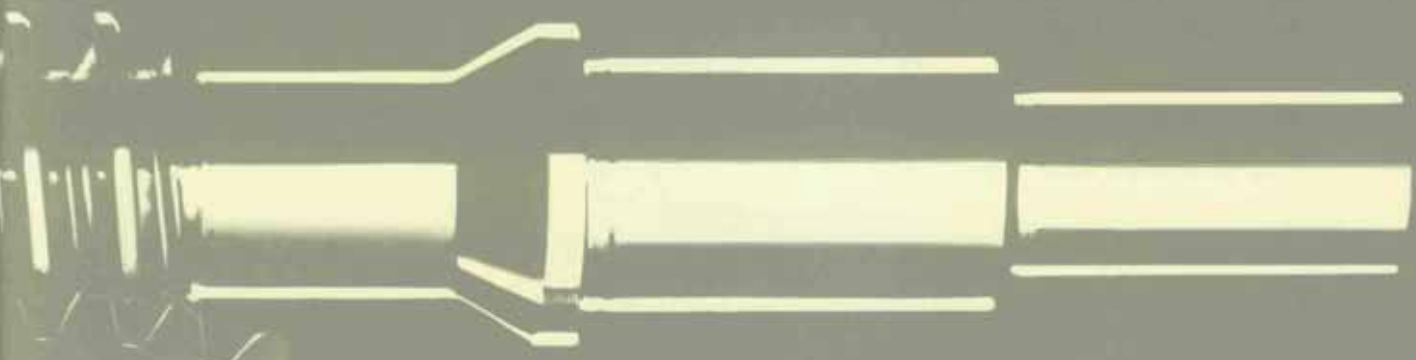
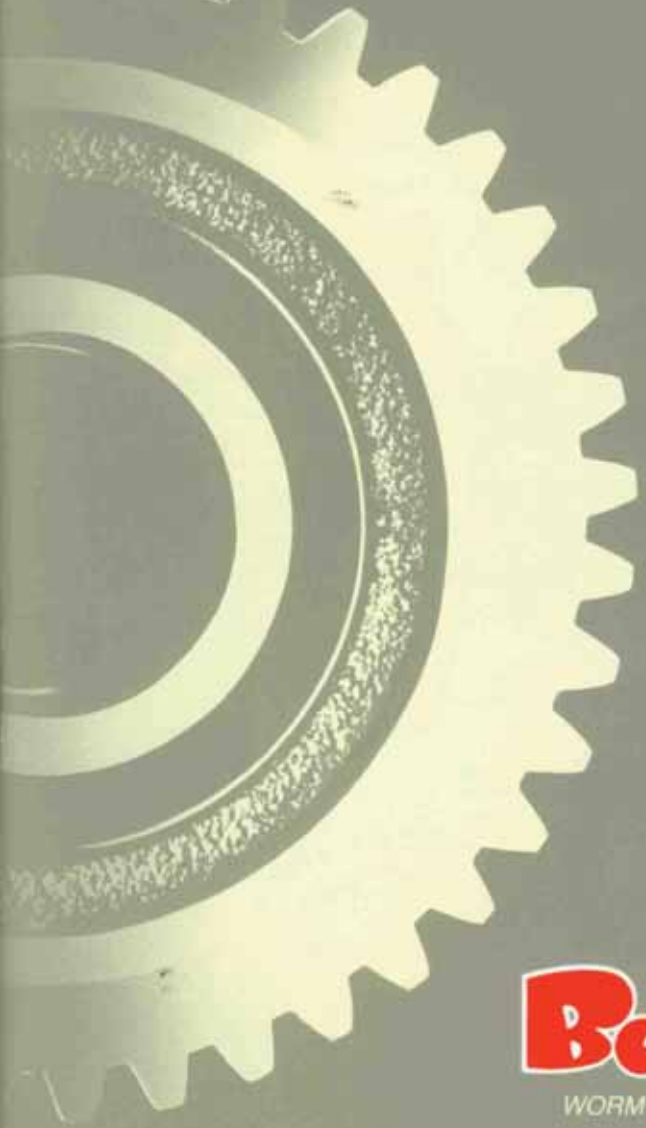
Product Guide

Forever Quiet and Dependable





Bellpony worm gear speed reducers are amazingly compact, quiet, and built to last forever. A super-clean, streamlined design sets Bellpony reducers apart from all others, offering the kind of reliable day-after-day performance that will add value to all kinds of modern products and equipment.

Bellpony

WORM GEAR SPEED REDUCERS

Features

Superior Quality

A highly precise tooth finish is vital to performance. Advanced gear grinders are used to finish the teeth of all Bellpony gears to an extremely fine tolerances of .003 to .005 mm. These gears are combined with other precisely machined components to ensure optimum tooth contact. Such precise tooth contact overcomes the typical disadvantages of all conventional worm gear speed reducers which are high heat generation and low efficiency.

Outstanding Performance

Worm gear speed reducers are smaller, quieter and provide a higher reduction ratio than other types of speed reducers. And because they are simply constructed, they are less likely to malfunction. The precisely finished gear teeth of Bellpony speed reducers offer the additional advantages of lower friction and wear.

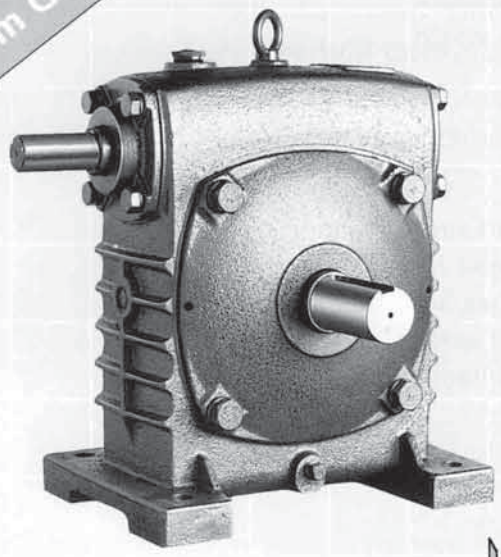
Carefully Selected Materials

Based on its vast wealth of experience, Bellpony carefully selects and processes the following materials to ensure that its major components are outstanding in both performance and durability.

Part	Material
Worm Shaft	S45C (Induction-hardened)
Output Shaft	S45C
Worm Wheel	$ALBC_2$
Gear Case and Cover	FC20
Bearing, Oil Seal, etc.	NACHI, NOK

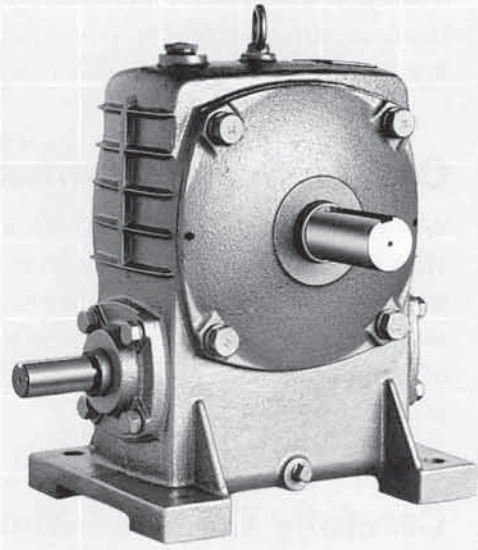
Product Line

Single-stage Worm Gear Speed Reducers



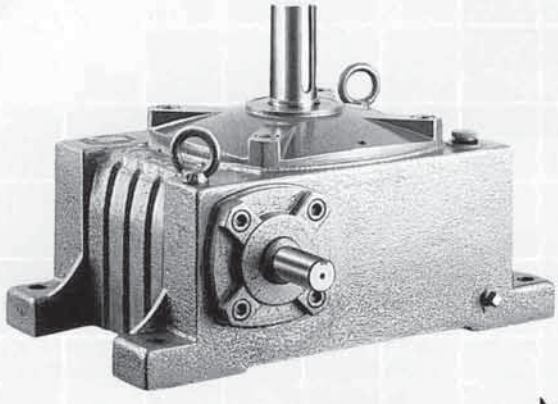
PR Series

This series has a wide range of applications. The input shaft is located at the upper part of the gear case for easy pulley or sprocket mounting.



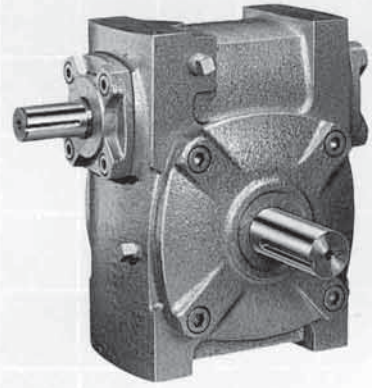
PA Series

The PA series is widely used as a universal unit. The worm and wheel are constantly immersed in lubricating oil, making it especially suitable for low speed operation.



PO Series

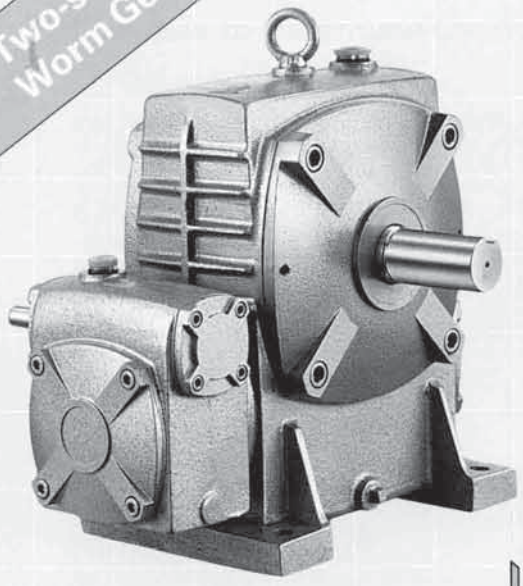
This series features a vertical output shaft. Since its worm and wheel are constantly immersed in lubricating oil, it is ideal for low-speed, high-torque applications in various mixing equipment.



PF Series

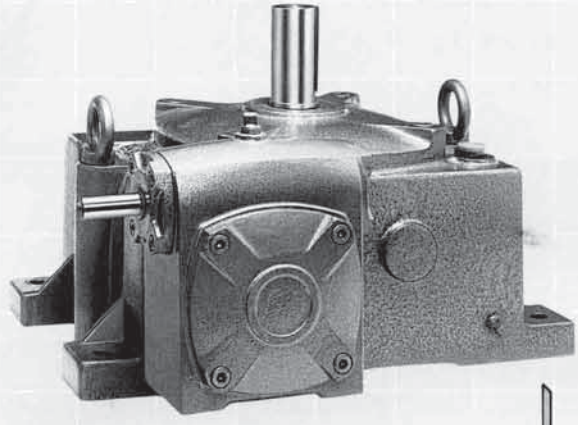
Doubles as a PR, PA or PO series by simply changing leg mounting location. This allows a small inventory to serve a wide range of needs.

Two-stage Worm Gear Speed Reducers



PDA Series

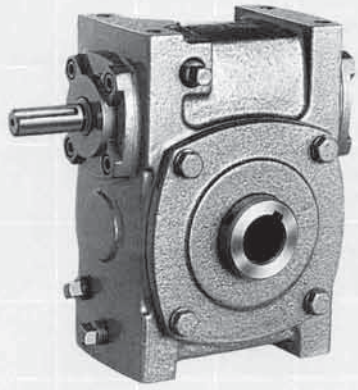
Worm gear reduction at both primary and secondary sides. Input and output shafts are parallel. The reduction ratio ranges from 1/100 to 1/2000. Capable of handling high-torque loads.



PDO Series

Worm gear reduction at both primary and secondary sides. The output shaft is vertically mounted. Features the same high-torque capacity of the PDA.

Hollow Output Shaft Worm Geer Speed Reducers



PFH Series

The hollow output shaft allows the PFH series to be used as a PR, PA or PO series.
No joints are required for connection.
Insert the shaft of the matching machine into the hollow part of the PFH output shaft.

Type Selection

1. Determine the type according to the installation and drive requirements.
2. Determine the required reduction ratio and input rpm.
3. According to the conditions and frequency of use, determine the service factor by referring to table 1. Then multiply the service factor by power output (kW) and output torque.

[Formula for Horsepower and Torque]

HP = horsepower (1 HP = 75kg·m/sec)
T = torque (kg-m)
N = rpm

$$KW = 2\pi NT/(75 \times 60) = \frac{NT}{973.7}$$

$$T = 973.7 \times KW/N$$

Load	Operating Hours per Day			
	30 minutes	2 hours	10 hours	24 hours
Steady	0.80 (0.90)	0.90 (1.00)	1.00 (1.25)	1.25 (1.50)
Medium Impact	0.90 (1.00)	1.00 (1.25)	1.25 (1.50)	1.50 (1.75)
Heavy Impact	1.00 (1.25)	1.25 (1.50)	1.50 (1.75)	1.75 (2.00)

Loads

Steady:

Agitators and mixers (liquid/semi-liquid)
Alternators and generators (lighting)
Blowers, exhaust fans, fans (centrifugal-induced draft, light, small-diameter fans)
Conveyors and elevators (uniform feed)
Beverage and food processing machines (bottlers, can fillers, ovens, coolers etc.)

Heavy Impact:

Alternators and generators (welding)
Conveyors and elevators (reciprocating, shaking, apron and pan feeds)
Stone breaking machinery
Papermaking machinery
Drum drives (grader grums, grizzly rolls, etc.)

Medium Impact:

Agitators and mixers (liquids plus solids or variable mixing)
Blowers, exhaust fans, fans (centrifugal-forced draft, large industrial fans, lobed rotor types, vane types)
Conveyors and elevators (non-uniform feed, screw feeders)
Cranes and hoists (main hoist and travel motion, skip hoists)
Laundry equipment (centrifugal driers, tumble driers, reverse-agitating washers)

4. Select a value from the type selection reference table which meets or exceeds the value calculated from the above formula.
5. For extremely high reduction ratios and low-speed operations, output torque must be carefully considered.

Overhang Loads

When attaching a chain sprocket or V-pulleys to the output shaft, the overhang load must be taken into consideration.
Allowable overhang loads are shown in the following table.

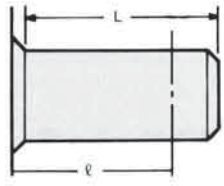
[Formula to Determine Overhang Load]

Allowable overhang load

Overhang load = T × H × S/R

T = Torque × service factor
S = Position factor
H = Overhang load factor
R = Radius of pitch of sprocket wheel or pulley

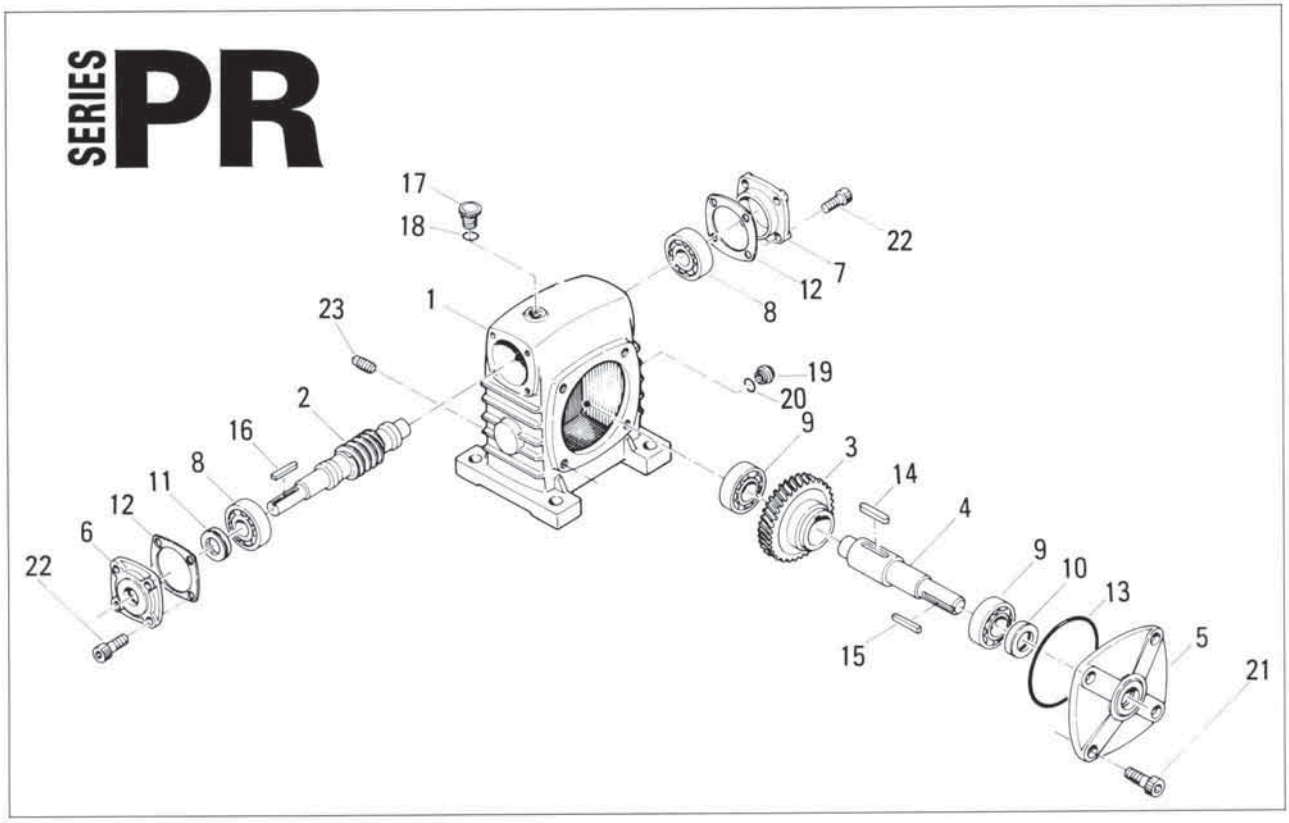
Chain	**1.00**
Gear	**1.25**
V-belt	**1.50**
Flat belt	**2.50**



If overhang load value does not satisfy the above formula, increase R (i.e. radius of pitch of sprocket wheel, gear or pulley).

