

# ATG SERVBOX

## Planetary Reducers

### Features of KSD Series

#### 저소음

헬리컬기어 사용으로 부드럽고 조용한 운전가능

#### Quiet operation

Helical gears contribute to reduce vibration and noise.

#### 고정밀도

Backlash  $\leq 3$  arcmin, 정밀제어에 이상적

#### High precision

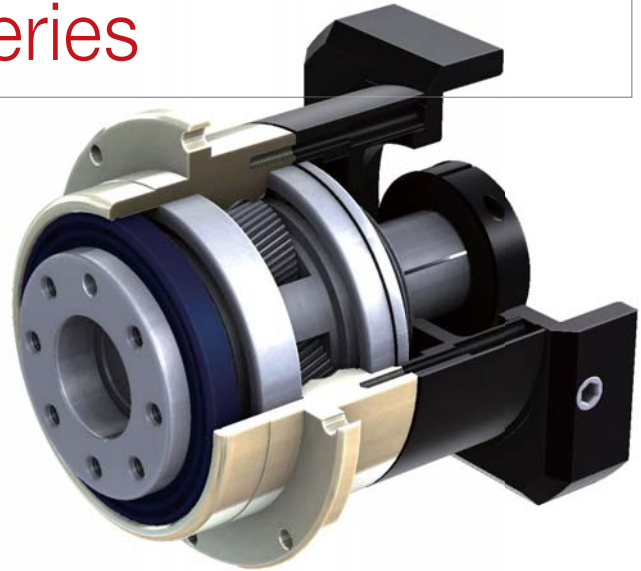
Backlash  $\leq 3$  arcmin reaches precision alignment.

#### 고강성과 높은 토크

uncage needle bearing 사용, 강성과 토크를 높임

#### High rigidity & torque

High rigidity & high torque are achieved by integrant needle roller bearings and one-piece constructed.



### Indication of Model Numbers

| KSD  |       | -               | 90 |  | -              | 10 |  |  | - | P1 |                         | MOTOR |  |
|------|-------|-----------------|----|--|----------------|----|--|-------------------------------------------------------------------------------------|---|----|-------------------------|-------|--|
| Type | Model | Ratio           |    |  | Output Bearing |    |  | Backlash Class                                                                      |   |    | Motor Type              |       |  |
| KSD  | 47    | 1-Stage         |    |  | □ : 무표기        |    |  | 1-Stage / 2-Stage                                                                   |   |    | Motor Brand & Model No. |       |  |
|      | 64    | 4, 5, 7, 10     |    |  | Standard       |    |  | Ps ≤ 1 / ≤ 3                                                                        |   |    |                         |       |  |
|      | 90    | 2-Stage         |    |  | (Ball Bearing) |    |  | P0 ≤ 3 / ≤ 5                                                                        |   |    |                         |       |  |
|      | 110   | 20, 25, 35, 40, |    |  | T : 표기         |    |  | P1 ≤ 5 / ≤ 7                                                                        |   |    |                         |       |  |
|      | 140   | 50, 70, 100     |    |  | Taper Bearing  |    |  | P2 ≤ 7 / ≤ 9                                                                        |   |    |                         |       |  |
| KSDL | 200   | 1-Stage         |    |  | ( 90#~ 255# )  |    |  | 1-Stage / 2-Stage                                                                   |   |    |                         |       |  |
|      | 255   | 4, 5, 7, 10,    |    |  |                |    |  | Ps ≤ 2 / ≤ 4                                                                        |   |    |                         |       |  |
|      |       | 14, 20          |    |  |                |    |  | P0 ≤ 4 / ≤ 7                                                                        |   |    |                         |       |  |
|      |       | 2-Stage         |    |  |                |    |  | P1 ≤ 6 / ≤ 9                                                                        |   |    |                         |       |  |
|      |       | 20, 25, 35, 40, |    |  |                |    |  | P2 ≤ 8 / ≤ 12                                                                       |   |    |                         |       |  |
|      |       | 50, 70, 100,    |    |  |                |    |  |                                                                                     |   |    |                         |       |  |
|      |       | 140, 200        |    |  |                |    |  |                                                                                     |   |    |                         |       |  |



