

■ Notes on [Motor specification] page

Note) 1. Regenerative resistors are not built in drivers of A and B frames. When regeneration occurs, prepare an optional external regenerative resistor.

[At AC100 V of power voltage]

Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.

- If the load is connected, frequency will be defines as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
- When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
- Power supply voltage is AC115 V (at 100 V of the main voltage).
If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/115) relative to the value in the table.
- When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.

[At AC200 V of power voltage]

Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.

- If the load is connected, frequency will be defines as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
- When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
- Power supply voltage is AC230 V (at 200 V of the main voltage).
If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
- When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.

Note) 2. If the effective torque is within the rated torque, there is no limit in generative brake.

Note) 3. Consult us or a dealer if the load moment of inertia exceeds the specified value.

■ Please contact us for Brake specifications, Permissible load, Environmental Conditions, Mass of motor.

Repair Consult to the dealer from whom you have purchased this product for details of repair work.
When the product is incorporated to the machine you have purchased, consult to the machine manufacturer or its dealer.

URL Electronic data of this product (Instruction Manual, CAD data) can be downloaded from the following web site;
industrial.panasonic.com/ac/e/

●Contakut to : _____

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Industrial Device Business Division
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Panasonic

INDUSTRY

AC Servo Motor & Driver

MINAS A6 family
Battery-less absolute encoder motor



AC Servo Motor & Driver

MINAS A6 family

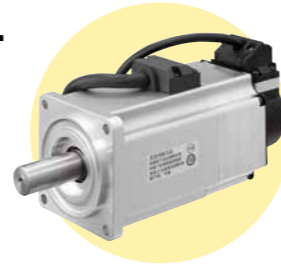
●This product is for industrial equipment. Don't use this product at general household.

Build an absolute system with no battery!

Reduced the battery for the absolute encoder by installing the power generating element in the motor. In addition to improving maintainability, we support the construction of ecological and economical industrial machines and systems.

Maintenance-free - there is no need to perform battery replacement.

The battery-less absolute encoder is an innovative encoder requiring no hassle inventory management or cost of battery replacement. It contributes to the construction of ecological and economical industrial machines and systems.



Battery-less absolute encoder motor lineup

	80 mm sq. or less Leadwire type						100 mm sq. or more Encoder connector (Small size JN2) type									
	50 W	100 W	200 W	400 W	750 W	1000 W	1.0 kW	1.5 kW	2.0 kW	3.0 kW	4.0 kW	5.0 kW				
Low inertia MSMF	100 V 200 V	100 V 200 V	100 V 200 V	100 V 200 V	200 V	200 V	200 V	200 V	200 V	200 V	200 V	200 V				
Middle inertia MQMF		100 V 200 V	100 V 200 V	100 V 200 V												
Middle inertia MDMF	<table border="1"> <tr> <td>(Table description)</td> <td>(On sale)</td> </tr> <tr> <td>Voltage specifications</td> <td>100 V 200 V</td> </tr> </table>						(Table description)	(On sale)	Voltage specifications	100 V 200 V	200 V	200 V	200 V	200 V	200 V	200 V
(Table description)	(On sale)															
Voltage specifications	100 V 200 V															
Middle inertia MGMF	<table border="1"> <tr> <td>(Coming soon)</td> <td></td> </tr> <tr> <td>Voltage specifications</td> <td>100 V 200 V</td> </tr> </table>						(Coming soon)		Voltage specifications	100 V 200 V	850 W 200 V	1.3 kW 200 V	1.8 kW 200 V	2.4 kW 200 V	2.9 kW 200 V	4.4 kW 200 V
(Coming soon)																
Voltage specifications	100 V 200 V															
High inertia MHMF	100 V 200 V	100 V 200 V	100 V 200 V	100 V 200 V	200 V	200 V	200 V	200 V	200 V	200 V	200 V	200 V				

[Motor] Model Designation



Special specifications
M: Special order product

① Type

Symbol	Type
MSM	Low inertia (50 W to 1000 W)
MHM	High inertia (50 W to 1000 W)

