



# SERVOBOX Planetary Reducers

## Characteristic of SD Series

SD

### Quiet operation

Helical gears contribute to reduce vibration and noise.

### High precision

Backlash  $\leq 1$  arc-min reaches precision alignment.

### High rigidity & torque

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



## Indication of Model Numbers

SD	90	10		P1	MOTOR
Type	Model	Ratio	Output Bearing	Backlash Class	Motor Type
SD	47	1-Stage 4, 5, 7, 10	<input type="checkbox"/> Standard (Ball Bearing) (47#~255#)	Ps	Motor Brand & Model No.
SDL	64	2-Stage 20, 25, 35, 40, 50, 70, 100	T: Taper Bearing (90#~255#)	P0	
SDD	90			P1	
	110			P2	
	140				
	200				
	255				



# Features of SD Series

SD



## One-piece Gearbox Housing

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



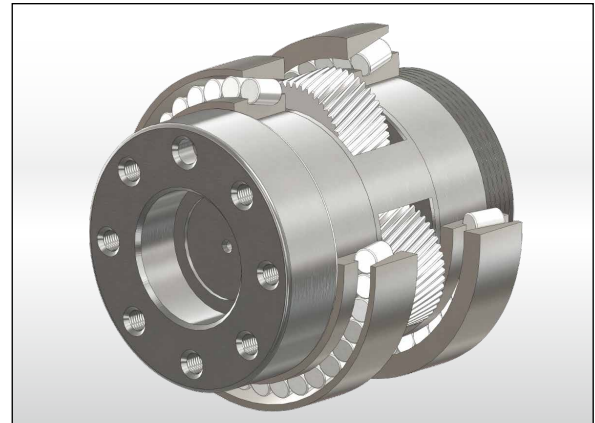
## Full Needle Roller Bearings Design

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

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.



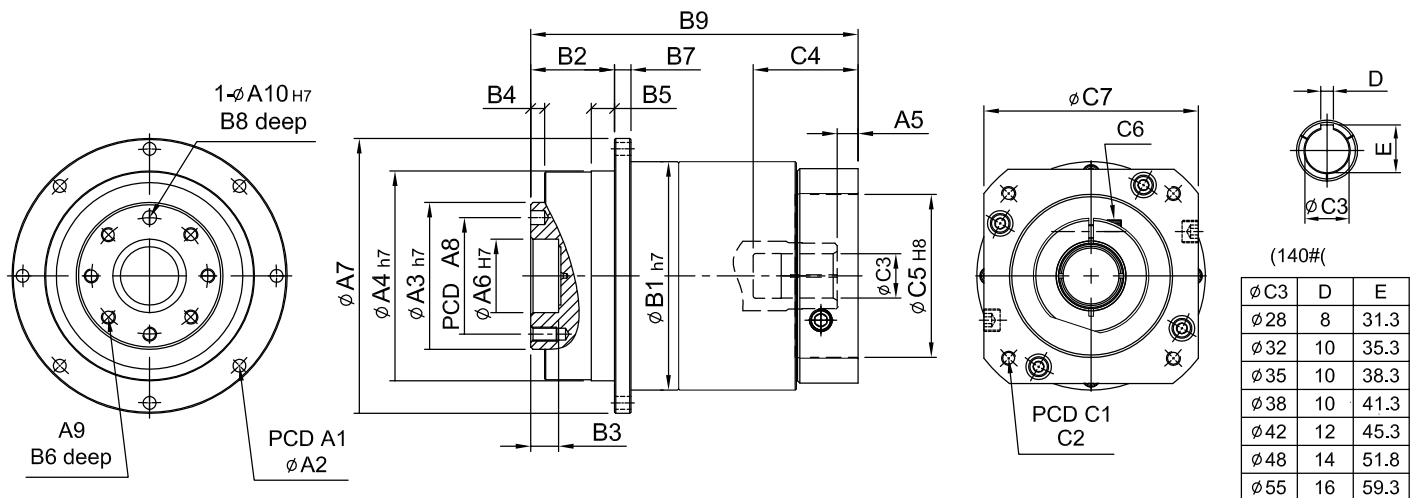
## Integrated Planetary Arm Bracket

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.

