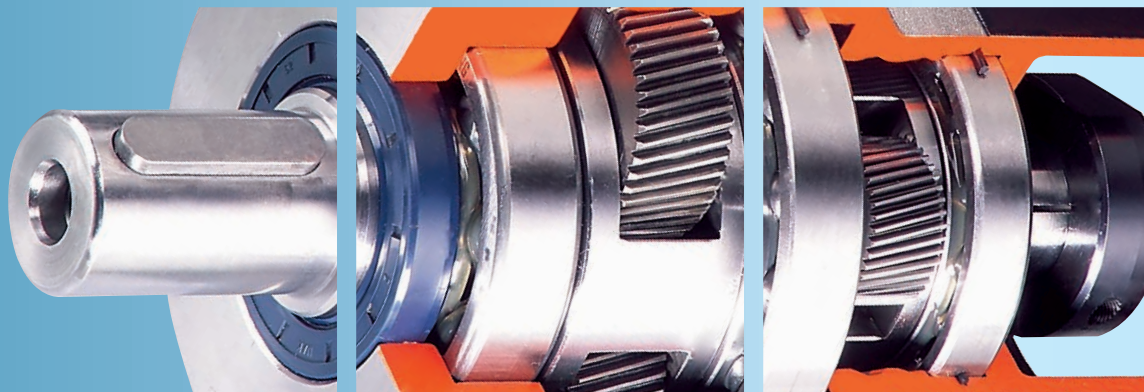


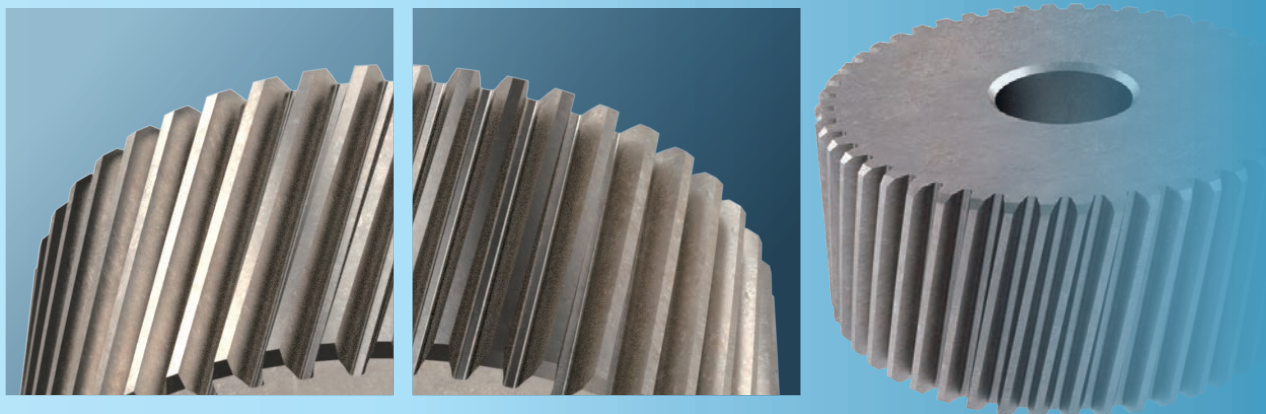
# SERVOBOX

High Precision Planetary Reducers





| SERIES             | High Precision Planetary Reducers                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|--------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                    | SB                                                                                | SE                                                                                | SF                                                                                | SA                                                                                | SD                                                                                | SDD                                                                               | SBL                                                                                 | SEL                                                                                 | SFL                                                                                 | SDL                                                                                 |
|                    |  |  |  |  |  |  |  |  |  |  |
| Backlash (1-Stage) | 1', 3', 5', 7'                                                                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2', 4', 6', 8'                                                                      |                                                                                     |                                                                                     |                                                                                     |
| Backlash (2-Stage) | 3', 5', 7', 9'                                                                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 4', 7', 9', 12'                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Ratio (1-Stage)    | 3, 4, 5, 6, 7, 8, 9, 10                                                           |                                                                                   |                                                                                   | 4, 5, 7, 10                                                                       |                                                                                   |                                                                                   | 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20                                         |                                                                                     |                                                                                     | 4, 5, 7, 10, 14, 20                                                                 |
| Ratio (2-Stage)    | 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100                                   |                                                                                   |                                                                                   | 20, 25, 35, 40, 50, 70, 100                                                       |                                                                                   |                                                                                   | 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100, 120, 140, 160, 180, 200            |                                                                                     |                                                                                     | 20, 25, 35, 50, 40, 70, 100, 140, 200                                               |
| Ratio (3-Stage)    | 125..1000                                                                         | ●                                                                                 | -                                                                                 | -                                                                                 |                                                                                   |                                                                                   | ●                                                                                   | ●                                                                                   | -                                                                                   | -                                                                                   |
| Surface Finish     | Coating                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Gear Type          | Helical Gear                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | Helical Gear with Spiral Bevel Gear                                                 |                                                                                     |                                                                                     |                                                                                     |
| Bearing Type       | Ball                                                                              |                                                                                   | Tapper                                                                            | Ball                                                                              | Ball / Tapper                                                                     |                                                                                   | Ball                                                                                |                                                                                     | Tapper                                                                              | Ball / Tapper                                                                       |
| Fixed Reducer      | Bore-Hole                                                                         | Screw                                                                             | Bore-Hole                                                                         | Screw                                                                             | Bore-Hole                                                                         |                                                                                   |                                                                                     | Screw                                                                               | Bore-Hole                                                                           |                                                                                     |
| Gearbox Material   | SCM440                                                                            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Service Life       | >30,000Hr                                                                         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Input Bore         | 5.65mm ~ 75mm                                                                     |                                                                                   | 5.65mm ~ 55mm                                                                     | 6mm ~ 32mm                                                                        | 5.65mm ~ 55mm                                                                     |                                                                                   | 5.65mm ~ 55mm                                                                       |                                                                                     |                                                                                     |                                                                                     |
| Input Power        | 100W ~ 75kW                                                                       |                                                                                   | 400W ~ 30kW                                                                       | 100W ~ 3.75kW                                                                     | 100W ~ 30kW                                                                       | -                                                                                 | 100W ~ 75kW                                                                         |                                                                                     | 400W ~ 30kW                                                                         | 100W ~ 30kW                                                                         |



|                    | High Precision Planetary Reducers                                                        |                                                                                          | Precision Planetary Reducers                                                            |                                                                                           |                                                                                            |                                                                                           |   |
|--------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---|
| SERIES             | SDH<br> | SBT<br> | PB<br> | PBL<br> | PBT<br> | SN<br> |   |
| Backlash (1-Stage) | -                                                                                        | 2', 4', 6', 8'                                                                           | <8'                                                                                     | <10'                                                                                      | <10'                                                                                       | <8'                                                                                       |   |
| Backlash (2-Stage) | 4', 7', 10'                                                                              | -                                                                                        | <10'                                                                                    | <12'                                                                                      | -                                                                                          | <12'                                                                                      |   |
| Ratio (1-Stage)    |                                                                                          | 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45, 50                                  | Same as SB                                                                              | Same as SBL                                                                               | 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45, 50                                    | 3, 4, 5, 7, 10                                                                            |   |
| Ratio (2-Stage)    | 20, 25, 35<br>50, 70, 100<br>150                                                         | -                                                                                        | Same as SB                                                                              | Same as SBL                                                                               | -                                                                                          | 15, 20, 25, 30,<br>35, 40, 50, 70,<br>100                                                 |   |
| Ratio (3-Stage)    | -                                                                                        | -                                                                                        | -                                                                                       | -                                                                                         | -                                                                                          | -                                                                                         | - |
| Surface Finish     | Coating                                                                                  |                                                                                          | Painting                                                                                |                                                                                           |                                                                                            | Black Processing                                                                          |   |
| Gear Type          | Helical Gear & Hypoid Gear                                                               | Helical Gear with Spiral Bevel Gear                                                      | Helical Gear                                                                            | Helical Gear with Spiral Bevel Gear                                                       |                                                                                            | Helical Gear                                                                              |   |
| Bearing Type       | Ball / Tapper                                                                            | Ball                                                                                     | Ball                                                                                    |                                                                                           |                                                                                            |                                                                                           |   |
| Fixed Reducer      | Bore-Hole                                                                                | Bore-Hole                                                                                | Bore-Hole                                                                               |                                                                                           |                                                                                            | Screw                                                                                     |   |
| Gearbox Material   | SCM440                                                                                   |                                                                                          | S45C                                                                                    |                                                                                           |                                                                                            |                                                                                           |   |
| Service Life       | >30,000Hr                                                                                |                                                                                          | >30,000Hr                                                                               |                                                                                           |                                                                                            |                                                                                           |   |
| Input Bore         | 5.65mm ~ 55mm                                                                            | 6mm ~ 35mm                                                                               | 5.65mm ~ 55mm                                                                           |                                                                                           | 6mm ~ 35mm                                                                                 | 6mm ~ 24mm                                                                                |   |
| Input Power        | 100W ~ 30kW                                                                              | 100W ~ 30kW                                                                              | 100W ~ 75kW                                                                             |                                                                                           | 100W ~ 5.5kW                                                                               | 100W ~ 1.5kW                                                                              |   |



# SERVOBOX Series Features

SERVOBOX



## Helical Gear Design

SERVOBOX speed reduction mechanism employs helical gear technology, which doubles meshing rate of teeth and improves load distribution, comparing to spur gears. In addition, shock load stress and noise are significantly reduced, contributing to smooth operation and extended service life.



## Synthetic Lubrication Grease

Each SERVOPBOX is greased for life, and sealed to IP65 class, for years of reliable, maintenance-free operation.



## Collet Locking Mechanism

Motor shaft is coupled to the reducer input using collet locking mechanism. SERVOPBOX manufacturing process includes dynamic balancing analysis of the input assembly, to ensure concentricity and solid, backlash-free motor shaft coupling.



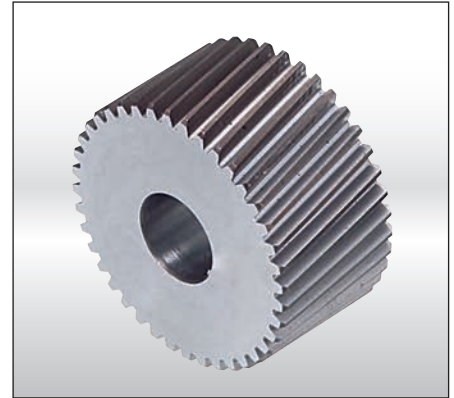
#### Full Needle Roller Bearings Design

The planet gears are supported by needle roller bearings without retainer. This maximises the rollers contact area, helping to improve structural rigidity and extend operating life.



#### Integrated Planetary Arm Bracket

The output shaft and the planet gears carrier form an integral structure that is precision machined as one piece. This achieves highest torsional rigidity and accuracy. Dual bearings support further improves axial and radial load capacity.



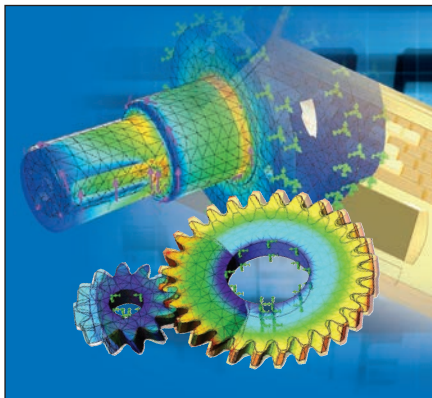
#### High Precision Gear Machining

SERVOBOX sun and planet gears are made from high quality Ni-Cr-Mo alloy steel (SNCM220), precision machined and quality tested to DIN6 accuracy, and carburized to 57-60 HRC hardness. This process improves wear resistance, impact tolerance, and increases service life, comparing to gears that are just surface nitride treated.



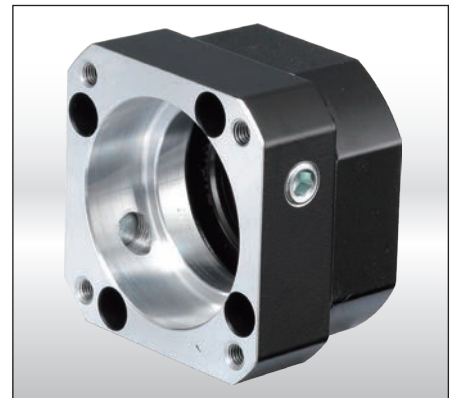
#### One-piece Body & Advanced Surface Treatment

SERVOBOX body and the internal ring gear is made from Ni-Cr-Mo alloy steel (SCM440), and form a single structural element to minimize distortions due to rapid speed changes and heavy loads. To maximize torque capacity whole structure is tempered, and the ring gear teeth are precision machined to DIN6 standard.



#### CAE Design and Analysis

We employ 3D-CAE software for modeling and analysis. Using the software we determine optimal design parameters for entire SERVOBOX taking into account high torque capacity, smooth meshing at any speed, extended service life, compact dimensions and many other requirements.



#### Modular Motor Adapter

Our modular motor adapter design allows direct coupling of almost any stepper or servo motor brand and model. Motor adapters are manufactured from aluminum alloy with anti-oxidation surface treatment for high corrosion-resistant properties.



# SERVOBOX Planetary Reducers

SERVOBOX family of precision reducers help to optimize power transfer from servo-motors to load. SERVOBOX employs helical planetary technology to deliver higher torque and efficiency within a smaller package. SERVOBOX gears are precision machined using gear hobbing CNC for optimal gears engagement, smooth running and minimum noise.

## SERVOBOX Series Overview

### Gearhead Construction:

SERVOBOX is designed for coupling directly to the motor, forming one component for installation. The rigid motor coupling improves load inertia handling capability and system stability. 9 frame sizes, 45 exact ratios, in-line & right-angle models simplify design and servomotor selection. Lubricated for life, maintenance free, can be installed in any orientation. Gears are manufactured from high tensile strength alloy steel. Hardening is applied to the entire gear, instead of surface only hardening. This process extends gear service life and retains high accuracy for longer.

### High Torque Capacity:

Nominal torque up to 8,790Nm;  
Acceleration torque up to 15.820Nm;  
Emergency stopping torque up to 26,370Nm

### Four precision grades (in-line/right-angle):

|                        |                                                                                 |
|------------------------|---------------------------------------------------------------------------------|
| Ps Sub-micro backlash: | 1-stage $\leq 1/2$ arcmin; 2-stage $\leq 3/4$ arcmin; 3-stage $\leq 5$ arcmin   |
| P0 Micro backlash:     | 1-stage $\leq 3/4$ arcmin; 2-stage $\leq 5/7$ arcmin; 3-stage $\leq 7$ arcmin   |
| P1 Low backlash:       | 1-stage $\leq 5/6$ arcmin; 2-stage $\leq 7/9$ arcmin; 3-stage $\leq 9$ arcmin   |
| P2 Standard backlash:  | 1-stage $\leq 7/8$ arcmin; 2-stage $\leq 9/12$ arcmin; 3-stage $\leq 11$ arcmin |

### High Efficiency:

1-stage models  $\geq 97\%$ ; 2-stage models  $\geq 94\%$ ; 3-stage models  $\geq 90\%$ .

### High Input Speed:

3,000...6,000rpm depending on the model size and number of reduction stages.

### Low noise:

56...78dB depending on the model size and number of reduction stages.

# SB & SE Series Model Code

The benchmark of our precision planetary servobox range

| SB           | 090             | 010                                       |                                                                  | P1             | MOTOR                      |
|--------------|-----------------|-------------------------------------------|------------------------------------------------------------------|----------------|----------------------------|
| Series       | Model/<br>Frame | Ratio                                     | Output Shaft Keyway                                              | Backlash Class | Motor Designation          |
| Inline:      | 044             | 1-Stage                                   | <input type="checkbox"/> Blank: Standard<br>(Keyed Output Shaft) | Ps             | Motor Brand &<br>Model No. |
| SB           | 062             | 003, 004, 005, 006,<br>007, 008, 009, 010 |                                                                  | P0             |                            |
| SE           | 090             |                                           |                                                                  | P1             |                            |
| SB-A         | 120             | 2-Stage                                   | N: Solid Output Shaft<br>(No Keyway)                             | P2             |                            |
| SE-A         | 142             | 015 ~ 100                                 |                                                                  |                |                            |
| Right Angle: | 180             | 3-Stage 125 ~ 1000                        |                                                                  |                |                            |
| SBL          | 220             |                                           |                                                                  |                |                            |
| SBL-A        | (270)           | 1-Stage SBT                               |                                                                  |                |                            |
| SEL          | (330)           | 003 ~ 050                                 |                                                                  |                |                            |
| SEL-A        |                 |                                           |                                                                  |                |                            |
| SBT          |                 |                                           |                                                                  |                |                            |

SBx044 ~ SBx220 have square frame with B5 mounting flange on output;

SB270 and SB330 have round body with B5 mounting flange output;

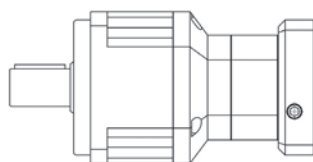
SE044 ~ SE330 have round frame with B14 mounting flange.

## Standard and A-Type Models

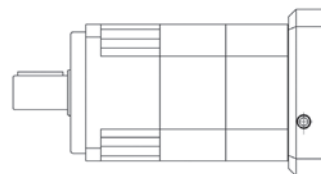
For high ratio and output torque, 2-stage and 3-stage SERVBOX models are available. Combined ratio of a multi-stage gearbox equals to the product of ratios of all individual stages.

Standard 2 / 3-stage models combine larger output with progressively smaller input stages, for optimal match of motor torque to SERVBOX output torque rating.

A-Type SERVBOX combines gearboxes stages with same frame size to accommodate larger motor shafts.



Standard Type



A-Type

## Selection examples:

Servo motor 0.5 kW, rated output torque 2.39 Nm, motor shaft Ø24 mm.

1. Suppose that required speed reduction ratio is 50:1

Output torque is  $2.39 \text{ Nm} \times 50 \times 94\% \text{ (efficiency)} = 112 \text{ Nm}$ .

- You can select SB-120-50 with rated output torque of 294 Nm and S.F. = 2.6
- You can select SB-90A-50 with rated output torque of 141 Nm and S.F. = 1.25

2. Suppose that required speed reduction ratio is 100:1

Output torque is  $2.39 \times 100 \times 94\% \text{ (efficiency)} = 224 \text{ Nm}$ .

You can select SB-120-100 and S.F. = 1.3.

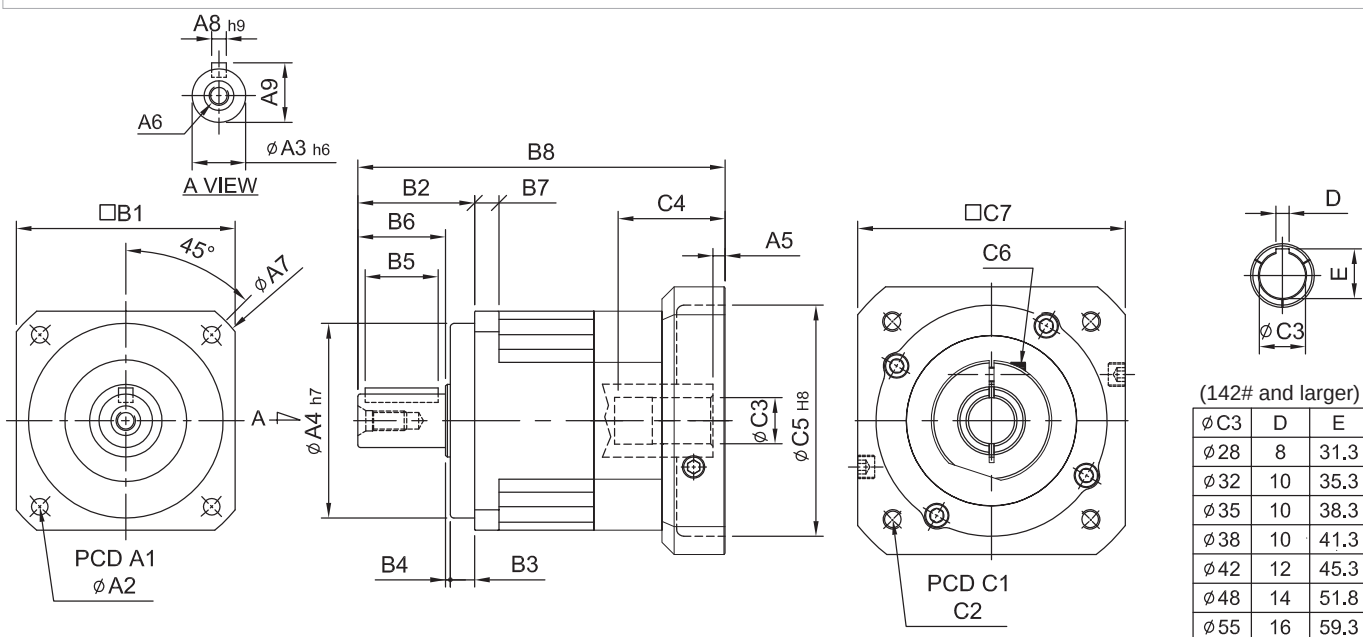
However, SB-90A-100 is not recommended because S.F. = 0.62.

# SERVOBOX Planetary Reducers

## SB Series

1-Stage

RATIO : 3, 4, 5, 6, 7, 8, 9, 10



unit: mm

| Model Code | 44         | 62             | 90                | 120            | 142            | 180                  | 220             |
|------------|------------|----------------|-------------------|----------------|----------------|----------------------|-----------------|
| A1         | 50         | 70             | 100               | 130            | 165            | 215                  | 250             |
| A2         | 4.5        | 5.5            | 6.8               | 9              | 11             | 13                   | 17              |
| A3         | 13         | 16             | 22                | 32             | 40             | 55                   | 75              |
| A4         | 35         | 50             | 80                | 110            | 130            | 160                  | 180             |
| A5         | 5          | 6              | 9, 23.5           | 10, 20         | 10             | 11.5, 14.5           | 12.5, 14.5      |
| A6         | M4 x P0.7  | M5 x P0.8      | M8 x P1.25        | M10 x P1.5     | M12 x P1.75    | M14 x P2.0           | M16 x P2.0      |
| A7         | 58         | 80             | 116               | 148            | 186            | 238                  | 288             |
| A8         | 5          | 5              | 6                 | 10             | 12             | 16                   | 20              |
| A9         | 15         | 18             | 24.5              | 35             | 43             | 59                   | 79.5            |
| B1         | 44         | 62             | 90                | 120            | 142            | 180                  | 220             |
| B2         | 26         | 36             | 48                | 65             | 92             | 106                  | 139             |
| B3         | 5          | 7              | 10                | 12             | 15             | 20                   | 30              |
| B4         | 1          | 1              | 2                 | 3              | 3              | 4                    | 5               |
| B5         | 15         | 20             | 30                | 40             | 65             | 70                   | 90              |
| B6         | 20         | 28             | 36                | 50             | 74             | 82                   | 104             |
| B7         | 5          | 8              | 10                | 12             | 15             | 16                   | 20              |
| B8         | 95         | 115, 123       | 164.5, 179        | 205, 215       | 260.5          | 323.5, 325.5         | 367.5           |
| C1         | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215  | 200, 215, 265, 300   | 200, 265, 300   |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   | M10, M12, M16        | M12, M16        |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 | 35, 38, 42, 48, 55   | 38, 42, 48, 55  |
| C4         | 26, 30.5   | 33.5, 41.5     | 59, 73.5          | 67, 77         | 84.5           | 114.5, 117.5         | 117.5, 119.5    |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  | 114.3, 180, 230, 250 | 114.3, 230, 250 |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     | M10 x P1.5           | M10 x P1.5      |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  | 182, 200, 250, 265   | 222, 250, 265   |



## SB 1-Stage

### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 44                                                                 | 62        | 90        | 120       | 142       | 180       | 220       |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 3      | 19                                                                 | 59        | 165       | 335       | 625       | 1,206     | 2,030     |
|                                                |            |           | 4      | 16                                                                 | 51        | 146       | 300       | 555       | 1,069     | 1,804     |
|                                                |            |           | 5      | 16                                                                 | 48        | 160       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 6      | 15                                                                 | 45        | 151       | 311       | 583       | 1,118     | 1,911     |
|                                                |            |           | 7      | 15                                                                 | 45        | 149       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 8      | 14                                                                 | 43        | 143       | 298       | 553       | 1,070     | 1,824     |
|                                                |            |           | 9      | 13                                                                 | 44        | 145       | 278       | 516       | 993       | 1,694     |
|                                                |            |           | 10     | 14                                                                 | 43        | 141       | 294       | 549       | 1,059     | 1,779     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 3 ~ 10 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 3 ~ 10 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 3 ~ 10 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 3 ~ 10 | 6,000                                                              | 6,000     | 6,000     | 5,000     | 5,000     | 4,000     | 3,000     |
| Backlash Ps                                    |            | arcmin    | 3 ~ 10 | -                                                                  | -         | $\leq 1$  | $\leq 1$  | $\leq 1$  | $\leq 1$  | $\leq 1$  |
| Backlash P0                                    |            | arcmin    | 3 ~ 10 | $\leq 3$                                                           | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  |
| Backlash P1                                    |            | arcmin    | 3 ~ 10 | $\leq 5$                                                           | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  |
| Backlash P2                                    |            | arcmin    | 3 ~ 10 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Torsional Rigidity                             |            | Nm/arcmin | 3 ~ 10 | 3                                                                  | 6         | 14        | 27        | 60        | 140       | 240       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 3 ~ 10 | 380                                                                | 1,180     | 3,200     | 6,800     | 9,300     | 15,600    | 51,000    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 3 ~ 10 | 190                                                                | 590       | 1,600     | 3,400     | 4,650     | 7,800     | 25,500    |
| Service Life                                   | $L_H$      | hr        | 3 ~ 10 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 3 ~ 10 | $\geq 97$                                                          |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 3 ~ 10 | - 25° C ~ + 90° C                                                  |           |           |           |           |           |           |
| Lubrication                                    |            |           | 3 ~ 10 | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 3 ~ 10 | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 3 ~ 10 | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 3 ~ 10 | $\leq 56$                                                          | $\leq 58$ | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ | $\leq 70$ |
| Weight $\pm 3\%$                               |            | Kg        | 3 ~ 10 | 0.6                                                                | 1.28      | 3.6       | 8         | 14.3      | 28.3      | 42.5      |

### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 44   | 62   | 90   | 120  | 142  | 180   | 220   |
|-------|------|------|------|------|------|-------|-------|
| 3     | 0.03 | 0.16 | 0.61 | 3.25 | 9.21 | 28.98 | 59.61 |
| 4     | 0.03 | 0.14 | 0.48 | 2.74 | 7.54 | 23.67 | 54.37 |
| 5     | 0.03 | 0.13 | 0.47 | 2.71 | 7.42 | 23.29 | 53.27 |
| 6     | 0.03 | 0.13 | 0.45 | 2.65 | 7.25 | 22.75 | 51.72 |
| 7     | 0.03 | 0.13 | 0.45 | 2.62 | 7.14 | 22.48 | 50.97 |
| 8     | 0.03 | 0.13 | 0.44 | 2.58 | 7.07 | 22.59 | 50.84 |
| 9     | 0.03 | 0.13 | 0.44 | 2.57 | 7.04 | 22.53 | 50.63 |
| 10    | 0.03 | 0.13 | 0.44 | 2.57 | 7.03 | 22.51 | 50.56 |

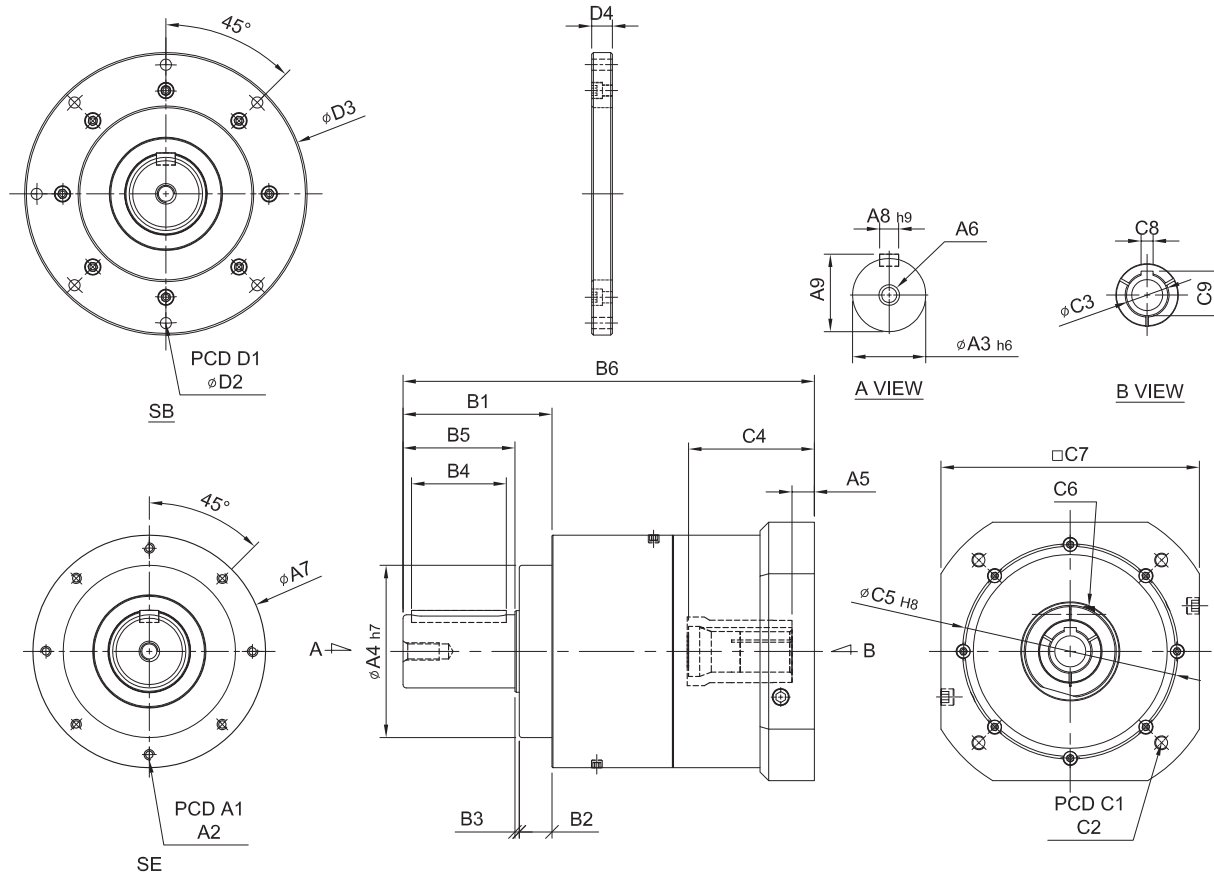
# SERVOBOX Planetary Reducers

## Series:

## SB SE

1-Stage

RATIO : 3, 4, 5, 7, 10



unit: mm

|   | Model | 270               | 330        |
|---|-------|-------------------|------------|
|   | Code  |                   |            |
| A | A1    | 240               | 300        |
|   | A2    | M12 x P1.75       | M16 x P2.0 |
|   | A3    | 85                | 100        |
|   | A4    | 200               | 250        |
|   | A5    | 26, 23            | 26, 23     |
|   | A6    | M20 x P2.5        | M24 x P3.0 |
|   | A7    | 270               | 336        |
|   | A8    | 22                | 28         |
|   | A9    | 90                | 106        |
| B | B1    | 173               | 187        |
|   | B2    | 38                | 42         |
|   | B3    | 5                 | 5          |
|   | B4    | 110               | 120        |
|   | B5    | 130               | 140        |
|   | B6    | 474.5, 477.5, 488 | 512, 515   |

unit: mm

|   | Model | 270                    | 330                  |
|---|-------|------------------------|----------------------|
|   | Code  |                        |                      |
| C | C1    | 265, 300, 350          | 265, 300, 350        |
|   | C2    | M12, M16, M18          | M12, M16, M18        |
|   | C3    | 48, 55, 60, 65, 70     | 55, 60, 65, 75       |
|   | C4    | 143, 149               | 143, 146             |
|   | C5    | 230, 250, 300          | 230, 250, 300        |
|   | C6    | M12 x P1.75            | M12 x P1.75          |
|   | C7    | 280, 300, 330          | 280, 300, 330        |
|   | C8    | 14, 16, 18, 20         | 16, 18, 20           |
|   | C9    | 51.8, 59.3, 64.4, 74.8 | 59.3, 64.4, 69.4, 80 |
| D | D1    | 300                    | 380                  |
|   | D2    | 13                     | 17                   |
|   | D3    | 328                    | 416                  |
|   | D4    | 24                     | 28                   |



### SB/SE 1-Stage (Large Frame)

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 270                                                                | 330                |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|--------------------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 3      | 4,770                                                              | 8,790              |
|                                                |            |           | 4      | 4,730                                                              | 8,730              |
|                                                |            |           | 5      | 4,680                                                              | 8,660              |
|                                                |            |           | 7      | 4,570                                                              | 8,520              |
|                                                |            |           | 10     | 4,420                                                              | 8,310              |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 3 ~ 10 | 1.8 Times of Rated Output Torque                                   |                    |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 3 ~ 10 | 3 Times of Rated Output Torque                                     |                    |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 3 ~ 10 | 2,000                                                              | 2,000              |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 3 ~ 10 | 3,000                                                              | 3,000              |
| Backlash Ps                                    |            | arcmin    | 3 ~ 10 | $\leq 1$                                                           | $\leq 1$           |
| Backlash P0                                    |            | arcmin    | 3 ~ 10 | $\leq 3$                                                           | $\leq 3$           |
| Backlash P1                                    |            | arcmin    | 3 ~ 10 | $\leq 5$                                                           | $\leq 5$           |
| Backlash P2                                    |            | arcmin    | 3 ~ 10 | $\leq 7$                                                           | $\leq 7$           |
| Torsional Rigidity                             |            | Nm/arcmin | 3 ~ 10 | 510                                                                | 980                |
| Max. Radial Force                              | $F_{2rB}$  | N         | 3 ~ 10 | 107,100                                                            | 224,910            |
| Max. Axial Force                               | $F_{2aB}$  | N         | 3 ~ 10 | 53,550                                                             | 112,455            |
| Service Life                                   | $L_H$      | hr        | 3 ~ 10 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |                    |
| Efficiency                                     | $\eta$     | %         | 3 ~ 10 | $\geq 97$                                                          |                    |
| Operating Temperature                          |            | °C        | 3 ~ 10 | - 25° C ~ + 90° C                                                  |                    |
| Lubrication                                    |            |           | 3 ~ 10 | Synthetic Grease                                                   |                    |
| Protection Class                               |            |           | 3 ~ 10 | IP65                                                               |                    |
| Mounting Position                              |            |           | 3 ~ 10 | Any                                                                |                    |
| Noise Level                                    |            | dB        | 3 ~ 10 | $\leq 72$                                                          | $\leq 74$          |
| Weight $\pm 3\%$                               |            | Kg        | 3 ~ 10 | SB : 97, SE : 87.5                                                 | SB : 190, SE : 172 |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

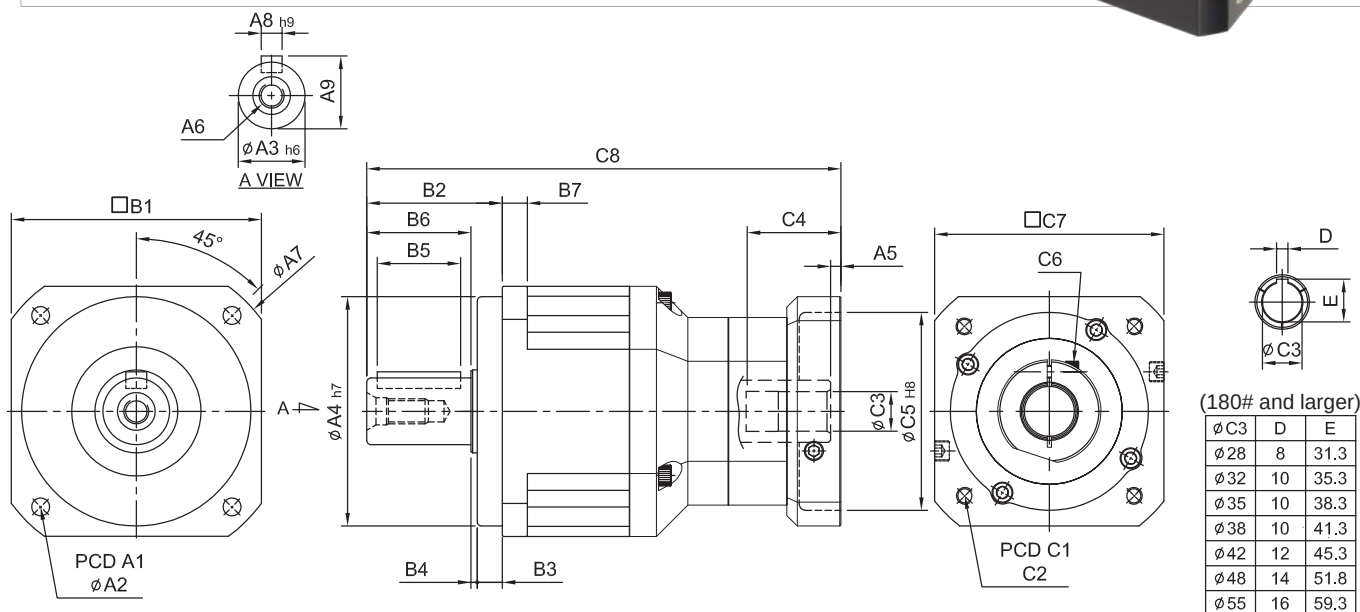
| Ratio | 270    | 330    |
|-------|--------|--------|
| 3     | 122.20 | 252.96 |
| 4     | 111.46 | 230.72 |
| 5     | 109.20 | 226.05 |
| 7     | 104.49 | 216.29 |
| 10    | 103.65 | 214.55 |

# SERVOBOX Planetary Reducers

## SB Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100



unit: mm

|   | Model Code | 62         | 90             | 120               | 142              | 180            | 220                |
|---|------------|------------|----------------|-------------------|------------------|----------------|--------------------|
|   |            |            |                |                   |                  |                |                    |
| A | A1         | 70         | 100            | 130               | 165              | 215            | 250                |
|   | A2         | 5.5        | 6.8            | 9                 | 11               | 13             | 17                 |
|   | A3         | 16         | 22             | 32                | 40               | 55             | 75                 |
|   | A4         | 50         | 80             | 110               | 130              | 160            | 180                |
|   | A5         | 5          | 6              | 9, 23.5           | 10, 20           | 10             | 11.5, 13.5         |
|   | A6         | M5 x P0.8  | M8 x P1.25     | M10 x P1.5        | M12 x P1.75      | M14 x P2.0     | M16 x P2.0         |
|   | A7         | 80         | 116            | 148               | 186              | 238            | 288                |
|   | A8         | 5          | 6              | 10                | 12               | 16             | 20                 |
|   | A9         | 18         | 24.5           | 35                | 43               | 59             | 79.5               |
| B | B1         | 62         | 90             | 120               | 142              | 180            | 220                |
|   | B2         | 36         | 48             | 65                | 92               | 106            | 139                |
|   | B3         | 7          | 10             | 12                | 15               | 20             | 30                 |
|   | B4         | 1          | 2              | 3                 | 3                | 4              | 5                  |
|   | B5         | 20         | 30             | 40                | 65               | 70             | 90                 |
|   | B6         | 28         | 36             | 50                | 74               | 82             | 104                |
|   | B7         | 8          | 10             | 12                | 15               | 16             | 20                 |
| C | C1         | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165    | 145, 165, 215  | 200, 215, 265      |
|   | C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8, M10   | M6, M8, M10      | M8, M10, M12   | M10, M12           |
|   | C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32   | 28, 32, 35, 38 | 35, 38, 42, 48, 55 |
|   | C4         | 26, 30.5   | 33.5, 41.5     | 59, 73.5          | 67, 77           | 84.5           | 114.5, 116.5       |
|   | C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 70, 95, 110, 130 | 110, 130, 180  | 114.3, 180, 230    |
|   | C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25       | M10 x P1.5     | M10 x P1.5         |
|   | C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150    | 146, 180, 190  | 182, 200, 250      |
|   | C8         | 139.5      | 172.5, 180.5   | 241, 255.5        | 298.5, 308.5     | 358.5          | 446.5              |



## SB 2-Stage

### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 62                                                                 | 90    | 120   | 142   | 180    | 220    |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 59                                                                 | 165   | 335   | 625   | 1,206  | 2,030  |
|                                                |            |           | 20       | 51                                                                 | 146   | 300   | 555   | 1,069  | 1,804  |
|                                                |            |           | 25       | 48                                                                 | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 30       | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 35       | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 40       | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 50       | 48                                                                 | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 60       | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 70       | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 80       | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 90       | 44                                                                 | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 100      | 43                                                                 | 141   | 294   | 549   | 1,059  | 1,779  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 100 | 1.8 Times of Rated Output Torque                                   |       |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 100 | 3 Times of Rated Output Torque                                     |       |       |       |        |        |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 100 | 3,000                                                              | 3,000 | 3,000 | 3,000 | 3,000  | 2,000  |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 100 | 6,000                                                              | 6,000 | 5,000 | 5,000 | 4,000  | 3,000  |
| Backlash Ps                                    |            | arcmin    | 15 ~ 100 | -                                                                  | -     | ≤ 3   | ≤ 3   | ≤ 3    | ≤ 3    |
| Backlash P0                                    |            | arcmin    | 15 ~ 100 | ≤ 5                                                                | ≤ 5   | ≤ 5   | ≤ 5   | ≤ 5    | ≤ 5    |
| Backlash P1                                    |            | arcmin    | 15 ~ 100 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    |
| Backlash P2                                    |            | arcmin    | 15 ~ 100 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 100 | 6                                                                  | 14    | 27    | 60    | 140    | 240    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 100 | 1,180                                                              | 3,200 | 6,800 | 9,300 | 15,600 | 51,000 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 100 | 590                                                                | 1,600 | 3,400 | 4,650 | 7,800  | 25,500 |
| Service Life                                   | $L_H$      | hr        | 15 ~ 100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 15 ~ 100 | ≥ 94                                                               |       |       |       |        |        |
| Operating Temperature                          |            | °C        | 15 ~ 100 | - 25° C ~ + 90° C                                                  |       |       |       |        |        |
| Lubrication                                    |            |           | 15 ~ 100 | Synthetic Grease                                                   |       |       |       |        |        |
| Protection Class                               |            |           | 15 ~ 100 | IP65                                                               |       |       |       |        |        |
| Mounting Position                              |            |           | 15 ~ 100 | Any                                                                |       |       |       |        |        |
| Noise Level                                    |            | dB        | 15 ~ 100 | ≤ 58                                                               | ≤ 60  | ≤ 63  | ≤ 65  | ≤ 67   | ≤ 70   |
| Weight ±3%                                     |            | Kg        | 15 ~ 100 | 1.73                                                               | 4.6   | 9.42  | 17.2  | 34.1   | 57.3   |

### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 62   | 90   | 120  | 142  | 180  | 220   |
|-------|------|------|------|------|------|-------|
| 15    | 0.03 | 0.14 | 0.46 | 2.63 | 7.3  | 22.79 |
| 20    | 0.03 | 0.14 | 0.46 | 2.63 | 7.3  | 22.79 |
| 25    | 0.03 | 0.14 | 0.46 | 2.63 | 7.1  | 22.79 |
| 30    | 0.03 | 0.14 | 0.46 | 2.43 | 7.1  | 22.59 |
| 35    | 0.03 | 0.14 | 0.44 | 2.43 | 7.1  | 22.59 |
| 40    | 0.03 | 0.14 | 0.44 | 2.43 | 6.92 | 22.59 |
| 50    | 0.03 | 0.14 | 0.44 | 2.43 | 6.92 | 22.59 |
| 60    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 |
| 70    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 |
| 80    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 |
| 90    | 0.03 | 0.14 | 0.40 | 2.39 | 6.72 | 21.60 |
| 100   | 0.03 | 0.14 | 0.40 | 2.39 | 6.72 | 21.60 |

# SERVOBOX Planetary Reducers

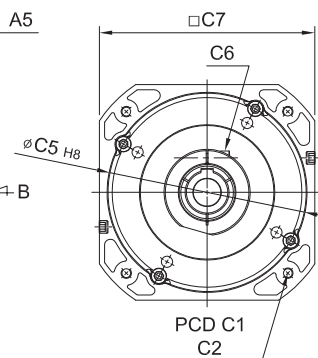
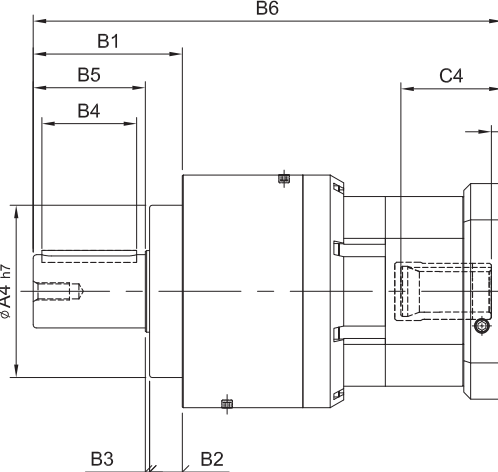
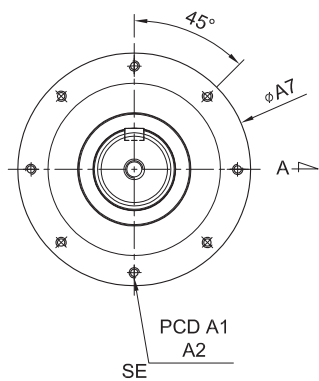
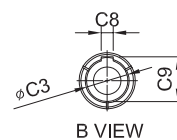
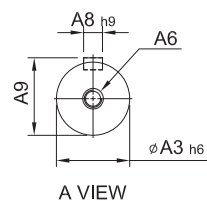
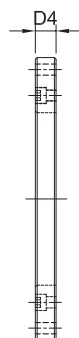
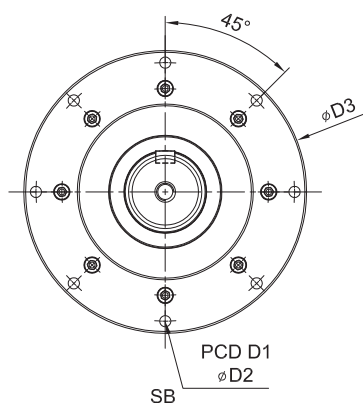
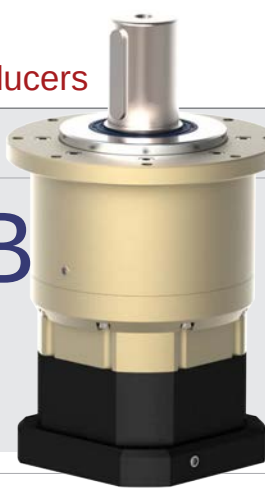
## Series:

## SB

## SE

2-Stage

RATIO : 15, 20, 25, 30, 35,  
40, 50, 70, 100



unit: mm

|   | Model | 270         | 330               |
|---|-------|-------------|-------------------|
|   | Code  |             |                   |
| A | A1    | 240         | 300               |
|   | A2    | M12 x P1.75 | M16 x P2.0        |
|   | A3    | 85          | 100               |
|   | A4    | 200         | 250               |
|   | A5    | 12.5        | 26, 23            |
|   | A6    | M20 x P2.5  | M24 x P3.0        |
|   | A7    | 270         | 336               |
|   | A8    | 22          | 28                |
|   | A9    | 90          | 106               |
| B | B1    | 173         | 187               |
|   | B2    | 38          | 42                |
|   | B3    | 5           | 5                 |
|   | B4    | 110         | 120               |
|   | B5    | 130         | 140               |
|   | B6    | 544, 547    | 625, 632.5, 635.5 |

unit: mm

|   | Model | 270              | 330                          |
|---|-------|------------------|------------------------------|
|   | Code  |                  |                              |
| C | C1    | 200, 265, 300    | 265, 300, 350                |
|   | C2    | M12, M16         | M12, M16, M18                |
|   | C3    | 42, 48, 55       | 48, 55, 60, 65, 70           |
|   | C4    | 117.5, 120.5     | 146, 149                     |
|   | C5    | 114.3, 230, 250  | 230, 250, 300                |
|   | C6    | M10 x P1.5       | M12 x P1.75                  |
|   | C7    | 222, 250, 265    | 280, 300, 330                |
|   | C8    | 12, 14, 16       | 14, 16, 18, 20               |
|   | C9    | 45.3, 51.8, 59.3 | 51.8, 59.3, 64.4, 69.4, 74.8 |
| D | D1    | 300              | 380                          |
|   | D2    | 13               | 17                           |
|   | D3    | 328              | 416                          |
|   | D4    | 24               | 28                           |



## SB/SE 2-Stage (Large Frame)

### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 270                                                                | 330                |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|--------------------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 4,770                                                              | 8,790              |
|                                                |            |           | 20       | 4,730                                                              | 8,730              |
|                                                |            |           | 25       | 4,680                                                              | 8,660              |
|                                                |            |           | 30       | 4,620                                                              | 8,610              |
|                                                |            |           | 35       | 4,570                                                              | 8,520              |
|                                                |            |           | 40       | 4,520                                                              | 8,440              |
|                                                |            |           | 50       | 4,680                                                              | 8,660              |
|                                                |            |           | 70       | 4,570                                                              | 8,520              |
|                                                |            |           | 100      | 4,420                                                              | 8,310              |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 100 | 1.8 Times of Rated Output Torque                                   |                    |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 100 | 3 Times of Rated Output Torque                                     |                    |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 100 | 2,000                                                              | 2,000              |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 100 | 3,000                                                              | 3,000              |
| Backlash Ps                                    |            | arcmin    | 15 ~ 100 | $\leq 3$                                                           | $\leq 3$           |
| Backlash P0                                    |            | arcmin    | 15 ~ 100 | $\leq 5$                                                           | $\leq 5$           |
| Backlash P1                                    |            | arcmin    | 15 ~ 100 | $\leq 7$                                                           | $\leq 7$           |
| Backlash P2                                    |            | arcmin    | 15 ~ 100 | $\leq 9$                                                           | $\leq 9$           |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 100 | 510                                                                | 980                |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 100 | 107,100                                                            | 224,910            |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 100 | 53,550                                                             | 112,455            |
| Service Life                                   | $L_H$      | hr        | 15 ~ 100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |                    |
| Efficiency                                     | $\eta$     | %         | 15 ~ 100 | $\geq 94$                                                          |                    |
| Operating Temperature                          |            | °C        | 15 ~ 100 | - 25° C ~ + 90° C                                                  |                    |
| Lubrication                                    |            |           | 15 ~ 100 | Synthetic Grease                                                   |                    |
| Protection Class                               |            |           | 15 ~ 100 | IP65                                                               |                    |
| Mounting Position                              |            |           | 15 ~ 100 | Any                                                                |                    |
| Noise Level                                    |            | dB        | 15 ~ 100 | $\leq 72$                                                          | $\leq 74$          |
| Weight $\pm 3\%$                               |            | Kg        | 15 ~ 100 | SB : 137, SE : 127.5                                               | SB : 186, SE : 176 |

### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

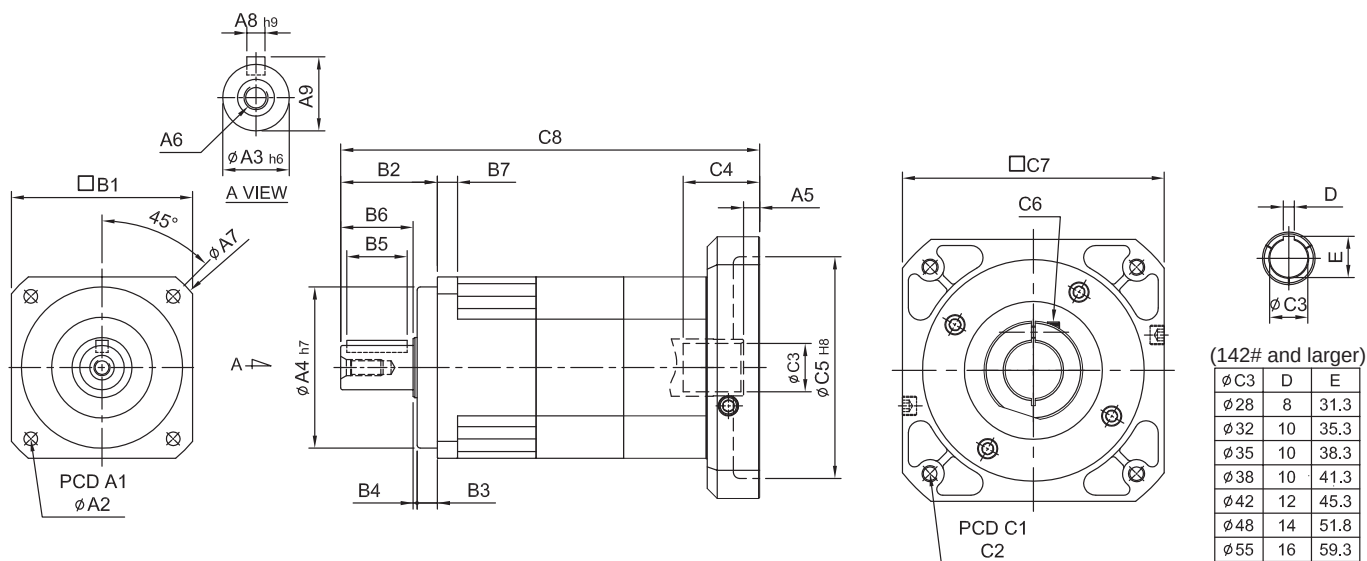
| Ratio | 270   | 330    |
|-------|-------|--------|
| 15    | 63.81 | 185.05 |
| 20    | 63.81 | 185.05 |
| 25    | 63.81 | 185.05 |
| 30    | 63.25 | 183.43 |
| 35    | 63.25 | 183.43 |
| 40    | 63.25 | 183.43 |
| 50    | 63.25 | 183.43 |
| 70    | 61.12 | 177.26 |
| 100   | 60.48 | 175.39 |

# SERVOBX Planetary Reducers

## SB-A Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100



(142# and larger)

| Ø C3 | D  | E    |
|------|----|------|
| Ø 28 | 8  | 31.3 |
| Ø 32 | 10 | 35.3 |
| Ø 35 | 10 | 38.3 |
| Ø 38 | 10 | 41.3 |
| Ø 42 | 12 | 45.3 |
| Ø 48 | 14 | 51.8 |
| Ø 55 | 16 | 59.3 |

unit: mm

| Model Code | 44A        | 62A            | 90A               | 120A           | 142A           | 180A               | 220A            |
|------------|------------|----------------|-------------------|----------------|----------------|--------------------|-----------------|
| A1         | 50         | 70             | 100               | 130            | 165            | 215                | 250             |
| A2         | 4.5        | 5.5            | 6.8               | 9              | 11             | 13                 | 17              |
| A3         | 13         | 16             | 22                | 32             | 40             | 55                 | 75              |
| A4         | 35         | 50             | 80                | 110            | 130            | 160                | 180             |
| A5         | 5          | 6              | 9, 23.5           | 10, 20         | 10             | 11.5, 13.5         | 12.5, 14.5      |
| A6         | M4 x P0.7  | M5 x P0.8      | M8 x P1.25        | M10 x P1.5     | M12 x P1.75    | M14 x P2.0         | M16 x P2.0      |
| A7         | 58         | 80             | 116               | 148            | 186            | 238                | 288             |
| A8         | 5          | 5              | 6                 | 10             | 12             | 16                 | 20              |
| A9         | 15         | 18             | 24.5              | 35             | 43             | 59                 | 79.5            |
| B1         | 44         | 62             | 90                | 120            | 142            | 180                | 220             |
| B2         | 26         | 36             | 48                | 65             | 92             | 106                | 139             |
| B3         | 5          | 7              | 10                | 12             | 15             | 20                 | 30              |
| B4         | 1          | 1              | 2                 | 3              | 3              | 4                  | 5               |
| B5         | 15         | 20             | 30                | 40             | 65             | 70                 | 90              |
| B6         | 20         | 28             | 36                | 50             | 74             | 82                 | 104             |
| B7         | 5          | 8              | 10                | 12             | 15             | 16                 | 20              |
| C1         | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215  | 200, 215, 265      | 200, 265, 300   |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   | M10, M12           | M12, M16        |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
| C4         | 26, 30.5   | 33.5           | 59, 73.5          | 67, 77         | 84.5           | 114.5, 116.5       | 117.5, 119.5    |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  | 114.3, 180, 230    | 114.3, 230, 250 |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.5      | M10 x P1.5     | M10 x P1.5         | M10 x P1.5      |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  | 182, 200, 250      | 222, 250, 265   |
| C8         | 121        | 148.8          | 208, 222.5        | 261, 271       | 327            | 404.5              | 460.5           |



## SB-A 2-Stage

### ■ Performance

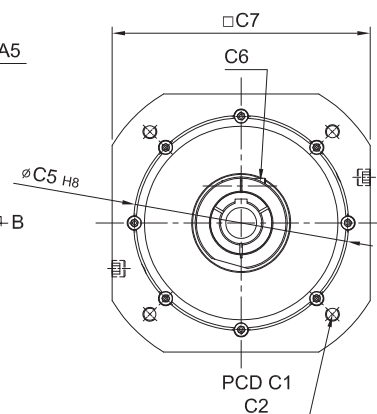
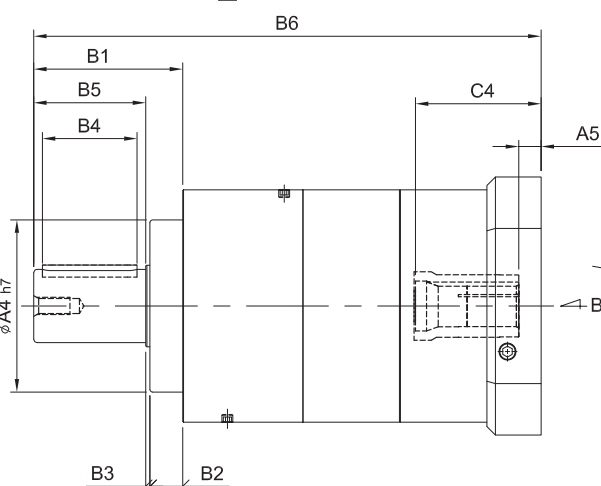
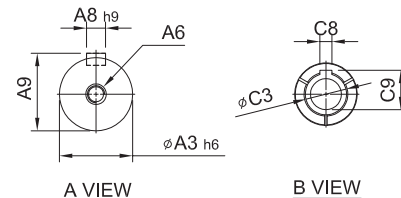
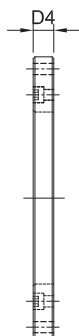
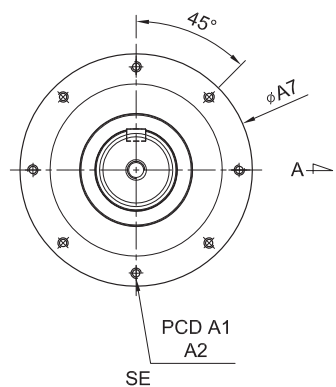
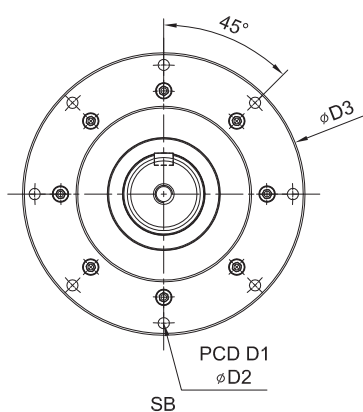
| Parameter \ Model No.                       | Sym        | Unit      | Ratio    | 44A                                                                | 62A   | 90A   | 120A  | 142A  | 180A   | 220A   |
|---------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-------|-------|-------|-------|--------|--------|
| Output Torque<br>(Nominal output torque)    | $T_{2N}$   | Nm        | 15       | 19                                                                 | 59    | 165   | 335   | 625   | 1,206  | 2,030  |
|                                             |            |           | 20       | 16                                                                 | 51    | 146   | 300   | 555   | 1,069  | 1,804  |
|                                             |            |           | 25       | 16                                                                 | 48    | 160   | 333   | 618   | 1,189  | 2,010  |
|                                             |            |           | 30       | 15                                                                 | 45    | 151   | 311   | 583   | 1,118  | 1,911  |
|                                             |            |           | 35       | 15                                                                 | 45    | 149   | 309   | 573   | 1,108  | 1,870  |
|                                             |            |           | 40       | 14                                                                 | 43    | 143   | 298   | 553   | 1,070  | 1,824  |
|                                             |            |           | 50       | 16                                                                 | 48    | 160   | 333   | 618   | 1,189  | 2,010  |
|                                             |            |           | 60       | 15                                                                 | 45    | 151   | 311   | 583   | 1,118  | 1,911  |
|                                             |            |           | 70       | 15                                                                 | 45    | 149   | 309   | 573   | 1,108  | 1,870  |
|                                             |            |           | 80       | 14                                                                 | 43    | 143   | 298   | 553   | 1,070  | 1,824  |
|                                             |            |           | 90       | 13                                                                 | 44    | 145   | 278   | 516   | 993    | 1,694  |
|                                             |            |           | 100      | 14                                                                 | 43    | 141   | 294   | 549   | 1,059  | 1,779  |
| Max. Acceleration Torque                    | $T_{2B}$   | Nm        | 15 ~ 100 | 1.8 Times of Rated Output Torque                                   |       |       |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque | $T_{2NOT}$ | Nm        | 15 ~ 100 | 3 Times of Rated Output Torque                                     |       |       |       |       |        |        |
| Rated Input Speed                           | $n_{1N}$   | rpm       | 15 ~ 100 | 3,000                                                              | 3,000 | 3,000 | 3,000 | 3,000 | 3,000  | 2,000  |
| Max. Input Speed                            | $n_{1B}$   | rpm       | 15 ~ 100 | 6,000                                                              | 6,000 | 6,000 | 5,000 | 5,000 | 4,000  | 3,000  |
| Backlash Ps                                 |            | arcmin    | 15 ~ 100 | -                                                                  | -     | -     | ≤ 3   | ≤ 3   | ≤ 3    | ≤ 3    |
| Backlash P0                                 |            | arcmin    | 15 ~ 100 | ≤ 5                                                                | ≤ 5   | ≤ 5   | ≤ 5   | ≤ 5   | ≤ 5    | ≤ 5    |
| Backlash P1                                 |            | arcmin    | 15 ~ 100 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    |
| Backlash P2                                 |            | arcmin    | 15 ~ 100 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    |
| Torsional Rigidity                          |            | Nm/arcmin | 15 ~ 100 | 3                                                                  | 6     | 14    | 27    | 60    | 140    | 240    |
| Max. Radial Force                           | $F_{2rB}$  | N         | 15 ~ 100 | 380                                                                | 1,180 | 3,200 | 6,800 | 9,300 | 15,600 | 51,000 |
| Max. Axial Force                            | $F_{2aB}$  | N         | 15 ~ 100 | 190                                                                | 590   | 1,600 | 3,400 | 4,650 | 7,800  | 25,500 |
| Service Life                                | $L_H$      | hr        | 15 ~ 100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |       |       |        |        |
| Efficiency                                  | $\eta$     | %         | 15 ~ 100 | ≥ 94                                                               |       |       |       |       |        |        |
| Operating Temperature                       |            | °C        | 15 ~ 100 | - 25° C ~ + 90° C                                                  |       |       |       |       |        |        |
| Lubrication                                 |            |           | 15 ~ 100 | Synthetic Grease                                                   |       |       |       |       |        |        |
| Protection Class                            |            |           | 15 ~ 100 | IP65                                                               |       |       |       |       |        |        |
| Mounting Position                           |            |           | 15 ~ 100 | Any                                                                |       |       |       |       |        |        |
| Noise Level                                 |            | dB        | 15 ~ 100 | ≤ 56                                                               | ≤ 58  | ≤ 60  | ≤ 63  | ≤ 65  | ≤ 67   | ≤ 70   |
| Weight ±3%                                  |            | Kg        | 15 ~ 100 | 0.6                                                                | 2     | 5.5   | 11    | 21    | 42     | 59     |

### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 44A  | 62A  | 90A  | 120A | 142A | 180A  | 220A  |
|-------|------|------|------|------|------|-------|-------|
| 15    | 0.03 | 0.14 | 0.46 | 2.63 | 7.30 | 22.79 | 56.98 |
| 20    | 0.03 | 0.14 | 0.46 | 2.63 | 7.30 | 22.79 | 56.98 |
| 25    | 0.03 | 0.14 | 0.46 | 2.63 | 7.10 | 22.79 | 56.98 |
| 30    | 0.03 | 0.14 | 0.46 | 2.43 | 7.10 | 22.59 | 56.48 |
| 35    | 0.03 | 0.14 | 0.44 | 2.43 | 7.10 | 22.59 | 56.48 |
| 40    | 0.03 | 0.14 | 0.44 | 2.43 | 6.92 | 22.59 | 56.48 |
| 50    | 0.03 | 0.14 | 0.44 | 2.43 | 6.92 | 22.59 | 56.48 |
| 60    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 | 54.58 |
| 70    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 | 54.58 |
| 80    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 | 54.58 |
| 90    | 0.03 | 0.14 | 0.40 | 2.39 | 6.72 | 21.60 | 54.00 |
| 100   | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 | 54.58 |

**SERVOBOX** Planetary Reducers**Series: SB-A SE-A**

2-Stage

RATIO : 15, 20, 25, 30, 35,  
40, 50, 70, 100

unit: mm

| A | Model | 270A         |
|---|-------|--------------|
|   | Code  |              |
|   | A1    | 240          |
|   | A2    | M12 x P1.75  |
|   | A3    | 85           |
|   | A4    | 200          |
|   | A5    | 26, 23       |
|   | A6    | M20 x P2.5   |
|   | A7    | 270          |
|   | A8    | 22           |
| B | A9    | 90           |
|   | B1    | 173          |
|   | B2    | 38           |
|   | B3    | 5            |
|   | B4    | 110          |
|   | B5    | 130          |
|   | B6    | 586.5, 589.5 |

unit: mm

| C | Model | 270A             |
|---|-------|------------------|
|   | Code  |                  |
|   | C1    | 265, 300, 350    |
|   | C2    | M12, M16, M18    |
|   | C3    | 48, 55, 60       |
|   | C4    | 143, 146, 149    |
|   | C5    | 230, 250, 300    |
|   | C6    | M12 x P1.75      |
|   | C7    | 280, 300, 330    |
|   | C8    | 14, 16, 18       |
| D | C9    | 51.8, 59.3, 64.4 |
|   | D1    | 300              |
|   | D2    | 13               |
|   | D3    | 328              |
|   | D4    | 24               |



## SB-A/SE-A 2-Stage (Large Frame)

### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 270A                                                               |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 4,770                                                              |
|                                                |            |           | 20       | 4,730                                                              |
|                                                |            |           | 25       | 4,680                                                              |
|                                                |            |           | 30       | 4,770                                                              |
|                                                |            |           | 35       | 4,570                                                              |
|                                                |            |           | 40       | 4,770                                                              |
|                                                |            |           | 50       | 4,680                                                              |
|                                                |            |           | 70       | 4,570                                                              |
|                                                |            |           | 100      | 4,220                                                              |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 100 | 1.8 Times of Rated Output Torque                                   |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 100 | 3 Times of Rated Output Torque                                     |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 100 | 2,000                                                              |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 100 | 3,000                                                              |
| Backlash Ps                                    |            | arcmin    | 15 ~ 100 | $\leq 3$                                                           |
| Backlash P0                                    |            | arcmin    | 15 ~ 100 | $\leq 5$                                                           |
| Backlash P1                                    |            | arcmin    | 15 ~ 100 | $\leq 7$                                                           |
| Backlash P2                                    |            | arcmin    | 15 ~ 100 | $\leq 9$                                                           |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 100 | 510                                                                |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 100 | 107,100                                                            |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 100 | 53,550                                                             |
| Service Life                                   | $L_H$      | hr        | 15 ~ 100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |
| Efficiency                                     | $\eta$     | %         | 15 ~ 100 | $\geq 94$                                                          |
| Operating Temperature                          |            | °C        | 15 ~ 100 | - 25° C ~ + 90° C                                                  |
| Lubrication                                    |            |           | 15 ~ 100 | Synthetic Grease                                                   |
| Protection Class                               |            |           | 15 ~ 100 | IP65                                                               |
| Mounting Position                              |            |           | 15 ~ 100 | Any                                                                |
| Noise Level                                    |            | dB        | 15 ~ 100 | $\leq 72$                                                          |
| Weight $\pm 3\%$                               |            | Kg        | 15 ~ 100 | SB : 146, SE : 136.5                                               |

### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

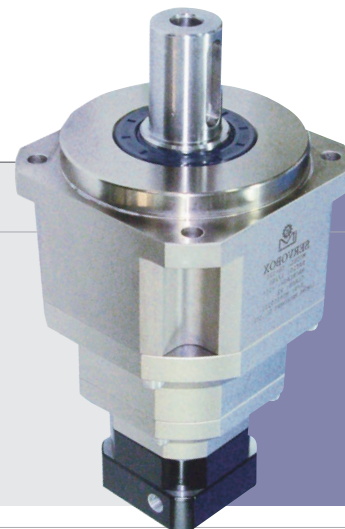
| Ratio | 270A  |
|-------|-------|
| 15    | 65.74 |
| 20    | 65.74 |
| 25    | 65.74 |
| 30    | 64.86 |
| 35    | 64.86 |
| 40    | 64.86 |
| 50    | 64.86 |
| 70    | 62.62 |
| 100   | 61.17 |

# SERVOBX Planetary Reducers

## SB Series

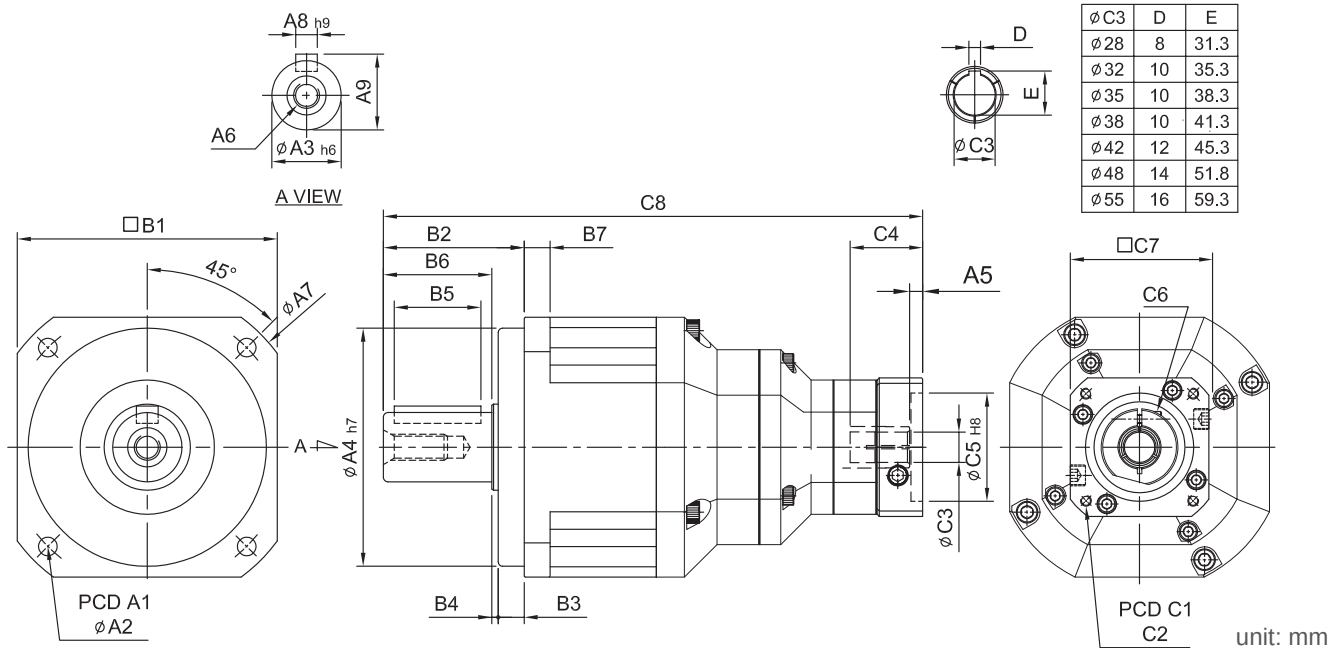
3-Stage

RATIO : 125, 150, 175, 200, 250, 300, 350,  
400, 450, 500, 600, 700, 800, 900, 1000



(220#)

| ø C3 | D  | E    |
|------|----|------|
| ø 28 | 8  | 31.3 |
| ø 32 | 10 | 35.3 |
| ø 35 | 10 | 38.3 |
| ø 38 | 10 | 41.3 |
| ø 42 | 12 | 45.3 |
| ø 48 | 14 | 51.8 |
| ø 55 | 16 | 59.3 |



unit: mm

| Model Code | 90         | 120            | 142               | 180            | 220            |
|------------|------------|----------------|-------------------|----------------|----------------|
| A1         | 100        | 130            | 165               | 215            | 250            |
| A2         | 6.8        | 9              | 11                | 13             | 17             |
| A3         | 22         | 32             | 40                | 55             | 75             |
| A4         | 80         | 110            | 130               | 160            | 180            |
| A5         | 5          | 6              | 9, 23.5           | 10, 20         | 10             |
| A6         | M8 x P1.25 | M10 x P1.5     | M12 x P1.75       | M14 x P2.0     | M16 x P2.0     |
| A7         | 116        | 148            | 186               | 238            | 288            |
| A8         | 6          | 10             | 12                | 16             | 20             |
| A9         | 24.5       | 35             | 43                | 59             | 79.5           |
| B1         | 90         | 120            | 142               | 180            | 220            |
| B2         | 48         | 65             | 92                | 106            | 139            |
| B3         | 10         | 12             | 15                | 20             | 30             |
| B4         | 2          | 3              | 3                 | 4              | 5              |
| B5         | 30         | 40             | 65                | 70             | 90             |
| B6         | 36         | 50             | 74                | 82             | 104            |
| B7         | 10         | 12             | 15                | 16             | 20             |
| C1         | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215  |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 |
| C4         | 26, 30.5   | 33.5, 41.5     | 59, 73.5          | 67, 77         | 84.5           |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  |
| C8         | 197        | 249, 257       | 334.5, 349        | 396.5, 406.5   | 481.5          |



