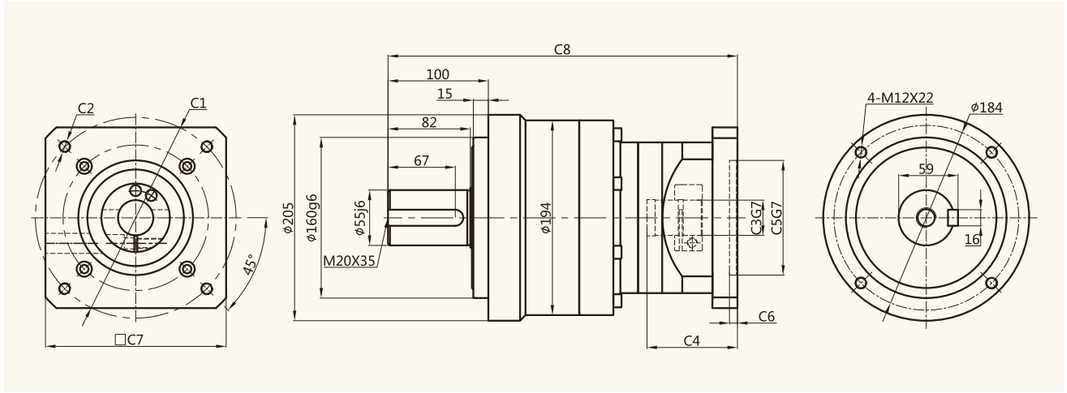
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AL-155-L1	Φ130	4-M8	Φ22	65	Φ95	7	150	247.5
	Φ145	4-M8	Φ22/Φ24	65	Φ110	7	150	247.5
	Φ165	4-M10	Φ32	90	Φ130	7	150	272.5
	Φ200	4-M12	Φ35	90	Φ114.3	7	180	272.5
	Φ200	4-M12	Φ35	115	Φ114.3	7	180	297.5
	Φ215	4-M12	Φ38/Φ42	90	Φ180	7	190	272.5
AL-155-L2	Φ130	4-M8	Φ22	65	Φ95	7	150	309.5
	Φ145	4-M8	Φ22/Φ24	65	Φ110	7	150	309.5
	Φ200	4-M12	Φ35	90	Φ114.3	7	180	334.5

外形尺寸图表
Outline dimensional

AL205-L1[Single]



AL205-L2[Double]



适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AL-205-L1	Φ200	4-M12	Φ35	83	Φ114.3	7	180	289.5
	Φ215	4-M12	Φ42	83	Φ180	7	190	289.5
AL-205-L2	Φ145	4-M8	Φ22/Φ24	65	Φ110	7	130	323
	Φ200	4-M12	Φ35	90	Φ114.3	7	180	348
	Φ200	4-M12	Φ35	115	Φ114.3	7	180	373
	Φ215	4-M12	Φ42	90	Φ180	7	190	348

- ALE070
- ALE090

ALE
Series

ALE系列减速机核心特性
The Core Characteristics of ALE Series Reducer

1. 采用斜齿齿轮传动，经渗碳淬火处理，齿向齿廓修形处理，确保运行低噪音、平稳；承载能力较直齿提高20%；
2. 整体式输出轴，行星轮两端轴承支撑，实现高精度、强度；
3. 回程间隙小，精密型单级可以做到5arcmin以内。

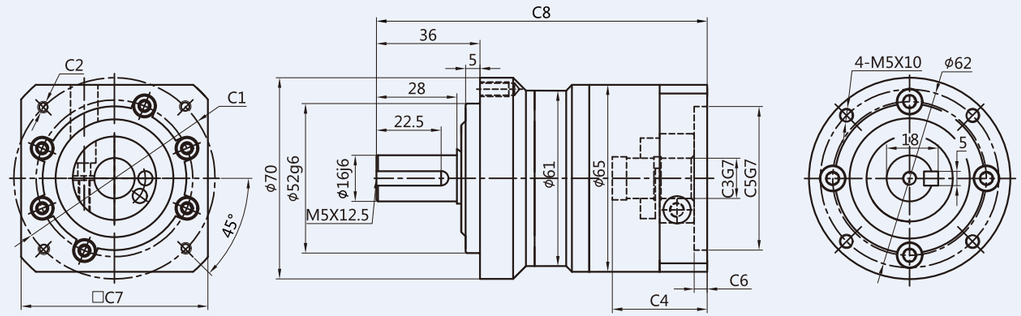
1. Helical gear transmission, carburizing and quenching treatment, tooth profile modification treatment, to ensure low noise and smooth operation. The bearing capacity is 20% higher than that of straight teeth.
2. Integral output shaft and bearing support at both ends of planetary wheel to achieve high precision and strength.
3. The backhaul clearance is small, and the precision single stage can achieve less than 3 arcmin.

减速机性能资料
Gear box performance information

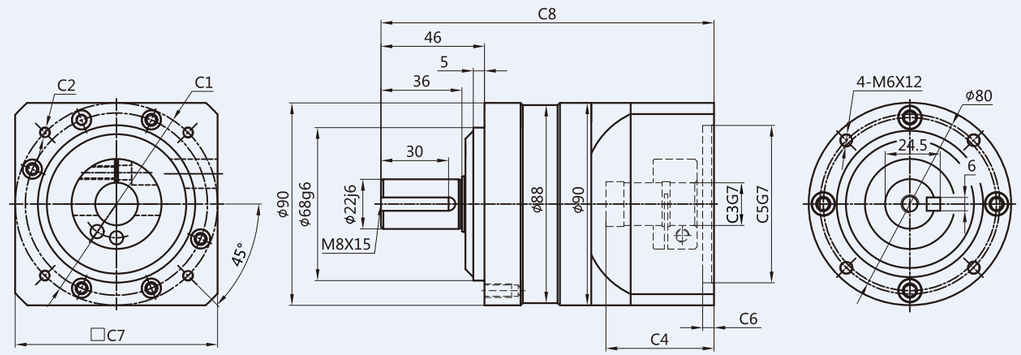
型号 Model	单位 Unit	ALE070	ALE090	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	18	50	3	1
		27	75	4	
		27	75	5	
		27	75	7	
		18	50	10	
故障停滞扭矩 Emergency stop torque	N·m	3倍额定输出扭矩 3 times Rated output torque			
额定输入转速 Norminal input speed	rmp	3000	3000		
最大输入转速 Maximum input speed	rmp	6000	6000		
最大径向力 Maximum radial force	N	1200	2400		
最大轴向力 Maximum axial force	N	1100	2200		
效率 Efficiency	%	Single [97%]			
平均寿命 Average lifetime	h	20000			
重量 Weight	kg	1.4	3.7		1
转动惯量 Moment of inertia	$kgcm^2$	0.16	0.61	3	1
		0.14	0.48	4	
		0.13	0.47	5	
		0.13	0.47	7	
		0.13	0.44	10	
回程间隙 Backlash	arcmin	≦ 5	≦ 5	Standard[1]	
抗扭刚性 Torsional rigidity	N·m/arc min	7	14		
噪音 Noise	dB	60	62		
润滑 lubricating		合成油脂润滑 Synthetic grease lubrication			
防护等级 levels of protection		IP65			

外形尺寸图表
Outline dimensional

ALE-070-L1[Single]



ALE-090-L1[Single]

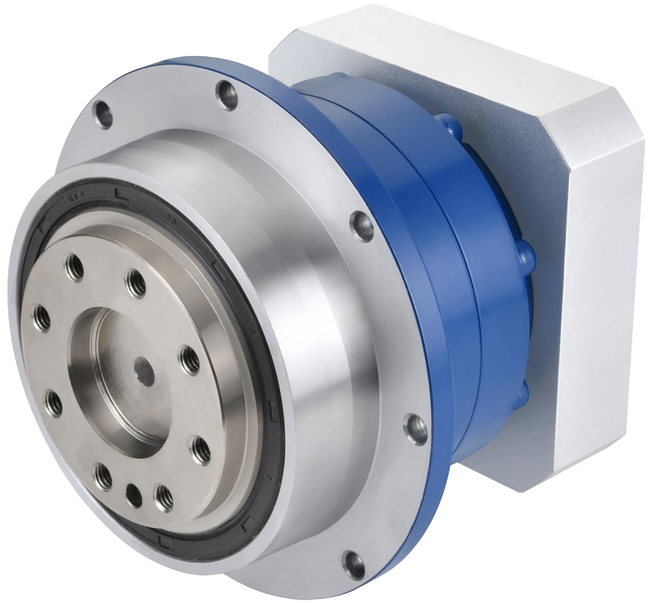


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ALE-070-L1	□47.14	4-M4	Φ8	30	Φ38.1	4.5	65	112
	Φ46	4-M4	Φ8	30	Φ30	4.5	65	112
	Φ45	4-M3	Φ8	30	Φ30	4.5	65	112
	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	115
ALE-090-L1	Φ70	4-M4/4-M5	Φ14	47	Φ50	4.5	90	147
	□69.6	4-M6	Φ14	48	Φ73	4.5	90	148
	Φ90	4-M5/4-M6	Φ19	48	Φ70	5.5	90	148
	Φ115	4-M8	Φ19/Φ22	60	Φ95	7.5	130	160
	Φ130	4-M8	Φ19/Φ22	60	Φ95	7.5	130	160
	Φ145	4-M8	Φ19/Φ22/Φ24	63	Φ110	13	130	163.5

AH Series

- AH064
- AH090
- AH110
- AH140



AH

Series

AH系列减速机核心特性

The Core Characteristics of AH Series Reducer

1. 采用斜齿齿轮传动，经渗碳淬火处理，齿向齿廓修形处理，确保运行低噪音、平稳；承载能力较直齿提高20%；
2. 整体式输出轴，行星轮两端轴承支撑，实现高精度、强度；
3. 回程间隙小，精密型单级可以做到3arcmin以内。

1. Helical gear transmission, carburizing and quenching treatment, tooth profile modification treatment, to ensure low noise and smooth operation. The bearing capacity is 20% higher than that of straight teeth.
2. Integral output shaft and bearing support at both ends of planetary wheel to achieve high precision and strength.
3. The backhaul clearance is small, and the precision single stage can achieve less than 3 arcmin.