# Features of KSD Series

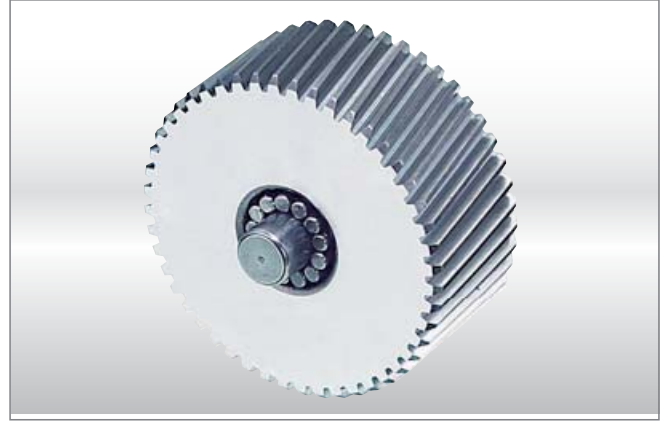
## KSD Series 제품 특성



### One-piece Helical Gearbox Housing

감속기 케이스에 내치기어를 일체형으로 정밀 가공하였고, 기어 맞물림이 스퍼기어의 2배이상인 Helical gear 적용으로 동작 소음을 최소화하여 고출력 저소음, 저백래쉬를 실현하였습니다.

The gearbox and internal gear are one-piece constructed.  
High gear accuracy meets DIN6 class.



### Full Needle Roller Bearings Design

감속기의 유성기어는 구조적 강도와 출력 향상을 위하여 Full needle bearing을 적용 하였습니다.

The planetary gear transmission employs full needle roller bearings without retainer to increase the contact surface, which greatly upgrades structural rigidity and service life.



### Collet Locking Mechanism

감속기의 입력축과 모터 출력축을 연결하기 위한 Collet Clamp 방식으로 역학상 확실한 체결력과 동심도를 보장하여 높은 속도에서 구동할 때에도 백래쉬가 발생하지 않고 동력을 전달합니다.

The input-end and the motor are coupled through a collet locking mechanism. It has passed dynamical balance analysis to assure concentricity and balance on the connection and no backlash for power transmission while running at high speed. No backlash for power transmission.



### Integrated Planetary Arm Bracket

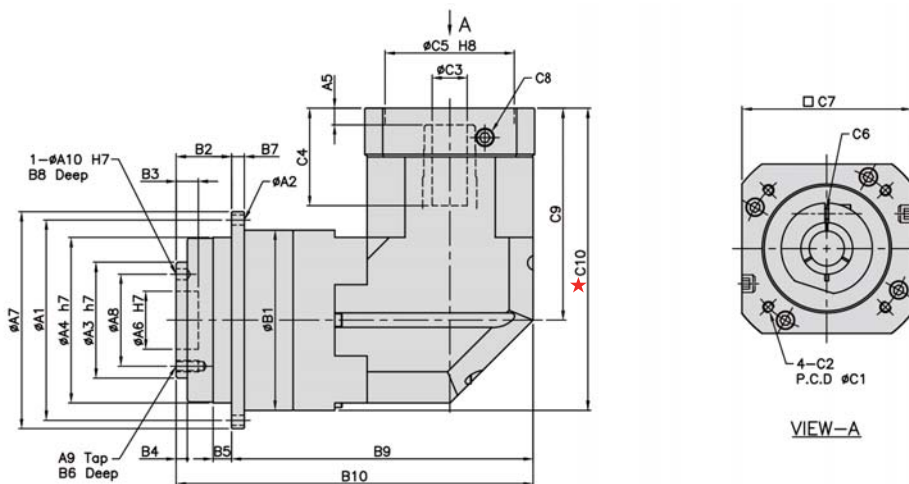
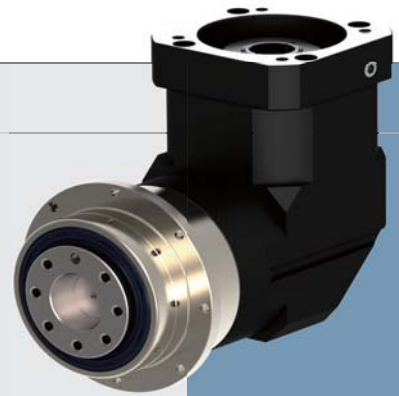
Planetary arm bracket과 출력 Shaft는 일체형 구조로 정밀 가공되어 비틀림 강도와 정밀도를 향상 시켰습니다.

