



# PLANETARY GEARBOX CATALOG

WANSHSIN®



WANSHSIN SEIKOU (HUNAN)CO.,LTD

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Committed To Building Enduring Highly-precision Gearbox

SPECIALIZED REDUCER / REDUCTION MOTOR / INVERTER MANUFACTURER

INTELLIGENT AUTOMATION SOLUTION PROVIDER



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WANSHSIN Seikou(Hunan)Co., Ltd.



WANSHSIN is a professional gearbox, gear motor and inverter manufacturer and intelligent automation complete solution provider, integrating R&D, production, sales and service. The products cover the light and heavy industry, are widely used in new energy, robots, automobile manufacturing, warehousing, logistics, food industry and other industries. WANSHSIN has gradually become a reliable long-term partner of those leading enterprises of relevant industries.

Enterprise Honor

| 2019                                                                          | 2020                                                                                                                                                                                                                                   | 2022                                                                                                                                                                       |
|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>National high-tech enterprise</li></ul> | <ul style="list-style-type: none"><li>Ministry of Industry and Information Technology of the People's Republic of China "specialized, special and new" key small giant enterprise</li><li>Hunan Enterprise Technology Center</li></ul> | <ul style="list-style-type: none"><li>2022 Hunan Reducer Engineering Technology Research Center</li><li>2022 The 2nd Ningxiang Mayor Quality Award(Organization)</li></ul> |

Core Competitiveness



Leading R&D Capability

Three major R&D centers have been established to lead the industry's high-quality development with innovation.

Excellent Quality

We are the pioneer in introducing and launching the advanced automotive industry quality control standards pre-planning of product quality and have equipped with a large number of imported international advanced inspection/testing equipment to ensure product quality.

Advanced Manufacturing

We have hundreds of domestic advanced processing equipment with a total value of more than 100 million yuan, and our capacity is in a leading position in China.

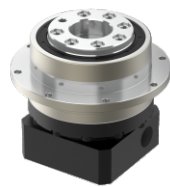
Fast Delivery

Sufficient spare parts in warehouse to ensure very short lead time.



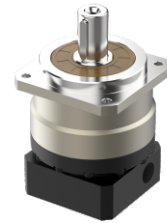
## WAD

Series Planetary Gearbox



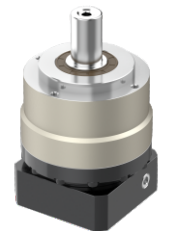
## WVRB

Series Planetary Gearbox



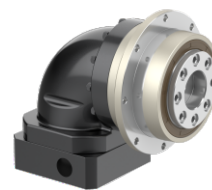
## WAE

Series Planetary Gearbox



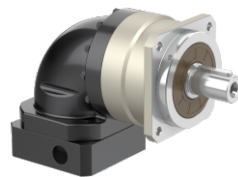
## WADR

Series Planetary Gearbox



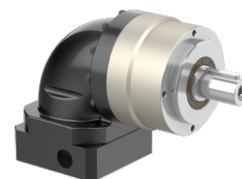
## WVRBR

Series Planetary Gearbox



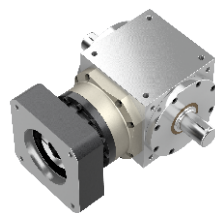
## WAER

Series Planetary Gearbox



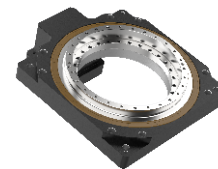
## WAT

Series Planetary Gearbox



## WTN

Series Hollow Rotating Platform



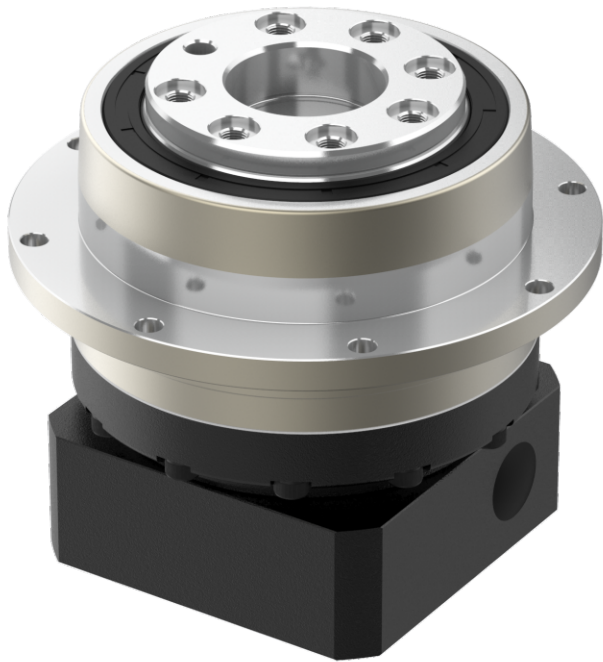
# WAD

 Series  
Planetary Gearbox

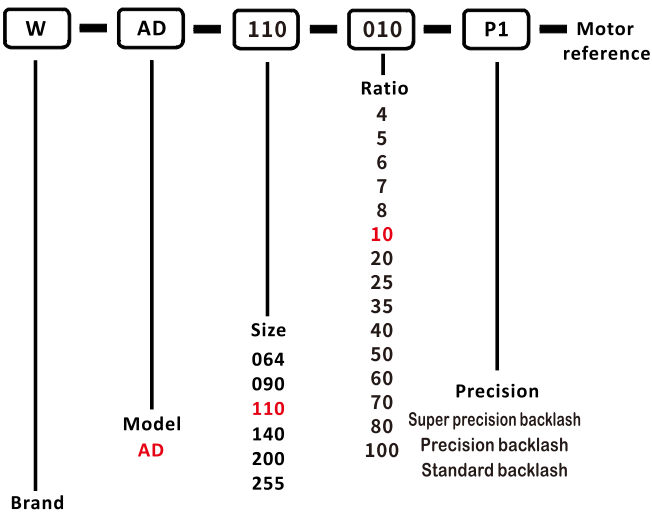
## FEATURES

- » The planet gear carrier and output end adopt an integrated double-supported structure design to ensure maximum torsional rigidity, toughness, and rotational accuracy.
- » The planet gear adopts a full needle roller design to increase the contact area and improve the structural rigidity and output torque.
- » The gear uses low carbon steel carburized and quenched to achieve a surface hardness of HRC62 to obtain the best wear resistance and impact toughness.
- » The gear profile is designed with assistance from imported software to obtain the best possible design, thereby reducing noise.
- » The connection between the input end and the motor shaft adopts a double-sided clamping method to achieve maximum clamping force and zero backlash power transmission.





SELECTION



GENERAL NOTICES

- Type, model and torque
- Ratio or output speed
- Working conditions and connection methods
- Quantity and installed machine name
- Input mode and input speed
- Motor brand model or flange and motor shaft size

PLANETARY GEARBOX

Performance

| Specification                     | Unit      | Stage | Ratio                        | WAD064                     | WAD090 | WAD110 | WAD140 | WAD200 | WAD255 |
|-----------------------------------|-----------|-------|------------------------------|----------------------------|--------|--------|--------|--------|--------|
| Rated output torque $T_{2N}$      | Nm        | 1     | 4                            | 48                         | 130    | 270    | 560    | 1100   | 1700   |
|                                   |           |       | 5                            | 60                         | 160    | 330    | 650    | 1200   | 2000   |
|                                   |           |       | 6                            | 50                         | 140    | 300    | 550    | 1100   | 1800   |
|                                   |           |       | 7                            | 50                         | 140    | 300    | 550    | 1100   | 1800   |
|                                   |           |       | 8                            | 40                         | 100    | 230    | 450    | 900    | 1500   |
|                                   |           |       | 10                           | 40                         | 100    | 230    | 450    | 900    | 1500   |
|                                   |           | 2     | 20                           | 48                         | 130    | 270    | 560    | 1100   | 1700   |
|                                   |           |       | 25                           | 60                         | 160    | 330    | 650    | 1200   | 2000   |
|                                   |           |       | 35                           | 50                         | 140    | 300    | 550    | 1100   | 1800   |
|                                   |           |       | 40                           | 48                         | 130    | 270    | 560    | 1100   | 1700   |
|                                   |           |       | 50                           | 60                         | 160    | 330    | 650    | 1200   | 2000   |
|                                   |           |       | 60                           | 50                         | 140    | 300    | 550    | 1100   | 1800   |
|                                   |           |       | 70                           | 50                         | 140    | 300    | 550    | 1100   | 1800   |
|                                   |           |       | 80                           | 40                         | 100    | 230    | 450    | 900    | 1500   |
|                                   |           | 100   | 40                           | 100                        | 230    | 450    | 900    | 1500   |        |
| Emergency stop torque $T_{2NOT}$  | Nm        | 1,2   | 4 ~ 100                      | Triple rated output torque |        |        |        |        |        |
| Rated input speed $n_{1N}$        | rpm       | 1,2   | 4 ~ 100                      | 5000                       | 4000   | 4000   | 3000   | 3000   | 2000   |
| Maximum iutput speed $n_{1B}$     |           | 1,2   | 4 ~ 100                      | 10000                      | 8000   | 8000   | 6000   | 6000   | 4000   |
| Super precision backlash $P_0$    | arcmin    | 1     | 4 ~ 10                       | ≤1.5                       | ≤1.5   | ≤1.5   | ≤1.5   | ≤1.5   | ≤1.5   |
|                                   |           | 2     | 20 ~ 100                     | ≤3                         | ≤3     | ≤3     | ≤3     | ≤3     | ≤3     |
| Precision backlash $P_1$          | arcmin    | 1     | 4 ~ 10                       | ≤3                         | ≤3     | ≤3     | ≤3     | ≤3     | ≤3     |
|                                   |           | 2     | 20 ~ 100                     | ≤5                         | ≤5     | ≤5     | ≤5     | ≤5     | ≤5     |
| Standard backlash $P_2$           | arcmin    | 1     | 4 ~ 10                       | ≤5                         | ≤5     | ≤5     | ≤5     | ≤5     | ≤5     |
|                                   |           | 2     | 20 ~ 100                     | ≤8                         | ≤8     | ≤8     | ≤8     | ≤8     | ≤8     |
| Torsional rigidity                | Nm/arcmin | 1,2   | 4 ~ 100                      | 13                         | 31     | 82     | 151    | 440    | 1006   |
| Maximum bending torque $M_{2KB}$  | Nm        | 1,2   | 4 ~ 100                      | 125                        | 235    | 430    | 1300   | 3064   | 5900   |
| Allowable axial force $F_{2aB}$   | N         | 1,2   | 4 ~ 100                      | 1050                       | 2850   | 2990   | 10590  | 16660  | 29430  |
| Lifespan                          | hr        | 1,2   | 4 ~ 100                      | 20000                      |        |        |        |        |        |
| Efficiency                        | %         | 1     | 4 ~ 10                       | ≥97%                       |        |        |        |        |        |
|                                   |           | 2     | 20 ~ 100                     | ≥94%                       |        |        |        |        |        |
| Weight                            | kg        | 1     | 4 ~ 10                       | 1.1                        | 2.9    | 5.4    | 11.9   | 31.6   | 56.1   |
|                                   |           | 2     | 20 ~ 100                     | 1.7                        | 4.2    | 8      | 15.9   | 36.9   | 70.4   |
| Use of temperature                | ℃         | 1,2   | 4 ~ 100                      | -20℃~+40℃                  |        |        |        |        |        |
| Lubricating                       |           | 1,2   | Synthetic lubricating grease |                            |        |        |        |        |        |
| IP Grade                          |           | 1,2   | 4 ~ 100                      | IP65                       |        |        |        |        |        |
| Installation direction            |           | 1,2   | 4 ~ 100                      | In any direction           |        |        |        |        |        |
| Noise level (n1=3000rpm,off load) | dB(A)     | 1,2   | 4 ~ 100                      | ≤58                        | ≤60    | ≤63    | ≤65    | ≤67    | ≤70    |

ROTATIONAL INERTIA OF REDUCER

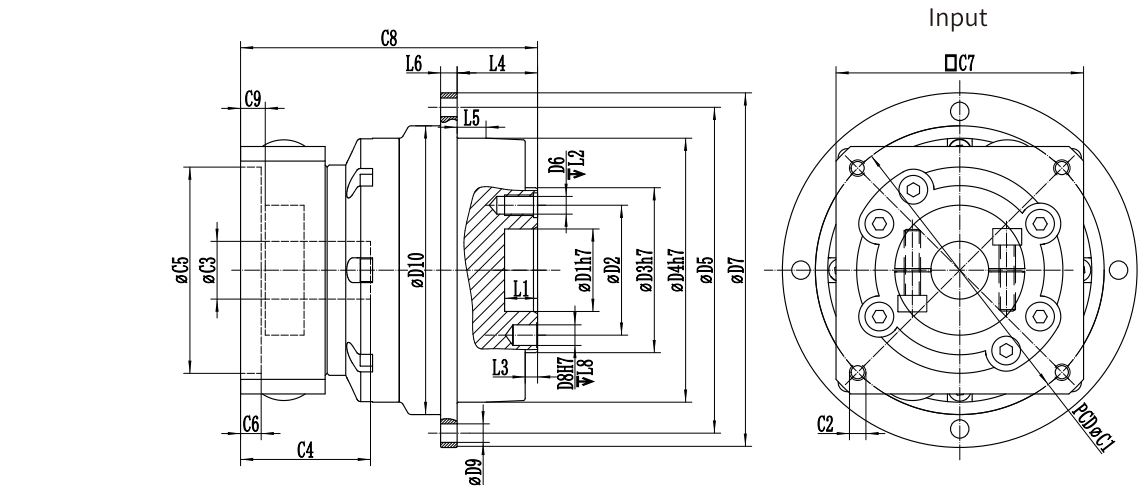
Rotational inertia

| Specification         | Unit                 | Stage | Ratio | WAD064 | WAD090 | WAD110 | WAD140 | WAD200 | WAD255 |
|-----------------------|----------------------|-------|-------|--------|--------|--------|--------|--------|--------|
| Rotational inertia J1 | kg • cm <sup>2</sup> | 1     | 4     | 0.14   | 0.51   | 2.87   | 7.54   | 25.03  | 58.31  |
|                       |                      |       | 5     | 0.13   | 0.47   | 2.71   | 7.42   | 23.29  | 53.27  |
|                       |                      |       | 6     | 0.13   | 0.45   | 2.61   | 7.14   | 22.48  | 50.97  |
|                       |                      |       | 7     | 0.13   | 0.45   | 2.67   | 7.14   | 22.48  | 50.97  |
|                       |                      |       | 8     | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  | 50.56  |
|                       |                      |       | 10    | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  | 50.56  |
|                       |                      | 2     | 20    | 0.03   | 0.13   | 0.47   | 2.71   | 7.42   | 23.29  |
|                       |                      |       | 25    | 0.03   | 0.13   | 0.47   | 2.71   | 7.42   | 23.29  |
|                       |                      |       | 35    | 0.03   | 0.13   | 0.47   | 2.71   | 7.42   | 23.29  |
|                       |                      |       | 40    | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  |
|                       |                      |       | 50    | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  |
|                       |                      |       | 60    | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  |
|                       |                      |       | 70    | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  |
|                       |                      |       | 80    | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  |
|                       |                      |       | 100   | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  |

1. Ratio( i=N<sub>in</sub>/N<sub>out</sub> )

2. Maximum acceleration torque T<sub>2B</sub> =60% Of T<sub>2NOT</sub>

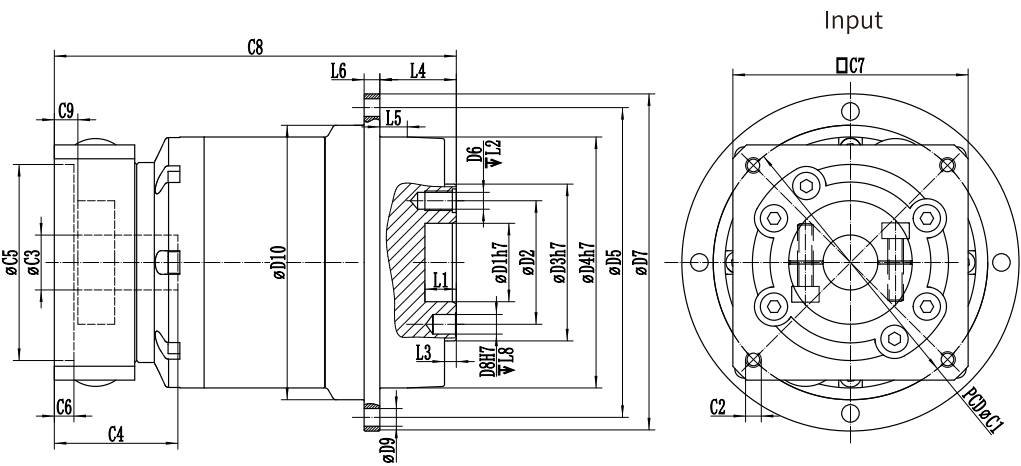
3. Output speed100rpm,acting on the center of the output shaft



DIMENSION SINGLE SECTION

Dimension(single stage,Ratio i=4~10)

| Dimension | WAD064    |     | WAD090  |      | WAD110   |       | WAD140      | WAD200      | WAD255      |
|-----------|-----------|-----|---------|------|----------|-------|-------------|-------------|-------------|
| D1 H7     | 20        |     | 31.5    |      | 40       |       | 50          | 80          | 100         |
| D2        | 31.5      |     | 50      |      | 63       |       | 80          | 125         | 140         |
| D3 h7     | 40        |     | 63      |      | 80       |       | 100         | 160         | 180         |
| D4 h7     | 64        |     | 90      |      | 110      |       | 140         | 200         | 255         |
| D5        | 79        |     | 109     |      | 135      |       | 168         | 233         | 280         |
| D6        | 7×M5×0.8P |     | 7×M6×1P |      | 11×M6×1P |       | 11×M8×1.25P | 11×M10×1.5P | 12×M16×2.0P |
| D7        | 86        |     | 118     |      | 145      |       | 179         | 247         | 300         |
| D8 H7     | 5         |     | 6       |      | 6        |       | 8           | 10          | 12          |
| D9        | 8×4.5     |     | 8×5.5   |      | 8×5.5    |       | 12×6.6      | 12×9        | 16×13.5     |
| D10       | 70        |     | 95      |      | 125      |       | 152         | 212         | 255         |
| L1        | 8         |     | 12      |      | 12       |       | 12          | 16          | 20          |
| L2        | 8         |     | 13.5    |      | 13.5     |       | 17          | 22.5        | 30.5        |
| L3        | 3         |     | 6       |      | 6        |       | 6           | 8           | 12          |
| L4        | 19.5      |     | 30      |      | 29       |       | 38          | 50          | 66          |
| L5        | 7         |     | 10      |      | 10       |       | 14.6        | 15          | 20          |
| L6        | 4         |     | 7       |      | 8        |       | 10          | 12          | 18          |
| L7        | 7.7       |     | 7.5     |      | 10       |       | 12          | 15          | 20          |
| L8        | 6         |     | 7       |      | 7        |       | 7           | 10          | 10          |
| C1        | 70        | 90  | 90      | 145  | 145      | 200   | 200         | 200         | 235         |
| C2        | M4        | M5  | M5      | M8   | M8       | M12   | M12*1.75P   | M12*1.75P   | M12*1.75P   |
| C3        | ≤14       | ≤19 | ≤19     | ≤24  | ≤24      | ≤35   | ≤35/≤42     | ≤42         | ≤42/≤55     |
| C4        | 31.5      | 41  | 41      | 59   | 60       | 81    | 81          | 114         | 117         |
| C5        | 50        | 70  | 70      | 110  | 110      | 114.3 | 114.3       | 114.3       | 200         |
| C6        | 5         | 5   | 6       | 14   | 14       | 19    | 19          | 24          | 20          |
| C7        | 60        | 80  | 80      | 130  | 130      | 180   | 180         | 180         | 220         |
| C8        | 76        | 89  | 102     | 120  | 127.5    | 149.5 | 173.5       | 225.5       | 268.5       |
| C9        | 6         | 9   | 9.5     | 21.5 | 19.5     | 25    | 22          | 30          | 36          |



# DIMENSION DOUBLE SECTION

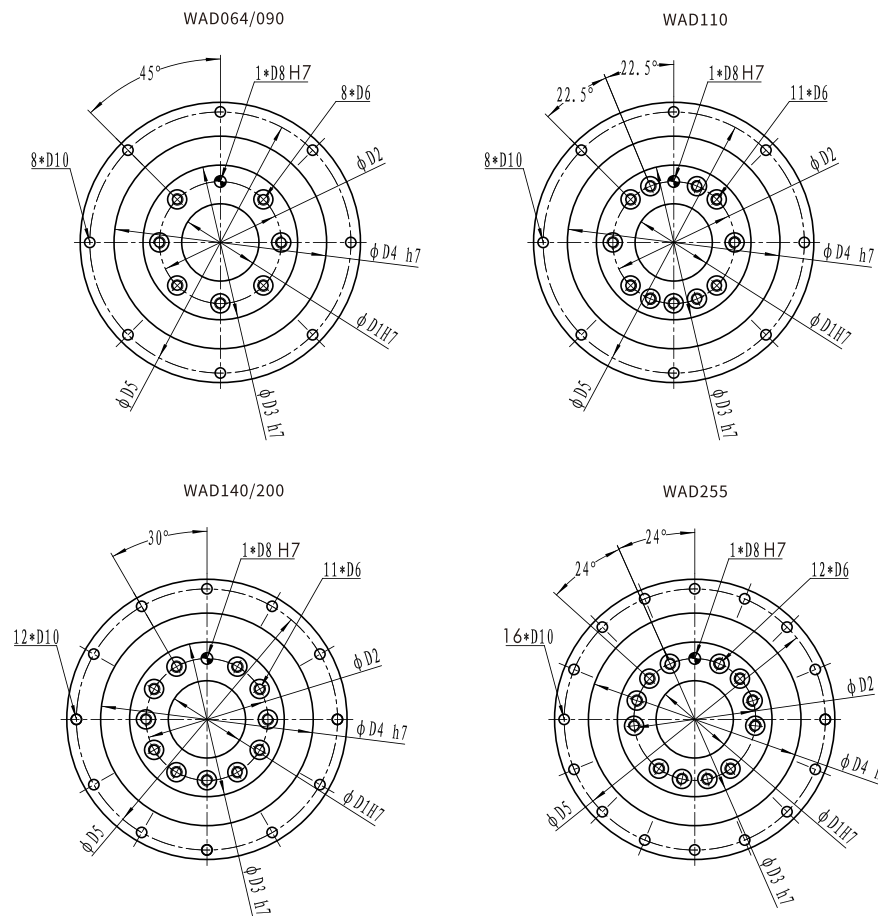
Dimension(double stage,Ratio i=20~100)

| Dimension | WAD064    |     | WAD090  |       | WAD110   |     | WAD140      |          | WAD200      |           | WAD255      |           |
|-----------|-----------|-----|---------|-------|----------|-----|-------------|----------|-------------|-----------|-------------|-----------|
| D1 H7     | 20        |     | 31.5    |       | 40       |     | 50          |          | 80          |           | 100         |           |
| D2        | 31.5      |     | 50      |       | 63       |     | 80          |          | 125         |           | 140         |           |
| D3 h7     | 40        |     | 63      |       | 80       |     | 100         |          | 160         |           | 180         |           |
| D4 h7     | 64        |     | 90      |       | 110      |     | 140         |          | 200         |           | 255         |           |
| D5        | 79        |     | 109     |       | 135      |     | 168         |          | 233         |           | 280         |           |
| D6        | 7×M5×0.8P |     | 7×M6×1P |       | 11×M6×1P |     | 11×M8×1.25P |          | 11×M10×1.5P |           | 12×M16×2.0P |           |
| D7        | 86        |     | 118     |       | 145      |     | 179         |          | 247         |           | 300         |           |
| D8 H7     | 5         |     | 6       |       | 6        |     | 8           |          | 10          |           | 12          |           |
| D9        | 8×4.5     |     | 8×5.5   |       | 8×5.5    |     | 12×6.6      |          | 12×9        |           | 16×13.5     |           |
| D10       | 70        |     | 95      |       | 125      |     | 152         |          | 212         |           | 255         |           |
| L1        | 8         |     | 12      |       | 12       |     | 12          |          | 16          |           | 20          |           |
| L2        | 8         |     | 13.5    |       | 13.5     |     | 17          |          | 22.5        |           | 20          |           |
| L3        | 3         |     | 6       |       | 6        |     | 6           |          | 8           |           | 12          |           |
| L4        | 19.5      |     | 30      |       | 29       |     | 38          |          | 50          |           | 66          |           |
| L5        | 7         |     | 10      |       | 10       |     | 14.6        |          | 15          |           | 20          |           |
| L6        | 4         |     | 7       |       | 8        |     | 10          |          | 12          |           | 18          |           |
| L7        | 7.7       |     | 7.5     |       | 10       |     | 12          |          | 15          |           | 20          |           |
| L8        | 6         |     | 7       |       | 7        |     | 7           |          | 10          |           | 10          |           |
| C1        | 70        | 90  | 70      | 90    | 145      | 90  | 145         | 145      | 200         | 200       | 200         | 200       |
| C2        | M4        | M5  | M4      | M5    | M8       | M5  | M8          | M8*1.25P | M12*1.75P   | M12*1.75P | M12*1.75P   | M12*1.75P |
| C3        | ≤14       | ≤19 | ≤14     | ≤19   | ≤24      | ≤19 | ≤24         | ≤24/≤28  | ≤35         | ≤35       | ≤42         | ≤42       |
| C4        | 31.5      | 41  | 31.5    | 41    | 59       | 41  | 60          | 66       | 80          | 80        | 114         | 114       |
| C5        | 50        | 70  | 50      | 70    | 110      | 70  | 110         | 110      | 114.3       | 114.3     | 114.3       | 114.3     |
| C6        | 5         | 5   | 5       | 6     | 14       | 6   | 14          | 19       | 9           | 9         | 30          | 30        |
| C7        | 60        | 80  | 60      | 80    | 130      | 80  | 130         | 180      | 180         | 180       | 180         | 180       |
| C8        | 108       | 121 | 123     | 139.5 | 157.5    | 142 | 172.5       | 234.5    | 260         | 260       | 364         | 364       |
| C9        | 6         | 9   | 9.5     | 21.5  | 19.5     | 25  | 22          | 22       | 30          | 30        | 36          | 36        |

# DIMENSION

## OUTPUT SHAFT DISK SURFACE

Output Shaft Disk Dimension



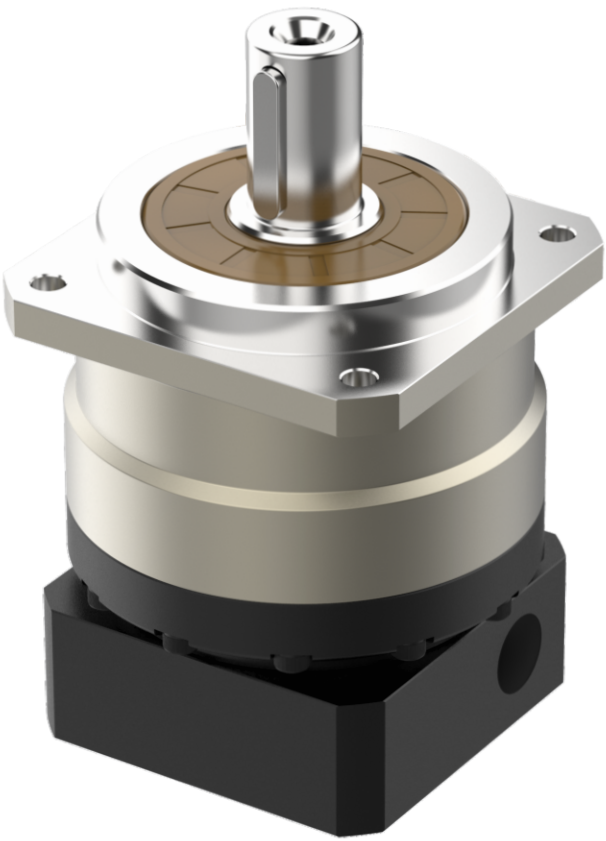
| Dimension | WAD064  | WAD090  | WAD110  | WAD140   | WAD200   | WAD255   |
|-----------|---------|---------|---------|----------|----------|----------|
| D1 H7     | 20      | 31.5    | 40      | 50       | 80       | 100      |
| D2        | 31.5    | 50      | 63      | 80       | 125      | 140      |
| D3 h7     | 40      | 63      | 80      | 100      | 160      | 180      |
| D4 h7     | 64      | 90      | 110     | 140      | 200      | 255      |
| D5        | 79      | 109     | 135     | 168      | 233      | 280      |
| D6        | M5*0.8P | M6*1.0P | M6*1.0P | M8*1.25P | M10*1.5P | M16*2.0P |
| D8 H7     | 5       | 6       | 6       | 8        | 10       | 12       |
| D10       | 4.5     | 5.5     | 5.5     | 6.8      | 9        | 13.5     |



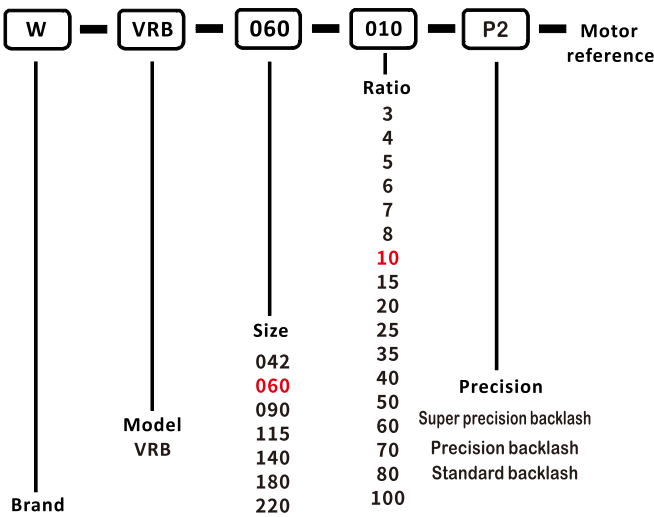
# WVRB Series Planetary Gearbox

## FEATURES

- » The planet gear carrier and output end adopt an integrated double-supported structure design to ensure maximum torsional rigidity, toughness, and rotational accuracy.
- » The planet gear adopts a full needle roller design to increase the contact area and improve the structural rigidity and output torque.
- » The gear uses low carbon steel carburized and quenched to achieve a surface hardness of HRC62 to obtain the best wear resistance and impact toughness.
- » The gear profile is designed with assistance from imported software to obtain the best possible design, thereby reducing noise.
- » The connection between the input end and the motor shaft adopts a double-sided clamping method to achieve maximum clamping force and zero backlash power transmission.



