WINGBOW

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WRV Precision Reducer
Product Manual
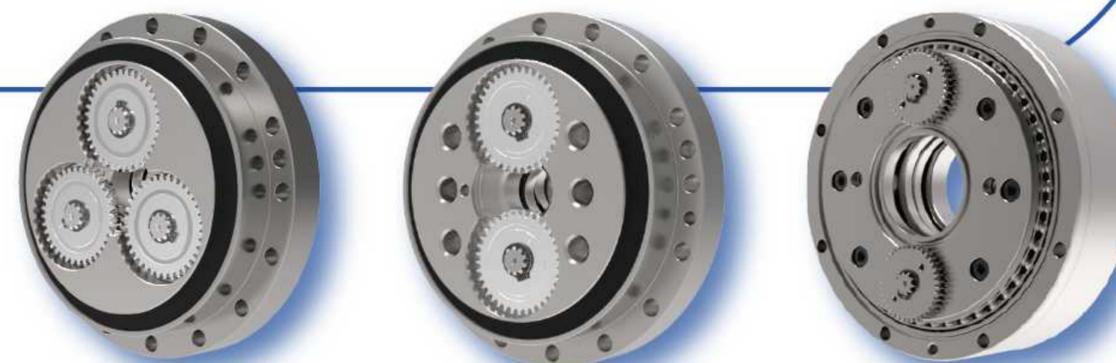
THE BEAUTY
OF TECH LIES IN PRECISION

WINGBOW

COMPANY PROFILE

Shanghai Wingbow Precision Technology co., Ltd. was established in December 2017, focusing on the research and development, design, production and sales of RV precision reducer for industrial robots, and passed the national high-tech enterprise certification and ISO 9001:2015 system certification in 2020.

The company is committed to independent research and development, with strong innovative research and development capabilities, customized service capabilities and high precision machining capabilities. At present, the company has made innovative breakthroughs in key technologies such as multidisciplinary simulation technology, component pairing algorithm, high-precision cycloidal gear tooth profile modification algorithm, and forward design software. As of June 2023, the company has applied for 62 intellectual property rights, including 15 invention patents.

Adopting the advanced industrial manufacturing concept of "Industry 4.0", the company has independently developed and designed a set of intelligent factory management system,which has been adapted to the whole product life cycle of the reducers.The system includes three core technologies: automatic assembly line, self-developed high-precision and high-speed for key components testing system, self-developed flexible digital manufacturing WMES system integrating procurement, production, quality and storage management to support intelligent decision-making. The company's annual output of the first production base of RV reducer can reach 30,000 units, and the production capacity of the second production base can reach 60,000 units after the construction and use.

In the era of "intelligent +", the company is highly in line with the national industrial orientation, adhere to innovation-driven, customer-oriented, quality as life, with high-quality products, advanced technology to provide users with perfect solutions, and scientific and technological innovation to achieve users' dreams.

CATALOG

WINGBOW

High precision radar

Industrial robot

SCARA robot

CNC machine tool library

Cooperative robot

Welding robot

Handling robot

Spraying robot

Medical robot

CNC machine tool turntable

Precision positioning turntable

AGV drive wheel

Torsional rigidity, lost motion, backlash

When a torque is applied to the output shaft while the input shaft is fixed, torsion is generated according to the torque value. The torsion can be shown in the hysteresis curves. The value of b/a is referred to as "torsional rigidity".

The torsion angle at the mid point of the hysteresis curve width within ±3% of the rated torque is referred to as "lost motion". The difference in torsion angle at the point where the hysteresis curve torque is 0 is refered to the "backlash".

Hysteresis curve
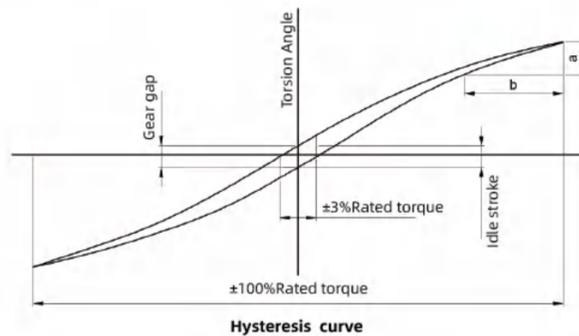
Angular transmission error

The angular transmission error is defined as the difference between the theoretical output angle of rotation (when there are input instructions for an arbitrary rotation angle) and the actual output angle of rotation.

Angle transfer error diagram

Moment rigidity

When a load moment occurs with an external load applied, the output shaft will tilt in proportion to the load moment (If ℓ3 is larger than b.) The moment rigidity indicates the rigidity of the main bearing, and it is represented by the load moment value required for tilting the main bearing by 1 arc.min.

$$\theta = \frac{W_1 \ell_1 + W_2 \ell_2}{M_1 \times 10^3}$$

θ : Tilt angle of the output shaft (arc.min.)

M_1 : Moment rigidity (Nm/arc.min.)

W_1, W_2 : Load (N)

ℓ_1, ℓ_2 : Distance to the point of load application (mm)

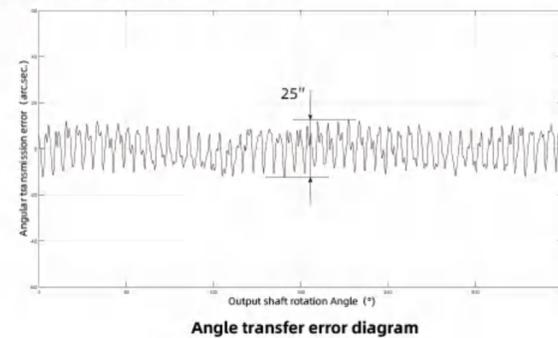ℓ_1 : $\ell + - b2 - - a$

ℓ : Distance from the output shaft installation surface to the point of load application (mm)

E-SERIES BENDING MOMENT STIFFNESS

Model number	Moment rigidity (Nm/arc.min.*3)	Size (mm)	
		a	b
WRV-6E	117	17.6	91.6
WRV-20E	372	20.1	113.3
WRV-40E	931	29.6	143.7
WRV-80E	1176	33.4	166.0
WRV-110E	1470	32.2	176.7
WRV-160E	2940	47.8	210.9
WRV-320E	4900	56.4	251.4

C-SERIES BENDING MOMENT STIFFNESS

Model number	Moment rigidity (Nm/arc.min.*3)	Size (mm)	
		a	b
WRV-10C	421	28	119.2
WRV-27C	1068	38.3	150.3
WRV-50C	1960	50.4	187.1
WRV-100C	2831	58.7	207.6
WRV-200C	9800	76.0	280.6
WRV-320C	12740	114.5	360.5

The WRV reducer is a two-stage reducer, and the transmission principle is shown in the right figure

The first-stage deceleration mechanism is a planetary gear transmission mechanism, which transfers power from the center wheel to the planetary wheel through the rotation of the input shaft, and decelerates according to the tooth ratio;

The second-stage deceleration mechanism is cycloidal pinwheel transmission mechanism, which is driven by the rotating crank shaft carried by the planetary wheel to drive two cycloidal wheels for eccentric movement. The crank shaft rotates for one week, and the cycloidal wheel rotates a pin tooth position in the opposite direction.

WRV reducer has the characteristics of small size, light weight, high rigidity, large load, etc., which can ensure that robots and other high-precision equipment maintain long life and high-precision operation.
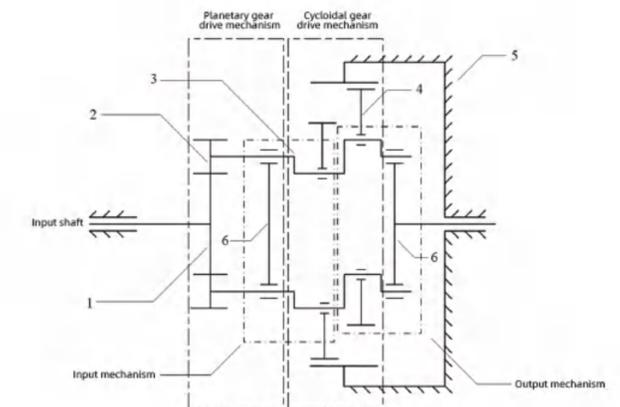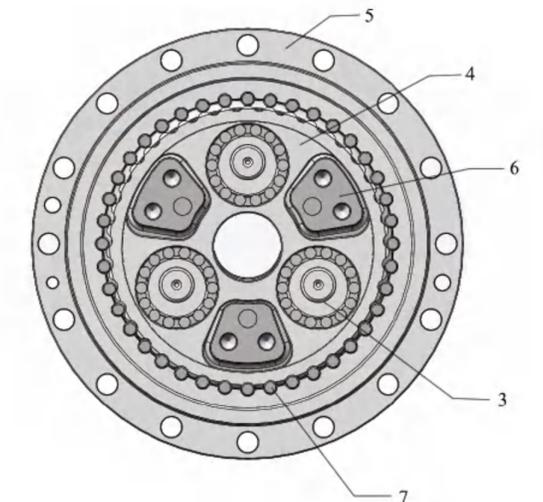
1. Involute center wheel.
2. Involute planetary wheel.
3. Crankshaft.
4. Cycloidal gear.
5. Pin casing.
6. Planet carrier.
7. Gear pin.

WRV Precision Reducer Digital Design Platform

Shanghai Wingbow Precision Technology Co.,Ltd. has fully independent intellectual property rights of the "WRV precision reducer digital design platform", with WRV reducer intelligent and customized design capabilities. The company realizes transmission design, force analysis, tooth profile modification, bearing analysis, transmission error and intelligent matching functions of WRV reducer, with customized design capabilities.
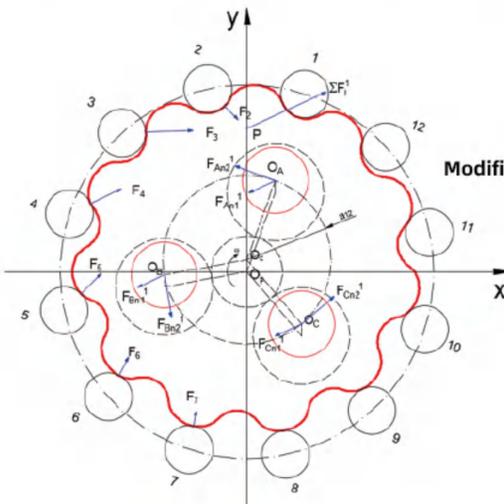
Principle of force analysis
of cycloidal wheel
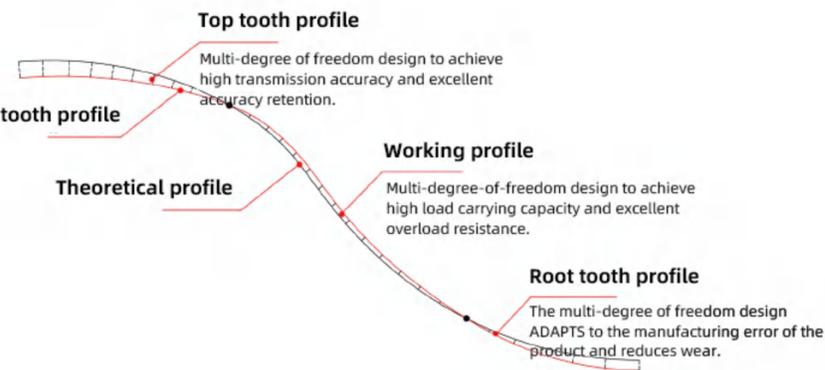
Cycloidal gear tooth profile
modification principle

Top tooth profile
Multi-degree of freedom design to achieve high transmission accuracy and excellent accuracy retention.