② Series

Symbol	Series name
F	A6 family

③ Motor rated output

Symbol	Rated output	Symbol	Rated output
5A	50 W	04	400 W
01	100 W	08	750 W
02	200 W	09	1000 W

④ Voltage specifications

Symbol	Specifications
1	100 V
2	200 V
Z	100 V / 200 V common (50 W only)

⑤ Rotary encoder specifications

Symbol	Format	Pulse counts	Resolution	Wires
A	Absolute	23-bit	8388608	7

⑥ Design order

Symbol	Specifications
1	Standard

⑦ Motor specifications: 80 mm sq. or less MSMF 50 W to 1000 W

Symbol	Shaft	Holding brake		Oil seal		Motor encoder terminal
		without	with	without	with	
A	2	●	●	●	●	●
B	2	●	●	●	●	●
C	2	●	●	●	●	●
D	2	●	●	●	●	●
S	2	●	●	●	●	●
T	2	●	●	●	●	●
U	2	●	●	●	●	●
V	2	●	●	●	●	●

⑦ Motor specifications: 80 mm sq. or less MHMF 50 W to 1000 W

Symbol	Shaft	Holding brake		Oil seal		Motor encoder terminal
		without	with	without	with	
A	2	●	●	●	●	●
B	2	●	●	●	●	●
C	2	●	●	●	●	●
C	4	●	●	●	●	●
D	2	●	●	●	●	●
D	4	●	●	●	●	●
S	2	●	●	●	●	●
T	2	●	●	●	●	●
U	2	●	●	●	●	●
U	4	●	●	●	●	●
V	2	●	●	●	●	●
V	4	●	●	●	●	●

Table of Model Numbers

● 80 mm sq. or less 50 W to 1000 W MSMF, MQMF, MHMF Leadwire type IP65

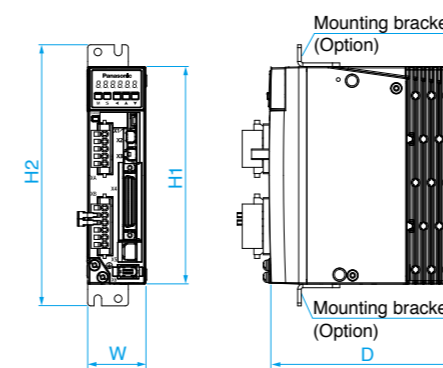
Motor series	Motor			Driver		Power capacity (at rated load)
	Power supply	Output (W)	Model No.	A6 series Model No.	Dimension Frame	
MSMF (Leadwire type) 3000 r/min Low inertia	Single phase 100 V	50	MSMF5AZA1□2	MADL☆01○★	A-frame	Approx. 0.4 kVA
		100	MSMF011A1□2	MADL☆11○★		
		200	MSMF021A1□2	MBDL☆21○★	B-frame	Approx. 0.5 kVA
		400	MSMF041A1□2	MCDL☆31○★	C-frame	Approx. 0.9 kVA
	Single phase/ 3-phase 200 V	50	MSMF5AZA1□2	MADL☆05○★	A-frame	Approx. 0.5 kVA
		100	MSMF012A1□2			
		200	MSMF022A1□2	MADL☆15○★	B-frame	Approx. 0.9 kVA
		400	MSMF042A1□2	MBDL☆25○★		
		750	MSMF082A1□2	MCDL☆35○★	C-frame	Approx. 1.8 kVA
		1000	MSMF092A1□2	MDDL☆45○★	D-frame	Approx. 2.4 kVA
MHMF (Leadwire type) 3000 r/min High inertia	Single phase 100 V	50	MHMF5AZA1□□	MADL☆01○★	A-frame	Approx. 0.4 kVA
		100	MHMF011A1□□	MADL☆11○★		
		200	MHMF021A1□□	MBDL☆21○★	B-frame	Approx. 0.5 kVA
		400	MHMF041A1□□	MCDL☆31○★	C-frame	Approx. 0.9 kVA
	Single phase/ 3-phase 200 V	50	MHMF5AZA1□□	MADL☆05○★	A-frame	Approx. 0.5 kVA
		100	MHMF012A1□□			
		200	MHMF022A1□□	MADL☆15○★	B-frame	Approx. 0.9 kVA
		400	MHMF042A1□□	MBDL☆25○★		
		750	MHMF082A1□□	MCDL☆35○★	C-frame	Approx. 1.8 kVA
		1000	MHMF092A1□□	MDDL☆55○★	D-frame	Approx. 2.4 kVA

[Motor] □ : For more information, Please refer to "[Motor] Model Designation" in P.1.
[Driver] ☆ ○ ★ : For more information, Please refer to "[Driver] Model Designation" below.

