

High precision planetary gearboxes
NIETZ

High precision
planetary gearboxes
helical teeth series



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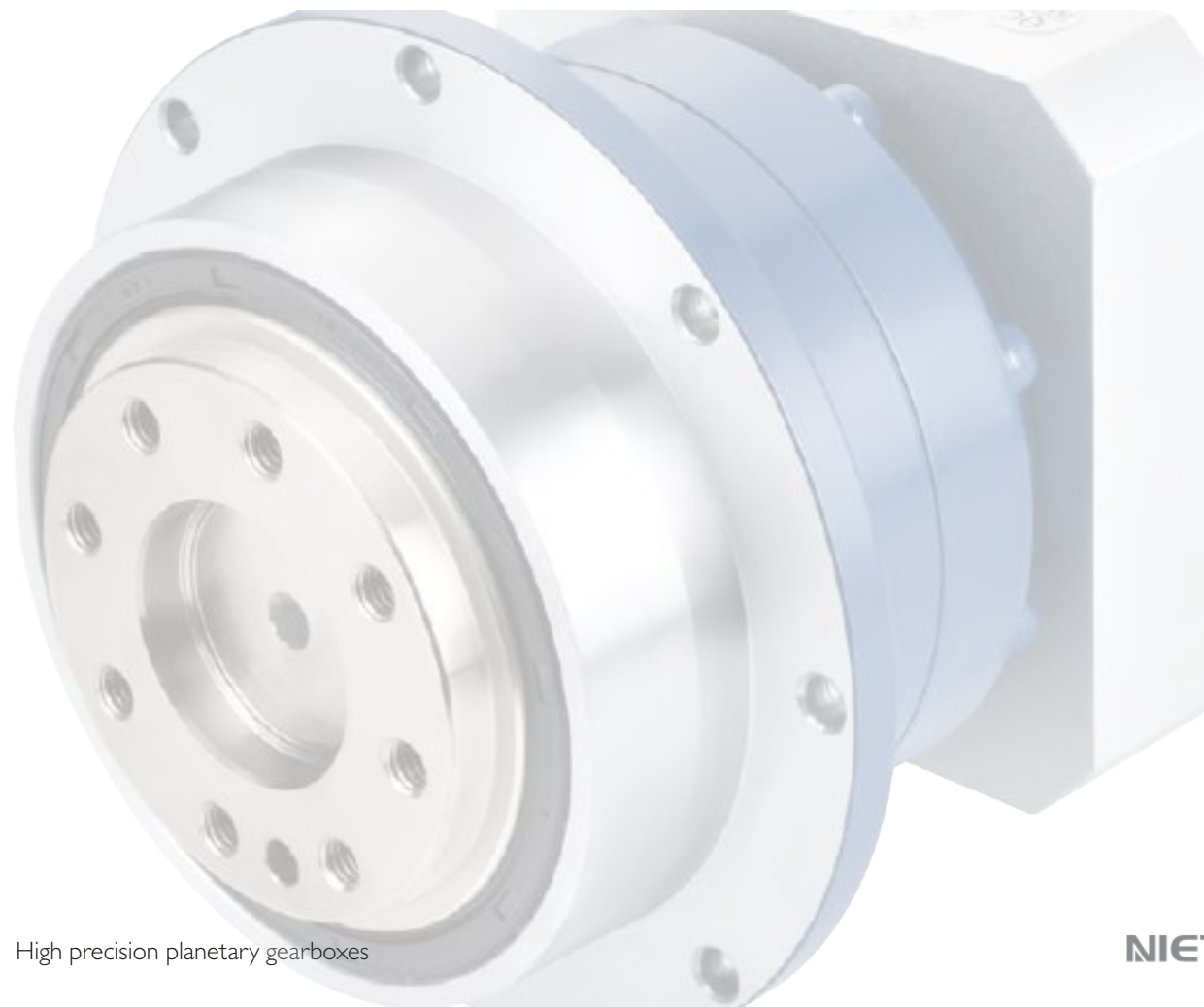
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DISTRIBUTORS

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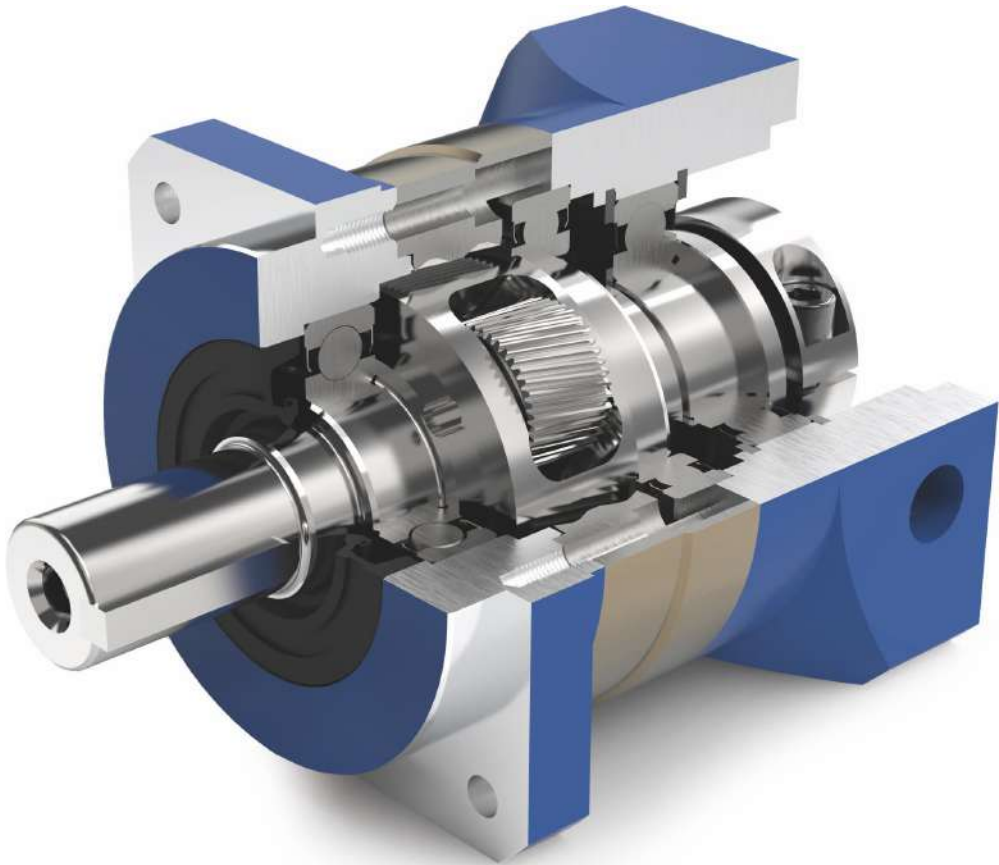
HOW TO ORDER

Model Code Description

SF	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 1 Stage L2: 二级 2 Stage)
									060: 规格 Model (060/090/115/140/180)
SF: 系列名称 Series name									

Mounting 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 ΦLZ: diameter of mounting holes (M for threaded holes) ΦLA: 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” ΦLB: Boss diameter ΦLE: 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” ΦS: Motor shaft diameter ΦLR: includes the length behind the boss



SF Series

The Main Features

- 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

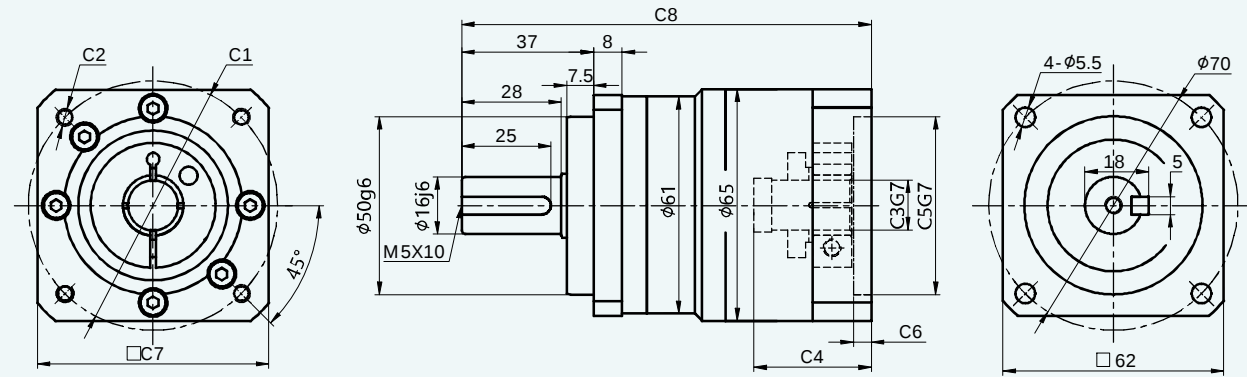
Gear box performance information

型号 Model	单位 Unit	SF-060	SF-090	SF-115	SF-140	SF-180	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	35	100	230	450	1000	3	1
		45	110	270	580	1300	4	
		44	105	255	540	1100	5	
		40	100	180	390	800	7	
		22	50	120	230	460	10	
		35	100	230	450	1000	15	2
		45	110	270	580	1300	16	
		45	110	270	580	1300	20	
		44	105	255	540	1100	25	
		45	110	270	580	1300	28	
		35	100	230	450	1000	30	
		44	105	255	540	1100	35	
		45	110	270	580	1300	40	
		44	105	255	540	1100	50	
		40	100	180	390	800	70	
		22	50	120	230	460	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	rpm	3000	3000	3000	2000	1500		
额定输入转速 Maximum input speed	rpm	6000	6000	6000	4000	3000		
最大径向力 ^{*1} Maximum radial force	N	920	1400	3000	5800	9500		
最大轴向力 ^{*1} Maximum axial force	N	630	600	2500	4500	6800		
效率 Efficiency	%	Single [97%]			Double [95%]			
平均寿命 Average lifetime	h	20000						
重量 (大概) Weight	kg	1.1	3.0	6.8	17	31.5		1
		1.6	4.3	10	24	37.5		2
转动惯量 Moment of inertia	kgcm ²	0.22	1.2	3.3	20	44	3	1
		0.17	0.95	2	15	28	4	
		0.16	0.86	1.6	14	22	5	
		0.14	0.79	1.1	12	16	7	
		0.14	0.75	0.95	11	14	10	
		0.14	0.72	0.8	11	12	15	2
		0.14	0.5	0.9	11	13	16	
		0.13	0.44	0.8	11	12	20	
		0.13	0.44	0.8	11	12	25	
		0.14	0.39	0.8	11	13	28	
		0.13	0.39	0.7	10	11	30	
		0.13	0.39	0.8	11	12	35	
		0.13	0.39	0.7	10	11	40	
		0.13	0.39	0.7	10	11	50	
		0.13	0.39	0.7	10	11	70	
		0.13	0.39	0.7	10	11	100	
回程间隙 Backlash	arcmin	3	3	3	5	5	Precise[1]	
		5	5	5	7	7	Standard[1]	
		5	5	5	7	7	Precise[2]	
		7	7	7	10	10	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						

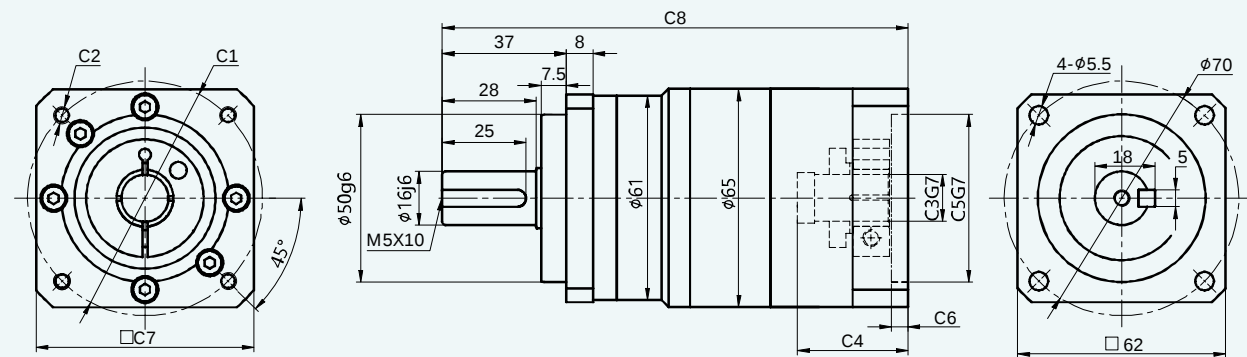
外形尺寸图表

Outline dimensional

SF-060-L1



SF-060-L2



适配电机输入接口尺寸(左端为输入尺寸)

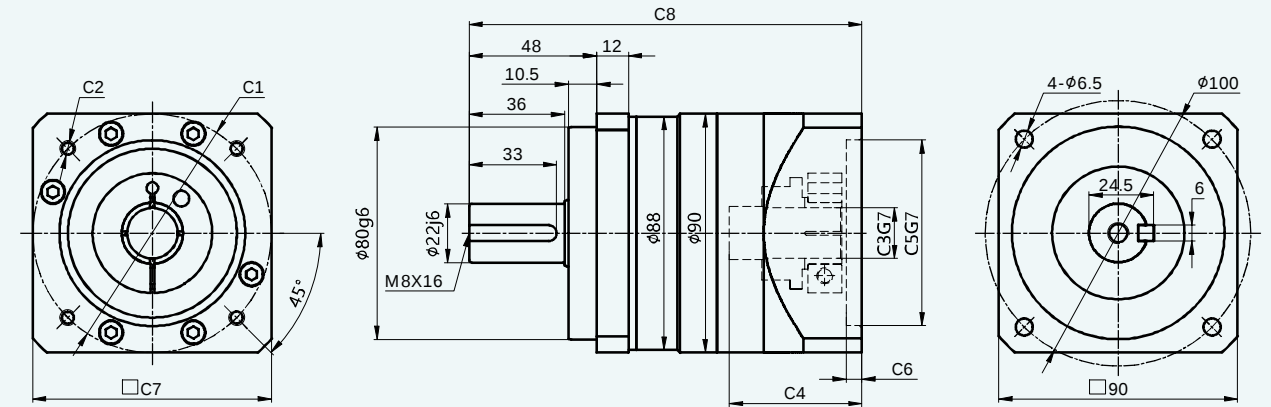
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SF-060-L1	□47.14	4-M4	Φ8	30	Φ38.1	5	65	112
	Φ46	4-M4	Φ8	30	Φ30	5	65	112
	Φ45	4-M3	Φ8	30	Φ30	5	65	112
	Φ70	4-M4/4-M5	Φ14	33	Φ50	5	65	115
SF-060-L2	□47.14	4-M4	Φ8	30	Φ38.1	5	65	136
	Φ46	4-M4	Φ8	30	Φ30	5	65	136
	Φ45	4-M3	Φ8	30	Φ30	5	65	136
	Φ70	4-M4/4-M5	Φ14	33	Φ50	5	65	139

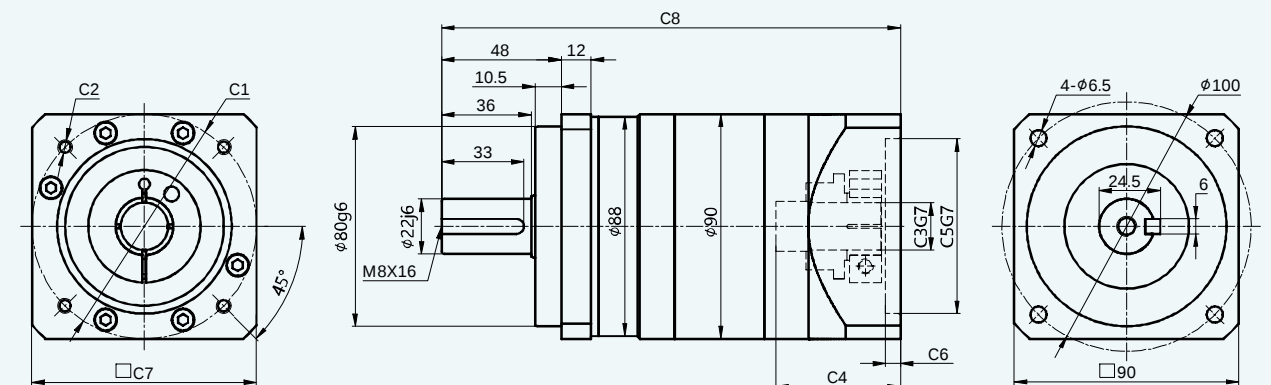
外形尺寸图表

Outline dimensional

SF-090-L1



SF-090-L2



适配电机输入接口尺寸(左端为输入尺寸)

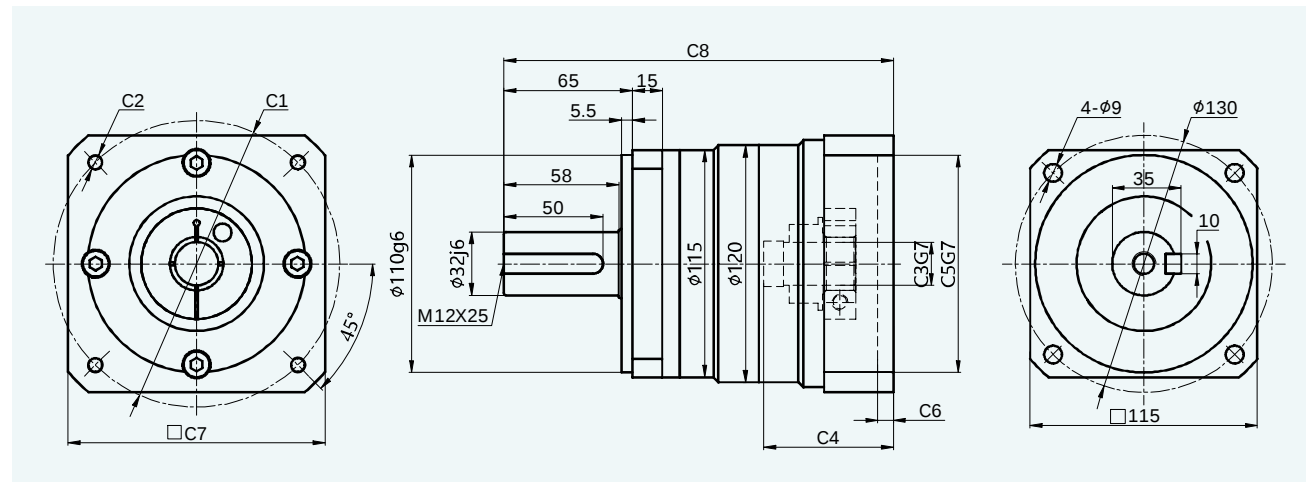
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SF-090-L1	Φ98.4	4-M6/4-M5	Φ14/Φ19	50	Φ73	6	90	148
	Φ90	4-M5/4-M6	Φ19	50	Φ70	6	90	148
	Φ115	4-M8	Φ19/Φ22	62	Φ95	8	110	160
	Φ130	4-M8	Φ19/Φ22	62	Φ95	8	110	160
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	14	130	163.5
SF-090-L2	Φ70	4-M4/4-M5	Φ14	38.5	Φ50	5	65	175
	Φ98.4	4-M6/4-M5	Φ14/Φ19	50	Φ73	6	90	184
	Φ90	4-M5/4-M6	Φ19	50	Φ70	6	90	184
	Φ115	4-M8	Φ19/Φ22	62	Φ95	8	110	196
	Φ130	4-M8	Φ19/Φ22	62	Φ95	8	110	196
	Φ145	4-M8	Φ19/Φ22	65.5	Φ110	14	130	199.5
	Φ160	4-M10	Φ22/Φ25	75	Φ125	16	150	216

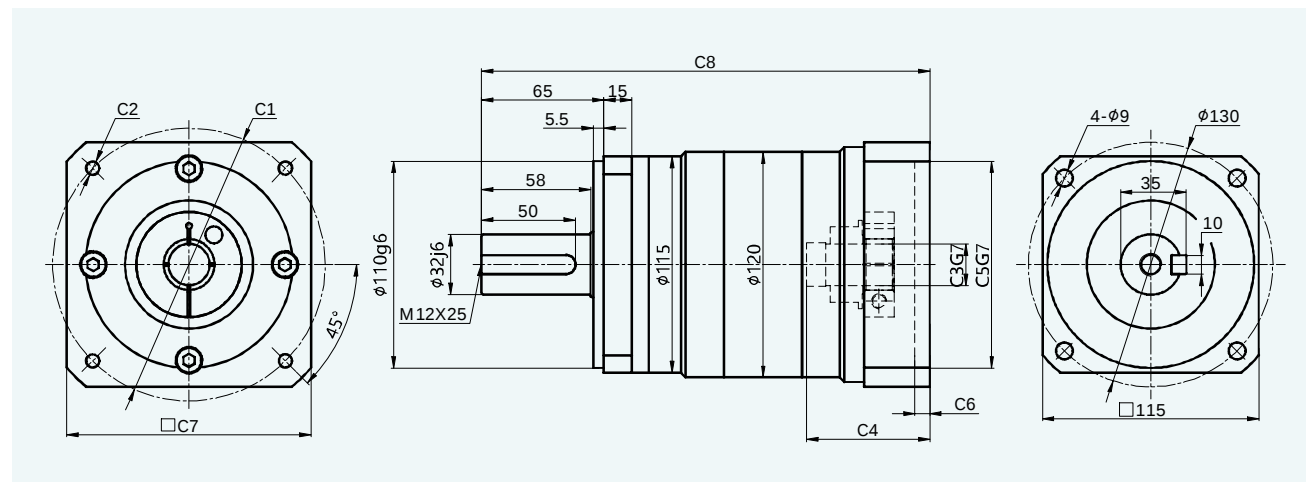
外形尺寸图表

Outline dimensional

SF-115-L1



SF-115-L2



适配电机输入接口尺寸(左端为输入尺寸)

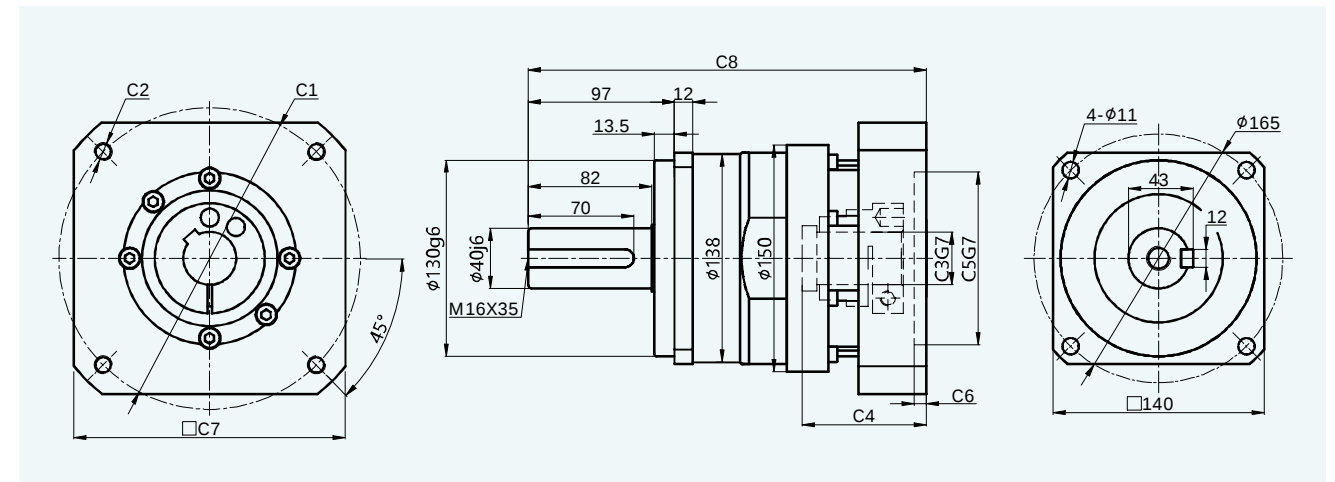
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SF-115-L1	Φ115	4-M8/4-M6	Φ19/Φ22/Φ24	62.5	Φ95	8	130	194
	Φ130	4-M8	Φ19/Φ22/Φ24	62.5	Φ95	8	130	194
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	8	130	197
SF-115-L2	Φ90	4-M5/4-M6	Φ19	57.5	Φ70	6	130	230.5
	Φ115	4-M8/4-M6	Φ19/Φ22/Φ24	62.5	Φ95	8	130	235.5
	Φ130	4-M8	Φ19/Φ22/Φ24	62.5	Φ95	8	130	235.5
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	8	130	238.5

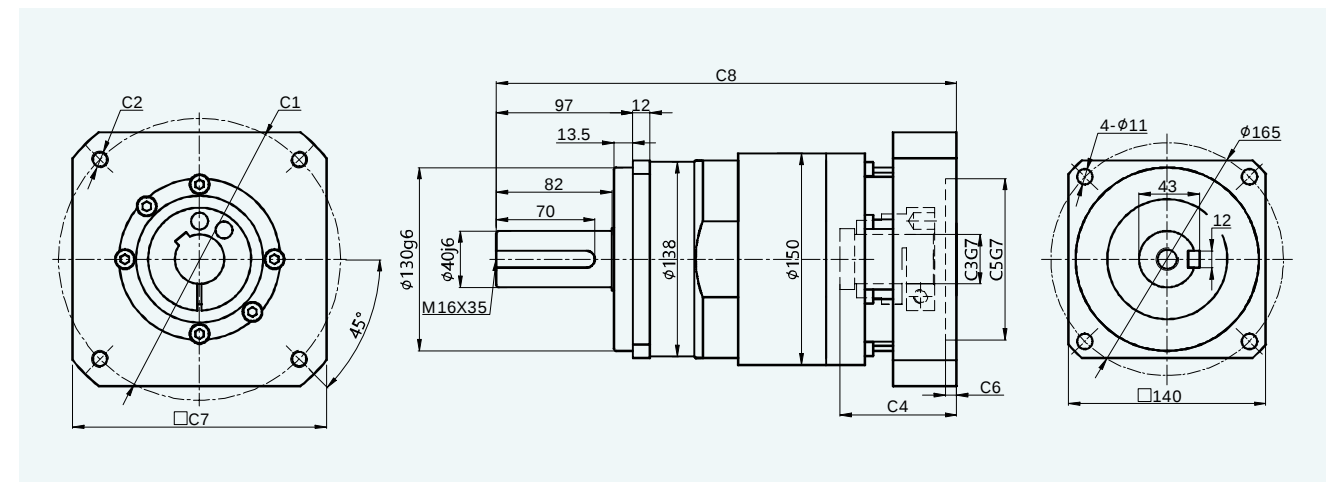
外形尺寸图表

Outline dimensional

SF-140-L1



SF-140-L2



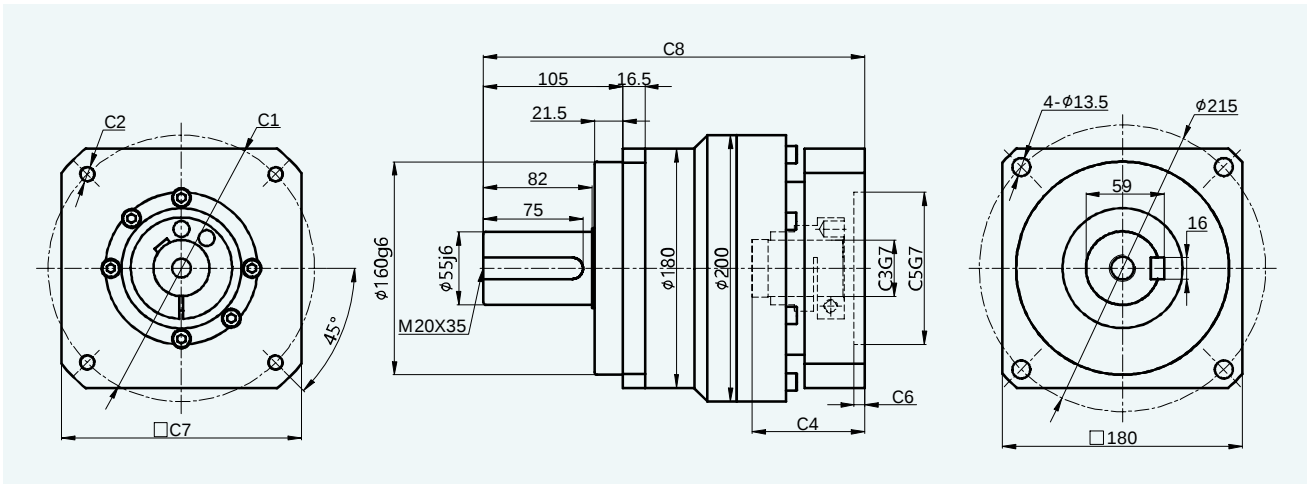
适配电机输入接口尺寸(左端为输入尺寸)

Adapter motor input interface size (The left end is the input size)

