Features

JUST FIT SIZE

26 sizes variation for most accurate economical selection.

Prepared full range 26 sizes variation.
Fitness size selection available for every requested torque.
Customer's wide design availability with most accurate economical selection.

Size	Output Torque
9015	2.6
9025	4.2
9030	6.4
9035	8.5
9040	10.1
9045	13.2
9050	15.3
9055	19.9
9060	24.4

Size	Output Torque
9065	31.4
9070	38.2
9075	47.8
9080	58.5
9085	73.1
9090	85.9
9095	101
9100	122
9105	144

Size	Output Torque
9110	174
9115	207
9118	260
9121	301
9126	351
9128	420
9131	473
9136	552

【kNm】

NEW DESIGN CONCEPT

Direct motor mount for right angle type also standardized.

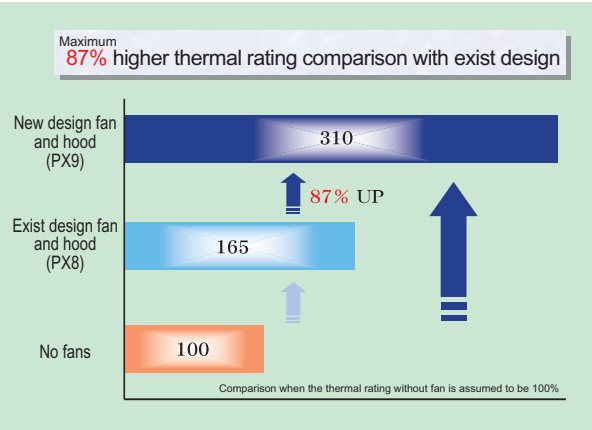
Direct motor mount design of right angle type is standardized.
It have a number of outstanding features.

1. No input coupling
2. No coupling alignment required
3. Compact drive assembly

LARGER THERMAL CAPACITY

Advanced thermal capacity by new designed fan cooling system. (Option)

New designed fan and conduct air cowling gain larger thermal capacity.
This system benefit for severe situation like continuous operation, even if compact size.

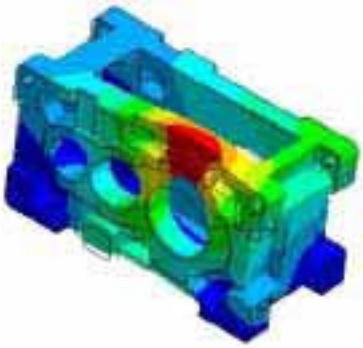


Features

LOW NOISE

Low noise resulting from optimized gear tooth profile modification and rigid housing design.

FEM analysis used to maximize housing strength and rigidity, so maintaining correct gear alignment and bearing loading.

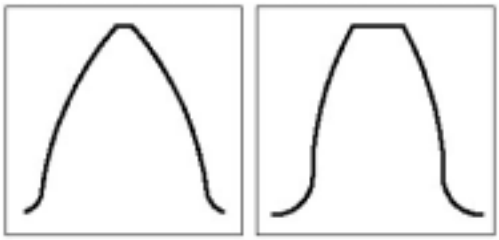


FEM Analysis

HIGH TOOTH STRENGTH

25 deg Pressure angle

In comparison with ordinary pressure angle (20 deg), 25 deg pressure angle permits a tooth from with thicker dedendum.
This translates into higher tooth strength rating, an essential feature for shock load applications.



25 deg Pressure Angle 20 deg Pressure Angle

UNIVERSAL HOUSING

Horizontal, vertical or upright mounting - All use the same housing.

Horizontal mounting

Vertical mounting

Upright mounting

AVAILABLE COMBINATION

Drive Unit: Right Angle

	Ratio	6.3	7.1	8	9	10	11.2	12.5	14	16	18	20	22.4	25	28	31.5	35.5	40	45	50	56	63	71
O/P speed r/min	60Hz	286	254	225	200	180	161	144	129	113	100	90	80	72	64	57	51	45	40	36	32	29	25
	50Hz	238	211	188	167	150	134	120	107	94	83	75	67	60	54	48	42	38	33	30	27	24	21
Motor (kW × P)	5.5x4															●	●	●	●	●	●	●	●
	7.5x4														●	●	●	●	●	●	●	●	●
	11x4									●	●	●	●	●	●	●	●	●	●	●	●	●	●
	15x4							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	18.5x4					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	22x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	30x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	37x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	45x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	55x4	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●

