

Permanent Magnet Type
Synchronous Motor

MEIDEN

PM Motor 100 Series

**High-accuracy speed control
achieved based on our feedback-less
control technology**



Empower for new days

The PM MOTOR 100 Series

The PM MOTOR is a permanent magnet type synchronous motor requiring no DC excitation.

Since the revolving speed can be synchronized with the frequency irrespective of load variations, high accuracy speed control is easily possible without feedback control.

The PM MOTOR 100 Series has the stoutness equivalent to that of cage-rotor type induction motors.

In addition, more compactness and higher speed have been attained. Thus the motor mass per unit output kW has been reduced to 2/3 to 1/2 that of conventional series, even smaller than cagerotor type induction motors. For this series, the ranges of capacities and revolutions have been extended so that a variety of needs can be met. This series involves the following three categories:

- (1) 4L (4-pole, Low speed) series
- (2) 4M (4-pole, Medium speed) series
- (3) 4H (4-pole, High speed) series

We recommend you to use Meiden's inverter THYFREC (static type variable frequency power supply unit) together with the PM MOTOR for optimum operation.



Features

- A variety of types** — 21 types of motors ranging from 0.6 kW to 15 kW are available for low, medium and high speed operations.
- Rigid structure** — The rotor is of a squirrel-cage type molded in one unit with aluminum diecast, and is similar to induction motors in rigidity. The magnet storage space is cleverly designed. The large sized rotor shaft provides high rigidity and speed.
- Stable characteristics** — The PM MOTOR 100 series employs high performance permanent magnets processed for reliable stability for many years of use.
- Excellent controllability** — By changing power frequency, a wide range of variable speed drive with high accuracy is available, which is suited for synchronized variable speed drive of a number of motors.
- Easy maintenance** — The adoption of totally-enclosed structure assures excellent anti-environment characteristics and broad applications similar to squirrel-cage type induction motors.
- Low cost operation** — High efficiency and power factor plus low starting current have realized small power capacity and low cost operation as well as the low priced motor.

Application

The PM MOTOR offers its full power for accurate rotation and synchronized operation of a number of motors. It is now being used for various industries such as for textile, glass, precision machine tools, etc..