1) $\ell \leqq L/2$ (when load is at middle or inner side) $S = 1$
2) $\ell > L/2$ (when load is at outer side) $S = 2\ell/L$

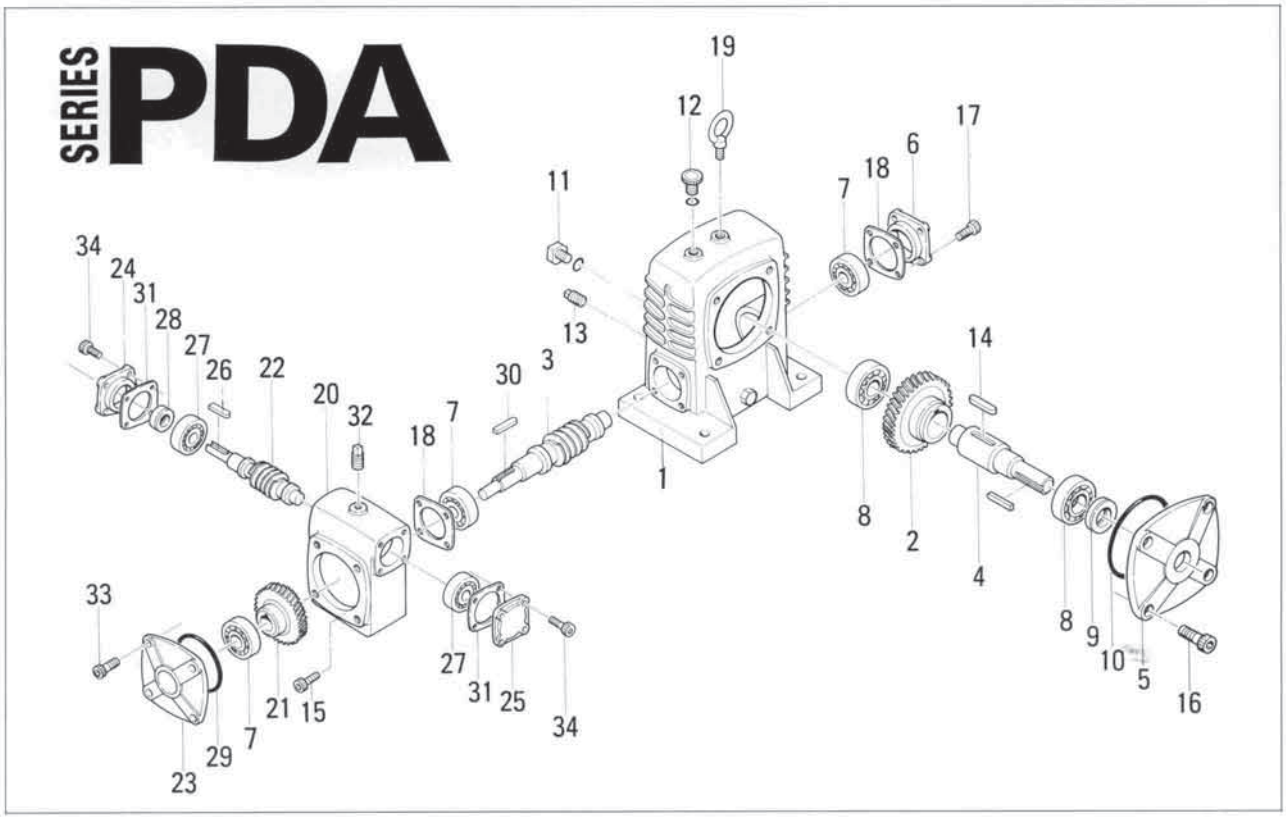
Parts Identification



Single-stage Worm Gear Speed Reducers PR Series Parts List

Ref. No.	Parts Name	Q'ty	Ref. No.	Parts Name	Q'ty
1	Gear case (body)	1	13	O-ring (output shaft)	1
2	Worm shaft (input shaft)	1	14	Key	1
3	Worm wheel	1	15	Key	1
4	Wheel shaft (output shaft)	1	16	Key	1
5	Cover (output shaft)	1	17	Oil cap	1
6	Input shaft open cover	1	18	O-ring (oil cap)	1
7	Input shaft blind cover	1	19	Oil gauge	1
8	Bearing (input shaft)	2	20	O-ring (oil gauge)	1
9	Bearing (output shaft)	2	21	Bolt (output shaft cover)	4
10	Oil seal (output shaft)	1	22	Bolt (input shaft cover)	8
11	Oil seal (input shaft)	1	23	Oil drain plug	1
12	Packing	1	24		

※The PA Series uses the identical parts.



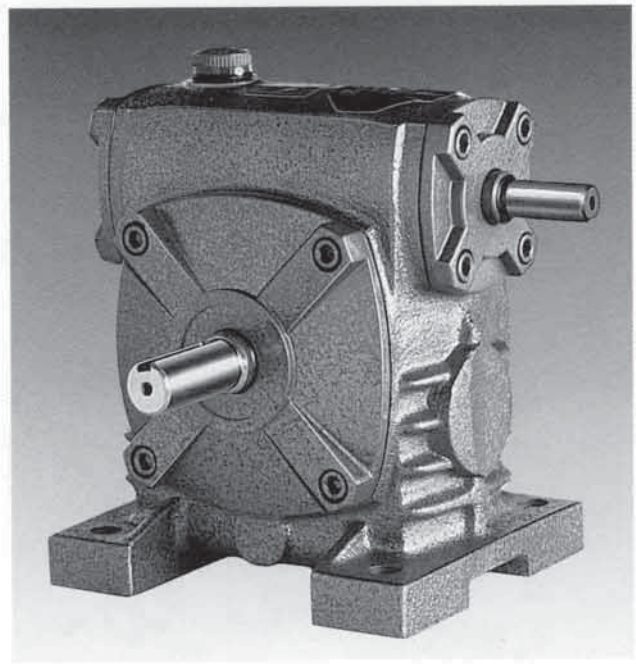
Two-stage Worm Gear Speed Reducers PDA Series Parts List

Ref. No.	Parts List	Q'ty	Ref. No.	Parts List	Q'ty
1	Secondary gear case	1	18	Packing	2
2	Secondary worm wheel	1	19	Ring bolt	1
3	Intermediate shaft	1	20	Primary gear case	1
4	Output shaft	1	21	Primary worm wheel	1
5	Output shaft cover	1	22	Input shaft	1
6	Intermediate shaft blind cover	1	23	Intermediate shaft blind cover	1
7	Taper roller bearing	2	24	Input shaft open cover	1
8	Ball bearing	2	25	Input shaft blind cover	1
9	Oil seal	1	26	key	1
10	O-ring	1	27	Taper roller bearing	2
11	Oil gauge	1	28	Oil seal	1
12	Oil plug	1	29	O-ring	1
13	Drain plug	1	30	Key	1
14	Key	1	31	Packing	2
15	Bolt(intermediate shaft cover)	4	32	Oildrain plug	1
16	Bolt(output shaft cover)	4	33	Bolt(intermediate shaft cover)	4
17	Bolt(intermediate cover)	4	34	Bolt(in put shaft cover)	4

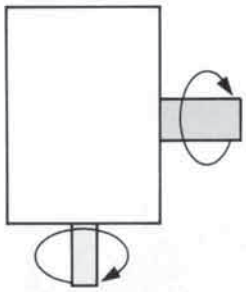
SERIES PR

● Type12 ● Type18 ● Type25
● Type15 ● Type22

These types have a wide range of applications. The input shaft is located at the upper part of the gear case for easy pulley or sprocket mounting.

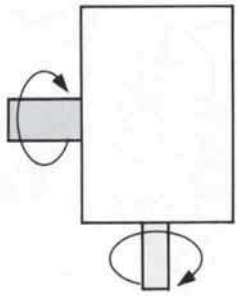


Output Shaft (Right)



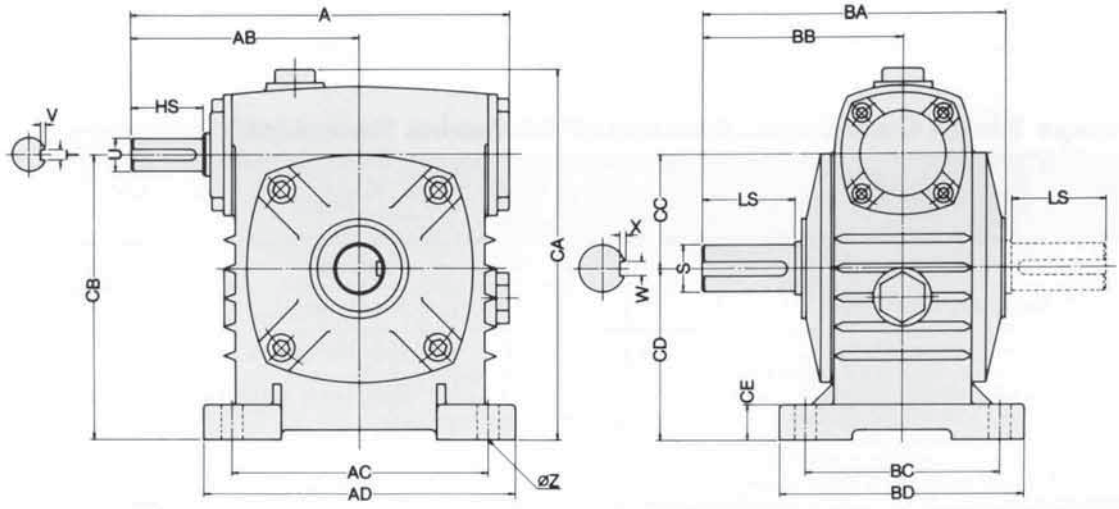
Input Shaft

Output Shaft (Left)



Input Shaft

■ Dimensions (Unit: mm)

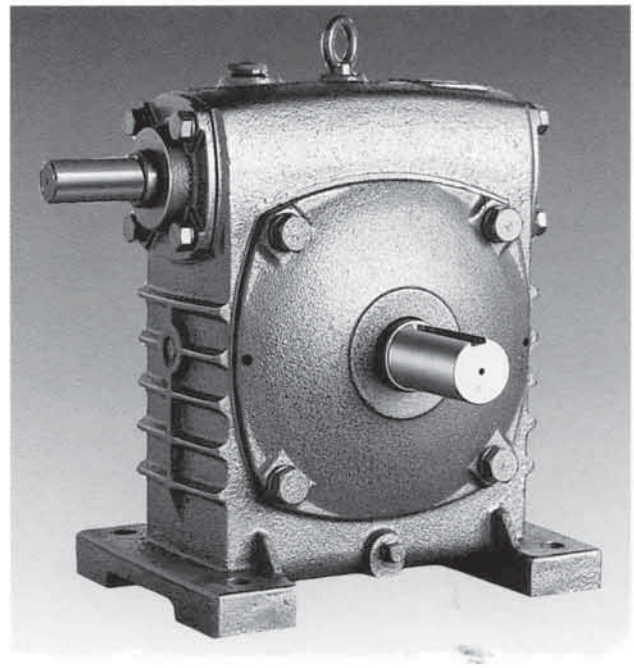


Type	Ratio	A	AB	AC	AD	BA	BB	BC	BD	CA	CB	CC	CD	CE	Z	Input Shaft				Output Shaft				Weight	Oil
																HS	U	T	V	LS	S	W	X	(kg)	(ℓ)
12	10	175	105	110	140	145	95	95	120	175	130	50	80	15	11	30	12	4	2.5	40	17	5	3.0	6.0	0.3
15	15 20	195	120	120	150	165	110	105	130	200	150	60	90	20	11	40	15	5	3.0	50	22	7	4.0	7.5	0.4
18	25 30	234	140	150	190	195	130	115	150	230	175	70	105	25	15	40	18	5	3.0	60	28	7	4.0	12.5	0.7
22	40 50	264	160	180	220	210	140	135	170	260	200	80	120	25	15	50	22	7	4.0	65	32	10	4.5	17.5	1.1
25	60	322	190	220	270	260	170	155	190	370	250	100	150	25	15	50	25	7	4.0	75	38	10	4.5	32.0	2.3

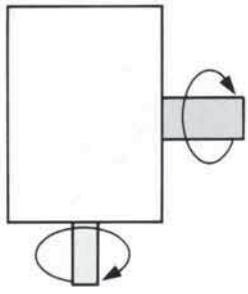
Design and specifications subject to change without prior notice.

- Type30
- Type35

These types have a wide range of applications. The input shaft is located at the upper part of the gear case for easy pulley or sprocket mounting.

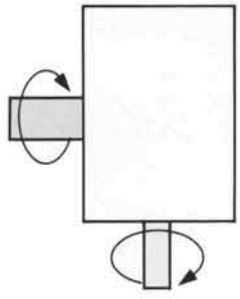


Output Shaft (Right)



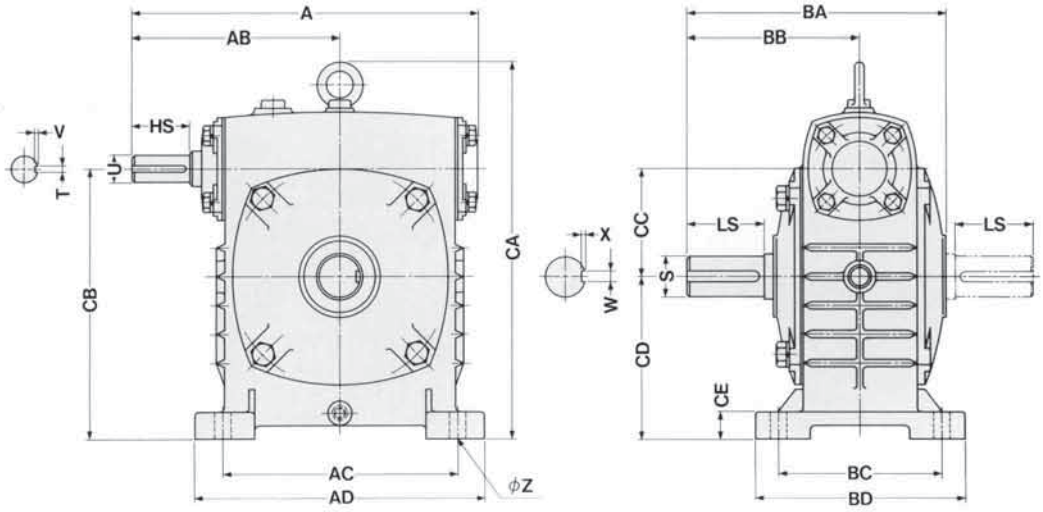
Input Shaft

Output Shaft (Left)



Input Shaft

■ Dimensions (Unit: mm)

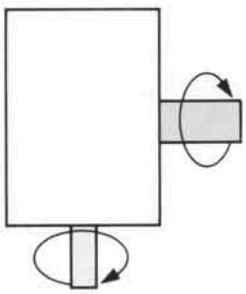


Type	Ratio	A	AB	AC	AD	BA	BB	BC	BD	CA	CB	CC	CD	CE	Z	Input Shaft				Output Shaft				Weight	Oil
																HS	U	T	V	LS	S	W	X	(kg)	(ℓ)
30	10 30 15 40	385	230	260	320	290	190	180	230	425	300	120	180	30	18	65	30	7	4.0	85	45	12	4.5	52.0	4.0
35	20 50 25 60	435	260	290	350	320	210	200	250	485	350	135	215	30	18	75	35	10	4.5	95	55	15	5.0	72.0	6.8

Design and specifications subject to change without prior notice.

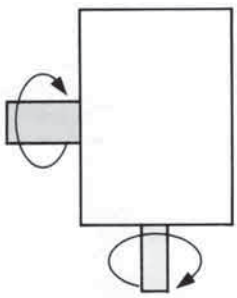
Type 9 is compactly designed and widely used as a universal unit for small machines. The worm and wheel are constantly greased, making it especially suitable for low speed operation.

Output Shaft (Right)

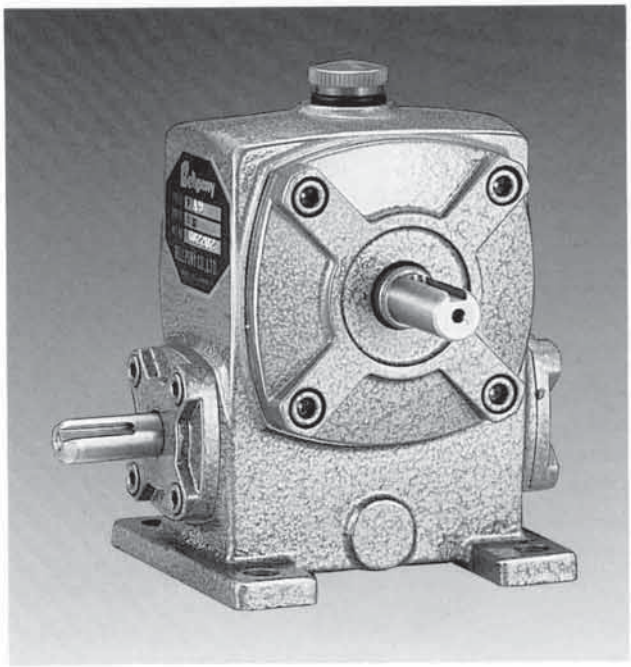


Input Shaft

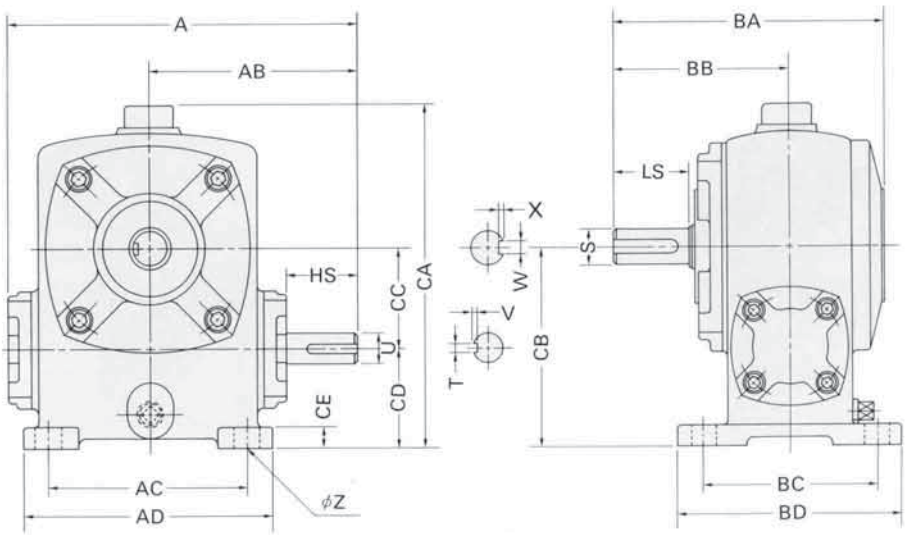
Output Shaft (Left)



Input Shaft



■ Dimensions (Unit: mm)

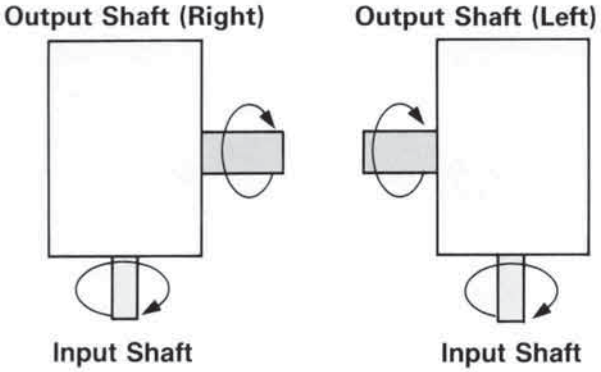


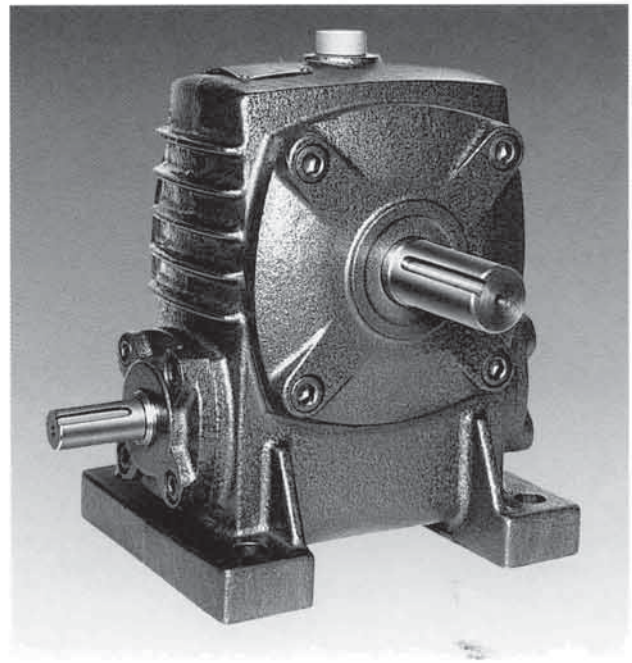
Type	Ratio	A	AB	AC	AD	BA	BB	BC	BD	CA	CB	CC	CD	CE	Z	Input Shaft				Output Shaft				Weight	Oil
																HS	U	T	V	LS	S	W	X	(kg)	(ℓ)
9	10 25 50 15 30 60 20 40	140	84	80	100	108	70	70	90	131	80	40	40	8	10	28	12	4	2.5	30	14	5	3.0	3.0	Grease

Design and specifications subject to change without prior notice.

