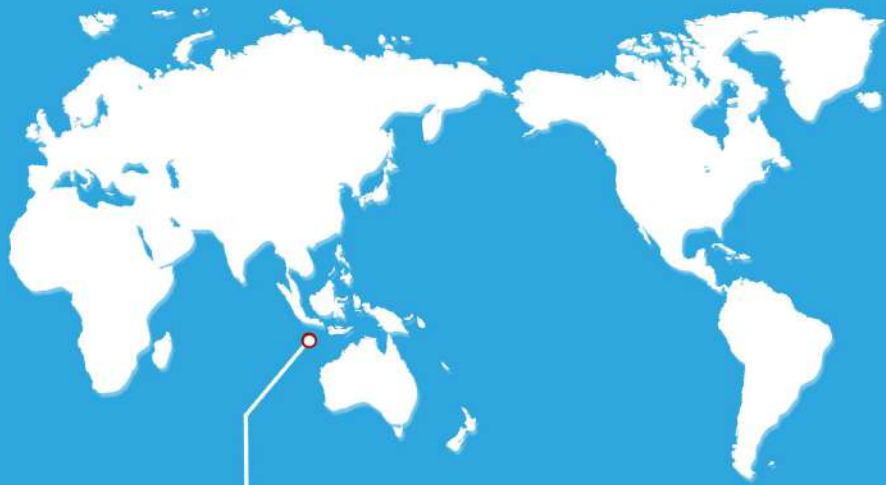




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CAL (Cast Iron) CAR (Stainless Steel)

End-Suction Volute Pump



CAR



CAL

The Torishima "Eco Pumps" lead the World!

End-Suction Volute Pump (10 bar type)

CAL is of Cast Iron construction. CAR is of Stainless Steel construction.

CA series pumps are eco-friendly high-efficiency pumps based on technology from our engineered pumps.



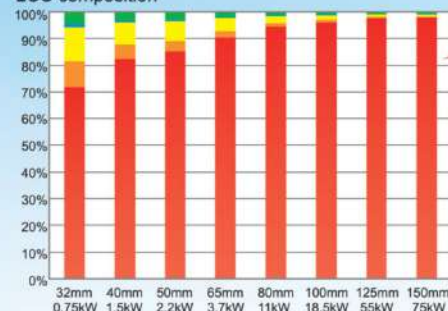
Energy Saving & Cost Reduction

Eco pumps significantly reduce the life cycle costs of pumps and CO₂ emissions because of their design (3D impeller, casing), motor (Torishima ultra high efficiency motor) and optimized specification (impeller cut).

■ Reduction of LCC (Life Cycle Cost)

About 90% of the pump LCC is generated from electricity cost. Increased efficiency leads to big reduction of LCC.

LCC composition



About 90% of pump LCC is electricity cost.

LCC is calculated on the basis of:
CAL size 32 to 150mm;
24hours day, 365days, 15years operation;
Operating at 60Hz-4P with normal temperature clean water;
Electricity cost of JPY10 per kWh.

Operating cost
■ Electricity
■ Maintenance
■ Spare parts

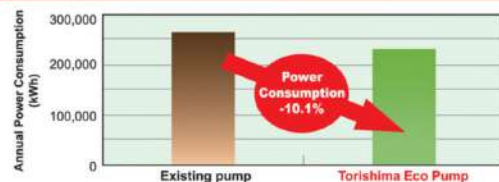
Initial cost
■ Installation work
■ Unit price

■ Energy Saving with Eco Pumps

Cooling water pump

Annual operating hours: 8,760hours

	Existing pump spec		Torishima pump CAL125-250	
	Motor capacity	30kW	30kW	Difference
	Facility spec	Operating point	Operating point	
Capacity(m ³ /min)	4.7	4.7	4.7	0%
Head(m)	26.5	27.7	26.5	-1.2m
Pump efficiency(%)		78	81	+3.0%
Shaft power(kW)		27.2	25.1	-2.1kW
Motor efficiency(%)		91.9	94.5	+2.6%
Power consumption(kW)		29.6	26.6	-3.0kW(-10.1%)
Annual Power Consumption(kWh)		259,296	233,016	-26,280kWh



Annual Saving
USD\$2,628
(= 26,280 kWh x
USD 0.1)

Electricity cost per kWh : USD 0.1

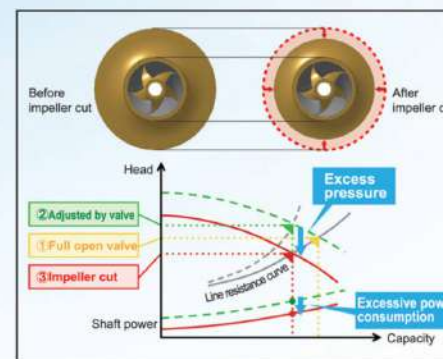
Annual
CO₂ Reduction
11.8t-CO₂

(=26,280kWh x 0.00045 t-CO₂/kWh)

Conversion factor of CO₂ emission: 0.00045 (t-CO₂/kWh)
referred from Tokyo Electric Power Co., Inc, 2011

■ Meeting Customer's Specification (Impeller cut)

The impeller diameter can be cut to meet the customer's specification to reduce unnecessary power consumption.



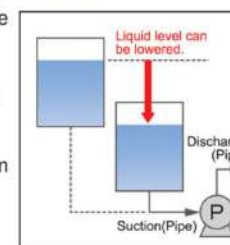
■ High Speed and Simplified Design

CAL/CAR are simplified with high speed and compact design, which enable to reduce the installation space.

■ Low NPSH and a Wide Application Range

Low NPSH performance enables lower suction level which reduces plant construction cost.

CAL/CAR can handle liquid temperatures from -40 to +350°C (heat medium) and various liquid types.



Maintenance & Operation

■ Mechanical Seal as Standard Part

Maintenance free.

No leakage from seal parts allows cleanliness around pumps.



Standard mechanical seal (rubber bellows seal) is easy to install and does not damage shaft, thus does not require shaft sleeve.

	Mechanical seal	Gland packing
Leakage	0 cc/min	15 cc/min
5-year leakage	0 L	39,420 L
Cost amount	USD\$ 0	USD\$ 138*

* In case of using tap water
- Industrial Water : USD\$ 17.74 (USD\$ 0.45/m³)
- Tap Water : USD\$ 138 (USD\$ 3.5/m³)
- Pure Water : USD\$ 591,000 (USD\$ 151)

39,420L leakage from using gland packing for 5 years equals to about 197 bathtubs (200L home bathtub)



■ Safe Operation with Precision Bearing Design

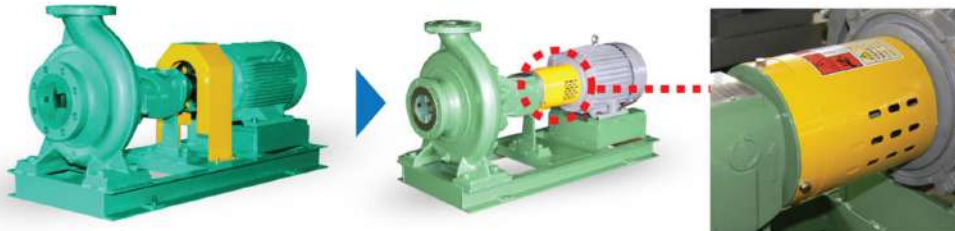
■ Stable Operation

The stable pump performance facilitates valve control and parallel operation.