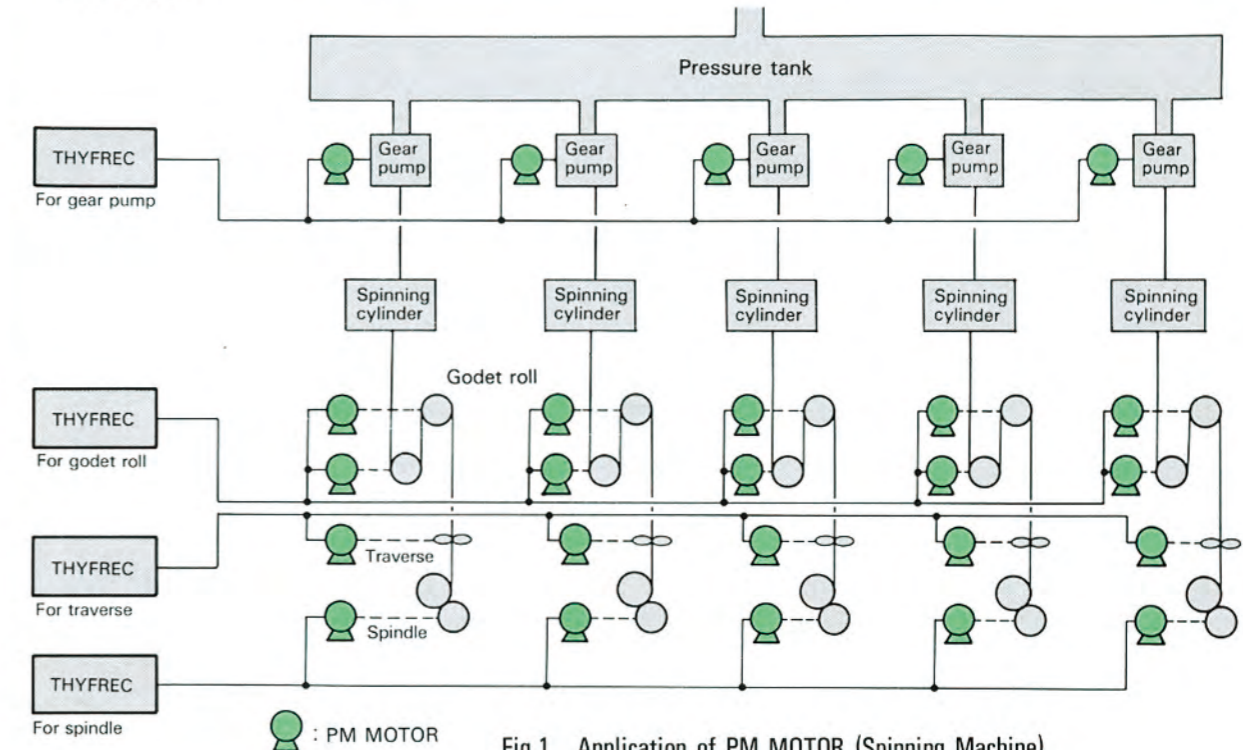


Fig.1 Application of PM MOTOR (Spinning Machine)

Construction

The structure of the frame, the stator core, and windings are the same as those of general cage-rotor type induction motors. (See Fig.2) The rotor has an aluminum die-cast integrated body to make it strong like a cage-rotor type induction motor. However, it incorporates strong magnets and this arrangement demonstrates performance of a synchronous motor.

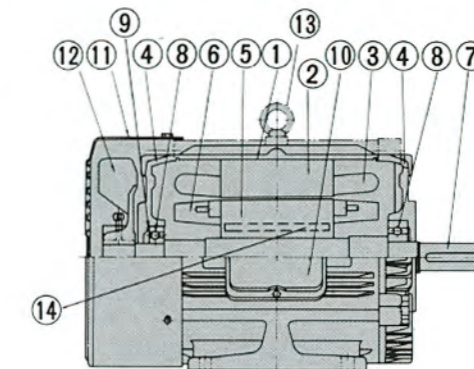


Fig.2 Construction Diagram

Item No.	Name of part	Item No.	Name of part	Item No.	Name of part
①	Frame	⑥	Rotor fan	⑪	Outer cover
②	Stator core	⑦	Shaft	⑫	Fan
③	Stator winding	⑧	Bearing	⑬	Eye bolt
④	Bracket	⑨	Corrugated spring	⑭	Magnet
⑤	Rotor core	⑩	Terminal box		

Standard Specifications * 1

No.	Item	Standard specifications	Substandard specifications	
1	Applicable standards	JIS, JEC-2100, JEM		
2	Protection type	Totally-enclosed, frame surface cooled, free convection type	IP44, IC410	
	Cooling type	Totally-enclosed, frame surface cooled type	IP44, IC411	
3	Power voltage/frequency (inverter input)	200 V – 50·60 Hz, 220 V – 60 Hz	400 V class	
4	Environmental conditions	Ambient temperature	- 10 ~ 40°C	
		Relative humidity	85% or less	
		Altitude	1000 m or less	
		Atmosphere	Free from sulfurous acid gas, chlorine gas, salt wind, etc	
5	Characteristics * 2, 3	Efficiency × Power factor	0.5 ~ 0.75	
		Locked rotor current	4L series	7 ~ 12 times the rated current
			4M series	8 ~ 10 times the rated current
			4H series	10 ~ 12 times the rated current
		Locked rotor torque	4L series	About 2 times the rated torque
			4M series	About 2.5 times the rated torque
			4H series	About 3 times the rated torque
Pull-in torque	100% or more (Load moment of inertia, less than allowable moment of inertia)			
Pull-out torque	160% or more			
6	Vibration	V10		
7	Shaft deflection	5/100 mm or less		
8	Thermal class	4L series	155 (F)	
		4M series	155 (F)	
		4H series	155 (F)	
9	Time rating	S1 (Continuous)		
10	Rotational direction	Clockwise as viewed from anti-coupling side	Counterclockwise	
11	Terminal box position	Right side as viewed from anti-coupling side	Left side	
12	Terminal lead-out	Lug type (lead wire type)	Junction terminal block type	
13	External cable lead-in	Knock-out type	Cable lead-out type	
14	Finish color	Munsell 5B 5/0.5 (standard color)	Other than standard color	
15	Accessory	Shaft end key		
16	Applicable variable speed device	THYFREC-VT630		