[Driver] Model Designation • About "☆" "○" "★" in the above table

(☆) Safety Function		(○) I/f specifications		(★) Classification of type	
Symbol	Specifications	Symbol (specification)	Symbol	Specifications	
N	without the safety function	S (Analog/Pulse)	E	Basic type (Pulse train only)*1	
T	with the safety function		F	Multi function type (Pulse, analog, full-closed)	
N	without the safety function	N (RTEX)	G	RS485 communication type (Pulse train only)	
T	with the safety function		E	Standard for rotary motor	
N	without the safety function	B (EtherCAT)	F	Multifunction for rotary motor	
T	with the safety function		E	Standard for rotary motor	
			F	Multifunction for rotary motor	

[Driver] Dimensions



Frame symbol	W (mm)	H1 (mm)	H2 (mm)	D (mm)	Mass (kg)
A-frame	40	150	180	130	0.8
B-frame	55	150	180	130	1.0
C-frame	65	150	180	170	1.6
D-frame	85	150	180	170	2.1

Rack mount type
(Base mount type [Back-end mounting] is also available.)

• Please refer to A6 family catalog for details.

Encoder Cable (Option)

Length (m)	Part No.(ex.)
3	MFECA0030EAD
5	MFECA0050EAD
10	MFECA0100EAD

• Please contact us for 10 m to 20 m.

*1 Because A6SE series driver (dedicated for position control) does not support the absolute system specification, only incremental system can be used in combination.

Motor Specifications MSMF type [Low inertia]

		50 W		100 W		
		AC100 V	AC200 V	AC100 V	AC200 V	
Motor model ^{*1}	IP65	MSMF5AZA1□2	MSMF5AZA1□2	MSMF011A1□2	MSMF012A1□2	
Applicable driver	Model No.	Multifunction type	MADLT01SF	MADLT05SF	MADLT11SF	MADLT05SF
		RS485 communication type ^{*2}	MADLN01SG	MADLN05SG	MADLN11SG	MADLN05SG
		Basic type ^{*2}	MADLN01SE	MADLN05SE	MADLN11SE	MADLN05SE
Frame symbol		A-frame		A-frame		
Power supply capacity (kVA)		0.4	0.5	0.4	0.5	
Rated output (W)		50		100		
Rated torque (N·m)		0.16		0.32		
Continuous stall torque (N·m)		0.16		0.32		
Momentary Max. peak torque (N·m)		0.48		0.95		
Rated current (A(rms))		1.1		1.6	1.1	
Max. current (A(o-p))		4.7		6.9	4.7	
Regenerative brake frequency (times/min) ^{Note)1}	Without option	No limit ^{Note)2}		No limit ^{Note)2}		
	With option	DV0P4280/No limit ^{Note)2}	DV0P4281/No limit ^{Note)2}	DV0P4280/No limit ^{Note)2}	DV0P4281/No limit ^{Note)2}	
Rated rotational speed (r/min)		3000		3000		
Max. rotational speed (r/min)		6000		6000		
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)	Without brake	0.026		0.048		
	With brake	0.029		0.051		
Recommended moment of inertia ratio of the load and the rotor ^{Note)3}		30 times or less		30 times or less		
Rotary encoder specifications		23-bit Absolute		23-bit Absolute		
Resolution per single turn		8388608		8388608		