Coupling Guard

CAL/CAR are covered with and enclosed type coupling guard as an optional

An enclosed coupling guard improves safety and maintenance compared to an existing coupling guard due to the wide area of coverage



Standard Coupling Guard

Enclosed Coupling Guard
(as optional)

TU Motor : 2P-55kW or less, 4P-110kW or less
Coupling Diameter : 280 mm or less
Motors have different size and frame by manufacturers

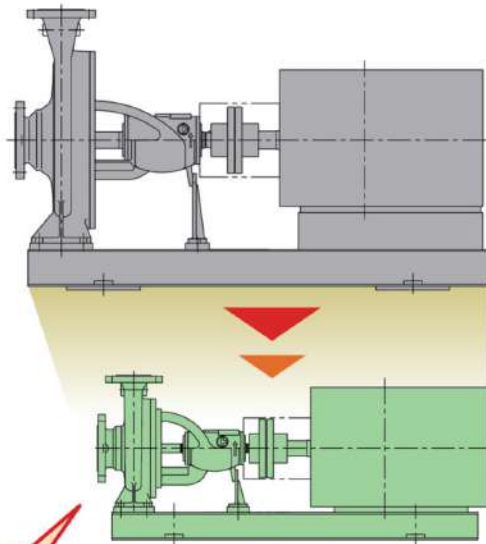
Downsizing to 2P Design

Increasing the pump speed by using a 2 pole motor reduces the pump size and weight.

Conditions: total head of 50m, capacity of 1m³/min, and 60Hz

Pole number: 4P
Pump size: CAL80-400
Motor output: 18.5kW
Weight: 400kg

Pole number: 2P
Pump size: CAL50-200
Motor output: 15kW
Weight: 209kg



**Weight reduced by 47%
compared to 4P**
= (400-209) ÷ 400 × 100

The above diagram describes characteristics of 2P. We can provide the design for 4P as well.
Weight includes pump, base plate, motor and coupling.
Motor weight differs depending on manufacturers.

Applications

Utility	Co-generation	Cooling water pump, Hot water (circulation) pump	CAL
	Air conditioning	Cold water pump, Cooling water pump, Hot water pump	
	Drainage treatment	Raw water pump, Filtrate pump, Back wash pump, Transfer pump	CAR
	Pure water facility	Raw water pump, RO wash pump, Recovering back wash pump, Filtrate water pump	
Iron & Metal	Power generation	Deaerator feed water pump	
	Hot rolling	Transfer pump, Hot water pump, Water pumping pump, Filtrate pump, Back wash pump,	CAL
	Flue gas desulfurization	Cooling water pump, Industrial water pump	
	Roll coolant	Spray pump	CAR
	Plating	Wash pump (Rinse pump)	
Food & Beverage	Manufacturing process	Cold water pump, Cooling water pump (Circulation / Boost), Recycle water pump, Filtrate pump, Sprinkling pump	CAL
	Refrigerator	Chilled pump, Defrost pump	
	CIP system	CIP supply / return pump	CAR
Automobile (Painting Plant)	Degreasing process	Degreasing pump, Hot / Cold water wash pump, Spray pump	
	Transformation process	Chemical pump, Hot / Cold water wash pump, Pure water pump	CAR
	Electrodeposition process	Electrodeposition liquid circulation pump, Wash pump, Pure water pump	
Garbage Incinerating Plant	Power generation	Deaerator feed water pump, Condensate pump,	
	Heat decrease tower	Heat decrease pump, Spray pump for heat decrease tower	CAL
	Drainage	Reuse water pump (pumping, transferring, feeding)	
Other Liquid Handled	Brain, Acetone, Calcium chloride, Kalium chloride, Alkaline solution, Ethylene glycol, Aqua fortis, Sulfate, Sodium hydroxide, Ammonia liquor, Caustic soda, etc.		CAR

Please ask about special fluid.

Specification

		CAL(Cast Iron) 	CAR(Stainless Steel) 
Handled liquid	Kinds	Clean water, Warm water, Oil, Chemical medicine, Alkaline solution, Brine, Heat transfer media, Abrasive slurry liquid under 3wt%, etc.	Pure water, Hot water, Sea water, Salted water, Refrigerant, Electrodeposition paint, Abrasive slurry liquid under 3wt%, etc.
	Temperature	Standard: -10°C < T ≤ 100°C Option: 100°C < T ≤ 350°C	Standard: -10°C to +80°C Option: -40°C to +140°C
Max. discharge pressure		Standard: 1MPa (10kgf/cm ² G) Option: 1.4MPa (14kgf/cm ² G)	1MPa (10kgf/cm ² G)
Max. suction pressure		0.8MPa (8kgf/cm ² G)	0.8MPa (8kgf/cm ² G)
Design	Impeller	Closed	Closed
	Shaft seals	Standard: Single mechanical seal (Rubber bellows) Option: Double mechanical seal, Gland packing	Standard: Single mechanical seal (Rubber bellows) Option: Double mechanical seal, Gland packing
	Water injection for shaft seal	Standard: Internal injection Option: Quenching, Flushing	Standard: Internal injection Option: Quenching, Flushing
	Lubricated bearing	Standard: Grease lubrication Option: Oil lubrication	Standard: Grease lubrication Option: Oil lubrication
Flange standard, Suction / Discharge direction		JIS 10KRF Shaft direction suction / Vertical top discharge	JIS 10KRF Shaft direction suction / Vertical top discharge
Pump material	Casing	Standard: FC250 Option: FCD400	Standard: SCS13 Option: SCS14
	Impeller	Standard: FC200 Option: SCS13, SCS14, BC6	Standard: SCS13 Option: SCS14
	Shaft	Standard: SUS420J2 Option: SUS329J1, SUS304	Standard: SUS304 Option: SUS316, SUS329J1
	Case wear ring	Standard: FC200	—

Design Features

Volute Casing

CFD optimized volute casing for high efficiency.

Wear Ring

Cast-iron CAL series pumps include wear ring as standard. Wear ring is not necessary for stainless steel CAR series.

High Efficiency 3D Impeller

Closed impeller is designed for stable operation as well as high efficiency and low NPSH characteristics.

Mechanical Seal

Energy saving, Resource saving, Maintenance free

Ball Bearing

Shaft

Robust shaft outer, long life design
EX) CAL40-250/2P
Shaft diameter under bearing is sized up from $\phi 35$ to $\phi 45$

Bearing Housing

Robust bearing housing reduces shaft deflection and ensures long lasting reliability.

Parts Interchangeability

■ **2P type** Same color and number in the same parts indicate interchangeability.

Parts	Casing	Casing Cover	Bearing Housing	Shaft	Mechanical Seal
Pump type					
32-125	1				
40-125	2	1			
65-125	3				
32-160	4				
40-160	5	2	1	1	1
50-160	6				
32-200	7				
40-200	8	3			
50-200	9				
80-160	10	4	2	2	
80-200	11	5			
32-250	12				2
40-250	13	6	3	3	
50-250	14				
80-250	15	7			

■ **4P type** Same color and number in the same parts indicate interchangeability.

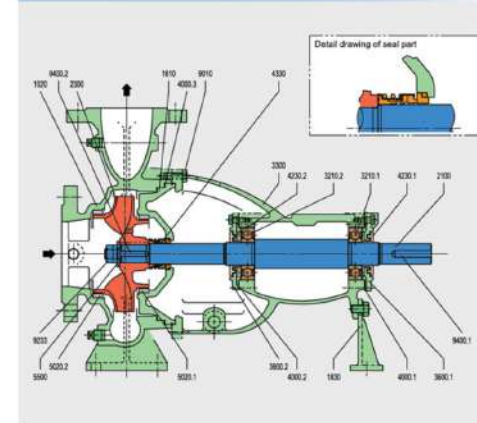
Parts	Casing	Casing Cover	Bearing Housing	Shaft	Mechanical Seal
Pump type					
32-125	1				
40-125	2	1			
65-125	3				
32-160	4				
40-160	5	2	1	1	1
50-160	6				
65-150	7				
32-200	8				
40-200	9	3			
50-200	10				
65-190	11				
80-150	12	4			
80-190	13	5			
100-190	14				
32-250	15				
40-250	16	6			
50-250	17				
65-240	18				
80-240	19	7	2	2	2
100-245	20				
100-250	21				
50-315	22				
65-310	23	8			
80-320	24				
100-320	25				
150-190	26	9	3	3	3
125-240	27	10			
125-250	28	11			
200-240	29				
125-310	30	12	4	4	
125-315	31	13	3	3	
80-400	32	14	4	4	
100-400	33	15	5	5	4
125-400	34	16			

Pump Sectional Drawing

The basic structure is same between CAL and CAR for parts interchangeability. CAR, which is made from stainless, does not require case wear ring. Due to adopting build to order method, various combination with pump material, seal and bearing is available according to liquids kinds and temperature.