Notes: * 1 The specifications for individual drive or approach run inverter drive are different from the above specifications. Other specifications are also available on request (see the back cover of this catalogue).
 * 2 The characteristics are for reference and vary with operating conditions or load conditions.
 * 3 Moment of inertia and load torque should be confirmed at the time of synchronous pull-in. For allowable load moment of inertia, refer to Page 4.

Handling Precautions

Since the mechanical structure of the PM MOTOR is the same as squirrel-cage type induction motors, it can be handled almost in the same manner. This PM MOTOR incorporates permanent magnets so the following points must be fully observed.

- Operating voltage** — When changing power frequency, the voltage should also be changed in proportion to the frequency. Do not increase the voltage alone, as it affects the stability of the permanent magnets.
- Disassembly** — When the rotor is to be removed for replacing the bearing, etc., care should be taken to ensure that it is free from deposits of iron powder. After it has been removed, place it on a piece of wood on a non-magnetized object.
- Re-starting** — Do not turn on the power when the motor is running, or else, the permanent magnets may be demagnetized due to the phase imbalance of induction voltage of permanent magnet with the power supply. The motor should be re-started after it has stopped completely.

Applications of Output and Frame No.

4L series (low speed series)

Frame No.	Rated output (kW) (Max. speed)	Allowable speed (min ⁻¹)	Operating frequency (Hz)	Rotor moment of inertia (kg·m ²)	Rotor GD ² (kg·m ²)	Enclosure * 1
63M	0.6	600 ~ 4500	20 ~ 150	0.001	(0.0039)	Totally-enclosed type
80M	0.8	600 ~ 4500	20 ~ 150	0.002	(0.0082)	Totally-enclosed, fan-cooled type
80M	1.6	600 ~ 4500	20 ~ 150	0.0035	(0.014)	Totally-enclosed, fan-cooled type
100L	2.5	600 ~ 4500	20 ~ 150	0.008	(0.032)	Totally-enclosed, fan-cooled type
100L	5.0	600 ~ 4500	20 ~ 150	0.013	(0.052)	Totally-enclosed, fan-cooled type
132S	8.0	600 ~ 4500	20 ~ 150	0.03	(0.13)	Totally-enclosed, fan-cooled type
132M	11.0	600 ~ 4500	20 ~ 150	0.05	(0.19)	Totally-enclosed, fan-cooled type

4M series (medium speed series)

Frame No.	Rated output (kW) (Max. speed)	Allowable speed (min ⁻¹)	Operating frequency (Hz)	Rotor moment of inertia (kg·m ²)	Rotor GD ² (kg·m ²)	Enclosure * 1
63M	0.8	600 ~ 8100	20 ~ 270	0.001	(0.0039)	Totally-enclosed, fan-cooled type
80M	1.4	600 ~ 8100	20 ~ 270	0.002	(0.0082)	Totally-enclosed, fan-cooled type
80M	2.2	600 ~ 8100	20 ~ 270	0.0035	(0.014)	Totally-enclosed, fan-cooled type
100L	4.0	600 ~ 8100	20 ~ 270	0.008	(0.032)	Totally-enclosed, fan-cooled type
100L	7.0	600 ~ 8100	20 ~ 270	0.013	(0.052)	Totally-enclosed, fan-cooled type
132S	9.0	600 ~ 6600	20 ~ 220	0.03	(0.13)	Totally-enclosed, fan-cooled type
132M	12.0	600 ~ 6600	20 ~ 220	0.05	(0.19)	Totally-enclosed, fan-cooled type