Modified tooth profile

Theoretical profile

Working profile
Multi-degree-of-freedom design to achieve high load carrying capacity and excellent overload resistance.

Root tooth profile
The multi-degree of freedom design ADAPTS to the manufacturing error of the product and reduces wear.

1. WRV-E SERIES MODEL AND STRUCTURE DESCRIPTION

1.1 TYPE DESCRIPTION

WRV - 40 E - 121

Model number	Product specification	Product series	Reduction ratio

E series current model specifications	Rated output torque (Nm)
6E	58
20E	167
40E	412
80E	784
110E	1078
160E	1568
320E	3136

1.2 STRUCTURE AND CHARACTERISTICS

（1）Structure

- Pin casing
- Main bearing
- Crankshaft
- Input gear
- Cycloidal gear
- Planetary gear
- Planetarium assembly
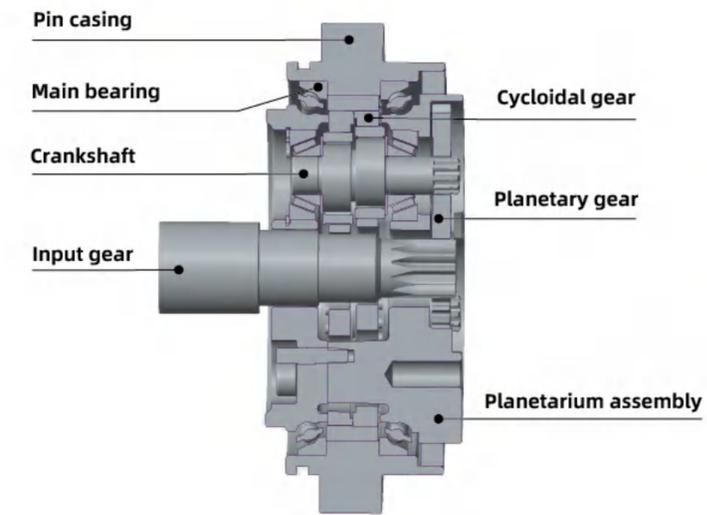
（2）Features

- Hollow Shaft Series.
- 2 stage reducer mechanism, small vibration, small moment of inertia.
- High load capacity.
- High rigidity.
- Impact resistance.
- Small backlash.
- Excellent accuracy retention.
- Multiple reduction ratios per model

2. WRV-E SERIES ROTATION RATIO CALCULATION

$$R = 1 + Z_2 / Z_1 \cdot Z_3$$

R: Speed ratio value.

Z_1: Enter the number of shaft teeth.

Z_2: Number of planetary gears.

Z_3: Number of pin teeth and pins.

| Model	Ratio code Shaft rotation	Ratio code Case rotation	5 Output torque (Nm)	5 Input power (KW)	10 Output torque (Nm)	10 Input power (KW)	15 Output torque (Nm)	15 Input power (KW)	20 Output torque (Nm)	20 Input power (KW)	25 Output torque (Nm)	25 Input power (KW)	30 Output torque (Nm)	30 Input power (KW)	40 Output torque (Nm)	40 Input power (KW)	50 Output torque (Nm)	50 Input power (KW)	60 Output torque (Nm)	60 Input power (KW)	Allowable acceleration/ deceleration torque (Nm/arc.min)	Allowable moment (Nm)	Momentary allowable moment (Nm)	Allowable output speed (r/min)	Allowable acceleration/ deceleration torque (Nm)	Momentary maximum allowable torque (Nm)	Backlash (arc.min)	lost motion MAX. (arc.min)	Angular transmission error MAX. (arc.sec)	Torsional rigidity (Nm/arc.min)	Reduced value of the inertia moment for the input shaft (Kgm²)	Weight (Kg)
6E	31 43 53.5 59 79 103	30 42 52.5 58 78 102	101	0.07	81	0.11	72	0.15	66	0.19	62	0.22	58	0.25	54	0.30	50	0.35	47	0.40	117	196	392	100	117	294	1.5	1.5	80	20	2.63×10^{-6} 2.00×10^{-6} 1.53×10^{-6} 1.39×10^{-6} 1.09×10^{-6} 0.74×10^{-6}	2.5
20E	57 81 105 121 141 161	56 80 104 120 140 160	231	0.16	188	0.26	167	0.35	153	0.43	143	0.50	135	0.57	124	0.70	115	0.81	110	0.92	372	882	1764	75	412	833	1.0	1.0	70	49	9.66×10^{-6} 6.07×10^{-6} 4.32×10^{-6} 3.56×10^{-6} 2.88×10^{-6} 2.39×10^{-6}	4.7
40E	57 81 105 121 153	56 80 104 120 152	572	0.40	465	0.65	412	0.86	377	1.05	353	1.23	334	1.40	307	1.71	287	2.00	271	2.27	931	1666	3332	70	1029	2058	1.0	1.0	60	108	3.25×10^{-5} 2.20×10^{-5} 1.63×10^{-5} 1.37×10^{-5} 1.01×10^{-5}	9.3
80E	57 81 101 121 153	56 80 100 120 152	1088	0.76	885	1.24	784	1.64	719	2.01	672	2.35	637	2.67	584	3.26	546	3.81	517	4.33	1176	2156	4312	70	1960	3920	1.0	1.0	50	196	8.16×10^{-5} 6.00×10^{-5} 4.82×10^{-5} 3.96×10^{-5} 2.98×10^{-5}	13.1
110E	81 111 161 175.28	80 110 160 174.28	1499	1.05	1215	1.70	1078	2.26	990	2.76	925	3.23	875	3.67	804	4.49					1470	2940	5880	50	2695	5390	1.0	1.0	50	294	9.88×10^{-5} 6.96×10^{-5} 4.36×10^{-5} 3.89×10^{-5}	17.4
160E	81 101 129 145 171	80 100 128 144 170	2176	1.52	1774	2.48	1568	3.28	1441	4.02	1343	4.69	1274	5.34							2940	3920	7840	45	3920	7840	1.0	1.0	50	392	1.77×10^{-4} 1.40×10^{-4} 1.06×10^{-4} 0.87×10^{-4} 0.74×10^{-4}	26.4
320E	81 101 118.5 129 141 171 185	80 100 117.5 128 140 170 184	4361	3.04	3538	4.94	3136	6.57	2881	8.05	2695	9.41	2548	10.7							4900	7056	14112	35	7840	15680	1.0	1.0	50	980	4.83×10^{-4} 3.79×10^{-4} 3.15×10^{-4} 2.84×10^{-4} 2.54×10^{-4} 1.97×10^{-4} 1.77×10^{-4}	45.3
450E	81 101 118.5 129 154.8 171 192	80 100 117.5 128 153.8 170 191	6135	4.28	4978	6.95	4410	9.24	4047	11.3	3783	13.2									7448	8820	17640	25	11025	22050	1.0	1.0	50	1176	8.75×10^{-4} 6.91×10^{-4} 5.75×10^{-4} 5.20×10^{-4} 4.12×10^{-4} 3.61×10^{-4} 3.07×10^{-4}	66.4

REMARK

1. The maximum speed of the input shaft shall not be greater than the maximum allowable output speed X transmission ratio;

2. Output torque (Nm) is the value obtained by setting the life time to a fixed value at each output speed;

3. The rated output torque refers to the output torque at 15r/min output speed, but the rated output torque of 6E is the output torque corresponding 30r/min output speed.

4. The value of inertia moment is the value after considering the width of the reducer body and the input gear teeth, excluding the inertia moment of the input gear shaft.

■ **WRV-6E** Output shaft bolt fastening shape and interface dimensions.
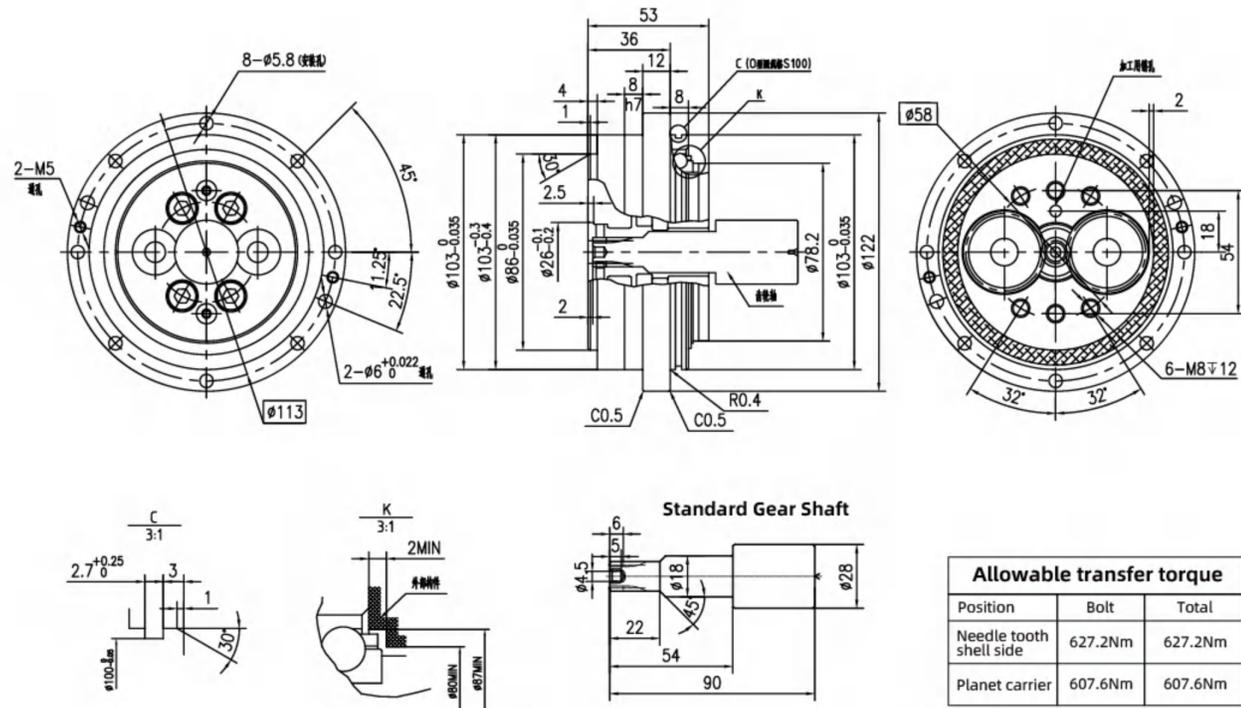
■ **WRV-8E** Output shaft bolt fastening shape and interface dimensions.
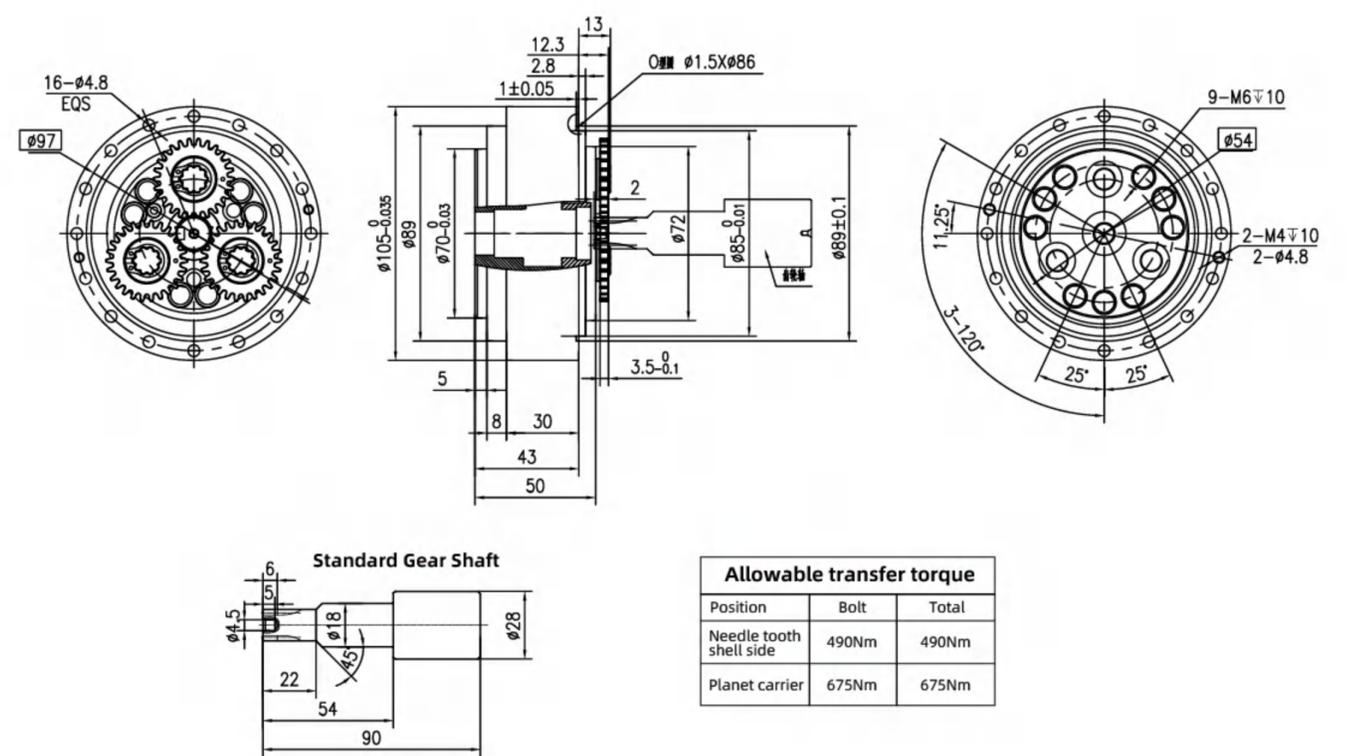
Standard Gear Shaft