Drive Unit: Parallel

	Ratio	6.3	7.1	8	9	10	11.2	12.5	14	16	18	20	22.4	25	28	31.5	35.5	40	45	50	56	63	71
O/P speed r/min	60Hz	286	254	225	200	180	161	144	129	113	100	90	80	72	64	57	51	45	40	36	32	29	25
	50Hz	238	211	188	167	150	134	120	107	94	83	75	67	60	54	48	42	38	33	30	27	24	21
Motor (kW × P)	5.5x4								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	7.5x4						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	11x4		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	15x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	18.5x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	22x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	30x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	37x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	45x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	55x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	75 x4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	90 x4			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	110 x4						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Reducer

	Ratio	6.3	7.1	8	9	10	11.2	12.5	14	16	18	20	22.4	25	28	31.5	35.5	40	45	50	56	63	71
Size	9015	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
	9025	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
	9030	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9035			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9040	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9045			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9050	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9055			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9060	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9065			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9070	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9075			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9080	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9085			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9090	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9095		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9100	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9105		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9110	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9115		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	9118													●		●	●	●	●	●	●	●	●
	9121														●	●	●	●	●	●	●	●	●
	9126														●	●	●	●	●	●	●	●	●
	9128														●	●	●	●	●	●	●	●	●
	9131												●	●	●	●	●	●	●	●	●	●	●
	9136												●	●	●	●	●	●	●	●	●	●	●

AVAILABLE COMBINATION

80	90	100	112	125	140	160	180	200	224	250	280	315	355	400	450	500	Ratio	
23	20	18	16	14	13	11	10	9.0	8.0	7.2	6.4	5.7	5.1	4.5	4.0	3.6	60Hz	O/P speed r/min
19	17	15	13	12	11	9.4	8.3	7.5	6.7	6.0	5.4	4.8	4.2	3.8	3.3	3.0	50Hz	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	5.5x4	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	7.5x4	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	11x4	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	15x4	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	18.5x4	Motor (kW × P)
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	22x4	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	30x4	
●	●	●	●	●	●	●	●	●	●	●	●	●	●				37x4	
●	●	●	●	●	●	●	●	●	●	●	●	●					45x4	
●	●	●	●	●	●	●	●	●	●	●							55x4	

80	90
23	20
19	17
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●

Drive Unit: Right Angle

Reducer: Right Angle

Drive Unit: Parallel

Reducer: Parallel

80	90	100	112	125	140	160	180	200	224	250	280	315	355	400	450	500	Ratio	
																	9015	
																	9025	
●	●	●	●	●	●	●	●	●	●								9030	
●	●	●	●	●	●	●	●	●	●	●	●						9035	
●	●	●	●	●	●	●	●	●	●								9040	
●	●	●	●	●	●	●	●	●	●	●	●						9045	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			9050	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	9055	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			9060	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	9065	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			9070	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	9075	Size
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			9080	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	9085	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			9090	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		9095	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			9100	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		9105	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			9110	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		9115	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		9118	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			9121	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			9126	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			9128	
●	●	●	●	●	●	●	●	●	●	●	●	●					9131	
●	●	●	●	●	●	●	●	●	●	●	●	●					9136	

AVAILABLE COMBINATION

Basic Motor

Table 1. 3-Phase Induction Motors (4 Pole).

◎ : Standard Insulation
● : Manufacutured Models

Capacity kW	Indoor Type	Outdoor Type	Corrosion-proof Class 2	Specifications Inslation Class B	F	H	Inverter Motors (Constant Torque) Indoor Type	Outdoor Type
5.5	●	●	●	◎	●	●	●	●
7.5	●	●	●	◎	●	●	●	●
11	●	●	●	◎	●	●	●	●
15	●	●	●	◎	●	●	●	●
18.5	●	●	●	◎	●	●	●	●
22	●	●	●	◎	●	●	●	●
30	●	●	●		◎	●	●	●
37	●	●	●		◎	●	●	●
45	●	●	●		◎	●	●	●
55	●	●	●		◎	●	●	●

Remarks
Continuous Rating, 55kW and under,
Applicable Voltage : 200V 50/60Hz(400V 50/60Hz,440V 60Hz,440V 60Hz)
Provided that the base frequency for driving an inverter is 60 Hz.

Table 2. 3-Phase Induction Motors with Built-in Brakes (4 Pole).