		200 W		400 W		
		AC100 V	AC200 V	AC100 V	AC200 V	
Motor model ^{*1}	IP65	MSMF021A1□2	MSMF022A1□2	MSMF041A1□2	MSMF042A1□2	
Applicable driver	Model No.	Multifunction type	MBDLT21SF	MADLT15SF	MCDLT31SF	MBDLT25SF
		RS485 communication type ^{*2}	MBDLN21SG	MADLN15SG	MCDLN31SG	MBDLN25SG
		Basic type ^{*2}	MBDLN21SE	MADLN15SE	MCDLN31SE	MBDLN25SE
Frame symbol		B-frame	A-frame	C-frame	B-frame	
Power supply capacity (kVA)		0.5		0.9		
Rated output (W)		200		400		
Rated torque (N·m)		0.64		1.27		
Continuous stall torque (N·m)		0.64		1.27		
Momentary Max. peak torque (N·m)		1.91		3.82		
Rated current (A(rms))		2.5	1.5	4.6	2.4	
Max. current (A(o-p))		10.6	6.5	19.5	10.2	
Regenerative brake frequency (times/min) ^{Note)1}	Without option	No limit ^{Note)2}		No limit ^{Note)2}		
	With option	DV0P4283 / No limit ^{Note)2}		DV0P4282/No limit ^{Note)2}	DV0P4283/No limit ^{Note)2}	
Rated rotational speed (r/min)		3000		3000		
Max. rotational speed (r/min)		6000		6000		
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)	Without brake	0.14		0.27		
	With brake	0.17		0.30		
Recommended moment of inertia ratio of the load and the rotor ^{Note)3}		30 times or less		30 times or less		
Rotary encoder specifications		23-bit Absolute		23-bit Absolute		
Resolution per single turn		8388608		8388608		

• For details of Note)1 to Note)3, refer to the back cover.

*1 □2 in the motor part number represents the motor specifications. Detail of model designation, refer to "[Motor] Model Designation" in P.1.

*2 Basic type and RS485 communication type are "Position control type". Detail of model designation, refer to "[Driver] Model Designation" in P.2.

		750 W	
		AC200 V	
Motor model ^{*1}	IP65	MSMF082A1□2	
Applicable driver	Model No.	Multifunction type	MCDLT35SF
		RS485 communication type ^{*2}	MCDLN35SG
		Basic type ^{*2}	MCDLN35SE
Frame symbol		C-frame	
Power supply capacity (kVA)		1.8	
Rated output (W)		750	
Rated torque (N·m)		2.39	
Continuous stall torque (N·m)		2.39	
Momentary Max. peak torque (N·m)		7.16	
Rated current (A(rms))		4.1	
Max. current (A(o-p))		17.4	
Regenerative brake frequency (times/min) ^{Note)1}	Without option	No limit ^{Note)2}	
	With option	DV0P4283 / No limit ^{Note)2}	
Rated rotational speed (r/min)		3000	
Max. rotational speed (r/min)		6000	
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)	Without brake	0.96	
	With brake	1.06	
Recommended moment of inertia ratio of the load and the rotor ^{Note)3}		20 times or less	
Rotary encoder specifications		23-bit Absolute	
Resolution per single turn		8388608	

		1000 W	
		AC200 V	
Motor model ^{*1}	IP65	MSMF092A1□2	
Applicable driver	Model No.	Multifunction type	MDDLTL45SF
		RS485 communication type ^{*2}	MDDLNL45SG
		Basic type ^{*2}	MDDLNL45SE
Frame symbol		D-frame	
Power supply capacity (kVA)		2.4	
Rated output (W)		1000	
Rated torque (N·m)		3.18	
Continuous stall torque (N·m)		3.18	
Momentary Max. peak torque (N·m)		9.55	
Rated current (A(rms))		5.7	
Max. current (A(o-p))		24.2	
Regenerative brake frequency (times/min) ^{Note)1}	Without option	No limit ^{Note)2}	
	With option	DV0P4284 / No limit ^{Note)2}	
Rated rotational speed (r/min)		3000	
Max. rotational speed (r/min)		6000	
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)	Without brake	1.26	
	With brake	1.36	
Recommended moment of inertia ratio of the load and the rotor ^{Note)3}		15 times or less	
Rotary encoder specifications		23-bit Absolute	
Resolution per single turn		8388608	

• For details of Note)1 to Note)3, refer to the back cover.