Allowable transfer torque		
Position	Bolt	Total
Needle tooth shell side	627.2Nm	627.2Nm
Planet carrier	607.6Nm	607.6Nm

Standard Gear Shaft

Allowable transfer torque		
Position	Bolt	Total
Needle tooth shell side	490Nm	490Nm
Planet carrier	675Nm	675Nm

■ **WRV-20E** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-40E** Output shaft bolt fastening shape and interface dimensions.

Standard Gear Shaft
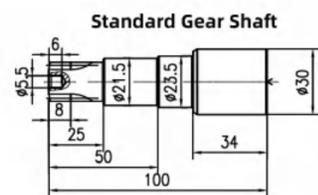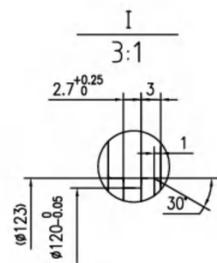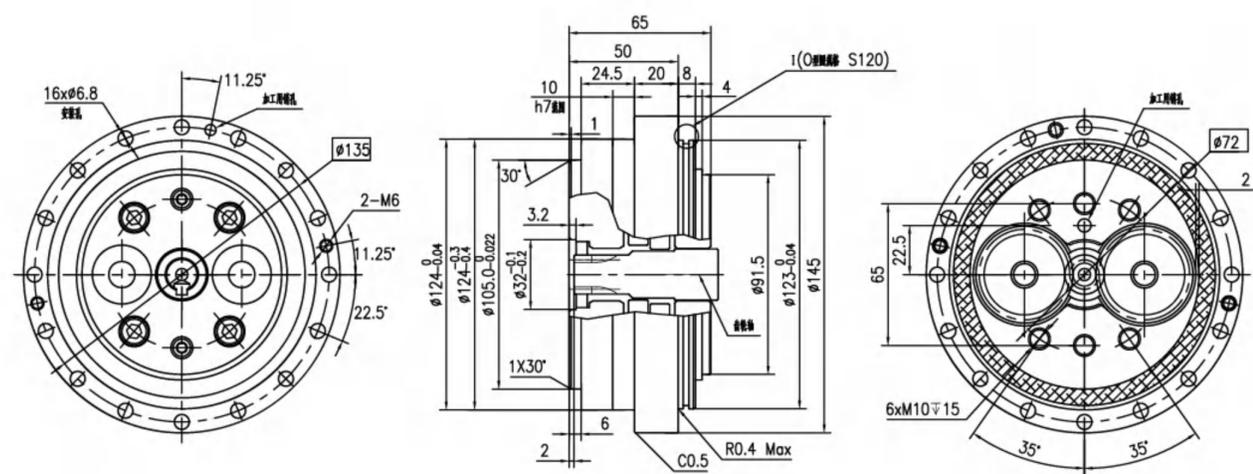
Allowable transfer torque		
Position	Bolt	Total
Needle tooth shell side	2136.4Nm	2136.4Nm
Planet carrier	1195.6Nm	1195.6Nm

Standard Gear Shaft

Allowable transfer torque		
Position	Bolt	Total
Needle tooth shell side	5027.4Nm	5027.4Nm
Planet carrier	3204.6Nm	3204.6Nm

■ **WRV-80E** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-110E** Output shaft bolt fastening shape and interface dimensions.

Standard Gear Shaft

Allowable transfer torque		
Position	Bolt	Total
Needle tooth shell side	5919.2Nm	5919.2Nm
Planet carrier	4939.2Nm	4939.2Nm

Standard Gear Shaft

Allowable transfer torque		
Position	Bolt	Total
Needle tooth shell side	7742Nm	7742Nm
Planet carrier	6370Nm	6370Nm

■ **WRV-160E** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-320E** Output shaft bolt fastening shape and interface dimensions.

Standard Gear Shaft

Allowable transfer torque

Position	Bolt	Total
Needle tooth shell side	12887Nm	12887Nm
Planet carrier	11593.4Nm	11593.4Nm

Standard Gear Shaft

Allowable transfer torque

Position	Bolt	Total
Needle tooth shell side	20099.8Nm	20099.8Nm
Planet carrier	19521.6Nm	19521.6Nm

■ **WRV-450E** Output shaft bolt fastening shape and interface dimensions.

Standard Gear Shaft
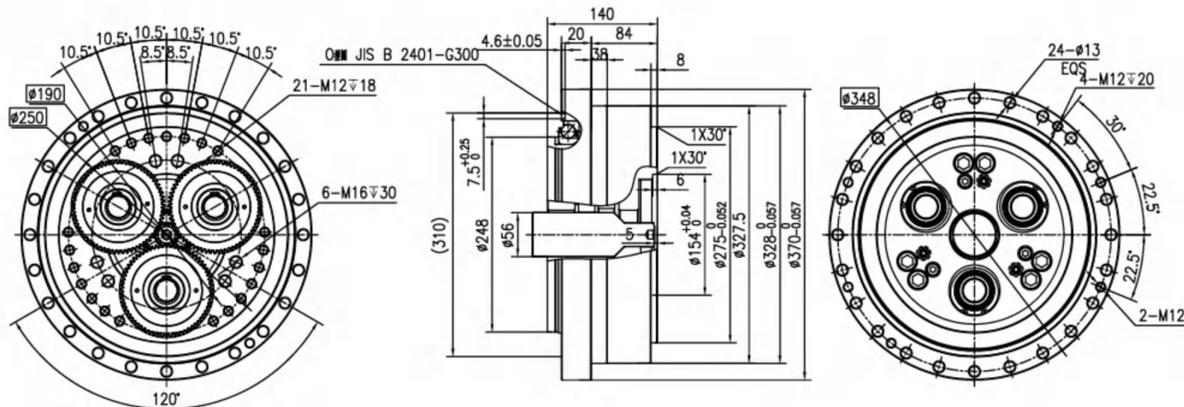
Allowable transfer torque		
Position	Bolt	Total
Needle tooth shell side	34515.6Nm	34515.6Nm
Planet carrier	30536.8Nm	30536.8Nm

1. WRV-C SERIES MODEL AND STRUCTURE DESCRIPTION

1.1 TYPE DESCRIPTION

WRV – 100 C – 36.75

Model number
Product specification
Product series
Reduction ratio
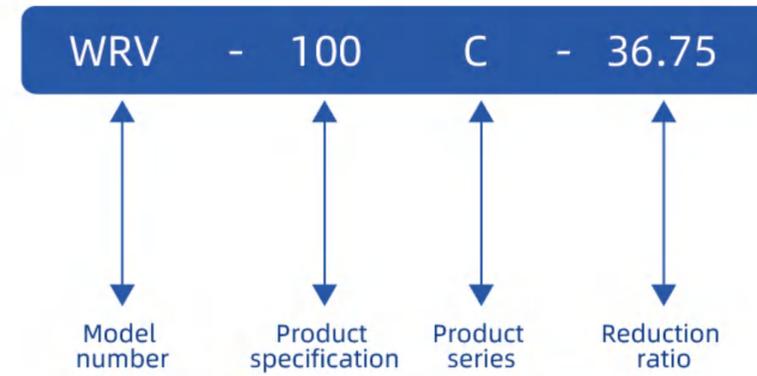
C series current model specifications	Rated output torque (Nm)
10C	98
27C	265
50C	490
100C	980
200C	1960
320C	3136

1.2 STRUCTURE AND CHARACTERISTICS

（1）Structure

Input gear
Planetary gear
Double gear
Pin casing
Planetarium assembly
Crankshaft
Cycloidal gear
Main bearing
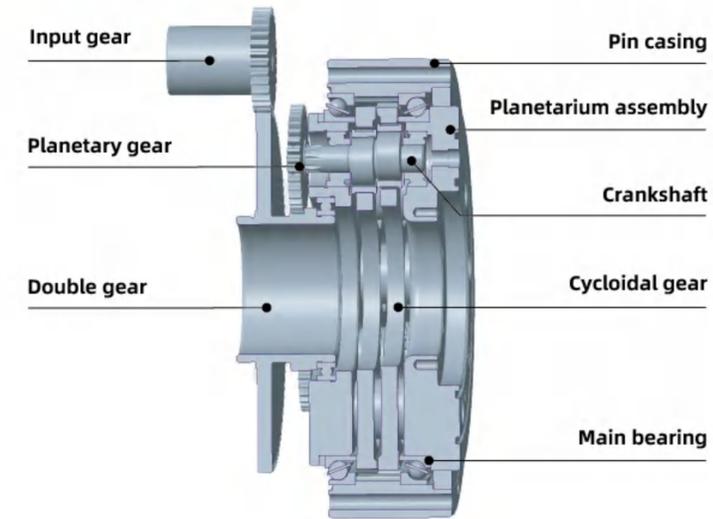
（2）Features

- Hollow series, used to insert cables inside the reducer, space-saving design.
- 2 stage reducer mechanism, small vibration, small moment of inertia.
- High load capacity.
- High rigidity.
- Impact resistance.
- Small backlash.
- Excellent accuracy retention.
- Multiple reduction ratios per model

2. WRV-C SERIES ROTATION RATIO CALCULATION

$$R = 1 + Z_2 / Z_1 \cdot Z_3$$

R: Speed ratio value.