## SELECTION



## GENERAL NOTICES

- Type, model and torque
- Ratio or output speed
- Working conditions and connection methods
- Quantity and installed machine name
- Input mode and input speed
- Motor brand model or flange and motor shaft size

PLANETARY GEARBOX

Performance

| Specification                          | Unit      | Stage | Ratio                              | WVRB042          | WVRB060 | WVRB090 | WVRB115 | WVRB140 | WVRB180 | WVRB220 |
|----------------------------------------|-----------|-------|------------------------------------|------------------|---------|---------|---------|---------|---------|---------|
| Rated output torque $T_{2N}$           | Nm        | 1     | 3                                  | 19               | 50      | 130     | 208     | 342     | 588     | 1140    |
|                                        |           |       | 4                                  | 20               | 55      | 140     | 290     | 542     | 1050    | 1700    |
|                                        |           |       | 5                                  | 22               | 60      | 160     | 330     | 650     | 1200    | 2000    |
|                                        |           |       | 6                                  | 20               | 55      | 150     | 310     | 600     | 1100    | 1900    |
|                                        |           |       | 7                                  | 19               | 50      | 140     | 300     | 550     | 1100    | 1800    |
|                                        |           |       | 8                                  | 17               | 45      | 120     | 260     | 500     | 1000    | 1600    |
|                                        |           |       | 10                                 | 14               | 40      | 100     | 230     | 450     | 900     | 1500    |
|                                        |           | 2     | 15                                 | 19               | 50      | 130     | 208     | 342     | 588     | 1140    |
|                                        |           |       | 20                                 | 20               | 55      | 140     | 290     | 542     | 1050    | 1700    |
|                                        |           |       | 25                                 | 22               | 60      | 160     | 330     | 650     | 1200    | 2000    |
|                                        |           |       | 30                                 | 20               | 55      | 150     | 310     | 600     | 1100    | 1900    |
|                                        |           |       | 35                                 | 19               | 50      | 140     | 300     | 550     | 1100    | 1800    |
|                                        |           |       | 40                                 | 20               | 55      | 140     | 290     | 542     | 1050    | 1700    |
|                                        |           |       | 50                                 | 22               | 60      | 160     | 330     | 650     | 1200    | 2000    |
|                                        |           |       | 60                                 | 20               | 55      | 150     | 310     | 600     | 1100    | 1900    |
|                                        |           |       | 70                                 | 19               | 50      | 140     | 300     | 550     | 1100    | 1800    |
|                                        |           |       | 80                                 | 17               | 45      | 120     | 260     | 500     | 1000    | 1600    |
|                                        |           |       | 100                                | 14               | 40      | 100     | 230     | 450     | 900     | 1500    |
| Emergency stop torque $T_{2NOT}$       | Nm        | 1,2   | 3 ~ 100 Triple rated output torque |                  |         |         |         |         |         |         |
| Rated input speed $n_{1N}$             | rpm       | 1,2   | 3 ~ 100                            | 5000             | 5000    | 4000    | 4000    | 3000    | 3000    | 2000    |
| Maximum iutput speed $n_{1B}$          | rpm       | 1,2   | 3 ~ 100                            | 10000            | 10000   | 8000    | 8000    | 6000    | 6000    | 4000    |
| Super precision backlash $P_0$         | arcmin    | 1     | 3 ~ 10                             | —                | ≤1.5    | ≤1.5    | ≤1.5    | ≤1.5    | ≤1.5    | ≤1.5    |
|                                        |           | 2     | 15 ~ 100                           | —                | ≤3      | ≤3      | ≤3      | ≤3      | ≤3      | ≤3      |
| Precision backlash $P_1$               | arcmin    | 1     | 3 ~ 10                             | —                | ≤3      | ≤3      | ≤3      | ≤3      | ≤3      | ≤3      |
|                                        |           | 2     | 15 ~ 100                           | —                | ≤5      | ≤5      | ≤5      | ≤5      | ≤5      | ≤5      |
| Standard backlash $P_2$                | arcmin    | 1     | 3 ~ 10                             | ≤12              | ≤5      | ≤5      | ≤5      | ≤5      | ≤5      | ≤5      |
|                                        |           | 2     | 15 ~ 100                           | ≤16              | ≤8      | ≤8      | ≤8      | ≤8      | ≤8      | ≤8      |
| Torsional rigidity                     | Nm/arcmin | 1,2   | 3 ~ 100                            | 3                | 7       | 14      | 25      | 50      | 145     | 225     |
| Allowable radial force $F_{2aB}$       | N         | 1,2   | 3 ~ 100                            | 780              | 1530    | 3250    | 6700    | 9400    | 14500   | 20000   |
| Allowable axial force $F_{2aB}$        | N         | 1,2   | 3 ~ 100                            | 390              | 765     | 1625    | 3350    | 4700    | 7250    | 10000   |
| Lifespan                               | hr        | 1,2   | 3 ~ 100                            | 20000            |         |         |         |         |         |         |
| Efficiency                             | %         | 1     | 3 ~ 10                             | ≥97%             |         |         |         |         |         |         |
|                                        |           | 2     | 15 ~ 100                           | ≥94%             |         |         |         |         |         |         |
| Weight                                 | kg        | 1     | 3 ~ 10                             | 0.6              | 1.5     | 3.7     | 7.8     | 16      | 36      | 53      |
|                                        |           | 2     | 15 ~ 100                           | 0.7              | 1.6     | 4.2     | 11      | 17      | 37      | 54      |
| Use of temperature                     | ℃         | 1,2   | 3 ~ 100                            | -20℃~+40℃        |         |         |         |         |         |         |
| Lubricating                            |           | 1,2   | Synthetic lubricating grease       |                  |         |         |         |         |         |         |
| IP Grade                               |           | 1,2   | 3 ~ 100                            | IP65             |         |         |         |         |         |         |
| Installation direction                 |           | 1,2   | 3 ~ 100                            | In any direction |         |         |         |         |         |         |
| Noise level ( $n_1=3000$ rpm,off load) | dB(A)     | 1,2   | 3 ~ 100                            | ≤56              | ≤58     | ≤60     | ≤63     | ≤65     | ≤67     | ≤70     |

ROTATIONAL INERTIA OF REDUCER

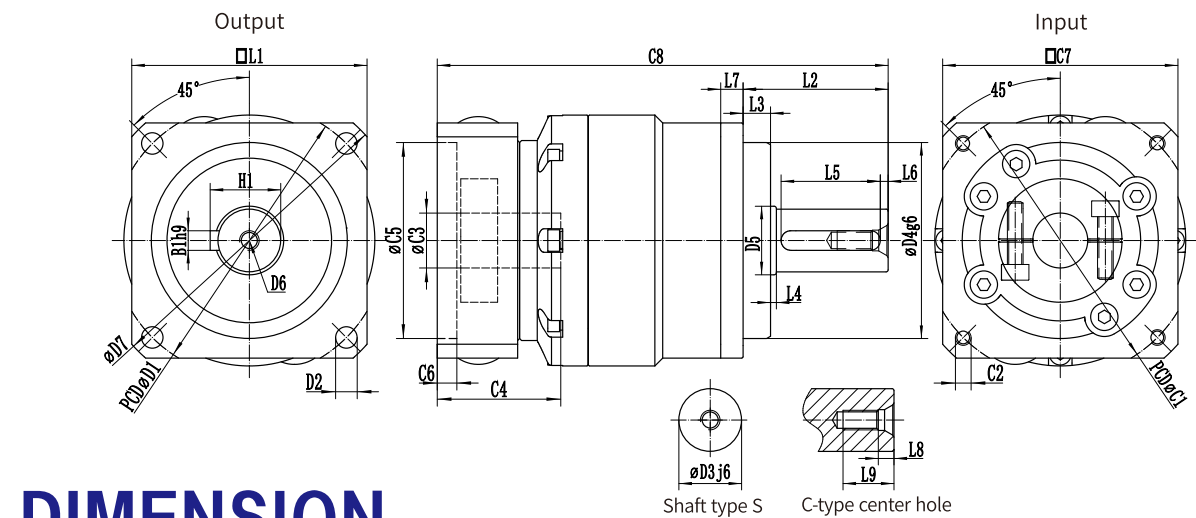
Rotational inertia

| Specification            | Unit                 | Stage | Ratio | WVRB042 | WVRB060 | WVRB090 | WVRB115 | WVRB140 | WVRB180 | WVRB220 |
|--------------------------|----------------------|-------|-------|---------|---------|---------|---------|---------|---------|---------|
| Rotational inertia $J_1$ | kg • cm <sup>2</sup> | 1     | 3     | 0.053   | 0.22    | 1.2     | 5.3     | 20      | 44      | 90      |
|                          |                      |       | 4     | 0.041   | 0.17    | 0.95    | 4.1     | 15      | 28      | 62      |
|                          |                      |       | 5     | 0.036   | 0.16    | 0.86    | 3.6     | 14      | 22      | 52      |
|                          |                      |       | 6     | 0.034   | 0.15    | 0.82    | 3.3     | 13      | 18      | 47      |
|                          |                      |       | 7     | 0.032   | 0.14    | 0.79    | 3.2     | 12      | 16      | 42      |
|                          |                      |       | 8     | 0.031   | 0.14    | 0.77    | 3.1     | 12      | 15      | 40      |
|                          |                      |       | 10    | 0.03    | 0.14    | 0.75    | 3       | 11      | 14      | 38      |
|                          |                      | 2     | 15    | 0.035   | 0.14    | 0.72    | 2.8     | 11      | 12      | 36      |
|                          |                      |       | 20    | 0.034   | 0.13    | 0.72    | 2.8     | 11      | 12      | 35      |
|                          |                      |       | 25    | 0.034   | 0.13    | 0.71    | 2.8     | 11      | 12      | 35      |
|                          |                      |       | 30    | 0.03    | 0.13    | 0.7     | 2.7     | 10      | 11      | 34      |
|                          |                      |       | 35    | 0.034   | 0.13    | 0.71    | 2.7     | 11      | 12      | 35      |
|                          |                      |       | 40    | 0.03    | 0.13    | 0.7     | 2.7     | 10      | 11      | 33      |
|                          |                      |       | 50    | 0.03    | 0.13    | 0.69    | 2.7     | 10      | 11      | 33      |
|                          |                      |       | 60    | 0.03    | 0.13    | 0.69    | 2.7     | 10      | 11      | 33      |
|                          |                      |       | 70    | 0.03    | 0.13    | 0.69    | 2.7     | 10      | 11      | 33      |
|                          |                      |       | 80    | 0.03    | 0.13    | 0.69    | 2.7     | 10      | 11      | 33      |
|                          |                      |       | 100   | 0.03    | 0.13    | 0.69    | 2.7     | 10      | 11      | 33      |

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

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

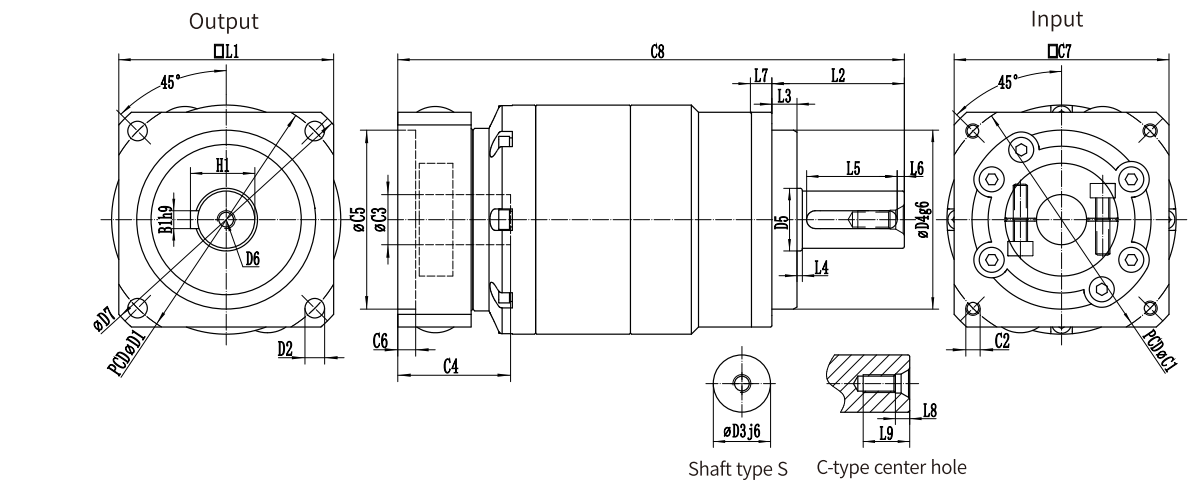
3. Output speed100rpm,acting on the center of the output shaft



DIMENSION  
SINGLE SECTION

Dimension(single stage,Ratio i=3~10)

| Dimension | WVRB042 |      | WVRB060 |     | WVRB090  |     | WVRB115   |       | WVRB140   |           | WVRB180   |           | WVRB220  |  |
|-----------|---------|------|---------|-----|----------|-----|-----------|-------|-----------|-----------|-----------|-----------|----------|--|
| D1        | 50      |      | 70      |     | 100      |     | 130       |       | 165       |           | 215       |           | 250      |  |
| D2        | 3.5     |      | 5.5     |     | 6.6      |     | 9         |       | 11        |           | 13.5      |           | 17       |  |
| D3 j6     | 13      |      | 16      |     | 22       |     | 32        |       | 40        |           | 55        |           | 75       |  |
| D4 g6     | 35      |      | 50      |     | 80       |     | 110       |       | 130       |           | 160       |           | 180      |  |
| D5        | 15      |      | 18      |     | 30       |     | 40        |       | 50        |           | 70        |           | 85       |  |
| D6        | M4*0.7P |      | M5*0.8P |     | M8*1.25P |     | M12*1.75P |       | M16*2.0P  |           | M20*2.5P  |           | M20*2.5P |  |
| D7        | 57      |      | 80      |     | 116      |     | 152       |       | 185       |           | 240       |           | 290      |  |
| L1        | 42      |      | 60      |     | 90       |     | 115       |       | 140       |           | 180       |           | 220      |  |
| L2        | 26      |      | 37      |     | 48       |     | 60        |       | 95        |           | 105       |           | 138      |  |
| L3        | 5.5     |      | 7       |     | 10       |     | 7         |       | 13        |           | 20        |           | 30       |  |
| L4        | 1       |      | 1.5     |     | 1.5      |     | 2         |       | 3         |           | 3         |           | 3        |  |
| L5        | 16      |      | 25      |     | 32       |     | 40        |       | 63        |           | 70        |           | 90       |  |
| L6        | 2       |      | 2       |     | 3        |     | 5         |       | 5         |           | 6         |           | 7        |  |
| L7        | 4       |      | 6       |     | 8        |     | 10        |       | 12        |           | 15        |           | 20       |  |
| L8        | 3.2     |      | 4.8     |     | 7.2      |     | 10        |       | 12        |           | 15        |           | 15       |  |
| L9        | 10      |      | 12.5    |     | 19       |     | 28        |       | 36        |           | 42        |           | 42       |  |
| C1        | 46      | 70   | 70      | 90  | 90       | 145 | 145       | 200   | 200       | 200       | 200       | 235       |          |  |
| C2        | M4      | M4   | M4      | M5  | M5       | M8  | M8        | M12   | M12*1.75P | M12*1.75P | M12*1.75P | M12*1.75P |          |  |
| C3        | ≤8      | ≤11  | ≤14     | ≤19 | ≤19      | ≤24 | ≤24       | ≤35   | ≤35/≤42   | ≤42       | ≤42/≤55   |           |          |  |
| C4        | 26      | 31.5 | 31.5    | 41  | 41       | 59  | 60        | 81    | 81        | 114       | 117       |           |          |  |
| C5        | 30      | 50   | 50      | 70  | 70       | 110 | 110       | 114.3 | 114.3     | 114.3     | 200       |           |          |  |
| C6        | 5       | 5    | 5       | 5   | 6        | 14  | 14        | 19    | 19        | 24        | 20        |           |          |  |
| C7        | 48      | 60   | 60      | 80  | 80       | 130 | 130       | 180   | 180       | 180       | 220       |           |          |  |
| C8        | 86      | 95   | 115     | 128 | 147      | 165 | 199.5     | 221.5 | 279       | 318       | 377       |           |          |  |
| B1 h9     | 5       |      | 5       |     | 6        |     | 10        |       | 12        |           | 16        |           | 20       |  |
| H1        | 15      |      | 18      |     | 24.5     |     | 35        |       | 43        |           | 59        |           | 79.5     |  |



DIMENSION  
SINGLE SECTION

Dimension(double stage,Ratio i=15~100)

| Dimension | WVRB042 |      | WVRB060 |     | WVRB090  |       |       | WVRB115   |       | WVRB140  |  | WVRB180   |  | WVRB220   |  |
|-----------|---------|------|---------|-----|----------|-------|-------|-----------|-------|----------|--|-----------|--|-----------|--|
| D1        | 50      |      | 70      |     | 100      |       |       | 130       |       | 165      |  | 215       |  | 250       |  |
| D2        | 3.5     |      | 5.5     |     | 6.6      |       |       | 9         |       | 11       |  | 13.5      |  | 17        |  |
| D3 j6     | 13      |      | 16      |     | 22       |       |       | 32        |       | 40       |  | 55        |  | 75        |  |
| D4 g6     | 35      |      | 50      |     | 80       |       |       | 110       |       | 130      |  | 160       |  | 180       |  |
| D5        | 15      |      | 18      |     | 30       |       |       | 40        |       | 50       |  | 70        |  | 85        |  |
| D6        | M4*0.7P |      | M5*0.8P |     | M8*1.25P |       |       | M12*1.75P |       | M16*2.0P |  | M20*2.5P  |  | M20*2.5P  |  |
| D7        | 57      |      | 80      |     | 116      |       |       | 152       |       | 185      |  | 240       |  | 290       |  |
| L1        | 42      |      | 60      |     | 90       |       |       | 115       |       | 140      |  | 180       |  | 220       |  |
| L2        | 26      |      | 37      |     | 48       |       |       | 60        |       | 95       |  | 105       |  | 138       |  |
| L3        | 5.5     |      | 7       |     | 10       |       |       | 7         |       | 13       |  | 20        |  | 30        |  |
| L4        | 1       |      | 1.5     |     | 1.5      |       |       | 2         |       | 3        |  | 3         |  | 3         |  |
| L5        | 16      |      | 25      |     | 32       |       |       | 40        |       | 63       |  | 70        |  | 90        |  |
| L6        | 2       |      | 2       |     | 3        |       |       | 5         |       | 5        |  | 6         |  | 7         |  |
| L7        | 4       |      | 7       |     | 8        |       |       | 10        |       | 12       |  | 15        |  | 20        |  |
| L8        | 3.2     |      | 4.8     |     | 7.2      |       |       | 10        |       | 12       |  | 15        |  | 15        |  |
| L9        | 10      |      | 12.5    |     | 19       |       |       | 28        |       | 36       |  | 42        |  | 42        |  |
| C1        | 46      | 70   | 70      | 90  | 70       | 90    | 145   | 90        | 145   | 145      |  | 200       |  | 200       |  |
| C2        | M4      | M4   | M4      | M5  | M4       | M5    | M8    | M5        | M8    | M8*1.25P |  | M12*1.75P |  | M12*1.75P |  |
| C3        | ≤8      | ≤11  | ≤14     | ≤19 | ≤14      | ≤19   | ≤24   | ≤19       | ≤24   | ≤24/≤28  |  | ≤35       |  | ≤42       |  |
| C4        | 26      | 31.5 | 31.5    | 41  | 31.5     | 41    | 59    | 41        | 60    | 66       |  | 80        |  | 114       |  |
| C5        | 30      | 50   | 50      | 70  | 50       | 70    | 110   | 70        | 110   | 110      |  | 114.3     |  | 114.3     |  |
| C6        | 5       | 5    | 5       | 5   | 5        | 6     | 14    | 6         | 14    | 10       |  | 9         |  | 24        |  |
| C7        | 48      | 60   | 60      | 80  | 60       | 80    | 130   | 80        | 130   | 130      |  | 180       |  | 180       |  |
| C8        | 107     | 116  | 147     | 160 | 168      | 184.5 | 202.5 | 214       | 244.5 | 325      |  | 352.5     |  | 441.5     |  |
| B1 h9     | 5       |      | 5       |     | 6        |       |       | 10        |       | 12       |  | 16        |  | 20        |  |
| H1        | 15      |      | 18      |     | 24.5     |       |       | 35        |       | 43       |  | 59        |  | 79.5      |  |

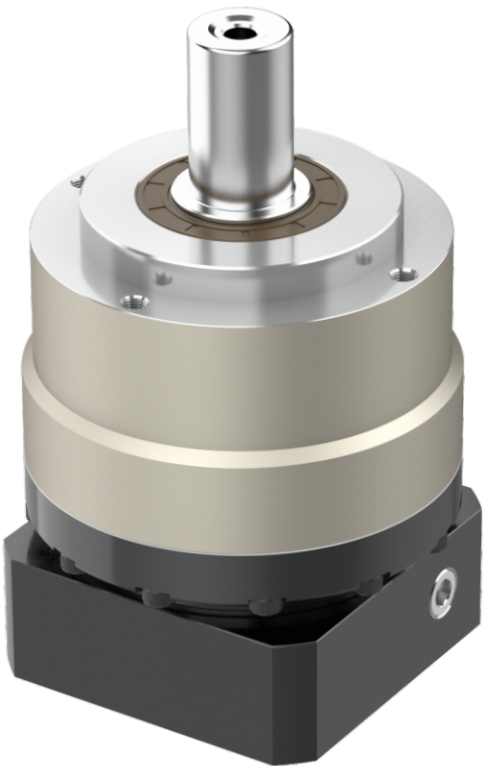
WAE

Series

Planetary Gearbox

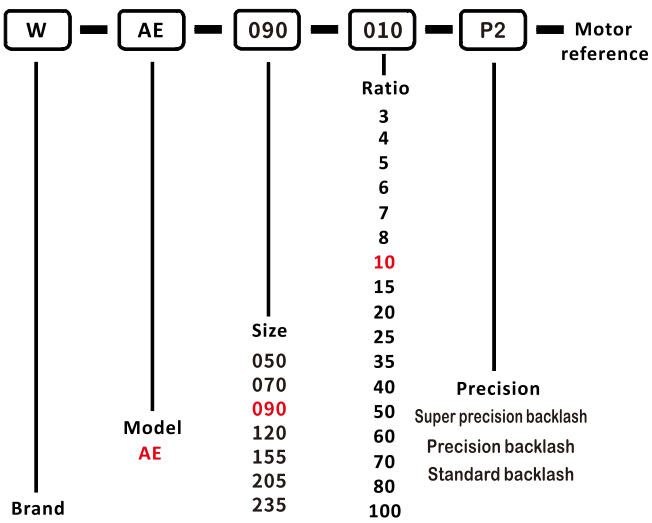
FEATURES

- » The planet gear carrier and output end adopt an integrated double-supported structure design to ensure maximum torsional rigidity, toughness, and rotational accuracy.
- » The planet gear adopts a full needle roller design to increase the contact area and improve the structural rigidity and output torque.
- » The gear uses low carbon steel carburized and quenched to achieve a surface hardness of HRC62 to obtain the best wear resistance and impact toughness.
- » The gear profile is designed with assistance from imported software to obtain the best possible design, thereby reducing noise.
- » The connection between the input end and the motor shaft adopts a double-sided clamping method to achieve maximum clamping force and zero backlash power transmission.



SELECTION

GENERAL NOTICES



- Type, model and torque
- Ratio or output speed
- Working conditions and connection methods
- Quantity and installed machine name
- Input mode and input speed
- Motor brand model or flange and motor shaft size



PLANETARY GEARBOX

Performance

| Specification                     | Unit   | Stage    | Ratio                        | WAE050                     | WAE070 | WAE090 | WAE120 | WAE155 | WAE205 | WAE235 |
|-----------------------------------|--------|----------|------------------------------|----------------------------|--------|--------|--------|--------|--------|--------|
| Rated output torque $T_{2N}$      | Nm     | 1        | 3                            | 20                         | 55     | 130    | 208    | 342    | 588    | 1140   |
|                                   |        |          | 4                            | 19                         | 50     | 140    | 290    | 542    | 1050   | 1700   |
|                                   |        |          | 5                            | 22                         | 60     | 160    | 330    | 650    | 1200   | 2000   |
|                                   |        |          | 6                            | 20                         | 55     | 150    | 310    | 600    | 1100   | 1900   |
|                                   |        |          | 7                            | 19                         | 50     | 140    | 300    | 550    | 1100   | 1800   |
|                                   |        |          | 8                            | 17                         | 45     | 120    | 260    | 500    | 1000   | 1600   |
|                                   |        | 2        | 10                           | 14                         | 40     | 100    | 230    | 450    | 900    | 1500   |
|                                   |        |          | 15                           | 20                         | 55     | 130    | 208    | 342    | 588    | 1140   |
|                                   |        |          | 20                           | 19                         | 50     | 140    | 290    | 542    | 1050   | 1700   |
|                                   |        |          | 25                           | 22                         | 60     | 160    | 330    | 650    | 1200   | 2000   |
|                                   |        |          | 30                           | 20                         | 55     | 150    | 310    | 600    | 1100   | 1900   |
|                                   |        |          | 35                           | 19                         | 50     | 140    | 300    | 550    | 1100   | 1800   |
|                                   |        |          | 40                           | 19                         | 50     | 140    | 290    | 542    | 1050   | 1700   |
|                                   |        |          | 50                           | 22                         | 60     | 160    | 330    | 650    | 1200   | 2000   |
|                                   |        |          | 60                           | 20                         | 55     | 150    | 310    | 600    | 1100   | 1900   |
|                                   |        |          | 70                           | 19                         | 50     | 140    | 300    | 550    | 1100   | 1800   |
|                                   |        |          | 80                           | 17                         | 45     | 120    | 260    | 500    | 1000   | 1600   |
|                                   |        |          | 100                          | 14                         | 40     | 100    | 230    | 450    | 900    | 1500   |
| Emergency stop torque $T_{2NOT}$  | Nm     | 1,2      | 3 ~ 100                      | Triple rated output torque |        |        |        |        |        |        |
| Rated input speed $n_{1N}$        | rpm    | 1,2      | 3 ~ 100                      | 5000                       | 5000   | 4000   | 4000   | 3000   | 3000   | 2000   |
| 1,2                               |        | 3 ~ 100  | 10000                        | 10000                      | 8000   | 8000   | 6000   | 6000   | 4000   |        |
| Maximum iutput speed $n_{1B}$     | arcmin | 1        | 3 ~ 10                       | -                          | ≤1.5   | ≤1.5   | ≤1.5   | ≤1.5   | ≤1.5   | ≤1.5   |
| 2                                 |        | 15 ~ 100 | -                            | ≤3                         | ≤3     | ≤3     | ≤3     | ≤3     | ≤3     |        |
| Super precision backlash $P_0$    | arcmin | 1        | 3 ~ 10                       | -                          | ≤3     | ≤3     | ≤3     | ≤3     | ≤3     | ≤3     |
| 2                                 |        | 15 ~ 100 | -                            | ≤5                         | ≤5     | ≤5     | ≤5     | ≤5     | ≤5     |        |
| Precision backlash $P_1$          | arcmin | 1        | 3 ~ 10                       | ≤12                        | ≤5     | ≤5     | ≤5     | ≤5     | ≤5     | ≤5     |
| 2                                 |        | 15 ~ 100 | ≤16                          | ≤8                         | ≤8     | ≤8     | ≤8     | ≤8     | ≤8     |        |
| Standard backlash $P_2$           | arcmin | 1        | 3 ~ 10                       | 3                          | 7      | 14     | 25     | 50     | 145    | 225    |
| 2                                 |        | 15 ~ 100 | 780                          | 1530                       | 3250   | 6700   | 9400   | 14500  | 20000  |        |
| Torsional rigidity                | N      | 1,2      | 3 ~ 100                      | 390                        | 765    | 1625   | 3350   | 4700   | 7250   | 10000  |
| Allowable radial force $F_{2aB}$  | N      | 1,2      | 3 ~ 100                      | 20000                      |        |        |        |        |        |        |
| Allowable axial force $F_{2aB}$   | hr     | 1,2      | 3 ~ 10                       | ≥97 %                      |        |        |        |        |        |        |
| Lifespan                          | %      | 2        | 15 ~ 100                     | ≥94 %                      |        |        |        |        |        |        |
| Efficiency                        | kg     | 1        | 3 ~ 10                       | 0.6                        | 1.2    | 3.7    | 7.5    | 16     | 36     | 53     |
|                                   |        | 2        | 15 ~ 100                     | 0.7                        | 1.6    | 4.2    | 10.7   | 17     | 37     | 54     |
| Weight                            | ℃      | 1,2      | 3 ~ 100                      | -20℃~+40℃                  |        |        |        |        |        |        |
| Use of temperature                |        | 1,2      | Synthetic lubricating grease |                            |        |        |        |        |        |        |
| Lubricating                       |        | 1,2      | 3 ~ 100                      | IP65                       |        |        |        |        |        |        |
| IP Grade                          |        | 1,2      | 3 ~ 100                      | In any direction           |        |        |        |        |        |        |
| Installation direction            |        | 1,2      | 3 ~ 100                      | In any direction           |        |        |        |        |        |        |
| Noise level (n1=3000rpm,off load) | dB(A)  | 1,2      | 3 ~ 100                      | ≤56                        | ≤58    | ≤60    | ≤63    | ≤65    | ≤67    | ≤70    |

ROTATIONAL INERTIA OF REDUCER

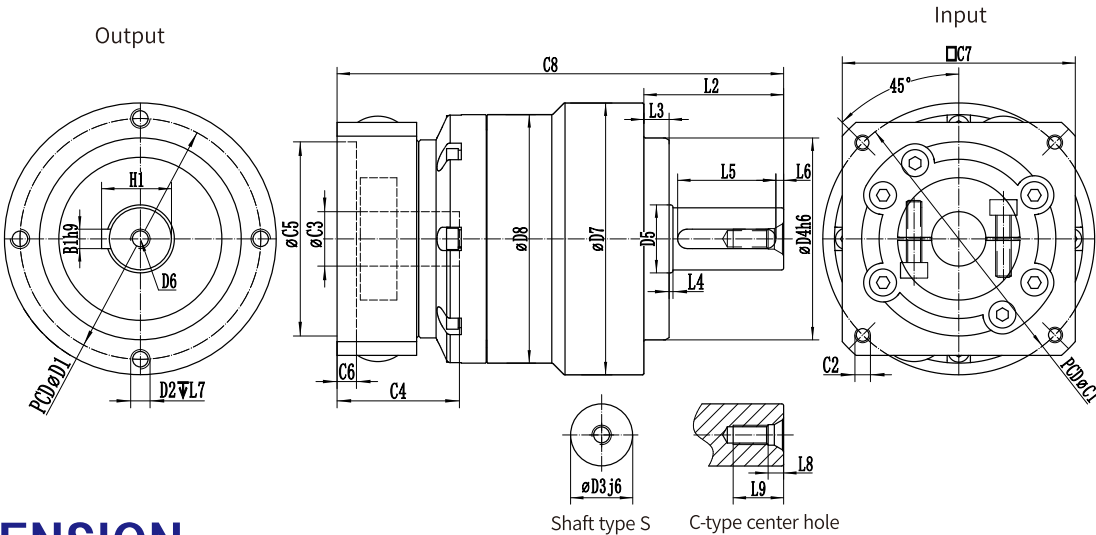
Rotational inertia

| Specification            | Unit                 | Stage | Ratio | WAE050 | WAE070 | WAE090 | WAE120 | WAE155 | WAE205 | WAE235 |
|--------------------------|----------------------|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| Rotational inertia $J_1$ | kg · cm <sup>2</sup> | 1     | 3     | 0.03   | 0.16   | 0.61   | 3.25   | 9.21   | 28.98  | 69.61  |
|                          |                      |       | 4     | 0.03   | 0.14   | 0.48   | 2.74   | 7.54   | 23.67  | 54.37  |
|                          |                      |       | 5     | 0.03   | 0.13   | 0.47   | 2.71   | 7.42   | 23.29  | 53.27  |
|                          |                      |       | 6     | 0.03   | 0.13   | 0.45   | 2.65   | 7.25   | 22.75  | 51.72  |
|                          |                      |       | 7     | 0.03   | 0.13   | 0.45   | 2.62   | 7.14   | 22.48  | 50.97  |
|                          |                      |       | 8     | 0.03   | 0.13   | 0.44   | 2.58   | 7.07   | 22.59  | 50.84  |
|                          |                      |       | 10    | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  | 50.56  |
|                          |                      | 2     | 15    | 0.03   | 0.03   | 0.13   | 0.47   | 2.71   | 7.42   | 23.29  |
|                          |                      |       | 20    | 0.03   | 0.03   | 0.13   | 0.47   | 2.71   | 7.42   | 23.29  |
|                          |                      |       | 25    | 0.03   | 0.03   | 0.13   | 0.47   | 2.71   | 7.42   | 23.29  |
|                          |                      |       | 30    | 0.03   | 0.03   | 0.13   | 0.47   | 2.71   | 7.42   | 23.29  |
|                          |                      |       | 35    | 0.03   | 0.03   | 0.13   | 0.47   | 2.71   | 7.42   | 23.29  |
|                          |                      |       | 40    | 0.03   | 0.03   | 0.13   | 0.47   | 2.71   | 7.42   | 23.29  |
|                          |                      |       | 50    | 0.03   | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  |
|                          |                      |       | 60    | 0.03   | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  |
|                          |                      |       | 70    | 0.03   | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  |
|                          |                      |       | 80    | 0.03   | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  |
|                          |                      |       | 100   | 0.03   | 0.03   | 0.13   | 0.44   | 2.57   | 7.03   | 22.51  |

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

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

3. Output speed100rpm,acting on the center of the output shaft

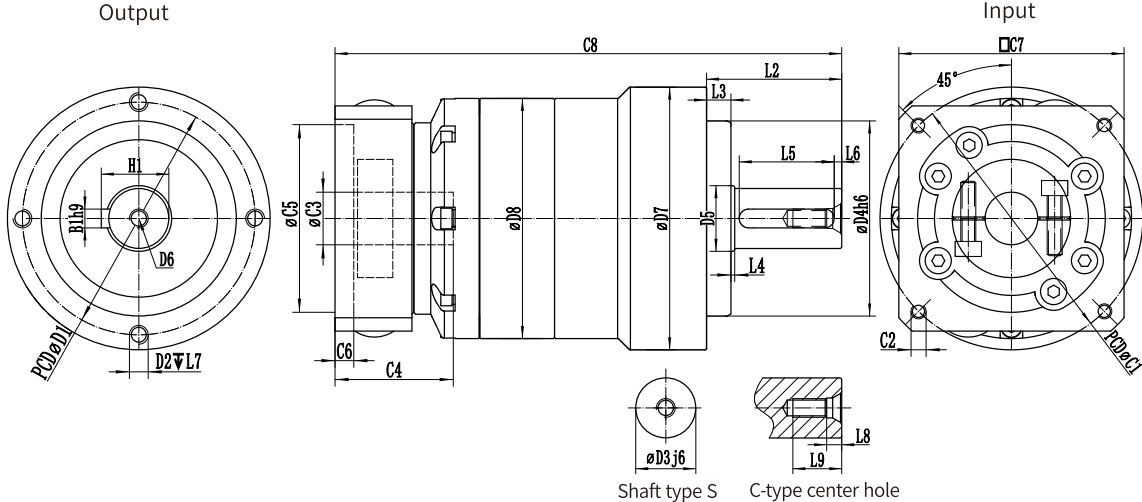


DIMENSION

SINGLE SECTION

Dimension(single stage,Ratio i=3~10)

| Dimension | WAE050  | WAE070  | WAE090   | WAE120    | WAE155   | WAE205    | WAE235   |
|-----------|---------|---------|----------|-----------|----------|-----------|----------|
| D1        | 44      | 62      | 80       | 108       | 140      | 184       | 210      |
| D2        | M4*0.7P | M5*0.8P | M6*1.0P  | M8*1.25P  | M10*1.5P | M12*1.75P | M16*2.0P |
| D3 j6     | 12      | 16      | 22       | 32        | 40       | 55        | 75       |
| D4 g6     | 35      | 52      | 68       | 90        | 120      | 160       | 180      |
| D5        | 15      | 18      | 30       | 40        | 50       | 70        | 85       |
| D6        | M4*0.7P | M5*0.8P | M8*1.25P | M12*1.75P | M16*2.0P | M20*2.5P  | M20*2.5P |
| D7        | 50      | 70      | 90       | 120       | 155      | 205       | 235      |
| D8        | 53      | 64      | 94       | 125       | 150      | 200       | 225      |
| L1        | -       | -       | -        | -         | -        | -         | -        |
| L2        | 24.5    | 36      | 46       | 70        | 97       | 100       | 126      |
| L3        | 4       | 6.5     | 8        | 17        | 15       | 15        | 18       |
| L4        | 1       | 1       | 1        | 1.5       | 3        | 3         | 3        |
| L5        | 14      | 25      | 32       | 40        | 63       | 70        | 90       |
| L6        | 2       | 2       | 3        | 5         | 5        | 6         | 7        |
| L7        | 10      | 10      | 12       | 16        | 20       | 22        | 28       |
| L8        | 3.2     | 4.8     | 7.2      | 10        | 12       | 15        | 15       |
| L9        | 10      | 12.5    | 19       | 28        | 36       | 42        | 42       |
| C1        | 46      | 70      | 90       | 90        | 145      | 145       | 200      |
| C2        | M4*0.7P | M4      | M5       | M5        | M8       | M8        | M12      |
| C3        | ≤8      | ≤14     | ≤19      | ≤19       | ≤24      | ≤24       | ≤35      |
| C4        | 26      | 31.5    | 41       | 41        | 59       | 60        | 81       |
| C5        | 30      | 50      | 70       | 70        | 110      | 110       | 114.3    |
| C6        | 5       | 5       | 5        | 6         | 14       | 14        | 19       |
| C7        | 42      | 60      | 80       | 80        | 130      | 130       | 180      |
| C8        | 86      | 115     | 128      | 147       | 165      | 199.5     | 221.5    |
| B1 h9     | 4       | 5       | 6        | 10        | 12       | 16        | 20       |
| H1        | 13.5    | 18      | 24.5     | 35        | 43       | 59        | 79.5     |