The planetary arm bracket and the output shaft are one-piece constructed to increase torsional rigidity and accuracy. The entire structure is one-time machined for controlling accuracy in the specified tolerance.

# MODEL : KSDL

1-Stage

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



\* Output Dimensions P.64 참조

unit : mm

| Code | Model | 47            | 64            | 90                | 110            | 140             | 200             | 255             |
|------|-------|---------------|---------------|-------------------|----------------|-----------------|-----------------|-----------------|
| A    | 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            | 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           | 9.5, 19.5      | 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              |
| B    | 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           | 10            | 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           |
| 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, (11)       | 14, (19)      | 19, (24)          | 24, (32)       | 35, (38)        | 38, 42, 48, 55  | 42, 48, 55      |
|      | C4    | 27            | 33.5, 41.5    | 53, 67.5          | 66.5, 76.5     | 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 | 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    | PT1/8"        | PT1/8"        | PT1/8"            | PT1/4"         | PT1/4"          | PT3/8"          | PT3/8"          |
|      | C9    | 61            | 77, 85        | 115.3, 129.8      | 141, 151       | 165.7           | 235, 237        | 235, 237        |
|      | C10   | 90.5          | 112, 120      | 164.3, 178.8      | 203.5, 213.5   | 243.7           | 341, 343        | 362, 364        |

## High Precision Planetary Reducer

| Model No.                                      |            | 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        | 155       | 333       | 618       | 1,189     | 2,010     |
|                                                |            |           | 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                              | $n_{IN}$   | rpm       | 4 ~ 20 | 3,000                                                              | 3,000     | 3,000     | 3,000     | 3,000     | 3,000     | 2,000     |
| Max. Input Speed                               | $n_{IB}$   | rpm       | 4 ~ 20 | 6,000                                                              | 6,000     | 6,000     | 5,000     | 5,000     | 4,000     | 3,000     |
| Backlash Ps                                    | $j_t$      | arcmin    | 4 ~ 20 | —                                                                  | $\leq 2$  | $\leq 2$  | $\leq 2$  | $\leq 2$  | $\leq 2$  | $\leq 2$  |
| Backlash P0                                    | $j_t$      | arcmin    | 4 ~ 20 | $\leq 4$                                                           | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  | $\leq 4$  |
| Backlash P1                                    | $j_t$      | arcmin    | 4 ~ 20 | $\leq 6$                                                           | $\leq 6$  | $\leq 6$  | $\leq 6$  | $\leq 6$  | $\leq 6$  | $\leq 6$  |
| Backlash P2                                    | $j_t$      | 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. Axial Force<br>Ball Bearing               | $F_{2aB}$  | N         | 4 ~ 20 | 1,020                                                              | 1,260     | 4,230     | 6,360     | 7,035     | 17,600    | 19,800    |
| Max. Axial Force<br>Taper Bearing              | $F_{2aB}$  | N         | 4 ~ 20 | —                                                                  | —         | 7,330     | 11,500    | 18,600    | 36,800    | 53,600    |
| Service Life                                   | $L_H$      | hr        | 4 ~ 20 | S5 Cycle Operation: >20,000 (S1 Continuous Operation: >10,000 hrs) |           |           |           |           |           |           |
| Efficiency                                     | $\eta$     | %         | 4 ~ 20 | $\geq 95\%$                                                        |           |           |           |           |           |           |
| Operating Temperature                          |            | °C        | 4 ~ 20 | -25°C ~ +90°C                                                      |           |           |           |           |           |           |
| Lubrication                                    |            |           | 4 ~ 20 | VIGO GREASE RE #0                                                  |           |           |           |           |           |           |
| 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        | 53.4      | 89.6      |