### SB 3-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio      | 90                                                                 | 120   | 142   | 180    | 220    |
|------------------------------------------------|------------|-----------|------------|--------------------------------------------------------------------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 125        | 160                                                                | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 150        | 165                                                                | 335   | 583   | 1,206  | 2,030  |
|                                                |            |           | 175        | 149                                                                | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 200        | 146                                                                | 300   | 555   | 1,069  | 1,804  |
|                                                |            |           | 250        | 160                                                                | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 300        | 151                                                                | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 350        | 149                                                                | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 400        | 143                                                                | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 450        | 145                                                                | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 500        | 160                                                                | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 600        | 151                                                                | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 700        | 149                                                                | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 800        | 143                                                                | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 900        | 145                                                                | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 1000       | 141                                                                | 294   | 549   | 1,059  | 1,779  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 125 ~ 1000 | 1.8 Times of Rated Output Torque                                   |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 125 ~ 1000 | 3 Times of Rated Output Torque                                     |       |       |        |        |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 125 ~ 1000 | 3,000                                                              | 3,000 | 3,000 | 3,000  | 2,000  |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 125 ~ 1000 | 6,000                                                              | 5,000 | 5,000 | 4,000  | 3,000  |
| Backlash Ps                                    |            | arcmin    | 125 ~ 1000 | -                                                                  | ≤ 5   | ≤ 5   | ≤ 5    | ≤ 5    |
| Backlash P0                                    |            | arcmin    | 125 ~ 1000 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    |
| Backlash P1                                    |            | arcmin    | 125 ~ 1000 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    |
| Backlash P2                                    |            | arcmin    | 125 ~ 1000 | ≤ 11                                                               | ≤ 11  | ≤ 11  | ≤ 11   | ≤ 11   |
| Torsional Rigidity                             |            | Nm/arcmin | 125 ~ 1000 | 14                                                                 | 27    | 60    | 140    | 240    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 125 ~ 1000 | 3,200                                                              | 6,800 | 9,300 | 15,600 | 51,000 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 125 ~ 1000 | 1,600                                                              | 3,400 | 4,650 | 7,800  | 25,500 |
| Service Life                                   | $L_H$      | hr        | 125 ~ 1000 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 125 ~ 1000 | ≥ 90                                                               |       |       |        |        |
| Operating Temperature                          |            | °C        | 125 ~ 1000 | - 25° C ~ + 90° C                                                  |       |       |        |        |
| Lubrication                                    |            |           | 125 ~ 1000 | Synthetic Grease                                                   |       |       |        |        |
| Protection Class                               |            |           | 125 ~ 1000 | IP65                                                               |       |       |        |        |
| Mounting Position                              |            |           | 125 ~ 1000 | Any                                                                |       |       |        |        |
| Noise Level                                    |            | dB        | 125 ~ 1000 | ≤ 60                                                               | ≤ 63  | ≤ 65  | ≤ 67   | ≤ 70   |
| Weight ±3%                                     |            | Kg        | 125 ~ 1000 | 5.2                                                                | 10    | 18.1  | 35     | 63.7   |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

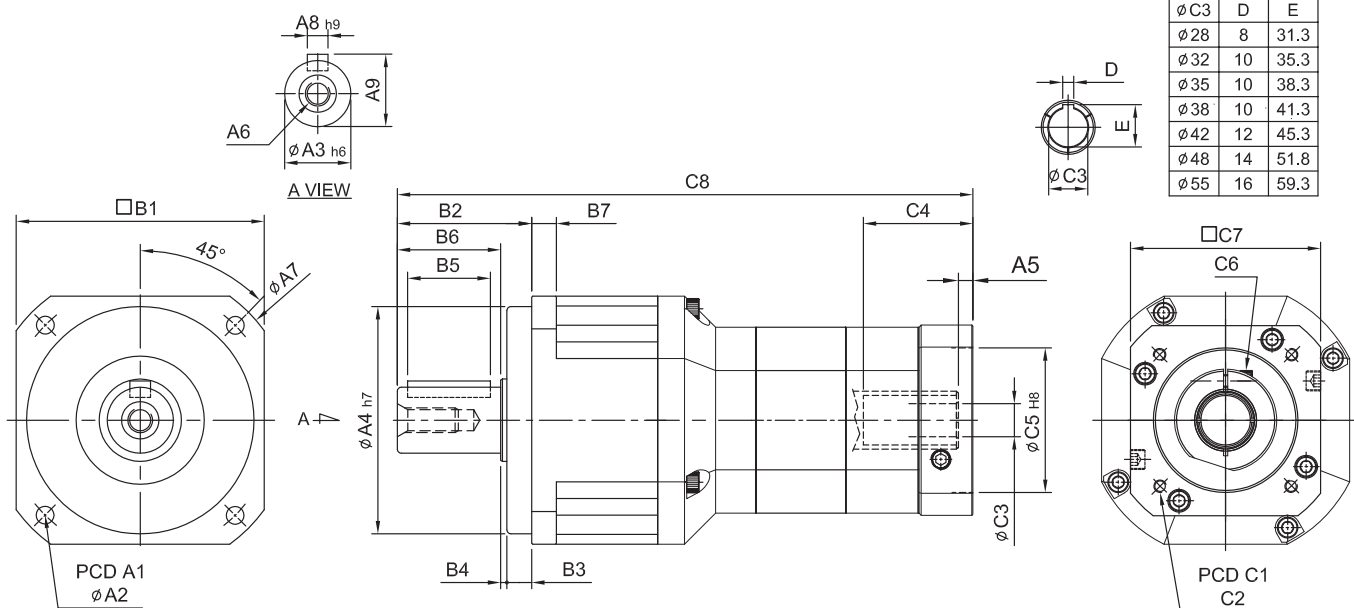
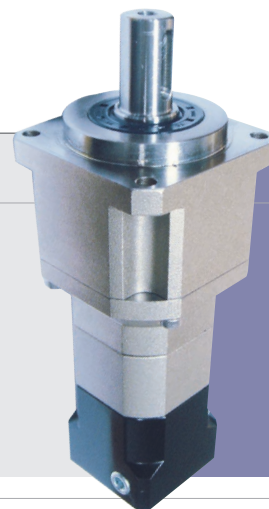
| Ratio | 90   | 120  | 142  | 180  | 220  |
|-------|------|------|------|------|------|
| 125   | 0.01 | 0.04 | 0.71 | 1.42 | 3.29 |
| 150   | 0.01 | 0.04 | 0.51 | 0.92 | 2.15 |
| 175   | 0.01 | 0.04 | 0.40 | 0.83 | 1.26 |
| 200   | 0.01 | 0.04 | 0.21 | 0.65 | 0.98 |
| 250   | 0.01 | 0.04 | 0.11 | 0.52 | 0.82 |
| 300   | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 350   | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 400   | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 450   | 0.01 | 0.04 | 0.09 | 0.21 | 0.51 |
| 500   | 0.01 | 0.04 | 0.08 | 0.12 | 0.51 |
| 600   | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 700   | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 800   | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 900   | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 1000  | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |

# SERVOBX Planetary Reducers

## SB-A Series

3-Stage

RATIO : 125, 150, 175, 200, 250, 300, 350,  
400, 450, 500, 600, 700, 800, 900, 1000



(180# and larger)

| Ø C3 | D  | E    |
|------|----|------|
| Ø 28 | 8  | 31.3 |
| Ø 32 | 10 | 35.3 |
| Ø 35 | 10 | 38.3 |
| Ø 38 | 10 | 41.3 |
| Ø 42 | 12 | 45.3 |
| Ø 48 | 14 | 51.8 |
| Ø 55 | 16 | 59.3 |

unit: mm

| Model Code | 62A        | 90A            | 120A              | 142A           | 180A           | 220A               |
|------------|------------|----------------|-------------------|----------------|----------------|--------------------|
| A1         | 70         | 100            | 130               | 165            | 215            | 250                |
| A2         | 5.5        | 6.8            | 9                 | 11             | 13             | 17                 |
| A3         | 16         | 22             | 32                | 40             | 55             | 75                 |
| A4         | 50         | 80             | 110               | 130            | 160            | 180                |
| A5         | 5          | 6              | 9, 23.5           | 10, 20         | 10             | 11.5, 13.5         |
| A6         | M5 x P0.8  | M8 x P1.25     | M10 x P1.5        | M12 x P1.75    | M14 x P2.0     | M16 x P2.0         |
| A7         | 80         | 116            | 148               | 186            | 238            | 288                |
| A8         | 5          | 6              | 10                | 12             | 16             | 20                 |
| A9         | 18         | 24.5           | 35                | 43             | 59             | 79.5               |
| B1         | 62         | 90             | 120               | 142            | 180            | 220                |
| B2         | 36         | 48             | 65                | 92             | 106            | 139                |
| B3         | 7          | 10             | 12                | 15             | 20             | 30                 |
| B4         | 1          | 2              | 3                 | 3              | 4              | 5                  |
| B5         | 20         | 30             | 40                | 65             | 70             | 90                 |
| B6         | 28         | 36             | 50                | 74             | 82             | 104                |
| B7         | 8          | 10             | 12                | 15             | 16             | 20                 |
| C1         | 46, 63, 60 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215  | 200, 215, 265      |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   | M10, M12           |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 | 35, 38, 42, 48, 55 |
| C4         | 26, 30.5   | 33.5, 41.5     | 59, 73.5          | 67, 77         | 84.5           | 114.5, 116.5       |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  | 114.3, 180, 230    |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     | M10 x P1.5         |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  | 182, 200, 250      |
| C8         | 165.5      | 206.3, 214.3   | 284.5, 299        | 354.5, 364.5   | 425            | 527.5              |



## SB-A 3-Stage

### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio      | 62A                                                                | 90A       | 120A      | 142A      | 180A      | 220A      |
|------------------------------------------------|------------|-----------|------------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 125        | 48                                                                 | 160       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 150        | 59                                                                 | 165       | 335       | 583       | 1,206     | 2,030     |
|                                                |            |           | 175        | 45                                                                 | 149       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 200        | 51                                                                 | 146       | 300       | 555       | 1,069     | 1,804     |
|                                                |            |           | 250        | 48                                                                 | 160       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 300        | 45                                                                 | 151       | 311       | 583       | 1,118     | 1,911     |
|                                                |            |           | 350        | 45                                                                 | 149       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 400        | 43                                                                 | 143       | 298       | 553       | 1,070     | 1,824     |
|                                                |            |           | 450        | 44                                                                 | 145       | 278       | 516       | 993       | 1,694     |
|                                                |            |           | 500        | 48                                                                 | 160       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 600        | 45                                                                 | 151       | 311       | 583       | 1,118     | 1,911     |
|                                                |            |           | 700        | 45                                                                 | 149       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 800        | 43                                                                 | 143       | 298       | 553       | 1,070     | 1,824     |
|                                                |            |           | 900        | 44                                                                 | 145       | 278       | 516       | 993       | 1,694     |
|                                                |            |           | 1000       | 43                                                                 | 141       | 294       | 549       | 1,059     | 1,779     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 125 ~ 1000 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 125 ~ 1000 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 125 ~ 1000 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 125 ~ 1000 | 6,000                                                              | 6,000     | 5,000     | 5,000     | 4,000     | 3,000     |
| Backlash Ps                                    |            | arcmin    | 125 ~ 1000 | -                                                                  | -         | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  |
| Backlash P0                                    |            | arcmin    | 125 ~ 1000 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Backlash P1                                    |            | arcmin    | 125 ~ 1000 | $\leq 9$                                                           | $\leq 9$  | $\leq 9$  | $\leq 9$  | $\leq 9$  | $\leq 9$  |
| Backlash P2                                    |            | arcmin    | 125 ~ 1000 | $\leq 11$                                                          | $\leq 11$ | $\leq 11$ | $\leq 11$ | $\leq 11$ | $\leq 11$ |
| Torsional Rigidity                             |            | Nm/arcmin | 125 ~ 1000 | 6                                                                  | 14        | 27        | 60        | 140       | 240       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 125 ~ 1000 | 1,180                                                              | 3,200     | 6,800     | 9,300     | 15,600    | 51,000    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 125 ~ 1000 | 590                                                                | 1,600     | 3,400     | 4,650     | 7,800     | 25,500    |
| Service Life                                   | $L_H$      | hr        | 125 ~ 1000 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 125 ~ 1000 | $\geq 90$                                                          |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 125 ~ 1000 | - 25° C ~ + 90° C                                                  |           |           |           |           |           |
| Lubrication                                    |            |           | 125 ~ 1000 | Synthetic Grease                                                   |           |           |           |           |           |
| Protection Class                               |            |           | 125 ~ 1000 | IP65                                                               |           |           |           |           |           |
| Mounting Position                              |            |           | 125 ~ 1000 | Any                                                                |           |           |           |           |           |
| Noise Level                                    |            | dB        | 125 ~ 1000 | $\leq 58$                                                          | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ | $\leq 70$ |
| Weight $\pm 3\%$                               |            | Kg        | 125 ~ 1000 | 4                                                                  | 6.5       | 13        | 30        | 57        | 87        |

### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

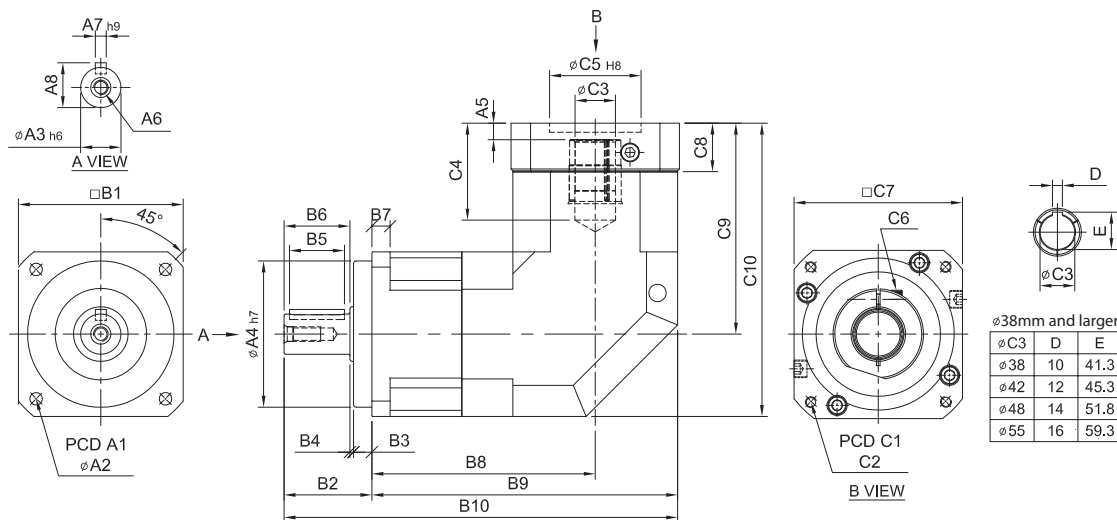
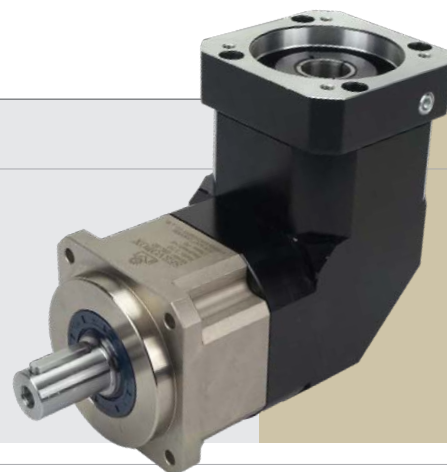
| Ratio | 62A  | 90A  | 120A | 142A | 180A | 220A |
|-------|------|------|------|------|------|------|
| 125   | 0.01 | 0.01 | 0.04 | 0.71 | 1.42 | 3.29 |
| 150   | 0.01 | 0.01 | 0.04 | 0.51 | 0.92 | 2.15 |
| 175   | 0.01 | 0.01 | 0.04 | 0.40 | 0.83 | 1.26 |
| 200   | 0.01 | 0.01 | 0.04 | 0.21 | 0.65 | 0.98 |
| 250   | 0.01 | 0.01 | 0.04 | 0.11 | 0.52 | 0.82 |
| 300   | 0.01 | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 350   | 0.01 | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 400   | 0.01 | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 450   | 0.01 | 0.01 | 0.04 | 0.09 | 0.21 | 0.51 |
| 500   | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.51 |
| 600   | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 700   | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 800   | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 900   | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 1000  | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |

# SERVOBX Planetary Reducers

## SBL Series

1-Stage

RATIO : 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20



unit: mm

| Model Code | 44         | 62             | 90                | 120           | 142            | 180                | 220             |
|------------|------------|----------------|-------------------|---------------|----------------|--------------------|-----------------|
| A1         | 50         | 70             | 100               | 130           | 165            | 215                | 250             |
| A2         | 4.5        | 5.5            | 6.8               | 9             | 11             | 13                 | 17              |
| A3         | 13         | 16             | 22                | 32            | 40             | 55                 | 75              |
| A4         | 35         | 50             | 80                | 110           | 130            | 160                | 180             |
| A5         | 6          | 6              | 9, 23.5           | 10, 20        | 10             | 12.5, 14.5         | 12.5, 14.5      |
| A6         | M4 x P0.7  | M5 x P0.8      | M8 x P1.25        | M10 x P1.5    | M12 x P1.75    | M14 x P2.0         | M16 x P2.0      |
| A7         | 5          | 5              | 6                 | 10            | 12             | 16                 | 20              |
| A8         | 15         | 18             | 24.5              | 35            | 43             | 59                 | 79.5            |
| B1         | 44         | 62             | 90                | 120           | 142            | 180                | 220             |
| B2         | 26         | 36             | 48                | 65            | 92             | 106                | 139             |
| B3         | 5          | 7              | 10                | 12            | 15             | 20                 | 30              |
| B4         | 1          | 1              | 2                 | 3             | 3              | 4                  | 5               |
| B5         | 15         | 20             | 30                | 40            | 65             | 70                 | 90              |
| B6         | 20         | 28             | 36                | 50            | 74             | 82                 | 104             |
| B7         | 5          | 8              | 10                | 12            | 15             | 16                 | 20              |
| B8         | 76         | 84.5           | 122.1             | 148           | 165.5          | 223.6              | 231.6           |
| B9         | 98         | 115.5          | 167.1             | 208           | 236.5          | 313.6              | 341.6           |
| B10        | 124        | 151.5          | 215               | 273           | 328.5          | 419.6              | 480.6           |
| C1         | 46, 60, 63 | 70, 75, 90     | 90, 110, 115, 145 | 115, 145, 165 | 145, 165, 215  | 200, 215, 265      | 200, 265, 300   |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10   | M8, M10, M12   | M10, M12, M16      | M12, M16        |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32    | 28, 32, 35, 38 | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
| C4         | 27         | 33.5, 42       | 53, 58, 67.5      | 67, 77        | 85             | 117, 119           | 117, 119        |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180  | 114.3, 180, 230    | 114.3, 230, 250 |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25    | M10 x P1.5     | M10 x P1.5         | M10 x P1.5      |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150 | 146, 150, 190  | 182, 200, 250      | 222, 250, 265   |
| C8         | 16         | 21.5           | 26.5, 41          | 35.5, 45.5    | 35.5           | 45.5, 47.5         | 45.5, 47.5      |
| C9         | 61         | 77, 85         | 115.3, 129.8      | 141, 151      | 165.7          | 235, 237           | 235             |
| C10        | 83         | 108, 116       | 160.3, 174.8      | 201, 211      | 236.7          | 325, 327           | 345             |

## High Precision Planetary Reducer

## SBL 1-Stage

## ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 44                                                                 | 62    | 90    | 120   | 142   | 180    | 220    |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-------|-------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 3      | 19                                                                 | 59    | 165   | 335   | 625   | 1,206  | 2,030  |
|                                                |            |           | 4      | 16                                                                 | 51    | 146   | 300   | 555   | 1,069  | 1,804  |
|                                                |            |           | 5      | 16                                                                 | 48    | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 6      | 15                                                                 | 45    | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 7      | 15                                                                 | 45    | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 8      | 14                                                                 | 43    | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 9      | 13                                                                 | 44    | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 10     | 14                                                                 | 43    | 141   | 294   | 549   | 1,059  | 1,779  |
|                                                |            |           | 12     | 15                                                                 | 45    | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 14     | 15                                                                 | 45    | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 16     | 14                                                                 | 43    | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 18     | 13                                                                 | 44    | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 20     | 14                                                                 | 43    | 141   | 294   | 549   | 1,059  | 1,779  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 3 ~ 20 | 1.8 Times of Rated Output Torque                                   |       |       |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 3 ~ 20 | 3 Times of Rated Output Torque                                     |       |       |       |       |        |        |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 3 ~ 20 | 3,000                                                              | 3,000 | 3,000 | 3,000 | 3,000 | 3,000  | 2,000  |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 3 ~ 20 | 6,000                                                              | 6,000 | 6,000 | 5,000 | 5,000 | 4,000  | 3,000  |
| Backlash Ps                                    |            | arcmin    | 3 ~ 20 | -                                                                  | -     | ≤ 2   | ≤ 2   | ≤ 2   | ≤ 2    | ≤ 2    |
| Backlash P0                                    |            | arcmin    | 3 ~ 20 | ≤ 4                                                                | ≤ 4   | ≤ 4   | ≤ 4   | ≤ 4   | ≤ 4    | ≤ 4    |
| Backlash P1                                    |            | arcmin    | 3 ~ 20 | ≤ 6                                                                | ≤ 6   | ≤ 6   | ≤ 6   | ≤ 6   | ≤ 6    | ≤ 6    |
| Backlash P2                                    |            | arcmin    | 3 ~ 20 | ≤ 8                                                                | ≤ 8   | ≤ 8   | ≤ 8   | ≤ 8   | ≤ 8    | ≤ 8    |
| Torsional Rigidity                             |            | Nm/arcmin | 3 ~ 20 | 3                                                                  | 6     | 14    | 27    | 60    | 140    | 240    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 3 ~ 20 | 380                                                                | 1,180 | 3,200 | 6,800 | 9,300 | 15,600 | 51,000 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 3 ~ 20 | 190                                                                | 590   | 1,600 | 3,400 | 4,650 | 7,800  | 25,500 |
| Service Life                                   | $L_H$      | hr        | 3 ~ 20 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 3 ~ 20 | ≥ 95                                                               |       |       |       |       |        |        |
| Operating Temperature                          |            | °C        | 3 ~ 20 | - 25° C ~ + 90° C                                                  |       |       |       |       |        |        |
| Lubrication                                    |            |           | 3 ~ 20 | Synthetic Grease                                                   |       |       |       |       |        |        |
| Protection Class                               |            |           | 3 ~ 20 | IP65                                                               |       |       |       |       |        |        |
| Mounting Position                              |            |           | 3 ~ 20 | Any                                                                |       |       |       |       |        |        |
| Noise Level                                    |            | dB        | 3 ~ 20 | ≤ 65                                                               | ≤ 68  | ≤ 70  | ≤ 72  | ≤ 74  | ≤ 76   | ≤ 78   |
| Weight ±3%                                     |            | Kg        | 3 ~ 20 | 1                                                                  | 2.3   | 6.6   | 13.2  | 22.3  | 50     | 75.2   |

■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

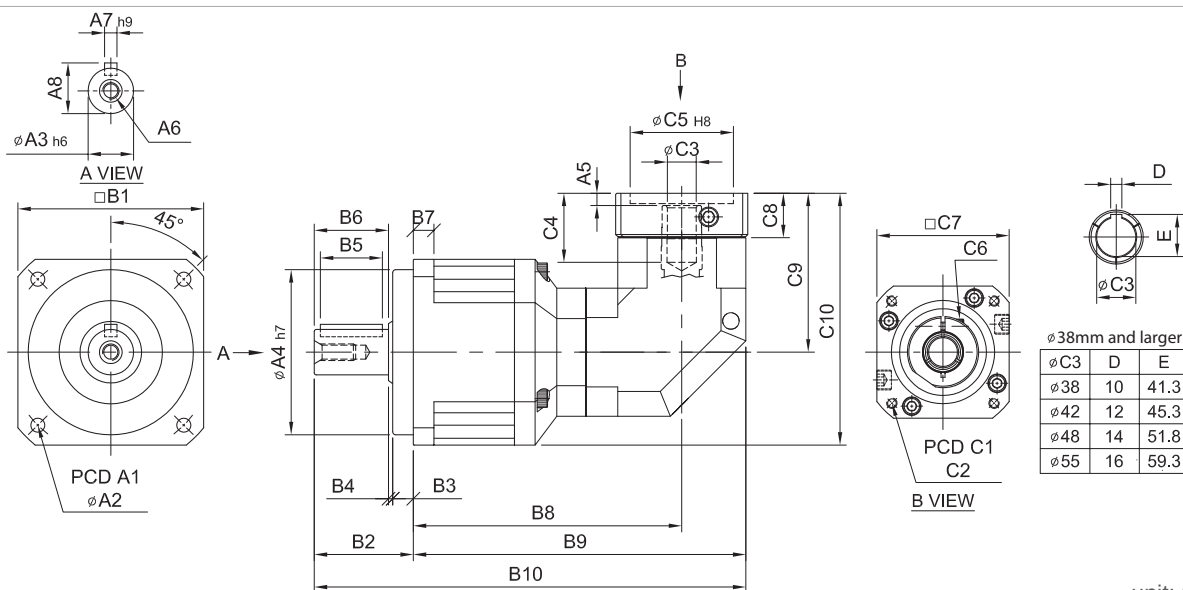
| Ratio | 44   | 62   | 90   | 120  | 142  | 180  | 220   |
|-------|------|------|------|------|------|------|-------|
| 3     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 4     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 5     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 6     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 7     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 8     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 9     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 10    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 12    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 65.5 | 119.2 |
| 14    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 65.5 | 119.2 |
| 16    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 65.5 | 119.2 |
| 18    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 65.5 | 119.2 |
| 20    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 65.5 | 119.2 |

# SERVOBX Planetary Reducers

## SBL Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70,  
80, 90, 100, 120, 140, 160, 180, 200



unit: mm

| Model Code | 62         | 90             | 120               | 142           | 180            | 220                |
|------------|------------|----------------|-------------------|---------------|----------------|--------------------|
| A1         | 70         | 100            | 130               | 165           | 215            | 250                |
| A2         | 5.5        | 6.8            | 9                 | 11            | 13             | 17                 |
| A3         | 16         | 22             | 32                | 40            | 55             | 75                 |
| A4         | 50         | 80             | 110               | 130           | 160            | 180                |
| A5         | 6          | 6              | 9, 23.5           | 10, 20        | 10             | 12.5, 14.5         |
| A6         | M5 x P0.8  | M8 x P1.25     | M10 x P1.5        | M12 x P1.75   | M14 x P2.0     | M16 x P2.0         |
| A7         | 5          | 6              | 10                | 12            | 16             | 20                 |
| A8         | 18         | 24.5           | 35                | 43            | 59             | 79.5               |
| B1         | 62         | 90             | 120               | 142           | 180            | 220                |
| B2         | 36         | 48             | 65                | 92            | 106            | 139                |
| B3         | 7          | 10             | 12                | 15            | 20             | 30                 |
| B4         | 1          | 2              | 3                 | 3             | 4              | 5                  |
| B5         | 20         | 30             | 40                | 65            | 70             | 90                 |
| B6         | 28         | 36             | 50                | 74            | 82             | 104                |
| B7         | 8          | 10             | 12                | 15            | 16             | 20                 |
| B8         | 110.5      | 130            | 181.6             | 214.5         | 249.5          | 313.6              |
| B9         | 132.5      | 161            | 266.6             | 274.5         | 320.5          | 403.6              |
| B10        | 168.5      | 209            | 291.6             | 366.5         | 426.5          | 542.6              |
| C1         | 46, 60, 63 | 70, 75, 90     | 90, 110, 115, 145 | 115, 145, 165 | 145, 165, 215  | 200, 215, 265      |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8, M10   | M6, M8, M10   | M8, M10, M12   | M10, M12, M16      |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32    | 28, 32, 35, 38 | 35, 38, 42, 48, 55 |
| C4         | 27         | 33.5, 42       | 53, 58, 67.5      | 67, 77        | 85             | 117, 119           |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180  | 114.3, 180, 230    |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25    | M10 x P1.5     | M10 x P1.5         |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150 | 146, 150, 190  | 182, 200, 250      |
| C8         | 16         | 21.5           | 26.5, 41          | 35.5, 45.5    | 35.5           | 45.5, 47.5         |
| C9         | 61         | 77, 85         | 115.3, 129.8      | 141, 151      | 165.7          | 235, 237           |
| C10        | 92         | 122, 130       | 175.3, 189.8      | 212, 222      | 255.7          | 345, 347           |



## High Precision Planetary Reducer

### SBL 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 62                                                                 | 90    | 120   | 142   | 180    | 220    |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 59                                                                 | 165   | 335   | 625   | 1,206  | 2,030  |
|                                                |            |           | 20       | 51                                                                 | 146   | 300   | 555   | 1,069  | 1,804  |
|                                                |            |           | 25       | 48                                                                 | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 30       | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 35       | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 40       | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 50       | 48                                                                 | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 60       | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 70       | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 80       | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 90       | 44                                                                 | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 100      | 43                                                                 | 141   | 294   | 549   | 1,059  | 1,779  |
|                                                |            |           | 120      | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 140      | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 160      | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 180      | 44                                                                 | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 200      | 43                                                                 | 141   | 294   | 549   | 1,059  | 1,779  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 200 | 1.8 Times of Rated Output Torque                                   |       |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 200 | 3 Times of Rated Output Torque                                     |       |       |       |        |        |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 200 | 3,000                                                              | 3,000 | 3,000 | 3,000 | 3,000  | 2,000  |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 200 | 6,000                                                              | 6,000 | 5,000 | 5,000 | 4,000  | 4,000  |
| Backlash Ps                                    |            | arcmin    | 15 ~ 200 | -                                                                  | ≤ 4   | ≤ 4   | ≤ 4   | ≤ 4    | ≤ 4    |
| Backlash P0                                    |            | arcmin    | 15 ~ 200 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    |
| Backlash P1                                    |            | arcmin    | 15 ~ 200 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    |
| Backlash P2                                    |            | arcmin    | 15 ~ 200 | ≤ 12                                                               | ≤ 12  | ≤ 12  | ≤ 12  | ≤ 12   | ≤ 12   |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 200 | 6                                                                  | 14    | 27    | 60    | 140    | 240    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 200 | 1,180                                                              | 3,200 | 6,800 | 9,300 | 15,600 | 51,000 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 200 | 590                                                                | 1,600 | 3,400 | 4,650 | 7,800  | 25,500 |
| Service Life                                   | $L_H$      | hr        | 15 ~ 200 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 15 ~ 200 | ≥ 92                                                               |       |       |       |        |        |
| Operating Temperature                          |            | °C        | 15 ~ 200 | - 25° C ~ + 90° C                                                  |       |       |       |        |        |
| Lubrication                                    |            |           | 15 ~ 200 | Synthetic Grease                                                   |       |       |       |        |        |
| Protection Class                               |            |           | 15 ~ 200 | IP65                                                               |       |       |       |        |        |
| Mounting Position                              |            |           | 15 ~ 200 | Any                                                                |       |       |       |        |        |
| Noise Level                                    |            | dB        | 15 ~ 200 | ≤ 68                                                               | ≤ 70  | ≤ 72  | ≤ 74  | ≤ 76   | ≤ 78   |
| Weight ±3%                                     |            | Kg        | 15 ~ 200 | 2                                                                  | 5.5   | 12.5  | 23.2  | 44.4   | 79.5   |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

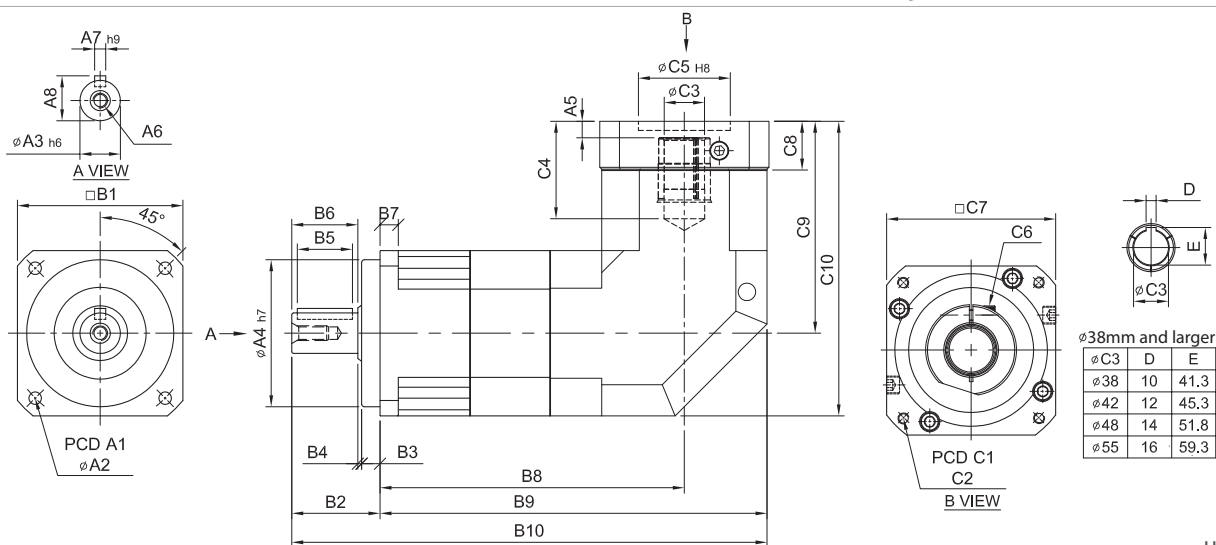
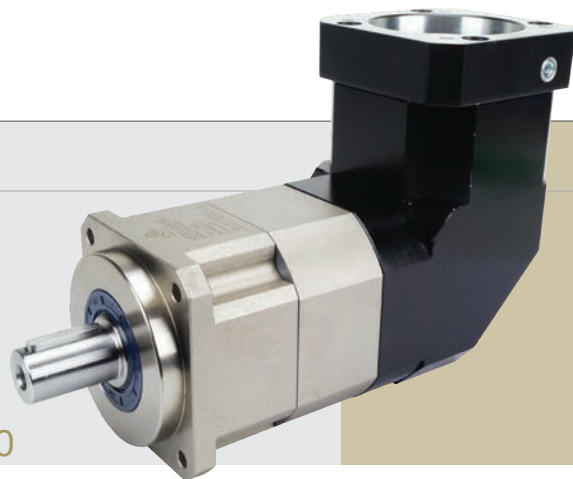
| Ratio | 62   | 90   | 120  | 142  | 180  | 220  |
|-------|------|------|------|------|------|------|
| 15    | 0.09 | 0.36 | 2.28 | 6.85 | 26.2 | 70.1 |
| 20    | 0.09 | 0.36 | 2.28 | 6.85 | 26.2 | 70.1 |
| 25    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 30    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 35    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 40    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 50    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 60    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 70    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 80    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 90    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 100   | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 120   | 0.03 | 0.10 | 1.88 | 6.20 | 21.2 | 65.1 |
| 140   | 0.03 | 0.10 | 1.88 | 6.20 | 21.2 | 65.1 |
| 160   | 0.03 | 0.10 | 1.88 | 6.20 | 21.2 | 65.1 |
| 180   | 0.03 | 0.10 | 1.88 | 6.20 | 21.2 | 65.1 |
| 200   | 0.03 | 0.10 | 1.88 | 6.20 | 21.2 | 65.1 |

# SERVOBX Planetary Reducers

## SBL-A Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70,  
80, 90, 100, 120, 140, 160, 180, 200



unit: mm

| Model Code | 44A        | 62A            | 90A               | 120A          | 142A           | 180A               | 220A            |
|------------|------------|----------------|-------------------|---------------|----------------|--------------------|-----------------|
| A1         | 50         | 70             | 100               | 130           | 165            | 215                | 250             |
| A2         | 4.5        | 5.5            | 6.8               | 9             | 11             | 13                 | 17              |
| A3         | 13         | 16             | 22                | 32            | 40             | 55                 | 75              |
| A4         | 35         | 50             | 80                | 110           | 130            | 160                | 180             |
| A5         | 6          | 6              | 9, 23.5           | 10, 20        | 10             | 12.5, 14.5         | 12.5, 14.5      |
| A6         | M4 x P0.7  | M5 x P0.8      | M8 x P1.25        | M10 x P1.5    | M12 x P1.75    | M14 x P2.0         | M16 x P2.0      |
| A7         | 5          | 5              | 6                 | 10            | 12             | 16                 | 20              |
| A8         | 15         | 18             | 24.5              | 35            | 43             | 59                 | 79.5            |
| B1         | 44         | 62             | 90                | 120           | 142            | 180                | 220             |
| B2         | 26         | 36             | 48                | 65            | 92             | 106                | 139             |
| B3         | 5          | 7              | 10                | 12            | 15             | 20                 | 30              |
| B4         | 1          | 1              | 2                 | 3             | 3              | 4                  | 5               |
| B5         | 15         | 20             | 30                | 40            | 65             | 70                 | 90              |
| B6         | 20         | 28             | 36                | 50            | 74             | 82                 | 104             |
| B7         | 5          | 8              | 10                | 12            | 15             | 16                 | 20              |
| B8         | 102        | 118.3          | 165.6             | 204           | 232            | 304.6              | 324.6           |
| B9         | 124        | 149.3          | 210.6             | 264           | 303            | 394.6              | 434.6           |
| B10        | 150        | 185.3          | 258.6             | 329           | 395            | 500.6              | 573.6           |
| C1         | 46, 60, 63 | 70, 75, 90     | 90, 110, 115, 145 | 115, 145, 165 | 145, 165, 215  | 200, 215, 265      | 200, 265, 300   |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10   | M8, M10, M12   | M10, M12, M16      | M12, M16        |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32    | 28, 32, 35, 38 | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
| C4         | 27         | 33.5, 42       | 53, 58, 67.5      | 67, 77        | 85             | 117, 119           | 117, 119        |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180  | 114.3, 180, 230    | 114.3, 230, 250 |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25    | M10 x P1.5     | M10 x P1.5         | M10 x P1.5      |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150 | 146, 150, 190  | 182, 200, 250      | 220, 250, 265   |
| C8         | 16         | 21.5           | 26.5, 41          | 35.5, 45.5    | 35.5           | 45.5, 47.5         | 45.5, 47.5      |
| C9         | 61         | 77             | 115.3, 129.8      | 141, 151      | 165.7          | 235, 237           | 235, 237        |
| C10        | 83         | 108            | 160.3, 174.8      | 201, 211      | 236.7          | 325, 327           | 345, 347        |

## High Precision Planetary Reducer

## SBL-A 2-Stage

## ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 44A                                                                | 62A   | 90A   | 120A  | 142A  | 180A   | 220A   |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-------|-------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 19                                                                 | 59    | 165   | 335   | 625   | 1,206  | 2,030  |
|                                                |            |           | 20       | 16                                                                 | 51    | 146   | 300   | 555   | 1,069  | 1,804  |
|                                                |            |           | 25       | 16                                                                 | 48    | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 30       | 15                                                                 | 45    | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 35       | 15                                                                 | 45    | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 40       | 14                                                                 | 43    | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 50       | 16                                                                 | 48    | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 60       | 15                                                                 | 45    | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 70       | 15                                                                 | 45    | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 80       | 14                                                                 | 43    | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 90       | 13                                                                 | 44    | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 100      | 14                                                                 | 43    | 141   | 294   | 549   | 1,059  | 1,779  |
|                                                |            |           | 120      | 15                                                                 | 45    | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 140      | 15                                                                 | 45    | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 160      | 14                                                                 | 43    | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 180      | 13                                                                 | 44    | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 200      | 14                                                                 | 43    | 141   | 294   | 549   | 1,059  | 1,779  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 200 | 1.8 Times of Rated Output Torque                                   |       |       |       |       |        |        |
| Max. Output Torque                             | $T_{2NOT}$ | Nm        | 15 ~ 200 | 3 Times of Rated Output Torque                                     |       |       |       |       |        |        |
| Emergency Stop Torque                          |            |           |          |                                                                    |       |       |       |       |        |        |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 200 | 3,000                                                              | 3,000 | 3,000 | 3,000 | 3,000 | 3,000  | 2,000  |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 200 | 6,000                                                              | 6,000 | 6,000 | 5,000 | 5,000 | 4,000  | 3,000  |
| Backlash Ps                                    |            | arcmin    | 15 ~ 200 | -                                                                  | -     | ≤ 4   | ≤ 4   | ≤ 4   | ≤ 4    | ≤ 4    |
| Backlash P0                                    |            | arcmin    | 15 ~ 200 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    |
| Backlash P1                                    |            | arcmin    | 15 ~ 200 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    |
| Backlash P2                                    |            | arcmin    | 15 ~ 200 | ≤ 12                                                               | ≤ 12  | ≤ 12  | ≤ 12  | ≤ 12  | ≤ 12   | ≤ 12   |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 200 | 3                                                                  | 6     | 14    | 27    | 60    | 140    | 240    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 200 | 380                                                                | 1,180 | 3,200 | 6,800 | 9,300 | 15,600 | 51,000 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 200 | 190                                                                | 590   | 1,600 | 3,400 | 4,650 | 7,800  | 25,500 |
| Service Life                                   | $L_{H1}$   | hr        | 15 ~ 200 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 15 ~ 200 | ≥ 92                                                               |       |       |       |       |        |        |
| Operating Temperature                          |            | °C        | 15 ~ 200 | - 25° C ~ + 90° C                                                  |       |       |       |       |        |        |
| Lubrication                                    |            |           | 15 ~ 200 | Synthetic Grease                                                   |       |       |       |       |        |        |
| Protection Class                               |            |           | 15 ~ 200 | IP65                                                               |       |       |       |       |        |        |
| Mounting Position                              |            |           | 15 ~ 200 | Any                                                                |       |       |       |       |        |        |
| Noise Level                                    |            | dB        | 15 ~ 200 | ≤ 65                                                               | ≤ 68  | ≤ 70  | ≤ 72  | ≤ 74  | ≤ 76   | ≤ 78   |
| Weight ±3%                                     |            | Kg        | 15 ~ 200 | 1.2                                                                | 3     | 8.2   | 12.5  | 23.2  | 52.4   | 94.5   |

■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 44A  | 62A  | 90A  | 120A | 142A  | 180A | 220A |
|-------|------|------|------|------|-------|------|------|
| 15    | 0.09 | 0.36 | 2.28 | 6.85 | 23.45 | 55.2 | 80.2 |
| 20    | 0.09 | 0.36 | 2.28 | 6.85 | 23.45 | 55.2 | 80.2 |
| 25    | 0.09 | 0.36 | 2.28 | 6.85 | 23.45 | 50.4 | 76.5 |
| 30    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 35    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 40    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 50    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 60    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 70    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 80    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 90    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 100   | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 120   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8  | 48.7 | 74.2 |
| 140   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8  | 48.7 | 74.2 |
| 160   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8  | 48.7 | 74.2 |
| 180   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8  | 48.7 | 74.2 |
| 200   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8  | 48.7 | 74.2 |

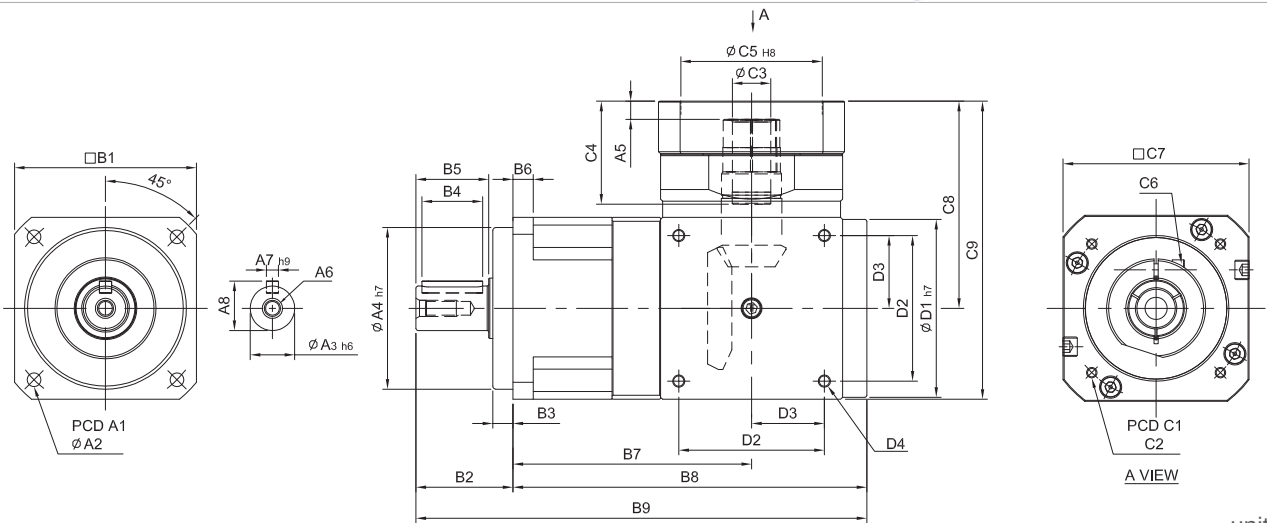
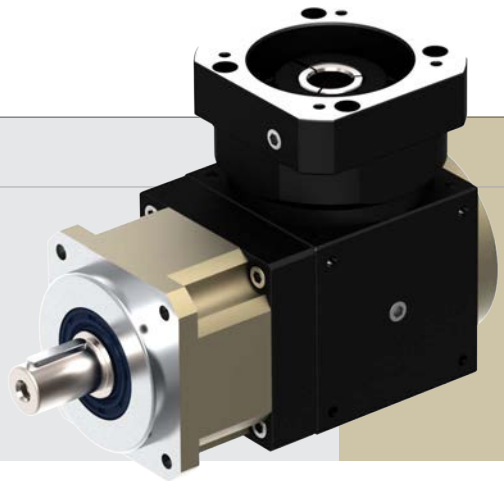
# SERVOBX Planetary Reducers

SB Helical Planetary with ST Spiral Bevel Input

## SBT Series

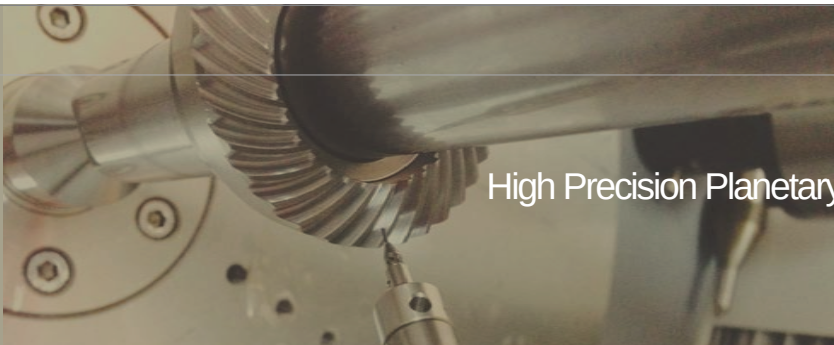
1-Stage

RATIO : 3, 4, 5, 6, 7, 8, 9, 10, 15,  
20, 25, 30, 35, 40, 45, 50



unit: mm

| Model Code | 44         | 62         | 90                | 120               | 142           | 180           | 220             |
|------------|------------|------------|-------------------|-------------------|---------------|---------------|-----------------|
| A1         | 50         | 70         | 100               | 130               | 165           | 215           | 250             |
| A2         | 4.5        | 5.5        | 6.8               | 9                 | 11            | 13            | 17              |
| A3         | 13         | 16         | 22                | 32                | 40            | 55            | 75              |
| A4         | 35         | 50         | 80                | 110               | 130           | 160           | 180             |
| A5         | 5          | 7          | 9, 23.5           | 9, 23.5           | 10            | 9.5           | 14, 16          |
| A6         | M4 x P0.7  | M5 x P0.8  | M8 x P1.25        | M10 x P1.5        | M12 x P1.75   | M14 x P2.0    | M16xP2.0        |
| A7         | 5          | 5          | 6                 | 10                | 12            | 16            | 20              |
| A8         | 15         | 18         | 24.5              | 35                | 43            | 59            | 79.5            |
| B1         | 44         | 62         | 90                | 120               | 142           | 180           | 220             |
| B2         | 26         | 36         | 48                | 65                | 92            | 106           | 139             |
| B3         | 5          | 7          | 10                | 12                | 15            | 20            | 30              |
| B4         | 15         | 20         | 30                | 40                | 65            | 70            | 90              |
| B5         | 20         | 28         | 36                | 50                | 74            | 82            | 104             |
| B6         | 5          | 8          | 10                | 12                | 15            | 16            | 20              |
| B7         | 67.5       | 87.5       | 118               | 145               | 175           | 207           | 237             |
| B8         | 99.5       | 128        | 175               | 215               | 260           | 307           | 360             |
| B9         | 125.5      | 164        | 223               | 280               | 352           | 413           | 499             |
| C1         | 46, 60, 63 | 70, 75, 90 | 90, 100, 115, 145 | 90, 100, 115, 145 | 115, 145, 165 | 145, 165, 215 | 200, 215, 265   |
| C2         | M3, M4, M5 | M4, M5, M6 | M5, M6, M8        | M5, M6, M8        | M6, M8, M10   | M8, M10, M12  | M10, M12, M16   |
| C3         | 8, 11      | 14         | 19, 24            | 22, 24            | 28, 32, 35    | 35, 38        | 42, 48, 55      |
| C4         | 26         | 36         | 51, 65.5          | 51, 65.5          | 68            | 84.5          | 117, 119        |
| C5         | 30, 40, 50 | 50, 60, 70 | 70, 80, 95, 110   | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180 | 114.3, 180, 230 |
| C6         | M4 x P0.7  | M5 x P0.8  | M6 x P1.0         | M6 x P1.0         | M8 x P1.25    | M10 x P1.5    | M10xP1.5        |
| C7         | 42         | 64, 70, 80 | 92, 110, 130      | 92, 110, 130      | 122, 130, 150 | 146, 150, 190 | 182, 200, 250   |
| C8         | 57         | 77         | 103, 117          | 122, 136          | 154           | 189           | 252, 254        |
| C9         | 82         | 110        | 148, 162          | 182, 196          | 225           | 279           | 362, 364        |
| D1         | 48         | 62         | 88                | 106               | 135           | 164           | 205             |
| D2         | -          | 52         | 72                | 88                | 110           | 134           | 170             |
| D3         | -          | 26         | 36                | 44                | 55            | 67            | 85              |
| D4         | -          | M5 x P0.8  | M6 x P1.0         | M8 x P1.25        | M10 x P1.5    | M12 x P1.75   | M16xP2.0        |



## High Precision Planetary Reducer

### SBT 1-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 44                                                                 | 62        | 90       | 120      | 142      | 180      | 220      |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|----------|----------|----------|----------|----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 3      | 19                                                                 | 59        | 165      | 335      | 625      | 1,206    | 2,030    |
|                                                |            |           | 4      | 16                                                                 | 51        | 146      | 300      | 555      | 1,069    | 1,804    |
|                                                |            |           | 5      | 16                                                                 | 48        | 160      | 333      | 618      | 1,189    | 2,010    |
|                                                |            |           | 6      | 15                                                                 | 45        | 151      | 311      | 583      | 1,118    | 1,911    |
|                                                |            |           | 7      | 15                                                                 | 45        | 149      | 309      | 573      | 1,108    | 1,870    |
|                                                |            |           | 8      | 14                                                                 | 43        | 143      | 298      | 553      | 1,070    | 1,824    |
|                                                |            |           | 9      | 13                                                                 | 44        | 145      | 278      | 516      | 993      | 1,694    |
|                                                |            |           | 10     | 16                                                                 | 48        | 160      | 333      | 618      | 1,189    | 1,779    |
|                                                |            |           | 15     | 16                                                                 | 48        | 160      | 333      | 618      | 1,189    | 2,030    |
|                                                |            |           | 20     | 16                                                                 | 48        | 160      | 333      | 618      | 1,189    | 1,804    |
|                                                |            |           | 25     | 16                                                                 | 48        | 160      | 333      | 618      | 1,189    | 2,010    |
|                                                |            |           | 30     | 15                                                                 | 45        | 151      | 311      | 583      | 1,118    | 1,911    |
|                                                |            |           | 35     | 15                                                                 | 45        | 149      | 309      | 573      | 1,108    | 1,870    |
|                                                |            |           | 40     | 14                                                                 | 43        | 143      | 298      | 553      | 1,070    | 1,824    |
|                                                |            |           | 45     | 13                                                                 | 44        | 145      | 278      | 516      | 993      | 1,694    |
|                                                |            |           | 50     | 14                                                                 | 43        | 141      | 294      | 549      | 1,059    | 1,779    |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 3 ~ 50 | 1.8 Times of Rated Output Torque                                   |           |          |          |          |          |          |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 3 ~ 50 | 3 Times of Rated Output Torque                                     |           |          |          |          |          |          |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 3 ~ 50 | 3,000                                                              | 3,000     | 3,000    | 2,500    | 2,500    | 2,000    | 2,000    |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 3 ~ 50 | 6,000                                                              | 6,000     | 5,500    | 4,500    | 3,500    | 3,000    | 3,000    |
| Backlash Ps                                    |            | arcmin    | 3 ~ 50 | -                                                                  | -         | $\leq 2$ | $\leq 2$ | $\leq 2$ | $\leq 2$ | $\leq 2$ |
| Backlash P0                                    |            | arcmin    | 3 ~ 50 | $\leq 4$                                                           | $\leq 4$  | $\leq 4$ | $\leq 4$ | $\leq 4$ | $\leq 4$ | $\leq 4$ |
| Backlash P1                                    |            | arcmin    | 3 ~ 50 | $\leq 6$                                                           | $\leq 6$  | $\leq 6$ | $\leq 6$ | $\leq 6$ | $\leq 6$ | $\leq 6$ |
| Backlash P2                                    |            | arcmin    | 3 ~ 50 | $\leq 8$                                                           | $\leq 8$  | $\leq 8$ | $\leq 8$ | $\leq 8$ | $\leq 8$ | $\leq 8$ |
| Torsional Rigidity                             |            | Nm/arcmin | 3 ~ 50 | 3                                                                  | 6         | 14       | 27       | 60       | 140      | 240      |
| Max. Radial Force                              | $F_{2rB}$  | N         | 3 ~ 50 | 380                                                                | 1,180     | 3,200    | 6,800    | 9,300    | 15,600   | 51,000   |
| Max. Axial Force                               | $F_{2aB}$  | N         | 3 ~ 50 | 190                                                                | 590       | 1,600    | 3,400    | 4,650    | 7,800    | 25,500   |
| Service Life                                   | $L_H$      | hr        | 3 ~ 50 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |          |          |          |          |          |
| Efficiency                                     | $\eta$     | %         | 3 ~ 50 | $\geq 95$                                                          |           |          |          |          |          |          |
| Operating Temperature                          |            | °C        | 3 ~ 50 | -25° C ~ + 90° C                                                   |           |          |          |          |          |          |
| Lubrication                                    |            |           | 3 ~ 50 | Synthetic Grease                                                   |           |          |          |          |          |          |
| Protection Class                               |            |           | 3 ~ 50 | IP65                                                               |           |          |          |          |          |          |
| Mounting Position                              |            |           | 3 ~ 50 | Any                                                                |           |          |          |          |          |          |
| Noise Level                                    |            | dB        | 3 ~ 50 | $\leq 65$                                                          | $\leq 68$ | $< 70$   | $< 72$   | $< 74$   | $< 76$   | $< 76$   |
| Weight $\pm 3\%$                               |            | Kg        | 3 ~ 50 | 1.2                                                                | 2.2       |          |          |          |          |          |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 44   | 62   | 90   | 120  | 142  | 180  | 220 |
|-------|------|------|------|------|------|------|-----|
| 3     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135 |
| 4     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135 |
| 5     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135 |
| 6     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135 |
| 7     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135 |
| 8     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135 |
| 9     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135 |
| 10    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135 |
| 15    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61.3 | 135 |
| 20    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61.3 | 135 |
| 25    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61.3 | 135 |
| 30    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61.3 | 135 |
| 35    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61.3 | 135 |
| 40    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61.3 | 135 |
| 45    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61.3 | 135 |
| 50    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61.3 | 135 |

#### ■ SBT Models PB / ST / Input Flange Table

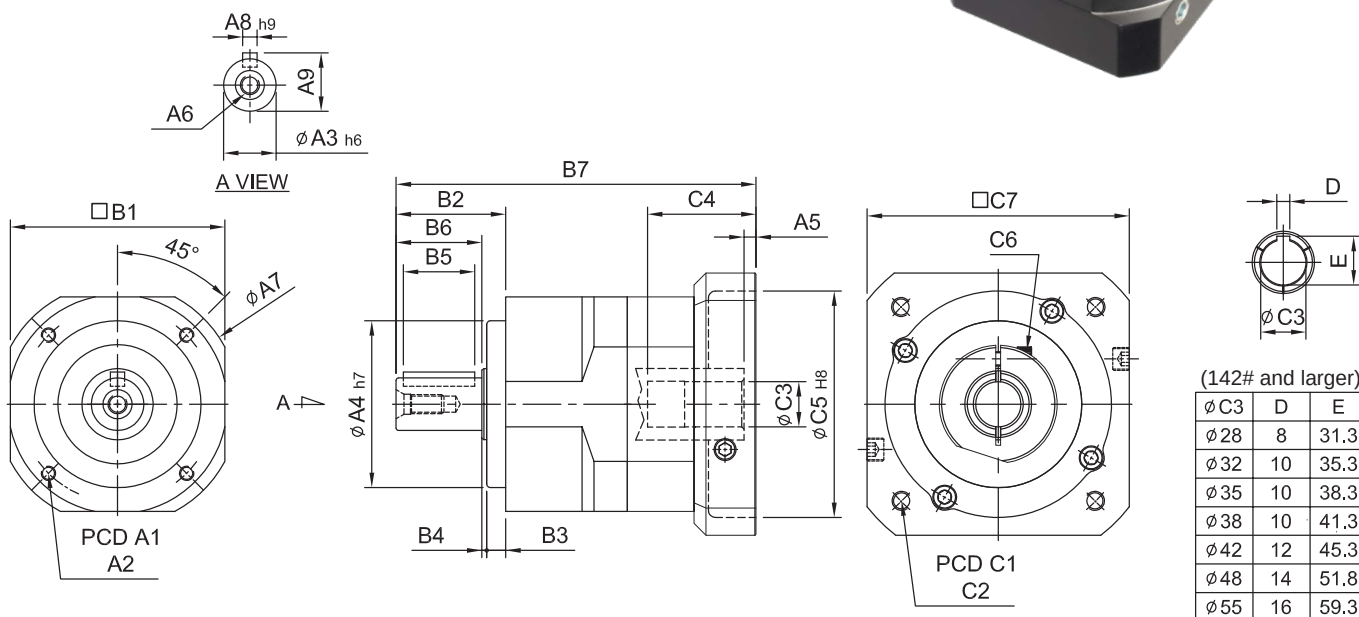
| Model | Ratio                                                         | Flange Model | Bevel Gear Reducer Model |
|-------|---------------------------------------------------------------|--------------|--------------------------|
| 44    | 3, 4, 5, 6, 7<br>8, 9, 10, 15, 20<br>25, 30, 35, 40<br>45, 50 | 044          | -                        |
| 62    |                                                               | 062          | ST65                     |
| 90    |                                                               | 090          | ST90                     |
| 120   |                                                               | 090          | ST110                    |
| 142   |                                                               | 120          | ST140                    |
| 180   |                                                               | 142          | ST170                    |
| 220   |                                                               | 180          | ST210                    |

# SERVOBOX Planetary Reducers

## SE Series

1-Stage

RATIO : 3, 4, 5, 6, 7, 8, 9, 10

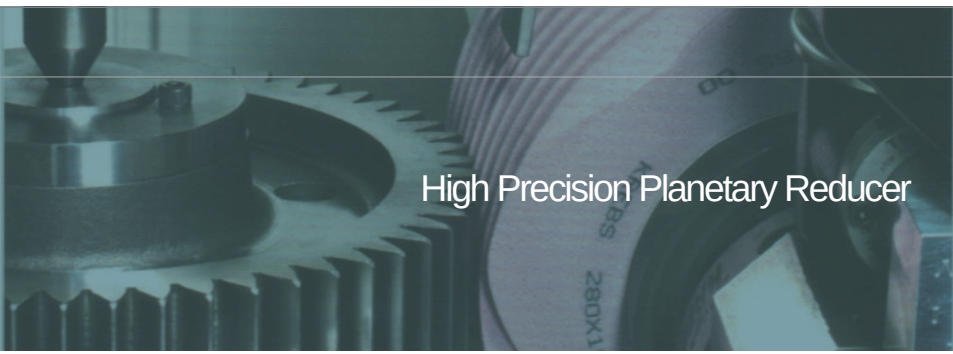


(142# and larger)

| Ø C3 | D  | E    |
|------|----|------|
| Ø 28 | 8  | 31.3 |
| Ø 32 | 10 | 35.3 |
| Ø 35 | 10 | 38.3 |
| Ø 38 | 10 | 41.3 |
| Ø 42 | 12 | 45.3 |
| Ø 48 | 14 | 51.8 |
| Ø 55 | 16 | 59.3 |

unit: mm

| Model Code | 44             | 62             | 90                | 120            | 142            | 180                  | 220             |
|------------|----------------|----------------|-------------------|----------------|----------------|----------------------|-----------------|
| <b>A</b>   |                |                |                   |                |                |                      |                 |
| A1         | 44             | 62             | 82                | 110            | 140            | 184                  | 218             |
| A2         | M4 x P0.7      | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     | M12 x P1.75          | M16 x P2.0      |
| A3         | 13             | 16             | 22                | 32             | 40             | 55                   | 75              |
| A4         | 35             | 50             | 70                | 90             | 120            | 160                  | 180             |
| A5         | 5              | 6              | 9, 23.5           | 10, 20         | 10             | 11.5, 14.5           | 12.5, 14.5      |
| A6         | M4 x P0.7      | M5 x P0.8      | M8 x P1.25        | M10 x P1.5     | M12 x P1.75    | M14 x P2.0           | M16 x P2.0      |
| A7         | 50             | 70             | 102               | 134            | 166            | 215                  | 252             |
| A8         | 5              | 5              | 6                 | 10             | 12             | 16                   | 20              |
| A9         | 15             | 18             | 24.5              | 35             | 43             | 59                   | 79.5            |
| <b>B</b>   |                |                |                   |                |                |                      |                 |
| B1         | 44             | 62             | 90                | 120            | 142            | 180                  | 220             |
| B2         | 26             | 36             | 46                | 65             | 92             | 106                  | 139             |
| B3         | 5              | 7              | 8                 | 12             | 15             | 20                   | 30              |
| B4         | 1              | 1              | 2                 | 3              | 3              | 4                    | 5               |
| B5         | 15             | 20             | 30                | 40             | 65             | 70                   | 90              |
| B6         | 20             | 28             | 36                | 50             | 74             | 82                   | 104             |
| B7         | 95             | 115, 123       | 164.5, 179        | 205, 215       | 260.5          | 323.5, 326.5         | 367.5           |
| <b>C</b>   |                |                |                   |                |                |                      |                 |
| C1         | 46, 60, 63, 90 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215  | 200, 215, 265, 300   | 200, 265, 300   |
| C2         | M3, M4, M5     | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   | M10, M12             | M12, M16        |
| C3         | 8, 9, 11       | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 | 35, 38, 42, 48, 55   | 38, 42, 48, 55  |
| C4         | 26, 30.5       | 33.5, 41.5     | 59, 73.5          | 67, 77         | 84.5           | 114.5, 117.5         | 117.5, 119.5    |
| C5         | 30, 40, 50     | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  | 114.3, 180, 230, 250 | 114.3, 230, 250 |
| C6         | M4 x P0.7      | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     | M10 x P1.5           | M10 x P1.5      |
| C7         | 46, 55         | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  | 182, 200, 250, 265   | 222, 250, 265   |



## High Precision Planetary Reducer

### SE 1-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 44                                                                 | 62        | 90        | 120       | 142       | 180       | 220       |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 3      | 19                                                                 | 59        | 165       | 335       | 625       | 1,206     | 2,030     |
|                                                |            |           | 4      | 16                                                                 | 51        | 146       | 300       | 555       | 1,069     | 1,804     |
|                                                |            |           | 5      | 16                                                                 | 48        | 160       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 6      | 15                                                                 | 45        | 151       | 311       | 583       | 1,118     | 1,911     |
|                                                |            |           | 7      | 15                                                                 | 45        | 149       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 8      | 14                                                                 | 43        | 143       | 298       | 553       | 1,070     | 1,824     |
|                                                |            |           | 9      | 13                                                                 | 44        | 145       | 278       | 516       | 993       | 1,694     |
|                                                |            |           | 10     | 14                                                                 | 43        | 141       | 294       | 549       | 1,059     | 1,779     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 3 ~ 10 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 3 ~ 10 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 3 ~ 10 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 3 ~ 10 | 6,000                                                              | 6,000     | 6,000     | 5,000     | 5,000     | 4,000     | 3,000     |
| Backlash Ps                                    |            | arcmin    | 3 ~ 10 | -                                                                  | -         | $\leq 1$  | $\leq 1$  | $\leq 1$  | $\leq 1$  | $\leq 1$  |
| Backlash P0                                    |            | arcmin    | 3 ~ 10 | $\leq 3$                                                           | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  |
| Backlash P1                                    |            | arcmin    | 3 ~ 10 | $\leq 5$                                                           | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  |
| Backlash P2                                    |            | arcmin    | 3 ~ 10 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Torsional Rigidity                             |            | Nm/arcmin | 3 ~ 10 | 3                                                                  | 6         | 14        | 27        | 60        | 140       | 240       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 3 ~ 10 | 380                                                                | 1,180     | 3,200     | 6,800     | 9,300     | 15,600    | 51,000    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 3 ~ 10 | 190                                                                | 590       | 1,600     | 3,400     | 4,650     | 7,800     | 25,500    |
| Service Life                                   | $L_H$      | hr        | 3 ~ 10 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 3 ~ 10 | $\geq 97$                                                          |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 3 ~ 10 | - 25° C ~ + 90° C                                                  |           |           |           |           |           |           |
| Lubrication                                    |            |           | 3 ~ 10 | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 3 ~ 10 | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 3 ~ 10 | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 3 ~ 10 | $\leq 56$                                                          | $\leq 58$ | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ | $\leq 70$ |
| Weight $\pm 3\%$                               |            | Kg        | 3 ~ 10 | 0.58                                                               | 1.32      | 3.4       | 7.88      | 14        | 29.16     | 39        |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

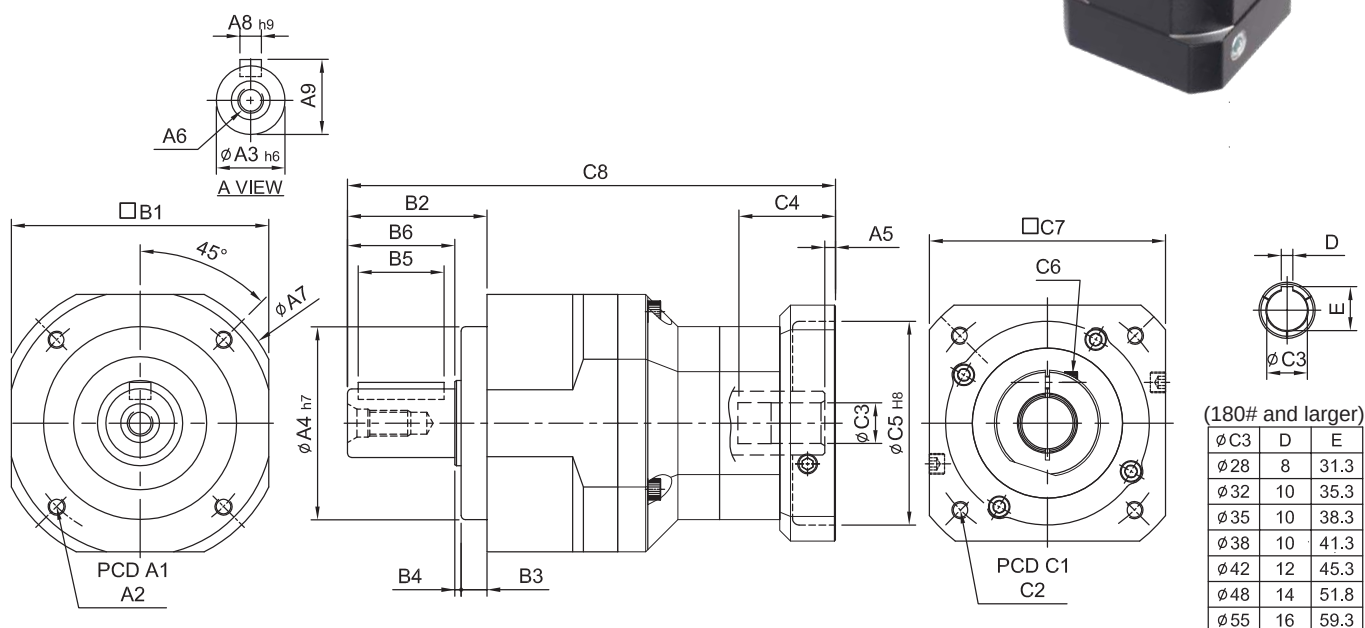
| Ratio | 44   | 62   | 90   | 120  | 142  | 180   | 220   |
|-------|------|------|------|------|------|-------|-------|
| 3     | 0.03 | 0.16 | 0.61 | 3.25 | 9.21 | 28.98 | 69.61 |
| 4     | 0.03 | 0.14 | 0.48 | 2.74 | 7.54 | 23.67 | 54.37 |
| 5     | 0.03 | 0.13 | 0.47 | 2.71 | 7.42 | 23.29 | 53.27 |
| 6     | 0.03 | 0.13 | 0.45 | 2.65 | 7.25 | 22.75 | 51.72 |
| 7     | 0.03 | 0.13 | 0.45 | 2.62 | 7.14 | 22.48 | 50.97 |
| 8     | 0.03 | 0.13 | 0.44 | 2.58 | 7.07 | 22.59 | 50.84 |
| 9     | 0.03 | 0.13 | 0.44 | 2.57 | 7.04 | 22.53 | 50.63 |
| 10    | 0.03 | 0.13 | 0.44 | 2.57 | 7.03 | 22.51 | 50.56 |