4H series (high speed series)

Frame No.	Rated output (kW) (Max. speed)	Allowable speed (min ⁻¹)	Operating frequency (Hz)	Rotor moment of inertia (kg·m ²)	Rotor GD ² (kg·m ²)	Enclosure * 1
63M	1.1	600 ~ 20,000	20 ~ 667	0.001	(0.0039)	Totally-enclosed, fan-cooled type
80M	2.2	600 ~ 15,000	20 ~ 500	0.002	(0.0082)	Totally-enclosed, fan-cooled type
80M	3.5	600 ~ 15,000	20 ~ 500	0.0035	(0.014)	Totally-enclosed, fan-cooled type
100L	5.5	600 ~ 12,000	20 ~ 400	0.008	(0.032)	Totally-enclosed, fan-cooled type
100L	9.0	600 ~ 12,000	20 ~ 400	0.013	(0.052)	Totally-enclosed, fan-cooled type
132S	11.0	600 ~ 10,000	20 ~ 330	0.03	(0.13)	Totally-enclosed, fan-cooled type
132M	15.0	600 ~ 10,000	20 ~ 330	0.05	(0.19)	Totally-enclosed, fan-cooled type

Note: * 1 Totally-enclosed type..... Totally-enclosed, frame surface cooled, free convection type IP44, IC410
 Totally-enclosed, fan-cooled type.... Totally-enclosed, frame surface cooled type IP44, IC411

Allowable Load Moment of Inertia J

The PM MOTOR 100 series has synchronous self-pull-in function at the start of operation. So the load moment of inertia is limited by the starting frequency and pull-in torque. Fig. 3 shows the allowable load moment of inertia (J) at a small starting load torque.

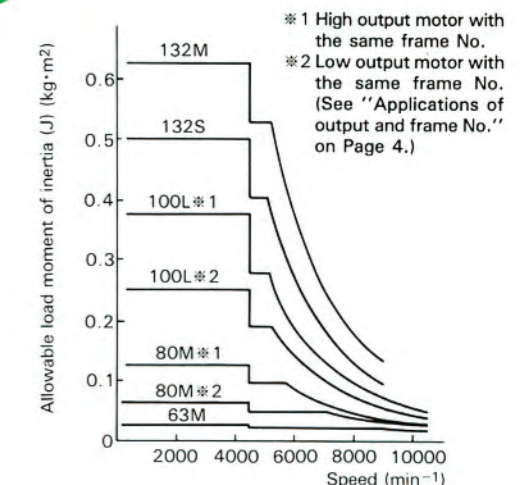


Fig.3 Allowable Load Moment of inertia of PM MOTOR 100 series

Outline Dimensions *1

4L series foot mounting type*2 — Totally-enclosed, frame surface cooled, free convection type (TI100-YFTP) IP44, IC410
 Totally-enclosed, splash-proof frame surface cooled type (TIS100-YFTP) IP44, IC411