Z_1: Center gear number of pinion teeth.

Z_2: Number of planetary gears.

Z_3: Number of pins.

Output speed (r/min)		5		10		15		20		25		30		40		50	
Model	Gear ratio	Output torque (Nm)	Input power (KW)	Output torque (Nm)	Input power (KW)	Output torque (Nm)	Input power (KW)	Output torque (Nm)	Input power (KW)	Output torque (Nm)	Input power (KW)	Output torque (Nm)	Input power (KW)	Output torque (Nm)	Input power (KW)	Output torque (Nm)	Input power (KW)
10C	27	136	0.09	111	0.16	98	0.21	90	0.25	84	0.29	80	0.34	73	0.41	68	0.47
27C	36.57 (1390/38)	368	0.26	299	0.42	265	0.55	243	0.68	227	0.79	215	0.90	197	1.10	184	1.29
50C	32.54 (1985/61)	681	0.48	554	0.77	490	1.03	450	1.26	420	1.47	398	1.67	366	2.04	341	2.38
100C	36.75	1362	0.95	1107	1.55	980	2.05	899	2.51	841	2.94	796	3.33	730	4.08		
120C	36.75	1422	0.99	1308	1.83	1176	2.46	1085	3.03	907	3.61	823	3.45	765	4.27		
200C	34.86 (1499/43)	2724	1.90	2215	3.09	1960	4.11	1803	5.04	1686	5.88	1597	5.34				
320C	35.61 (2778/78)	4361	3.04	3538	4.49	3136	6.57	2881	8.05	2690	9.41						

60		Allowable acceleration/ deceleration torque (Nm/arc.min)	Allowable moment (Nm)	Momentary allowable moment (Nm)	Allowable output speed (r/min)	Allowable acceleration/ deceleration torque (Nm)	Momentary maximum allowable torque (Nm)	Backlash (arc.min)	lost motion MAX. (arc.min)	Angular transmission error MAX. (arc.sec)	Torsional rigidity (Nm/arc.min)	Reduced value of the inertia moment for the input shaft (Kgm²)	Weight (Kg)
Output torque (Nm)	Input power (KW)												
65	0.54	421	686	1372	80	245	490	1.0	1.0	70	47	1.38×10^{-5}	4.6
174	1.46	1068	980	1960	60	662	1323	1.0	1.0	70	147	0.550×10^{-4}	8.5
		1960	1764	3528	50	1225	2450	1.0	1.0	60	255	1.82×10^{-4}	14.6
		2813	2450	4900	40	2450	4900	1.0	1.0	50	510	0.475×10^{-3}	19.5
		2813	2450	4900	40	2940	5880	1.0	1.0	50	588	0.475×10^{-3}	21
		9800	8820	17640	30	4900	9800	1.0	1.0	50	980	1.39×10^{-3}	55.6
		12740	20580	39200	25	7840	15608	1.0	1.0	50	1960	0.518×10^{-2}	79.5

REMARK

1. The maximum speed of the input shaft shall not be greater than the maximum allowable output speed X transmission ratio;

2. Output torque (Nm) is the value obtained by setting the life time to a fixed value at each output speed;

3. The Rated output torque refers to the output torque at 15r/min output speed.

4. The inertia moment value is the value of the reducer body, and does not consider the inertia moment of the center gear and the input gear.
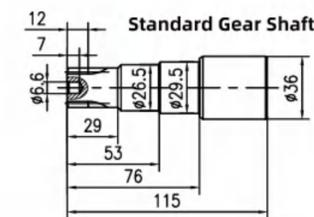
■ **WRV-10C** Output shaft bolt fastening shape and interface dimensions.

Allowable transfer torque		
Position	Bolt	Total
Needle tooth shell side	1058.4Nm	1058.4Nm
Planet carrier	882Nm	882Nm

■ **WRV-27C** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-50C** Output shaft bolt fastening shape and interface dimensions.

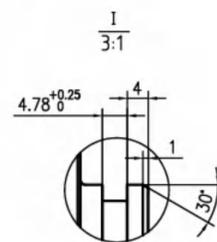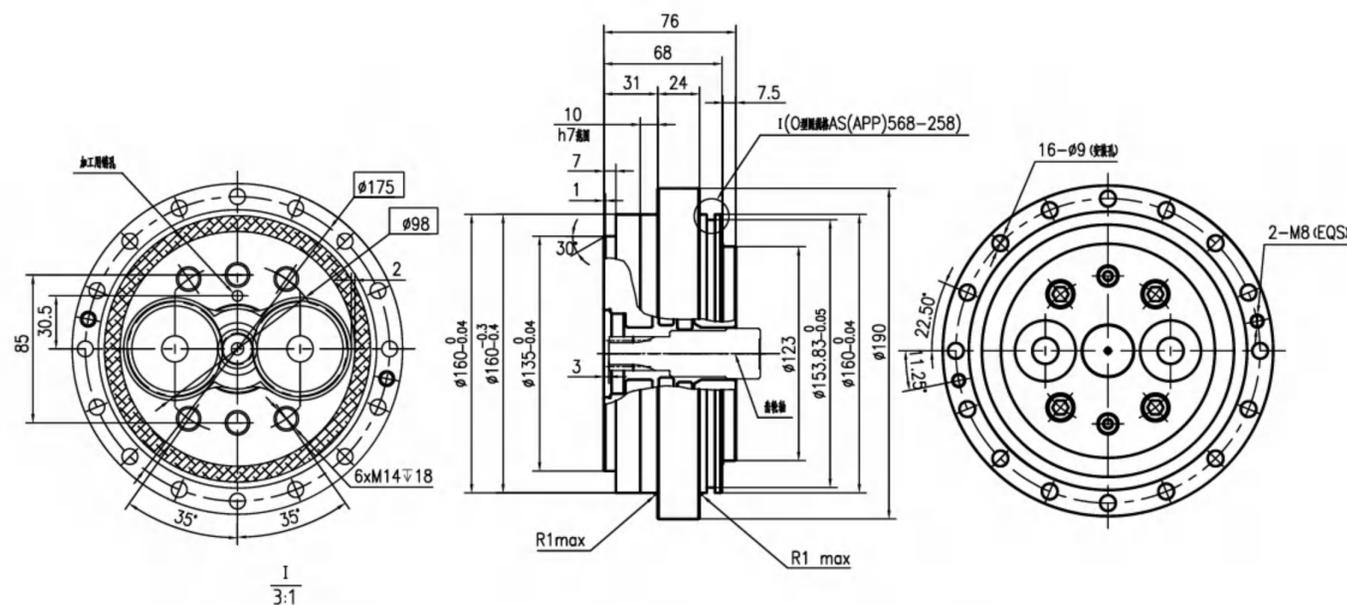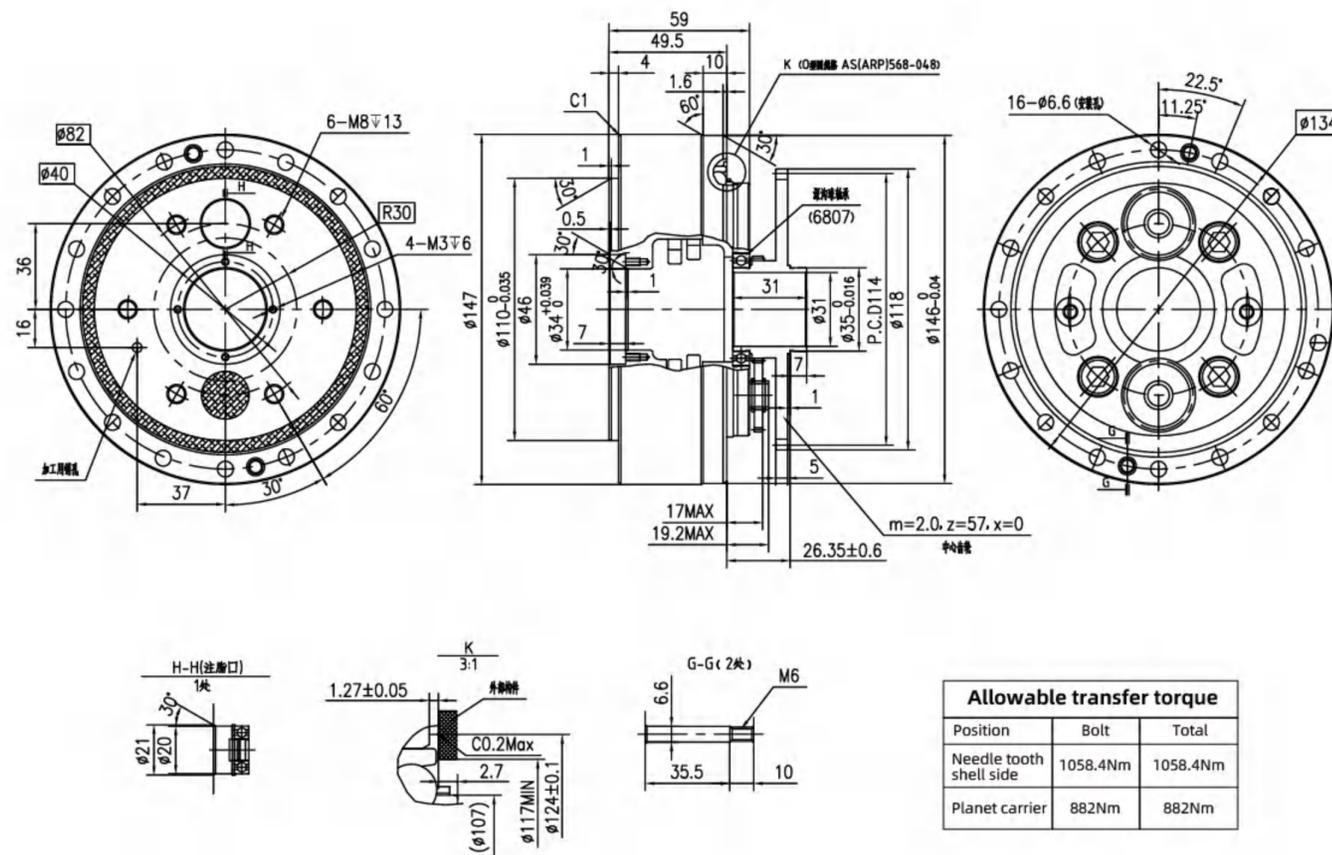**Allowable transfer torque** (WRV-27C)

Position	Bolt	Total
Needle tooth shell side	1999.2Nm	1999.2Nm
Planet carrier	1666Nm	1666Nm

Allowable transfer torque (WRV-50C)

Position	Bolt	Total
Needle tooth shell side	2989Nm	2989Nm
Planet carrier	3410.4Nm	3410.4Nm

■ **WRV-100C** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-120C** Output shaft bolt fastening shape and interface dimensions.