◎ : Standard Insulation
● : Manufacutured Models

Capacity kW	Indoor Type	Outdoor Type	Corrosion-proof Class 2	Specifications Inslation Class B	F	H	Inverter Motors (Constant Torque) Indoor Type	Outdoor Type
5.5	●	●	●	◎	●	●	●	●
7.5	●	●	●	◎	●	●	●	●
11	●	●	●	◎	●	●	●	●
15	●	●	●	◎	●	●	●	●
18.5	●	●	●	◎	●	●	●	●
22	●	●	●	◎	●	●	●	●
30	●	●	●		◎	●	●	●
37	●	●	●		◎	●		

Remarks
Continuous Rating,
Applicable Voltage : 200V 50/60Hz , 220V 50/60Hz (400V 50/60Hz , 440V 60Hz)
Provided that the base frequency for driving an inverter is 60 Hz.
Brake Insulation : B type

Notes: 1. Motors with output kW specifications other than as listed in Tables 1-4 are also manufactured. Consult factory.
Examples: Special voltage, dust-proof, humidity-proof, tropical treatment, high temperature, ship use, dual shaft (round & square shaft), CSA standard, NEMA standard, etc.
2. When using an inverter drive, advice us of ambient temperature, input r/min, mounting method, load characteristics and other conditions of use.

AVAILABLE COMBINATION

Table 3. Safety Increased Explosion-proof (eG3) 3-Phase Induction Motor (4 Pole).

◎ : Standard Insulation
● : Manufacutured Models

Capacity kW	Specifications: Indoor Type	Outdoor Type	Corrosion-proof Class 2	Inslation Class B	Inslation Class F
5.5	●	●	●	◎	●
7.5	●	●	●	◎	●
11	●	●	●	◎	●
15	●	●	●	◎	
18.5	●	●	●	◎	
22	●	●	●	◎	
30	●	●	●	◎	●
37	●	●	●		◎
45	●	●	●		◎
55	●	●	●		◎

Remarks
Continuous Rating
Applicable Voltage: 200V, 220V, 350V, 380V, 400V, 440V, 50/60Hz

Table 4. Pressure-tight Explosion-proof (d2G4) 3-Phase Motor (4 Pole).

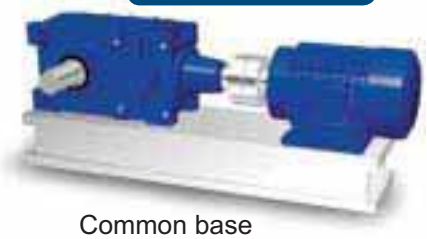
◎ : Standard Insulation
● : Manufacutured Models

Capacity kW	Specifications: Indoor Type	Outdoor Type	Corrosion-proof Class 2	Inslation Class B	Inverter Motors (Constant Torque) Indoor Type
5.5	●	●	●	◎	●
7.5	●	●	●	◎	●
11	●	●	●	◎	●
15	●	●	●	◎	●
18.5	●	●	●	◎	●
22	●	●	●	◎	●
30	●	●	●	◎	●
37	●	●	●		●

Remarks
Continuous Rating
Applicable Voltage : 200V , 220V , 350V , 380V , 400V , 440V 50/60Hz
(Inverter Motors) : 200V 60Hz , 220V 60Hz , 400V 60Hz , 440V 60Hz
Applicable Inverter :Applicable only to Sumitomo Inverters.(Refer to Inverter catalogue.)