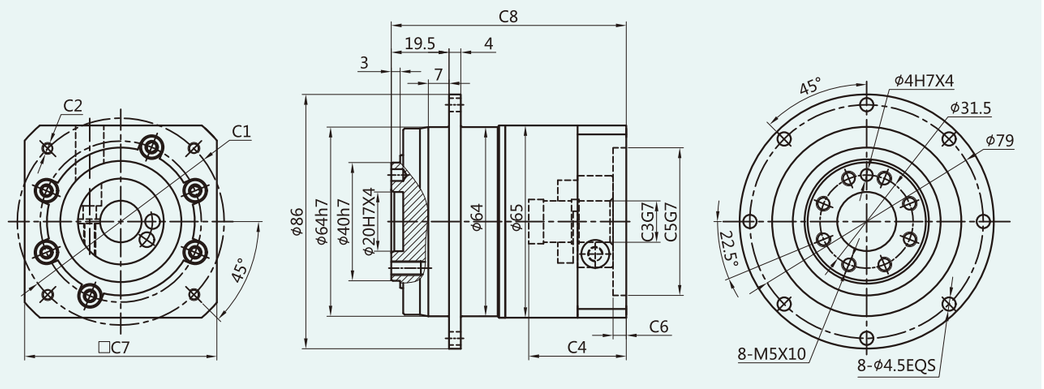
减速机性能资料

Gear box performance information

型号 Model	单位 Unit	AH064	AH090	AH110	AH140	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	18	50	120	240	3	1
		27	75	180	360	4	
		27	75	180	360	5	
		27	75	180	360	7	
		18	50	120	240	10	
		35	90	180	450	15	2
		37	96	230	450	16	
		37	96	230	564	20	
		37	96	255	585	25	
		37	96	230	564	28	
		27	87	180	360	30	
		37	96	255	585	35	
		37	96	230	564	40	
		37	96	255	585	50	
		27	87	180	360	70	
		18	50	120	240	100	
故障停滞扭矩 Emergency stop torque	N·m	3倍额定输出扭矩 3 times Rated output torque					
额定输入转速 Norminal input speed	rmp	3000	3000	3000	2000		
最大输入转速 Maximum input speed	rmp	6000	6000	6000	3500		
最大径向力 Maximum radial force	N	1500	3300	8500	9100		
最大轴向力 Maximum axial force	N	750	1700	4300	8200		
效率 Efficiency	%	Single [97%]			Double [95%]		
平均寿命 Average lifetime	h	20000					
重量 Weight	kg	1.4	3.7	8	16		1
		1.6	4.2	8.9	17		2
转动惯量 Moment of inertia	$kgcm^2$	0.16	0.61	3.25	12.31	3	1
		0.14	0.48	2.74	7.54	4	
		0.13	0.47	2.71	7.42	5	
		0.13	0.47	2.62	7.25	7	
		0.13	0.44	2.57	7.14	10	
		0.127	0.72	2.56	12.35	15	2
		0.088	0.5	1.75	7.47	16	
		0.075	0.44	1.5	6.65	20	
		0.075	0.44	1.49	5.81	25	
		0.064	0.39	1.3	6.34	28	
		0.064	0.39	1.3	6.34	30	
		0.064	0.39	1.3	6.34	35	
		0.064	0.39	1.3	4.08	50	
		0.075	0.39	1.5	7.5	63	
		0.075	0.39	1.5	7.5	70	
		0.075	0.39	1.5	7.5	100	
回程间隙 Backlash	arcmin	≦ 3	≦ 3	≦ 3	≦ 3	Precise[1]	
		≦ 5	≦ 5	≦ 5	≦ 5	Standard[1]	
		≦ 5	≦ 5	≦ 5	≦ 5	Precise[2]	
		≦ 7	≦ 7	≦ 7	≦ 7	Standard[2]	
抗扭刚性 Torsional rigidity	N·m/arc min	7	14	25	50		
噪音 Noise	dB	60	62	62	68		
润滑 lubricating		合成油脂润滑 Synthetic grease lubrication					
防护等级 levels of protection		IP65					

外形尺寸图表
Outline dimensional

AH064-L1[Single]



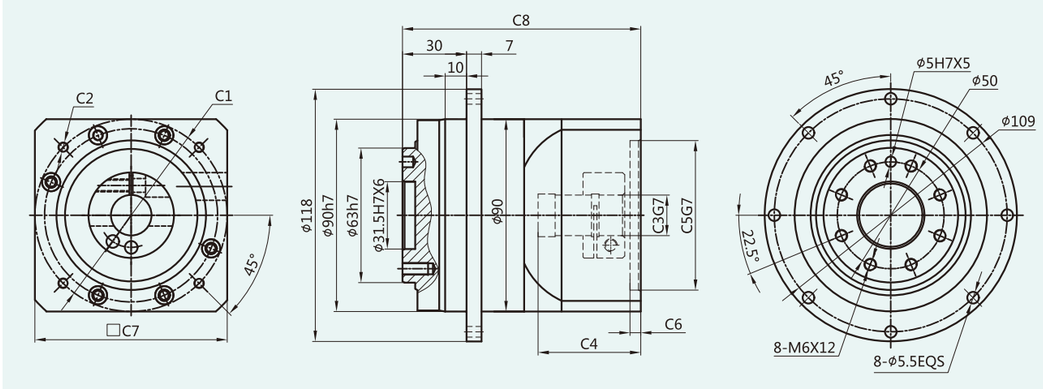
AH064-L2[Double]

适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AH-064-L1	□47.14	4-M4	Φ8	30	Φ38.1	4.5	65	76.5
	Φ46	4-M4	Φ8	30	Φ30	4.5	65	76.5
	Φ45	4-M3	Φ8	30	Φ30	4.5	65	76.5
	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	79.5
AH-064-L2	□47.14	4-M4	Φ8	30	Φ38.1	4.5	65	100.5
	Φ46	4-M4	Φ8	30	Φ30	4.5	65	100.5
	Φ45	4-M3	Φ8	30	Φ30	4.5	65	100.5
	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	103.5

外形尺寸图表
Outline dimensional

AH090-L1[Single]



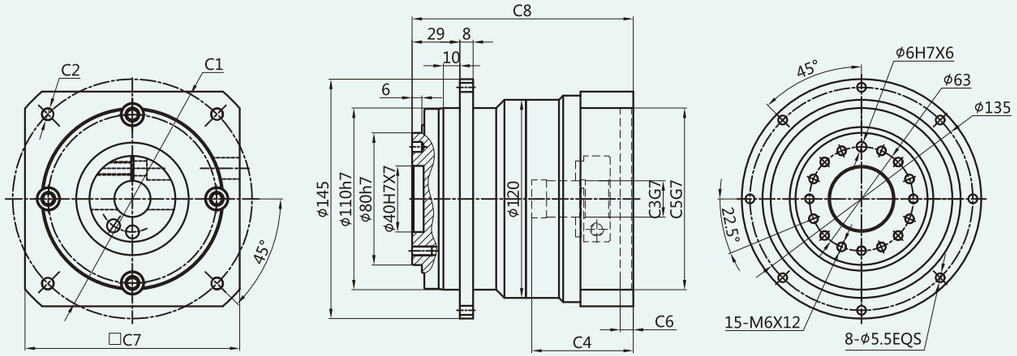
AH090-L2[Double]

适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

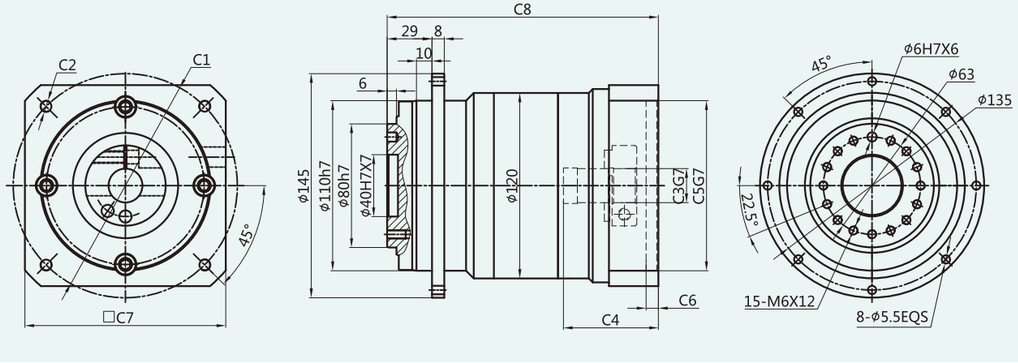
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AH-090-L1	Φ70	4-M4/4-M5	Φ14	47	Φ50	4.5	90	110.5
	□69.6	4-M6	Φ14	48	Φ73	4.5	90	111.5
	Φ90	4-M5/4-M6	Φ19	48	Φ70	5.5	90	111.5
	Φ115	4-M8	Φ19/Φ22	60	Φ95	7.5	130	123.5
	Φ130	4-M8	Φ19/Φ22	60	Φ95	7.5	130	123.5
	Φ145	4-M8	Φ19/Φ22/Φ24	63	Φ110	13	130	127
AH-090-L2	Φ70	4-M4/4-M5	Φ14	47	Φ50	4.5	90	146.5
	□69.6	4-M6	Φ14	48	Φ73	4.5	90	147.5
	Φ90	4-M5/4-M6	Φ19	48	Φ70	5.5	90	147.5

外形尺寸图表
Outline dimensional

AH110-L1[Single]



AH110-L2[Double]