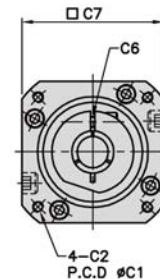
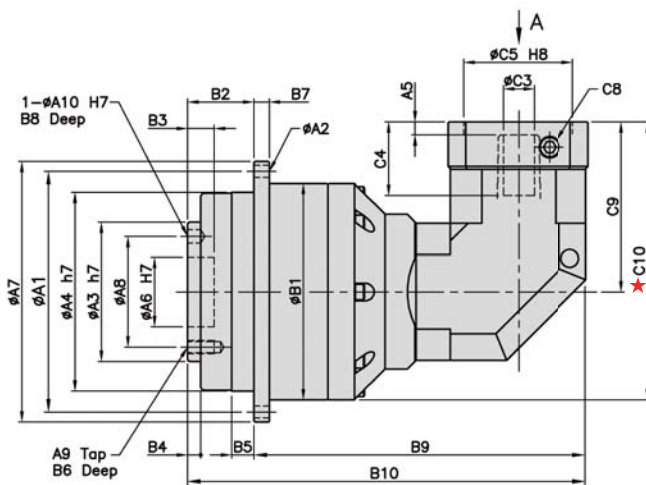
■ Mass Moments of Inertia (kg·cm<sup>2</sup>)

| 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 | 6.20 | 21.8 | 66.5 | 120.2 |
| 20    | 0.03 | 0.08 | 1.88 | 6.20 | 21.8 | 66.3 | 118.8 |

# MODEL : KSDL

2-Stage

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



VIEW-A

\* Output Dimensions P.64 참조

unit : mm

| Code | Model | 47            | 64            | 90            | 110               | 140             | 200             | 255             |
|------|-------|---------------|---------------|---------------|-------------------|-----------------|-----------------|-----------------|
| A    | 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            | 16-13.5         |
|      | A3    | 28            | 40            | 63            | 80                | 100             | 160             | 180             |
|      | A4    | 47            | 64            | 90            | 110               | 140             | 200             | 255             |
|      | A5    | 6             | 6             | 6             | 10.5, 25          | 10, 20          | 10              | 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              |
| B    | 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           | 10            | 12            | 12                | 16              | 22              | 32              |
|      | B7    | 4             | 5             | 7             | 8                 | 10              | 12              | 18              |
|      | 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           |
| C    | 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        |
|      | C3    | 8, (11)       | 8, (11)       | 14, (19)      | 19, (24)          | 24, (32)        | 35, (38)        | 38, 42, 48, 55  |
|      | C4    | 27            | 27            | 33.5, 41.5    | 54.5, 69          | 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    | PT1/8"        | PT1/8"        | PT1/8"        | PT1/8"            | PT1/4"          | PT1/4"          | PT3/8"          |
|      | C9    | 61            | 61            | 77, 85        | 115.3, 129.8      | 141, 151        | 165.7           | 235, 237        |
|      | C10   | 90.5          | 96            | 126, 134      | 177.8, 192.3      | 219, 229        | 271.7           | 362.5, 364.5    |