# SERVOBOX Planetary Reducers

## MODEL : SD

1-Stage  
RATIO : 4, 5, 7, 10



unit: mm

Model Code	47	64	90	110	140	200	255
<b>A</b>	A1	67	79	109	135	168	233
	A2	8-3.4	8-4.5	8-5.5	8-5.5	12-6.6	12-9.0
	A3	28	40	63	80	100	160
	A4	47	64	90	110	140	200
	A5	5	6	9·23.5	10·20	10	11.5·13.5
	A6	12	20	31.5	40	50	80
	A7	72	86	118	146	179	248
	A8	20	31.5	50	63	80	125
	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
	A10	3	5	6	6	8	10
<b>B</b>	B1	59	70	98	125	156	212
	B2	19.5	19.5	30	29	38	50
	B3	5	7	12	12	12	16
	B4	3	4	6	6	6	8
	B5	5	6	10	10	15	15
	B6	6.5	8	12	12	16	22
	B7	4	5	7	8	10	12
	B8	4	6	6	7	7	10
	B9	74.7	84.5·92.5	133·147.5	153·173	186.5	250.5·252.5
<b>C</b>	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·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
	C4	32	34·41.5	58.5·73	67·82	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
							222·250·265

## High Precision Planetary Reducer

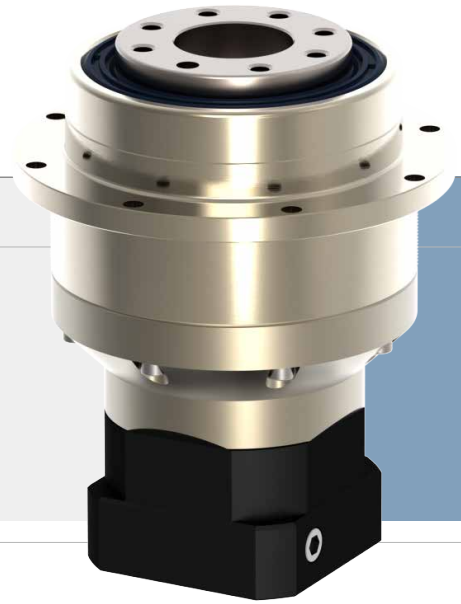
Model No.		Unit	Ratio	47	64	90	110	140	200	255
Rated Output Torque (Nominal output torque)	$T_{2N}$	Nm	4	22	60	160	335	650	1,200	2,020
			5	20	50	155	333	618	1,189	2,010
			7	19	47	142	309	573	1,108	1,870
			10	16	43	136	294	549	1,059	1,779
Max. Acceleration Torque	$T_{2B}$	Nm	4 ~ 10	1.8 Times of Rated Output Torque						
Max. Output Torque 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 P <sub>s</sub>		arcmin	4 ~ 10	-	-	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1
Backlash P <sub>0</sub>		arcmin	4 ~ 10	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3
Backlash P <sub>1</sub>		arcmin	4 ~ 10	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5
Backlash P <sub>2</sub>		arcmin	4 ~ 10	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7
Torsional Rigidity		Nm/arcmin	4 ~ 10	6	14	30	86	155	450	1126
Max. Radial Force Ball Bearing	$F_{2rB}$	N	4 ~ 10	2,040	2,520	8,460	12,720	14,070	35,200	39,600
Max. Axial Force Ball Bearing	$F_{2aB}$	N	4 ~ 10	1,020	1,260	4,230	6,360	7,035	17,600	19,800
Max. Radial Force Taper Bearing	$F_{2rB}$	N	4 ~ 10	-	-	14,660	23,000	37,200	73,600	107,200
Max. Axial Force Taper Bearing	$F_{2aB}$	N	4 ~ 10	-	-	7,330	11,500	18,600	36,800	53,600
Max. Tilting Moment Ball Bearing ※	$M_{2K}$	Nm	4 ~ 10	31	98	185	320	940	2,200	4,300
Max. Tilting Moment Taper Bearing ※	$M_{2K}$	Nm	4 ~ 10	-	-	280	480	1,400	3,300	6,480
Service Life	$L_H$	hr	4 ~ 10	S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs)						
Efficiency	$\eta$	%	4 ~ 10	≥ 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	≤ 56	≤ 58	≤ 60	≤ 63	≤ 65	≤ 67	≤ 70
Weight ±3%		Kg	4 ~ 10	0.7	1.4	4.2	7.4	13.9	32.4	55

※Applied to the output shaft center at 100 rpm.