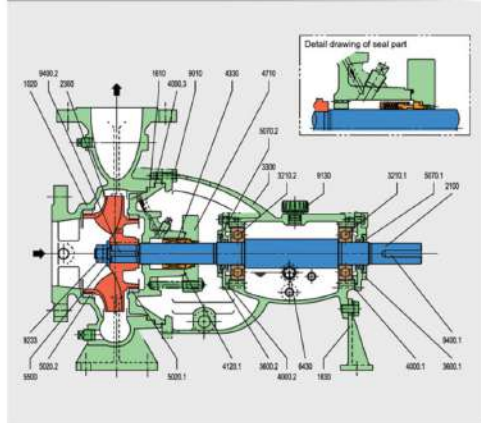
Standard

Seal: Mechanical seal
Bearing: Grease lubrication



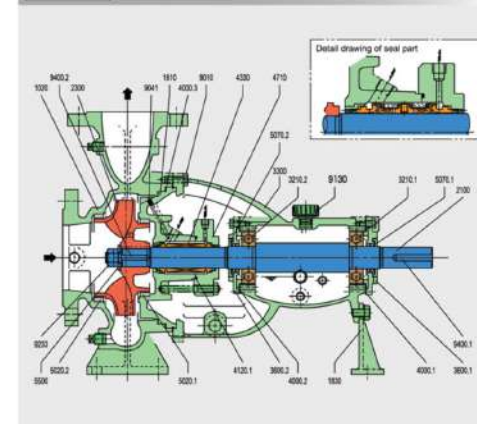
Option

Seal: Mechanical seal + Water cooling
Bearing: Oil lubrication



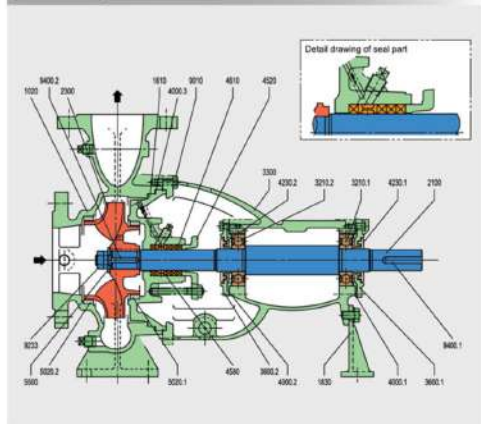
Option

Seal: Double mechanical seal
Bearing: Oil lubrication



Option

Seal: Gland packing
Bearing: Grease lubrication



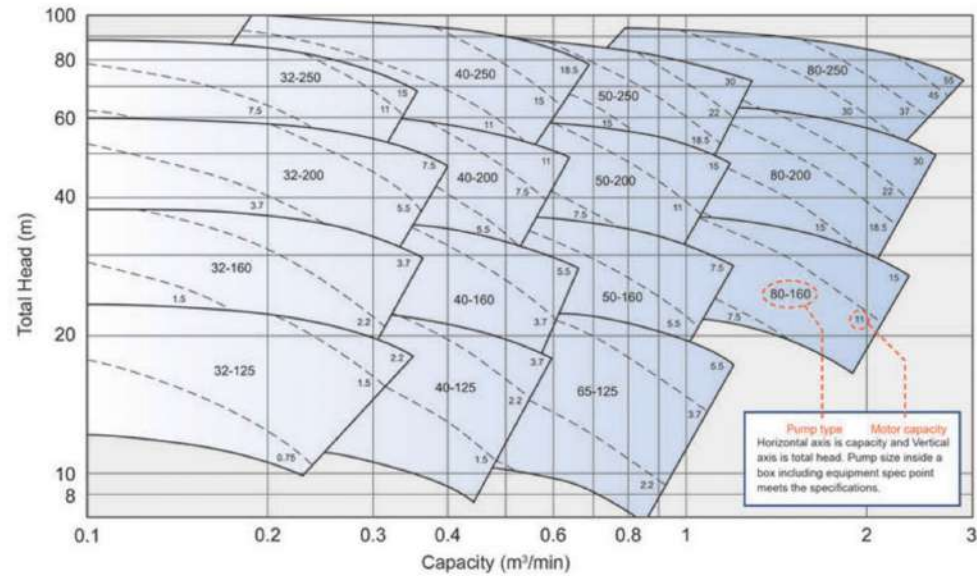
Parts number	Parts name	Parts number	Parts name	Parts number	Parts name	Parts number	Parts name
1020	Volute casing	3600.2	Bearing cover	4580	Lantern ring	9010	Hex. bolt
1610	Casing cover	4000.1	Flat gasket	4610	Gland packing	9041	Nock
1830	Support foot	4000.2	Flat gasket	4710	Seal cover	9130	Plug
2100	Shaft	4000.3	Flat gasket	5020.1	Casing wear ring	9233	Lock nut
2300	Impeller	4120.1	O-ring	5020.2	Casing wear ring	9400.1	Key
3210.1	Deep groove ball bearing	4230.1	Labyrinth ring	5070.1	Deflector	9400.2	Key
3210.2	Deep groove ball bearing	4230.2	Mechanical seal	5070.2	Deflector		
3300	Bearing housing	4330	Shaft box gland	5500	Washer		
3600.1	Bearing cover	4520		6430	Oil gauge		

CAL (Cast Iron) Selection Range Charts

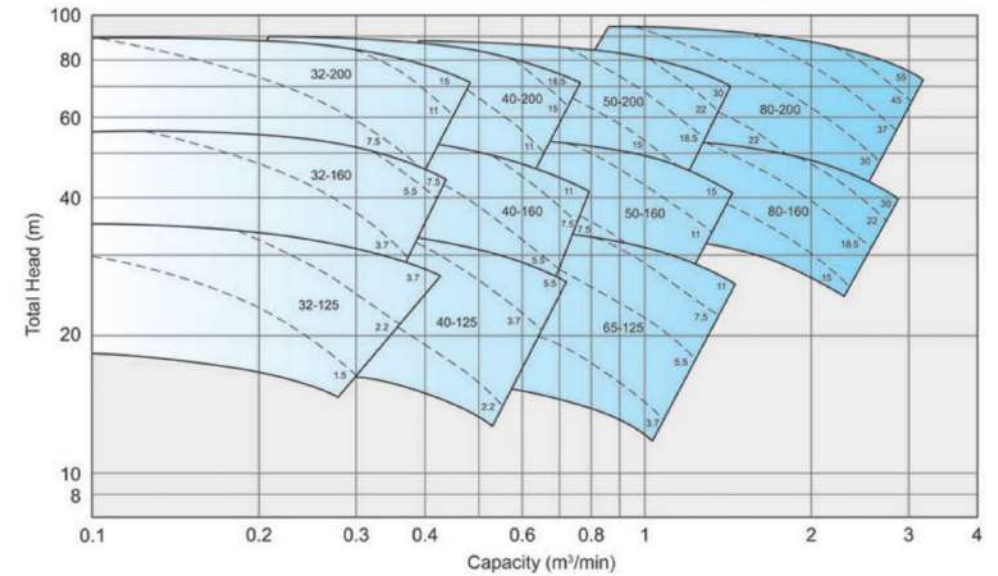
6P is also available. Please ask our sales representative for details.