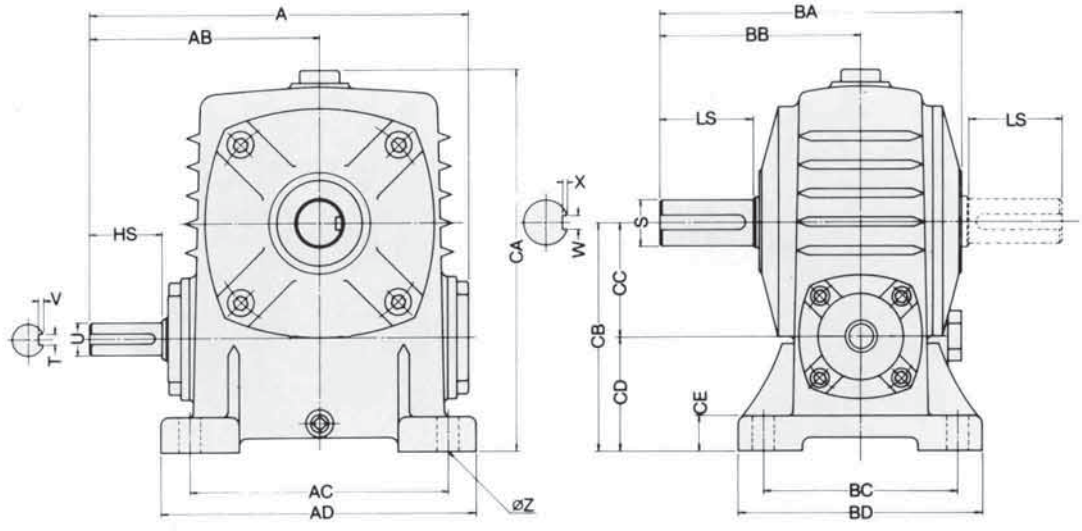
● Type 12 ● Type 18 ● Type 25
● Type 15 ● Type 22

These types are widely used as a universal unit. The worm and wheel are constantly immersed in lubricating oil, making them especially suitable for low speed operation.





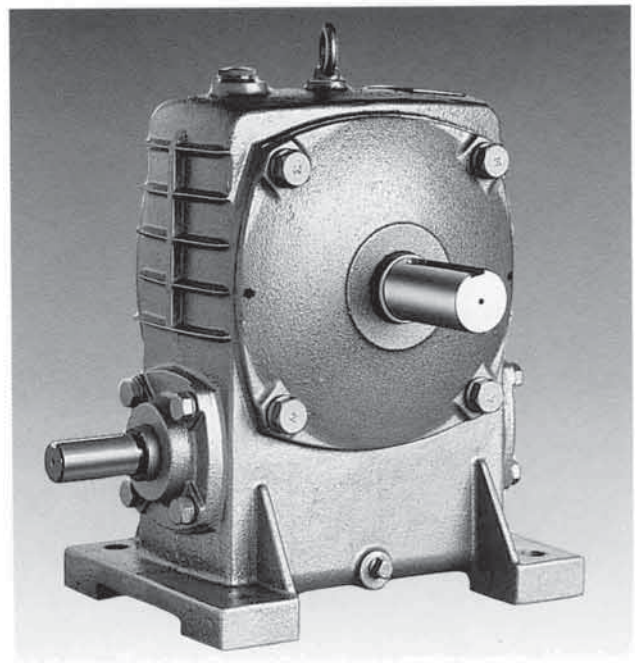
■ Dimensions (Unit: mm)



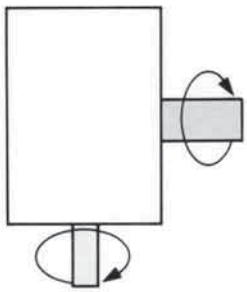
Type	Ratio	A	AB	AC	AD	BA	BB	BC	BD	CA	CB	CC	CD	CE	Z	Input Shaft				Output Shaft				Weight	Oil
																HS	U	T	V	LS	S	W	X	(kg)	(ℓ)
12	10	175	105	110	140	145	95	95	120	175	100	50	50	15	11	30	12	4	2.5	40	17	5	3.0	6.0	0.2
15	15 20	195	120	120	150	165	110	105	130	205	120	60	60	20	11	40	15	5	3.0	50	22	7	4.0	8.5	0.3
18	25 30	234	140	150	190	195	130	115	150	240	140	70	70	25	15	40	18	5	3.0	60	28	7	4.0	13.0	0.5
22	40 50	264	160	180	220	210	140	135	170	270	160	80	80	25	15	50	22	7	4.0	65	32	10	4.5	19.5	0.7
25	60	322	190	220	270	260	170	155	190	380	200	100	100	25	15	50	25	7	4.0	75	38	10	4.5	33.0	1.4

Design and specifications subject to change without prior notice.

These types are widely used as a universal unit. The worm and wheel are constantly immersed in lubricating oil, making them especially suitable for low speed operation.

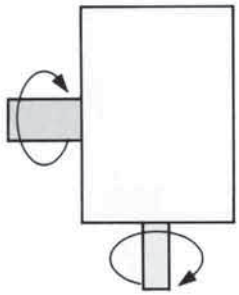


Output Shaft (Right)



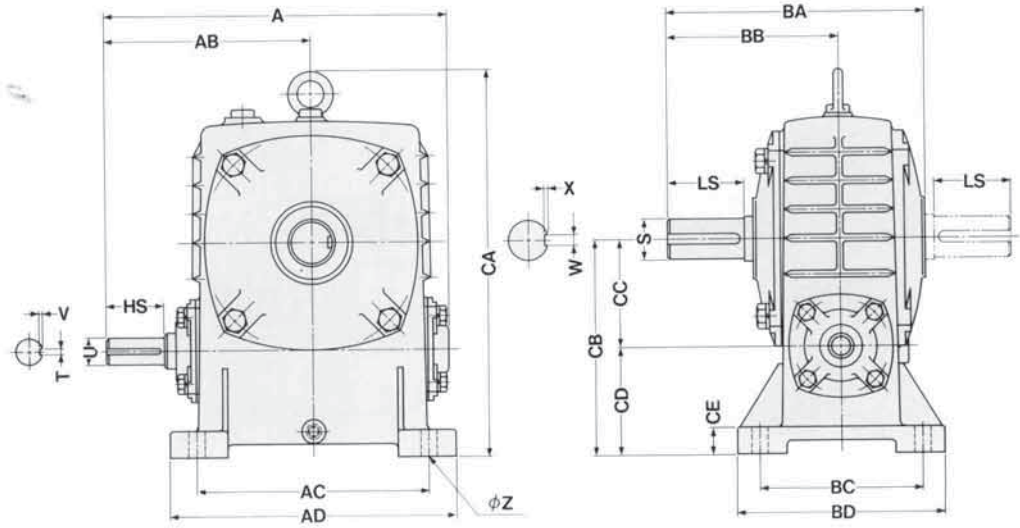
Input Shaft

Output Shaft (Left)



Input Shaft

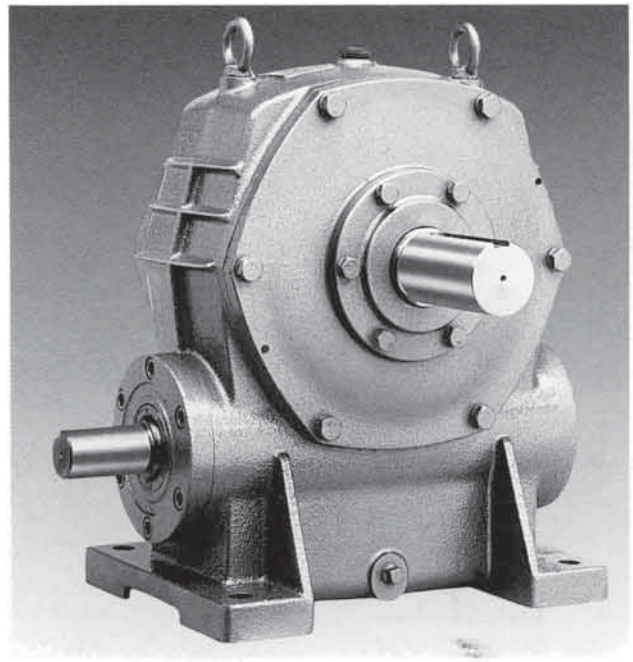
■ Dimensions (Unit: mm)



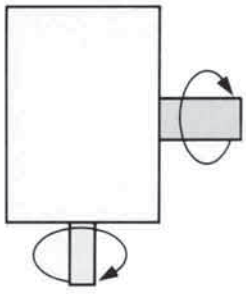
Type	Ratio	A	AB	AC	AD	BA	BB	BC	BD	CA	CB	CC	CD	CE	Z	Input Shaft				Output Shaft				Weight	Oil
																HS	U	T	V	LS	S	W	X	(kg)	(ℓ)
30	10 30 15 40	383	230	260	320	290	190	180	230	445	240	120	120	30	18	65	30	7	4.0	85	45	12	4.5	52.0	2.4
35	20 50 25 60	435	260	290	350	320	210	200	250	495	270	135	135	30	18	75	35	10	4.5	95	55	15	5.0	71.0	3.0

Design and specifications subject to change without prior notice.

These types are widely used as a universal unit. The worm and wheel are constantly immersed in lubricating oil, making them especially suitable for low speed operation.

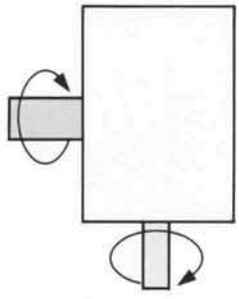


Output Shaft (Right)



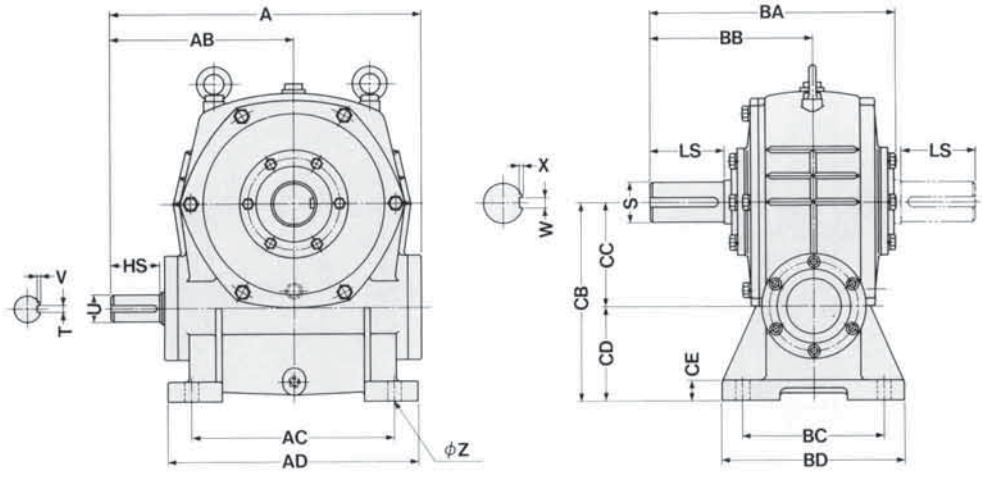
Input Shaft

Output Shaft (Left)



Input Shaft

■ Dimensions (Unit: mm)



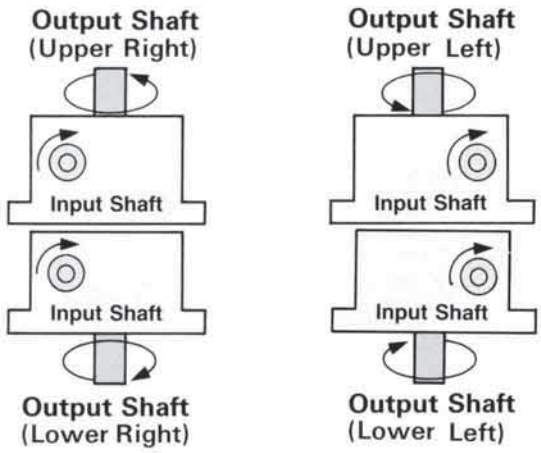
Type	Ratio	A	AB	AC	AD	BA	BB	BC	BD	CA	CB	CC	CD	CE	Z	Input Shaft				Output Shaft				Weight	Oil
																HS	U	T	V	LS	S	W	X	(kg)	(ℓ)
40	10 30 15 40 20 50 25 60	461	271	300	370	360	240	210	270	470	295	155	140	30	21	75	40	10	4.5	110	60	15	5.0	105.0	4.3
45		536	316	310	380	415	270	220	280	548	330	180	150	35	21	90	45	12	4.5	120	65	18	6.0	135.0	7.0
50		637	376	360	440	490	315	260	340	645	390	220	170	40	24	110	50	15	5.0	140	75	20	7.0	220.0	11.0
60		678	399	390	470	515	335	280	360	707	420	250	170	40	24	115	60	18	6.0	150	80	24	8.0	300.0	11.5

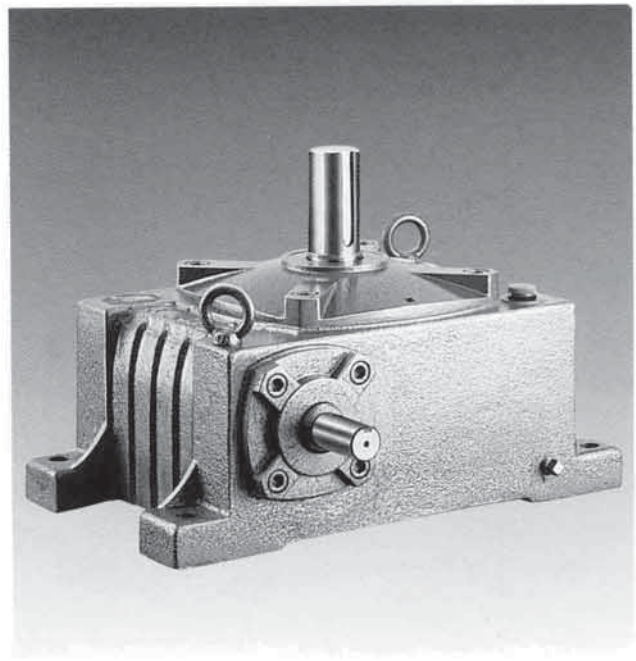
Design and specifications subject to change without prior notice.

SERIES PO

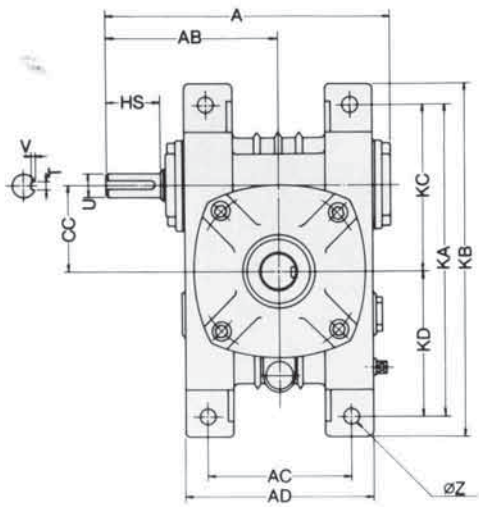
● Type 12 ● Type 18 ● Type 25 ● Type 35
● Type 15 ● Type 22 ● Type 30

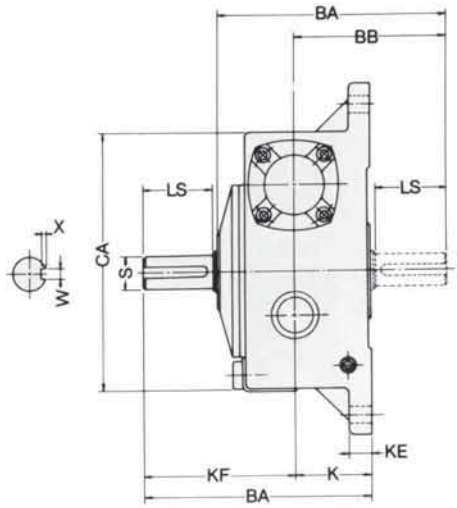
These types feature a vertical output shaft. Since the worm and wheel are constantly immersed in lubricating oil, they are ideal for low-speed, high-torque applications in various mixing equipment.