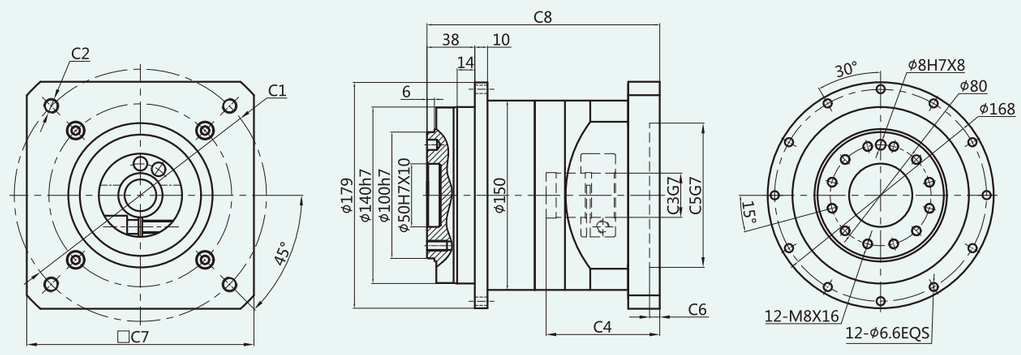


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

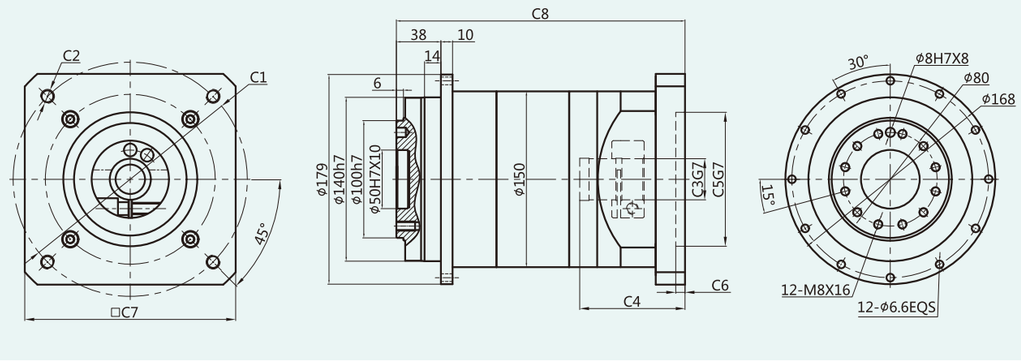
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AH-110-L1	Φ115	4-M8	Φ19/Φ22	60	Φ95	7	130	134
	Φ130	4-M8	Φ19/Φ22	60	Φ95	7	130	134
	Φ145	4-M8	Φ19/Φ22/Φ24	62	Φ110	7	130	137
	Φ200	4-M12	Φ35	82	Φ114.3	7	180	155.5
AH-110-L2	Φ90	4-M5/4-M6	Φ19	55	Φ70	5.5	90	170.5
	Φ115	4-M8	Φ19/Φ22	60	Φ95	7	130	175.5
	Φ130	4-M8	Φ19/Φ22	60	Φ95	7	130	175.5
	Φ145	4-M8	Φ19/Φ22/Φ24	62	Φ110	7	180	178.5

外形尺寸图表
Outline dimensional

AH140-L1[Single]



AH140-L2[Double]

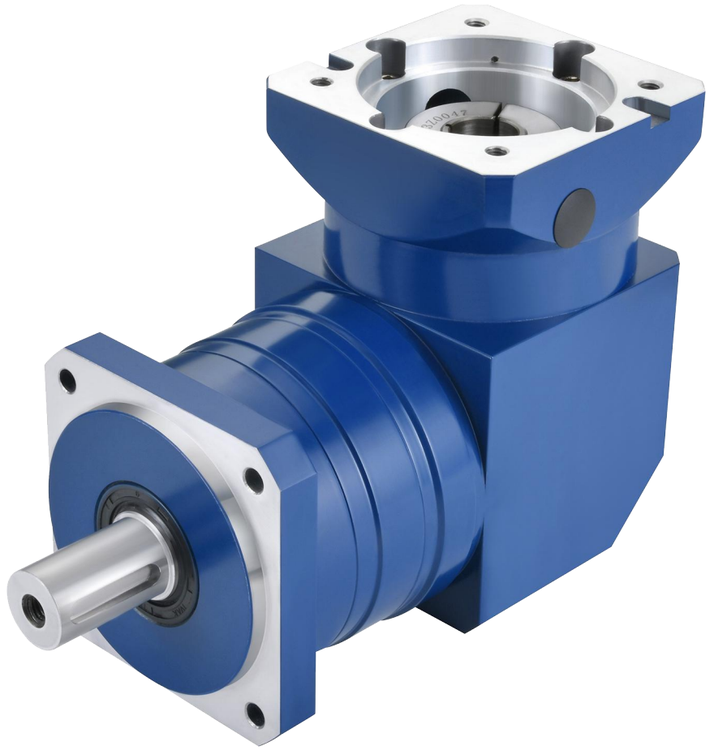


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
AH-140-L1	Φ130	4-M8	Φ22	65	Φ95	7	150	159.5
	Φ145	4-M8	Φ22/Φ24	65	Φ110	7	150	159.5
	Φ165	4-M10	Φ32	90	Φ130	7	150	184.5
	Φ200	4-M12	Φ35	90	Φ114.3	7	180	184.5
	Φ200	4-M12	Φ35	115	Φ114.3	7	180	209.5
	Φ215	4-M12	Φ38/Φ42	90	Φ180	7	190	184.5
AH-140-L2	Φ130	4-M8	Φ22	65	Φ95	7	150	221.5
	Φ145	4-M8	Φ22/Φ24	65	Φ110	7	150	221.5
	Φ200	4-M12	Φ35	90	Φ114.3	7	180	246.5

ZAF Series

- ZAF060
- ZAF090
- ZAF115
- ZAF140



ZAF

Series

ZAF系列减速机核心特性

The Core Characteristics of ZAF Series Reducer

1. 采用斜齿齿轮传动，经渗碳淬火处理，齿向齿廓修形处理，确保运行低噪音、平稳；承载能力较直齿提高20%；
2. 整体式输出轴，行星轮两端轴承支撑，实现高精度、强度；
3. 回程间隙小，精密型单级可以做到5arcmin以内。

1. Helical gear transmission, carburizing and quenching treatment, tooth profile modification treatment, to ensure low noise and smooth operation. The bearing capacity is 20% higher than that of straight teeth.
2. Integral output shaft and bearing support at both ends of planetary wheel to achieve high precision and strength.
3. The backhaul clearance is small, and the precision single stage can achieve less than 5 arcmin.

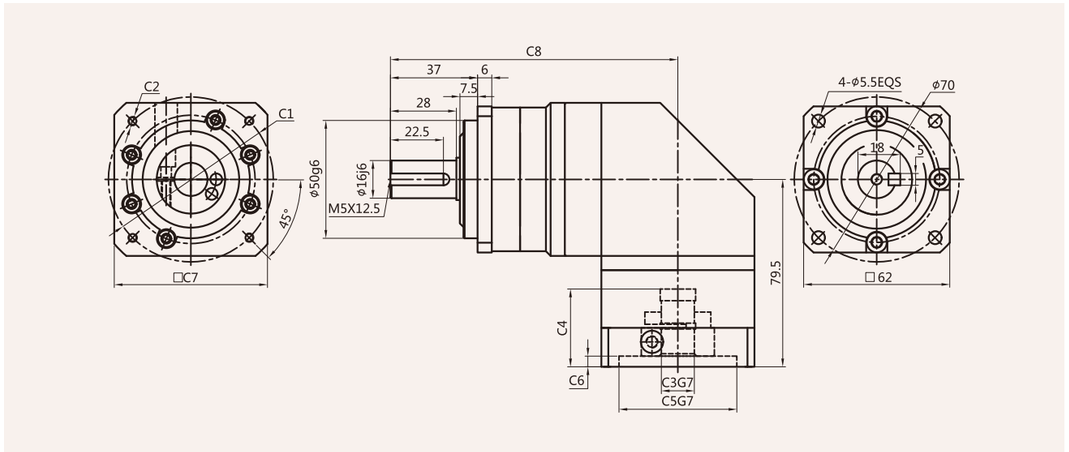
减速机性能资料

Gear box performance information

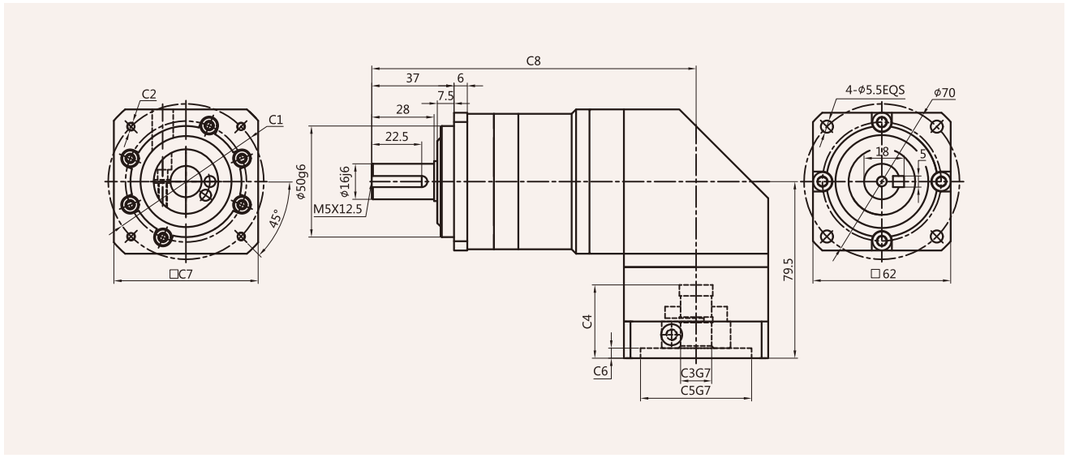
型号 Model	单位 Unit	ZAF060	ZAF090	ZAF115	ZAF140	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	18	50	120	240	3	1
		27	75	180	360	4	
		27	75	180	360	5	
		27	75	180	360	7	
		18	50	120	240	10	
		35	90	180	450	15	2
		37	96	230	450	16	
		37	96	230	564	20	
		37	96	255	585	25	
		37	96	230	564	28	
		27	87	180	360	30	
		37	96	255	585	35	
		37	96	230	564	40	
		37	96	255	585	50	
		27	87	180	360	70	
		18	50	120	240	100	
故障停滞扭矩 Emergency stop torque	N·m	3倍额定输出扭矩 3 times Rated output torque					
额定输入转速 Norminal input speed	rmp	3000	3000	3000	2000		
最大输入转速 Maximum input speed	rmp	6000	6000	6000	3500		
最大径向力 Maximum radial force	N	1200	2400	4300	9100		
最大轴向力 Maximum axial force	N	1100	2200	3900	8200		
效率 Efficiency	%	Single [97%]			Double [95%]		
平均寿命 Average lifetime	h	20000					
重量 Weight	kg	1.4	3.7	8	16		1
		1.6	4.2	8.9	17		2
转动惯量 Moment of inertia	$kgcm^2$	0.16	0.61	3.25	12.31	3	1
		0.14	0.48	2.74	7.54	4	
		0.13	0.47	2.71	7.42	5	
		0.13	0.47	2.62	7.25	7	
		0.13	0.44	2.57	7.14	10	
		0.127	0.72	2.56	12.35	15	2
		0.088	0.5	1.75	7.47	16	
		0.075	0.44	1.5	6.65	20	
		0.075	0.44	1.49	5.81	25	
		0.064	0.39	1.3	6.34	28	
		0.064	0.39	1.3	6.34	30	
		0.064	0.39	1.3	6.34	35	
		0.064	0.39	1.3	4.08	50	
		0.075	0.39	1.5	7.5	63	
		0.075	0.39	1.5	7.5	70	
		0.075	0.39	1.5	7.5	100	
回程间隙 Backlash	arcmin	≦ 5	≦ 5	≦ 5	≦ 5	Precise[1]	
		≦ 10	≦ 10	≦ 10	≦ 10	Standard[1]	
		≦ 7	≦ 7	≦ 7	≦ 7	Precise[2]	
		≦12	≦12	≦12	≦12	Standard[2]	
抗扭刚性 Torsional rigidity	N·m/arc min	7	14	25	50		
噪音 Noise	dB	65	65	70	75		
润滑 lubricating		合成油脂润滑 Synthetic grease lubrication					
防护等级 levels of protection		IP65					