Allowable transfer torque

Position	Bolt	Total
Needle tooth shell side	9310Nm	9310Nm
Planet carrier	5948.6Nm	5948.6Nm

Allowable transfer torque

Position	Bolt	Total
Needle tooth shell side	9542Nm	9542Nm
Planet carrier	4941Nm	4941Nm

■ **WRV-200C** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-320C** Output shaft bolt fastening shape and interface dimensions.

Allowable transfer torque

Position	Bolt	Total
Needle tooth shell side	10701.6Nm	10701.6Nm
Planet carrier	13543Nm	13543Nm

Allowable transfer torque

Position	Bolt	Total
Needle tooth shell side	27440Nm	27440Nm
Planet carrier	34202Nm	34202Nm

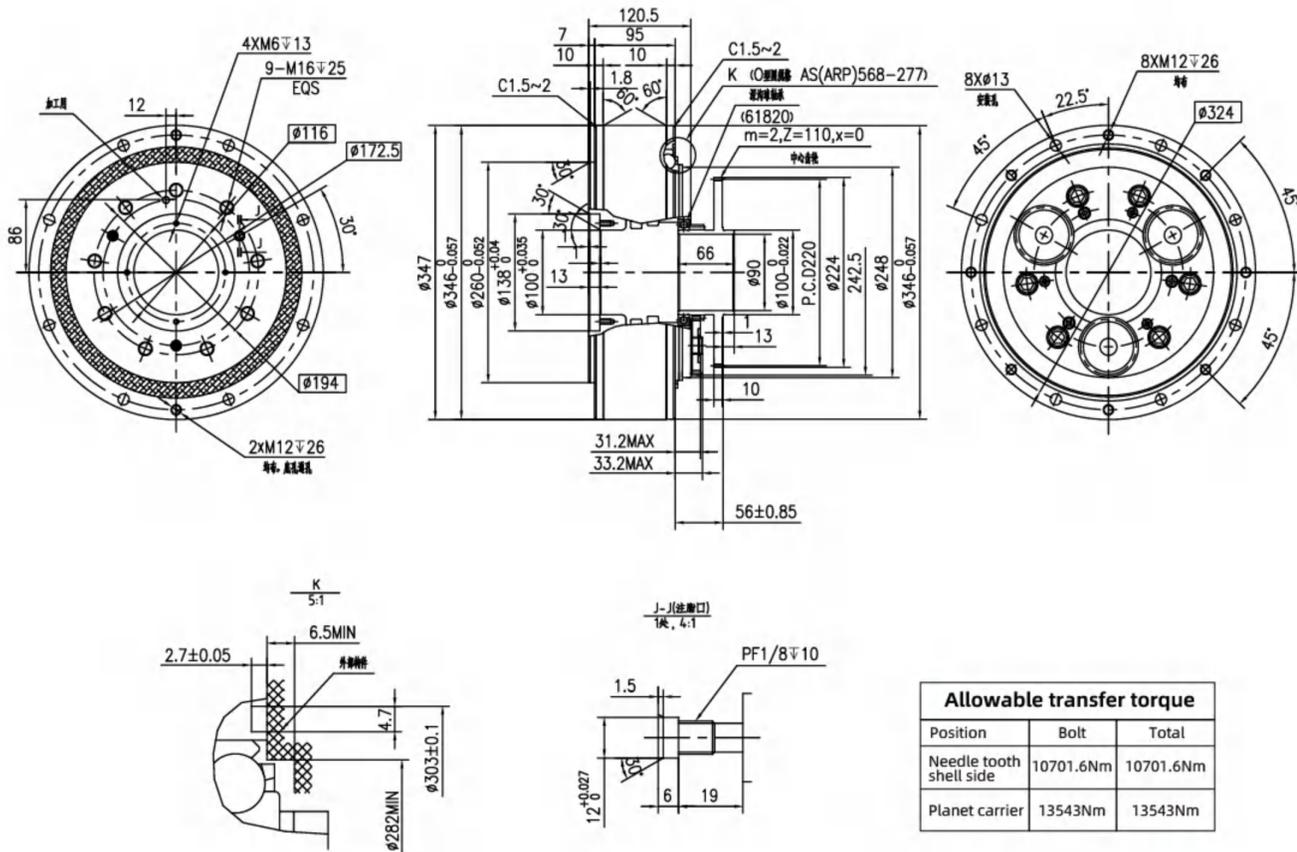| Model	Gear ratio Rotation of shaft	Gear ratio Case rotation	Output speed 5 Output torque (Nm)	Input power (KW)	10 Output torque (Nm)	Input power (KW)	15 Output torque (Nm)	Input power (KW)	20 Output torque (Nm)	Input power (KW)	25 Output torque (Nm)	Input power (KW)	30 Output torque (Nm)	Input power (KW)	40 Output torque (Nm)	Input power (KW)	50 Output torque (Nm)	Input power (KW)	60 Output torque (Nm)	Input power (KW)	Torsional rigidity (reference value) (Nm/arc.min)	Allowable moment (Nm)	Momentary max. allowable torque (Nm)	Maximum output speed allowed (r/min)	Allowable torque at start and stop (Nm)	Instantaneous maximum allowable torque (Nm)	Minimal backlash (arc.min)	lost motion MAX. (arc.min)	Angular transmission error (arc.sec)	Torsional rigidity (Nm/arc.min)
6SE	31 43 53.5 59 79 103	30 42 52.5 58 78 102	101	0.07	81	0.11	72	0.15	66	0.19	62	0.22	58	0.25	54	0.30	50	0.35	47	0.40	117	196	392	100	117	294	1.5	1.5	80	20
20SE	57 81 105 121 141 161	56 80 104 120 140 160	231	0.16	188	0.26	167	0.35	153	0.43	143	0.50	135	0.57	124	0.70	115	0.81	110	0.92	372	882	1764	75	412	833	1.0	1.0	70	49
40SE	57 81 105 121 153	56 80 104 120 152	572	0.40	465	0.65	412	0.86	377	1.05	353	1.23	334	1.40	307	1.71	287	2.00	271	2.27	931	1666	3332	70	1029	2058	1.0	1.0	60	108
80SE	57 81 101 121 153	56 80 100 120 152	1088	0.76	885	1.24	784	1.64	719	2.01	672	2.35	637	2.67	584	3.26	546	3.81	517	4.33	1176	2156	4312	70	1960	3920	1.0	1.0	50	196
110SE	81 111 161 175.28	80 110 160 174.28	1499	1.05	1215	1.70	1078	2.26	990	2.76	925	3.23	875	3.67	804	4.49					1470	2940	5880	50	2695	5390	1.0	1.0	50	294
160SE	81 101 129 145 171	80 100 128 144 170	2176	1.52	1774	2.48	1568	3.28	1441	4.02	1343	4.69	1274	5.34							2940	3920	7840	45	3920	7840	1.0	1.0	50	392
320SE	81 101 118.5 129 141 171 185	80 100 117.5 128 140 170 184	4361	3.04	3538	4.94	3136	6.57	2881	8.05	2695	9.41	2548	10.7							4900	7056	14112	35	7840	15680	1.0	1.0	50	980
450SE	81 101 118.5 129 154.8 171 192	80 100 117.5 128 153.8 170 191	6135	4.28	4978	6.95	4410	9.24	4047	11.3	3783	13.2									7448	8820	17640	25	11025	22050	1.0	1.0	50	1176

REMARK

1. The maximum speed of the input shaft shall not be greater than the maximum allowable output speed X transmission ratio;

2. Output torque (Nm) is the value obtained by setting the life time to a fixed value at each output speed;

3. The rated output torque refers to the output torque at 15r/min output speed,but the rated output torque of 6E is the output torque at 30r/min output speed;

4. The value of inertia moment is the value after considering the width of the reducer body and the input gear teeth, excluding the inertia moment of the input gear shaft.

1. WRV-SE SERIES MODEL AND STRUCTURE DESCRIPTION

1.1 TYPE DESCRIPTION

WRV - 40 SE - 121

| Model number | Product specification | Product series | Reduction ratio |
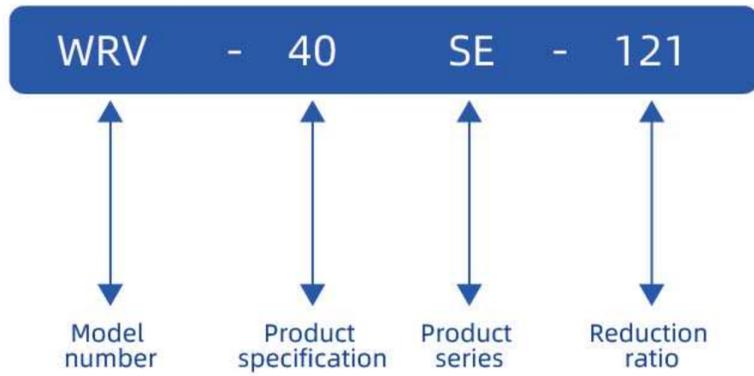
SE series current model specifications	Rated output torque (Nm)
20SE	167
40SE	412
80SE	784
110SE	1078
160SE	1568
320SE	3136

1.2 STRUCTURE AND CHARACTERISTICS

（1）Structure

（2）Features

● High precision, high rigidity, overload resistance.

● Matchable application interface design,easy for customers to use and install.

● Optional grease package for easier application.

● Multiple reduction ratios per model.

■ **WRV-20SE** Output shaft bolt fastening shape and interface dimensions.
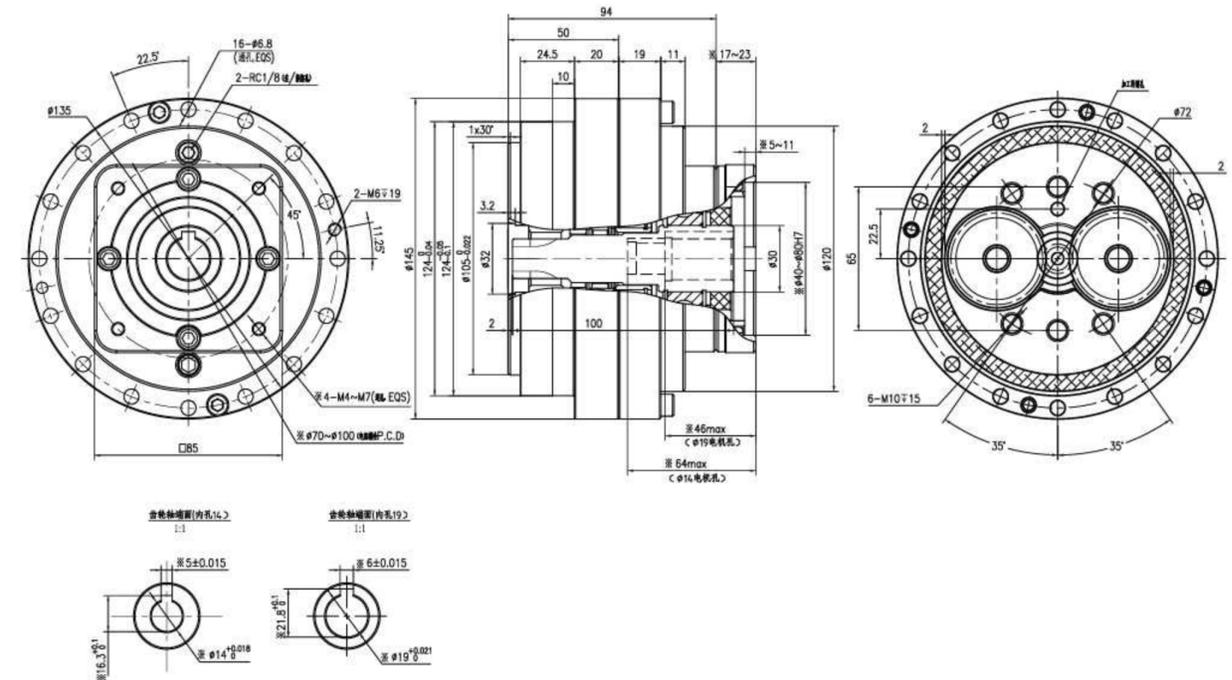
INSTRUCTIONS:

1. Ratio code: 81, 105, 121, 141, 161;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 167Nm, rated output speed: 15rpm.