DIMENSION

DOUBLE SECTION

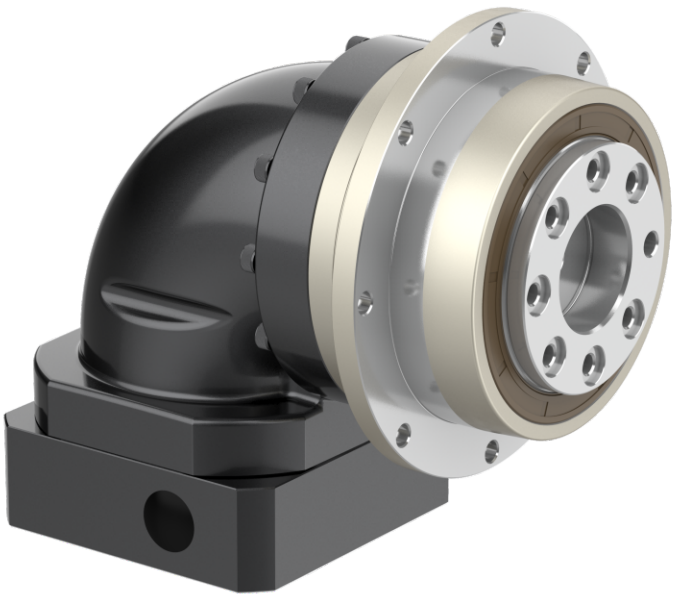
Dimension(double stage,Ratio i=15~100)

| Dimension | WAE050  | WAE070  | WAE090   | WAE120    | WAE155   | WAE205    | WAE235   |
|-----------|---------|---------|----------|-----------|----------|-----------|----------|
| D1        | 44      | 62      | 80       | 108       | 140      | 184       | 210      |
| D2        | M4*0.7P | M5*0.8P | M6*1.0P  | M8*1.25P  | M10*1.5P | M12*1.75P | M16*2.0P |
| D3 j6     | 12      | 16      | 22       | 32        | 40       | 55        | 75       |
| D4 g6     | 35      | 52      | 68       | 90        | 120      | 160       | 180      |
| D5        | 15      | 18      | 30       | 40        | 50       | 70        | 85       |
| D6        | M4*0.7P | M5*0.8P | M8*1.25P | M12*1.75P | M16*2.0P | M20*2.5P  | M20*2.5P |
| D7        | 50      | 70      | 90       | 120       | 155      | 205       | 235      |
| D8        | 53      | 64      | 94       | 125       | 150      | 200       | 225      |
| L1        | -       | -       | -        | -         | -        | -         | -        |
| L2        | 24.5    | 36      | 46       | 70        | 97       | 100       | 126      |
| L3        | 4       | 6.5     | 8        | 17        | 15       | 15        | 18       |
| L4        | 1       | 1       | 1        | 1.5       | 3        | 3         | 3        |
| L5        | 14      | 25      | 32       | 40        | 63       | 70        | 90       |
| L6        | 2       | 2       | 3        | 5         | 5        | 6         | 7        |
| L7        | 10      | 10      | 12       | 16        | 20       | 22        | 28       |
| L8        | 3.2     | 4.8     | 7.2      | 10        | 12       | 15        | 15       |
| L9        | 10      | 12.5    | 19       | 28        | 36       | 42        | 42       |
| C1        | 46      | 70      | 90       | 70        | 90       | 145       | 90       |
| C2        | M4*0.7P | M4      | M5       | M4        | M5       | M8        | M5       |
| C3        | ≤8      | ≤14     | ≤19      | ≤14       | ≤19      | ≤24       | ≤19      |
| C4        | 26      | 31.5    | 41       | 31.5      | 41       | 59        | 41       |
| C5        | 30      | 50      | 70       | 50        | 70       | 110       | 70       |
| C6        | 5       | 5       | 5        | 5         | 6        | 14        | 6        |
| C7        | 42      | 60      | 80       | 60        | 80       | 130       | 80       |
| C8        | 107     | 147     | 160      | 168       | 184.5    | 202.5     | 214      |
| B1 h9     | 4       | 5       | 6        | 10        | 12       | 16        | 20       |
| H1        | 13.5    | 18      | 24.5     | 35        | 43       | 59        | 79.5     |

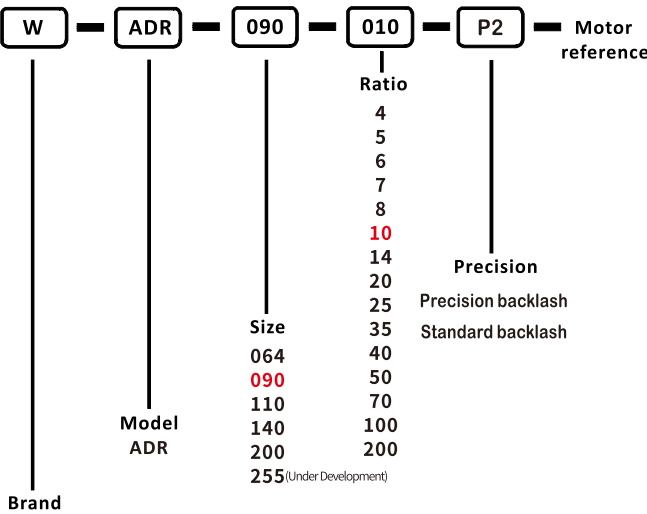
# WADR Series Planetary Gearbox

## FEATURES

- » Planet gear carrier and output shaft are integrated structure designed to ensure maximum torsional rigidity.
- » Planet gear with full needle design, increase the contact area to improve the rigidity and output torque.
- » The gears are carburized and quenched to the HRC62 with low carbon steel surface for optimum wear and impact toughness.
- » Gears refer to foreign imported software-assisted design to obtain the best tooth shape to reduce noise.
- » Adopt spiral bevel gear design, allow high output torque, more than 30% higher than straight bevel gear.
- » High allowable input speed, more than 8 times higher than straight bevel gear input.
- » The meshing tooth imprint of spiral bevel gear has been optimized by optimum design, thus ensuring even load on the contact tooth surface and a long service life.
- » Spiral bevel gears are meshed by optimum motion error analysis and strict process control to ensure high precision running backlash.



## SELECTION



## GENERAL NOTICES

- Type, model and torque
- Ratio or output speed
- Working conditions and connection methods
- Quantity and installed machine name
- Input mode and input speed
- Motor brand model or flange and motor shaft size

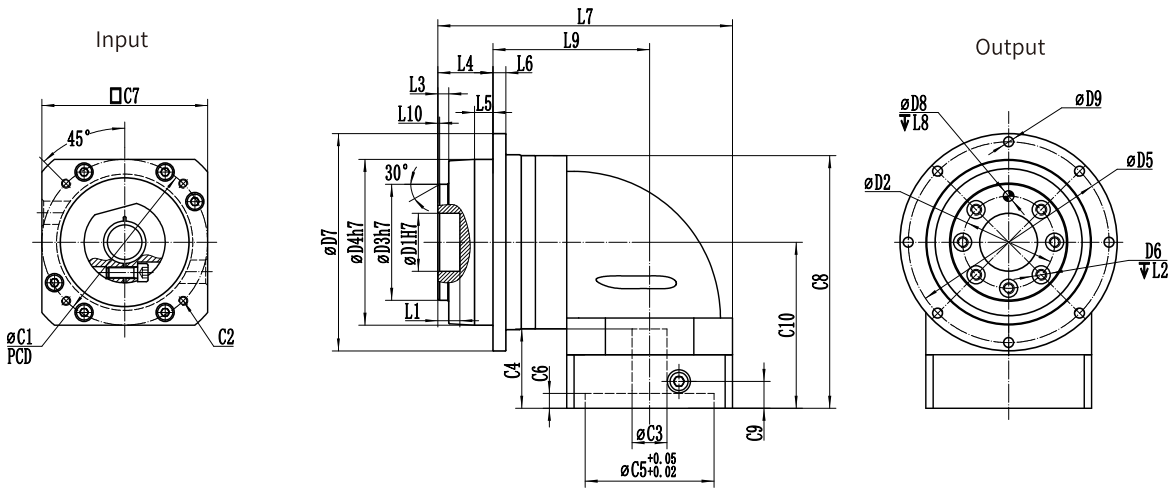
PLANETARY GEARBOX

Performance

| Specification                           | Unit      | Stage                        | Ratio  | WADR064                    | WADR090 | WADR110 | WADR140 | WADR200 | WADR255 |
|-----------------------------------------|-----------|------------------------------|--------|----------------------------|---------|---------|---------|---------|---------|
| Rated output torqueT <sub>2N</sub>      | Nm        | 1                            | 4      | 48                         | 130     | 270     | 560     | 1100    | -       |
|                                         |           |                              | 5      | 60                         | 160     | 330     | 650     | 1200    | -       |
|                                         |           |                              | 6      | 50                         | 140     | 300     | 550     | 1100    | -       |
|                                         |           |                              | 7      | 50                         | 140     | 300     | 550     | 1100    | -       |
|                                         |           |                              | 8      | 48                         | 130     | 270     | 560     | 1100    | -       |
|                                         |           |                              | 10     | 60                         | 160     | 330     | 650     | 1200    | -       |
|                                         |           |                              | 14     | 50                         | 140     | 300     | 550     | 1100    | -       |
|                                         |           |                              | 20     | 40                         | 100     | 230     | 450     | 900     | -       |
|                                         |           | 2                            | 25     | 60                         | 160     | 330     | 650     | 1200    | -       |
|                                         |           |                              | 35     | 50                         | 140     | 300     | 550     | 1100    | -       |
|                                         |           |                              | 40     | 48                         | 130     | 270     | 560     | 1100    | -       |
|                                         |           |                              | 50     | 60                         | 160     | 330     | 650     | 1200    | -       |
|                                         |           |                              | 70     | 50                         | 140     | 300     | 550     | 1100    | -       |
|                                         |           |                              | 100    | 60                         | 160     | 330     | 650     | 1200    | -       |
|                                         |           |                              | 140    | 50                         | 140     | 300     | 550     | 1100    | -       |
|                                         |           |                              | 200    | 40                         | 100     | 230     | 450     | 900     | -       |
| Emergency stop torque T <sub>2NOT</sub> | Nm        | 1,2                          | 4~200  | Triple rated output torque |         |         |         |         |         |
| Rated input speed Π <sub>1N</sub>       | rpm       | 1,2                          | 4~200  | 5000                       | 4000    | 4000    | 3000    | 3000    | -       |
| Maximum iutput speed Π <sub>1B</sub>    | rpm       | 1,2                          | 4~200  | 10000                      | 8000    | 8000    | 6000    | 6000    | -       |
| Precision backlashP <sub>1</sub>        | arcmin    | 1                            | 4~20   | ≤5                         | ≤5      | ≤5      | ≤5      | ≤5      | -       |
|                                         |           | 2                            | 25~200 | ≤7                         | ≤7      | ≤7      | ≤7      | ≤7      | -       |
| Standard backlashP <sub>2</sub>         | arcmin    | 1                            | 4~20   | ≤7                         | ≤7      | ≤7      | ≤7      | ≤7      | -       |
|                                         |           | 2                            | 25~200 | ≤10                        | ≤10     | ≤10     | ≤10     | ≤10     | -       |
| Torsional rigidity                      | Nm/arcmin | 1,2                          | 4~200  | 13                         | 31      | 82      | 151     | 440     | -       |
| Maximum bending torque M <sub>2KB</sub> | Nm        | 1,2                          | 4~200  | 125                        | 235     | 430     | 1300    | 3064    | -       |
| Allowable axial force F <sub>2aB</sub>  | N         | 1,2                          | 4~200  | 1050                       | 2850    | 2990    | 10590   | 16660   | -       |
| Lifespan                                | hr        | 1,2                          | 4~200  | 20000                      |         |         |         |         |         |
| Efficiency                              | %         | 1                            | ≥95%   |                            |         |         |         |         |         |
|                                         |           | 2                            | ≥92%   |                            |         |         |         |         |         |
| Weight                                  | kg        | 1                            | 4~20   | 1.9                        | 4.5     | 9.8     | 20.1    | 46.6    | -       |
|                                         |           | 2                            | 25~200 | 2.1                        | 5.9     | 10.5    | 21.9    | 53.9    | -       |
| Use of temperature                      | ℃         | 1,2                          | 4~200  | -20℃~+40℃                  |         |         |         |         |         |
| Lubricating                             |           | Synthetic lubricating grease |        |                            |         |         |         |         |         |
| IP Grade                                |           | 1,2                          | 4~200  | IP65                       |         |         |         |         |         |
| Installation direction                  |           | 1,2                          | 4~200  | In any direction           |         |         |         |         |         |
| Noise level (n1=3000rpm,off load)       | dB(A)     | 1,2                          | 4~200  | ≤63                        | ≤65     | ≤68     | ≤70     | ≤72     | -       |

Rotational inertia

| Specification            | Unit  | Stage | Ratio   | WADR064 | WADR090 | WADR110 | WADR140 | WADR200 | WADR255 |
|--------------------------|-------|-------|---------|---------|---------|---------|---------|---------|---------|
| Rotational inertia $J_1$ | kg·cm | 1     | 4~10    | 0.35    | 2.25    | 6.84    | 23.4    | -       | -       |
|                          |       |       | 14      | 0.07    | 1.87    | 6.25    | 21.8    | -       | -       |
|                          |       |       | 20      | 0.07    | 1.87    | 6.25    | 21.8    | -       | -       |
|                          |       | 2     | 25~100  | 0.09    | 0.35    | 2.25    | 6.84    | -       | -       |
|                          |       |       | 140~200 | -       | 0.31    | 1.87    | 6.25    | -       | -       |

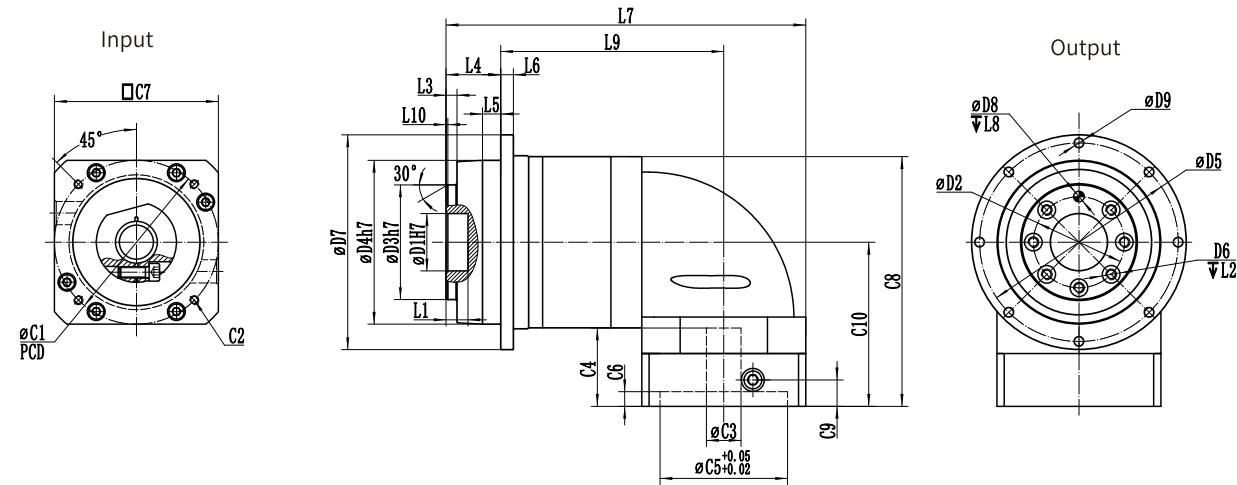


DIMENSION  
SINGLE SECTION

Dimension(single stage,Ratio i=4~20)

| Dimension | WADR064 | WADR090 | WADR110 | WADR140 | WADR200 | WADR255 |
|-----------|---------|---------|---------|---------|---------|---------|
| D1H7      | 20      | 31.5    | 40      | 50      | 80      | -       |
| D2        | 31.5    | 50      | 63      | 80      | 125     | -       |
| D3h7      | 40      | 63      | 80      | 100     | 160     | -       |
| D4h7      | 64      | 90      | 110     | 140     | 200     | -       |
| D5        | 79      | 109     | 135     | 168     | 233     | -       |
| D6        | 7-M5    | 7-M6    | 11-M6   | 11-M8   | 11-M10  | -       |
| D7        | 86      | 118     | 145     | 179     | 247     | -       |
| D8H7      | 5       | 6       | 6       | 8       | 10      | -       |
| D9        | 8-4.5   | 8-5.5   | 8-5.5   | 12-6.6  | 12-9    | -       |
| L1        | 8       | 12      | 12      | 12      | 16      | -       |
| L2        | 9       | 12      | 12      | 17      | 23      | -       |
| L3        | 3       | 6       | 6       | 6       | 8       | -       |
| L4        | 19.5    | 30      | 29      | 38      | 50      | -       |
| L5        | 7       | 10      | 10      | 14.6    | 15      | -       |
| L6        | 4       | 7       | 8       | 10      | 12      | -       |
| L7        | 113.2   | 160     | 187     | 241.5   | 301.5   | -       |
| L8        | 6       | 7       | 7       | 7       | 10      | -       |
| L9        | 63.7    | 85      | 100.5   | 132.5   | 161.5   | -       |
| L10       | 0.5     | 1       | 1       | 1       | 1.5     | -       |
| C1        | 70      | 90      | 145     | 200     | 200     | -       |
| C2        | 4-M4    | 4-M5    | 4-M8    | 4-M12   | 4-M12   | -       |
| C3        | 14      | .19     | 24      | 35      | 42      | -       |
| C4        | 35      | 43      | 71      | 86      | 119     | -       |
| C5        | 50      | 70      | 110     | 114.3   | 114.3   | -       |
| C6        | 5       | 8       | 14      | 19      | 15      | -       |
| C7        | 60      | 90      | 130     | 180     | 180     | -       |
| C8        | 103.9   | 137.1   | 189     | 237.5   | 300.5   | -       |
| C9        | 11.5    | 14.5    | 27      | 32      | 65      | -       |
| C10       | 71.9    | 90.1    | 126.5   | 162.5   | 162.5   | -       |





# DIMENSION

## SINGLE SECTION

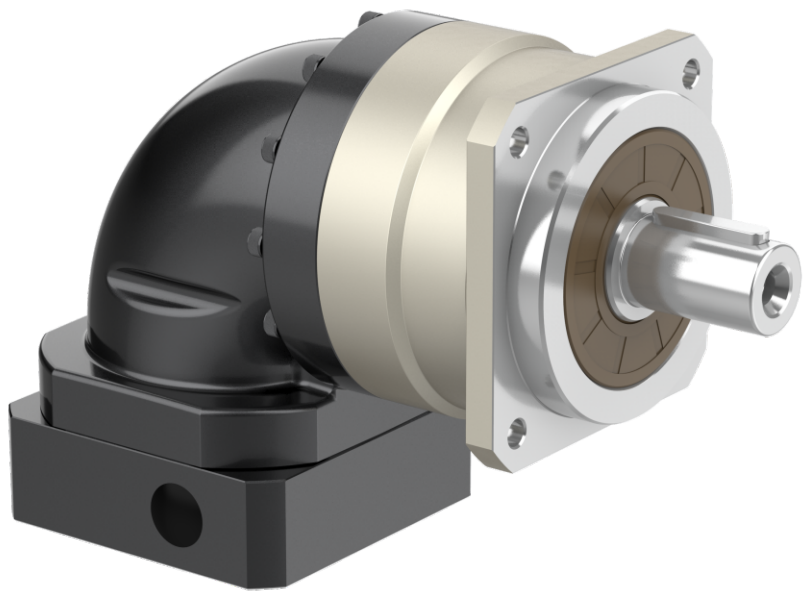
Dimension(double stage,Ratio i=25~200)

| Dimension | WADR064 | WADR090 | WADR110 | WADR140 | WADR200 | WADR255 |
|-----------|---------|---------|---------|---------|---------|---------|
| D1H7      | 20      | 31.5    | 40      | 50      | 80      | -       |
| D2        | 31.5    | 50      | 63      | 80      | 125     | -       |
| D3h7      | 40      | 63      | 80      | 100     | 160     | -       |
| D4h7      | 64      | 90      | 110     | 140     | 200     | -       |
| D5        | 79      | 109     | 135     | 168     | 233     | -       |
| D6        | 7-M5    | 7-M6    | 11-M6   | 11-M8   | 11-M10  | -       |
| D7        | 86      | 118     | 145     | 179     | 247     | -       |
| D8H7      | 5       | 6       | 6       | 8       | 10      | -       |
| D9        | 8-4.5   | 8-5.5   | 8-5.5   | 12-6.6  | 12-9    | -       |
| L1        | 8       | 12      | 12      | 12      | 16      | -       |
| L2        | 9       | 12      | 12      | 17      | 23      | -       |
| L3        | 3       | 6       | 6       | 6       | 8       | -       |
| L4        | 19.5    | 30      | 29      | 38      | 50      | -       |
| L5        | 7       | 10      | 10      | 14.6    | 15      | -       |
| L6        | 4       | 7       | 8       | 10      | 12      | -       |
| L7        | 145.2   | 197.5   | 232     | 302.5   | 339     | -       |
| L8        | 6       | 7       | 7       | 7       | 10      | -       |
| L9        | 95.7    | 122.5   | 145.5   | 193.5   | 199     | -       |
| L10       | 0.5     | 1       | 1       | 1       | 1.5     | -       |
| C1        | 70      | 90      | 145     | 200     | 200     | -       |
| C2        | 4-M4    | 4-M5    | 4-M8    | 4-M12   | 4-M12   | -       |
| C3        | 14      | 19      | 24      | 35      | 42      | -       |
| C4        | 35      | 43      | 71      | 86      | 119     | -       |
| C5        | 50      | 70      | 110     | 114.3   | 114.3   | -       |
| C6        | 5       | 8       | 14      | 19      | 15      | -       |
| C7        | 60      | 90      | 130     | 180     | 180     | -       |
| C8        | 103.9   | 137.1   | 189     | 237.5   | 300.5   | -       |
| C9        | 11.5    | 14.5    | 27      | 32      | 65      | -       |
| C10       | 71.9    | 90.1    | 126.5   | 162.5   | 162.5   | -       |

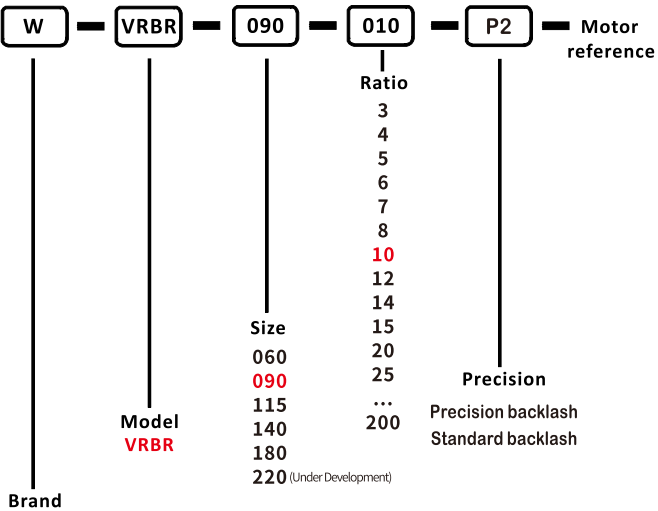
# WVRBR Series Planetary Gearbox

## FEATURES

- » Planet gear carrier and output shaft are integrated structure designed to ensure maximum torsional rigidity.
- » Planet gear with full needle design, increase the contact area to improve the rigidity and output torque.
- » The gears are carburized and quenched to the HRC62 with low carbon steel surface for optimum wear and impact toughness.
- » Gears refer to foreign imported software-assisted design to obtain the best tooth shape to reduce noise.
- » Adopt spiral bevel gear design, allow high output torque, more than 30% higher than straight bevel gear.
- » High allowable input speed, more than 8 times higher than straight bevel gear input.
- » The meshing tooth imprint of spiral bevel gear has been optimized by optimum design, thus ensuring even load on the contact tooth surface and a long service life.
- » Spiral bevel gears are meshed by optimum motion error analysis and strict process control to ensure high precision running backlash.



SELECTION



GENERAL NOTICES

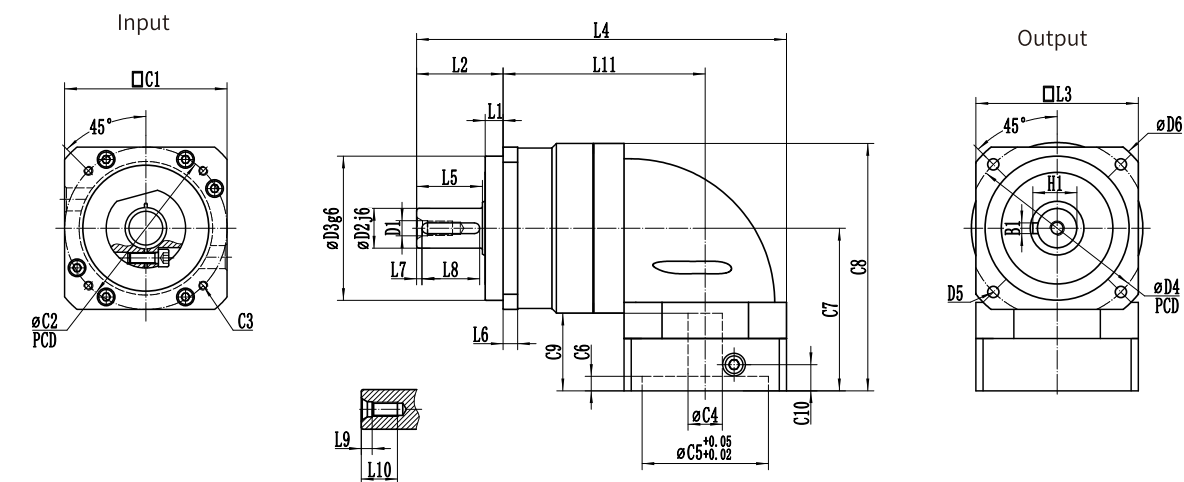
- Type, model and torque
- Ratio or output speed
- Working conditions and connection methods
- Quantity and installed machine name
- Input mode and input speed
- Motor brand model or flange and motor shaft size

Performance

| Specification                    | Unit      | Stage | Ratio                        | WVRBR060                   | WVRBR090 | WVRBR115 | WVRBR140 | WVRBR180 | WVRBR220 |
|----------------------------------|-----------|-------|------------------------------|----------------------------|----------|----------|----------|----------|----------|
| Rated output torque $T_{2N}$     | Nm        | 1     | 3                            | 55                         | 130      | 208      | 342      | 588      | -        |
|                                  |           |       | 4                            | 50                         | 140      | 290      | 540      | 1050     | -        |
|                                  |           |       | 5                            | 60                         | 160      | 330      | 650      | 1200     | -        |
|                                  |           |       | 6                            | 55                         | 150      | 310      | 600      | 1100     | -        |
|                                  |           |       | 7                            | 50                         | 140      | 300      | 550      | 1100     | -        |
|                                  |           |       | 8                            | 50                         | 140      | 290      | 542      | 1050     | -        |
|                                  |           |       | 10                           | 60                         | 160      | 330      | 650      | 1200     | -        |
|                                  |           |       | 12                           | 55                         | 150      | 310      | 600      | 1100     | -        |
|                                  |           |       | 14                           | 50                         | 140      | 300      | 550      | 1100     | -        |
|                                  |           |       | 20                           | 40                         | 100      | 230      | 450      | 900      | -        |
|                                  |           | 2     | 15                           | 55                         | 130      | 208      | 342      | 588      | -        |
|                                  |           |       | 25                           | 60                         | 160      | 330      | 650      | 1200     | -        |
|                                  |           |       | 30                           | 55                         | 130      | 208      | 342      | 588      | -        |
|                                  |           |       | 35                           | 50                         | 140      | 300      | 550      | 1100     | -        |
|                                  |           |       | 40                           | 50                         | 140      | 290      | 542      | 1050     | -        |
|                                  |           |       | 50                           | 60                         | 160      | 330      | 650      | 1200     | -        |
|                                  |           |       | 60                           | 55                         | 150      | 310      | 600      | 1100     | -        |
|                                  |           |       | 70                           | 50                         | 140      | 300      | 550      | 1100     | -        |
|                                  |           |       | 80                           | 50                         | 140      | 290      | 542      | 1050     | -        |
|                                  |           |       | 100                          | 60                         | 160      | 330      | 650      | 1200     | -        |
| 120                              | 55        | 150   | 310                          | 600                        | 1100     | -        |          |          |          |
| Emergency stop torque $T_{2NOT}$ | Nm        | 1,2   | 3~200                        | Triple rated output torque |          |          |          |          |          |
| Rated input speed $n_{1N}$       | rpm       | 1,2   | 3~200                        | 5000                       | 4000     | 4000     | 3000     | 3000     | -        |
| Maximum iutput speed $n_{1B}$    | rpm       | 1,2   | 3~200                        | 10000                      | 8000     | 8000     | 6000     | 6000     | -        |
| Precision backlash $P_1$         | arcmin    | 1     | 3~20                         | ≤5                         | ≤5       | ≤5       | ≤5       | ≤5       | -        |
|                                  |           | 2     | 15~200                       | ≤7                         | ≤7       | ≤7       | ≤7       | ≤7       | -        |
| Standard backlash $P_2$          | arcmin    | 1     | 3~20                         | ≤7                         | ≤7       | ≤7       | ≤7       | ≤7       | -        |
|                                  |           | 2     | 15~200                       | ≤10                        | ≤10      | ≤10      | ≤10      | ≤10      | -        |
| Torsional rigidity               | Nm/arcmin | 1,2   | 3~200                        | 7                          | 14       | 25       | 50       | 145      | -        |
| Allowable radial force $F_{2aB}$ | N         | 1,2   | 3~200                        | 1530                       | 3250     | 6700     | 9400     | 14500    | -        |
| Allowable axial force $F_{2aB}$  | N         | 1,2   | 3~200                        | 765                        | 1625     | 3350     | 4700     | 7250     | -        |
| Lifespan                         | hr        | 1,2   | 3~200                        | 20000                      |          |          |          |          |          |
| Efficiency                       | %         | 1     | 3~20                         | 95%                        |          |          |          |          |          |
|                                  |           | 2     | 25~200                       | 92%                        |          |          |          |          |          |
| Weight                           | kg        | 1     | 3~20                         | 2.1                        | 6.4      | 13       | 24.5     | 51       | -        |
|                                  |           | 2     | 25~200                       | 1.5                        | 7.8      | 14.2     | 27.5     | 54       | -        |
| Use of temperature               | °C        | 1,2   | 3~200                        | -20°C~+40°C                |          |          |          |          |          |
| Lubricating                      |           |       | Synthetic lubricating grease |                            |          |          |          |          |          |
| IP Grade                         |           | 1,2   | 3~200                        | IP65                       |          |          |          |          |          |
| Installation direction           |           |       | 3~200                        | In any direction           |          |          |          |          |          |
| Noise level (n1=3000, off load)  | dB(A)     | 1,2   | 3~200                        | ≤63                        | ≤65      | ≤68      | ≤70      | ≤72      | -        |