外形尺寸图表
Outline dimensional

ZAF060-L1[Single]



ZAF060-L2[Double]

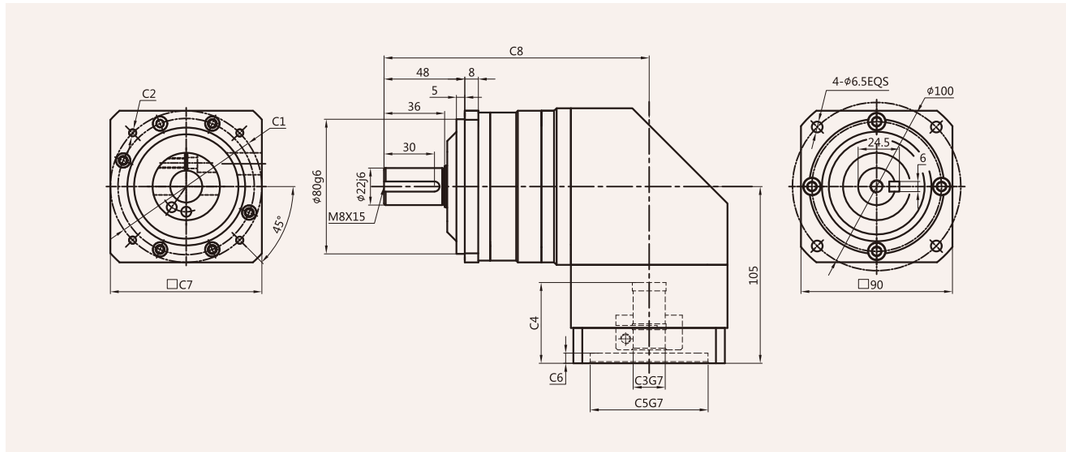


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

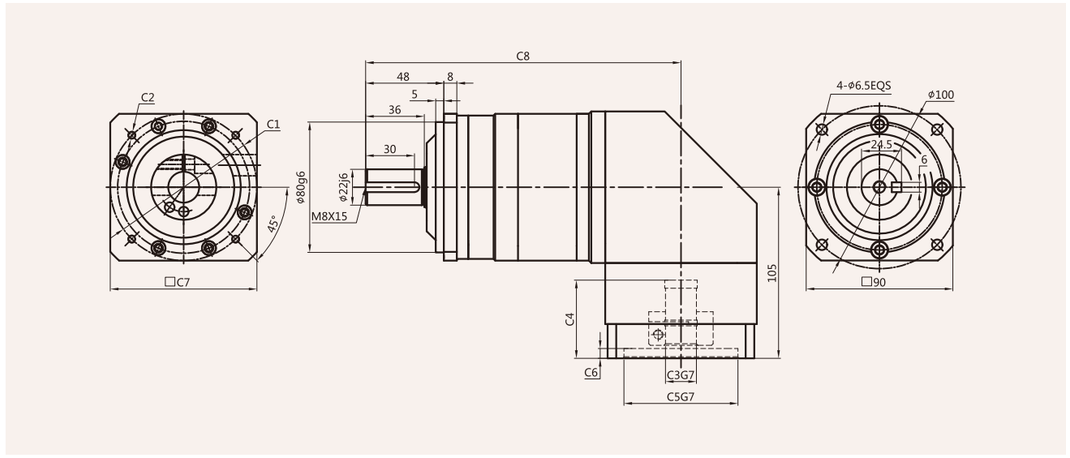
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ZAF-060-L1	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	122
ZAF-060-L2	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	146

外形尺寸图表
Outline dimensional

ZAF090-L1[Single]



ZAF090-L2[Double]

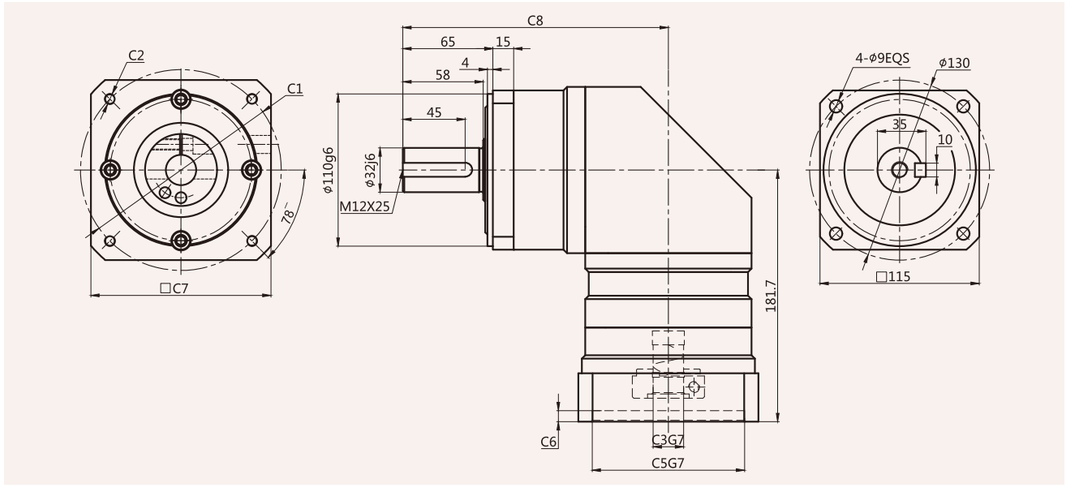


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

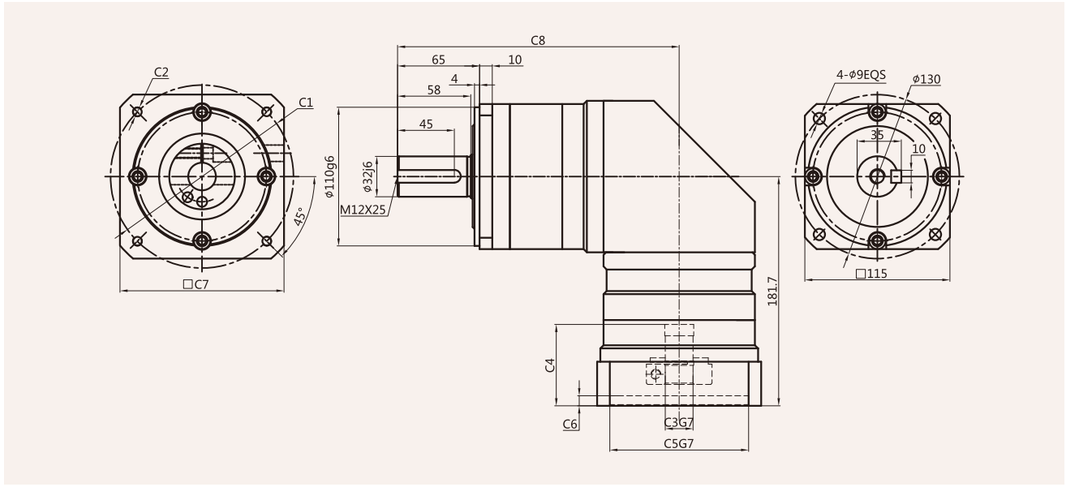
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ZAF-090-L1	Φ90	4-M5/4-M6	Φ19	47	Φ70	5.5	90	157.5
ZAF-090-L2	Φ90	4-M5/4-M6	Φ19	47	Φ70	5.5	90	193.5

外形尺寸图表
Outline dimensional

ZAF115-L1[Single]



ZAF115-L2[Double]

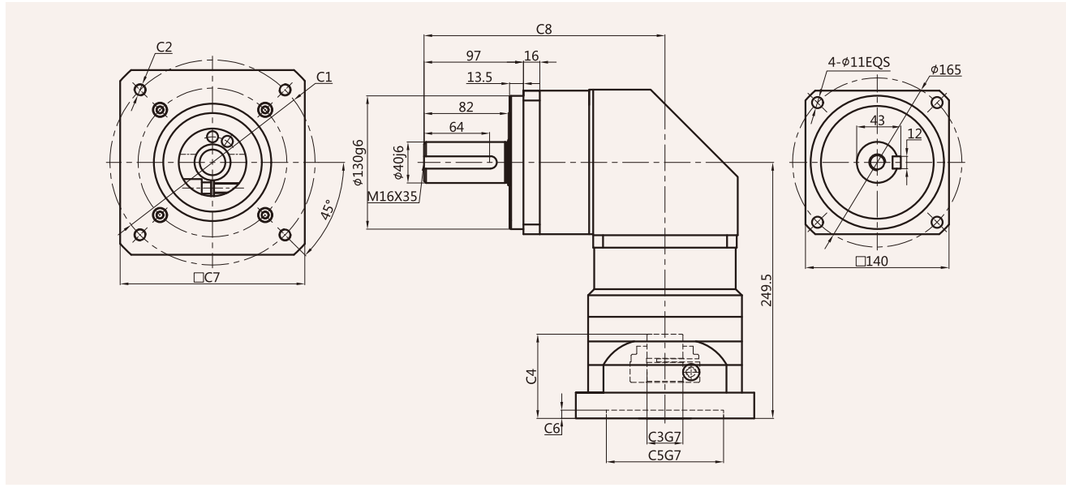


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

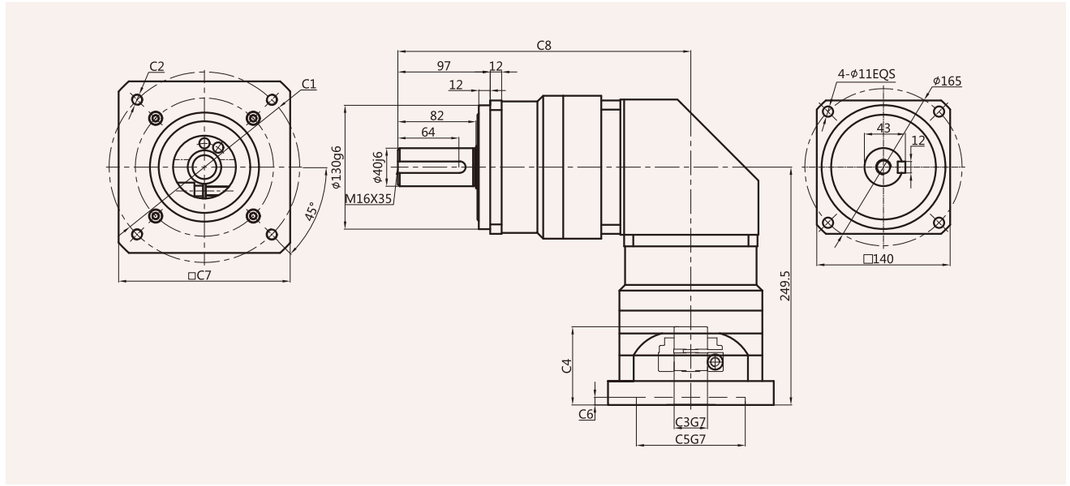
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ZAF-115-L1	Φ145	4-M8	Φ19/Φ22/Φ24	62	Φ110	7	130	191.7
ZAF-115-L2	Φ145	4-M8	Φ19/Φ22/Φ24	62	Φ110	7	130	223.2