4. The size of the ※ symbol can be adapted according to the motor.

■ **WRV-40SE** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-80SE** Output shaft bolt fastening shape and interface dimensions.

INSTRUCTIONS:

1. Ratio code: 81, 105, 121, 153;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 412Nm, rated output speed: 15rpm.

4. The size of the ※ symbol can be adapted according to the motor.

INSTRUCTIONS:

1. Ratio code: 81, 101, 121, 153;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 784Nm, rated output speed: 15rpm.

4. The size of the ※ symbol can be adapted according to the motor.

■ **WRV-110SE** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-160SE** Output shaft bolt fastening shape and interface dimensions.
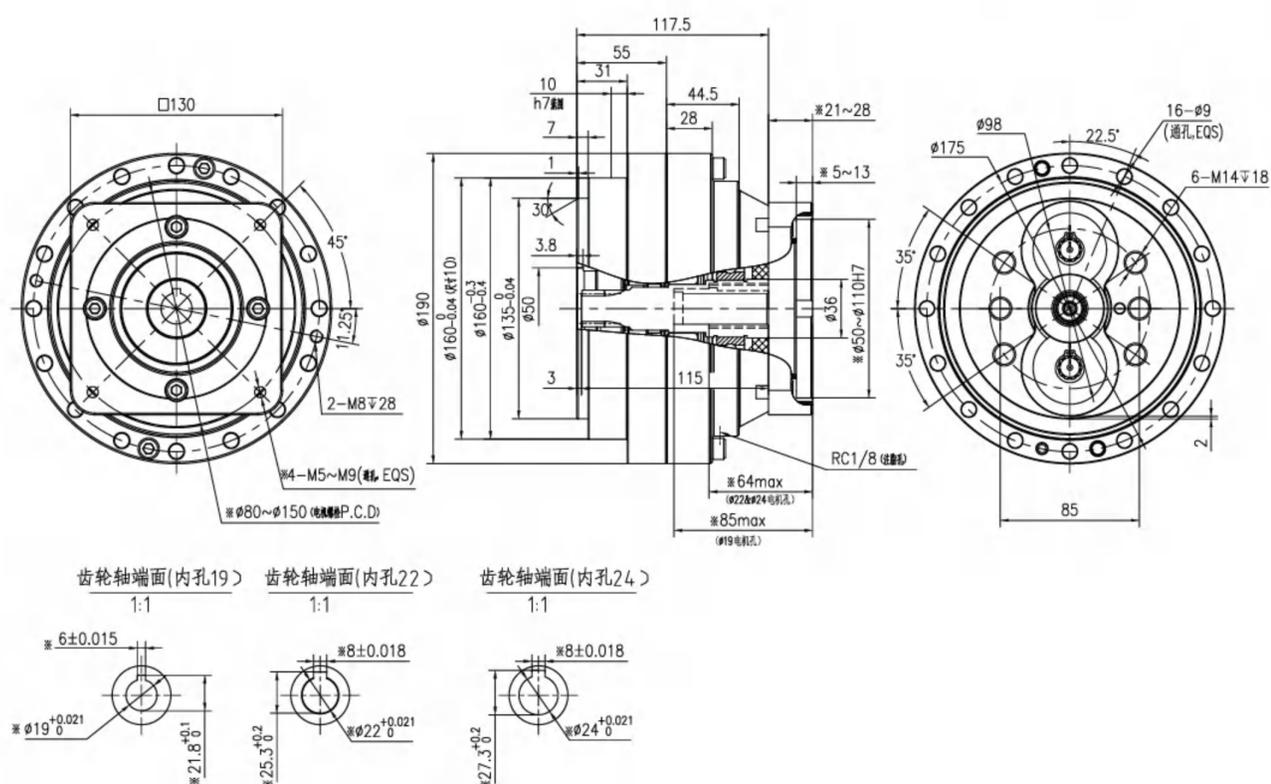

INSTRUCTIONS:

1. Ratio code: 81, 111, 161, 175;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 784Nm, rated output speed: 15rpm.

4. The size of the ※ symbol can be adapted according to the motor.
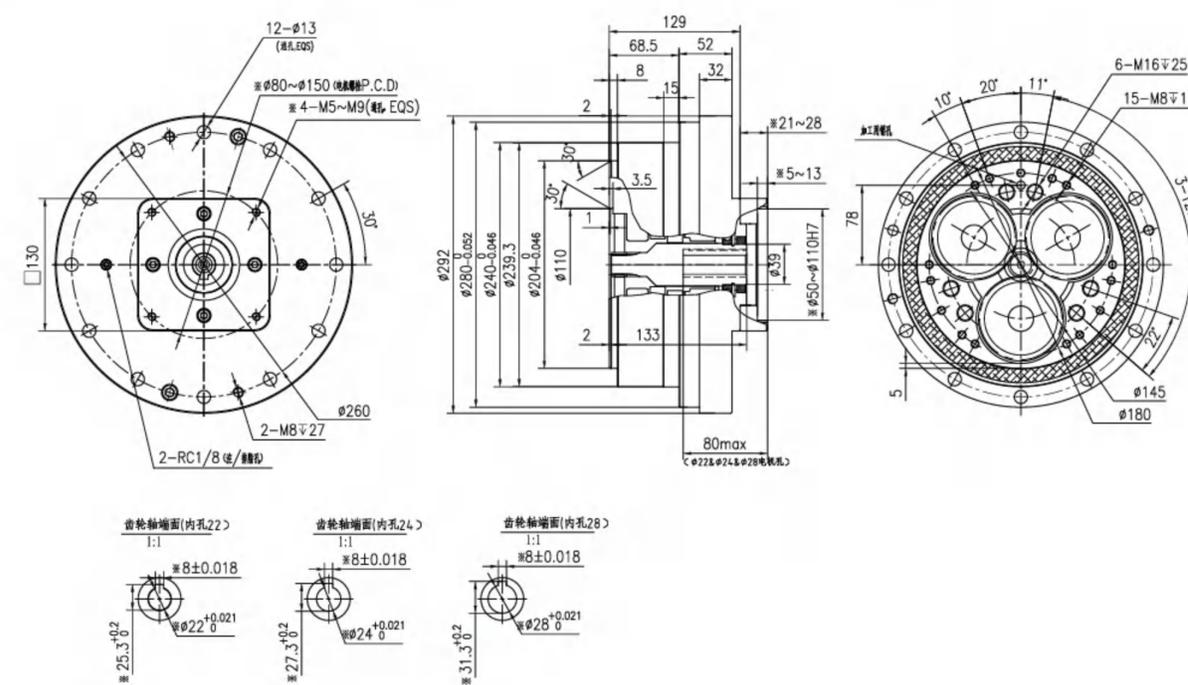
INSTRUCTIONS:

1. Ratio code: 81, 101, 129, 145, 171;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 1568Nm, rated output speed: 15rpm.

4. The size of the ※ symbol can be adapted according to the motor.

■ **WRV-320SE** Output shaft bolt fastening shape and interface dimensions.
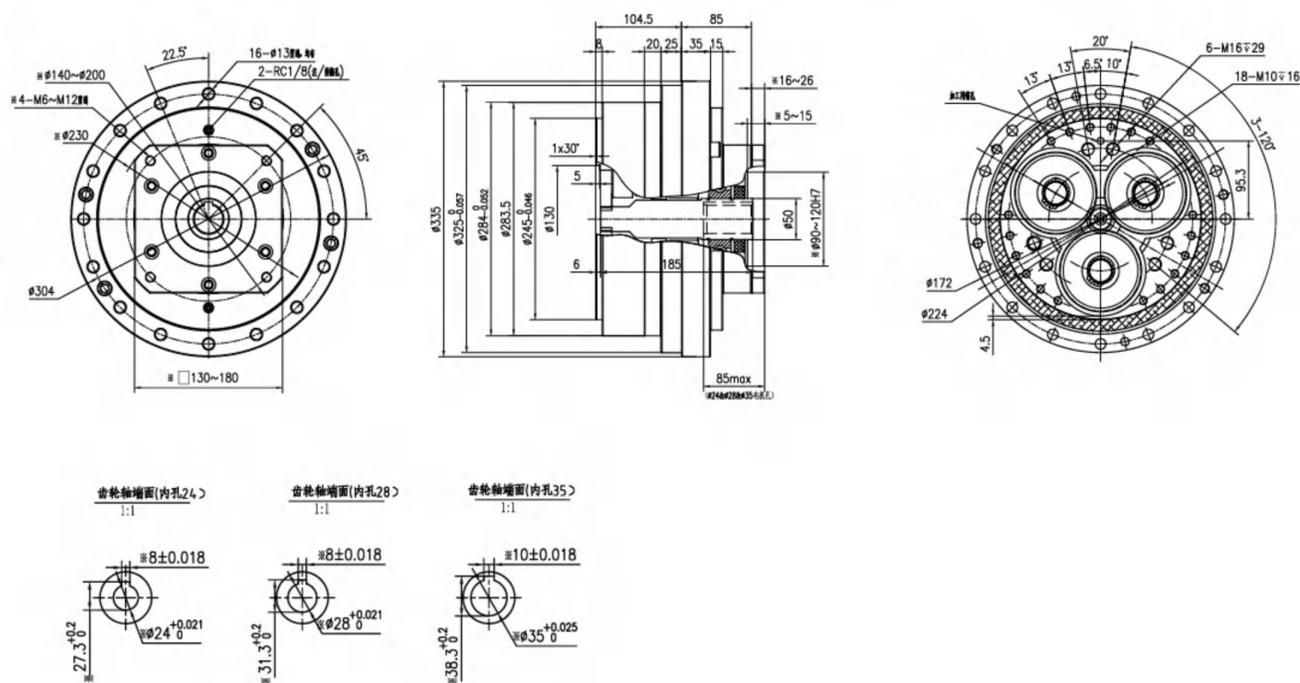
INSTRUCTIONS:

1. Ratio code: 81, 101, 129, 141, 171, 185, 201;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 3136Nm, rated output speed: 15rpm.