## High Precision Planetary Reducer

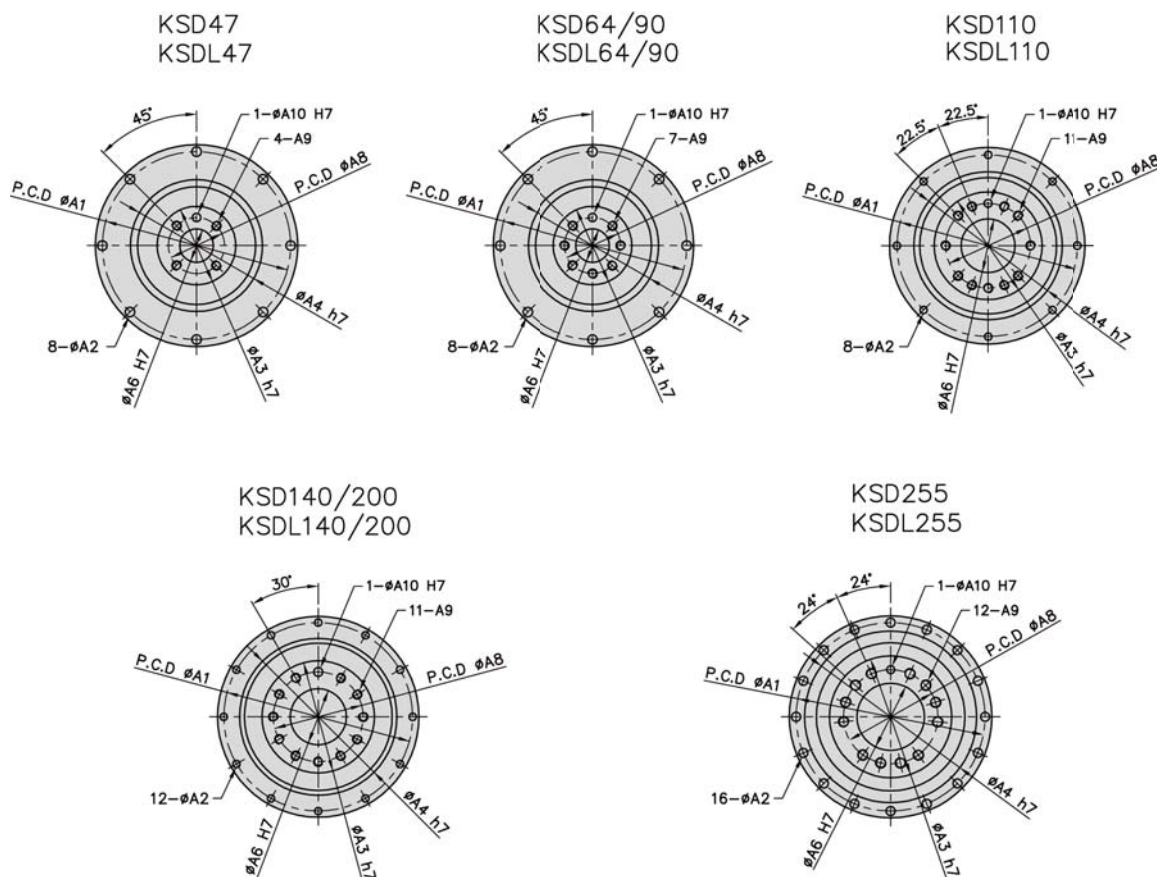
| Model No.                                      |            | Unit      | Ratio    | 47                                                                 | 64    | 90    | 110    | 140    | 200    | 255    |
|------------------------------------------------|------------|-----------|----------|--------------------------------------------------------------------|-------|-------|--------|--------|--------|--------|
| 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 | 5,000  | 5,000  | 4,000  | 3,000  |
| Backlash Ps                                    | $j_t$      | arcmin    | 20 ~ 200 | —                                                                  | —     | ≤ 4   | ≤ 4    | ≤ 4    | ≤ 4    | ≤ 4    |
| Backlash P0                                    | $j_t$      | arcmin    | 20 ~ 200 | ≤ 7                                                                | ≤ 7   | ≤ 7   | ≤ 7    | ≤ 7    | ≤ 7    | ≤ 7    |
| Backlash P1                                    | $j_t$      | arcmin    | 20 ~ 200 | ≤ 9                                                                | ≤ 9   | ≤ 9   | ≤ 9    | ≤ 9    | ≤ 9    | ≤ 9    |
| Backlash P2                                    | $j_t$      | 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. Axial Force<br>Ball Bearing               | $F_{2aB}$  | N         | 20 ~ 200 | 1,020                                                              | 1,260 | 4,230 | 6,360  | 7,035  | 17,600 | 19,800 |
| Max. Axial Force<br>Taper Bearing              | $F_{2aB}$  | N         | 20 ~ 200 | —                                                                  | —     | 7,330 | 11,500 | 18,600 | 36,800 | 53,600 |
| Service Life                                   | $L_H$      | hr        | 20 ~ 200 | S5 Cycle Operation: >20,000 (S1 Continuous Operation: >10,000 hrs) |       |       |        |        |        |        |
| Efficiency                                     | $\eta$     | %         | 20 ~ 200 | ≥ 92%                                                              |       |       |        |        |        |        |
| Operating Temperature                          |            | °C        | 20 ~ 200 | -25°C ~ +90°C                                                      |       |       |        |        |        |        |
| Lubrication                                    |            |           | 20 ~ 200 | VIGO GREASE RE #0                                                  |       |       |        |        |        |        |
| 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 | 1.08                                                               | 2     | 6     | 11.8   | 22.3   | 47.6   | 90.1   |