外形尺寸图表
Outline dimensional

ZAF140-L1[Single]



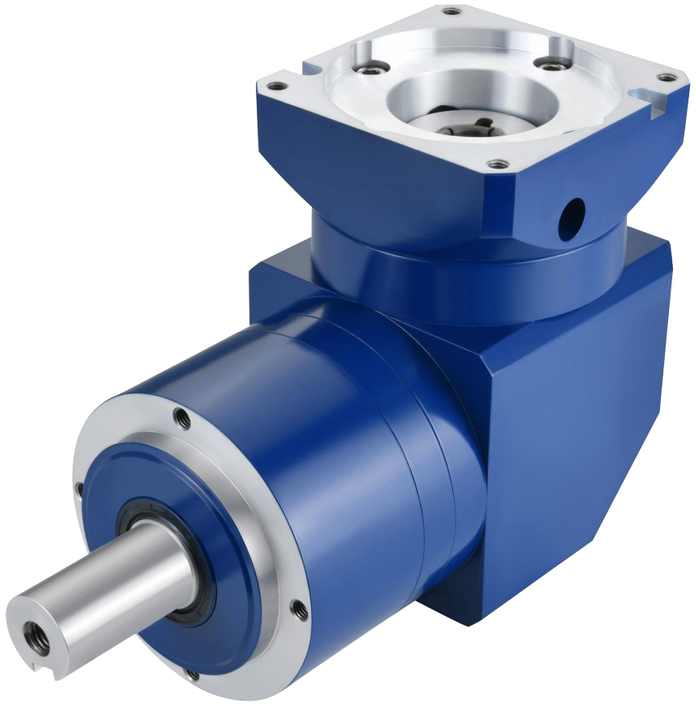
ZAF140-L2[Double]



适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ZAF-140-L1	Φ200	4-M12	Φ35	90	Φ114.3	7	180	235
ZAF-140-L2	Φ200	4-M12	Φ35	90	Φ114.3	7	180	307.5

- ZAL070
- ZAL090
- ZAL120
- ZAL155



ZAL

Series

ZAL系列减速机核心特性

The Core Characteristics of ZAL Series Reducer

1. 采用斜齿齿轮传动，经渗碳淬火处理，齿向齿廓修形处理，确保运行低噪音、平稳；承载能力较直齿提高20%；
2. 整体式输出轴，行星轮两端轴承支撑，实现高精度、强度；
3. 回程间隙小，精密型单级可以做到5arcmin以内。

1. Helical gear transmission, carburizing and quenching treatment, tooth profile modification treatment, to ensure low noise and smooth operation. The bearing capacity is 20% higher than that of straight teeth.
2. Integral output shaft and bearing support at both ends of planetary wheel to achieve high precision and strength.
3. The backhaul clearance is small, and the precision single stage can achieve less than 5 arcmin.

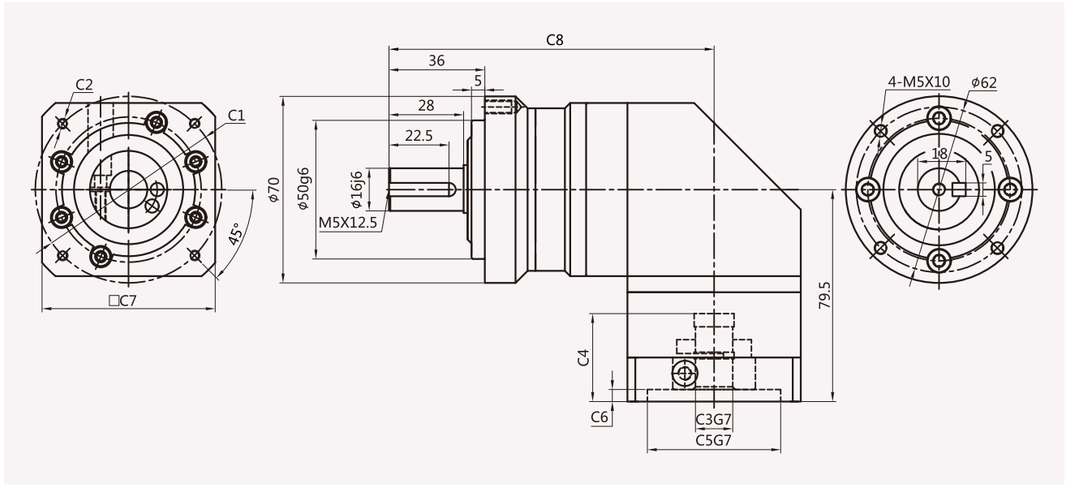
减速机性能资料

Gear box performance information

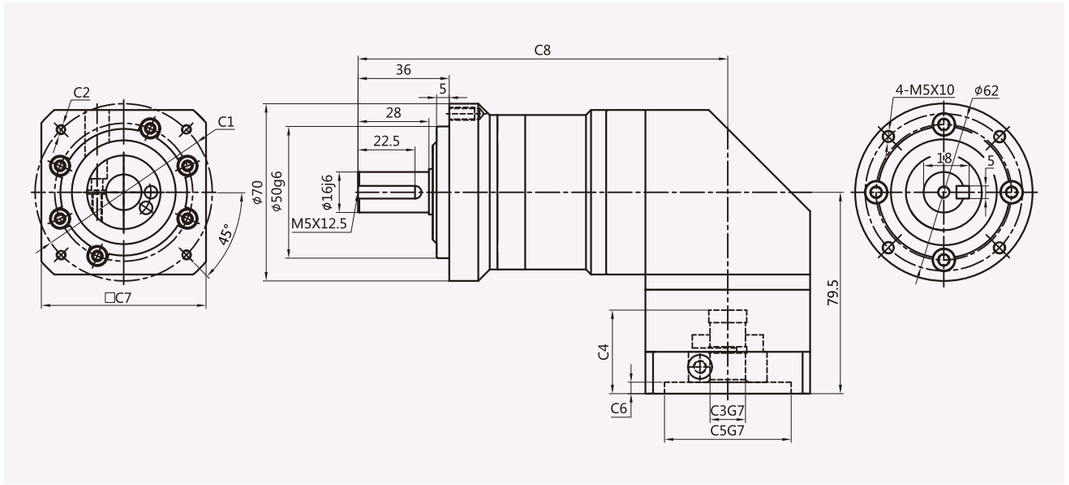
型号 Model	单位 Unit	ZAL070	ZAL090	ZAL120	ZAL155	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	18	50	120	240	3	
		27	75	180	360	4	
		27	75	180	360	5	2
		27	75	180	360	7	
		18	50	120	240	10	
		35	90	180	450	15	
		37	96	230	450	16	
		37	96	230	564	20	
		37	96	255	585	25	
		37	96	230	564	28	
		27	87	180	360	30	3
		37	96	255	585	35	
		37	96	230	564	40	
		37	96	255	585	50	
		27	87	180	360	70	
		18	50	120	240	100	
故障停滞扭矩 Emergency stop torque	N·m	3倍额定输出扭矩 3 times Rated output torque					
额定输入转速 Norminal input speed	rmp	3000	3000	3000	2000		
最大输入转速 Maximum input speed	rmp	6000	6000	6000	3500		
最大径向力 Maximum radial force	N	1200	2400	4300	9100		
最大轴向力 Maximum axial force	N	1100	2200	3900	8200		
效率 Efficiency	%	Single [97%]			Double [95%]		
平均寿命 Average lifetime	h	20000					
重量 Weight	kg	1.4	3.7	8	16		1
		1.6	4.2	8.9	17		2
转动惯量 Moment of inertia	$kgcm^2$	0.16	0.61	3.25	12.31	3	
		0.14	0.48	2.74	7.54	4	
		0.13	0.47	2.71	7.42	5	2
		0.13	0.47	2.62	7.25	7	
		0.13	0.44	2.57	7.14	10	
		0.127	0.72	2.56	12.35	15	
		0.088	0.5	1.75	7.47	16	
		0.075	0.44	1.5	6.65	20	
		0.075	0.44	1.49	5.81	25	
		0.064	0.39	1.3	6.34	28	
		0.064	0.39	1.3	6.34	30	3
		0.064	0.39	1.3	6.34	35	
		0.064	0.39	1.3	4.08	50	
		0.075	0.39	1.5	7.5	63	
		0.075	0.39	1.5	7.5	70	
		0.075	0.39	1.5	7.5	100	
回程间隙 Backlash	arcmin	≦ 5	≦ 5	≦ 5	≦ 5	Precise[2]	
		≦ 10	≦ 10	≦ 10	≦ 10	Standard[2]	
		≦ 7	≦ 7	≦ 7	≦ 7	Precise[3]	
		≦12	≦12	≦12	≦12	Standard[3]	
抗扭刚性 Torsional rigidity	N·m/arc min	7	14	25	50		
噪音 Noise	dB	65	65	70	75		
润滑 lubricating		合成油脂润滑 Synthetic grease lubrication					
防护等级 levels of protection		IP65					

外形尺寸图表
Outline dimensional

ZAL070-L1[Single]



ZAL070-L2[Double]

