

# High Precision High Torque Planetary Gearbox

## PAB



- The integral structure of the planetary wall frame and the output shaft ensures the maximum torsion rigidity and stability
- The surface of the gear box is treated with electroless Nickel, and the plate is treated with blue anode to improve the tolerance and corrosion resistance of the environment.
- Lowest backlash
- High efficiency 95%
- Life time lubrication

## Model Selection of Speed Reducers

### PAB Type

PAB090 - 10 - S1 - P1 / Motor

#### Reducer Model

PAB042, PAB060, PAB090, PAB115  
PAB142, PAB180, PAB220, PAB240  
PAB280, PAB300

#### Output Shaft Keyway

S1: Solid Output Shaft No Keyway  
S2: Standard (Keyway)  
S3: Output for holes

#### Motor Model

Motor Manufacturer & Model

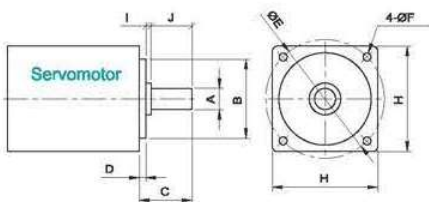
#### Ratio

1-stage: 3, 4, 5, 6, 7, 8, 9, 10  
2-stage: 12, 15, 16, 20, 25, 28, 30, 35,  
40, 50, 70, 80, 100

#### Backlash Grade

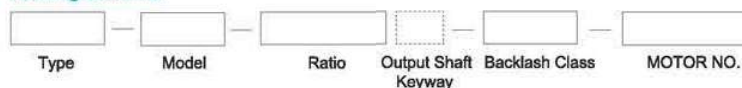
P0: High precision backlash  
P1: Precision backlash  
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions :



A	B	C	D	E	F	H	I	J

Naming Scheme:



# PAB Reducer Specifications

Specs	Unit	Stage	Ratio	PAB042	PAB060	PAB090	PAB115	PAB142	PAB180	PAB220	PAB242	PAB285	PAB330				
Rated Output Torque / T2N	Nm	1	3	19	55	130	230	450	950	1220	1900	4230	8200				
			4	20	55	160	290	580	1050	2000	3200	5800	10190				
			5	21	58	159	330	650	1250	2100	2500	4400	7180				
			6	16	48	120	310	600	1100	1350	—	—	—				
			7	19	50	148	300	550	1100	1800	1830	3520	9800				
			8	13	45	130	260	500	890	1600	1360	2595	4080				
			9	12	40	100	220	350	588	1140	—	—	—				
			10	15	40	100	208	342	520	1140	1150	1820	5000				
			2	12	18	52	130	300	342	588	1220	1820	4230	8200			
				15	18	53	130	280	450	950	1650	2420	5620	8200			
		16		20	53	158	320	580	1200	2050	3390	6400	10800				
		20		20	60	160	320	650	1200	2050	3390	6400	10800				
		25		20	60	160	320	650	1200	2100	2650	4710	7550				
		28		20	60	150	300	550	1100	1850	2650	4710	7550				
		30		18	50	130	230	450	950	1600	1820	4230	7000				
		35		20	60	160	390	650	1200	2100	2420	5620	9800				
		Max. Output Torque / T2max	Nm	1,2	3-100	3Times of Nominal Output Torque											
						Rated Input Speed / P1n	rpm	1,2	3-100	4000	4000	4000	3500	3000	2000	1000	1000
Max. Input Speed / P1n	rpm					1,2	3-100	6000	6000	6000	5500	4500	4500	4000	1500	1500	1500
Micro Backlash P0	arcmin					1	3-10	≤1	≤1	≤1	≤1	≤1	≤1	≤1	—	—	—
						2	12-100	≤3	≤3	≤3	≤3	≤3	≤3	≤3	—	—	—
Precision Backlash P1	arcmin					1	3-10	≤3	≤3	≤3	≤3	≤3	≤3	≤3	—	—	—
						2	12-100	≤5	≤5	≤5	≤5	≤5	≤5	≤5	—	—	—
Standard Backlash P2	arcmin					1	3-10	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤8	≤8	≤8
						2	12-100	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤10	≤10	≤10
Torsional Rigidity	Nm/arcmin					1,2	3-100	3	7	12	25	50	140	210	—	—	—
		N	1,2	3-100	780	1300	3200	6750	9400	14500	50000	59000	62000				
Max. Axial Force / Fmax	N	1,2	3-100	330	700	1580	3300	4700	7200	28000	29000	30000	33000				
Service Life	hr	1,2	3-100	≥21000h													
		1	3-10	≥97%													
Efficiency / η	%	2	12-100	≥94%													
		1	3-10	—													
Weight	kg	1	3-10	0.5	1.3	3.7	7.8	15	29	52	71	113	245				
		2	12-100	0.8	1.48	4.1	9.6	18.9	33	66	75	136	290				
Operating Temperature	°C	1,2	3-100	(-15°C ~ +90°C)													
Lubrication		1,2	3-100	(Synthetic Grease)													
Protection Class		1,2	3-100	IP65													
Mounting Position		1,2	3-100	(Any Direction)													
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3-100	≤63	≤63	≤63	≤65	≤65	≤70	≤70	≤75	≤75	≤75				

## Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	PAB042	PAB060	PAB090	PAB115	PAB142	PAB180	PAB220	PAB242	PAB285	PAB330	
Moment of Inertia	kg.cm <sup>2</sup>	1	3	0.03	0.16	0.61	3.25	9.21	28.98	69.61	70.21	73.29	75.23	
			4	0.03	0.14	0.48	2.74	7.54	23.67	54.37	58.21	70.27	73.37	
			5	0.03	0.13	0.47	2.71	7.42	23.29	53.27	59.27	70.61	73.29	
			6	0.03	0.13	0.45	2.65	7.25	22.75	51.72	53.37	55.72	58.75	
			7	0.03	0.13	0.45	2.62	7.14	22.48	50.97	51.23	53.97	56.61	
			8	0.03	0.13	0.44	2.58	7.07	22.59	50.84	51.72	53.84	56.24	
			9	0.03	0.13	0.44	2.57	7.04	22.53	50.63	55.27	58.63	60.54	
			10	0.03	0.13	0.44	2.57	7.03	22.51	50.56	55.27	58.56	60.72	
			2	12-40	0.03	0.03	0.13	0.47	2.71	7.42	23.29	29.20	31.29	24.29
				50-100	0.03	0.03	0.13	0.44	2.57	7.03	22.51	28.20	30.51	35.51

1. The Max. acceleration torque T2B=60% of T2NOT 2. When output speed is 100rpm, inertia acts on the output shaft center position.  
3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