■ Dimensions (Unit: mm)

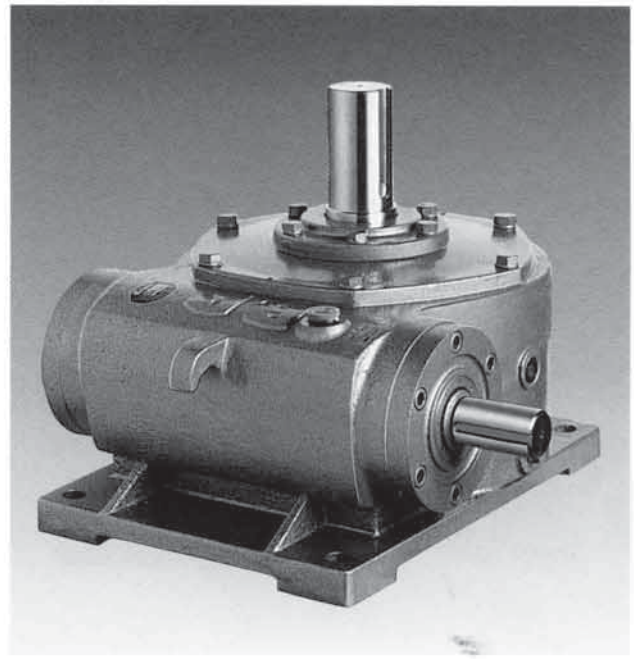


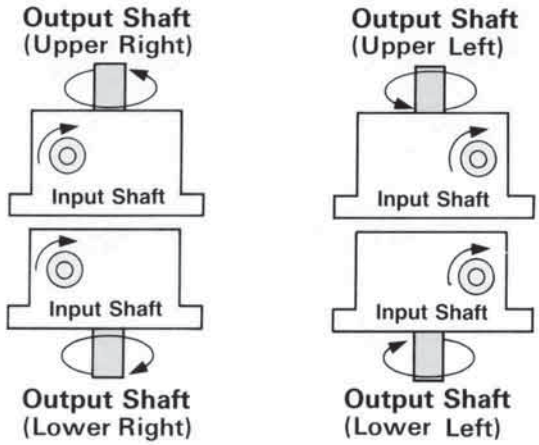


Type	Ratio	A	AB	AC	AD	BA	BB	CA	CB	CC	KA	KB	KC	KD	KE	KF	K	Z	Input Shaft				Output Shaft				Weight	Oil
																			HS	U	T	V	LS	S	W	X	(kg)	(ℓ)
12	10	175	105	90	116	145	95	87	78	50	195	220	102	93	14	95	50	11	30	12	4	2.5	40	17	5	3.0	6.5	0.4
15	15	195	120	95	125	165	110	100	90	60	230	270	120	110	20	110	55	11	40	15	5	3.0	50	22	7	4.0	8.5	0.5
18	20	234	140	115	155	195	130	115	100	70	265	305	140	125	20	130	65	15	40	18	5	3.0	60	28	7	4.0	14.0	1.1
22	25 30	264	160	135	175	210	140	130	110	80	290	330	155	135	20	140	70	15	50	22	7	4.0	65	32	10	4.5	19.0	1.4
25	40	322	190	190	225	260	170	160	140	100	350	390	185	165	30	170	90	15	50	25	7	4.0	75	38	10	4.5	36.0	3.1
30	50	385	230	210	265	290	190	190	165	120	405	460	215	190	30	190	100	18	65	30	7	4.0	85	45	12	4.5	52.0	5.0
35	60	435	260	260	305	315	210	213	182	135	450	500	240	210	30	210	105	18	75	35	10	4.5	95	55	15	5.0	73.0	6.5

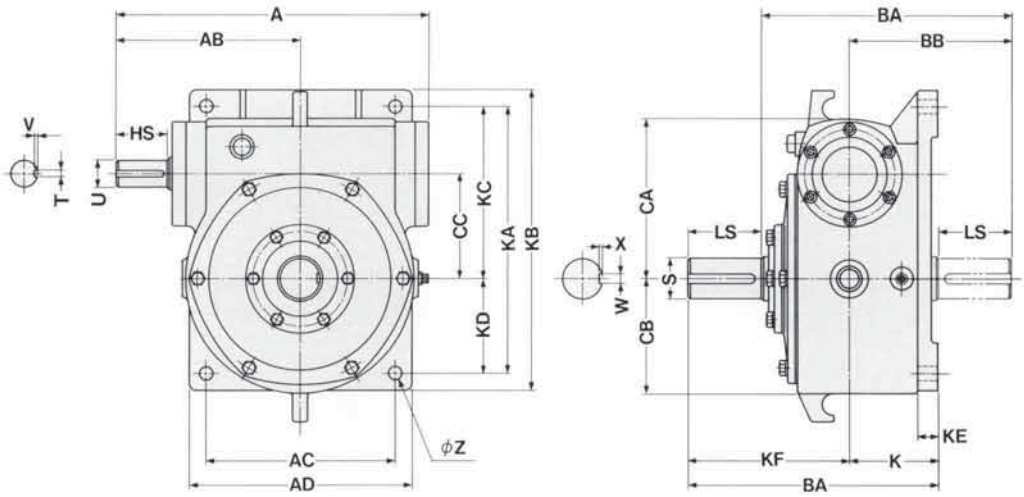
Design and specifications subject to change without prior notice.

These types feature a vertical output shaft. Since the worm and wheel are constantly immersed in lubricating oil, they are ideal for low-speed, high-torque applications in various mixing equipment.





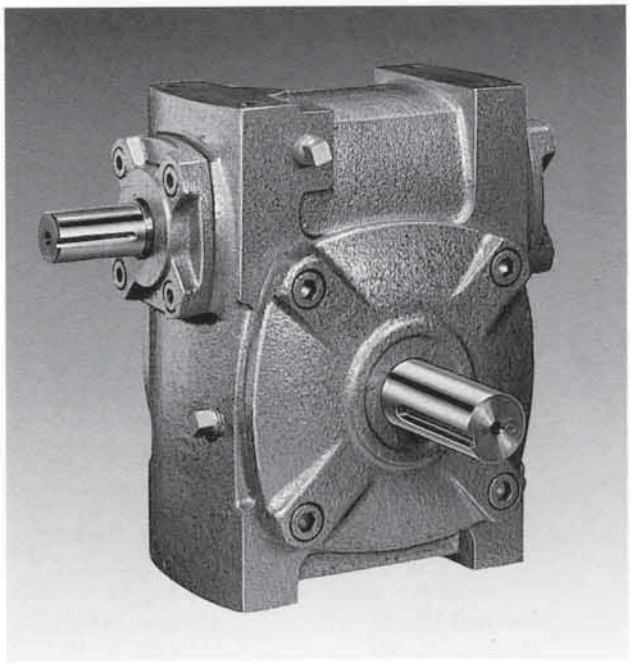
■ Dimensions (Unit: mm)



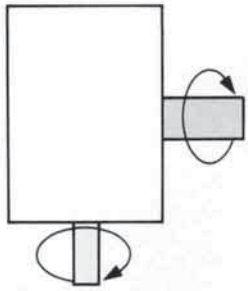
Type	Ratio	A	AB	AC	AD	BA	BB	CA	CB	CC	KA	KB	KC	KD	KE	KF	K	Z	Input Shaft				Output Shaft				Weight	Oil
																			HS	U	T	V	LS	S	W	X	(kg)	(ℓ)
40	10 30	461	271	280	330	370	240	280	212	155	395	445	105	105	30	240	130	21	75	40	10	4.5	110	60	15	5.0	107.0	7.2
45	15 40 20 50	536	316	330	380	420	270	310	251	180	450	500	125	125	35	270	150	21	90	45	12	4.5	120	65	18	6.0	153.0	12.8
50	25 60	637	376	400	460	485	315	360	285	220	530	590	150	150	35	315	170	24	110	50	15	5.0	140	75	20	6.0	233.0	20.0

Design and specifications subject to change without prior notice.

Doubles as a PR, PA or PO series by simply changing leg mounting location. This allows a small inventory to serve a wide range of needs.

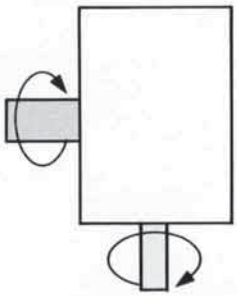


Output Shaft (Right)



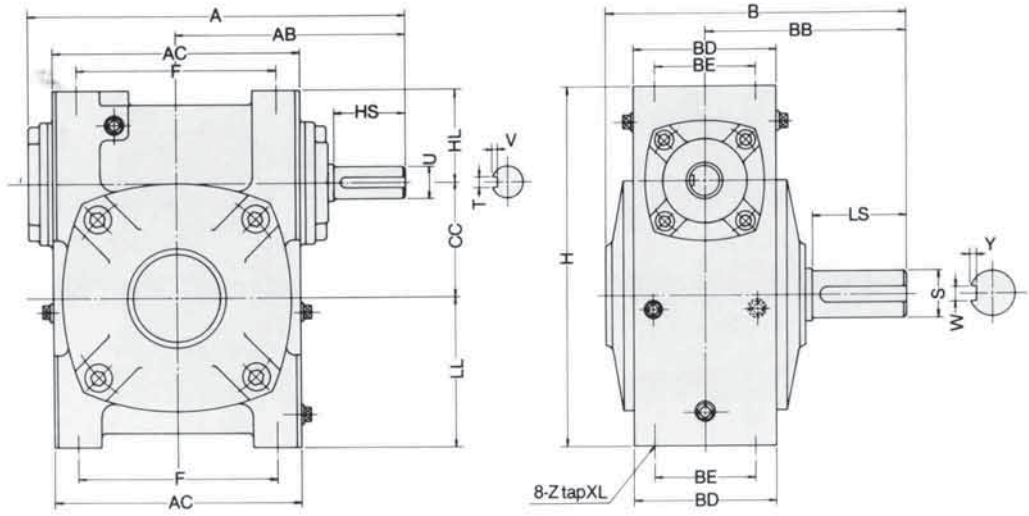
Input Shaft

Output Shaft (Left)



Input Shaft

■ Dimensions (Unit: mm)

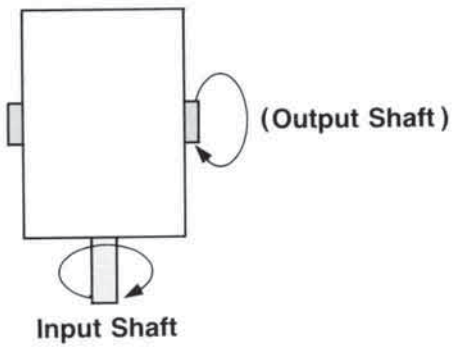


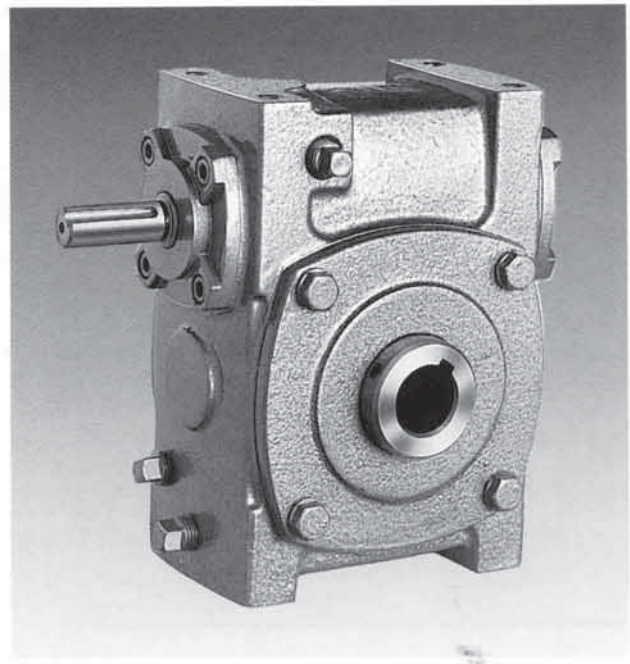
Type	Ratio	A	AB	AC	B	BB	BD	BE	CC	F	H	HL	LL	ZXL	Input Shaft				Output Shaft				Weight	Oil
															HS	U	T	V	LS	S	W	X	(kg)	(ℓ)
12	10	175	105	115	145	95	70	50	50	85	160	40	70	M 6×18	30	12	4	2.5	40	17	5	3.0	8	0.4
15	15 20	195	120	126	165	110	80	55	60	105	186	48	78	M 8×20	40	15	5	3.0	50	22	7	4.0	10	0.5
18	25 30	234	140	155	195	130	90	65	70	125	215	55	90	M10×25	40	18	5	3.0	60	28	7	4.0	17	1.1
22	40	264	160	174	210	140	100	70	80	140	250	65	105	M12×30	50	22	7	4.0	65	32	10	4.5	21	1.4
25	50 60	322	190	224	260	170	116	90	100	180	310	80	130	M12×30	50	25	7	4.0	75	38	10	4.5	35	2.6

Design and specifications subject to change without prior notice.

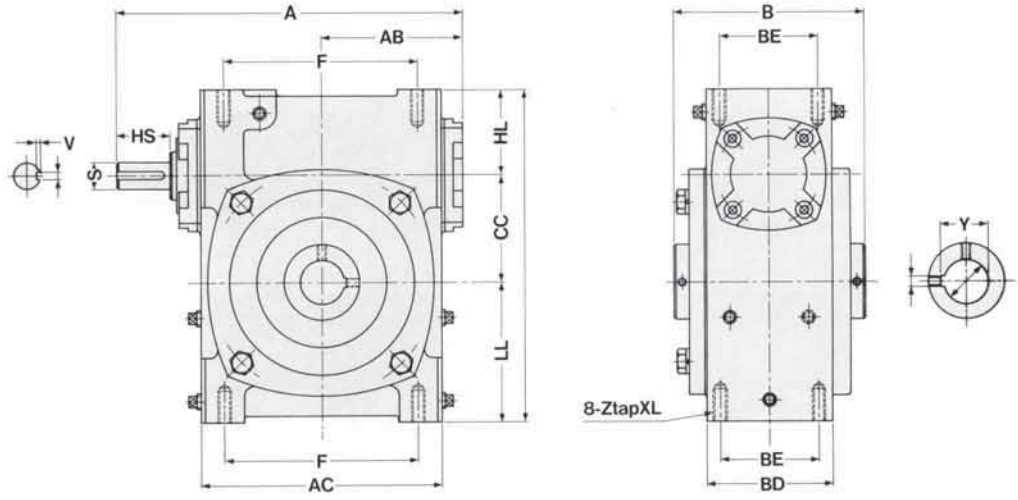
Hollow Output Shaft

The hollow output shaft allows the PFH series to be used as a PR, PA or PO series. No joints are required for connection. Insert the shaft of the matching machine into the hollow part of the PFH output shaft.





■ Dimensions (Unit: mm)



Type	Ratio	A	AB	AC	B	BD	F	BE	CC	LL	HL	L	ZXL	Input Shaft					Output Shaft		
														HS	HS_1	U	T	V	S	W	Y
15	10	195	120	126	120	78	105	55	60	78	48	186	8×20	40	35	15	5	12.0	25	7	28.0
18	15 20	234	140	155	130	90	125	65	70	90	55	215	10×25	40	35	18	5	15.0	30	7	33.0
22	25	264	160	174	145	96	140	70	80	105	65	250	12×25	50	45	22	7	18.0	35	10	38.5
25	30	322	190	224	175	116	180	90	100	130	80	310	12×30	50	45	25	7	21.0	40	10	43.5
30	40 50	385	230	265	200	135	220	100	120	155	95	370	16×30	65	60	30	7	26.0	45	12	48.5
35	60	435	260	305	210	146	260	110	135	185	105	425	16×35	75	70	35	10	30.5	60	15	65.0

Design and specifications subject to change without prior notice.

Selection Table

• PR Series • PO Series • PFH Series
• PA Series • PF Series

Type	Input Speeds (rpm)	Ratio	1/10	1/15	1/20	1/25	1/30	1/40	1/50	1/60
9	1800	Input(KW)	0.45	0.35	0.25	0.20	0.23	0.17	0.14	0.12
		Efficiency(%)	80.6	76.5	72.7	71.3	66.2	60.8	58.4	52.2
		Output Torque(kg-m)	1.95	2.19	2.00	1.94	2.48	2.28	2.20	1.96
		Overhang Load(kg)	56	70	81	86	85	91	95	95
	1500	Input(KW)	0.42	0.32	0.23	0.18	0.21	0.15	0.12	0.11
		Efficiency(%)	79.7	75.6	71.7	70.1	64.9	59.3	57.3	50.7
		Output Torque(kg-m)	2.15	2.36	2.14	2.07	2.64	2.33	2.29	2.08
		Overhang Load(kg)	65	81	87	93	92	98	100	100
	1200	Input(KW)	0.36	0.28	0.20	0.16	0.18	0.14	0.11	0.10
		Efficiency(%)	78.8	74.5	70.3	68.5	63.2	57.5	55.2	48.1
		Output Torque(kg-m)	2.31	2.52	2.25	2.20	2.84	2.61	2.49	2.24
		Overhang Load(kg)	78	91	94	100	100	100	100	100
	1000	Input(KW)	0.32	0.25	0.18	0.15	0.17	0.13	0.10	0.09
		Efficiency(%)	78.2	73.7	69.3	67.4	61.8	55.9	53.7	47.0
		Output Torque(kg-m)	2.44	2.66	2.43	2.39	3.04	2.78	2.68	2.37
		Overhang Load(kg)	85	95	100	100	100	100	100	100
	800	Input(KW)	0.28	0.22	0.16	0.13	0.15	0.11	0.09	0.08
		Efficiency(%)	77.5	72.2	67.5	65.8	59.9	53.8	51.7	44.8
		Output Torque(kg-m)	2.64	2.92	2.62	2.58	3.29	2.96	2.84	2.52
		Overhang Load(kg)	96	100	100	100	100	100	100	100
	600	Input(KW)	0.24	0.18	0.14	0.11	0.13	0.09	0.08	0.06
		Efficiency(%)	75.9	70.7	65.8	64.2	57.8	51.6	49.7	42.5
		Output Torque(kg-m)	2.96	3.17	2.91	2.74	3.61	3.21	3.12	2.67
		Overhang Load(kg)	100	100	100	100	100	100	100	100
12	1800	Input(KW)	0.82	0.63	0.48	0.35	0.41	0.31	0.24	0.20
		Efficiency(%)	81.3	77.6	76.4	71.0	68.0	66.2	58.4	54.3
		Output Torque(kg-m)	3.59	3.99	3.94	3.33	4.50	4.50	3.73	3.59
		Overhang Load(kg)	97	121	134	146	158	174	174	180
	1500	Input(KW)	0.74	0.56	0.43	0.31	0.37	0.29	0.22	0.18
		Efficiency(%)	80.6	76.8	75.6	69.8	66.7	64.9	56.8	52.9
		Output Torque(kg-m)	3.87	4.22	4.21	3.52	4.78	4.80	4.03	3.70
		Overhang Load(kg)	102	129	143	154	167	180	180	180
	1200	Input(KW)	0.65	0.50	0.37	0.28	0.33	0.25	0.19	0.16
		Efficiency(%)	79.7	75.6	74.5	68.1	64.9	63.2	54.6	50.7
		Output Torque(kg-m)	4.23	4.58	4.43	3.85	5.20	5.14	4.28	4.01
		Overhang Load(kg)	111	139	155	166	180	180	180	180
	1000	Input(KW)	0.58	0.45	0.33	0.25	0.30	0.23	0.18	0.15
		Efficiency(%)	79.2	74.5	73.7	66.6	63.2	61.8	52.6	48.6
		Output Torque(kg-m)	4.44	4.94	4.76	4.05	5.46	5.49	4.63	4.32
		Overhang Load(kg)	120	147	166	175	180	180	180	180
	800	Input(KW)	0.53	0.39	0.29	0.22	0.27	0.20	0.16	0.13
		Efficiency(%)	78.2	73.7	72.1	65.3	61.8	59.9	51.1	47.0
		Output Torque(kg-m)	5.00	5.23	5.16	4.40	6.07	5.85	4.89	4.54
		Overhang Load(kg)	131	162	179	180	180	180	180	180
	600	Input(KW)	0.43	0.32	0.25	0.19	0.22	0.17	0.13	0.11
		Efficiency(%)	77.0	72.1	70.7	63.5	59.9	57.8	48.8	44.8
		Output Torque(kg-m)	5.35	5.70	5.74	4.79	6.44	6.32	5.23	4.85
		Overhang Load(kg)	138	170	180	180	180	180	180	180
15	1800	Input(KW)	1.31	1.00	0.72	0.54	0.66	0.48	0.37	0.32
		Efficiency(%)	81.7	78.4	74.7	70.6	68.7	68.7	58.0	55.5
		Output Torque(kg-m)	5.78	6.33	5.82	5.14	7.33	6.55	5.73	5.75
		Overhang Load(kg)	145	183	190	216	237	250	250	250
	1500	Input(KW)	1.17	0.90	0.64	0.48	0.58	0.42	0.34	0.29
		Efficiency(%)	81.3	77.6	74.1	69.7	68.0	62.9	56.5	54.2
		Output Torque(kg-m)	6.15	6.83	6.19	5.43	7.73	6.92	6.31	6.06
		Overhang Load(kg)	156	195	210	230	250	250	250	250
	1200	Input(KW)	1.04	0.79	0.56	0.43	0.53	0.39	0.30	0.25
		Efficiency(%)	80.6	76.4	72.7	68.0	66.2	60.8	54.5	52.2
		Output Torque(kg-m)	6.78	7.36	6.64	5.90	8.46	7.61	6.58	6.43
		Overhang Load(kg)	170	210	226	247	250	250	250	250
	1000	Input(KW)	0.93	0.71	0.51	0.39	0.47	0.35	0.27	0.23
		Efficiency(%)	79.7	75.6	71.7	66.7	64.9	59.3	52.9	50.7
		Output Torque(kg-m)	7.23	7.88	7.14	6.32	8.84	8.00	7.05	6.88
		Overhang Load(kg)	179	224	240	250	250	250	250	250
	800	Input(KW)	0.82	0.62	0.44	0.34	0.42	0.31	0.24	0.21
		Efficiency(%)	78.8	74.5	70.3	65.3	63.2	57.5	51.1	48.1
		Output Torque(kg-m)	7.86	8.49	7.57	6.72	9.67	8.58	7.51	7.50
		Overhang Load(kg)	196	244	250	250	250	250	250	250
	600	Input(KW)	0.67	0.51	0.39	0.29	0.36	0.26	0.20	0.18
		Efficiency(%)	78.1	73.5	68.2	63.3	60.7	54.7	48.7	45.8
		Output Torque(kg-m)	8.54	9.04	8.56	7.42	10.50	9.35	8.07	7.90
		Overhang Load(kg)	211	250	250	250	250	250	250	250