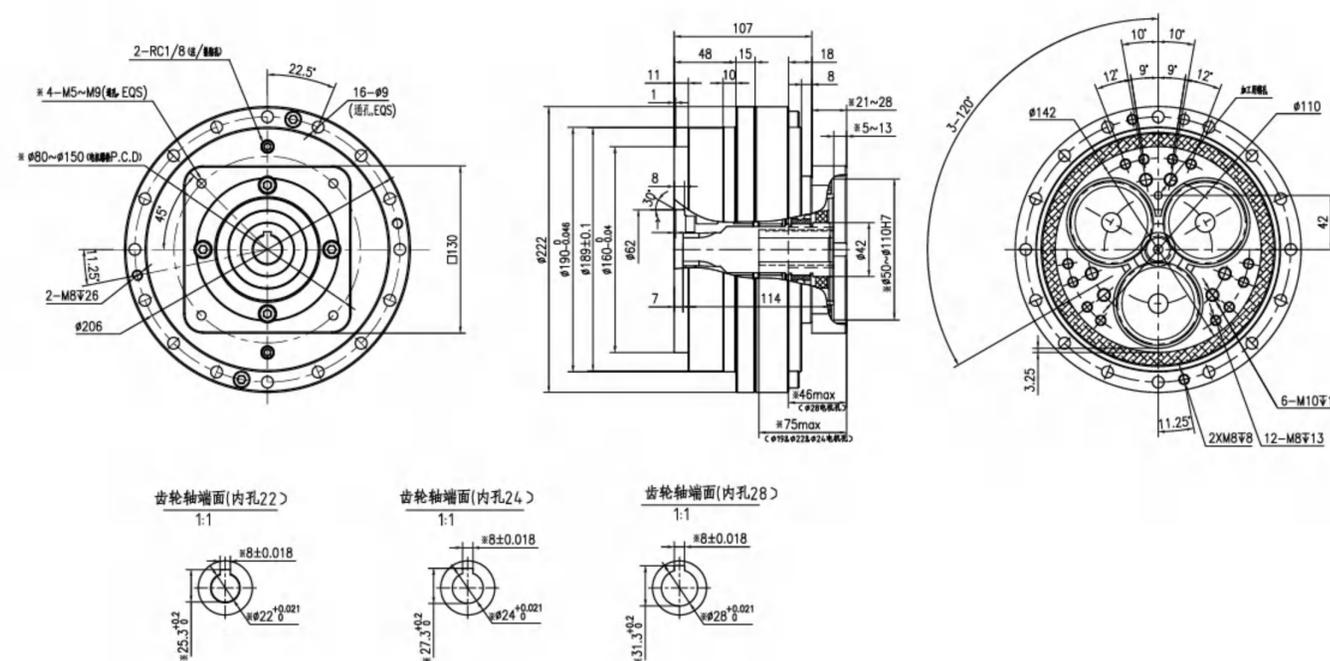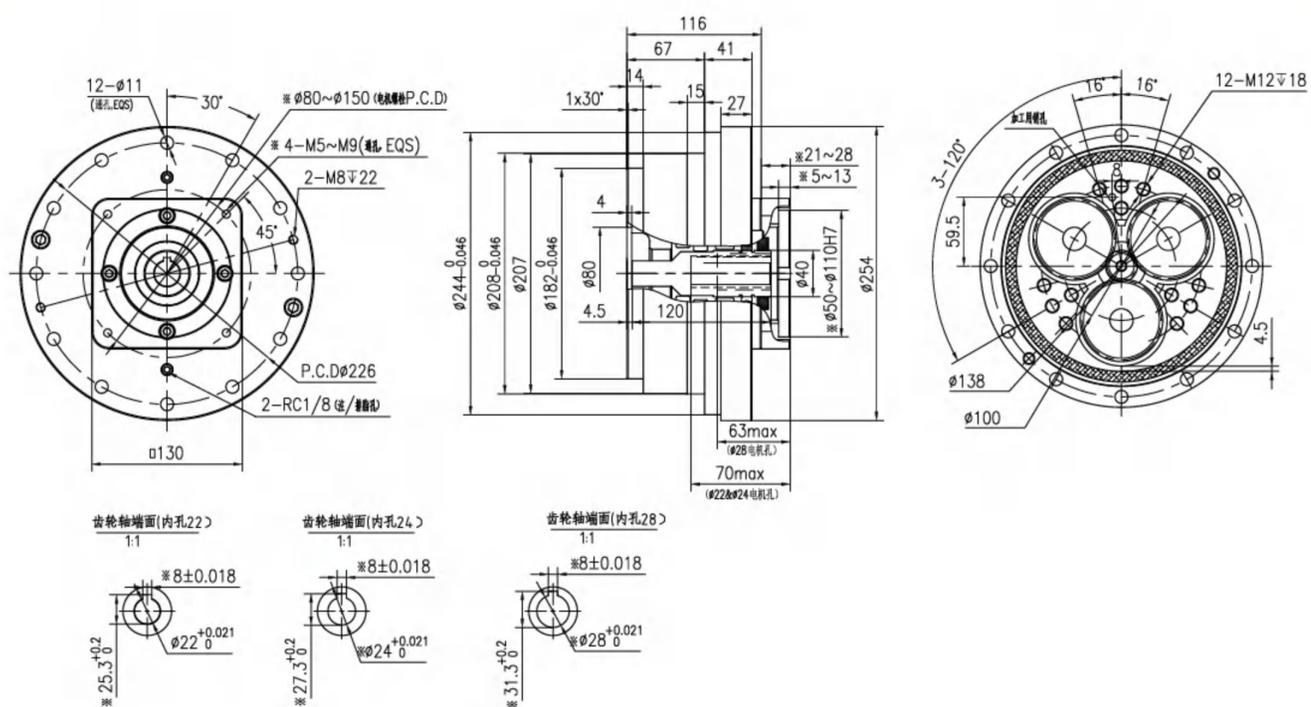4. The size of the ※symbol can be adapted according to the motor.

1. WRV-N SERIES MODEL AND STRUCTURE DESCRIPTION

1.1 TYPE DESCRIPTION

| WRV | – | 25 | N | – | 126 |

| Model number | Product specification | Product series | Reduction ratio |
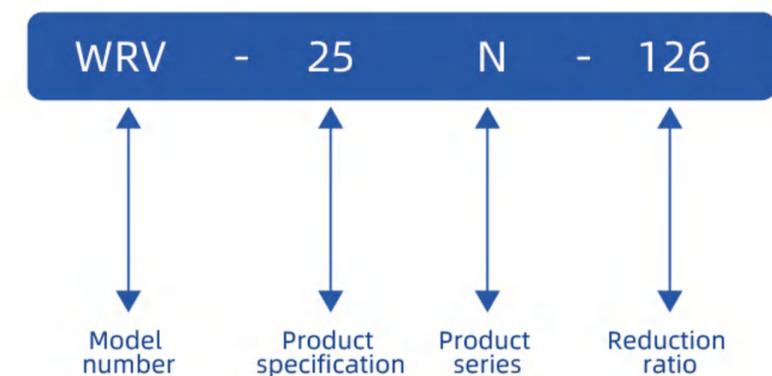
N series current model specifications	Rated output torque (Nm)
25N	245
42N	412
60N	600
125N	1225
160N	1600

1.2 STRUCTURE AND CHARACTERISTICS

（1）Structure

Pin casing
Planetarium assembly
Gear pin
Planetary gear
Crankshaft
Input gear
Cycloidal gear
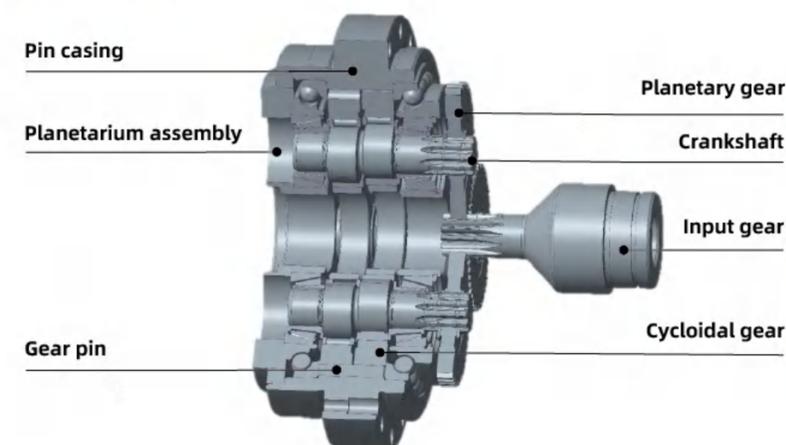
（2）Features

● Product middle solid series.

● Higher torque density.

● 2-stage reducer mechanism, small vibration, small moment of inertia.

● High bearing capacity, high rigidity, impact resistance, small backlash.

● Excellent accuracy retention.

● Multiple reduction ratios per model.

2. ROTATION DIRECTION AND DECELERATION

$$R = 1 + Z_2/Z_1 \cdot Z_3$$

R: Speed ratio value.

Z_1: Number of input shaft teeth.

Z_2: Number of planetary gears.

Z_3: Number of pins.

Model	Ratio code — Rotation of shaft	Ratio code — Case rotation	Output speed 5 — Output torque (Nm)	5 — Input power (KW)	10 — Output torque (Nm)	10 — Input power (KW)	15 — Output torque (Nm)	15 — Input power (KW)	20 — Output torque (Nm)	20 — Input power (KW)	25 — Output torque (Nm)	25 — Input power (KW)	30 — Output torque (Nm)	30 — Input power (KW)	40 — Output torque (Nm)	40 — Input power (KW)	50 — Output torque (Nm)	50 — Input power (KW)
25N	41 / 81 / 323/3 / 126 / 137 / 2133/13	40 / 80 / 320/3 / 125 / 136 / 2120/13	341	0.25	277	0.41	245	0.55	255	0.67	210	0.79	199	0.89	183	1.09	171	1.28
42N	41 / 81 / 105 / 126 / 141 / 2133/13	40 / 80 / 104 / 125 / 140 / 2120/13	573	0.43	465	0.70	412	0.92	378	1.13	353	1.32	335	1.50	307	1.84	287	2.15
60N	41 / 81 / 1737/17 / 121 / 1893/13 / 161	40 / 80 / 1720/17 / 120 / 1880/13 / 160	834	0.62	678	1.01	600	1.35	550	1.65	515	1.93	487	2.19	447	2.68	418	3.13
125N	41 / 81 / 1737/17 / 121 / 1893/13 / 161	40 / 80 / 1720/17 / 120 / 1880/13 / 160	1703	1.27	1383	2.07	1225	2.75	1124	3.36	1051	3.93	995	4.47	913	5.46	854	6.39
160N	41 / 81 / 1131/11 / 2379/19 / 156 / 201	40 / 80 / 1120/11 / 2360/19 / 155 / 200	2225	1.66	1807	2.70	1600	3.59	1468	4.39	1373	5.13	1300	5.83	1192	7.13		