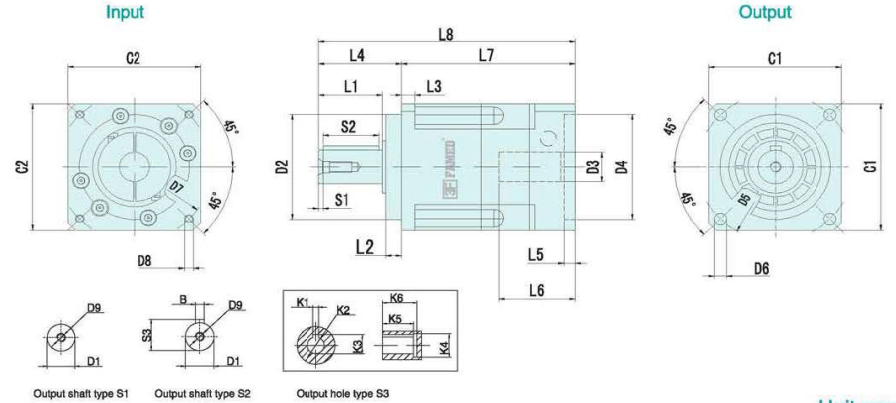
# MODEL: PAB

1-Stage

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



## Dimensions:



Output shaft type S1 Output shaft type S2 Output hole type S3

Unit:mm

Size	PAB042-L1	PAB060-L1	PAB090-L1	PAB115-L1	PAB142-L1	PAB180-L1	PAB220-L1	PAB242-L1	PAB285-L1	PAB330-L1
D1	φ13	φ16	φ22	φ32	φ40	φ55	φ75	φ55	φ70	φ80
D2	φ35	φ50	φ80	φ110	φ130	φ180	φ220	φ250	φ290	φ290
D3	φ8(≤11)	φ14(≤14)	φ19(≤24)	φ24(≤32)	φ35(≤42)	φ38(≤50)	φ55(≤65)	φ42	φ55	φ60
D4	φ30(30-50)	φ50(30-70)	φ70(50-110)	φ110(50-130)	φ114.3(95-180)	φ180(95-180)	φ215(180-255)	φ200(114.3-200)	φ200	φ230
D5	φ50	φ70	φ100	φ130	φ185	φ215	φ250	φ285	φ315	φ370
D6	4-φ3.4	4-φ5.5	4-φ6.6	4-φ9	4-φ11	4-φ13	4-φ17	4-φ18	4-φ18	4-φ22
D7	φ48(22-70)	φ70(45-90)	φ90(70-145)	φ145(70-145)	φ200(90-215)	φ200(90-300)	φ235(200-300)	φ200(200-235)	φ235	φ265
D8	(4-M3X8L)	(4-M5X10L)	(4-M6X12L)	(4-M8X25L)	(4-M12X30L)	(4-M12X30L)	(4-M12X30L)	4-M12	4-M12	4-M12
D9	M4X0.7P	M5X0.8P	M8X1.25P	M12X1.75P	M16X2.0P	M20X2.5P	M20X2.5P	M20X4.0	M16X3.5	M16X3.5
L1	19	28.5	36.5	51	79	82	105	105	110	120
L2	5.5	7	10	12	15	20	30	20	20	25
L3	4	6	8	10	12	15	20	22	25	30
L4	26	37	48	65	97	105	138	130	135	150
L5	(4)	(5)	(7)	(11)	(7)	(7)	(12.5)	15	7	10
L6	30	34	45	65	67.5	85	105	118	115	145
L7	(65.5)	(78)	(99)	(135)	(150)	(182)	(226)	262	262	391
L8	(91.5)	(115)	(147)	(200)	(247)	(287)	(385)	382(≤382)	417	541
C1	□42	□60	□90	□115	□142	□180	□220	□242	□285	□330
C2	(□42)	(□60)	(□90)	(□130)	(□142)	(□180)	(□220)	220	285	150
S1	2	2	3	5	5	5	7	5	5	5
S2	16	25	32	40	65	70	90	90	100	110
S3	15	18	24.5	35	43	59	79	74.5	74.5	85
B	5	5	6	10	12	16	20	20	20	22
K1	-	4	6	8	10	14	16	-	-	-
K2	-	φ11	φ22	φ28	φ38	φ50	φ60	-	-	-
K3	-	12.7	25	31.3	42	53.8	64.4	-	-	-
K4	-	φ16	φ32	φ38	φ48	φ60	φ72	-	-	-
K5	-	15	20	27	35	43	60	-	-	-
K6	-	18	24	32	40	50	65	-	-	-

Note 1: Inside of ( ) is the optional range of sizes, outside of ( ) is the standard sizes.  
Note 2: The reducer output shaft size and length can be customized for customers.  
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.