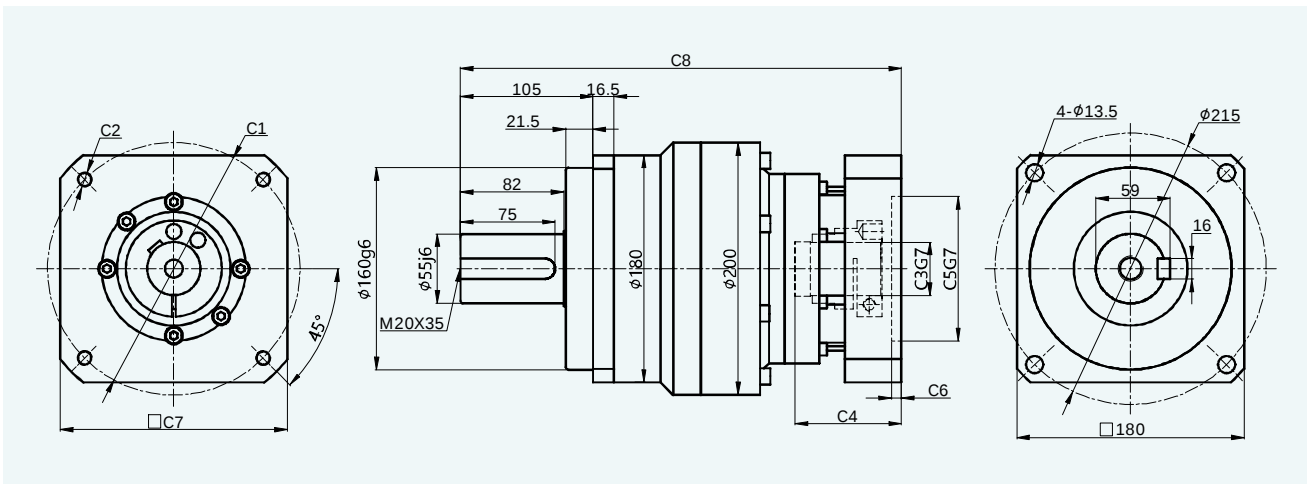
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SF-140-L1	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	249
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	254
	Φ200	4-M12	Φ35/Φ38/Φ42	82.5	Φ114.3	8	180	264
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	296.5
	Φ215	4-M12	Φ38/Φ42	87.5	Φ180	8	200	269
SF-140-L2	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	311.5
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	316.5
	Φ200	4-M12	Φ35	82.5	Φ114.3	8	180	326.5

外形尺寸图表
Outline dimensional

SF-180-L1

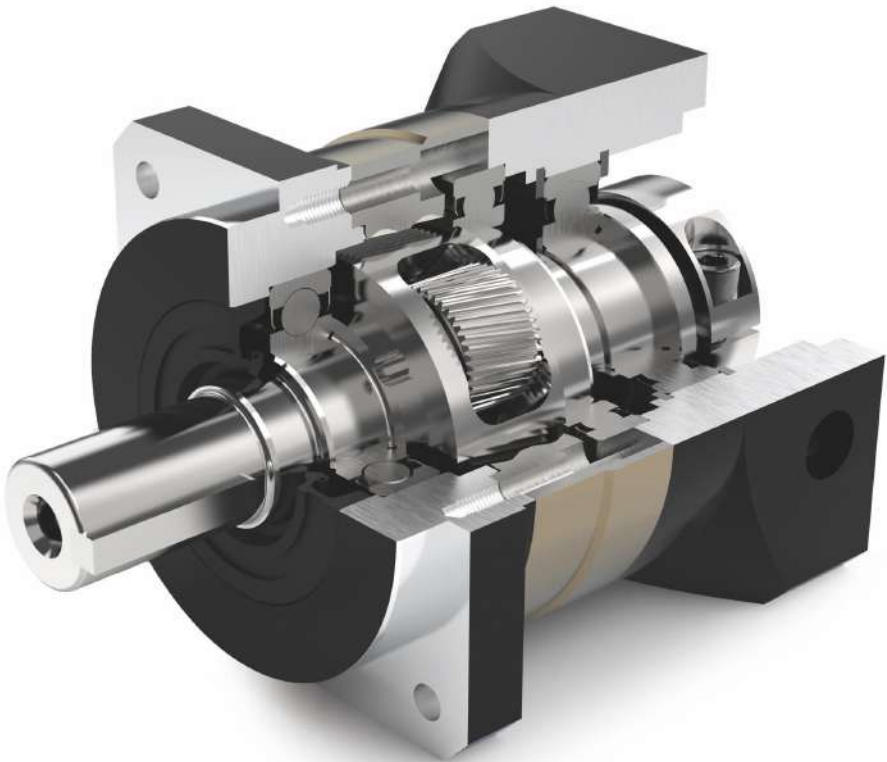


SF-180-L2



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
SF-180-L1	Φ200	4-M12	Φ35/Φ38/Φ42	82.5	Φ114.3	8	180	286.5
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	319
	Φ215	4-M12	Φ38/Φ42	87.5	Φ180	8	200	291.5
SF-180-L2	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	334.5
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	339.5
	Φ200	4-M12	Φ35/Φ38/Φ42	82.5	Φ114.3	8	180	349.5
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	382
	Φ215	4-M12	Φ38/Φ42	87.5	Φ180	8	200	354.5



SLF Series

The Main Features

- 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.

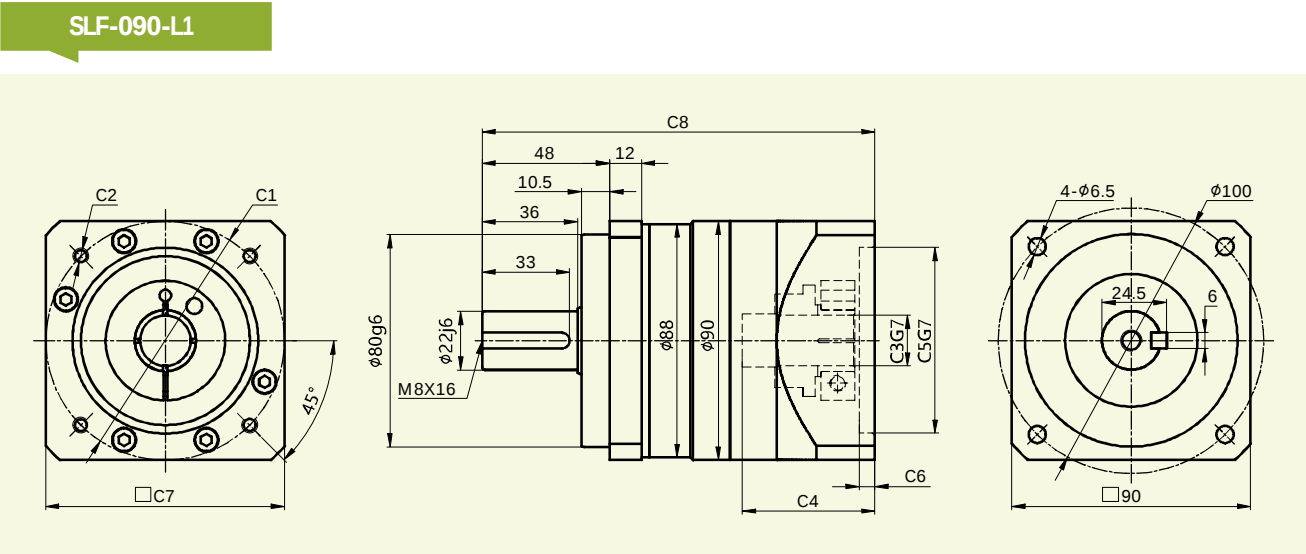
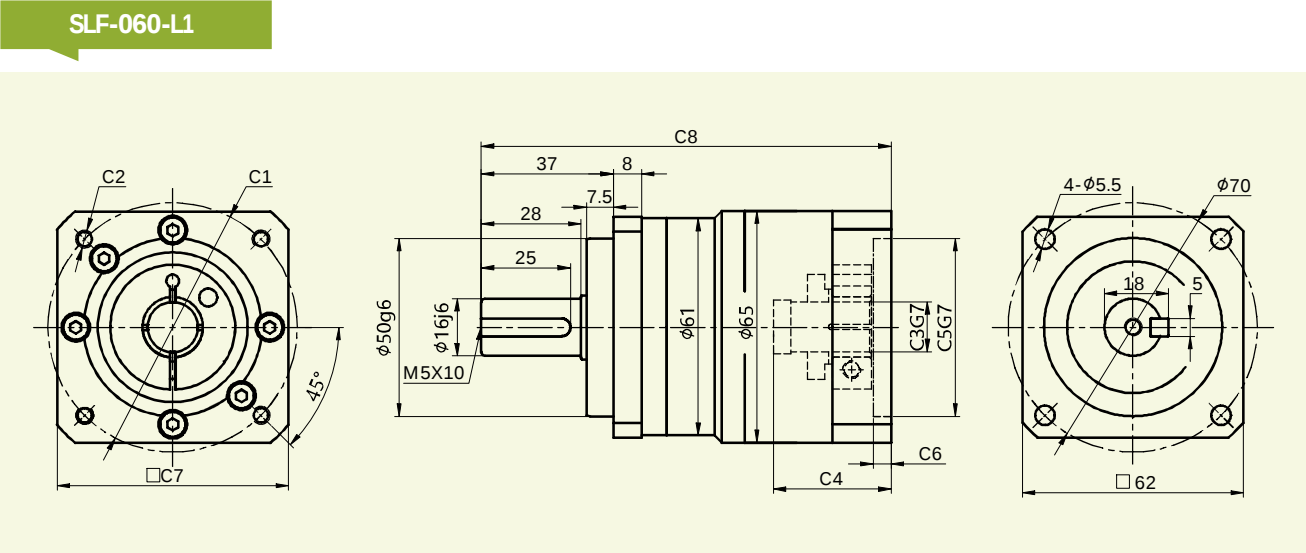
2 Integral output shaft and bearing support at both ends of planetary wheel to achieve high precision and strength.

3 The backlash 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	SLF-060	SLF-090	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	35	100	3	1
		45	110	4	
		44	105	5	
		40	100	7	
		22	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	rpm	3000	3000		
额定输入转速 Maximum input speed	rpm	6000	6000		
最大径向力 ^{※1} Maximum radial force	N	920	1400		
最大轴向力 ^{※1} Maximum axial force	N	630	600		
效率 Efficiency	%	Single [97%]			
平均寿命 Average lifetime	h	2000			
重量（大概） Weight	kg	1.1	3.0		1
转动惯量 Moment of inertia	kgcm ²	0.22	1.2	3	1
		0.17	0.95	4	
		0.16	0.86	5	
		0.14	0.79	7	
		0.14	0.75	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



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
SLF-060-L1	Φ70	4-M4/4-M5	Φ14	33	Φ50	5	65	115
SLF-090-L1	Φ90	4-M5/4-M6	Φ19	50	Φ70	6	90	148
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	14	130	163.5



SL Series

The Main Features

- 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.

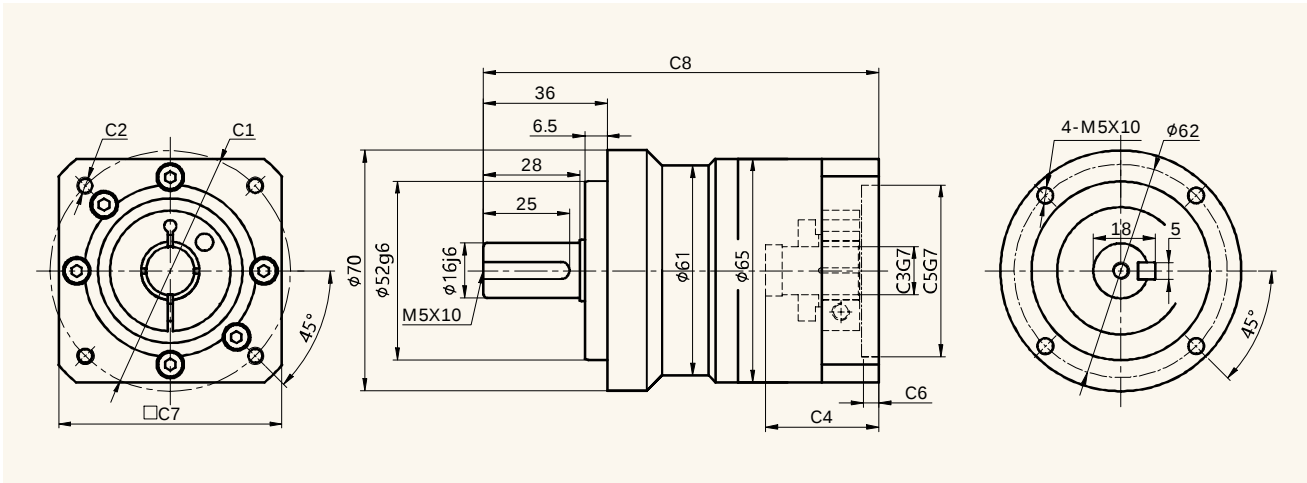
减速机性能资料

Gear box performance information

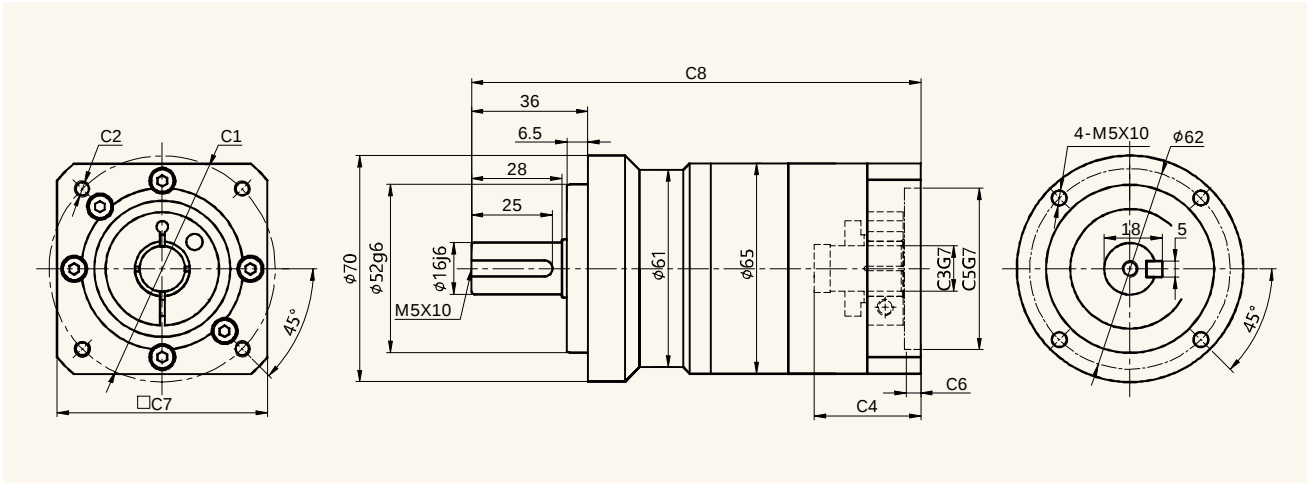
型号 Model	单位 Unit	SL-060	SL-090	SL-115	SL-140	SL-180	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	35	100	230	450	1000	3	1
		45	110	270	580	1300	4	
		44	105	255	540	1100	5	
		40	100	180	390	800	7	
		22	50	120	230	460	10	
		35	100	230	450	1000	15	2
		45	110	270	580	1300	16	
		45	110	270	580	1300	20	
		44	105	255	540	1100	25	
		45	110	270	580	1300	28	
		35	100	230	450	1000	30	
		44	105	255	540	1100	35	
		45	110	270	580	1300	40	
		44	105	255	540	1100	50	
		40	100	180	390	800	70	
		22	50	120	230	460	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	rpm	3000	3000	3000	2000	1500		
额定输入转速 Maximum input speed	rpm	6000	6000	6000	4000	3000		
最大径向力 ^{*1} Maximum radial force	N	920	1400	3000	5800	9500		
最大轴向力 ^{*1} Maximum axial force	N	630	600	2500	4500	6800		
效率 Efficiency	%	Single [97%]			Double [95%]			
平均寿命 Average lifetime	h	20000						
重量 (大概) Weight	kg	1.1	3.0	6.8	17	31.5		1
		1.6	4.3	10	24	37.5		2
转动惯量 Moment of inertia	kgcm ²	0.22	1.2	3.3	20	44	3	1
		0.17	0.95	2	15	28	4	
		0.16	0.86	1.6	14	22	5	
		0.14	0.79	1.1	12	16	7	
		0.14	0.75	0.95	11	14	10	
		0.14	0.72	0.8	11	12	15	2
		0.14	0.5	0.9	11	13	16	
		0.13	0.44	0.8	11	12	20	
		0.13	0.44	0.8	11	12	25	
		0.14	0.39	0.8	11	13	28	
		0.13	0.39	0.7	10	11	30	
		0.13	0.39	0.8	11	12	35	
		0.13	0.39	0.7	10	11	40	
		0.13	0.39	0.7	10	11	50	
		0.13	0.39	0.7	10	11	70	
		0.13	0.39	0.7	10	11	100	
回程间隙 Backlash	arcmin	3	3	3	5	5	Precise[1]	
		5	5	5	7	7	Standard[1]	
		5	5	5	7	7	Precise[2]	
		7	7	7	10	10	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

SL-070-L1



SL-070-L2

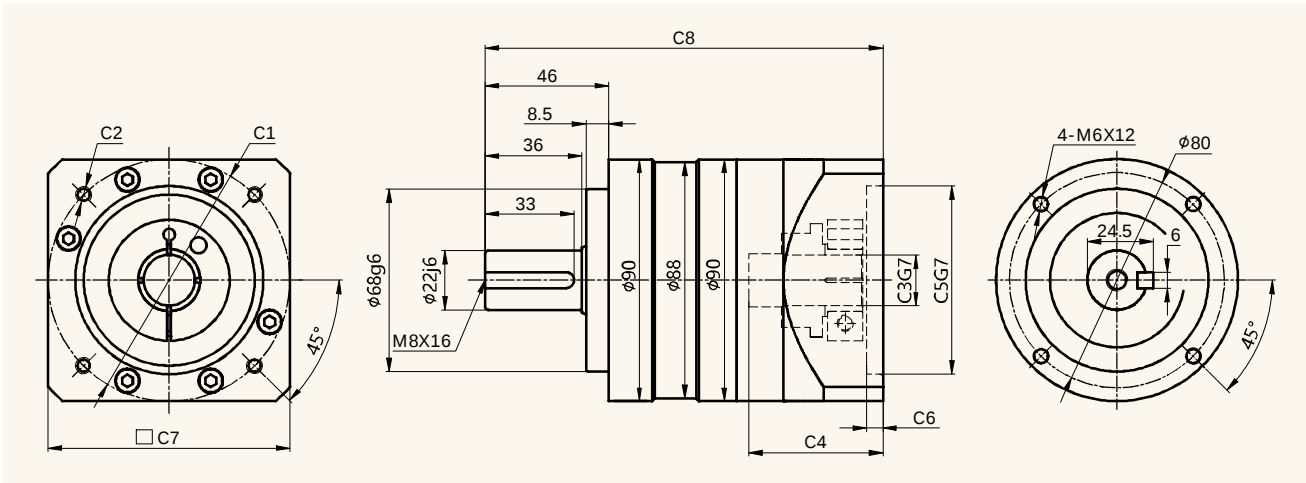


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

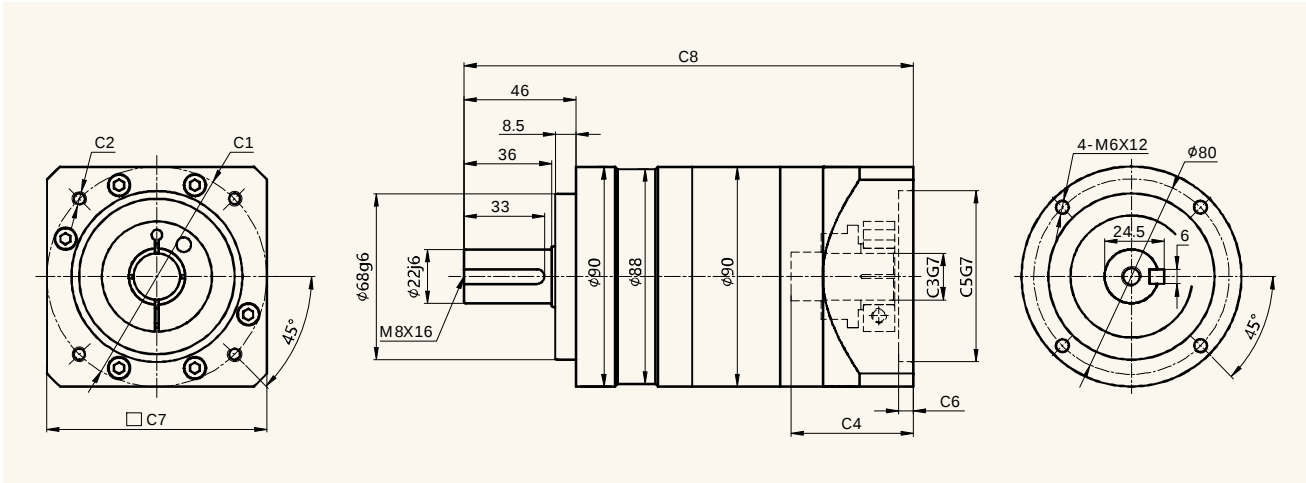
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SL-070-L1	□47.14	4-M4	Φ8	30	Φ38.1	5	65	112
	Φ46	4-M4	Φ8	30	Φ30	5	65	112
	Φ45	4-M3	Φ8	30	Φ30	5	65	112
	Φ70	4-M4/4-M5	Φ14	33	Φ50	5	65	115
SL-070-L2	□47.14	4-M4	Φ8	30	Φ38.1	5	65	136
	Φ46	4-M4	Φ8	30	Φ30	5	65	136
	Φ45	4-M3	Φ8	30	Φ30	5	65	136
	Φ70	4-M4/4-M5	Φ14	33	Φ50	5	65	139

外形尺寸图表
Outline dimensional

SL-090-L1



SL-090-L2



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)

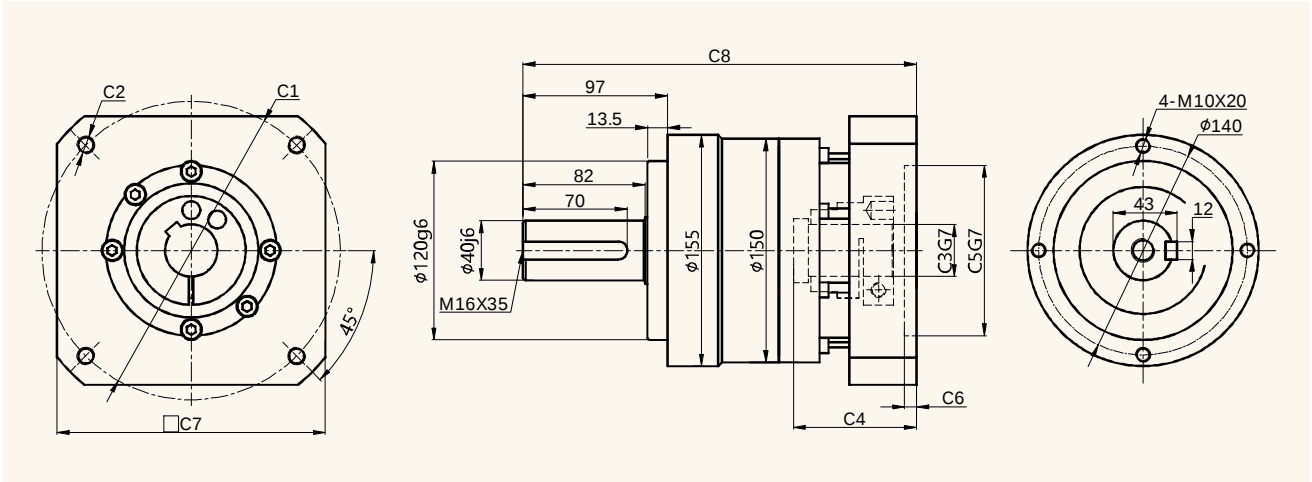
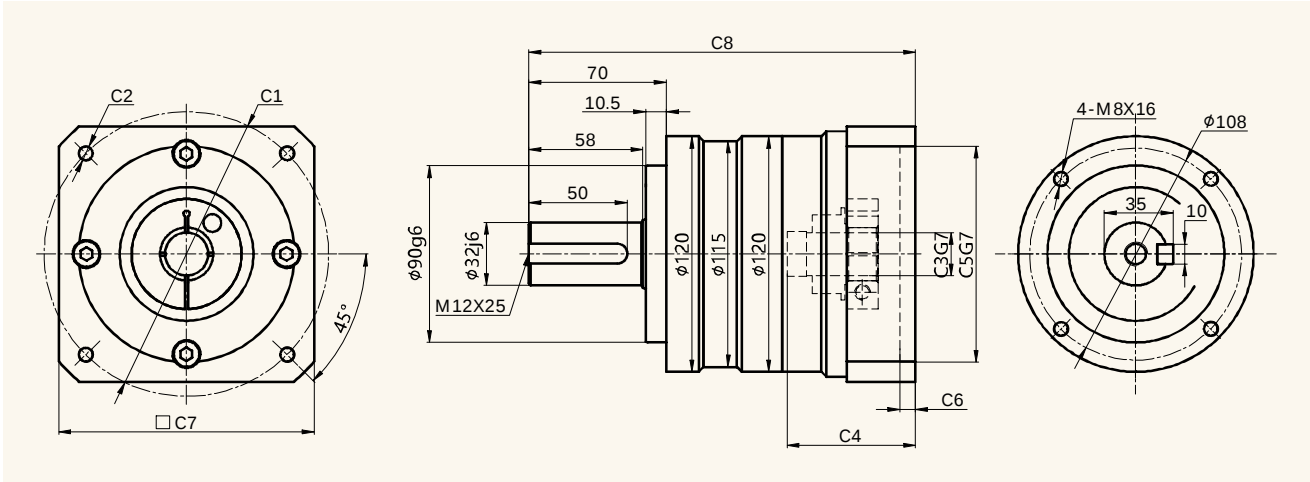
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SL-090-L1	Φ98.4	4-M6/4-M5	Φ14/Φ19	50	Φ73	6	90	148
	Φ90	4-M5/4-M6	Φ19	50	Φ70	6	90	148
	Φ115	4-M8	Φ19/Φ22	62	Φ95	8	110	160
	Φ130	4-M8	Φ19/Φ22	62	Φ95	8	110	160
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	14	130	163.5
SL-090-L2	Φ70	4-M4/4-M5	Φ14	38.5	Φ50	5	65	175
	Φ98.4	4-M6/4-M5	Φ14/Φ19	50	Φ73	6	90	184
	Φ90	4-M5/4-M6	Φ19	50	Φ70	6	90	184
	Φ115	4-M8	Φ19/Φ22	62	Φ95	8	110	196
	Φ130	4-M8	Φ19/Φ22	62	Φ95	8	110	196
	Φ145	4-M8	Φ19/Φ22	65.5	Φ110	14	130	199.5