# SERVOBOX Planetary Reducers

## SE Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100

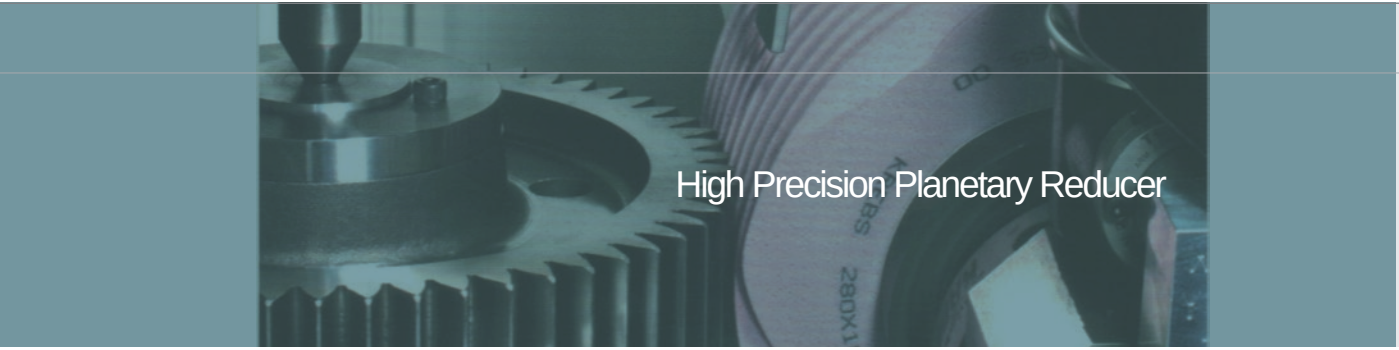


(180# and larger)

| Ø C3 | D  | E    |
|------|----|------|
| Ø 28 | 8  | 31.3 |
| Ø 32 | 10 | 35.3 |
| Ø 35 | 10 | 38.3 |
| Ø 38 | 10 | 41.3 |
| Ø 42 | 12 | 45.3 |
| Ø 48 | 14 | 51.8 |
| Ø 55 | 16 | 59.3 |

unit: mm

| Model Code | 62         | 90             | 120               | 142            | 180            | 220                |
|------------|------------|----------------|-------------------|----------------|----------------|--------------------|
| A1         | 62         | 82             | 110               | 140            | 184            | 218                |
| A2         | M5 x P0.8  | M6 x P1.0      | M8 x P1.25        | M10 x P1.5     | M12 x P1.75    | M16 x P2.0         |
| A3         | 16         | 22             | 32                | 40             | 55             | 75                 |
| A4         | 50         | 70             | 90                | 120            | 160            | 180                |
| A5         | 5          | 6              | 9, 23.5           | 10, 20         | 10             | 11.5, 13.5         |
| A6         | M5 x P0.8  | M8 x P1.25     | M10 x P1.5        | M12 x P1.75    | M14 x P2.0     | M16 x P2.0         |
| A7         | 70         | 102            | 134               | 166            | 215            | 252                |
| A8         | 5          | 6              | 10                | 12             | 16             | 20                 |
| A9         | 18         | 24.5           | 35                | 43             | 59             | 79.5               |
| B1         | 62         | 90             | 120               | 142            | 180            | 220                |
| B2         | 36         | 46             | 65                | 92             | 106            | 139                |
| B3         | 7          | 8              | 12                | 15             | 20             | 30                 |
| B4         | 1          | 2              | 3                 | 3              | 4              | 5                  |
| B5         | 20         | 30             | 40                | 65             | 70             | 90                 |
| B6         | 28         | 36             | 50                | 74             | 82             | 104                |
| C1         | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215  | 200, 215, 265      |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   | M10, M12           |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 | 35, 38, 42, 48, 55 |
| C4         | 26, 30.5   | 33.5, 41.5     | 59, 73.5          | 67, 77         | 84.5           | 114.5, 116.5       |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  | 114.3, 180, 230    |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     | M10 x P1.5         |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  | 182, 200, 250      |
| C8         | 139.5      | 172.5, 180.5   | 241, 255.5        | 298.5, 308.5   | 358.5          | 446.5              |



## High Precision Planetary Reducer

### SE 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 62                                                                 | 90    | 120   | 142   | 180    | 220    |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 59                                                                 | 165   | 335   | 625   | 1,206  | 2,030  |
|                                                |            |           | 20       | 51                                                                 | 146   | 300   | 555   | 1,069  | 1,804  |
|                                                |            |           | 25       | 48                                                                 | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 30       | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 35       | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 40       | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 50       | 48                                                                 | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 60       | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 70       | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 80       | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 90       | 44                                                                 | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 100      | 43                                                                 | 141   | 294   | 549   | 1,059  | 1,779  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 100 | 1.8 Times of Rated Output Torque                                   |       |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 100 | 3 Times of Rated Output Torque                                     |       |       |       |        |        |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 100 | 3,000                                                              | 3,000 | 3,000 | 3,000 | 3,000  | 2,000  |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 100 | 6,000                                                              | 6,000 | 5,000 | 5,000 | 4,000  | 4,000  |
| Backlash Ps                                    |            | arcmin    | 15 ~ 100 | -                                                                  | -     | ≤ 3   | ≤ 3   | ≤ 3    | ≤ 3    |
| Backlash P0                                    |            | arcmin    | 15 ~ 100 | ≤ 5                                                                | ≤ 5   | ≤ 5   | ≤ 5   | ≤ 5    | ≤ 5    |
| Backlash P1                                    |            | arcmin    | 15 ~ 100 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    |
| Backlash P2                                    |            | arcmin    | 15 ~ 100 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 100 | 6                                                                  | 14    | 27    | 60    | 140    | 240    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 100 | 1,180                                                              | 3,200 | 6,800 | 9,300 | 15,600 | 51,000 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 100 | 590                                                                | 1,600 | 3,400 | 4,650 | 7,800  | 25,500 |
| Service Life                                   | $L_H$      | hr        | 15 ~ 100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 15 ~ 100 | ≥ 94                                                               |       |       |       |        |        |
| Operating Temperature                          |            | °C        | 15 ~ 100 | - 25° C ~ + 90° C                                                  |       |       |       |        |        |
| Lubrication                                    |            |           | 15 ~ 100 | Synthetic Grease                                                   |       |       |       |        |        |
| Protection Class                               |            |           | 15 ~ 100 | IP65                                                               |       |       |       |        |        |
| Mounting Position                              |            |           | 15 ~ 100 | Any                                                                |       |       |       |        |        |
| Noise Level                                    |            | dB        | 15 ~ 100 | ≤ 58                                                               | ≤ 60  | ≤ 63  | ≤ 65  | ≤ 67   | ≤ 70   |
| Weight ±3%                                     |            | Kg        | 15 ~ 100 | 1.68                                                               | 4.4   | 9.3   | 15.5  | 34.8   | 56.5   |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

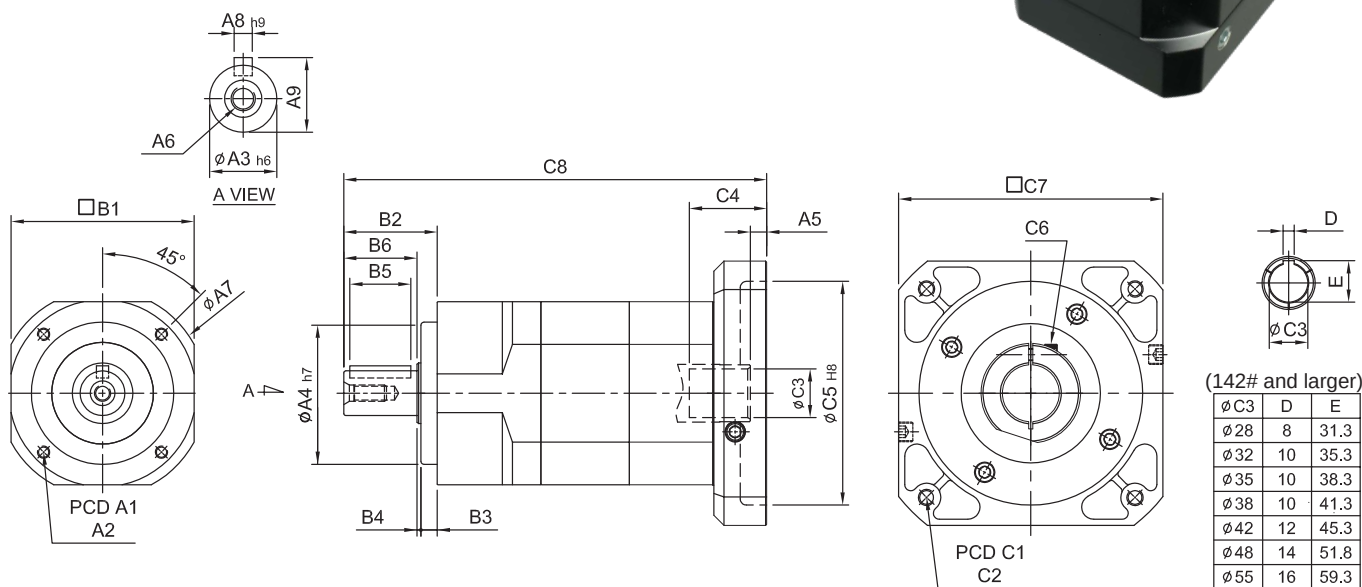
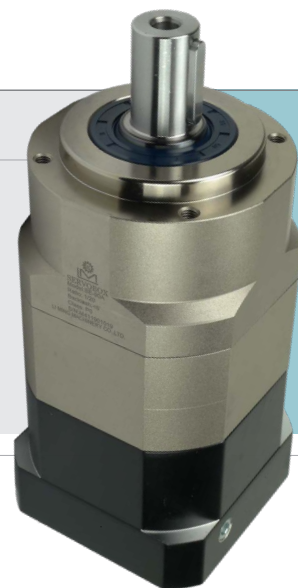
| Ratio | 62   | 90   | 120  | 142  | 180  | 220   |
|-------|------|------|------|------|------|-------|
| 15    | 0.03 | 0.14 | 0.46 | 2.63 | 7.3  | 22.79 |
| 20    | 0.03 | 0.14 | 0.46 | 2.63 | 7.3  | 22.79 |
| 25    | 0.03 | 0.14 | 0.46 | 2.63 | 7.1  | 22.79 |
| 30    | 0.03 | 0.14 | 0.46 | 2.43 | 7.1  | 22.59 |
| 35    | 0.03 | 0.14 | 0.44 | 2.43 | 7.1  | 22.59 |
| 40    | 0.03 | 0.14 | 0.44 | 2.43 | 6.92 | 22.59 |
| 50    | 0.03 | 0.14 | 0.44 | 2.43 | 6.92 | 22.59 |
| 60    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 |
| 70    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 |
| 80    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 |
| 90    | 0.03 | 0.14 | 0.40 | 2.39 | 6.72 | 21.60 |
| 100   | 0.03 | 0.14 | 0.40 | 2.39 | 6.72 | 21.60 |

# SERVOBOX Planetary Reducers

## SE-A Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100

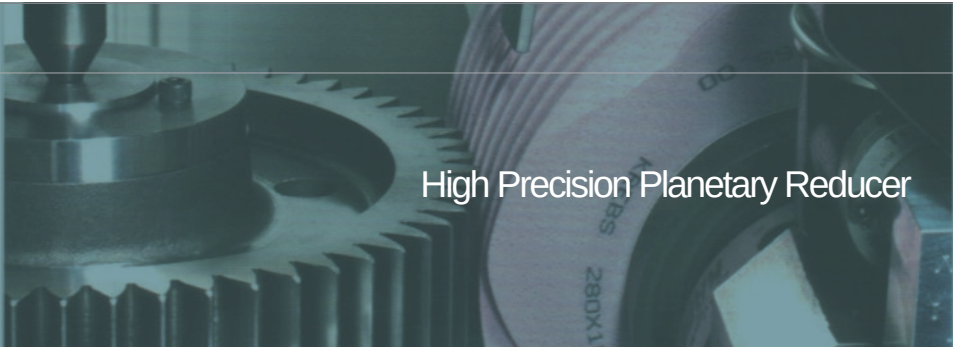


(142# and larger)

| ø C3 | D  | E    |
|------|----|------|
| ø 28 | 8  | 31.3 |
| ø 32 | 10 | 35.3 |
| ø 35 | 10 | 38.3 |
| ø 38 | 10 | 41.3 |
| ø 42 | 12 | 45.3 |
| ø 48 | 14 | 51.8 |
| ø 55 | 16 | 59.3 |

unit: mm

| Model Code | 44A        | 62A            | 90A               | 120A           | 142A           | 180A               | 220A            |
|------------|------------|----------------|-------------------|----------------|----------------|--------------------|-----------------|
| A1         | 44         | 62             | 82                | 110            | 140            | 184                | 218             |
| A2         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     | M12 x P1.75        | M16 x P2.0      |
| A3         | 13         | 16             | 22                | 32             | 40             | 55                 | 75              |
| A4         | 35         | 50             | 70                | 90             | 120            | 160                | 180             |
| A5         | 5          | 6              | 9, 23.5           | 10, 20         | 10             | 11.5, 13.5         | 12.5, 14.5      |
| A6         | M4 x P0.7  | M5 x P0.8      | M8 x P1.25        | M10 x P1.5     | M12 x P1.75    | M14 x P2.0         | M16 x P2.0      |
| A7         | 50         | 70             | 102               | 134            | 166            | 215                | 252             |
| A8         | 5          | 5              | 6                 | 10             | 12             | 16                 | 20              |
| A9         | 15         | 18             | 24.5              | 35             | 43             | 59                 | 79.5            |
| B1         | 44         | 62             | 90                | 120            | 142            | 180                | 220             |
| B2         | 26         | 36             | 46                | 65             | 92             | 106                | 139             |
| B3         | 5          | 7              | 8                 | 12             | 15             | 20                 | 30              |
| B4         | 1          | 1              | 2                 | 3              | 3              | 4                  | 5               |
| B5         | 15         | 20             | 30                | 40             | 65             | 70                 | 90              |
| B6         | 20         | 28             | 36                | 50             | 74             | 82                 | 104             |
| C1         | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215  | 200, 215, 265      | 200, 265, 300   |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   | M10, M12           | M12, M16        |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
| C4         | 26, 30.5   | 33.5           | 59, 73.5          | 67, 77         | 84.5           | 114.5, 116.5       | 117.5, 119.5    |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  | 114.3, 180, 230    | 114.3, 230, 250 |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     | M10 x P1.5         | M10 x P1.5      |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  | 182, 200, 250      | 222, 250, 265   |
| C8         | 121        | 148.8          | 208, 222.5        | 261, 271       | 327            | 404.5              | 460.5           |



## High Precision Planetary Reducer

### SE-A 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 44A                                                                | 62A       | 90A       | 120A      | 142A      | 180A      | 220A      |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 19                                                                 | 59        | 165       | 335       | 625       | 1,206     | 2,030     |
|                                                |            |           | 20       | 16                                                                 | 51        | 146       | 300       | 555       | 1,069     | 1,804     |
|                                                |            |           | 25       | 16                                                                 | 48        | 160       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 30       | 15                                                                 | 45        | 151       | 311       | 583       | 1,118     | 1,911     |
|                                                |            |           | 35       | 15                                                                 | 45        | 149       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 40       | 14                                                                 | 43        | 143       | 298       | 553       | 1,070     | 1,824     |
|                                                |            |           | 50       | 16                                                                 | 48        | 160       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 60       | 15                                                                 | 45        | 151       | 311       | 583       | 1,118     | 1,911     |
|                                                |            |           | 70       | 15                                                                 | 45        | 149       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 80       | 14                                                                 | 43        | 143       | 298       | 553       | 1,070     | 1,824     |
|                                                |            |           | 90       | 13                                                                 | 44        | 145       | 278       | 516       | 993       | 1,694     |
|                                                |            |           | 100      | 14                                                                 | 43        | 141       | 294       | 549       | 1,059     | 1,779     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 100 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 100 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 100 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 100 | 6,000                                                              | 6,000     | 6,000     | 5,000     | 5,000     | 4,000     | 3,000     |
| Backlash Ps                                    |            | arcmin    | 15 ~ 100 | -                                                                  | -         | -         | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  |
| Backlash P0                                    |            | arcmin    | 15 ~ 100 | $\leq 5$                                                           | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  |
| Backlash P1                                    |            | arcmin    | 15 ~ 100 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Backlash P2                                    |            | arcmin    | 15 ~ 100 | $\leq 9$                                                           | $\leq 9$  | $\leq 9$  | $\leq 9$  | $\leq 9$  | $\leq 9$  | $\leq 9$  |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 100 | 3                                                                  | 6         | 14        | 27        | 60        | 140       | 240       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 100 | 380                                                                | 1,180     | 3,200     | 6,800     | 9,300     | 15,600    | 51,000    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 100 | 190                                                                | 590       | 1,600     | 3,400     | 4,650     | 7,800     | 25,500    |
| Service Life                                   | $L_H$      | hr        | 15 ~ 100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 15 ~ 100 | $\geq 94$                                                          |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 15 ~ 100 | - 25° C ~ + 90° C                                                  |           |           |           |           |           |           |
| Lubrication                                    |            |           | 15 ~ 100 | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 15 ~ 100 | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 15 ~ 100 | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 15 ~ 100 | $\leq 56$                                                          | $\leq 58$ | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ | $\leq 70$ |
| Weight $\pm 3\%$                               |            | Kg        | 15 ~ 100 | 0.9                                                                | 2         | 6         | 10.2      | 22.5      | 42        | 59        |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

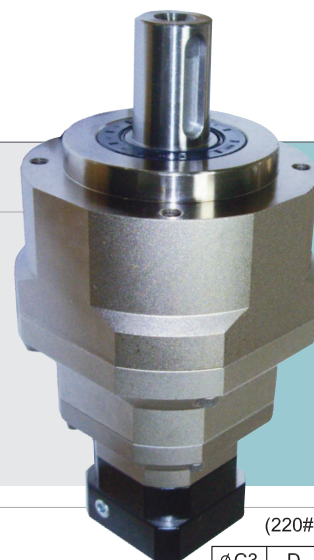
| Ratio | 44A  | 62A  | 90A  | 120A | 142A | 180A  | 220A  |
|-------|------|------|------|------|------|-------|-------|
| 15    | 0.03 | 0.14 | 0.46 | 2.63 | 7.30 | 22.79 | 56.98 |
| 20    | 0.03 | 0.14 | 0.46 | 2.63 | 7.30 | 22.79 | 56.98 |
| 25    | 0.03 | 0.14 | 0.46 | 2.63 | 7.10 | 22.79 | 56.98 |
| 30    | 0.03 | 0.14 | 0.46 | 2.43 | 7.10 | 22.59 | 56.48 |
| 35    | 0.03 | 0.14 | 0.44 | 2.43 | 7.10 | 22.59 | 56.48 |
| 40    | 0.03 | 0.14 | 0.44 | 2.43 | 6.92 | 22.59 | 56.48 |
| 50    | 0.03 | 0.14 | 0.44 | 2.39 | 6.92 | 22.59 | 56.48 |
| 60    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 | 54.58 |
| 70    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 | 54.58 |
| 80    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 | 54.58 |
| 90    | 0.03 | 0.14 | 0.40 | 2.39 | 6.72 | 21.60 | 54.00 |
| 100   | 0.03 | 0.14 | 0.40 | 2.39 | 6.72 | 21.60 | 54.00 |

# SERVOBX Planetary Reducers

## SE Series

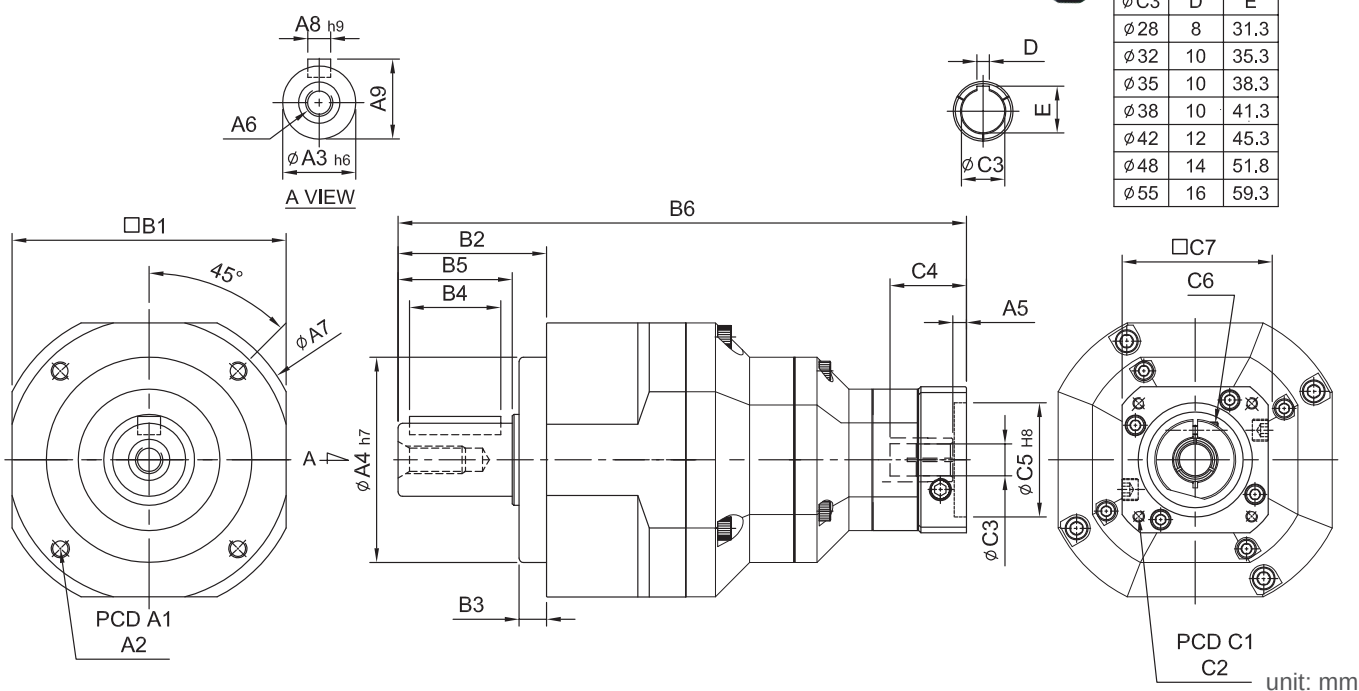
3-Stage

RATIO : 125, 150, 175, 200, 250, 300, 350,  
400, 450, 500, 600, 700, 800, 900, 1000



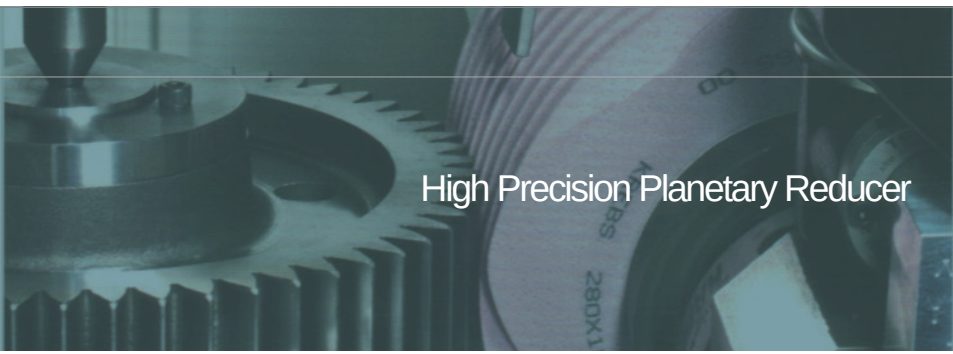
(220#)

| Ø C3 | D  | E    |
|------|----|------|
| Ø 28 | 8  | 31.3 |
| Ø 32 | 10 | 35.3 |
| Ø 35 | 10 | 38.3 |
| Ø 38 | 10 | 41.3 |
| Ø 42 | 12 | 45.3 |
| Ø 48 | 14 | 51.8 |
| Ø 55 | 16 | 59.3 |



unit: mm

| Model Code | 90         | 120            | 142               | 180            | 220            |
|------------|------------|----------------|-------------------|----------------|----------------|
| A1         | 82         | 110            | 140               | 184            | 218            |
| A2         | M6 x P1.0  | M8 x P1.25     | M10 x P1.5        | M12 x P1.75    | M16 x P2.0     |
| A3         | 22         | 32             | 40                | 55             | 75             |
| A4         | 70         | 90             | 120               | 160            | 180            |
| A5         | 5          | 6              | 9, 23.5           | 10, 20         | 10             |
| A6         | M8 x P1.25 | M10 x P1.5     | M12 x P1.75       | M14 x P2.0     | M16 x P2.0     |
| A7         | 102        | 134            | 166               | 215            | 252            |
| A8         | 6          | 10             | 12                | 16             | 20             |
| A9         | 24.5       | 35             | 43                | 59             | 79.5           |
| B1         | 90         | 120            | 142               | 180            | 220            |
| B2         | 46         | 65             | 92                | 106            | 139            |
| B3         | 8          | 12             | 15                | 20             | 30             |
| B4         | 30         | 40             | 65                | 70             | 90             |
| B5         | 36         | 50             | 74                | 82             | 104            |
| B6         | 195        | 249, 257       | 334.5, 349        | 396.5, 406.5   | 481.5          |
| C1         | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215  |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 |
| C4         | 26, 30.5   | 33.5, 41.5     | 59, 73.5          | 67, 77         | 84.5           |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  |



## High Precision Planetary Reducer

### SE 3-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio      | 90                                                                 | 120   | 142   | 180    | 220    |
|------------------------------------------------|------------|-----------|------------|--------------------------------------------------------------------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 125        | 160                                                                | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 150        | 165                                                                | 335   | 625   | 1,206  | 2,030  |
|                                                |            |           | 175        | 149                                                                | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 200        | 146                                                                | 300   | 555   | 1,069  | 1,804  |
|                                                |            |           | 250        | 160                                                                | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 300        | 151                                                                | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 350        | 149                                                                | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 400        | 143                                                                | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 450        | 145                                                                | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 500        | 160                                                                | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 600        | 151                                                                | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 700        | 149                                                                | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 800        | 143                                                                | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 900        | 145                                                                | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 1000       | 141                                                                | 294   | 549   | 1,059  | 1,779  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 125 ~ 1000 | 1.8 Times of Rated Output Torque                                   |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 125 ~ 1000 | 3 Times of Rated Output Torque                                     |       |       |        |        |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 125 ~ 1000 | 3,000                                                              | 3,000 | 3,000 | 3,000  | 2,000  |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 125 ~ 1000 | 6,000                                                              | 5,000 | 5,000 | 4,000  | 3,000  |
| Backlash Ps                                    |            | arcmin    | 125 ~ 1000 | -                                                                  | ≤ 5   | ≤ 5   | ≤ 5    | ≤ 5    |
| Backlash P0                                    |            | arcmin    | 125 ~ 1000 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    |
| Backlash P1                                    |            | arcmin    | 125 ~ 1000 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    |
| Backlash P2                                    |            | arcmin    | 125 ~ 1000 | ≤ 11                                                               | ≤ 11  | ≤ 11  | ≤ 11   | ≤ 11   |
| Torsional Rigidity                             |            | Nm/arcmin | 125 ~ 1000 | 14                                                                 | 27    | 60    | 140    | 240    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 125 ~ 1000 | 3,200                                                              | 6,800 | 9,300 | 15,600 | 51,000 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 125 ~ 1000 | 1,600                                                              | 3,400 | 4,650 | 7,800  | 25,500 |
| Service Life                                   | $L_H$      | hr        | 125 ~ 1000 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 125 ~ 1000 | ≥ 90                                                               |       |       |        |        |
| Operating Temperature                          |            | °C        | 125 ~ 1000 | - 25° C ~ + 90° C                                                  |       |       |        |        |
| Lubrication                                    |            |           | 125 ~ 1000 | Synthetic Grease                                                   |       |       |        |        |
| Protection Class                               |            |           | 125 ~ 1000 | IP65                                                               |       |       |        |        |
| Mounting Position                              |            |           | 125 ~ 1000 | Any                                                                |       |       |        |        |
| Noise Level                                    |            | dB        | 125 ~ 1000 | ≤ 60                                                               | ≤ 63  | ≤ 65  | ≤ 67   | ≤ 70   |
| Weight ±3%                                     |            | Kg        | 125 ~ 1000 | 4.9                                                                | 10    | 23    | 47     | 70     |

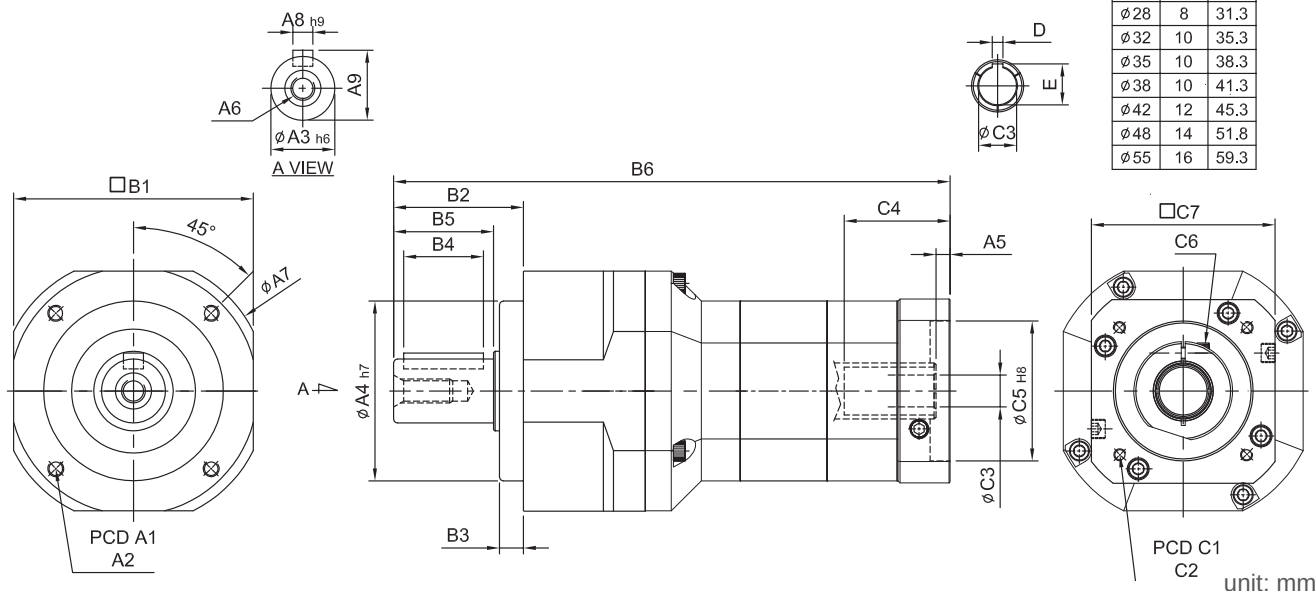
#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 90   | 120  | 142  | 180  | 220  |
|-------|------|------|------|------|------|
| 125   | 0.01 | 0.04 | 0.71 | 1.42 | 3.29 |
| 150   | 0.01 | 0.04 | 0.51 | 0.92 | 2.15 |
| 175   | 0.01 | 0.04 | 0.40 | 0.83 | 1.26 |
| 200   | 0.01 | 0.04 | 0.21 | 0.65 | 0.98 |
| 250   | 0.01 | 0.04 | 0.11 | 0.52 | 0.82 |
| 300   | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 350   | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 400   | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 450   | 0.01 | 0.04 | 0.09 | 0.21 | 0.51 |
| 500   | 0.01 | 0.04 | 0.08 | 0.12 | 0.51 |
| 600   | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 700   | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 800   | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 900   | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 1000  | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |

### 3-Stage

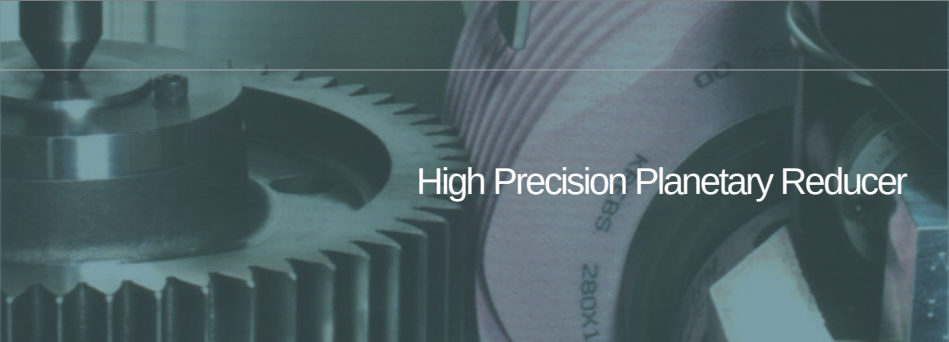
(180# and

| ØC3 | D  | E    |
|-----|----|------|
| Ø28 | 8  | 31.3 |
| Ø32 | 10 | 35.3 |
| Ø35 | 10 | 38.3 |
| Ø38 | 10 | 41.3 |
| Ø42 | 12 | 45.3 |
| Ø48 | 14 | 51.8 |
| Ø55 | 16 | 59.3 |



unit: mm

|   | Model Code | Unit: mm   |                |                   |                |                |                    |
|---|------------|------------|----------------|-------------------|----------------|----------------|--------------------|
|   |            | 62A        | 90A            | 120A              | 142A           | 180A           | 220A               |
| A | A1         | 62         | 82             | 110               | 140            | 184            | 218                |
|   | A2         | M5 x P0.8  | M6 x P1.0      | M8 x P1.25        | M10 x P1.5     | M12 x P1.75    | M16 x P2.0         |
|   | A3         | 16         | 22             | 32                | 40             | 55             | 75                 |
|   | A4         | 50         | 70             | 90                | 120            | 160            | 180                |
|   | A5         | 6.5        | 6              | 9, 23.5           | 10, 20         | 10             | 11.5, 13.5         |
|   | A6         | M5 x P0.8  | M8 x P1.25     | M10 x P1.5        | M12 x P1.75    | M14 x P2.0     | M16 x P2.0         |
|   | A7         | 70         | 102            | 134               | 166            | 215            | 252                |
|   | A8         | 5          | 6              | 10                | 12             | 16             | 20                 |
|   | A9         | 18         | 24.5           | 35                | 43             | 59             | 79.5               |
| B | B1         | 62         | 90             | 120               | 142            | 180            | 220                |
|   | B2         | 36         | 46             | 65                | 92             | 106            | 139                |
|   | B3         | 7          | 8              | 12                | 15             | 20             | 30                 |
|   | B4         | 20         | 30             | 40                | 65             | 70             | 90                 |
|   | B5         | 28         | 36             | 50                | 74             | 82             | 104                |
|   | B6         | 165.5      | 204.5, 212.5   | 284.5             | 354.5          | 425            | 527.5              |
| C | C1         | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215  | 200, 215, 265      |
|   | C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   | M10, M12           |
|   | C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 | 35, 38, 42, 48, 55 |
|   | C4         | 26, 30.5   | 33.5, 41.5     | 59, 73.5          | 67, 77         | 84.5           | 114.5, 116.5       |
|   | C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  | 114.3, 180, 230    |
|   | C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     | M10 x P1.5         |
|   | C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  | 182, 200, 250      |



## High Precision Planetary Reducer

### SE-A 3-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio      | 62A                                                                | 90A   | 120A  | 142A  | 180A   | 220A   |
|------------------------------------------------|------------|-----------|------------|--------------------------------------------------------------------|-------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 125        | 48                                                                 | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 150        | 59                                                                 | 165   | 335   | 625   | 1,206  | 2,030  |
|                                                |            |           | 175        | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 200        | 51                                                                 | 146   | 300   | 555   | 1,069  | 1,804  |
|                                                |            |           | 250        | 48                                                                 | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 300        | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 350        | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 400        | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 450        | 44                                                                 | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 500        | 48                                                                 | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 600        | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 700        | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 800        | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 900        | 44                                                                 | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 1000       | 43                                                                 | 141   | 294   | 549   | 1,059  | 1,779  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 125 ~ 1000 | 1.8 Times of Rated Output Torque                                   |       |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 125 ~ 1000 | 3 Times of Rated Output Torque                                     |       |       |       |        |        |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 125 ~ 1000 | 3,000                                                              | 3,000 | 3,000 | 3,000 | 3,000  | 2,000  |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 125 ~ 1000 | 6,000                                                              | 6,000 | 5,000 | 5,000 | 4,000  | 3,000  |
| Backlash Ps                                    |            | arcmin    | 125 ~ 1000 | -                                                                  | -     | ≤ 5   | ≤ 5   | ≤ 5    | ≤ 5    |
| Backlash P0                                    |            | arcmin    | 125 ~ 1000 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    |
| Backlash P1                                    |            | arcmin    | 125 ~ 1000 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    |
| Backlash P2                                    |            | arcmin    | 125 ~ 1000 | ≤ 11                                                               | ≤ 11  | ≤ 11  | ≤ 11  | ≤ 11   | ≤ 11   |
| Torsional Rigidity                             |            | Nm/arcmin | 125 ~ 1000 | 6                                                                  | 14    | 27    | 60    | 140    | 240    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 125 ~ 1000 | 1,180                                                              | 3,200 | 6,800 | 9,300 | 15,600 | 51,000 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 125 ~ 1000 | 590                                                                | 1,600 | 3,400 | 4,650 | 7,800  | 25,500 |
| Service Life                                   | $L_H$      | hr        | 125 ~ 1000 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 125 ~ 1000 | ≥ 90                                                               |       |       |       |        |        |
| Operating Temperature                          |            | °C        | 125 ~ 1000 | - 25° C ~ + 90° C                                                  |       |       |       |        |        |
| Lubrication                                    |            |           | 125 ~ 1000 | Synthetic Grease                                                   |       |       |       |        |        |
| Protection Class                               |            |           | 125 ~ 1000 | IP65                                                               |       |       |       |        |        |
| Mounting Position                              |            |           | 125 ~ 1000 | Any                                                                |       |       |       |        |        |
| Noise Level                                    |            | dB        | 125 ~ 1000 | ≤ 58                                                               | ≤ 60  | ≤ 63  | ≤ 65  | ≤ 67   | ≤ 70   |
| Weight ±3%                                     |            | Kg        | 125 ~ 1000 | 2.5                                                                | 6.5   | 13    | 26    | 56.5   | 86     |

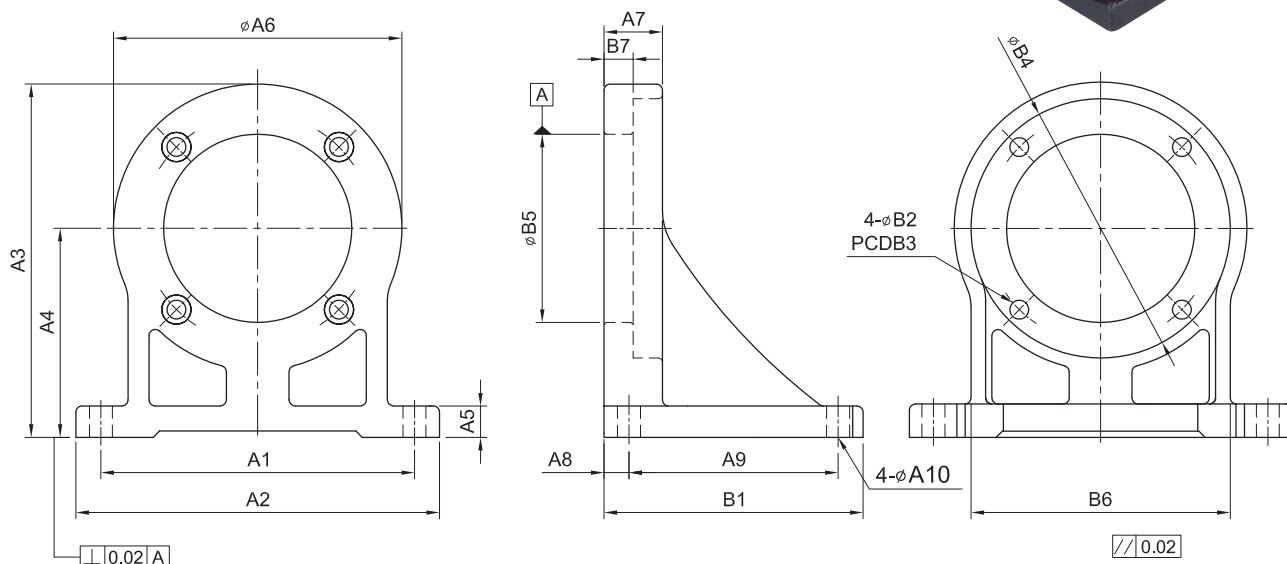
#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 62A  | 90A  | 120A | 142A | 180A | 220A |
|-------|------|------|------|------|------|------|
| 125   | 0.01 | 0.01 | 0.04 | 0.71 | 1.42 | 3.29 |
| 150   | 0.01 | 0.01 | 0.04 | 0.51 | 0.92 | 2.15 |
| 175   | 0.01 | 0.01 | 0.04 | 0.4  | 0.83 | 1.26 |
| 200   | 0.01 | 0.01 | 0.04 | 0.21 | 0.65 | 0.98 |
| 250   | 0.01 | 0.01 | 0.04 | 0.11 | 0.52 | 0.82 |
| 300   | 0.01 | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 350   | 0.01 | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 400   | 0.01 | 0.01 | 0.04 | 0.09 | 0.21 | 0.82 |
| 450   | 0.01 | 0.01 | 0.04 | 0.09 | 0.21 | 0.51 |
| 500   | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.51 |
| 600   | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 700   | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 800   | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 900   | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |
| 1000  | 0.01 | 0.01 | 0.04 | 0.08 | 0.12 | 0.25 |

## SE Series Accessories

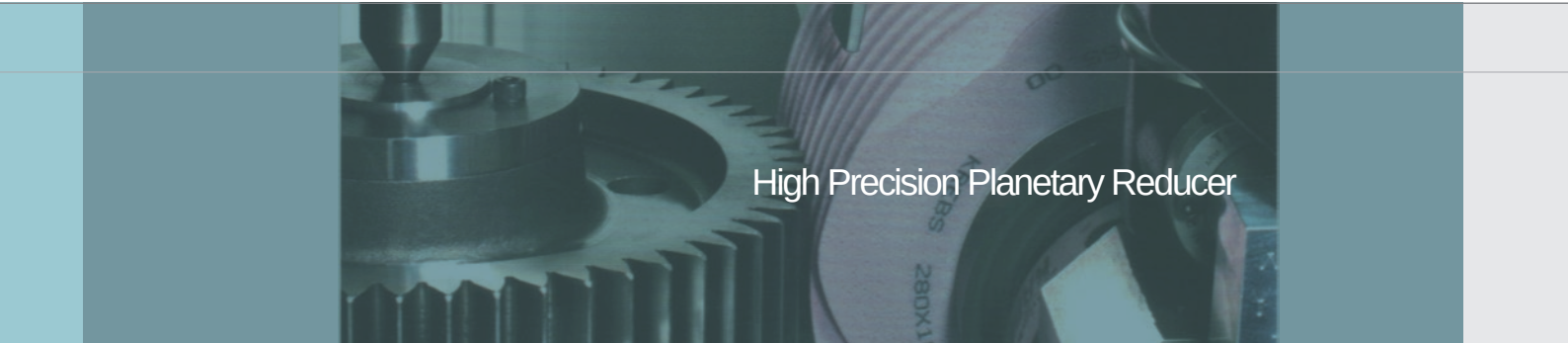


## L Type Base Kit



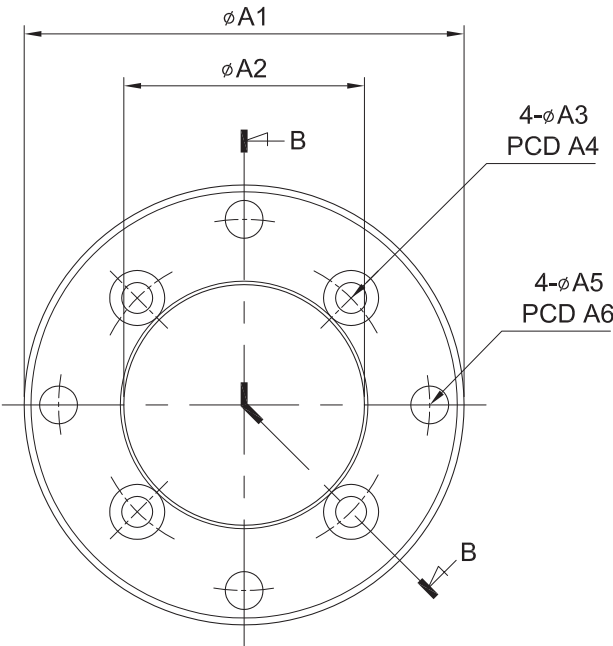
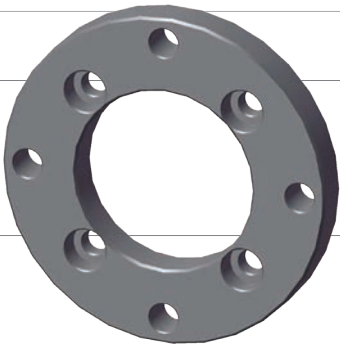
unit: mm

|   | Model Code | 44   | 62   | 90   | 120  | 142   | 180   | 220   |
|---|------------|------|------|------|------|-------|-------|-------|
|   |            |      |      |      |      |       |       |       |
| A | A1         | 70   | 90   | 110  | 150  | 190   | 240   | 280   |
|   | A2         | 88   | 108  | 130  | 176  | 220   | 276   | 330   |
|   | A3         | 75.5 | 95.5 | 127  | 170  | 207.5 | 274   | 334   |
|   | A4         | 45   | 55   | 75   | 100  | 120   | 160   | 200   |
|   | A5         | 8    | 9    | 11   | 16   | 19    | 24    | 30    |
|   | A6         | 60   | 81   | 104  | 140  | 175   | 228   | 268   |
|   | A7         | 13   | 16   | 21   | 28   | 35    | 45    | 60    |
|   | A8         | 10   | 10   | 11   | 14   | 16    | 19    | 26    |
|   | A9         | 40   | 50   | 75   | 100  | 120   | 160   | 200   |
|   | A10        | Ø7   | Ø7   | Ø9   | Ø11  | Ø13   | Ø17   | Ø21   |
| B | B1         | 60   | 70   | 97   | 128  | 152   | 198   | 252   |
|   | B2         | Ø4.5 | Ø5.5 | Ø6.8 | Ø9   | Ø11   | Ø13   | Ø17   |
|   | B3         | 44   | 62   | 82   | 110  | 140   | 184   | 218   |
|   | B4         | 50   | 70   | 92   | 124  | 155   | 205   | 242   |
|   | B5         | 35   | 50   | 70   | 90   | 120   | 160   | 180   |
|   | B6         | 50   | 70   | 90   | 125  | 156   | 200   | 230   |
|   | B7         | 6    | 8    | 9    | 14   | 16    | 21    | 30    |
| C | Kg         |      | 0.71 | 1.57 | 3.86 | 6.41  | 13.44 | 27.73 |



SE-Series Accessories

Front Plate



B-B SECTION

| A | Model Code | 44  | 62  | 90  | 120 | 142 | 180 | 220 |
|---|------------|-----|-----|-----|-----|-----|-----|-----|
|   | A1         | 64  | 88  | 123 | 158 | 188 | 238 | 298 |
|   | A2         | 35  | 50  | 70  | 90  | 120 | 160 | 180 |
|   | A3         | 4.5 | 5.5 | 6.8 | 9   | 11  | 13  | 17  |
|   | A4         | 44  | 62  | 82  | 110 | 140 | 184 | 218 |
|   | A5         | 5.5 | 6.8 | 9   | 11  | 13  | 15  | 17  |
|   | A6         | 54  | 75  | 106 | 140 | 165 | 210 | 260 |
|   | A7         | 8   | 9   | 11  | 14  | 17  | 22  | 30  |

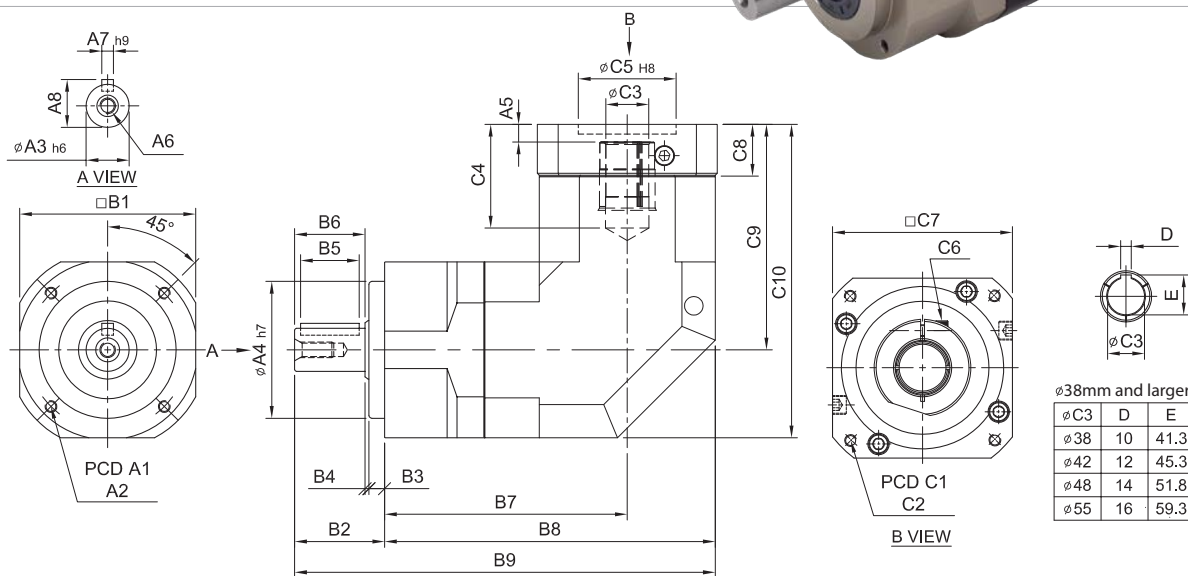
unit: mm

# SERVOBX Planetary Reducers

## SEL Series

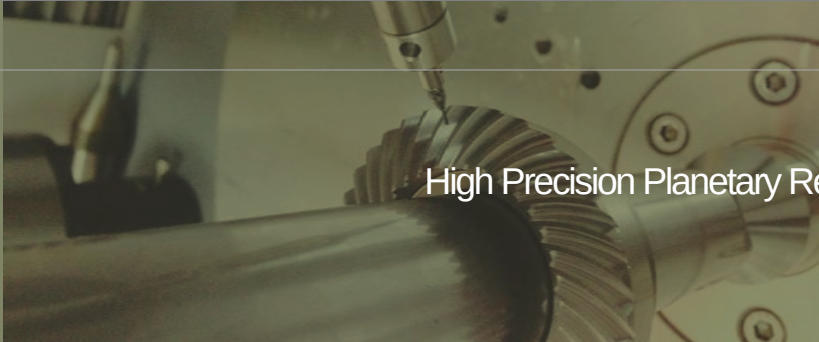
1-Stage

RATIO : 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20



unit: mm

|   | Model Code | 44         | 62             | 90                | 120           | 142            | 180                | 220             |
|---|------------|------------|----------------|-------------------|---------------|----------------|--------------------|-----------------|
|   |            | A1         | A2             | A3                | A4            | A5             | A6                 | A7              |
| A | A1         | 44         | 62             | 82                | 110           | 140            | 184                | 218             |
|   | A2         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25    | M10 x P1.5     | M12 x P1.75        | M16 x P2.0      |
|   | A3         | 13         | 16             | 22                | 32            | 40             | 55                 | 75              |
|   | A4         | 35         | 50             | 70                | 90            | 120            | 160                | 180             |
|   | A5         | 6          | 6              | 9, 23.5           | 10, 20        | 10             | 12.5, 14.5         | 12.5, 14.5      |
|   | A6         | M4 x P0.7  | M5 x P0.8      | M8 x P1.25        | M10 x P1.5    | M12 x P1.75    | M14 x P2.0         | M16 x P2.0      |
|   | A7         | 5          | 5              | 6                 | 10            | 12             | 16                 | 20              |
|   | A8         | 15         | 18             | 24.5              | 35            | 43             | 59                 | 79.5            |
|   | A9         | 15         | 18             | 24.5              | 35            | 43             | 59                 | 79.5            |
| B | B1         | 44         | 62             | 90                | 120           | 142            | 180                | 220             |
|   | B2         | 26         | 36             | 46                | 65            | 92             | 106                | 139             |
|   | B3         | 5          | 7              | 8                 | 12            | 15             | 20                 | 30              |
|   | B4         | 1          | 1              | 2                 | 3             | 3              | 4                  | 5               |
|   | B5         | 15         | 20             | 30                | 40            | 65             | 70                 | 90              |
|   | B6         | 20         | 28             | 36                | 50            | 74             | 82                 | 104             |
|   | B7         | 76         | 84.5           | 122.1             | 148           | 165.5          | 223.6              | 231.6           |
|   | B8         | 98         | 115.5          | 167.1             | 208           | 236.5          | 313.6              | 341.6           |
|   | B9         | 124        | 151.5          | 215.1             | 273           | 328.5          | 419.6              | 480.6           |
| C | C1         | 46, 60, 63 | 70, 75, 90     | 90, 110, 115, 145 | 115, 145, 165 | 145, 165, 215  | 200, 215, 265      | 200, 265, 300   |
|   | C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10   | M8, M10, M12   | M10, M12, M16      | M12, M16        |
|   | C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32    | 28, 32, 35, 38 | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
|   | C4         | 27         | 33.5, 42       | 53, 58, 67.5      | 67, 77        | 85             | 117, 119           | 117, 119        |
|   | C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180  | 114.3, 180, 230    | 114.3, 230, 250 |
|   | C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25    | M10 x P1.5     | M10 x P1.5         | M10 x P1.5      |
|   | C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150 | 146, 180, 190  | 182, 200, 250      | 222, 250, 265   |
|   | C8         | 16         | 21.5           | 26.5, 41          | 35.5, 45.5    | 35.5           | 45.5, 47.5         | 45.5, 47.5      |
|   | C9         | 61         | 77, 85         | 115.3, 129.8      | 141, 151      | 165.7          | 235, 237           | 235, 237        |
|   | C10        | 83         | 108, 116       | 160.3, 174.8      | 201, 211      | 236.7          | 325, 327           | 345, 347        |



## High Precision Planetary Reducer

### SEL 1-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 44                                                                 | 62        | 90        | 120       | 142       | 180       | 220       |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 3      | 19                                                                 | 59        | 165       | 335       | 625       | 1,206     | 2,030     |
|                                                |            |           | 4      | 16                                                                 | 51        | 146       | 300       | 555       | 1,069     | 1,804     |
|                                                |            |           | 5      | 16                                                                 | 48        | 160       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 6      | 15                                                                 | 45        | 151       | 311       | 583       | 1,118     | 1,911     |
|                                                |            |           | 7      | 15                                                                 | 45        | 149       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 8      | 14                                                                 | 43        | 143       | 298       | 553       | 1,070     | 1,824     |
|                                                |            |           | 9      | 13                                                                 | 44        | 145       | 278       | 516       | 993       | 1,694     |
|                                                |            |           | 10     | 14                                                                 | 43        | 141       | 294       | 549       | 1,059     | 1,779     |
|                                                |            |           | 12     | 15                                                                 | 45        | 151       | 311       | 583       | 1,118     | 1,911     |
|                                                |            |           | 14     | 15                                                                 | 45        | 149       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 16     | 14                                                                 | 43        | 143       | 298       | 553       | 1,070     | 1,824     |
|                                                |            |           | 18     | 13                                                                 | 44        | 145       | 278       | 516       | 993       | 1,694     |
|                                                |            |           | 20     | 14                                                                 | 43        | 141       | 294       | 549       | 1,059     | 1,779     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 3 ~ 20 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 3 ~ 20 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 3 ~ 20 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 3 ~ 20 | 6,000                                                              | 6,000     | 6,000     | 5,000     | 5,000     | 4,000     | 3,000     |
| Backlash Ps                                    |            | arcmin    | 3 ~ 20 | -                                                                  | -         | $\leq 2$  | $\leq 2$  | $\leq 2$  | $\leq 2$  | $\leq 2$  |
| Backlash P0                                    |            | arcmin    | 3 ~ 20 | $\leq 4$                                                           | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  |
| Backlash P1                                    |            | arcmin    | 3 ~ 20 | $\leq 6$                                                           | $\leq 6$  | $\leq 6$  | $\leq 6$  | $\leq 6$  | $\leq 6$  | $\leq 6$  |
| Backlash P2                                    |            | arcmin    | 3 ~ 20 | $\leq 8$                                                           | $\leq 8$  | $\leq 8$  | $\leq 8$  | $\leq 8$  | $\leq 8$  | $\leq 8$  |
| Torsional Rigidity                             |            | Nm/arcmin | 3 ~ 20 | 3                                                                  | 6         | 14        | 27        | 60        | 140       | 240       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 3 ~ 20 | 380                                                                | 1,180     | 3,200     | 6,800     | 9,300     | 15,600    | 51,000    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 3 ~ 20 | 190                                                                | 590       | 1,600     | 3,400     | 4,650     | 7,800     | 25,500    |
| Service Life                                   | $L_H$      | hr        | 3 ~ 20 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 3 ~ 20 | $\geq 95$                                                          |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 3 ~ 20 | - 25° C ~ + 90° C                                                  |           |           |           |           |           |           |
| Lubrication                                    |            |           | 3 ~ 20 | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 3 ~ 20 | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 3 ~ 20 | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 3 ~ 20 | $\leq 65$                                                          | $\leq 68$ | $\leq 70$ | $\leq 72$ | $\leq 74$ | $\leq 76$ | $\leq 78$ |
| Weight $\pm 3\%$                               |            | Kg        | 3 ~ 20 | 0.8                                                                | 2.8       | 6.3       | 9.2       | 22.5      | 52.3      | 75        |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

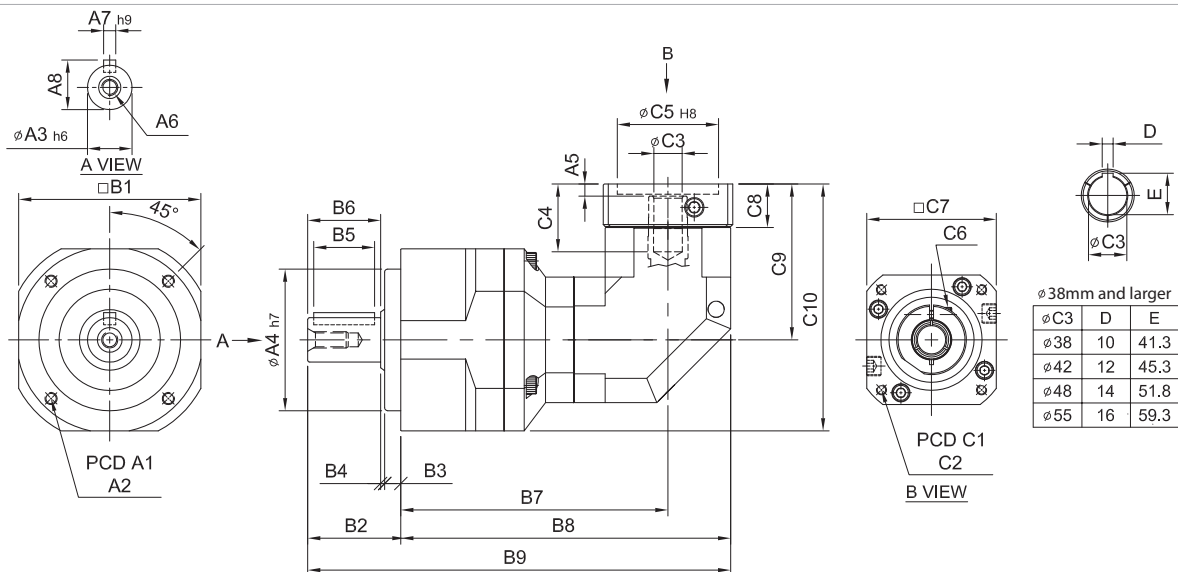
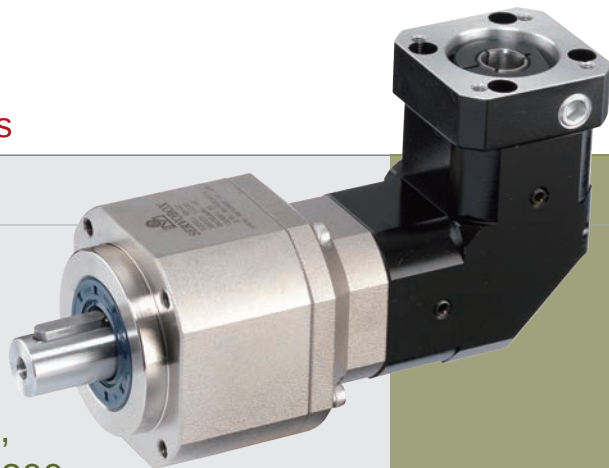
| Ratio | 44   | 62   | 90   | 120  | 142  | 180  | 220   |
|-------|------|------|------|------|------|------|-------|
| 3     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 4     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 5     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 6     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 7     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 8     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 9     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 10    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135   |
| 12    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 65.5 | 119.2 |
| 14    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 65.5 | 119.2 |
| 16    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 65.5 | 119.2 |
| 18    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 65.5 | 119.2 |
| 20    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 65.5 | 119.2 |

# SERVOBOX Planetary Reducers

## SEL Series

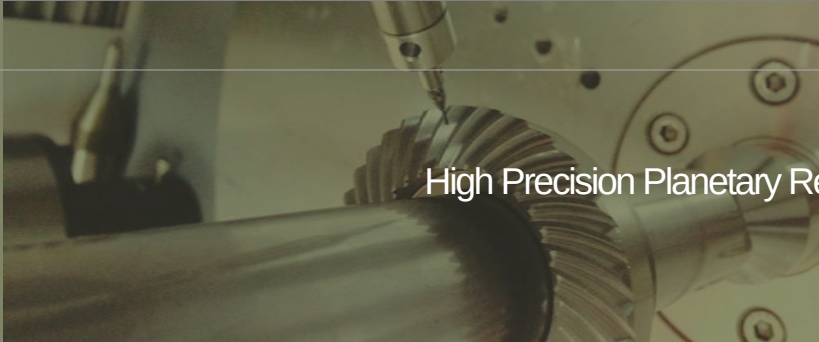
2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70,  
80, 90, 100, 120, 140, 160, 180, 200



unit: mm

| Model Code | 62         | 90             | 120               | 142           | 180            | 220                       |
|------------|------------|----------------|-------------------|---------------|----------------|---------------------------|
| A1         | 62         | 82             | 110               | 140           | 184            | 218                       |
| A2         | M5 x P0.8  | M6 x P1.0      | M8 x P1.25        | M10 x P1.5    | M12 x P1.75    | M16 x P2.0                |
| A3         | 16         | 22             | 32                | 40            | 55             | 75                        |
| A4         | 50         | 70             | 90                | 120           | 160            | 180                       |
| A5         | 6          | 6              | 9, 23.5           | 10, 20        | 10             | 12.5, 14.5                |
| A6         | M5 x P0.8  | M8 x P1.25     | M10 x P1.5        | M12 x P1.75   | M14 x P2.0     | M16 x P2.0                |
| A7         | 5          | 6              | 10                | 12            | 16             | 20                        |
| A8         | 18         | 24.5           | 35                | 43            | 59             | 79.5                      |
| B1         | 62         | 90             | 120               | 142           | 180            | 220                       |
| B2         | 36         | 46             | 65                | 92            | 106            | 139                       |
| B3         | 7          | 8              | 12                | 15            | 20             | 30                        |
| B4         | 1          | 2              | 3                 | 3             | 4              | 5                         |
| B5         | 20         | 30             | 40                | 65            | 70             | 90                        |
| B6         | 28         | 36             | 50                | 74            | 82             | 104                       |
| B7         | 110.5      | 132            | 181.6             | 214.5         | 249.5          | 313.6                     |
| B8         | 132.5      | 163            | 226.6             | 274.5         | 320.5          | 403.6                     |
| B9         | 168.5      | 209            | 291.6             | 366.5         | 426.5          | 542.6                     |
| C1         | 46, 60, 63 | 70, 75, 90     | 90, 110, 115, 145 | 115, 145, 165 | 145, 165, 215  | 200, 215, 265             |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10   | M8, M10, M12   | M12, M16                  |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32    | 28, 32, 35, 38 | 35, 38, 42, 48, 55        |
| C4         | 27         | 33.5, 42       | 53, 58, 67.5      | 67, 77        | 85             | 117, 119                  |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180  | 114.3, 180, 200, 230, 250 |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25    | M10 x P1.5     | M10 x P1.5                |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150 | 146, 180, 190  | 182, 200, 220, 250, 265   |
| C8         | 16         | 21.5           | 26.5, 41          | 35.5, 45.5    | 35.5           | 45.5, 47.5                |
| C9         | 61         | 77, 85         | 115.3, 129.8      | 141, 151      | 165.7          | 235, 237                  |
| C10        | 92         | 122, 130       | 175.3, 189.8      | 212, 222      | 255.7          | 345, 347                  |



## High Precision Planetary Reducer

### SEL 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 62                                                                 | 90    | 120   | 142   | 180    | 220    |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 59                                                                 | 165   | 335   | 625   | 1,206  | 2,030  |
|                                                |            |           | 20       | 51                                                                 | 146   | 300   | 555   | 1,069  | 1,804  |
|                                                |            |           | 25       | 48                                                                 | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 30       | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 35       | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 40       | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 50       | 48                                                                 | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 60       | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 70       | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 80       | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 90       | 44                                                                 | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 100      | 43                                                                 | 141   | 294   | 549   | 1,059  | 1,779  |
|                                                |            |           | 120      | 45                                                                 | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 140      | 45                                                                 | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 160      | 43                                                                 | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 180      | 44                                                                 | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 200      | 43                                                                 | 141   | 294   | 549   | 1,059  | 1,779  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 200 | 1.8 Times of Rated Output Torque                                   |       |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 200 | 3 Times of Rated Output Torque                                     |       |       |       |        |        |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 200 | 3,000                                                              | 3,000 | 3,000 | 3,000 | 3,000  | 2,000  |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 200 | 6,000                                                              | 6,000 | 5,000 | 5,000 | 4,000  | 4,000  |
| Backlash Ps                                    |            | arcmin    | 15 ~ 200 | -                                                                  | ≤ 4   | ≤ 4   | ≤ 4   | ≤ 4    | ≤ 4    |
| Backlash P0                                    |            | arcmin    | 15 ~ 200 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    |
| Backlash P1                                    |            | arcmin    | 15 ~ 200 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    |
| Backlash P2                                    |            | arcmin    | 15 ~ 200 | ≤ 12                                                               | ≤ 12  | ≤ 12  | ≤ 12  | ≤ 12   | ≤ 12   |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 200 | 6                                                                  | 14    | 27    | 60    | 140    | 240    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 200 | 1,180                                                              | 3,200 | 6,800 | 9,300 | 15,600 | 51,000 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 200 | 590                                                                | 1,600 | 3,400 | 4,650 | 7,800  | 25,500 |
| Service Life                                   | $L_H$      | hr        | 15 ~ 200 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 15 ~ 200 | ≥ 92                                                               |       |       |       |        |        |
| Operating Temperature                          |            | °C        | 15 ~ 200 | - 25° C ~ + 90° C                                                  |       |       |       |        |        |
| Lubrication                                    |            |           | 15 ~ 200 | Synthetic Grease                                                   |       |       |       |        |        |
| Protection Class                               |            |           | 15 ~ 200 | IP65                                                               |       |       |       |        |        |
| Mounting Position                              |            |           | 15 ~ 200 | Any                                                                |       |       |       |        |        |
| Noise Level                                    |            | dB        | 15 ~ 200 | ≤ 68                                                               | ≤ 70  | ≤ 72  | ≤ 74  | ≤ 76   | ≤ 78   |
| Weight ±3%                                     |            | Kg        | 15 ~ 200 | 1.8                                                                | 5.8   | 12    | 22.8  | 43.9   | 78.5   |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

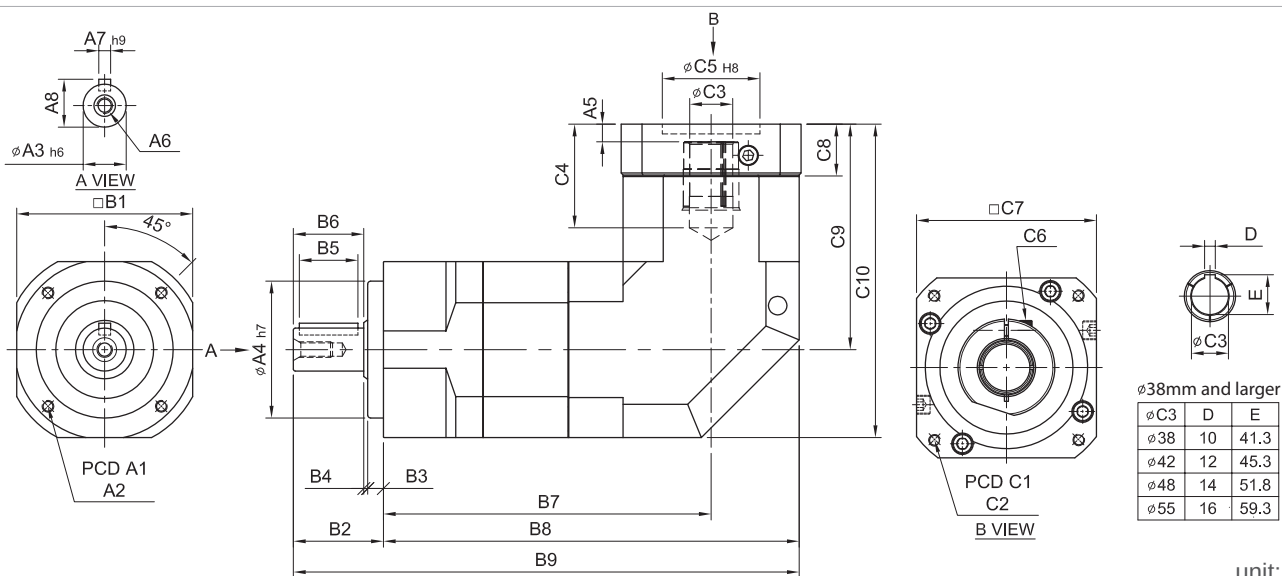
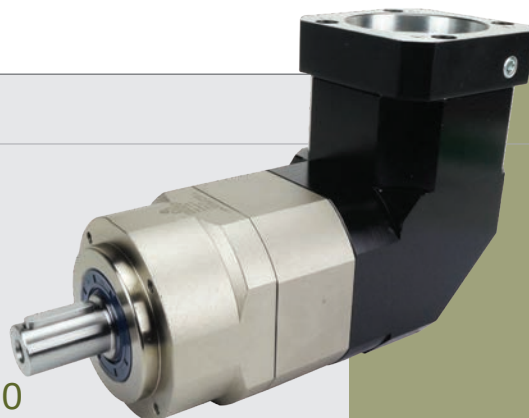
| Ratio | 62   | 90   | 120  | 142  | 180  | 220  |
|-------|------|------|------|------|------|------|
| 15    | 0.09 | 0.36 | 6.28 | 6.85 | 26.2 | 70.1 |
| 20    | 0.09 | 0.36 | 6.28 | 6.85 | 26.2 | 70.1 |
| 25    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 30    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 35    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 40    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 50    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 60    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 70    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 80    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 90    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 100   | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 120   | 0.03 | 0.1  | 1.88 | 6.2  | 21.2 | 65.1 |
| 140   | 0.03 | 0.1  | 1.88 | 6.2  | 21.2 | 65.1 |
| 160   | 0.03 | 0.1  | 1.88 | 6.2  | 21.2 | 65.1 |
| 180   | 0.03 | 0.1  | 1.88 | 6.2  | 21.2 | 65.1 |
| 200   | 0.03 | 0.1  | 1.88 | 6.2  | 21.2 | 65.1 |

# SERVOBX Planetary Reducers

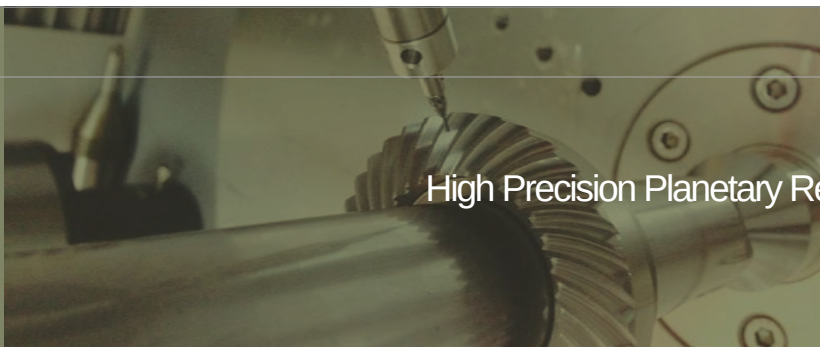
## SEL-A Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70,  
80, 90, 100, 120, 140, 160, 180, 200



| Model Code | 44A        | 62A            | 90A               | 120A          | 142A           | 180A               | 220A            |
|------------|------------|----------------|-------------------|---------------|----------------|--------------------|-----------------|
| A1         | 44         | 62             | 82                | 110           | 140            | 184                | 218             |
| A2         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25    | M10 x P1.5     | M12 x P1.75        | M16 x P2.0      |
| A3         | 13         | 16             | 22                | 32            | 40             | 55                 | 75              |
| A4         | 35         | 50             | 70                | 90            | 120            | 160                | 180             |
| A5         | 6          | 6              | 9, 23.5           | 10, 20        | 10             | 12.5, 14.5         | 12.5, 14.5      |
| A6         | M4 x P0.7  | M5 x P0.8      | M8 x P1.25        | M10 x P1.5    | M12 x P1.75    | M14 x P2.0         | M16 x P2.0      |
| A7         | 5          | 5              | 6                 | 10            | 12             | 16                 | 20              |
| A8         | 15         | 18             | 24.5              | 35            | 43             | 59                 | 79.5            |
| B1         | 44         | 62             | 90                | 120           | 142            | 180                | 220             |
| B2         | 26         | 36             | 46                | 65            | 92             | 106                | 139             |
| B3         | 5          | 7              | 8                 | 12            | 15             | 20                 | 30              |
| B4         | 1          | 1              | 2                 | 3             | 3              | 4                  | 5               |
| B5         | 15         | 20             | 30                | 40            | 65             | 70                 | 90              |
| B6         | 20         | 28             | 36                | 50            | 74             | 82                 | 104             |
| B7         | 102        | 118.3          | 167.6             | 204           | 232            | 304.6              | 324.6           |
| B8         | 124        | 149.3          | 212.6             | 264           | 303            | 394.6              | 434.6           |
| B9         | 150        | 185.3          | 258.6             | 329           | 395            | 500.6              | 573.6           |
| C1         | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165 | 145, 165, 215  | 200, 215, 265      | 200, 265, 300   |
| C2         | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10   | M8, M10, M12   | M10, M12, M16      | M12, M16        |
| C3         | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32    | 28, 32, 35, 38 | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
| C4         | 27         | 33.5, 42       | 53, 58, 67.5      | 67, 77        | 85             | 117, 119           | 117, 119        |
| C5         | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180  | 114.3, 180, 230    | 114.3, 230, 250 |
| C6         | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25    | M10 x P1.5     | M10 x P1.5         | M10 x P1.5      |
| C7         | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150 | 146, 150, 190  | 182, 200, 250      | 220, 250, 265   |
| C8         | 16         | 21.5           | 26.5, 41          | 35.5, 45.5    | 35.5           | 45.5, 47.5         | 45.5, 47.5      |
| C9         | 61         | 77             | 115.3, 129.8      | 141, 151      | 165.7          | 235, 237           | 235, 237        |
| C10        | 83         | 108            | 160.3, 174.8      | 201, 211      | 236.7          | 325, 327           | 345, 347        |



## High Precision Planetary Reducer

### SEL-A 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 44A                                                                | 62A   | 90A   | 120A  | 142A  | 180A   | 220A   |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-------|-------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 19                                                                 | 59    | 165   | 335   | 625   | 1,206  | 2,030  |
|                                                |            |           | 20       | 16                                                                 | 51    | 146   | 300   | 555   | 1,069  | 1,804  |
|                                                |            |           | 25       | 16                                                                 | 48    | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 30       | 15                                                                 | 45    | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 35       | 15                                                                 | 45    | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 40       | 14                                                                 | 43    | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 50       | 16                                                                 | 48    | 160   | 333   | 618   | 1,189  | 2,010  |
|                                                |            |           | 60       | 15                                                                 | 45    | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 70       | 15                                                                 | 45    | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 80       | 14                                                                 | 43    | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 90       | 13                                                                 | 44    | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 100      | 14                                                                 | 43    | 141   | 294   | 549   | 1,059  | 1,779  |
|                                                |            |           | 120      | 15                                                                 | 45    | 151   | 311   | 583   | 1,118  | 1,911  |
|                                                |            |           | 140      | 15                                                                 | 45    | 149   | 309   | 573   | 1,108  | 1,870  |
|                                                |            |           | 160      | 14                                                                 | 43    | 143   | 298   | 553   | 1,070  | 1,824  |
|                                                |            |           | 180      | 13                                                                 | 44    | 145   | 278   | 516   | 993    | 1,694  |
|                                                |            |           | 200      | 14                                                                 | 43    | 141   | 294   | 549   | 1,059  | 1,779  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 200 | 1.8 Times of Rated Output Torque                                   |       |       |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 200 | 3 Times of Rated Output Torque                                     |       |       |       |       |        |        |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 200 | 3,000                                                              | 3,000 | 3,000 | 3,000 | 3,000 | 3,000  | 2,000  |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 200 | 6,000                                                              | 6,000 | 6,000 | 5,000 | 5,000 | 4,000  | 3,000  |
| Backlash Ps                                    |            | arcmin    | 15 ~ 200 | -                                                                  | -     | ≤ 4   | ≤ 4   | ≤ 4   | ≤ 4    | ≤ 4    |
| Backlash P0                                    |            | arcmin    | 15 ~ 200 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    |
| Backlash P1                                    |            | arcmin    | 15 ~ 200 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    |
| Backlash P2                                    |            | arcmin    | 15 ~ 200 | ≤ 12                                                               | ≤ 12  | ≤ 12  | ≤ 12  | ≤ 12  | ≤ 12   | ≤ 12   |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 200 | 3                                                                  | 6     | 14    | 27    | 60    | 140    | 240    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 200 | 380                                                                | 1,180 | 3,200 | 6,800 | 9,300 | 15,600 | 51,000 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 200 | 190                                                                | 590   | 1,600 | 3,400 | 4,650 | 7,800  | 25,500 |
| Service Life                                   | $L_H$      | hr        | 15 ~ 200 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 15 ~ 200 | ≥ 92                                                               |       |       |       |       |        |        |
| Operating Temperature                          |            | °C        | 15 ~ 200 | - 25° C ~ + 90° C                                                  |       |       |       |       |        |        |
| Lubrication                                    |            |           | 15 ~ 200 | Synthetic Grease                                                   |       |       |       |       |        |        |
| Protection Class                               |            |           | 15 ~ 200 | IP65                                                               |       |       |       |       |        |        |
| Mounting Position                              |            |           | 15 ~ 200 | Any                                                                |       |       |       |       |        |        |
| Noise Level                                    |            | dB        | 15 ~ 200 | ≤ 65                                                               | ≤ 68  | ≤ 70  | ≤ 72  | ≤ 74  | ≤ 76   | ≤ 78   |
| Weight ±3%                                     |            | Kg        | 15 ~ 200 | 1                                                                  | 2.9   | 8     | 12    | 22.6  | 51.7   | 94.5   |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 44A  | 62A  | 90A  | 120A | 142A  | 180A | 220A |
|-------|------|------|------|------|-------|------|------|
| 15    | 0.09 | 0.36 | 2.28 | 6.85 | 23.45 | 55.2 | 80.2 |
| 20    | 0.09 | 0.36 | 2.28 | 6.85 | 23.45 | 55.2 | 80.2 |
| 25    | 0.09 | 0.36 | 2.28 | 6.85 | 23.45 | 50.4 | 76.5 |
| 30    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 35    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 40    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 50    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 60    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 70    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 80    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 90    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 100   | 0.09 | 0.36 | 2.28 | 6.85 | 23.5  | 50.4 | 76.5 |
| 120   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8  | 48.7 | 74.2 |
| 140   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8  | 48.7 | 74.2 |
| 160   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8  | 48.7 | 74.2 |
| 180   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8  | 48.7 | 74.2 |
| 200   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8  | 48.7 | 74.2 |



# SERVOBOX Planetary Reducers

## SD Series Overview

### Gearhead Construction:

Various design features including flange output, one piece construction and taper roller bearings enhance the gearbox performance

### Very High Load-Bearing Capacity:

Output radial force up to 107,200N  
Output axial force up to 53,600N

### Flange Output:

Designed for tight integration with the machine, and highly dynamic loads

### Seven Frame Sizes:

47mm..255mm

### Four Precision Grades:

Backlash classes up to  $\leq 1$ arcmin

### High Efficiency

1-stage models  $\geq 97\%$ ; 2-stage models  $\geq 94\%$



## SD Series Model Code

| SD                        | 090               | 010                                                                            |                                                            | P1                   | MOTOR                      |
|---------------------------|-------------------|--------------------------------------------------------------------------------|------------------------------------------------------------|----------------------|----------------------------|
| Series                    | Model/<br>Frame   | Ratio                                                                          | Output Shaft Keyway                                        | Backlash Class       | Motor Designation          |
| Inline<br>SD              | 047*<br>064       | 1-Stage (SD/D)<br>004, 005, 007, 010                                           | <input type="checkbox"/> Blank: (Standard)<br>Ball Bearing | Ps<br>P0<br>P1<br>P2 | Motor Brand &<br>Model No. |
| Right Angle<br>SDL<br>SDH | 090<br>110<br>140 | 2-Stage (SD/D)<br>020 ~ 100                                                    | (47#~255#)                                                 |                      |                            |
| Input Shaft<br>SDD        | 200<br>255        | 1-Stage (SDL)<br>004, 005, 007,<br>010, 014, 020<br>2-Stage (SDL)<br>020 ~ 200 | T: Taper Bearing<br>(90#~255#)                             |                      |                            |
|                           | *excl. SDH        | 2-Stage (SDH)<br>020, 025, 035, 050<br>070, 100, 150                           |                                                            |                      |                            |

## SD Series Features



### One-piece Gearbox Housing

SD gearbox body and the internal ring gear form a single structural element to minimise distortions due to rapid speed changes and heavy loads. The ring gear teeth are precision machined to DIN6 standard.