Rotational inertia

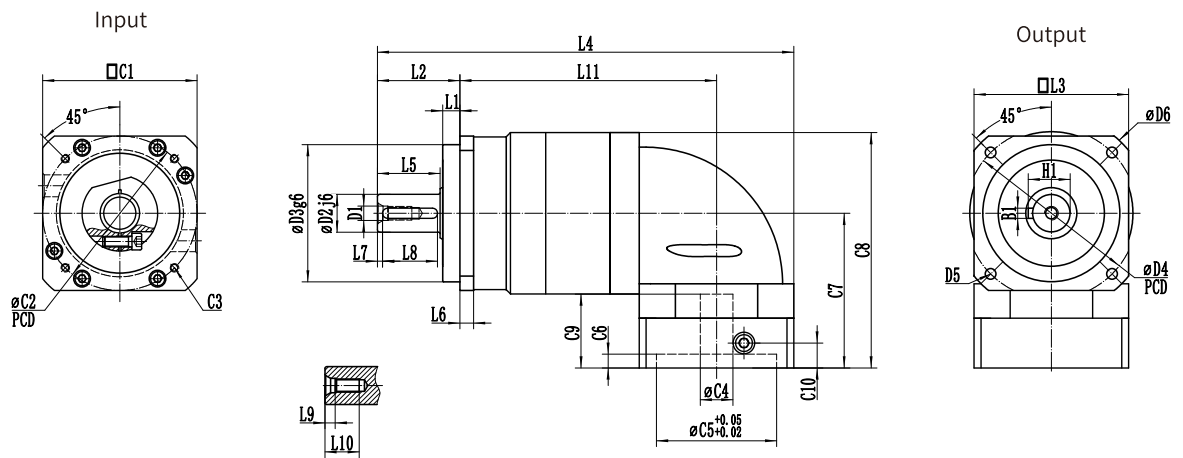
| Specification            | Unit               | Stage | Ratio   | WVRBR060 | WVRBR090 | WVRBR115 | WVRBR140 | WVRBR180 | WVRBR220 |
|--------------------------|--------------------|-------|---------|----------|----------|----------|----------|----------|----------|
| Rotational inertia $J_1$ | kg.cm <sup>2</sup> | 1     | 3~10    | 0.35     | 2.25     | 6.84     | 23.4     | 68.9     | -        |
|                          |                    |       | 12~14   | 0.07     | 1.87     | 6.25     | 21.8     | 65.6     | -        |
|                          |                    |       | 20      | 0.07     | 1.87     | 6.25     | 21.8     | 65.6     | -        |
|                          |                    | 2     | 15      | 0.35     | 2.25     | 6.84     | 23.4     | 68.9     | -        |
|                          |                    |       | 25~100  | 0.09     | 0.35     | 2.25     | 6.84     | 23.4     | -        |
|                          |                    |       | 120~200 | 0.01     | 0.31     | 1.87     | 6.25     | 21.8     | -        |



DIMENSION  
DOUBLE SECTION

Dimension(single stage,Ratio i=3~20)

| Dimension | WVRBR060 | WVRBR090 | WVRBR115 | WVRBR140 | WVRBR180 | WVRBR220 |
|-----------|----------|----------|----------|----------|----------|----------|
| D1        | M5       | M8       | M12      | M16      | M20      | -        |
| D2j6      | 16       | 22       | 32       | 40       | 55       | -        |
| D3g6      | 50       | 80       | 110      | 130      | 160      | -        |
| D4        | 70       | 100      | 130      | 165      | 215      | -        |
| D5        | 4-5.5    | 4-6.6    | 4-9      | 4-11     | 4-13.5   | -        |
| D6        | 80       | 116      | 152      | 185      | 240      | -        |
| L1        | 7        | 10       | 7        | 13       | 20       | -        |
| L2        | 37       | 48       | 60       | 95       | 105      | -        |
| L3        | 60       | 90       | 115      | 140      | 180      | -        |
| L4        | 152.2    | 205      | 259      | 347      | 394      | -        |
| L5        | 28.5     | 36.5     | 51       | 79       | 82       | -        |
| L6        | 6        | 8        | 10       | 12       | 15       | -        |
| L7        | 2        | 3        | 5        | 5        | 6        | -        |
| L8        | 25       | 32       | 40       | 63       | 70       | -        |
| L9        | 4        | 6        | 10       | 12       | 11.5     | -        |
| L10       | 13       | 20       | 28       | 36       | 42       | -        |
| L11       | 85.2     | 112      | 141.5    | 181      | 199      | -        |
| C1        | 60       | 90       | 130      | 180      | 180      | -        |
| C2        | 70       | 90       | 145      | 200      | 200      | -        |
| C3        | 4-M4     | 4-M5     | 4-M8     | 4-M12    | 4-M12    | -        |
| C4        | 14       | 19       | 24       | 35       | 42       | -        |
| C5        | 50       | 70       | 110      | 114.3    | 114.3    | -        |
| C6        | 5        | 8        | 14       | 19       | 15       | -        |
| C7        | 71.9     | 90.1     | 126.5    | 162.5    | 195.5    | -        |
| C8        | 103.9    | 137.1    | 189      | 237.5    | 295.5    | -        |
| C9        | 35       | 43       | 71       | 86       | 119      | -        |
| C10       | 11.5     | 14.5     | 27       | 32       | 65       | -        |
| B1        | 5        | 6        | 10       | 12       | 16       | -        |
| H1        | 18       | 24.5     | 35       | 43       | 59       | -        |



DIMENSION  
DOUBLE SECTION

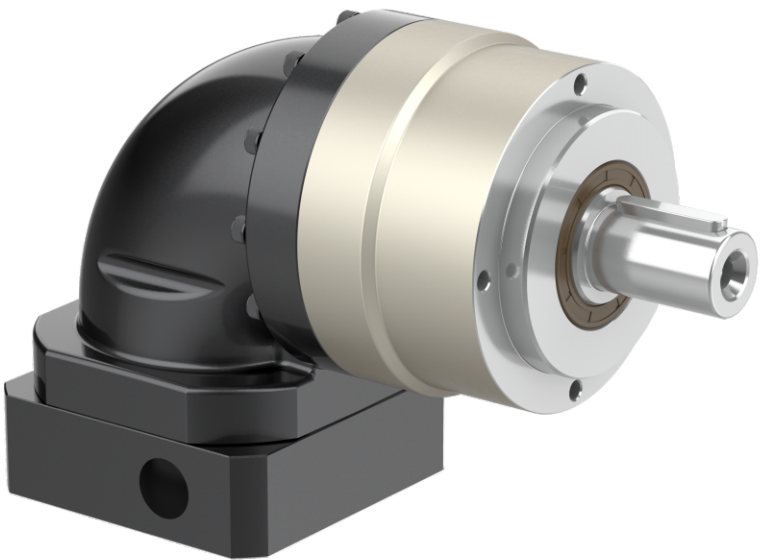
Dimension(double stage,Ratio i=15~200)

| Dimension | WVRBR060 | WVRBR090 | WVRBR115 | WVRBR140 | WVRBR180 | WVRBR220 |
|-----------|----------|----------|----------|----------|----------|----------|
| D1        | M5       | M8       | M12      | M16      | M20      | -        |
| D2j6      | 16       | 22       | 32       | 40       | 55       | -        |
| D3g6      | 50       | 80       | 110      | 130      | 160      | -        |
| D4        | 70       | 100      | 130      | 165      | 215      | -        |
| D5        | 4-5.5    | 4-6.6    | 4-9      | 4-11     | 4-13.5   | -        |
| D6        | 80       | 116      | 152      | 185      | 240      | -        |
| L1        | 7        | 10       | 7        | 13       | 20       | -        |
| L2        | 37       | 48       | 60       | 95       | 105      | -        |
| L3        | 60       | 90       | 115      | 140      | 180      | -        |
| L4        | 184.2    | 242.5    | 304      | 408      | 431.5    | -        |
| L5        | 28.5     | 36.5     | 51       | 79       | 82       | -        |
| L6        | 6        | 8        | 10       | 12       | 15       | -        |
| L7        | 2        | 3        | 5        | 5        | 6        | -        |
| L8        | 25       | 32       | 40       | 63       | 70       | -        |
| L9        | 4        | 6        | 10       | 12       | 11.5     | -        |
| L10       | 13       | 20       | 28       | 36       | 42       | -        |
| L11       | 117.2    | 149.5    | 186.5    | 242      | 236.5    | -        |
| C1        | 60       | 90       | 130      | 180      | 180      | -        |
| C2        | 70       | 90       | 145      | 200      | 200      | -        |
| C3        | 4-M4     | 4-M5     | 4-M8     | 4-M12    | 4-M12    | -        |
| C4        | 14       | 19       | 24       | 35       | 42       | -        |
| C5        | 50       | 70       | 110      | 114.3    | 114.3    | -        |
| C6        | 5        | 8        | 14       | 19       | 15       | -        |
| C7        | 71.9     | 90.1     | 126.5    | 162.5    | 195.5    | -        |
| C8        | 103.9    | 137.1    | 189      | 237.5    | 295.5    | -        |
| C9        | 35       | 43       | 71       | 86       | 119      | -        |
| C10       | 11.6     | 14.5     | 27       | 32       | 65       | -        |
| B1        | 5        | 6        | 10       | 12       | 16       | -        |
| H1        | 18       | 24.5     | 35       | 43       | 59       | -        |

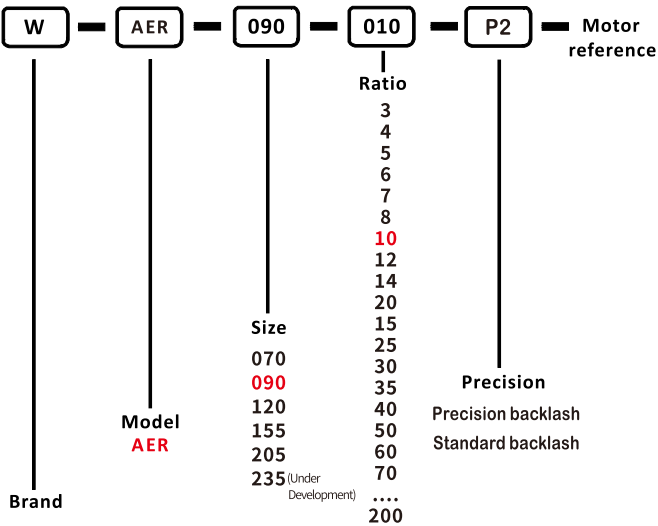
# WAER Series Planetary Gearbox

## FEATURES

- » Planet gear carrier and output shaft are integrated structure designed to ensure maximum torsional rigidity.
- » Planet gear with full needle design, increase the contact area to improve the rigidity and output torque.
- » The gears are carburized and quenched to the HRC62 with low carbon steel surface for optimum wear and impact toughness.
- » Gears refer to foreign imported software-assisted design to obtain the best tooth shape to reduce noise.
- » Adopt spiral bevel gear design, allow high output torque, more than 30% higher than straight bevel gear.
- » High allowable input speed, more than 8 times higher than straight bevel gear input.
- » The meshing tooth imprint of spiral bevel gear has been optimized by optimum design, thus ensuring even load on the contact tooth surface and a long service life.
- » Spiral bevel gears are meshed by optimum motion error analysis and strict process control to ensure high precision running backlash.



## SELECTION



## GENERAL NOTICES

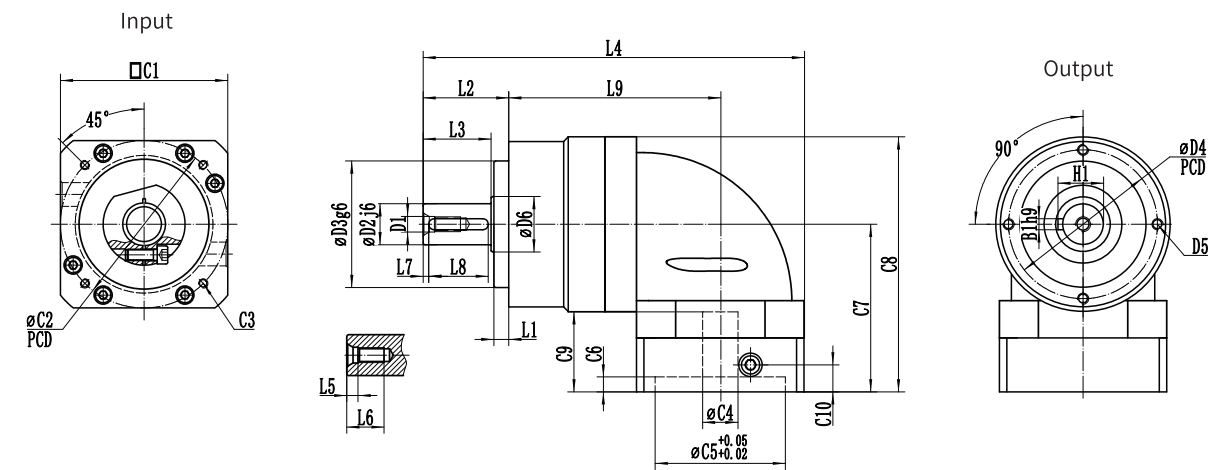
- Type, model and torque
- Ratio or output speed
- Working conditions and connection methods
- Quantity and installed machine name
- Input mode and input speed
- Motor brand model or flange and motor shaft size

Performance

| Specification                    | Unit      | Stage | Ratio  | WAER070                      | WAER090 | WAER120 | WAER155 | WAER205 | WAER235 |
|----------------------------------|-----------|-------|--------|------------------------------|---------|---------|---------|---------|---------|
| Rated output torque $T_{2N}$     | Nm        | 1     | 3      | 55                           | 130     | 208     | 342     | 588     | -       |
|                                  |           |       | 4      | 50                           | 140     | 290     | 540     | 1050    | -       |
|                                  |           |       | 5      | 60                           | 160     | 330     | 650     | 1200    | -       |
|                                  |           |       | 6      | 55                           | 150     | 310     | 600     | 1100    | -       |
|                                  |           |       | 7      | 50                           | 140     | 300     | 550     | 1100    | -       |
|                                  |           |       | 8      | 50                           | 140     | 290     | 542     | 1050    | -       |
|                                  |           |       | 10     | 60                           | 160     | 330     | 650     | 1200    | -       |
|                                  |           |       | 12     | 55                           | 150     | 310     | 600     | 1100    | -       |
|                                  |           | 2     | 14     | 50                           | 140     | 300     | 550     | 1100    | -       |
|                                  |           |       | 20     | 40                           | 100     | 230     | 450     | 900     | -       |
|                                  |           |       | 15     | 55                           | 130     | 208     | 342     | 588     | -       |
|                                  |           |       | 25     | 60                           | 160     | 330     | 650     | 1200    | -       |
|                                  |           |       | 30     | 55                           | 130     | 208     | 342     | 588     | -       |
|                                  |           |       | 35     | 50                           | 140     | 300     | 550     | 1100    | -       |
|                                  |           |       | 40     | 50                           | 140     | 290     | 542     | 1050    | -       |
|                                  |           |       | 50     | 60                           | 160     | 330     | 650     | 1200    | -       |
|                                  |           |       | 60     | 55                           | 150     | 310     | 600     | 1100    | -       |
|                                  |           |       | 70     | 50                           | 140     | 300     | 550     | 1100    | -       |
|                                  |           |       | 80     | 50                           | 140     | 290     | 542     | 1050    | -       |
|                                  |           |       | 100    | 60                           | 160     | 330     | 650     | 1200    | -       |
|                                  |           |       | 120    | 55                           | 150     | 310     | 600     | 1100    | -       |
|                                  |           |       | 140    | 50                           | 140     | 300     | 550     | 1100    | -       |
|                                  |           |       | 160    | 45                           | 120     | 260     | 500     | 1000    | -       |
|                                  |           |       | 200    | 40                           | 100     | 230     | 450     | 900     | -       |
| Emergency stop torque $T_{2NOT}$ | Nm        | 1,2   | 3~200  | Triple rated output torque   |         |         |         |         |         |
| Rated input speed $n_{1N}$       | rpm       | 1,2   | 3~200  | 5000                         | 4000    | 4000    | 3000    | 3000    | -       |
| Maximum input speed $n_{1B}$     | rpm       | 1,2   | 3~200  | 10000                        | 8000    | 8000    | 6000    | 6000    | -       |
| Precision backlash $P_1$         | arcmin    | 1     | 3~20   | ≤5                           | ≤5      | ≤5      | ≤5      | ≤5      | -       |
|                                  |           | 2     | 15~200 | ≤7                           | ≤7      | ≤7      | ≤7      | ≤7      | -       |
| Standard backlash $P_2$          | arcmin    | 1     | 3~20   | ≤7                           | ≤7      | ≤7      | ≤7      | ≤7      | -       |
|                                  |           | 2     | 15~200 | ≤10                          | ≤10     | ≤10     | ≤10     | ≤10     | -       |
| Torsional rigidity               | Nm/arcmin | 1,2   | 3~200  | 7                            | 14      | 25      | 50      | 145     | -       |
| Allowable radial force $F_{2aB}$ | N         | 1,2   | 3~200  | 1530                         | 3250    | 6700    | 9400    | 14500   | -       |
| Allowable axial force $F_{2aB}$  | N         | 1,2   | 3~200  | 765                          | 1625    | 3350    | 4700    | 7250    | -       |
| Lifespan                         | hr        | 1,2   | 3~200  | 20000                        |         |         |         |         |         |
| Efficiency                       | %         | 1     | 3~20   | 95%                          |         |         |         |         |         |
|                                  |           | 2     | 25~200 | 92%                          |         |         |         |         |         |
| Weight                           | kg        | 1     | 3~20   | 2.1                          | 6.4     | 13      | 24.5    | 51      | -       |
|                                  |           | 2     | 25~200 | 1.5                          | 7.8     | 14.2    | 27.5    | 54      | -       |
| Use of temperature               | °C        | 1,2   | 3~200  | -20°C~+40°C                  |         |         |         |         |         |
| Lubricating                      |           |       |        | Synthetic lubricating grease |         |         |         |         |         |
| IP Grade                         |           | 1,2   | 3~200  | IP65                         |         |         |         |         |         |
| Installation direction           |           |       | 3~200  | In any direction             |         |         |         |         |         |
| Noise level (n1=3000, off load)  | dB(A)     | 1,2   | 3~200  | ≤63                          | ≤65     | ≤68     | ≤70     | ≤72     | -       |

Rotational inertia

| Specification            | Unit               | Stage | Ratio  | WAER070 | WAER090 | WAER120 | WAER155 | WAER205 | WAER235 |
|--------------------------|--------------------|-------|--------|---------|---------|---------|---------|---------|---------|
| Rotational inertia $J_1$ | kg.cm <sup>2</sup> | 1     | 3~10   | 0.35    | 2.25    | 6.84    | 23.4    | 68.9    | -       |
|                          |                    |       | 12、14  | 0.07    | 1.87    | 6.25    | 21.8    | 65.6    | -       |
|                          |                    |       | 20     | 0.07    | 1.87    | 6.25    | 21.8    | 65.6    | -       |
|                          |                    | 2     | 15     | 0.35    | 2.25    | 6.84    | 23.4    | 68.9    | -       |
|                          |                    |       | 25~100 | 0.09    | 0.35    | 2.25    | 6.84    | 23.4    | -       |
|                          |                    |       | 0.007  | 0.01    | 0.31    | 1.87    | 6.25    | 21.8    | -       |



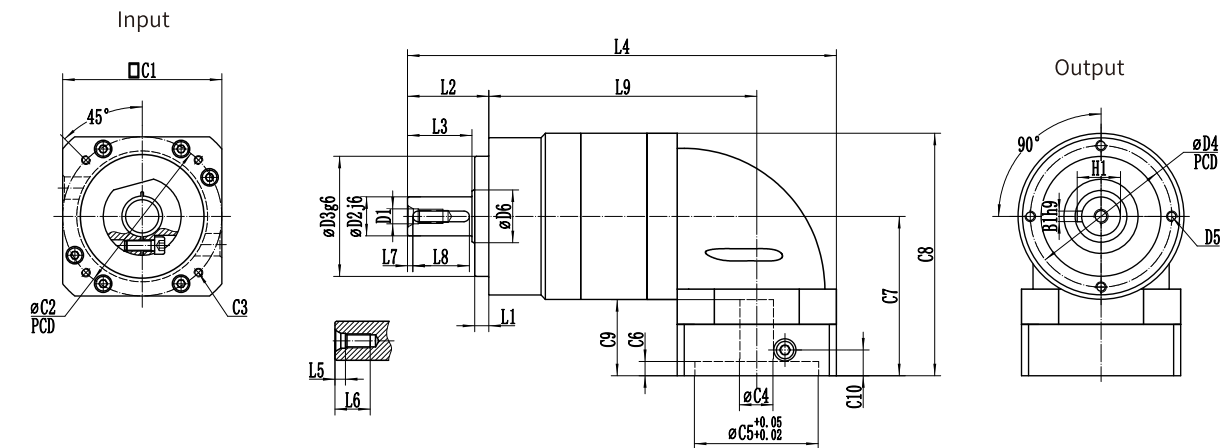
DIMENSION

SINGLE SECTION

Dimension(single stage,Ratio i=3~20)

| Dimension | WAER070 | WAER090 | WAER120 | WAER155 | WAER205 | WAER235 |
|-----------|---------|---------|---------|---------|---------|---------|
| D1        | M5      | M8      | M12     | M16     | M16     | -       |
| D2j6      | 16      | 22      | 32      | 40      | 55      | -       |
| D3g6      | 52      | 68      | 90      | 120     | 160     | -       |
| D4        | 62      | 80      | 108     | 140     | 184     | -       |
| D5        | 4-M5    | 4-M6    | 4-M8    | 4-M10   | 4-M12   | -       |
| D6        | 17.5    | 29.8    | 39.5    | 49.5    | 69.5    | -       |
| L1        | 6.5     | 8       | 17      | 15      | 15      | -       |
| L2        | 36      | 46      | 70      | 97      | 100     | -       |
| L3        | 28.5    | 36.5    | 51      | 79      | 82      | -       |
| L4        | 152.2   | 205     | 259     | 347     | 394     | -       |
| L5        | 4       | 6       | 10      | 12      | 11.5    | -       |
| L6        | 13      | 20      | 28      | 36      | 42      | -       |
| L7        | 2       | 3       | 5       | 5       | 6       | -       |
| L8        | 25      | 32      | 40      | 63      | 70      | -       |
| L9        | 86.2    | 114     | 131.5   | 179     | 204     | -       |
| C1        | 60      | 90      | 130     | 180     | 180     | -       |
| C2        | 70      | 90      | 145     | 200     | 200     | -       |
| C3        | 4-M4    | 4-M5    | 4-M8    | 4-M12   | 4-M12   | -       |
| C4        | 14      | 19      | 24      | 35      | 42      | -       |
| C5        | 50      | 70      | 110     | 114.3   | 114.3   | -       |
| C6        | 5       | 8       | 14      | 19      | 15      | -       |
| C7        | 71.9    | 90.1    | 126.5   | 162.5   | 195.5   | -       |
| C8        | 106.9   | 137.1   | 189     | 237.5   | 295.5   | -       |
| C9        | 35      | 43      | 71      | 86      | 119     | -       |
| C10       | 11.5    | 14.5    | 27      | 32      | 65      | -       |
| B1        | 5       | 6       | 10      | 12      | 16      | -       |
| H1        | 18      | 24.5    | 35      | 43      | 59      | -       |





# DIMENSION

## SINGLE SECTION

Dimension(double stage,Ratio i=15~200)

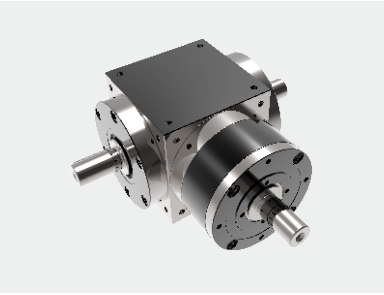
| Dimension | WAER070 | WAER090 | WAER120 | WAER155 | WAER205 | WAER235 |
|-----------|---------|---------|---------|---------|---------|---------|
| D1        | M5      | M8      | M12     | M16     | M16     | -       |
| D2j6      | 16      | 22      | 32      | 40      | 55      | -       |
| D3g6      | 52      | 68      | 90      | 120     | 160     | -       |
| D4        | 62      | 80      | 108     | 140     | 184     | -       |
| D5        | 4-M5    | 4-M6    | 4-M8    | 4-M10   | 4-M12   | -       |
| D6        | 17.5    | 29.8    | 39.5    | 49.5    | 69.5    | -       |
| L1        | 6.5     | 8       | 17      | 15      | 15      | -       |
| L2        | 36      | 46      | 70      | 97      | 100     | -       |
| L3        | 28.5    | 36.5    | 51      | 79      | 82      | -       |
| L4        | 184.2   | 242.5   | 304     | 408     | 431.5   | -       |
| L5        | 4       | 6       | 10      | 12      | 11.5    | -       |
| L6        | 13      | 20      | 28      | 36      | 42      | -       |
| L7        | 2       | 3       | 5       | 5       | 6       | -       |
| L8        | 25      | 32      | 40      | 63      | 70      | -       |
| L9        | 118.2   | 151.5   | 176.5   | 240     | 241.5   | -       |
| C1        | 60      | 90      | 130     | 180     | 180     | -       |
| C2        | 70      | 90      | 145     | 200     | 200     | -       |
| C3        | 4-M4    | 4-M5    | 4-M8    | 4-M12   | 4-M12   | -       |
| C4        | 14      | 19      | 24      | 35      | 42      | -       |
| C5        | 50      | 70      | 110     | 114.3   | 114.3   | -       |
| C6        | 5       | 8       | 14      | 19      | 15      | -       |
| C7        | 71.9    | 90.1    | 126.5   | 162.5   | 195.5   | -       |
| C8        | 106.9   | 137.1   | 189     | 237.5   | 295.5   | -       |
| C9        | 35      | 43      | 71      | 86      | 119     | -       |
| C10       | 11.5    | 14.5    | 27      | 32      | 65      | -       |
| B1        | 5       | 6       | 10      | 12      | 16      | -       |
| H1        | 18      | 24.5    | 35      | 43      | 59      | -       |

# WAT Series

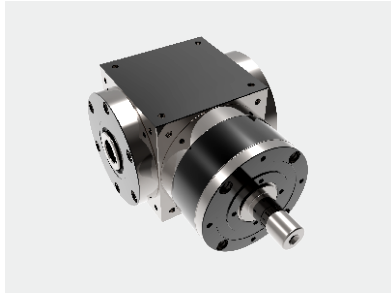
## Planetary Gearbox

## FEATURES

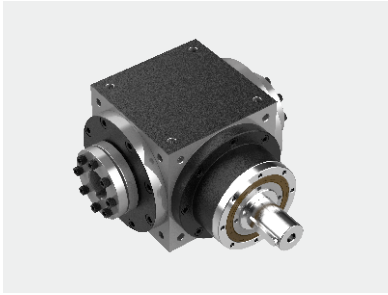
- » By using top-level design software for spiral bevel gear, the contact tooth surface load can allow for high torque output through optimal design. The gear is made of high-strength carburized alloy steel and ground to a precision level within DIN 5 standards.
- » The high-precision ground worm and helical gear set, combined with another optimized gear set, can achieve a reduction ratio of 1000:1.
- » The compact design with high torque and low backlash is suitable for precision servo applications.
- » The patented oil seal design eliminates the need for maintenance and oil replacement, thus ensuring long service life.



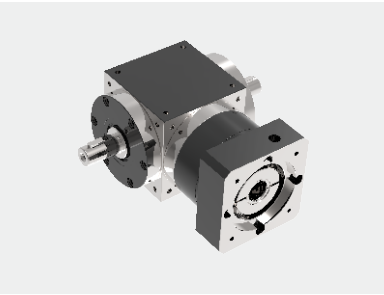
WATAD/L/R Series



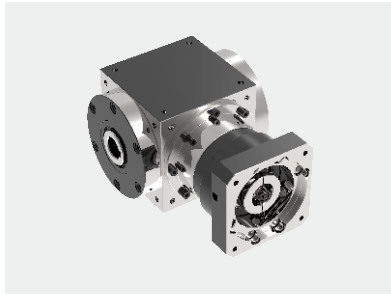
WATAH Series



WATAC Series



WATD/L/R Series

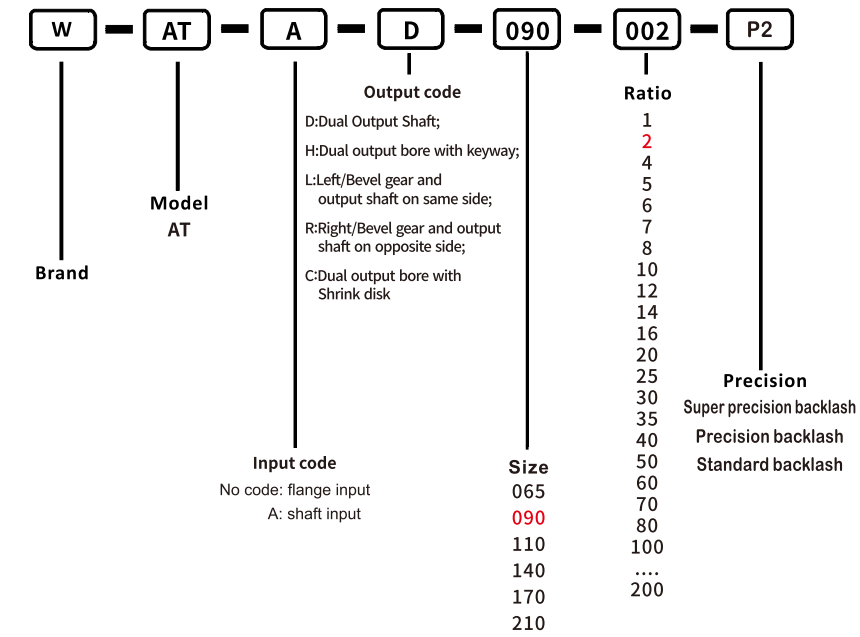


WATH Series



WATC Series

SELECTION



GENERAL NOTICES

- Type, model and torque
- Ratio or output speed
- Working conditions and connection methods
- Quantity and installed machine name
- Input mode and input speed
- Motor brand model or flange and motor shaft size

PLANETARY GEARBOX

Performance

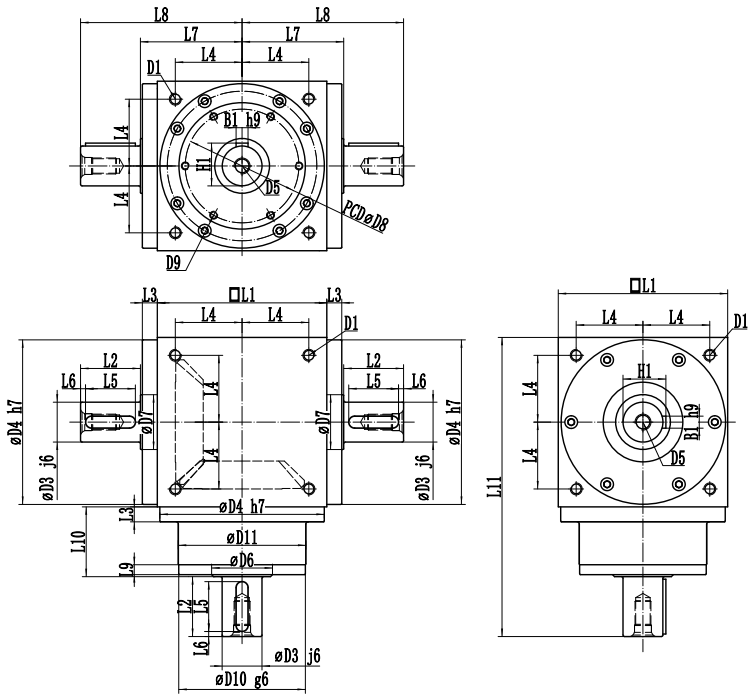
| Specification               | Unit   | Stage   | Ratio  | WAT065      | WAT090 | WAT110 | WAT140 | WAT170 | WAT210 |
|-----------------------------|--------|---------|--------|-------------|--------|--------|--------|--------|--------|
| Rated Output Torque T2N     | Nm     | 1       | 1      | 25          | 78     | 150    | 360    | 580    | 1300   |
|                             |        |         | 2      | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 4      | 25          | 50     | 150    | 305    | 580    | 1300   |
|                             |        |         | 5      | 25          | 60     | 150    | 330    | 580    | 1300   |
|                             |        | 2       | 6      | 25          | 50     | 140    | 300    | 550    | 1000   |
|                             |        |         | 7      | 25          | 50     | 140    | 300    | 550    | 1000   |
|                             |        |         | 8      | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 10     | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 12     | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 14     | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 16     | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 20     | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        | 3       | 25     | 25          | 60     | 150    | 330    | 580    | 1300   |
|                             |        |         | 30     | 25          | 50     | 140    | 300    | 550    | 1000   |
|                             |        |         | 35     | 25          | 50     | 140    | 300    | 550    | 1000   |
|                             |        |         | 40     | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 50     | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 60     | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 70     | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 80     | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 100    | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 120    | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 140    | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 160    | 25          | 68     | 150    | 360    | 580    | 1300   |
|                             |        |         | 200    | 25          | 68     | 150    | 360    | 580    | 1300   |
| Emergency stop Torque T2NOT | Nm     | 1, 2, 3 | 1~200  | 2 Times T2N |        |        |        |        |        |
| Rated Input Speed n1N       | rpm    | 1       | 1~2    | 3000        | 3000   | 3000   | 3000   | 3000   | 2000   |
|                             |        | 2       | 4~20   | 3000        | 3000   | 3000   | 3000   | 3000   | 3000   |
|                             |        | 3       | 25~200 | 3000        | 3000   | 3000   | 3000   | 3000   | 3000   |
| Max Input Speed n1B         | rpm    | 1       | 1~2    | 6000        | 6000   | 5000   | 4500   | 3500   | 3000   |
|                             |        | 2       | 4~20   | 6000        | 6000   | 5000   | 4500   | 3500   | 3000   |
|                             |        | 3       | 25~200 | 6000        | 6000   | 6000   | 5000   | 4500   | 3500   |
| Super Precision Backlash P0 | arcmin | 1       | 1~2    | -           | -      | -      | -      | -      | -      |
|                             |        | 2       | 4~20   | ≤4          | ≤4     | ≤4     | ≤4     | ≤4     | ≤4     |
|                             |        | 3       | 25~200 | ≤6          | ≤6     | ≤6     | ≤6     | ≤6     | ≤6     |
| Precision Backlash P1       | arcmin | 1       | 1~2    | ≤4          | ≤4     | ≤4     | ≤4     | ≤4     | ≤4     |
|                             |        | 2       | 4~20   | ≤6          | ≤6     | ≤6     | ≤6     | ≤6     | ≤6     |
|                             |        | 3       | 25~200 | ≤8          | ≤8     | ≤8     | ≤8     | ≤8     | ≤8     |