外形尺寸图表
Outline dimensional

外形尺寸图表
Outline dimensional

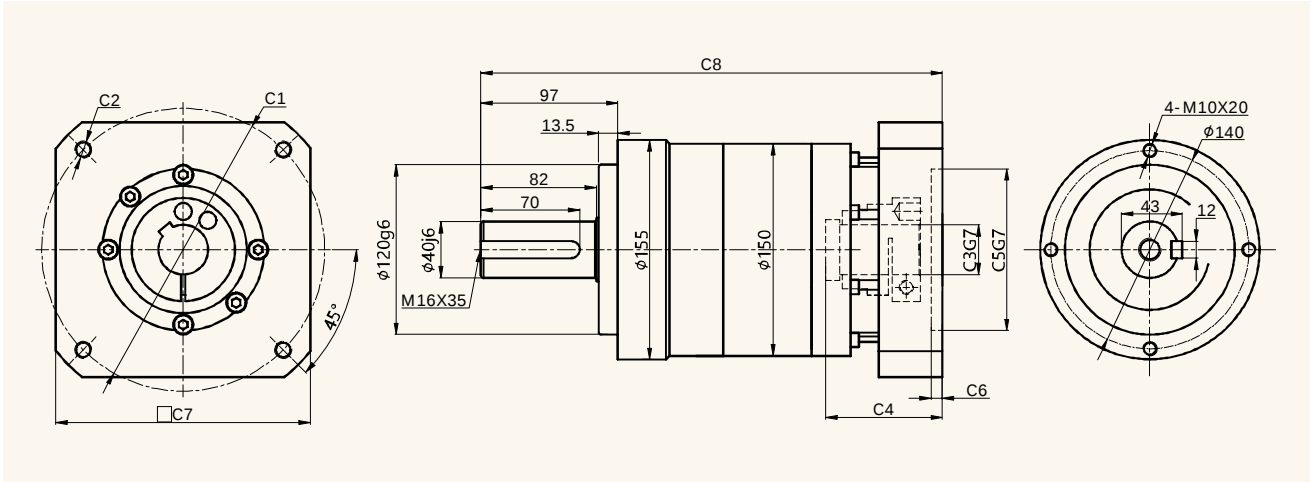
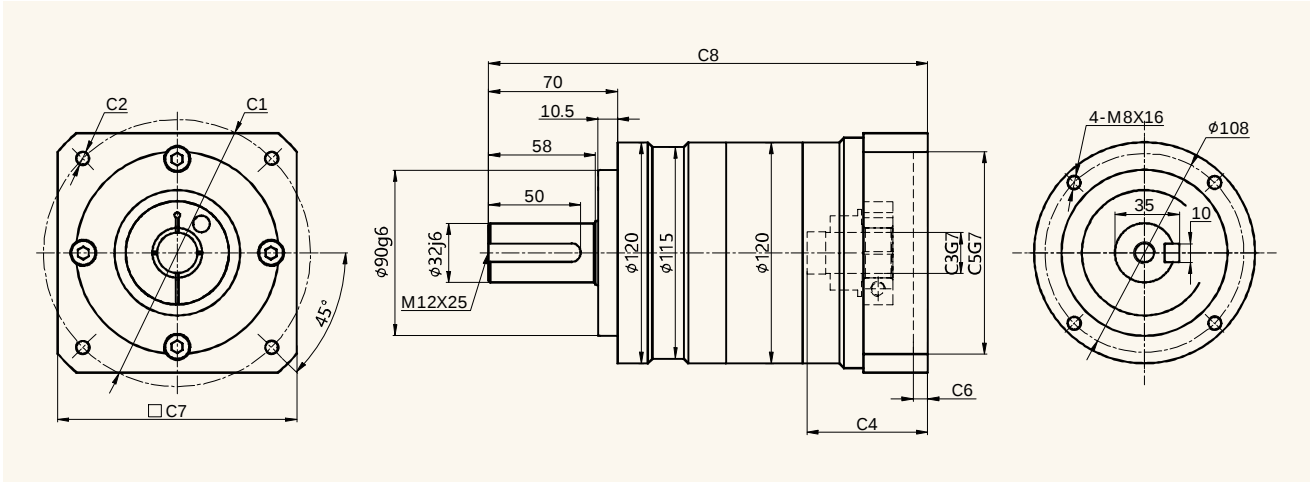
SL-120-L1

SL-155-L1



SL-120-L2

SL-155-L2



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)

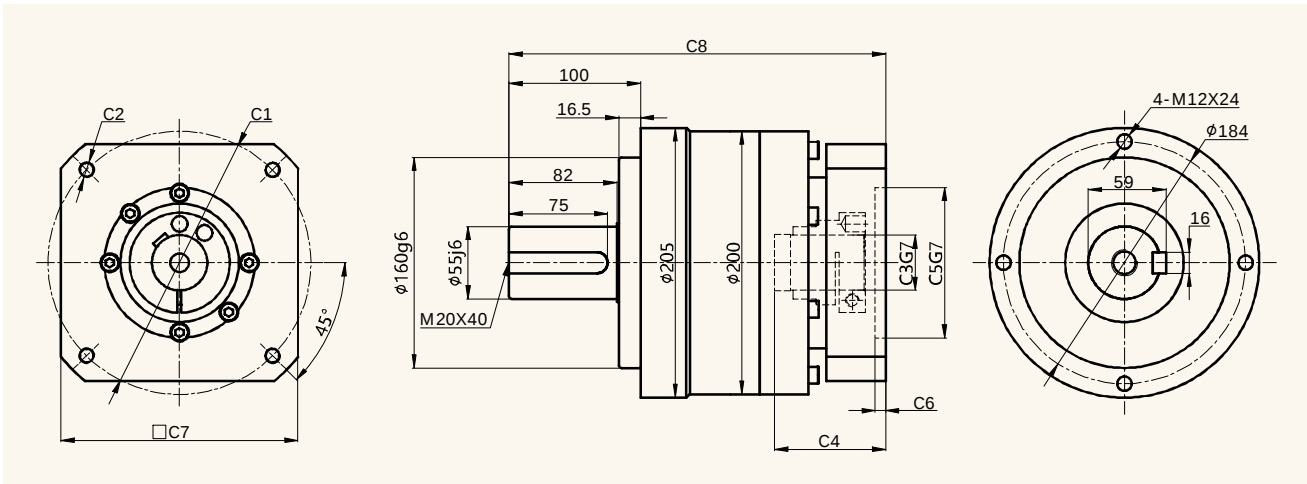
适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SL-120-L1	$\Phi 115$	4-M8/4-M6	$\Phi 19/\Phi 22/\Phi 24$	62.5	$\Phi 95$	8	130	194
	$\Phi 130$	4-M8	$\Phi 19/\Phi 22/\Phi 24$	62.5	$\Phi 95$	8	130	194
	$\Phi 145$	4-M8	$\Phi 19/\Phi 22/\Phi 24$	65.5	$\Phi 110$	8	130	197
SL-120-L2	$\Phi 90$	4-M5/4-M6	$\Phi 19$	57.5	$\Phi 70$	6	130	230.5
	$\Phi 115$	4-M8/4-M6	$\Phi 19/\Phi 22/\Phi 24$	62.5	$\Phi 95$	8	130	235.5
	$\Phi 130$	4-M8	$\Phi 19/\Phi 22/\Phi 24$	62.5	$\Phi 95$	8	130	235.5
	$\Phi 145$	4-M8	$\Phi 19/\Phi 22/\Phi 24$	65.5	$\Phi 110$	8	130	238.5

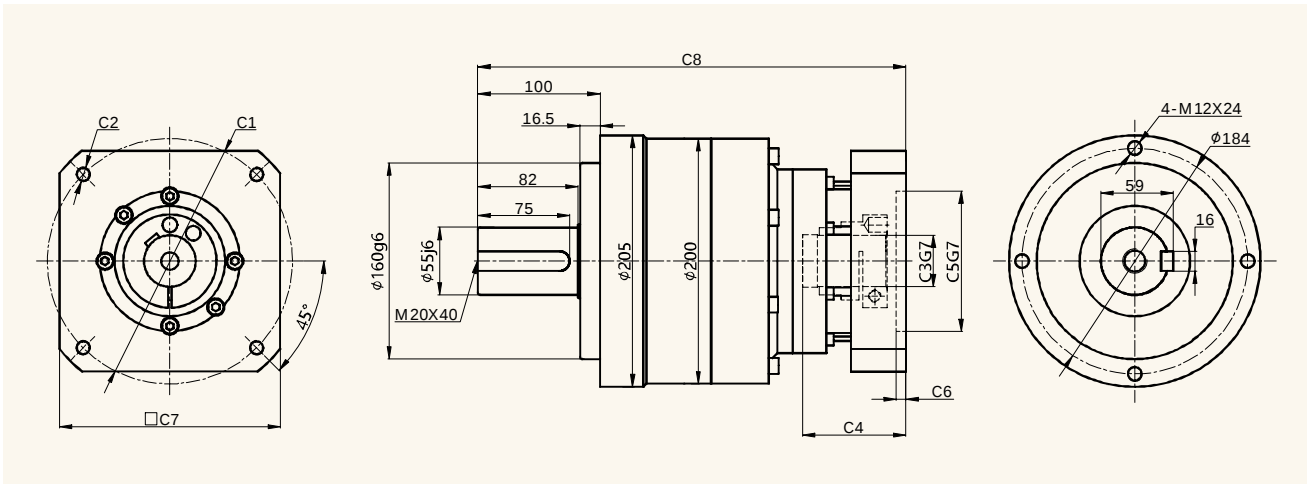
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SL-155-L1	$\Phi 115$	4-M8/M6	$\Phi 22/\Phi 24$	67.5	$\Phi 95$	8	115	249
	$\Phi 145$	4-M8	$\Phi 22/\Phi 24$	72.5	$\Phi 110$	8	130	254
	$\Phi 200$	4-M12	$\Phi 35/\Phi 38/\Phi 42$	82.5	$\Phi 114.3$	8	180	264
	$\Phi 200$	4-M12	$\Phi 35/\Phi 42$	117	$\Phi 114.3$	8	180	296.5
	$\Phi 215$	4-M12	$\Phi 38/\Phi 42$	87.5	$\Phi 180$	8	200	269
SL-155-L2	$\Phi 115$	4-M8/M6	$\Phi 22/\Phi 24$	67.5	$\Phi 95$	8	115	311.5
	$\Phi 145$	4-M8	$\Phi 22/\Phi 24$	72.5	$\Phi 110$	8	130	316.5
	$\Phi 200$	4-M12	$\Phi 35$	82.5	$\Phi 114.3$	8	180	326.5

外形尺寸图表
Outline dimensional

SL-205-L1

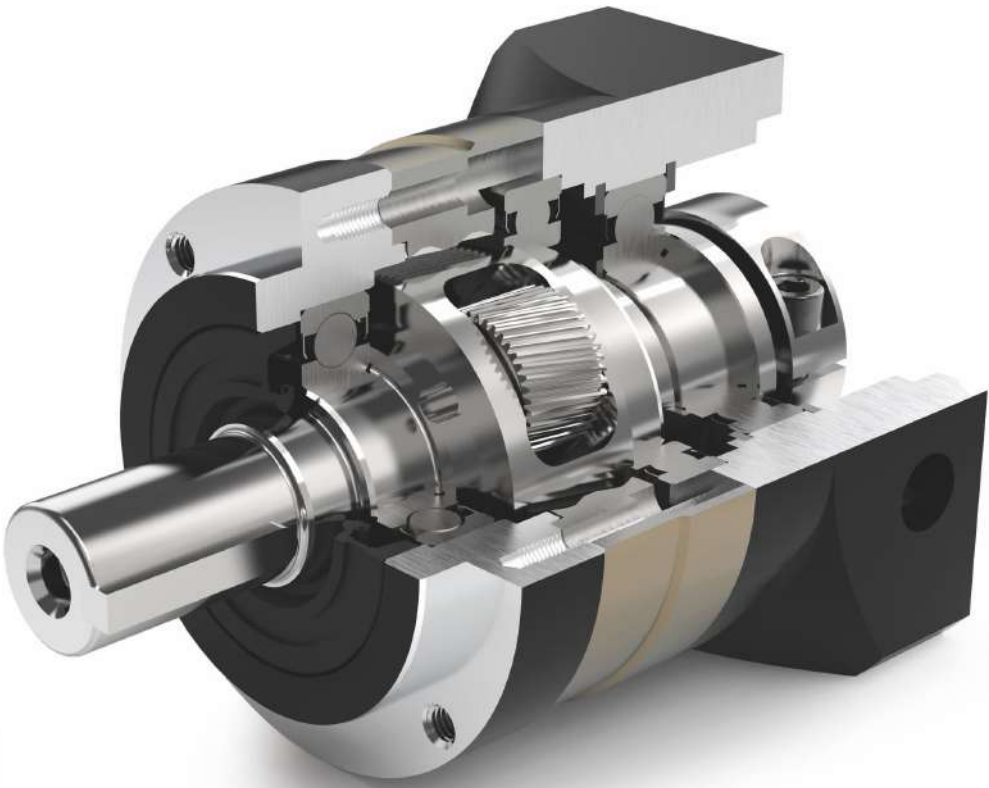


SL-205-L2



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
SL-205-L1	Φ200	4-M12	Φ35/Φ38/Φ42	82.5	Φ114.3	8	180	286.5
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	319
	Φ215	4-M12	Φ38/Φ42	87.5	Φ180	8	200	291.5
SL-205-L2	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	334.5
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	339.5
	Φ200	4-M12	Φ35/Φ38/Φ42	82.5	Φ114.3	8	180	349.5
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	382
	Φ215	4-M12	Φ38/Φ42	87.5	Φ180	8	200	354.5



SLE Series

The Main Features

- 1 采用斜齿轮传动，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.

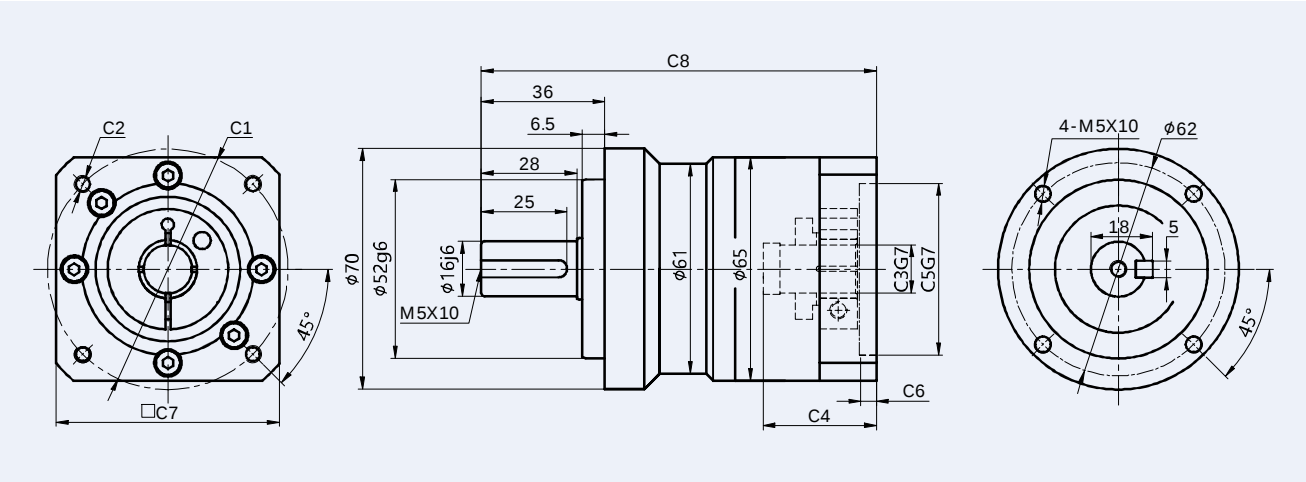
3 The backlash clearance is small, and the precision single stage can achieve less than 3 arcmin.

减速机性能资料
Gear box performance information

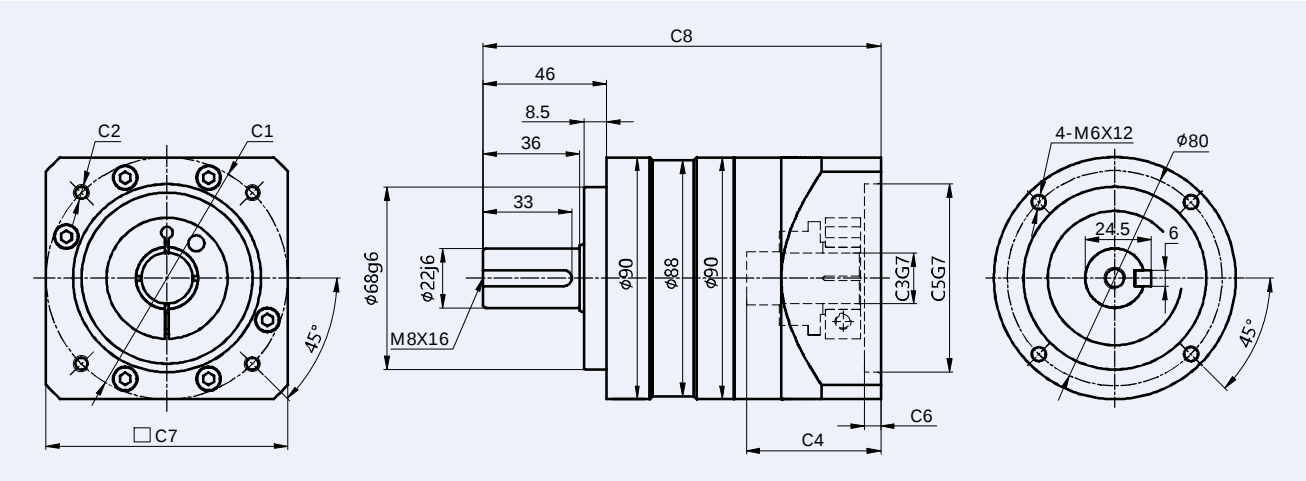
型号 Model	单位 Unit	SLE-070	SLE-090	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	35	100	3	1
		45	110	4	
		44	105	5	
		40	100	7	
		22	50	10	
故障停滞扭矩 Emergency stop torque	N·m	3倍额定输出扭矩 3 times Rated output torque			
额定输入转速 Norminal input speed	rpm	3000	3000		
额定输入转速 Maximum input speed	rpm	6000	6000		
最大径向力 ^{*1} Maximum radial force	N	920	1400		
最大轴向力 ^{*1} Maximum axial force	N	630	600		
效率 Efficiency	%	Single [97%]			
平均寿命 Average lifetime	h	2000			
重量（大概） Weight	kg	1.1	3.0		1
转动惯量 Moment of inertia	kgcm ²	0.22	1.2	3	1
		0.17	0.95	4	
		0.16	0.86	5	
		0.14	0.79	7	
		0.14	0.75	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

SLE-070-L1

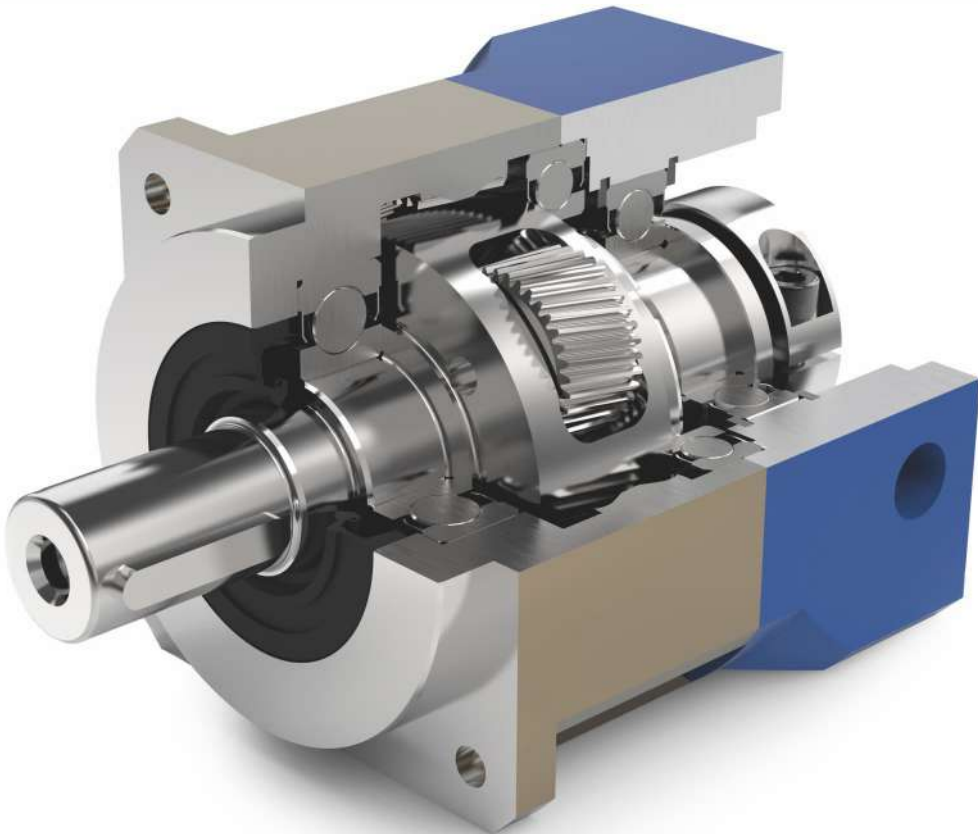


SLE-090-L1



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
SLE-070-L1	Φ70	4-M4/4-M5	Φ14	33	Φ50	5	65	115
SLE-090-L1	Φ90	4-M5/4-M6	Φ19	50	Φ70	6	90	148
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	14	130	163.5



SXF Series

The Main Features

- 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

内齿圈采用整体式结构设计；
- 4

齿轮模数加大，更高的刚性；
- 5

大跨度轴承排列，超强径向承载能力；
- 6

回程间隙小，精密型单级可以做到3arcmin
- 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 inner gear ring adopts integral structure design.
- 4

Gear module increase, achieve higher rigidity.
- 5

Long span bearing arrangement, super radial bearing energy.
- 6

The backhaul clearance is small, and the precision single stage can achieve less than 3 arcmin.

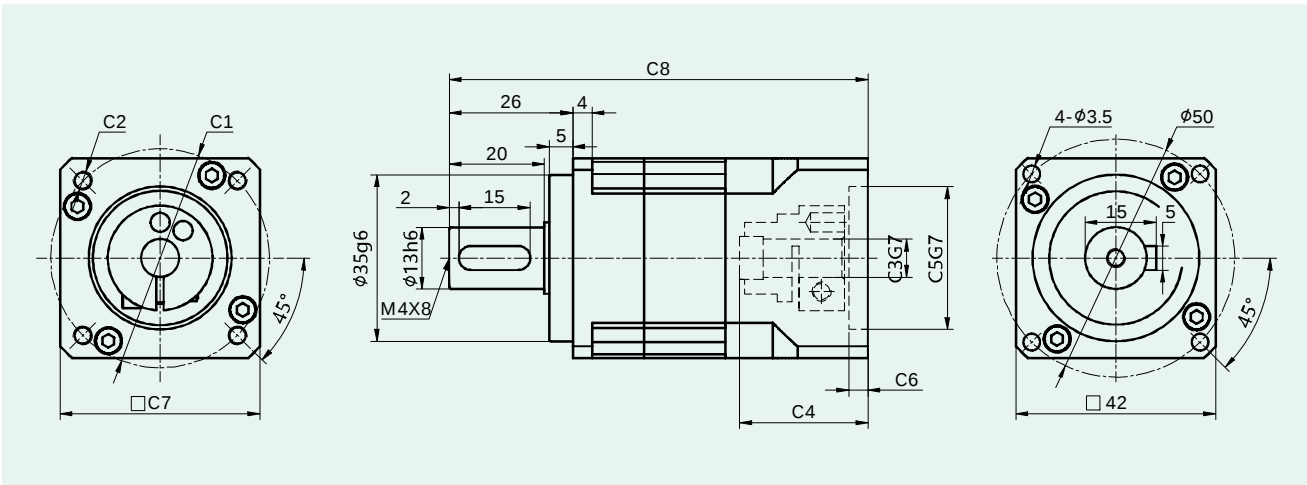
减速机性能资料

Gear box performance information

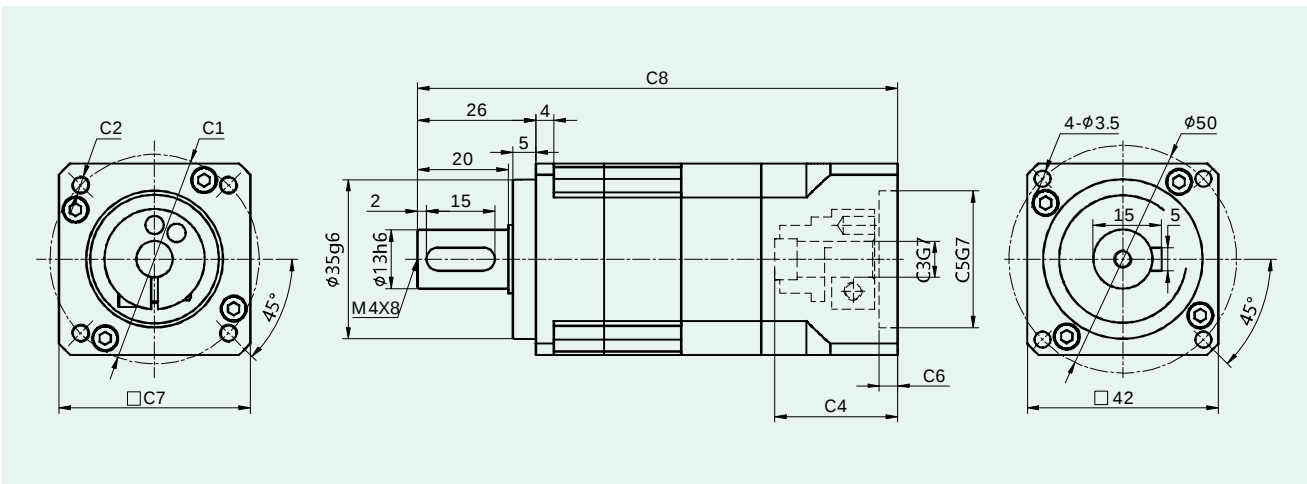
型号 Model	单位 Unit	SXF042	SXF060	SXF090	SXF115	SXF142	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	-	55	160	335	650	3	1
		20	65	165	345	700	4	
		20	60	160	335	650	5	
		19	50	135	290	540	7	
		14	42	105	255	455	10	
		-	55	160	335	650	15	
		20	65	165	345	700	16	2
		20	65	165	345	700	20	
		20	60	160	335	650	25	
		20	65	165	345	700	28	
		-	55	160	335	650	30	
		20	60	160	335	650	35	
		20	65	165	345	700	40	
		20	60	160	335	650	50	
		19	50	135	290	540	70	
		14	35	100	200	410	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	rpm	3000	3000	3000	3000	2000		
额定输入转速 Maximum input speed	rpm	6000	6000	6000	6000	4000		
最大径向力 ^{※1} Maximum radial force	N	700	1500	3200	6700	9600		
最大轴向力 ^{※1} Maximum axial force	N	380	760	1600	3300	4800		
效率 Efficiency	%	Single [97%]			Double [95%]			
平均寿命 Average lifetime	h	20000						
重量 (大概) Weight	kg	0.8	1.5	4	8.2	18		1
		1.3	2.0	5.5	12	25		2
转动惯量 Moment of inertia	kgcm ²	-	0.22	1.2	3.3	20	3	1
		0.022	0.17	0.95	2	15	4	
		0.019	0.16	0.86	1.6	14	5	
		0.017	0.14	0.79	1.1	12	7	
		0.017	0.14	0.75	0.95	11	10	
		-	0.14	0.72	0.8	11	15	2
		0.022	0.14	0.5	0.9	11	16	
		0.019	0.13	0.44	0.8	11	20	
		0.017	0.13	0.44	0.8	11	25	
		0.017	0.14	0.39	0.8	11	28	
		-	0.13	0.39	0.7	10	30	
		0.016	0.13	0.39	0.8	11	35	
		0.016	0.13	0.39	0.7	10	40	
		0.016	0.13	0.39	0.7	10	50	
		0.016	0.13	0.39	0.7	10	70	
		0.019	0.13	0.39	0.7	10	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	3	7	14	25	50		
噪音 Noise	dB	56	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

SXF042-L1



SXF042-L2

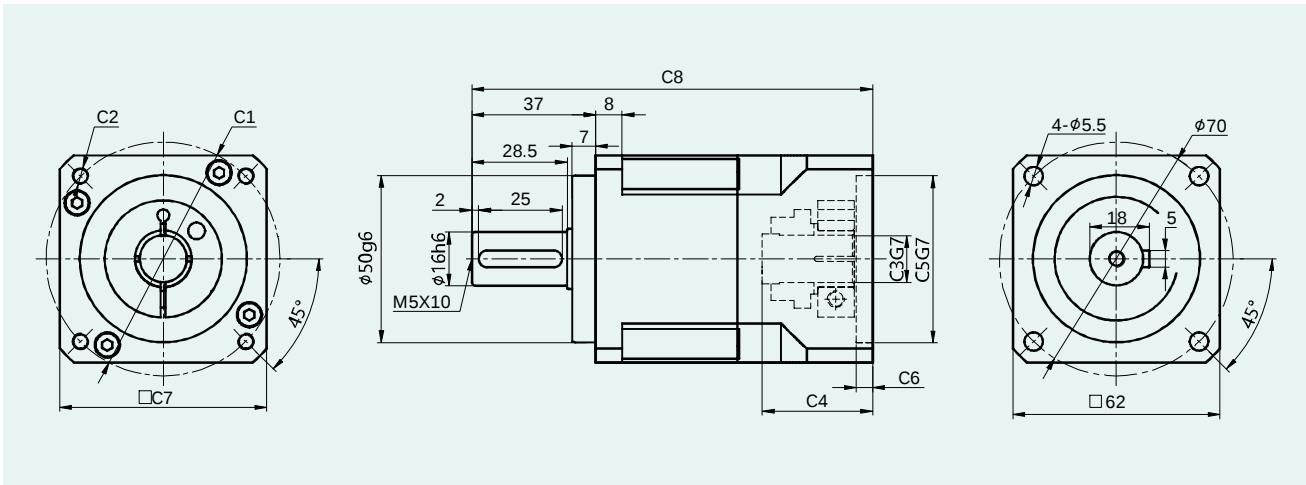


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

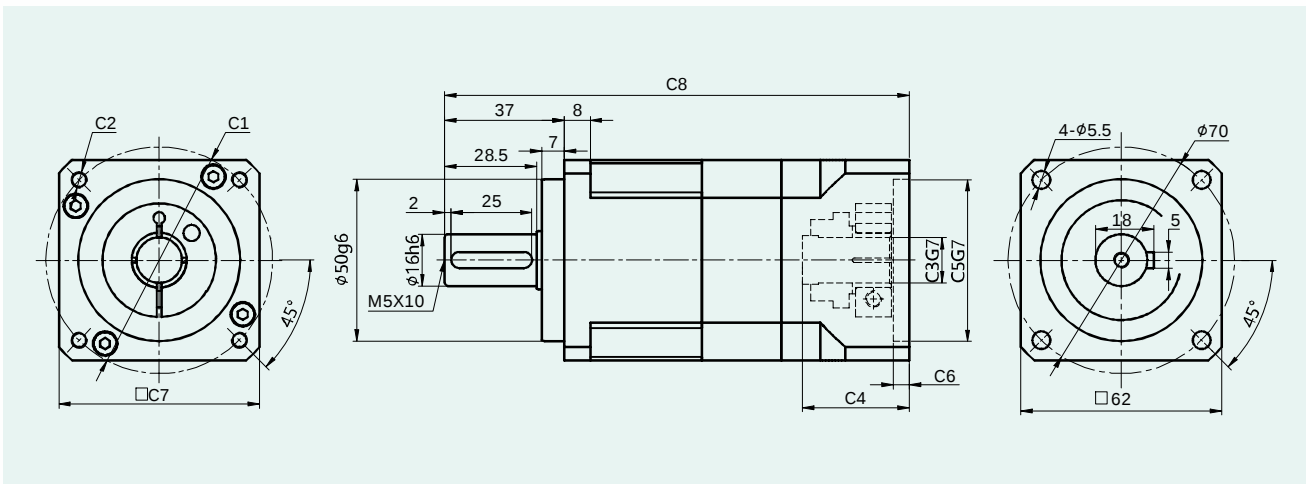
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SXF-042-L1	Φ46	4-M4	Φ8	27	Φ30	6	42	88
	Φ45	4-M3	Φ8	27	Φ30	6	42	88
SXF-042-L2	Φ46	4-M4	Φ8	27	Φ30	6	42	105.5
	Φ45	4-M3	Φ8	27	Φ30	6	42	105.5