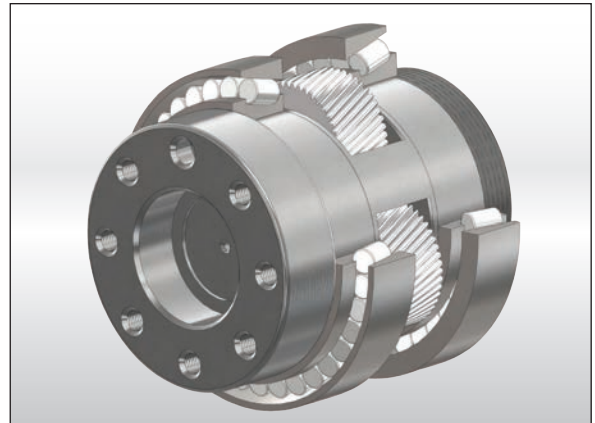
### Full Needle Roller Bearings Design

The planet gears are supported by needle roller bearings without retainer. This maximises the rollers contact area, helping to improve structural rigidity and extend operating life.



### Collet Locking Mechanism

Motor shaft is coupled to the reducer input using collet locking mechanism. Manufacturing process includes dynamic balancing analysis of the reducer input assembly, to ensure concentricity and solid, back-lash-free motor shaft coupling at any speed.



### Integrated Planetary Arm Bracket

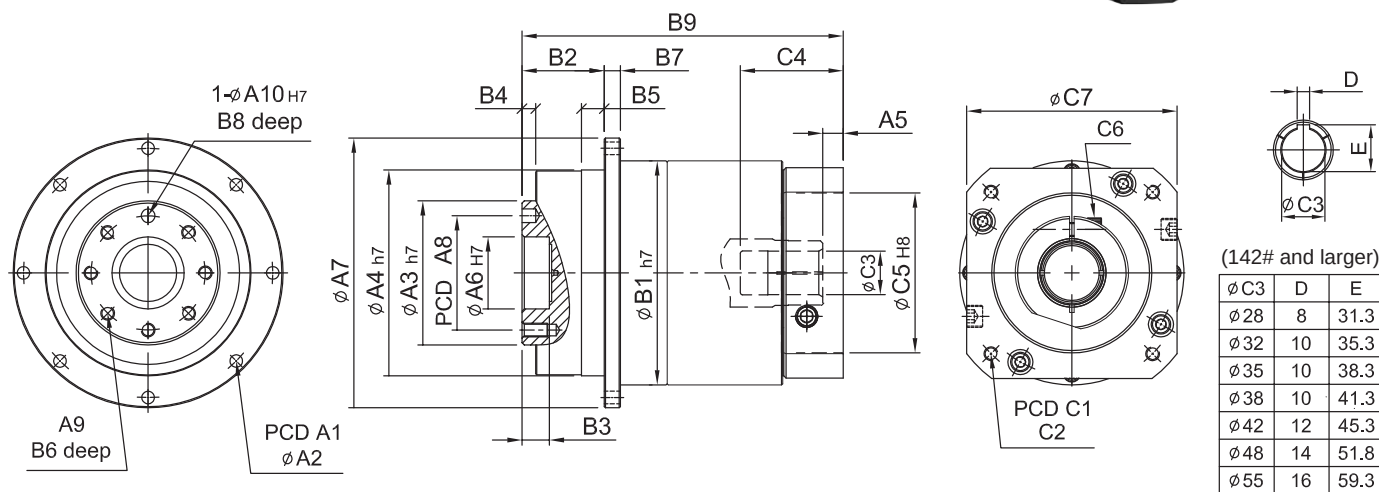
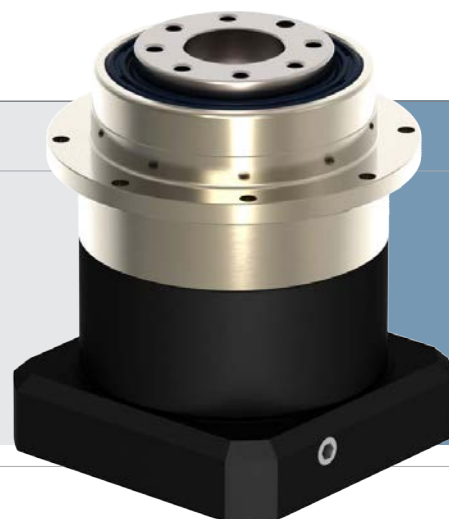
The output shaft and the planet gears carrier form an integral structure that is machined as one piece. This achieves highest torsional rigidity and accuracy. Dual roller bearing support further improves axial and radial load capacity.

# SERVOBX Planetary Reducers

## SD Series

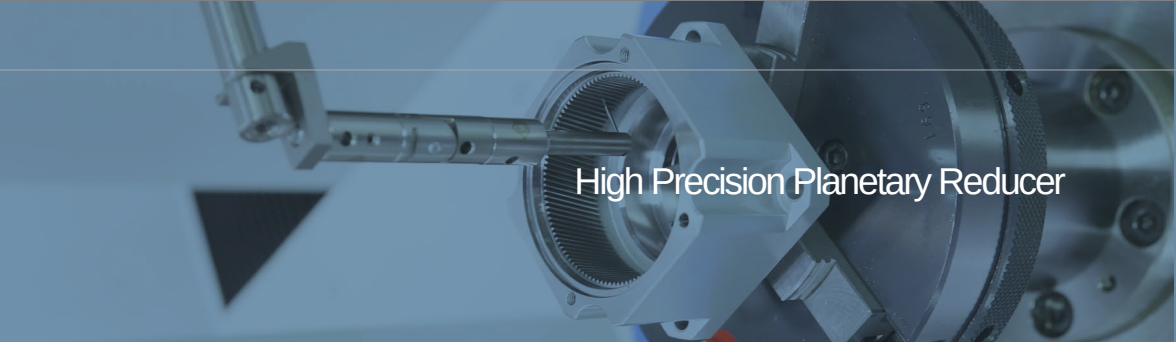
1-Stage

RATIO : 4, 5, 7, 10



unit: mm

| Model Code | 47            | 64             | 90                | 110            | 140             | 200                | 255             |
|------------|---------------|----------------|-------------------|----------------|-----------------|--------------------|-----------------|
| A1         | 67            | 79             | 109               | 135            | 168             | 233                | 280             |
| A2         | 8-3.4         | 8-4.5          | 8-5.5             | 8-5.5          | 12-6.6          | 12-9.0             | 16-13.5         |
| A3         | 28            | 40             | 63                | 80             | 100             | 160                | 180             |
| A4         | 47            | 64             | 90                | 110            | 140             | 200                | 255             |
| A5         | 5             | 6              | 9, 23.5           | 10, 20         | 10              | 11.5, 13.5         | 10.5, 12.5      |
| A6         | 12            | 20             | 31.5              | 40             | 50              | 80                 | 100             |
| A7         | 72            | 86             | 118               | 146            | 179             | 248                | 300             |
| A8         | 20            | 31.5           | 50                | 63             | 80              | 125                | 140             |
| A9         | 4 - M3 x P0.5 | 7 - M5 x P0.8  | 7 - M6 x P1.0     | 11 - M6 x P1.0 | 11 - M8 x P1.25 | 11 - M10 x P1.5    | 12 - M16 x P2.0 |
| A10        | 3             | 5              | 6                 | 6              | 8               | 10                 | 12              |
| B1         | 59            | 70             | 98                | 125            | 156             | 212                | 255             |
| B2         | 19.5          | 19.5           | 30                | 29             | 38              | 50                 | 66              |
| B3         | 5             | 7              | 12                | 12             | 12              | 16                 | 20              |
| B4         | 3             | 4              | 6                 | 6              | 6               | 8                  | 12              |
| B5         | 5             | 6              | 10                | 10             | 15              | 15                 | 20              |
| B6         | 6.5           | 8              | 12                | 12             | 16              | 22                 | 32              |
| B7         | 4             | 5              | 7                 | 8              | 10              | 12                 | 18              |
| B8         | 4             | 6              | 6                 | 7              | 7               | 10                 | 10              |
| B9         | 74.7          | 84.5, 92.5     | 133, 147.5        | 153, 173       | 186.5           | 250.5, 252.5       | 263, 265        |
| C1         | 46, 60, 63    | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215   | 200, 215, 265      | 200, 265, 300   |
| C2         | M3, M4, M5    | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12    | M10, M12, M16      | M12, M16        |
| C3         | 8, 11         | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32, 35 | 28, 32, 35, 38  | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
| C4         | 32            | 34, 41.5       | 58.5, 73          | 67, 82         | 84.5            | 114.5, 116.5       | 115.5, 117.5    |
| C5         | 30, 40, 50    | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180   | 114.3, 180, 230    | 114.3, 230, 250 |
| C6         | M4 x P0.7     | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5      | M10 x P1.5         | M10 x P1.5      |
| C7         | 46, 55        | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190   | 182, 200, 250      | 222, 250, 265   |



## High Precision Planetary Reducer

### SD 1-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 47                                                                 | 64        | 90        | 110       | 140       | 200       | 255       |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 4      | 22                                                                 | 60        | 160       | 335       | 650       | 1,200     | 2,020     |
|                                                |            |           | 5      | 20                                                                 | 50        | 155       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 7      | 19                                                                 | 47        | 142       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 10     | 16                                                                 | 43        | 136       | 294       | 549       | 1,059     | 1,779     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 4 ~ 10 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 4 ~ 10 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 4 ~ 10 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 4 ~ 10 | 6,000                                                              | 6,000     | 6,000     | 6,000     | 5,000     | 4,000     | 3,000     |
| Backlash Ps                                    |            | arcmin    | 4 ~ 10 | -                                                                  | -         | $\leq 1$  | $\leq 1$  | $\leq 1$  | $\leq 1$  | $\leq 1$  |
| Backlash P0                                    |            | arcmin    | 4 ~ 10 | $\leq 3$                                                           | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  |
| Backlash P1                                    |            | arcmin    | 4 ~ 10 | $\leq 5$                                                           | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  |
| Backlash P2                                    |            | arcmin    | 4 ~ 10 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Torsional Rigidity                             |            | Nm/arcmin | 4 ~ 10 | 6                                                                  | 14        | 30        | 86        | 155       | 450       | 1126      |
| Max. Radial Force<br>Ball Bearing              | $F_{2rB}$  | N         | 4 ~ 10 | 2,040                                                              | 2,520     | 8,460     | 12,720    | 14,070    | 35,200    | 39,600    |
| Max. Axial Force<br>Ball Bearing               | $F_{2aB}$  | N         | 4 ~ 10 | 1,020                                                              | 1,260     | 4,230     | 6,360     | 7,035     | 17,600    | 19,800    |
| Max. Radial Force<br>Taper Bearing             | $F_{2rB}$  | N         | 4 ~ 10 | -                                                                  | -         | 14,660    | 23,000    | 37,200    | 73,600    | 107,200   |
| Max. Axial Force<br>Taper Bearing              | $F_{2aB}$  | N         | 4 ~ 10 | -                                                                  | -         | 7,330     | 11,500    | 18,600    | 36,800    | 53,600    |
| Service Life                                   | $L_H$      | hr        | 4 ~ 10 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 4 ~ 10 | $\geq 97$                                                          |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 4 ~ 10 | - 25° C ~ + 90° C                                                  |           |           |           |           |           |           |
| Lubrication                                    |            |           | 4 ~ 10 | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 4 ~ 10 | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 4 ~ 10 | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 4 ~ 10 | $\leq 56$                                                          | $\leq 58$ | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ | $\leq 70$ |
| Weight $\pm 3\%$                               |            | Kg        | 4 ~ 10 | 0.7                                                                | 1.4       | 4.2       | 7.4       | 13.9      | 32.4      | 55        |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

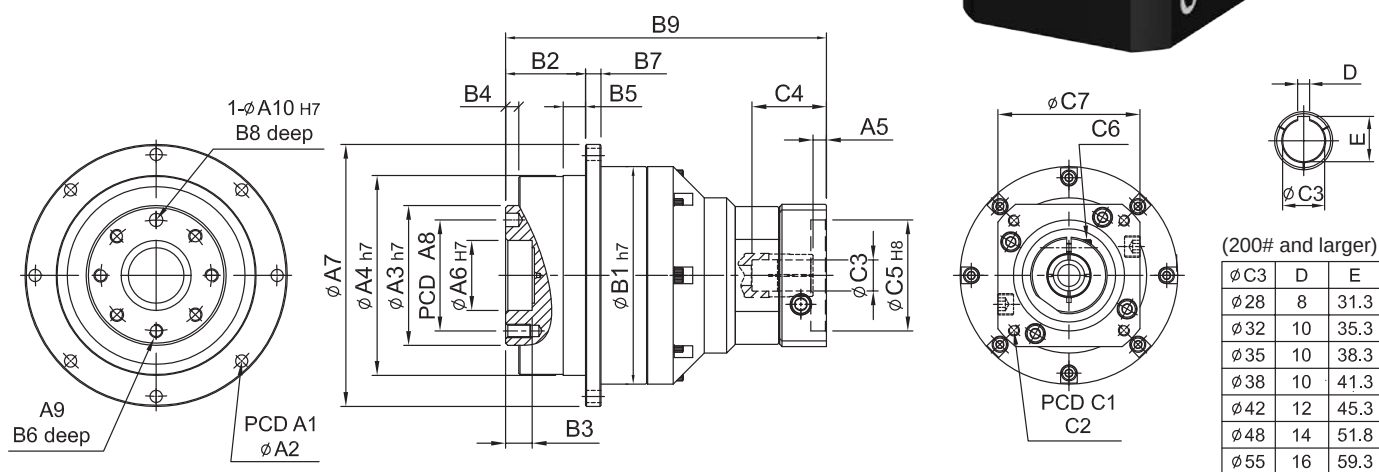
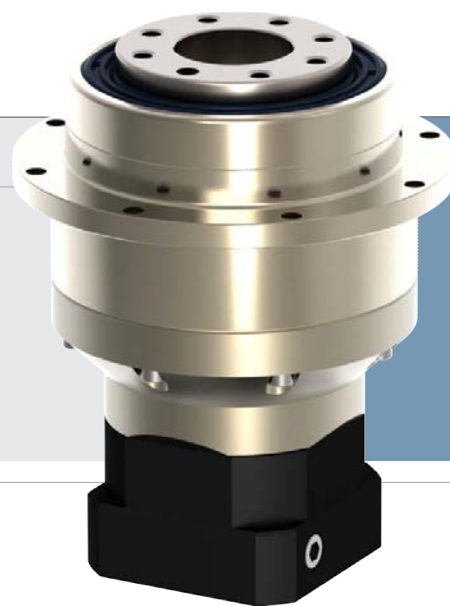
| Ratio | 47   | 64   | 90   | 110  | 140  | 200   | 255   |
|-------|------|------|------|------|------|-------|-------|
| 4     | 0.03 | 0.13 | 0.47 | 2.75 | 7.46 | 24.00 | 55    |
| 5     | 0.03 | 0.12 | 0.45 | 2.70 | 7.41 | 23.23 | 53.19 |
| 7     | 0.03 | 0.12 | 0.45 | 2.64 | 7.12 | 22.11 | 50.78 |
| 10    | 0.03 | 0.12 | 0.43 | 2.56 | 7.01 | 22.21 | 50.50 |

# SERVOBX Planetary Reducers

## SD Series

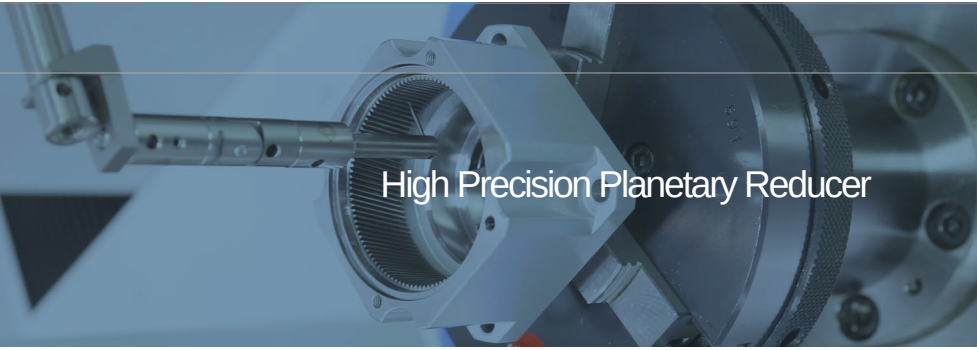
2-Stage

RATIO : 20, 25, 35, 40, 50, 70, 100



unit: mm

| Model Code | 47            | 64            | 90             | 110               | 140                 | 200             | 255                |
|------------|---------------|---------------|----------------|-------------------|---------------------|-----------------|--------------------|
| A1         | 67            | 79            | 109            | 135               | 168                 | 233             | 280                |
| A2         | 8-3.4         | 8-4.5         | 8-5.5          | 8-5.5             | 12-6.6              | 12-9.0          | 16-13.5            |
| A3         | 28            | 40            | 63             | 80                | 100                 | 160             | 180                |
| A4         | 47            | 64            | 90             | 110               | 140                 | 200             | 255                |
| A5         | 5             | 5             | 6              | 9, 23             | 10, 20              | 10              | 11.5, 13.5         |
| A6         | 12            | 20            | 31.5           | 40                | 50                  | 80              | 100                |
| A7         | 72            | 86            | 118            | 146               | 179                 | 248             | 300                |
| A8         | 20            | 31.5          | 50             | 63                | 80                  | 125             | 140                |
| A9         | 4 - M3 x P0.5 | 7 - M5 x P0.8 | 7 - M6 x P1.0  | 11 - M6 x P1.0    | 11 - M8 x P1.25     | 11 - M10 x P1.5 | 12 - M16 x P2.0    |
| A10        | 3             | 5             | 6              | 6                 | 8                   | 10              | 12                 |
| B1         | 59            | 70            | 98             | 125               | 156                 | 212             | 255                |
| B2         | 19.5          | 19.5          | 30             | 29                | 38                  | 50              | 66                 |
| B3         | 5             | 7             | 12             | 12                | 12                  | 16              | 20                 |
| B4         | 3             | 4             | 6              | 6                 | 6                   | 8               | 12                 |
| B5         | 5             | 6             | 10             | 10                | 15                  | 15              | 20                 |
| B6         | 6.5           | 8             | 12             | 12                | 16                  | 22              | 32                 |
| B7         | 4             | 5             | 7              | 8                 | 10                  | 12              | 16                 |
| B8         | 4             | 6             | 6              | 7                 | 7                   | 10              | 10                 |
| B9         | 100.7         | 109           | 144.5, 152.5   | 189, 203.5        | 224.5, 234.5, 244.5 | 290.5           | 349, 351           |
| C1         | 46, 60, 63    | 46, 60, 63    | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165       | 145, 165, 215   | 200, 215, 265      |
| C2         | M3, M4, M5    | M3, M4, M5    | M4, M5, M6     | M5, M6, M8        | M6, M8, M10         | M8, M10, M12    | M10, M12, M16      |
| C3         | 8, 11         | 8, 11         | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32, 35  | 28, 32, 35, 38  | 35, 38, 42, 48, 55 |
| C4         | 26            | 26, 30.5      | 33.5, 41.5     | 59, 73.5          | 67, 77, 82          | 84.5            | 114.5, 116.5       |
| C5         | 30, 40, 50    | 30, 40, 50    | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130        | 110, 130, 180   | 114.3, 180, 230    |
| C6         | M4 x P0.7     | M4 x P0.7     | M5 x P1.8      | M6 x P1.0         | M8 x P1.25          | M10 x P1.5      | M10 x P1.5         |
| C7         | 46, 55        | 46, 55        | 64, 70, 80     | 92, 110, 130      | 122, 130, 150       | 146, 150, 190   | 182, 200, 250      |



## High Precision Planetary Reducer

### SD 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 47                                                                 | 64        | 90        | 110       | 140       | 200       | 255       |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 20       | 22                                                                 | 60        | 160       | 335       | 650       | 1,200     | 2,020     |
|                                                |            |           | 25       | 20                                                                 | 50        | 155       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 35       | 19                                                                 | 47        | 142       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 40       | 22                                                                 | 60        | 160       | 335       | 650       | 1,200     | 2,020     |
|                                                |            |           | 50       | 20                                                                 | 50        | 155       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 70       | 19                                                                 | 47        | 142       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 100      | 16                                                                 | 43        | 136       | 294       | 549       | 1,059     | 1,779     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 20 ~ 100 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 20 ~ 100 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 20 ~ 100 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 20 ~ 100 | 6,000                                                              | 6,000     | 6,000     | 6,000     | 5,000     | 4,000     | 3,000     |
| Backlash Ps                                    |            | arcmin    | 20 ~ 100 | -                                                                  | -         | -         | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  |
| Backlash P0                                    |            | arcmin    | 20 ~ 100 | $\leq 5$                                                           | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  |
| Backlash P1                                    |            | arcmin    | 20 ~ 100 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Backlash P2                                    |            | arcmin    | 20 ~ 100 | $\leq 9$                                                           | $\leq 9$  | $\leq 9$  | $\leq 9$  | $\leq 9$  | $\leq 9$  | $\leq 9$  |
| Torsional Rigidity                             |            | Nm/arcmin | 20 ~ 100 | 6                                                                  | 14        | 30        | 86        | 155       | 450       | 1,126     |
| Max. Radial Force<br>Ball Bearing              | $F_{2rB}$  | N         | 4 ~ 10   | 2,040                                                              | 2,520     | 8,460     | 12,720    | 14,070    | 35,200    | 39,600    |
| Max. Axial Force<br>Ball Bearing               | $F_{2aB}$  | N         | 4 ~ 10   | 1,020                                                              | 1,260     | 4,230     | 6,360     | 7,035     | 17,600    | 19,800    |
| Max. Radial Force<br>Taper Bearing             | $F_{2rB}$  | N         | 4 ~ 10   | -                                                                  | -         | 14,660    | 23,000    | 37,200    | 73,600    | 107,200   |
| Max. Axial Force<br>Taper Bearing              | $F_{2aB}$  | N         | 4 ~ 10   | -                                                                  | -         | 7,330     | 11,500    | 18,600    | 36,800    | 53,600    |
| Service Life                                   | $L_H$      | hr        | 20 ~ 100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 20 ~ 100 | $\geq 94$                                                          |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 20 ~ 100 | - 25° C ~ + 90° C                                                  |           |           |           |           |           |           |
| Lubrication                                    |            |           | 20 ~ 100 | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 20 ~ 100 | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 20 ~ 100 | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 20 ~ 100 | $\leq 56$                                                          | $\leq 58$ | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ | $\leq 70$ |
| Weight $\pm 3\%$                               |            | Kg        | 20 ~ 100 | 1                                                                  | 1.9       | 4.8       | 9.4       | 16.7      | 40.12     | 64        |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

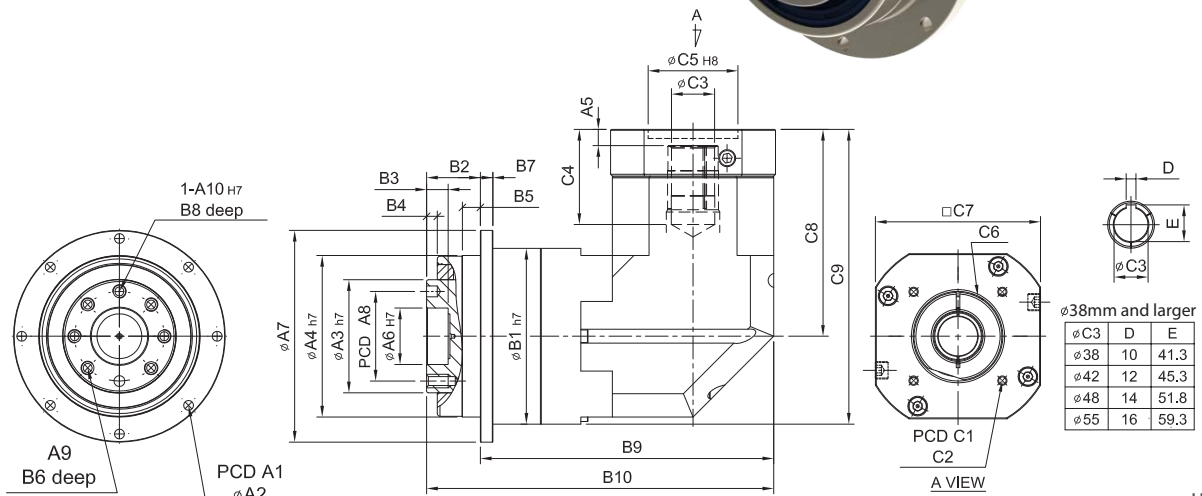
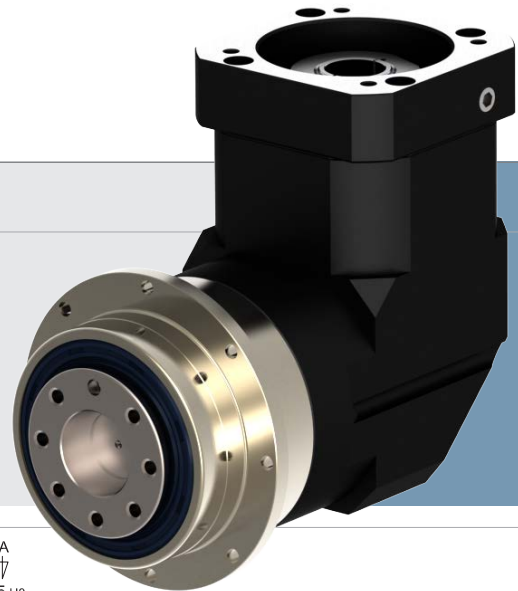
| Ratio | 47   | 64   | 90   | 110  | 140 | 200  | 255   |
|-------|------|------|------|------|-----|------|-------|
| 20    | 0.03 | 0.03 | 0.15 | 0.45 | 2.7 | 7.22 | 23.22 |
| 25    | 0.03 | 0.03 | 0.15 | 0.45 | 2.7 | 7.22 | 23.22 |
| 35    | 0.03 | 0.03 | 0.15 | 0.45 | 2.7 | 7.22 | 23.22 |
| 40    | 0.03 | 0.03 | 0.15 | 0.45 | 2.7 | 7.22 | 23.22 |
| 50    | 0.03 | 0.03 | 0.14 | 0.4  | 2.6 | 7.05 | 23.07 |
| 70    | 0.03 | 0.03 | 0.14 | 0.4  | 2.6 | 7.05 | 23.07 |
| 100   | 0.03 | 0.03 | 0.14 | 0.4  | 2.6 | 7.01 | 22.67 |

# SERVOBX Planetary Reducers

## SDL Series

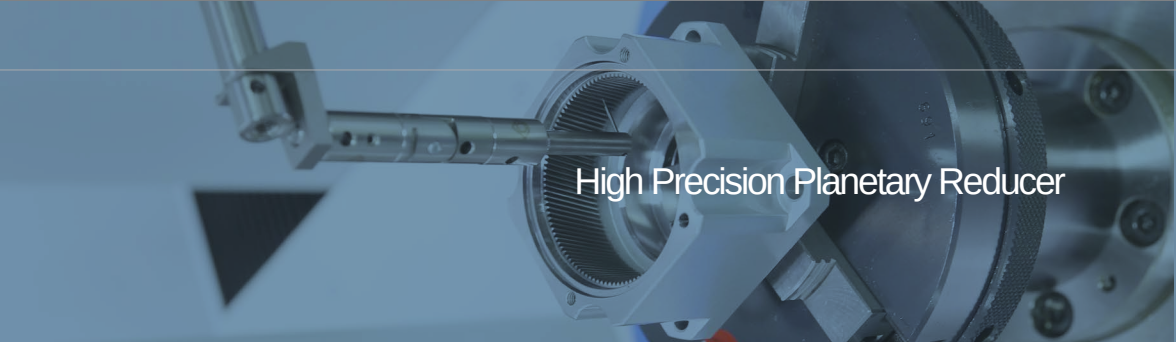
1-Stage

RATIO : 4, 5, 7, 10, 14, 20



unit: mm

| Model Code | 47            | 64            | 90                | 110            | 140             | 200                | 255             |
|------------|---------------|---------------|-------------------|----------------|-----------------|--------------------|-----------------|
| A1         | 67            | 79            | 109               | 135            | 168             | 233                | 280             |
| A2         | 8-3.4         | 8-4.5         | 8-5.5             | 8-5.5          | 12-6.6          | 12-9.0             | 16-13.5         |
| A3         | 28            | 40            | 63                | 80             | 100             | 160                | 180             |
| A4         | 47            | 64            | 90                | 110            | 140             | 200                | 255             |
| A5         | 6             | 6             | 9, 23.5           | 10, 20         | 10              | 12.5, 14.5         | 12.5, 14.5      |
| A6         | 12            | 20            | 31.5              | 40             | 50              | 80                 | 100             |
| A7         | 72            | 86            | 118               | 146            | 179             | 248                | 300             |
| A8         | 20            | 31.5          | 50                | 63             | 80              | 125                | 140             |
| A9         | 4 - M3 x P0.5 | 7 - M5 x P0.8 | 7 - M6 x P1.0     | 11 - M6 x P1.0 | 11 - M8 x P1.25 | 11 - M10 x P1.5    | 12 - M16 x P2.0 |
| A10        | 3             | 5             | 6                 | 6              | 8               | 10                 | 12              |
| B1         | 59            | 70            | 98                | 125            | 156             | 212                | 255             |
| B2         | 19.5          | 19.5          | 30                | 29             | 38              | 50                 | 66              |
| B3         | 5             | 7             | 12                | 12             | 12              | 16                 | 20              |
| B4         | 3             | 4             | 6                 | 6              | 6               | 8                  | 12              |
| B5         | 5             | 6             | 10                | 10             | 15              | 15                 | 20              |
| B6         | 6.5           | 8             | 12                | 12             | 16              | 22                 | 32              |
| B7         | 4             | 5             | 7                 | 8              | 10              | 12                 | 18              |
| B8         | 4             | 6             | 6                 | 7              | 7               | 10                 | 10              |
| B9         | 84.2          | 105.5         | 163.6             | 203            | 227.5           | 313                | 332.5           |
| B10        | 103.7         | 125           | 193.6             | 232            | 265.5           | 363                | 398.5           |
| C1         | 46, 60, 63    | 70, 75, 90    | 90, 110, 115, 145 | 115, 145, 165  | 145, 165, 215   | 200, 215, 265      | 200, 265, 300   |
| C2         | M3, M4, M5    | M4, M5, M6    | M5, M6, M8        | M6, M8, M10    | M8, M10, M12    | M10, M12, M16      | M12, M16        |
| C3         | 8, 9, 11      | 11, 14, 19    | 16, 19, 22, 24    | 24, 28, 32     | 32, 35, 38      | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
| C4         | 27            | 33.5, 42      | 53, 67.5          | 67, 77         | 85              | 132, 134           | 132, 134        |
| C5         | 30, 40, 50    | 50, 60, 70    | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180   | 114.3, 180, 230    | 220, 250, 265   |
| C6         | M4 x P0.7     | M5 x P0.8     | M6 x P1.0         | M8 x P1.25     | M10 x P1.5      | M10 x P1.5         | M10 x P1.5      |
| C7         | 46, 55        | 64, 70, 80    | 92, 110, 130      | 122, 130, 150  | 146, 150, 190   | 182, 200, 250      | 222, 250, 265   |
| C8         | 61            | 77, 85        | 115.3, 129.8      | 141, 151       | 165.7           | 235, 237           | 235, 273        |
| C9         | 90.5          | 112, 120      | 164.3, 178.8      | 203.5, 213.5   | 243.7           | 341, 343           | 362, 364        |



## High Precision Planetary Reducer

### SDL 1-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 47                                                                 | 64        | 90        | 110       | 140       | 200       | 255       |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 4      | 22                                                                 | 60        | 160       | 335       | 650       | 1,200     | 2,020     |
|                                                |            |           | 5      | 20                                                                 | 50        | 155       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 7      | 19                                                                 | 47        | 142       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 10     | 20                                                                 | 50        | 136       | 294       | 549       | 1,059     | 1,779     |
|                                                |            |           | 14     | 19                                                                 | 47        | 142       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 20     | 16                                                                 | 43        | 136       | 294       | 549       | 1,059     | 1,779     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 4 ~ 20 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 4 ~ 20 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 4 ~ 20 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 4 ~ 20 | 6,000                                                              | 6,000     | 6,000     | 6,000     | 5,000     | 4,000     | 3,000     |
| Backlash Ps                                    |            | arcmin    | 4 ~ 20 | -                                                                  | -         | $\leq 2$  | $\leq 2$  | $\leq 2$  | $\leq 2$  | $\leq 2$  |
| Backlash P0                                    |            | arcmin    | 4 ~ 20 | $\leq 4$                                                           | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  |
| Backlash P1                                    |            | arcmin    | 4 ~ 20 | $\leq 6$                                                           | $\leq 6$  | $\leq 6$  | $\leq 6$  | $\leq 6$  | $\leq 6$  | $\leq 6$  |
| Backlash P2                                    |            | arcmin    | 4 ~ 20 | $\leq 8$                                                           | $\leq 8$  | $\leq 8$  | $\leq 8$  | $\leq 8$  | $\leq 8$  | $\leq 8$  |
| Torsional Rigidity                             |            | Nm/arcmin | 4 ~ 20 | 6                                                                  | 14        | 30        | 86        | 155       | 450       | 1,126     |
| Max. Radial Force<br>Ball Bearing              | $F_{2rB}$  | N         | 4 ~ 10 | 2,040                                                              | 2,520     | 8,460     | 12,720    | 14,070    | 35,200    | 39,600    |
| Max. Axial Force<br>Ball Bearing               | $F_{2aB}$  | N         | 4 ~ 10 | 1,020                                                              | 1,260     | 4,230     | 6,360     | 7,035     | 17,600    | 19,800    |
| Max. Radial Force<br>Taper Bearing             | $F_{2rB}$  | N         | 4 ~ 10 | -                                                                  | -         | 14,660    | 23,000    | 37,200    | 73,600    | 107,200   |
| Max. Axial Force<br>Taper Bearing              | $F_{2aB}$  | N         | 4 ~ 10 | -                                                                  | -         | 7,330     | 11,500    | 18,600    | 36,800    | 53,600    |
| Service Life                                   | $L_H$      | hr        | 4 ~ 20 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 4 ~ 20 | $\geq 95$                                                          |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 4 ~ 20 | - 25° C ~ + 90° C                                                  |           |           |           |           |           |           |
| Lubrication                                    |            |           | 4 ~ 20 | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 4 ~ 20 | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 4 ~ 20 | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 4 ~ 20 | $\leq 65$                                                          | $\leq 68$ | $\leq 70$ | $\leq 72$ | $\leq 74$ | $\leq 76$ | $\leq 78$ |
| Weight $\pm 3\%$                               |            | Kg        | 4 ~ 20 | 1.1                                                                | 2.3       | 6.9       | 13.4      | 23        | 80        | 90        |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

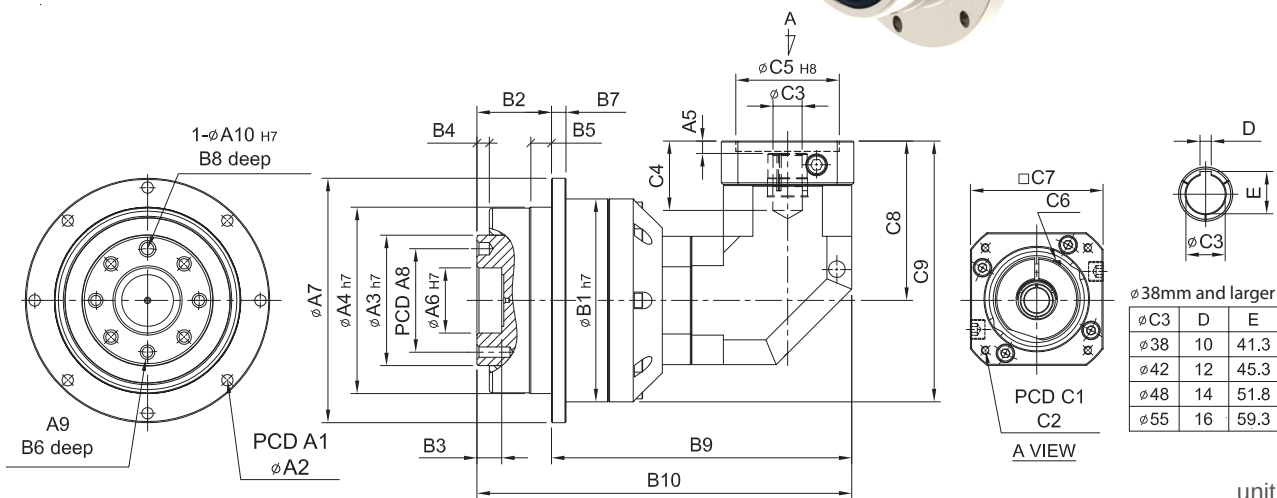
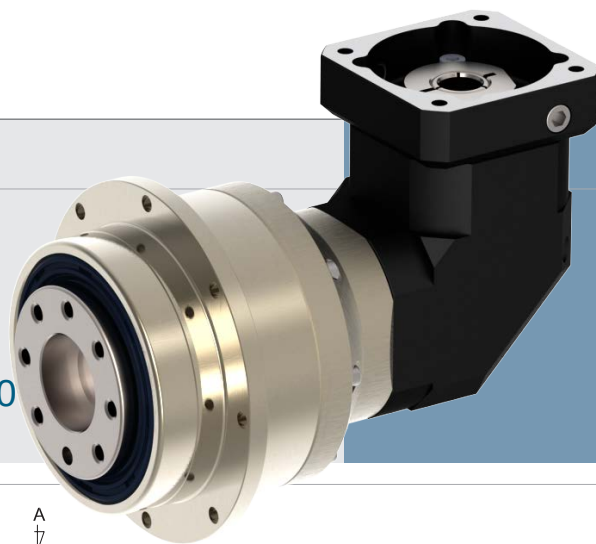
| Ratio | 47   | 64   | 90   | 110  | 140  | 200  | 255   |
|-------|------|------|------|------|------|------|-------|
| 4     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.1 | 134.8 |
| 5     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.1 | 134.8 |
| 7     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.1 | 134.8 |
| 10    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.1 | 134.8 |
| 14    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 66.5 | 120.2 |
| 20    | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 66.3 | 118.8 |

# SERVOBX Planetary Reducers

## SDL Series

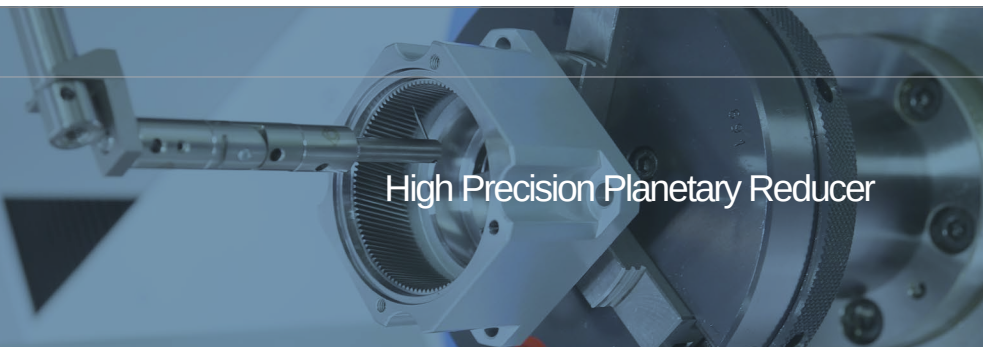
2-Stage

RATIO : 20, 25, 35, 40, 50, 70, 100, 140, 200



unit: mm

| Model Code | 47            | 64            | 90            | 110               | 140             | 200             | 255                |
|------------|---------------|---------------|---------------|-------------------|-----------------|-----------------|--------------------|
| A1         | 67            | 79            | 109           | 135               | 168             | 233             | 280                |
| A2         | 8-3.4         | 8-4.5         | 8-5.5         | 8-5.5             | 12-6.6          | 12-9.0          | 16-13.5            |
| A3         | 28            | 40            | 63            | 80                | 100             | 160             | 180                |
| A4         | 47            | 64            | 90            | 110               | 140             | 200             | 255                |
| A5         | 6             | 6             | 9, 23         | 9, 23.5           | 10              | 12.5            | 12.5, 14.5         |
| A6         | 12            | 20            | 31.5          | 40                | 50              | 80              | 100                |
| A7         | 72            | 86            | 118           | 146               | 179             | 248             | 300                |
| A8         | 20            | 31.5          | 50            | 63                | 80              | 125             | 140                |
| A9         | 4 - M3 x P0.5 | 7 - M5 x P0.8 | 7 - M6 x P1.0 | 11 - M6 x P1.0    | 11 - M8 x P1.25 | 11 - M10 x P1.5 | 12 - M16 x P2.0    |
| A10        | 3             | 5             | 6             | 6                 | 8               | 10              | 12                 |
| B1         | 59            | 70            | 98            | 125               | 156             | 212             | 255                |
| B2         | 19.5          | 19.5          | 30            | 29                | 38              | 50              | 66                 |
| B3         | 5             | 7             | 12            | 12                | 12              | 16              | 20                 |
| B4         | 3             | 4             | 6             | 6                 | 6               | 8               | 12                 |
| B5         | 5             | 6             | 10            | 10                | 15              | 15              | 20                 |
| B6         | 6.5           | 8             | 12            | 12                | 16              | 22              | 32                 |
| B7         | 4             | 5             | 7             | 8                 | 10              | 12              | 16                 |
| B8         | 4             | 6             | 6             | 7                 | 7               | 10              | 10                 |
| B9         | 110.2         | 118.5         | 151           | 210.6             | 254.5           | 308.5           | 379.1              |
| B10        | 129.7         | 138           | 181           | 239.6             | 292.5           | 358.5           | 445.1              |
| C1         | 46, 60, 63    | 46, 60, 63    | 70, 75, 90    | 90, 110, 115, 145 | 115, 145, 165   | 145, 165, 215   | 200, 215, 265      |
| C2         | M3, M4, M5    | M3, M4, M5    | M4, M5, M6    | M5, M6, M8, M10   | M6, M8, M10     | M8, M10, M12    | M10, M12, M16      |
| C3         | 8, 9, 11      | 8, 9, 11      | 14, 16, 19    | 16, 19, 22, 24    | 24, 28, 32      | 35, 38          | 35, 38, 42, 48, 55 |
| C4         | 27            | 27            | 33.5, 42      | 53, 67.5          | 67, 77          | 85              | 117, 119           |
| C5         | 30, 40, 50    | 30, 40, 50    | 50, 60, 70    | 70, 80, 95, 110   | 95, 110, 130    | 110, 130, 180   | 114.3, 180, 230    |
| C6         | M4 x P0.7     | M4 x P0.7     | M5 x P0.8     | M6 x P1.0         | M8 x P1.25      | M10 x P1.5      | M10 x P1.5         |
| C7         | 46, 55        | 46, 55        | 64, 70, 80    | 92, 110, 130      | 122, 130, 150   | 146, 150, 190   | 182, 200, 250      |
| C8         | 61            | 61            | 77, 85        | 115.3, 129.8      | 141, 151        | 165.7           | 235, 237           |
| C9         | 90.5          | 96            | 126, 134      | 177.8, 192.3      | 219, 229        | 271.7           | 362.5, 364.5       |



## High Precision Planetary Reducer

### SDL 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 47                                                                 | 64    | 90     | 110    | 140    | 200    | 255     |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-------|--------|--------|--------|--------|---------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 20       | 22                                                                 | 60    | 160    | 335    | 650    | 1,200  | 2,020   |
|                                                |            |           | 25       | 20                                                                 | 50    | 155    | 333    | 618    | 1,189  | 2,010   |
|                                                |            |           | 35       | 19                                                                 | 47    | 142    | 309    | 573    | 1,108  | 1,870   |
|                                                |            |           | 40       | 22                                                                 | 60    | 160    | 335    | 650    | 1,200  | 2,020   |
|                                                |            |           | 50       | 20                                                                 | 50    | 155    | 333    | 618    | 1,189  | 2,010   |
|                                                |            |           | 70       | 19                                                                 | 47    | 142    | 309    | 573    | 1,108  | 1,870   |
|                                                |            |           | 100      | 16                                                                 | 43    | 136    | 294    | 549    | 1,059  | 1,779   |
|                                                |            |           | 140      | 19                                                                 | 47    | 142    | 309    | 573    | 1,108  | 1,870   |
|                                                |            |           | 200      | 16                                                                 | 43    | 136    | 294    | 549    | 1,059  | 1,779   |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 20 ~ 200 | 1.8 Times of Rated Output Torque                                   |       |        |        |        |        |         |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 20 ~ 200 | 3 Times of Rated Output Torque                                     |       |        |        |        |        |         |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 20 ~ 200 | 3,000                                                              | 3,000 | 3,000  | 3,000  | 3,000  | 3,000  | 2,000   |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 20 ~ 200 | 6,000                                                              | 6,000 | 6,000  | 6,000  | 6,000  | 4,000  | 3,000   |
| Backlash Ps                                    |            | arcmin    | 20 ~ 200 | -                                                                  | -     | -      | ≤ 4    | ≤ 4    | ≤ 4    | ≤ 4     |
| Backlash P0                                    |            | arcmin    | 20 ~ 200 | ≤ 7                                                                | ≤ 7   | ≤ 7    | ≤ 7    | ≤ 7    | ≤ 7    | ≤ 7     |
| Backlash P1                                    |            | arcmin    | 20 ~ 200 | ≤ 9                                                                | ≤ 9   | ≤ 9    | ≤ 9    | ≤ 9    | ≤ 9    | ≤ 9     |
| Backlash P2                                    |            | arcmin    | 20 ~ 200 | ≤ 12                                                               | ≤ 12  | ≤ 12   | ≤ 12   | ≤ 12   | ≤ 12   | ≤ 12    |
| Torsional Rigidity                             |            | Nm/arcmin | 20 ~ 200 | 6                                                                  | 14    | 30     | 86     | 155    | 450    | 1,126   |
| Max. Radial Force<br>Ball Bearing              | $F_{2rB}$  | N         | 4 ~ 10   | 2,040                                                              | 2,520 | 8,460  | 12,720 | 14,070 | 35,200 | 39,600  |
| Max. Axial Force<br>Ball Bearing               | $F_{2aB}$  | N         | 4 ~ 10   | 1,020                                                              | 1,260 | 4,230  | 6,360  | 7,035  | 17,600 | 19,800  |
| Max. Radial Force<br>Taper Bearing             | $F_{2rB}$  | N         | 4 ~ 10   | -                                                                  | -     | 14,660 | 23,000 | 37,200 | 73,600 | 107,200 |
| Max. Axial Force<br>Taper Bearing              | $F_{2aB}$  | N         | 4 ~ 10   | -                                                                  | -     | 7,330  | 11,500 | 18,600 | 36,800 | 53,600  |
| Service Life                                   | $L_H$      | hr        | 20 ~ 200 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |        |        |        |        |         |
| Efficiency                                     | $\eta$     | %         | 20 ~ 200 | ≥ 92                                                               |       |        |        |        |        |         |
| Operating Temperature                          |            | °C        | 20 ~ 200 | - 25° C ~ + 90° C                                                  |       |        |        |        |        |         |
| Lubrication                                    |            |           | 20 ~ 200 | Synthetic Grease                                                   |       |        |        |        |        |         |
| Protection Class                               |            |           | 20 ~ 200 | IP65                                                               |       |        |        |        |        |         |
| Mounting Position                              |            |           | 20 ~ 200 | Any                                                                |       |        |        |        |        |         |
| Noise Level                                    |            | dB        | 20 ~ 200 | ≤ 65                                                               | ≤ 68  | ≤ 70   | ≤ 72   | ≤ 74   | ≤ 76   | ≤ 78    |
| Weight ±3%                                     |            | Kg        | 20 ~ 200 | 1.4                                                                | 2     | 6      | 11.8   | 22.3   | 48.5   | 97.5    |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

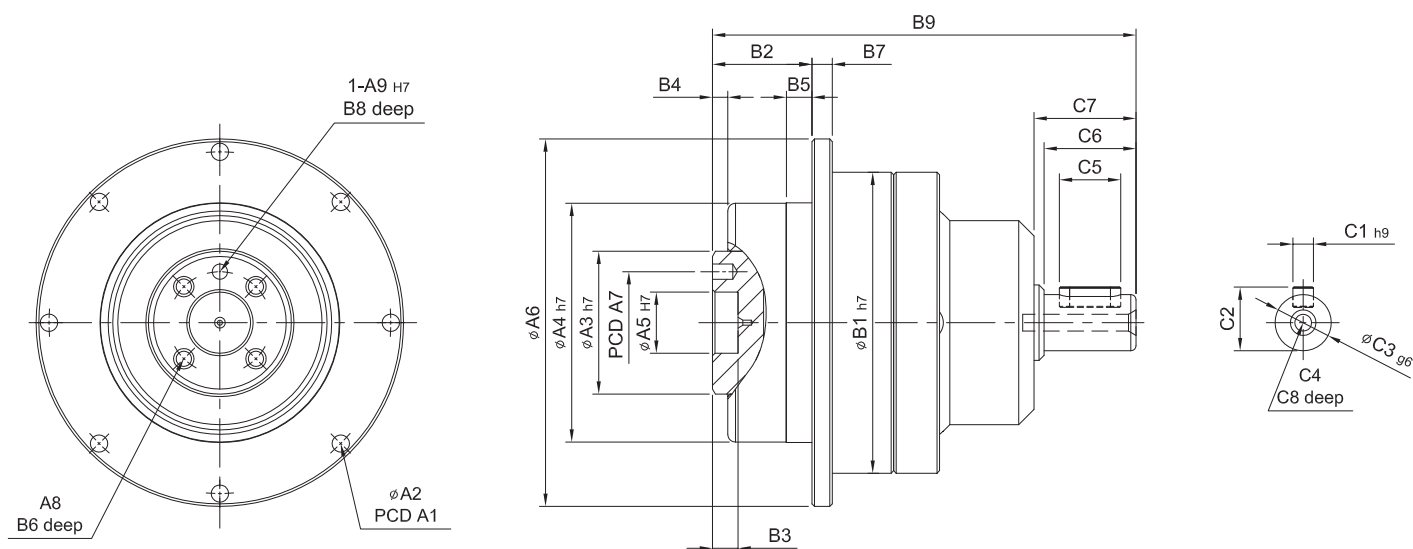
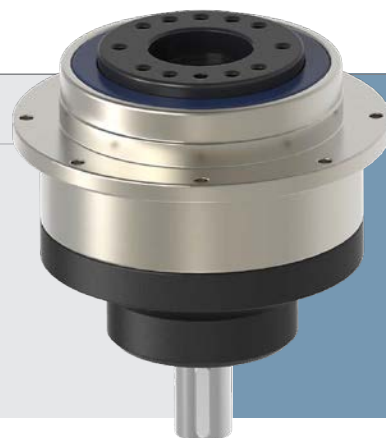
| Ratio | 47   | 64   | 90   | 110  | 140  | 200  | 255  |
|-------|------|------|------|------|------|------|------|
| 20    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 22.8 | 68.2 |
| 25    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 22.8 | 68.2 |
| 35    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 22.8 | 68.2 |
| 40    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 22.8 | 68.2 |
| 50    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 22.8 | 68.2 |
| 70    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 22.8 | 68.2 |
| 100   | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 22.8 | 68.2 |
| 140   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 21.1 | 64.9 |
| 200   | 0.03 | 0.08 | 1.88 | 6.2  | 21.8 | 21.1 | 64.9 |

# SERVOBX Planetary Reducers

## SDD Series

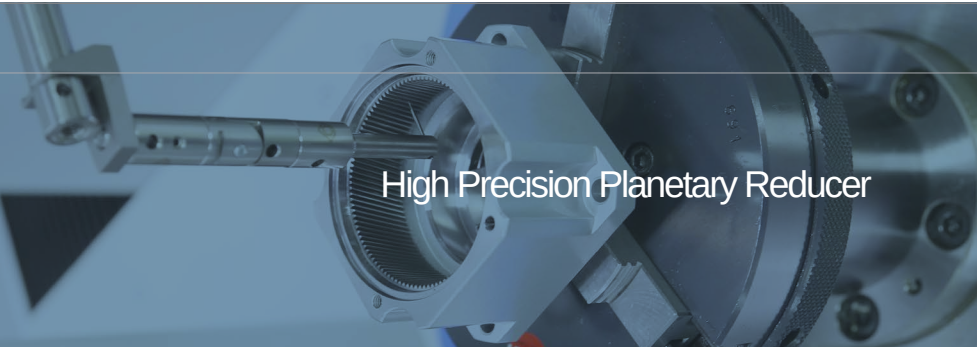
1-Stage

RATIO : 4, 5, 7, 10



unit: mm

| Model Code | 47            | 64            | 90            | 110            | 140             | 200             | 255            |
|------------|---------------|---------------|---------------|----------------|-----------------|-----------------|----------------|
| A1         | 67            | 79            | 109           | 135            | 168             | 233             | 280            |
| A2         | 8-3.4         | 8-4.5         | 8-5.5         | 8-5.5          | 12-6.6          | 12-9.0          | 16-13.5        |
| A3         | 28            | 40            | 63            | 80             | 100             | 160             | 180            |
| A4         | 47            | 64            | 90            | 110            | 140             | 200             | 255            |
| A5         | 12            | 20            | 31.5          | 40             | 50              | 80              | 100            |
| A6         | 72            | 86            | 118           | 146            | 179             | 248             | 300            |
| A7         | 20            | 31.5          | 50            | 63             | 80              | 125             | 140            |
| A8         | 4 - M3 x P0.5 | 7 - M5 x P0.8 | 7 - M6 x P1.0 | 11 - M6 x P1.0 | 11 - M8 x P1.25 | 11 - M10 x P1.5 | 12 - M16 x 2.0 |
| A9         | 3             | 5             | 6             | 6              | 8               | 10              | 12             |
| B1         | 59            | 70            | 98            | 125            | 156             | 212             | 255            |
| B2         | 19.5          | 19.5          | 30            | 29             | 38              | 50              | 66             |
| B3         | 5             | 7             | 12            | 12             | 12              | 16              | 20             |
| B4         | 1.5           | 4             | 6             | 6              | 6               | 8               | 12             |
| B5         | 5             | 6             | 10            | 10             | 15              | 15              | 20             |
| B6         | 6.5           | 8             | 12            | 12             | 16              | 22              | 32             |
| B7         | 4             | 5             | 7             | 8              | 10              | 12              | 18             |
| B8         | 4             | 6             | 6             | 7              | 7               | 10              | 10             |
| B9         | 83            | 99            | 134           | 160            | 195             | 252             | 322.5          |
| C1         | 4             | 5             | 5             | 6              | 10              | 12              | 16             |
| C2         | 12.5          | 16            | 18            | 24.5           | 35              | 43              | 59             |
| C3         | 11            | 14            | 16            | 22             | 32              | 40              | 55             |
| C4         | M4 x P0.7     | M5 x P0.8     | M6 x P1.0     | M8 x P1.25     | M12 x P1.75     | M14 x P2.0      | M16 x P2.0     |
| C5         | 12            | 20            | 20            | 30             | 40              | 50              | 75             |
| C6         | 18            | 24            | 28            | 36             | 50              | 60              | 85             |
| C7         | 20            | 26.3          | 31.5          | 40             | 54              | 65              | 90             |
| C8         | 8             | 10            | 12            | 16             | 24              | 28              | 32             |



## High Precision Planetary Reducer

### SDD 1-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 47                                                                 | 64        | 90        | 110       | 140       | 200       | 255       |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 4      | 22                                                                 | 60        | 160       | 335       | 650       | 1,200     | 2,020     |
|                                                |            |           | 5      | 20                                                                 | 50        | 155       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 7      | 19                                                                 | 47        | 142       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 10     | 16                                                                 | 43        | 136       | 294       | 549       | 1,059     | 1,779     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 4 ~ 10 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 4 ~ 10 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 4 ~ 10 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 4 ~ 10 | 6,000                                                              | 6,000     | 6,000     | 6,000     | 5,000     | 4,000     | 3,000     |
| Backlash Ps                                    |            | arcmin    | 4 ~ 10 | -                                                                  | -         | $\leq 1$  | $\leq 1$  | $\leq 1$  | $\leq 1$  | $\leq 1$  |
| Backlash P0                                    |            | arcmin    | 4 ~ 10 | $\leq 3$                                                           | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  |
| Backlash P1                                    |            | arcmin    | 4 ~ 10 | $\leq 5$                                                           | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  |
| Backlash P2                                    |            | arcmin    | 4 ~ 10 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Torsional Rigidity                             |            | Nm/arcmin | 4 ~ 10 | 6                                                                  | 14        | 30        | 86        | 155       | 450       | 1,126     |
| Max. Radial Force<br>Ball Bearing              | $F_{2rB}$  | N         | 4 ~ 10 | 2,040                                                              | 2,520     | 8,460     | 12,720    | 14,070    | 35,200    | 39,600    |
| Max. Axial Force<br>Ball Bearing               | $F_{2aB}$  | N         | 4 ~ 10 | 1,020                                                              | 1,260     | 4,230     | 6,360     | 7,035     | 17,600    | 19,800    |
| Max. Radial Force<br>Taper Bearing             | $F_{2rB}$  | N         | 4 ~ 10 | -                                                                  | -         | 14,660    | 23,000    | 37,200    | 73,600    | 107,200   |
| Max. Axial Force<br>Taper Bearing              | $F_{2aB}$  | N         | 4 ~ 10 | -                                                                  | -         | 7,330     | 11,500    | 18,600    | 36,800    | 53,600    |
| Service Life                                   | $L_H$      | hr        | 4 ~ 10 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 4 ~ 10 | $\geq 97$                                                          |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 4 ~ 10 | - 25° C ~ + 90° C                                                  |           |           |           |           |           |           |
| Lubrication                                    |            |           | 4 ~ 10 | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 4 ~ 10 | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 4 ~ 10 | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 4 ~ 10 | $\leq 56$                                                          | $\leq 58$ | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ | $\leq 70$ |
| Weight $\pm 3\%$                               |            | Kg        | 4 ~ 10 | 0.71                                                               | 1.3       | 3.6       | 6.2       | 12        | 32        | 53        |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

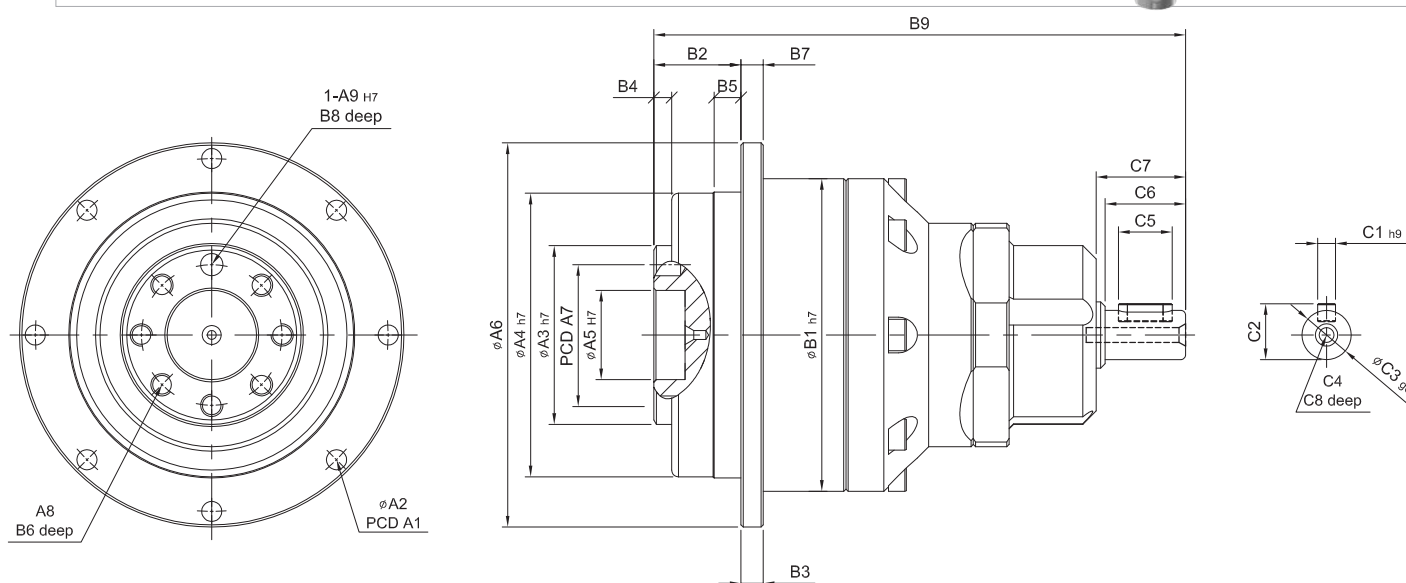
| Ratio | 47   | 64   | 90   | 110  | 140  | 200   | 255   |
|-------|------|------|------|------|------|-------|-------|
| 4     | 0.03 | 0.13 | 0.47 | 2.75 | 7.46 | 24.00 | 55    |
| 5     | 0.03 | 0.12 | 0.45 | 2.70 | 7.41 | 23.23 | 53.19 |
| 7     | 0.03 | 0.12 | 0.45 | 2.64 | 7.12 | 22.11 | 50.78 |
| 10    | 0.03 | 0.12 | 0.43 | 2.56 | 7.01 | 22.21 | 50.50 |