PLANETARY GEARBOX

Performance

| Specification                     | Unit   | Stage | Ratio  | WAT065                    | WAT090 | WAT110 | WAT140 | WAT170 | WAT210 |
|-----------------------------------|--------|-------|--------|---------------------------|--------|--------|--------|--------|--------|
| StandardBacklashP2                | arcmin | 1     | 1~2    | ≤6                        | ≤6     | ≤6     | ≤6     | ≤6     | ≤6     |
|                                   |        | 2     | 4~20   | ≤8                        | ≤8     | ≤8     | ≤8     | ≤8     | ≤8     |
|                                   |        | 3     | 25~200 | ≤10                       | ≤10    | ≤10    | ≤10    | ≤10    | ≤10    |
| Allowable Radial Force F2R        | N      |       |        | 2000                      | 3200   | 5000   | 6500   | 9100   | 13000  |
| Allowable Axle Force F2A          | N      |       |        | 1000                      | 1600   | 2500   | 3250   | 4550   | 6500   |
| Service Life                      | h      |       |        | 20000                     |        |        |        |        |        |
| Efficient                         | %      | 1     | 1~2    | ≥97                       |        |        |        |        |        |
|                                   |        | 2     | 4~20   | ≥95                       |        |        |        |        |        |
|                                   |        | 3     | 25~200 | ≥92                       |        |        |        |        |        |
| Use of temperature                | ℃      |       |        | -20℃~+40℃                 |        |        |        |        |        |
| Weight                            | kg     | 1     | 1~2    | 3                         | 7      | 11.5   | 19.5   | 34     | 65     |
|                                   |        | 2     | 4~20   | 3.2                       | 8      | 14     | 24     | 38     | 74     |
|                                   |        | 3     | 25~200 | 3.4                       | 8.5    | 14.5   | 27     | 39     | 75     |
| Protection class                  |        |       |        | Ip65                      |        |        |        |        |        |
| Lubrication                       |        |       |        | Synthetic Lubricating Oil |        |        |        |        |        |
| Mounting position                 |        |       |        | In any direction          |        |        |        |        |        |
| Noise level (n1=3000rpm,off load) | dB(A)  | 1     |        | ≤72                       | ≤74    | ≤76    | ≤78    | ≤80    | ≤82    |
|                                   |        | 2     |        | ≤62                       | ≤62    | ≤64    | ≤66    | ≤68    | ≤72    |
|                                   |        | 3     |        | ≤62                       | ≤62    | ≤64    | ≤66    | ≤68    | ≤72    |

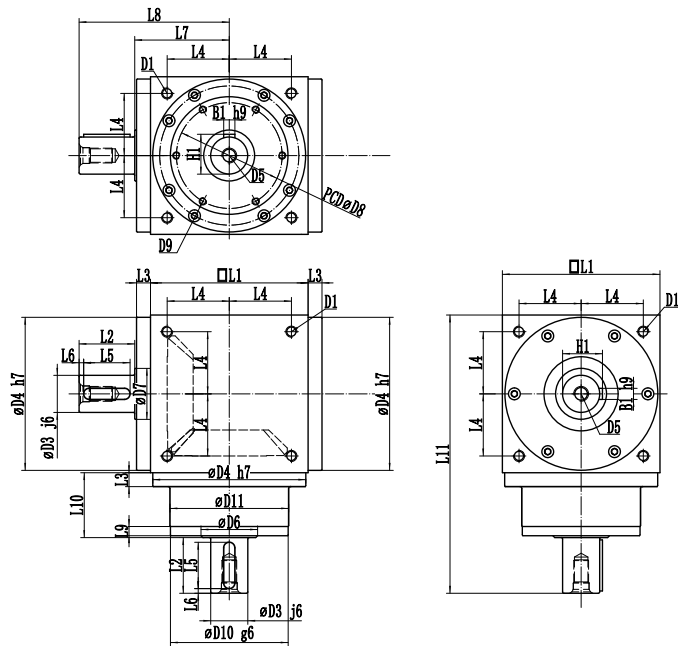
WATAD-L1



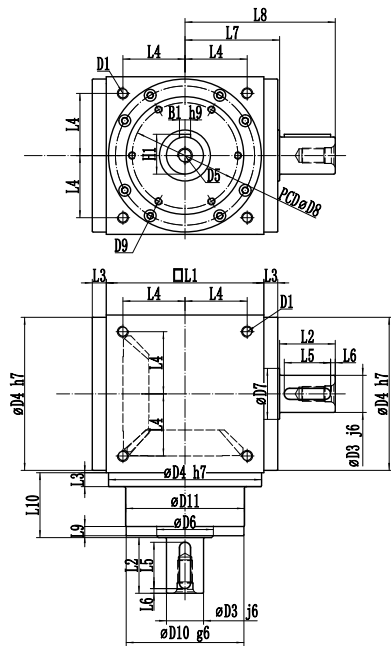
Dimension (single stage, Ratio i=1~2)

| Dimension | WATAD065 | WATAD090  | WATAD110  | WATAD140  | WATAD170  | WATAD210  |
|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| D1        | M5 ↓ 10  | M6 ↓ 12   | M8 ↓ 16   | M10 ↓ 20  | M12 ↓ 25  | M16 ↓ 32  |
| D3 j6     | 13       | 18        | 22        | 32        | 40        | 50        |
| D4 h7     | 63       | 88        | 108       | 135       | 165       | 205       |
| D5        | M4 ↓ 8   | M5 ↓ 10   | M8 ↓ 16   | M12 ↓ 25  | M16 ↓ 32  | M16 ↓ 32  |
| D6        | 29.5     | 39.5      | 49.5      | 59.5      | 74.5      | 94.5      |
| D7        | 19.9     | 29.9      | 39.9      | 44.9      | 54.9      | 74.9      |
| D8        | 53       | 76        | 95        | 92        | 114       | 142       |
| D9        | 4-M4 ↓ 8 | 4-M5 ↓ 10 | 6-M6 ↓ 12 | 6-M6 ↓ 12 | 6-M8 ↓ 16 | 6-M8 ↓ 16 |
| D10 g6    | 62.9     | 87        | 107       | 103       | 127       | 158       |
| D11       | 62.5     | 87.5      | 106       | 104       | 128       | 160       |
| L1        | 65       | 90        | 110       | 140       | 170       | 210       |
| L2        | 19.5     | 35        | 40        | 50        | 60        | 75        |
| L3        | 13       | 15        | 15        | 15        | 15        | 20        |
| L4        | 27       | 36        | 44        | 55        | 67        | 85        |
| L5        | 16       | 25        | 32        | 44        | 55        | 69        |
| L6        | 2        | 5         | 3         | 2.5       | 2.5       | 2.5       |
| L7        | 47.5     | 62        | 72        | 87        | 102       | 127       |
| L8        | 67       | 97        | 112       | 137       | 162       | 202       |
| L9        | 8        | 8         | 8         | 10        | 10        | 10        |
| L10       | 43       | 55        | 60        | 60        | 70        | 90        |
| L11       | 127.5    | 180       | 210       | 250       | 300       | 375       |
| B1 h9     | 5        | 6         | 6         | 10        | 12        | 14        |
| H1        | 15       | 20.5      | 24.5      | 35        | 43        | 53.5      |

WATAL-L1



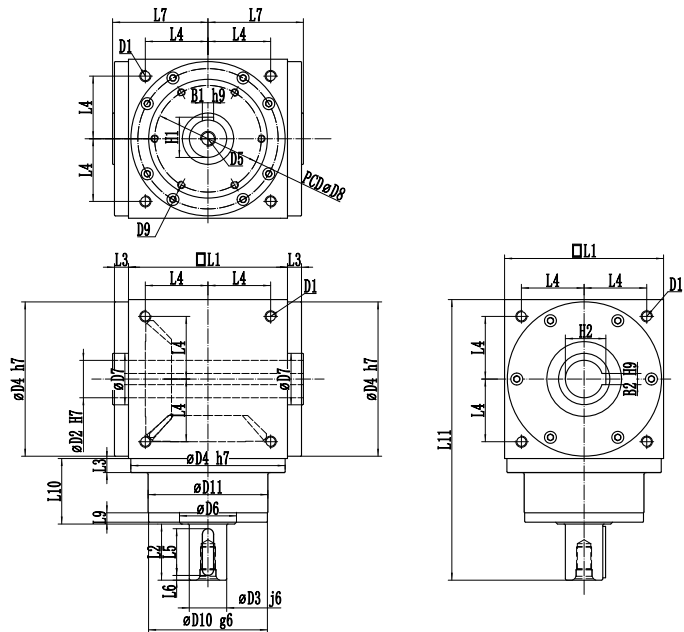
WATAR



Dimension (single stage, Ratio i=1~2)

| Dimension | WATAL/R065 | WATAL/R090 | WATAL/R110 | WATAL/R140 | WATAL/R170 | WATAL/R210 |
|-----------|------------|------------|------------|------------|------------|------------|
| D1        | M5 ↓ 10    | M6 ↓ 12    | M8 ↓ 16    | M10 ↓ 20   | M12 ↓ 25   | M16 ↓ 32   |
| D3 j6     | 13         | 18         | 22         | 32         | 40         | 50         |
| D4 h7     | 63         | 88         | 108        | 135        | 165        | 205        |
| D5        | M4 ↓ 8     | M5 ↓ 10    | M8 ↓ 16    | M12 ↓ 25   | M16 ↓ 32   | M16 ↓ 32   |
| D6        | 29.5       | 39.5       | 49.5       | 59.5       | 74.5       | 94.5       |
| D7        | 19.9       | 29.9       | 39.9       | 44.9       | 54.9       | 74.9       |
| D8        | 53         | 76         | 95         | 92         | 114        | 142        |
| D9        | 4-M4 ↓ 8   | 4-M5 ↓ 10  | 6-M6 ↓ 12  | 6-M6 ↓ 12  | 6-M8 ↓ 16  | 6-M8 ↓ 16  |
| D10 g6    | 62.9       | 87         | 107        | 103        | 127        | 158        |
| D11       | 62         | 86         | 106        | 104        | 128        | 160        |
| L1        | 65         | 90         | 110        | 140        | 170        | 210        |
| L2        | 19.5       | 35         | 40         | 50         | 60         | 75         |
| L3        | 13         | 15         | 15         | 15         | 15         | 20         |
| L4        | 27         | 36         | 44         | 55         | 67         | 85         |
| L5        | 16         | 25         | 32         | 44         | 55         | 69         |
| L6        | 2          | 5          | 3          | 2.5        | 2.5        | 2.5        |
| L7        | 47.5       | 62         | 72         | 87         | 102        | 127        |
| L8        | 67         | 97         | 112        | 137        | 162        | 202        |
| L9        | 8          | 8          | 8          | 10         | 10         | 10         |
| L10       | 43         | 55         | 60         | 60         | 70         | 90         |
| L11       | 127.5      | 180        | 210        | 250        | 300        | 375        |
| B1 h9     | 5          | 6          | 6          | 10         | 12         | 14         |
| H1        | 15         | 20.5       | 24.5       | 35         | 43         | 53.5       |

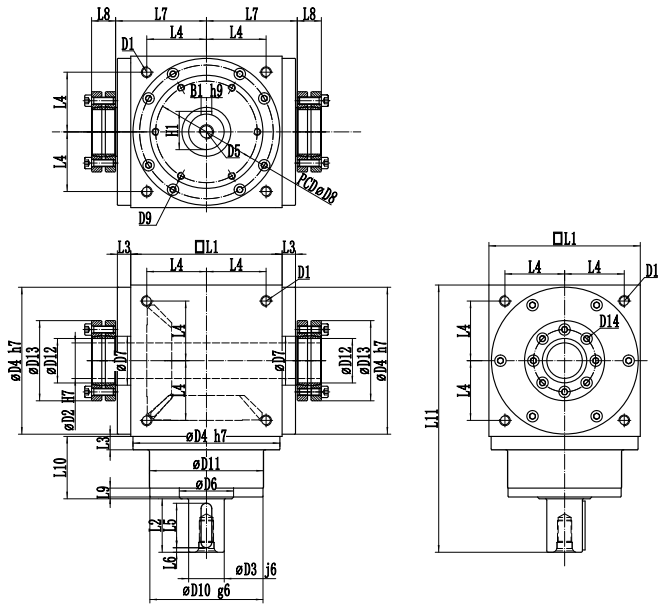
WATAH-L1



Dimension (single stage, Ratio i=1~2)

| Dimension | WATAH065 | WATAH090  | WATAH110  | WATAH140  | WATAH170  | WATAH210  |
|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| D1        | M5 ↓ 10  | M6 ↓ 12   | M8 ↓ 16   | M10 ↓ 20  | M12 ↓ 25  | M16 ↓ 32  |
| D2 H7     | 13       | 18        | 22        | 32        | 40        | 50        |
| D3 j6     | 13       | 18        | 22        | 32        | 40        | 50        |
| D4 h7     | 63       | 88        | 108       | 135       | 165       | 205       |
| D5        | M4 ↓ 8   | M5 ↓ 10   | M8 ↓ 16   | M12 ↓ 25  | M16 ↓ 32  | M16 ↓ 32  |
| D6        | 29.5     | 39.5      | 49.5      | 59.5      | 74.5      | 94.5      |
| D7        | 19.9     | 29.9      | 39.9      | 44.9      | 54.9      | 74.9      |
| D8        | 53       | 76        | 95        | 92        | 114       | 142       |
| D9        | 4-M4 ↓ 8 | 4-M5 ↓ 10 | 6-M6 ↓ 12 | 6-M6 ↓ 12 | 6-M8 ↓ 16 | 6-M8 ↓ 16 |
| D10 g6    | 62.9     | 87        | 107       | 103       | 127       | 158       |
| D11       | 62.5     | 87.5      | 106       | 104       | 128       | 160       |
| L1        | 65       | 90        | 110       | 140       | 170       | 210       |
| L2        | 19.5     | 35        | 40        | 50        | 60        | 75        |
| L3        | 13       | 15        | 15        | 15        | 15        | 20        |
| L4        | 27       | 36        | 44        | 55        | 67        | 85        |
| L5        | 16       | 25        | 32        | 44        | 55        | 69        |
| L6        | 2        | 5         | 3         | 2.5       | 2.5       | 2.5       |
| L7        | 47.5     | 62        | 72        | 87        | 102       | 127       |
| L9        | 8        | 8         | 8         | 10        | 10        | 10        |
| L10       | 43       | 55        | 60        | 60        | 70        | 90        |
| L11       | 127.5    | 180       | 210       | 250       | 300       | 375       |
| B1 h9     | 5        | 6         | 6         | 10        | 12        | 14        |
| B2 H9     | 5        | 6         | 6         | 10        | 12        | 14        |
| H1        | 15       | 20.5      | 24.5      | 35        | 43        | 53.5      |
| H2        | 15.3     | 20.8      | 24.8      | 35.3      | 43.3      | 53.8      |

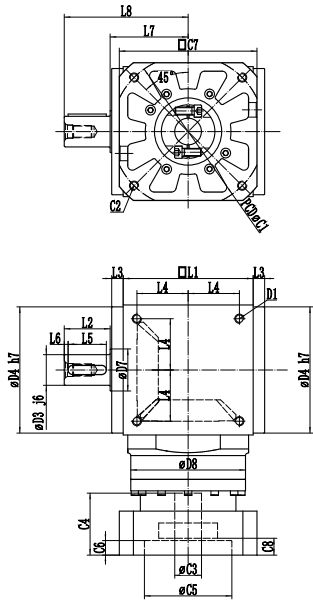
WATAC-L1



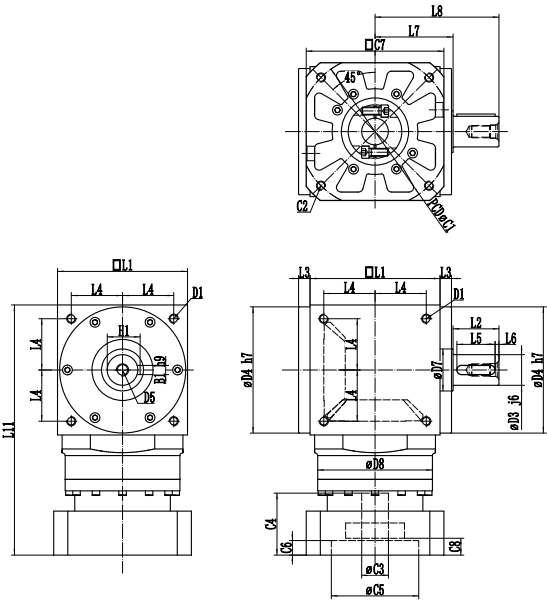
Dimension (single stage, Ratio i=1~2)

| Dimension | WATAC065 | WATAC090  | WATAC110  | WATAC140  | WATAC170  | WATAC210  |
|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| D1        | M5 ↓ 10  | M6 ↓ 12   | M8 ↓ 16   | M10 ↓ 20  | M12 ↓ 25  | M16 ↓ 32  |
| D2 H7     | 13       | 18        | 22        | 32        | 40        | 50        |
| D3 j6     | 13       | 18        | 22        | 32        | 40        | 50        |
| D4 h7     | 63       | 88        | 108       | 135       | 165       | 205       |
| D5        | M4 ↓ 8   | M5 ↓ 10   | M8 ↓ 16   | M12 ↓ 25  | M16 ↓ 32  | M16 ↓ 32  |
| D6        | 29.5     | 39.5      | 49.5      | 59.5      | 74.5      | 94.5      |
| D7        | 19.9     | 29.9      | 39.9      | 44.9      | 54.9      | 74.9      |
| D8        | 53       | 76        | 95        | 92        | 114       | 142       |
| D9        | 4-M4 ↓ 8 | 4-M5 ↓ 10 | 6-M6 ↓ 12 | 6-M6 ↓ 12 | 6-M8 ↓ 16 | 6-M8 ↓ 16 |
| D10 g6    | 62.9     | 87        | 107       | 103       | 127       | 158       |
| D11       | 62       | 86        | 106       | 104       | 128       | 160       |
| D12       | 16       | 22        | 27        | 44        | 50        | 62        |
| D13       | 41       | 50        | 53        | 80        | 90        | 110       |
| D14       | 6-M6     | 6-M6      | 7-M6      | 8-M6      | 8-M8      | 8-M8      |
| L1        | 65       | 90        | 110       | 140       | 170       | 210       |
| L2        | 19.5     | 35        | 40        | 50        | 60        | 75        |
| L3        | 13       | 15        | 15        | 15        | 15        | 20        |
| L4        | 27       | 36        | 44        | 55        | 67        | 85        |
| L5        | 16       | 25        | 32        | 44        | 55        | 69        |
| L6        | 2        | 5         | 3         | 2.5       | 2.5       | 2.5       |
| L7        | 47.5     | 62        | 72        | 87        | 102       | 127       |
| L8        | 18       | 20        | 20        | 25        | 27        | 30        |
| L9        | 8        | 8         | 8         | 10        | 10        | 10        |
| L10       | 43       | 55        | 60        | 60        | 70        | 90        |
| L11       | 127.5    | 180       | 210       | 250       | 300       | 375       |
| B1 h9     | 5        | 6         | 6         | 10        | 12        | 14        |
| H1        | 15       | 20.5      | 24.5      | 35        | 43        | 53.5      |

WATL-L2



WATR-L2

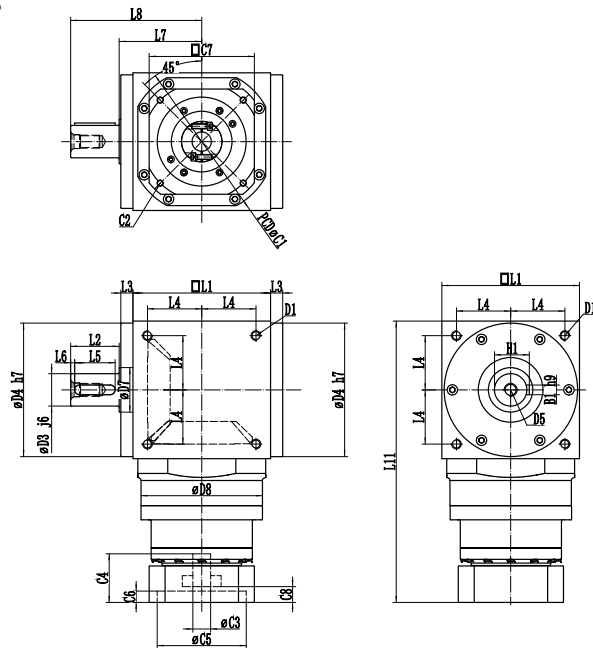


Dimension (double stage, Ratio i=4~20)

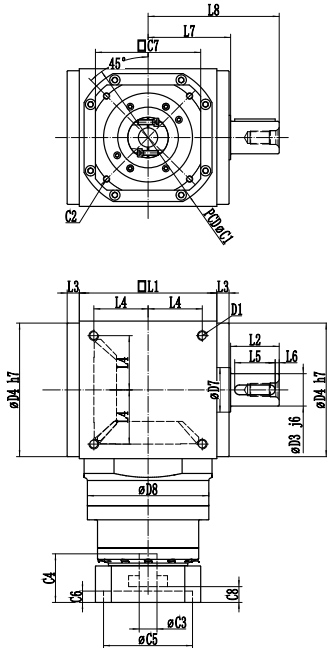
| Dimension | WATL/R065 | WATL/R090   | WATL/R110 | WATL/R140   | WATL/R170 | WATL/R210   |
|-----------|-----------|-------------|-----------|-------------|-----------|-------------|
| D1        | M5 ↓ 10   | M6 ↓ 12     | M8 ↓ 16   | M10 ↓ 20    | M12 ↓ 25  | M16 ↓ 32    |
| D3 j6     | 13        | 18          | 22        | 32          | 40        | 50          |
| D4 h7     | 63        | 88          | 108       | 135         | 165       | 205         |
| D5        | M4 ↓ 8    | M5 ↓ 10     | M8 ↓ 16   | M12 ↓ 25    | M16 ↓ 32  | M16 ↓ 32    |
| D7        | 19.9      | 29.9        | 39.9      | 44.9        | 54.9      | 74.9        |
| D8        | 64        | 64          | 94        | 125         | 150       | 170         |
| L1        | 65        | 90          | 110       | 140         | 170       | 210         |
| L2        | 19.5      | 35          | 40        | 50          | 60        | 75          |
| L3        | 13        | 15          | 15        | 15          | 15        | 20          |
| L4        | 27        | 36          | 44        | 55          | 67        | 85          |
| L5        | 16        | 25          | 32        | 44          | 55        | 69          |
| L6        | 2         | 5           | 3         | 2.5         | 2.5       | 2.5         |
| L7        | 47.5      | 62          | 72        | 87          | 102       | 127         |
| L8        | 67        | 97          | 112       | 137         | 162       | 202         |
| L11       | 129/142   | 155.8/168.8 | 197/215   | 255.5/277.5 | 327/360   | 405.3/408.3 |
| B1 h9     | 5         | 6           | 6         | 10          | 12        | 14          |
| H1        | 15        | 20.5        | 24.5      | 35          | 43        | 53.5        |
| C1        | 70/90     | 70/90       | 90/145    | 145/200     | 200       | 200/235     |
| C2        | M4/M5     | M4/M5       | M5/M8     | M8/M12      | M12       | M12         |
| C3        | ≤14/≤19   | ≤14/≤19     | ≤19/≤24   | ≤24/≤35     | ≤35/≤42   | ≤42/≤55     |
| C4        | 31.5/41   | 31.5/41     | 41/59     | 60/81       | 81/114    | 114/117     |
| C5        | 50/70     | 50/70       | 70/110    | 110/114.3   | 114.3     | 114.3/200   |
| C6        | 5/6       | 5/6         | 6/14      | 14/23       | 19/15     | 24          |
| C7        | 60/80     | 60/80       | 80/130    | 130/180     | 180       | 180/220     |
| C8        | 6/9       | 6/9         | 9.5/21.5  | 19.5/25     | 22/55     | 30/33       |



WATL-L3



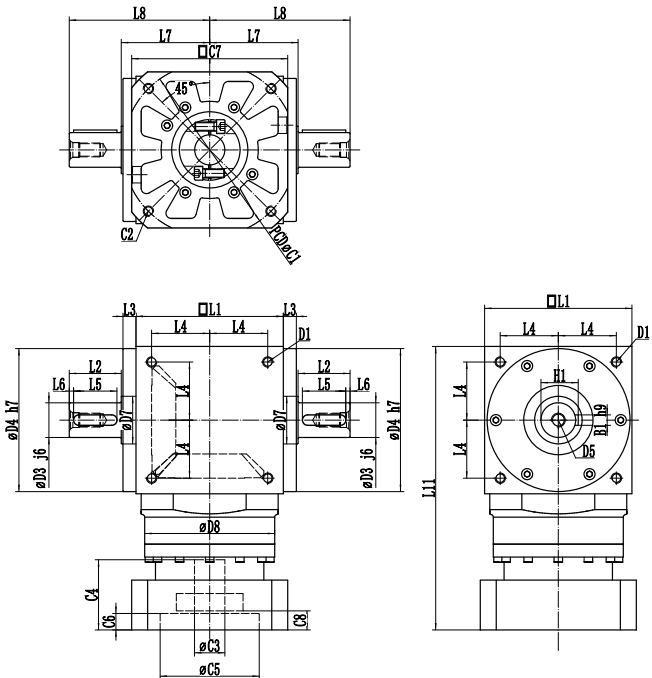
WATR-L3



Dimension (3 stage, Ratio i=25~200)

| Dimension | WATL/R065 | WATL/R090   | WATL/R110   | WATL/R140 | WATL/R170 | WATL/R210 |
|-----------|-----------|-------------|-------------|-----------|-----------|-----------|
| D1        | M5 ↓ 10   | M6 ↓ 12     | M8 ↓ 16     | M10 ↓ 20  | M12 ↓ 25  | M16 ↓ 32  |
| D3 j6     | 13        | 18          | 22          | 32        | 40        | 50        |
| D4 h7     | 63        | 88          | 108         | 135       | 165       | 205       |
| D5        | M4 ↓ 8    | M5 ↓ 10     | M8 ↓ 16     | M12 ↓ 25  | M16 ↓ 32  | M16 ↓ 32  |
| D7        | 19.9      | 29.9        | 39.9        | 44.9      | 54.9      | 74.9      |
| D8        | 64        | 64          | 94          | 125       | 150       | 170       |
| L1        | 65        | 90          | 110         | 140       | 170       | 210       |
| L2        | 19.5      | 35          | 40          | 50        | 60        | 75        |
| L3        | 13        | 15          | 15          | 15        | 15        | 20        |
| L4        | 27        | 36          | 44          | 55        | 67        | 85        |
| L5        | 16        | 25          | 32          | 44        | 55        | 69        |
| L6        | 2         | 5           | 3           | 2.5       | 2.5       | 2.5       |
| L7        | 47.5      | 62          | 72          | 87        | 102       | 127       |
| L8        | 67        | 97          | 112         | 137       | 162       | 202       |
| L11       | 161/174   | 187.8/200.8 | 216.5/234.5 | 270/300.5 | 347.5/388 | 438/471   |
| B1 h9     | 5         | 6           | 6           | 10        | 12        | 14        |
| H1        | 15        | 20.5        | 24.5        | 35        | 43        | 53.5      |
| C1        | 70/90     | 70/90       | 70/90       | 90/145    | 145/200   | 200       |
| C2        | M4/M5     | M4/M5       | M4/M5       | M5/M8     | M8/M12    | M12       |
| C3        | ≤14/≤19   | ≤14/≤19     | ≤14/≤19     | ≤19/≤24   | ≤24/≤35   | ≤35/≤42   |
| C4        | 31.5/41   | 31.5/41     | 31.5/41     | 41/60     | 60/81     | 81/114    |
| C5        | 50/70     | 50/70       | 50/70       | 70/110    | 110/114.3 | 114.3     |
| C6        | 5/6       | 5/6         | 50/70       | 6/14      | 14/19     | 19/15     |
| C7        | 60/80     | 60/80       | 60/80       | 80/130    | 130/180   | 180       |
| C8        | 6/9       | 6/9         | 6/9.5       | 9.5/19.5  | 19.5/22   | 22/55     |

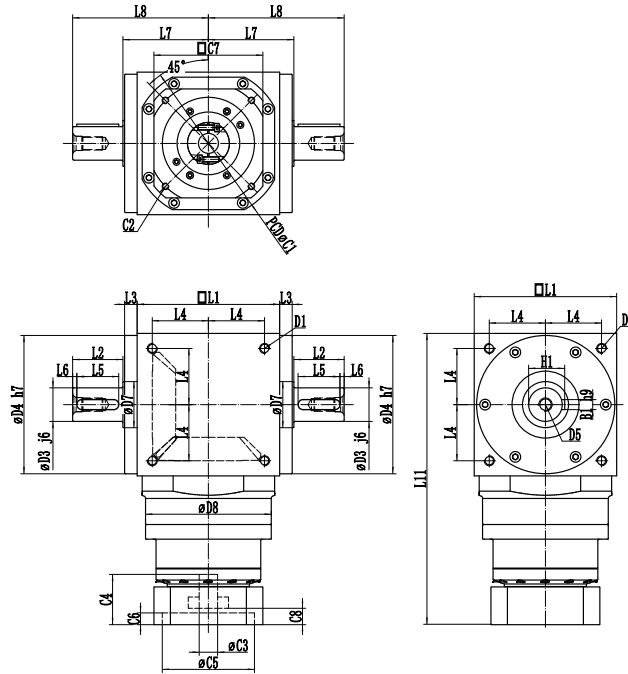
WATD-L2



Dimension (double stage, Ratio i=4~20)

| Dimension | WATD065 | WATD090     | WATD110  | WATD140     | WATAD170 | WATAD210    |
|-----------|---------|-------------|----------|-------------|----------|-------------|
| D1        | M5 ↓ 10 | M6 ↓ 12     | M8 ↓ 16  | M10 ↓ 20    | M12 ↓ 25 | M16 ↓ 32    |
| D3 j6     | 13      | 18          | 22       | 32          | 40       | 50          |
| D4 h7     | 63      | 88          | 108      | 135         | 165      | 205         |
| D5        | M4 ↓ 8  | M5 ↓ 10     | M8 ↓ 16  | M12 ↓ 25    | M16 ↓ 32 | M16 ↓ 32    |
| D7        | 19.9    | 29.9        | 39.9     | 44.9        | 54.9     | 74.9        |
| D8        | 64      | 64          | 94       | 125         | 150      | 170         |
| L1        | 65      | 90          | 110      | 140         | 170      | 210         |
| L2        | 19.5    | 35          | 40       | 50          | 60       | 75          |
| L3        | 13      | 15          | 15       | 15          | 15       | 20          |
| L4        | 27      | 36          | 44       | 55          | 67       | 85          |
| L5        | 16      | 25          | 32       | 44          | 55       | 69          |
| L6        | 2       | 5           | 3        | 2.5         | 2.5      | 2.5         |
| L7        | 47.5    | 62          | 72       | 87          | 102      | 127         |
| L8        | 67      | 97          | 112      | 137         | 162      | 202         |
| L11       | 129/142 | 155.8/168.8 | 197/215  | 255.5/277.5 | 327/360  | 405.3/408.3 |
| B1 h9     | 5       | 6           | 6        | 10          | 12       | 14          |
| H1        | 15      | 20.5        | 24.5     | 35          | 43       | 53.5        |
| C1        | 70/90   | 70/90       | 90/145   | 145/200     | 200      | 200/235     |
| C2        | M4/M5   | M4/M5       | M5/M8    | M8/M12      | M12      | M12         |
| C3        | ≤14/≤19 | ≤14/≤19     | ≤19/≤24  | ≤24/≤35     | ≤35/≤42  | ≤42/≤55     |
| C4        | 31.5/41 | 31.5/41     | 41/59    | 60/81       | 81/114   | 114/117     |
| C5        | 50/70   | 50/70       | 70/110   | 110/114.3   | 114.3    | 114.3/200   |
| C6        | 5/6     | 5/6         | 6/14     | 14/23       | 19/15    | 24          |
| C7        | 60/80   | 60/80       | 80/130   | 130/180     | 180      | 180/220     |
| C8        | 6/9     | 6/9         | 9.5/21.5 | 19.5/25     | 22/55    | 30/33       |