Type	Input Speeds (rpm)	Ratio	1/10	1/15	1/20	1/25	1/30	1/40	1/50	1/60
18	1800	Input(KW)	2.76	2.08	1.54	1.21	1.36	1.01	0.79	0.77
		Efficiency(%)	82.3	79.1	77.4	75.6	69.7	67.3	65.1	56.8
		Output Torque(kg-m)	12.28	13.37	12.87	12.34	15.33	14.66	13.87	14.14
		Overhang Load(kg)	152	193	212	241	249	270	270	270
	1500	Input(KW)	2.47	1.90	1.39	1.08	1.21	0.90	0.73	0.70
		Efficiency(%)	81.7	78.1	76.7	74.9	68.7	66.6	63.9	55.4
		Output Torque(kg-m)	13.10	14.16	13.84	13.13	16.25	15.48	15.09	15.11
		Overhang Load(kg)	162	203	226	257	265	295	295	295
	1200	Input(KW)	2.20	1.66	1.21	0.97	1.08	0.80	0.64	0.61
		Efficiency(%)	81.1	77.3	75.4	73.3	67.5	64.6	61.7	53.9
		Output Torque(kg-m)	14.46	15.65	14.85	14.39	17.77	16.88	16.01	16.00
		Overhang Load(kg)	178	222	243	275	295	295	295	295
	1000	Input(KW)	1.96	1.50	1.10	0.85	0.99	0.73	0.59	0.57
		Efficiency(%)	80.3	76.4	74.5	72.5	65.9	63.3	60.1	51.9
		Output Torque(kg-m)	15.33	16.74	15.96	15.05	19.02	17.90	17.19	17.20
		Overhang Load(kg)	189	237	259	295	295	295	295	295
	800	Input(KW)	1.71	1.30	0.95	0.75	0.87	0.64	0.52	0.49
		Efficiency(%)	79.4	75.3	73.3	71.3	64.4	61.6	58.1	50.1
		Output Torque(kg-m)	16.58	17.88	16.92	16.23	20.38	19.19	18.32	18.04
		Overhang Load(kg)	206	257	283	295	295	295	295	295
	600	Input(KW)	1.43	1.08	0.83	0.63	0.73	0.55	0.42	0.42
		Efficiency(%)	78.2	73.7	71.5	69.7	62.0	59.0	56.6	47.3
		Output Torque(kg-m)	18.21	19.40	19.14	17.80	22.07	20.93	19.37	19.46
		Overhang Load(kg)	216	268	295	295	295	295	295	295
22	1800	Input(KW)	3.80	2.95	2.06	1.68	1.89	1.35	1.10	0.90
		Efficiency(%)	82.8	79.6	76.6	74.8	71.1	66.5	63.9	58.8
		Output Torque(kg-m)	17.0	19.0	17.1	17.0	21.8	19.5	19.1	17.1
		Overhang Load(kg)	175	222	258	268	293	312	321	322
	1500	Input(KW)	3.41	2.65	1.88	1.49	1.70	1.23	1.02	0.83
		Efficiency(%)	82.0	78.6	75.4	74.1	69.4	64.5	62.7	56.5
		Output Torque(kg-m)	18.2	20.3	18.4	17.9	23.0	20.6	20.7	18.3
		Overhang Load(kg)	184	233	270	287	304	325	341	343
	1200	Input(KW)	3.07	2.30	1.65	1.32	1.49	1.12	0.88	0.73
		Efficiency(%)	81.4	78.0	74.4	73.0	68.3	63.2	61.3	55.0
		Output Torque(kg-m)	20.3	21.9	19.9	19.6	24.8	22.9	21.8	19.5
		Overhang Load(kg)	203	257	294	314	333	355	395	364
	1000	Input(KW)	2.75	2.08	1.47	1.20	1.37	0.98	0.80	0.66
		Efficiency(%)	81.0	77.1	73.5	71.8	67.2	61.9	59.5	53.6
		Output Torque(kg-m)	21.7	23.4	21.1	21.0	26.9	23.8	23.3	20.7
		Overhang Load(kg)	219	273	314	330	356	380	406	406
	800	Input(KW)	2.42	1.83	1.31	1.03	1.21	0.88	0.71	0.58
		Efficiency(%)	79.9	75.9	72.1	70.5	65.4	59.9	57.8	51.3
		Output Torque(kg-m)	23.5	25.4	23.0	22.2	28.9	25.6	24.8	21.9
		Overhang Load(kg)	248	310	357	378	406	406	406	406
	600	Input(KW)	2.03	1.52	1.11	0.88	1.02	0.74	0.59	0.51
		Efficiency(%)	78.8	74.5	70.3	68.5	63.2	57.5	55.2	48.1
		Output Torque(kg-m)	26.0	27.5	25.3	24.5	31.3	27.6	26.6	23.8
		Overhang Load(kg)	285	355	406	406	406	406	406	406
25	1800	Input(KW)	6.91	5.29	3.89	3.03	3.39	2.48	1.95	1.61
		Efficiency(%)	83.8	80.6	79.6	77.9	72.6	71.1	68.3	65.6
		Output Torque(kg-m)	31.3	34.6	33.5	31.9	39.9	38.1	35.9	34.3
		Overhang Load(kg)	200	256	285	323	340	374	386	421
	1500	Input(KW)	6.24	4.70	3.53	2.69	3.01	2.24	1.78	1.46
		Efficiency(%)	82.8	79.8	78.6	77.0	71.3	69.4	66.7	64.4
		Output Torque(kg-m)	33.5	36.5	36.0	33.6	41.9	40.4	38.7	36.7
		Overhang Load(kg)	212	272	299	342	357	389	455	455
	1200	Input(KW)	5.58	4.17	3.06	2.37	2.67	2.02	1.54	1.26
		Efficiency(%)	82.0	78.6	78.0	76.0	69.4	68.3	65.5	63.1
		Output Torque(kg-m)	37.1	39.9	38.7	36.5	45.1	44.9	40.9	38.8
		Overhang Load(kg)	231	291	330	372	380	425	455	455
	1000	Input(KW)	4.98	3.79	2.75	2.14	2.43	1.78	1.39	1.16
		Efficiency(%)	81.5	78.0	77.1	75.0	68.5	67.2	64.1	61.4
		Output Torque(kg-m)	39.5	43.2	41.3	39.1	48.7	46.6	43.4	41.7
		Overhang Load(kg)	248	313	350	395	412	455	455	455
	800	Input(KW)	4.31	3.28	2.43	1.85	2.14	1.57	1.23	1.00
		Efficiency(%)	81.0	71.1	75.9	73.7	67.2	65.4	62.2	59.7
		Output Torque(kg-m)	42.5	46.2	45.0	41.5	52.6	50.2	46.7	43.8
		Overhang Load(kg)	288	359	398	455	455	455	455	455
	600	Input(KW)	3.65	2.78	2.05	1.57	1.81	1.32	1.03	0.85
		Efficiency(%)	79.7	75.6	74.5	72.1	64.9	63.2	59.9	57.1
		Output Torque(kg-m)	47.2	51.1	49.5	46.0	57.4	54.1	50.0	47.2
		Overhang Load(kg)	327	408	455	455	455	455	455	455

Selection Table • PR Series • PO Series • PA Series

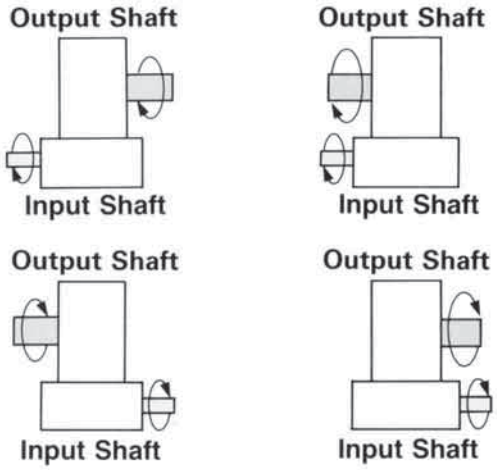
Type	Input Speeds (rpm)	Ratio	1/10	1/15	1/20	1/25	1/30	1/40	1/50	1/60
30	1800	Input(KW)	10.76	8.32	5.92	4.93	5.23	3.76	3.10	2.55
		Efficiency(%)	84.0	81.4	78.7	79.6	74.0	69.8	71.1	66.1
		Output Torque(kg-m)	48.9	55.0	50.4	53.1	62.8	56.8	59.6	54.8
		Overhang Load(kg)	267	345	375	440	460	492	545	545
	1500	Input(KW)	9.88	7.38	5.35	4.36	4.70	3.45	2.83	2.32
		Efficiency(%)	83.4	80.6	77.8	78.6	72.6	68.2	69.4	65.1
		Output Torque(kg-m)	53.5	57.9	54.0	55.6	66.4	61.0	63.7	58.7
		Overhang Load(kg)	284	364	395	462	481	513	545	545
	1200	Input(KW)	8.77	6.58	4.72	3.81	4.17	3.06	2.46	2.03
		Efficiency(%)	82.7	79.6	76.6	78.0	71.1	66.5	68.3	62.9
		Output Torque(kg-m)	58.9	63.7	58.7	60.2	72.2	66.1	68.1	62.1
		Overhang Load(kg)	310	393	426	509	519	545	545	545
	1000	Input(KW)	7.68	5.93	4.20	3.47	3.79	2.82	2.19	1.80
		Efficiency(%)	82.0	78.6	75.4	77.1	69.4	64.5	67.2	62.1
		Output Torque(kg-m)	61.3	68.1	61.6	65.1	76.9	70.7	71.6	65.4
		Overhang Load(kg)	328	414	447	545	545	545	545	545
	800	Input(KW)	6.82	5.13	3.69	2.99	3.37	2.45	1.94	1.59
		Efficiency(%)	81.4	78.0	74.4	75.9	68.3	63.2	65.4	60.0
		Output Torque(kg-m)	67.6	73.0	66.7	69.1	83.9	75.2	77.3	69.5
		Overhang Load(kg)	380	480	514	545	545	545	545	545
	600	Input(KW)	5.67	4.38	3.17	2.51	2.79	2.06	1.61	1.34
		Efficiency(%)	80.6	76.4	72.7	74.5	66.1	60.8	63.2	57.4
		OutputTorque(kg-m)	74.2	81.5	74.8	76.0	90.0	81.3	82.5	74.9
		Overhang Load(kg)	440	545	545	545	545	545	545	545
35	1800	Input(KW)	15.00	11.78	8.49	6.73	7.31	5.37	4.21	3.42
		Efficiency(%)	84.8	82.6	81.4	80.1	76.0	73.9	72.0	67.9
		Output Torque(kg-m)	68.8	79.0	74.8	72.9	90.2	86.0	82.0	76.5
		Overhang Load(kg)	326	427	508	581	656	724	773	753
	1500	Input(KW)	13.91	10.43	7.82	5.98	6.56	4.88	3.80	3.11
		Efficiency(%)	84.4	81.9	80.7	79.4	74.7	72.7	70.5	67.6
		Output Torque(kg-m)	76.2	83.2	82.0	77.0	95.4	92.2	87.0	82.0
		Overhang Load(kg)	348	450	538	615	686	762	814	814
	1200	Input(KW)	12.23	9.17	6.78	5.19	5.81	4.30	3.36	2.71
		Efficiency(%)	83.8	81.1	79.6	78.3	73.4	71.1	68.7	65.6
		Output Torque(kg-m)	83.2	90.5	87.5	82.5	103.0	99.0	93.0	86.7
		Overhang Load(kg)	381	491	579	667	740	814	814	814
	1000	Input(KW)	10.89	8.36	6.05	4.66	5.22	3.88	2.98	2.41
		Efficiency(%)	83.1	80.1	79.0	77.6	71.9	70.1	68.0	64.8
		Output Torque(kg-m)	88.1	97.8	93.1	88.1	109.0	106.0	98.0	91.4
		Overhang Load(kg)	403	516	622	713	776	814	814	814
	800	Input(KW)	9.59	7.22	5.28	4.12	4.67	3.35	2.63	2.12
		Efficiency(%)	82.6	79.6	78.2	76.4	70.8	68.8	66.1	62.8
		Output Torque(kg-m)	96.4	104.0	100.0	95.8	120.0	112.0	106.0	97.0
		Overhang Load(kg)	470	599	715	814	814	814	814	814
	600	Input(KW)	8.03	6.15	4.47	3.45	3.86	2.82	2.20	1.78
		Efficiency(%)	81.8	78.2	76.8	74.9	68.8	66.6	63.9	60.4
		Output Torque(kg-m)	106	117	111	104	129	122	114	104
		Overhang Load(kg)	543	681	814	814	814	814	814	814