Output speed 60 — Output torque (Nm)	Input power (KW)	Torsional rigidity (reference value) (Nm/arc.min)	Allowable moment (Nm)	Momentary max. allowable torque (Nm)	Maximum output speed allowed (r/min)	Allowable torque at start and stop (Nm)	Instantaneous maximum allowable torque (Nm)	Minimal backlash (arc.min)	lost motion MAX. (arc.min)	Angular transmission error (arc.sec)	Torsional rigidity (Nm/arc.min)	Torque of inertia (I=GD2/4) input axis conversion value (Kgm²)	Weight (Kg)
162	1.45	530	784	1568	57	612	1225	1.0	1.0	70	61	1.71×10^{-5} 6.79×10^{-6} 4.91×10^{-6} 4.03×10^{-6} 3.62×10^{-6} 3.26×10^{-6}	3.8
272	2.44	840	1660	3320	52	1029	2058	1.5	1.5	60	113	4.43×10^{-5} 1.87×10^{-5} 1.42×10^{-5} 1.07×10^{-5} 1.01×10^{-5} 7.66×10^{-6}	6.3
396	3.55	1140	2000	4000	44	1500	3000	1.0	1.0	50	200	8.51×10^{-5} 3.93×10^{-5} 2.86×10^{-5} 2.33×10^{-5} 1.84×10^{-5} 1.61×10^{-5}	8.9
808	7.25	1600	3430	6860	35	3062	6125	1.0	1.0	50	334	2.59×10^{-5} 9.61×10^{-5} 7.27×10^{-5} 5.88×10^{-5} 4.60×10^{-5}	13.9
		2050	4000	8000	19	4000	8000	1.0	1.0	50	490	3.32×10^{-5} 1.54×10^{-5} 1.13×10^{-5} 8.95×10^{-5} 6.75×10^{-5}	22.1

REMARK

1. The maximum speed of the input shaft shall not be greater than the maximum allowable output speed X transmission ratio;

2. Output torque (Nm) is the value obtained by setting the life time to a fixed value at each output speed;

3. Rated output torque refers to the output torque at 15r/min output speed.

4. The inertia moment value is the value of the reducer body, and does not consider the inertia moment of the center gear and the input gear.

■ **WRV-25N** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-42N** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-60N** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-125N** Output shaft bolt fastening shape and interface dimensions.

Model	Gear ratio	5 Output torque (Nm)	5 Input power (KW)	10 Output torque (Nm)	10 Input power (KW)	15 Output torque (Nm)	15 Input power (KW)	20 Output torque (Nm)	20 Input power (KW)	25 Output torque (Nm)	25 Input power (KW)	30 Output torque (Nm)	30 Input power (KW)	40 Output torque (Nm)	40 Input power (KW)	50 Output torque (Nm)	50 Input power (KW)	60 Output torque (Nm)	60 Input power (KW)	Torsional rigidity (reference value) (Nm/arc.min)	Allowable moment (Nm)	Momentary max. allowable torque (Nm)	Maximum output speed allowed (r/min)	Allowable torque at start and stop (Nm)	Instantaneous maximum allowable torque (Nm)	Minimal backlash (arc.min)	lost motion MAX. (arc.min)	Torsional rigidity (Nm/arc.min)	Torsional rigidity (Nm/arc.min)
10SC	27	136	0.09	111	0.16	98	0.21	90	0.25	84	0.29	80	0.34	73	0.41	68	0.47	65	0.54	421	686	1372	80	245	490	1.0	1.0	70	47
27SC	36.57 (1390/38)	368	0.26	299	0.42	265	0.55	243	0.68	227	0.79	215	0.90	197	1.10	184	1.29	174	1.46	1068	980	1960	60	662	1323	1.0	1.0	70	147
50SC	32.54 (1985/61)	681	0.48	554	0.77	490	1.03	450	1.26	420	1.47	398	1.67	366	2.04	341	2.38			1906	1764	3528	50	1225	2450	1.0	1.0	60	255
100SC	36.75	1362	0.95	1107	1.55	980	2.05	899	2.51	841	2.94	796	3.33	730	4.08					2813	2450	4900	40	2450	4900	1.0	1.0	50	510
120SC	36.75	1422	0.99	1308	1.83	1176	2.46	1085	3.03	907	3.61	823	3.45	765	4.27					2813	2450	4900	40	2940	5880	1.0	1.0	50	588
200SC	34.86 (1499/43)	2724	1.90	2215	3.09	1960	4.11	1803	5.04	1686	5.88	1597	5.34							9800	8820	17640	30	4900	9800	1.0	1.0	50	980
320SC	35.61 (2778/78)	4361	3.04	3538	4.94	3136	6.57	2881	8.05	2690	9.41									12740	20580	39200	25	7840	15608	1.0	1.0	50	1960

REMARK

1. The maximum speed of the input shaft shall not be greater than the maximum allowable output speed X transmission ratio;

2. Output torque (Nm) is the value obtained by setting the life time to a fixed value at each output speed;

3. The rated output torque refers to the output torque at 15r/min output speed. but the rated output torque of 6E is the output torque at 15r/min output speed.

4. The value of inertia moment is the value after considering the width of the reducer body and the input gear teeth, excluding the inertia moment of the input gear shaft.

1. WRV-SC SERIES MODEL AND STRUCTURE DESCRIPTION

1.1 TYPE DESCRIPTION

| WRV | - | 10 | SC | - | 000 |

SC series current model specifications	Rated output torque (Nm)
10SC	98
27SC	265
50SC	490
100SC	980
200SC	1960
320SC	3136

Model number
Product specification
Product series
Reduction ratio

1.2 STRUCTURE AND CHARACTERISTICS

（1）Structure

Mounting flange
Neutral pipe
Motor connection flange
Input gear

（2）Features

● High precision, high rigidity, overload resistance.

● Matchable application interface design, easy for customers to use and install.

● Optional grease package for easier application.

● Multiple reduction ratios, higher applicability.

2. WRV-E SERIES ROTATION RATIO CALCULATION

$$R = 1 + Z_2/Z_1 \cdot Z_3$$

R: Speed ratio value.
Z_1: Enter the number of shaft teeth.
Z_2: Number of planetary gears.
Z_3: Number of pin teeth and pins.

■ **WRV-10SC** Output shaft bolt fastening shape and interface dimensions.

INSTRUCTIONS:

1. Ratio code: 108, 189;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 98Nm, rated output speed: 15rpm.

4. The size of the ※ symbol can be adapted according to the motor.

■ **WRV-27SC** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-50SC** Output shaft bolt fastening shape and interface dimensions.

INSTRUCTIONS:

1. Ratio code: 100, 184;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 265Nm, rated output speed: 15rpm.

4. The size of the ※ symbol can be adapted according to the motor.

INSTRUCTIONS:

1. Ratio code: 107, 197;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 490Nm, rated output speed: 15rpm.

4. The size of the ※ symbol can be adapted according to the motor.

■ **WRV-100SC** Output shaft bolt fastening shape and interface dimensions.

■ **WRV-200SC** Output shaft bolt fastening shape and interface dimensions.

INSTRUCTIONS:

1. Ratio code: 100, 152, 211, 257;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 980Nm, rated output speed: 15rpm.

4. The size of the ※ symbol can be adapted according to the motor.

INSTRUCTIONS:

1. Ratio code: 104, 158, 204, 244;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 1960Nm, rated output speed: 15rpm.

4. The size of the ※ symbol can be adapted according to the motor.

■ **WRV-320SC** Output shaft bolt fastening shape and interface dimensions.

INSTRUCTIONS:

1. Ratio code: 110, 154, 209, 249;

2. Lubricating GREASE: VIGO GREASE REO or RE-00(MOLYWHITE).

3. Rated output torque: 3136Nm, rated output speed: 15rpm.

4. The size of the ※ symbol can be adapted according to the motor.

In order to maximize the performance of the E Series and the C Series, it is important to optimize the design of assembly accuracy, installation methods, lubrication and sealing. Please carefully read the following precautions before designing.

1.MOTOR FLANGE DESIGN REQUIREMENTS

In order to avoid contact with the reducer parts, the motor flange should be designed with reference to the dimensions marked in the outline and interface dimensions diagram.

1) The size and number of mounting bolts of the motor flange are determined after considering the torque and bending moment, so please fix the flange according to the mounting hole design of the reducer housing.

2) After setting the reducer, it is recommended to set the grease inlet,for easy grease replacement.

3) According to the specified tightening torque, evenly tighten the hexagon screw with the disk spring washer for the hexagon screw.

In order to maximize the performance of the E Series and the C Series, it is important to optimize the design of assembly accuracy, installation methods, lubrication and sealing.

As the main bearing adopts angular contact ball bearings, in order to avoid contact between the angular contact ball bearing retainer and the motor mounting flange, the size of its supporting parts is designed by referring to the following table.
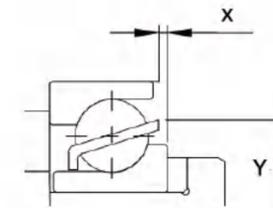

SIZE DESIGN REQUIREMENTS FOR SUPPORTING

	X	Y
WRV-6E	MAX1.9	MAXØ85
WRV-320E	MAX3.2	MAXØ222.2

Note: For other models, no special attention is required since the cage does not protrude from the end of the housing.

4) Motor flange assembly accuracy, please according to the following table requirements. If the installation accuracy is poor, it is particularly easy to cause vibration and noise.


Output shaft

Electric machine

Liquid sealants are required for mounting surfaces.

o-ring
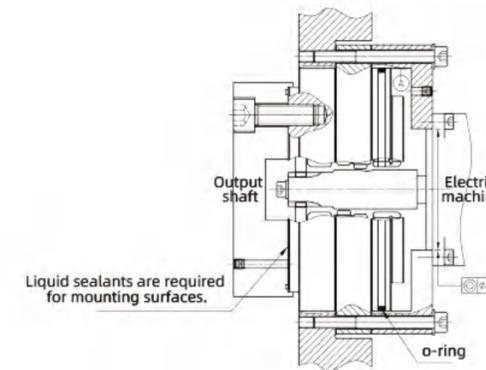
WRV-E SERIES ASSEMBLY ACCURACY   Unit (mm)

Model number	Concentricity tolerance	Model number	Concentricity tolerance
	a		a
WRV-6E	MAX0.03	WRV-110E	MAX0.03
WRV-20E	MAX0.03	WRV-160E	MAX0.05
WRV-40E	MAX0.03	WRV-320E	MAX0.05
WRV-80E	MAX0.03		

WRV-C SERIES ASSEMBLY ACCURACY   Unit (mm)

Model number	Center spacing tolerance	Concentricity tolerance	Parallelism tolerance
	x	a	b
WRV-10C	±0.03	MAX0.03	MAX0.03
WRV-27C	±0.03	MAX0.03	MAX0.03
WRV-50C	±0.03	MAX0.03	MAX0.03
WRV-100C	±0.03	MAX0.03	MAX0.03
WRV-200C	±0.03	MAX0.03	MAX0.03
WRV-320C	±0.03	MAX0.03	MAX0.03

Center distance tolerance X
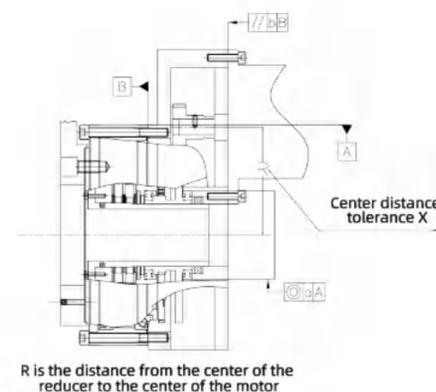
R is the distance from the center of the reducer to the center of the motor