## PAR Reducer Specifications

Specs	Unit	Stage	Ratio	PAR042	PAR060	PAR090	PAR115	PAR142	PAR180	PAR220
Rated Output Torque / T2N	Nm	1	3	19	55	130	230	450	950	1220
			4	20	55	160	290	580	1050	2000
			5	21	58	159	330	650	1250	2100
			6	16	48	120	310	600	1100	1350
			7	19	50	148	300	550	1100	1800
			8	13	45	130	260	500	880	1600
			9	12	40	100	220	350	588	1140
			10	15	40	100	208	342	520	1140
			14	18	50	130	300	550	1100	1800
			20	15	40	130	208	342	520	1140
		2	15	20	55	130	320	650	1200	2050
			20	20	60	160	320	650	1200	2100
			25	20	60	150	300	550	1100	1850
			30	18	50	130	230	450	950	1600
			35	20	60	160	390	650	1200	2100
			40	18	50	140	290	542	1100	2000
			50	18	60	160	290	650	1200	2100
			70	16	50	140	280	600	1000	1800
			80	10	43	120	230	500	880	1600
			100	10	40	100	260	342	520	1140
Max Output Torque / T200%	Nm	1,2	3-200	3Times of Nominal Output Torque						
				3000	3000	3000	3000	2500	2000	2000
				6000	6000	6000	5500	4500	4000	4000
				≤1	≤1	≤1	≤1	≤1	≤1	≤1
				≤3	≤3	≤3	≤3	≤3	≤3	≤3
				≤3	≤3	≤3	≤3	≤3	≤3	≤3
				≤5	≤5	≤5	≤5	≤5	≤5	≤5
				≤5	≤5	≤5	≤5	≤5	≤5	≤5
Max Radial Force / F <sub>ra</sub>	N	1,2	3-200	780	1300	3200	6750	9400	14500	50000
				330	700	1580	3300	4700	7200	28000
Max Axial Force / F <sub>ta</sub>	N	1,2	3-200	330	700	1580	3300	4700	7200	28000
				330	700	1580	3300	4700	7200	28000
Service Life	hr	1,2	3-200	21000 h						
				≥93%						
Efficiency / η	%	1,2	25-200	≥90%						
				0.9	1.5	6.4	13	24.5	51	83
Weight	kg	1,2	25-200	1.2	2.1	7.8	14.2	27.5	54	95
				0.9	1.5	6.4	13	24.5	51	83
Operating Temperature	°C	1,2	3-200	(-15°C ~ +90°C)						
				(Synthetic Grease)						
Lubrication		1,2	3-200	IP65						
Protection Class		1,2	3-200	(Any Direction)						
Mounting Position		1,2	3-200	(Any Direction)						
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3-200	≤65	≤65	≤68	≤68	≤70	≤72	≤74

## Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	PAR042	PAR060	PAR090	PAR115	PAR142	PAR180	PAR220
Moment of Inertia	kg.cm <sup>2</sup>	1	3-10	0.09	0.35	2.25	6.84	23.4	68.9	135.4
			14-20	0.03	0.07	1.87	6.25	21.8	65.6	119.8
		2	15-100	0.09	0.09	0.35	2.25	6.84	23.4	68.9
			120-200	—	—	0.31	1.87	6.25	21.8	65.6

1. The Max. acceleration torque T2B=60% of T2NOT. 2. When output speed is 100rpm, inertia acts on the output shaft center position. 3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