外形尺寸图表
Outline dimensional

SXF060-L1



SXF060-L2



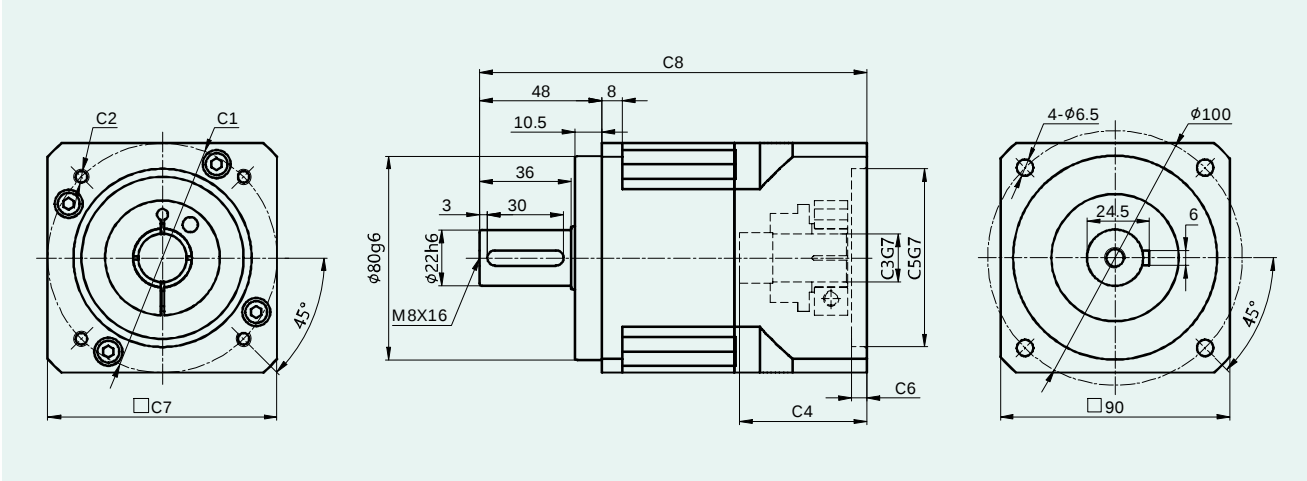
适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SXF-060-L1	Φ70	4-M4/4-M5	Φ14	33	Φ50	5	62	120
SXF-060-L2	Φ70	4-M4/4-M5	Φ14	33	Φ50	5	62	143.5

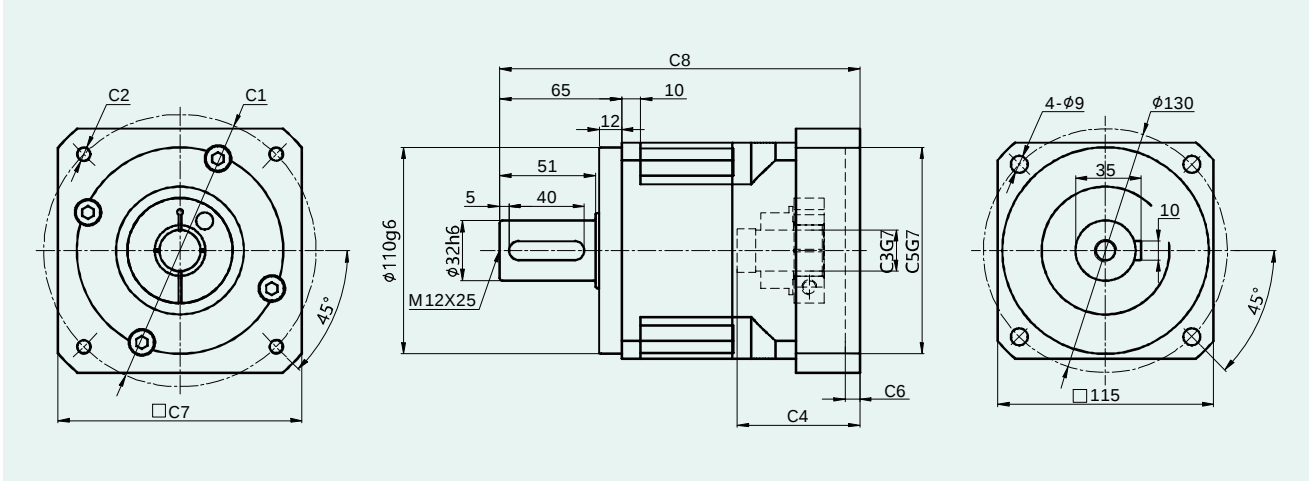
外形尺寸图表
Outline dimensional

外形尺寸图表
Outline dimensional

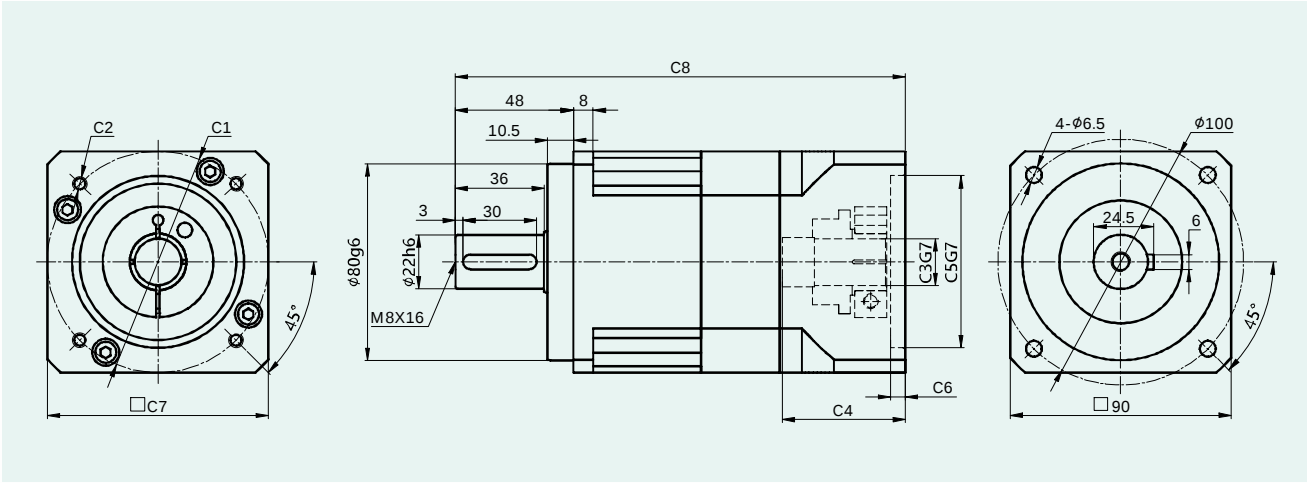
SXF090-L1



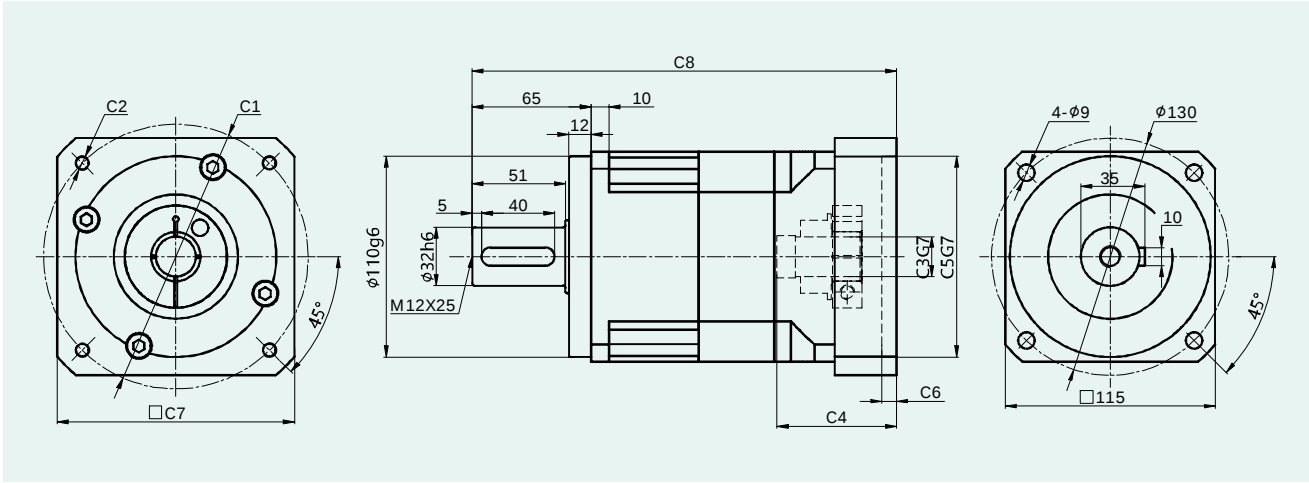
SXF115-L1



SXF090-L2



SXF115-L2



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)

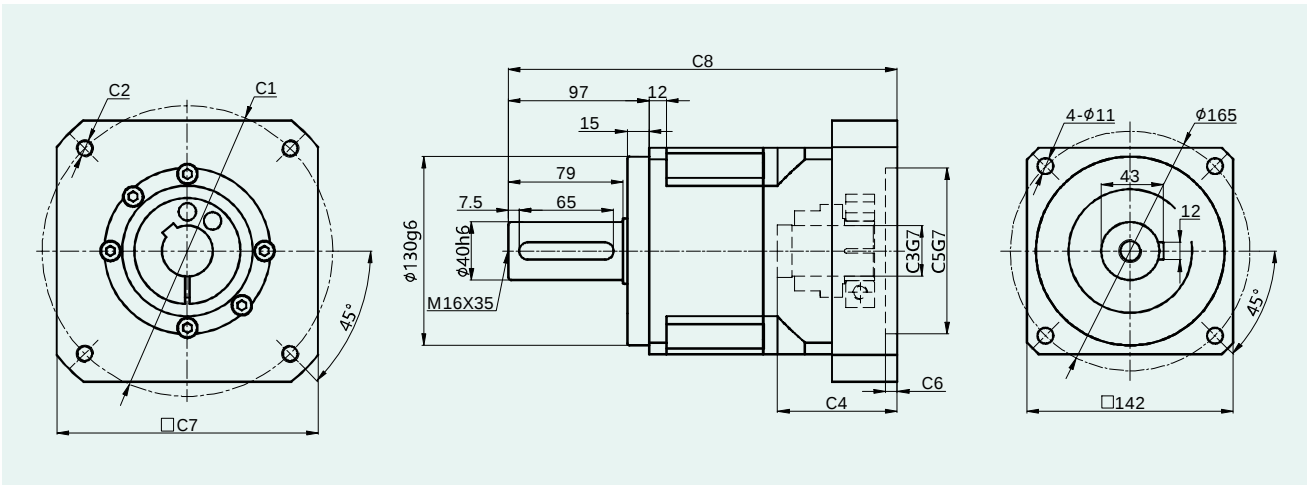
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SXF-090-L1	Φ98.4	4-M6/4-M5	Φ14/Φ19	50	Φ73	6	90	152
	Φ90	4-M5/4-M6	Φ19	50	Φ70	6	90	152
	Φ115	4-M8	Φ19/Φ22	62	Φ95	8	110	164
	Φ130	4-M8	Φ19/Φ22	62	Φ95	8	110	164
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	8	130	167.5
SXF-090-L2	Φ70	4-M4/4-M5	Φ14	38.5	Φ50	5	65	174
	Φ98.4	4-M6/4-M5	Φ14/Φ19	50	Φ73	6	90	181
	Φ90	4-M5/4-M6	Φ19	50	Φ70	6	90	183
	Φ115	4-M8	Φ19/Φ22	62	Φ95	8	110	195
	Φ130	4-M8	Φ19/Φ22	62	Φ95	8	110	195
	Φ145	4-M8	Φ19/Φ22	65.5	Φ110	8	130	198.5

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)

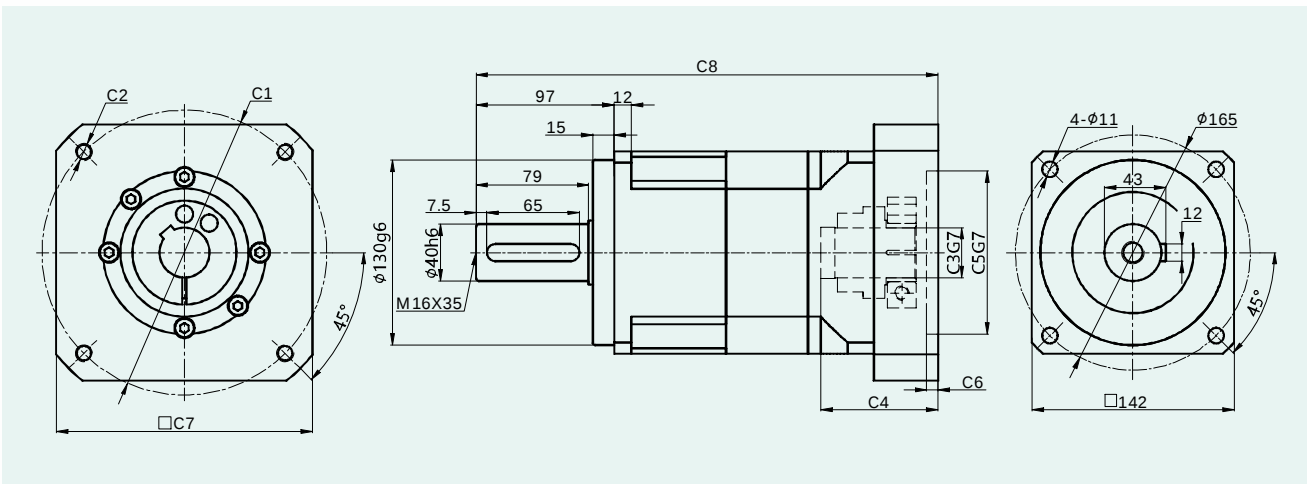
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SXF-115-L1	Φ115	4-M8/4-M6	Φ19/Φ22/Φ24	62.5	Φ95	8	130	189
	Φ130	4-M8	Φ19/Φ22/Φ24	62.5	Φ95	8	130	189
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	8	130	192
SXF-115-L2	Φ90	4-M5/4-M6	Φ19	57.5	Φ70	6	130	224.5
	Φ115	4-M8/4-M6	Φ19/Φ22/Φ24	62.5	Φ95	8	130	229.5
	Φ130	4-M8	Φ19/Φ22/Φ24	62.5	Φ95	8	130	229.5
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	8	130	232.5

外形尺寸图表
Outline dimensional

SXF142-L1

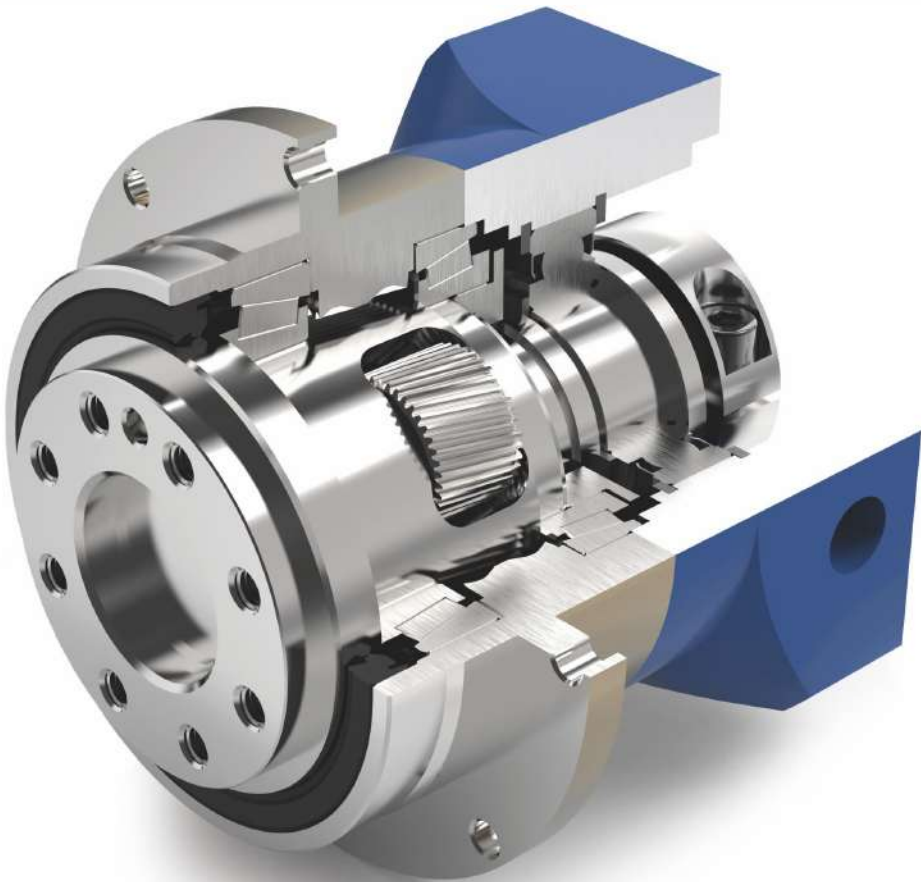


SXF142-L2



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
SXF-142-L1	Φ200	4-M12	Φ35/Φ38/Φ42	82.5	Φ114.3	8	180	268
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	300.5
	Φ215	4-M12	Φ38/Φ42	87.5	Φ180	8	200	273
SXF-142-L2	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	309.5
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	314.5
	Φ200	4-M12	Φ35	82.5	Φ114.3	8	180	324.5



SH Series

The Main Features

- 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 内齿圈采用整体式结构设计；

4 前后大跨度圆锥滚子轴承排列，超强径向和轴向承载能力（AH064除外）；

5 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 inner gear ring adopts integral structure design.

4 Arrangement of front and rear large span tapered roller bearings, Super strong radial and axial bearing capacity(Except AH064 Series) .

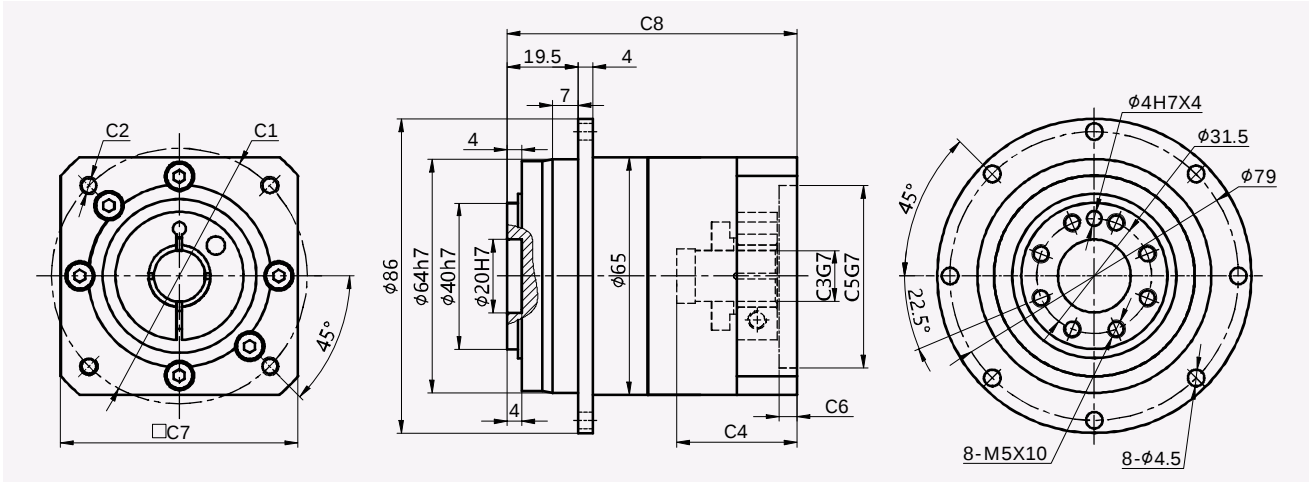
5 The backlash clearance is small, and the precision single

减速机性能资料
Gear box performance information

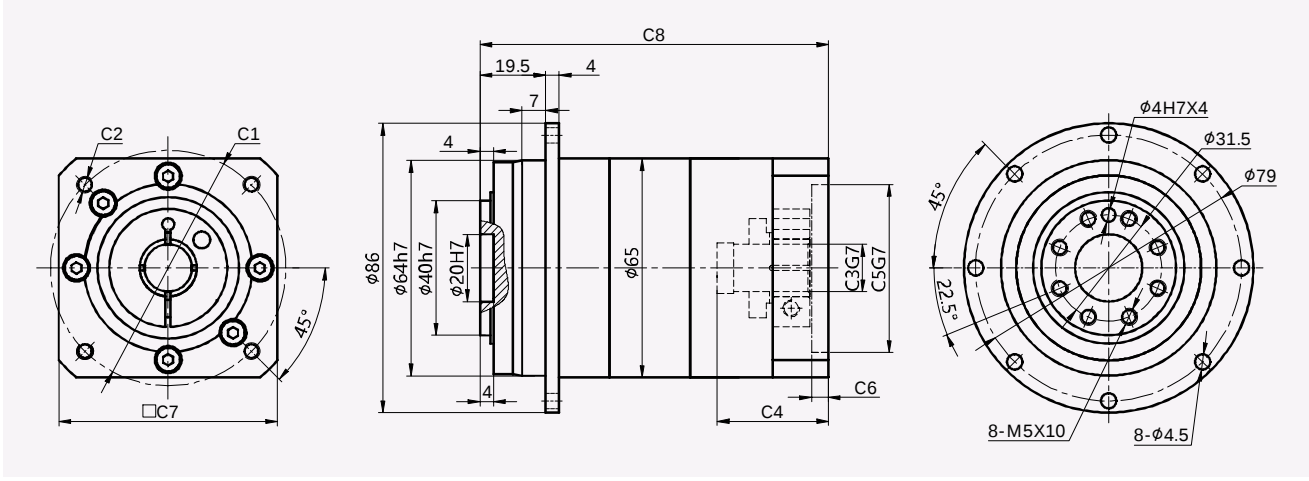
型号 Model	单位 Unit	SH064	SH090	SH110	SH140	SH200	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	45	150	270	580	1300	4	1
		44	140	255	540	1100	5	
		40	100	180	390	800	7	
		22	50	120	230	460	10	
		45	150	270	580	1300	16	2
		45	150	270	580	1300	20	
		44	140	255	540	1100	25	
		45	150	270	580	1300	28	
		44	140	255	540	1100	35	
		45	150	270	580	1300	40	
		44	140	255	540	1100	50	
		40	100	180	390	800	70	
		22	50	120	230	460	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	rpm	3000	3000	3000	2000	1500		
额定输入转速 Maximum input speed	rpm	6000	6000	6000	4000	3000		
最大径向力 ^{※1} Maximum radial force	N	550	4000	7800	10000	16000		
最大轴向力 ^{※1} Maximum axial force	N	375	3000	7000	8000	13000		
效率 Efficiency	%	Single [97%]			Double [95%]			
平均寿命 Average lifetime	h	20000						
重量（大概） Weight	kg	1.2	3.8	7	14.5	36		1
		1.7	5.1	10.5	22	42		2
转动惯量 Moment of inertia	kgcm ²	0.18	0.95	4.6	15	28	4	1
		0.17	0.86	3.9	14	22	5	
		0.15	0.79	3.3	12	16	7	
		0.14	0.75	3	11	14	10	
		0.14	0.5	2.9	11	13	16	
		0.14	0.44	2.8	11	12	20	2
		0.13	0.44	2.8	11	12	25	
		0.14	0.39	2.8	11	13	28	
		0.13	0.39	2.8	11	12	35	
		0.13	0.39	2.7	10	11	40	
		0.13	0.39	2.7	10	11	50	
		0.13	0.39	2.7	10	11	70	
		0.13	0.39	2.7	10	11	100	
回程间隙 Backlash	arcmin	3	3	3	5	5	Precise[1]	
		5	5	5	7	7	Standard[1]	
		5	5	5	7	7	Precise[2]	
		7	7	7	10	10	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

SH064-L1



SH064-L2

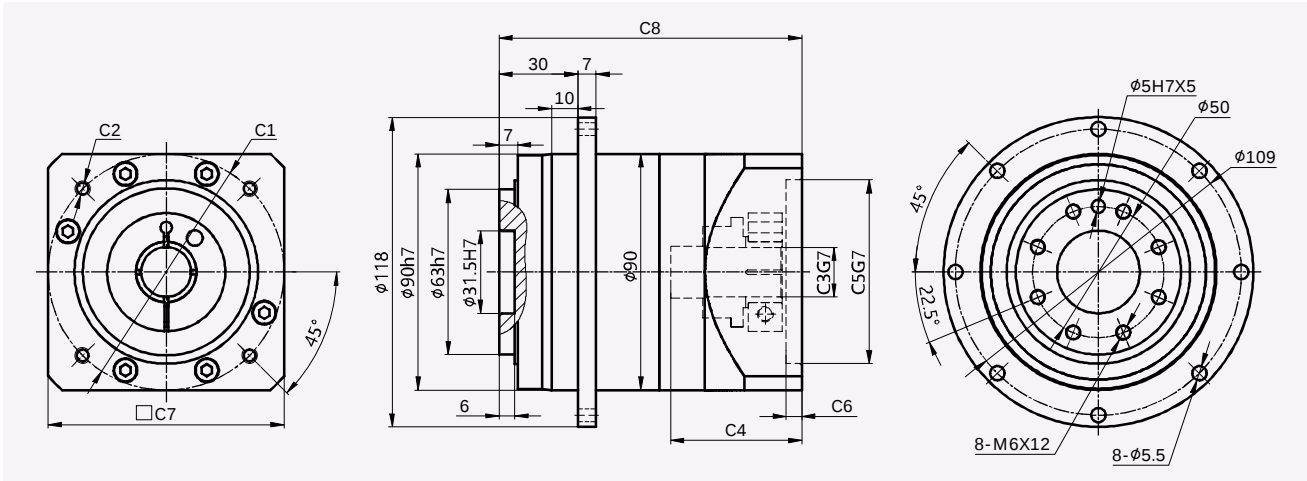


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

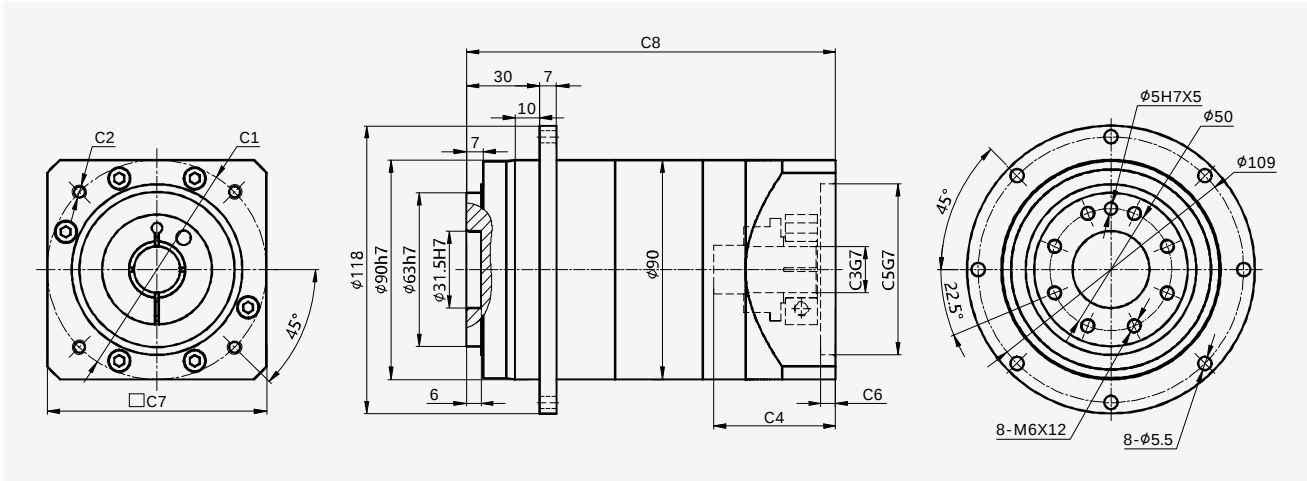
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SH-064-L1	□47.14	4-M4	Φ8	30	Φ38.1	5	65	76.5
	Φ46	4-M4	Φ8	30	Φ30	5	65	76.5
	Φ45	4-M3	Φ8	30	Φ30	5	65	76.5
	Φ70	4-M4/4-M5	Φ14	33	Φ50	5	65	79.5
SH-064-L2	□47.14	4-M4	Φ8	30	Φ38.1	5	65	100.5
	Φ46	4-M4	Φ8	30	Φ30	5	65	100.5
	Φ45	4-M3	Φ8	30	Φ30	5	65	100.5
	Φ70	4-M4/4-M5	Φ14	33	Φ50	5	65	103.5