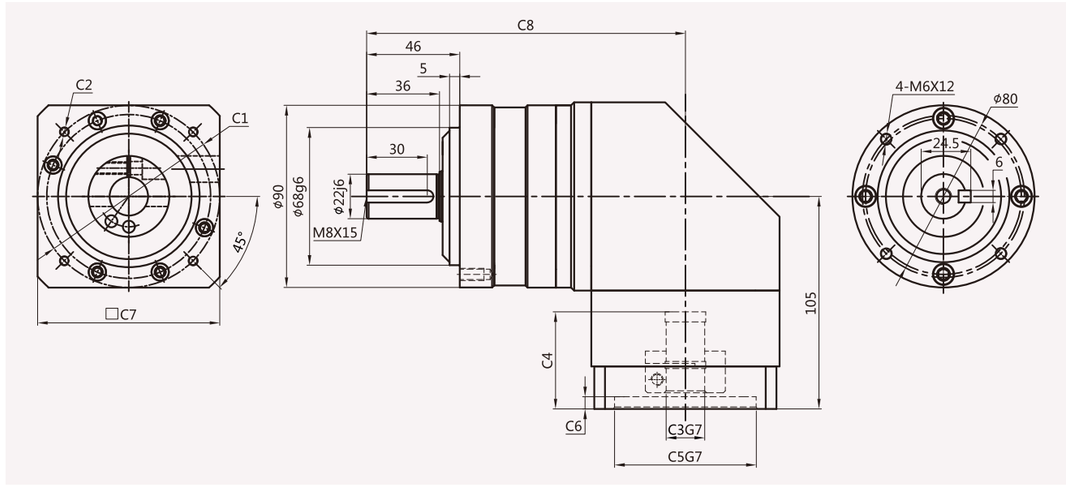


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

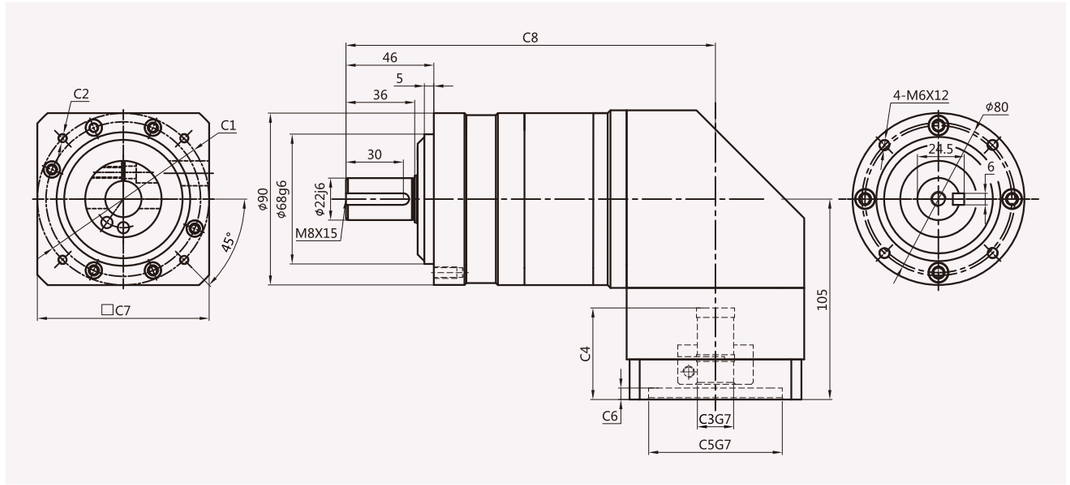
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ZAL-070-L1	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	122
ZAL-070-L2	Φ70	4-M4/4-M5	Φ14	34	Φ50	4.5	65	146

外形尺寸图表
Outline dimensional

ZAL090-L1[Single]



ZAL090-L2[Double]



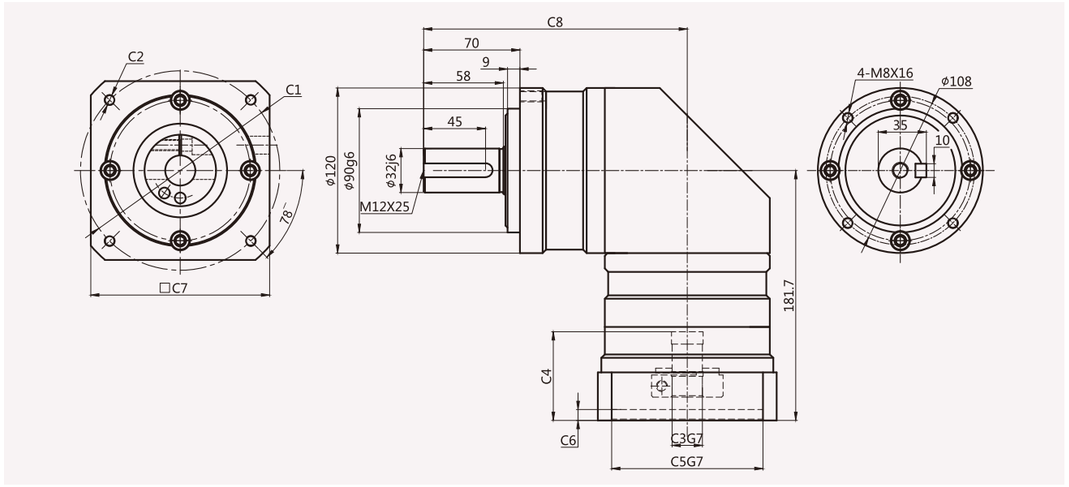
适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ZAL-090-L1	Φ90	4-M5/4-M6	Φ19	47	Φ70	5.5	90	157.5
ZAL-090-L2	Φ90	4-M5/4-M6	Φ19	47	Φ70	5.5	90	193.5

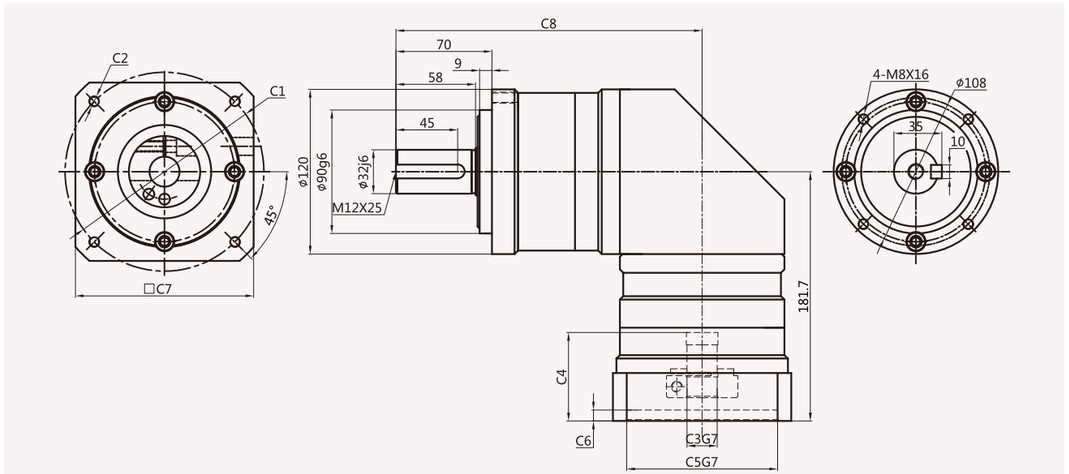
ZAL

外形尺寸图表
Outline dimensional

ZAL120-L1[Single]



ZAL120-L2[Double]

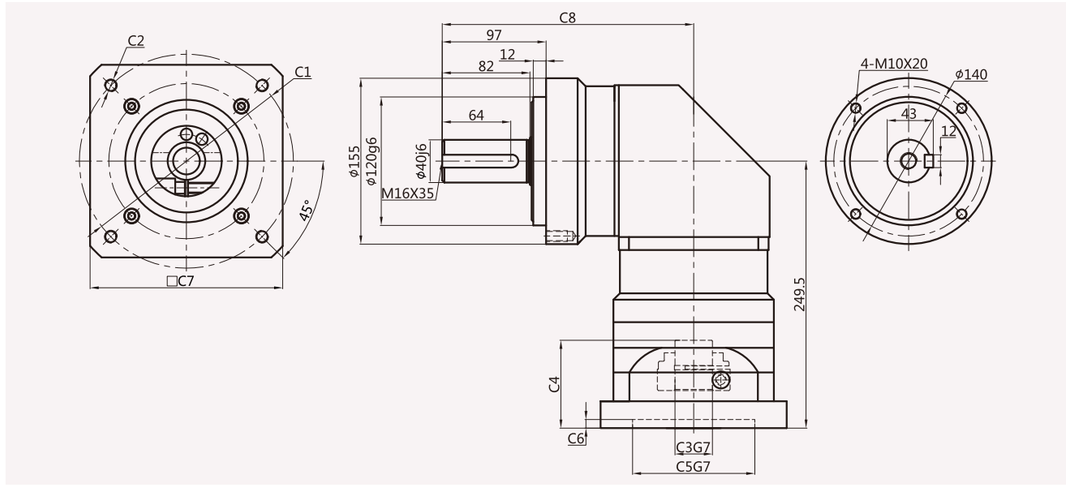


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

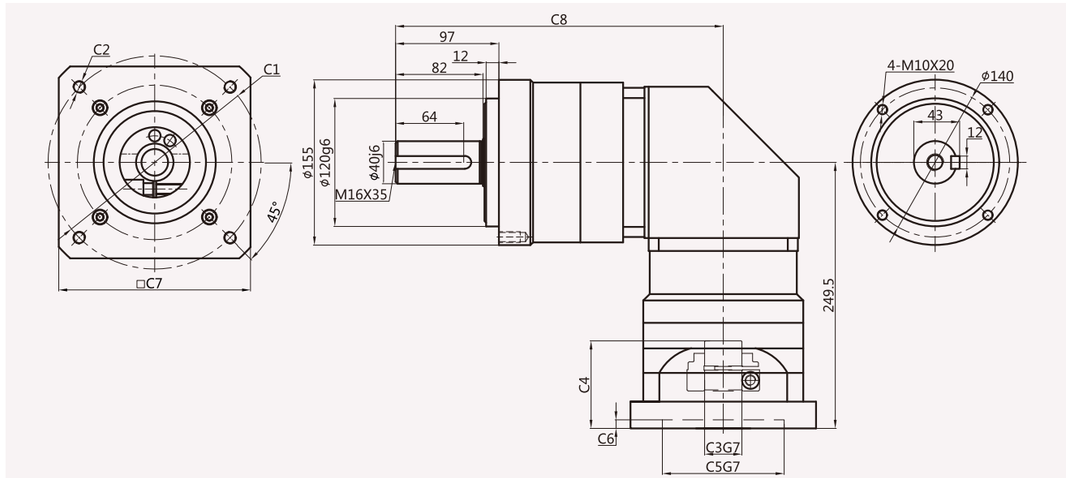
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ZAL-120-L1	Φ145	4-M8	Φ19/Φ22/Φ24	62	Φ110	7	130	191.7
ZAL-120-L2	Φ145	4-M8	Φ19/Φ22/Φ24	62	Φ110	7	130	223.2

外形尺寸图表
Outline dimensional

ZAL155-L1[Single]



ZAL155-L2[Double]



适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ZAL-155-L1	Φ200	4-M12	Φ35	90	Φ114.3	7	180	235
ZAL-155-L2	Φ200	4-M12	Φ35	90	Φ114.3	7	180	307.5

ZAL

Basic Concepts Related to Type Selection

选型相关的基本概念

减速比 Ratio

输入转速/输出转速

Input speed / Output speed

额定输入转速 Rated input speed n_1[rpm]

减速机的驱动速度，若减速机与电机转速相同。本书中的额定输入转速是在环境温度为20℃的条件下测得的。环境温度较高时请降低转速n_1。

The drive speed of the reducer is the same as that of the motor. The rated input speed in this book is measured at ambient temperature of 20 degrees Celsius. Reduce speed n_1 at higher ambient temperature.