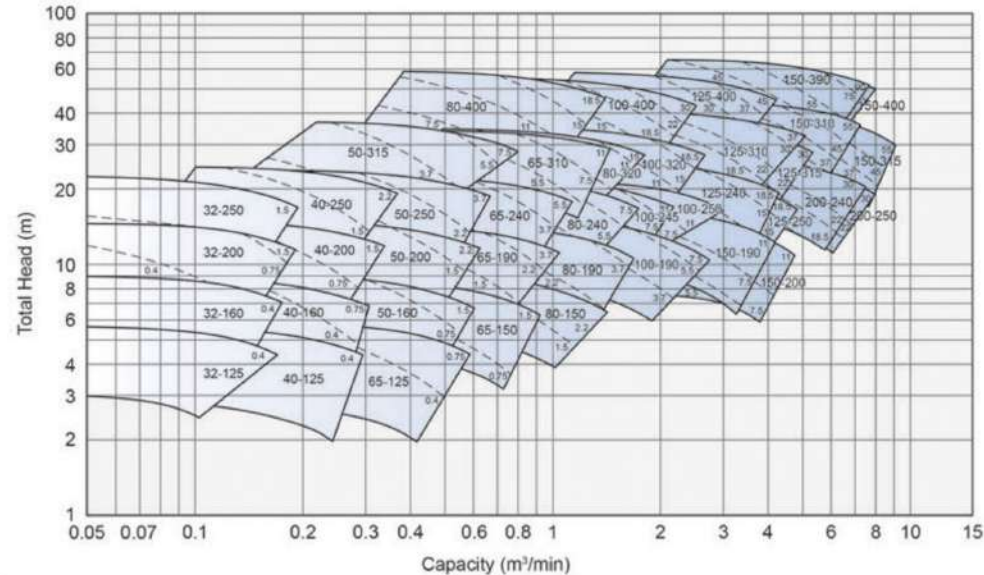
■ 50Hz-2P (3000min⁻¹)



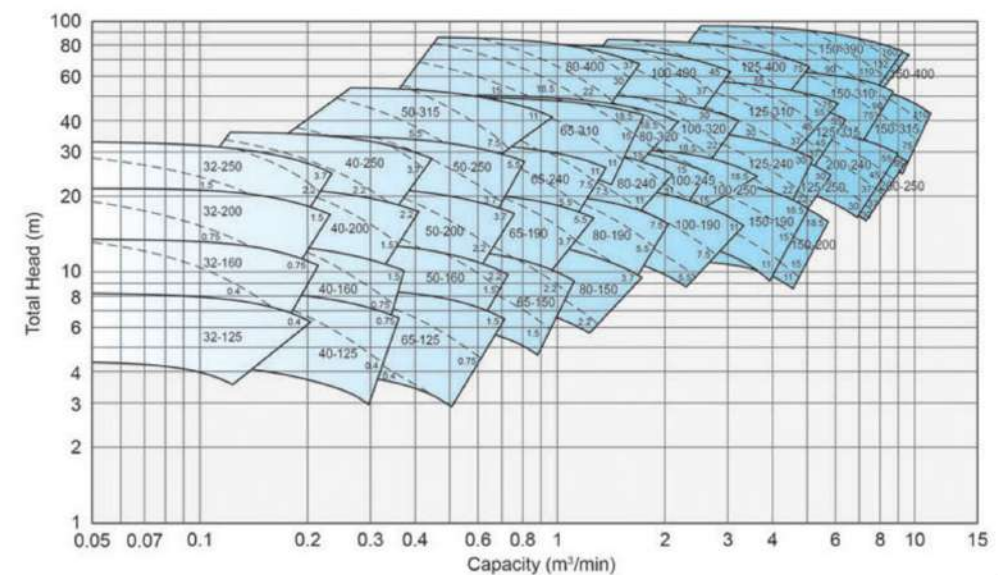
■ 60Hz-2P (3600min⁻¹)



■ 50Hz-4P (1500min⁻¹)



■ 60Hz-4P (1800min⁻¹)

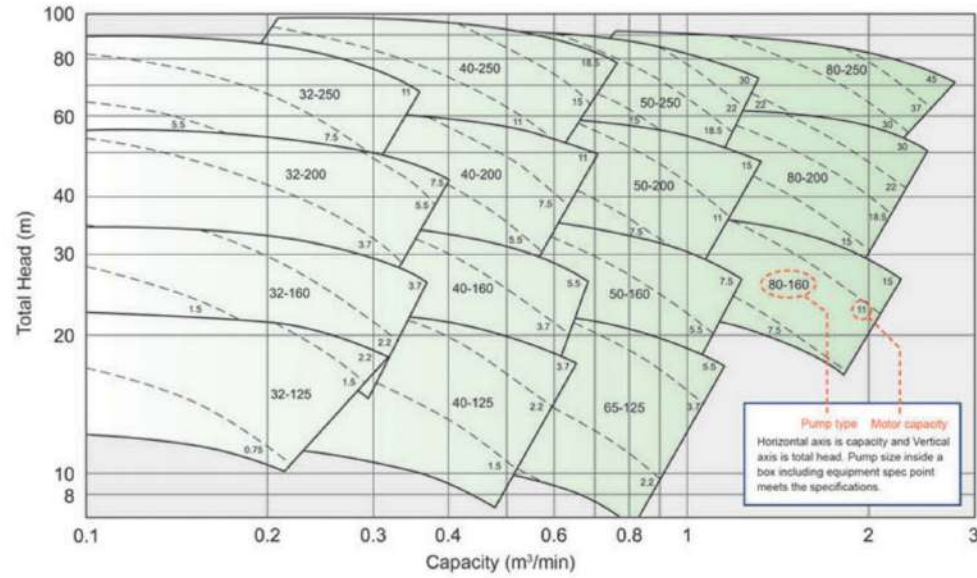


CAR (Stainless Steel) Selection Range Charts

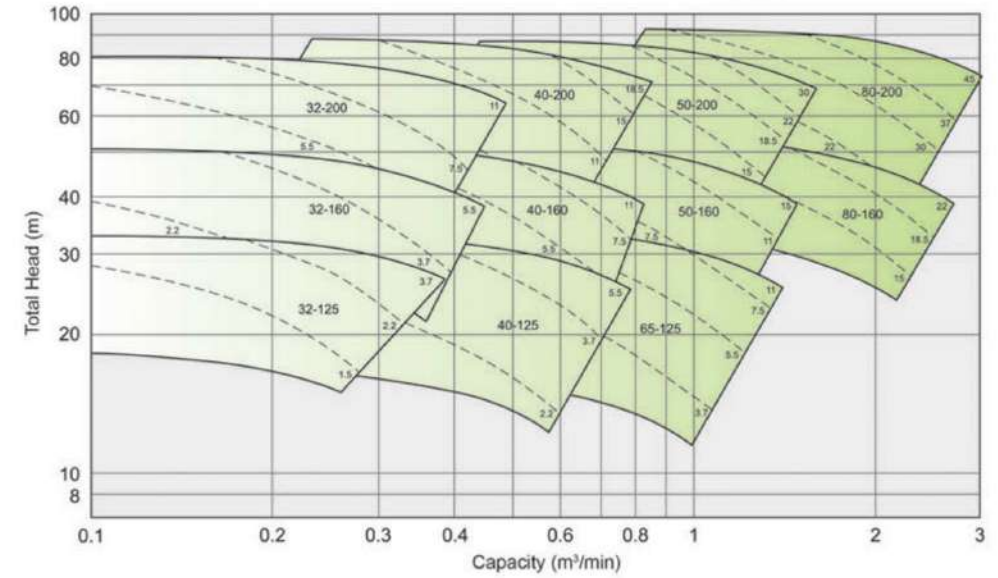
6P is also available. Please ask our sales representative for details.