INTRODUCTION OF APPLICATION

With Motor



Common base

Drive unit right angle

Drive unit parallel

Double Stack

Single stage

Top mount

Reducer

Steel housing

Right angle

Parallel

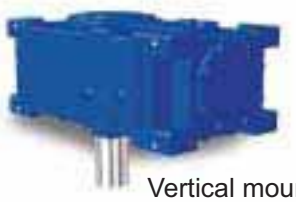
Mounting

Upright mount

Upright wall mount

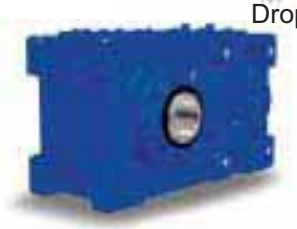
Special slow speed shaft

Drop bearing housing



Vertical mount

Ceiling mount



Hollow shaft

<Drive Unit Right Angle Shaft>

<Drive Unit Parallel Shaft>

B

Drive Unit

Drive Unit Standard Specifications

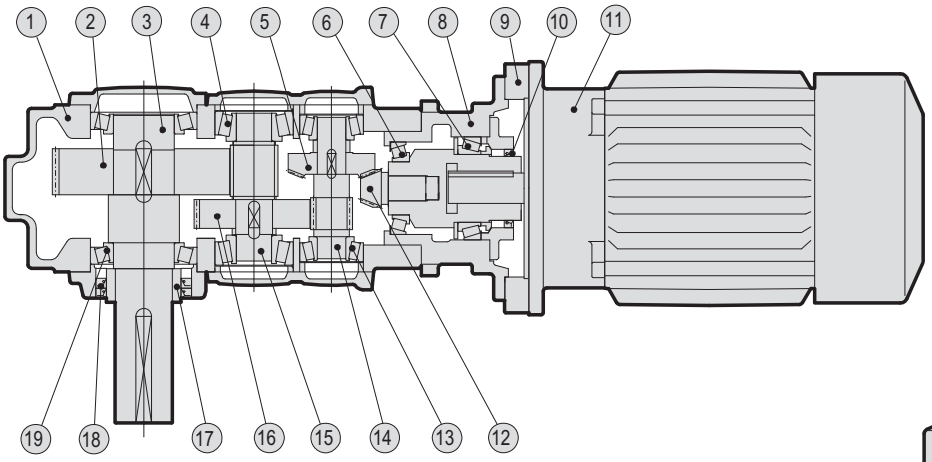
Item		Standard Specification		Standard Specification with Built-in Brake	
Motor	Capacity Range	5.5kWX4P ～ 55kWX4P		5.5kWX4P ～ 11kWX4P・FB Brake (Non Asbestos) 15kWX4P CMB Brake 18.5kWX4P ～ 37kWX4P ESB Brake	
	Enclosure	Totally enclosed fan cooled type		Totally enclosed fan cooled type	
	Power Source	55kW and smaller 200V 50/60Hz, 220V 60Hz		15kW and smaller 200V 50/60Hz, 220V 60Hz	
	Insulation	P / Insulation	4P	P / Insulation	4P
		Class B	5.5 ～ 22kW	Class B	5.5 ～ 15kW
		Class F	30 ～ 55kW		
	Time Rating	Continuous rating		Continuous rating	
	Lead Wiring (Lug Type)	P / Lead wiring	4P	P / Lead wiring	4P
		3	5.5 ～ 7.5kW (Direct starting)	5	5.5 ～ 7.5kW (Direct starting)
		6	Note 1 11 ～ 55kW (人-Δstarting available)	8	Note 1 11 ～ 37kW (人-Δstarting available)
	Standards	According to JIS			

Note 1: 人-Δ start is also available. Please consult us.

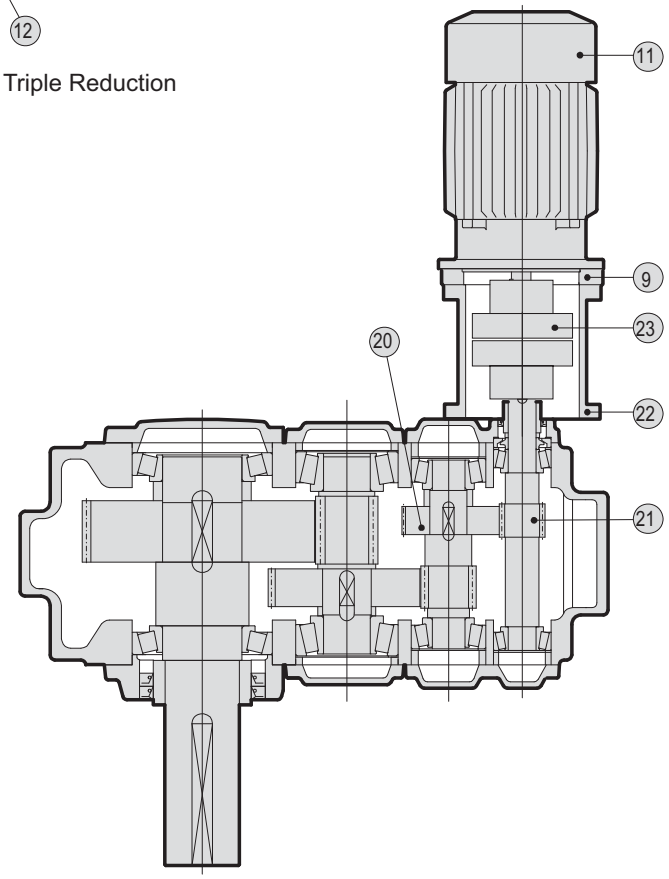
Item		Standard Specification		
		Mounting	High Speed Shaft Speed	
Reducer	Lubrication Method	Horizontal Shaft	750 ～ 1800r/min	Oil bath lubrication In case of high speed shaft speed is less than 750r/min, electric pump lubrication may be used. Consult SUMITOMO for details.
		Vertical Shaft	400 ～ 1800r/min	Pump lubrication (Two different pump lubrication systems are available; shaft connected pump lubrication and electric pump lubrication. For details, refer to the outside dimension drawing.)
		Upright Shaft	750 ～ 1800r/min	Oil bath lubrication Grease lubrication for right angle input shaft.
	Lubricant	Refer to the page D-2		
	Gear Type	Involute external gear		
Ambient Conditions	Installation Location	Indoor (Minimal dust and humidity)		
	Ambient Temperature	－ 10℃～ 40℃ A cooling fan may provided depending on the usage (Note 1)		
	Ambient Humidity	Under 85%		
	Elevation	Under 1,000 meters		
	Atmosphere	Well ventilated location, free of corrosive gases, explosive gases, vapors and dust.		
Installation		Horizontal installation Refer to the page D-2		
Method of Coupling with Driven Machine		Coupling, gears, chain sprocket or belt.		
Painting		Surface preparation: Shot blasting after washing before machining Inside painting: UNI GROUND PTC primer is sprayed once Outside painting: For prime-coating, UNI GROUND PTC primer is sprayed once. For final coating, NEO ALKYS is sprayed once. Painting color: MANSEL 5G 6/4.5. Refer to the page D-3.		