*1 □2 in the motor part number represents the motor specifications. Detail of model designation, refer to "[Motor] Model Designation" in P.1.

*2 Basic type and RS485 communication type are "Position control type". Detail of model designation, refer to "[Driver] Model Designation" in P.2.

Motor Specifications MHMF type [High inertia]

		50 W		100 W		
		AC100 V	AC200 V	AC100 V	AC200 V	
Motor model ^{*1}	IP65	MHMF5AZA1□□	MHMF5AZA1□□	MHMF011A1□□	MHMF012A1□□	
Applicable driver	Model No.	Multifunction type	MADLT01SF	MADLT05SF	MADLT11SF	MADLT05SF
		RS485 communication type ^{*2}	MADLN01SG	MADLN05SG	MADLN11SG	MADLN05SG
		Basic type ^{*2}	MADLN01SE	MADLN05SE	MADLN11SE	MADLN05SE
Frame symbol		A-frame		A-frame		
Power supply capacity	(kVA)	0.4	0.5	0.4	0.5	
Rated output	(W)	50		100		
Rated torque	(N·m)	0.16		0.32		
Continuous stall torque	(N·m)	0.18		0.33		
Momentary Max. peak torque	(N·m)	0.56		1.11		
Rated current	(A(rms))	1.1		1.6	1.1	
Max. current	(A(o-p))	5.5		7.9	5.5	
Regenerative brake frequency (times/min) ^{Note)1}	Without option	No limit ^{Note)2}		No limit ^{Note)2}		
	With option	DV0P4280/No limit ^{Note)2}	DV0P4281/No limit ^{Note)2}	DV0P4280/No limit ^{Note)2}	DV0P4281/No limit ^{Note)2}	
Rated rotational speed	(r/min)	3000		3000		
Max. rotational speed	(r/min)	6500		6500		
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)	Without brake	0.038		0.071		
	With brake	0.042		0.074		
Recommended moment of inertia ratio of the load and the rotor ^{Note)3}		30 times or less		30 times or less		
Rotary encoder specifications		23-bit Absolute		23-bit Absolute		
	Resolution per single turn	8388608		8388608		

		200 W		400 W		
		AC100 V	AC200 V	AC100 V	AC200 V	
Motor model ^{*1}	IP65	MHMF021A1□□	MHMF022A1□□	MHMF041A1□□	MHMF042A1□□	
Applicable driver	Model No.	Multifunction type	MBDLT21SF	MADLT15SF	MCDLT31SF	MBDLT25SF
		RS485 communication type ^{*2}	MBDLN21SG	MADLN15SG	MCDLN31SG	MBDLN25SG
		Basic type ^{*2}	MBDLN21SE	MADLN15SE	MCDLN31SE	MBDLN25SE
Frame symbol		B-frame	A-frame	C-frame	B-frame	
Power supply capacity	(kVA)	0.5		0.9		
Rated output	(W)	200		400		
Rated torque	(N·m)	0.64		1.27		
Continuous stall torque	(N·m)	0.76		1.40		
Momentary Max. peak torque	(N·m)	2.23		4.46		
Rated current	(A(rms))	2.1	1.4	4.1	2.1	
Max. current	(A(o-p))	10.4	6.9	20.3	10.4	
Regenerative brake frequency (times/min) ^{Note)1}	Without option	No limit ^{Note)2}		No limit ^{Note)2}		
	With option	DV0P4283 / No limit ^{Note)2}		DV0P4282/No limit ^{Note)2}	DV0P4283/No limit ^{Note)2}	
Rated rotational speed	(r/min)	3000		3000		
Max. rotational speed	(r/min)	6500		6500		
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)	Without brake	0.29		0.56		
	With brake	0.31		0.58		
Recommended moment of inertia ratio of the load and the rotor ^{Note)3}		30 times or less		30 times or less		
Rotary encoder specifications		23-bit Absolute		23-bit Absolute		
	Resolution per single turn	8388608		8388608		

• For details of Note)1 to Note)3, refer to the back cover.

*1 □□ in the motor part number represents the motor specifications. Detail of model designation, refer to "[Motor] Model Designation" in P.1.