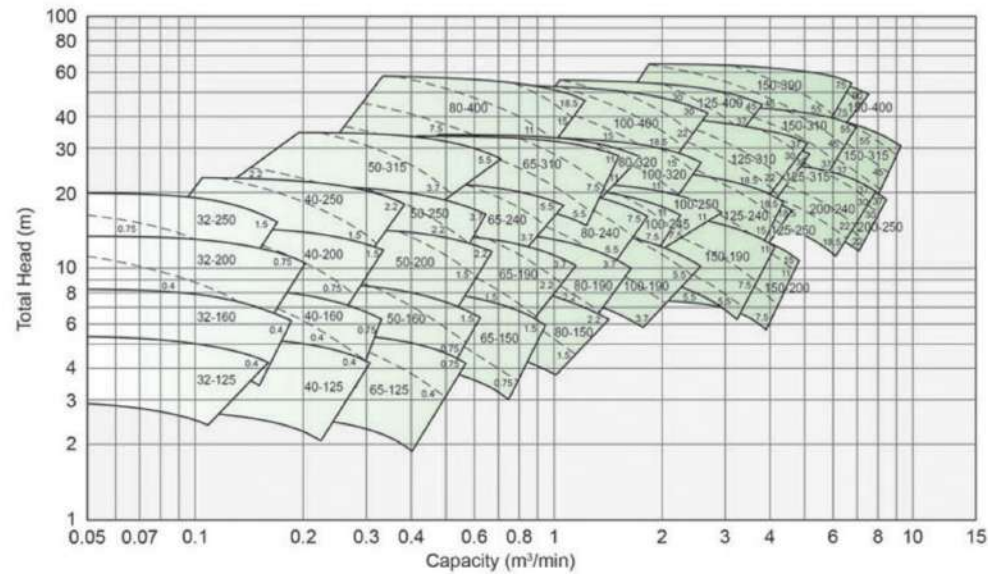
50Hz-2P (3000min⁻¹)



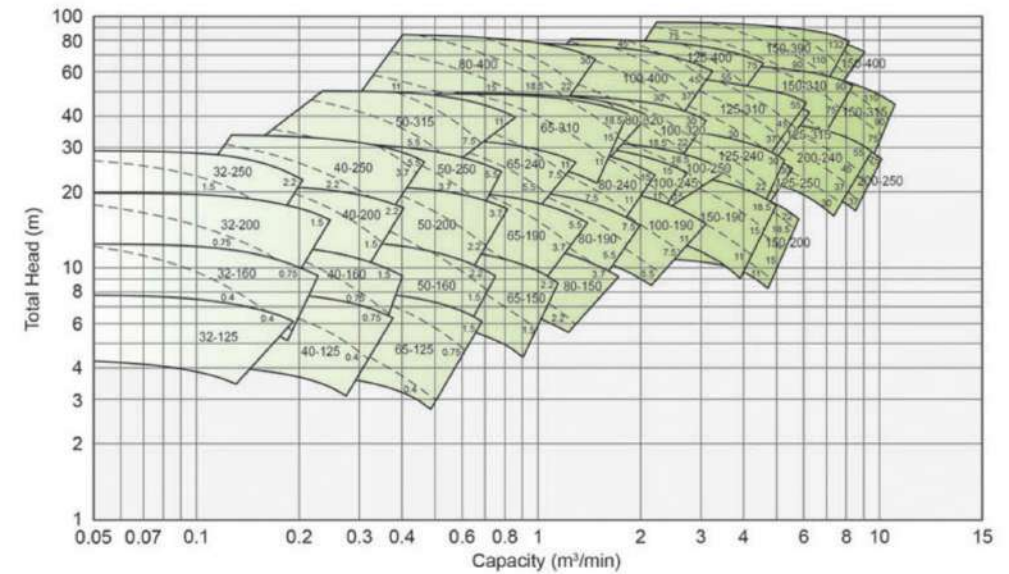
60Hz-2P (3600min⁻¹)



50Hz-4P (1500min⁻¹)



60Hz-4P (1800min⁻¹)

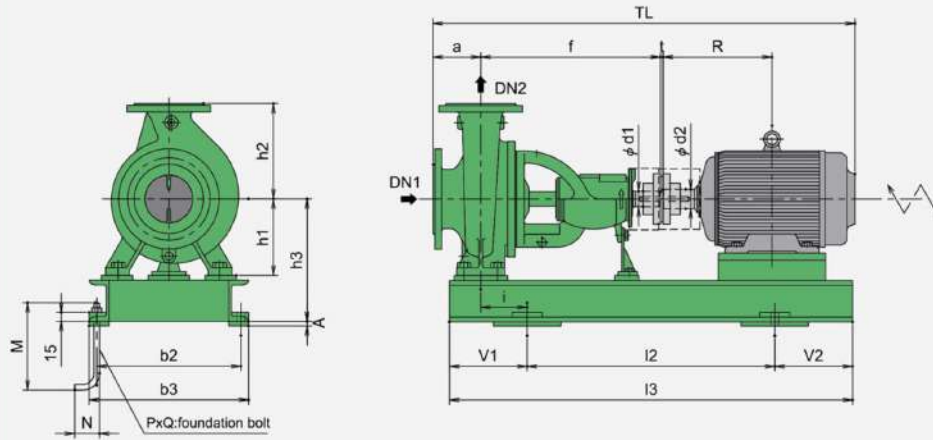
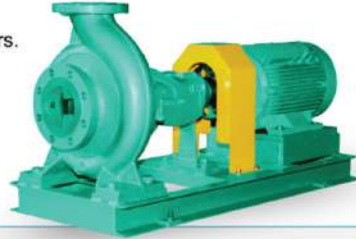


Dimension Chart

■ Flange standard CAL : JIS10K RF / CAR : JIS10K RF

■ Below dimension is based on totally enclosed fan-cooled motor.

■ Motors have different size and frame depending on manufacturers.



Dimension Chart for 2P Motor Drive

Pump Sizes	Pump										Motor		Base Plate			Foundation Dimensions										Coupling		Refer.			
	Bore		Dimension				Axle		Weight		Frame	Dimension		b3	I3	A	Wt.	h3	i	b2	I2	M	N	P	Q	V1	V2		t	Wt.	TL
	DN1	DN2	a	f	h1	h2	d1	Grade L	Grade R	R		d2																			
	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg		kg	mm																		
32-125 40-125	50 65	32 40	80 80	360 360	112 112	140 140	24 24	27 28	28 29	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
										71M	120	14	320	670	0	27	202	45	290	420	200	50	4	M12	105	145	3	1.1	681		
										80	140	19	320	670	0	27	202	45	290	420	200	50	4	M12	105	145	3	1.1	725.5		
										80M	140	19	320	670	0	27	202	45	290	420	200	50	4	M12	105	145	3	1.1	705		
										90S	156	24	320	750	0	28	202	55	290	480	200	50	4	M12	115	155	3	1.1	750.5		
										90L	168.5	24	320	750	0	28	202	55	290	480	200	50	4	M12	115	155	3	1.1	775.5		
										100L	193	28	320	750	0	28	202	55	290	480	200	50	4	M12	115	155	3	1.6	809		
										112M	200	28	320	750	0	27	202	55	290	480	200	50	4	M12	115	155	3	1.6	834.5		
										132S	239	38	350	870	0	32	219	90	320	600	200	50	4	M12	150	120	3	3.2	897		
										80	140	19	320	670	0	28	222	45	290	420	200	50	4	M12	105	145	3	1.1	745.5		
										80M	140	19	320	670	0	28	222	45	290	420	200	50	4	M12	105	145	3	1.1	725		
32-160 40-160 50-125	50 65 80	32 40 65	80 80 100	360 360 360	132 132 132	160 160 180	24 24 24	28 30 31	30 31 33	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
										90S	156	24	320	750	0	30	222	55	290	480	200	50	4	M12	115	155	3	1.1	770.5		
										90L	168.5	24	320	750	0	30	222	55	290	480	200	50	4	M12	115	155	3	1.1	795.5		
										100L	193	28	320	750	0	29	222	55	290	480	200	50	4	M12	115	155	3	1.6	829		
										112M	200	28	320	750	0	28	222	55	290	480	200	50	4	M12	115	155	3	1.6	854.5		
										132S	239	38	350	870	0	31	222	90	320	600	200	50	4	M12	150	120	3	3.2	917		
										160M*	323	42	430	1000	0	41	250	110	400	660	200	50	4	M12	170	170	3	6.7	1071		
										160M**	323	42	430	1000	0	41	250	110	400	660	200	50	4	M12	170	170	3	6.7	786		
										160L	345	42	430	1000	0	41	250	110	400	660	200	50	4	M12	170	170	3	6.7	1115		

*Motor frame is the same but shaft axle diameter (d2) is different.