Note 1: In general, a heating or cooling system is necessary in case the ambient temperature is lower than － 10℃ or higher than +50℃ .

Drive Unit Construction Drawing



Drive Unit Right Angle Shaft Triple Reduction

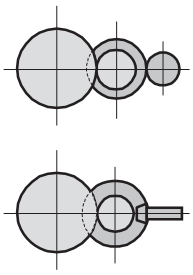
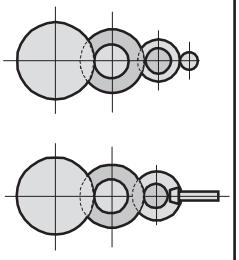
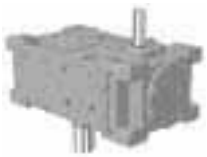
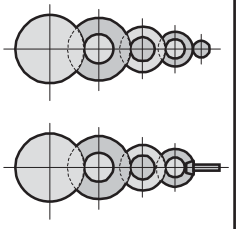


Drive Unit Parallel Shaft Triple Reduction

Ref.No.	Part Name	Ref.No.	Part Name	Ref.No.	Part Name	Ref.No.	Part Name
1	Housing	7	Taper roller bearing	13	Taper roller bearing	19	Taper roller bearing
2	Helical gear	8	Bearing housing	14	Helical pinion shaft	20	Helical gear
3	Slow speed shaft	9	Flange for motor	15	Helical pinion shaft	21	Helical pinion shaft
4	Taper roller bearing	10	Oil seal	16	Helical gear	22	Motor adapter
5	Bevel gear	11	Motor	17	Collar	23	Coupling
6	Taper roller bearing	12	Bevel pinion shaft	18	Oil seal		

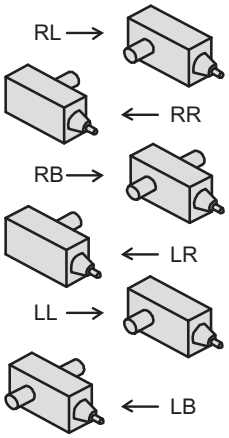
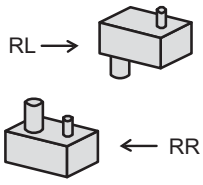
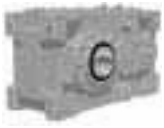
Drive Unit Nomenclature