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

| Ratio | 47   | 64   | 90   | 110  | 140  | 200  | 255  |
|-------|------|------|------|------|------|------|------|
| 20    | 0.09 | 0.09 | 0.36 | 2.28 | 6.85 | 22.8 | 68.2 |
| 25    | 0.09 | 0.09 | 0.36 | 2.28 | 6.85 | 22.8 | 68.2 |
| 35    | 0.09 | 0.09 | 0.36 | 2.28 | 6.85 | 22.8 | 68.2 |
| 40    | 0.09 | 0.09 | 0.36 | 2.28 | 6.85 | 22.8 | 68.2 |
| 50    | 0.09 | 0.09 | 0.36 | 2.28 | 6.85 | 22.8 | 68.2 |
| 70    | 0.09 | 0.09 | 0.36 | 2.28 | 6.85 | 22.8 | 68.2 |
| 100   | 0.09 | 0.09 | 0.36 | 2.28 | 6.85 | 22.8 | 68.2 |
| 140   | 0.03 | 0.03 | 0.08 | 1.88 | 6.20 | 21.1 | 64.9 |
| 200   | 0.03 | 0.03 | 0.08 | 1.88 | 6.20 | 21.1 | 64.9 |



## Output Frame Dimension of KSD, KSDL Series



1-Stage KSD, KSDL    2-Stage KSD, KSDL

unit : mm

| Model Code | 47        | 64        | 90        | 110       | 140        | 200        | 255        |
|------------|-----------|-----------|-----------|-----------|------------|------------|------------|
| A1         | 67        | 79        | 109       | 135       | 168        | 233        | 280        |
| A2         | 3.4       | 4.5       | 5.5       | 5.5       | 6.6        | 9          | 13.5       |
| A3         | 28        | 40        | 63        | 80        | 100        | 160        | 180        |
| A4         | 47        | 64        | 90        | 110       | 140        | 200        | 255        |
| A6         | 12        | 20        | 31.5      | 40        | 50         | 80         | 100        |
| A8         | 20        | 31.5      | 50        | 63        | 80         | 125        | 140        |
| A9         | M3 x P0.5 | M5 x P0.8 | M6 x P1.0 | M6 x P1.0 | M8 x P1.25 | M10 x P1.5 | M16 x P2.0 |
| A10        | 3         | 5         | 6         | 6         | 8          | 10         | 12         |