### ■ 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

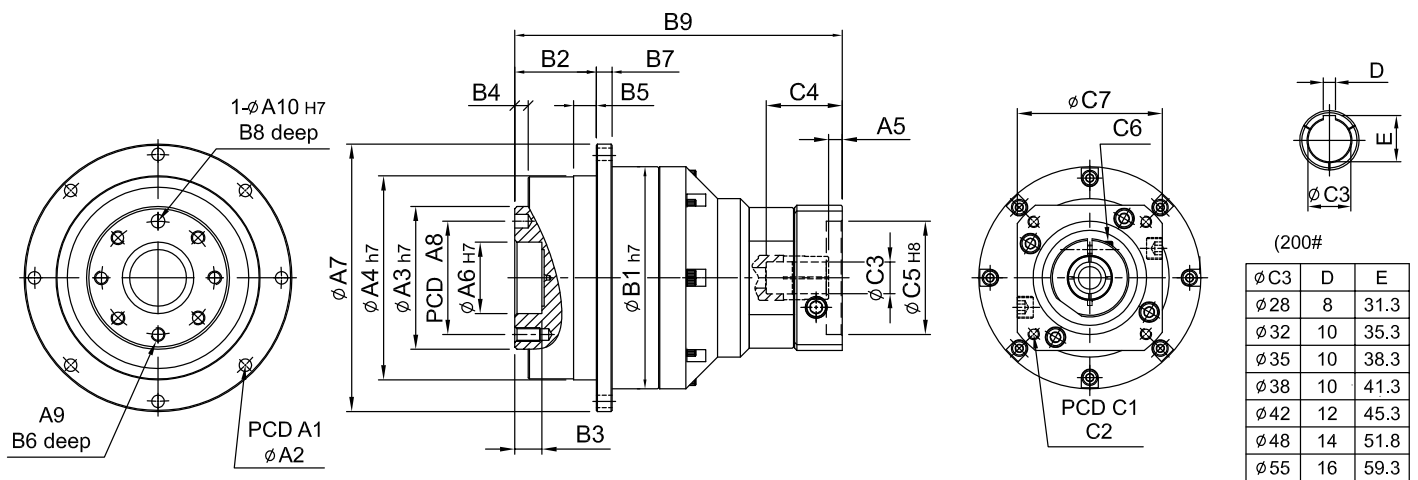
# SERVOBOX Planetary Reducers



## MODEL : SD

2-Stage

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



unit: mm

Model Code	47	64	90	110	140	200	255
<b>A</b>							
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
<b>B</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	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
<b>C</b>							
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

Model No.		Unit	Ratio	47	64	90	110	140	200	255
Rated Output Torque (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 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 Ball Bearing	$F_{2rB}$	N	4 ~ 10	2,040	2,520	8,460	12,720	14,070	35,200	39,600
Max. Axial Force Ball Bearing	$F_{2aB}$	N	4 ~ 10	1,020	1,260	4,230	6,360	7,035	17,600	19,800
Max. Radial Force Taper Bearing	$F_{2rB}$	N	4 ~ 10	-	-	14,660	23,000	37,200	73,600	107,200
Max. Axial Force Taper Bearing	$F_{2aB}$	N	4 ~ 10	-	-	7,330	11,500	18,600	36,800	53,600
Max. Tilting Moment Ball Bearing ※	$M_{2K}$	Nm	4 ~ 10	31	98	185	320	940	2,200	4,300
Max. Tilting Moment Taper Bearing ※	$M_{2K}$	Nm	4 ~ 10	-	-	280	480	1,400	3,300	6,480
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	1.9	4.8	9.4	16.7	40.12	64

※Applied to the output shaft center at 100 rpm.

### ■ 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