P	H	A	9055	R	3

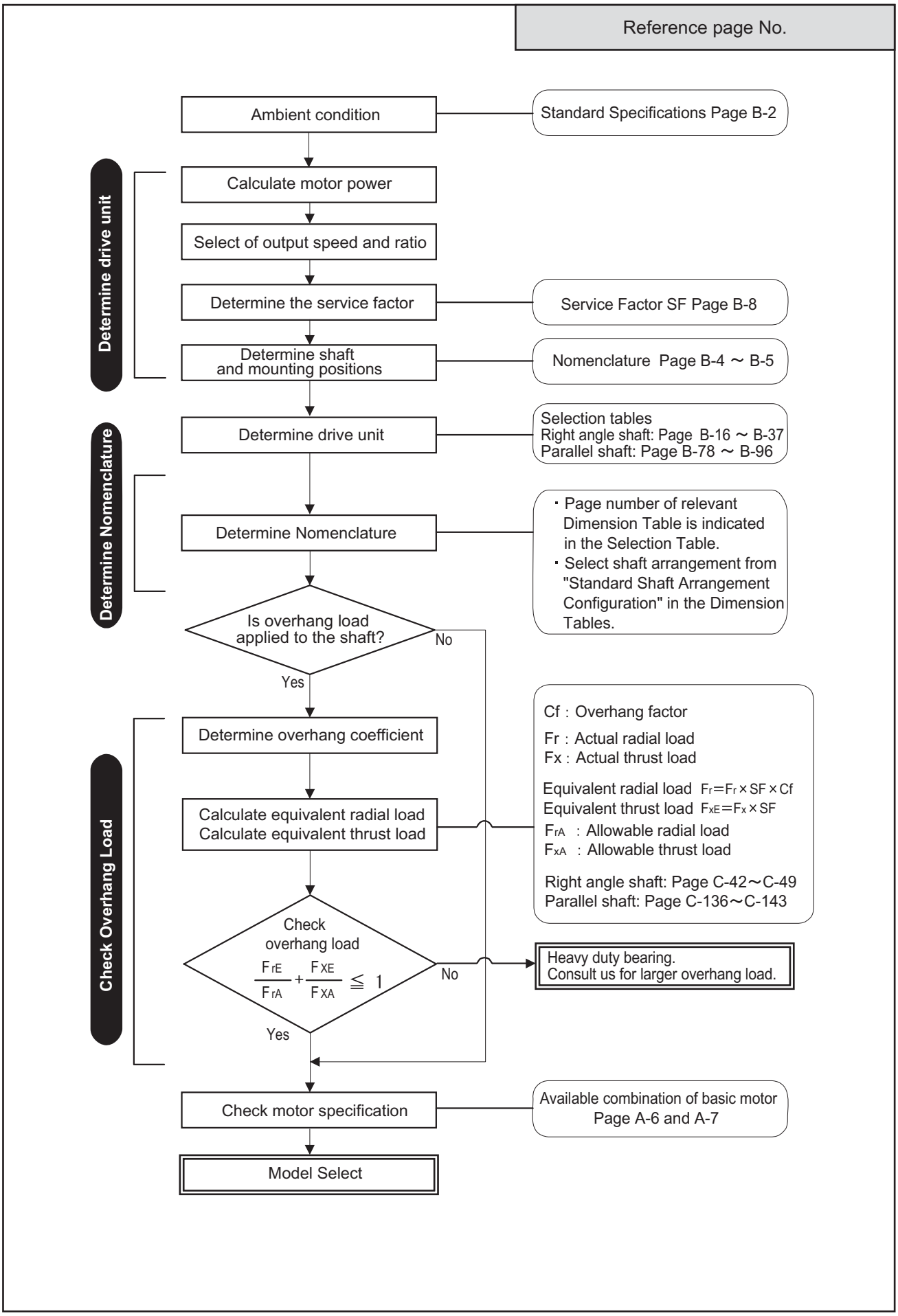
Series	Mounting	Housing	Size	Torque kNm	Shaft Position	Number of Gear Stage
P Paramax	H  Horizontal	A Monoblock	9015	2.6	R  Right Angle	2  Double Reduction
			9025	4.2		
			9030	6.4		
			9035	8.5		
			9040	10.1		
	V  Vertical		9045	13.2		3  Triple Reduction
			9050	15.3		
			9055	19.9	P  Parallel	
		D Split	9060	24.4		
	W  Upright		9065	31.4		4  Quadruple Reduction
			9070	38.2		
			9075	47.8		
			9080	58.5		
			9085	73.1		

1. For shaft arrangement, refer to the dimension sheets.
2. Consult us for reduction ratios smaller than 6.3.

[ ] — R M L K B — 35.5

Mounting for Upright	Shaft Arrangement	High Speed Shaft	Slow Speed Shaft	Option	Nominal Ratio
(Blank) 		M  Right Angle Shaft  Parallel Shaft	(Blank)  Solid Shaft	(Blank)  Without Option	Right Angle Shaft 6.3 56 7.1 63 8 71 9 80 10 90 11.2 100 12.5 112 14 125 16 140 18 160 20 180 22.4 200 25 224 28 250 31.5 280 35.5 315 40 355 45 400 50 450
W  Wall Mount (Upright Mounting)		Y  Flange for Motor (Right Angle Shaft) J  Motor Adapter (Parallel Shaft)	T  Hollow Shaft (Shrink Disk Type) K  Hollow Shaft (Key Type)	B  With Backstop	Parallel Shaft 6.3 56 7.1 63 8 71 9 80 10 90 11.2 100 12.5 112 14 125 16 140 18 160 20 180 22.4 200 25 224 28 250 31.5 280 35.5 315 40 355 45 400 50 450 500