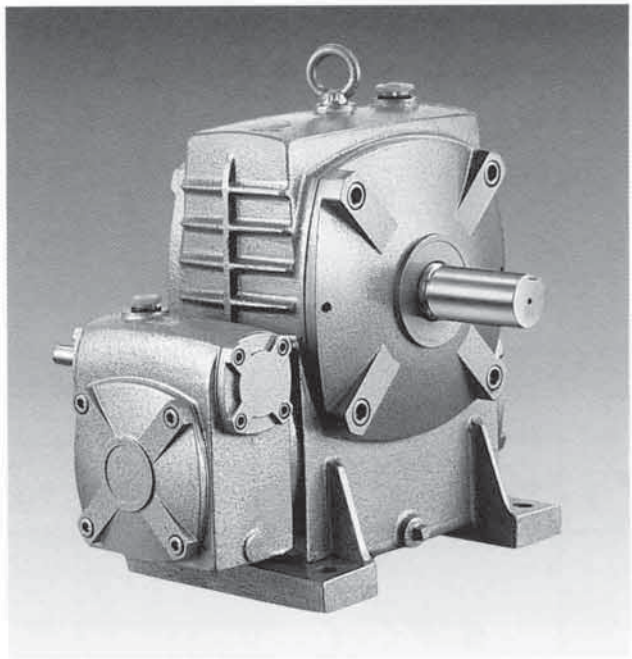
Type	Input Speeds (rpm)	Ratio	1/10	1/15	1/20	1/25	1/30	1/40	1/50	1/60
40	1500	Input(KW)	17.94	13.29	9.84	8.36	8.83	6.23	5.35	4.30
		Efficiency(%)	84.7	82.3	79.9	78.9	75.5	71.6	69.9	64.9
		Output Torque(kg-m)	98	106	102	106	123	115	121	108
		Overhang Load(kg)	610	790	930	1060	1145	1170	1240	1245
	1200	Input(KW)	15.97	11.97	8.73	7.44	7.41	5.58	4.69	3.80
		Efficiency(%)	84.0	81.4	78.8	77.8	74.0	69.8	68.3	62.7
		Output Torque(kg-m)	108	118	111	117	133	126	129	116
		Overhang Load(kg)	730	945	1105	1190	1275	1345	1345	1345
	1000	Input(KW)	14.12	10.85	7.71	6.51	6.73	5.05	4.26	3.47
		Efficiency(%)	83.6	80.7	77.9	76.6	72.9	68.5	66.4	61.2
		Output Torque(kg-m)	114	127	116	121	143	134	137	124
		Overhang Load(kg)	855	1090	1200	1280	1345	1345	1345	1345
	800	Input(KW)	12.41	9.31	6.74	5.74	6.02	4.43	3.69	3.00
		Efficiency(%)	82.8	79.9	76.8	75.7	71.2	66.5	65.1	58.9
		Output Torque(kg-m)	125	135	126	132	156	143	146	129
		Overhang Load(kg)	1020	1235	1345	1345	1345	1345	1345	1345
	600	Input(KW)	10.40	7.93	5.84	4.78	4.95	3.68	3.07	2.51
		Efficiency(%)	82.1	78.7	75.4	74.1	69.7	64.8	62.8	56.8
		Output Torque(kg-m)	138	152	143	143	167	154	156	138
		Overhang Load(kg)	1230	1345	1345	1345	1345	1345	1345	1345
45	1200	Input(KW)	21.09	15.61	12.55	11.07	9.69	7.99	6.85	5.59
		Efficiency(%)	84.0	81.4	79.6	79.6	74.0	71.0	71.1	68.3
		Output Torque(kg-m)	143	154	162	178	174	184	197	185
		Overhang Load(kg)	865	1120	1310	1445	1510	1535	1700	1700
	1000	Input(KW)	18.57	14.28	11.14	9.66	8.97	7.19	6.21	5.07
		Efficiency(%)	83.4	80.6	78.7	78.6	72.7	69.7	69.4	66.4
		Output Torque(kg-m)	150	168	170	184	190	195	209	196
		Overhang Load(kg)	1005	1285	1420	1555	1620	1700	1700	1700
	800	Input(KW)	16.56	12.31	9.57	8.41	7.97	6.31	5.36	4.35
		Efficiency(%)	82.7	79.6	77.7	78.0	71.1	68.2	68.3	65.1
		Output Torque(kg-m)	166	178	181	199	207	209	222	206
		Overhang Load(kg)	1205	1445	1600	1700	1700	1700	1700	1700
	600	Input(KW)	13.83	10.29	8.43	7.07	6.67	5.23	4.45	3.63
		Efficiency(%)	81.7	78.3	76.3	76.4	68.7	66.0	66.1	62.8
		Output Torque(kg-m)	183	196	208	219	223	224	238	221
		Overhang Load(kg)	1430	1700	1700	1700	1700	1700	1700	1700
50	1000	Input(KW)	30.53	23.31	20.53	15.11	14.59	13.21	9.83	8.52
		Efficiency(%)	84.0	81.5	81.2	78.2	74.1	73.4	68.8	67.2
		Output Torque(kg-m)	249	277	324	287	315	375	329	334
		Overhang Load(kg)	1035	1335	1520	1685	1810	2000	2000	2000
	800	Input(KW)	27.71	20.36	17.82	13.36	13.08	11.46	8.66	7.25
		Efficiency(%)	82.5	80.5	80.2	77.0	72.4	72.1	67.1	65.5
		Output Torque(kg-m)	277	299	348	312	345	402	353	346
		Overhang Load(kg)	1160	1590	1810	2000	2000	2000	2000	2000
	600	Input(KW)	22.94	17.11	15.33	11.22	10.89	9.45	7.12	6.02
		Efficiency(%)	82.2	79.3	79.2	75.5	70.6	70.2	64.4	63.2
		Output Torque(kg-m)	306	330	394	343	374	430	372	370
		Overhang Load(kg)	1520	2000	2000	2000	2000	2000	2000	2000
60	1000	Input(KW)	53.89	41.31	28.90	21.82	25.53	18.05	13.89	11.76
		Efficiency(%)	84.9	82.7	81.0	78.9	76.2	73.4	69.9	69.7
		Output Torque(kg-m)	445	499	455	419	568	515	472	479
		Overhang Load(kg)	1165	1530	1710	1925	2140	2500	2500	2500
	800	Input(KW)	48.02	36.03	25.39	19.32	22.82	16.00	12.11	10.00
		Efficiency(%)	84.4	81.9	80.1	77.7	74.6	71.7	68.3	68.2
		Output Torque(kg-m)	493	538	495	457	621	558	502	497
		Overhang Load(kg)	1410	1825	2045	2285	2500	2500	2500	2500
	600	Input(KW)	41.16	30.21	21.97	16.28	18.94	13.35	10.15	8.26
		Efficiency(%)	83.6	80.8	78.4	76.1	73.0	69.5	65.7	66.0
		Output Torque(kg-m)	558	594	558	502	673	601	540	530
		Overhang Load(kg)	1790	2295	2500	2500	2500	2500	2500	2500

SERIES PDA

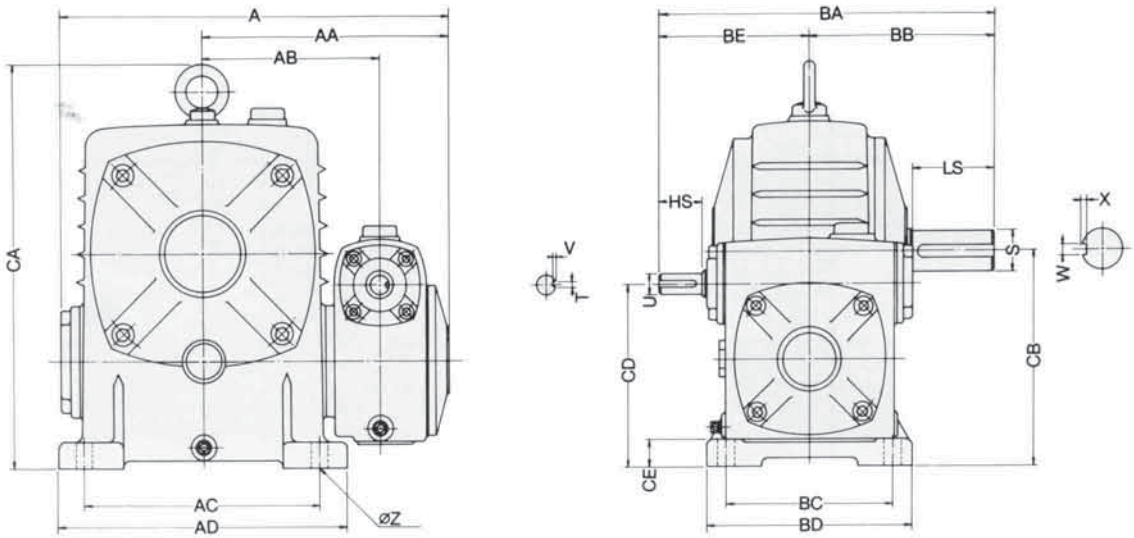
●Type18 ●Type25 ●Type35 ●Type45
●Type22 ●Type30 ●Type40 ●Type50

Worm gear reduction at both primary and secondary sides. Input and output shafts are parallel. The reduction ratio ranges from 1/100 to 1/2000. Capable of handling high-torque loads.





■ Dimensions (Unit: mm)



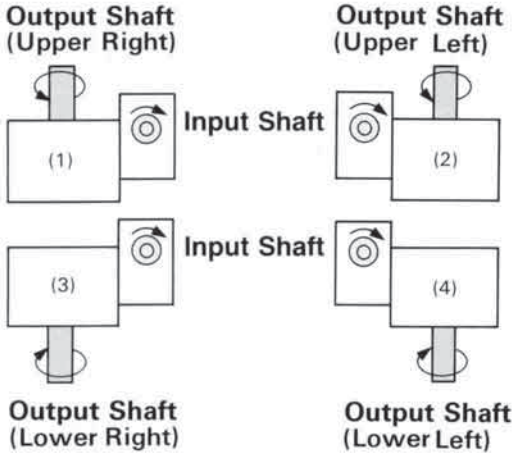
Type	Ratio	A	AA	AB	AC	AD	BA	BB	BC	BD	BE	CA	CB	CD	CE	Z	Input Shaft				Output Shaft				Weight	Oil
																	HS	U	T	V	LS	S	W	X	(kg)	(ℓ)
18	100 150	264	170	120	150	190	235	130	115	150	105	240	140	120	25	15	30	12	4	2.5	60	28	7	4.0	23.2	0.7
22	200 250	289	185	135	180	220	245	140	135	170	105	270	160	130	25	15	30	12	4	2.5	65	32	10	4.5	29.2	0.9
25	300 400	352	220	165	220	270	290	170	155	190	120	380	200	160	25	15	40	15	5	3.0	75	38	10	4.5	47.0	1.7
30	500 600	410	255	190	260	320	330	190	180	230	140	445	240	190	30	18	40	18	5	3.0	85	45	12	4.5	75.0	2.8
35	800 900	470	295	225	290	350	370	210	200	250	160	495	270	215	30	18	50	22	7	4.0	95	55	15	5.0	109.0	3.6
40	1000 1200	525	335	245	300	370	430	240	210	270	190	500	295	240	30	21	50	25	7	4.0	110	60	15	5.0	156.0	6.9
45	1500 1600	605	385	285	310	380	500	270	220	280	230	540	330	270	35	21	65	30	7	4.0	120	65	18	6.0	196.5	9.3
50	1800 2000	696	435	325	360	440	575	315	260	340	260	660	390	305	40	24	75	35	10	4.5	140	75	20	7.0	312.0	14.2

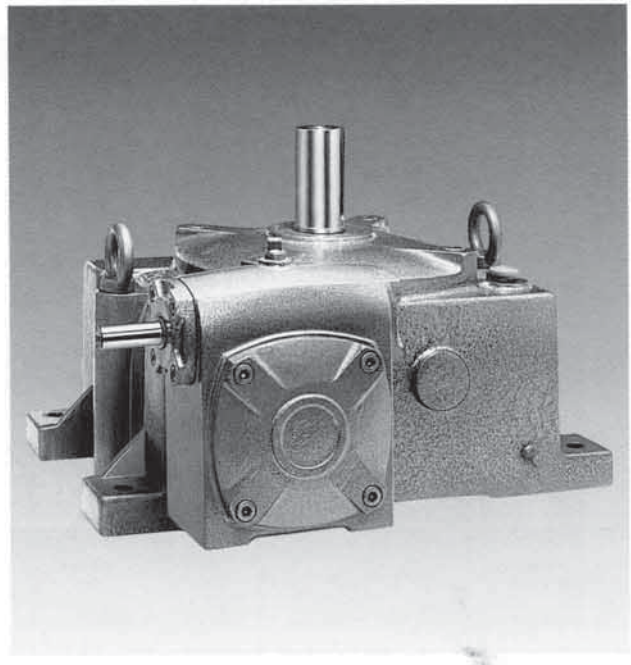
Design and specifications subject to change without prior notice.

SERIES PDO

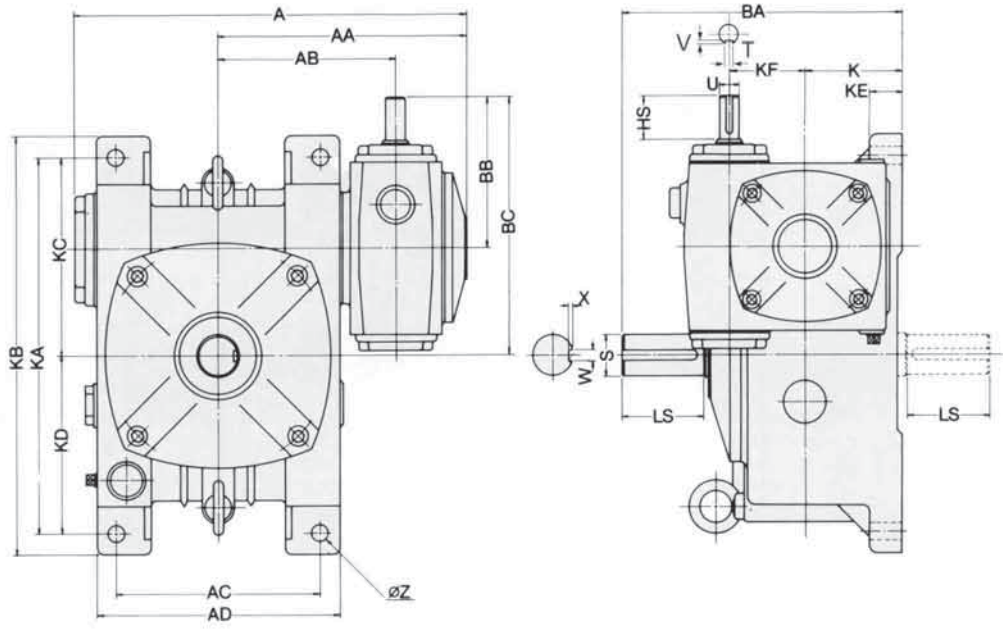
●Type18 ●Type25 ●Type35
●Type22 ●Type30

Worm gear reduction at both primary and secondary sides. The output shaft is vertically mounted. Features the same high-torque capacity of the PDA.





■ Dimensions (Unit: mm)



Type	Ratio	A	AA	AB	AC	AD	BA	BB	BC	KA	KB	KC	KD	KE	KF	K	Z	Input Shaft				Output Shaft				Weight	Oil
																		HS	U	T	V	LS	S	W	X	(kg)	(ℓ)
18	100 800	264	170	120	115	155	195	105	175	265	305	140	125	20	50	65	15	30	12	4	2.5	60	28	7	4.0	24.2	1.3
22	150 900 200 1000	289	185	135	135	175	210	105	185	290	330	155	135	20	50	70	15	30	12	4	2.5	65	32	10	4.5	31.2	1.6
25	250 1200 300 1500	352	220	165	190	225	260	120	220	350	390	185	165	30	60	90	15	40	15	5	3.0	75	38	10	4.5	54.0	3.4
30	400 1600 500 1800	410	255	190	210	265	290	140	260	405	460	215	190	30	70	100	18	40	18	5	3.0	85	45	12	4.5	78.0	5.4
35	600 2000	470	295	225	260	305	315	160	295	450	500	240	210	30	80	105	18	50	22	7	4.0	95	55	15	5.0	107.0	7.1

Design and specifications subject to change without prior notice.

Selection Table • PDA Series • PDO Series

Type	Input Speeds (rpm)	Ratio	1/100	1/150	1/200	1/250	1/300	1/400	1/500	1/600
18	1800	Input(KW)	0.76	0.54	0.42	0.35	0.30	0.24	0.20	0.18
		Efficiency(%)	60.7	57.3	55.4	53.4	50.7	48.5	46.9	42.9
		Output Torque(kg-m)	25	25	25	25	25	25	25	25
		Overhang Load(kg)	295	295	295	295	295	295	295	295
	1500	Input(KW)	0.64	0.46	0.35	0.29	0.26	0.20	0.17	0.15
		Efficiency(%)	59.9	56.2	54.4	52.7	49.4	47.6	46.0	41.7
		Output Torque(kg-m)	25	25	25	25	25	25	25	25
		Overhang Load(kg)	295	295	295	295	295	295	295	295
	1200	Input(KW)	0.52	0.37	0.29	0.24	0.21	0.17	0.14	0.13
		Efficiency(%)	58.9	55.1	53.1	51.2	48.1	46.4	44.5	40.5
		Output Torque(kg-m)	25	25	25	25	25	25	25	25
		Overhang Load(kg)	295	295	295	295	295	295	295	295
	1000	Input(KW)	0.44	0.32	0.25	0.20	0.18	0.14	0.12	0.11
		Efficiency(%)	57.8	53.8	52.1	50.2	47.3	45.3	43.5	39.2
		Output Torque(kg-m)	25	25	25	25	25	25	25	25
		Overhang Load(kg)	295	295	295	295	295	295	295	295
	800	Input(KW)	0.36	0.26	0.20	0.17	0.15	0.12	0.10	0.09
		Efficiency(%)	56.5	52.8	50.7	48.9	45.9	44.1	42.3	37.7
		Output Torque(kg-m)	25	25	25	25	25	25	25	25
		Overhang Load(kg)	295	295	295	295	295	295	295	295
22	1800	Input(KW)	1.16	0.83	0.64	0.55	0.49	0.38	0.34	0.30
		Efficiency(%)	60.5	56.5	55.0	50.6	47.3	45.8	41.7	39.5
		Output Torque(kg-m)	38	38	38	38	38	38	38	38
		Overhang Load(kg)	406	406	406	406	406	406	406	406
	1500	Input(KW)	0.98	0.70	0.54	0.47	0.42	0.33	0.29	0.25
		Efficiency(%)	59.4	55.5	53.9	49.3	46.4	44.6	40.6	38.4
		Output Torque(kg-m)	38	38	38	38	38	38	38	38
		Overhang Load(kg)	406	406	406	406	406	406	406	406
	1200	Input(KW)	0.81	0.58	0.44	0.39	0.35	0.27	0.24	0.21
		Efficiency(%)	58.1	54.1	52.7	47.8	44.9	43.2	39.1	36.8
		Output Torque(kg-m)	38	38	38	38	38	38	38	38
		Overhang Load(kg)	406	406	406	406	406	406	406	406
	1000	Input(KW)	0.68	0.49	0.38	0.34	0.30	0.23	0.21	0.18
		Efficiency(%)	57.4	52.9	51.8	46.3	43.6	42.4	37.7	35.3
		Output Torque(kg-m)	38	38	38	38	38	38	38	38
		Overhang Load(kg)	406	406	406	406	406	406	406	406
	800	Input(KW)	0.56	0.40	0.31	0.28	0.24	0.19	0.17	0.15
		Efficiency(%)	56.0	51.9	50.2	45.0	42.5	41.0	36.4	34.1
		Output Torque(kg-m)	38	38	38	38	38	38	38	38
		Overhang Load(kg)	406	406	406	406	406	406	406	406
25	1800	Input(KW)	1.64	1.17	0.94	0.80	0.64	0.50	0.44	0.39
		Efficiency(%)	62.0	57.7	54.3	50.8	52.9	51.0	45.7	43.6
		Output Torque(kg-m)	55	55	55	55	55	55	55	55
		Overhang Load(kg)	455	455	455	455	455	455	455	455
	1500	Input(KW)	1.39	1.00	0.79	0.68	0.54	0.42	0.38	0.33
		Efficiency(%)	60.9	56.6	53.4	49.8	51.8	49.9	44.7	43.3
		Output Torque(kg-m)	55	55	55	55	55	55	55	55
		Overhang Load(kg)	455	455	455	455	455	455	455	455
	1200	Input(KW)	1.13	0.82	0.65	0.56	0.45	0.35	0.31	0.27
		Efficiency(%)	59.8	55.2	51.9	48.1	50.5	48.5	43.2	41.6
		Output Torque(kg-m)	55	55	55	55	55	55	55	55
		Overhang Load(kg)	455	455	455	455	455	455	455	455
	1000	Input(KW)	0.96	0.69	0.55	0.48	0.38	0.30	0.27	0.23
		Efficiency(%)	58.6	54.2	50.8	46.9	49.4	47.4	41.9	40.4
		Output Torque(kg-m)	55	55	55	55	55	55	55	55
		Overhang Load(kg)	455	455	455	455	455	455	455	455
	800	Input(KW)	0.78	0.57	0.46	0.40	0.31	0.24	0.22	0.19
		Efficiency(%)	57.6	52.9	49.4	45.4	48.2	46.2	40.5	38.9
		Output Torque(kg-m)	55	55	55	55	55	55	55	55
		Overhang Load(kg)	455	455	455	455	455	455	455	455