Pump Sizes	Pump									Motor		Base Plate				Foundation Dimensions										Coupling		Refer.			
	Bore		Dimension				Axle		Weight		Frame	Dimension		b3	I3	A	Wt.	h3	I	b2	I2	M	N	P	Q	V1	V2		t	Wt.	TL
	DN1	DN2	a	f	h1	h2	d1	Grade L	Grade R	R		d2																			
	mm	mm	mm	mm	mm	mm	mm	kg	kg	---		mm	mm																		
32-200 40-200 50-160	50	32	80	360	160	180	24	36	38	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
										90L	168.5	24	320	750	0	33	250	55	290	480	200	50	4	M12	115	155	3	1.1	795.5		
										100L	193	28	320	750	0	33	250	55	290	480	200	50	4	M12	115	155	3	1.6	829		
										112M	200	28	320	750	0	32	250	55	290	480	200	50	4	M12	115	155	3	1.6	854.5		
										132S	239	38	350	870	0	34	250	90	320	600	200	50	4	M12	150	120	3	3.2	917		
										160M*	323	42	430	1000	0	39	250	110	400	660	200	50	4	M12	170	170	3	6.7	1071		
										160M**	323	42	430	1000	0	39	250	110	400	660	200	50	4	M12	170	170	3	6.7	786		
										160L	345	42	430	1000	0	39	250	110	400	660	200	50	4	M12	170	170	3	6.7	1115		
										160L*	345	42	430	1000	0	39	250	110	400	660	200	50	4	M12	170	170	3	6.7	1115		
										160L**	345	42	430	1000	0	39	250	110	400	660	200	50	4	M12	170	170	3	6.7	1115		
										180MA	351.5	48	430	1000	0	42	270	110	400	660	200	50	4	M12	170	170	3	9.0	1107		
50-200	80	50	100	360	160	200	24	37	39	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
										112M	200	28	320	750	0	32	250	55	290	480	200	50	4	M12	115	155	3	1.6	854.5		
										132S	239	38	350	870	0	34	250	90	320	600	200	50	4	M12	150	120	3	3.2	917		
										160M*	323	42	430	1000	0	39	250	110	400	660	200	50	4	M12	170	170	3	6.7	1071		
										160M**	323	42	430	1000	0	39	250	110	400	660	200	50	4	M12	170	170	3	6.7	786		
										160L*	345	42	430	1000	0	39	250	110	400	660	200	50	4	M12	170	170	3	6.7	1115		
										160L**	345	42	430	1000	0	39	250	110	400	660	200	50	4	M12	170	170	3	6.7	1115		
										180MA	351.5	48	430	1000	0	42	270	110	400	660	200	50	4	M12	170	170	3	9.0	1135		
										180M*	351.5	48	430	1000	0	42	270	110	400	660	200	50	4	M12	170	170	3	9.0	1107		
										180M**	351.5	55	430	1000	0	42	270	110	400	660	200	50	4	M12	170	170	3	13.9	1040		
										180L	370.5	55	430	1000	0	42	270	110	400	660	200	50	4	M12	170	170	3	13.9	1145		
80-160	100	80	125	470	160	225	32	50	52	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
										200LA	395.5	55	470	1120	0	53	292	130	440	740	200	50	4	M12	190	190	3	13.9	1233		
										200L	395.5	55	470	1120	0	53	292	130	440	740	200	50	4	M12	190	190	3	13.9	1213.5		
										225S	402	55	530	1250	10	71	342	145	490	840	250	63	4	M16	205	205	3	13.9	1230		
										132S	239	38	350	1000	0	33	250	110	320	660	200	50	4	M12	170	170	3	3.2	1052		
										160M*	323	42	430	1120	0	36	250	130	400	740	200	50	4	M12	190	190	3	6.7	1206		
										160M**	323	42	430	1120	0	36	250	130	400	740	200	50	4	M12	190	190	3	6.7	921		
										160L*	345	42	430	1120	0	36	250	130	400	740	200	50	4	M12	190	190	3	6.7	1250		
										160L**	345	48	430	1120	0	36	250	130	400	740	200	50	4	M12	190	190	3	9.0	1168.5		
										180MA	351.5	48	430	1120	0	44	270	130	400	740	200	50	4	M12	190	190	3	9.0	1270		
										180M*	351.5	48	430	1120	0	44	270	130	400	740	200	50	4	M12	190	190	3	9.0	1242		
32-250 40-250 50-250 80-200	50	32	100	470	180	225	32	54	56	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
										180L	370.5	55	470	1120	0	44	270	130	400	740	200	50	4	M12	190	190	3	13.9	1280		
										200LA	395.5	55	530	1250	10	67	317	130	490	840	250	63	4	M16	205	205	3	13.9	1368		
										200L	395.5	55	530	1250	10	67	317	130	490	840	250	63	4	M16	205	205	3	13.9	1348.5		
										225S	402	55	530	1250	10	65	342	145	490	840	250	63	4	M16	205	205	3	13.9	1365		
										112M	200	28	380	870	0	38	270	75	350	600	200	50	4	M12	150	120	3	3.2	989.5		
										132S	239	38	430	1000	0	42	270	95	400	660	200	50	4	M12	170	170	3	3.2	1052		
										160M*	323	42	470	1120	0	45	270	115	440	740	200	50	4	M12	190	190	3	6.7	1206		
										160M**	323	42	470	1120	0	45	270	115	440	740	200	50	4	M12	190	190	3	6.7	921		
										160L*	345	42	470	1120	0	45	270	115	440	740	200	50	4	M12	190	190	3	6.7	1250		
										160L**	345	48	470	1120	0	45	270	115	440	740	200	50	4	M12	190	190	3	9.0	1168.5		
80-250	100	80	125	470	225	280	32	67	70	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
										180MA	351.5	48	470	1120	0	43	270	115	440	740	200	50	4	M12	190	190	3	9.0	1270		
										180M*	351.5	48	470	1120	0	43	270	115	440	740	200	50	4	M12	190	190	3	9.0	1242		
										180M**	351.5	55	470	1120	0	43	270	115	440	740	200	50	4	M12	190	190	3	13.9	1175		
										180L	370.5	55	470	1120	0	43	270	115	440	740	200	50	4	M12	190	190	3	13.9	1280		
										200LA	395.5	55	530	1250	10	67	317	130	490	840	250	63	4	M16	205	205	3	13.9	1368		
										200L	395.5	55	530	1250	10	67	317	130	490	840	250	63	4	M16	205	205	3	13.9	1348.5		
										225S	402	55	530	1250	10	69	342	130	490	840	250	63	4	M16	205	205	3	13.9	1365		
										225MA	414.5	55	530	1250	10	69	342	130	490	840	250	63	4	M16	205	205	3	13.9	1409		
										225M	414.5	55	530	1250	10	69	342	130	490	840	250	63	4	M16	205	205	3	13.9	1462.5		
										250SA	463.5	60	530	1250	10	76	370	130	490	840	250	63	4	M16	205	205	4	21.0	1481.5		
250M	452.5	55	530	1250	10	76	370	130	490	840	250	63	4	M16	205	205	3	13.9	1526												