外形尺寸图表
Outline dimensional

SH090-L1



SH090-L2

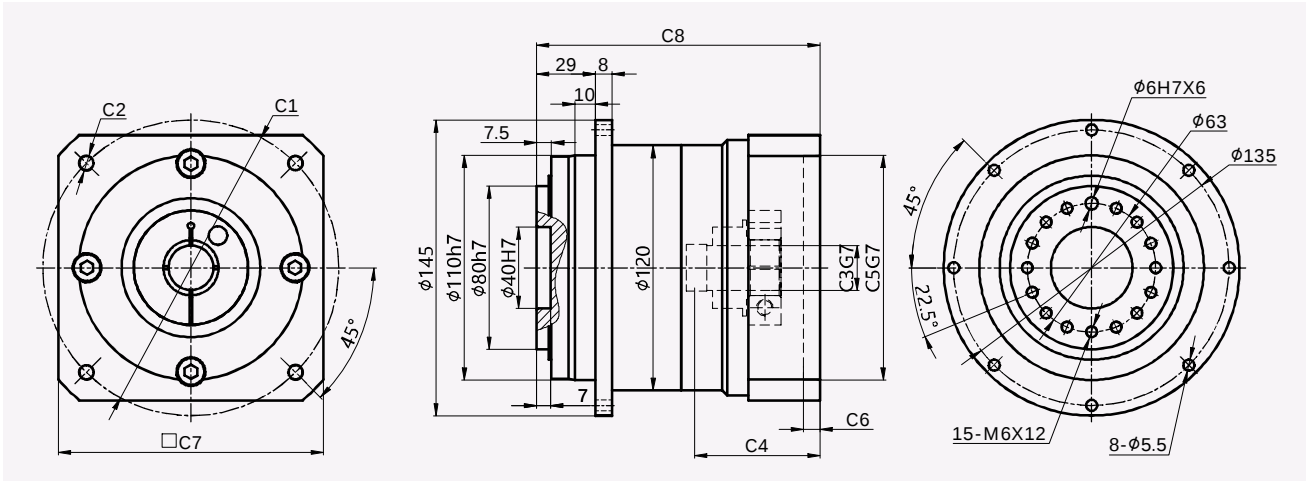


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

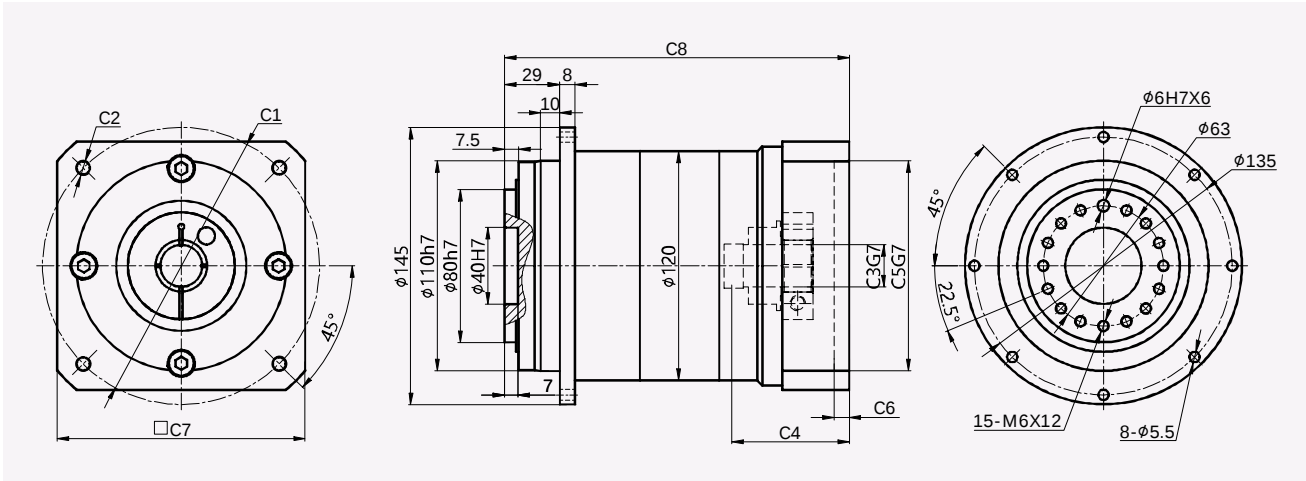
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SH-090-L1	Φ98.4	4-M6/4-M5	Φ14/Φ19	50	Φ73	6	90	115.5
	Φ90	4-M5/4-M6	Φ19	50	Φ70	6	90	115.5
	Φ115	4-M8	Φ19/Φ22	62	Φ95	8	110	127.5
	Φ130	4-M8	Φ19/Φ22	62	Φ95	8	110	127.5
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	14	130	131
SH-090-L2	Φ70	4-M4/4-M5	Φ14	38.5	Φ50	5	65	142.5
	Φ98.4	4-M6/4-M5	Φ14/Φ19	50	Φ73	6	90	151.5
	Φ90	4-M5/4-M6	Φ19	50	Φ70	6	90	151.5
	Φ115	4-M8	Φ19/Φ22	62	Φ95	8	110	163.5
	Φ130	4-M8	Φ19/Φ22	62	Φ95	8	110	163.5
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	14	130	167

外形尺寸图表
Outline dimensional

SH110-L1



SH110-L2

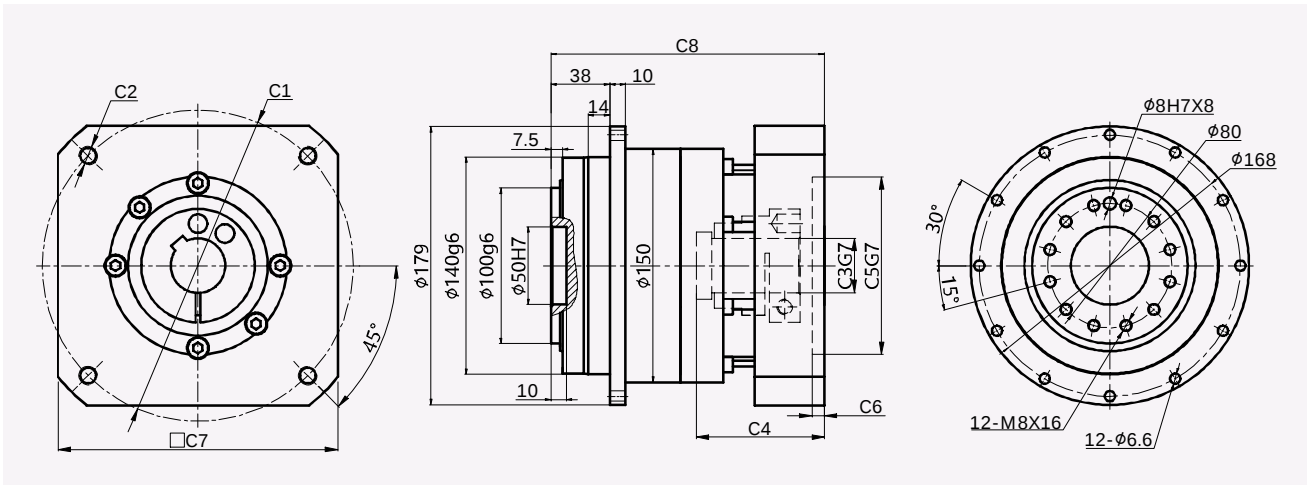


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

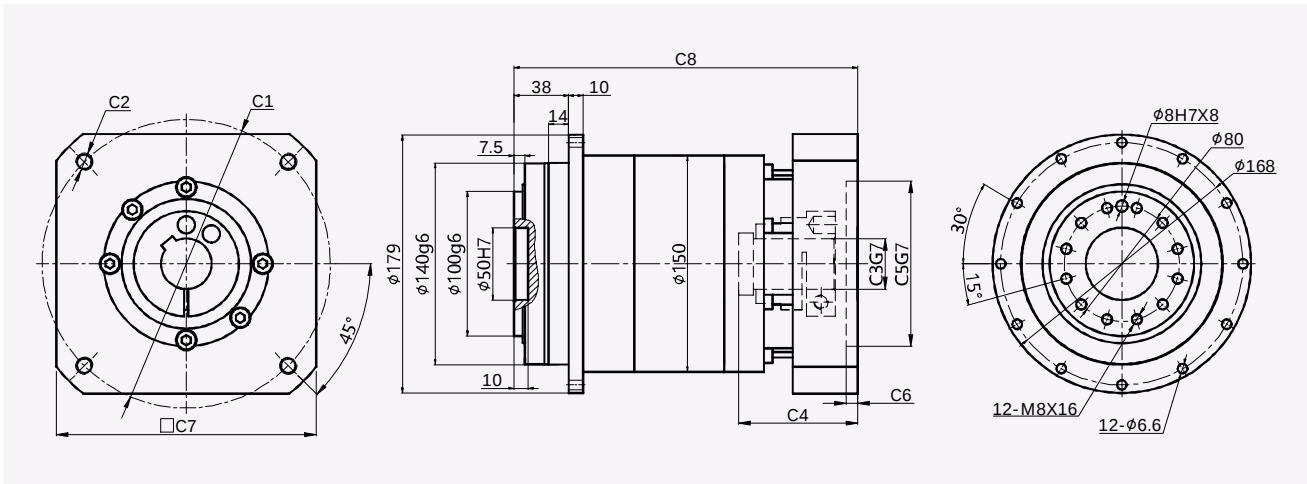
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SH-110-L1	Φ115	4-M8/4-M6	Φ19/Φ22/Φ24	62.5	Φ95	8	130	136
	Φ130	4-M8	Φ19/Φ22/Φ24	62.5	Φ95	8	130	136
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	8	130	139
SH-110-L2	Φ90	4-M5/4-M6	Φ19	57.5	Φ70	6	130	172.5
	Φ115	4-M8/4-M6	Φ19/Φ22/Φ24	62.5	Φ95	8	130	172.5
	Φ130	4-M8	Φ19/Φ22/Φ24	62.5	Φ95	8	130	172.5
	Φ145	4-M8	Φ19/Φ22/Φ24	65.5	Φ110	8	130	180.5

外形尺寸图表
Outline dimensional

SH140-L1



SH140-L2

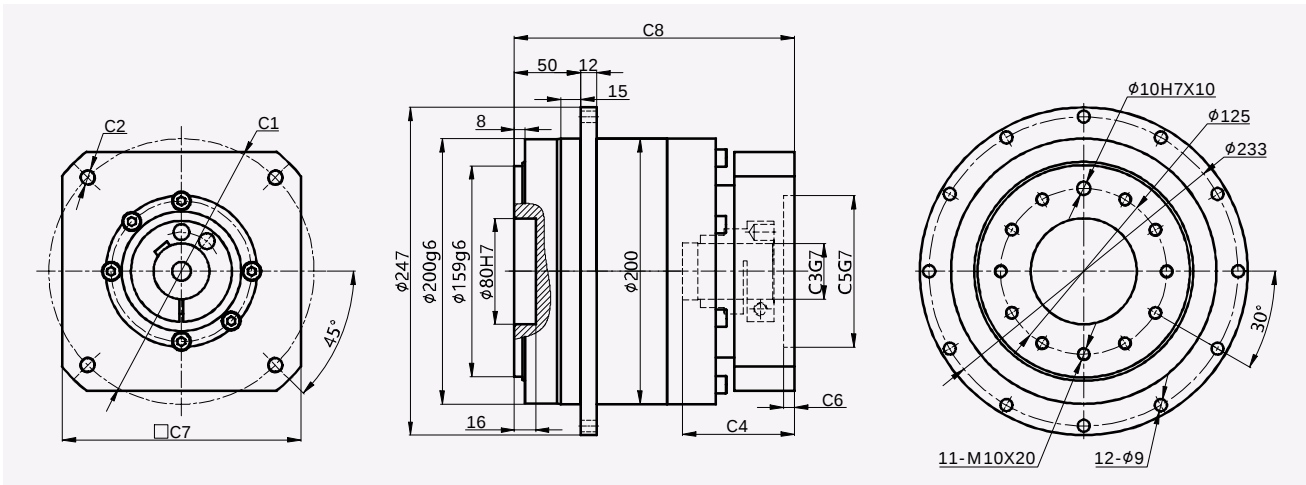


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

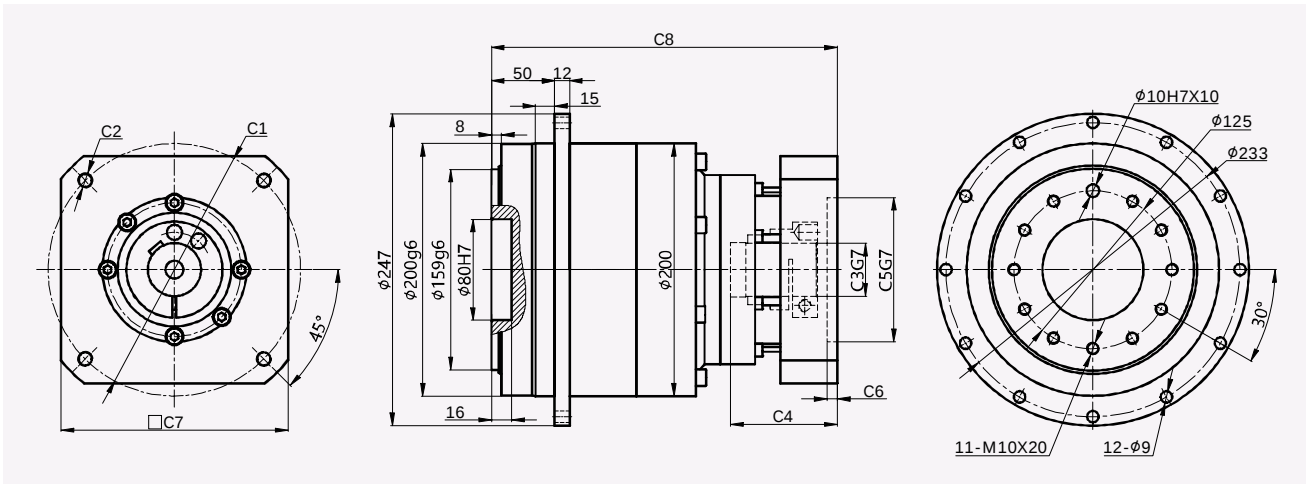
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
SH-140-L1	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	161
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	166
	Φ200	4-M12	Φ35/Φ38/Φ42	82.5	Φ114.3	8	180	176
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	208.5
	Φ215	4-M12	Φ38/Φ42	87.5	Φ180	8	200	181
SH-140-L2	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	223.5
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	228.5
	Φ200	4-M12	Φ35	82.5	Φ114.3	8	180	238.5
	Φ200	4-M12	Φ35	82.5	Φ114.3	8	180	238.5

外形尺寸图表
Outline dimensional

SH200-L1

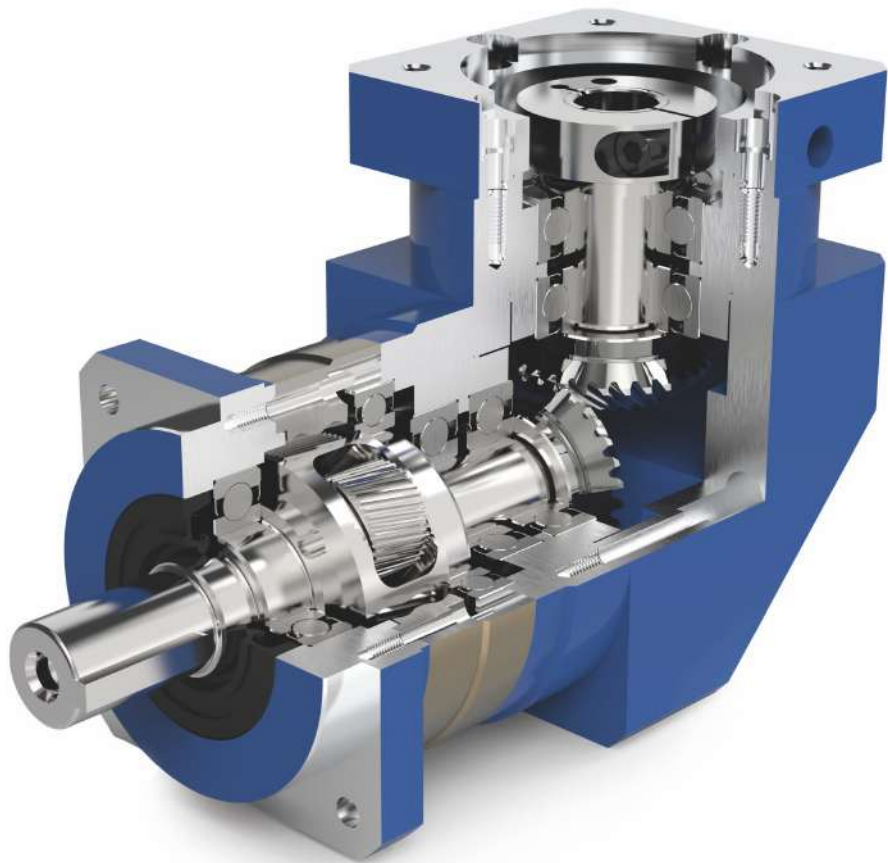


SH200-L2



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
SH-200-L1	Φ200	4-M12	Φ35/Φ38/Φ42	82.5	Φ114.3	8	180	211
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	243.5
	Φ215	4-M12	Φ38/Φ42	87.5	Φ180	8	200	216
	Φ215	4-M12	Φ38/Φ42	87.5	Φ180	8	200	216
SH-200-L2	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	259
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	264
	Φ200	4-M12	Φ35/Φ38/Φ42	82.5	Φ114.3	8	180	274
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	306.5
	Φ215	4-M12	Φ38/Φ42	87.5	Φ180	8	200	279



TSF Series

The Main Features

- 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 pr

减速机性能资料

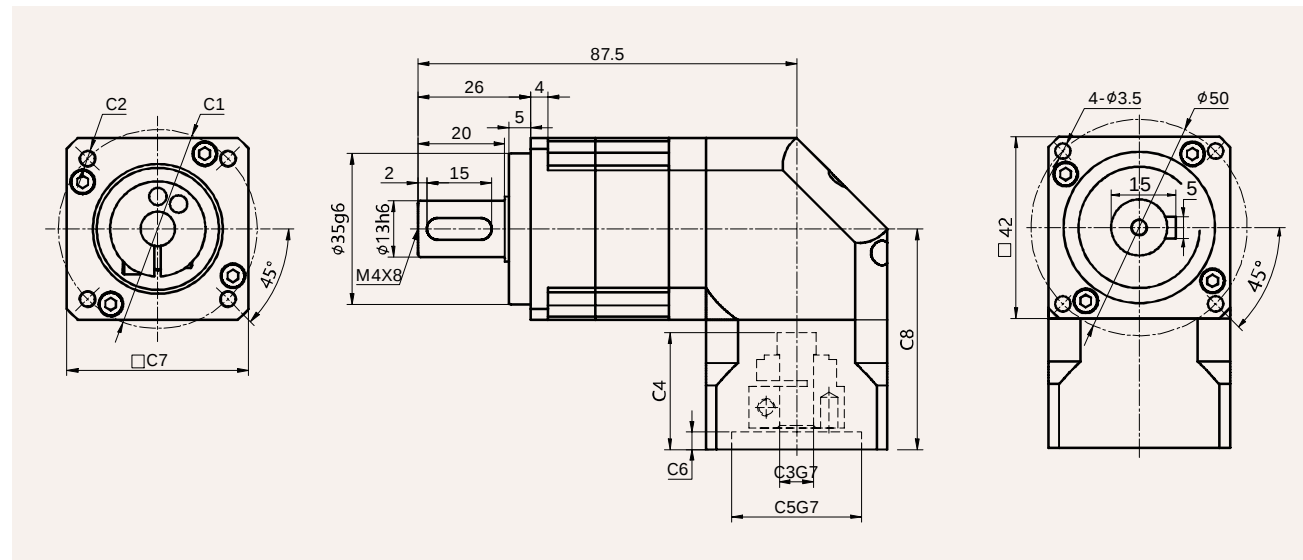
Gear box performance information

型号 Model	单位 Unit	TSF042	TSF060	TSF090	TSF115	TSF140	TSF180	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	-	35	100	230	450	1000	3	1
		20	45	110	270	580	1300	4	
		20	44	105	255	540	1100	5	
		19	40	100	180	390	800	7	
		14	22	50	120	230	460	10	
		-	35	100	230	450	1000	15	2
		20	45	110	270	580	1300	16	
		20	45	110	270	580	1300	20	
		20	44	105	255	540	1100	25	
		20	45	110	270	580	1300	28	
		-	35	100	230	450	1000	30	
		20	44	105	255	540	1100	35	
		20	45	110	270	580	1300	40	
		20	44	105	255	540	1100	50	
		19	40	100	180	390	800	70	
		14	22	50	120	230	460	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	rpm	3000	3000	3000	3000	2000	1500		
额定输入转速 Maximum input speed	rpm	6000	6000	6000	6000	4000	3000		
最大径向力 ^{※1} Maximum radial force	N	700	920	1400	3000	5800	9500		
最大轴向力 ^{※1} Maximum axial force	N	380	630	600	2500	4500	6800		
效率 Efficiency	%	Single [95%]			Double [93%]				
平均寿命 Average lifetime	h	20000							
重量 (大概)	kg	1.1	2.1	5.6	11	24	39		1
		1.8	2.6	6.6	14	30	45		2
转动惯量 Moment of inertia	kgcm ²	-	0.39	2.45	6.7	27	44	3	1
		0.022	0.34	2.22	5.4	22	28	4	
		0.019	0.32	2.13	5	21	22	5	
		0.017	0.31	2.06	4.6	19	16	7	
		0.017	0.3	2.02	4.4	19	14	10	
		-	0.11	0.6	0.8	15	12	15	2
		0.022	0.12	0.65	0.9	15	13	16	
		0.019	0.11	0.59	0.8	14	12	20	
		0.017	0.11	0.59	0.8	14	12	25	
		0.017	0.12	0.64	0.8	15	13	28	
		-	0.10	0.51	0.7	13	11	30	
		0.016	0.11	0.59	0.8	14	12	35	
		0.016	0.10	0.51	0.7	13	11	40	
		0.016	0.10	0.51	0.7	13	11	50	
		0.016	0.10	0.51	0.7	13	11	70	
		0.019	0.10	0.51	0.7	13	11	100	
回程间隙 Backlash	arcmin	7	7	7	7	10	10	Precise[1]	
		10	10	10	10	12	12	Standard[1]	
		10	10	10	10	12	12	Precise[2]	
		12	12	12	12	14	14	Standard[2]	
抗扭刚性 Torsional rigidity	N·m/arc min	3	7	14	25	50	145		
噪音 Noise	dB	60	65	65	68	70	75		
润滑 Lubricating		合成油脂润滑 Synthetic grease lubrication							
防护等级 Levels of protection		IP65							

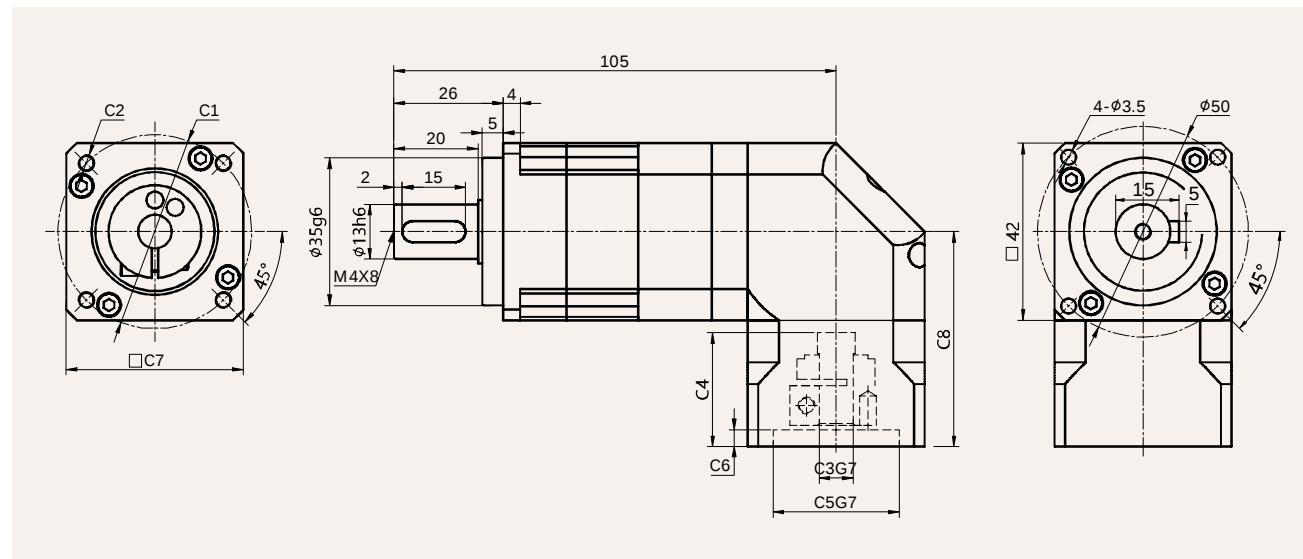
外形尺寸图表

Outline dimensional

TSF-042-L1



TSF-042-L2



适配电机输入接口尺寸(左端为输入尺寸)

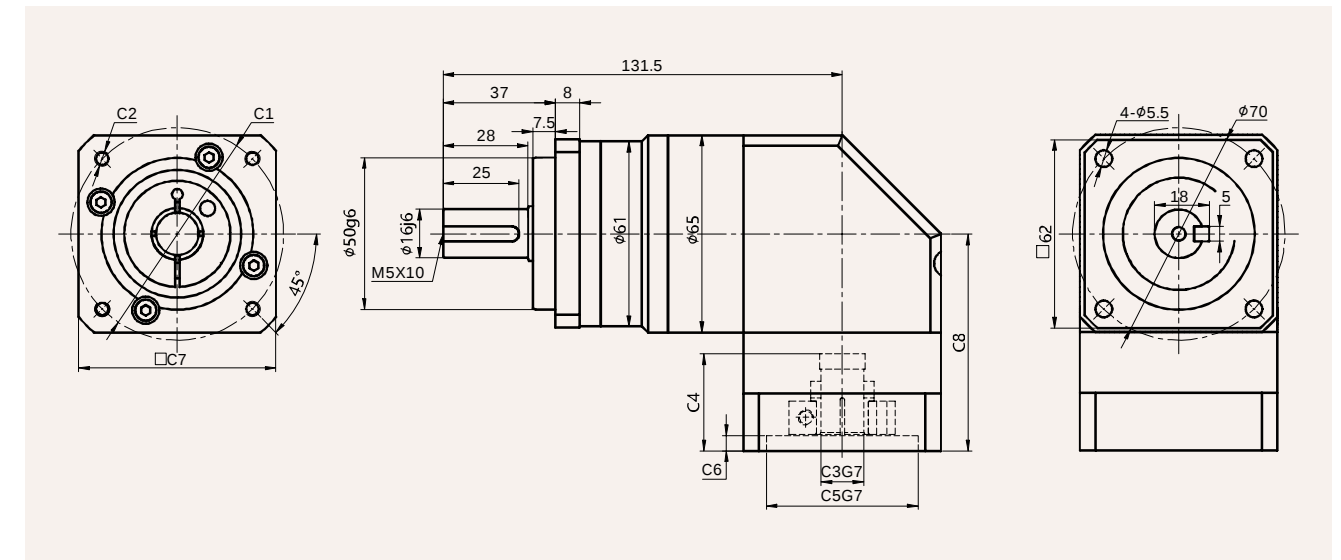
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
TSF-042-L1	Φ46	4-M4	Φ8	27	Φ30	6	42	51
	Φ45	4-M3	Φ8	27	Φ30	6	42	51
TSF-042-L2	Φ46	4-M4	Φ8	27	Φ30	6	42	51
	Φ45	4-M3	Φ8	27	Φ30	6	42	51