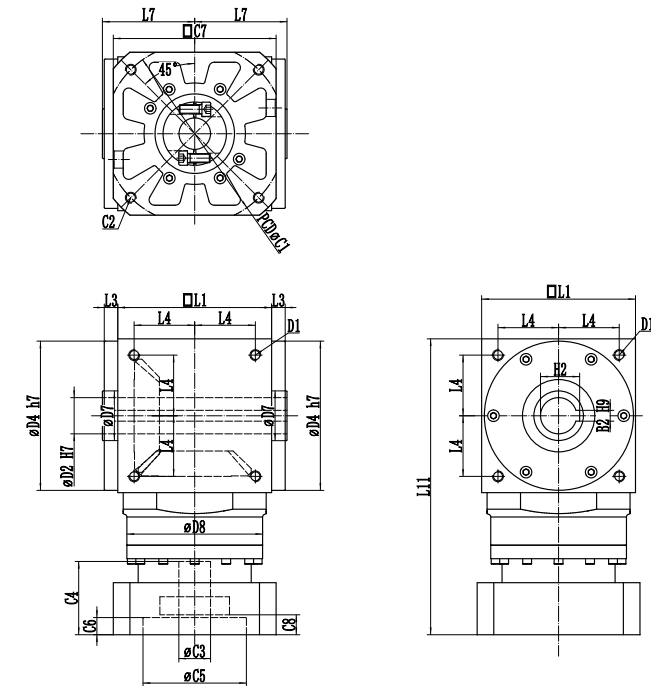
## WATD-L3



Dimension (3 stage, Ratio  $i=25\sim 200$ )

| Dimension | WATD065 | WATD090     | WATD110     | WATD140   | WATAD170  | WATAD210 |
|-----------|---------|-------------|-------------|-----------|-----------|----------|
| D1        | M5 ↓ 10 | M6 ↓ 12     | M8 ↓ 16     | M10 ↓ 20  | M12 ↓ 25  | M16 ↓ 32 |
| D3 j6     | 13      | 18          | 22          | 32        | 40        | 50       |
| D4 h7     | 63      | 88          | 108         | 135       | 165       | 205      |
| D5        | M4 ↓ 8  | M5 ↓ 10     | M8 ↓ 16     | M12 ↓ 25  | M16 ↓ 32  | M16 ↓ 32 |
| D7        | 19.9    | 29.9        | 39.9        | 44.9      | 54.9      | 74.9     |
| D8        | 64      | 64          | 94          | 125       | 150       | 170      |
| L1        | 65      | 90          | 110         | 140       | 170       | 210      |
| L2        | 19.5    | 35          | 40          | 50        | 60        | 75       |
| L3        | 13      | 15          | 15          | 15        | 15        | 20       |
| L4        | 27      | 36          | 44          | 55        | 67        | 85       |
| L5        | 16      | 25          | 32          | 44        | 55        | 69       |
| L6        | 2       | 5           | 3           | 2.5       | 2.5       | 2.5      |
| L7        | 47.5    | 62          | 72          | 87        | 102       | 127      |
| L8        | 67      | 97          | 112         | 137       | 162       | 202      |
| L11       | 161/174 | 187.8/200.8 | 216.5/234.5 | 270/300.5 | 347.5/388 | 438/471  |
| B1 h9     | 5       | 6           | 6           | 10        | 12        | 14       |
| H1        | 15      | 20.5        | 24.5        | 35        | 43        | 53.5     |
| C1        | 70/90   | 70/90       | 90/145      | 145/200   | 200       | 200/235  |
| C2        | M4/M5   | M4/M5       | M4/M5       | M5/M8     | M8/M12    | M12      |
| C3        | ≤14/≤19 | ≤14/≤19     | ≤19/≤24     | ≤19/≤24   | ≤24/≤35   | ≤35/≤42  |
| C4        | 31.5/41 | 31.5/41     | 31.5/41     | 41/60     | 60/81     | 81/114   |
| C5        | 50/70   | 50/70       | 50/70       | 70/110    | 110/114.3 | 114.3    |
| C6        | 5/6     | 5/6         | 5/6         | 6/14      | 14/19     | 19/15    |
| C7        | 60/80   | 60/80       | 60/80       | 80/130    | 130/180   | 180      |
| C8        | 6/9     | 6/9         | 6/9.5       | 9.5/19.5  | 19.5/22   | 22/55    |

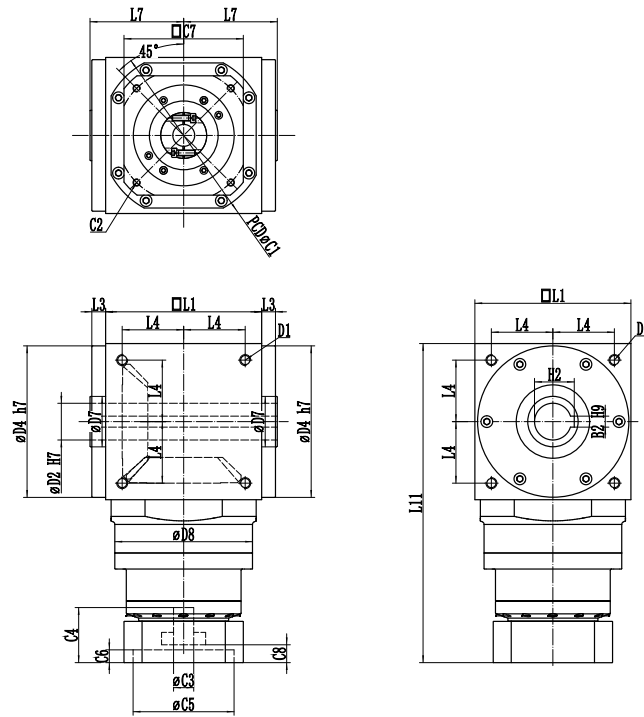
## WATH-L2



Dimension (double stage, Ratio  $i=4\sim 20$ )

| Dimension | WATH065 | WATH090     | WATH110  | WATH140     | WATH170  | WATH210     |
|-----------|---------|-------------|----------|-------------|----------|-------------|
| D1        | M5 ↓ 10 | M6 ↓ 12     | M8 ↓ 16  | M10 ↓ 20    | M12 ↓ 25 | M16 ↓ 32    |
| D2 H7     | 13      | 18          | 22       | 32          | 40       | 50          |
| D4 h7     | 63      | 88          | 108      | 135         | 165      | 205         |
| D7        | 19.9    | 29.9        | 39.9     | 44.9        | 54.9     | 74.9        |
| D8        | 64      | 64          | 94       | 125         | 150      | 170         |
| L1        | 65      | 90          | 110      | 140         | 170      | 210         |
| L3        | 13      | 15          | 15       | 15          | 15       | 20          |
| L4        | 27      | 36          | 44       | 55          | 67       | 85          |
| L7        | 47.5    | 62          | 72       | 87          | 102      | 127         |
| L11       | 129/142 | 155.8/168.8 | 197/215  | 255.5/277.5 | 327/36   | 405.3/408.3 |
| B2 H9     | 5       | 6           | 6        | 10          | 012      | 14          |
| H2        | 15.3    | 20.8        | 24.8     | 35.3        | 43.3     | 53.8        |
| C1        | 70/90   | 70/90       | 90/145   | 145/200     | 200      | 200/235     |
| C2        | M4/M5   | M4/M5       | M5/M8    | M8/M12      | M12      | M12         |
| C3        | ≤14/≤19 | ≤14/≤19     | ≤19/≤24  | ≤24/≤35     | ≤35/≤42  | ≤42/≤55     |
| C4        | 31.5/41 | 31.5/41     | 41/59    | 60/81       | 81/114   | 114/117     |
| C5        | 50/70   | 50/70       | 70/110   | 110/114.3   | 114.3    | 114.3/200   |
| C6        | 5/6     | 5/6         | 6/14     | 14/23       | 19/15    | 24          |
| C7        | 60/80   | 60/80       | 80/130   | 130/180     | 180      | 180/220     |
| C8        | 6/9     | 6/9         | 9.5/21.5 | 19.5/25     | 22/55    | 30/33       |

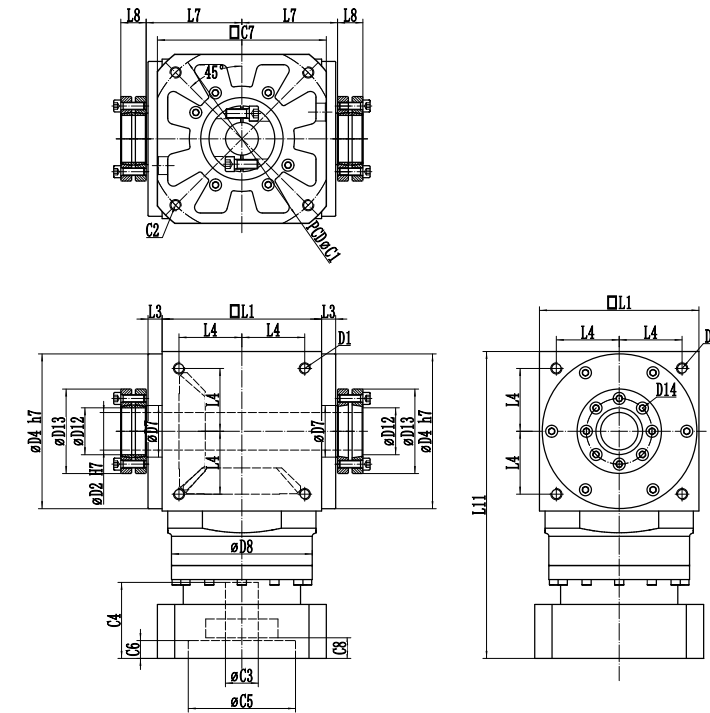
## WATH-L3



Dimension (double stage, Ratio  $i=25\sim 200$ )

| Dimension | WATH065 | WATH090     | WATH110     | WATH140   | WATH170   | WATH210  |
|-----------|---------|-------------|-------------|-----------|-----------|----------|
| D1        | M5 ↓ 10 | M6 ↓ 12     | M8 ↓ 16     | M10 ↓ 20  | M12 ↓ 25  | M16 ↓ 32 |
| D2 H7     | 13      | 18          | 22          | 32        | 40        | 50       |
| D4 h7     | 63      | 88          | 108         | 135       | 165       | 205      |
| D7        | 19.9    | 29.9        | 39.9        | 44.9      | 54.9      | 74.9     |
| D8        | 64      | 64          | 94          | 125       | 150       | 170      |
| L1        | 65      | 90          | 110         | 140       | 170       | 210      |
| L3        | 13      | 15          | 15          | 15        | 15        | 20       |
| L4        | 27      | 36          | 44          | 55        | 67        | 85       |
| L7        | 47.5    | 62          | 72          | 87        | 102       | 127      |
| L11       | 161/174 | 187.8/200.8 | 216.5/234.5 | 270/300.5 | 347.5/388 | 438/471  |
| B2 H9     | 5       | 6           | 6           | 10        | 12        | 14       |
| H2        | 15.3    | 20.8        | 24.8        | 35.3      | 43.3      | 53.8     |
| C1        | 70/90   | 70/90       | 70/90       | 90/145    | 145/200   | 200      |
| C2        | M4/M5   | M4/M5       | M4/M5       | M5/M8     | M8/M12    | M12      |
| C3        | ≤14/≤19 | ≤14/≤19     | ≤14/≤19     | ≤19/≤24   | ≤24/≤35   | ≤35/≤42  |
| C4        | 31.5/41 | 31.5/41     | 31.5/41     | 41/60     | 60/81     | 81/114   |
| C5        | 50/70   | 50/70       | 50/70       | 70/110    | 110/114.3 | 114.3    |
| C6        | 5/6     | 5/6         | 5/6         | 6/14      | 14/19     | 19/15    |
| C7        | 60/80   | 60/80       | 60/80       | 80/130    | 130/180   | 180      |
| C8        | 6/9     | 6/9         | 6/9.5       | 9.5/19.5  | 19.5/22   | 22/55    |

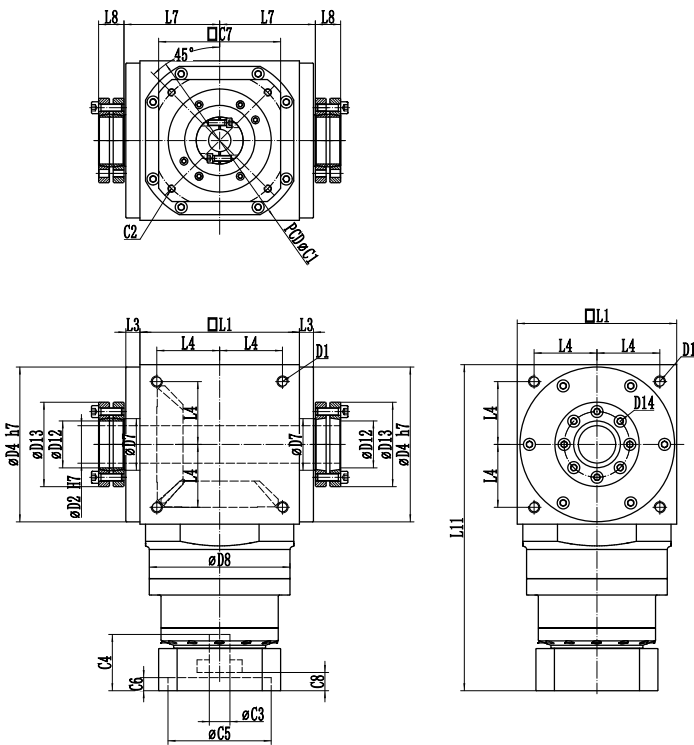
## WATC-L2



Dimension (double stage, Ratio  $i=4\sim 20$ )

| Dimension | WATC065 | WATC090     | WATC110  | WATC140     | WATC170  | WATC210     |
|-----------|---------|-------------|----------|-------------|----------|-------------|
| D1        | M5 ↓ 10 | M6 ↓ 12     | M8 ↓ 16  | M10 ↓ 20    | M12 ↓ 25 | M16 ↓ 32    |
| D2 H7     | 13      | 18          | 22       | 32          | 40       | 50          |
| D4 h7     | 63      | 88          | 108      | 135         | 165      | 205         |
| D7        | 19.9    | 29.9        | 39.9     | 44.9        | 54.9     | 74.9        |
| D8        | 64      | 64          | 94       | 125         | 150      | 170         |
| D12       | 16      | 22          | 27       | 44          | 50       | 62          |
| D13       | 41      | 50          | 53       | 80          | 90       | 110         |
| D14       | 6-M6    | 6-M6        | 7-M6     | 8-M6        | 8-M8     | 8-M8        |
| L1        | 65      | 90          | 110      | 140         | 170      | 210         |
| L3        | 13      | 15          | 15       | 15          | 15       | 20          |
| L4        | 27      | 36          | 44       | 55          | 67       | 85          |
| L7        | 47.5    | 62          | 72       | 87          | 102      | 127         |
| L8        | 18      | 20          | 20       | 25          | 27       | 30          |
| L11       | 129/142 | 155.8/168.8 | 197/215  | 255.5/277.5 | 327/360  | 405.3/408.3 |
| C1        | 70/90   | 70/90       | 90/145   | 145/200     | 200      | 200/235     |
| C2        | M4/M5   | M4/M5       | M5/M8    | M8/M12      | M12      | M12         |
| C3        | ≤14/≤19 | ≤14/≤19     | ≤19/≤24  | ≤24/≤35     | ≤35/≤42  | ≤42/≤55     |
| C4        | 31.5/41 | 31.5/41     | 41/59    | 60/81       | 81/114   | 114/117     |
| C5        | 50/70   | 50/70       | 70/110   | 110/114.3   | 114.3    | 114.3/200   |
| C6        | 5/6     | 5/6         | 6/14     | 14/23       | 19/15    | 24          |
| C7        | 60/80   | 60/80       | 80/130   | 130/180     | 180      | 180/220     |
| C8        | 6/9     | 6/9         | 9.5/21.5 | 19.5/25     | 22/55    | 30/33       |

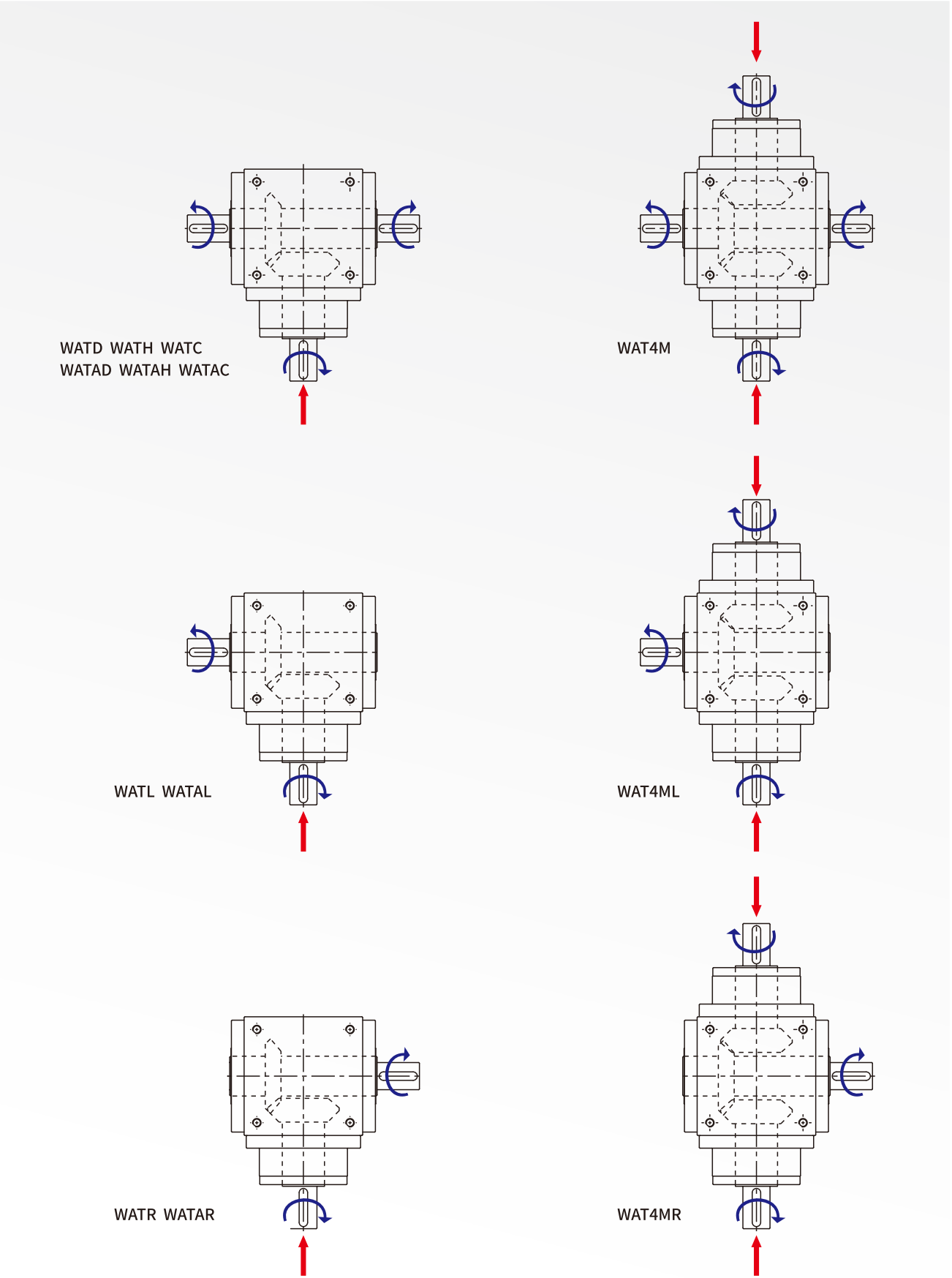
WATC-L3



Dimension (3 stage, Ratio i=25~200)

| Dimension | WATC065 | WATC090     | WATC110     | WATC140   | WATC170   | WATC210  |
|-----------|---------|-------------|-------------|-----------|-----------|----------|
| D1        | M5 ↓ 10 | M6 ↓ 12     | M8 ↓ 16     | M10 ↓ 20  | M12 ↓ 25  | M16 ↓ 32 |
| D2 H7     | 13      | 18          | 22          | 32        | 40        | 50       |
| D4 h7     | 63      | 88          | 108         | 135       | 165       | 205      |
| D7        | 19.9    | 29.9        | 39.9        | 44.9      | 54.9      | 74.9     |
| D8        | 64      | 64          | 94          | 125       | 150       | 170      |
| D12       | 16      | 22          | 27          | 44        | 50        | 62       |
| D13       | 41      | 50          | 53          | 80        | 90        | 110      |
| D14       | 6-M6    | 6-M6        | 7-M6        | 8-M6      | 8-M8      | 8-M8     |
| L1        | 65      | 90          | 110         | 140       | 170       | 210      |
| L3        | 13      | 15          | 15          | 15        | 15        | 20       |
| L4        | 27      | 36          | 44          | 55        | 67        | 85       |
| L7        | 47.5    | 62          | 72          | 87        | 102       | 127      |
| L8        | 18      | 20          | 20          | 25        | 27        | 30       |
| L11       | 161/174 | 187.8/200.8 | 216.5/234.5 | 270/300.5 | 347.5/388 | 438/471  |
| C1        | 70/90   | 70/90       | 70/90       | 90/145    | 145/200   | 200      |
| C2        | M4/M5   | M4/M5       | M4/M5       | M5/M8     | M8/M12    | M12      |
| C3        | ≤14/≤19 | ≤14/≤19     | ≤14/≤19     | ≤19/≤24   | ≤24/≤35   | ≤35/≤42  |
| C4        | 31.5/41 | 31.5/41     | 31.5/41     | 41/60     | 60/81     | 81/114   |
| C5        | 50/70   | 50/70       | 50/70       | 70/110    | 110/114.3 | 114.3    |
| C6        | 5/6     | 5/6         | 5/6         | 6/14      | 14/19     | 19/15    |
| C7        | 60/80   | 60/80       | 60/80       | 80/130    | 130/180   | 180      |
| C8        | 6/9     | 6/9         | 6/9.5       | 9.5/19.5  | 19.5/22   | 22/55    |

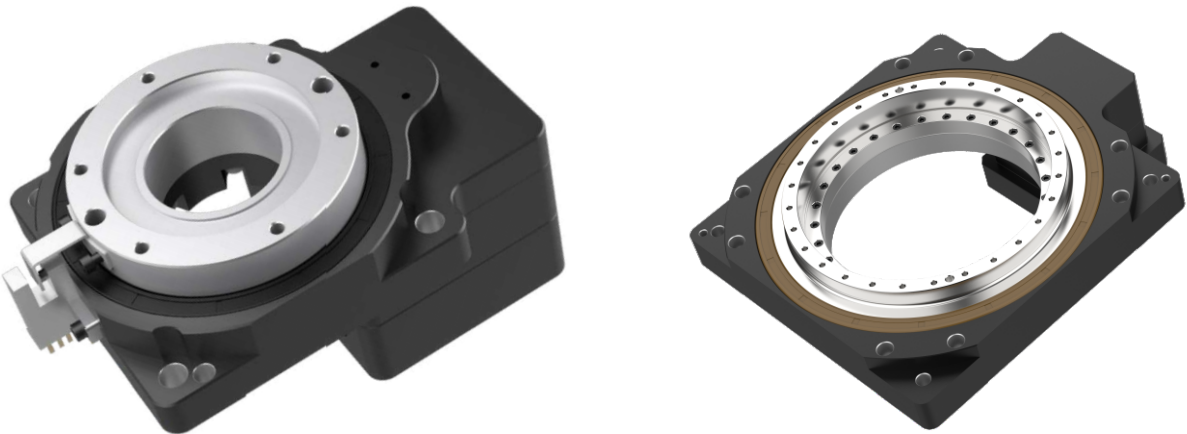
Rotation Direction Diagram



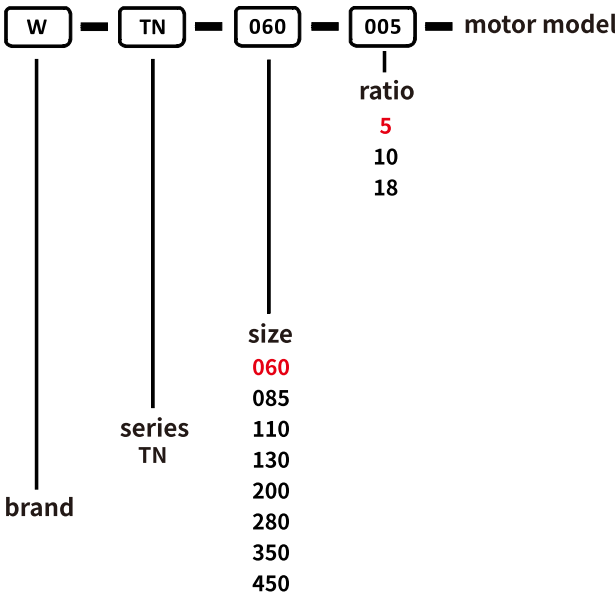
WTN Hollow Rotary Platform

FEATURES

- » Competitive price
- » Larger hollow hole, convenient for wiring and piping
- » Compact size, greater power density
- » Crossed roller bearing output, with greater load-bearing capacity



SELECTION



GENERAL NOTICES

- Type, model and torque
- Ratio or output speed
- Working conditions and connection methods
- Quantity and installed machine name
- Input mode and input speed
- Motor brand model or flange and motor shaft size

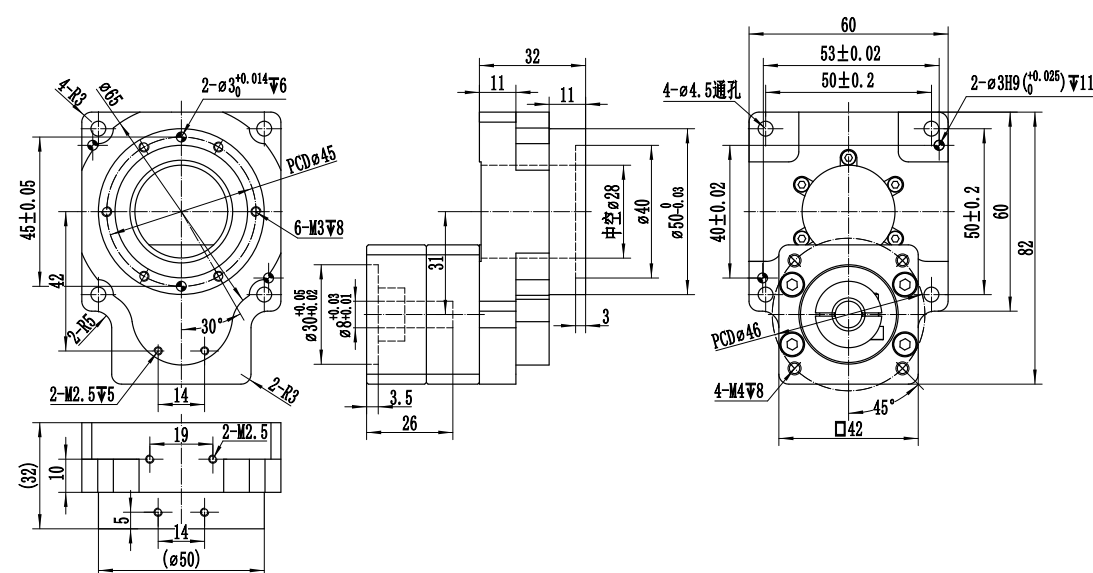


## WTN060 Heavy-load type

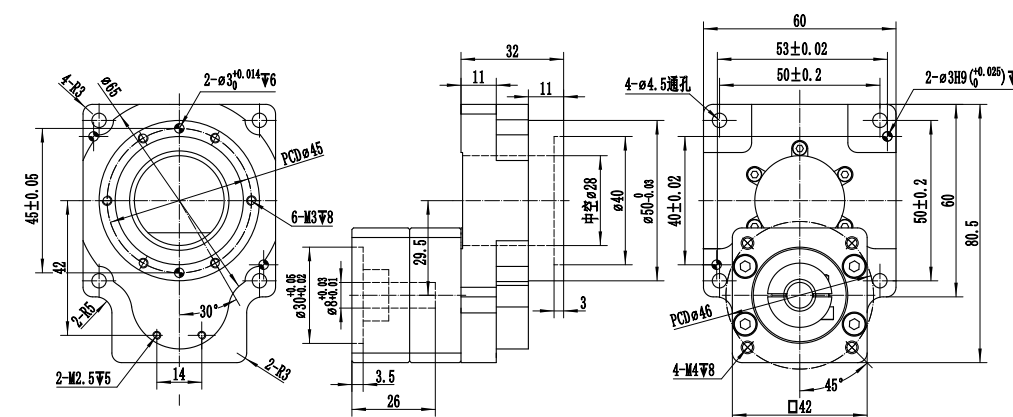
## Performance

| Specifications                     | Unit              | WTN060           |     |     | WTN060+WVRB042       |    |                        |    |     | WTN060+WRS042            |    |    |
|------------------------------------|-------------------|------------------|-----|-----|----------------------|----|------------------------|----|-----|--------------------------|----|----|
| Applicable motor models            |                   | 42 stepper motor |     |     | 50W~100W servo motor |    |                        |    |     | motor shaft diameter≤8mm |    |    |
| Bearing type                       |                   |                  |     |     |                      |    | crossed roller bearing |    |     |                          |    |    |
| Ratio                              |                   | 5                | 10  | 18  | 25                   | 40 | 50                     | 70 | 100 | 15                       | 30 | 50 |
| Rotational inertia                 | Kg.m <sup>2</sup> |                  |     |     |                      |    | 3507x10-7              |    |     |                          |    |    |
| Rated output torque                | N·m               | 5.2              | 4.6 | 1.2 | 5.2                  |    |                        |    |     | 5.2                      |    |    |
| Rated output speed                 | rpm               |                  |     |     |                      |    | 300                    |    |     |                          |    |    |
| Angular transmission accuracy      | arcmin            |                  |     |     |                      |    | <2                     |    |     |                          |    |    |
| Reset positioning accuracy         | arcsec            |                  |     |     |                      |    | <15                    |    |     |                          |    |    |
| Backlash                           | arcmin            | <1               |     |     | <3                   |    |                        |    |     | <3                       |    |    |
| Allowable axial load               | N                 |                  |     |     | 250                  |    |                        |    |     |                          |    |    |
| Allowable moment of inertia        | N·m               |                  |     |     | 5                    |    |                        |    |     |                          |    |    |
| Parallelism of rotation platform   | mm                |                  |     |     | 0.015                |    |                        |    |     |                          |    |    |
| Concentricity of rotation platform | mm                |                  |     |     | 0.01                 |    |                        |    |     |                          |    |    |
| Output end face runout             | mm                |                  |     |     | 0.008                |    |                        |    |     |                          |    |    |
| Noise                              | dB                | 65               |     |     | 60                   |    |                        |    |     | 65                       |    |    |
| Service life                       | h                 |                  |     |     | 20000                |    |                        |    |     |                          |    |    |
| Protection level                   | IP                |                  |     |     | 40                   |    |                        |    |     |                          |    |    |
| Weight                             | Kg                | 0.6              |     |     | 1.2                  |    |                        |    |     | 1.3                      |    |    |