# SERVOBX Planetary Reducers

## SDD Series

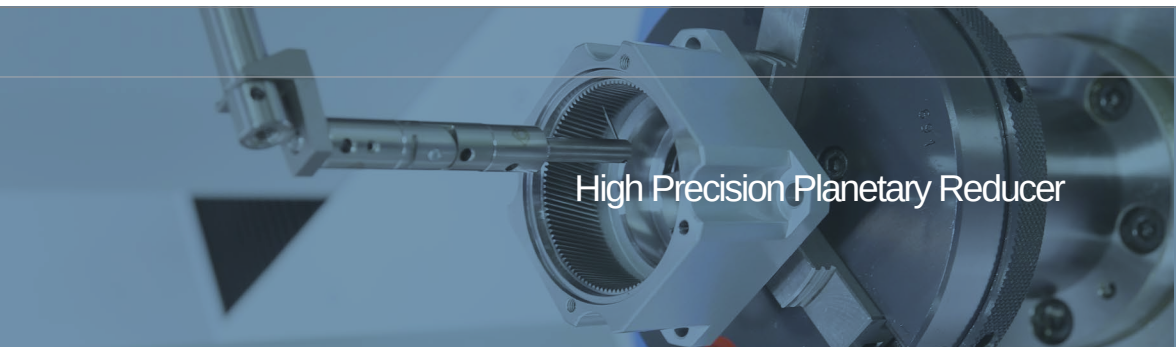
2-Stage

RATIO : 20, 25, 35, 40, 50, 70, 100



unit: mm

| Model Code | 47            | 64            | 90            | 110            | 140             | 200             | 255             |
|------------|---------------|---------------|---------------|----------------|-----------------|-----------------|-----------------|
| A1         | 67            | 79            | 109           | 135            | 168             | 233             | 280             |
| A2         | 8-3.4         | 8-4.5         | 8-5.5         | 8-5.5          | 12-6.6          | 12-9.0          | 16-13.5         |
| A3         | 28            | 40            | 63            | 80             | 100             | 160             | 180             |
| A4         | 47            | 64            | 90            | 110            | 140             | 200             | 255             |
| A5         | 12            | 20            | 31.5          | 40             | 50              | 80              | 100             |
| A6         | 72            | 86            | 118           | 146            | 179             | 248             | 300             |
| A7         | 20            | 31.5          | 50            | 63             | 80              | 125             | 140             |
| A8         | 4 - M3 x P0.5 | 7 - M5 x P0.8 | 7 - M6 x P1.0 | 11 - M6 x P1.0 | 11 - M8 x P1.25 | 11 - M10 x P1.5 | 12 - M16 x P2.0 |
| A9         | 3             | 5             | 6             | 6              | 8               | 10              | 12              |
| B1         | 59            | 70            | 98            | 125            | 156             | 212             | 255             |
| B2         | 19.5          | 19.5          | 30            | 29             | 38              | 50              | 66              |
| B3         | 5             | 7             | 12            | 12             | 12              | 16              | 20              |
| B4         | 1.5           | 4             | 6             | 6              | 6               | 8               | 12              |
| B5         | 5             | 6             | 10            | 10             | 15              | 15              | 20              |
| B6         | 6.5           | 8             | 12            | 12             | 16              | 22              | 32              |
| B7         | 4             | 5             | 7             | 8              | 10              | 12              | 18              |
| B8         | 4             | 6             | 6             | 7              | 7               | 10              | 10              |
| B9         | 109           | 119           | 159           | 190            | 231.5           | 299             | 350.5           |
| C1         | 4             | 4             | 5             | 5              | 6               | 10              | 12              |
| C2         | 12.5          | 12.5          | 16            | 18             | 24.5            | 35              | 43              |
| C3         | 11            | 11            | 14            | 16             | 22              | 32              | 40              |
| C4         | M4 x P0.7     | M4 x P0.7     | M5 x P0.8     | M6 x P1.0      | M8 x P1.25      | M12 x P1.75     | M14 x P2.0      |
| C5         | 12            | 12            | 20            | 20             | 30              | 40              | 50              |
| C6         | 18            | 18            | 24            | 28             | 36              | 50              | 60              |
| C7         | 20            | 20            | 26            | 31.5           | 40              | 54              | 65              |
| C8         | 8             | 8             | 10            | 12             | 16              | 24              | 28              |



## High Precision Planetary Reducer

### SDD 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 47                                                                 | 64    | 90     | 110    | 140    | 200    | 255     |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-------|--------|--------|--------|--------|---------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 20       | 22                                                                 | 60    | 160    | 335    | 650    | 1,200  | 2,020   |
|                                                |            |           | 25       | 20                                                                 | 50    | 155    | 333    | 618    | 1,189  | 2,010   |
|                                                |            |           | 35       | 19                                                                 | 47    | 142    | 309    | 573    | 1,108  | 1,870   |
|                                                |            |           | 40       | 22                                                                 | 60    | 160    | 335    | 650    | 1,200  | 2,020   |
|                                                |            |           | 50       | 20                                                                 | 50    | 155    | 333    | 618    | 1,189  | 2,010   |
|                                                |            |           | 70       | 19                                                                 | 47    | 142    | 309    | 573    | 1,108  | 1,870   |
|                                                |            |           | 100      | 16                                                                 | 43    | 136    | 294    | 549    | 1,059  | 1,779   |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 20 ~ 100 | 1.8 Times of Rated Output Torque                                   |       |        |        |        |        |         |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 20 ~ 100 | 3 Times of Rated Output Torque                                     |       |        |        |        |        |         |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 20 ~ 100 | 3,000                                                              | 3,000 | 3,000  | 3,000  | 3,000  | 3,000  | 2,000   |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 20 ~ 100 | 6,000                                                              | 6,000 | 6,000  | 6,000  | 5,000  | 4,000  | 3,000   |
| Backlash Ps                                    |            | arcmin    | 20 ~ 100 | -                                                                  | -     | -      | ≤ 3    | ≤ 3    | ≤ 3    | ≤ 3     |
| Backlash P0                                    |            | arcmin    | 20 ~ 100 | ≤ 5                                                                | ≤ 5   | ≤ 5    | ≤ 5    | ≤ 5    | ≤ 5    | ≤ 5     |
| Backlash P1                                    |            | arcmin    | 20 ~ 100 | ≤ 7                                                                | ≤ 7   | ≤ 7    | ≤ 7    | ≤ 7    | ≤ 7    | ≤ 7     |
| Backlash P2                                    |            | arcmin    | 20 ~ 100 | ≤ 9                                                                | ≤ 9   | ≤ 9    | ≤ 9    | ≤ 9    | ≤ 9    | ≤ 9     |
| Torsional Rigidity                             |            | Nm/arcmin | 20 ~ 100 | 6                                                                  | 14    | 30     | 86     | 155    | 450    | 1,126   |
| Max. Radial Force<br>Ball Bearing              | $F_{2rB}$  | N         | 4 ~ 10   | 2,040                                                              | 2,520 | 8,460  | 12,720 | 14,070 | 35,200 | 39,600  |
| Max. Axial Force<br>Ball Bearing               | $F_{2aB}$  | N         | 4 ~ 10   | 1,020                                                              | 1,260 | 4,230  | 6,360  | 7,035  | 17,600 | 19,800  |
| Max. Radial Force<br>Taper Bearing             | $F_{2rB}$  | N         | 4 ~ 10   | -                                                                  | -     | 14,660 | 23,000 | 37,200 | 73,600 | 107,200 |
| Max. Axial Force<br>Taper Bearing              | $F_{2aB}$  | N         | 4 ~ 10   | -                                                                  | -     | 7,330  | 11,500 | 18,600 | 36,800 | 53,600  |
| Service Life                                   | $L_H$      | hr        | 20 ~ 100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |        |        |        |        |         |
| Efficiency                                     | $\eta$     | %         | 20 ~ 100 | ≥ 94                                                               |       |        |        |        |        |         |
| Operating Temperature                          |            | °C        | 20 ~ 100 | - 25° C ~ + 90° C                                                  |       |        |        |        |        |         |
| Lubrication                                    |            |           | 20 ~ 100 | Synthetic Grease                                                   |       |        |        |        |        |         |
| Protection Class                               |            |           | 20 ~ 100 | IP65                                                               |       |        |        |        |        |         |
| Mounting Position                              |            |           | 20 ~ 100 | Any                                                                |       |        |        |        |        |         |
| Noise Level                                    |            | dB        | 20 ~ 100 | ≤ 56                                                               | ≤ 58  | ≤ 60   | ≤ 63   | ≤ 65   | ≤ 67   | ≤ 70    |
| Weight ±3%                                     |            | Kg        | 20 ~ 100 | 1.15                                                               | 1.7   | 4.25   | 8.5    | 14.95  | 37.2   | 69      |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 47   | 64   | 90   | 110  | 140 | 200  | 255   |
|-------|------|------|------|------|-----|------|-------|
| 20    | 0.03 | 0.03 | 0.15 | 0.45 | 2.7 | 7.22 | 23.22 |
| 25    | 0.03 | 0.03 | 0.15 | 0.45 | 2.7 | 7.22 | 23.22 |
| 35    | 0.03 | 0.03 | 0.15 | 0.45 | 2.7 | 7.22 | 23.22 |
| 40    | 0.03 | 0.03 | 0.15 | 0.45 | 2.7 | 7.22 | 23.22 |
| 50    | 0.03 | 0.03 | 0.14 | 0.4  | 2.6 | 7.05 | 23.07 |
| 70    | 0.03 | 0.03 | 0.14 | 0.4  | 2.6 | 7.05 | 23.07 |
| 100   | 0.03 | 0.03 | 0.14 | 0.4  | 2.6 | 7.01 | 22.67 |

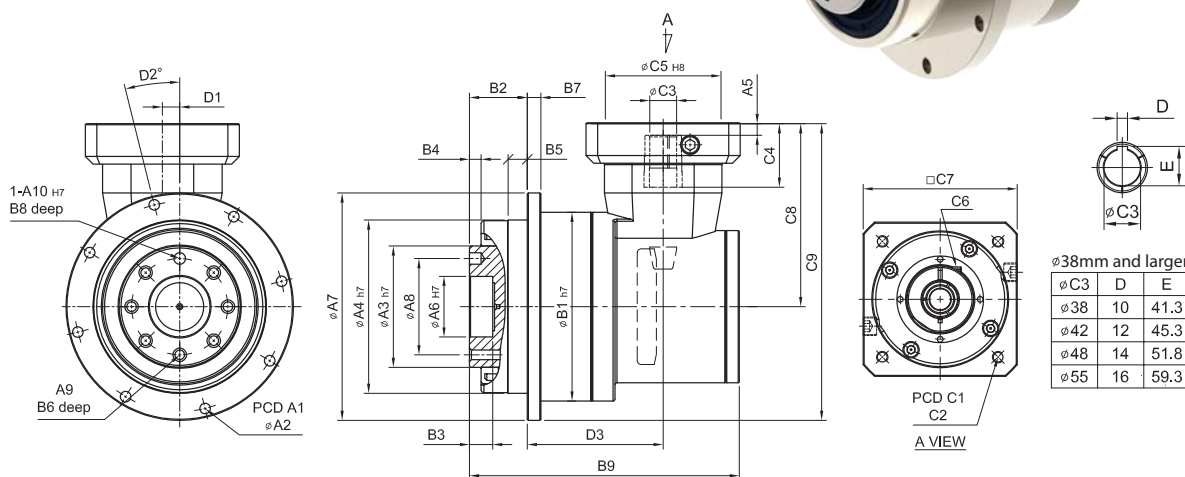
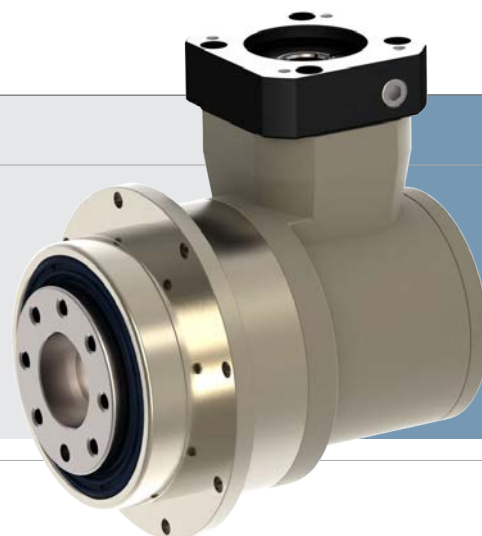
# SERVOBX Planetary Reducers

Hypoid Gear with Helical Planetary Input

## SDH Series

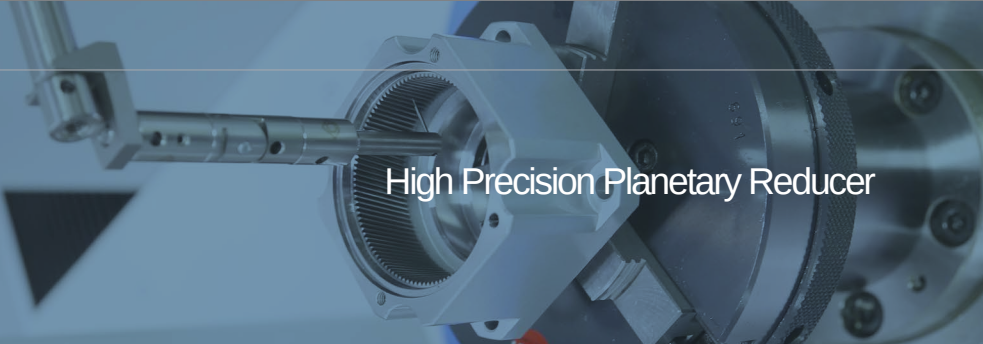
2-Stage

RATIO : 20, 25, 35, 50, 70, 100, 150



unit: mm

| Model Code | 64            | 90            | 110               | 140             | 200             | 255             |
|------------|---------------|---------------|-------------------|-----------------|-----------------|-----------------|
| A1         | 79            | 109           | 135               | 168             | 233             | 280             |
| A2         | 8-4.5         | 8-5.5         | 8-5.5             | 12-6.6          | 12-9.0          | 16-13.5         |
| A3         | 40            | 63            | 80                | 100             | 160             | 180             |
| A4         | 64            | 90            | 110               | 140             | 200             | 255             |
| A5         | 5             | 6             | 9                 | 10              | 10              | 13              |
| A6         | 20            | 31.5          | 40                | 50              | 80              | 100             |
| A7         | 86            | 118           | 146               | 179             | 248             | 300             |
| A8         | 31.5          | 50            | 63                | 80              | 125             | 140             |
| A9         | 7 - M5 x P0.8 | 7 - M6 x P1.0 | 11 - M6 x P1.0    | 11 - M8 x P1.25 | 11 - M10 x P1.5 | 12 - M16 x P2.0 |
| A10        | 5             | 6             | 6                 | 8               | 10              | 12              |
| B1         | 70            | 98            | 125               | 156             | 212             | 255             |
| B2         | 19.5          | 30            | 29                | 38              | 50              | 66              |
| B3         | 7             | 12            | 12                | 12              | 16              | 20              |
| B4         | 4             | 6             | 6                 | 6               | 8               | 12              |
| B5         | 6             | 10            | 10                | 15              | 15              | 20              |
| B6         | 8             | 12            | 12                | 16              | 22              | 32              |
| B7         | 5             | 7             | 8                 | 10              | 12              | 18              |
| B8         | 6             | 6             | 7                 | 7               | 10              | 10              |
| B9         | 96            | 140           | 168               | 202             | 273             | 303.5           |
| C1         | 46, 60, 63    | 70, 75, 90    | 90, 110, 115, 145 | 115, 145, 165   | 145, 165, 215   | 200, 215, 265   |
| C2         | M3, M4, M5    | M4, M5, M6    | M5, M6, M8        | M6, M8, M10     | M8, M10, M12    | M10, M12, M16   |
| C3         | 8, 9, 11      | 14            | 24                | 32              | 38              | 42, 48, 55      |
| C4         | 26            | 33            | 59                | 67              | 85              | 116             |
| C5         | 30, 40, 50    | 50, 60, 70    | 70, 80, 95, 110   | 95, 110, 130    | 110, 130, 180   | 114.3, 180, 230 |
| C6         | M4 x P0.7     | M5 x P0.8     | M6 x P1.0         | M8 x P1.25      | M10 x P1.5      | M10 x P1.5      |
| C7         | 46, 55        | 64, 70, 80    | 92, 110, 130      | 122, 130, 150   | 146, 150, 190   | 182, 200, 250   |
| C8         | 69            | 95.5          | 126.5             | 149             | 203             | 259.5           |
| C9         | 112           | 154.5         | 199.5             | 238.5           | 327             | 409.5           |
| C10        | 1/8"PT        | 1/8"PT        | 1/8"PT            | 1/4"PT          | 1/4"PT          | 3/8"PT          |
| D1         | 9             | 9             | 14                | 18              | 27              | 32              |
| D2         | 19            | 14            | 14                | 0               | 0               | 18              |
| D3         | 46.2          | 70.5          | 90                | 103.8           | 144             | 147.5           |



## High Precision Planetary Reducer

### SDH 2-Stage

#### ■ Performance

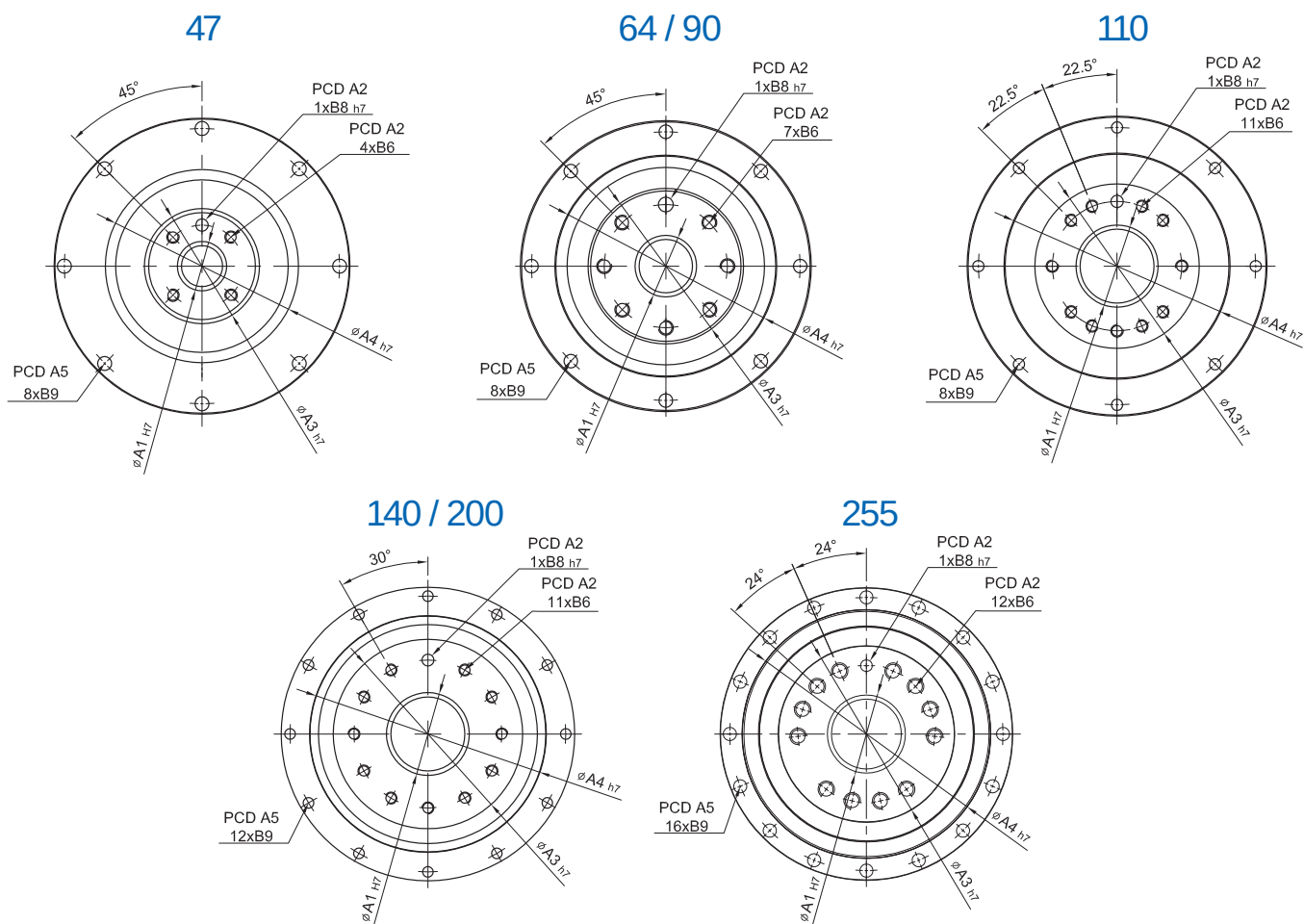
| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 64                                                                 | 90        | 110       | 140       | 200       | 255       |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 20     | 60                                                                 | 160       | 335       | 650       | 1,200     | 2,020     |
|                                                |            |           | 25     | 50                                                                 | 155       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 35     | 47                                                                 | 142       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 50     | 50                                                                 | 155       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 70     | 47                                                                 | 142       | 309       | 573       | 1,108     | 1,870     |
|                                                |            |           | 100    | 43                                                                 | 136       | 294       | 549       | 1,059     | 1,779     |
|                                                |            |           | 150    | 43                                                                 | 136       | 294       | 549       | 1,059     | 1,779     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 4 ~ 10 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 4 ~ 10 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 4 ~ 10 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 2,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 4 ~ 10 | 6,000                                                              | 6,000     | 5,000     | 5,000     | 4,000     | 4,000     |
| Backlash P0                                    |            | arcmin    | 4 ~ 10 | $\leq 4$                                                           | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  |
| Backlash P1                                    |            | arcmin    | 4 ~ 10 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Backlash P2                                    |            | arcmin    | 4 ~ 10 | $\leq 10$                                                          | $\leq 10$ | $\leq 10$ | $\leq 10$ | $\leq 10$ | $\leq 10$ |
| Torsional Rigidity                             |            | Nm/arcmin | 4 ~ 10 | 14                                                                 | 30        | 86        | 155       | 450       | 1,126     |
| Max. Radial Force<br>Ball Bearing              | $F_{2rB}$  | N         | 4 ~ 10 | 2,520                                                              | 8,460     | 12,720    | 14,070    | 35,200    | 39,600    |
| Max. Axial Force<br>Ball Bearing               | $F_{2aB}$  | N         | 4 ~ 10 | 1,260                                                              | 4,230     | 6,360     | 7,035     | 17,600    | 19,800    |
| Max. Radial Force<br>Taper Bearing             | $F_{2rB}$  | N         | 4 ~ 10 | -                                                                  | 14,660    | 23,000    | 37,200    | 73,600    | 107,200   |
| Max. Axial Force<br>Taper Bearing              | $F_{2aB}$  | N         | 4 ~ 10 | -                                                                  | 7,330     | 11,500    | 18,600    | 36,800    | 53,600    |
| Service Life                                   | $L_H$      | hr        | 4 ~ 10 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 4 ~ 10 | $\geq 95$                                                          |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 4 ~ 10 | - 25° C ~ + 90° C                                                  |           |           |           |           |           |
| Lubrication                                    |            |           | 4 ~ 10 | Synthetic Grease                                                   |           |           |           |           |           |
| Protection Class                               |            |           | 4 ~ 10 | IP65                                                               |           |           |           |           |           |
| Mounting Position                              |            |           | 4 ~ 10 | Any                                                                |           |           |           |           |           |
| Noise Level                                    |            | dB        | 4 ~ 10 | $\leq 68$                                                          | $\leq 70$ | $\leq 72$ | $\leq 74$ | $\leq 76$ | $\leq 78$ |
| Weight $\pm 3\%$                               |            | Kg        | 4 ~ 10 | 1.7                                                                | 4.7       | 9.2       | 17.4      | 38.8      | 61.7      |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 64   | 90   | 110  | 140  | 200  | 255   |
|-------|------|------|------|------|------|-------|
| 20    | 0.03 | 0.15 | 0.45 | 2.7  | 7.22 | 23.22 |
| 25    | 0.22 | 1.37 | 4.11 | 14.1 | 40.8 | 80.8  |
| 35    | 0.22 | 1.37 | 4.11 | 14.1 | 40.8 | 80.8  |
| 50    | 0.18 | 1.14 | 3.43 | 11.7 | 34.0 | 67.4  |
| 70    | 0.03 | 0.14 | 0.4  | 2.6  | 7.05 | 23.07 |
| 100   | 0.03 | 0.14 | 0.4  | 2.6  | 7.01 | 22.67 |
| 150   | 0.03 | 0.14 | 0.4  | 2.6  | 7.01 | 22.67 |



## SD, SDL, SDD Series Output Frame Dimensions



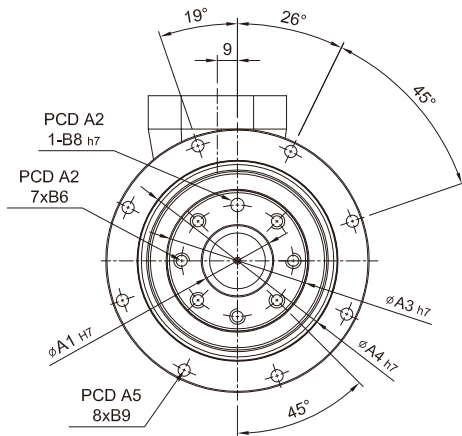
1-Stage SD, SDL, SDD 2-Stage SD, SDL, SDD

unit: mm

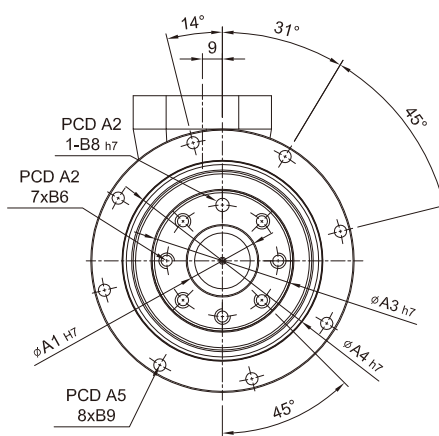
| Model Code | 47 | 64        | 90        | 110     | 140     | 200        | 255        |
|------------|----|-----------|-----------|---------|---------|------------|------------|
| A          | A1 | 12        | 20        | 31.5    | 40      | 50         | 100        |
|            | A2 | 20        | 31.5      | 50      | 63      | 80         | 140        |
|            | A3 | 28        | 40        | 63      | 80      | 100        | 180        |
|            | A4 | 47        | 64        | 90      | 110     | 200        | 255        |
|            | A5 | 67        | 79        | 109     | 135     | 233        | 280        |
| B          | B6 | M3 x P0.5 | M5 x P0.8 | M6 x P1 | M6 x P1 | M8 x P1.25 | M10 x P1.5 |
|            | B8 | 3         | 5         | 6       | 6       | 8          | 10         |
|            | B9 | 3.4       | 4.5       | 5.5     | 5.5     | 6.6        | 9          |

## SDH Series Output Frame Dimensions

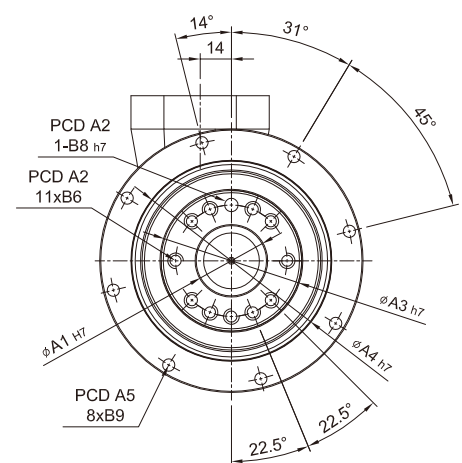
SDH64



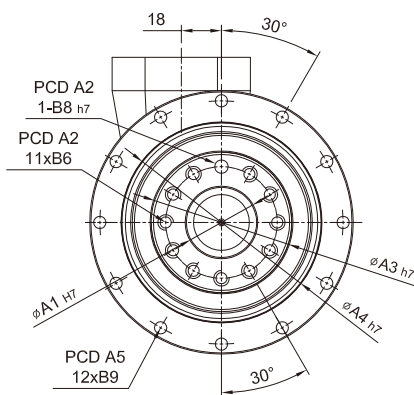
SDH90



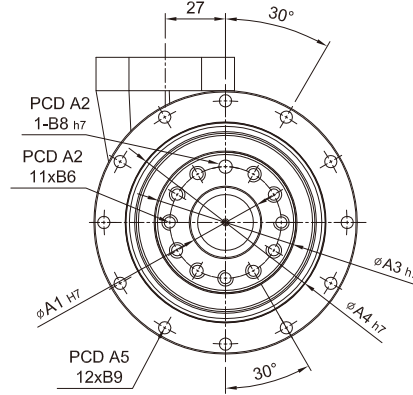
SDH110



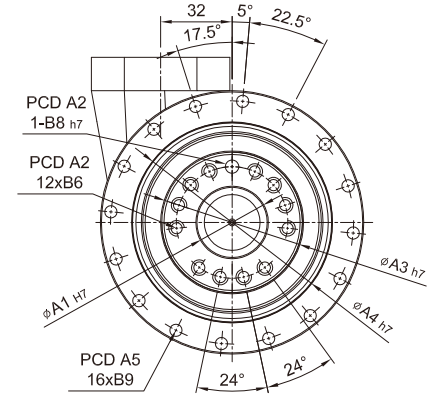
SDH140



SDH200



SDH255



2-Stage SDH

unit: mm

|   | Model | 64        | 90      | 110     | 140        | 200        | 255      |
|---|-------|-----------|---------|---------|------------|------------|----------|
|   | Code  |           |         |         |            |            |          |
| A | A1    | 20        | 31.5    | 40      | 50         | 80         | 100      |
|   | A2    | 31.5      | 50      | 63      | 80         | 125        | 140      |
|   | A3    | 40        | 63      | 80      | 100        | 160        | 180      |
|   | A4    | 64        | 90      | 110     | 140        | 200        | 255      |
|   | A5    | 79        | 109     | 135     | 168        | 233        | 280      |
| B | B6    | M5 x P0.8 | M6 x P1 | M6 x P1 | M8 x P1.25 | M10 x P1.5 | M16 x P2 |
|   | B8    | 5         | 6       | 6       | 8          | 10         | 12       |
|   | B9    | 4.5       | 5.5     | 5.5     | 6.6        | 9          | 13.5     |

# SERVOBOX Planetary Reducers

## SF/SFL Series Features

### Enhanced Load-Bearing Capacity:

Dual taper roller bearing support output shaft

Designed for direct pulley or pinion mounting

Output radial force up to 17,860N

Output axial force up to 15,180N

Helical hardened & ground gearing for greater wear resistance

### Five Frame Sizes:

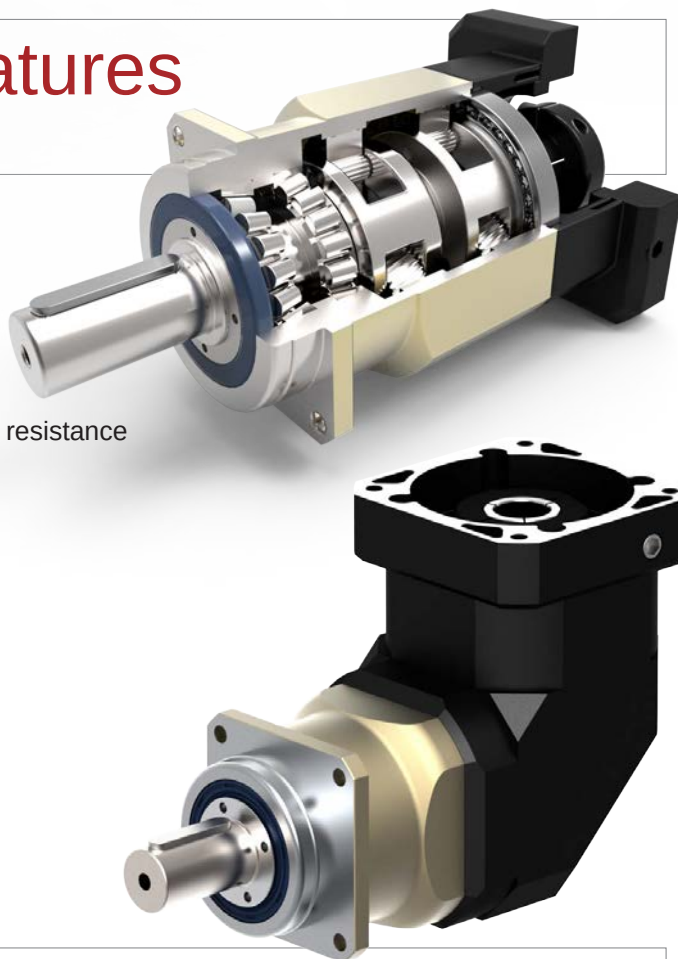
62mm..180mm

### Four Precision Grades:

Backlash classes up to  $\leq 1$ arcmin

### High Efficiency

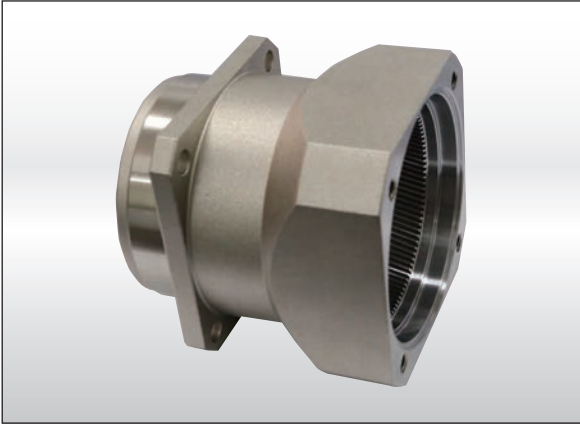
1-stage models  $\geq 97\%$ ; 2-stage models  $\geq 94\%$



## SF Series Model Code

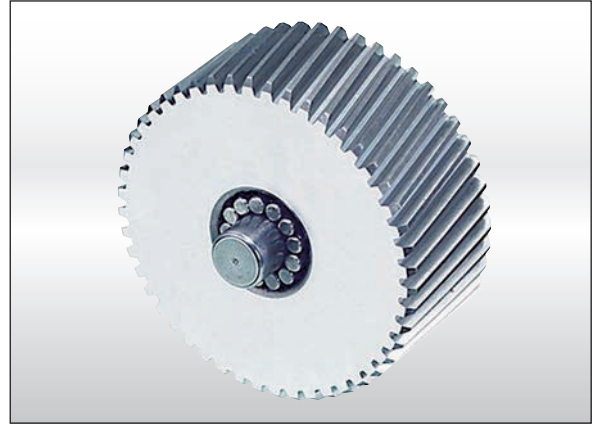
| SF                                                                   | 142                                             | 010                                                                                                                                                                          |                                                                                                                                        | P1                                            | MOTOR                                                  |
|----------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------|
| <b>Series</b><br>Inline<br>SF<br>SF-A<br>Right Angle<br>SFL<br>SFL-A | <b>Model</b><br>062<br>075<br>100<br>142<br>180 | <b>Ratio</b><br>1-Stage (SF/-A)<br>003, 004, 005, 006<br>007, 008, 009, 010<br>2-Stage (SF/-A)<br>015 ~ 100<br>1-Stage (SFL/A)<br>003 ~ 020<br>2-Stage (SFL/-A)<br>015 ~ 200 | <b>Output Shaft Keyway</b><br><input type="checkbox"/> Blank: Standard<br>(Keyed Output Shaft)<br>N: Solid Output Shaft<br>(No Keyway) | <b>Backlash Class</b><br>Ps<br>P0<br>P1<br>P2 | <b>Motor Designation</b><br>Motor Brand &<br>Model No. |

## SF Series Features



### One-piece Helical Gear Box

SF gearbox body and the internal ring gear form a single structural element to minimise distortions due to rapid speed changes and heavy loads. The ring gear teeth are precision machined to DIN6 standard.



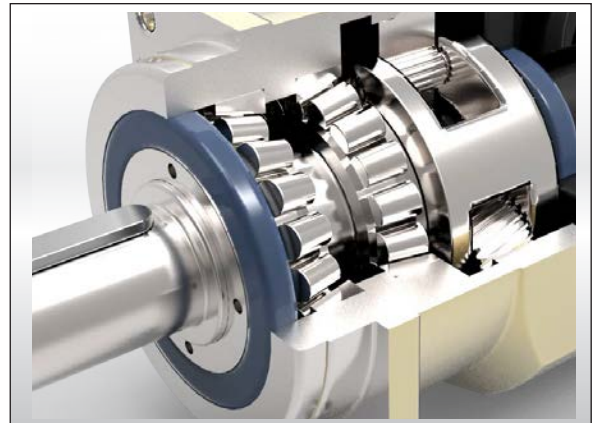
### Full Needle Roller Bearings Design

The planet gears are supported by needle roller bearings without retainer. This maximises the rollers contact area, helping to improve structural rigidity and extend operating life.



### Collet Locking Mechanism

Motor shaft is coupled to the reducer input using collet locking mechanism. Our manufacturing process includes dynamic balance analysis of the input assembly, to ensure concentricity and rigid, reliable, backlash-free permanent engagement with the motor shaft, at any speed and torque.



### Integrated Planetary Arm Bracket

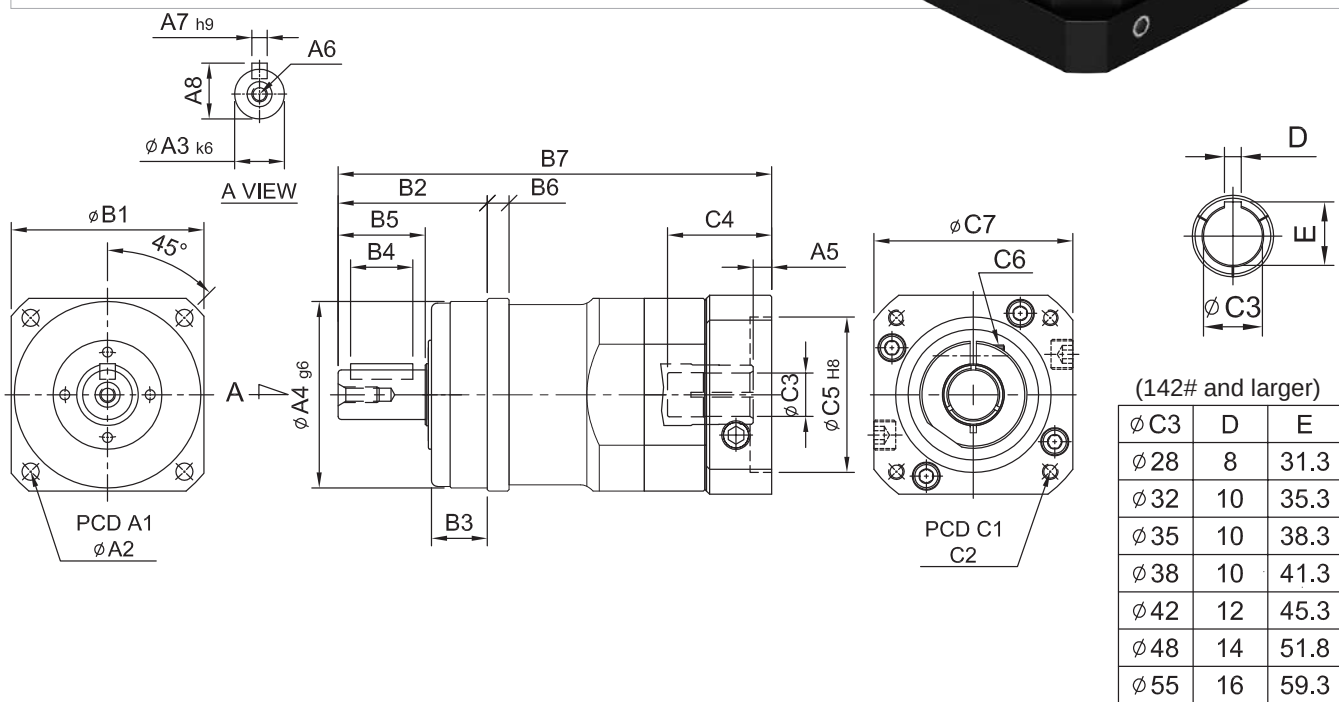
The reducer output shaft and the planet gears carrier form an integral structure that is machined as one piece. This achieves highest torsional rigidity and accuracy. Dual roller bearing support further improves axial and radial load capacity.

# SERVOBX Planetary Reducers

## SF Series

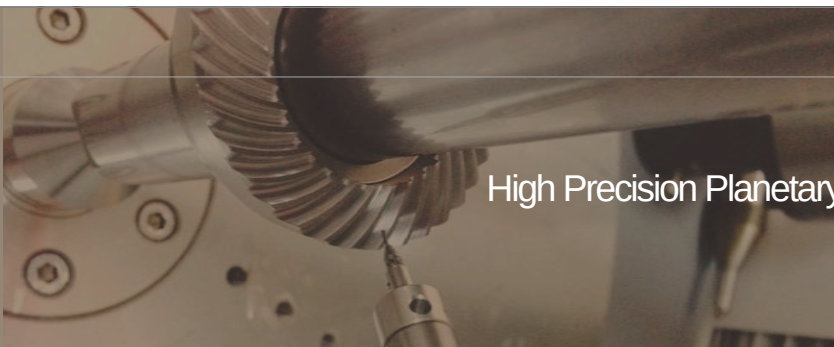
1-Stage

RATIO : 3, 4, 5, 6, 7, 8, 9, 10



unit: mm

| Model Code | 62             | 75                | 100            | 142            | 180                |
|------------|----------------|-------------------|----------------|----------------|--------------------|
| A1         | 68             | 85                | 120            | 165            | 215                |
| A2         | 5.5            | 6.8               | 9              | 11             | 13                 |
| A3         | 16             | 22                | 32             | 40             | 55                 |
| A4         | 60             | 70                | 90             | 130            | 160                |
| A5         | 6              | 9.2               | 10.5           | 10             | 11.5, 13.5         |
| A6         | M5 x P0.8      | M8 x P1.25        | M10 x P1.5     | M12 x P1.75    | M14 x P2.0         |
| A7         | 5              | 6                 | 10             | 12             | 16                 |
| A8         | 18             | 24.5              | 35             | 43             | 59                 |
| B1         | 62             | 76                | 106            | 142            | 180                |
| B2         | 48             | 56                | 88             | 112            | 112                |
| B3         | 18             | 18                | 27             | 27             | 26                 |
| B4         | 20             | 32                | 50             | 70             | 70                 |
| B5         | 28             | 36                | 58             | 82             | 82                 |
| B6         | 6              | 7                 | 10             | 12             | 15                 |
| B7         | 139.5, 147.5   | 191               | 242.5          | 306            | 360, 362           |
| C1         | 70, 75, 90     | 90, 110, 115, 145 | 115, 145, 165  | 145, 165, 215  | 200, 215, 265      |
| C2         | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   | M10, M12, M16      |
| C3         | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32, 35 | 28, 32, 35, 38 | 35, 38, 42, 48, 55 |
| C4         | 33.5           | 59.2              | 67.5           | 84.5           | 114.5, 116.5       |
| C5         | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  | 114.3, 180, 230    |
| C6         | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     | M10 x P1.5         |
| C7         | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  | 182, 200, 250      |



## High Precision Planetary Reducer

### SF 1-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 62                                                                 | 75        | 100       | 142       | 180       |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 3      | 59                                                                 | 165       | 216       | 625       | 1,206     |
|                                                |            |           | 4      | 51                                                                 | 146       | 208       | 555       | 1,069     |
|                                                |            |           | 5      | 48                                                                 | 155       | 333       | 618       | 1,189     |
|                                                |            |           | 6      | 45                                                                 | 150       | 315       | 583       | 1,118     |
|                                                |            |           | 7      | 45                                                                 | 142       | 309       | 573       | 1,108     |
|                                                |            |           | 8      | 44                                                                 | 141       | 305       | 553       | 1,070     |
|                                                |            |           | 9      | 44                                                                 | 140       | 293       | 551       | 1,060     |
|                                                |            |           | 10     | 43                                                                 | 136       | 294       | 549       | 1,059     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 3 ~ 10 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 3 ~ 10 | 3 Times of Rated Output Torque                                     |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 3 ~ 10 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 3 ~ 10 | 6,000                                                              | 6,000     | 6,000     | 5,000     | 4,000     |
| Backlash Ps                                    |            | arcmin    | 3 ~ 10 | -                                                                  | $\leq 1$  | $\leq 1$  | $\leq 1$  | $\leq 1$  |
| Backlash P0                                    |            | arcmin    | 3 ~ 10 | $\leq 3$                                                           | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  |
| Backlash P1                                    |            | arcmin    | 3 ~ 10 | $\leq 5$                                                           | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  |
| Backlash P2                                    |            | arcmin    | 3 ~ 10 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Torsional Rigidity                             |            | Nm/arcmin | 3 ~ 10 | 8                                                                  | 15        | 27        | 60        | 150       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 3 ~ 10 | 2,240                                                              | 4,150     | 8,760     | 12,750    | 17,860    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 3 ~ 10 | 1,920                                                              | 3,780     | 7,500     | 10,840    | 15,180    |
| Service Life                                   | $L_H$      | hr        | 3 ~ 10 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 3 ~ 10 | $\geq 97$                                                          |           |           |           |           |
| Operating Temperature                          |            | °C        | 3 ~ 10 | - 25° C ~ + 90° C                                                  |           |           |           |           |
| Lubrication                                    |            |           | 3 ~ 10 | Synthetic Grease                                                   |           |           |           |           |
| Protection Class                               |            |           | 3 ~ 10 | IP65                                                               |           |           |           |           |
| Mounting Position                              |            |           | 3 ~ 10 | Any                                                                |           |           |           |           |
| Noise Level                                    |            | dB        | 3 ~ 10 | $\leq 58$                                                          | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ |
| Weight $\pm 3\%$                               |            | Kg        | 3 ~ 10 | 1.7                                                                | 4.5       | 8.3       | 16.7      | 34.3      |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

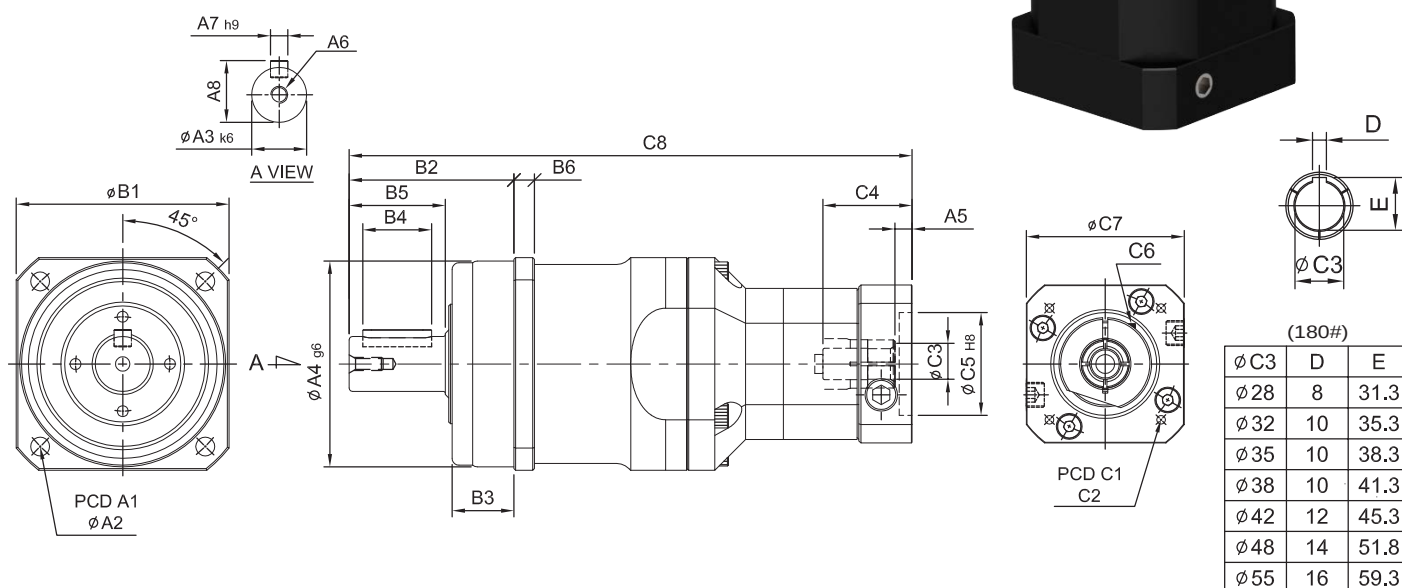
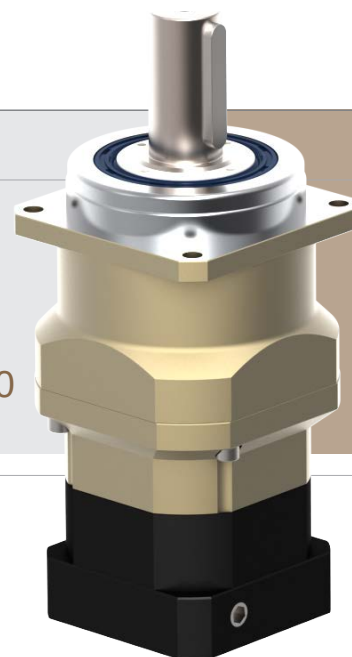
| Ratio | 62   | 75   | 100  | 142  | 180   |
|-------|------|------|------|------|-------|
| 3     | 0.15 | 0.60 | 3.21 | 9.18 | 28.82 |
| 4     | 0.14 | 0.51 | 2.80 | 7.51 | 23.56 |
| 5     | 0.13 | 0.45 | 2.71 | 7.40 | 23.74 |
| 6     | 0.13 | 0.45 | 2.65 | 7.15 | 22.65 |
| 7     | 0.12 | 0.42 | 2.54 | 7.15 | 22.40 |
| 8     | 0.12 | 0.42 | 2.51 | 7.01 | 22.35 |
| 9     | 0.12 | 0.42 | 2.51 | 7.01 | 22.35 |
| 10    | 0.12 | 0.42 | 2.51 | 7.01 | 22.35 |

# SERVOBOX Planetary Reducers

## SF Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100



| unit: mm |       |            |                |                   |                |                |
|----------|-------|------------|----------------|-------------------|----------------|----------------|
| A        | Model | 62         | 75             | 100               | 142            | 180            |
|          | A1    | 68         | 85             | 120               | 165            | 215            |
|          | A2    | 5.5        | 6.8            | 9                 | 11             | 13             |
|          | A3    | 16         | 22             | 32                | 40             | 55             |
|          | A4    | 60         | 70             | 90                | 130            | 160            |
|          | A5    | 5          | 6              | 9                 | 10             | 10             |
|          | A6    | M5 x P0.8  | M8 x P1.25     | M10 x P1.5        | M12 x P1.75    | M14 x P2.0     |
|          | A7    | 5          | 6              | 10                | 12             | 16             |
|          | A8    | 18         | 24.5           | 35                | 43             | 59             |
|          | A9    | 18         | 24.5           | 35                | 43             | 59             |
| B        | B1    | 62         | 76             | 106               | 142            | 180            |
|          | B2    | 48         | 56             | 88                | 112            | 112            |
|          | B3    | 18         | 18             | 27                | 27             | 26             |
|          | B4    | 20         | 32             | 50                | 70             | 70             |
|          | B5    | 28         | 36             | 58                | 82             | 82             |
|          | B6    | 6          | 7              | 10                | 12             | 15             |
| C        | C1    | 46, 60, 63 | 70, 75, 90     | 90, 110, 115, 145 | 115, 145, 165  | 145, 165, 215  |
|          | C2    | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   |
|          | C3    | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 |
|          | C4    | 26         | 33.5           | 59                | 67             | 84.5           |
|          | C5    | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  |
|          | C6    | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     |
|          | C7    | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  |
|          | C8    | 164        | 198.8, 206.8   | 278               | 344            | 395            |



## High Precision Planetary Reducer

### SF 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 62                                                                 | 75        | 100       | 142       | 180       |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 59                                                                 | 142       | 298       | 625       | 1,206     |
|                                                |            |           | 20       | 51                                                                 | 126       | 267       | 555       | 1,069     |
|                                                |            |           | 25       | 48                                                                 | 158       | 296       | 618       | 1,189     |
|                                                |            |           | 30       | 45                                                                 | 130       | 278       | 583       | 1,118     |
|                                                |            |           | 35       | 45                                                                 | 128       | 275       | 573       | 1,108     |
|                                                |            |           | 40       | 43                                                                 | 123       | 265       | 553       | 1,070     |
|                                                |            |           | 50       | 48                                                                 | 138       | 296       | 618       | 1,189     |
|                                                |            |           | 60       | 45                                                                 | 130       | 277       | 583       | 1,118     |
|                                                |            |           | 70       | 45                                                                 | 128       | 275       | 573       | 1,108     |
|                                                |            |           | 80       | 43                                                                 | 123       | 265       | 553       | 1,070     |
|                                                |            |           | 90       | 44                                                                 | 125       | 247       | 516       | 993       |
|                                                |            |           | 100      | 43                                                                 | 121       | 262       | 549       | 1,059     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 100 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 100 | 3 Times of Rated Output Torque                                     |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 100 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 100 | 6,000                                                              | 6,000     | 5,000     | 5,000     | 4,000     |
| Backlash Ps                                    |            | arcmin    | 15 ~ 100 | -                                                                  | -         | $\leq 3$  | $\leq 3$  | $\leq 3$  |
| Backlash P0                                    |            | arcmin    | 15 ~ 100 | $\leq 5$                                                           | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  |
| Backlash P1                                    |            | arcmin    | 15 ~ 100 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Backlash P2                                    |            | arcmin    | 15 ~ 100 | $\leq 9$                                                           | $\leq 9$  | $\leq 9$  | $\leq 9$  | $\leq 9$  |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 100 | 8                                                                  | 15        | 27        | 60        | 140       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 100 | 2,240                                                              | 4,150     | 8,760     | 12,750    | 17,860    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 100 | 1,920                                                              | 3,780     | 7,500     | 10,840    | 15,180    |
| Service Life                                   | $L_H$      | hr        | 15 ~ 100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 15 ~ 100 | $\geq 94$                                                          |           |           |           |           |
| Operating Temperature                          |            | °C        | 15 ~ 100 | - 25° C ~ + 90° C                                                  |           |           |           |           |
| Lubrication                                    |            |           | 15 ~ 100 | Synthetic Grease                                                   |           |           |           |           |
| Protection Class                               |            |           | 15 ~ 100 | IP65                                                               |           |           |           |           |
| Mounting Position                              |            |           | 15 ~ 100 | Any                                                                |           |           |           |           |
| Noise Level                                    |            | dB        | 15 ~ 100 | $\leq 58$                                                          | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ |
| Weight $\pm 3\%$                               |            | Kg        | 15 ~ 100 | 2.52                                                               | 4.8       | 8.48      | 19.98     | 37.3      |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

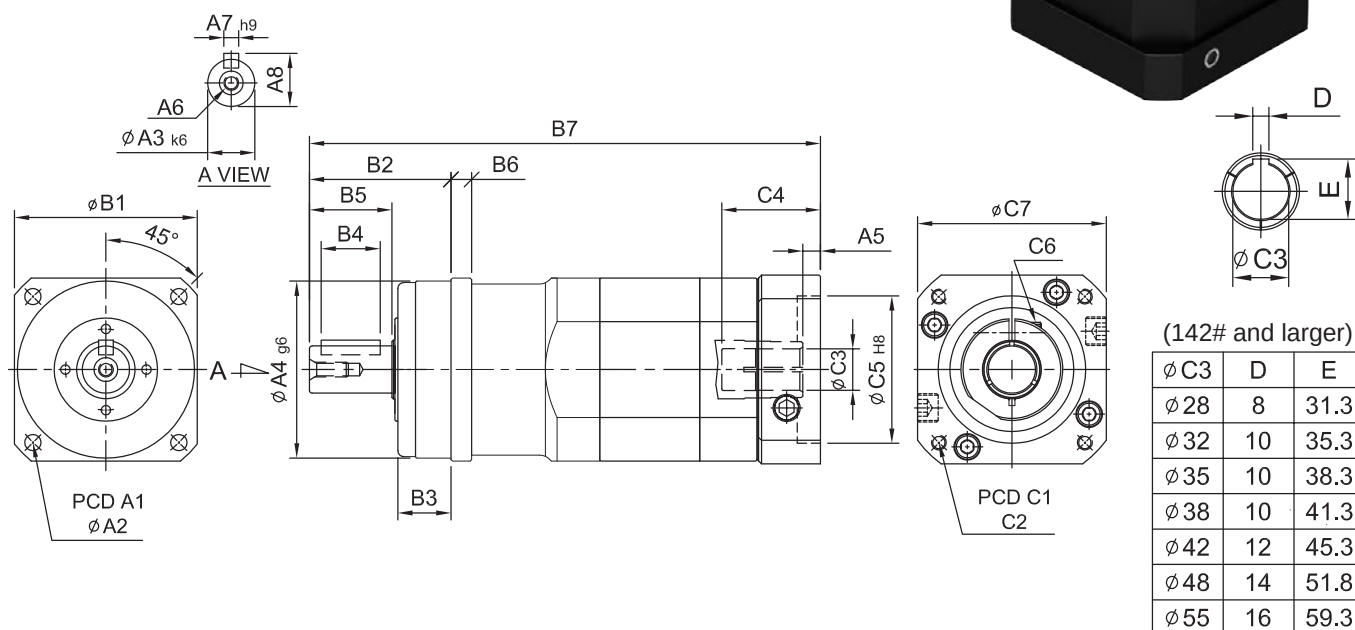
| Ratio | 62   | 75   | 100  | 142  | 180  |
|-------|------|------|------|------|------|
| 15    | 0.03 | 0.13 | 0.47 | 2.63 | 7.30 |
| 20    | 0.03 | 0.13 | 0.47 | 2.63 | 7.30 |
| 25    | 0.03 | 0.13 | 0.47 | 2.63 | 7.10 |
| 30    | 0.03 | 0.13 | 0.47 | 2.43 | 7.10 |
| 35    | 0.03 | 0.13 | 0.47 | 2.43 | 7.10 |
| 40    | 0.03 | 0.13 | 0.47 | 2.43 | 6.92 |
| 50    | 0.03 | 0.13 | 0.44 | 2.43 | 6.92 |
| 60    | 0.03 | 0.13 | 0.44 | 2.39 | 6.72 |
| 70    | 0.03 | 0.13 | 0.44 | 2.39 | 6.72 |
| 80    | 0.03 | 0.13 | 0.44 | 2.39 | 6.72 |
| 90    | 0.03 | 0.13 | 0.44 | 2.39 | 6.72 |
| 100   | 0.03 | 0.13 | 0.44 | 2.39 | 6.72 |

# SERVOBX Planetary Reducers

## SF-A Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 70, 100



unit: mm

| Model Code | 62A            | 75A               | 100A          | 142A           | 180A               |
|------------|----------------|-------------------|---------------|----------------|--------------------|
| A1         | 68             | 85                | 120           | 165            | 215                |
| A2         | 5.5            | 6.8               | 9             | 11             | 13                 |
| A3         | 16             | 22                | 32            | 40             | 55                 |
| A4         | 60             | 70                | 90            | 130            | 160                |
| A5         | 6              | 8                 | 10.5          | 10             | 11.5, 13.5         |
| A6         | M5 x P0.8      | M8 x P1.25        | M10 x P1.5    | M12 x P1.75    | M14 x P2.0         |
| A7         | 5              | 6                 | 10            | 12             | 16                 |
| A8         | 18             | 24.5              | 35            | 43             | 59                 |
| B1         | 62             | 76                | 106           | 142            | 180                |
| B2         | 48             | 56                | 88            | 112            | 112                |
| B3         | 18             | 18                | 27            | 27             | 26                 |
| B4         | 20             | 32                | 50            | 70             | 70                 |
| B5         | 28             | 36                | 58            | 82             | 82                 |
| B6         | 6              | 7                 | 10            | 12             | 15                 |
| B7         | 173.3, 181.3   | 214               | 282.5         | 373            | 441, 443           |
| C1         | 70, 75, 90     | 90, 110, 115, 145 | 115, 145, 165 | 145, 165, 215  | 200, 215, 265      |
| C2         | M4, M5, M6     | M5, M6, M8        | M6, M8, M10   | M8, M10, M12   | M10, M12, M16      |
| C3         | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32    | 28, 32, 35, 38 | 35, 38, 42, 48, 55 |
| C4         | 33.5           | 51                | 67.5          | 84.5           | 114.5, 116.5       |
| C5         | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180  | 114.3, 180, 230    |
| C6         | M5 x P0.8      | M6 x P1.0         | M8 x P1.25    | M10 x P1.5     | M10 x P1.5         |
| C7         | 64, 70, 80     | 92, 110, 130      | 122, 130, 150 | 146, 150, 190  | 182, 200, 250      |



## High Precision Planetary Reducer

### SF-A 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 62A                                                                | 75A       | 100A      | 142A      | 180A      |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 59                                                                 | 165       | 216       | 625       | 1,206     |
|                                                |            |           | 20       | 51                                                                 | 146       | 208       | 555       | 1,069     |
|                                                |            |           | 25       | 48                                                                 | 155       | 333       | 618       | 1,189     |
|                                                |            |           | 30       | 45                                                                 | 150       | 315       | 583       | 1,118     |
|                                                |            |           | 35       | 45                                                                 | 142       | 309       | 573       | 1,108     |
|                                                |            |           | 40       | 51                                                                 | 146       | 208       | 555       | 1,069     |
|                                                |            |           | 50       | 48                                                                 | 155       | 333       | 618       | 1,189     |
|                                                |            |           | 70       | 45                                                                 | 142       | 309       | 573       | 1,108     |
|                                                |            |           | 100      | 43                                                                 | 136       | 291       | 549       | 1,059     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 100 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 100 | 3 Times of Rated Output Torque                                     |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 100 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 100 | 6,000                                                              | 6,000     | 5,000     | 5,000     | 4,000     |
| Backlash Ps                                    |            | arcmin    | 15 ~ 100 | -                                                                  | $\leq 3$  | $\leq 3$  | $\leq 3$  | $\leq 3$  |
| Backlash P0                                    |            | arcmin    | 15 ~ 100 | $\leq 5$                                                           | $\leq 5$  | $\leq 5$  | $\leq 5$  | $\leq 5$  |
| Backlash P1                                    |            | arcmin    | 15 ~ 100 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Backlash P2                                    |            | arcmin    | 15 ~ 100 | $\leq 9$                                                           | $\leq 9$  | $\leq 9$  | $\leq 9$  | $\leq 9$  |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 100 | 8                                                                  | 15        | 27        | 60        | 140       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 100 | 2,240                                                              | 4,150     | 8,760     | 12,750    | 17,860    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 100 | 1,920                                                              | 3,780     | 7,500     | 10,840    | 15,180    |
| Service Life                                   | $L_H$      | hr        | 15 ~ 100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 15 ~ 100 | $\geq 94$                                                          |           |           |           |           |
| Operating Temperature                          |            | °C        | 15 ~ 100 | - 25° C ~ + 90° C                                                  |           |           |           |           |
| Lubrication                                    |            |           | 15 ~ 100 | Synthetic Grease                                                   |           |           |           |           |
| Protection Class                               |            |           | 15 ~ 100 | IP65                                                               |           |           |           |           |
| Mounting Position                              |            |           | 15 ~ 100 | Any                                                                |           |           |           |           |
| Noise Level                                    |            | dB        | 15 ~ 100 | $\leq 58$                                                          | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ |
| Weight $\pm 3\%$                               |            | Kg        | 15 ~ 100 | 2.6                                                                | 8.2       | 11.5      | 25.6      | 43        |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

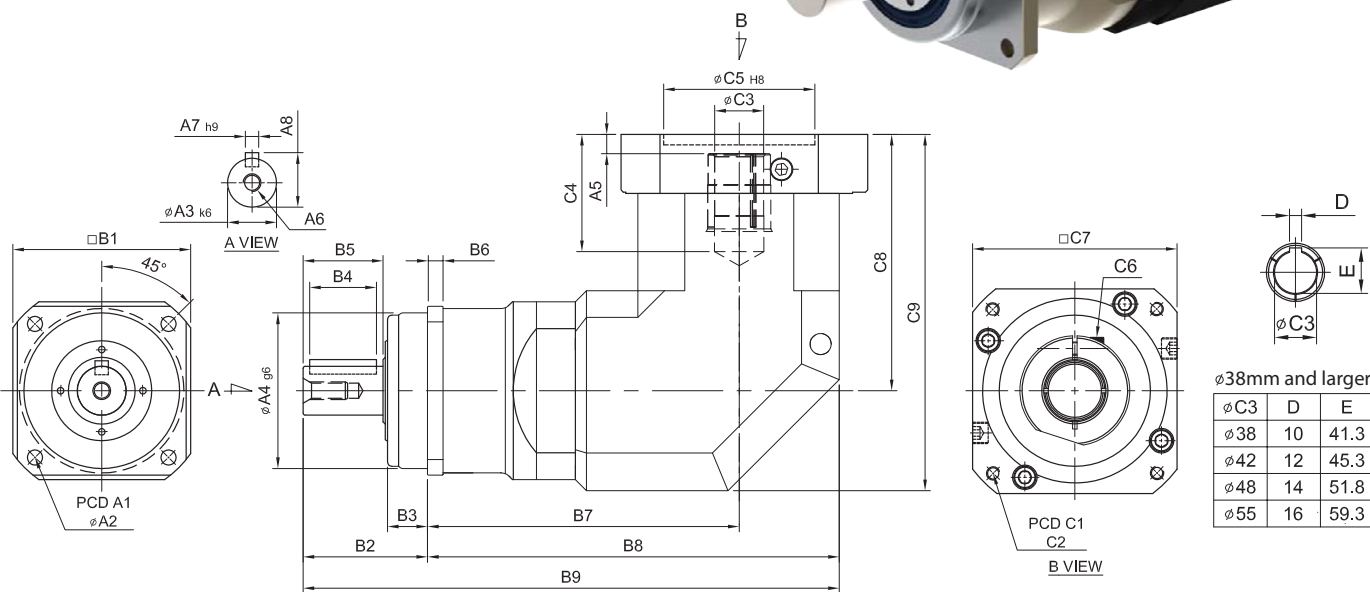
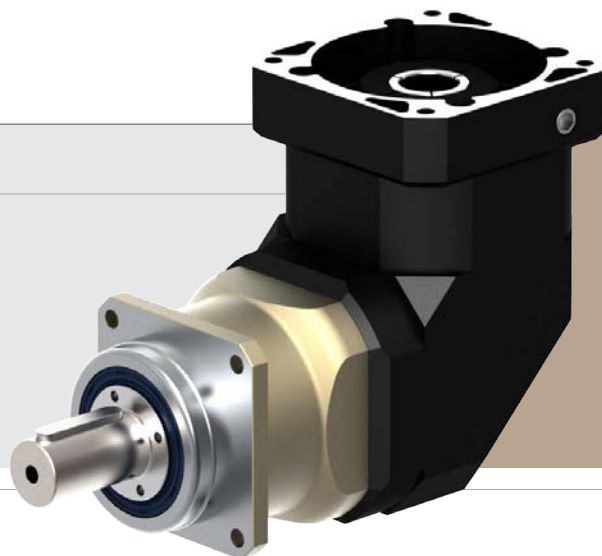
| Ratio | 62A  | 75A  | 100A | 142A | 180A  |
|-------|------|------|------|------|-------|
| 15    | 0.15 | 0.60 | 3.21 | 9.18 | 28.82 |
| 20    | 0.14 | 0.51 | 2.80 | 7.51 | 23.56 |
| 25    | 0.13 | 0.45 | 2.71 | 7.40 | 23.24 |
| 30    | 0.15 | 0.60 | 3.21 | 9.18 | 28.82 |
| 35    | 0.12 | 0.42 | 2.54 | 7.15 | 22.40 |
| 40    | 0.14 | 0.51 | 2.80 | 7.51 | 23.56 |
| 50    | 0.13 | 0.45 | 2.71 | 7.40 | 23.24 |
| 70    | 0.12 | 0.42 | 2.54 | 7.15 | 22.40 |
| 100   | 0.12 | 0.42 | 2.51 | 7.01 | 22.35 |

# SERVOBX Planetary Reducers

## SFL Series

1-Stage

RATIO : 3, 4, 5, 6, 7, 8, 9, 10, 12, 14,  
16, 18, 20



unit: mm

|   | Model Code |                |                   |               |                |                    |
|---|------------|----------------|-------------------|---------------|----------------|--------------------|
|   |            | 62             | 75                | 100           | 142            | 180                |
| A | A1         | 68             | 85                | 120           | 165            | 215                |
|   | A2         | 5.5            | 6.8               | 9             | 11             | 13                 |
|   | A3         | 16             | 22                | 32            | 40             | 55                 |
|   | A4         | 60             | 70                | 90            | 130            | 160                |
|   | A5         | 6              | 9                 | 10            | 10             | 12.5, 14.5         |
|   | A6         | M5 x P0.8      | M8 x P1.25        | M10 x P1.5    | M12 x P1.75    | M14 x P2.0         |
|   | A7         | 5              | 6                 | 10            | 12             | 16                 |
|   | A8         | 18             | 24.5              | 35            | 43             | 59                 |
| B | B1         | 62             | 76                | 106           | 142            | 180                |
|   | B2         | 48             | 56                | 88            | 112            | 112                |
|   | B3         | 18             | 18                | 27            | 27             | 26                 |
|   | B4         | 20             | 32                | 50            | 70             | 70                 |
|   | B5         | 28             | 36                | 58            | 82             | 82                 |
|   | B6         | 6              | 7                 | 10            | 12             | 15                 |
|   | B7         | 97             | 142.9             | 162           | 191            | 254.1              |
|   | B8         | 128            | 187.9             | 222           | 262            | 344.1              |
| C | B9         | 176            | 243.9             | 310           | 374            | 456.1              |
|   | C1         | 70, 75, 90     | 90, 110, 115, 145 | 115, 145, 165 | 145, 165, 215  | 200, 215, 265      |
|   | C2         | M4, M5, M6     | M5, M6, M8        | M6, M8, M10   | M8, M10, M12   | M10, M12, M16      |
|   | C3         | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32    | 28, 32, 35, 38 | 35, 38, 42, 48, 55 |
|   | C4         | 33.5, 41.5     | 53, 67.5          | 67, 77        | 85             | 117, 119           |
|   | C5         | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180  | 114.3, 180, 230    |
|   | C6         | M5 x P0.8      | M6 x P1.0         | M8 x P1.25    | M10 x P1.5     | M10 x P1.5         |
|   | C7         | 64, 70, 80     | 92, 110, 130      | 122, 130, 150 | 146, 150, 190  | 182, 200, 250      |
|   | C8         | 77, 85         | 115.3             | 141           | 165.7          | 235, 237           |
|   | C9         | 108, 116       | 160.3             | 201           | 236.7          | 325, 327           |



## High Precision Planetary Reducer

### SFL 1-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 62                                                                 | 75        | 100       | 142       | 180       |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 3      | 59                                                                 | 165       | 216       | 625       | 1,206     |
|                                                |            |           | 4      | 51                                                                 | 146       | 208       | 555       | 1,069     |
|                                                |            |           | 5      | 48                                                                 | 155       | 333       | 618       | 1,189     |
|                                                |            |           | 6      | 45                                                                 | 150       | 315       | 583       | 1,118     |
|                                                |            |           | 7      | 45                                                                 | 142       | 309       | 573       | 1,108     |
|                                                |            |           | 8      | 44                                                                 | 141       | 305       | 553       | 1,070     |
|                                                |            |           | 9      | 44                                                                 | 140       | 293       | 551       | 1,060     |
|                                                |            |           | 10     | 43                                                                 | 138       | 291       | 549       | 1,059     |
|                                                |            |           | 12     | 45                                                                 | 150       | 315       | 583       | 1,118     |
|                                                |            |           | 14     | 45                                                                 | 142       | 309       | 573       | 1,108     |
|                                                |            |           | 16     | 44                                                                 | 141       | 305       | 553       | 1,070     |
|                                                |            |           | 18     | 44                                                                 | 140       | 293       | 551       | 1,060     |
|                                                |            |           | 20     | 43                                                                 | 138       | 291       | 549       | 1,059     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 3 ~ 20 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 3 ~ 20 | 3 Times of Rated Output Torque                                     |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 3 ~ 20 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 3 ~ 20 | 6,000                                                              | 6,000     | 6,000     | 5,000     | 4,000     |
| Backlash Ps                                    |            | arcmin    | 3 ~ 20 | -                                                                  | $\leq 2$  | $\leq 2$  | $\leq 2$  | $\leq 2$  |
| Backlash P0                                    |            | arcmin    | 3 ~ 20 | $\leq 4$                                                           | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  |
| Backlash P1                                    |            | arcmin    | 3 ~ 20 | $\leq 6$                                                           | $\leq 6$  | $\leq 6$  | $\leq 6$  | $\leq 6$  |
| Backlash P2                                    |            | arcmin    | 3 ~ 20 | $\leq 8$                                                           | $\leq 8$  | $\leq 8$  | $\leq 8$  | $\leq 8$  |
| Torsional Rigidity                             |            | Nm/arcmin | 3 ~ 20 | 8                                                                  | 15        | 27        | 60        | 150       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 3 ~ 20 | 2,240                                                              | 4,150     | 8,760     | 12,750    | 17,860    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 3 ~ 20 | 1,920                                                              | 3,780     | 7,500     | 10,840    | 15,180    |
| Service Life                                   | $L_H$      | hr        | 3 ~ 20 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 3 ~ 20 | $\geq 95$                                                          |           |           |           |           |
| Operating Temperature                          |            | °C        | 3 ~ 20 | - 25° C ~ + 90° C                                                  |           |           |           |           |
| Lubrication                                    |            |           | 3 ~ 20 | Synthetic Grease                                                   |           |           |           |           |
| Protection Class                               |            |           | 3 ~ 20 | IP65                                                               |           |           |           |           |
| Mounting Position                              |            |           | 3 ~ 20 | Any                                                                |           |           |           |           |
| Noise Level                                    |            | dB        | 3 ~ 20 | $\leq 68$                                                          | $\leq 70$ | $\leq 72$ | $\leq 74$ | $\leq 76$ |
| Weight $\pm 3\%$                               |            | Kg        | 3 ~ 20 | 2.7                                                                | 7.5       | 10.9      | 25.6      | 57.9      |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