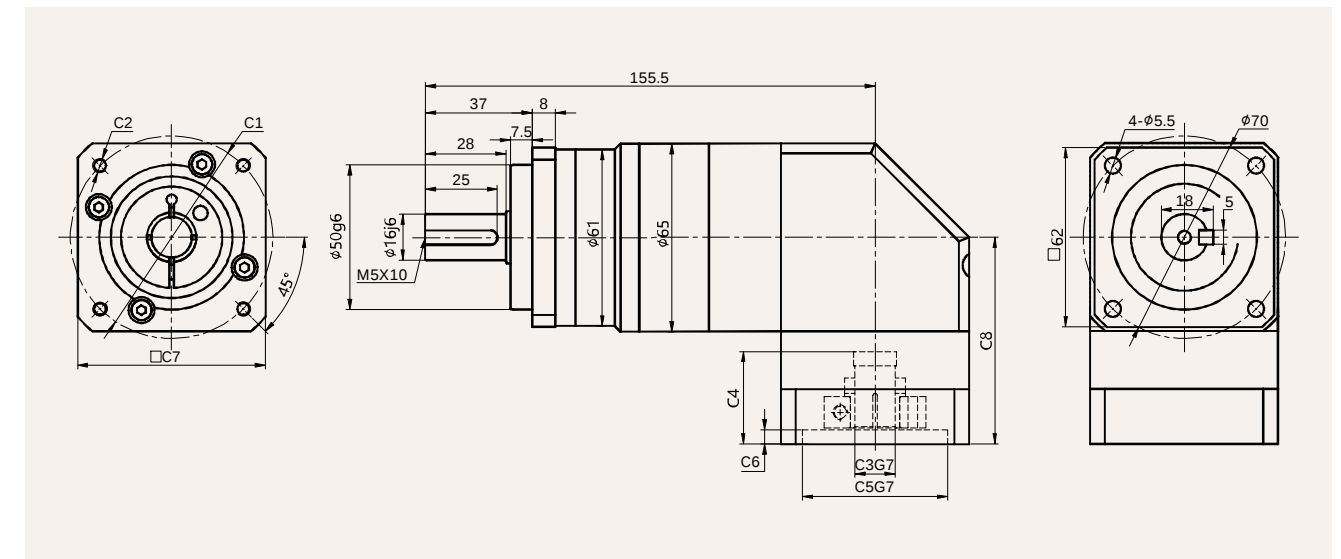
外形尺寸图表

Outline dimensional

TSF-060-L1



TSF-060-L2



适配电机输入接口尺寸(左端为输入尺寸)

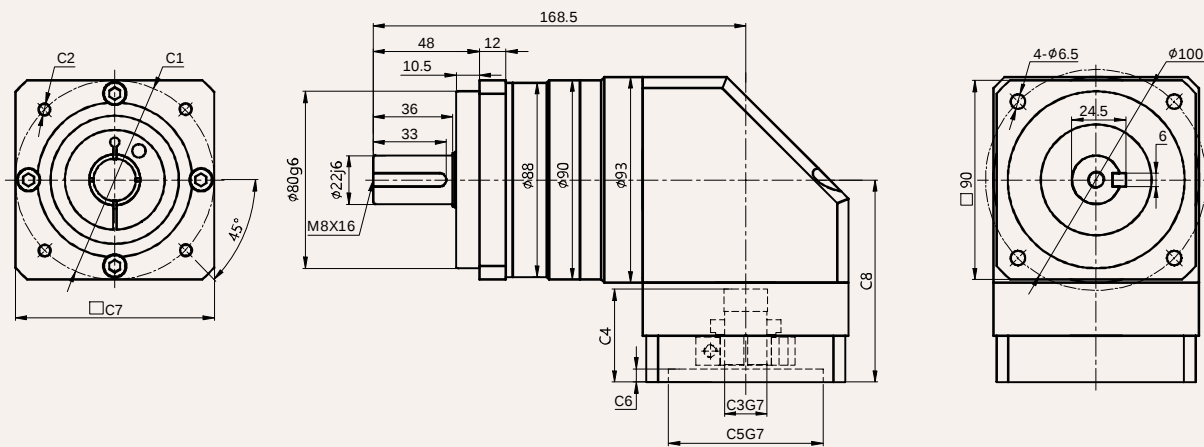
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
TSF-060-L1	Φ70	4-M4/4-M5	Φ14	32	Φ50	5	65	71.5
TSF-060-L2	Φ70	4-M4/4-M5	Φ14	32	Φ50	5	65	71.5

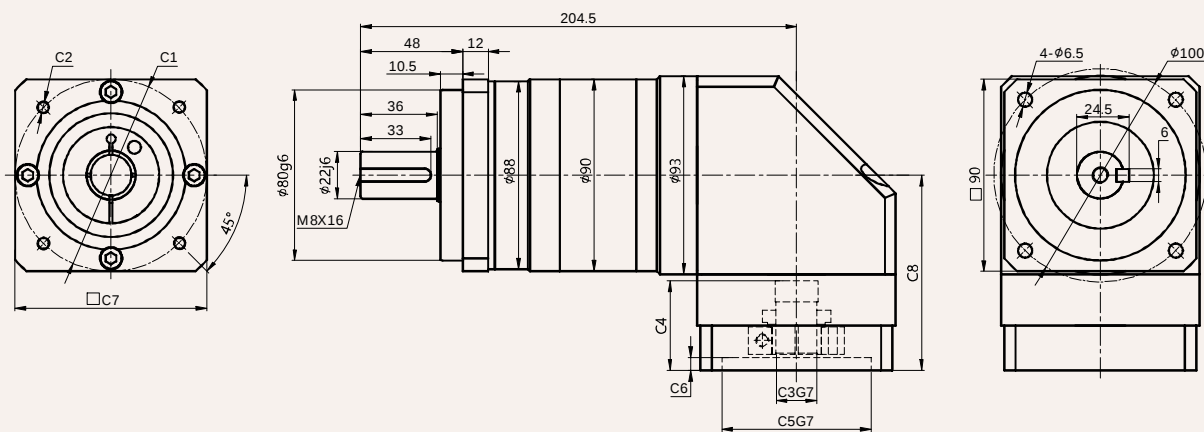
外形尺寸图表

Outline dimensional

TSF-090-L1



TSF-090-L2



适配电机输入接口尺寸(左端为输入尺寸)

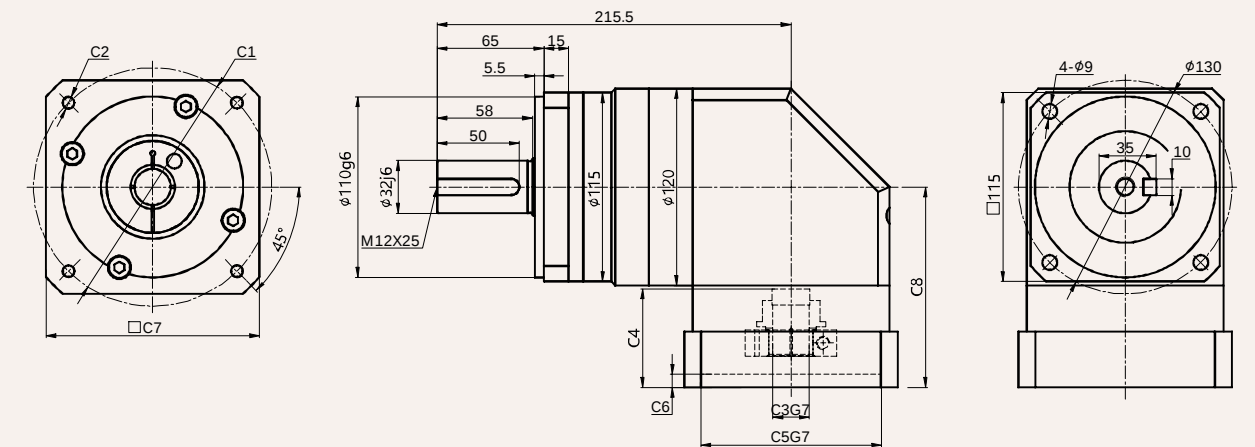
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ZAF-090-L1	Φ98.4	4-M6/4-M5	Φ14/Φ19	42	Φ73	6	90	91.5
	Φ90	4-M5/4-M6	Φ19	42	Φ70	6	90	91.5
	Φ115	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
	Φ130	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
	Φ145	4-M8	Φ19/Φ22	57.5	Φ110	8	130	107
ZAF-090-L2	Φ98.4	4-M6/4-M5	Φ14/Φ19	42	Φ73	6	90	91.5
	Φ90	4-M5/4-M6	Φ19	42	Φ70	6	90	91.5
	Φ115	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
	Φ130	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
	Φ145	4-M8	Φ19/Φ22	57.5	Φ110	8	130	107

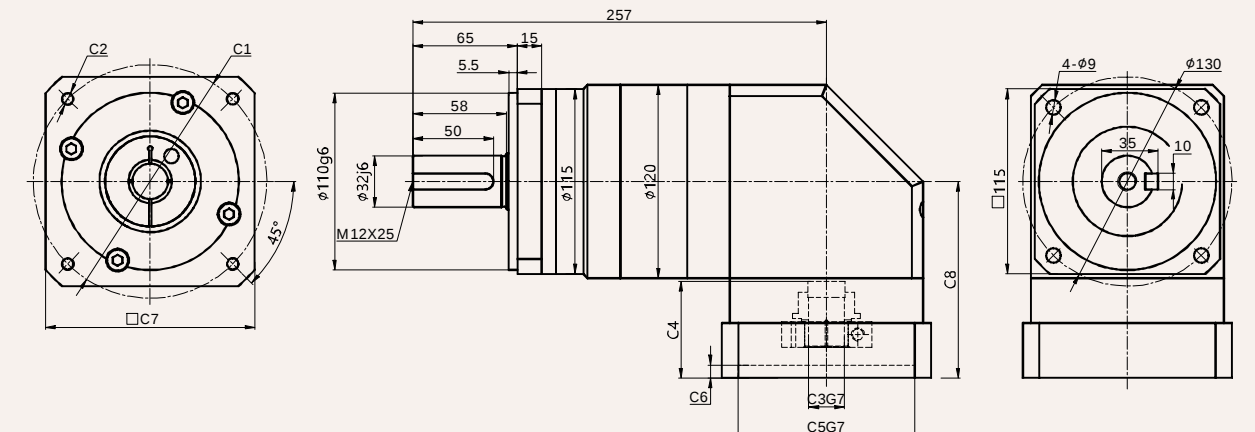
外形尺寸图表

Outline dimensional

TSF-115-L1



TSF-115-L2



适配电机输入接口尺寸(左端为输入尺寸)

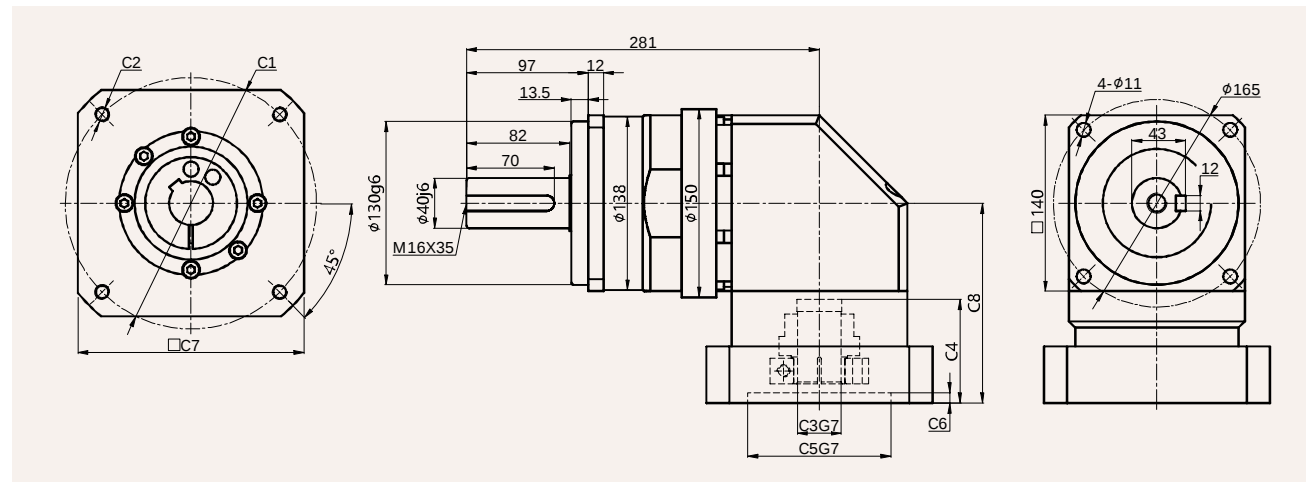
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
ZAF-115-L1	Φ115	4-M8/4-M6	Φ22/Φ24	57	Φ95	8	130	119
	Φ130	4-M8	Φ22/Φ24	57	Φ95	8	130	119
	Φ145	4-M8	Φ22/Φ24	60	Φ110	8	130	122
ZAF-115-L2	Φ115	4-M8/4-M6	Φ22/Φ24	57	Φ95	8	130	119
	Φ130	4-M8	Φ22/Φ24	57	Φ95	8	130	119
	Φ145	4-M8	Φ22/Φ24	60	Φ110	8	130	122

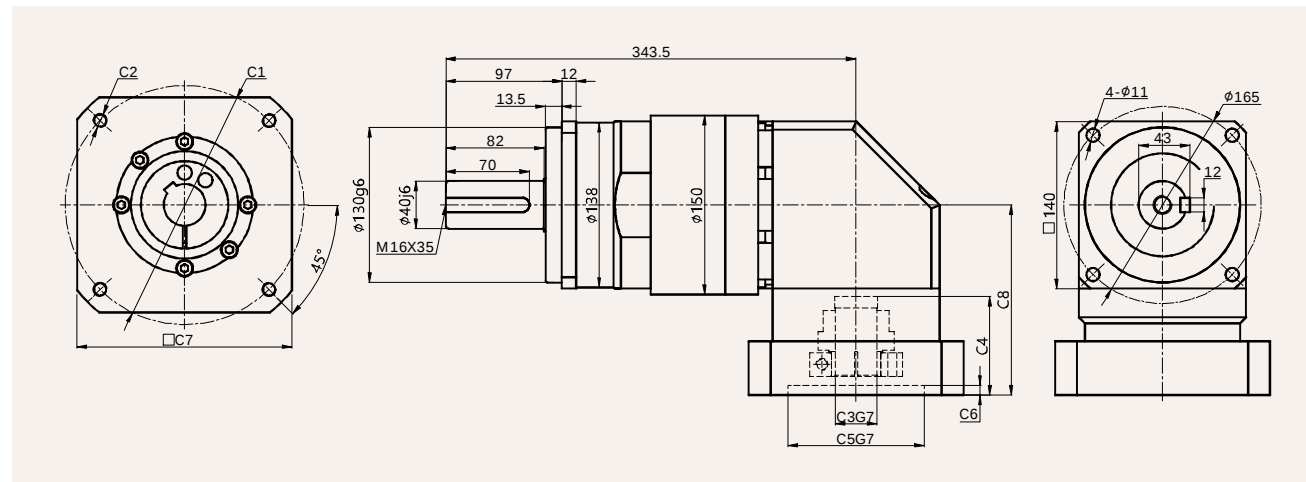
外形尺寸图表

Outline dimensional

TSF-140-L1



TSF-140-L2



适配电机输入接口尺寸(左端为输入尺寸)

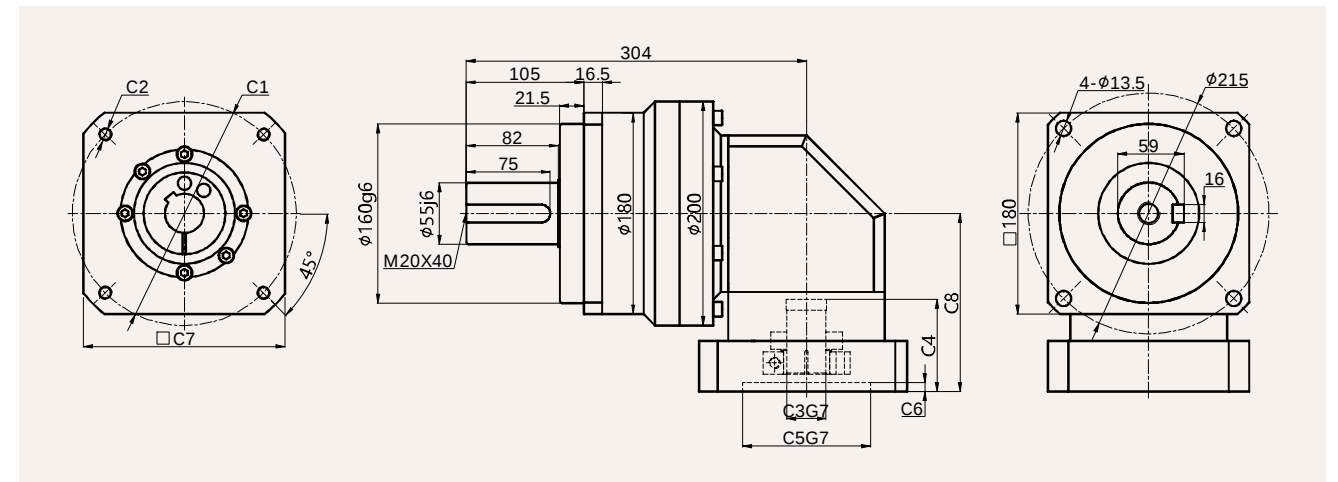
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
TSF-140-L1	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	144
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	149
	Φ200	4-M12	Φ35/Φ42	82.5	Φ114.3	8	180	159
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	191.5
	Φ215	4-M12	Φ42	87.5	Φ180	8	200	164
TSF-140-L2	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	144
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	149
	Φ200	4-M12	Φ35/Φ42	82.5	Φ114.3	8	180	159
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	191.5

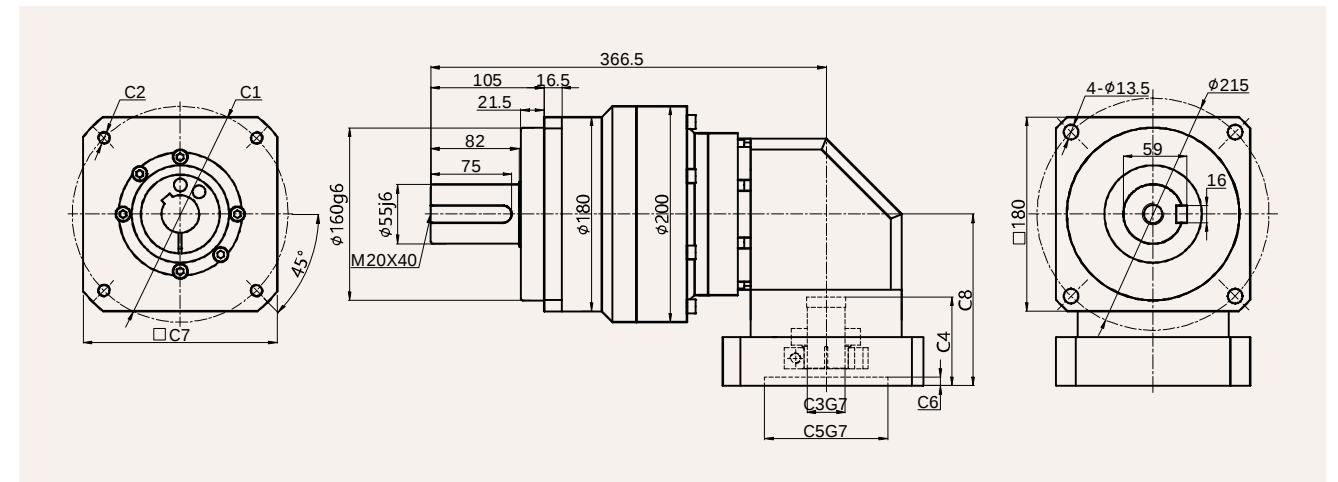
外形尺寸图表

Outline dimensional

TSF-180-L1



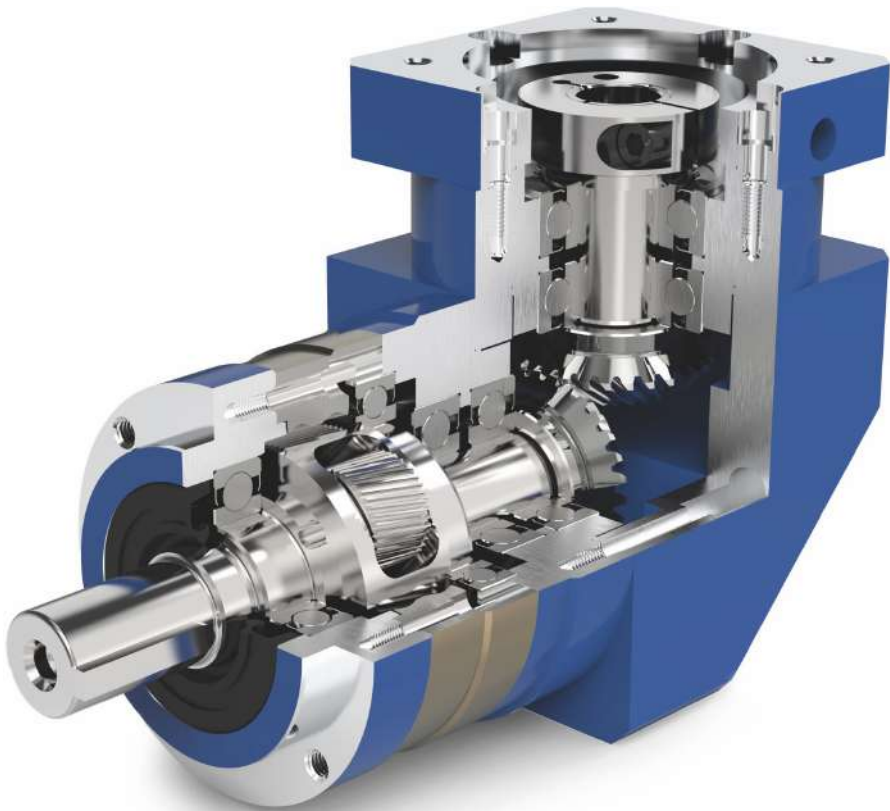
TSF-180-L2



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
TSF-180-L1	Φ200	4-M12	Φ35/Φ42	82.5	Φ114.3	8	180	159
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	191.5
	Φ215	4-M12	Φ42	87.5	Φ180	8	200	164
TSF-180-L2	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	144
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	149
	Φ200	4-M12	Φ35/Φ42	82.5	Φ114.3	8	180	159
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	191.5
	Φ215	4-M12	Φ42	87.5	Φ180	8	200	164



TSL Series

The Main Features

- 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 achi

减速机性能资料

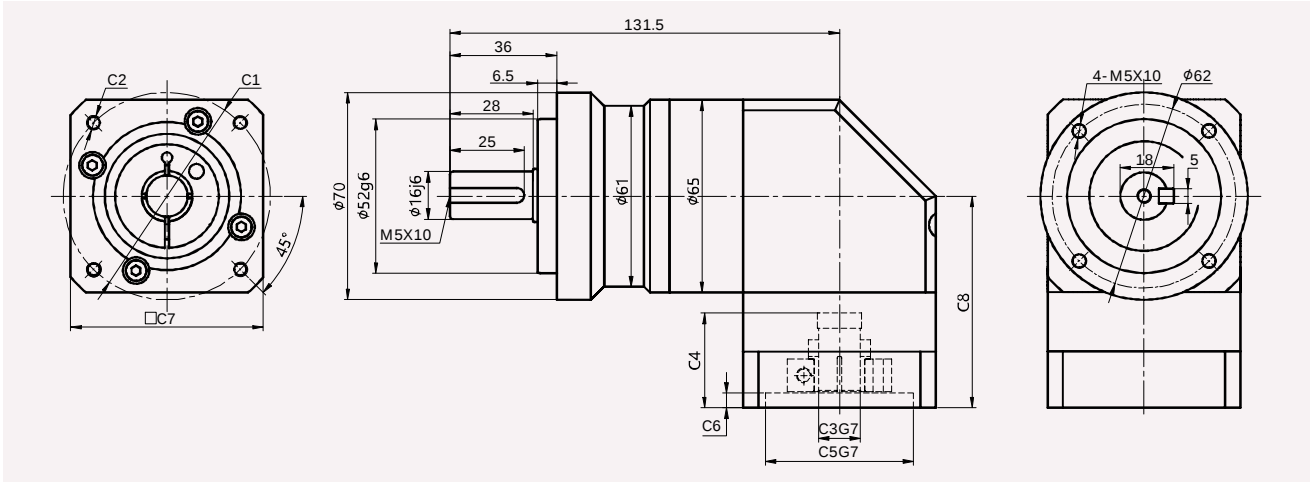
Gear box performance information

型号 Model	单位 Unit	TSL070	TSL090	TSL120	TSL155	TSL205	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	35	100	230	450	1000	3	1
		45	110	270	580	1300	4	
		44	105	255	540	1100	5	
		40	100	180	390	800	7	
		22	50	120	230	460	10	
		35	100	230	450	1000	15	2
		45	110	270	580	1300	16	
		45	110	270	580	1300	20	
		44	105	255	540	1100	25	
		45	110	270	580	1300	28	
		35	100	230	450	1000	30	
		44	105	255	540	1100	35	
		45	110	270	580	1300	40	
		44	105	255	540	1100	50	
		40	100	180	390	800	70	
		22	50	120	230	460	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	rpm	3000	3000	3000	2000	1500		
额定输入转速 Maximum input speed	rpm	6000	6000	6000	4000	3000		
最大径向力 ^{※1} Maximum radial force	N	920	1400	3000	5800	9500		
最大轴向力 ^{※1} Maximum axial force	N	630	600	2500	4500	6800		
效率 Efficiency	%	Single [95%]			Double [93%]			
平均寿命 Average lifetime	h	20000						
重量 (大概) Weight	kg	2.1	5.6	11	24	39		1
		2.6	6.6	14	30	45		2
转动惯量 Moment of inertia	kgcm ²	0.39	2.45	6.7	27	44	3	1
		0.34	2.22	5.4	22	28	4	
		0.32	2.13	5	21	22	5	
		0.31	2.06	4.6	19	16	7	
		0.3	2.02	4.4	19	14	10	
		0.11	0.6	0.8	15	12	15	2
		0.12	0.65	0.9	15	13	16	
		0.11	0.59	0.8	14	12	20	
		0.11	0.59	0.8	14	12	25	
		0.12	0.64	0.8	15	13	28	
		0.10	0.51	0.7	13	11	30	
		0.11	0.59	0.8	14	12	35	
		0.10	0.51	0.7	13	11	40	
		0.10	0.51	0.7	13	11	50	
		0.10	0.51	0.7	13	11	70	
		0.10	0.51	0.7	13	11	100	
回程间隙 Backlash	arcmin	7	7	7	10	10	Precise[1]	
		10	10	10	12	12	Standard[1]	
		10	10	10	12	12	Precise[2]	
		12	12	12	14	14	Standard[2]	
抗扭刚性 Torsional rigidity	N·m/arc min	7	14	25	50	145		
噪音 Noise	dB	65	65	68	70	75		
润滑 Lubricating		合成油脂润滑 Synthetic grease lubrication						
防护等级 levels of protection		IP65						