*2 Basic type and RS485 communication type are "Position control type". Detail of model designation, refer to "[Driver] Model Designation" in P.2.

		750 W	
		AC200 V	
Motor model ^{*1}	IP65	MHMF082A1□□	
Applicable driver	Model No.	Multifunction type	MCDLT35SF
		RS485 communication type ^{*2}	MCDLN35SG
		Basic type ^{*2}	MCDLN35SE
Frame symbol		C-frame	
Power supply capacity	(kVA)	1.8	
Rated output	(W)	750	
Rated torque	(N·m)	2.39	
Continuous stall torque	(N·m)	2.86	
Momentary Max. peak torque	(N·m)	8.36	
Rated current	(A(rms))	3.8	
Max. current	(A(o-p))	18.8	
Regenerative brake frequency (times/min) ^{Note)1}	Without option	No limit ^{Note)2}	
	With option	DV0P4283 / No limit ^{Note)2}	
Rated rotational speed	(r/min)	3000	
Max. rotational speed	(r/min)	6000	
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)	Without brake	1.56	
	With brake	1.66	
Recommended moment of inertia ratio of the load and the rotor ^{Note)3}		20 times or less	
Rotary encoder specifications		23-bit Absolute	
	Resolution per single turn	8388608	

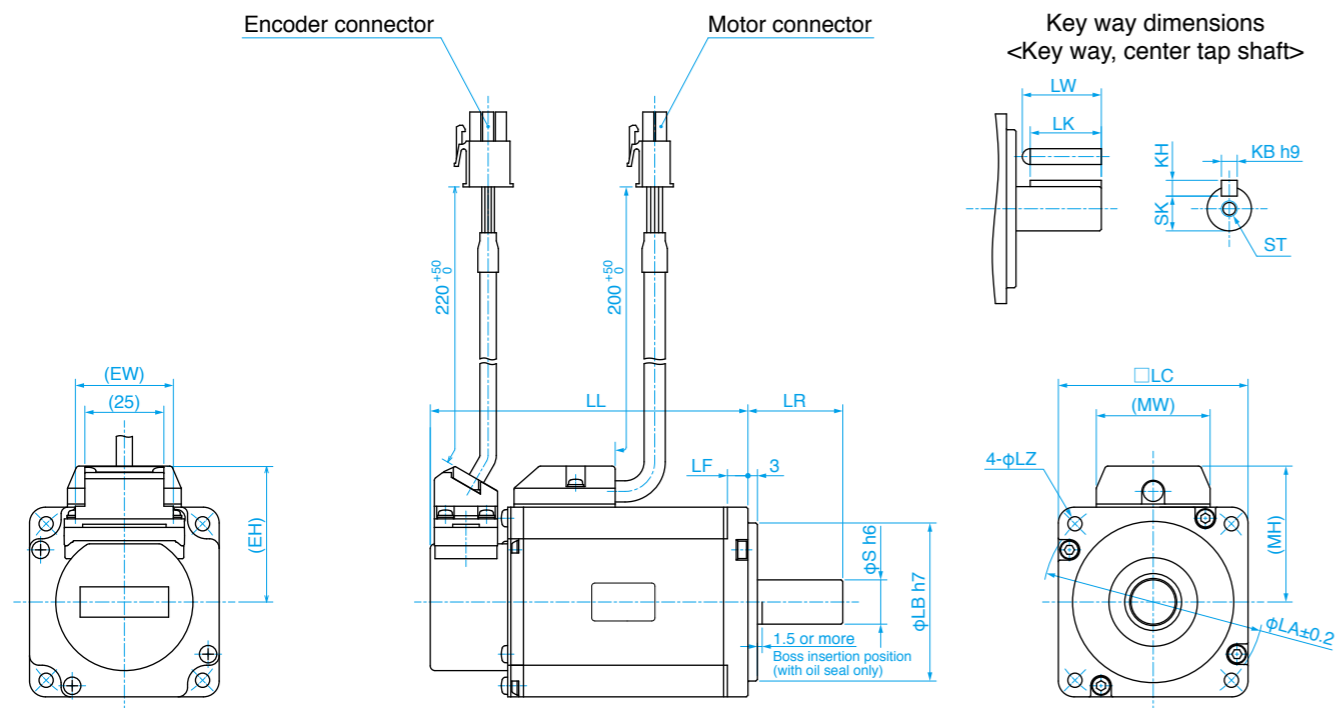
		1000 W	
		AC200 V	
Motor model ^{*1}	IP65	MHMF092A1□□	
Applicable driver	Model No.	Multifunction type	MDDLTL55SF
		RS485 communication type ^{*2}	MDDLNL55SG
		Basic type ^{*2}	MDDLNL55SE
Frame symbol		D-frame	
Power supply capacity	(kVA)	2.4	
Rated output	(W)	1000	
Rated torque	(N·m)	3.18	
Continuous stall torque	(N·m)	3.34	
Momentary Max. peak torque	(N·m)	11.1	
Rated current	(A(rms))	5.7	
Max. current	(A(o-p))	28.2	
Regenerative brake frequency (times/min) ^{Note)1}	Without option	No limit ^{Note)2}	
	With option	DV0P4284 / No limit ^{Note)2}	
Rated rotational speed	(r/min)	3000	
Max. rotational speed	(r/min)	6000	
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)	Without brake	2.03	
	With brake	2.13	
Recommended moment of inertia ratio of the load and the rotor ^{Note)3}		15 times or less	
Rotary encoder specifications		23-bit Absolute	
	Resolution per single turn	8388608	