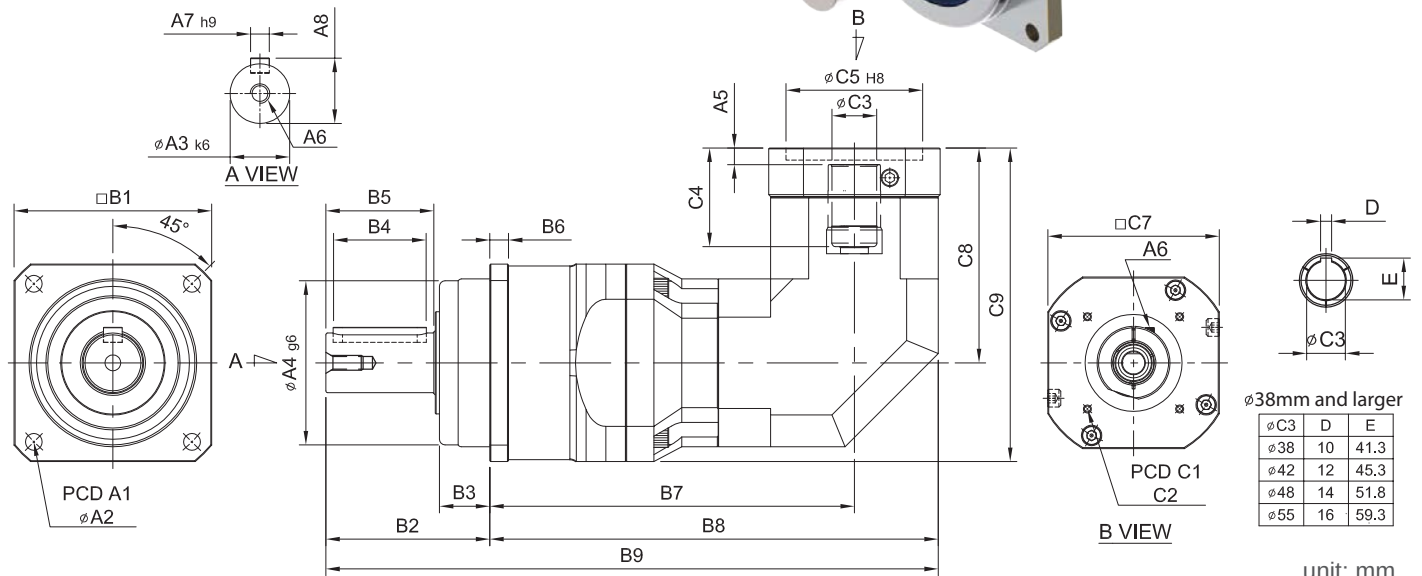
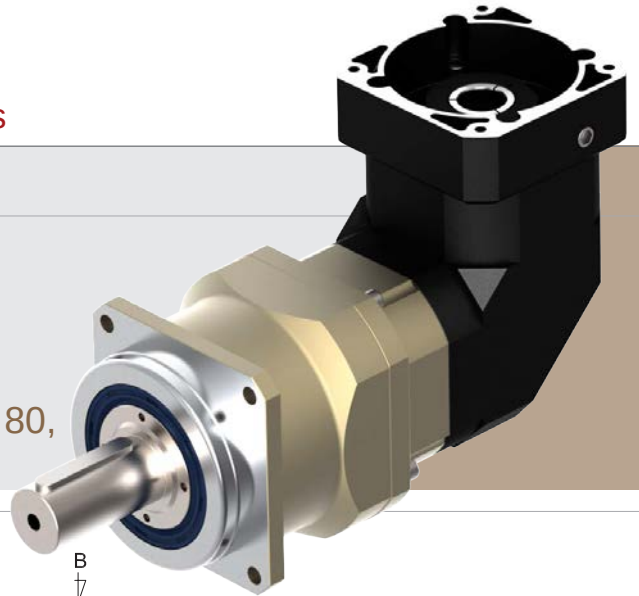
| Ratio | 62   | 75   | 100  | 142   | 180   |
|-------|------|------|------|-------|-------|
| 3     | 0.30 | 2.11 | 6.42 | 18.36 | 57.65 |
| 4     | 0.28 | 2.02 | 5.61 | 18.02 | 56.17 |
| 5     | 0.26 | 2.01 | 5.42 | 17.21 | 55.05 |
| 6     | 0.24 | 2.00 | 5.33 | 16.50 | 53.44 |
| 7     | 0.24 | 1.97 | 5.09 | 15.85 | 51.10 |
| 8     | 0.24 | 1.94 | 5.06 | 14.94 | 49.03 |
| 9     | 0.24 | 1.94 | 5.04 | 14.61 | 48.08 |
| 10    | 0.24 | 1.94 | 5.02 | 14.02 | 41.33 |
| 12    | 0.22 | 1.94 | 4.98 | 13.86 | 41.12 |
| 14    | 0.22 | 1.94 | 4.95 | 13.53 | 40.50 |
| 16    | 0.21 | 1.92 | 4.91 | 13.03 | 40.11 |
| 18    | 0.21 | 1.91 | 4.87 | 12.57 | 39.73 |
| 20    | 0.20 | 1.88 | 4.75 | 12.11 | 38.65 |

# SERVOBX Planetary Reducers

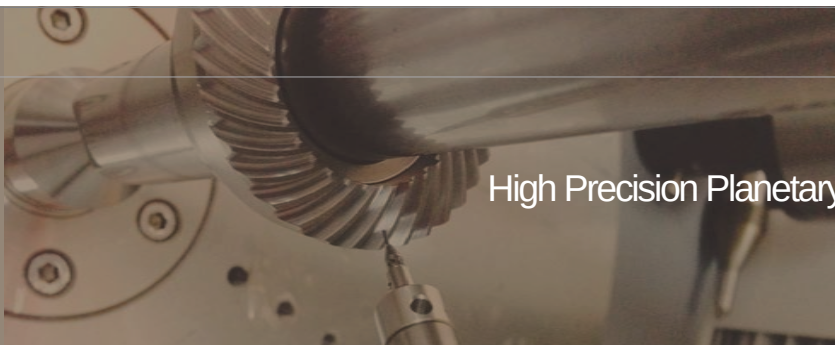
## SFL Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100, 120, 140, 160, 180, 200



| Model Code |    | 62         | 75             | 100               | 142            | 180            |
|------------|----|------------|----------------|-------------------|----------------|----------------|
| A          | A1 | 68         | 85             | 120               | 165            | 215            |
|            | A2 | 5.5        | 6.8            | 9                 | 11             | 13             |
|            | A3 | 16         | 22             | 32                | 40             | 55             |
|            | A4 | 60         | 70             | 90                | 130            | 160            |
|            | A5 | 6          | 6              | 9                 | 10             | 10             |
|            | A6 | M5 x P0.8  | M8 x P1.25     | M10 x P1.5        | M12 x P1.75    | M14 x P2.0     |
|            | A7 | 5          | 6              | 10                | 12             | 16             |
|            | A8 | 18         | 24.5           | 35                | 43             | 59             |
| B          | B1 | 62         | 76             | 106               | 142            | 180            |
|            | B2 | 48         | 56             | 88                | 112            | 112            |
|            | B3 | 18         | 18             | 27                | 27             | 26             |
|            | B4 | 20         | 32             | 50                | 70             | 70             |
|            | B5 | 28         | 36             | 58                | 82             | 82             |
|            | B6 | 6          | 7              | 10                | 12             | 15             |
|            | B7 | 123        | 148.3          | 195.6             | 240            | 280            |
|            | B8 | 145        | 179.3          | 240.6             | 300            | 351            |
|            | B9 | 193        | 235.3          | 328.6             | 412            | 463            |
| C          | C1 | 46, 60, 63 | 70, 75, 90     | 90, 110, 115, 145 | 115, 145, 165  | 145, 165, 215  |
|            | C2 | M3, M4, M5 | M4, M5, M6     | M5, M6, M8, M10   | M6, M8, M10    | M8, M10, M12   |
|            | C3 | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32, 35 | 28, 32, 35, 38 |
|            | C4 | 27         | 33.5, 41.5     | 53                | 67             | 85             |
|            | C5 | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  |
|            | C6 | M4 x P0.7  | M5 x P0.8      | M6 x P1.0         | M8 x P1.25     | M10 x P1.5     |
|            | C7 | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  |
|            | C8 | 61         | 77, 85         | 115.3             | 141            | 165.7          |
|            | C9 | 92         | 117, 125       | 168.3             | 212            | 255.7          |



## High Precision Planetary Reducer

### SFL 2-Stage

#### ■ Performance

| Parameter \ Model No                           | Sym        | Unit      | Ratio    | 62                                                                 | 75    | 100   | 142    | 180    |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 59                                                                 | 142   | 298   | 625    | 1,206  |
|                                                |            |           | 20       | 51                                                                 | 126   | 267   | 555    | 1,069  |
|                                                |            |           | 25       | 48                                                                 | 158   | 296   | 618    | 1,189  |
|                                                |            |           | 30       | 45                                                                 | 130   | 278   | 583    | 1,118  |
|                                                |            |           | 35       | 45                                                                 | 128   | 275   | 573    | 1,108  |
|                                                |            |           | 40       | 43                                                                 | 123   | 265   | 553    | 1,070  |
|                                                |            |           | 50       | 48                                                                 | 138   | 296   | 618    | 1,189  |
|                                                |            |           | 60       | 45                                                                 | 130   | 277   | 583    | 1,118  |
|                                                |            |           | 70       | 45                                                                 | 128   | 275   | 573    | 1,108  |
|                                                |            |           | 80       | 43                                                                 | 123   | 265   | 553    | 1,070  |
|                                                |            |           | 90       | 44                                                                 | 125   | 247   | 516    | 993    |
|                                                |            |           | 100      | 43                                                                 | 121   | 262   | 549    | 1,059  |
|                                                |            |           | 120      | 45                                                                 | 130   | 277   | 583    | 1,118  |
|                                                |            |           | 140      | 45                                                                 | 128   | 275   | 573    | 1,108  |
|                                                |            |           | 160      | 43                                                                 | 123   | 265   | 553    | 1,070  |
|                                                |            |           | 180      | 44                                                                 | 125   | 247   | 516    | 993    |
|                                                |            |           | 200      | 43                                                                 | 121   | 262   | 549    | 1,059  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 200 | 1.8 Times of Rated Output Torque                                   |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 200 | 3 Times of Rated Output Torque                                     |       |       |        |        |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 200 | 3,000                                                              | 3,000 | 3,000 | 3,000  | 3,000  |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 200 | 6,000                                                              | 6,000 | 5,000 | 5,000  | 4,000  |
| Backlash Ps                                    |            | arcmin    | 15 ~ 200 | -                                                                  | -     | ≤ 4   | ≤ 4    | ≤ 4    |
| Backlash P0                                    |            | arcmin    | 15 ~ 200 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    |
| Backlash P1                                    |            | arcmin    | 15 ~ 200 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    |
| Backlash P2                                    |            | arcmin    | 15 ~ 200 | ≤ 12                                                               | ≤ 12  | ≤ 12  | ≤ 12   | ≤ 12   |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 200 | 8                                                                  | 15    | 27    | 60     | 150    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 200 | 2,240                                                              | 4,150 | 8,760 | 12,750 | 17,860 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 200 | 1,920                                                              | 3,780 | 7,500 | 10,840 | 15,180 |
| Service Life                                   | $L_H$      | hr        | 15 ~ 200 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 15 ~ 200 | ≥ 92                                                               |       |       |        |        |
| Operating Temperature                          |            | °C        | 15 ~ 200 | - 25° C ~ + 90° C                                                  |       |       |        |        |
| Lubrication                                    |            |           | 15 ~ 200 | Synthetic Grease                                                   |       |       |        |        |
| Protection Class                               |            |           | 15 ~ 200 | IP65                                                               |       |       |        |        |
| Mounting Position                              |            |           | 15 ~ 200 | Any                                                                |       |       |        |        |
| Noise Level                                    |            | dB        | 15 ~ 200 | ≤ 68                                                               | ≤ 70  | ≤ 72  | ≤ 74   | ≤ 76   |
| Weight ±3%                                     |            | Kg        | 15 ~ 200 | 2.93                                                               | 4.8   | 11.38 | 21.5   | 46.47  |

#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

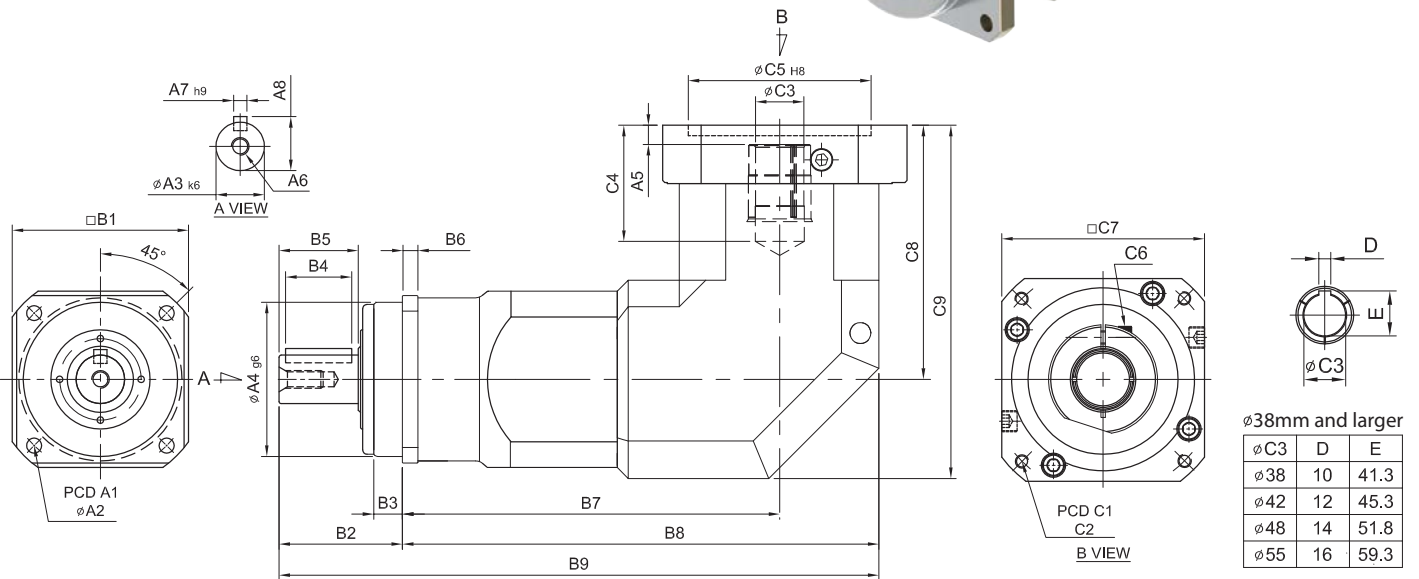
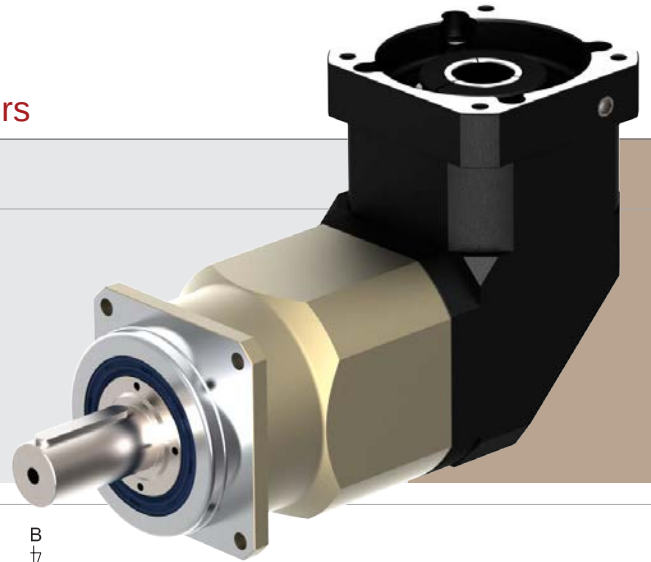
| Ratio | 62   | 75   | 100  | 142  | 180  |
|-------|------|------|------|------|------|
| 15    | 0.09 | 0.34 | 2.20 | 6.85 | 26.2 |
| 20    | 0.09 | 0.34 | 2.20 | 6.85 | 26.2 |
| 25    | 0.09 | 0.34 | 2.20 | 6.85 | 23.1 |
| 30    | 0.09 | 0.34 | 2.20 | 6.85 | 23.1 |
| 35    | 0.09 | 0.34 | 2.20 | 6.85 | 23.1 |
| 40    | 0.09 | 0.34 | 2.20 | 6.85 | 23.1 |
| 50    | 0.09 | 0.34 | 2.20 | 6.85 | 23.1 |
| 60    | 0.09 | 0.34 | 2.20 | 6.85 | 23.1 |
| 70    | 0.09 | 0.34 | 2.20 | 6.85 | 23.1 |
| 80    | 0.09 | 0.34 | 2.20 | 6.85 | 23.1 |
| 90    | 0.09 | 0.34 | 2.20 | 6.85 | 23.1 |
| 100   | 0.09 | 0.34 | 2.20 | 6.85 | 23.1 |
| 120   | 0.03 | 0.30 | 1.86 | 6.20 | 21.2 |
| 140   | 0.03 | 0.30 | 1.86 | 6.20 | 21.2 |
| 160   | 0.03 | 0.30 | 1.86 | 6.20 | 21.2 |
| 180   | 0.03 | 0.30 | 1.86 | 6.20 | 21.2 |
| 200   | 0.03 | 0.30 | 1.86 | 6.20 | 21.2 |

# SERVOBX Planetary Reducers

## SFL-A Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60,  
70, 80, 100, 140, 200



| Model Code | 62A        | 75A               | 100A          | 142A          | 180A            |
|------------|------------|-------------------|---------------|---------------|-----------------|
| A1         | 68         | 85                | 120           | 165           | 215             |
| A2         | 5.5        | 6.8               | 9             | 11            | 13              |
| A3         | 16         | 22                | 32            | 40            | 55              |
| A4         | 60         | 70                | 90            | 130           | 160             |
| A5         | 6          | 9                 | 10            | 10            | 12.5, 14.5      |
| A6         | M5 x P0.8  | M8 x P1.25        | M10 x P1.5    | M12 x P1.75   | M14 x P2.0      |
| A7         | 5          | 6                 | 10            | 12            | 16              |
| A8         | 18         | 24.5              | 35            | 43            | 59              |
| B1         | 62         | 76                | 106           | 142           | 180             |
| B2         | 48         | 56                | 88            | 112           | 112             |
| B3         | 18         | 18                | 27            | 27            | 26              |
| B4         | 20         | 32                | 50            | 70            | 70              |
| B5         | 28         | 36                | 58            | 82            | 82              |
| B6         | 6          | 7                 | 10            | 12            | 15              |
| B7         | 130.8      | 173.9             | 206           | 258           | 335.1           |
| B8         | 161.8      | 218.9             | 266           | 329           | 425.1           |
| B9         | 209.8      | 274.9             | 354           | 441           | 537.1           |
| C1         | 70, 75, 90 | 90, 110, 115, 145 | 115, 145, 165 | 145, 165, 215 | 200, 215, 265   |
| C2         | M4, M5, M6 | M5, M6, M8        | M6, M8, M10   | M8, M10, M12  | M10, M12, M16   |
| C3         | 14, 19     | 19, 22, 24        | 24, 28, 32    | 28, 32, 35    | 38, 42, 48, 55  |
| C4         | 33.5, 41.5 | 53, 67.5          | 67, 77        | 85            | 117, 119        |
| C5         | 50, 60, 70 | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180 | 114.3, 180, 230 |
| C6         | M5 x P0.8  | M6 x P1.0         | M8 x P1.25    | M10 x P1.5    | M10 x P1.5      |
| C7         | 64, 70, 80 | 92, 110, 130      | 122, 130, 150 | 146, 150, 190 | 182, 200, 250   |
| C8         | 77, 85     | 115.3             | 141           | 165.7         | 235, 237        |
| C9         | 108, 116   | 160.3             | 201           | 236.7         | 325, 327        |



## High Precision Planetary Reducer

### SFL-A 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio    | 62A                                                                | 75A       | 100A      | 142A      | 180A      |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15       | 59                                                                 | 165       | 216       | 625       | 1,206     |
|                                                |            |           | 20       | 51                                                                 | 146       | 208       | 555       | 1,069     |
|                                                |            |           | 25       | 48                                                                 | 155       | 333       | 618       | 1,189     |
|                                                |            |           | 30       | 45                                                                 | 150       | 315       | 583       | 1,118     |
|                                                |            |           | 35       | 45                                                                 | 142       | 309       | 573       | 1,108     |
|                                                |            |           | 40       | 51                                                                 | 122       | 208       | 555       | 1,069     |
|                                                |            |           | 50       | 48                                                                 | 155       | 333       | 618       | 1,189     |
|                                                |            |           | 60       | 45                                                                 | 150       | 315       | 583       | 1,118     |
|                                                |            |           | 70       | 45                                                                 | 142       | 309       | 573       | 1,108     |
|                                                |            |           | 80       | 51                                                                 | 146       | 208       | 555       | 1,069     |
|                                                |            |           | 100      | 48                                                                 | 155       | 333       | 618       | 1,189     |
|                                                |            |           | 140      | 45                                                                 | 142       | 309       | 573       | 1,108     |
|                                                |            |           | 200      | 43                                                                 | 138       | 291       | 549       | 1,059     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15 ~ 200 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15 ~ 200 | 3 Times of Rated Output Torque                                     |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15 ~ 200 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15 ~ 200 | 6,000                                                              | 6,000     | 5,000     | 5,000     | 4,000     |
| Backlash Ps                                    |            | arcmin    | 15 ~ 200 | -                                                                  | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  |
| Backlash P0                                    |            | arcmin    | 15 ~ 200 | $\leq 7$                                                           | $\leq 7$  | $\leq 7$  | $\leq 7$  | $\leq 7$  |
| Backlash P1                                    |            | arcmin    | 15 ~ 200 | $\leq 9$                                                           | $\leq 9$  | $\leq 9$  | $\leq 9$  | $\leq 9$  |
| Backlash P2                                    |            | arcmin    | 15 ~ 200 | $\leq 12$                                                          | $\leq 12$ | $\leq 12$ | $\leq 12$ | $\leq 12$ |
| Torsional Rigidity                             |            | Nm/arcmin | 15 ~ 200 | 8                                                                  | 15        | 27        | 60        | 150       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15 ~ 200 | 2,240                                                              | 4,150     | 8,760     | 12,750    | 17,860    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15 ~ 200 | 1,920                                                              | 3,780     | 7,500     | 10,840    | 15,180    |
| Service Life                                   | $L_H$      | hr        | 15 ~ 200 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 15 ~ 200 | $\geq 92$                                                          |           |           |           |           |
| Operating Temperature                          |            | °C        | 15 ~ 200 | - 25° C ~ + 90° C                                                  |           |           |           |           |
| Lubrication                                    |            |           | 15 ~ 200 | Synthetic Grease                                                   |           |           |           |           |
| Protection Class                               |            |           | 15 ~ 200 | IP65                                                               |           |           |           |           |
| Mounting Position                              |            |           | 15 ~ 200 | Any                                                                |           |           |           |           |
| Noise Level                                    |            | dB        | 15 ~ 200 | $\leq 68$                                                          | $\leq 70$ | $\leq 72$ | $\leq 74$ | $\leq 76$ |
| Weight $\pm 3\%$                               |            | Kg        | 15 ~ 200 | 3.5                                                                | 11.1      | 16.8      | 29.9      | 66.1      |

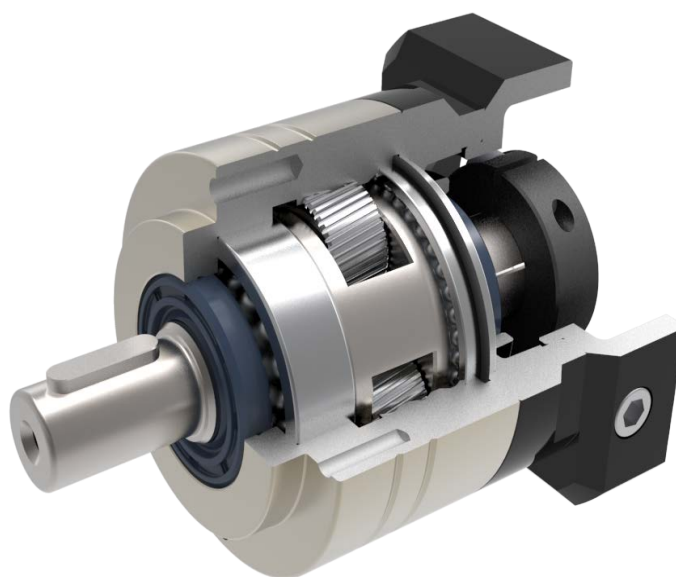
#### ■ Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 62A  | 75A  | 100A | 142A | 180A  |
|-------|------|------|------|------|-------|
| 15    | 0.15 | 0.60 | 3.21 | 9.18 | 28.82 |
| 20    | 0.14 | 0.51 | 2.80 | 7.51 | 23.56 |
| 25    | 0.13 | 0.45 | 2.71 | 7.40 | 23.24 |
| 30    | 0.12 | 0.43 | 2.66 | 7.32 | 22.91 |
| 35    | 0.12 | 0.42 | 2.54 | 7.15 | 22.40 |
| 40    | 0.14 | 0.51 | 2.80 | 7.51 | 23.56 |
| 50    | 0.13 | 0.45 | 2.71 | 7.40 | 23.24 |
| 60    | 0.12 | 0.43 | 2.66 | 7.32 | 22.91 |
| 70    | 0.12 | 0.42 | 2.54 | 7.15 | 22.40 |
| 80    | 0.14 | 0.51 | 2.80 | 7.51 | 23.56 |
| 100   | 0.13 | 0.45 | 2.71 | 7.40 | 23.24 |
| 140   | 0.12 | 0.42 | 2.54 | 7.15 | 22.40 |
| 200   | 0.11 | 0.41 | 2.48 | 7.02 | 22.14 |



# SERVOBOX Planetary Reducers

## SA Series



## SA Series Model Code

| SA     | 090                             | 010                                                                                                       |                                                                                                              | P1                                                                                                                                                 | MOTOR                      |
|--------|---------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Series | Model                           | Ratio                                                                                                     | Output Shaft Keyway                                                                                          | Backlash Class                                                                                                                                     | Motor Designation          |
| SA     | 050<br>070<br>090<br>120<br>160 | 1-Stage<br>003, 004, 005,<br>007, 010<br><br>2-Stage<br>015, 020, 025,<br>030, 035, 040,<br>050, 070, 100 | <input type="checkbox"/> Blank: Standard<br>(Keyed Output Shaft)<br><br>N: Solid Output Shaft<br>(No Keyway) | 1-Stage<br>$P_s \leq 1$<br>$P_0 \leq 3$<br>$P_1 \leq 5$<br>$P_2 \leq 7$<br>2-Stage<br>$P_s \leq 3$<br>$P_0 \leq 5$<br>$P_1 \leq 7$<br>$P_2 \leq 9$ | Motor Brand &<br>Model No. |

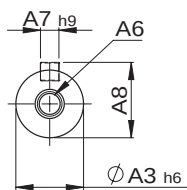


# SERVOBOX Planetary Reducers

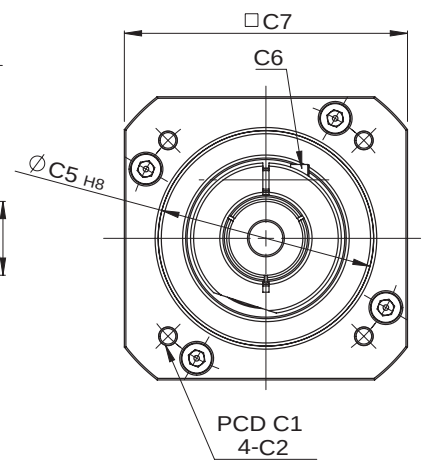
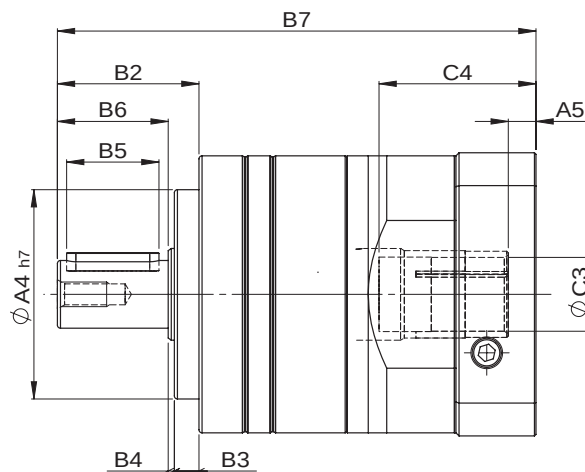
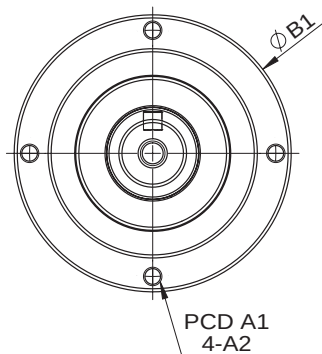
## SA Series

1-Stage

RATIO : 3, 4, 5, 7, 10

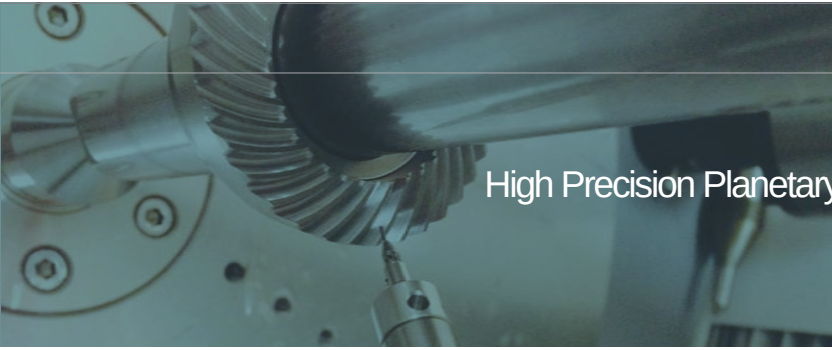


A VIEW



unit: mm

| Model | 50             | 70         | 90                | 120           | 160        |
|-------|----------------|------------|-------------------|---------------|------------|
| Code  | 50             | 70         | 90                | 120           | 160        |
| A1    | 44             | 62         | 80                | 108           | 140        |
| A2    | M4 x 0.7       | M5 x 0.8   | M6 x 1.0          | M8 x 1.25     | M10 x 1.5  |
| A3    | 12             | 16         | 22                | 32            | 40         |
| A4    | 35             | 52         | 68                | 90            | 120        |
| A5    | 4.5            | 6          | 9, 23.5           | 10, 20        | 10         |
| A6    | M4 x 0.7       | M5 x 0.8   | M8 x 1.25         | M12 x 1.75    | M12 x 1.75 |
| A7    | 4              | 5          | 6                 | 10            | 12         |
| A8    | 13.5           | 18         | 24.5              | 35            | 43         |
| B1    | 51             | 70         | 90                | 122           | 160        |
| B2    | 25.5           | 36         | 46                | 70            | 88         |
| B3    | 4              | 6.5        | 8                 | 9             | 8          |
| B4    | 1.5            | 1.5        | 2                 | 3             | 2          |
| B5    | 15             | 20         | 30                | 50            | 65         |
| B6    | 20             | 28         | 36                | 58            | 78         |
| B7    | 96.5           | 115        | 155.5, 170        | 211, 221      | 238.5      |
| C1    | 45, 46, 63, 70 | 70, 75, 90 | 90, 100, 115, 145 | 115, 145, 165 | 165        |
| C2    | M3, M4, M5     | M5, M6     | M6, M8            | M6, M8, M10   | M10        |
| C3    | 11, 14         | 14, 19     | 19, 24            | 24, 28, 32    | 24, 28, 32 |
| C4    | 32             | 33.5, 41   | 51, 65.5          | 67, 77        | 63         |
| C5    | 30, 40, 50     | 50, 60, 70 | 70, 80, 95, 110   | 95, 110, 130  | 130        |
| C6    | M4 x 0.7       | M5 x 0.8   | M6 x 1.0          | M8 x 1.25     | M8 x 1.25  |
| C7    | 46, 55, 60     | 70, 75, 80 | 92, 110, 130      | 122, 130, 150 | 150        |



## High Precision Planetary Reducer

### SA 1-Stage

#### ■ Performance

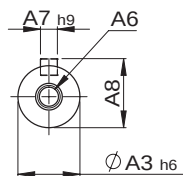
| Parameter \ Model No.                          | Sym        | Unit               | Ratio | 50                                                                 | 70        | 90        | 120       | 160       |
|------------------------------------------------|------------|--------------------|-------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal Output Torque) | $T_{2N}$   | Nm                 | 3     | 17                                                                 | 54        | -         | -         | 625       |
|                                                |            |                    | 4     | 15                                                                 | 48        | 146       | 208       | 555       |
|                                                |            |                    | 5     | 14                                                                 | 45        | 155       | 333       | 618       |
|                                                |            |                    | 7     | 13                                                                 | 41        | 142       | 309       | 573       |
|                                                |            |                    | 10    | 12                                                                 | 40        | 136       | 294       | 549       |
| Max. Acceleration Torque                       | $T_{2N}$   | Nm                 | 3~10  | 1.8 Times of Rated Output Torque                                   |           |           |           |           |
| Mass Moments of Inertia                        |            | kg.cm <sup>2</sup> | 3     | 0.03                                                               | 0.15      | -         | -         | 9.21      |
|                                                |            |                    | 4     | 0.03                                                               | 0.15      | 0.51      | 2.8       | 7.54      |
|                                                |            |                    | 5     | 0.03                                                               | 0.13      | 0.45      | 2.71      | 7.42      |
|                                                |            |                    | 7     | 0.03                                                               | 0.13      | 0.42      | 2.54      | 7.14      |
|                                                |            |                    | 10    | 0.03                                                               | 0.13      | 0.42      | 2.51      | 7.03      |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm                 | 3~10  | 3 Times of Rated Output Torque                                     |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm                | 3~10  | 3,000                                                              |           |           |           |           |
| Max. Input Speed                               | $n_{1B}$   | rpm                | 3~10  | 6,000                                                              | 6,000     | 6,000     | 5,000     | 5,000     |
| Torsional Rigidity                             |            | Nm/arcmin          | 3~10  | 3                                                                  | 3         | 15        | 27        | 60        |
| Max. Radial Force                              | $F_{2rB}$  | N                  | 3~10  | 320                                                                | 800       | 4,150     | 8,760     | 9,300     |
| Max. Axial Force                               | $F_{2aB}$  | N                  | 3~10  | 160                                                                | 400       | 3,780     | 7,500     | 4,650     |
| Service Life                                   | $L_H$      | hr                 | 3~10  | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |
| Efficiency                                     | $\eta$     | %                  | 3~10  | $\geq 97\%$                                                        |           |           |           |           |
| Operating Temperature                          |            | °C                 | 3~10  | -25°C ~ +90°C                                                      |           |           |           |           |
| Lubrication                                    |            |                    | 3~10  | Synthetic Grease                                                   |           |           |           |           |
| Protection Class                               |            |                    | 3~10  | IP 65                                                              |           |           |           |           |
| Mounting Position                              |            |                    | 3~10  | Any                                                                |           |           |           |           |
| Noise Level                                    |            | dB                 | 3~10  | $\leq 58$                                                          | $\leq 58$ | $\leq 60$ | $\leq 63$ | $\leq 65$ |
| Weight $\pm 2\%$                               |            | Kg                 | 3~10  | 0.6                                                                | 1.4       | 2.8       | 6.7       | 13.25     |

# SERVOBOX Planetary Reducers

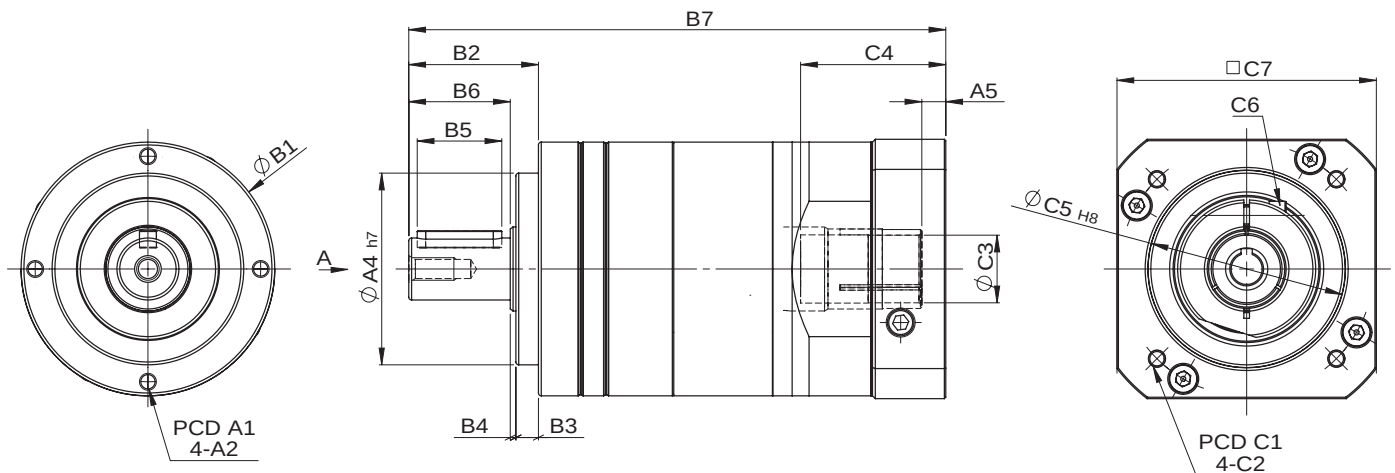
## SA Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 70, 100



A VIEW



unit: mm

| Model | 50             | 70         | 90                | 120           | 160           |
|-------|----------------|------------|-------------------|---------------|---------------|
| Code  | 50             | 70         | 90                | 120           | 160           |
| A1    | 44             | 62         | 80                | 108           | 140           |
| A2    | M4 x 0.7       | M5 x 0.8   | M6 x 1.0          | M8 x 1.25     | M10 x 1.5     |
| A3    | 12             | 16         | 22                | 32            | 40            |
| A4    | 35             | 52         | 68                | 90            | 120           |
| A5    | 4.5            | 6          | 9, 23.5           | 10, 20        | 10            |
| A6    | M4 x 0.7       | M5 x 0.8   | M8 x 1.25         | M12 x 1.75    | M12 x 1.75    |
| A7    | 4              | 5          | 6                 | 10            | 12            |
| A8    | 13.5           | 18         | 24.5              | 35            | 43            |
| B1    | 51             | 70         | 90                | 122           | 160           |
| B2    | 25.5           | 36         | 46                | 70            | 88            |
| B3    | 4              | 6.5        | 8                 | 9             | 8             |
| B4    | 1.5            | 1.5        | 2                 | 3             | 2             |
| B5    | 15             | 20         | 30                | 50            | 65            |
| B6    | 20             | 28         | 36                | 58            | 78            |
| B7    | 122.5          | 148.8      | 155.5, 170        | 257           | 298.5         |
| C1    | 45, 46, 63, 70 | 70, 75, 90 | 90, 100, 115, 145 | 115, 145, 165 | 115, 145, 165 |
| C2    | M3, M4, M5     | M5, M6     | M6, M8            | M6, M8, M10   | M6, M8, M10   |
| C3    | 11, 14         | 14, 19     | 19, 24            | 24, 28, 32    | 24, 28, 32    |
| C4    | 32             | 33.5, 41   | 51, 65.5          | 67, 77        | 67            |
| C5    | 30, 40, 50     | 50, 60, 70 | 70, 80, 95, 110   | 95, 110, 130  | 95, 110, 130  |
| C6    | M4 x 0.7       | M5 x 0.8   | M6 x 1.0          | M8 x 1.25     | M8 x 1.25     |
| C7    | 46, 55, 60     | 70, 75, 80 | 92, 110, 130      | 122, 130, 150 | 122, 130, 150 |



## High Precision Planetary Reducer

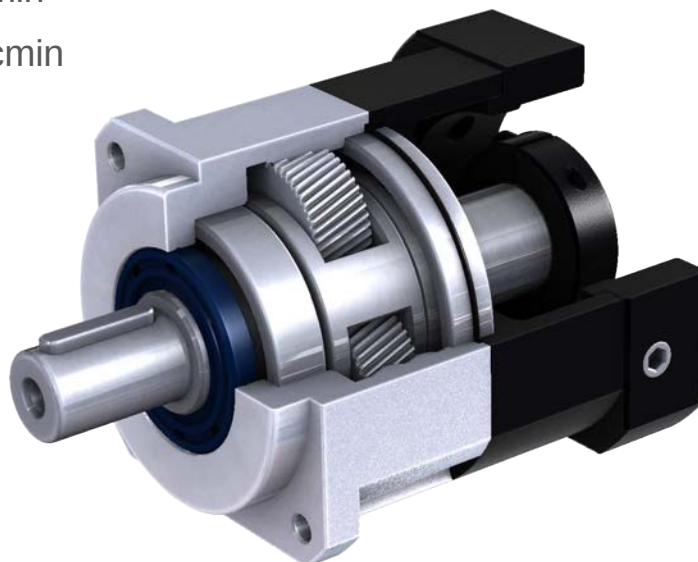
### SA 2-Stage

#### ■ Performance

| Parameter \ Model No.                          | Sym        | Unit               | Ratio  | 50                                                                 | 70           | 90           | 120          | 160          |
|------------------------------------------------|------------|--------------------|--------|--------------------------------------------------------------------|--------------|--------------|--------------|--------------|
| Rated Output Torque<br>(Nominal Output Torque) | $T_{2N}$   | Nm                 | 15     | 17                                                                 | 54           | -            | -            | 625          |
|                                                |            |                    | 20     | 15                                                                 | 48           | 126          | 267          | 555          |
|                                                |            |                    | 25     | 14                                                                 | 45           | 158          | 296          | 618          |
|                                                |            |                    | 30     | 13                                                                 | 41           | -            | -            | 583          |
|                                                |            |                    | 35     | 13                                                                 | 41           | 128          | 275          | 573          |
|                                                |            |                    | 40     | 12                                                                 | 39           | 123          | 265          | 553          |
|                                                |            |                    | 50     | 14                                                                 | 45           | 138          | 296          | 618          |
|                                                |            |                    | 70     | 13                                                                 | 41           | 128          | 275          | 573          |
|                                                |            |                    | 100    | 12                                                                 | 40           | 121          | 262          | 549          |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm                 | 15~100 | 1.8 Times of Rated Output Torque                                   |              |              |              |              |
| Mass Moments of Inertia                        |            | kg.cm <sup>2</sup> | 15     | 0.03                                                               | 0.13         | -            | -            | 2.63         |
|                                                |            |                    | 20     | 0.03                                                               | 0.13         | 0.13         | 0.47         | 2.63         |
|                                                |            |                    | 25     | 0.03                                                               | 0.13         | 0.13         | 0.47         | 2.63         |
|                                                |            |                    | 30     | 0.03                                                               | 0.13         | -            | -            | 2.43         |
|                                                |            |                    | 35     | 0.03                                                               | 0.13         | 0.13         | 0.47         | 2.43         |
|                                                |            |                    | 40     | 0.03                                                               | 0.13         | 0.13         | 0.47         | 2.43         |
|                                                |            |                    | 50     | 0.03                                                               | 0.13         | 0.13         | 0.44         | 2.43         |
|                                                |            |                    | 70     | 0.03                                                               | 0.13         | 0.13         | 0.44         | 2.39         |
|                                                |            |                    | 100    | 0.03                                                               | 0.13         | 0.13         | 0.44         | 2.39         |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm                 | 15~100 | 3 Times of Rated Output Torque                                     |              |              |              |              |
| Rated Input Speed                              | $n_{1N}$   | rpm                | 15~100 | 3,000                                                              |              |              |              |              |
| Max. Input Speed                               | $n_{1B}$   | rpm                | 15~100 | 6,000                                                              | 6,000        | 6,000        | 5,000        | 5,000        |
| Torsional Rigidity                             |            | Nm/arcmin          | 15~100 | 3                                                                  | 3            | 15           | 27           | 60           |
| Max. Radial Force                              | $F_{2rB}$  | N                  | 15~100 | 320                                                                | 800          | 4,150        | 8,760        | 9,300        |
| Max. Axial Force                               | $F_{2aB}$  | N                  | 15~100 | 160                                                                | 400          | 2,075        | 7,500        | 4,650        |
| Service Life                                   | $L_H$      | hr                 | 15~100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |              |              |              |              |
| Efficiency                                     | $\eta$     | %                  | 15~100 | $\geq 94\%$                                                        |              |              |              |              |
| Operating Temperature                          |            | °C                 | 15~100 | -25°C ~ +90°C                                                      |              |              |              |              |
| Lubrication                                    |            |                    | 15~100 | Synthetic Grease                                                   |              |              |              |              |
| Protection Class                               |            |                    | 15~100 | IP 65                                                              |              |              |              |              |
| Mounting Position                              |            |                    | 15~100 | Any                                                                |              |              |              |              |
| Noise Level                                    |            | dB                 | 15~100 | $\leq 60$ dB                                                       | $\leq 60$ dB | $\leq 63$ dB | $\leq 63$ dB | $\leq 65$ dB |
| Weight $\pm 2\%$                               |            | Kg                 | 15~100 | 1.05                                                               | 2.2          | 4.48         | 9.84         | 18.5         |

# PB Series

- Economy in-line helical planetary series
- Same installation dimensions as corresponding SB series
- 1-Stage Backlash  $\leq 8$  arcmin
- 2-Stage Backlash  $\leq 10$  arcmin



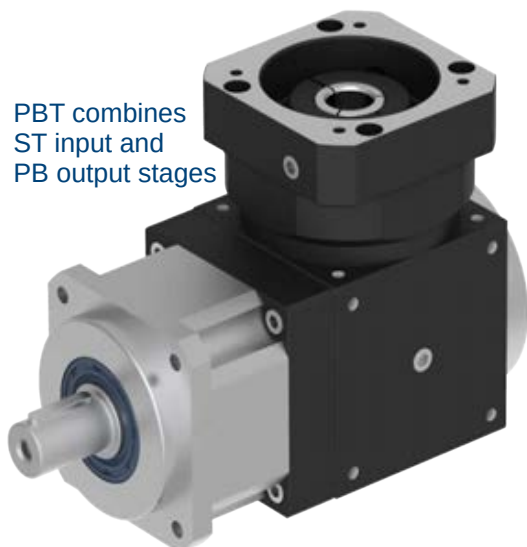
## PB Series Model Code

| PB     | 090   | 010                                                              |  | MOTOR                      |
|--------|-------|------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------|
| Series | Model | Ratio                                                            | Output Shaft Keyway                                                                 | Motor Designation          |
| PB     | 044   | 1-Stage                                                          | <input type="checkbox"/> Blank: Standard<br>(Keyed Output Shaft)                    | Motor Brand &<br>Model No. |
| PB-A   | 062   | 003, 004, 005, 006,<br>007, 008, 009, 100                        |                                                                                     |                            |
|        | 090   | 2-Stage                                                          | N: Solid Output Shaft<br>(No Keyway)                                                |                            |
|        | 120   | 015, 020, 025, 030,<br>035, 040, 050, 060,<br>070, 080, 090, 100 |                                                                                     |                            |
|        | 142   |                                                                  |                                                                                     |                            |
|        | 180   |                                                                  |                                                                                     |                            |
|        | 220   |                                                                  |                                                                                     |                            |

# PBL & PBT Series

- Economy right-angle helical planetary series
- Same installation dimensions as corresponding SBL or SBT series
- 1-Stage Backlash  $\leq 10$  arcmin
- 2-Stage Backlash  $\leq 12$  arcmin

PBT combines  
ST input and  
PB output stages



PBL Series



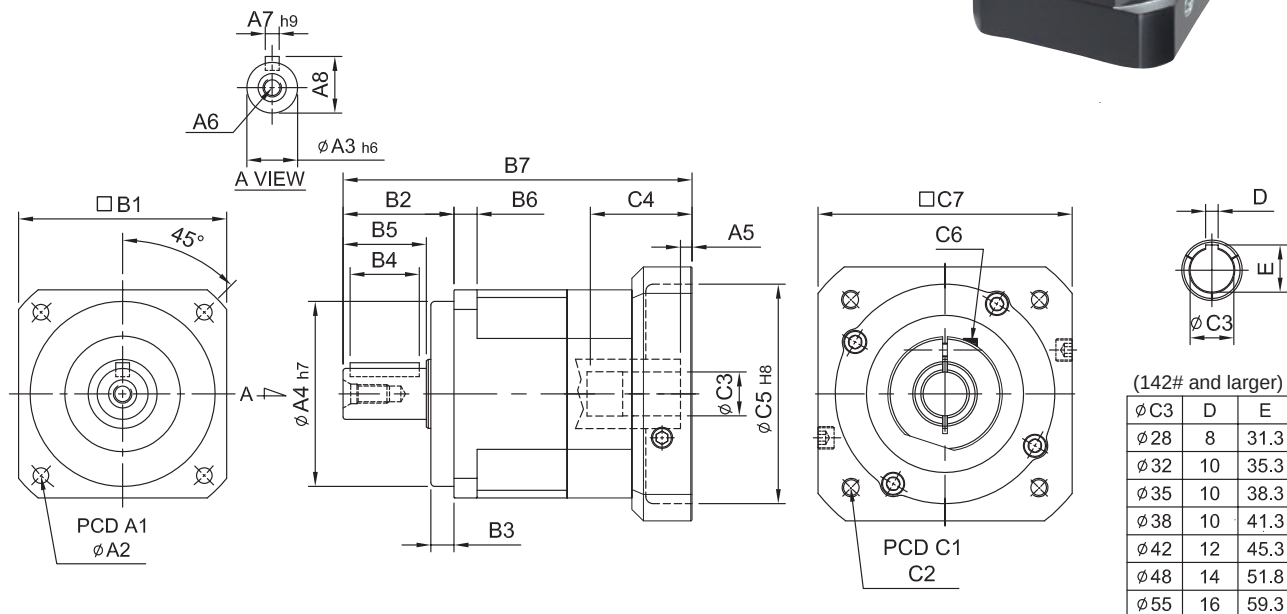
## PBL & PBT Series Model Code

| PBL    | 090   | 010                                                                                          |                                                                  | MOTOR                      |
|--------|-------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------|
| Series | Model | Ratio                                                                                        | Output Shaft Keyway                                              | Motor Designation          |
| PBL    | 044   | 1-Stage                                                                                      | <input type="checkbox"/> Blank: Standard<br>(Keyed Output Shaft) | Motor Brand &<br>Model No. |
| PBL-A  | 062   | 003, 004, 005, 006,<br>007, 008, 009, 010,<br>012, 014, 016, 018, 020                        | N: Solid Output Shaft<br>(No Keyway)                             |                            |
| PBT    | 120   | 2-Stage                                                                                      |                                                                  |                            |
|        | 142   | 015, 020, 025, 030, 035,<br>040, 050, 060, 070,<br>080, 090, 100, 120,<br>140, 160, 180, 200 |                                                                  |                            |
|        | 180   | 1-Stage PBT                                                                                  |                                                                  |                            |
|        | 220   | 003, 004, 005, 006,<br>007, 008, 009, 010,<br>015, 020, 025, 030,<br>035, 040, 045, 050      |                                                                  |                            |

## PB Series

1-Stage

RATIO : 3, 4, 5, 6, 7, 8, 9, 10



unit: mm

| Code | Model | 44         | 62             | 90                | 120            | 142            | 180                | 220             |
|------|-------|------------|----------------|-------------------|----------------|----------------|--------------------|-----------------|
| A    | A1    | 50         | 70             | 100               | 130            | 165            | 215                | 250             |
|      | A2    | 4.5        | 5.5            | 6.8               | 9              | 11             | 13                 | 17              |
|      | A3    | 13         | 16             | 22                | 32             | 40             | 55                 | 75              |
|      | A4    | 35         | 50             | 80                | 110            | 130            | 160                | 180             |
|      | A5    | 5          | 6              | 9, 23.5           | 10, 20         | 10             | 11.5, 13.5         | 12.5, 14.5      |
|      | A6    | M4 × P0.7  | M5 × P0.8      | M8 × P1.25        | M10 × P1.5     | M12 × P1.75    | M14 × P2.0         | M16 × P2.0      |
|      | A7    | 5          | 5              | 6                 | 10             | 12             | 16                 | 20              |
|      | A8    | 15         | 18             | 24.5              | 35             | 43             | 59                 | 79.5            |
| B    | B1    | 44         | 62             | 90                | 120            | 142            | 180                | 220             |
|      | B2    | 26         | 36             | 48                | 65             | 92             | 106                | 139             |
|      | B3    | 5          | 7              | 10                | 12             | 15             | 20                 | 30              |
|      | B4    | 15         | 20             | 30                | 40             | 65             | 70                 | 90              |
|      | B5    | 20         | 28             | 36                | 50             | 74             | 82                 | 104             |
|      | B6    | 5          | 8              | 10                | 12             | 15             | 16                 | 20              |
|      | B7    | 95         | 115, 123       | 164.5, 179        | 205, 215       | 260.5          | 323.5, 325.5       | 367.5, 369.5    |
| C    | C1    | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215  | 200, 215, 265      | 200, 265, 300   |
|      | C2    | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   | M10, M12, M16      | M12, M16        |
|      | C3    | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
|      | C4    | 26, 30.5   | 33.5, 41.5     | 59, 73.5          | 67, 77         | 84.5           | 116.5, 118.5       | 117.5, 119.5    |
|      | C5    | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  | 114.3, 180, 230    | 114.3, 230, 250 |
|      | C6    | M4 × P0.7  | M5 × P0.8      | M6 × P1.0         | M8 × P1.25     | M10 × P1.5     | M10 × P1.5         | M10 × P1.5      |
|      | C7    | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  | 182, 200, 250      | 222, 250, 265   |

# PB Series 1-Stage Specifications

## Performance

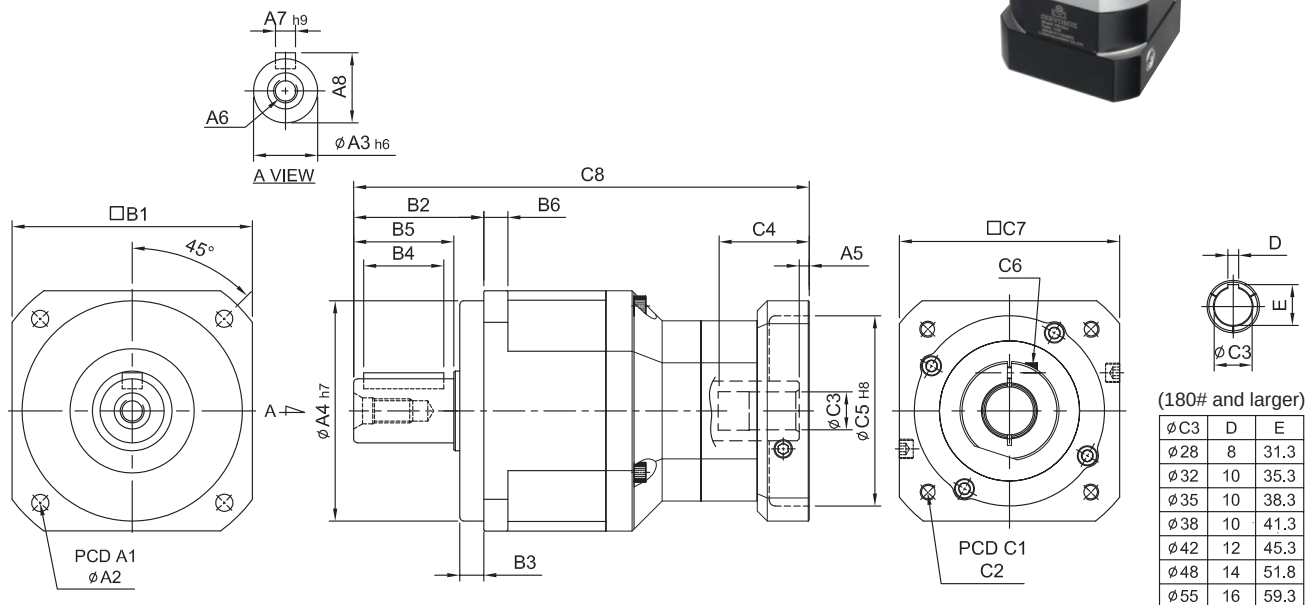
| Parameter \ Model No.                          | Sym        | Unit      | Ratio | 44                                                                 | 62        | 90        | 120       | 142       | 180       | 220       |
|------------------------------------------------|------------|-----------|-------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 3     | 17                                                                 | 54        | 145       | 301       | 553       | 1,067     | 1,786     |
|                                                |            |           | 4     | 15                                                                 | 48        | 128       | 269       | 491       | 940       | 1,587     |
|                                                |            |           | 5     | 14                                                                 | 45        | 132       | 278       | 510       | 1,050     | 1,770     |
|                                                |            |           | 6     | 13                                                                 | 41        | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 7     | 13                                                                 | 41        | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 8     | 12                                                                 | 39        | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 9     | 11                                                                 | 40        | 120       | 227       | 412       | 875       | 1,490     |
|                                                |            |           | 10    | 12                                                                 | 40        | 116       | 246       | 452       | 930       | 1,565     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 3~10  | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 3~10  | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 3~10  | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 3~10  | 6,000                                                              | 6,000     | 6,000     | 5,000     | 5,000     | 4,000     | 3,000     |
| Torsional Rigidity                             |            | Nm/arcmin | 3~10  | 3                                                                  | 6         | 14        | 27        | 60        | 140       | 240       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 3~10  | 360                                                                | 1,120     | 3,040     | 6,460     | 8,830     | 14,820    | 48,450    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 3~10  | 180                                                                | 560       | 1,520     | 3,230     | 4,410     | 7,410     | 24,225    |
| Service Life                                   | $L_H$      | hr        | 3~10  | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 3~10  | $\geq 97\%$                                                        |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 3~10  | -25° C ~ +90° C                                                    |           |           |           |           |           |           |
| Lubrication                                    |            |           | 3~10  | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 3~10  | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 3~10  | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 3~10  | $\leq 56$                                                          | $\leq 58$ | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ | $\leq 70$ |
| Weight $\pm 3\%$                               |            | Kg        | 3~10  | 0.58                                                               | 1.35      | 3.69      | 8.63      | 14.55     | 28.3      | 42.5      |

## Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 44   | 62   | 90   | 120  | 142  | 180   | 220   |
|-------|------|------|------|------|------|-------|-------|
| 3     | 0.03 | 0.16 | 0.61 | 3.25 | 9.21 | 28.98 | 59.61 |
| 4     | 0.03 | 0.14 | 0.48 | 2.74 | 7.54 | 23.67 | 54.37 |
| 5     | 0.03 | 0.13 | 0.47 | 2.74 | 7.42 | 23.29 | 53.27 |
| 6     | 0.03 | 0.13 | 0.45 | 2.65 | 7.25 | 22.75 | 51.72 |
| 7     | 0.03 | 0.13 | 0.45 | 2.62 | 7.14 | 22.48 | 50.97 |
| 8     | 0.03 | 0.13 | 0.44 | 2.58 | 7.07 | 22.59 | 50.84 |
| 9     | 0.03 | 0.13 | 0.44 | 2.57 | 7.04 | 22.53 | 50.63 |
| 10    | 0.03 | 0.13 | 0.44 | 2.57 | 7.03 | 22.51 | 50.56 |

## 2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100



| Model |    | Unit: mm   |                |                   |                  |                |                    |
|-------|----|------------|----------------|-------------------|------------------|----------------|--------------------|
| Code  |    | 62         | 90             | 120               | 142              | 180            | 220                |
| A     | A1 | 70         | 100            | 130               | 165              | 215            | 250                |
|       | A2 | 5.5        | 6.8            | 9                 | 11               | 13             | 17                 |
|       | A3 | 16         | 22             | 32                | 40               | 55             | 75                 |
|       | A4 | 50         | 80             | 110               | 130              | 160            | 180                |
|       | A5 | 5          | 6              | 9, 23.5           | 10, 20           | 10             | 11.5, 13.5         |
|       | A6 | M5 × P0.8  | M8 × P1.25     | M10 × P1.5        | M12 × P1.75      | M14 × P2.0     | M16 × P2.0         |
|       | A7 | 5          | 6              | 10                | 12               | 16             | 20                 |
|       | A8 | 18         | 24.5           | 35                | 43               | 59             | 79.5               |
| B     | B1 | 62         | 90             | 120               | 142              | 180            | 220                |
|       | B2 | 36         | 48             | 65                | 92               | 106            | 139                |
|       | B3 | 7          | 10             | 12                | 15               | 20             | 30                 |
|       | B4 | 20         | 30             | 40                | 65               | 70             | 90                 |
|       | B5 | 28         | 36             | 50                | 74               | 82             | 104                |
|       | B6 | 8          | 10             | 12                | 15               | 16             | 20                 |
| C     | C1 | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165    | 145, 165, 215  | 200, 215, 265      |
|       | C2 | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10      | M8, M10, M12   | M10, M12           |
|       | C3 | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32   | 28, 32, 35, 38 | 35, 38, 42, 48, 55 |
|       | C4 | 26, 30.5   | 33.5, 41.5     | 59, 73.5          | 67, 77           | 84.5           | 116.5, 118.5       |
|       | C5 | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 70, 95, 110, 130 | 110, 130, 180  | 114.3, 180, 230    |
|       | C6 | M4 × P0.7  | M5 × P0.8      | M6 × P1.0         | M8 × P1.25       | M10 × P1.5     | M10 × P1.5         |
|       | C7 | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150    | 146, 180, 190  | 182, 200, 250      |
|       | C8 | 139.5      | 172.5, 180.5   | 241, 255.5        | 298.5, 308.5     | 358.5          | 446.5, 448.5       |

# PB Series 2-Stage Specifications

## Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 62                                                                 | 90        | 120       | 142       | 180       | 220       |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15     | 54                                                                 | 145       | 301       | 553       | 1,067     | 1,786     |
|                                                |            |           | 20     | 48                                                                 | 128       | 269       | 491       | 940       | 1,587     |
|                                                |            |           | 25     | 45                                                                 | 132       | 278       | 510       | 1,050     | 1,770     |
|                                                |            |           | 30     | 41                                                                 | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 35     | 41                                                                 | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 40     | 39                                                                 | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 50     | 45                                                                 | 132       | 278       | 510       | 1,050     | 1,770     |
|                                                |            |           | 60     | 41                                                                 | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 70     | 41                                                                 | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 80     | 40                                                                 | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 90     | 40                                                                 | 120       | 227       | 412       | 875       | 1,490     |
|                                                |            |           | 100    | 40                                                                 | 116       | 246       | 452       | 930       | 1,565     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15~100 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15~100 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15~100 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15~100 | 6,000                                                              | 6,000     | 5,000     | 5,000     | 4,000     | 4,000     |
| Torsional Rigidity                             |            | Nm/arcmin | 15~100 | 6                                                                  | 14        | 27        | 60        | 140       | 240       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15~100 | 1,120                                                              | 3,040     | 6,460     | 8,830     | 14,820    | 48,450    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15~100 | 560                                                                | 1,520     | 3,230     | 4,410     | 7,410     | 24,225    |
| Service Life                                   | $L_H$      | hr        | 15~100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 15~100 | $\geq 94\%$                                                        |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 15~100 | -25° C ~ +90° C                                                    |           |           |           |           |           |
| Lubrication                                    |            |           | 15~100 | Synthetic Grease                                                   |           |           |           |           |           |
| Protection Class                               |            |           | 15~100 | IP65                                                               |           |           |           |           |           |
| Mounting Position                              |            |           | 15~100 | Any                                                                |           |           |           |           |           |
| Noise Level                                    |            | dB        | 15~100 | $\leq 58$                                                          | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ | $\leq 70$ |
| Weight $\pm 3\%$                               |            | Kg        | 15~100 | 1.6                                                                | 4.04      | 9.49      | 17        | 34.1      | 57.3      |

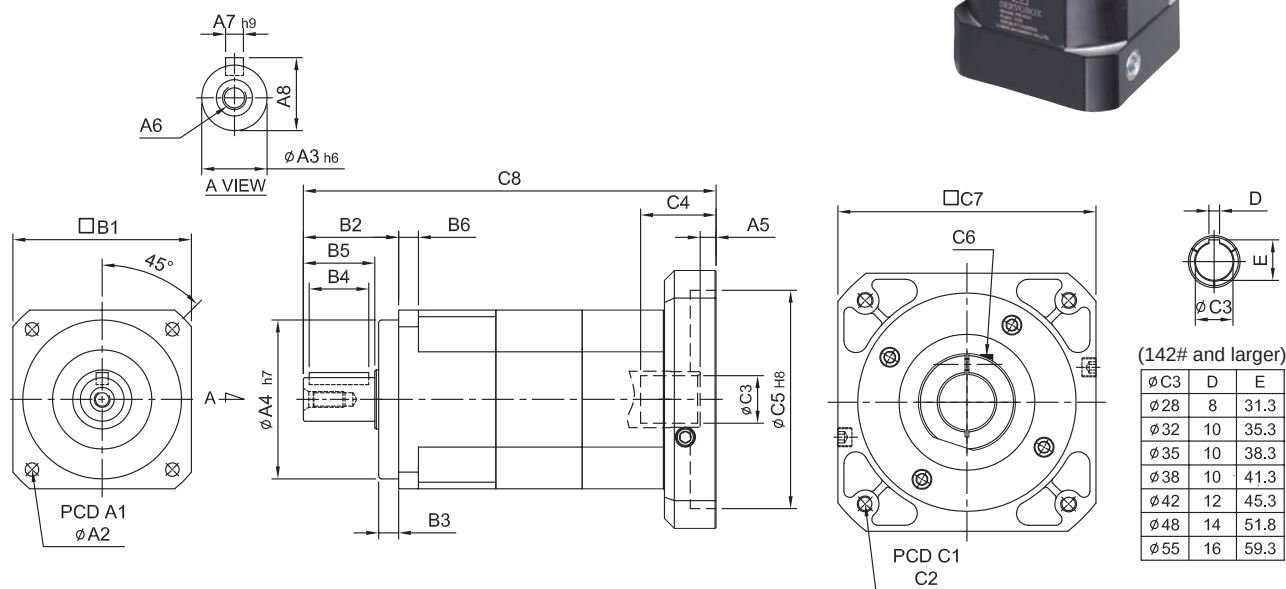
## Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 62   | 90   | 120  | 142  | 180  | 220   |
|-------|------|------|------|------|------|-------|
| 15    | 0.03 | 0.14 | 0.46 | 2.63 | 7.3  | 22.79 |
| 20    | 0.03 | 0.14 | 0.46 | 2.63 | 7.3  | 22.79 |
| 25    | 0.03 | 0.14 | 0.46 | 2.63 | 7.1  | 22.79 |
| 30    | 0.03 | 0.14 | 0.46 | 2.43 | 7.1  | 22.59 |
| 35    | 0.03 | 0.14 | 0.44 | 2.43 | 7.1  | 22.59 |
| 40    | 0.03 | 0.14 | 0.44 | 2.43 | 6.92 | 22.59 |
| 50    | 0.03 | 0.14 | 0.44 | 2.43 | 6.92 | 22.59 |
| 60    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 |
| 70    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 |
| 80    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 |
| 90    | 0.03 | 0.14 | 0.40 | 2.39 | 6.72 | 21.60 |
| 100   | 0.03 | 0.14 | 0.40 | 2.39 | 6.72 | 21.60 |

# PB-A Series

2-Stage

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100



|      |       | unit: mm   |                |                   |                |                |                    |                 |
|------|-------|------------|----------------|-------------------|----------------|----------------|--------------------|-----------------|
| Code | Model | 44A        | 62A            | 90A               | 120A           | 142A           | 180A               | 220A            |
| A    | A1    | 50         | 70             | 100               | 130            | 165            | 215                | 250             |
|      | A2    | 4.5        | 5.5            | 6.8               | 9              | 11             | 13                 | 17              |
|      | A3    | 13         | 16             | 22                | 32             | 40             | 55                 | 75              |
|      | A4    | 35         | 50             | 80                | 110            | 130            | 160                | 180             |
|      | A5    | 5          | 6              | 9, 23.5           | 10, 20         | 10             | 11.5, 13.5         | 12.5, 14.5      |
|      | A6    | M4 × P0.7  | M5 × P0.8      | M8 × P1.25        | M10 × P1.5     | M12 × P1.75    | M14 × P2.0         | M16 × P2.0      |
|      | A7    | 5          | 5              | 6                 | 10             | 12             | 16                 | 20              |
|      | A8    | 15         | 18             | 24.5              | 35             | 43             | 59                 | 79.5            |
| B    | B1    | 44         | 62             | 90                | 120            | 142            | 180                | 220             |
|      | B2    | 26         | 36             | 48                | 65             | 92             | 106                | 139             |
|      | B3    | 5          | 7              | 10                | 12             | 15             | 20                 | 30              |
|      | B4    | 15         | 20             | 30                | 40             | 65             | 70                 | 90              |
|      | B5    | 20         | 28             | 36                | 50             | 74             | 82                 | 104             |
|      | B6    | 5          | 8              | 10                | 12             | 15             | 16                 | 20              |
| C    | C1    | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165  | 145, 165, 215  | 200, 215, 265      | 200, 265, 300   |
|      | C2    | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10    | M8, M10, M12   | M10, M12           | M12, M16        |
|      | C3    | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 22, 24, 28, 32 | 28, 32, 35, 38 | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
|      | C4    | 26         | 33.5, 41.5     | 59, 73.5          | 67, 77         | 84.5           | 114.5, 116.5       | 117.5, 119.5    |
|      | C5    | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130   | 110, 130, 180  | 114.3, 180, 230    | 114.3, 230, 250 |
|      | C6    | M4 × P0.7  | M5 × P0.8      | M6 × P1.0         | M8 × P1.25     | M10 × P1.5     | M10 × P1.5         | M10 × P1.5      |
|      | C7    | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150  | 146, 150, 190  | 182, 200, 250      | 222, 250, 265   |
|      | C8    | 121        | 148.8, 156.8   | 208, 222.5        | 261, 271       | 327            | 404.5, 406.5       | 460.5, 462.5    |

# PB-A Series 2-Stage Specifications

## Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 44A                                                                | 62A       | 90A       | 120A      | 142A      | 180A      | 220A      |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15     | 17                                                                 | 54        | 145       | 301       | 553       | 1,067     | 1,786     |
|                                                |            |           | 20     | 15                                                                 | 48        | 128       | 269       | 491       | 940       | 1,587     |
|                                                |            |           | 25     | 14                                                                 | 45        | 132       | 278       | 510       | 1,050     | 1,770     |
|                                                |            |           | 30     | 13                                                                 | 41        | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 35     | 13                                                                 | 41        | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 40     | 12                                                                 | 39        | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 50     | 14                                                                 | 45        | 132       | 278       | 510       | 1,050     | 1,770     |
|                                                |            |           | 60     | 13                                                                 | 41        | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 70     | 13                                                                 | 41        | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 80     | 12                                                                 | 40        | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 90     | 11                                                                 | 40        | 120       | 227       | 412       | 875       | 1,490     |
|                                                |            |           | 100    | 12                                                                 | 40        | 116       | 246       | 452       | 930       | 1,565     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15~100 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15~100 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15~100 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15~100 | 6,000                                                              | 6,000     | 6,000     | 5,000     | 5,000     | 4,000     | 4,000     |
| Torsional Rigidity                             |            | Nm/arcmin | 15~100 | 3                                                                  | 6         | 14        | 27        | 60        | 140       | 240       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15~100 | 360                                                                | 1,120     | 3,040     | 6,460     | 8,830     | 14,820    | 48,450    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15~100 | 180                                                                | 560       | 1,520     | 3,230     | 4,410     | 7,410     | 24,225    |
| Service Life                                   | $L_H$      | hr        | 15~100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 15~100 | $\geq 94\%$                                                        |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 15~100 | -25° C ~ +90° C                                                    |           |           |           |           |           |           |
| Lubrication                                    |            |           | 15~100 | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 15~100 | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 15~100 | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 15~100 | $\leq 56$                                                          | $\leq 58$ | $\leq 60$ | $\leq 63$ | $\leq 65$ | $\leq 67$ | $\leq 70$ |
| Weight $\pm 3\%$                               |            | Kg        | 15~100 | 0.86                                                               | 2         | 5.48      | 10        | 21.4      | 42        | 59        |