Type	Input Speeds (rpm)	Ratio	1/800	1/900	1/1000	1/1200	1/1500	1/1600	1/1800	1/2000
18	1800	Input(KW)	0.14	0.15	0.12	0.12	0.10	0.09	0.19	0.18
		Efficiency(%)	40.6	34.1	38.8	32.1	30.5	30.4	26.3	28.8
		Output Torque(kg-m)	25	25	25	25	25	25	25	25
		Overhang Load(kg)	295	295	295	295	295	295	295	295
	1500	Input(KW)	0.12	0.13	0.10	0.10	0.09	0.08	0.08	0.07
		Efficiency(%)	39.9	33.2	37.9	31.2	29.6	29.6	25.4	28.0
		Output Torque(kg-m)	25	25	25	25	25	25	25	25
		Overhang Load(kg)	295	295	295	295	295	295	295	295
	1200	Input(KW)	0.10	0.11	0.08	0.08	0.07	0.07	0.07	0.06
		Efficiency(%)	38.3	32.0	36.0	29.9	28.2	28.3	24.0	26.4
		Output Torque(kg-m)	25	25	25	25	25	25	25	25
		Overhang Load(kg)	295	295	295	295	295	295	295	295
	1000	Input(KW)	0.09	0.095	0.07	0.07	0.06	0.06	0.06	0.05
		Efficiency(%)	37.3	30.7	34.8	29.0	26.8	27.1	22.9	25.3
		Output Torque(kg-m)	25	25	25	25	25	25	25	25
		Overhang Load(kg)	295	295	295	295	295	295	295	295
	800	Input(KW)	0.07	0.08	0.06	0.06	0.05	0.05	0.05	0.04
		Efficiency(%)	35.6	29.6	32.8	27.5	25.4	26.0	21.6	23.7
		Output Torque(kg-m)	25	25	25	25	25	25	25	25
		Overhang Load(kg)	295	295	295	295	295	295	295	295
22	1800	Input(KW)	0.23	0.23	0.21	0.18	0.17	0.16	0.15	0.15
		Efficiency(%)	37.8	33.9	32.8	32.0	27.7	26.6	25.4	23.8
		Output Torque(kg-m)	38	38	38	38	38	38	38	38
		Overhang Load(kg)	406	406	406	406	406	406	406	406
	1500	Input(KW)	0.20	0.20	0.18	0.16	0.15	0.14	0.13	0.13
		Efficiency(%)	36.6	32.9	31.5	30.9	26.5	25.8	24.4	22.8
		Output Torque(kg-m)	38	38	38	38	38	38	38	38
		Overhang Load(kg)	406	406	406	406	406	406	406	406
	1200	Input(KW)	0.17	0.17	0.16	0.13	0.12	0.12	0.11	0.11
		Efficiency(%)	35.1	31.6	30.0	29.5	25.1	24.5	22.9	21.6
		Output Torque(kg-m)	38	38	38	38	38	38	38	38
		Overhang Load(kg)	406	406	406	406	406	406	406	406
	1000	Input(KW)	0.14	0.14	0.13	0.11	0.11	0.10	0.10	0.10
		Efficiency(%)	34.0	30.7	28.4	28.5	23.7	23.5	21.5	20.3
		Output Torque(kg-m)	38	38	38	38	38	38	38	38
		Overhang Load(kg)	406	406	406	406	406	406	406	406
	800	Input(KW)	0.12	0.12	0.11	0.10	0.09	0.08	0.08	0.08
		Efficiency(%)	32.3	29.2	27.1	27.0	22.5	22.3	20.4	19.2
		Output Torque(kg-m)	38	38	38	38	38	38	38	38
		Overhang Load(kg)	406	406	406	406	406	406	406	406
25	1800	Input(KW)	0.31	0.32	0.28	0.27	0.24	0.19	0.21	0.20
		Efficiency(%)	40.3	35.3	36.2	31.3	28.1	32.7	26.4	25.5
		Output Torque(kg-m)	55	55	55	55	55	55	55	55
		Overhang Load(kg)	455	455	455	455	455	455	455	455
	1500	Input(KW)	0.26	0.27	0.24	0.23	0.21	0.17	0.18	0.17
		Efficiency(%)	39.4	34.2	35.0	30.6	26.8	31.9	25.4	24.5
		Output Torque(kg-m)	55	55	55	55	55	55	55	55
		Overhang Load(kg)	455	455	455	455	455	455	455	455
	1200	Input(KW)	0.22	0.23	0.20	0.19	0.18	0.14	0.16	0.15
		Efficiency(%)	37.6	33.1	33.4	28.9	25.4	30.3	24.1	23.1
		Output Torque(kg-m)	55	55	55	55	55	55	55	55
		Overhang Load(kg)	455	455	455	455	455	455	455	455
	1000	Input(KW)	0.19	0.20	0.18	0.17	0.15	0.12	0.14	0.13
		Efficiency(%)	36.4	31.8	32.0	27.8	24.4	29.3	23.0	21.9
		Output Torque(kg-m)	55	55	55	55	55	55	55	55
		Overhang Load(kg)	455	455	455	455	455	455	455	455
	800	Input(KW)	0.16	0.16	0.15	0.14	0.13	0.10	0.12	0.11
		Efficiency(%)	34.8	30.5	30.4	26.6	23.0	28.1	21.3	20.7
		Output Torque(kg-m)	55	55	55	55	55	55	55	55
		Overhang Load(kg)	455	455	455	455	455	455	455	455

Selection Table

- PDA Series
- PDO Series

Type	Input Speeds (rpm)	Ratio	1/100	1/150	1/200	1/250	1/300	1/400	1/500	1/600
30	1800	Input(KW)	2.64	1.85	1.47	1.21	1.09	0.88	0.72	0.66
		Efficiency(%)	62.9	60.0	56.7	54.9	50.7	47.3	46.0	41.9
		Output Torque(kg-m)	90	90	90	90	90	90	90	90
		Overhang Load(kg)	545	545	545	545	545	545	545	545
	1500	Input(KW)	2.25	1.61	1.24	1.03	0.94	0.74	0.62	0.57
		Efficiency(%)	61.7	57.5	55.8	53.9	49.0	46.1	45.0	40.7
		Output!Torque(kg-m)	90	90	90	90	90	90	90	90
		Overhang Load(kg)	545	545	545	545	545	545	545	545
	1200	Input(KW)	1.83	1.31	1.02	0.85	0.77	0.62	0.51	0.47
		Efficiency(%)	60.7	56.3	54.3	52.2	47.9	44.9	43.2	39.4
		Output Torque(kg-m)	90	90	90	90	90	90	90	90
		Overhang Load(kg)	545	545	545	545	545	545	545	545
	1000	Input(KW)	1.55	1.12	0.87	0.72	0.66	0.53	0.44	0.40
		Efficiency(%)	59.7	55.2	53.2	51.2	46.9	43.6	42.3	38.1
		Output Torque(kg-m)	90	90	90	90	90	90	90	90
		Overhang Load(kg)	545	545	545	545	545	545	545	545
	800	Input(KW)	1.27	0.19	0.71	0.59	0.54	0.44	0.36	0.33
		Efficiency(%)	58.2	53.9	51.8	50.0	45.3	42.2	41.1	36.6
		Output Torque(kg-m)	90	90	90	90	90	90	90	90
		Overhang Load(kg)	545	545	545	545	545	545	545	545
35	1800	Input(KW)	4.60	3.25	2.56	2.12	1.78	1.41	1.17	1.04
		Efficiency(%)	64.3	60.7	57.7	55.9	55.3	52.4	50.5	47.4
		Output Torque(kg-m)	160	160	160	160	160	160	160	160
		Overhang Load(kg)	814	814	814	814	814	814	814	814
	1500	Input(KW)	3.89	2.77	2.18	1.79	1.52	1.20	1.00	0.89
		Efficiency(%)	63.3	59.4	56.4	55.0	54.1	51.1	49.4	45.9
		Output Torque(kg-m)	160	160	160	160	160	160	160	160
		Overhang Load(kg)	814	814	814	814	814	814	814	814
	1200	Input(KW)	3.16	2.25	1.79	1.49	1.24	0.99	0.82	0.73
		Efficiency(%)	62.3	58.4	55.2	53.0	52.7	49.7	48.2	44.7
		Output Torque(kg-m)	160	160	160	160	160	160	160	160
		Overhang Load(kg)	814	814	814	814	814	814	814	814
	1000	Input(KW)	2.68	1.91	1.52	1.25	1.05	0.84	0.70	0.63
		Efficiency(%)	61.3	57.4	54.1	52.4	52.0	48.8	47.0	43.5
		Output Torque(kg-m)	160	160	160	160	160	160	160	160
		Overhang Load(kg)	814	814	814	814	814	814	814	814
	800	Input(KW)	2.19	1.56	1.25	1.03	0.87	0.69	0.58	0.52
		Efficiency(%)	59.9	56.0	52.6	51.1	50.5	47.3	45.6	41.9
		Output Torque(kg-m)	160	160	160	160	160	160	160	160
		Overhang Load(kg)	814	814	814	814	814	814	814	814
40	1800	Input(KW)	6.38	4.81	3.40	2.83	2.82	2.23	1.85	1.67
		Efficiency(%)	65.9	62.4	60.7	58.9	53.9	51.9	49.9	46.0
		Output Torque(kg-m)	227	243	223	225	246	250	250	250
		Overhang Load(kg)	1345	1345	1345	1345	1345	1345	1345	1345
	1500	Input(KW)	5.73	4.19	3.04	2.52	2.44	1.90	1.58	1.44
		Efficiency(%)	64.7	61.2	59.5	57.8	52.5	50.6	48.8	44.6
		Output Torque(kg-m)	240	250	235	237	250	250	250	250
		Overhang Load(kg)	1345	1345	1345	1345	1345	1345	1345	1345
	1200	Input(KW)	4.85	3.44	2.59	2.14	2.02	1.56	1.30	1.20
		Efficiency(%)	63.5	59.7	58.6	56.6	50.7	49.5	47.4	42.8
		Output Torque(kg-m)	250	250	247	246	250	250	250	250
		Overhang Load(kg)	1345	1345	1345	1345	1345	1345	1345	1345
	1000	Input(KW)	4.09	2.91	2.23	1.85	1.71	1.32	1.11	1.02
		Efficiency(%)	62.7	58.8	57.5	55.4	49.9	48.5	46.3	41.8
		Output Torque(kg-m)	250	250	250	250	250	250	250	250
		Overhang Load(kg)	1345	1345	1345	1345	1345	1345	1345	1345
	800	Input(KW)	3.64	2.37	1.83	1.52	1.41	1.09	0.91	0.84
		Efficiency(%)	61.5	57.7	56.1	54.1	48.6	46.9	44.9	40.5
		Output Torque(kg-m)	250	250	250	250	250	250	250	250
		Overhang Load(kg)	1345	1345	1345	1345	1345	1345	1345	1345

Type	Input Speeds (rpm)	Ratio	1/800	1/900	1/1000	1/1200	1/1500	1/1600	1/1800	1/2000
30	1800	Input(KW)	0.52	0.50	0.44	0.41	0.35	0.36	0.34	0.30
		Efficiency(%)	39.6	36.7	37.7	33.6	32.0	29.0	27.5	27.7
		Output Torque(kg-m)	90	90	90	90	90	90	90	90
		Overhang Load(kg)	545	545	545	545	545	545	545	545
	1500	Input(KW)	0.45	0.44	0.38	0.35	0.30	0.31	0.29	0.26
		Efficiency(%)	38.8	35.1	36.7	32.8	30.9	27.7	26.3	26.8
		Output Torque(kg-m)	90	90	90	90	90	90	90	90
		Overhang Load(kg)	545	545	545	545	545	545	545	545
	1200	Input(KW)	0.37	0.36	0.32	0.29	0.25	0.26	0.24	0.22
		Efficiency(%)	37.1	33.9	34.8	31.3	29.2	26.6	25.2	25.2
		Output Torque(kg-m)	90	90	90	90	90	90	90	90
		Overhang Load(kg)	545	545	545	545	545	545	545	545
	1000	Input(KW)	0.32	0.31	0.27	0.25	0.22	0.23	0.21	0.19
		Efficiency(%)	35.8	32.9	33.5	30.1	28.1	25.6	24.0	24.2
		Output Torque(kg-m)	90	90	90	90	90	90	90	90
		Overhang Load(kg)	545	545	545	545	545	545	545	545
	800	Input(KW)	0.27	0.26	0.23	0.21	0.18	0.19	0.18	0.16
		Efficiency(%)	34.4	31.4	32.1	28.8	26.8	24.2	22.6	23.0
		Output Torque(kg-m)	90	90	90	90	90	90	90	90
		Overhang Load(kg)	545	545	545	545	545	545	545	545
35	1800	Input(KW)	0.85	0.84	0.71	0.70	0.59	0.54	0.54	0.54
		Efficiency(%)	43.7	39.0	41.7	35.4	33.6	34.3	30.5	32.3
		Output Torque(kg-m)	160	160	160	160	160	160	160	160
		Overhang Load(kg)	814	814	814	814	814	814	814	814
	1500	Input(KW)	0.73	0.73	0.61	0.60	0.50	0.47	0.47	0.39
		Efficiency(%)	42.2	37.5	40.4	34.0	32.5	32.8	28.8	31.2
		Output Torque(kg-m)	160	160	160	160	160	160	160	160
		Overhang Load(kg)	814	814	814	814	814	814	814	814
	1200	Input(KW)	0.60	0.60	0.50	0.50	0.42	0.39	0.39	0.33
		Efficiency(%)	40.8	36.2	39.1	32.8	31.2	31.6	27.6	30.0
		Output Torque(kg-m)	160	160	160	160	160	160	160	160
		Overhang Load(kg)	814	814	814	814	814	814	814	814
	1000	Input(KW)	0.52	0.52	0.43	0.43	0.37	0.34	0.34	0.28
		Efficiency(%)	39.5	35.2	37.7	31.6	29.9	30.5	26.6	28.8
		Output Torque(kg-m)	160	160	160	160	160	160	160	160
		Overhang Load(kg)	814	814	814	814	814	814	814	814
	800	Input(KW)	0.43	0.43	0.36	0.36	0.30	0.28	0.28	0.24
		Efficiency(%)	37.9	33.7	36.1	30.1	28.7	29.1	24.9	27.3
		Output Torque(kg-m)	160	160	160	160	160	160	160	160
		Overhang Load(kg)	814	814	814	814	814	814	814	814
40	1800	Input(KW)	1.31	1.28	1.10	1.01	0.85	0.88	0.75	0.73
		Efficiency(%)	44.1	40.0	41.9	38.1	36.0	32.8	34.1	31.5
		Output Torque(kg-m)	250	250	250	250	250	250	250	250
		Overhang Load(kg)	1345	1345	1345	1345	1345	1345	1345	1345
	1500	Input(KW)	1.13	1.10	0.95	0.88	0.74	0.77	0.65	0.63
		Efficiency(%)	42.6	38.8	40.5	36.6	34.7	31.4	33.0	30.3
		Output Torque(kg-m)	250	250	250	250	250	250	250	250
		Overhang Load(kg)	1345	1345	1345	1345	1345	1345	1345	1345
	1200	Input(KW)	0.93	0.92	0.78	0.72	0.61	0.63	0.54	0.53
		Efficiency(%)	41.4	37.0	39.2	35.5	33.5	30.4	31.7	29.2
		Output Torque(kg-m)	250	250	250	250	250	250	250	250
		Overhang Load(kg)	1345	1345	1345	1345	1345	1345	1345	1345
	1000	Input(KW)	0.80	0.79	0.68	0.62	0.53	0.54	0.47	0.45
		Efficiency(%)	40.4	36.0	37.9	34.5	32.2	29.4	30.5	28.1
		Output Torque(kg-m)	250	250	250	250	250	250	250	250
		Overhang Load(kg)	1345	1345	1345	1345	1345	1345	1345	1345
	800	Input(KW)	0.66	0.66	0.56	0.52	0.44	0.46	0.39	0.38
		Efficiency(%)	38.7	34.7	36.3	32.9	30.8	28.0	29.2	26.7
		Output Torque(kg-m)	250	250	250	250	250	250	250	250
		Overhang Load(kg)	1345	1345	1345	1345	1345	1345	1345	1345

Selection Table • PDA Series

Type	Input Speeds (rpm)	Ratio	1/100	1/150	1/200	1/250	1/300	1/400	1/500	1/600
45	1800	Input(KW)	8.64	6.03	4.75	3.80	3.56	2.82	2.17	1.97
		Efficiency(%)	65.3	62.3	59.4	59.3	55.3	52.5	51.9	47.6
		Output Torque(kg-m)	305	320	320	320	320	320	320	320
		Overhang Load(kg)	1700	1700	1700	1700	1700	1700	1700	1700
	1500	Input(KW)	7.55	5.11	4.04	3.23	3.05	2.43	1.86	1.69
		Efficiency(%)	64.4	61.3	58.1	58.1	53.8	50.8	50.6	46.2
		Output Torque(kg-m)	319	320	320	320	320	320	320	320
		Overhang Load(kg)	1700	1700	1700	1700	1700	1700	1700	1700
	1200	Input(KW)	6.23	4.19	3.32	2.63	2.51	2.00	1.52	1.41
		Efficiency(%)	63.3	59.7	56.6	57.1	52.4	49.2	49.5	44.5
		Output Torque(kg-m)	320	320	320	320	320	320	320	320
		Overhang Load(kg)	1700	1700	1700	1700	1700	1700	1700	1700
	1000	Input(KW)	5.28	3.58	2.83	2.23	2.16	1.71	1.30	1.22
		Efficiency(%)	62.2	58.4	55.3	56.1	50.8	48.1	48.3	43.0
		Output Torque(kg-m)	320	320	320	320	320	320	320	320
		Overhang Load(kg)	1700	1700	1700	1700	1700	1700	1700	1700
	800	Input(KW)	4.29	2.91	2.31	1.83	1.76	1.41	1.07	1.00
		Efficiency(%)	61.2	57.3	54.1	54.6	49.8	46.6	46.9	41.8
		Output Torque(kg-m)	320	320	320	320	320	320	320	320
		Overhang Load(kg)	1700	1700	1700	1700	1700	1700	1700	1700
50	1800	Input(KW)	13.45	9.60	7.43	6.08	5.15	3.98	3.29	2.93
		Efficiency(%)	68.3	63.8	61.8	60.4	59.4	57.7	55.8	52.3
		Output Torque(kg-m)	497	497	497	497	497	497	497	497
		Overhang Load(kg)	2000	2000	2000	2000	2000	2000	2000	2000
	1500	Input(KW)	11.65	8.14	6.27	5.16	4.36	3.40	2.80	2.50
		Efficiency(%)	65.7	62.7	61.0	59.3	58.5	56.2	54.7	51.0
		Output Torque(kg-m)	497	497	497	497	497	497	497	497
		Overhang Load(kg)	2000	2000	2000	2000	2000	2000	2000	2000
	1200	Input(KW)	9.48	6.64	5.15	4.24	3.54	2.79	2.30	2.06
		Efficiency(%)	64.6	61.5	59.4	57.8	57.7	54.8	53.3	49.5
		Output Torque(kg-m)	497	497	497	497	497	497	497	497
		Overhang Load(kg)	2000	2000	2000	2000	2000	2000	2000	2000
	1000	Input(KW)	8.08	5.66	4.36	3.61	3.08	2.36	1.95	1.77
		Efficiency(%)	63.2	60.1	58.5	56.6	55.3	54.0	52.3	48.0
		Output Torque(kg-m)	497	497	497	497	497	497	497	497
		Overhang Load(kg)	2000	2000	2000	2000	2000	2000	2000	2000
	800	Input(KW)	6.52	4.60	3.56	2.94	2.50	1.94	1.60	1.45
		Efficiency(%)	62.6	59.1	57.3	55.5	54.5	52.6	50.9	46.8
		Output Torque(kg-m)	497	497	497	497	497	497	497	497
		Overhang Load(kg)	2000	2000	2000	2000	2000	2000	2000	2000