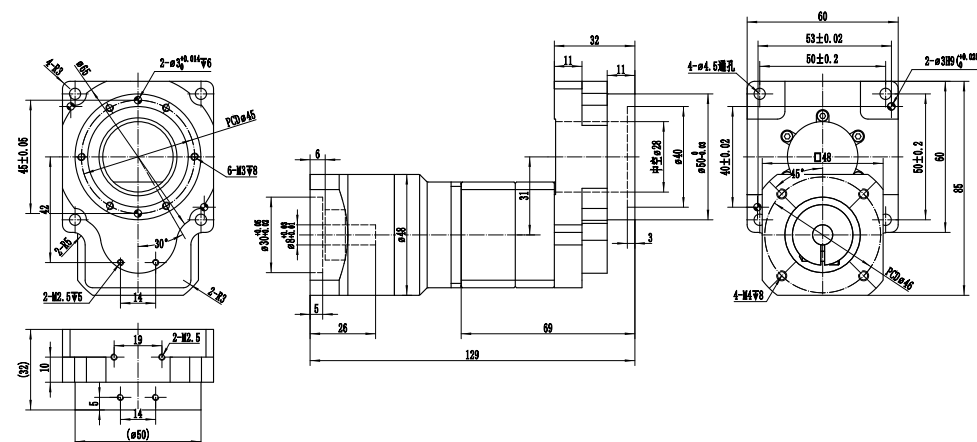
Ratio 5/10 dimension



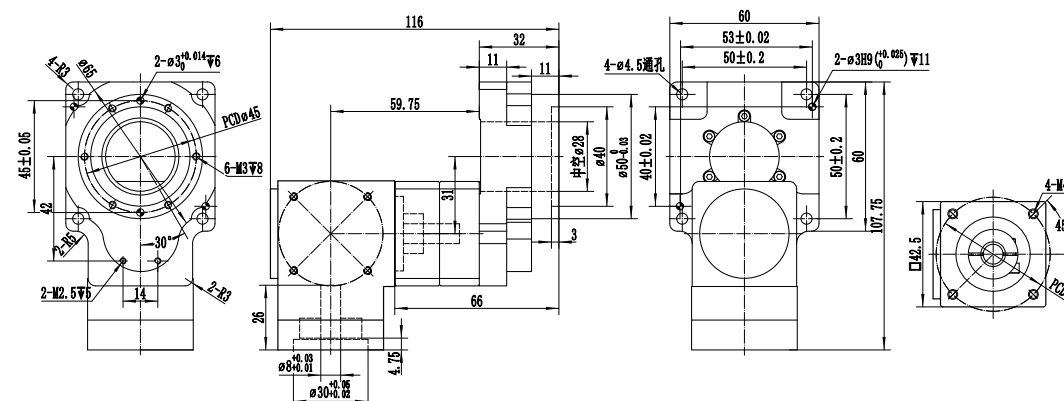
### Ratio 18 dimension



### Combined gearbox dimension



### Combined right-angle gearbox dimension

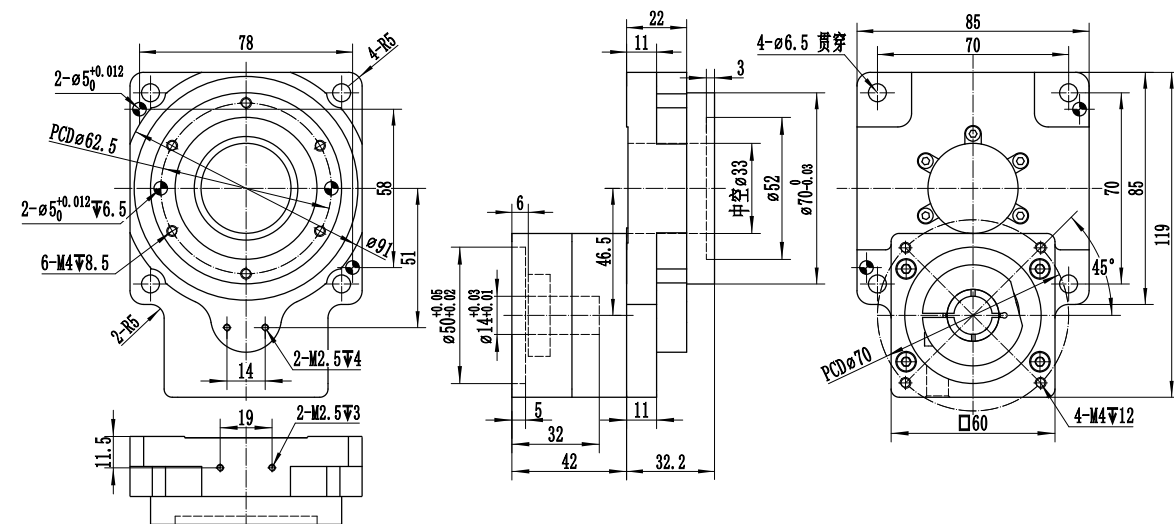


## WTN085 Heavy-load type

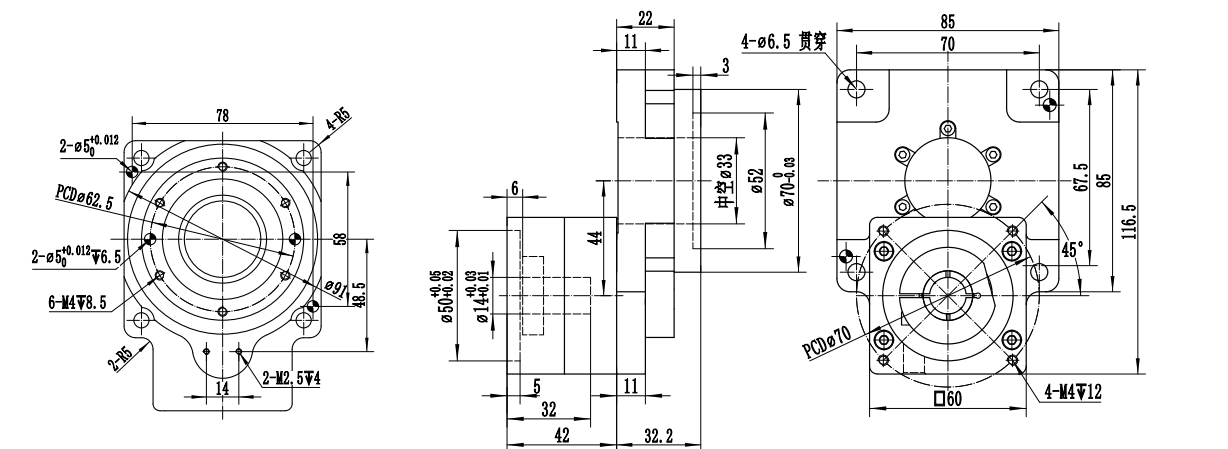
## Performance

| Specifications                     | Unit              | WTN085                 | WTN085+WVRB060        | WTN085+WRS060             |
|------------------------------------|-------------------|------------------------|-----------------------|---------------------------|
| Applicable motor models            |                   | 57 stepper motor       | 200W~400W servo motor | motor shaft diameter≤14mm |
| Bearing type                       |                   | crossed roller bearing |                       |                           |
| Ratio                              |                   | 5 10                   | 30 40 50 70 100       | 15 30 50                  |
| Rotational inertia                 | Kg.m <sup>2</sup> | 12593x10-7             |                       |                           |
| Rated output torque                | N·m               | 12 10                  | 12                    | 12                        |
| Rated output speed                 | rpm               | 300                    |                       |                           |
| Angular transmission accuracy      | arcmin            | <2                     |                       |                           |
| Reset positioning accuracy         | arcsec            | <15                    |                       |                           |
| Backlash                           | arcmin            | <1                     | <2                    | <2                        |
| Allowable axial load               | N                 | 500                    |                       |                           |
| Allowable moment of inertia        | N·m               | 10                     |                       |                           |
| Parallelism of rotation platform   | mm                | 0.015                  |                       |                           |
| Concentricity of rotation platform | mm                | 0.01                   |                       |                           |
| Output end face runout             | mm                | 0.008                  |                       |                           |
| Noise                              | dB                | 65                     | 60                    | 65                        |
| Service life                       | h                 | 20000                  |                       |                           |
| Protection level                   | IP                | 40                     |                       |                           |
| Weight                             | Kg                | 1.2                    | 2.7                   | 2.5                       |

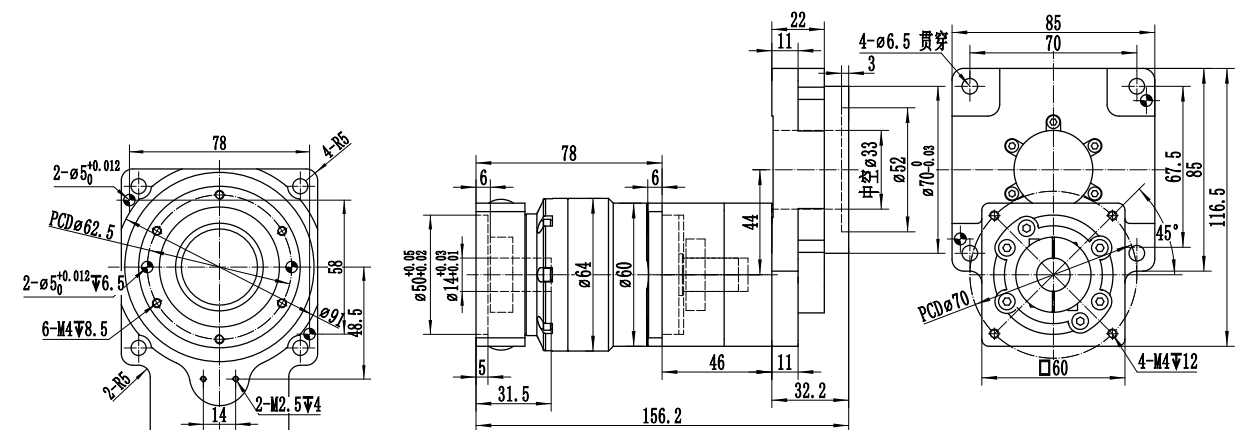
## Ratio 5 dimension



Ratio 10 dimension

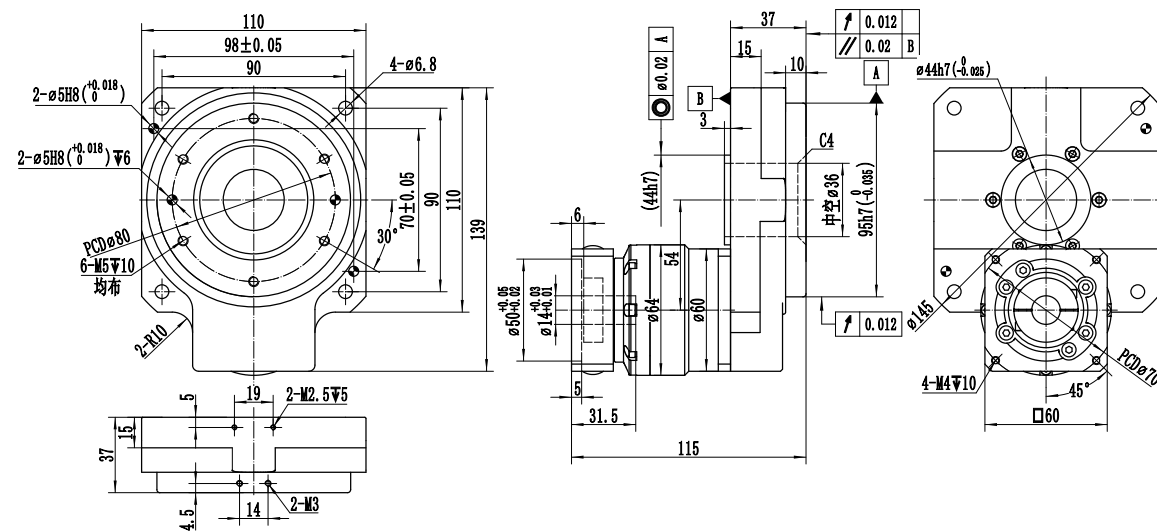


### Combined gearbox dimension

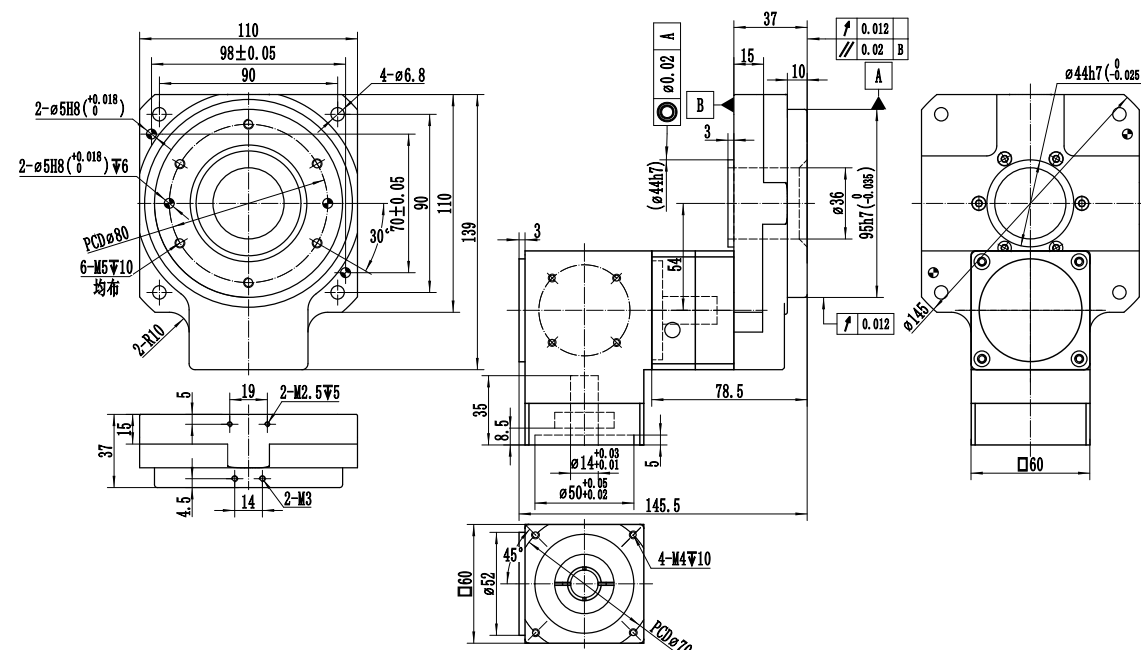




### Combined gearbox dimension



### Combined right-angle gearbox dimension

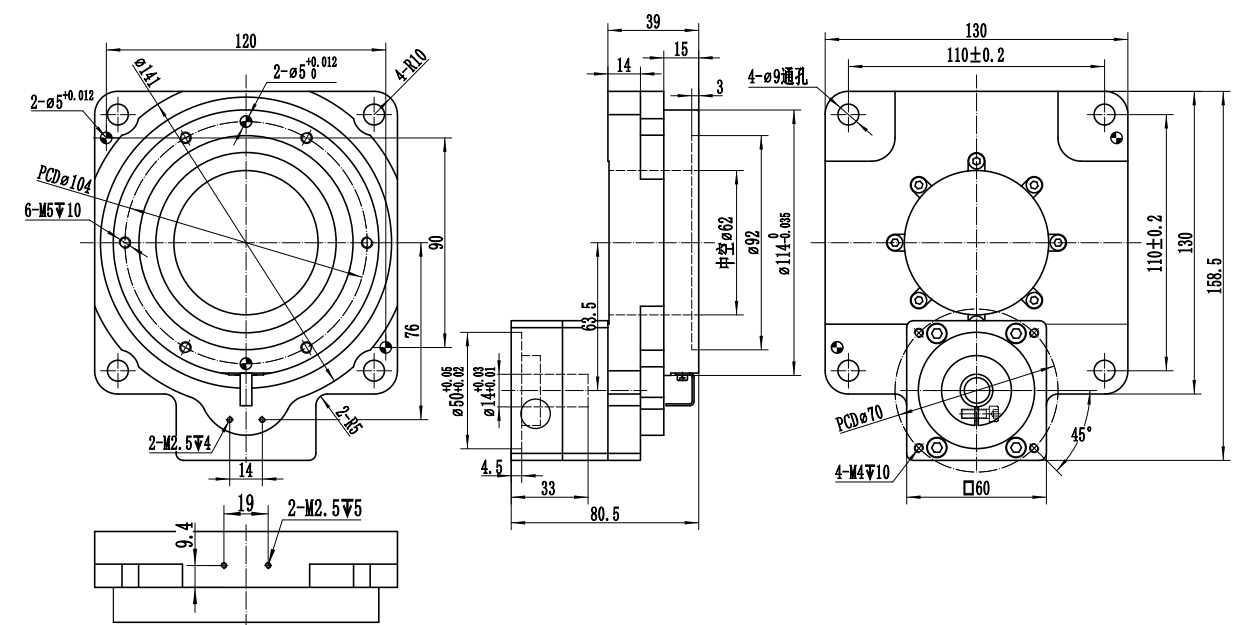


## WTN130 Heavy-load type

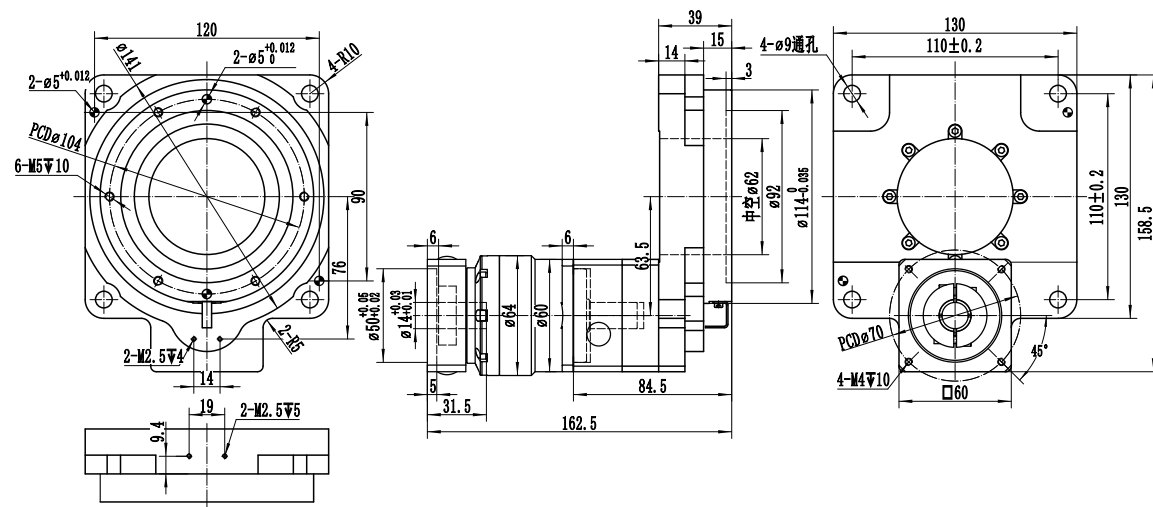
## Performance

| Specifications                     | Unit              | WTN130                 |    | WTN130+WVRB060        |    |    |     |     | WTN130+WRS060             |    |    |
|------------------------------------|-------------------|------------------------|----|-----------------------|----|----|-----|-----|---------------------------|----|----|
| Applicable motor models            |                   | 57 stepper motor       |    | 200W~400W servo motor |    |    |     |     | motor shaft diameter≤14mm |    |    |
| Bearing type                       |                   | crossed roller bearing |    |                       |    |    |     |     |                           |    |    |
| Ratio                              |                   | 10                     | 18 | 30                    | 40 | 50 | 70  | 100 | 10                        | 30 | 50 |
| Rotational inertia                 | Kg.m <sup>2</sup> | 8155x10-6              |    |                       |    |    |     |     |                           |    |    |
| Rated output torque                | N·m               | 32                     | 20 | 32                    |    |    |     |     | 32                        |    |    |
| Rated output speed                 | rpm               | 200                    |    |                       |    |    |     |     |                           |    |    |
| Angular transmission accuracy      | arcmin            | <1.5                   |    |                       |    |    |     |     |                           |    |    |
| Reset positioning accuracy         | arcsec            | <15                    |    |                       |    |    |     |     |                           |    |    |
| Backlash                           | arcmin            | <1                     |    |                       | <2 |    |     | <2  |                           |    |    |
| Allowable axial load               | N                 | 2000                   |    |                       |    |    |     |     |                           |    |    |
| Allowable moment of inertia        | N·m               | 50                     |    |                       |    |    |     |     |                           |    |    |
| Parallelism of rotation platform   | mm                | 0.02                   |    |                       |    |    |     |     |                           |    |    |
| Concentricity of rotation platform | mm                | 0.012                  |    |                       |    |    |     |     |                           |    |    |
| Output end face runout             | mm                | 0.012                  |    |                       |    |    |     |     |                           |    |    |
| Noise                              | dB                | 65                     |    |                       | 60 |    |     | 65  |                           |    |    |
| Service life                       | h                 | 20000                  |    |                       |    |    |     |     |                           |    |    |
| Protection level                   | IP                | 40                     |    |                       |    |    |     |     |                           |    |    |
| Weight                             | Kg                | 2.8                    |    | 4.3                   |    |    | 4.1 |     |                           |    |    |

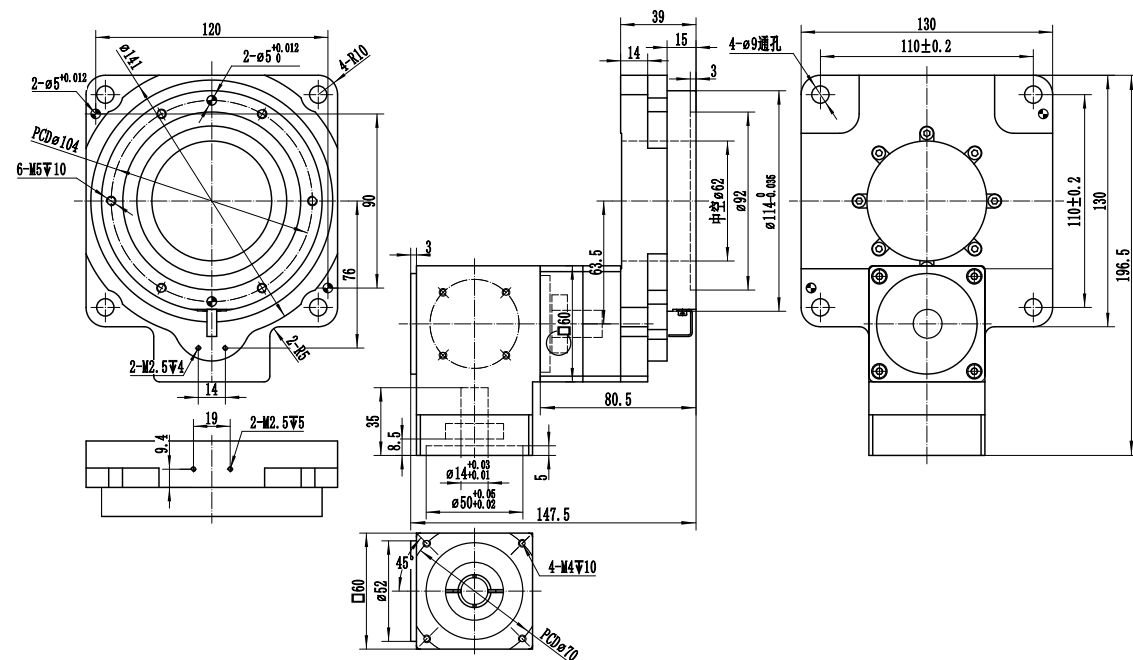
Ratio 10/18 dimension



### Combined gearbox dimension



### Combined right-angle gearbox dimension

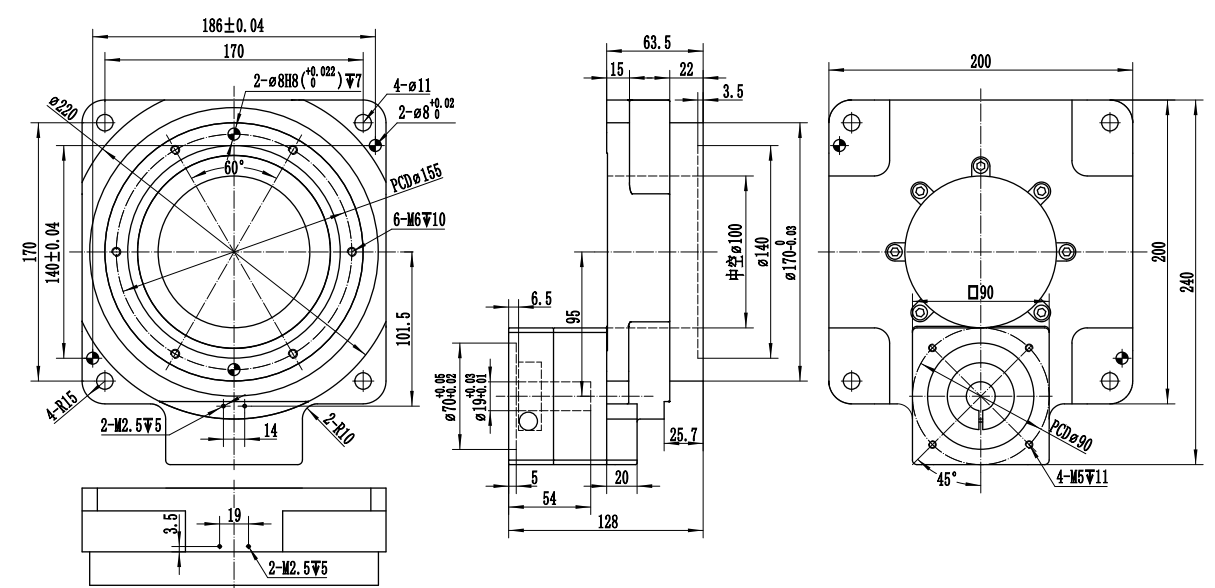


## WTN200 Heavy-load type

## Performance

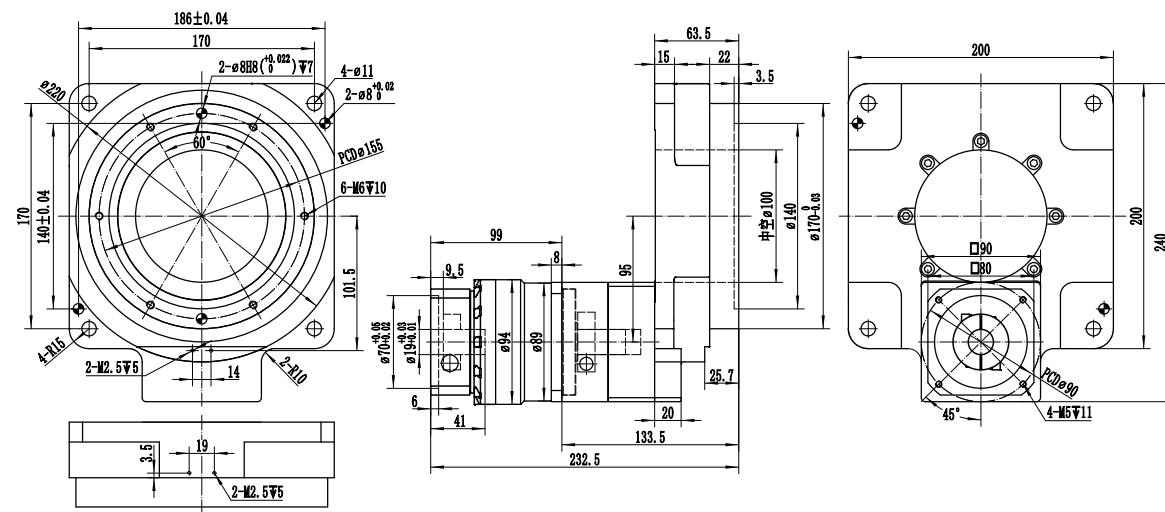
| Specifications                     | Unit              | WTN200                 | WTN200+WVRB090   | WTN200+WRS090             |
|------------------------------------|-------------------|------------------------|------------------|---------------------------|
| Applicable motor models            |                   | 86 stepper motor       | 750W servo motor | motor shaft diameter≤19mm |
| Bearing type                       |                   | crossed roller bearing |                  |                           |
| Ratio                              |                   | 10 18                  | 30 40 50 70 100  | 10 30 50                  |
| Rotational inertia                 | Kg.m <sup>2</sup> | 36122x10-6             |                  |                           |
| Rated output torque                | N·m               | 70 70                  | 70               | 70                        |
| Rated output speed                 | rpm               | 200                    |                  |                           |
| Angular transmission accuracy      | arcmin            | <1                     |                  |                           |
| Reset positioning accuracy         | arcsec            | <10                    |                  |                           |
| Backlash                           | arcmin            | <1                     | <2               | <2                        |
| Allowable axial load               | N                 | 4000                   |                  |                           |
| Allowable moment of inertia        | N·m               | 100                    |                  |                           |
| Parallelism of rotation platform   | mm                | 0.02                   |                  |                           |
| Concentricity of rotation platform | mm                | 0.012                  |                  |                           |
| Output end face runout             | mm                | 0.012                  |                  |                           |
| Noise                              | dB                | 67                     | 62               | 67                        |
| Service life                       | h                 | 20000                  |                  |                           |
| Protection level                   | IP                | 40                     |                  |                           |
| Weight                             | Kg                | 9.6                    | 13.3             | 13.7                      |

Ratio 10/18 dimension

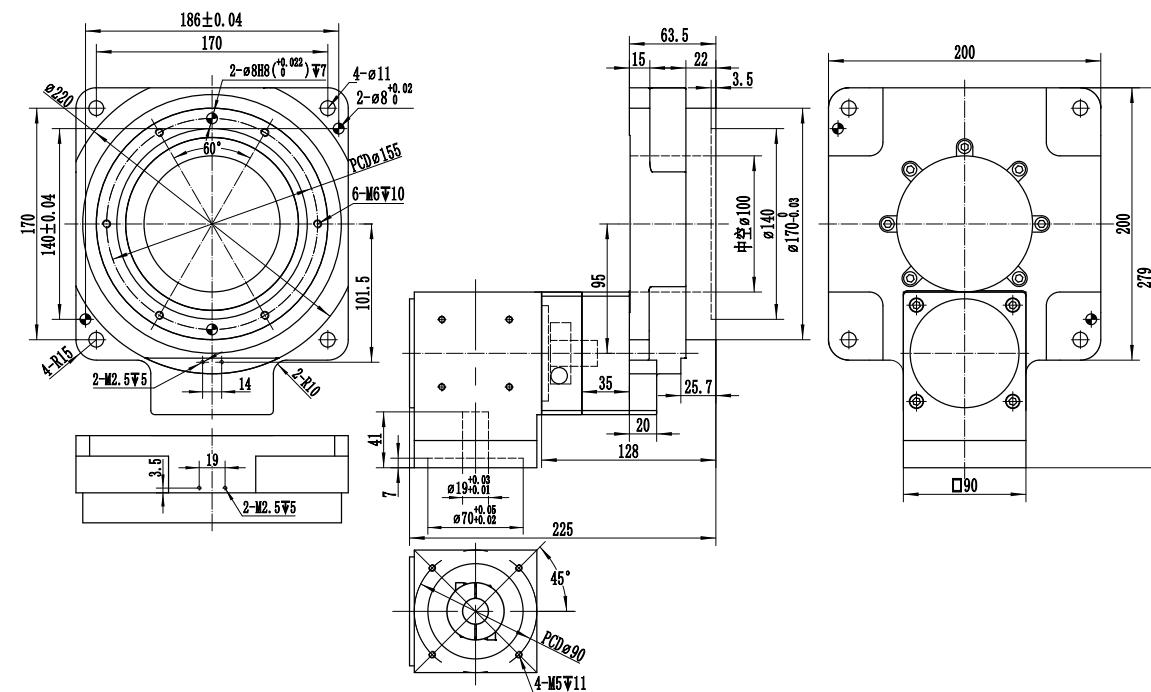




### Combined gearbox dimension



### Combined right-angle gearbox dimension

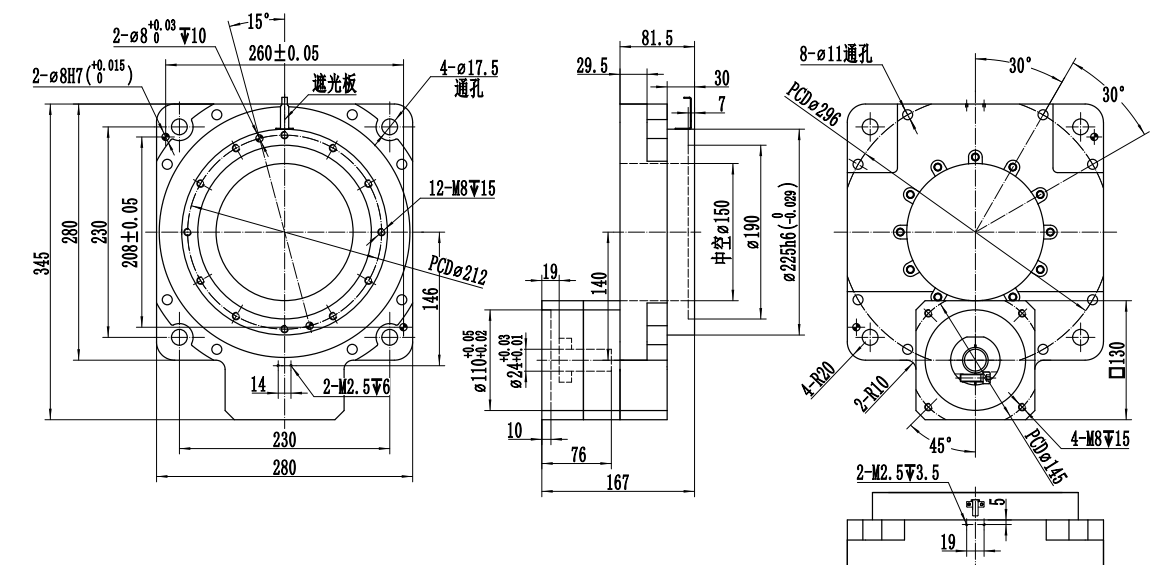


## WTN280 Heavy-load type

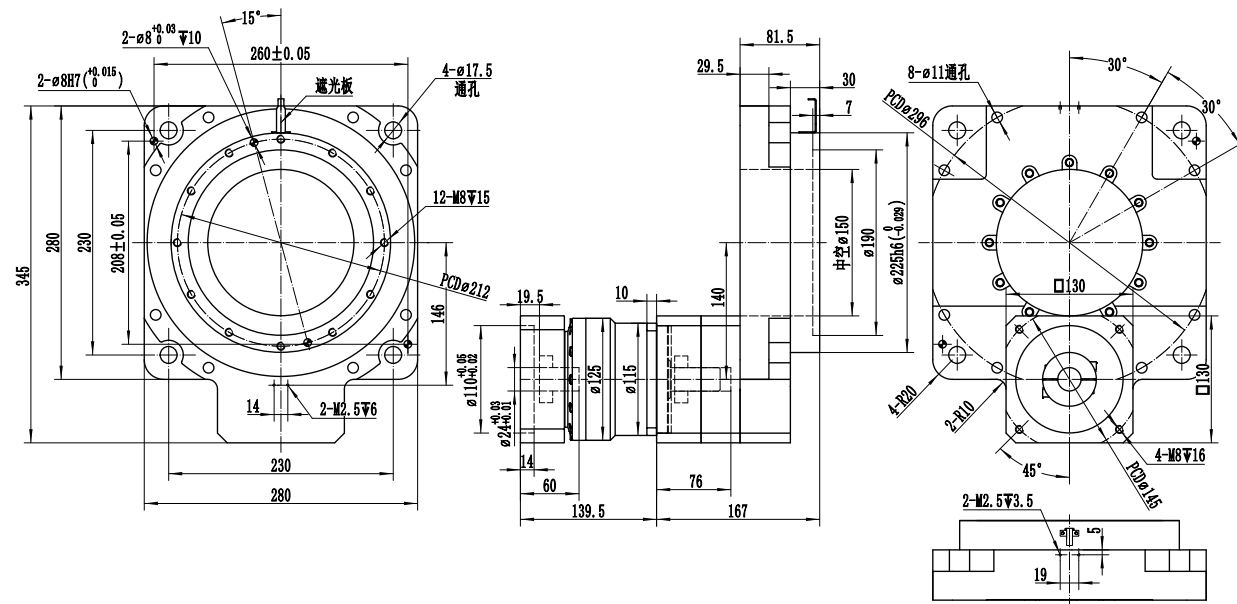
## Performance

| Specifications                     | Unit              | WTN280                 | WTN280+WVRB115          |    |    |                           |     |  |
|------------------------------------|-------------------|------------------------|-------------------------|----|----|---------------------------|-----|--|
| Applicable motor models            |                   | 110/130 stepper motor  | 1000W~3000W servo motor |    |    | motor shaft diameter≤24mm |     |  |
| Bearing type                       |                   | crossed roller bearing |                         |    |    |                           |     |  |
| Ratio                              |                   | 10                     | 30                      | 40 | 50 | 70                        | 100 |  |
| Rotational inertia                 | Kg.m <sup>2</sup> | 14600x10-5             |                         |    |    |                           |     |  |
| Rated output torque                | N·m               | 180                    | 180                     |    |    |                           |     |  |
| Emergency stop Torque T2NOT        | rpm               | Rated output torque    |                         |    |    |                           |     |  |
| Rated output speed                 | rpm               | 200                    |                         |    |    |                           |     |  |
| Angular transmission accuracy      | arcmin            | <1                     |                         |    |    |                           |     |  |
| Reset positioning accuracy         | arcsec            | <10                    |                         |    |    |                           |     |  |
| Backlash                           | arcmin            | <1                     | <2                      |    |    |                           |     |  |
| Allowable axial load               | N                 | 7000                   |                         |    |    |                           |     |  |
| Allowable moment of inertia        | N·m               | 200                    |                         |    |    |                           |     |  |
| Parallelism of rotation platform   | mm                | 0.030                  |                         |    |    |                           |     |  |
| Concentricity of rotation platform | mm                | 0.015                  |                         |    |    |                           |     |  |
| Output end face runout             | mm                | 0.015                  |                         |    |    |                           |     |  |
| Noise                              | dB                | 71                     | 65                      |    |    |                           |     |  |
| Service life                       | h                 | 20000                  |                         |    |    |                           |     |  |
| Protection level                   | IP                | 40                     |                         |    |    |                           |     |  |
| Weight                             | Kg                | 18                     | 25.8                    |    |    |                           |     |  |