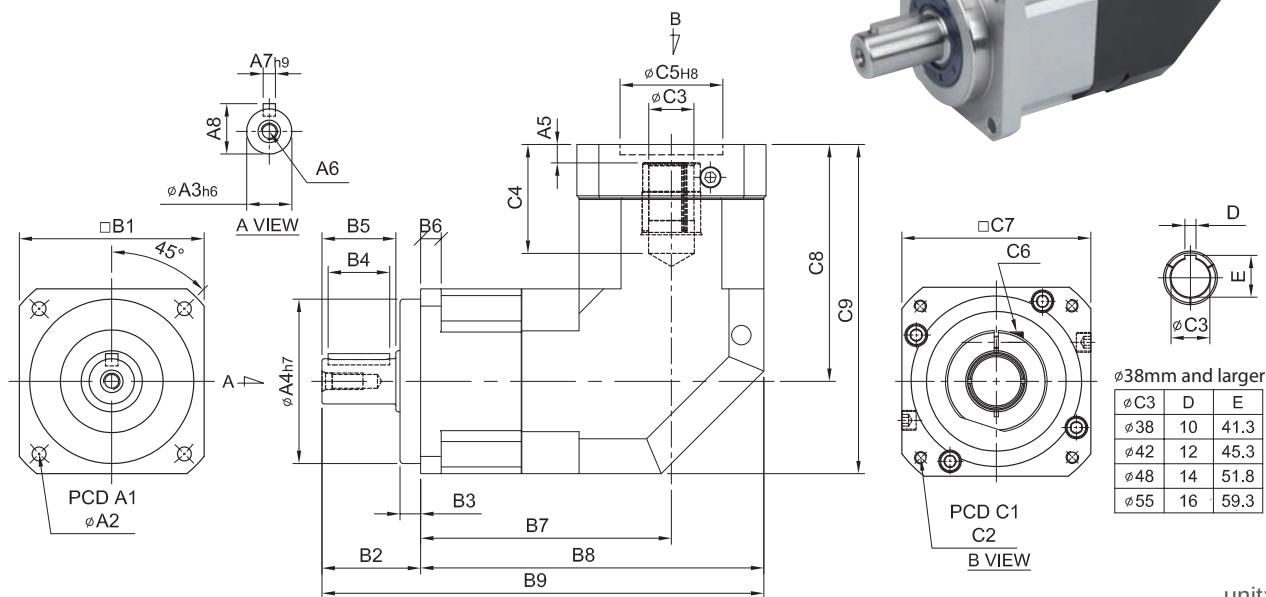
## Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 44A  | 62A  | 90A  | 120A | 142A | 180A  | 220A  |
|-------|------|------|------|------|------|-------|-------|
| 15    | 0.03 | 0.14 | 0.46 | 2.63 | 7.3  | 22.79 | 56.98 |
| 20    | 0.03 | 0.14 | 0.46 | 2.63 | 7.3  | 22.79 | 56.98 |
| 25    | 0.03 | 0.14 | 0.46 | 2.63 | 7.1  | 22.79 | 56.98 |
| 30    | 0.03 | 0.14 | 0.46 | 2.43 | 7.1  | 22.59 | 56.48 |
| 35    | 0.03 | 0.14 | 0.44 | 2.43 | 7.1  | 22.59 | 56.48 |
| 40    | 0.03 | 0.14 | 0.44 | 2.43 | 6.92 | 22.59 | 56.48 |
| 50    | 0.03 | 0.14 | 0.44 | 2.43 | 6.92 | 22.59 | 56.48 |
| 60    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 | 54.58 |
| 70    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 | 54.58 |
| 80    | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 | 54.58 |
| 90    | 0.03 | 0.14 | 0.40 | 2.39 | 6.72 | 21.60 | 54.00 |
| 100   | 0.03 | 0.14 | 0.43 | 2.39 | 6.72 | 21.83 | 54.58 |

# PBL Series

1-Stage

RATIO : 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20



unit: mm

| Code | Model | 44         | 62             | 90                | 120           | 142            | 180                | 220             |
|------|-------|------------|----------------|-------------------|---------------|----------------|--------------------|-----------------|
| A    | A1    | 50         | 70             | 100               | 130           | 165            | 215                | 250             |
|      | A2    | 4.5        | 5.5            | 6.8               | 9             | 11             | 13                 | 17              |
|      | A3    | 13         | 16             | 22                | 32            | 40             | 55                 | 75              |
|      | A4    | 35         | 50             | 80                | 110           | 130            | 160                | 180             |
|      | A5    | 6          | 6              | 9, 23.5           | 10, 20        | 10             | 12.5, 14.5         | 12.5, 14.5      |
|      | A6    | M4 × P0.7  | M5 × P0.8      | M8 × P1.25        | M10 × P1.5    | M12 × P1.75    | M14 × P2.0         | M16 × P2.0      |
|      | A7    | 5          | 5              | 6                 | 10            | 12             | 16                 | 20              |
|      | A8    | 15         | 18             | 24.5              | 35            | 43             | 59                 | 79.5            |
| B    | B1    | 44         | 62             | 90                | 120           | 142            | 180                | 220             |
|      | B2    | 26         | 36             | 48                | 65            | 92             | 106                | 139             |
|      | B3    | 5          | 7              | 10                | 12            | 15             | 20                 | 30              |
|      | B4    | 15         | 20             | 30                | 40            | 65             | 70                 | 90              |
|      | B5    | 20         | 28             | 36                | 50            | 74             | 82                 | 104             |
|      | B6    | 5          | 8              | 10                | 12            | 15             | 16                 | 20              |
|      | B7    | 76         | 84.5           | 122.1             | 148           | 165.5          | 223.6              | 231.6           |
|      | B8    | 98         | 115.5          | 167.1             | 208           | 236.5          | 313.6              | 341.6           |
|      | B9    | 124        | 151.5          | 215.1             | 273           | 328.5          | 419.6              | 480.6           |
| C    | C1    | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165 | 145, 165, 215  | 200, 215, 265      | 200, 265, 300   |
|      | C2    | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10   | M8, M10, M12   | M10, M12, M16      | M12, M16        |
|      | C3    | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32    | 28, 32, 35, 38 | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
|      | C4    | 27         | 33.5, 42       | 53, 67.5          | 67, 77        | 85             | 117, 119           | 117, 119        |
|      | C5    | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180  | 114.3, 180, 230    | 114.3, 230, 250 |
|      | C6    | M4 × P0.7  | M5 × P0.8      | M6 × P1.0         | M8 × P1.25    | M10 × P1.5     | M10 × P1.5         | M10 × P1.5      |
|      | C7    | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150 | 146, 150, 190  | 182, 200, 250      | 222, 250, 265   |
|      | C8    | 61         | 77, 85         | 115.3, 129.8      | 141, 151      | 165.7          | 235, 237           | 235, 237        |
|      | C9    | 83         | 108, 116       | 160.3, 174.8      | 201, 211      | 236.7          | 325, 327           | 345, 347        |

# PBL Series 1-Stage Specifications

## Performance

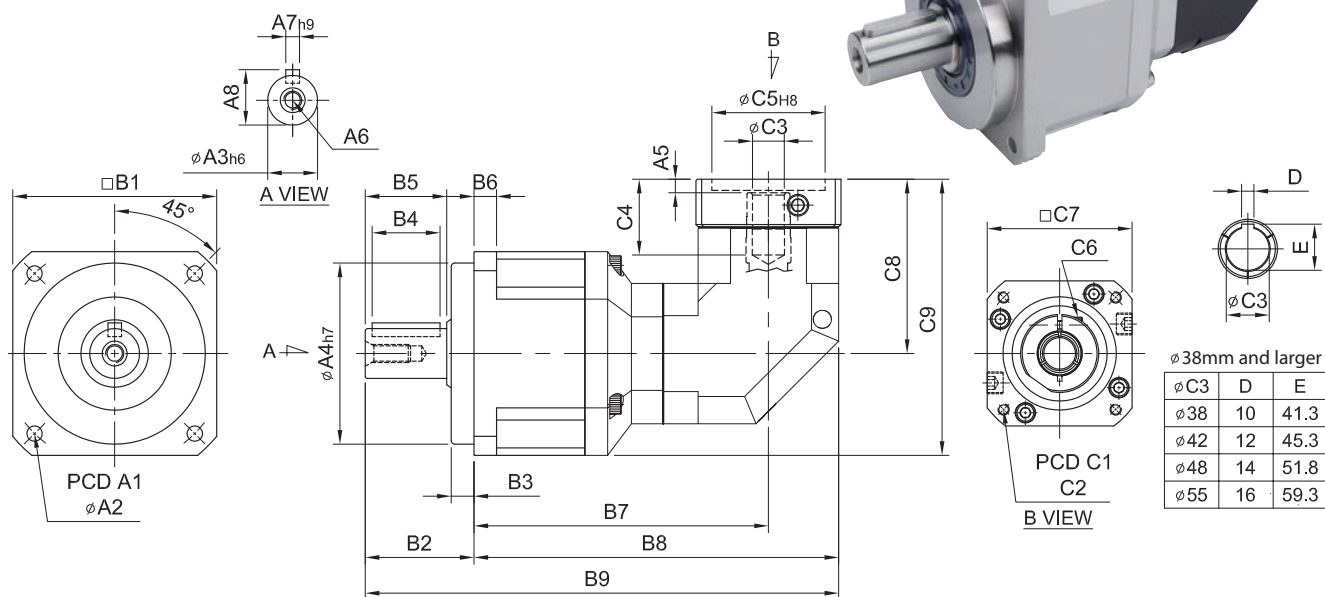
| Parameter \ Model No.                          | Sym        | Unit      | Ratio | 44                                                                 | 62        | 90        | 120       | 142       | 180       | 220       |
|------------------------------------------------|------------|-----------|-------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 3     | 17                                                                 | 54        | 145       | 301       | 553       | 1,067     | 1,786     |
|                                                |            |           | 4     | 15                                                                 | 48        | 128       | 269       | 491       | 940       | 1,587     |
|                                                |            |           | 5     | 14                                                                 | 45        | 132       | 278       | 510       | 1,050     | 1,770     |
|                                                |            |           | 6     | 13                                                                 | 41        | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 7     | 13                                                                 | 41        | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 8     | 12                                                                 | 39        | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 9     | 11                                                                 | 40        | 120       | 227       | 412       | 875       | 1,490     |
|                                                |            |           | 10    | 12                                                                 | 40        | 116       | 246       | 452       | 930       | 1,565     |
|                                                |            |           | 12    | 13                                                                 | 41        | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 14    | 13                                                                 | 41        | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 16    | 12                                                                 | 39        | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 18    | 11                                                                 | 40        | 120       | 227       | 412       | 875       | 1,490     |
|                                                |            |           | 20    | 12                                                                 | 40        | 116       | 246       | 452       | 930       | 1,565     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 3~20  | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 3~20  | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 3~20  | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 3~20  | 6,000                                                              | 6,000     | 6,000     | 5,000     | 5,000     | 4,000     | 3,000     |
| Torsional Rigidity                             |            | Nm/arcmin | 3~20  | 3                                                                  | 6         | 14        | 27        | 60        | 140       | 240       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 3~20  | 360                                                                | 1,120     | 3,040     | 6,460     | 8,830     | 14,820    | 48,450    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 3~20  | 180                                                                | 560       | 1,520     | 3,230     | 4,410     | 7,410     | 24,225    |
| Service Life                                   | $L_H$      | hr        | 3~20  | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 3~20  | $\geq 95\%$                                                        |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 3~20  | -25° C ~ +90° C                                                    |           |           |           |           |           |           |
| Lubrication                                    |            |           | 3~20  | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 3~20  | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 3~20  | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 3~20  | $\leq 65$                                                          | $\leq 68$ | $\leq 70$ | $\leq 72$ | $\leq 74$ | $\leq 76$ | $\leq 78$ |
| Weight $\pm 3\%$                               |            | Kg        | 3~20  | 0.99                                                               | 2.1       | 6.88      | 12.5      | 23.16     | 51        | 75.2      |

## Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 44   | 62   | 90   | 120  | 142  | 180  | 220   |
|-------|------|------|------|------|------|------|-------|
| 3     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135.0 |
| 4     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135.0 |
| 5     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135.0 |
| 6     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135.0 |
| 7     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135.0 |
| 8     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135.0 |
| 9     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135.0 |
| 10    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68.2 | 135.0 |
| 12    | 0.03 | 0.08 | 1.88 | 6.20 | 21.8 | 65.5 | 119.2 |
| 14    | 0.03 | 0.08 | 1.88 | 6.20 | 21.8 | 65.5 | 119.2 |
| 16    | 0.03 | 0.08 | 1.88 | 6.20 | 21.8 | 65.5 | 119.2 |
| 18    | 0.03 | 0.08 | 1.88 | 6.20 | 21.8 | 65.5 | 119.2 |
| 20    | 0.03 | 0.08 | 1.88 | 6.20 | 21.8 | 65.5 | 119.2 |

# PBL Series

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100, 120, 140, 160, 180, 200 (2-Stage)



unit: mm

| Code | Model | 62         | 90             | 120               | 142              | 180            | 220                |
|------|-------|------------|----------------|-------------------|------------------|----------------|--------------------|
| A    | A1    | 70         | 100            | 130               | 165              | 215            | 250                |
|      | A2    | 5.5        | 6.8            | 9                 | 11               | 13             | 17                 |
|      | A3    | 16         | 22             | 32                | 40               | 55             | 75                 |
|      | A4    | 50         | 80             | 110               | 130              | 160            | 180                |
|      | A5    | 6          | 6              | 9, 23.5           | 10, 20           | 10             | 12.5, 14.5         |
|      | A6    | M5 × P0.8  | M8 × P1.25     | M10 × P1.5        | M12 × P1.75      | M14 × P2.0     | M16 × P2.0         |
|      | A7    | 5          | 6              | 10                | 12               | 16             | 20                 |
|      | A8    | 18         | 24.5           | 35                | 43               | 59             | 79.5               |
| B    | B1    | 62         | 90             | 120               | 142              | 180            | 220                |
|      | B2    | 36         | 48             | 65                | 92               | 106            | 139                |
|      | B3    | 7          | 10             | 12                | 15               | 20             | 30                 |
|      | B4    | 20         | 30             | 40                | 65               | 70             | 90                 |
|      | B5    | 28         | 36             | 50                | 74               | 82             | 104                |
|      | B6    | 8          | 10             | 12                | 15               | 16             | 20                 |
|      | B7    | 110.5      | 130            | 181.6             | 214.5            | 249.5          | 313.6              |
|      | B8    | 132.5      | 161            | 266.6             | 274.5            | 320.5          | 403.6              |
| C    | B9    | 168.5      | 209            | 291.6             | 366.5            | 426.5          | 542.6              |
|      | C1    | 46, 60, 63 | 70, 75, 90     | 90, 110, 115, 145 | 115, 145, 165    | 145, 165, 215  | 200, 215, 265      |
|      | C2    | M3, M4, M5 | M4, M5, M6     | M5, M6, M8, M10   | M6, M8, M10      | M8, M10, M12   | M10, M12, M16      |
|      | C3    | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32       | 28, 32, 35, 38 | 35, 38, 42, 48, 55 |
|      | C4    | 27         | 33.5, 42       | 53, 67.5          | 67, 77           | 85             | 117, 119           |
|      | C5    | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 70, 95, 110, 130 | 110, 130, 180  | 114.3, 180, 230    |
|      | C6    | M4 × P0.7  | M5 × P0.8      | M6 × P1.0         | M8 × P1.25       | M10 × P1.5     | M10 × P1.5         |
|      | C7    | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150    | 146, 150, 190  | 182, 200, 250      |
|      | C8    | 61         | 77, 85         | 115.3, 129.8      | 141, 151         | 165.7          | 235, 237           |
|      | C9    | 92         | 122, 130       | 175.3, 189.8      | 212, 222         | 255.7          | 345, 347           |

# PBL Series 2-Stage Specifications

## Performance

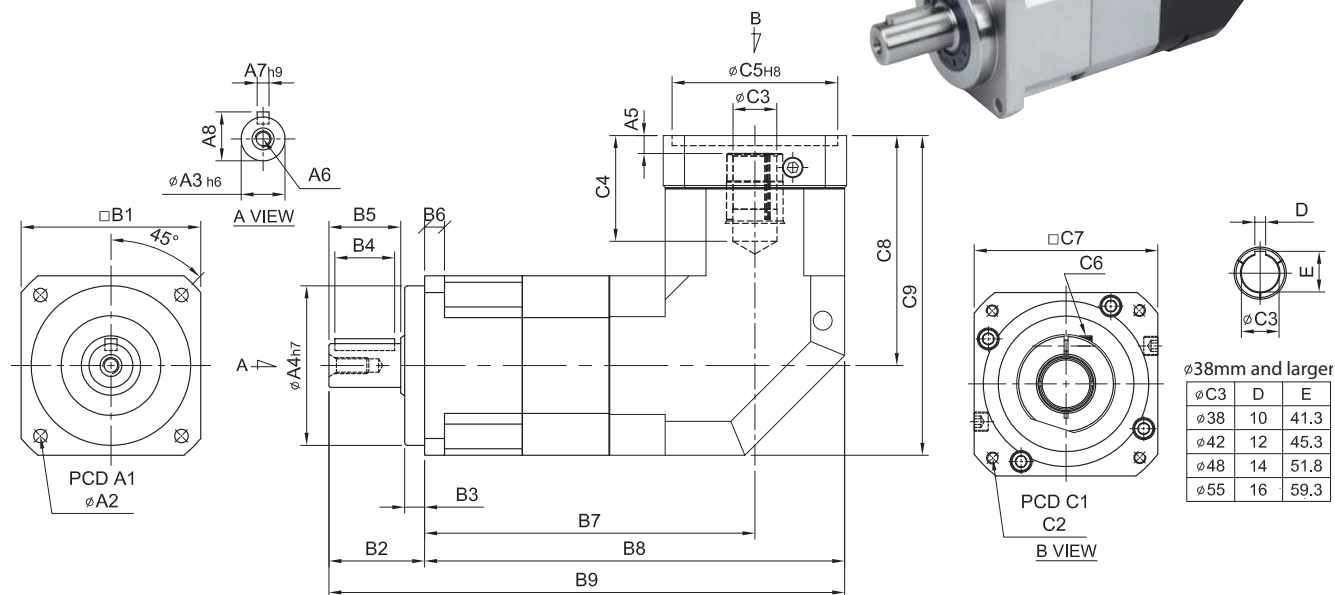
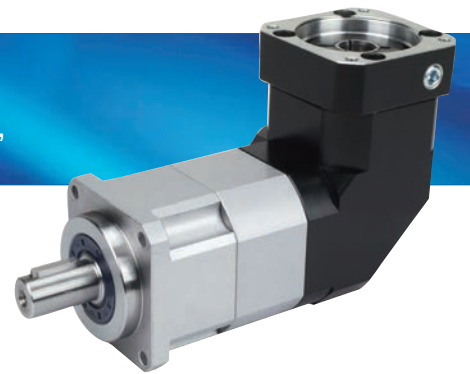
| Parameter \ No.                                | Sym        | Unit      | Ratio  | 62                                                                 | 90        | 120       | 142       | 180       | 220       |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15     | 54                                                                 | 145       | 301       | 553       | 1,067     | 1,786     |
|                                                |            |           | 20     | 48                                                                 | 128       | 269       | 491       | 940       | 1,587     |
|                                                |            |           | 25     | 45                                                                 | 132       | 278       | 510       | 1,050     | 1,770     |
|                                                |            |           | 30     | 41                                                                 | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 35     | 41                                                                 | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 40     | 39                                                                 | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 50     | 45                                                                 | 132       | 278       | 510       | 1,050     | 1,770     |
|                                                |            |           | 60     | 41                                                                 | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 70     | 41                                                                 | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 80     | 40                                                                 | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 90     | 40                                                                 | 120       | 227       | 412       | 875       | 1,490     |
|                                                |            |           | 100    | 40                                                                 | 116       | 246       | 452       | 930       | 1,565     |
|                                                |            |           | 120    | 41                                                                 | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 140    | 41                                                                 | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 160    | 40                                                                 | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 180    | 40                                                                 | 120       | 227       | 412       | 875       | 1,490     |
|                                                |            |           | 200    | 40                                                                 | 116       | 246       | 452       | 930       | 1,565     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15~200 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15~200 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15~200 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15~200 | 6,000                                                              | 6,000     | 5,000     | 5,000     | 4,000     | 3,000     |
| Torsional Rigidity                             |            | Nm/arcmin | 15~200 | 6                                                                  | 14        | 27        | 60        | 140       | 240       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15~200 | 1,120                                                              | 3,040     | 6,460     | 8,830     | 14,820    | 48,450    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15~200 | 560                                                                | 1,520     | 3,230     | 4,410     | 7,410     | 24,225    |
| Service Life                                   | $L_H$      | hr        | 15~200 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 15~200 | $\geq 92\%$                                                        |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 15~200 | -25° C ~ +90° C                                                    |           |           |           |           |           |
| Lubrication                                    |            |           | 15~200 | Synthetic Grease                                                   |           |           |           |           |           |
| Protection Class                               |            |           | 15~200 | IP65                                                               |           |           |           |           |           |
| Mounting Position                              |            |           | 15~200 | Any                                                                |           |           |           |           |           |
| Noise Level                                    |            | dB        | 15~200 | $\leq 68$                                                          | $\leq 70$ | $\leq 72$ | $\leq 74$ | $\leq 76$ | $\leq 78$ |
| Weight $\pm 3\%$                               |            | Kg        | 15~200 | 2                                                                  | 6.1       | 12.5      | 23.2      | 41.4      | 73        |

## Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 62   | 90   | 120  | 142  | 180  | 220  |
|-------|------|------|------|------|------|------|
| 15    | 0.09 | 0.36 | 2.28 | 6.85 | 26.2 | 70.1 |
| 20    | 0.09 | 0.36 | 2.28 | 6.85 | 26.2 | 70.1 |
| 25    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 30    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 35    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 40    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 50    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 60    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 70    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 80    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 90    | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 100   | 0.09 | 0.36 | 2.28 | 6.85 | 23.1 | 68.2 |
| 120   | 0.03 | 0.10 | 1.88 | 6.20 | 21.2 | 65.1 |
| 140   | 0.03 | 0.10 | 1.88 | 6.20 | 21.2 | 65.1 |
| 160   | 0.03 | 0.10 | 1.88 | 6.20 | 21.2 | 65.1 |
| 180   | 0.03 | 0.10 | 1.88 | 6.20 | 21.2 | 65.1 |
| 200   | 0.03 | 0.10 | 1.88 | 6.20 | 21.2 | 65.1 |

# PBL-A Series

RATIO : 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100, 120, 140, 160, 180, 200 (2-Stage)



unit: mm

| Code | Model | 44A        | 62A            | 90A               | 120A          | 142A           | 180A               | 220A            |
|------|-------|------------|----------------|-------------------|---------------|----------------|--------------------|-----------------|
| A    | A1    | 50         | 70             | 100               | 130           | 165            | 215                | 250             |
|      | A2    | 4.5        | 5.5            | 6.8               | 9             | 11             | 13                 | 17              |
|      | A3    | 13         | 16             | 22                | 32            | 40             | 55                 | 75              |
|      | A4    | 35         | 50             | 80                | 110           | 130            | 160                | 180             |
|      | A5    | 6          | 6              | 9, 23.5           | 10, 20        | 10             | 12.5, 14.5         | 12.5, 14.5      |
|      | A6    | M4 × P0.7  | M5 × P0.8      | M8 × P1.25        | M10 × P1.5    | M12 × P1.75    | M14 × P2.0         | M16, P2.0       |
|      | A7    | 5          | 5              | 6                 | 10            | 12             | 16                 | 20              |
|      | A8    | 15         | 18             | 24.5              | 35            | 43             | 59                 | 79.5            |
| B    | B1    | 44         | 62             | 90                | 120           | 142            | 180                | 220             |
|      | B2    | 26         | 36             | 48                | 65            | 92             | 106                | 139             |
|      | B3    | 5          | 7              | 10                | 12            | 15             | 20                 | 30              |
|      | B4    | 15         | 20             | 30                | 40            | 65             | 70                 | 90              |
|      | B5    | 20         | 28             | 36                | 50            | 74             | 82                 | 104             |
|      | B6    | 5          | 8              | 10                | 12            | 15             | 16                 | 20              |
|      | B7    | 102        | 118.3          | 165.6             | 204           | 232            | 304.6              | 324.6           |
|      | B8    | 124        | 149.3          | 210.6             | 264           | 303            | 394.6              | 434.6           |
|      | B9    | 150        | 185.3          | 258.6             | 329           | 395            | 500.6              | 573.6           |
| C    | C1    | 46, 60, 63 | 70, 75, 90     | 90, 100, 115, 145 | 115, 145, 165 | 145, 165, 215  | 200, 215, 265      | 200, 265, 300   |
|      | C2    | M3, M4, M5 | M4, M5, M6     | M5, M6, M8        | M6, M8, M10   | M8, M10, M12   | M10, M12, M16      | M12, M16        |
|      | C3    | 8, 9, 11   | 11, 14, 16, 19 | 16, 19, 22, 24    | 24, 28, 32    | 28, 32, 35, 38 | 35, 38, 42, 48, 55 | 38, 42, 48, 55  |
|      | C4    | 27         | 33.5, 42       | 53, 67.5          | 67, 77        | 85             | 117, 119           | 117, 119        |
|      | C5    | 30, 40, 50 | 50, 60, 70     | 70, 80, 95, 110   | 95, 110, 130  | 110, 130, 180  | 114.3, 180, 230    | 114.3, 230, 250 |
|      | C6    | M4 × P0.7  | M5 × P0.8      | M6 × P1.0         | M8 × P1.25    | M10 × P1.5     | M10 × P1.5         | M10, P1.5       |
|      | C7    | 46, 55     | 64, 70, 80     | 92, 110, 130      | 122, 130, 150 | 146, 150, 190  | 182, 200, 250      | 220, 250, 265   |
|      | C8    | 61         | 77, 85         | 115.3, 129.8      | 141, 151      | 165.7          | 235, 237           | 235, 237        |
|      | C9    | 83         | 108, 116       | 160.3, 174.8      | 201, 211      | 236.7          | 325, 327           | 345, 34         |

# PBL-A Series 2-Stage Specifications

## Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio  | 44A                                                                | 62A       | 90A       | 120A      | 142A      | 180A      | 220A      |
|------------------------------------------------|------------|-----------|--------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 15     | 17                                                                 | 54        | 145       | 301       | 553       | 1,067     | 1,786     |
|                                                |            |           | 20     | 15                                                                 | 48        | 128       | 269       | 491       | 940       | 1,587     |
|                                                |            |           | 25     | 14                                                                 | 45        | 132       | 278       | 510       | 1,050     | 1,770     |
|                                                |            |           | 30     | 13                                                                 | 41        | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 35     | 13                                                                 | 41        | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 40     | 12                                                                 | 39        | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 50     | 11                                                                 | 45        | 132       | 278       | 510       | 1,050     | 1,770     |
|                                                |            |           | 60     | 12                                                                 | 41        | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 70     | 13                                                                 | 41        | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 80     | 13                                                                 | 40        | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 90     | 12                                                                 | 40        | 120       | 227       | 412       | 875       | 1,490     |
|                                                |            |           | 100    | 11                                                                 | 40        | 116       | 246       | 452       | 930       | 1,565     |
|                                                |            |           | 120    | 12                                                                 | 41        | 125       | 252       | 466       | 985       | 1,680     |
|                                                |            |           | 140    | 13                                                                 | 41        | 123       | 258       | 473       | 975       | 1,645     |
|                                                |            |           | 160    | 13                                                                 | 39        | 115       | 241       | 442       | 942       | 1,605     |
|                                                |            |           | 180    | 12                                                                 | 40        | 120       | 227       | 412       | 875       | 1,490     |
|                                                |            |           | 200    | 11                                                                 | 40        | 116       | 246       | 452       | 930       | 1,565     |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 15~200 | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 15~200 | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm       | 15~200 |                                                                    | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{1B}$   | rpm       | 15~200 |                                                                    | 6,000     | 6,000     | 5,000     | 5,000     | 4,000     | 3,000     |
| Torsional Rigidity                             |            | Nm/arcmin | 15~200 |                                                                    | 6         | 14        | 27        | 60        | 140       | 240       |
| Max. Radial Force                              | $F_{2rB}$  | N         | 15~200 |                                                                    | 1,120     | 3,040     | 6,460     | 8,830     | 14,820    | 48,450    |
| Max. Axial Force                               | $F_{2aB}$  | N         | 15~200 |                                                                    | 560       | 1,520     | 3,230     | 4,410     | 7,410     | 24,225    |
| Service Life                                   | $L_H$      | hr        | 15~200 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 15~200 | $\geq 92\%$                                                        |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 15~200 | -25° C ~ +90° C                                                    |           |           |           |           |           |           |
| Lubrication                                    |            |           | 15~200 | Synthetic Grease                                                   |           |           |           |           |           |           |
| Protection Class                               |            |           | 15~200 | IP65                                                               |           |           |           |           |           |           |
| Mounting Position                              |            |           | 15~200 | Any                                                                |           |           |           |           |           |           |
| Noise Level                                    |            | dB        | 15~200 | $\leq 65$                                                          | $\leq 68$ | $\leq 70$ | $\leq 72$ | $\leq 74$ | $\leq 76$ | $\leq 78$ |
| Weight $\pm 3\%$                               |            | Kg        | 15~200 | 1.5                                                                | 3         | 8.15      | 13.9      | 29.4      | 52.4      | 94.5      |

## Mass Moments of Inertia (kg.cm<sup>2</sup>)

| Ratio | 44A  | 62A  | 90A  | 120A | 142A  | 180A | 220A |
|-------|------|------|------|------|-------|------|------|
| 15    | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 55.2 | 80.2 |
| 20    | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 55.2 | 80.2 |
| 25    | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 50.4 | 76.5 |
| 30    | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 50.4 | 76.5 |
| 35    | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 50.4 | 76.5 |
| 40    | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 50.4 | 76.5 |
| 50    | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 50.4 | 76.5 |
| 60    | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 50.4 | 76.5 |
| 70    | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 50.4 | 76.5 |
| 80    | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 50.4 | 76.5 |
| 90    | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 50.4 | 76.5 |
| 100   | 0.09 | 0.36 | 2.28 | 6.85 | 23.50 | 50.4 | 76.5 |
| 120   | 0.03 | 0.08 | 1.88 | 6.20 | 21.80 | 48.7 | 74.2 |
| 140   | 0.03 | 0.08 | 1.88 | 6.20 | 21.80 | 48.7 | 74.2 |
| 160   | 0.03 | 0.08 | 1.88 | 6.20 | 21.80 | 48.7 | 74.2 |
| 180   | 0.03 | 0.08 | 1.88 | 6.20 | 21.80 | 48.7 | 74.2 |
| 200   | 0.03 | 0.08 | 1.88 | 6.20 | 21.80 | 48.7 | 74.2 |



# PBT Series 1-Stage Specifications

## Performance

| Parameter \ Model No.                          | Sym        | Unit      | Ratio | 44                                                                 | 62    | 90    | 120   | 142   | 180    | 220    |
|------------------------------------------------|------------|-----------|-------|--------------------------------------------------------------------|-------|-------|-------|-------|--------|--------|
| Rated Output Torque<br>(Nominal output torque) | $T_{2N}$   | Nm        | 3     | 17                                                                 | 54    | 145   | 301   | 553   | 1,067  | 1,786  |
|                                                |            |           | 4     | 15                                                                 | 48    | 128   | 269   | 491   | 940    | 1,587  |
|                                                |            |           | 5     | 14                                                                 | 45    | 132   | 278   | 510   | 1,050  | 1,770  |
|                                                |            |           | 6     | 13                                                                 | 41    | 125   | 252   | 466   | 985    | 1,680  |
|                                                |            |           | 7     | 13                                                                 | 41    | 123   | 258   | 473   | 975    | 1,645  |
|                                                |            |           | 8     | 12                                                                 | 39    | 115   | 241   | 442   | 942    | 1,605  |
|                                                |            |           | 9     | 11                                                                 | 40    | 120   | 227   | 412   | 875    | 1,490  |
|                                                |            |           | 10    | 14                                                                 | 45    | 132   | 278   | 510   | 1,050  | 1,565  |
|                                                |            |           | 15    | 14                                                                 | 45    | 132   | 278   | 510   | 1,050  | 1,786  |
|                                                |            |           | 20    | 14                                                                 | 45    | 132   | 278   | 510   | 1,050  | 1,587  |
|                                                |            |           | 25    | 14                                                                 | 45    | 132   | 278   | 510   | 1,050  | 1,770  |
|                                                |            |           | 30    | 13                                                                 | 41    | 125   | 252   | 466   | 985    | 1,680  |
|                                                |            |           | 35    | 13                                                                 | 41    | 123   | 258   | 473   | 975    | 1,645  |
|                                                |            |           | 40    | 12                                                                 | 39    | 115   | 241   | 442   | 942    | 1,605  |
|                                                |            |           | 45    | 11                                                                 | 40    | 120   | 227   | 412   | 875    | 1,490  |
|                                                |            |           | 50    | 12                                                                 | 40    | 116   | 246   | 452   | 930    | 1,565  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm        | 3~50  | 1.8 Times of Rated Output Torque                                   |       |       |       |       |        |        |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm        | 3~50  | 3 Times of Rated Output Torque                                     |       |       |       |       |        |        |
| Rated Input Speed                              | $n_{IN}$   | rpm       | 3~50  | 3,000                                                              | 3,000 | 3,000 | 2,500 | 2,500 | 2,000  | 2,000  |
| Max. Input Speed                               | $n_{IB}$   | rpm       | 3~50  | 6,000                                                              | 6,000 | 5,500 | 4,500 | 3,500 | 3,000  | 3,000  |
| Backlash                                       |            | arcmin    | 3~50  | ≤ 10                                                               | ≤ 10  | ≤ 10  | ≤ 10  | ≤ 10  | ≤ 10   | ≤ 10   |
| Torsional Rigidity                             |            | Nm/arcmin | 3~50  | 3                                                                  | 6     | 14    | 27    | 60    | 140    | 240    |
| Max. Radial Force                              | $F_{2rB}$  | N         | 3~50  | 360                                                                | 1,120 | 3,040 | 6,460 | 8,830 | 14,820 | 48,450 |
| Max. Axial Force                               | $F_{2aB}$  | N         | 3~50  | 180                                                                | 560   | 1,520 | 3,230 | 4,410 | 7,410  | 24,225 |
| Service Life                                   | $L_H$      | hr        | 3~50  | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |       |       |        |        |
| Efficiency                                     | $\eta$     | %         | 3~50  | ≥ 95%                                                              |       |       |       |       |        |        |
| Operating Temperature                          |            | °C        | 3~50  | -25° C ~ +90° C                                                    |       |       |       |       |        |        |
| Lubrication                                    |            |           | 3~50  | Synthetic Grease                                                   |       |       |       |       |        |        |
| Protection Class                               |            |           | 3~50  | IP65                                                               |       |       |       |       |        |        |
| Mounting Position                              |            |           | 3~50  | Any                                                                |       |       |       |       |        |        |
| Noise Level                                    |            | dB        | 3~50  | ≤ 65                                                               | ≤ 68  | ≤ 70  | ≤ 72  | ≤ 74  | ≤ 76   | ≤ 76   |
| Weight ±3%                                     |            | Kg        | 3~50  | 1.2                                                                | 2     | 7     | 13    | 24    | 48     | 78     |

## Mass Moments of Inertia (kg.cm<sup>2</sup>)

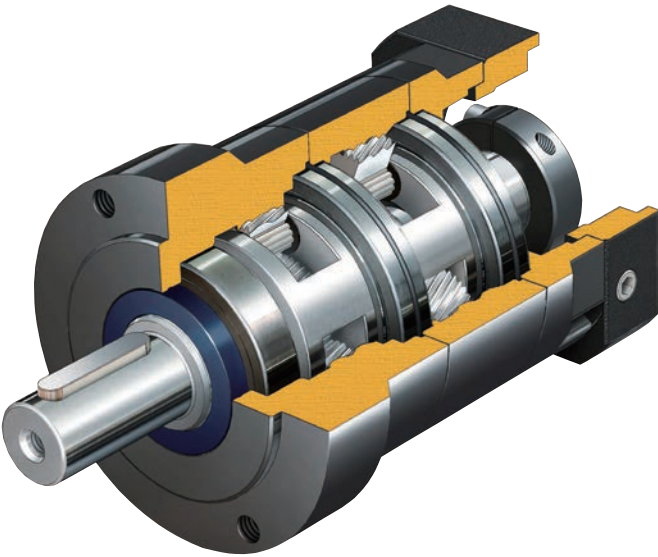
| Ratio | 44   | 62   | 90   | 120  | 142  | 180  | 220 |
|-------|------|------|------|------|------|------|-----|
| 3     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68   | 135 |
| 4     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68   | 135 |
| 5     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68   | 135 |
| 6     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68   | 135 |
| 7     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68   | 135 |
| 8     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68   | 135 |
| 9     | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68   | 135 |
| 10    | 0.09 | 0.36 | 2.28 | 6.85 | 23.5 | 68   | 135 |
| 15    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61   | 135 |
| 20    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61   | 135 |
| 25    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61   | 135 |
| 30    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61   | 135 |
| 35    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61   | 135 |
| 40    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61   | 135 |
| 45    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61.3 | 135 |
| 50    | 0.06 | 0.22 | 2.05 | 6.21 | 21.2 | 61   | 135 |

## PBT Models PB / ST / Input Flange Table

| Model | Ratio                                                           | Flange Model | Bevel Gear Reducer Model |
|-------|-----------------------------------------------------------------|--------------|--------------------------|
| 44    | 3, 4, 5, 6<br>7, 8, 9, 10<br>15, 20, 25<br>30, 35, 40<br>45, 50 | 044          |                          |
| 62    |                                                                 | 062          | ST065                    |
| 90    |                                                                 | 090          | ST090                    |
| 120   |                                                                 | 90           | ST110                    |
| 142   |                                                                 | 120          | ST140                    |
| 180   |                                                                 | 142          | ST170                    |
| 220   |                                                                 | 180          | ST210                    |

# SN Series

- 1-Stage Backlash  $\leq 8$  arcmin
- 2-Stage Backlash  $\leq 12$  arcmin

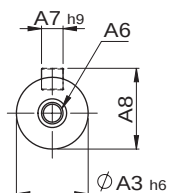


## SN Series Model Code

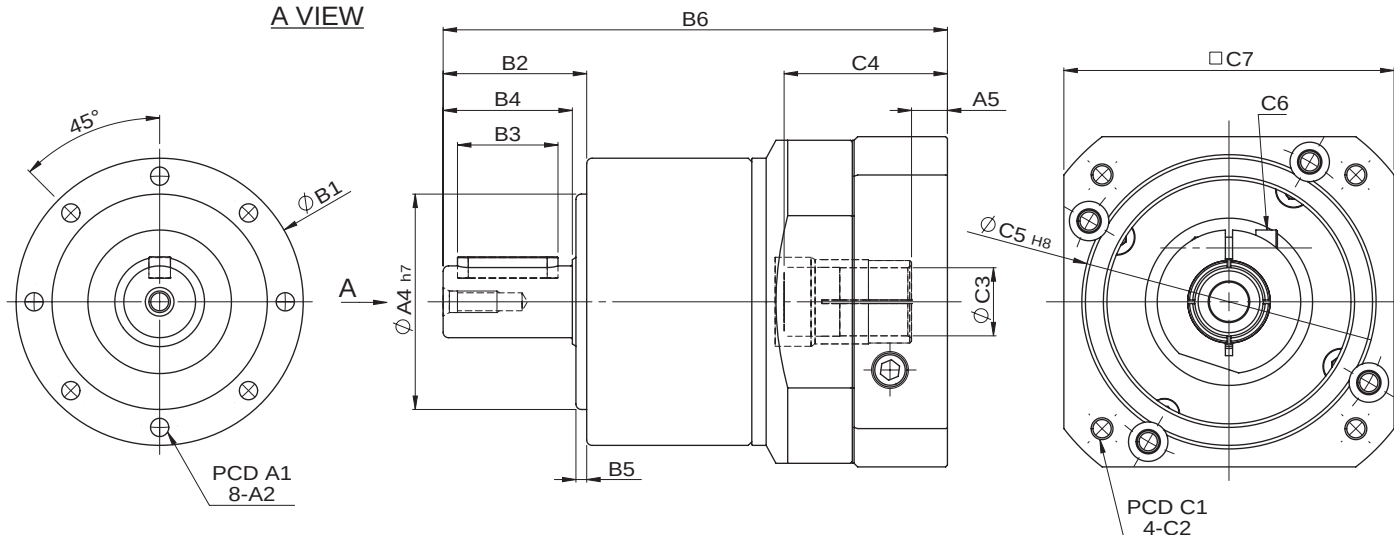
| SN     | 080   | — | 010                                               |                           | — | MOTOR                      |
|--------|-------|---|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---|----------------------------|
| Series | Model |   | Ratio                                             | Output Shaft Keyway                                                                                          |   | Motor Designation          |
| SN     | 040   |   | 1-Stage                                           | <input type="checkbox"/> Blank: Standard<br>(Keyed Output Shaft)<br><br>N: Solid Output Shaft<br>(No Keyway) |   | Motor Brand &<br>Model No. |
|        | 050   |   | 003, 004, 005,<br>007, 010                        |                                                                                                              |   |                            |
|        | 060   |   |                                                   |                                                                                                              |   |                            |
|        | 070   |   | 2-Stage                                           |                                                                                                              |   |                            |
|        | 080   |   | 015, 020, 025,<br>030, 035, 040,<br>050, 070, 100 |                                                                                                              |   |                            |
|        | 090   |   |                                                   |                                                                                                              |   |                            |
|        | 115   |   |                                                   |                                                                                                              |   |                            |
|        | 120   |   |                                                   |                                                                                                              |   |                            |
|        | 155   |   |                                                   |                                                                                                              |   |                            |
|        | 160   |   |                                                   |                                                                                                              |   |                            |
|        |       |   |                                                   |                                                                                                              |   |                            |
|        |       |   |                                                   |                                                                                                              |   |                            |

# SN Series

RATIO : 3, 4, 5, 7, 10 (1-Stage)



A VIEW



unit: mm

| Model Code |            | 50                   | 60                   | 70             | 80                | 90                | 115               | 120           | 155            | 160            |
|------------|------------|----------------------|----------------------|----------------|-------------------|-------------------|-------------------|---------------|----------------|----------------|
| A          | A1         | 44                   | 52                   | 62             | 70                | 80                | 100               | 108           | 140            | 145            |
|            | A2         | M4 x P0.7            | M5 x P0.8            | M5 x P0.8      | M6 x P1.0         | M6 x P1.0         | M10 x P1.5        | M8 x P1.25    | M10 x P1.5     | M12 x P1.75    |
|            | A3         | 12                   | 14                   | 16             | 20                | 22                | 25                | 32            | 40             | 40             |
|            | A4         | 35                   | 40                   | 52             | 60                | 68                | 80                | 90            | 120            | 130            |
|            | A5         | 4.5                  | 4.5                  | 6              | 10                | 9, 23.5           | 8, 22.5           | 10            | 10             | 10             |
|            | A6         | M4 x P0.7            | M4 x P0.7            | M5 x P0.8      | M6 x P1.0         | M6 x P1.0         | M8 x P1.25        | M12 x P1.75   | M12 x P1.75    | M12 x P1.75    |
|            | A7         | 4                    | 5                    | 5              | 6                 | 6                 | 8                 | 10            | 12             | 12             |
|            | A8         | 13.5                 | 16                   | 18             | 22.5              | 24.5              | 28                | 35            | 43             | 43             |
| B          | B1         | 51                   | 60                   | 70             | 80                | 90                | 115               | 122           | 155            | 160            |
|            | B2         | 25.5                 | 34                   | 36             | 40                | 46                | 56                | 70            | 88             | 88             |
|            | B3         | 15                   | 25                   | 20             | 28                | 30                | 40                | 50            | 65             | 65             |
|            | B4         | 20                   | 30                   | 28             | 36                | 36                | 50                | 58            | 78             | 78             |
|            | B5         | 4                    | 3                    | 6.5            | 3                 | 8                 | 4                 | 9             | 8              | 8              |
|            | B6         | 96.5                 | 108                  | 115            | 140.5             | 155.5, 170        | 173.5, 188        | 211, 221      | 238.5<br>260.5 | 238.5<br>260.5 |
| C          | C1         | 45, 46, 48.5, 63, 70 | 45, 46, 48.5, 63, 70 | 70, 75, 90     | 90, 100, 115, 145 | 90, 100, 115, 145 | 90, 100, 115, 145 | 115, 145, 165 | 115, 145, 165  | 115, 145, 165  |
|            |            |                      |                      |                |                   |                   |                   |               | 145, 165, 200  | 145, 165, 200  |
|            | C2         | M3, M4, M5           | M3, M4, M5           | M5, M6         | M6, M8            | M6, M8            | M6, M8            | M6, M8, M10   | M6, M8, M10    | M6, M8, M10    |
|            |            |                      |                      |                |                   |                   |                   |               | M8, M10, M12   | M8, M10, M12   |
|            | C3         | 8, 10, 11, 14        | 8, 9, 10, 12.7, 14   | 11, 14, 16, 19 | 14, 16, 19        | 19, 24            | 19, 22, 24        | 24, 28, 32    | 24, 28, 32     | 24, 28, 32     |
|            |            |                      |                      |                |                   |                   |                   |               | 35, 38         | 35, 38         |
|            | C4         | 32                   | 32                   | 33.5           | 45.5              | 51, 65.5          | 51, 65.5          | 67, 77        | 63             | 63             |
|            |            |                      |                      |                |                   |                   |                   |               | 84.5           | 84.5           |
|            | C5         | 30, 40, 50           | 30, 40, 50           | 50, 60, 70     | 70, 80, 95, 110   | 70, 80, 95, 110   | 70, 80, 95, 110   | 95, 110, 130  | 95, 110, 130   | 95, 110, 130   |
|            |            |                      |                      |                |                   |                   |                   |               | 110, 130, 180  | 110, 130, 180  |
| C6         | M4 x P0.7  | M4 x P0.7            | M5 x P0.8            | M5 x P0.8      | M6 x P1.0         | M6 x P1.0         | M8 x P1.25        | M8 x P1.25    | M8 x P1.25     |                |
|            |            |                      |                      |                |                   |                   |                   | M10 x P1.5    | M10 x P1.5     |                |
| C7         | 46, 55, 60 | 46, 55, 60           | 70, 75, 80           | 92, 110, 130   | 92, 110, 130      | 92, 110, 130      | 122, 130, 150     | 122, 130, 150 | 122, 130, 150  |                |
|            |            |                      |                      |                |                   |                   |                   | 146, 150, 190 | 146, 150, 190  |                |

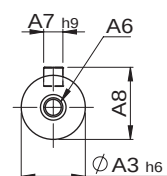
# SN Series 1-Stage Specifications

## Performance

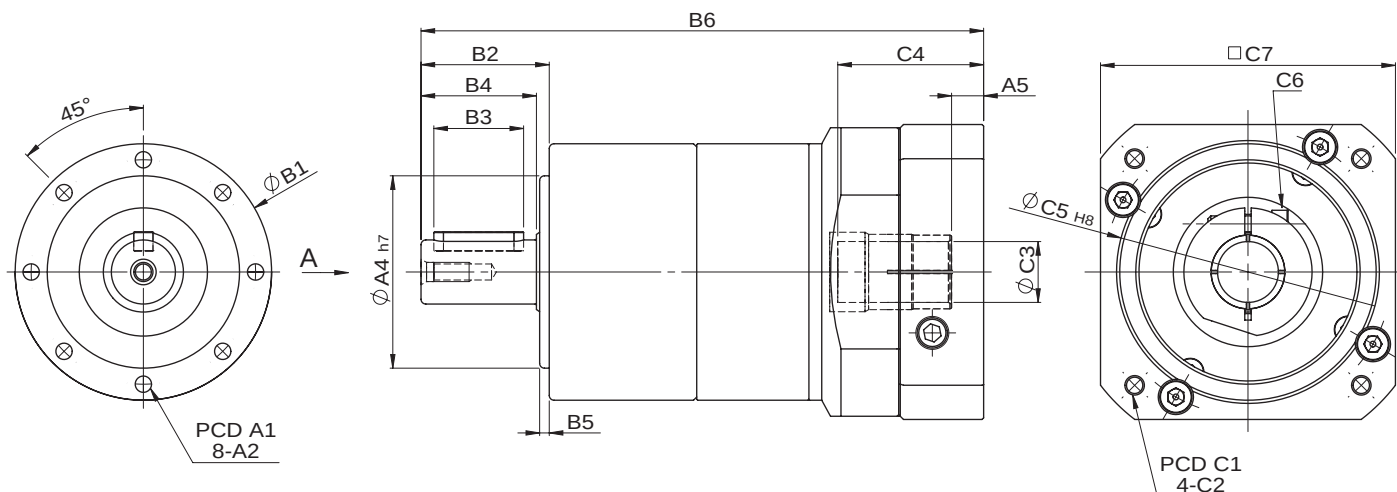
| Parameter \ Model No.                          | Sym        | Unit               | Ratio | 50                                                                 | 60        | 70        | 80        | 90        | 115       | 120       | 155       | 160       |
|------------------------------------------------|------------|--------------------|-------|--------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output Torque<br>(Nominal Output Torque) | $T_{2N}$   | Nm                 | 3     | 17                                                                 | 28        | 54        | 112       | 146       | 165       | 233       | 301       | 625       |
|                                                |            |                    | 4     | 15                                                                 | 38        | 48        | 110       | 144       | 146       | 208       | 269       | 555       |
|                                                |            |                    | 5     | 14                                                                 | 40        | 45        | 108       | 140       | 160       | 220       | 278       | 618       |
|                                                |            |                    | 7     | 13                                                                 | 35        | 41        | 105       | 128       | 149       | 204       | 258       | 573       |
|                                                |            |                    | 10    | 12                                                                 | 25        | 40        | 100       | 123       | 141       | 195       | 246       | 549       |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm                 | 3~10  | 1.8 Times of Rated Output Torque                                   |           |           |           |           |           |           |           |           |
| Mass Moments of Inertia                        |            | kg.cm <sup>2</sup> | 3     | 0.03                                                               | 0.06      | 0.15      | 0.48      | 0.55      | 0.60      | 1.62      | 3.25      | 9.21      |
|                                                |            |                    | 4     | 0.03                                                               | 0.06      | 0.15      | 0.38      | 0.42      | 0.45      | 1.37      | 2.74      | 7.42      |
|                                                |            |                    | 5     | 0.03                                                               | 0.06      | 0.13      | 0.38      | 0.42      | 0.45      | 1.37      | 2.74      | 7.42      |
|                                                |            |                    | 7     | 0.03                                                               | 0.06      | 0.13      | 0.38      | 0.42      | 0.45      | 1.30      | 2.62      | 7.14      |
|                                                |            |                    | 10    | 0.03                                                               | 0.06      | 0.13      | 0.35      | 0.38      | 0.41      | 1.28      | 2.57      | 7.03      |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm                 | 3~10  | 3 Times of Rated Output Torque                                     |           |           |           |           |           |           |           |           |
| Rated Input Speed                              | $n_{1N}$   | rpm                | 3~10  | 3,000                                                              |           |           |           |           |           |           |           |           |
| Max. Input Speed                               | $n_{1B}$   | rpm                | 3~10  | 6,000                                                              |           |           |           |           |           | 5,000     |           |           |
| Torsional Rigidity                             |            | Nm/arcmin          | 3~10  | 3                                                                  | 4         | 5         | 12        | 13        | 14        | 19        | 37        | 60        |
| Max. Radial Force                              | $F_{2rB}$  | N                  | 3~10  | 670                                                                | 1,030     | 1,760     | 2,350     | 2,920     | 3,500     | 5,340     | 6,300     | 7,680     |
| Max. Axial Force                               | $F_{2aB}$  | N                  | 3~10  | 335                                                                | 515       | 880       | 1,175     | 1,460     | 1,750     | 2,670     | 3,150     | 3,840     |
| Service Life                                   | $L_H$      | hr                 | 3~10  | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |           |           |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %                  | 3~10  | $\geq 97\%$                                                        |           |           |           |           |           |           |           |           |
| Operating Temperature                          |            | °C                 | 3~10  | -25° C ~ +90° C                                                    |           |           |           |           |           |           |           |           |
| Lubrication                                    |            |                    | 3~10  | Synthetic Grease                                                   |           |           |           |           |           |           |           |           |
| Protection Class                               |            |                    | 3~10  | IP65                                                               |           |           |           |           |           |           |           |           |
| Mounting Position                              |            |                    | 3~10  | Any                                                                |           |           |           |           |           |           |           |           |
| Noise Level                                    |            | dB                 | 3~10  | $\leq 58$                                                          | $\leq 58$ | $\leq 58$ | $\leq 60$ | $\leq 60$ | $\leq 63$ | $\leq 63$ | $\leq 65$ | $\leq 65$ |
| Weight $\pm 2\%$                               |            | Kg                 | 3~10  | 0.73                                                               | 0.99      | 1.25      | 2.1       | 2.8       | 4.98      | 6.7       |           | 13.25     |

# SN Series

RATIO : 15, 20, 25, 30, 35, 40, 50, 70, 100 (2-Stage)



A VIEW



unit: mm

| Model |    | 50                   | 60                   | 70             | 80                | 90                | 115               | 120           | 155           | 160           |
|-------|----|----------------------|----------------------|----------------|-------------------|-------------------|-------------------|---------------|---------------|---------------|
| Code  |    |                      |                      |                |                   |                   |                   |               |               |               |
| A     | A1 | 44                   | 52                   | 62             | 70                | 80                | 100               | 108           | 140           | 145           |
|       | A2 | M4 x P0.7            | M5 x P0.8            | M5 x P0.8      | M6 x P1.0         | M6 x P1.0         | M10 x P1.5        | M8 x P1.25    | M10 x P1.5    | M12 x P1.75   |
|       | A3 | 12                   | 14                   | 16             | 20                | 22                | 25                | 32            | 40            | 40            |
|       | A4 | 35                   | 40                   | 52             | 60                | 68                | 80                | 90            | 120           | 130           |
|       | A5 | 4.5                  | 4.5                  | 6              | 10                | 8.5               | 8, 22.5           | 10            | 10            | 10            |
|       | A6 | M4 x P0.7            | M4 x P0.7            | M5 x P0.8      | M6 x P1.0         | M6 x P1.0         | M8 x P1.25        | M12 x P1.75   | M12 x P1.75   | M12 x P1.75   |
|       | A7 | 4                    | 5                    | 5              | 6                 | 6                 | 8                 | 10            | 12            | 12            |
|       | A8 | 13.5                 | 16                   | 18             | 22.5              | 24.5              | 28                | 35            | 43            | 43            |
| B     | B1 | 51                   | 60                   | 70             | 80                | 90                | 115               | 122           | 155           | 160           |
|       | B2 | 25.5                 | 34                   | 36             | 40                | 46                | 56                | 70            | 88            | 88            |
|       | B3 | 15                   | 25                   | 20             | 28                | 30                | 40                | 50            | 65            | 65            |
|       | B4 | 20                   | 30                   | 28             | 36                | 36                | 50                | 58            | 78            | 80            |
|       | B5 | 4                    | 3                    | 6.5            | 3                 | 8                 | 4                 | 9             | 8             | 8             |
|       | B6 | 122.5                | 134                  | 148.8          | 175.5             | 190.5, 205        | 217, 231.5        | 257, 267      | 298.5         | 298.5         |
| C     | C1 | 45, 46, 48.5, 63, 70 | 45, 46, 48.5, 63, 70 | 70, 75, 90     | 90, 100, 115, 145 | 90, 100, 115, 145 | 90, 100, 115, 145 | 115, 145, 165 | 115, 145, 165 | 115, 145, 165 |
|       | C2 | M3, M4, M5           | M3, M4, M5           | M5, M6         | M6, M8            | M6, M8            | M6, M8            | M6, M8, M10   | M6, M8, M10   | M6, M8, M10   |
|       | C3 | 8, 10, 11, 14        | 8, 9, 10, 12.7, 14   | 11, 14, 16, 19 | 14, 16, 19        | 19, 24            | 19, 22, 24        | 24, 28, 32    | 24, 28, 32    | 24, 28, 32    |
|       | C4 | 32                   | 32                   | 33.5           | 45.5              | 51, 65.5          | 51, 65.5          | 67, 77        | 67            | 67            |
|       | C5 | 30, 40, 50           | 30, 40, 50           | 50, 60, 70     | 70, 80, 95, 110   | 70, 80, 95, 110   | 70, 80, 95, 110   | 95, 110, 130  | 95, 110, 130  | 95, 110, 130  |
|       | C6 | M4 x P0.7            | M4 x P0.7            | M5 x P0.8      | M5 x P0.8         | M6 x P1.0         | M6 x P1.0         | M8 x P1.25    | M8 x P1.25    | M8 x P1.25    |
|       | C7 | 46, 55, 60           | 46, 55, 60           | 70, 75, 80     | 92, 110, 130      | 92, 110, 130      | 92, 110, 130      | 122, 130, 150 | 122, 130, 150 | 122, 130, 150 |

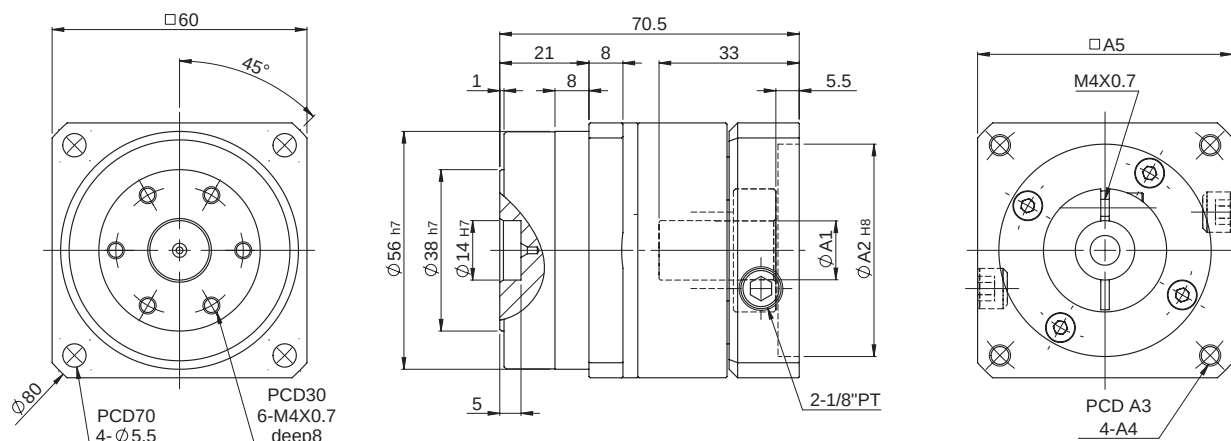
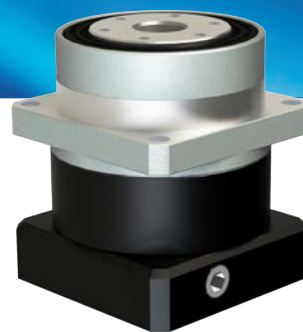
# SN Series 2-Stage Specifications

## Performance

| Parameter \ Model No.                          | Sym        | Unit               | Ratio  | 50                                                                 | 60    | 70    | 80    | 90    | 115   | 120   | 155   | 160   |
|------------------------------------------------|------------|--------------------|--------|--------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Rated Output Torque<br>(Nominal Output Torque) | $T_{2N}$   | Nm                 | 15     | 17                                                                 | 28    | 54    | 112   | 146   | 165   | 233   | 301   | 625   |
|                                                |            |                    | 20     | 15                                                                 | 38    | 48    | 110   | 144   | 146   | 208   | 269   | 555   |
|                                                |            |                    | 25     | 14                                                                 | 40    | 45    | 108   | 140   | 160   | 220   | 278   | 618   |
|                                                |            |                    | 30     | 17                                                                 | 28    | 54    | 112   | 146   | 165   | 233   | 301   | 625   |
|                                                |            |                    | 35     | 13                                                                 | 35    | 41    | 105   | 128   | 149   | 204   | 258   | 618   |
|                                                |            |                    | 40     | 15                                                                 | 38    | 48    | 110   | 144   | 146   | 208   | 269   | 555   |
|                                                |            |                    | 50     | 14                                                                 | 40    | 45    | 108   | 140   | 160   | 220   | 278   | 618   |
|                                                |            |                    | 70     | 13                                                                 | 35    | 41    | 105   | 128   | 149   | 204   | 258   | 573   |
|                                                |            |                    | 100    | 12                                                                 | 25    | 40    | 100   | 123   | 141   | 195   | 246   | 549   |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm                 | 15~100 | 1.8 Times of Rated Output Torque                                   |       |       |       |       |       |       |       |       |
| Mass Moments of Inertia                        |            | kg.cm <sup>2</sup> | 15     | 0.025                                                              | 0.05  | 0.11  | 0.29  | 0.38  | 0.40  | 1.52  | 3.06  | 8.68  |
|                                                |            |                    | 20     | 0.025                                                              | 0.05  | 0.11  | 0.29  | 0.38  | 0.40  | 1.30  | 2.57  | 7.08  |
|                                                |            |                    | 25     | 0.025                                                              | 0.05  | 0.11  | 0.29  | 0.38  | 0.40  | 1.30  | 2.57  | 6.97  |
|                                                |            |                    | 30     | 0.025                                                              | 0.05  | 0.11  | 0.29  | 0.38  | 0.40  | 1.52  | 3.06  | 8.65  |
|                                                |            |                    | 35     | 0.025                                                              | 0.05  | 0.11  | 0.29  | 0.38  | 0.40  | 1.22  | 2.46  | 6.71  |
|                                                |            |                    | 40     | 0.025                                                              | 0.05  | 0.11  | 0.29  | 0.38  | 0.40  | 1.30  | 2.57  | 7.08  |
|                                                |            |                    | 50     | 0.025                                                              | 0.05  | 0.11  | 0.29  | 0.38  | 0.40  | 1.30  | 2.57  | 6.97  |
|                                                |            |                    | 70     | 0.025                                                              | 0.05  | 0.11  | 0.29  | 0.38  | 0.40  | 1.22  | 2.46  | 6.71  |
|                                                |            |                    | 100    | 0.025                                                              | 0.05  | 0.11  | 0.26  | 0.32  | 0.38  | 1.20  | 2.41  | 6.61  |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm                 | 15~100 | 3 Times of Rated Output Torque                                     |       |       |       |       |       |       |       |       |
| Rated Input Speed                              | $n_{1N}$   | rpm                | 15~100 | 3,000                                                              |       |       |       |       |       |       |       |       |
| Max. Input Speed                               | $n_{1B}$   | rpm                | 15~100 | 6,000                                                              |       |       |       |       |       | 5,000 |       |       |
| Torsional Rigidity                             |            | Nm/arcmin          | 15~100 | 3                                                                  | 4     | 5     | 12    | 13    | 14    | 19    | 37    | 60    |
| Max. Radial Force                              | $F_{2rB}$  | N                  | 15~100 | 670                                                                | 1,030 | 1,760 | 2,350 | 2,920 | 3,500 | 5,340 | 6,300 | 7,680 |
| Max. Axial Force                               | $F_{2aB}$  | N                  | 15~100 | 335                                                                | 515   | 880   | 1,175 | 1,460 | 1,750 | 2,670 | 3,150 | 3,840 |
| Service Life                                   | $L_H$      | hr                 | 15~100 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |       |       |       |       |       |       |       |       |
| Efficiency                                     | $\eta$     | %                  | 15~100 | ≥ 94%                                                              |       |       |       |       |       |       |       |       |
| Operating Temperature                          |            | °C                 | 15~100 | -25° C ~ +90° C                                                    |       |       |       |       |       |       |       |       |
| Lubrication                                    |            |                    | 15~100 | Synthetic Grease                                                   |       |       |       |       |       |       |       |       |
| Protection Class                               |            |                    | 15~100 | IP65                                                               |       |       |       |       |       |       |       |       |
| Mounting Position                              |            |                    | 15~100 | Any                                                                |       |       |       |       |       |       |       |       |
| Noise Level                                    |            | dB                 | 15~100 | ≤ 60                                                               | ≤ 60  | ≤ 60  | ≤ 62  | ≤ 62  | ≤ 65  | ≤ 65  | ≤ 67  | ≤ 67  |
| Weight ±2%                                     |            | Kg                 | 15~100 | 1.05                                                               | 1.46  | 1.9   | 3.2   | 4.48  | 6.92  | 9.84  |       | 18.5  |

# Model: AD60

RATIO : 3, 4, 5, 7, 10 (1-Stage)



Dimension of Input Flange

unit: mm

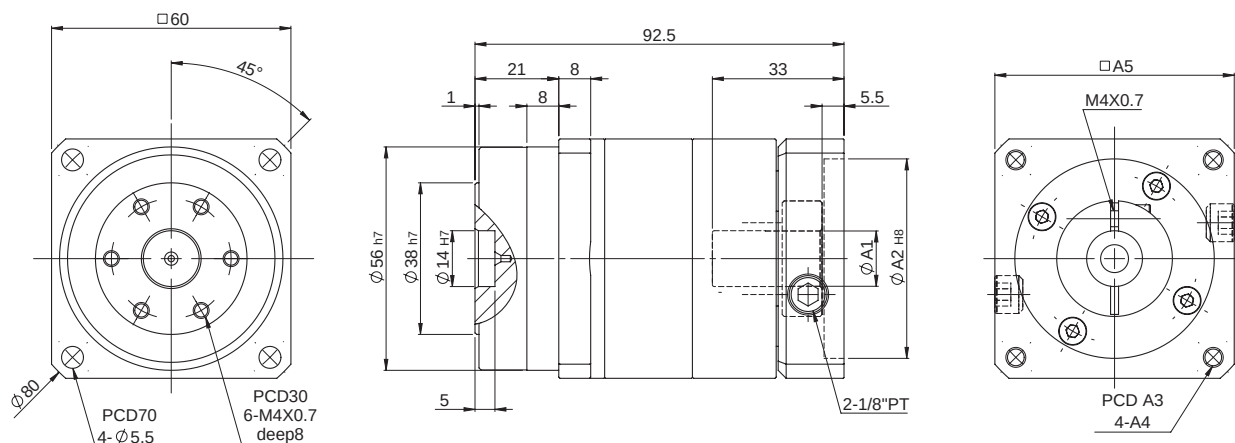
| NO. | ØA1                | ØA2 | A3   | A4 | A5 |
|-----|--------------------|-----|------|----|----|
| 1   | 8, 9, 10, 12.7, 14 | 30  | 45   | M3 | 46 |
| 2   |                    | 30  | 46   | M4 | 46 |
| 3   |                    | 30  | 48.5 | M3 | 55 |
| 4   |                    | 40  | 63   | M5 | 55 |
| 5   |                    | 50  | 70   | M5 | 60 |

## AD60-1 Specifications

| Ratio                                          | Sym        | Unit               | 3                                                                  | 4    | 5    | 7    | 10   |
|------------------------------------------------|------------|--------------------|--------------------------------------------------------------------|------|------|------|------|
| Rated Output Torque<br>(Nominal Output Torque) | $T_{2N}$   | Nm                 | 28                                                                 | 38   | 40   | 35   | 25   |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm                 | 50                                                                 | 68   | 22   | 63   | 45   |
| Mass Moments of Inertia                        |            | kg.cm <sup>2</sup> | 0.16                                                               | 0.12 | 0.10 | 0.08 | 0.06 |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm                 | 2 Times of Rated Output Torque                                     |      |      |      |      |
| Rated Input Speed                              | $n_{1N}$   | rpm                | 3,000                                                              |      |      |      |      |
| Max. Input Speed                               | $n_{1B}$   | rpm                | 5,000                                                              |      |      |      |      |
| Torsional Rigidity                             |            | Nm/arcmin          | 4                                                                  |      |      |      |      |
| Max. Radial Force                              | $F_{2rB}$  | N                  | 460                                                                |      |      |      |      |
| Max. Axial Force                               | $F_{2aB}$  | N                  | 230                                                                |      |      |      |      |
| Service Life                                   | $L_H$      | hr                 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |      |      |      |      |
| Efficiency                                     | $\eta$     | %                  | $\geq 97\%$                                                        |      |      |      |      |
| Operating Temperature                          |            | °C                 | - 25° C ~ + 90° C                                                  |      |      |      |      |
| Lubrication                                    |            |                    | Synthetic Grease                                                   |      |      |      |      |
| Protection Class                               |            |                    | IP 65                                                              |      |      |      |      |
| Mounting Position                              |            |                    | Any                                                                |      |      |      |      |
| Noise Level                                    |            | dB                 | $\leq 58$ dB                                                       |      |      |      |      |
| Weight $\pm 2\%$                               |            | Kg                 | 0.88                                                               |      |      |      |      |

# Model: AD60

RATIO : 15, 20, 25, 30, 35, 40, 50, 70, 100 (2-Stage)



Dimension of Input Flange

unit: mm

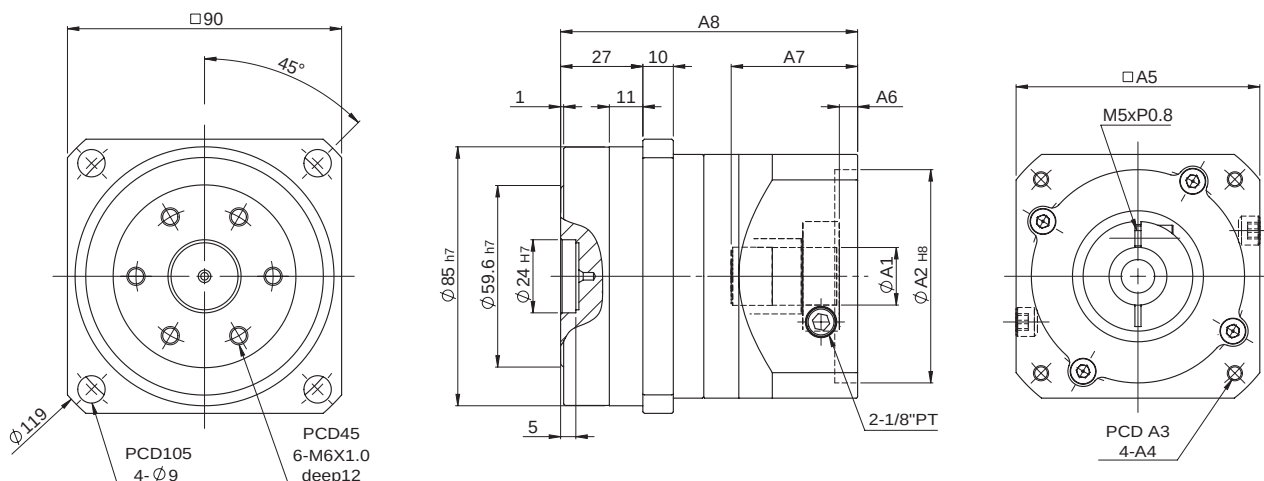
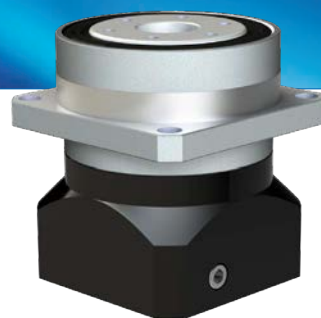
| NO. | ØA1                | ØA2 | A3   | A4 | A5 |
|-----|--------------------|-----|------|----|----|
| 1   | 8, 9, 10, 12.7, 14 | 30  | 45   | M3 | 46 |
| 2   |                    | 30  | 46   | M4 | 46 |
| 3   |                    | 30  | 48.5 | M3 | 55 |
| 4   |                    | 40  | 63   | M5 | 55 |
| 5   |                    | 50  | 70   | M5 | 60 |

## AD60-2 Specifications

| Ratio                                          | Sym        | Unit               | 3                                                                  | 4  | 5  | 3  | 7  | 4  | 5  | 7  | 10  |
|------------------------------------------------|------------|--------------------|--------------------------------------------------------------------|----|----|----|----|----|----|----|-----|
| Rated Output Torque<br>(Nominal Output Torque) | $T_{2N}$   | Nm                 | 15                                                                 | 20 | 25 | 30 | 35 | 40 | 50 | 70 | 100 |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm                 | 28                                                                 | 38 | 40 | 28 | 35 | 38 | 40 | 35 | 25  |
| Mass Moments of Inertia                        |            | kg·cm <sup>2</sup> | 50                                                                 | 68 | 22 | 50 | 63 | 68 | 72 | 63 | 45  |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm                 | 2 Times of Rated Output Torque                                     |    |    |    |    |    |    |    |     |
| Rated Input Speed                              | $n_{1N}$   | rpm                | 3,000                                                              |    |    |    |    |    |    |    |     |
| Max. Input Speed                               | $n_{1B}$   | rpm                | 5,000                                                              |    |    |    |    |    |    |    |     |
| Torsional Rigidity                             |            | Nm/arcmin          | 4                                                                  |    |    |    |    |    |    |    |     |
| Max. Radial Force                              | $F_{2rB}$  | N                  | 460                                                                |    |    |    |    |    |    |    |     |
| Max. Axial Force                               | $F_{2aB}$  | N                  | 230                                                                |    |    |    |    |    |    |    |     |
| Service Life                                   | $L_H$      | hr                 | S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs) |    |    |    |    |    |    |    |     |
| Efficiency                                     | $\eta$     | %                  | ≥ 97%                                                              |    |    |    |    |    |    |    |     |
| Operating Temperature                          |            | °C                 | - 25° C ~ + 90° C                                                  |    |    |    |    |    |    |    |     |
| Lubrication                                    |            |                    | Synthetic Grease                                                   |    |    |    |    |    |    |    |     |
| Protection Class                               |            |                    | IP 65                                                              |    |    |    |    |    |    |    |     |
| Mounting Position                              |            |                    | Any                                                                |    |    |    |    |    |    |    |     |
| Noise Level                                    |            | dB                 | ≤ 58 dB                                                            |    |    |    |    |    |    |    |     |
| Weight ±2%                                     |            | Kg                 | 1.24                                                               |    |    |    |    |    |    |    |     |

# Model: AD90

RATIO : 3, 4, 5, 7, 10 (1-Stage)



Dimension of Input Flange

unit: mm

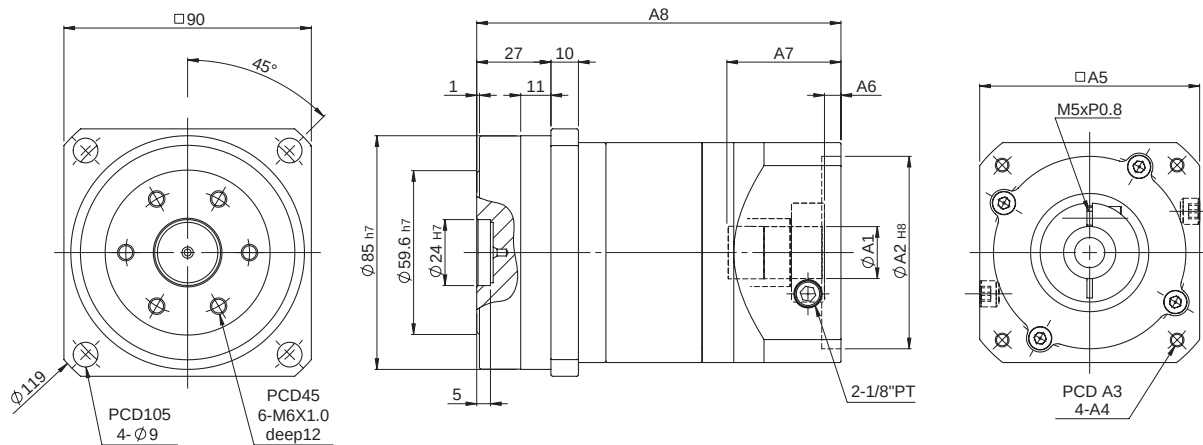
| NO. | ØA1    | ØA2 | A3 | A4 | A5 | A6  | A7   | A8   |
|-----|--------|-----|----|----|----|-----|------|------|
| 1   | 14, 19 | 50  | 70 | M5 | 80 | 5.5 | 33.5 | 89.5 |
| 2   |        | 70  | 90 | M6 | 80 | 6   | 41.5 | 97.5 |

## AD90-1 Specifications

| Ratio                                          | Sym        | Unit               | 3                                                                  | 4    | 5    | 7    | 10   |
|------------------------------------------------|------------|--------------------|--------------------------------------------------------------------|------|------|------|------|
| Rated Output Torque<br>(Nominal Output Torque) | $T_{2N}$   | Nm                 | 112                                                                | 110  | 108  | 105  | 100  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm                 | 168                                                                | 165  | 162  | 158  | 150  |
| Mass Moments of Inertia                        |            | kg.cm <sup>2</sup> | 0.48                                                               | 0.45 | 0.40 | 0.35 | 0.32 |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm                 | 2 Times of Rated Output Torque                                     |      |      |      |      |
| Rated Input Speed                              | $n_{1N}$   | rpm                | 3,000                                                              |      |      |      |      |
| Max. Input Speed                               | $n_{1B}$   | rpm                | 5,000                                                              |      |      |      |      |
| Torsional Rigidity                             |            | Nm/arcmin          | 12                                                                 |      |      |      |      |
| Max. Radial Force                              | $F_{2rB}$  | N                  | 1,400                                                              |      |      |      |      |
| Max. Axial Force                               | $F_{2aB}$  | N                  | 660                                                                |      |      |      |      |
| Service Life                                   | $L_H$      | hr                 | S5 Cycle Operation: >20,000 (S1 Continuous Operation: >10,000 hrs) |      |      |      |      |
| Efficiency                                     | $\eta$     | %                  | $\geq 97\%$                                                        |      |      |      |      |
| Operating Temperature                          |            | °C                 | - 20° C ~ + 90° C                                                  |      |      |      |      |
| Lubrication                                    |            |                    | Synthetic Grease                                                   |      |      |      |      |
| Protection Class                               |            |                    | IP 65                                                              |      |      |      |      |
| Mounting Position                              |            |                    | Any                                                                |      |      |      |      |
| Noise Level                                    |            | dB                 | $\leq 60$ dB                                                       |      |      |      |      |
| Weight $\pm 2\%$                               |            | Kg                 | 2.3                                                                |      |      |      |      |

# Model: AD90

RATIO : 15, 20, 25, 30, 35, 40, 50, 70, 100 (2-Stage)



Dimension of Input Flange

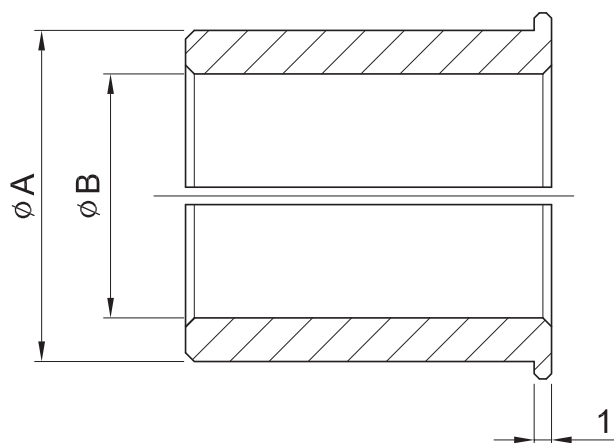
unit: mm

| NO. | ØA1    | ØA2 | A3 | A4 | A5 | A6  | A7   | A8    |
|-----|--------|-----|----|----|----|-----|------|-------|
| 1   | 14, 19 | 50  | 70 | M5 | 80 | 5.5 | 33.5 | 124.5 |
| 2   |        | 70  | 90 | M6 | 80 | 6   | 41.5 | 132.5 |

## AD90-2 Specifications

| Ratio                                          | Sym        | Unit               | 15                                                                 | 20   | 25   | 30   | 35   | 40   | 50   | 70   | 100  |
|------------------------------------------------|------------|--------------------|--------------------------------------------------------------------|------|------|------|------|------|------|------|------|
| Rated Output Torque<br>(Nominal Output Torque) | $T_{2N}$   | Nm                 | 112                                                                | 110  | 108  | 112  | 105  | 110  | 108  | 105  | 100  |
| Max. Acceleration Torque                       | $T_{2B}$   | Nm                 | 168                                                                | 165  | 162  | 202  | 158  | 165  | 162  | 158  | 150  |
| Mass Moments of Inertia                        |            | kg.cm <sup>2</sup> | 0.45                                                               | 0.42 | 0.42 | 0.42 | 0.42 | 0.42 | 0.42 | 0.42 | 0.42 |
| Max. Output Torque<br>Emergency Stop Torque    | $T_{2NOT}$ | Nm                 | 2 Times of Rated Output Torque                                     |      |      |      |      |      |      |      |      |
| Rated Input Speed                              | $n_{1N}$   | rpm                | 3,000                                                              |      |      |      |      |      |      |      |      |
| Max. Input Speed                               | $n_{1B}$   | rpm                | 5,000                                                              |      |      |      |      |      |      |      |      |
| Torsional Rigidity                             |            | Nm/arcmin          | 12                                                                 |      |      |      |      |      |      |      |      |
| Max. Radial Force                              | $F_{2rB}$  | N                  | 1,400                                                              |      |      |      |      |      |      |      |      |
| Max. Axial Force                               | $F_{2aB}$  | N                  | 660                                                                |      |      |      |      |      |      |      |      |
| Service Life                                   | $L_H$      | hr                 | S5 Cycle Operation: >20,000 (S1 Continuous Operation: >10,000 hrs) |      |      |      |      |      |      |      |      |
| Efficiency                                     | $\eta$     | %                  | ≥ 95%                                                              |      |      |      |      |      |      |      |      |
| Operating Temperature                          |            | °C                 | - 25° C ~ + 90° C                                                  |      |      |      |      |      |      |      |      |
| Lubrication                                    |            |                    | Synthetic Grease                                                   |      |      |      |      |      |      |      |      |
| Protection Class                               |            |                    | IP 65                                                              |      |      |      |      |      |      |      |      |
| Mounting Position                              |            |                    | Any                                                                |      |      |      |      |      |      |      |      |
| Noise Level                                    |            | dB                 | ≤ 62 dB                                                            |      |      |      |      |      |      |      |      |
| Weight ±2%                                     |            | Kg                 | 3.3                                                                |      |      |      |      |      |      |      |      |

# Bushings



If motor shaft diameter = servobox input shaft bore then shaft bush is not needed.