• For details of Note)1 to Note)3, refer to the back cover.

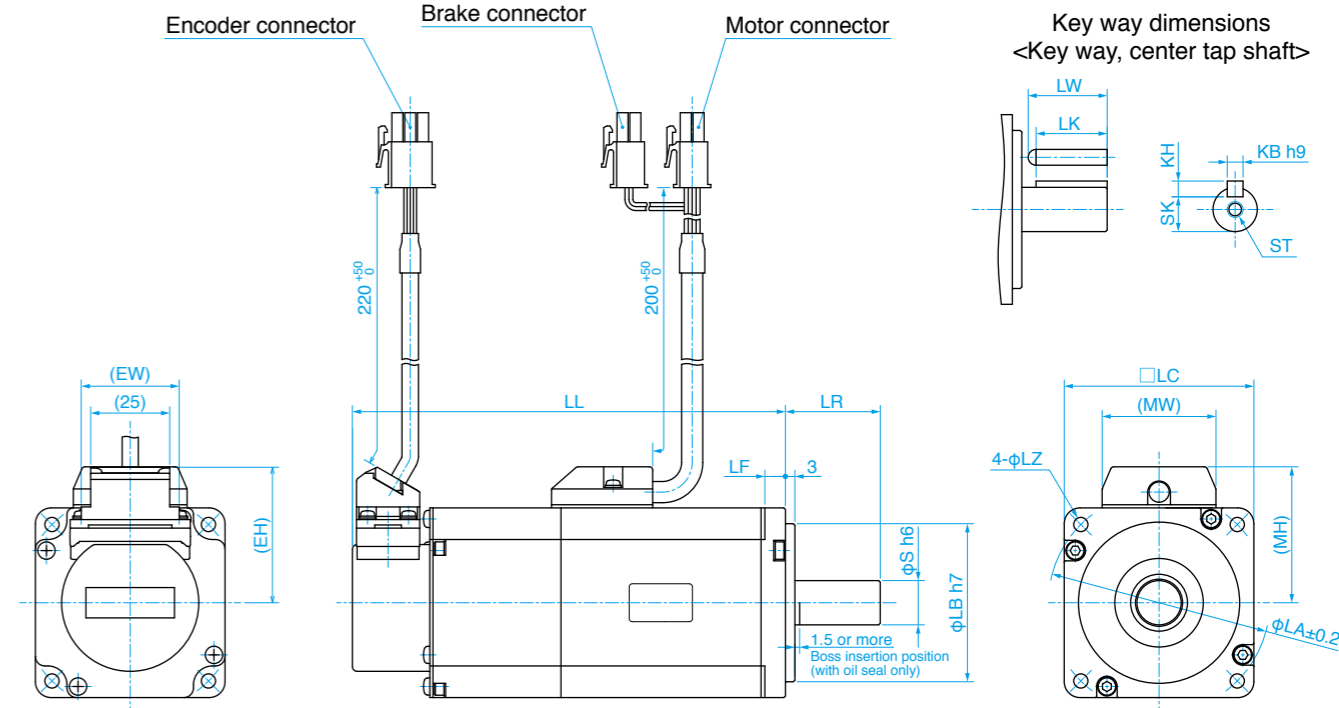
*1 □□ in the motor part number represents the motor specifications. Detail of model designation, refer to "[Motor] Model Designation" in P.1.