输出转速 Output speed n_2[rpm]

输出转速按照下列公式通过输入转速n_1 和传动比i 计算出来：$n_2=n_1/i$

The output speed is calculated in accordance with the following formula from the input speed n_1 and the transmission ratio I.

段/级数 Poles

行星减速机的套数。由于一套行星减速机无法满足较大的传比，有时需要两套或来满足用户对较大传动比的求，也就是说，减速比越大段/级数越多。由于增加了行星齿轮的数量，所以二级减速机的长度有所增加，效率会有所下降。

The number of Sets of planetary gear. Owing to one set planetary can't satisfy bigger transmission ratio, two sets can meet Users' requirements of bigger transmission ratio, Since increasing the gear quality, the length of the two poles motor will increase accordingly, the efficiency will reduce accordingly.

传动效率 Efficiency

指在额定负载情况下，减速机的传动效率。减速比越大，级数越多，效率越低。

If refers to the gearing efficiency of the gearboxes in the case of the largest load.

平均寿命 Average lifetime

指减速机在额定负载下，额定输入转速是减速机的连续工作时间。

The rated input speed is the continuous working time of the reducer under the rated load.

定位精度 Prise Positioning

在高速机械往复运动中做到精确定位的关键在于尽量减少通过运动产生的角偏差。定位精度取决于两个值，一个与加载有关的偏转角，涉及回程间隙和扭转刚度；另一个是与运动控制有关的偏转角，涉及到同步偏差问题。

In high-speed reciprocating mechanical movement achieve precise Positioning , is the key to minimizing the movement through the angular deviation,positioning accuracy depends on the two values, with a load of the ration angle, involving partial synchronization the problem worse.

回程间隙背隙 Backlash

减速机输出轴与输入轴的最大角偏差，测量时先将齿轮输入轴固定住，然后在输出轴用力矩仪加载一定力矩（$2\%T_N$），以克服减速机内的摩擦力。

The maximum angular deviation between the output shaft and the input shaft of the reducer is measured by fixing the gear input shaft, and then loading a certain moment ($2\%T_N$) on the output shaft with a torquer to overcome the friction in the reducer.

迟滞曲线 hysteresis cycle

迟滞曲线是为了得出减速的扭转刚度，通过检测到迟滞曲线 。检测时，先将减速机输入端固定住，然后在输出端的两个旋转方向分别持续地加载到T_{2B}最大输出力矩。继而逐步卸载，用仪器记录下力矩的仿差角，得到的曲线是一条闭合曲线，从中可以计算出减速机回程间隙(j_t)和扭转刚度(C_{t21}).

The hysteresis curve is used to obtain the torsional stiffness of deceleration, and the hysteresis curve is detected. During the detection, the input end of the reducer is fixed, and then the maximum output torque of T_{2B} is continuously loaded in the two rotating directions of the output end. Then unloading step by step and recording the imitation angle of the moment with the instrument, the curve obtained is a closed curve from which the return clearance (j_t) and torsional stiffness (C_{t21}) of the reducer can be calculated.

转动惯性 Inertia

本说明书中的该值均指输入端。表示一个物体尽力保持转动状态（或机静止或转动）特征的一个值。

This value in this specification refers to the input end. A value representing the characteristic of an object trying to maintain its rotational state (or the machine being stationary or rotating).

惯量比 The proportion of ratio

是指负载惯量与传动系统惯量（电机加上减速机）之间的比值。这个比值决定了系统的可控性。值越大，也就是个转动惯量差值越大，高动态的动作过程就越难精确控制，建议尽可能将值控制在<5。齿轮箱可以将负载惯量降低1/i^2。

It refers to the ratio between load inertia and transmission inertia (motor plus reducer). This ratio determines the controllability of the system. The greater the value, that is, the greater the difference of inertia, the more difficult it is to accurately control the high dynamic motion process. It is suggested that the value be controlled at < 5 as far as possible. Gearbox can reduce load inertia by 1/i^2.

噪音 Noise

单位是分贝(dB)。此数值是在输入转速为3000转/分时，不带负载，距离减速机一米距离是测量的。

The unit is decibel(dB). This value is measured at the input speed of 3000 rpm without load and one meter away from the reducer.

额定输出扭矩 Rated output torque T_N[Nm]

T_N[Nm]减速机长时间（连续工作制）可以加载的力矩（无磨损），条件应满足负载均匀，安全系数S=1，AF140以下机型，理论寿命为20000小时：AF180以上机型理论寿命为10000小时：T_N值遵守ISODP6336齿轮标准与ISO281轴承标准。

T_N[Nm] reducer can be loaded for a long time (continuous working system) without wear and tear. The condition should satisfy the uniform load, safety factor S=1, AF140 model, theoretical life is 20 000 hours: AF180 model, theoretical life is 10 000 hours: T_N value conforms to ISODP6336 gear standard and ISO281 bearing standard.

Basic Concepts Related to Type Selection

选型相关的基本概念

加速扭矩
Accelerating Torque
T_{2B}[Nm]

指工作周期每小时少于1000次时允许短时间加载到输出端的最大力矩。工作周期每小时大于1000次时，须考虑冲击因素，加载扭矩是周期工作制选型时的一个最大值，实际使用中的加速力矩必须小T_{2B},否则会缩短减速机的寿命。

It refers to the maximum moment that can be loaded to the output in a short time when the working cycle is less than 1000 times per hour. When the working cycle is more than 1000 times per hour, the impact factor must be considered. Loading torque is the maximum value in the selection of periodic working system. The acceleration moment in actual use must be smaller than T_{2B} , otherwise the life of reducer will be shortened.

紧急制动扭矩
Emergency braking torque
T_{2NOT}[Nm]

指减速机输出端所能加载的最大力矩，这个力矩可在减速机寿命期内加载1000次，绝对不能超过1000次。（备注：AF140以下机型为$T_{2NOT}=2*T_{2B}$, AF180以上机型为$T_{2HOT}=1.5*T_{2B}$)

It refers to the maximum moment that can be loaded at the output end of the reducer. This moment can be loaded 1000 times in the lifetime of the reducer, absolutely not more than 1000 times.(Note: The models below AF140 are $T_{2NOT}=2*T_{2B}$, AF180 model above are $T_{2HOT}=1.5*T_{2B}$)

空载扭矩
No-load Torque
T_{012}[Nm]

指加载到减速机上的以克服减速机内摩擦力的力矩。

Refers to the moment loaded on the reducer to overcome friction in the reducer.

最大输出扭矩
Maximum output torque
T_{2max}

指减速机在静态条件或频繁启动条件下所能承受的输出扭矩，通常指峰值负载或启动负载。

Refers to the gearbox output torque can ba loaded under static conditions or frequent starts conditions,usually refers to the peak load or the start load.

实际所需扭矩
Actual required torque
T_2[Nm]

所需扭矩取决于应用场合的实际工况，拟选减速机的额定扭矩T_{2N}必须大于这个扭矩。

The required torque depends on the actual conditions of the applications, to be selected rated torque T_{2N} must be greater than the required torque.

计算扭矩
Computational Torque
T_{C2}[Nm]

会在选择减速机时被用到，可以由实际所需扭矩T_2和系数f_S，按以下公式得出$T_{C2}=T_2*f_S \leq T_N$

$T_{C2}=T_2*f_S \leq T_N$ can be obtained from the following formulas, which can be used to select the reducer. The actual required torque T_2 and coefficient f_S can be used to calculate the $T_{C2}=T_2*f_S \leq T_N$.

轴向力
axial force
F_a[N]

是指平行于轴心的一个力，它的作用点与输出轴端有一定的轴向偏差(Y_2)时，会形成一个额外的弯绕力矩。轴向力超过样本所示的额定值时，须用联轴节来抵消这种弯绕力。

It refers to a force parallel to the axis. When its action point has a certain axial deviation (Y_2) from the output shaft end, it will form an additional bending moment. When the axial force exceeds the rated value shown in the sample, the bending force shall be offset by the coupling.

径向力
radial force
F_r[N]

指垂直作用于轴向力的一个力，它平行于输出轴，它的作用点与轴端有一定的轴向距离(X_2)。这个点成一个杠杆点，横向力形成一个弯绕力矩。

A force acting perpendicularly on the axial force, parallel to the output axis, has an axial distance (X_2) between the action point and the end of the axis. This point is a lever point, and the lateral force forms a bending moment.

轴伸径向载荷、轴向载荷
Axis Extension Radial Load and Axis Load

选择减速机的附加依据是输出轴伸出端上的径向载荷和轴向载荷。轴的强度和轴承的承载能力决定了许用轴伸的的径向载荷。产品样本中给出的最大允许值是指在最不利的方向作用轴伸出端中点（即1/2L处）的力。当作用力不在中点时，越接近轴肩，允许的径向载荷就越大；相反，作用点离轴肩越远，允许的径向载荷就越小。

The additional basis for selecting the reducer is the radial and axial loads on the extension end of the output shaft. The strength of the shaft and the bearing capacity determine the allowable radial load of the axle extension. The maximum allowable value given in the product sample refers to the force at the midpoint (i.e. 1/2L) where the axis extends in the most disadvantageous direction. When the force is not at the midpoint, the closer to the shoulder, the greater the allowable radial load; on the contrary, the farther the action point is from the shoulder, the smaller the allowable radial load.