Dimension Chart

Dimension Chart for 4P Motor Drive

Pump Sizes	Pump								Motor		Base Plate				Foundation Dimensions												Coupling		Refer.	
	Bore		Dimension			Axle		Weight		Frame	Dimension		b3	l3	A	Wt	h3	i	b2	i2	M	N	P	Q	V1	V2	t	Wt		TL
	DN1	DN2	a	f	h1	h2	d1	Grade L	Grade R		R	d2																		
	mm	mm	mm	mm	mm	mm	mm	mm	kg		kg	mm																		
32-125 40-125	50	32	80	360	112	140	24	27	28	71M	120	14	320	670	0	27	202	45	290	420	200	50	4	M12	105	145	3	1.1	681	
	65	40	80	360	112	140	24	28	29	80	140	19	320	670	0	27	202	45	290	420	200	50	4	M12	105	145	3	1.1	726	
										80M	140	19	320	670	0	27	202	45	290	420	200	50	4	M12	105	145	3	1.1	705	
										71M	120	14	320	670	0	28	222	45	290	420	200	50	4	M12	105	145	3	1.1	681	
32-160 40-160 65-125	50	32	80	360	132	160	24	28	30	80	140	19	320	670	0	28	222	45	290	420	200	50	4	M12	105	145	3	1.1	726	
	65	40	80	360	132	160	24	30	31	80M	140	19	320	670	0	28	222	45	290	420	200	50	4	M12	105	145	3	1.1	705	
										90L	168.5	24	320	750	0	30	222	55	290	480	200	50	4	M12	115	155	3	1.1	776	
										71M	120	14	320	670	0	30	250	45	290	420	200	50	4	M12	105	145	3	1.1	701	
32-200 40-200 50-160 65-150	50	32	80	360	160	180	24	36	38	80	140	19	320	670	0	30	250	45	290	420	200	50	4	M12	105	145	3	1.1	746	
	65	40	80	360	160	180	24	37	39	80M	140	19	320	670	0	30	250	45	290	420	200	50	4	M12	105	145	3	1.1	725	
										90L	168.5	24	320	750	0	33	250	55	290	480	200	50	4	M12	115	155	3	1.1	796	
										100L	193	28	320	750	0	33	250	55	290	480	200	50	4	M12	115	155	3	1.6	838	
50-200 65-190	80	50	100	360	160	200	24	37	39	112M	200	28	320	750	0	32	250	55	290	480	200	50	4	M12	115	155	3	1.9	855	
										80	140	19	320	670	0	30	250	45	290	420	200	50	4	M12	105	145	3	1.1	746	
										80M	140	19	320	670	0	30	250	45	290	420	200	50	4	M12	105	145	3	1.1	725	
										90L	168.5	24	320	750	0	33	250	55	290	480	200	50	4	M12	115	155	3	1.1	796	
80-150	80	50	100	360	160	200	24	37	39	100L	193	28	320	750	0	33	250	55	290	480	200	50	4	M12	115	155	3	1.6	838	
										112M	200	28	320	750	0	32	250	55	290	480	200	50	4	M12	115	155	3	1.9	855	
										132S	239	38	350	870	0	34	250	90	320	600	200	50	4	M12	150	120	3	3.2	917	
										90L	168.5	24	320	750	0	30	250	90	290	600	200	50	4	M12	150	120	3	3.2	906	
80-150	100	80	100	470	160	200	32	47	49	100L	193	28	320	870	0	30	250	90	290	600	200	50	4	M12	150	120	3	3.2	948	
										112M	200	28	320	870	0	29	250	90	290	600	200	50	4	M12	150	120	3	3.2	965	
										132S	239	38	350	1000	0	33	250	110	320	660	200	50	4	M12	170	170	3	3.2	1027	
										80	140	19	380	870	0	38	270	75	350	600	200	50	4	M12	150	120	3	3.2	881	
32-250 40-250 50-250 65-240 80-190	50	32	100	470	180	225	32	49	51	80M	140	19	380	870	0	38	270	75	350	600	200	50	4	M12	150	120	3	3.2	860	
										90L	168.5	24	380	870	0	36	270	75	350	600	200	50	4	M12	150	120	3	3.2	931	
										100L	193	28	380	870	0	38	270	75	350	600	200	50	4	M12	150	120	3	3.2	973	
										112M	200	28	380	870	0	38	270	75	350	600	200	50	4	M12	150	120	3	3.2	990	
32-250 40-250 50-250 65-240 80-190	80	50	100	470	180	225	32	52	54	132S	239	38	430	1000	0	42	270	95	400	660	200	50	4	M12	170	170	3	3.2	1052	
										132M	258	38	430	1000	0	42	270	95	400	660	200	50	4	M12	170	170	3	5.4	1090	
										160M	323	42	470	1120	0	45	270	115	440	740	200	50	4	M12	190	190	3	6.7	1206	
										100L	193	28	380	870	0	41	292	60	350	600	200	50	4	M12	150	120	3	3.2	973	
80-240 100-190	100	80	100	470	200	250	32	63	62	112M	200	28	380	870	0	41	292	60	350	600	200	50	4	M12	150	120	3	3.2	990	
										132S	239	38	430	1000	0	46	292	80	400	660	200	50	4	M12	170	170	3	3.2	1052	
										132M	258	38	430	1000	0	46	292	80	400	660	200	50	4	M12	170	170	3	5.4	1090	
										160M	323	42	470	1120	0	49	292	100	440	740	200	50	4	M12	190	190	3	6.7	1206	
50-315	80	50	100	470	225	280	32	70	71	160L	345	42	470	1120	0	49	292	100	440	740	200	50	4	M12	190	190	3	6.7	1250	
										100L	193	28	380	870	0	38	315	75	350	600	200	50	4	M12	150	120	3	3.2	948	
										112M	200	28	380	870	0	42	315	75	350	600	200	50	4	M12	150	120	3	3.2	965	
										132S	239	38	430	1000	0	46	315	95	400	660	200	50	4	M12	170	170	3	3.2	1027	
100-245 100-230 65-310 80-320	125	100	125	470	225	280	32	71	75	132M	258	38	430	1000	0	46	315	95	400	660	200	50	4	M12	170	170	3	5.4	1065	
										160M	323	42	470	1120	0	51	315	115	440	740	200	50	4	M12	190	190	3	6.7	1181	
										160L	345	42	470	1120	0	51	315	115	440	740	200	50	4	M12	190	190	3	6.7	1225	
										112M	200	28	430	870	0	45	317	60	400	600	200	50	4	M12	150	120	3	3.2	990	
100-245 100-230 65-310 80-320	125	100	125	470	225	280	32	71	75	132S	239	38	430	1000	0	49	317	80	400	660	200	50	4	M12	170	170	3	3.2	1052	
										132M	258	38	430	1000	0	49	317	80	400	660	200	50	4	M12	170	170	3	5.4	1090	
										160M	323	42	470	1120	0	52	317	100	440	740	200	50	4	M12	190	190	3	6.7	1206	
										160L	345	42	470	1120	0	52	317	100	440	740	200	50	4	M12	190	190	3	6.7	1250	
100-245 100-230 65-310 80-320	125	100	125	470	225	280	32	71	75	180M**	345	48	470	1120	0	52	317	100	440	740	200	50	4	M12	190	190	3	9.0	1169	
										180MC	351.5	48	470	1120	0	53	317	100	440	740	200	50	4	M12	190	190	3	9.0	1270	
										180M*	351.5	48	470	1120	0	53	317	100	440	740	200	50	4	M12	190	190	3	9.0	1242	
										180M**	351.5	55	470	1120	0	53	317	100	440	740	200	50	4	M12	190	190	3	13.9	1183	
100-245 100-230 65-310 80-320	125	100	125	470	225	280	32	71	75	180L	370.5	48	470	1120	0	53	317	100	440	740	200	50	4	M12	190	190	3	9.0	1308	
										180L	370.5	55	470	1120	0	53	317	100	440	740	200	50	4	M12	190	190	3	13.9	1280	
										200LC	395.5	55	530	1250	10	74	342	115	490	840	250	63	4	M16	205	205	3	13.9	1368	
										200L*	395.5	55	530	1250	10	74	342	115	490	840	250	63	4	M16	205	205	3	13.9	1394	
100-320	125	100	125	470	250	315	32	81	91	200L**	425.5	60	530	1250	10	74	342	115	490	840	250	63	4	M16	205	205	4	21.0	1380	
										132S	239	38	430	1000	0	51	342	80	400	660	200	50	4	M12	170	170	3	3.2	1052	
										132M	258	38	430	1000	0	51	342	80	400	660	200	50	4	M12	170	170	3	5.4	1090	
										160M	323	42	470	1120	0	56	342	100	440	740	200	50	4	M12	190	190	3	6.7	1206	
100-320	125	100	125	470	250	315	32	81	91	160L*	345	42																		

Dimension Chart

Dimension Chart for 4P Motor Drive (continuation)