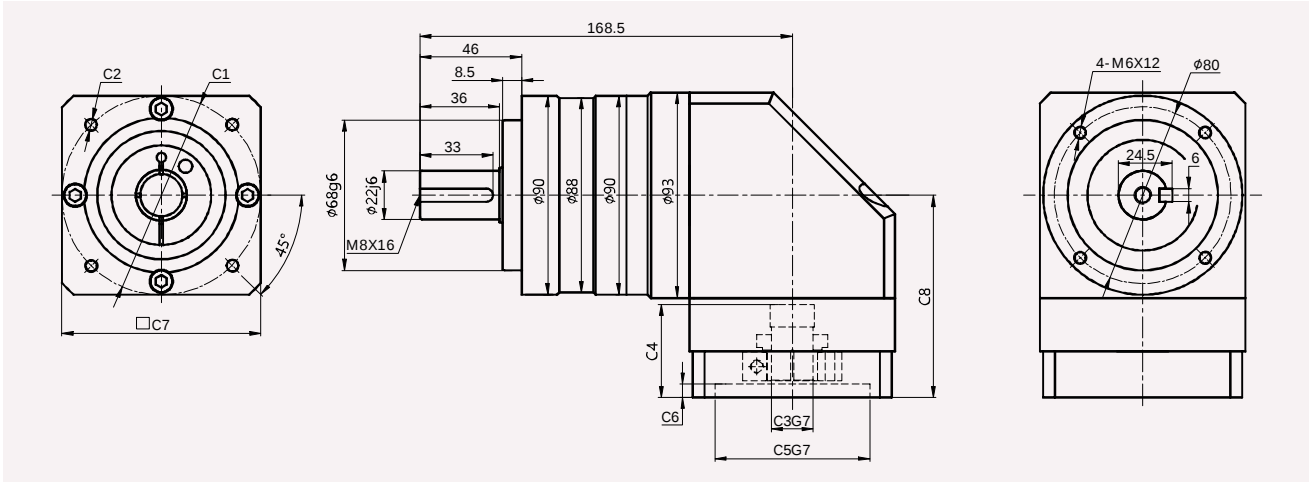
外形尺寸图表
Outline dimensional

外形尺寸图表
Outline dimensional

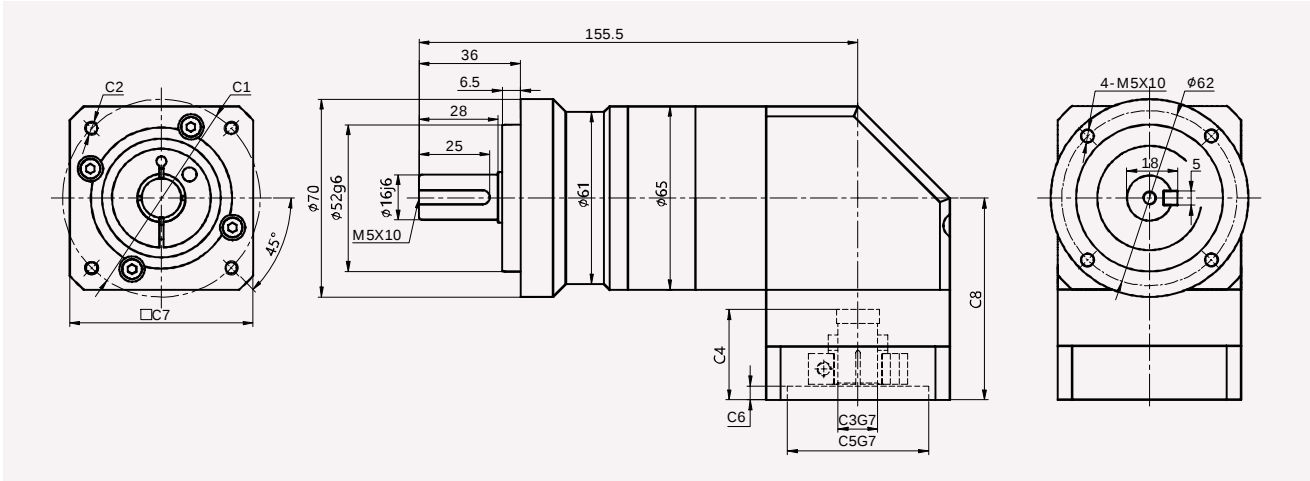
TSL-070-L1



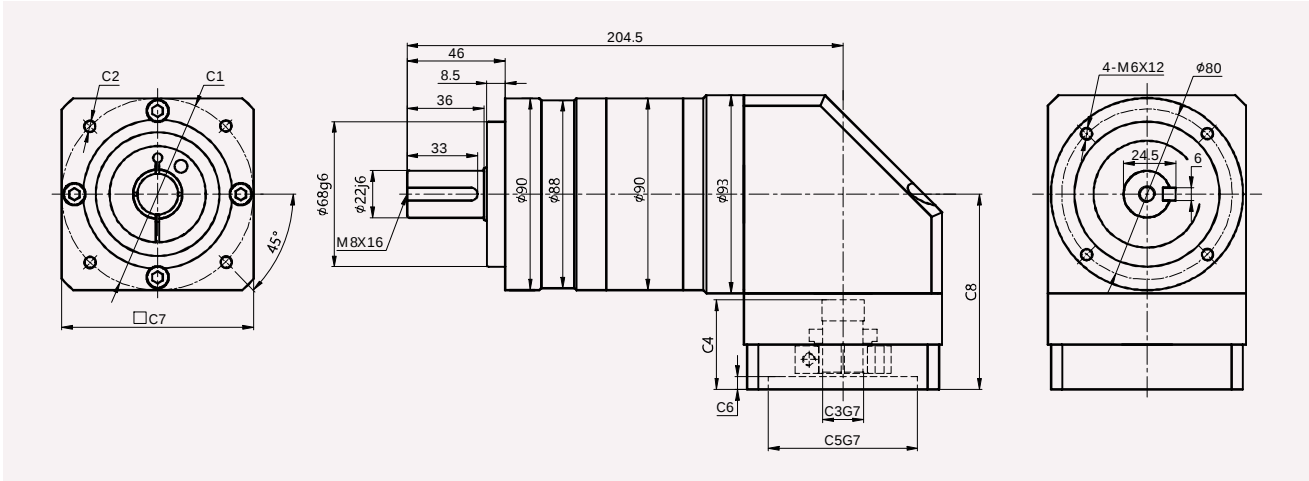
TSL-090-L1



TSL-070-L2



TSL-090-L2



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)

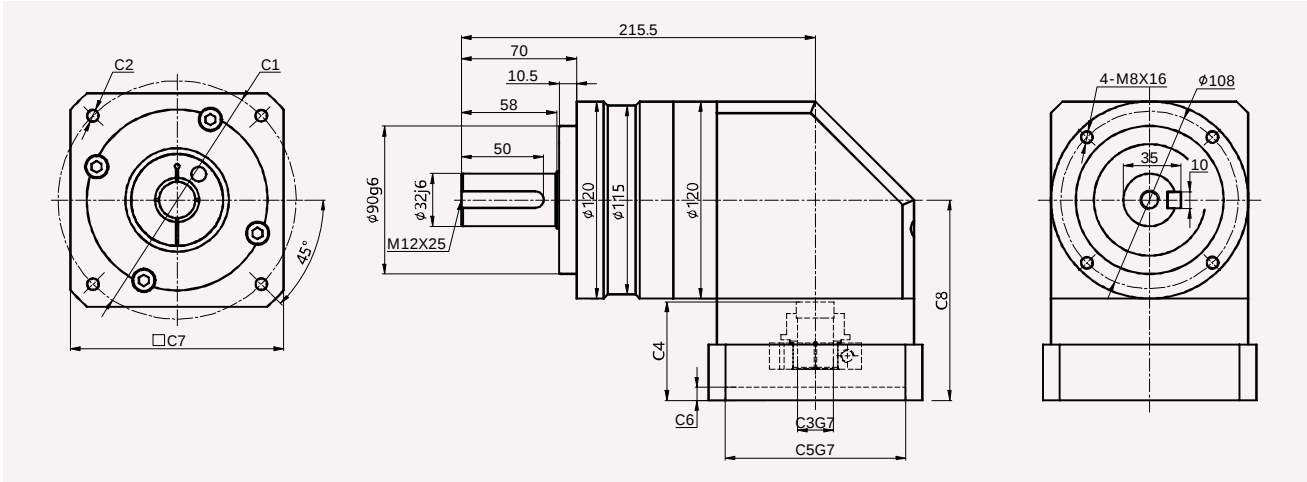
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
TSL-070-L1	Φ70	4-M4/4-M5	Φ14	32	Φ50	5	65	71.5
TSL-070-L2	Φ70	4-M4/4-M5	Φ14	32	Φ50	5	65	71.5

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)

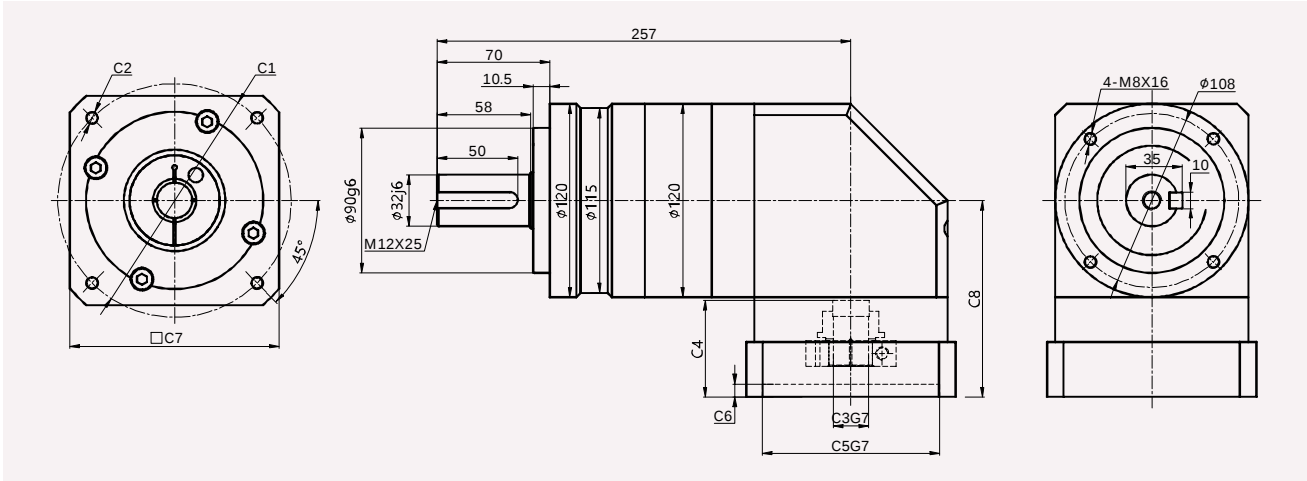
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
TSL-090-L1	Φ98.4	4-M6/4-M5	Φ14/Φ19	42	Φ73	6	90	91.5
	Φ90	4-M5/4-M6	Φ19	42	Φ70	6	90	91.5
	Φ115	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
	Φ130	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
TSL-090-L2	Φ145	4-M8	Φ19/Φ22	57.5	Φ110	8	130	107
	Φ98.4	4-M6/4-M5	Φ14/Φ19	42	Φ73	6	90	91.5
	Φ90	4-M5/4-M6	Φ19	42	Φ70	6	90	91.5
	Φ115	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
TSL-090-L2	Φ130	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
	Φ145	4-M8	Φ19/Φ22	57.5	Φ110	8	130	107

外形尺寸图表
Outline dimensional

TSL-120-L1



TSL-120-L2

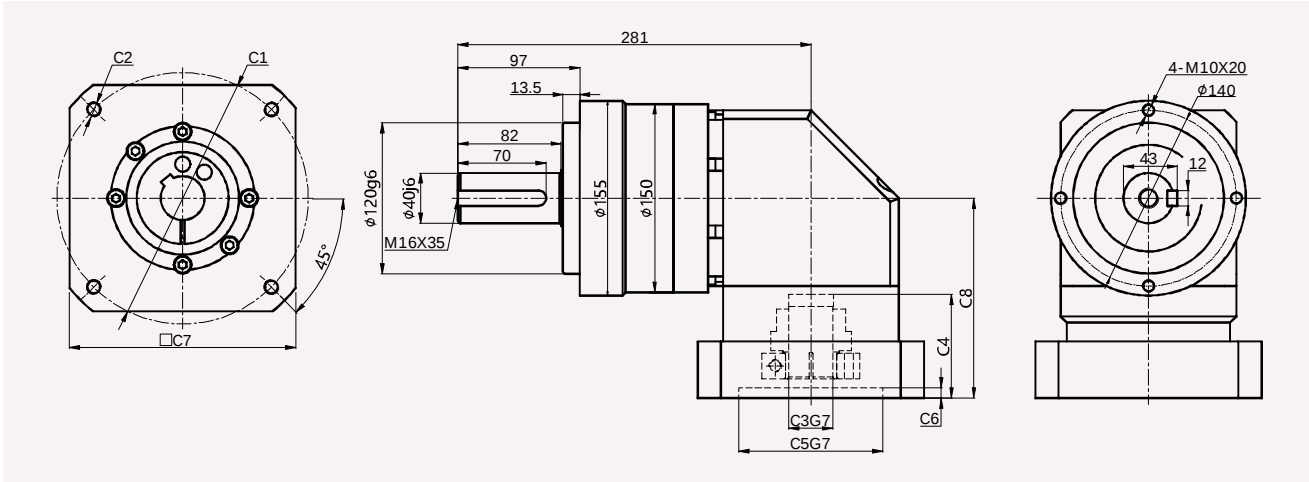


适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

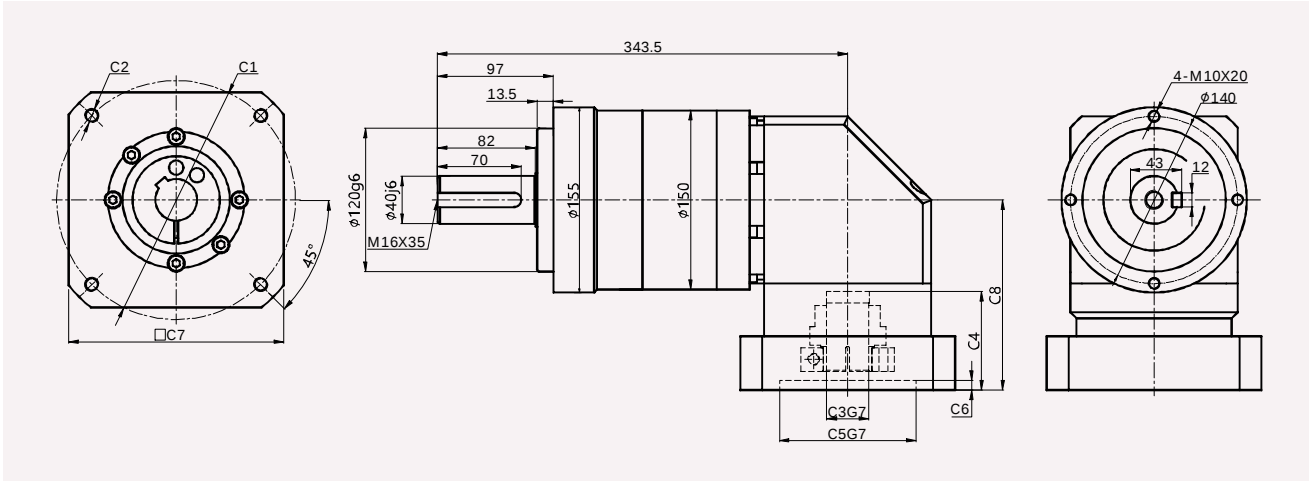
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
TSL-120-L1	$\Phi 115$	4-M8/4-M6	$\Phi 22/\Phi 24$	57	$\Phi 95$	8	130	119
	$\Phi 130$	4-M8	$\Phi 22/\Phi 24$	57	$\Phi 95$	8	130	119
	$\Phi 145$	4-M8	$\Phi 22/\Phi 24$	60	$\Phi 110$	8	130	122
TSL-120-L2	$\Phi 115$	4-M8/4-M6	$\Phi 22/\Phi 24$	57	$\Phi 95$	8	130	119
	$\Phi 130$	4-M8	$\Phi 22/\Phi 24$	57	$\Phi 95$	8	130	119
	$\Phi 145$	4-M8	$\Phi 22/\Phi 24$	60	$\Phi 110$	8	130	122

外形尺寸图表
Outline dimensional

TSL-155-L1



TSL-155-L2



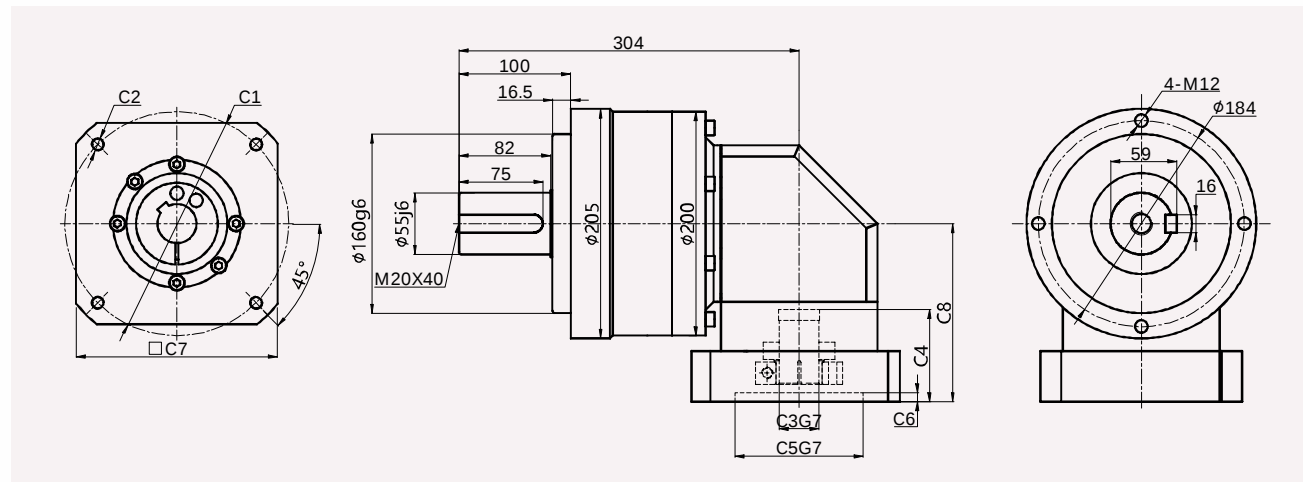
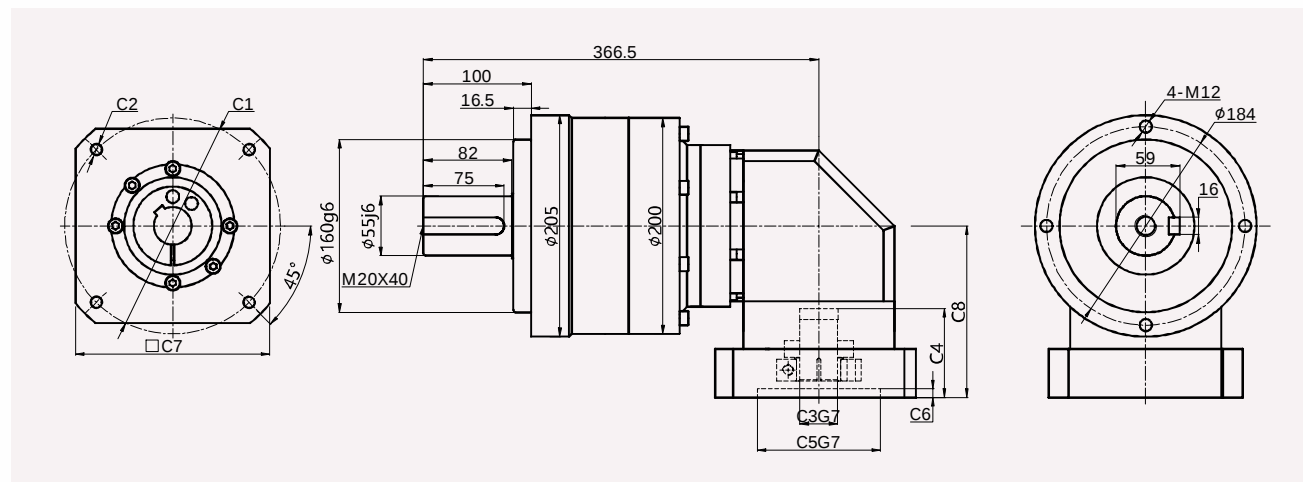
适配电机输入接口尺寸(左端为输入尺寸)
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
TSL-155-L1	$\Phi 115$	4-M8/M6	$\Phi 22/\Phi 24$	67.5	$\Phi 95$	8	115	144
	$\Phi 145$	4-M8	$\Phi 22/\Phi 24$	72.5	$\Phi 110$	8	130	149
	$\Phi 200$	4-M12	$\Phi 35/\Phi 42$	82.5	$\Phi 114.3$	8	180	159
	$\Phi 200$	4-M12	$\Phi 35/\Phi 42$	117	$\Phi 114.3$	8	180	191.5
	$\Phi 215$	4-M12	$\Phi 42$	87.5	$\Phi 180$	8	200	164
TSL-155-L2	$\Phi 115$	4-M8/M6	$\Phi 22/\Phi 24$	67.5	$\Phi 95$	8	115	144
	$\Phi 145$	4-M8	$\Phi 22/\Phi 24$	72.5	$\Phi 110$	8	130	149
	$\Phi 200$	4-M12	$\Phi 35/\Phi 42$	82.5	$\Phi 114.3$	8	180	159
	$\Phi 200$	4-M12	$\Phi 35/\Phi 42$	117	$\Phi 114.3$	8	180	191.5

外形尺寸图表

Outline dimensional

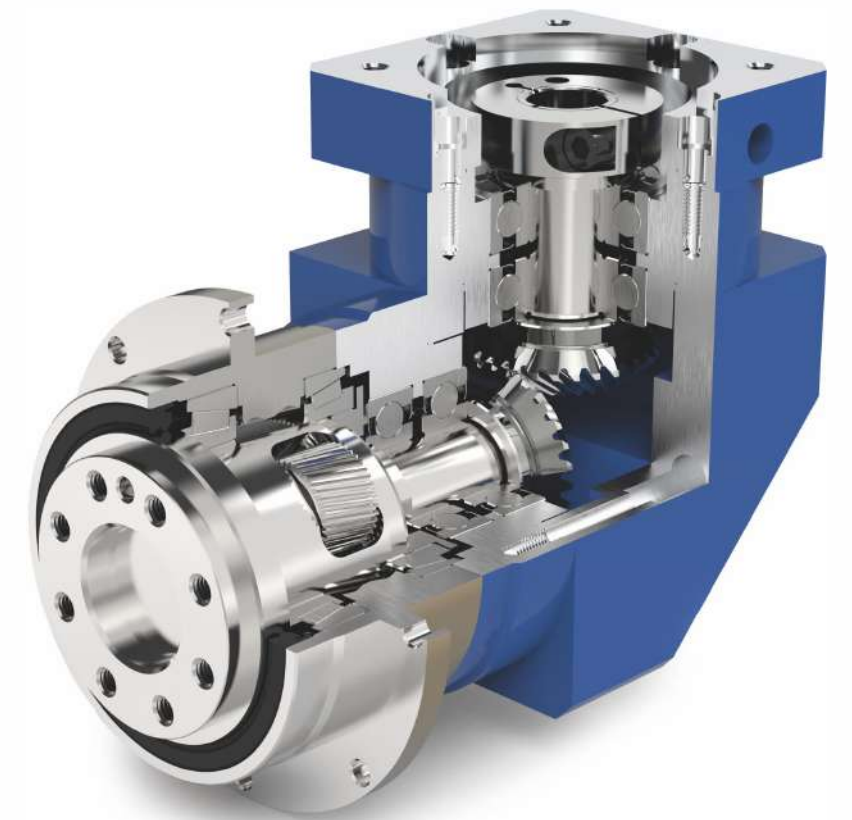
TSL-205-L1

**TSL-205-L2**

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
TSL-205-L1	Φ200	4-M12	Φ35/Φ42	82.5	Φ114.3	8	180	159
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	191.5
	Φ215	4-M12	Φ42	87.5	Φ180	8	200	164
TSL-205-L2	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	144
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	149
	Φ200	4-M12	Φ35/Φ42	82.5	Φ114.3	8	180	159
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	191.5
	Φ215	4-M12	Φ42	87.5	Φ180	8	200	164



TSGH Series

The Main Features

- 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 内齿圈采用整体式结构设计；
- 4 前后大跨度圆锥滚子轴承排列，超强径向和轴向承载能力（ZAHO64除外）；
- 5 伞齿轮采用磨齿工艺精度可达6级，确保运行低噪音、平稳；
- 6 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 inner gear ring adopts integral structure design.
- 4 Arrangement of front and rear large span tapered roller bearings □ Super strong radial and axial bearing capacity (Except ZAH064 Series) .
- 5 The bevel gear adopts gear grinding technology, and the accuracy grade can reach grade 6.
- 6 The backlash clearance is small, and the precision single stage can achieve less than 5 arcmin.