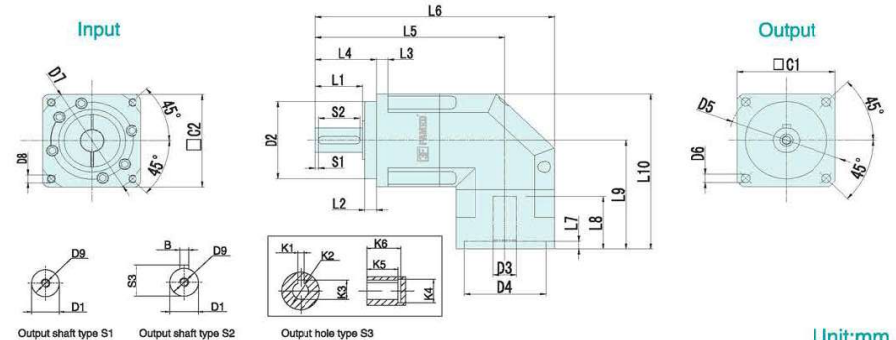
## MODEL: PAR

1-Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10, 14, 16, 20



## Dimensions:



Unit:mm

Size	PAR042-L1	PAR060-L1	PAR090-L1	PAR115-L1	PAR142-L1	PAR180-L1	PAR220-L1
D1	φ 13	φ 16	φ 22	φ 32	φ 40	φ 55	φ 75
D2	φ 35	φ 50	φ 80	φ 110	φ 130	φ 160	φ 180
D3	φ 8(≤11)	φ 14(≤14)	φ 19(≤24)	φ 24(≤32)	φ 35(≤42)	φ 38(≤50)	φ 55(≤55)
D4	φ 30(30-50)	φ 50(30-70)	φ 70(50-110)	φ 110(50-130)	φ 114.3(95-130)	φ 180(95-180)	φ 215(180-255)
D5	φ 50	φ 70	φ 100	φ 130	φ 165	φ 215	φ 250
D6	4-φ 3.4	4-φ 5.5	4-φ 6.6	4-φ 9	4-φ 11	4-φ 13	4-φ 17
D7	φ 46(22-70)	φ 70(45-90)	φ 90(70-145)	φ 145(70-145)	φ 200(90-215)	φ 200(90-300)	φ 235(200-300)
D8	(4-M3X8L)	(4-M5X10L)	(4-M6X12L)	(4-M8X25L)	(4-M12X30L)	(4-M12X30L)	(4-M12X30L)
D9	M4X0.7P	M5X0.8P	M8X1.25P	M12X1.75P	M16X2.0P	M20X2.5P	M20X2.5P
L1	19	28.5	36.5	51	79	82	105
L2	5.5	7	10	12	15	20	30
L3	4	6	8	10	12	15	20
L4	26	37	48	65	97	105	138
L5	96	117	175	227	255	289	346
L6	(122)	(154)	(223)	(292)	(382)	(394)	(484)
L7	(3.5)	(5)	(5)	(11)	(14)	(15)	(7)
L8	(30)	(34)	(44)	(60)	(81)	(85)	(85)
L9	(69.5)	(81.5)	(107.5)	(134)	(165)	(213.5)	(268.5)
L10	(95.5)	(110.5)	(158)	(199)	(230)	(303.5)	(378.5)
C1	□42	□60	□90	□115	□142	□180	□220
C2	(□42)	(□60)	(□90)	(□130)	(□142)	(□180)	(□220)
S1	2	2	2	5	5	5	7
S2	16	25	32	40	65	70	90
S3	15	18	24.5	35	43	59	79
B	5	5	6	10	12	16	20
K1	—	—	6	8	10	14	16
K2	—	φ 11	φ 22	φ 28	φ 38	φ 50	φ 60
K3	—	12.7	25	31.3	42	53.8	64.4
K4	—	φ 16	φ 32	φ 38	φ 48	φ 60	φ 72
K5	—	15	20	27	35	43	60
K6	—	18	24	32	40	50	65

Note 1: Inside of ( ) is the optional range of sizes, outside of ( ) is the standard sizes.

Note 2: The reducer output shaft size and length can be customized for customers.

Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

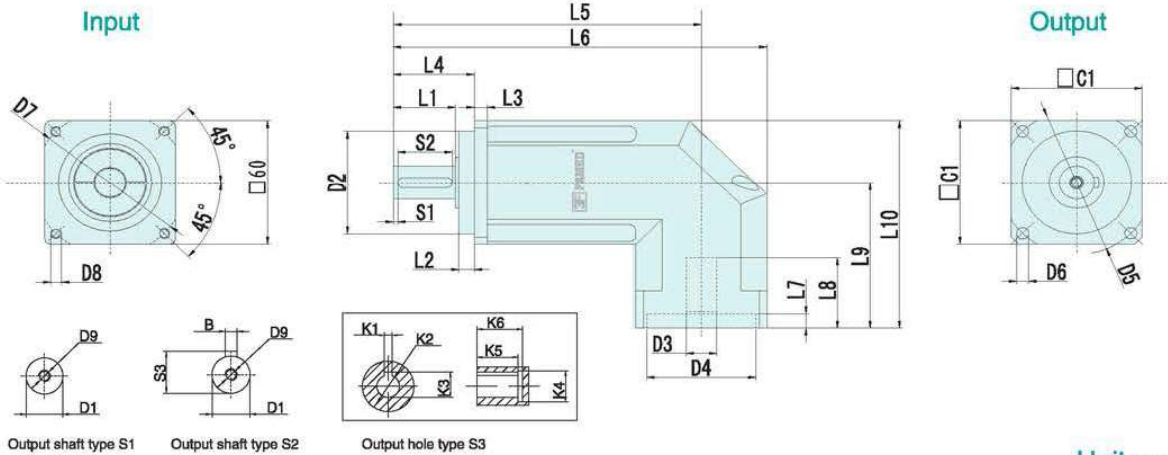
# MODEL: PAR

2-Stage

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



## Dimensions:



Unit:mm

Size	PAR042-L2	PAR060-L2	PAR090-L2	PAR115-L2	PAR142-L2	PAR180-L2	PAR220-L2
D1	φ 13	φ 16	φ 22	φ 32	φ 40	φ 55	φ 75
D2	φ 35	φ 50	φ 80	φ 110	φ 130	φ 160	φ 180
D3	φ 8(≤11)	φ 14(≤14)	φ 14	φ 24(≤32)	φ 35(≤42)	φ 38(≤50)	φ 55(≤55)
D4	φ 30(30-50)	φ 50(30-70)	φ 50	φ 110(50-130)	φ 114.3(95-180)	φ 180(95-180)	φ 215(180-255)
D5	φ 50	φ 70	φ 100	φ 130	φ 165	φ 215	φ 250
D6	4-φ 3.4	4-φ 5.5	4-φ 6.6	4-φ 9	4-φ 11	4-φ 13	4-φ 17
D7	φ 46(22-70)	φ 70(45-90)	φ 70	φ 145(70-145)	φ 200(90-215)	φ 200(90-300)	φ 235(200-300)
D8	(4-M3X8L)	(4-M5X10L)	(4-M5X12L)	(4-M8X25L)	(4-M12X30L)	(4-M12X30L)	(4-M12X30L)
D9	M4X0.7P	M5X0.8P	M8X1.25P	M12X1.75P	M16X2.0P	M20X2.5P	M20X2.5P
L1	19	28.5	36.5	51	79	82	105
L2	5.5	7	10	12	15	20	30
L3	4	6	8	10	12	15	20
L4	26	37	48	65	97	105	138
L5	113	134	157	224	282	322	383
L6	139	171	205	(292)	(378)	(427)	(521)
L7	( 3.5 )	( 5 )	( 5 )	( 11 )	( 14 )	( 15 )	( 7 )
L8	(30)	( 34 )	( 44 )	( 60 )	( 81 )	( 85 )	( 85 )
L9	(69.5)	(81.5)	(107.5)	(134)	(165)	(213.5)	(268.5)
L10	( 90.5 )	( 111.5 )	( 152.5 )	( 191.5 )	( 236 )	( 303.5 )	( 378.5 )
C1	□42	□60	□90	□115	□142	□180	□220
C2	(□42)	(□60)	(□90)	(□130)	(□142)	(□180)	(□220)
S1	2	2	2	5	5	5	7
S2	16	25	32	40	65	70	90
S3	15	18	24.5	35	43	59	79
B	5	5	6	10	12	16	20
K1	-	4	6	8	10	14	16
K2	-	φ 11	φ 22	φ 28	φ 38	φ 50	φ 60
K3	-	12.7	25	31.3	42	53.8	64.4
K4	-	φ 16	φ 32	φ 38	φ 48	φ 60	φ 72
K5	-	15	20	27	35	43	60
K6	-	18	24	32	40	50	65

Note 1: Inside of ( ) is the optional range of sizes, outside of ( ) is the standard sizes.

Note 2: The reducer output shaft size and length can be customized for customers.

Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.



Planetary reducer standard interface table. For customized motor interfaces, please contact MOTIONtek



**PAB**

Model	PAB-042	PAB-060	PAB-090	PAB-115	PAB-142	PAB-180	PAB-220
Input dimensions (standard)	8-30-46(45)-M4(M3)	14-50-70-M5(M4)	19-70-90-M6(M5)	24(22)-110-145-M8	35-114.3-200-M12	38-180-200-M12	55-215-235-M12
Output shaft diameter (standard)	13	16	22	32	40	55	75

**PAR**

Model	PAR-042	PAR-060	PAR-090	PAR-115	PAR-142	PAR-180	PAR-220
Input dimensions (standard)	8-30-46(45)-M4(M3)	14-50-70-M5 (M4)	19-70-90-M6(M5)	24(22)-110-145-M8	35-114.3-200-M12	38-180-220-M12	55-215-235-M12
Output shaft diameter (standard)	13	16	22	32	40	55	75

**VRT**

Model	VRT-047	VRT-064	VRT-090	VRT-110	VRT-140	VRT-200	VRT-255
Input dimensions (standard)	8-30-46(45)-M4(M3)	14-50-70-M5 (M4)	19-70-90-M6(M5)	24(22)-110-145-M8	35-114.3-200-M12	35-114.3-200-M12	48-200-235-M16