Drive Unit Selection



Drive Unit Selection Example

○ : Conditions ■ : Selected item		Reference page No.
○ Ambient Condition	: Indoor, Ambient temperature 20℃	
■ Check ambient condition	→ OK	B-2 Standard Specifications
○ Load Power P	: P = 17kW	
■ Motor power	→ 18.5 kW	
○ Electric source	: 200V 50Hz	
○ Output speed	: 33 r/min	
Load condition		
○ Type of load, Operating hours	: Uniform load ・14 hors/day	
■ Determine service factor	→ 1.25	B-8 Service Factor
○ Shaft and mounting positions	: Right Angle Shaft・Horizontal Mounting	B-4 ～B-5 Nomenclature
■ Determine size, shaft position, number of stages	→ 9030 R3 45 Size 9030 Right Angle Shaft Triple Reduction Nominal Reduction Ratio 45	B-24 Selection Tables
■ Check dimension		B-44 *1 Dimension Tables
■ Check shaft arrangement	→ RML	
■ Check nomenclature	→ PHA9030R3-RML-45	
Check Overhang load		
○ Overhang member	: Sprocket (Single row)	
■ Overhang factor Cf	→ Cf = 1.0	B-38 Allowable external load
○ Radial load position and direction	: Center of solid shaft, Downward	
○ Radial load Fr	: 8.5 kN	
○ Thrust load Fx	: 0 kN	
■ Equivalent radial load Fr E	→ FrE = 8.5 × 1.25 × 1.0 = 10.6	
■ Equivalent axial load Fr X	→ FrX = 0 × 1.25 = 0	
■ Allowable radial load	→ 26.5 kN	B-38 Allowable Radial Load
■ Allowable thrust load	→ 26.5 kN	B-38 Allowable Thrust Load
$\frac{10.6}{26.5} + \frac{0}{26.5} = 0.40 < 1$	→ OK	
○ Motor specification	: 200V 50Hz without brake・indoor	
■ Check motor specification	→ OK	A-6 Available Combination of Basic Motor
■ Model selected	→ PHA9035R3-RML-45 200V 50Hz without brake・indoor	

*1 Page number of the relevant Dimension Table is indicated in the Selection Table.

Service Factor SF

Driven Machine	Operating Hours (hours/day) 3 hrs	10 hrs	24 hrs
CRANES			
Classification of Crane / Hoisting / Traverse Motion / Travel Motion / Slewing Motion / Boom Hoisting — Group Ⅰ: 1.00 / 1.50 / 1.25 / 1.00; Group Ⅱ: 1.25 / 1.50 / 1.00; Group Ⅲ: 1.50 / 1.75 / 1.25; Group Ⅳ: 1.75 / 2.00 / 1.50 — The crane classification is based on JIS B8821-1976 "Calculation standard for the structure of crane."			
CONVEYORS (General purpose)			
Uniformly load or fed	1.00	1.00	1.25
Heavy load			
Not uniformly fed	1.00	1.25	1.50
Reciprocating or shaker	1.50	1.75	2.00
ELEVATORS			
Elevators	1.50	1.50	1.50
Escalators	1.25	1.25	1.25
METAL MILLS			
Draw bench carriage and main drive	1.50	1.50	1.50
Runout table			
Non reversing			
Group drives	1.50	1.50	1.50
Individual drivers	2.00	2.00	2.00
Reversing	2.00	2.00	2.00
Slab pushers	1.50	1.50	1.50
Shears	2.00	2.00	2.00
Wire drawing	1.25	1.25	1.25
Wire winding machine	1.25	1.50	1.50
METAL STRIP PROCESSING MACHINERY			
Bridles	1.50	1.50	1.50
Coilers & uncoilers	1.00	1.25	1.50
Edge trimmers	1.00	1.25	1.50
Flatteners	1.25	1.25	1.50
Loopers (Accumulators)	1.50	1.50	2.00
Pinch rolls	1.25	1.25	1.50
Scrap choppers	2.00	2.00	2.00
Shears	2.00	2.00	2.00
Slitters	1.00	1.25	1.50
MILL, ROTARY TYPE			
Ball and rod	2.00	2.00	2.00
Cement Kilns	2.00	2.00	2.00
Kilns (Except cement klins)	1.50	1.50	1.50
Dryers and coolers	1.50	1.50	1.50
SEWAGE DISPOSAL EQUIPMENT			
Aerators	2.00	2.00	2.00
Bar screens	1.25	1.25	1.25
Chemical feeders	1.25	1.25	1.25
Dewatering screens	1.50	1.50	1.50
Scum breakers	1.50	1.50	1.50
Slow or rapid mixers	1.50	1.50	1.50
Sludge collectors	1.25	1.25	1.25
Thickeners	1.50	1.50	1.50
Vacuum filters	1.50	1.50	1.50
EXTRUDERS			
Plastics	1.25	1.25	1.25
Rubber	1.50	1.50	1.50
FEEDERS			
Apron	1.00	1.25	1.50
Belt	1.00	1.25	1.50
Disk	1.00	1.00	1.25
Reciprocating	1.50	1.75	2.00
Screw	1.00	1.25	1.50