减速机性能资料

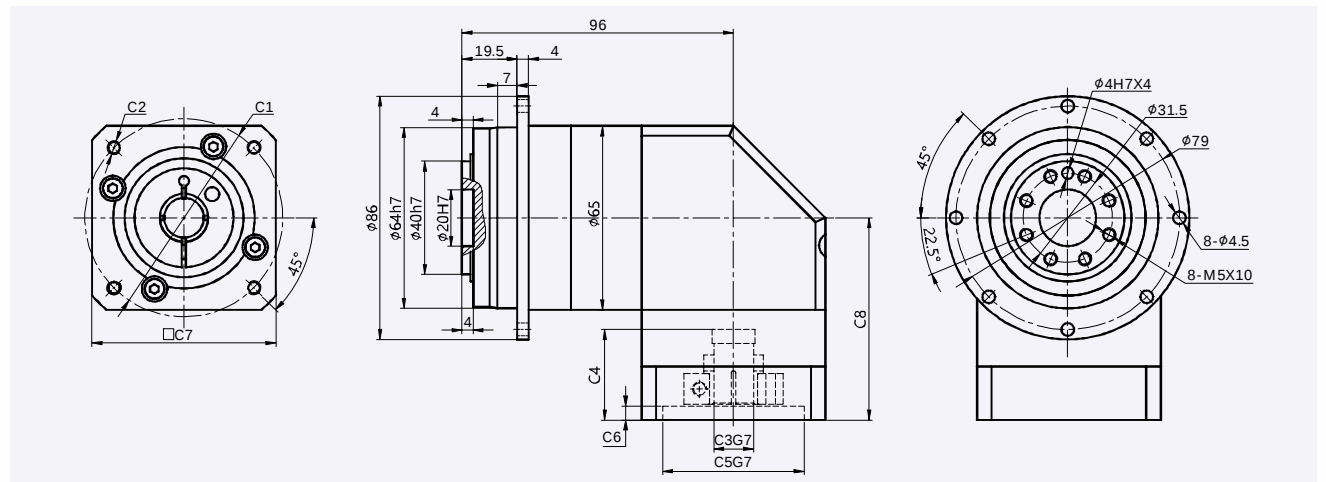
Gear box performance information

型号 Model	单位 Unit	TSGH064	TSGH090	TSGH110	TSGH140	TSGH200	减速比 Ratio	Stage
额定输出扭矩 Rated output torque	N·m	45	150	270	580	1300	4	1
		44	140	255	540	1100	5	
		40	100	180	390	800	7	
		22	50	120	230	460	10	
		45	150	270	580	1300	16	2
		45	150	270	580	1300	20	
		44	140	255	540	1100	25	
		45	150	270	580	1300	28	
		44	140	255	540	1100	35	
		45	150	270	580	1300	40	
		44	140	255	540	1100	50	
		40	100	180	390	800	70	
		22	50	120	230	460	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	rpm	3000	3000	3000	2000	1500		
额定输入转速 Maximum input speed	rpm	6000	6000	6000	4000	3000		
最大径向力 ^{*1} Maximum radial force	N	550	4000	7800	10000	16000		
最大轴向力 ^{*3} Maximum axial force	N	375	3000	7000	8000	13000		
效率 Efficiency	%	Single [95%]			Double [93%]			
平均寿命 Average lifetime	h	20000						
重量 (大概) Weight	kg	2.3	6.1	12	24	43		1
		2.8	7.4	15	30	49		2
转动惯量 Moment of inertia	kgcm ²	0.34	2.22	5.4	22	28	4	1
		0.32	2.13	5	21	22	5	
		0.31	2.06	4.6	19	16	7	
		0.3	2.02	4.4	19	14	10	
		0.12	0.65	2.7	15	13	16	
		0.11	0.59	2.5	14	12	20	2
		0.11	0.59	2.5	14	12	25	
		0.12	0.64	2.7	15	13	28	
		0.11	0.59	2.1	14	12	35	
		0.10	0.51	2.1	13	11	40	
		0.10	0.51	2.1	13	11	50	
		0.10	0.51	2.1	13	11	70	
		0.10	0.51	2.1	13	11	100	
		回程间隙 Backlash	arcmin	7	7	7	10	
10	10			10	12	12	Standard[1]	
10	10			10	12	12	Precise[2]	
12	12			12	14	14	Standard[2]	
抗扭刚性 Torsional rigidity	N·m/arc min	7	14	25	50	145		
噪音 Noise	dB	65	65	68	70	75		
润滑 Lubricating		合成油脂润滑 Synthetic grease lubrication						
防护等级 levels of protection		IP65						

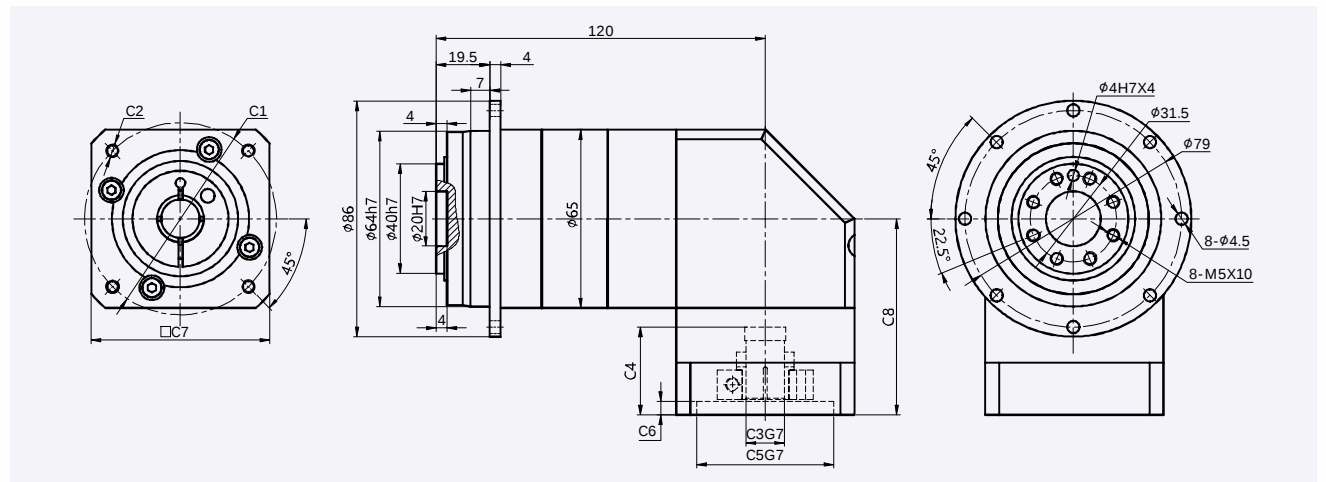
外形尺寸图表

Outline dimensional

TSGH-064-L1



TSGH-064-L2



适配电机输入接口尺寸(左端为输入尺寸)

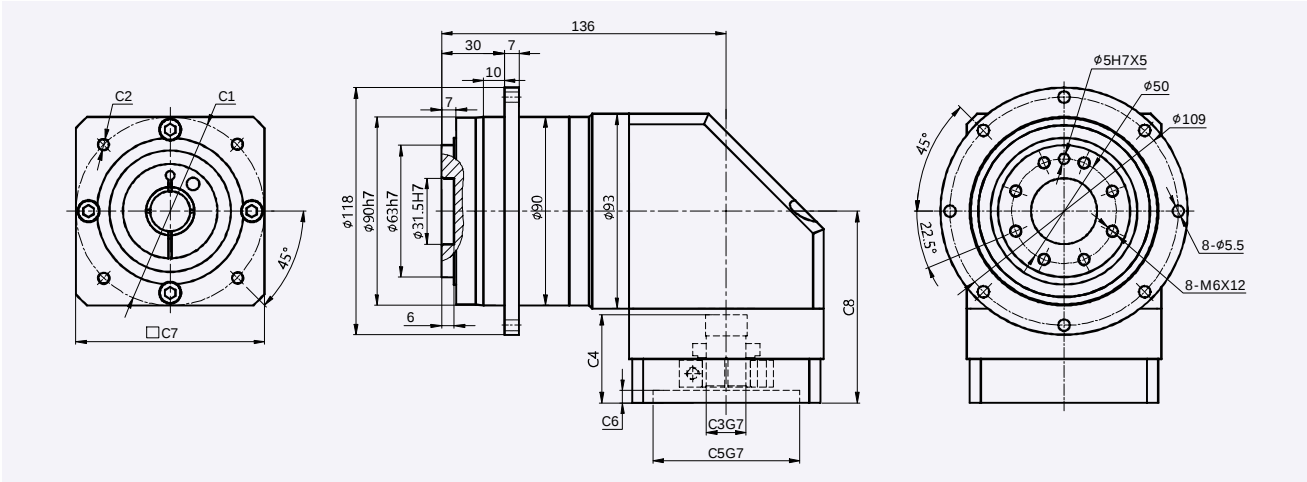
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
TSGH-064-L1	Φ70	4-M4/4-M5	Φ14	32	Φ50	5	65	71.5
TSGH-064-L2	Φ70	4-M4/4-M5	Φ14	32	Φ50	5	65	71.5

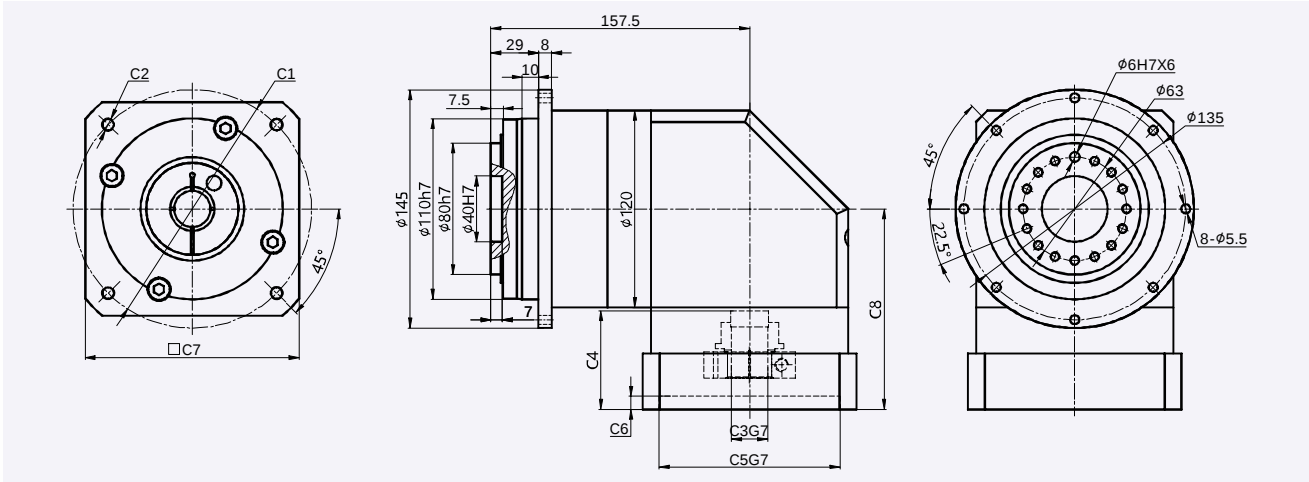
外形尺寸图表
Outline dimensional

外形尺寸图表
Outline dimensional

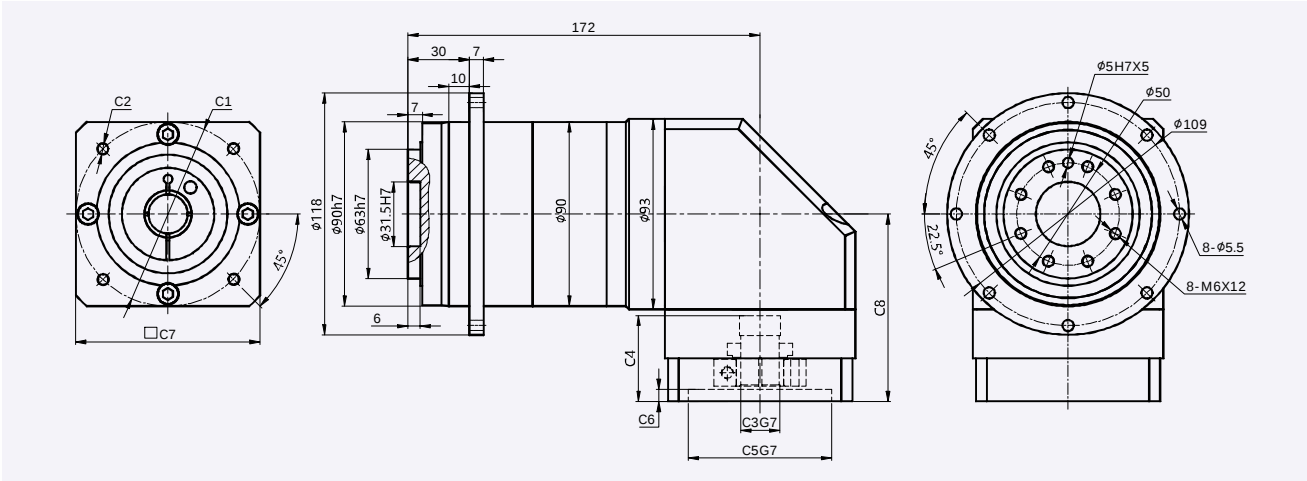
TSGH-090-L1



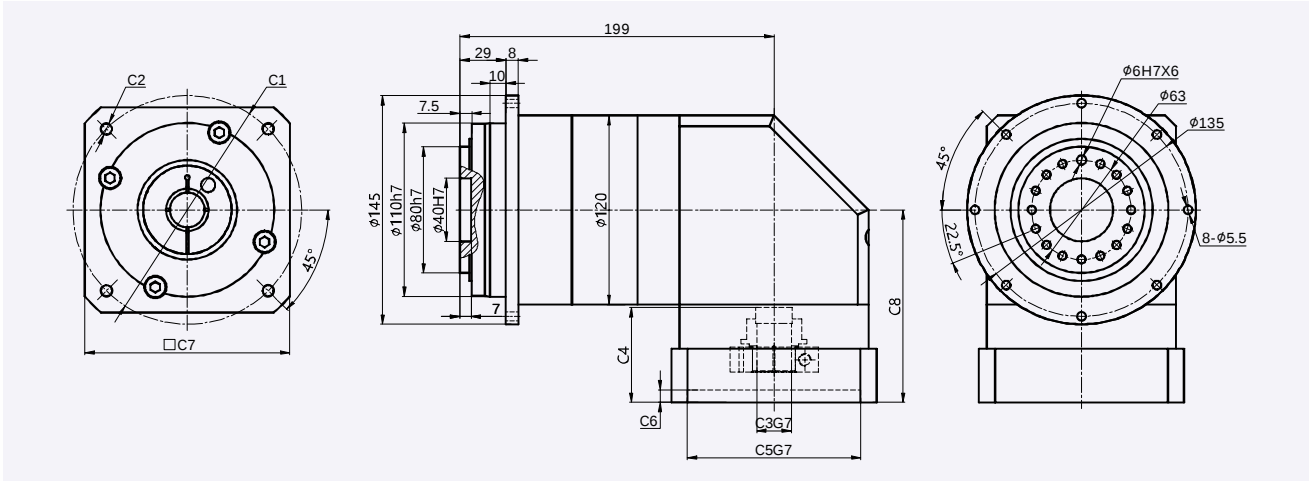
TSGH-110-L1



TSGH-090-L2



TSGH-110-L2



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)

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)

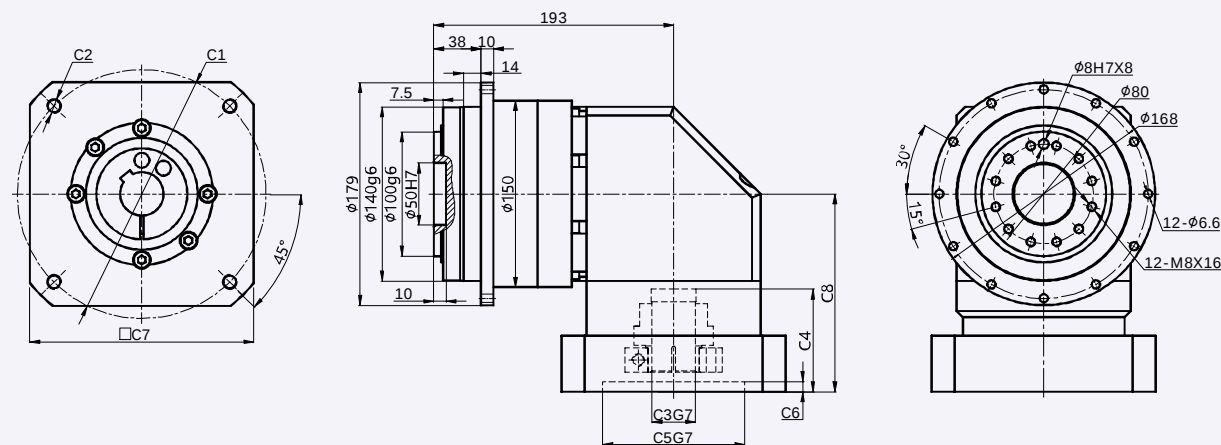
尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
TSGH-090-L1	Φ98.4	4-M6/4-M5	Φ14/Φ19	42	Φ73	6	90	91.5
	Φ90	4-M5/4-M6	Φ19	42	Φ70	6	90	91.5
	Φ115	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
	Φ130	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
	Φ145	4-M8	Φ19/Φ22	57.5	Φ110	8	130	107
TSGH-090-L2	Φ98.4	4-M6/4-M5	Φ14/Φ19	42	Φ73	6	90	91.5
	Φ90	4-M5/4-M6	Φ19	42	Φ70	6	90	91.5
	Φ115	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
	Φ130	4-M8	Φ19/Φ22	54	Φ95	8	110	103.5
	Φ145	4-M8	Φ19/Φ22	57.5	Φ110	8	130	107

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
TSGH-110-L1	Φ115	4-M8/4-M6	Φ22/Φ24	57	Φ95	8	130	119
	Φ130	4-M8	Φ22/Φ24	57	Φ95	8	130	119
	Φ145	4-M8	Φ22/Φ24	60	Φ110	8	130	122
TSGH-110-L2	Φ115	4-M8/4-M6	Φ22/Φ24	57	Φ95	8	130	119
	Φ130	4-M8	Φ22/Φ24	57	Φ95	8	130	119
	Φ145	4-M8	Φ22/Φ24	60	Φ110	8	130	122

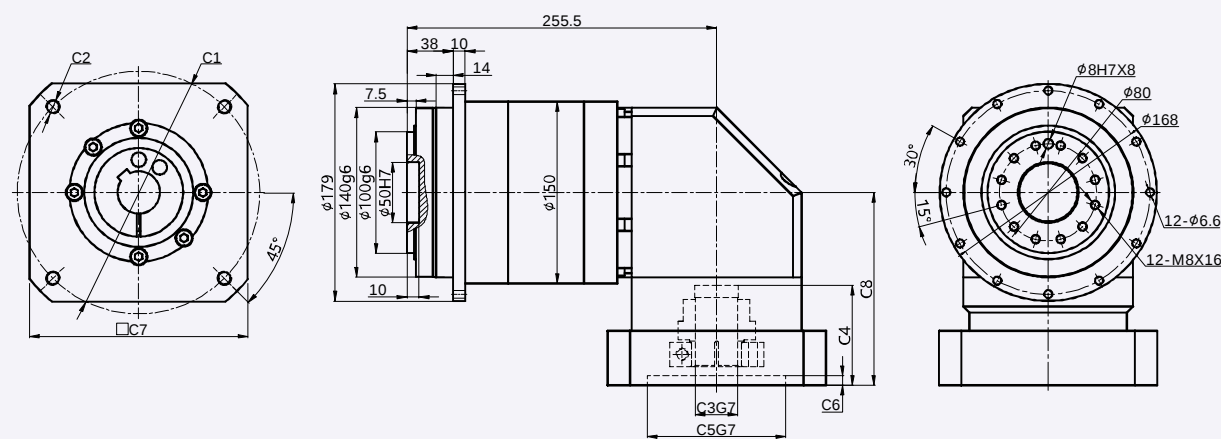
外形尺寸图表

Outline dimensional

TSGH-140-L1



TSGH-140-L2



适配电机输入接口尺寸(左端为输入尺寸)

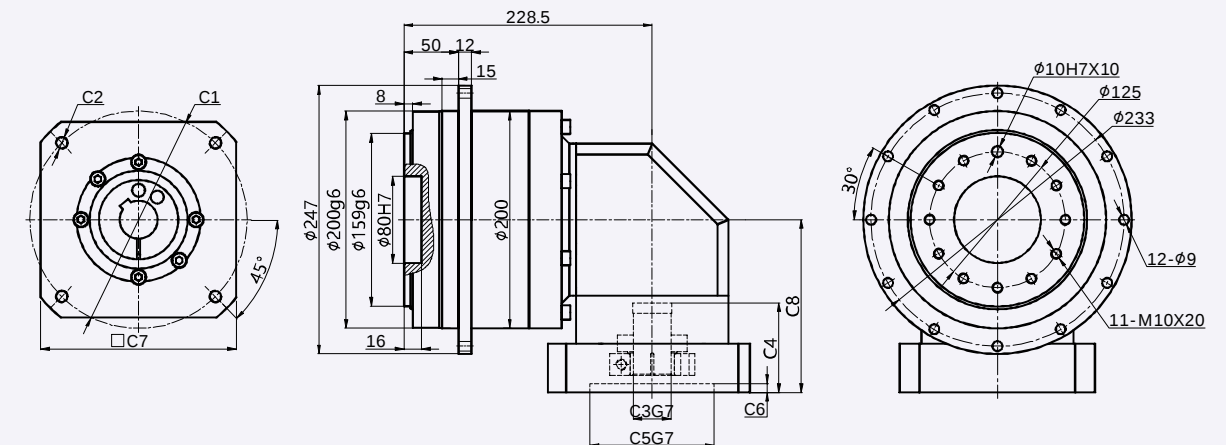
Adapter motor input interface size (The left end is the input size)

尺寸 Size	C1	C2	C3	C4	C5	C6	C7	C8
TSGH-140-L1	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	144
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	149
	Φ200	4-M12	Φ35/Φ42	82.5	Φ114.3	8	180	159
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	191.5
	Φ215	4-M12	Φ42	87.5	Φ180	8	200	164
TSGH-140-L2	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	144
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	149
	Φ200	4-M12	Φ35/Φ42	82.5	Φ114.3	8	180	159
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	191.5

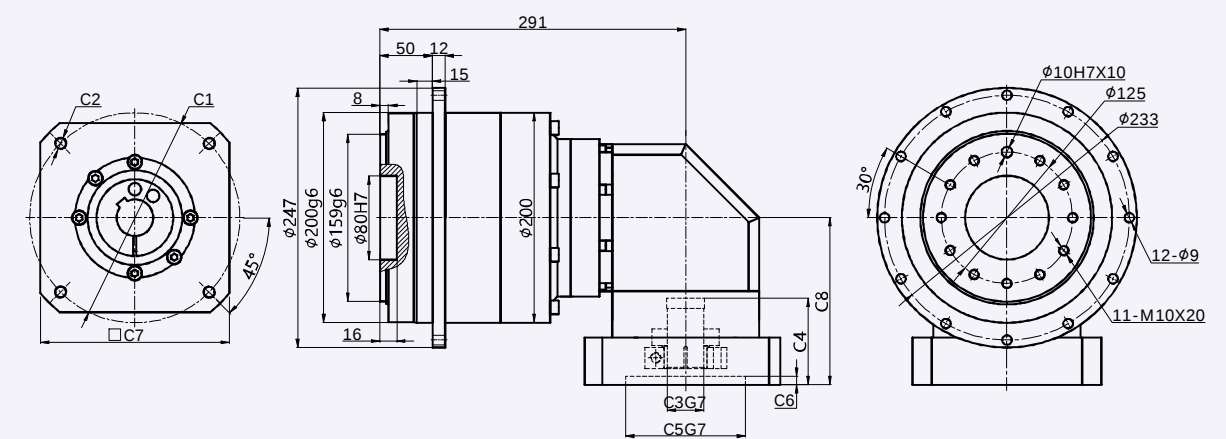
外形尺寸图表

Outline dimensional

TSGH-200-L1



TSGH-200-L2



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
TSGH-200-L1	Φ200	4-M12	Φ35/Φ42	82.5	Φ114.3	8	180	159
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	191.5
	Φ215	4-M12	Φ42	87.5	Φ180	8	200	164
TSGH-200-L2	Φ115	4-M8/M6	Φ22/Φ24	67.5	Φ95	8	115	144
	Φ145	4-M8	Φ22/Φ24	72.5	Φ110	8	130	149
	Φ200	4-M12	Φ35/Φ42	82.5	Φ114.3	8	180	159
	Φ200	4-M12	Φ35/Φ42	117	Φ114.3	8	180	191.5
	Φ215	4-M12	Φ42	87.5	Φ180	8	200	164

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
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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.
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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>i</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>I</i> .
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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.
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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.
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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.
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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.
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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.
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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_r)和扭转刚度(C_{21})。 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_r) and torsional stiffness (C_{21}) of the reducer can be calculated.
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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).
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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 $1/i^2$.
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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.
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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.
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Basic Concepts Related to Type Selection

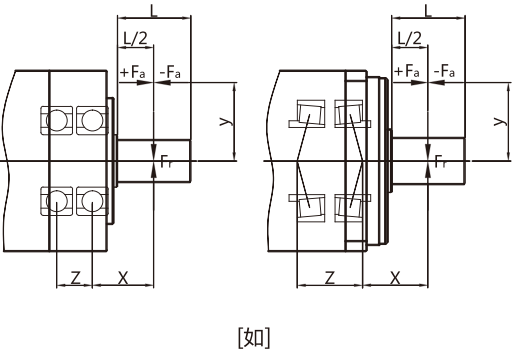
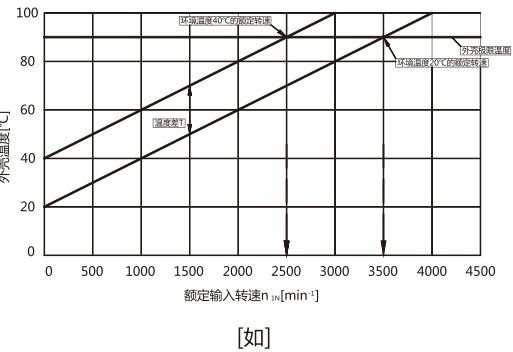
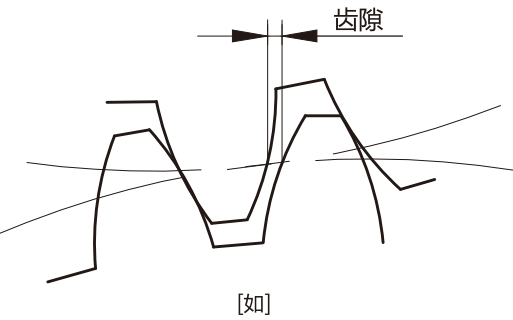
选型相关的基本概念

加速扭矩 Accelerating Torque $T_{2B}[\text{Nm}]$	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 $T_{2NOT}[\text{Nm}]$	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 $T_{012}[\text{Nm}]$	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 $T_2[\text{Nm}]$	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 $T_{C2}[\text{Nm}]$	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_5，按以下公式得出$T_{C2}=T_2*f_5\leq T_{2N}$ $T_{C2}=T_2*f_5 \leq T_{2N}$ can be obtained from the following formulas, which can be used to select the reducer. The actual required torque T_2 and coefficient f_5 can be used to calculate the $T_{C2}=T_2*f_5\leq T_{2N}$.
轴向力 axial force $F_a[\text{N}]$	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 $F_r[\text{N}]$	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_5 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_{21} Torsional stiffness $[\text{Nm}/\text{Arcmin}]$	由加载力矩和所产生的扭转角之间的比率来定义。$C_{21}=\Delta T/\Delta \phi$ 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. $C_{21}=\Delta T/\Delta \phi$ 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 $[\text{Nm}]$	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



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) °C
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

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 $b=2 \cdot \pi \cdot r \cdot a^{\circ} / 360^{\circ}$ 。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。

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。

额定输入转速n1[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n1。

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。

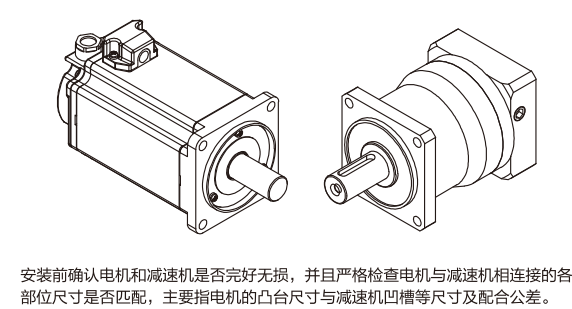
空载扭矩 [Nm]: 指加载到减速机上以克服齿轮箱内的摩擦力的力矩。样本所标值是在转速为3000rpm，环境温度在20℃时的测得的。

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。

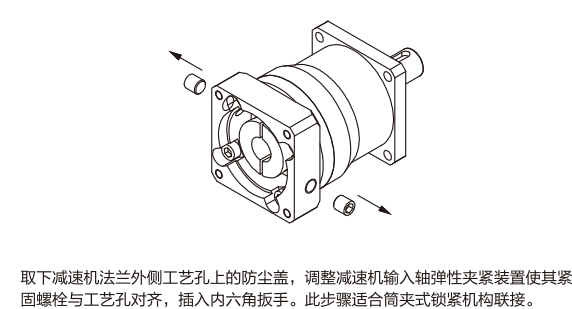
减速机安装指南

Speed reducer installation guide

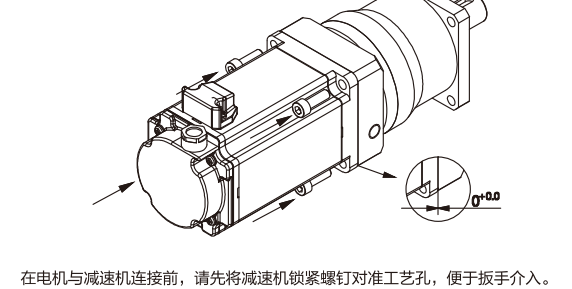
第一步
确认电机和减速机是否完好（若有电机轴键，需移走）



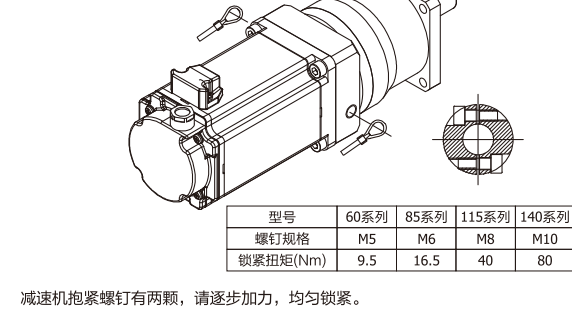
第三步
旋掉减速机法兰外侧的螺钉，插入内六角扳手



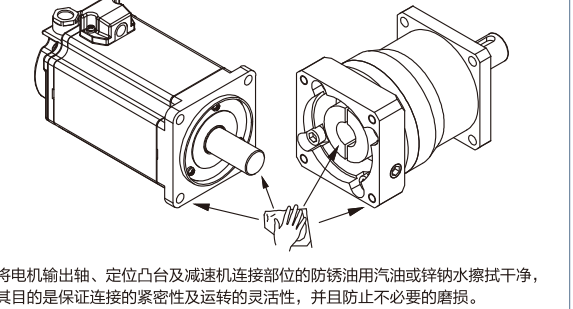
第五步
试连接好，并准备安装螺钉



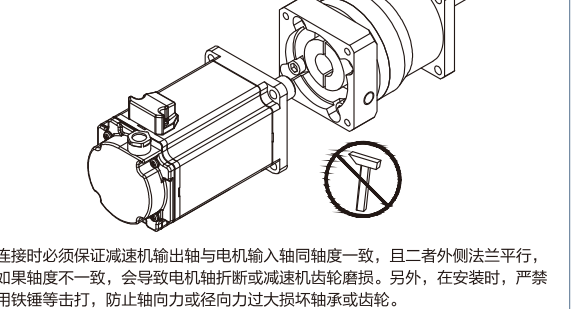
第七步
锁紧抱紧螺钉，扭力的上限值见下表



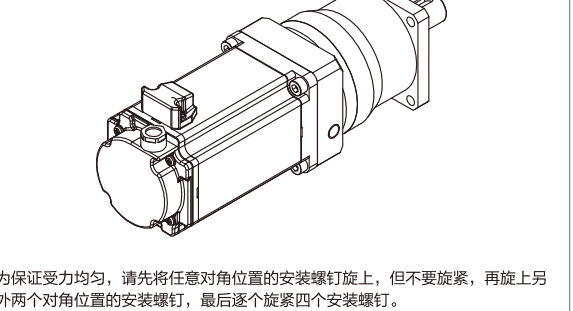
第二步
将电机轴和减速机的连接部分清洁干净



第四步
将电机和减速机自然连接，严禁敲打



第六步
锁紧固定螺钉



第八步
安装工艺螺钉