安全系数 S
safety factor

安全系数等于减速机的额定输入功率的比值。

The safety factor is equal to the ratio of the rated input power of the reducer.

使用系数 f_S
Coefficient of use

使用系数表现减速机的应用特征，它考虑发哦减速机的负载类型和每日工作时间。

The coefficient of use represents the application characteristics of the reducer. It considers the load type and working time of the reducer.

扭转刚度 C_{t21}
Torsional stiffness
[Nm/Arcmin]

由加载力矩和所产生的扭转角之间的比率来定义。$C_{t21}=\triangle T/\triangle \phi$ 它说明需要用多大的力矩才能把输出轴转动一弧分。扭转刚度是从迟滞曲线得出的。在曲线图上只需要关注T_{2B}的50%到100%这个范围，在这个范围内，曲线可看成是一条直线。

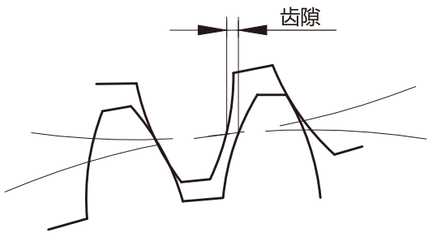
It is defined by the ratio between the loading moment and the resulting torsion angle. $C_{t21}=\triangle T/\triangle \phi$ indicates how much torque is required to rotate the output shaft in an arc. Torsional stiffness is derived from hysteresis curve. In the graph, only 50% to 100% of T_{2B} is needed to be concerned. In this range, the curve can be regarded as a straight line.

安装力矩
Installation Torque
[Nm]

减速机的组装以及电机与减速机连接安装（输入轴采用弹性联轴器要求），都是有力矩要求。建议使用力矩扳手来完成安装步骤。

The assembly of reducer and the connection between motor and reducer (the requirement of elastic coupling for input shaft) are all strong moment requirements. It is recommended to use the moment wrench to complete the installation steps.

减速机专用名词解释
Explanation of special terms for reducer



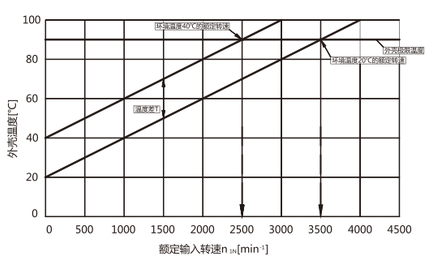
[如]

定位精确度：在高速机械往复运动中做到精确定位的关键在于尽量减小通过运动产生的角偏差，定位精确度取决于两个值，一个是与加载有关的偏转角，涉及到回程间隙与扭转刚度，另一个是与运动控制有关偏转角，涉及到同步偏差问题。

转动惯量J[Kgcm²]：表示一个物体尽力保持自己转动状态(或静止或转动)特性的一个值。样本中的值均指输入端。

弧分 [Arcmin]：一度分为60弧分(=60 Arcmin=60’).如回程间隙标为1 Arcmin时,意思是说齿轮箱转一圈,输出端的角偏差为1/60°。在实际应用中，这个角偏差与轴直径有关b=2·π·r·a°/360°。就是说，输出端半径为500mm时，齿轮箱精度为jt=3’时，齿轮箱转一圈的偏差为b=0.44mm。

回程间隙jt [Arcmin]：指减速机输出轴与输入端的最大偏差角.测量时先将齿轮输入端固定住,然后在输出端用力矩仪加载一定力矩(2%T2B)，以克服减速机内的磨擦力。



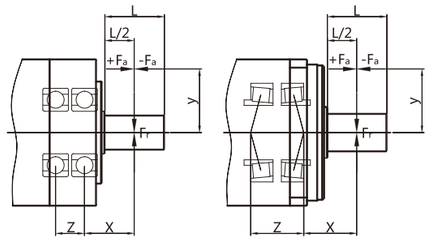
[如]

速比i：表示减速机改变某一运动的三个主要参数值的值，即通过减速机的速比来改变转速、扭矩和惯性力矩。

噪音[dB]：成套设备选用低噪音减速机，有助于环境保护和健康保护。速比与转速直接影响到噪音水平，一般是转速越高，噪音越大；速比越大噪音越小。样本中的值是在输入转速为3000rpm/min时，不带负载，离减速机一米距离时测量的。

平均寿命[h]：指减速机在额定负载下，额定输入转速时的连续工作时间。

转速（n）：减速机选型时必须要考虑的两个转速是最大输入转速和额定输入转速。为间歇工作制选用减速机时，要考虑不能超过最大输入转速n1max。为连续工作制选用减速机时，要考虑不能超出最大额定转速n1N。额定转速受到减速机外壳温度的限制，这个温度不能超过90℃。从下图中可以看出，环境温度越高时，减速机的温度也提前达到额定温度。换句话说，在环境温度高时必须降低转速。



[如]

额定输入转速n_1[rpm]：减速机的驱动速度，如减速机与电机直接相连，则转速值与电机转速相同。本书中的额定输入转速是在环境温度为20° C的条件下测得的，环境温度较高时请降低转速n_1。

传动效率 η：由于摩擦引起的损失总是使有效率小于1，也就是少于100%。样本上的效率是齿轮箱在满负荷运动情况下，减速机的传输效率。

额定输出扭矩 [Nm]：指减速机长时间（连续工作制）可以加载的力矩（无磨损），条件应满足负载均匀，安全系数S=1，理论寿命为20000小时；T2N值遵守ISO DP 6336齿轮标准与ISO 281轴承标准。

空载扭矩 [Nm]：指加载到减速机上以克服齿轮箱内的摩擦力的力矩。样本所标值是在转速为3000rpm，环境温度在20℃时的测得的。

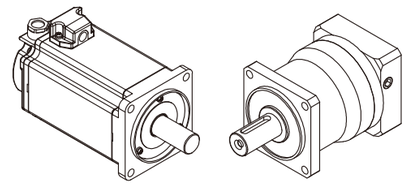
轴向力FaMax[N]：是指平行于轴心的一个力。它平行于输出轴。它的作用点与输出轴端有一定的轴向偏差（y）时，会形成一个额外的弯挠力矩。轴向力超过样本所示的额定值时，须用联轴节来抵消这种弯挠力 。

径向力FrMax[N]：指垂直作用于轴向力的一个力。它的作用点与轴端有一定的轴向距离（x），这个点成一个杠杆点。横向力形成一个弯挠力矩。

工作温度/ Operating temp	℃	（-40）-25bis/to+90(+120)
保护等级 / Degree of protection		IP65
润滑 / Lubrication		长效润滑 / Life time lubrication
安装方式 / Mounting position		任意 / Any
法兰标准 / Motor flange precision		Din 42955-N

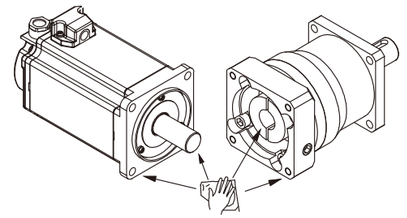
减速机安装指南
Speed reducer installation guide

第一步
确认电机和减速机是否完好（若有电机轴键，需移走）



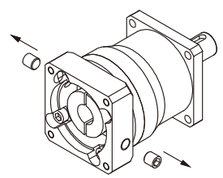
安装前确认电机和减速机是否完好无损，并且严格检查电机与减速机相连接的各部位尺寸是否匹配，主要指电机的凸台尺寸与减速机凹槽等尺寸及配合公差。

第二步
将电机轴和减速机的连接部分清洁干净



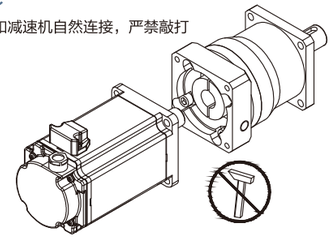
将电机输出轴、定位凸台及减速机连接部位的防锈油用汽油或锌钠水擦拭干净，其目的是保证连接的紧密性及运转的灵活性，并且防止不必要的磨损。

第三步
旋掉减速机法兰外侧的螺钉，插入内六角扳手



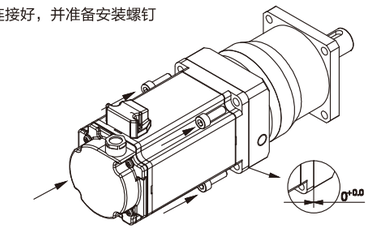
取下减速机法兰外侧工艺孔上的防尘盖，调整减速机输入轴弹性夹紧装置使其紧固螺栓与工艺孔对齐，插入内六角扳手。此步骤适合筒夹式锁紧机构联接。

第四步
将电机和减速机自然连接，严禁敲打



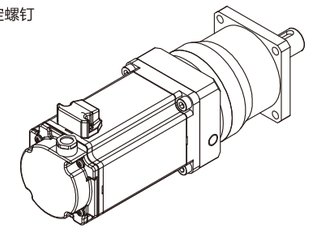
连接时必须保证减速机输出轴与电机输入轴同轴度一致，且二者外侧法兰平行，如果轴度不一致，会导致电机轴折断或减速机齿轮磨损。另外，在安装时，严禁用铁锤等击打，防止轴向力或径向力过大损坏轴承或齿轮。

第五步
试连接好，并准备安装螺钉



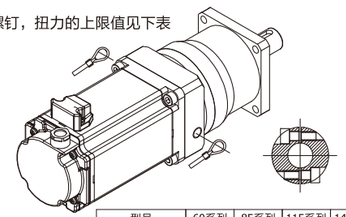
在电机与减速机连接前，请先将减速机锁紧螺钉对准工艺孔，便于扳手介入。

第六步
锁紧固定螺钉



为保证受力均匀，请先将任意对角位置的安装螺钉旋上，但不要旋紧，再旋上另外两个对角位置的安装螺钉，最后逐个旋紧四个安装螺钉。

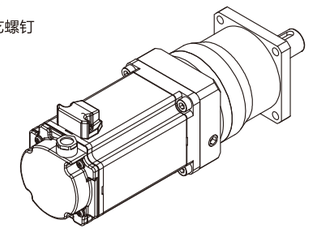
第七步
锁紧抱紧螺钉，扭力的上限值见下表



型号	60系列	85系列	115系列	140系列
螺钉规格	M5	M6	M8	M10
锁紧扭矩(Nm)	9.5	16.5	40	80

减速机抱紧螺钉有两颗，请逐步加力，均匀锁紧。

第八步
安装工艺螺钉



工艺螺钉的安装可以更好的达到防护等级。