Ratio 10 dimension



### Combined gearbox dimension

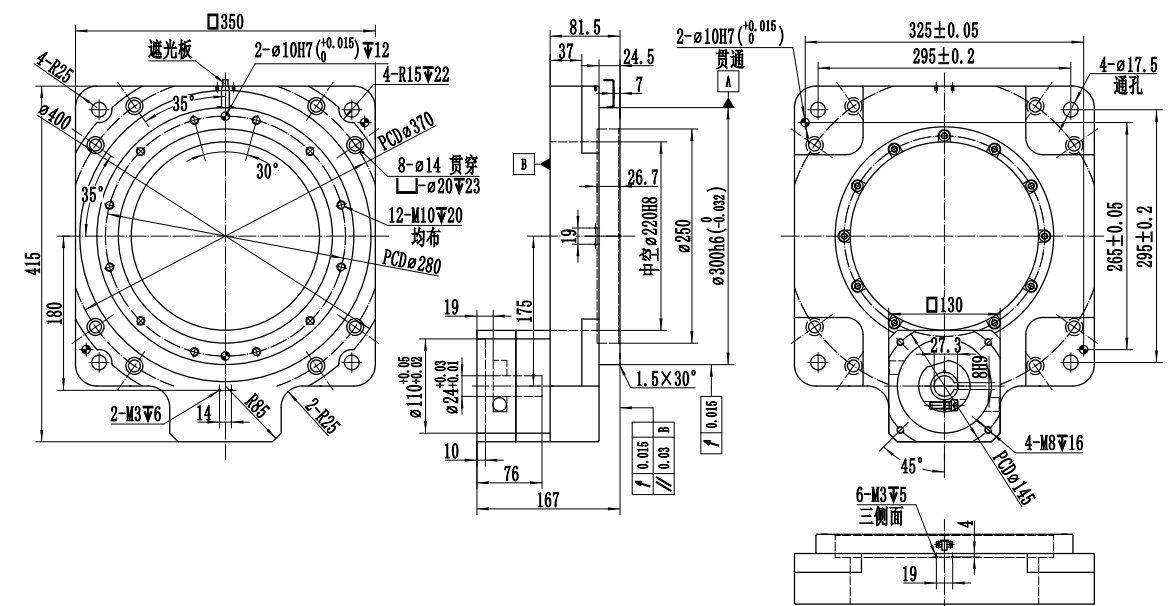


## WTN350 Heavy-load type

## Performance

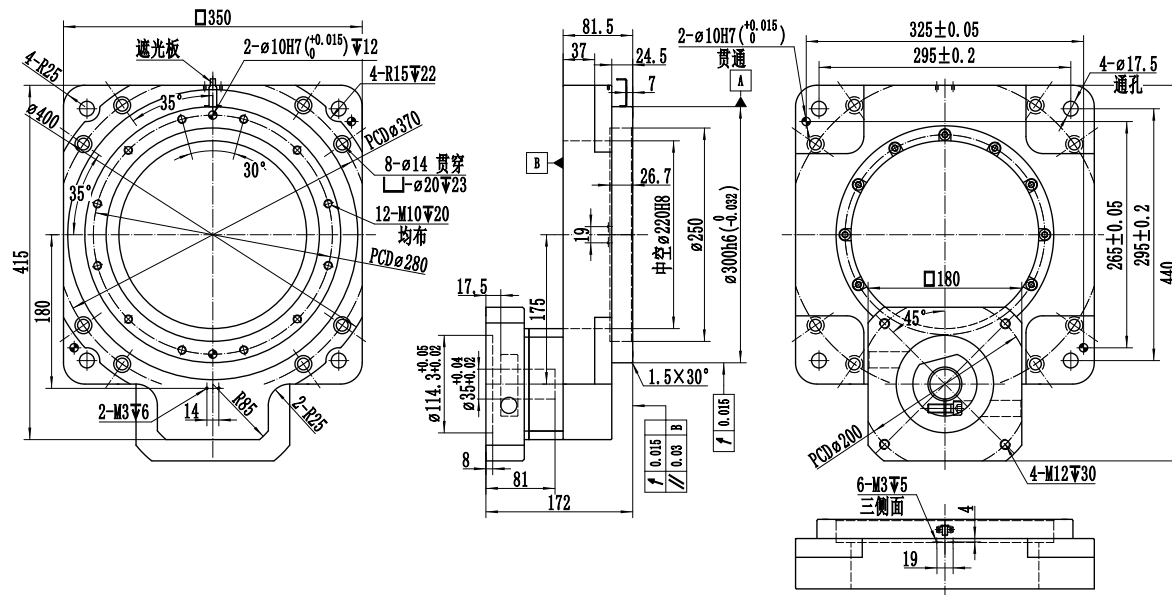
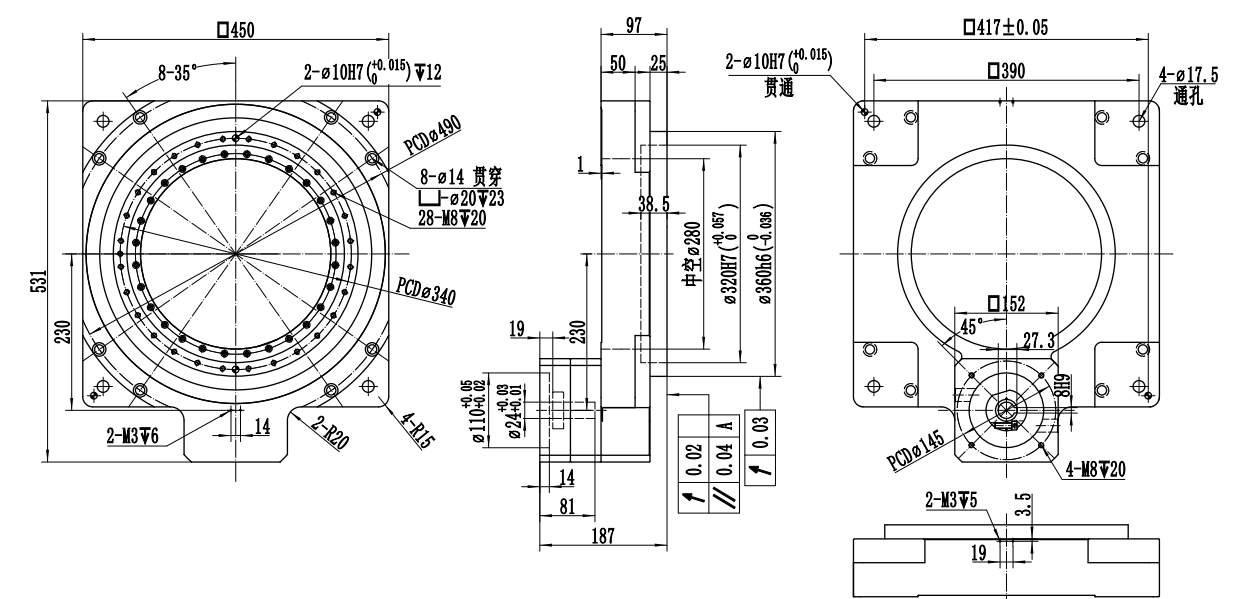
| Specifications                     | Unit              | WTN350                 |     | WTN350+WVRB115          |    |                           |    |     |
|------------------------------------|-------------------|------------------------|-----|-------------------------|----|---------------------------|----|-----|
| Applicable motor models            |                   | 130 stepper motor      |     | 1000W~3000W servo motor |    | motor shaft diameter≤35mm |    |     |
| Bearing type                       |                   | crossed roller bearing |     |                         |    |                           |    |     |
| Ratio                              |                   | 10                     | 18  | 30                      | 40 | 50                        | 70 | 100 |
| Rotational inertia                 | Kg.m <sup>2</sup> | 25500X10-5             |     |                         |    |                           |    |     |
| Rated output torque                | N·m               | 320                    | 260 | 320                     |    |                           |    |     |
| Emergency stop Torque T2NOT        | rpm               | Rated output torque    |     |                         |    |                           |    |     |
| Rated output speed                 | rpm               | 150                    |     |                         |    |                           |    |     |
| Angular transmission accuracy      | arcmin            | <1                     |     |                         |    |                           |    |     |
| Reset positioning accuracy         | arcsec            | <10                    |     |                         |    |                           |    |     |
| Backlash                           | arcmin            | <1                     |     | <1.5                    |    |                           |    |     |
| Allowable axial load               | N                 | 9000                   |     |                         |    |                           |    |     |
| Allowable moment of inertia        | N·m               | 300                    |     |                         |    |                           |    |     |
| Parallelism of rotation platform   | mm                | 0.03                   |     |                         |    |                           |    |     |
| Concentricity of rotation platform | mm                | 0.015                  |     |                         |    |                           |    |     |
| Output end face runout             | mm                | 0.015                  |     |                         |    |                           |    |     |
| Noise                              | dB                | 73                     |     | 66                      |    |                           |    |     |
| Service life                       | h                 | 20000                  |     |                         |    |                           |    |     |
| Protection level                   | IP                |                        |     | 40                      |    |                           |    |     |
| Weight                             | Kg                | 25.5                   |     | 33.3                    |    |                           |    |     |

Ratio 10/18 dimension(motor shaft OD 24mm)

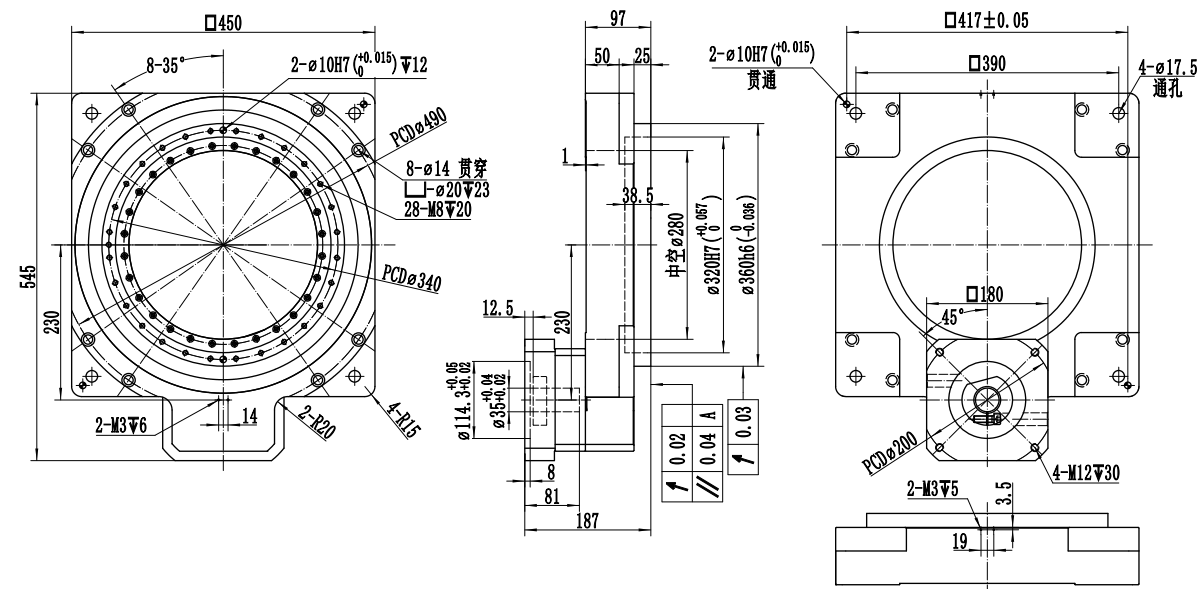


## Performance

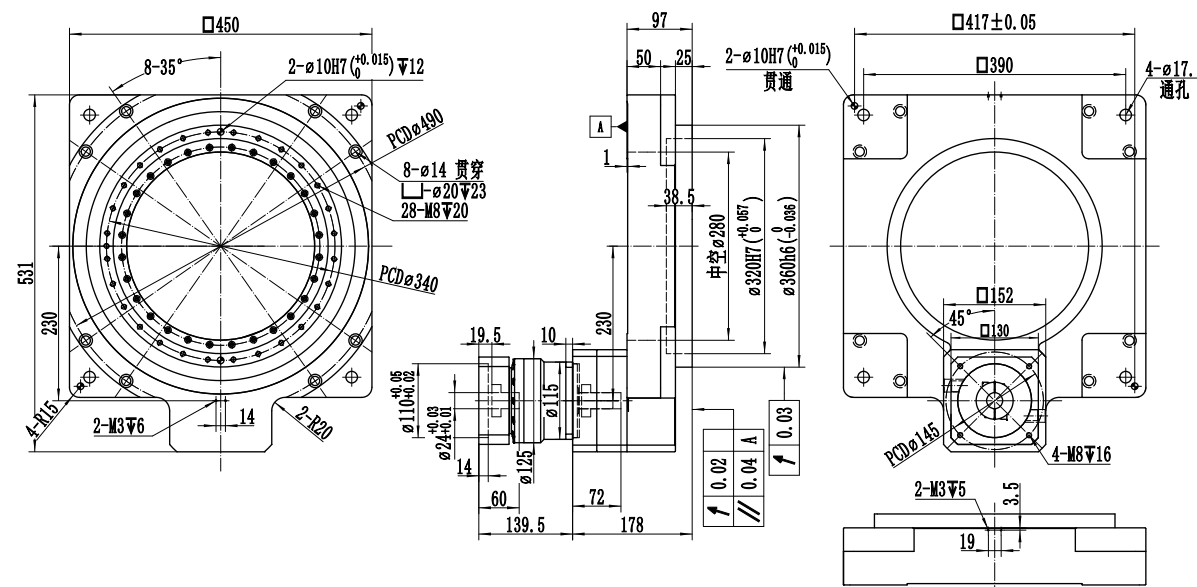
| Specifications                     | Unit                   | WTN450              | WTN450+WVRB115          |    |                           |    |     |
|------------------------------------|------------------------|---------------------|-------------------------|----|---------------------------|----|-----|
| Applicable motor models            |                        | 130 stepper motor   | 1000W~5500W servo motor |    | motor shaft diameter≤38mm |    |     |
| Bearing type                       | crossed roller bearing |                     |                         |    |                           |    |     |
| Ratio                              |                        | 10                  | 30                      | 40 | 50                        | 70 | 100 |
| Rotational inertia                 | Kg.m <sup>2</sup>      | 80500X10-5          |                         |    |                           |    |     |
| Rated output torque                | N·m                    | 400                 | 400                     |    |                           |    |     |
| Emergency stop Torque T2NOT        | rpm                    | Rated output torque |                         |    |                           |    |     |
| Rated output speed                 | rpm                    | 150                 |                         |    |                           |    |     |
| Angular transmission accuracy      | arcmin                 | <1                  |                         |    |                           |    |     |
| Reset positioning accuracy         | arcsec                 | <10                 |                         |    |                           |    |     |
| Backlash                           | arcmin                 | <1                  | <1.5                    |    |                           |    |     |
| Allowable axial load               | N                      | 11000               |                         |    |                           |    |     |
| Allowable moment of inertia        | N·m                    | 400                 |                         |    |                           |    |     |
| Parallelism of rotation platform   | mm                     | 0.040               |                         |    |                           |    |     |
| Concentricity of rotation platform | mm                     | 0.02                |                         |    |                           |    |     |
| Output end face runout             | mm                     | 0.02                |                         |    |                           |    |     |
| Noise                              | dB                     | 75                  | 66                      |    |                           |    |     |
| Service life                       | h                      | 20000               |                         |    |                           |    |     |
| Protection level                   | IP                     | 40                  |                         |    |                           |    |     |
| Weight                             | Kg                     | 49                  | 56.8                    |    |                           |    |     |

[illegible]

Dimension(motor shaft OD 35mm)

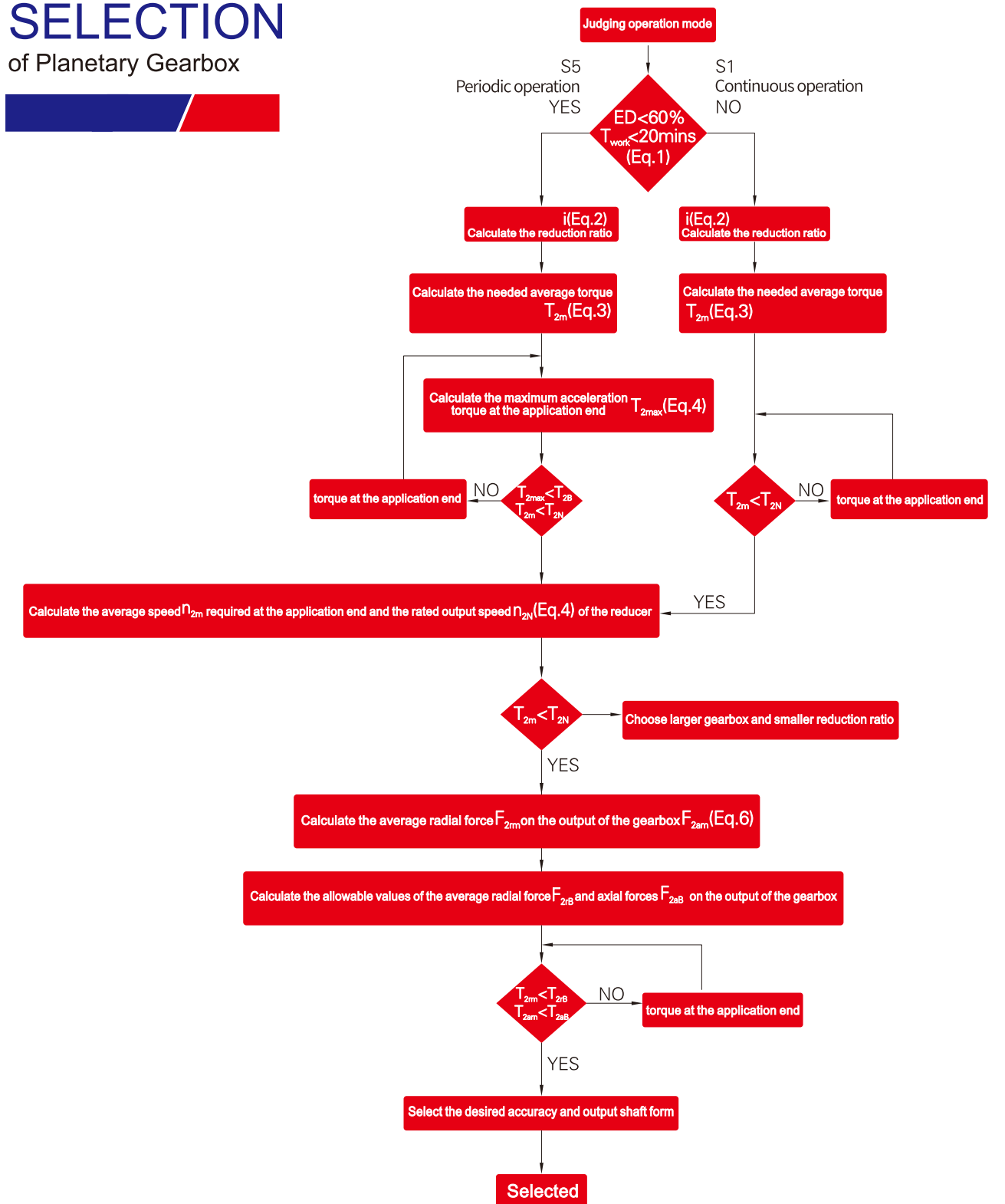


### Combined gearbox dimension



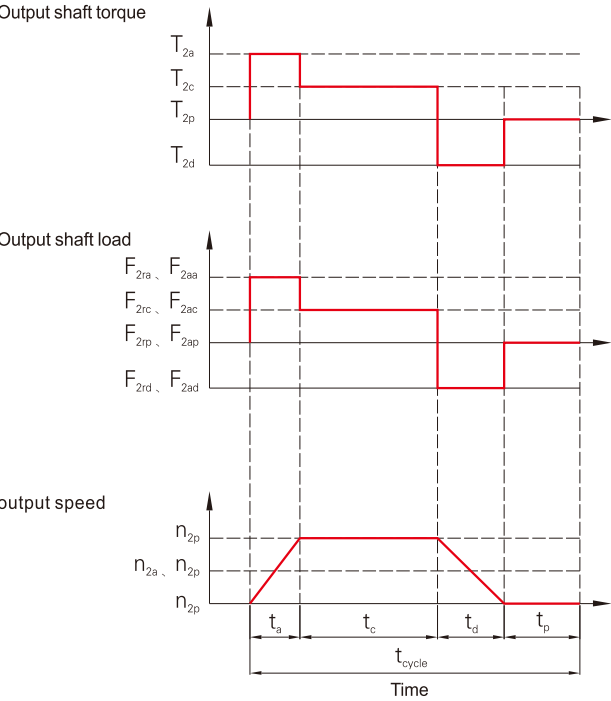
## SELECTION

of Planetary Gearbox



|                                                                                                                                                |                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| S5 suggestions for cycle operation<br>General application inertia must conform to the following formula<br>$\frac{J_L}{J_m} \leq 4 \times J_m$ | The most appropriate application inertia must conform to the following formula<br>$\frac{J_L}{J_m} \approx J_m$ |
|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|

J<sub>L</sub>: Load inertia    J<sub>m</sub>: Motor inertia



1  $ED = \frac{t_a + t_c + t_d}{t_{cycle}} \times 100\%$  ,  $t_{work} = t_a + t_c + t_d$  ( Eq.1 )

Subscript description:  
a.accelerate, c.constant, d.decelerate, p.stop

2  $i \approx \frac{n_m}{n_{work}}$  ( Eq.2 )  
n<sub>m</sub> : Motor output speed    n<sub>work</sub> : Actual application speed

3  $T_{2m} = 3 \sqrt{\frac{n_{2a} \times t_a \times T_{2a}^3 + n_{2c} \times t_c \times T_{2c}^3 + n_{2p} \times t_p \times T_{2p}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2p} \times t_p}}$  ( Eq.3 )

4  $T_{2max} = T_{mB} \times K_s \times K_c \times \eta$  ( Eq.4 )

|      |     |           |
|------|-----|-----------|
| Ks   | Ks  | 周期次数 / 小时 |
| 负载系数 | 1.0 | 0~1000    |
|      | 1.1 | 1000~1500 |
|      | 1.3 | 1500~2000 |
|      | 1.6 | 2000~3000 |
|      | 1.8 | 3000~5000 |

T<sub>mB</sub> Motor maximum output torque  
η Gearbox operating efficiency

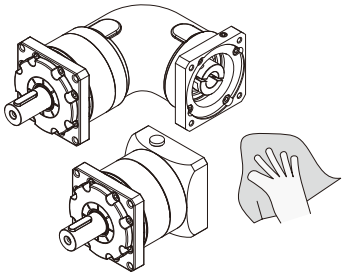
5  $n_{2a} = n_{2d} = \frac{1}{2} \times n_{2c}$   
 $n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{t_a + t_c + t_d}$   
 $n_{2N} = \frac{n_{1N}}{i}$  ( Eq.5 )

6  $F_{2m} = 3 \sqrt{\frac{n_{2a} \times t_a \times F_{2a}^3 + n_{2c} \times t_c \times F_{2c}^3 + n_{2p} \times t_p \times F_{2p}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2p} \times t_p}}$   
 $F_{2am} = 3 \sqrt{\frac{n_{2a} \times t_a \times F_{2aa}^3 + n_{2c} \times t_c \times F_{2ac}^3 + n_{2d} \times t_d \times F_{2ad}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$  ( Eq.6 )

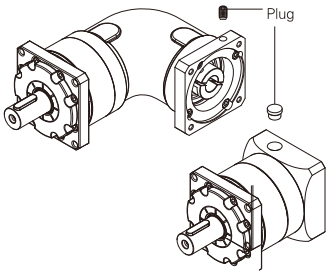
INSTALLATION OF  
**PLANETARY REDUCERS**

If your company install the planetary reducers by yourself, please comply with the following requirements:  
The size of the motor mounting flange of the planetary reducer differs according to the servo motor, the designated servo motor maybe not able to be installed. (Please be sure to install the designated servo motor when purchased)  
There may be rust inhibitor on the output shaft of the servo motor.

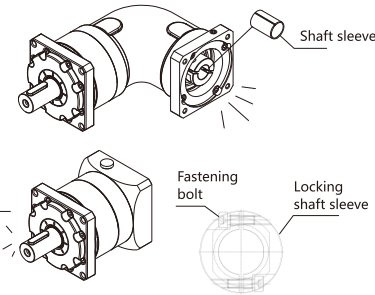
1 Clean up the rust inhibitor and grease on the installing side of the motor shaft



2 Take off the plug



3 Rotate the input shaft, and align the top of the fastening bolt at the plug hole. Make sure that the fastening bolt is loose at the time. Lay the reducer vertically on the flat place, and face up the installing side of the motor.(If there is a shaft sleeve, please install it as the picture shows below)



4 Please insert the motor shaft into the input shaft slowly to avoid impact, and make sure the surfaces of the motor flange and the reducer flange are stick together. Fasten the motor mounting bolt according to the specified fastening torque. (Refer to the Table 3)

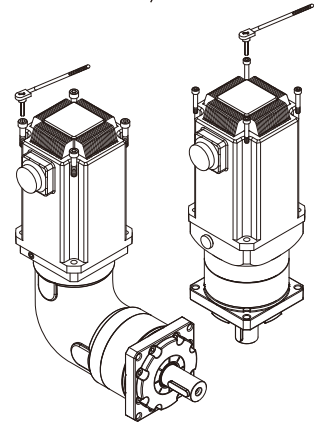
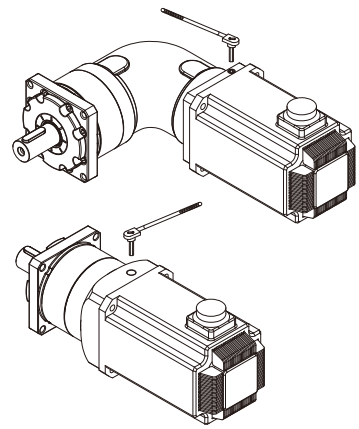


Diagram 3 Bolt fastening torque

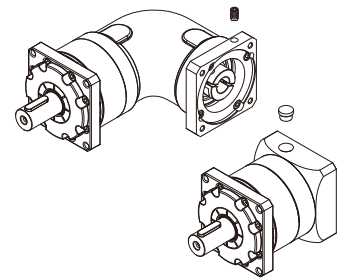
| Bolt size           | M3      | M4   | M5   | M6   | M8   | M10 | M12 | M16 |
|---------------------|---------|------|------|------|------|-----|-----|-----|
| Motor mounting bolt | N · m   | 1.0  | 2.5  | 5.1  | 8.7  | 21  | 42  | 72  |
|                     | kgf · m | 0.11 | 0.26 | 0.52 | 0.89 | 2.1 | 4.3 | 7.3 |
| Fastening bolt      | N · m   | 1.9  | 4.3  | 8.7  | 15   | 36  | 71  | 125 |
|                     | kgf · m | 0.18 | 0.44 | 0.89 | 1.5  | 3.7 | 7.2 | 13  |



- 5** Follow the specified fastening torque, and fasten the fastening bolt of the input shaft with the tools such as torque spanner.(Refer to the table 3)



- 6** Install the plug, and the installinn complete.



### Installation and setting up

- Please avoid using in places that are exposed to rain directly.(Please consult to WANSHSIN or our distributors first when using it outside or in places exposed to dust and water.)
  - Please fit it in the temperature under 0-40°C.
  - Please install it on the stable and firm surface, and fasten it tightly with bolt.
- During installation, it is necessary to ensure easy maintenance and inspection.

### Output shaft connecting

- When installing gear wheels, belt pulley and chain wheels on the output flange model, please use the installing design with bulged edges, and implant them into it. Avoid applying too much strength when installing.
- When installing coupling, chain wheels on the output shaft, please do not apply too much strength onto it. Do not knock too hard on the output shaft when implanting, or it may cause damages to the axletree and the interior part of the reducer.
- Too much gap between shaft and key in the coupling may cause firing so please be careful when installing.
- Please accurate centering when connect.

### Install it to the output flange(limited to the flange model)

- When installing the device component to the output flange, please follow the specified fastening torque and use the tools such as torque wrench.

| Bolt size      |         | M3   | M4   | M5   | M6  | M8  | M10 | M12 | M16 | M20 |
|----------------|---------|------|------|------|-----|-----|-----|-----|-----|-----|
| Fastening bolt | N · m   | 1.9  | 4.3  | 8.7  | 15  | 36  | 71  | 125 | 310 | 603 |
|                | kgf · m | 0.18 | 0.44 | 0.89 | 1.5 | 3.7 | 7.2 | 13  | 32  | 62  |

※ Recommended strength level of the bolt is above 12.9

### Notes before starting

- The specified amount of lubricant has been added before delivery, so the reducers can be used directly when arrived.
- Please confirm the rolling direction of the output shaft and increase the load gradually at the first time operating.

### Notes need attention during operating

- Do not overloaded.  
The rolling speed of the output shaft should not be faster than the specified one.
- Please shut the machine down when following situation shows.
  - 1.The temperature rise suddenly.
  - 2.Strange noise are emerged.
  - 3.The rolling speed becomes unstable.
- The possible reasons are as follows, please make sure to deal with it in time.
  - 1.Whether it is overloaded or not?
  - 2.Are the axletrees, gear wheels and the rolling side damaged?
  - 3.Is the connecting condition abnormal?

### The lubricant managing

- The grease can not be replace.

### Daily check

- Whether the temperature of the reducer shell rise abnormally?(Maximum 90 °C)
- Are there any abnormal noise on axletrees or chain wheels.
- Is the reducer vibrating abnormally?(If it happens, please shut down the machine and contact WANSHSIN or our distributors)
- Is the lubricant leaking?(If it happens, please contact WANSHSIN or our distributors.)

### Regular check

- Whether it is overloaded or rolling abnormally?
- Is the belt pulley, chain wheel, the installation bolt of the reducer loose?
- The check and maintenance of main components. (When there is an abnormal phenomenon, please shut down the machine and contact WANSHSIN or our distributors.)