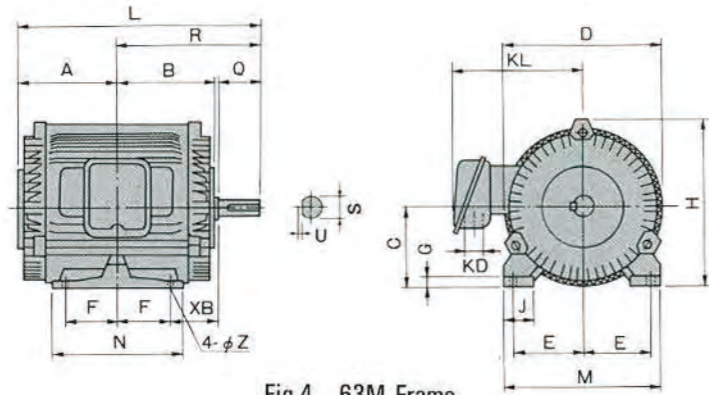


Fig.4 63M Frame

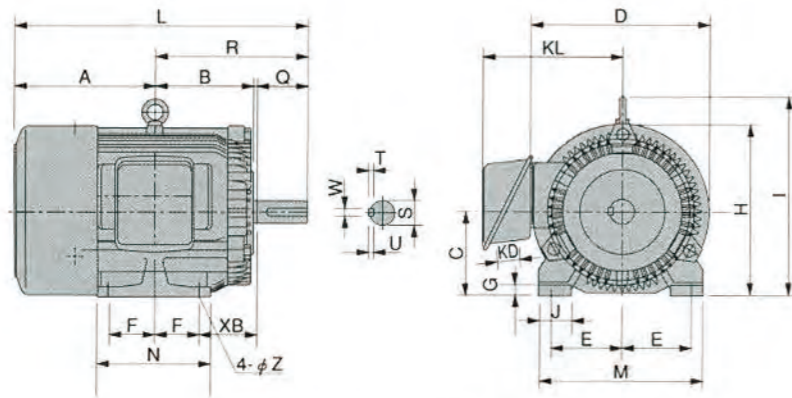


Fig.5 80M~132M Frame

4L Series Foot Mounting Type

Frame No.	A	B	C	D	E	F	G	H	I	J	L	M	N
63M	77.5	76	63	141	50	40	6.5	129	—	26	180.5	124	101
80M	136	96	80	178	62.5	50	8.5	169	—	33	276	155	130
100L	180	128.5	100	220	80	70	11	210	243.5	40	373	196	176
132S	217	153	132	276	108	70	16	270	311.5	50	456	252	176
132M	236	172	132	276	108	89	16	270	311.5	50	494	252	214

Frame No.	Z	XB	KD	KL	R	S	Q	T	U	W	Coupling side bearing	Anti-coupling side bearing	Fig. No.
63M	7	40	22	128	103	11h6	23	—	1	—	6201ZZ	6201ZZ	4
80M	10	50	22	142	140	19j6	40	6	3.5	6	6204ZZ	6204ZZ	5
100L	12	63	22	162	193	28j6	60	7	4	8	6206ZZ	6205ZZ	5
132S	12	89	34	215	239	38k6	80	8	5	10	6308ZZ	6207ZZ	5
132M	12	89	34	215	258	38k6	80	8	5	10	6308ZZ	6207ZZ	5

Notes: *1 Dimensions are subject to change. When designing, contact our office for advice.
 *2 4M and 4H series bearings and lubricating system may be different from others. For details, contact our office.

4L series flange type*3 — Totally-enclosed, frame surface cooled, free convection flange-mounted type (HTI100-YFTP) IP44, IC410
 Totally-enclosed, frame surface cooled flange-mounted type (HTIS100-YFTP) IP44, IC411