Type	Input Speeds (rpm)	Ratio	1/800	1/900	1/1000	1/1200	1/1500	1/1600	1/1800	1/2000
45	1800	Input(KW)	1.60	1.67	1.27	1.30	1.04	1.09	1.00	0.88
		Efficiency(%)	44.1	39.4	44.2	36.2	36.1	34.0	33.0	33.5
		Output Torque(kg-m)	320	320	320	320	320	320	320	320
		Overhang Load(kg)	1700	1700	1700	1700	1700	1700	1700	1700
	1500	Input(KW)	1.38	1.44	1.10	1.12	0.90	0.95	0.86	0.76
		Efficiency(%)	42.5	38.1	42.7	34.8	34.8	32.5	32.0	32.2
		Output Torque(kg-m)	320	320	320	320	320	320	320	320
		Overhang Load(kg)	1700	1700	1700	1700	1700	1700	1700	1700
	1200	Input(KW)	1.15	1.19	0.90	0.94	0.75	0.80	0.72	0.63
		Efficiency(%)	40.9	36.7	41.6	33.3	33.4	30.9	30.4	31.2
		Output Torque(kg-m)	320	320	320	320	320	320	320	320
		Overhang Load(kg)	1700	1700	1700	1700	1700	1700	1700	1700
	1000	Input(KW)	1.00	1.04	0.77	0.81	0.64	0.69	0.62	0.54
		Efficiency(%)	39.3	35.0	40.4	32.0	32.4	29.7	29.5	30.1
		Output Torque(kg-m)	320	320	320	320	320	320	320	320
		Overhang Load(kg)	1700	1700	1700	1700	1700	1700	1700	1700
	800	Input(KW)	0.82	0.86	0.64	0.68	0.54	0.58	0.52	0.46
		Efficiency(%)	38.0	33.8	38.8	30.5	30.8	28.2	28.0	28.7
		Output Torque(kg-m)	320	320	320	320	320	320	320	320
		Overhang Load(kg)	1700	1700	1700	1700	1700	1700	1700	1700
50	1800	Input(KW)	2.29	2.46	1.91	1.96	1.64	1.43	1.73	1.43
		Efficiency(%)	50.2	41.5	48.2	39.0	37.3	40.1	29.5	32.1
		Output Torque(kg-m)	497	497	497	497	497	497	497	497
		Overhang Load(kg)	2000	2000	2000	2000	2000	2000	2000	2000
	1500	Input(KW)	1.96	2.14	1.63	1.69	1.42	1.24	1.49	1.24
		Efficiency(%)	48.8	39.8	46.8	37.8	35.8	38.7	28.6	30.9
		Output Torque(kg-m)	497	497	497	497	497	497	497	497
		Overhang Load(kg)	2000	2000	2000	2000	2000	2000	2000	2000
	1200	Input(KW)	1.62	1.77	1.35	1.41	1.19	1.03	1.25	1.03
		Efficiency(%)	47.2	38.4	45.2	36.2	34.2	37.1	27.1	29.6
		Output Torque(kg-m)	497	497	497	497	497	497	497	497
		Overhang Load(kg)	2000	2000	2000	2000	2000	2000	2000	2000
	1000	Input(KW)	1.38	1.53	1.15	1.21	1.02	0.89	1.08	0.89
		Efficiency(%)	46.2	37.0	44.3	35.0	33.4	36.0	26.3	28.7
		Output Torque(kg-m)	497	497	497	497	497	497	497	497
		Overhang Load(kg)	2000	2000	2000	2000	2000	2000	2000	2000
	800	Input(KW)	1.14	1.27	0.96	1.01	0.85	0.74	0.91	0.75
		Efficiency(%)	44.8	35.7	42.6	33.8	31.9	34.6	25.0	27.3
		Output Torque(kg-m)	497	497	497	497	497	497	497	497
		Overhang Load(kg)	2000	2000	2000	2000	2000	2000	2000	2000

Component List

PR Series, PA Series
PO Series, PF Series

Type	Bearing		Oil Seal (SC)		O-ring JIS 1517	Remarks
	Input Shaft	Output Shaft	Input Shaft	Output Shaft		
12	30203	6204	17306	20358	14	
15	30204	6205	20358	25408	19	
18	30205	6206	25408	305011	25	
22	30206	6207	305011	355511	28	
25	30207	6208	355511	406212	39	
30	32208	6210	406212	507212	44	
35	32209	6212	456812	608212	51	
40	30310	32213 30313 (O)	507212	659514	—	(O) represents PO type
45	30311	6314 30314 (O)	558012	7010014	—	(O) represents PO type
50	30313	6316 30316 (O)	659514	8011515	—	(O) represents PO type
60	30313	6317 30317 (O)	659514	8512015	—	

Self-Locking

Conventional worm gears have an integral braking effect. Bellpony speed reducers provide poor braking because their teeth are extra-precise. To obtain adequate braking, operating efficiency must be reduced by more than 50 percent.

Self-locking differs between moving loads and stationary loads. Static friction is always greater than dynamic friction, so self-locking for stationary loads may not be effective for moving loads. Locking efficiency depends on such factors as rpm and helix angle. For single screw threads, self-locking is usually effective at a ratio of 1/40 or 1/60. With Bellpony reducers, tooth engagement is so smooth that a helix angle of approx. 3° is required. If self-locking is needed, modifications can be made upon request. Write for details.

Lubrication

Adequate lubrication is extremely important because worm gears are subject to intense friction.
Lubricants for worm gear speed reducers must match the model, load condition and ambient temperature.

[Lubrication Table]

Room Temperature	Operating Conditions	ISO VG	Mobil	Shell	Exxon
-15°C to 5°C	Medium Impact (Input rpm: 600 or more)	150	Mobilgear 629 DTE Oil Extra Heavy	Omala Oil 150	Spartan EP150
	Heavy Impact (Input rpm: Below 600)	320	Mobilgear 632 DTE Oil AA	Omala Oil 320	Spartan EP320
5°C to 40°C	Medium Impact (Input rpm: 600 or more)	320	Mobilgear 632 DTE Oil AA	Omala Oil 320	Spartan EP320
	Heavy Impact (Input rpm: Below 600)	460	Mobilgear 634 DTE Oil HH	Omala Oil 460	Spartan EP460
40°C to 70°C	Medium Impact (Input rpm: 600 or more)	460	Mobilgear 634 DTE Oil HH	Omala Oil 460	Spartan EP460
	Heavy Impact (Input rpm: Below 600)	680	Mobilgear 636	Omala Oil 460	Spartan EP680

Notes:

1. First 30 hrs: Operate with a lighter load than normal.
   First 100 hrs: Change oil after cleaning.
   After first 100 hrs: Change oil every 2,500 hrs.
2. Never operate without oil. Such operation will seriously damage gear teeth and shaft. Excessive oil can cause overheating and leaks. Never overfill.
3. Proper lubrication and maintenance have an important effect on service life. For details, refer to the instruction manual.

Ordering

1. Bellpony speed reducers are designed to operate at an input shaft reference speed of 1,800 rpm, but can be used at speeds as low as 300 rpm within the input power ranges in the selection table.
2. Select a higher rated speed reducer if special operating or load conditions or extremely large impulses are involved.
3. When ordering, specify the following:
   - Series name, type No., output shaft location (left, right, double, etc.).
   - Input shaft rpm, reduction ratio.
   - Output shaft power (kW).
   - Torque during continuous operation and during intermittent operation.
   - Connection with other machines and details of load condition.
   - Necessity of self-locking
   - Installation location and condition.
   - Number of units required.

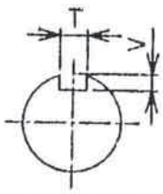
Troubleshooting

Problems	Causes	Remedy
Gear case becomes unusually hot.	1. Overloaded.	Decrease load or use a larger model.
	2. Insufficient or excessive lubricating oil.	Adjust oil level so it aligns with mark on oil gauge.
	3. Contaminated oil.	Flush interior and replace oil.
	4. Oil viscosity is improper.	Change oil with one having the proper viscosity.
	5. Bearings are improperly mounted.	Reassemble and tighten properly (Consult dealer.)
	6. Shaft is connected improperly.	Align properly.
	7. Air vent port is closed.	Remove rubber plug from oil cap.
	8. Ambient temperature is too high.	Install cooling fan or move to cooler area.
Unusual or excessive noise.	1. Improper meshing.	Adjust properly (Consult dealer).
	2. Bearings are damaged or worn.	Replace bearings (Consult dealer).
	3. Overloaded.	Decrease load or use a larger model.
	4. Insufficient oil.	Add oil so level aligns with oil gauge.
	5. Oil seal is not wet with oil.	Lubricate.
	6. Improper installation or connection.	Tighten loose bolts and align correctly.
	7. Bearings are improperly mounted.	Adjust (Consult dealer).
	8. Input rpm is too high.	Reduce.
	9. Foreign particles are mixed in oil.	Remove foreign particles and replace oil after flushing interior. (Consult dealer)
Vibration is excessive.	1. Gear teeth are worn.	Replace wheel (Consult dealer).
	2. Foreign particles are mixed in oil.	Remove foreign particles and replace oil after flushing interior (Consult dealer).
	3. Bearings are worn or damaged.	Replace bearings. (Consult dealer)
	4. Mounting bolts are loose	Tighten.
	5. Wheel is improperly aligned.	Replace wheel (Consult dealer).
Input/output shafts do not rotate at all.	1. Teeth seizure.	Replace worm and wheel (Consult dealer).
	2. Bearings are worn or damaged.	Replace bearings (Consult dealer).
	3. Foreign particles are mixed in oil.	Remove foreign particles and replace oil after flushing interior.
Input/output shaft rotates in idle condition and output shaft is not driven.	1. Wheel teeth is worn.	Replace wheel (Consult dealer).
	2. Wheel boss or shaft key are damaged.	Replace wheel or key (Consult dealer).
	3. Input shaft or worm teeth are damaged.	Replace shaft or worm (Consult dealer).
	4. Input shaft is broken.	Replace shaft (Consult dealer).
Teeth are worn.	1. Overloaded.	Reduced load.
	2. Contaminated oil.	Replace oil after flushing interior.
	3. Insufficient oil.	Add oil.
	4. Oil viscosity is too low.	Replace oil with one having the proper viscosity.
	5. Ambient temperature is too high.	Install cooling fan or move to cooler area.
	6. Foreign particles are mixed in oil.	Remove foreign particles, clean interior and replace oil.
	7. Excessive rpm.	Reducer rpm or use a different model.
	8. Backlash is improper.	Reassemble and adjust.
Main body has cracks or shaft is broken.	1. Overloaded.	Reduce load or use a larger model.
	2. Impact load is greater than rated load.	Reduce impact load or use a larger model.
	3. Connection is improper.	Align properly.
	4. Gear case has partial thickness or cavities.	Replace gear case. (Consult dealer)
Oil leaks	1. Oil seal is defective.	Replace oil seal.
	2. Cover mounting bolts are loose.	Tighten bolts.
	3. Air does not escape.	Check oil cap.
	4. Input and output shafts are marred.	Replace shafts. (Consult dealer)
	5. Excessive oil.	Adjust oil level so it aligns with mark on oil gauge.
	6. Gear case has cavities.	Replace gear case. (Consult dealer)
	7. Gear case has fissures.	Replace gear case. (Consult dealer)
	8. Other than normal installation directions (horizontal oblique, upside-down etc.)	Consult dealer about installation.

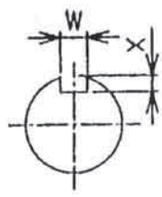
BELLPONY WORM GEAR SPEED REDUCERS NEW KEY SIZE TABLE

N－PR・N－PA・N－PO・N－PF
N－PDA・N－PDO SERIES

INPUT SHAFT

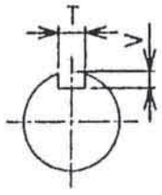


OUTPUT SHAFT

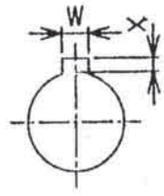


N－PFH SERIES

INPUT SHAFT



OUTPUT SHAFT



N－PR・N－PA・N－PO・N－PF SERIES

TYPE	SHAFT	SHAFT DIA-METER	SIZE	BEFOR	AFTER
12	INPUT	12	KEY SIZE	4X4	4X4
			T SIZE	4	4
			V SIZE	2.5	2.5
	OUTPUT	17	KEY SIZE	5X5	5X5
			W SIZE	5	5
			X SIZE	3	3
15	INPUT	15	KEY SIZE	5X5	5X5
			T SIZE	5	5
			V SIZE	3	3
	OUTPUT	22	KEY SIZE	7X7	6X6
			W SIZE	7	6
			X SIZE	4	3.5
18	INPUT	18	KEY SIZE	5X5	6X6
			T SIZE	5	6
			V SIZE	3	3.5
	OUTPUT	28	KEY SIZE	7X7	8X7
			W SIZE	7	8
			X SIZE	4	4
22	INPUT	22	KEY SIZE	7X7	6X6
			T SIZE	7	6
			V SIZE	4	3.5
	OUTPUT	32	KEY SIZE	10X8	10X8
			W SIZE	10	10
			X SIZE	4.5	5
25	INPUT	25	KEY SIZE	7X7	8X7
			T SIZE	7	8
			V SIZE	4	4
	OUTPUT	38	KEY SIZE	10X8	10X8
			W SIZE	10	10
			X SIZE	4.5	5
30	INPUT	30	KEY SIZE	7X7	8X7
			T SIZE	7	8
			V SIZE	4	4
	OUTPUT	45	KEY SIZE	12X8	14X9
			W SIZE	12	14
			X SIZE	4.5	5.5
35	INPUT	35	KEY SIZE	10X8	10X8
			T SIZE	10	10
			V SIZE	4.5	5
	OUTPUT	55	KEY SIZE	15X10	16X10
			W SIZE	15	16
			X SIZE	5	6
40	INPUT	40	KEY SIZE	10X8	12X8
			T SIZE	10	12
			V SIZE	4.5	5
	OUTPUT	60	KEY SIZE	15X10	18X11
			W SIZE	15	18
			X SIZE	5	7
45	INPUT	45	KEY SIZE	12X8	14X9
			T SIZE	12	14
			V SIZE	4.5	5.5
	OUTPUT	65	KEY SIZE	18X12	18X11
			W SIZE	18	18
			X SIZE	6	7
50	INPUT	50	KEY SIZE	15X10	14X9
			T SIZE	15	14
			V SIZE	5	5.5
	OUTPUT	75	KEY SIZE	20X13	20X12
			W SIZE	20	20
			X SIZE	7	7.5
60	INPUT	60	KEY SIZE	18X12	18X11
			T SIZE	18	18
			V SIZE	6	7
	OUTPUT	80	KEY SIZE	24X16	22X14
			W SIZE	24	22
			X SIZE	8	9

N－PFH SERIES

TYPE	SHAFT	SHAFT DIA-METER	SIZE	BEFOR	AFTER
15	INPUT	15	KEY SIZE	5X5	5X5
			T SIZE	5	5
			V SIZE	3	3
	OUTPUT	25	KEY SIZE	7X7	8X7
			W SIZE	7	8
			X SIZE	3	3.3
18	INPUT	18	KEY SIZE	5X5	6X6
			T SIZE	5	6
			V SIZE	3	3.5
	OUTPUT	30	KEY SIZE	7X7	8X7
			W SIZE	7	8
			X SIZE	3	3.3
22	INPUT	22	KEY SIZE	7X7	6X6
			T SIZE	7	6
			V SIZE	4	3.5
	OUTPUT	35	KEY SIZE	10X8	10X8
			W SIZE	10	10
			X SIZE	3.5	3.3
25	INPUT	25	KEY SIZE	7X7	8X7
			T SIZE	7	8
			V SIZE	4	4
	OUTPUT	40	KEY SIZE	10X8	12X8
			W SIZE	10	12
			X SIZE	3.5	3.3
30	INPUT	30	KEY SIZE	7X7	8X7
			T SIZE	7	8
			V SIZE	4	4
	OUTPUT	45	KEY SIZE	12X8	14X9
			W SIZE	12	14
			X SIZE	3.5	3.8
35	INPUT	35	KEY SIZE	10X8	10X8
			T SIZE	10	10
			V SIZE	4.5	5
	OUTPUT	60	KEY SIZE	15X10	18X11
			W SIZE	15	18
			X SIZE	5	4.4

N－PDA・N－PDO SERIES

TYPE	SHAFT	SHAFT DIA-METER	SIZE	BEFOR	AFTER
18	INPUT	12	KEY SIZE	4X4	4X4
			T SIZE	4	4
			V SIZE	2.5	2.5
	OUTPUT	28	KEY SIZE	7X7	8X7
			W SIZE	7	8
			X SIZE	4	4
22	INPUT	12	KEY SIZE	4X4	4X4
			T SIZE	4	4
			V SIZE	2.5	2.5
	OUTPUT	32	KEY SIZE	10X8	10X8
			W SIZE	10	10
			X SIZE	4.5	5
25	INPUT	15	KEY SIZE	5X5	5X5
			T SIZE	5	5
			V SIZE	3	3
	OUTPUT	38	KEY SIZE	10X8	10X8
			W SIZE	10	10
			X SIZE	4.5	5
30	INPUT	18	KEY SIZE	5X5	6X6
			T SIZE	5	6
			V SIZE	3	3.5
	OUTPUT	45	KEY SIZE	12X8	14X9
			W SIZE	12	14
			X SIZE	4.5	5.5
35	INPUT	22	KEY SIZE	7X7	6X6
			T SIZE	7	6
			V SIZE	4	3.5
	OUTPUT	55	KEY SIZE	15X10	16X10
			W SIZE	15	16
			X SIZE	5	6
40	INPUT	25	KEY SIZE	7X7	8X7
			T SIZE	7	8
			V SIZE	4	4
	OUTPUT	60	KEY SIZE	15X10	18X11
			W SIZE	15	18
			X SIZE	5	7
45	INPUT	30	KEY SIZE	7X7	8X7
			T SIZE	7	8
			V SIZE	4	4
	OUTPUT	65	KEY SIZE	18X12	18X11
			W SIZE	18	18
			X SIZE	7	7
50	INPUT	35	KEY SIZE	10X8	10X8
			T SIZE	10	10
			V SIZE	4.5	5
	OUTPUT	75	KEY SIZE	20X13	20X12
			W SIZE	20	20
			X SIZE	7	7.5