If motor shaft diameter < servobox input shaft bore select bush from the table below:

ØA = servobox input shaft bore

ØB = inner bore = motor shaft diameter.

| Bush Bore ØB \ Shaft Bore ØA | 8 | 11 | 14 | 19 | 22 | 24 | 28 | 32 | 35 | 38 | 42 | 48 |
|------------------------------|---|----|----|----|----|----|----|----|----|----|----|----|
| 5                            | • | •  |    |    |    |    |    |    |    |    |    |    |
| 5.65                         |   | •  |    |    |    |    |    |    |    |    |    |    |
| 6                            | • | •  | •  |    |    |    |    |    |    |    |    |    |
| 6.35                         | • |    | •  |    |    |    |    |    |    |    |    |    |
| 8                            |   | •  | •  |    |    |    |    |    |    |    |    |    |
| 9                            |   | •  | •  |    |    |    |    |    |    |    |    |    |
| 9.52                         |   |    |    | •  |    |    |    |    |    |    |    |    |
| 10                           |   |    | •  | •  |    |    |    |    |    |    |    |    |
| 11                           |   |    | •  | •  |    |    |    |    |    |    |    |    |
| 12                           |   |    | •  | •  |    |    |    |    |    |    |    |    |
| 12.7                         |   |    | •  | •  |    |    |    |    |    |    |    |    |
| 14                           |   |    |    | •  |    | •  |    |    |    |    |    |    |
| 15.85                        |   |    |    | •  |    |    |    |    |    |    |    |    |
| 16                           |   |    |    | •  |    | •  | •  |    |    |    |    |    |
| 19                           |   |    |    |    | •  | •  | •  |    |    |    |    |    |
| 22                           |   |    |    |    |    | •  | •  | •  | •  |    |    |    |
| 22.22                        |   |    |    |    |    |    |    |    |    | •  |    |    |
| 24                           |   |    |    |    |    |    | •  |    | •  |    |    |    |
| 25                           |   |    |    |    |    |    |    | •  |    |    |    |    |
| 28                           |   |    |    |    |    |    |    | •  | •  |    | •  |    |
| 32                           |   |    |    |    |    |    |    |    | •  | •  |    |    |
| 35                           |   |    |    |    |    |    |    |    |    | •  | •  |    |
| 38                           |   |    |    |    |    |    |    |    |    |    | •  |    |
| 42                           |   |    |    |    |    |    |    |    |    |    |    | •  |

# Collet Locking Mechanism

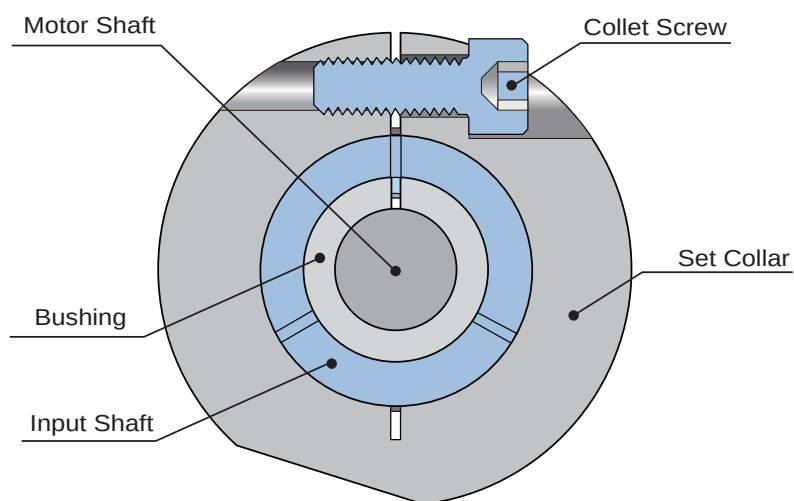
Collet Screw & Set Collar Torque Table

| MODEL      |           |            |     |     |            |                |          |            |            |                | Spec. of Collet Screw | Screw Grade | Tightening Torque (Nm) | Clenching Torque (Nm) | key |
|------------|-----------|------------|-----|-----|------------|----------------|----------|------------|------------|----------------|-----------------------|-------------|------------------------|-----------------------|-----|
| SB SE      | SBT PBT   | SD         | SDH | SF  | PB         | FA             | SN       | SA         | FB         | PE             |                       |             |                        |                       |     |
| 44         | 44        | 47         | 64  | -   | 44         | 50             | 50<br>60 | 50         | 50         | 32<br>40<br>60 | M4 x P 0.7            | 12.9        | 4.83                   | 87                    |     |
| 62         | 62        | 64         | 90  | 62  | 62         | 70<br>80<br>90 | 70<br>80 | 70         | 70         | 80             | M5 x P 0.8            | 12.9        | 10                     | 164                   |     |
| 90         | 90<br>120 | 90         | 110 | 75  | 90         | 100            | 115      | 90         | 90         | -              | M6 x P 1.0            | 12.9        | 16.3                   | 233                   |     |
| 120        | 142       | 110        | 140 | 100 | 120        | 120            | 160      | 120<br>160 | 120        | -              | M8 x P 1.25           | 12.9        | 41                     | 423                   |     |
| 142        | 180       | 140        | 200 | 142 | 142        | 142            | -        | -          | 145        | -              | M10 x P 1.5           | 12.9        | 81                     | 678                   |     |
| 180<br>220 | -         | 200<br>255 | 255 | 180 | 180<br>220 | 180            | -        | -          | 180<br>220 | -              | M10 x P 1.5           | 12.9        | 81                     | 678                   | ●   |
| 270<br>330 | -         | -          | -   | -   | -          | -              | -        | -          | -          | -              | M12 x P 1.75          | 12.9        | 110                    | 813                   | ●   |

※ Ensure that the motor shaft and servobox clamp collet bore are clean and free from lubricant to prevent slippage

※ Motor shaft slip can occur if motor torque exceeds clenching torque

| Input Bore | Ø38    | Ø42    | Ø48    | Ø55     | Ø60     | Ø75     |
|------------|--------|--------|--------|---------|---------|---------|
| Key        | 10 x 8 | 12 x 8 | 14 x 9 | 16 x 10 | 18 x 11 | 20 x 12 |





# SERVOBOX - Motor Matching Table

## 1-Stage

| Model         | SB<br>SE<br>PB       | -  | -  | -       | 44           | -                   | -                          | -  | 62       | -        | 90             | -        | 120            | 142            | -   | -        | -              | 180                  | 220            | 270                  | 330            |
|---------------|----------------------|----|----|---------|--------------|---------------------|----------------------------|----|----------|----------|----------------|----------|----------------|----------------|-----|----------|----------------|----------------------|----------------|----------------------|----------------|
|               | SB-A<br>SE-A<br>PB-A | -  | -  | -       | 44A          | -                   | -                          | -  | 62A      | -        | 90A            | -        | 120A           | 142A           | -   | -        | -              | 180A                 | 220A           | -                    | -              |
|               | SBT<br>PBT           | -  | -  | 44      | -            | -                   | -                          | 62 | -        | 90       | -              | 120      | -              | 142            | 180 | -        | -              | -                    | -              | -                    | -              |
|               | SD                   | -  | -  | -       | 47           | -                   | -                          | -  | 64       | -        | 90             | -        | 110            | 140            | -   | -        | -              | 200                  | 255            | -                    | -              |
|               | SF                   | -  | -  | -       | -            | -                   | -                          | -  | 62       | -        | 75             | -        | 100            | -              | -   | 142      | -              | 180                  | -              | -                    | -              |
|               | SF-A                 | -  | -  | -       | -            | -                   | -                          | -  | 62A      | -        | 75A            | -        | 100A           | -              | -   | 142A     | -              | 180A                 | -              | -                    | -              |
|               | FA                   | -  | -  | -       | -            | 50                  | -                          | -  | 80       | -        | 100            | -        | 120            | -              | -   | 142      | -              | 180                  | -              | -                    | -              |
|               | SN                   | -  | -  | -       | -            | 50                  | 60                         | -  | 70<br>80 | -        | 115            | -        | 160            | -              | -   | -        | -              | -                    | -              | -                    | -              |
|               | SA                   | -  | -  | -       | -            | 50                  | -                          | -  | 70       | -        | 90             | -        | 120<br>160     | -              | -   | -        | -              | -                    | -              | -                    | -              |
|               | FB, FE               | -  | -  | -       | 50           | -                   | -                          | -  | 70       | -        | 90             | -        | 120            | -              | -   | 145      | 180            | -                    | 220            | -                    | -              |
|               | PE                   | 32 | 40 | -       | 60           | 80                  | -                          | -  | -        | -        | -              | -        | -              | -              | -   | -        | -              | -                    | -              | -                    | -              |
| Input<br>Bore | Power                | 6  | 8  | 8<br>11 | 8<br>9<br>11 | 8<br>10<br>11<br>14 | 8<br>9<br>10<br>12.7<br>14 | 14 | 14<br>19 | 19<br>24 | 19<br>22<br>24 | 22<br>24 | 24<br>28<br>32 | 28<br>32<br>35 | 35  | 35<br>38 | 38<br>42<br>48 | 38<br>42<br>48<br>55 | 42<br>48<br>55 | 48<br>55<br>60<br>70 | 55<br>60<br>75 |
| 100 W         |                      | ●  | ●  | ●       | ●            | ●                   | ●                          |    |          |          |                |          |                |                |     |          |                |                      |                |                      |                |
| 200 W         |                      |    |    | ●       | ●            | ●                   | ●                          |    |          |          |                |          |                |                |     |          |                |                      |                |                      |                |
| 400 W         |                      |    |    |         |              | ●                   | ●                          | ●  | ●        |          |                |          |                |                |     |          |                |                      |                |                      |                |
| 750 W         |                      |    |    |         |              |                     |                            |    | ●        | ●        | ●              |          |                |                |     |          |                |                      |                |                      |                |
| 1 kW          |                      |    |    |         |              |                     |                            |    |          | ●        | ●              |          |                |                |     |          |                |                      |                |                      |                |
| 1.5 kW        |                      |    |    |         |              |                     |                            |    |          | ●        | ●              | ●        | ●              |                |     |          |                |                      |                |                      |                |
| 2.2 kW        |                      |    |    |         |              |                     |                            |    |          |          |                |          | ●              | ●              |     |          |                |                      |                |                      |                |
| 3.75 kW       |                      |    |    |         |              |                     |                            |    |          |          |                |          | ●              | ●              | ●   | ●        |                |                      |                |                      |                |
| 5.5 kW        |                      |    |    |         |              |                     |                            |    |          |          |                |          |                | ●              | ●   | ●        | ●              | ●                    |                |                      |                |
| 7.5 kW        |                      |    |    |         |              |                     |                            |    |          |          |                |          |                |                |     | ●        | ●              | ●                    |                |                      |                |
| 11 kW         |                      |    |    |         |              |                     |                            |    |          |          |                |          |                |                |     |          | ●              | ●                    | ●              |                      |                |
| 15 kW         |                      |    |    |         |              |                     |                            |    |          |          |                |          |                |                |     |          | ●              | ●                    | ●              |                      |                |
| 22 kW         |                      |    |    |         |              |                     |                            |    |          |          |                |          |                |                |     |          | ●              | ●                    | ●              | ●                    |                |
| 30 kW         |                      |    |    |         |              |                     |                            |    |          |          |                |          |                |                |     |          |                | ●                    | ●              | ●                    | ●              |
| 37 kW         |                      |    |    |         |              |                     |                            |    |          |          |                |          |                |                |     |          |                |                      |                |                      | ●              |
| 45 kW         |                      |    |    |         |              |                     |                            |    |          |          |                |          |                |                |     |          |                |                      |                |                      | ●              |
| 55 kW         |                      |    |    |         |              |                     |                            |    |          |          |                |          |                |                |     |          |                |                      |                |                      | ●              |
| 75 kW         |                      |    |    |         |              |                     |                            |    |          |          |                |          |                |                |     |          |                |                      |                |                      | ●              |

※ The table is for quick reference only. Final SERVOBOX selection must take the rated output torque into consideration.

# SERVOBOX - Motor Matching Table

## 2-Stage

| Model                  | SB<br>SE<br>PB | -  | -  | 62           | -                   | -                          | -  | 90       | 120            | 142            | 180            | -              | -        | -              | 220                  | 270            | 330                  |
|------------------------|----------------|----|----|--------------|---------------------|----------------------------|----|----------|----------------|----------------|----------------|----------------|----------|----------------|----------------------|----------------|----------------------|
|                        | SDH            | -  | -  | 64           | -                   | -                          | 90 | -        | 110            | 140            | -              | 200            | -        | -              | -                    | 255            | -                    |
|                        | SF             | -  | -  | 62           | -                   | -                          | -  | 75       | 100            | 142            | -              | -              | 180      | -              | -                    | -              | -                    |
|                        | FA             | -  | -  | -            | 50                  | -                          | -  | 80       | 100            | 120            | -              | -              | 142      | -              | 180                  | -              | -                    |
|                        | SN             | -  | -  | -            | 50                  | 60                         | -  | 70<br>80 | -              | 115<br>160     | -              | -              | -        | -              | -                    | -              | -                    |
|                        | SA             | -  | -  | -            | 50                  | -                          | -  | 70       | 90             | 120<br>160     | -              | -              | -        | -              | -                    | -              | -                    |
|                        | FB<br>FE       | -  | -  | 50           | -                   | -                          | -  | 70       | 90             | 120            | -              | -              | 145      | 180            | -                    | 220            | -                    |
|                        | PE             | 32 | 40 | 60           | 80                  | -                          | -  | -        | -              | -              | -              | -              | -        | -              | -                    | -              | -                    |
| Input<br>Bore<br>Power |                | 6  | 8  | 8<br>9<br>11 | 8<br>10<br>11<br>14 | 8<br>9<br>10<br>12.7<br>14 | 14 | 14<br>19 | 19<br>22<br>24 | 24<br>28<br>32 | 28<br>32<br>35 | 28<br>32<br>38 | 35<br>38 | 38<br>42<br>48 | 38<br>42<br>48<br>55 | 42<br>48<br>55 | 48<br>55<br>60<br>70 |
| 100 W                  |                | •  | •  | •            | •                   | •                          |    |          |                |                |                |                |          |                |                      |                |                      |
| 200 W                  |                |    |    | •            | •                   | •                          |    |          |                |                |                |                |          |                |                      |                |                      |
| 400 W                  |                |    |    |              | •                   | •                          | •  | •        |                |                |                |                |          |                |                      |                |                      |
| 750 W                  |                |    |    |              |                     |                            |    | •        | •              |                |                |                |          |                |                      |                |                      |
| 1 kW                   |                |    |    |              |                     |                            |    |          | •              |                |                |                |          |                |                      |                |                      |
| 1.5 kW                 |                |    |    |              |                     |                            |    |          | •              | •              |                |                |          |                |                      |                |                      |
| 2.2 kW                 |                |    |    |              |                     |                            |    |          |                | •              | •              | •              |          |                |                      |                |                      |
| 3.75 kW                |                |    |    |              |                     |                            |    |          |                | •              | •              | •              | •        |                |                      |                |                      |
| 5.5 kW                 |                |    |    |              |                     |                            |    |          |                |                | •              | •              | •        | •              | •                    |                |                      |
| 7.5 kW                 |                |    |    |              |                     |                            |    |          |                |                |                | •              | •        | •              | •                    |                |                      |
| 11 kW                  |                |    |    |              |                     |                            |    |          |                |                |                |                |          | •              | •                    | •              |                      |
| 15 kW                  |                |    |    |              |                     |                            |    |          |                |                |                |                |          | •              | •                    | •              |                      |
| 22 kW                  |                |    |    |              |                     |                            |    |          |                |                |                |                |          | •              | •                    | •              | •                    |
| 30 kW                  |                |    |    |              |                     |                            |    |          |                |                |                |                |          |                | •                    | •              | •                    |

※ The table is for reference only. Final SERVOBOX selection must take the rated output torque into consideration.



# Glossary

## Gear Ratio ( $i$ )

The gear ratio  $i$  indicates the factor by which gearbox transforms the three important motion parameters (speed, torque and mass moment of inertia).

The factor is a result of the geometry of the gearing elements (Example:  $i = 10$ ).

$$\begin{array}{lcl} n_1 = 3000 \text{ rpm} & \xrightarrow{1/i} & n_2 = 300 \text{ rpm} \\ T_1 = 20 \text{ Nm} & \xrightarrow{\times i} & T_2 = 200 \text{ Nm} \\ J_2 = 10 \text{ kgm}^2 & \xrightarrow{1/i^2} & J_1 = 0.10 \text{ kgm}^2 \end{array}$$

## Input Speed ( $n_1$ ) [rpm]

Input Speed is same as motor speed when motor is coupled to reducer.

## Output Speed ( $n_2$ ) [rpm]

The output speed is calculated by dividing input speed  $n_1$  by reduction ratio  $i$ .

$$n_2 = \frac{n_1}{i}$$

## Nominal (Rated) Input Speed ( $n_{1N}$ ) [rpm]

For S1 duty (continuous) applications, motor speed must never exceed nominal input speed for the gearbox.

Gearbox running continuously at nominal input speed ( $n_{1N}$ ) in ambient temperature of 20° C may approach, but not exceed, the maximum permitted case temperature of 90° C.

Gearbox input speed ( $n_1$ ) should be reduced below nominal, if ambient temperature is above 20° C, or temperature of gearbox case exceeds 90° C.

# Glossary

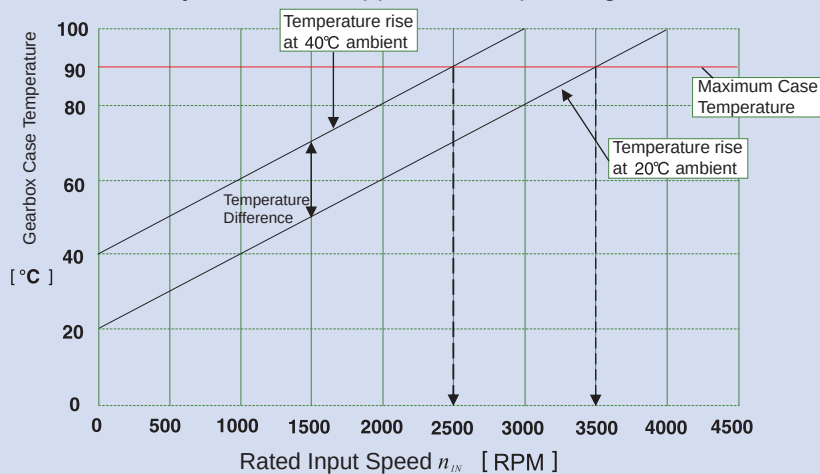
## Max Input Speed ( $n_{1B}$ ) [rpm]

Applicable to intermittent motion operation (S5 duty). Gearbox input speed can exceed the rated input speed, up to the maximum input speed value, as long as average (RMS) input speed does not exceed the rated speed over full cycle.

The max input speed is defined for ambient temperature of 20° C. If the ambient temperature is higher or the temperature of gearbox surface exceeds 90° C, please lower input speed ( $n_1$ ).

## Speed ( $n$ ) [rpm]

When selecting gearboxes, the nominal speed and the maximum input speed specifications must be considered. The maximum (permissible) speed  $n_{1B}$  must not be exceeded during operation. The nominal speed  $n_{1N}$  is the speed limit when motor is running continuously. For cyclical operation, the nominal speed must remain below motor RMS speed for the application. Gearbox housing operating temperature (which must not exceed 90° C) determines the nominal speed limit. The nominal input speed specified in the catalogue applies to an ambient temperature of 20° C. As can be seen in the diagram below, the temperature limit will be reached quicker with elevated ambient temperature. The nominal input speed must be reduced if the ambient temperature is higher than 20° C. Adjusted values applicable to specific gearbox model are available on request.



Note: the lower the backlash, the higher the temperature rise.

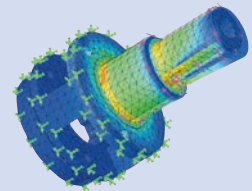
- A. For P0 backlash (<3arcmin), average temperature increase is 3~5 degrees.
- B. For Ps backlash (<1arcmin), average temperature increase is 5~10 degrees.
- C. Gearboxes with Ps and P0 backlash are suitable mainly for intermittent operation (S5 duty).
- D. Gearboxes with P2 backlash are suitable for continuous operation (S1 duty).
- E. When the backlash is Ps or P0, motor speed should not exceed rated input speed.
- F. Please contact our company for special applications.

# Glossary

$T_{2N}$  [Nm]

## Nominal torque (Rated Output Torque) ( $T_{2N}$ ) [Nm]

The nominal torque  $T_{2N}$  specifies torque limit that can be transmitted continuously by a gearbox, without excessive stress or wear of internal gears.



CAE Analysis

$T_{2NOT}$  [Nm]

## Emergency Stop Torque (Max. Output Torque) ( $T_{2NOT}$ ) [Nm]

The emergency stop torque  $T_{2NOT}$  is the maximum permissible torque at the gearbox output. Exceeding  $T_{2NOT}$  can cause gearbox to fail. Repeated applications of emergency torque can cause damage to internal gears. Design limit for  $T_{2NOT}$  repeats is 1000 times for the service life of a gearbox. SERVOBOX  $T_{2NOT} = 3 \cdot T_{2B}$  (3 times of rated output torque). Please avoid using  $T_{2NOT}$  torque as part of normal application cycle.

$T_{2B}$  [Nm]

## Acceleration Torque ( $T_{2B}$ ) [Nm]

The acceleration torque  $T_{2B}$  is the maximum permissible torque that can briefly be transmitted at the gearbox output end under the duty cycle  $< 1000/h$  cycles. For  $> 1000/h$  cycles, the impact factor must be taken into account.  $T_{2B}$  is the max. parameter in cyclic operation. Application acceleration torque ( $T_{2b}$ ) shall be smaller than  $T_{2B}$ ; otherwise the gearbox service life will be reduced.

$T_{012}$  [Nm]

## No Load Running Torque ( $T_{012}$ ) [Nm]

The no load running torque is the torque which must be applied to a gearbox in order to overcome the internal friction; it is therefore considered lost torque.

## Back Driving Torque [Nm]

The back driving torque is the minimum torque to start the rotation from the output side of gearbox. A larger size or a higher ratio gearbox requires greater back driving torque.

# Glossary

## Average Service Life [h]

Average service life is the working time of gearbox running at rated loading and nominal input speed at cyclic operation.

The service life is not a guarantee of the actual service life of the gear reducer. It is an average calculated life derived from industry formulas (\*), and other factors such as running test results, CAE (Computer Aided Engineering ) software and so on. These factors take into consideration the metal composition, heat treatment, the design of the gearing and bearings, as well as calculated loads. Service life calculations are not based on actual field conditions or applications, and do not represent a guarantee with respect to expected life, performance, or other characteristics of gear reducer in any given application or use. The actual service life could vary substantially from the nominal service life.

\*: Industry formula Refer to the following standardization organization  
GB/T 3480-1997 , ISO 6336-1~6336-3:1996

ISO: International Organization for Standardization

GB: Guobiao standards (Chinese National Standards)

DIN: Deutsches Institut für Normung : (German Institute for Standardization)

AGMA: American Gear Manufacturers Association

JIS: Japanese Standards Association

# Glossary

## Output Shaft Loading Considerations

When selecting a reducer, check that radial and axial forces on output shaft are within specifications. Strength of the shaft and load rating of support bearings determine maximum allowable forces on the shaft.

$F_{2A}$  [N]

### Axial Force ( $F_{2A}$ ) [N]

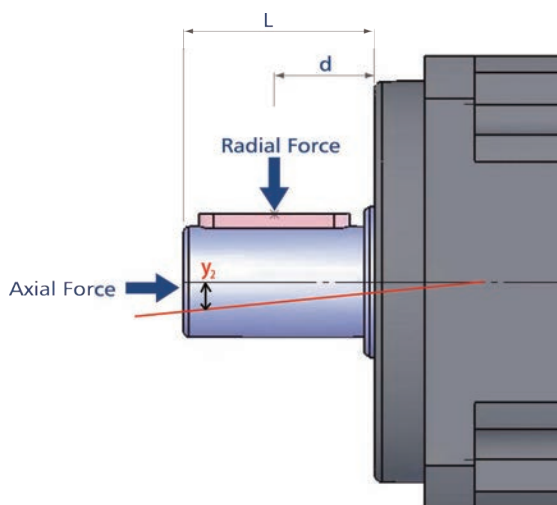
The axial force  $F_{2A}$  is an external force component that is considered to be acting along the centre of output shaft. If the parallel force is applied with an offset  $y_2$  from output shaft centre then bending moment is also produced - which must be accounted for by the radial force rating. If application axial force on output shaft exceeds reducer specifications, additional design features (e.g. coupling) must be implemented.

$F_{2R}$  [N]

### Radial Force ( $F_{2R}$ ) [N]

The radial force  $F_{2R}$  is the component of external force that is considered to be acting at right angle on the output shaft axis. Radial force is perpendicular to axial force. Rated radial force is the maximum force that can be applied at the distance (d) from output shaft end up to 100 rpm. For reducers with conventional output shaft  $d=1/2$  shaft length. If application radial force is further than d from the shaft shoulder reduce maximum radial force accordingly.

Radial force applied to an output shaft, which acts as a lever arm, produces a bending moment.



SERVOBOX will support radial load while its output shaft connected to transmission elements, such as chain pulley or pinion. Use the Overhang Load formula to determine application radial force:

$$OHL = \frac{T \cdot s \cdot f \cdot p}{R}$$

$T$ = Torque of transmission machinery

$s$ = Service factor (0.50~2.10 see next page)

$f$ = Load Coefficient (1.00~2.50 see next page)

$R$ = Radius of pulley, pinion or chain wheel

$p$ = Position Factor: loading position less than d,  $p=1$

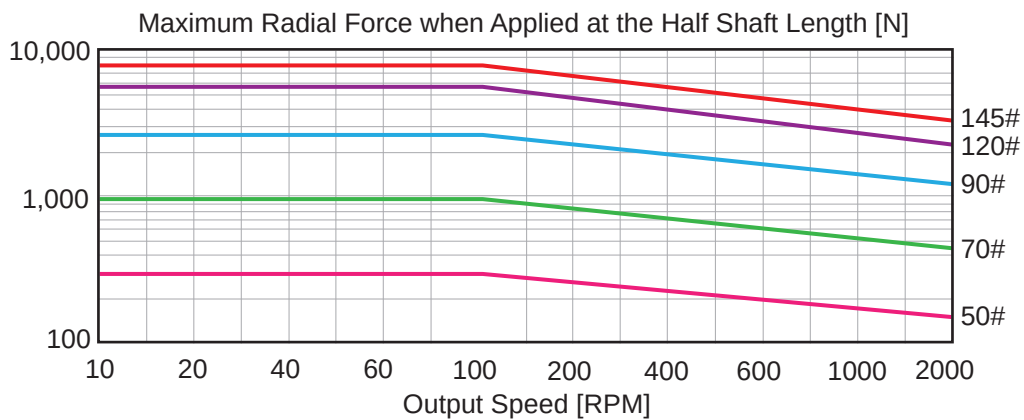
loading position larger than d,  $p=1.5$

# Glossary

$F_{2rB}$  [N]

## Permitted Radial Force ( $F_{2rB}$ ) [N]

The maximum allowed radial force at the ½ length position of gearbox output shaft when rotating at ≤100 RPM. This value decreases as output speed increases.



## Permitted Axial Force ( $F_{2aB}$ ) [N]

The maximum allowed axial force (along gearbox output shaft centre) when rotating at ≤100 RPM..

## Transmission efficiency $\eta$ [%]

Efficiency ( $\eta$ ) is the ratio of output power to input power. Power lost through friction reduces efficiency below 1 or <100%.

$$\eta = \frac{P_{out}}{P_{in}} = \frac{P_{in} - P_{lost}}{P_{in}}$$

(Sf) Service factor table for ≤10 start/stop operations in one hour

| Loading classification | Running per 24hr period |      |         |          |
|------------------------|-------------------------|------|---------|----------|
|                        | 0.50 hr                 | 2 hr | 8-10 hr | 10-24 hr |
| Uniform                | 0.80                    | 0.90 | 1.00    | 1.25     |
| Medium shock           | 0.90                    | 1.00 | 1.25    | 1.50     |
| Heavy shock            | 1.00                    | 1.25 | 1.50    | 1.75     |

(Sf) Service factor table for >10 start/stop operations in one hour

| Loading classification | Running per 24hr period |      |         |          |
|------------------------|-------------------------|------|---------|----------|
|                        | 0.50 hr                 | 2 hr | 8-10 hr | 10-24 hr |
| Uniform                | 0.95                    | 1.10 | 1.20    | 1.50     |
| Medium shock           | 1.10                    | 1.20 | 1.50    | 1.80     |
| Heavy shock            | 1.20                    | 1.50 | 1.80    | 2.10     |

Load Coefficient (f)

| Driving mode | (f)  |
|--------------|------|
| Chain pulley | 1.00 |
| Gear         | 1.25 |
| V-belt       | 1.50 |
| Flat-belt    | 2.50 |

# Glossary

## Noise Level [dB]

Gearbox operating noise specified in the catalog is tested for ratios  $i=10$  and  $i=100$  (2 stage) with no load and motor running at 3,000rpm. Noise level is measured at 1M distance from the gearbox. Higher speeds or loads may result in increased noise level.

## $J$ [Kg.cm<sup>2</sup>]

### Inertia (full terminology: mass moment of inertia) ( $J$ ) [Kg.cm<sup>2</sup>]

Inertia  $J$  is the mass distribution property an object around the centre of rotation. Value of  $J$  is proportional to the torque that needs to be applied to change angular velocity the object.

## Inertia Ratio ( $\lambda$ )

Inertia ratio  $\lambda$  is the ratio of combined load + transmission inertia (application side) and combined motor + gearbox inertia\* (driving side). It is an important parameter indicating the controllability and stability of the system. Accurate control of closed loop dynamic processes becomes more difficult as inertia ratio  $\lambda$  increases.

The guideline or "rule of thumb" for servo driven systems

$\lambda \leq 10$  for high rigidity transmissions (e.g. ballscrews) and constant speed applications;

$\lambda \leq 5$  for medium rigidity transmissions (e.g. belt drives) and dynamic applications;

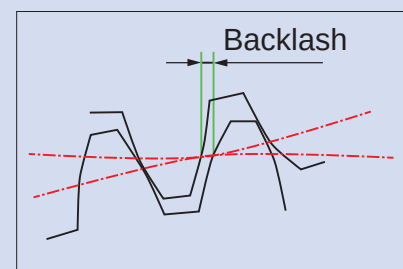
$\lambda \leq 3$  for low rigidity transmissions (e.g. long belt drives or chain drives), highly dynamic applications (e.g. machine tools). Modern servo motors and drives with high resolution feedback may be able to handle higher ratios. Please assess application on case by case basis.

\*Due to the rigid construction and tight coupling SERVBOX and servo motor form one element with combined inertia that helps to counterbalance load inertia.

Gearbox reduces load inertia by square of the ratio (i.e. load  $J \times 1 / i^2$ ) further improving system stability and dynamic capacity.

## Torsional Backlash ( $j_t$ ) [arcmin]

Torsional backlash  $j_t$  is the maximum angle of torsion of the output shaft in relation to the input. Torsional backlash is measured with the input shaft locked. The output is then loaded with a defined test torque (2% rated output torque) in order to overcome friction of the internal gears. The main factor affecting torsional backlash is the face clearance between the gear teeth.



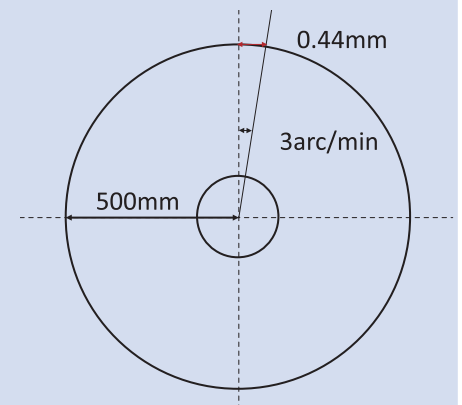
# Glossary

## Angular minute [Arcmin]

A degree is subdivided into 60 angular minutes ( $= 60 \text{ arcmin} = 60'$ ). In other words, if the torsional backlash is specified as 1 arcmin, for example, the output can be turned  $1/60^\circ$ . The repercussions for the actual application are determined by the arc length.

EX: A pinion with a radius  $r = 500 \text{ mm}$  on a gearhead with standard torsional backlash  $j_t = 3'$  can be turned  $b = 0.44 \text{ mm}$ .

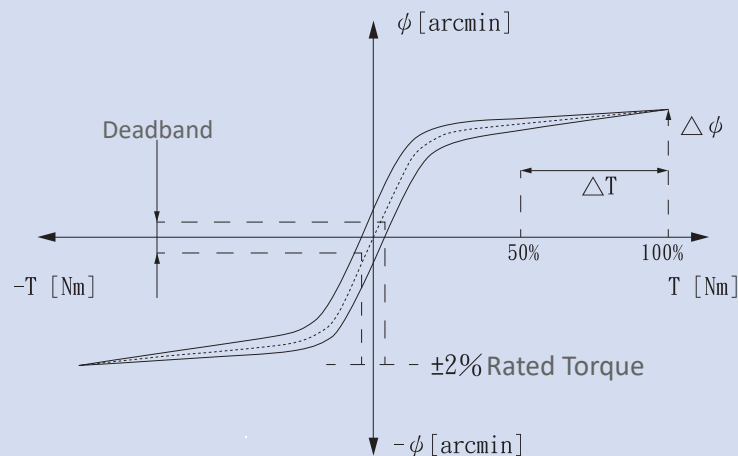
$$b = \frac{2 \cdot \pi \cdot r \cdot j_t}{21600}$$



## Hysteresis Curve

The hysteresis is measured to determine the torsional rigidity of a gearbox. The result of this measurement is known as the hysteresis curve. If the input shaft is locked, the gearhead is loaded with a torque that increases continuously up to  $T_{2B}$  and is then relieved at the output in both directions. The torsional angle is plotted against the torque. This yields a closed curve from which the torsional backlash and torsional rigidity can be calculated.

$$C_{t21} = \frac{\Delta T}{\Delta \phi}$$





# Glossary

## Torsional rigidity ( $C_{t21}$ ) [Nm/Arcmin]

Rigidity is reciprocal of elasticity. Torsional rigidity is defined as the ratio between torque applied to output shaft and the resulting angular deflection, while all transmission elements are stationary.

$$C_{t21} = \frac{\Delta T}{\Delta \phi}$$

The torsional rigidity value is the torque required to deflect the output shaft by one angular minute. The torsional rigidity can also be determined from the hysteresis curve. Only the area between 50% and 100% of  $T_{2B}$  is considered because this area of the curve profile can be considered linear.

## Operating modes

(continuous operation S1 and cyclic operation S5)

When selecting a gearbox, it is important to consider whether the motion profile is characterized by frequent acceleration and deceleration phases in cyclic operation (S5) as well as pauses, or whether it is designed for continuous operation (S1), i.e. extended periods at constant velocity.

## Continuous operation (S1)

Continuous operation is defined by the duty cycle. Duty cycle that is 60% or higher, or continuous motion that is 20 minutes or longer - qualifies as continuous operation (S1 duty).

## Cyclic operation (S5)

Cyclic operation is defined by the duty cycle. Duty cycle is less than 60% and continuous motion is shorter than 20 minutes - qualifies as cyclic operation (S5 duty).

# Glossary

## Duty cycle (ED)

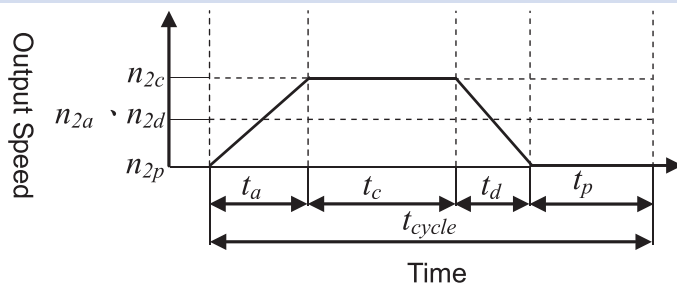
The duty cycle ED is determined by one cycle. The times for acceleration ( $t_a$ ), constant travel if applicable ( $t_c$ ) and deceleration ( $t_d$ ) combined yield the duty cycle in minutes. The duty cycle is expressed as a percentage with inclusion of the pause time  $t_p$ .

$t_{work} = t_{acceleration} + t_{uniform\ speed} + t_{deceleration} = t_a + t_c + t_d$

$t_{cycle} = t_{acceleration} + t_{uniform\ speed} + t_{deceleration} + t_{pause} = t_a + t_c + t_d + t_p$

$ED[\%] = t_{work} / t_{cycle} \times 100\%$

$ED[\text{min}] = t_{work}$



$$ED = \frac{t_a + t_c + t_d}{t_{cycle}}, t_{work} = t_a + t_c + t_d$$

$t_a$  Acceleration ,  $t_c$  Constant ,

$t_d$  Deceleration ,  $t_p$  Pause

## Stage

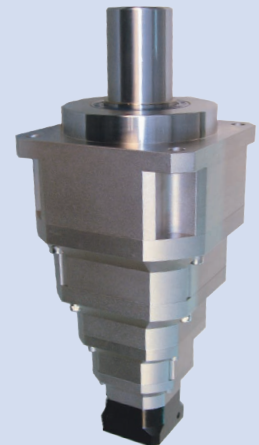
Single sun and planet gears set form one planetary speed reduction stage (1 stage). To achieve higher reduction ratios, multiple planetary stages can be connected in tandem.

1 stage inline SERVBOX planetary reducers support ratios from 3:1 to 10:1.

2 inline stages support ratios from 15:1 to 100:1.

Right angle planetary models with helical bevel input stage can double reduction ratio up to 200:1.

Even higher reduction can be produced by adding more stages. SERVBOX modular design enables combining multiple gear trains (stages) to achieve ratios up to 100,000:1.



# Glossary

## Degree of protection (IP)

SERVOBOX IP65 sealed design protects against ingress as well as lubricant leakage problems.

IEC 60529 "Degrees of protection offered by enclosure (IP code)" defines various degrees of protection.

The IP degree of protection (IP stands for International Protection) is represented by two digits. The first digit indicates the protection against the ingress of impurities and the second the protection against the ingress of water.



● IP65 Test Report by Metal Industries & Development Center.

| Protection against contact and against solid foreign objects. |                                                                  | Protection against ingress of water. |                                                                                  |
|---------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------|
| 1st numeral                                                   | Description                                                      | 2nd numeral                          | Description                                                                      |
| 0                                                             | Not-protected                                                    | 0                                    | Not-protected                                                                    |
| 1                                                             | Protected against solid foreign objects >50mm Ø                  | 1                                    | Protected against vertically falling water drops                                 |
| 2                                                             | Protected against solid foreign objects >12.5mm Ø                | 2                                    | Protected against vertically falling water drops when enclosure tilted up to 15° |
| 3                                                             | Protected against solid foreign objects >2.5mm Ø                 | 3                                    | Protected against spraying water when enclosure tilted up to 60°                 |
| 4                                                             | Protected against solid foreign objects >1.0mm Ø                 | 4                                    | Protected against splashing water                                                |
| 5                                                             | Protected against ingress of dust (dust-protected)               | 5                                    | Protected against water jets                                                     |
| 6                                                             | Protected against ingress of dust by under pressure (dust-tight) | 6                                    | Protected against powerful water jets                                            |
|                                                               |                                                                  | 7                                    | Protected against the effects of temporary immersion in water                    |
|                                                               |                                                                  | 8                                    | Protected against the effects of continuous immersion in water                   |

# Glossary

## Operating Temperature

The Operating Temperature indicates the allowable temperature limits of the gearbox case. Operating SERVOPBOX series reducer case temperature must remain within  $-25^{\circ}\text{C} \sim +90^{\circ}\text{C}$ . The temperature limits, temperature rise due to speed, and ambient temperature must be considered when selecting gearbox for your application. Practical working ambient range is  $-25^{\circ}\text{C} \sim +45^{\circ}\text{C}$ .

## Lubrication

Standard products uses synthetic grease (0#). Depending on the application, other grease types can be requested, e.g. food grade grease. SERVOPBOX reducers are lubricated and sealed for life. No lubrication related maintenance is required.

## Collet Clamping

The Collet Clamping ensures rigid lock between motor shaft and gearbox input. Dynamical balance analysis is used to verify vibration-free operation and concentricity for backlash-free grip.

## Bushing

If the motor shaft diameter is smaller than the input bore of gearbox, a bushing is used to compensate for the difference in diameters.

# Glossary

## Motor Adapter

Each SERVOBOX reducer can be supplied with an adapter to suit your motor mounting dimensions. Adapter makes it easy to rigidly connect motor to SERVOBOX, without misalignment. This catalog includes typical adapter dimensions with some common variations e.g. motor bolt circle. Within certain mechanical constraints (such as max/min motor shaft dia.) we will design an adapter to suit your motor.

Motor Adapter Configuration Software - Motor Specifications

| Parameter         | Value | Unit               |
|-------------------|-------|--------------------|
| 輸出功率 Output Power | 0.5   | W                  |
| 額定力矩 Rated Torque | 1.59  | NM                 |
| 最大力矩 Max. Torque  | 4.77  | NM                 |
| 額定轉速 Rated Speed  | 3000  | RPM                |
| 最大轉速 Max. Speed   | 3000  | RPM                |
| 轉動慣量 Inertia      | 0.6   | kg/cm <sup>2</sup> |
| 軸徑 Shaft Dia.     | 24    | mm                 |
| 外徑 Diameter       | 130   | mm                 |
| 凸緣                | 110   | mm                 |
| PCD               | 145   | mm                 |

1-1. 輸入減速機之減速比 Input GEAR Ratio: 10

1-2. 輸入減速機之 TYPE: SB

Motor Adapter Configuration Software - Adapter Configuration

STEP1 STEP2 STEP3 STEP4

1-1. 輸入減速機之減速比 Input GEAR Ratio: 3

1-2. 輸入減速機之 Motor Shaft Dia, A: 19

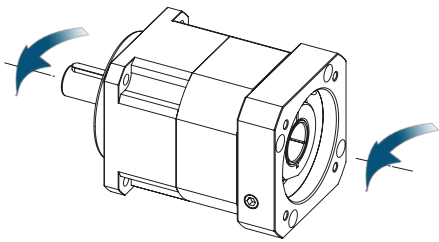
1. 下一步 Next Step

Diagram showing dimensions: I, J, D, C, and A.

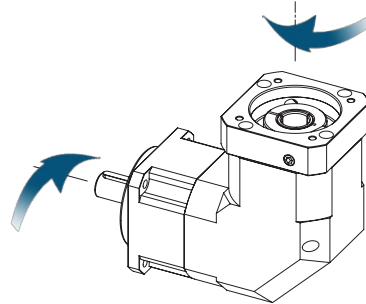


# Rotation Direction

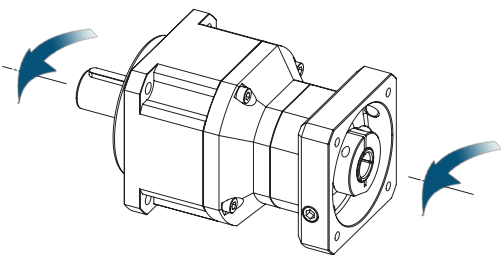
1-Stage Planetary Reducer



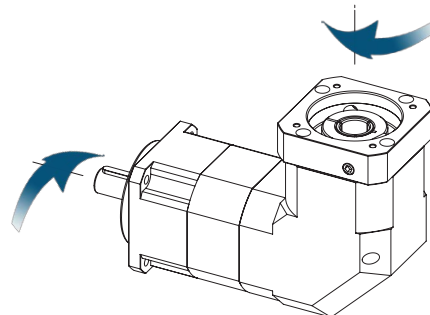
1-Stage Spiral Bevel Gear & Planetary Reducer



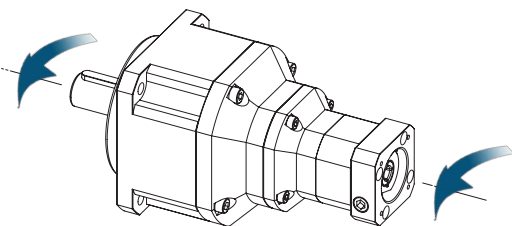
2-Stage Planetary Reducer



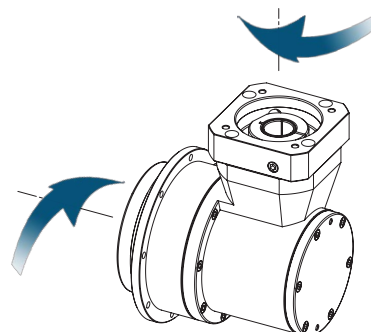
2-Stage Spiral Bevel Gear & Planetary Reducer



3-Stage Planetary Reducer



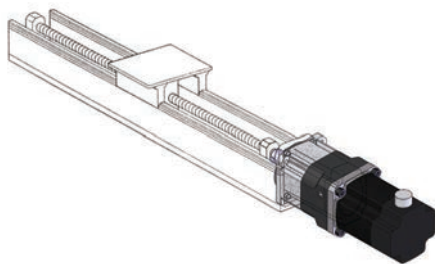
1-Stage Hypoid Gear & Planetary Reducer



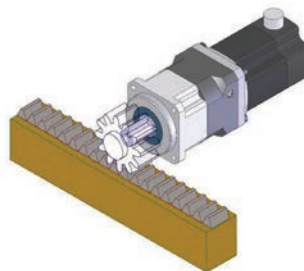
# Typical Applications

## ○ Linear Motion

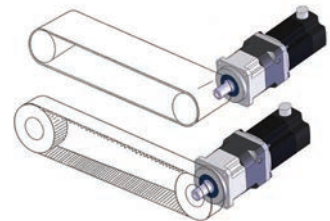
### ● Ball Screw Actuator



### ● Rack & Pinion

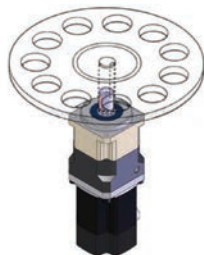


### ● Roller / Belt Pulleys

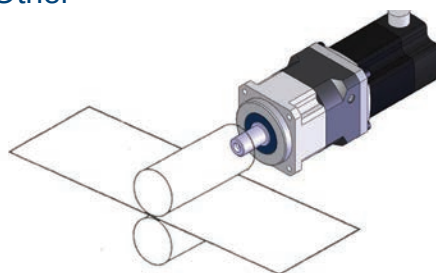


## ○ Rotary Motion

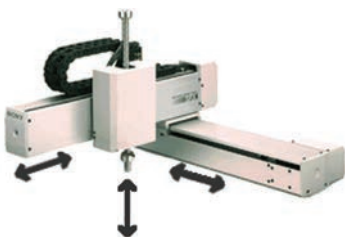
### ● Index



## ○ Other



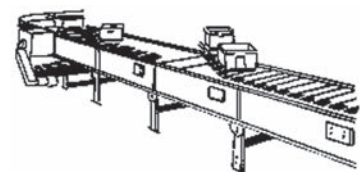
### ● Robots



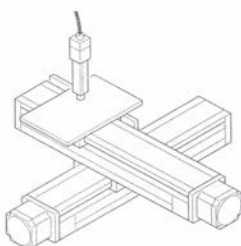
### ● Printing Machines



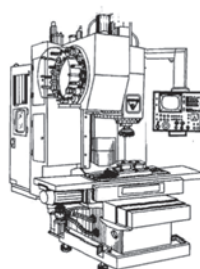
### ● Conveyor



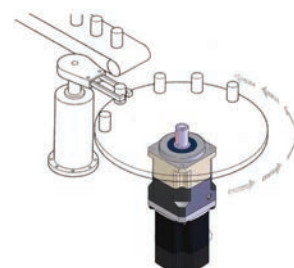
### ● Work Tables



### ● CNC Axis & Spindle



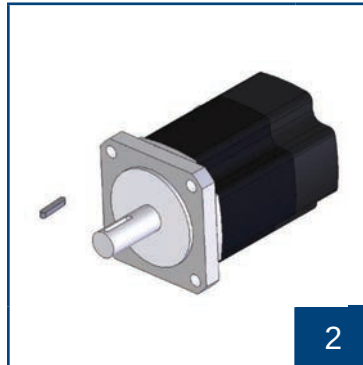
### ● Indexing



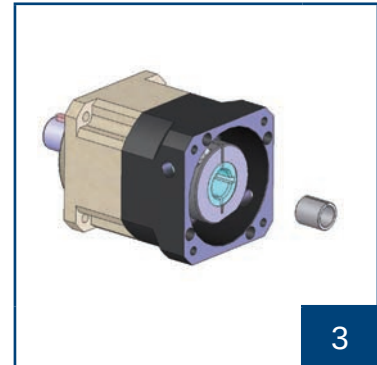
# Mounting Instructions



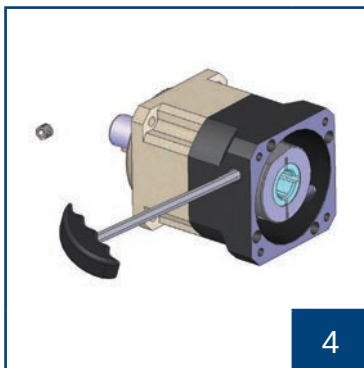
Confirm the motor, and gearbox size.  
Clean up the mounting surface.



Remove the motor key if the diameter  
of motor shaft is under  $\varnothing 35\text{mm}$ .



Check motor shaft size and insert  
bushing into input bore if necessary.



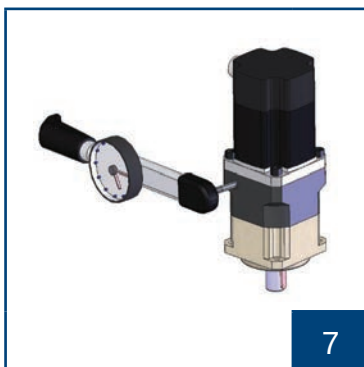
Remove the plug on the adapter plate.  
Rotate the set collar till the bolt is line  
up.



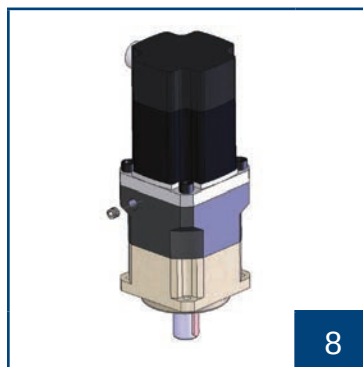
Put the motor into the gearbox vertically.



Tighten the mounting bolt in 1-4 order  
with torque wrench.



Tighten the set collar bolt with torque  
wrench.



Tighten back the screw plug.

## Important!

Please assemble in the order of the  
steps as shown. In particular step 6  
must precede step 7.

i.e.

Tighten motor mounting bolts first,  
then tighten the set collar on motor  
shaft.

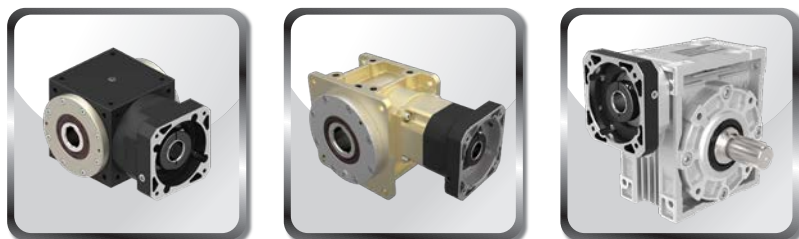
Otherwise motor shaft bearings can  
be damaged by resulting axial forces.

# Reducers for Servo Motors

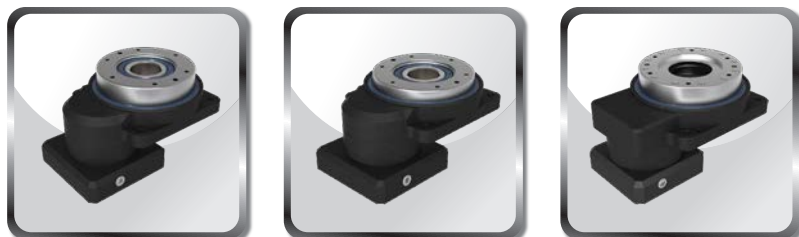
## High Precision Planetary Reducers



## High Precision Right Angle Reducers



## Hollow Rotary Actuator Reducers



# Speed Reducers

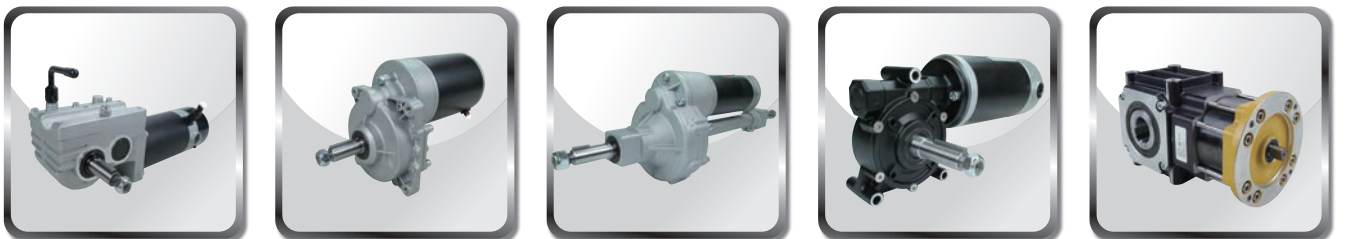
## Gear Reducers



## Worm Gear Reducers

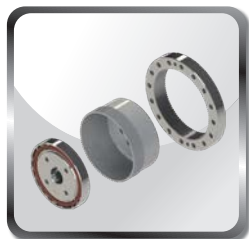


## Power Transmission Reducers

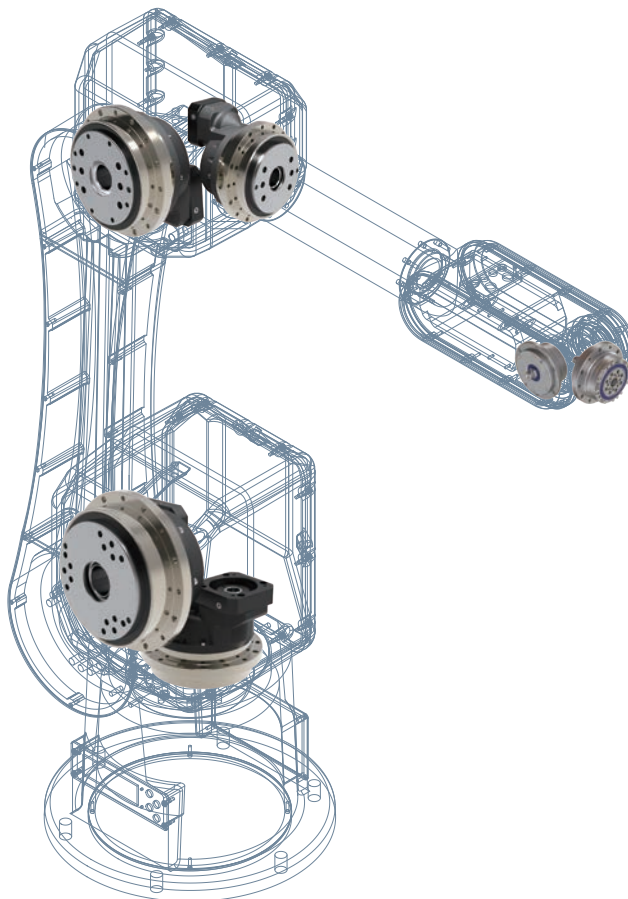
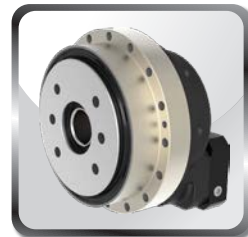
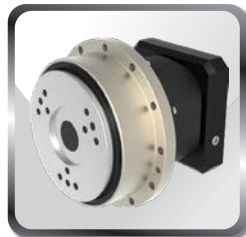
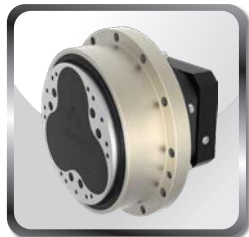


# Articulated Robot Reducers

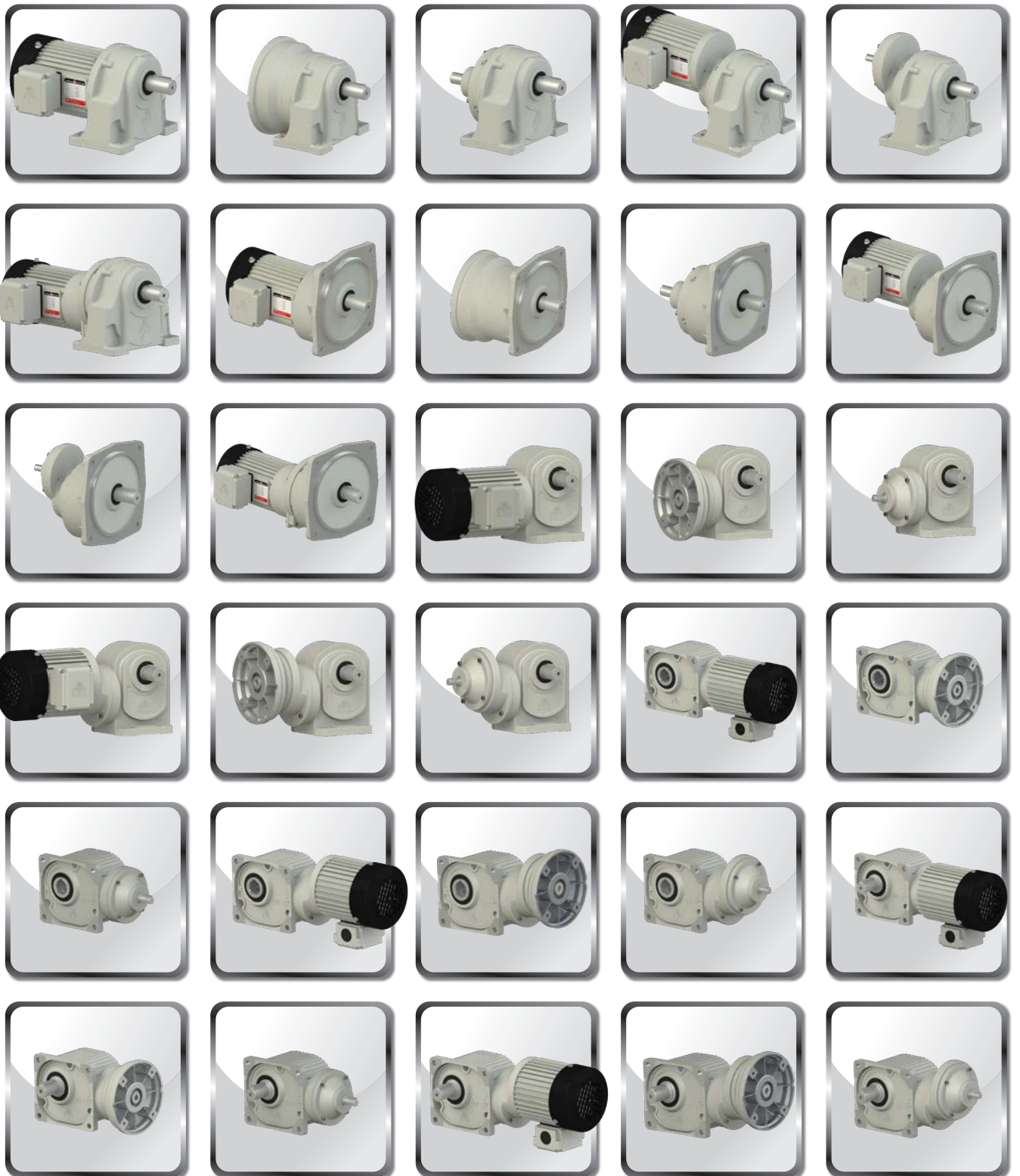
## HARMONICDRIVE



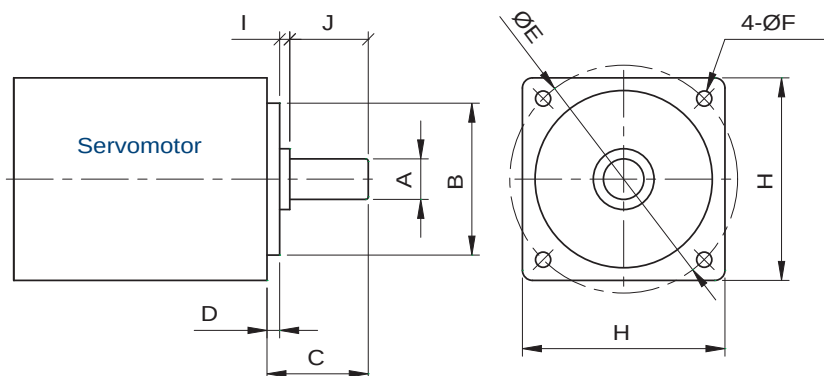
## CYKLODRIVE



## Small Gear Reducers



# SERVOBOX Inquiry Information



| A | B | C | D | E | F | H | I | J |
|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |

|        |   |       |   |       |   |                        |   |                |
|--------|---|-------|---|-------|---|------------------------|---|----------------|
|        | — |       | — |       | — |                        | — |                |
| Series |   | Model |   | Ratio |   | Output Shaft<br>Keyway |   | Backlash Class |
|        |   |       |   |       |   |                        |   | MOTOR NO.      |

## Application details / comments:

- ◆ Preferred reducer size, type or model
- ◆ Transmitted power, or torque and output shaft speed
- ◆ Reduction ratio and motor speed
- ◆ Method of connection to the load
- ◆ Motor coupling method (e.g. gearhead mounting, shaft to shaft coupling, etc.)
- ◆ Motor brand and model, or frame size & shaft diameter
- ◆ Alternatively, please contact us for assistance with reducer sizing, selection, and even motor and transmission optimisation to suit your application

|              |     |                |
|--------------|-----|----------------|
| Company Name |     | Contact Person |
| Address      |     |                |
| Tel          | Fax | E-Mail         |
| Notes        |     |                |



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