Pump Sizes	Pump									Motor		Base Plate				Foundation Dimensions										Coupling		Refer.				
	Bore		Dimension			Axle		Weight		Dimension																						
	DN1	DN2	a	f	h	h2	d1	Grade L	Grade R	Frame	R	d2	b3	l3	A	Wt.	h3	i	b2	l2	M	N	P	Q	V1	V2	t		Wt.	TL		
	mm	mm	mm	mm	mm	mm	mm		kg	kg	---	mm	mm	mm	mm	mm	kg	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm	mm	
125-400 200-240 200-250	150 200 200	125 200 200	140 200 160	530 160 530	315 530 315	400 315 375	42 42 42	165 158 158	182 174 174	160L	345	48	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	3	9	0	1263	3	
										180MC	351	5	48	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	3	9	0	1365	
										180M*	351	5	48	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	3	9	0	1337	
										180M**	351	5	55	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	3	13	9	1278	
										180LC	370	5	48	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	3	9	0	1403	
										180L*	370	5	55	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	3	13	9	1375	
										180L**	400	5	60	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	4	21	0	1381	
										200M	406	5	65	590	1400	10	99	435	120	550	940	250	63	4	M16	230	230	4	21	0	1401	
										200LC	395	5	55	590	1400	10	99	435	120	550	940	250	63	4	M16	230	230	3	13	9	1463	
										200L*	395	5	55	590	1400	10	99	435	120	550	940	250	63	4	M16	230	230	3	13	9	1488	3
										200L**	425	5	60	590	1400	10	99	435	120	550	940	250	63	4	M16	230	230	4	21	0	1474	
										225SC	432	60	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	21	0	1510		
										225S*	432	60	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	21	0	1566		
										225S**	432	65	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	21	0	1591		
										225S***	432	75	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	31	0	1551		
										225MC	444	5	60	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	21	0	1535	
										225M*	444	5	60	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	21	0	1588	
										225M**	444	5	75	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	31	0	1551	
										250SC	463	5	70	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	31	0	1576	3
										250S	463	5	75	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	31	0	1574	
										250MC	482	5	70	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	31	0	1614	
										250M*	482	5	65	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	21	0	1627	
										250M**	482	5	75	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	31	0	1652	
										280SB	544	80	710	1600	10	109	435	160	670	1060	250	63	4	M16	270	270	4	45	0	1765	3	
										280S	514	75	710	1600	10	109	435	160	670	1060	250	63	4	M16	270	270	4	31	0	1718		
280M*	539	5	75	710	1600	10	109	435	160	670	1060	250	63	4	M16	270	270	4	31	0	1769											
280M**	569	5	85	710	1600	10	109	435	160	670	1060	250	63	4	M16	270	270	4	45	0	1777											
150-310 150-315 150-390 150-400	200 200 200 200	150 150 160 150	160 160 530 530	315 315 315 450	400 400 480 480	48 48 48 48	188 188 204 204	198 198 217 217	180MC	351	5	48	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	3	9	0	1365		
									180M*	351	5	48	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	3	9	0	1337		
									180M**	351	5	55	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	3	13	9	1278		
									180LC	370	5	48	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	3	9	0	1403		
									180L*	370	5	55	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	3	13	9	1375		
									180L**	400	5	60	590	1250	10	90	435	95	550	840	250	63	4	M16	205	205	4	21	0	1367		
									200M	406	5	65	590	1400	10	99	435	120	550	940	250	63	4	M16	230	230	4	21	0	1401		
									200LC	395	5	55	590	1400	10	99	435	120	550	940	250	63	4	M16	230	230	3	13	9	1463		
									200L*	395	5	55	590	1400	10	99	435	120	550	940	250	63	4	M16	230	230	3	13	9	1488		
									200L**	425	5	60	590	1400	10	99	435	120	550	940	250	63	4	M16	230	230	4	21	0	1474		
									225SC	432	60	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	21	0	1510			
									225S*	432	60	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	21	0	1566			
									225S**	432	65	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	21	0	1491			
									225S***	432	75	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	31	0	1551			
									225MC	444	5	60	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	21	0	1535		
									225M*	444	5	60	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	21	0	1588		
									225M**	444	5	75	590	1400	10	95	435	120	550	940	250	63	4	M16	230	230	4	31	0	1551		
									250SC	463	5	70	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	31	0	1576		
									250S*	463	5	75	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	31	0	1574		
									250S**	493	5	85	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	45	0	1551		
									250MC	482	5	70	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	31	0	1614		
									250M*	482	5	65	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	21	0	1627		
									250M**	482	5	75	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	31	0	1652		
									250M***	512	5	85	640	1400	10	99	435	120	600	940	250	63	4	M16	230	230	4	45	0	1606		
									280SB	544	80	710	1600	10	109	435	160	670	1060	250	63	4	M16	270	270	4	45	0	1765	3		
280S*	514	75	710	1600	10	109	435	160	670	1060	250	63	4	M16	270	270	4	31	0	1718												
280S**	544	85	710	1600	10	109	435	160	670	1060	250	63	4	M16	270	270	4	45	0	1726												
280MB	569	5	80	710	1600	10	109	435	160	670	1060	250	63	4	M16	270	270	4	45	0	1816											
280M*	539	5	75	710	1600	10	109	435	160	670	1060	250	63	4	M16	270	270	4	31	0	1769											
280M**	569	5	85	710	1600	10	109	435	160	670	1060	250	63	4	M16	270	270	4	45	0	1777											
315SB	589	85	710	1600	10	109	445	160	670	1060	250	63	4	M16	270	270	4	61	0	1881												

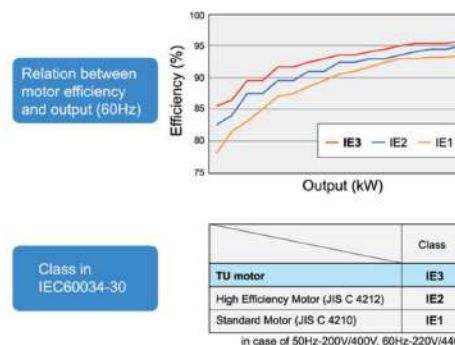
*Motor frame is the same but shaft axle diameter (d2) is different

TU Motor (Torishima Ultra High Efficiency Motor)



■ Torishima pursues high efficiency for not only pump but motor.

IEC (International Electrotechnical Commission) classifies IE1 (standard), IE2 (high efficiency), IE3 (premium efficiency) by motor efficiency. TU motor is equivalent to IE3.



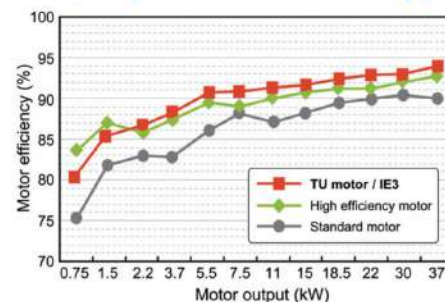
Copper Loss
Reduce copper loss by coil combination and optimized iron core configuration

Iron Loss
Reduce iron loss by use of high quality magnetic steel sheet

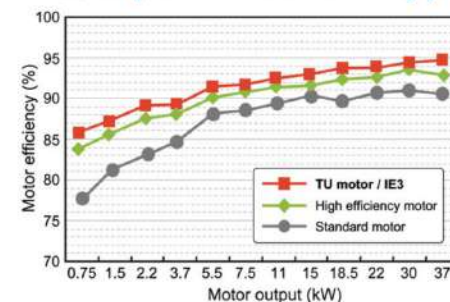
Machine Loss
Reduce machine loss by downsized fan

TU Motor Efficiency (Ex. 50Hz, 400V)

■ Comparison of motor efficiency (2P)

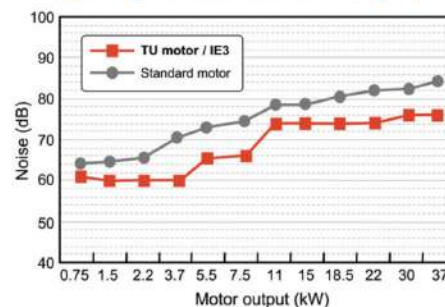


■ Comparison of motor efficiency (4P)



TU Motor Noise (Ex. 50Hz, 400V)

■ Comparison of motor noise (2P)



■ Comparison of motor noise (4P)