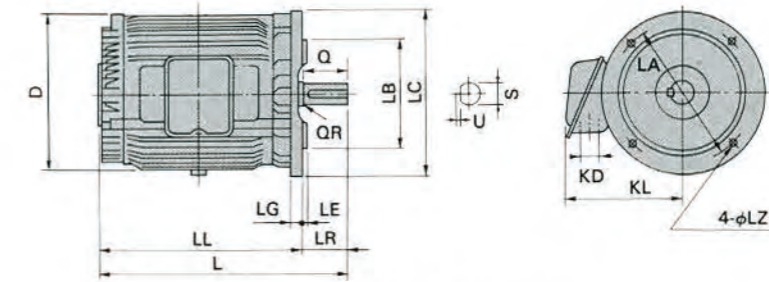


Fig.6 63M Frame

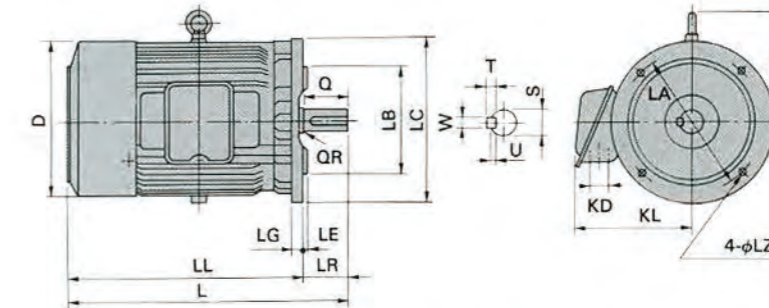


Fig.7 80M~132M Frame

4L Series Flange Type

Flange No.	Frame No.	D	L	LL	IE	LA	*4LB	LC	LE	LG	LZ	LR	KD	KL
FF130	63M	141	191.5	168.5	—	130	110	160	3.5	10	10	23	22	128
FF165	80M	178	288	248	—	165	130	200	3.5	12	12	40	22	142
FF215	100L	220	373	313	144	215	180	250	4	16	14.5	60	22	162
FF265	132S	276	456	376	180	265	230	300	4	20	14.5	80	34	215
	132M	276	494	414	180	265	230	300	4	20	14.5	80	34	215

Flange No.	Frame No.	S	Q	T	U	W	Coupling side bearing	Anti-coupling side bearing	Fig. No.
FF130	63M	11h6	23	—	1	—	6201ZZ	6201ZZ	6
FF165	80M	19j6	40	6	3.5	6	6204ZZ	6204ZZ	7
FF215	100L	28j6	60	7	4	8	6206ZZ	6205ZZ	7
FF265	132S	38k6	80	8	5	10	6308ZZ	6207ZZ	7
	132M	38k6	80	8	5	10	6308ZZ	6207ZZ	7

Note: *3 4M and 4H series bearing and lubricating system may be different from others. For details, contact our office.
 *4 The dimensional tolerance LB is "j6" according to JISB0401.

■ When Ordering, Specify the Following Items

No.	Specification item	Contents	Remarks
1	Facility		
2	Driven equipment		
3	Quantity		
4	Output range	~ kW	
5	Number of poles	4 P	
6	Voltage range	~ V	
7	Frequency range	~ Hz	
8	Type	Vertical shaft type, with feet type, flange type	
9	Coupling system	Direct coupling, roll load	For roll load, specify weight and the position of center of gravity. When heater is provided, specify the type and temperature.
10	Rotational direction	Clockwise, counterclockwise	As viewed from anti-coupling side
11	Terminal	Lug type, cable drawout type	For cable drawout type, specify the size and finished outside diameter.
12	Shaft end designation	With, without	
13	Starting system	Direct start, low frequency start, zero start	
14	Number of starting operation	Hot _____ operations, Cold _____ operations	
15	Load moment of inertia	kg · m ²	
16	Required torque	Locked rotor torque (%) Pull-out torque (%) Pull-in torque (%)	When a large torque is required, specify the value.
17	Ambient condition	Standard, special	Specify special points (ambient temperature, humidity, corrosive gas)
18	Finish color designation	Without, with	Meidensha's standard color, Munsell 5B5/0.5
19	Accessory	Required/not required	Specify the name and quantity.

- [Remarks] This catalog is for standard PM MOTORS. For any of the following cases, contact our office.
- (1) The relation between load moment of inertia and motor frame No. does not conform to Fig.3.
 - (2) Speed in excess of the maximum speed is required.
 - (3) Special bearing specifications are required.
 - (4) Problem of dangerous speed owing to roll load.
 - (5) Installation of hot roll.
 - (6) Shaft deflection and vibration need to be reduced.
 - (7) For individual drive or approach run inverter drive, zero start operation is required.
In this case, the load moment of inertia is not limited while the motor capacity and maximum speed can be increased.
For details, contact our office.



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