Driven Machine	Operating Hours (hours/day) 3 hrs	10 hrs	24 hrs
RUBBER INDUSTRY			
Mixers	1.75	1.75	2.00
Mixing mill -2 smooth rolls	1.50	1.50	1.75
Batch drop mill -2 smooth rolls	1.50	1.50	1.50
Cracker warmer			
-2 roll: 1 corrugated roll	1.75	1.75	1.75
Cracker -2 corrugated rolls	2.00	2.00	2.00
Holding, feed and blend mill			
-2 rolls	1.25	1.25	1.25
Refiner -2 rolls	1.50	1.50	1.50
Calenders	1.50	1.50	1.50
PAPER MILL			
All types incl. Paper making machine	2.00	2.00	2.00
AGITATORS AND MIXERS			
Pure liquids	1.00	1.00	1.25
Liquids and solids	1.00	1.25	1.50
Liquids variable density	1.00	1.25	1.50
MIXERS			
Concrete	1.25	1.25	1.50
CRUSHER			
Stone or ore	2.50	2.50	2.50
BLOWERS			
Centrifugal	1.00	1.00	1.25
Lobe	1.00	1.25	1.50
Vane	1.00	1.25	1.50
COMPRESSORS			
Centrifugal	1.00	1.00	1.25
Lobe	1.00	1.25	1.50
Reciprocating: multi cylinder	1.50	1.50	1.75
Reciprocating: single cylinder	1.75	1.75	2.00
FANS			
Centrifugal	1.00	1.00	1.25
Cooling towers	• •	• •	• •
Forced draft	1.25	1.25	1.25
Suction draft	1.50	1.50	1.50
Industrial and mine	1.50	1.50	1.50
PUMPS			
Centrifugal	1.00	1.00	1.25
Screw pump	1.25	1.25	1.50
Gear pump	1.25	1.25	1.50
DREDGES			
Cable reels	1.25	1.25	1.50
Conveyors	1.25	1.25	1.50
Cutter head drive	2.00	2.00	2.00
Pumps	2.00	2.00	2.00
Screen drives	1.75	1.75	2.00
Stackers	1.25	1.25	1.50
Winches	1.25	1.25	1.50
GENERATORS AND EXCITERS	1.00	1.00	1.25
HAMMER MILLS	1.75	1.75	2.00
SUGAR INDUSTRY			
Beet slicer	2.00	2.00	2.00
Cane knives	1.50	1.50	1.50
Crushers	1.50	1.50	1.50
Mills (Slow speed end)	1.75	1.75	1.75

Notes:
(1) Values in the above table are based on AGMA standards and SUMITOMO's experience.
(2) Values in the above table apply for electric motors as prime movers - if prime mover is a multi cylinder combustion engine, 0.25 has to be added to the SF.
(3) Consult us for special duty or when special safety specifications are needed.
(4) • •: For SF, consult us.

Refer to the following for driven machines not shown on the left page.

Prime Mover	Operating Hours	Type of Load		
		Uniform Load	Moderate Shock Load	Heavy Shock Load
		U	M	H
Electric Motor	3 hours/day	1.00	1.00	1.50
	10 hours/day	1.00	1.25	1.75
	24 hours/day	1.25	1.50	2.00
Internal Combustion Engine (multi cylinder)	3 hours/day	1.00	1.25	1.75
	10 hours/day	1.25	1.50	2.00
	24 hours/day	1.50	1.75	2.25

Note: Consult us when the operating hours are less than 3 hours/day or when an internal combustion engine (single cylinder) is used.