*2 Basic type and RS485 communication type are "Position control type". Detail of model designation, refer to "[Driver] Model Designation" in P.2.

■ without Brake



■ with Brake



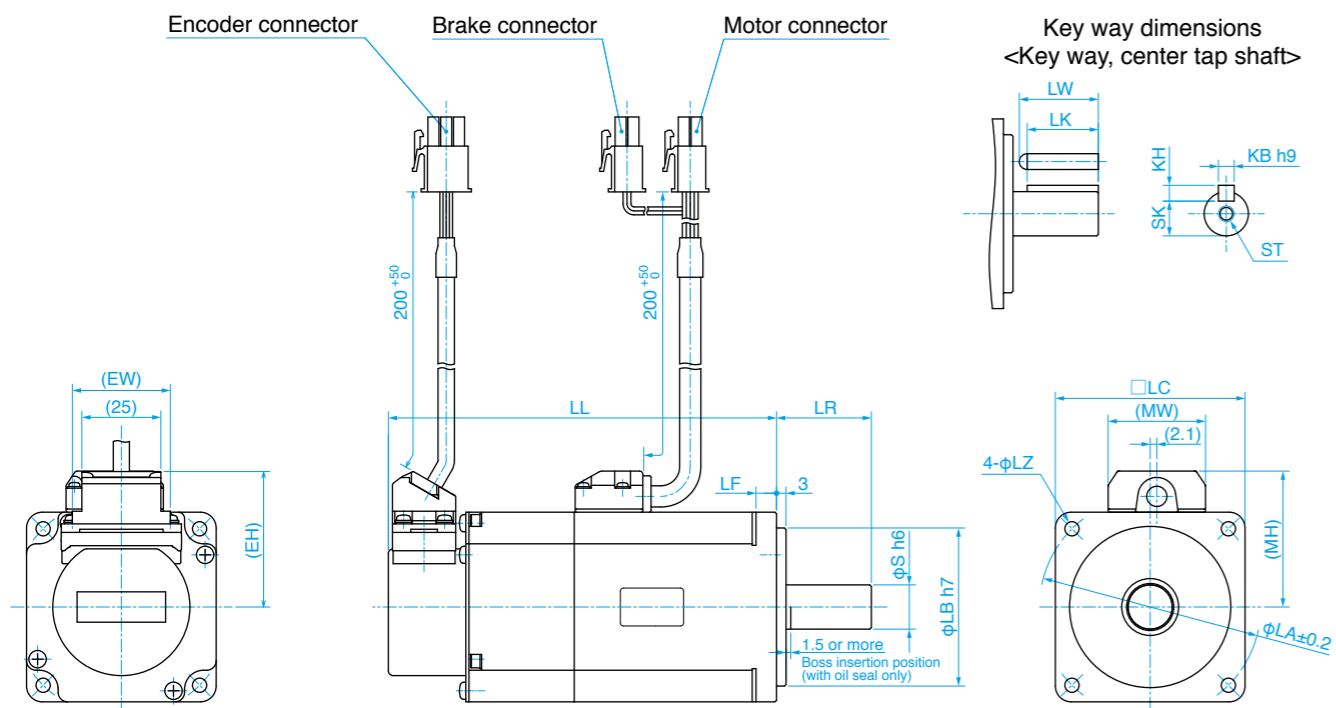
● MSMF dimension table

[Unit: mm]

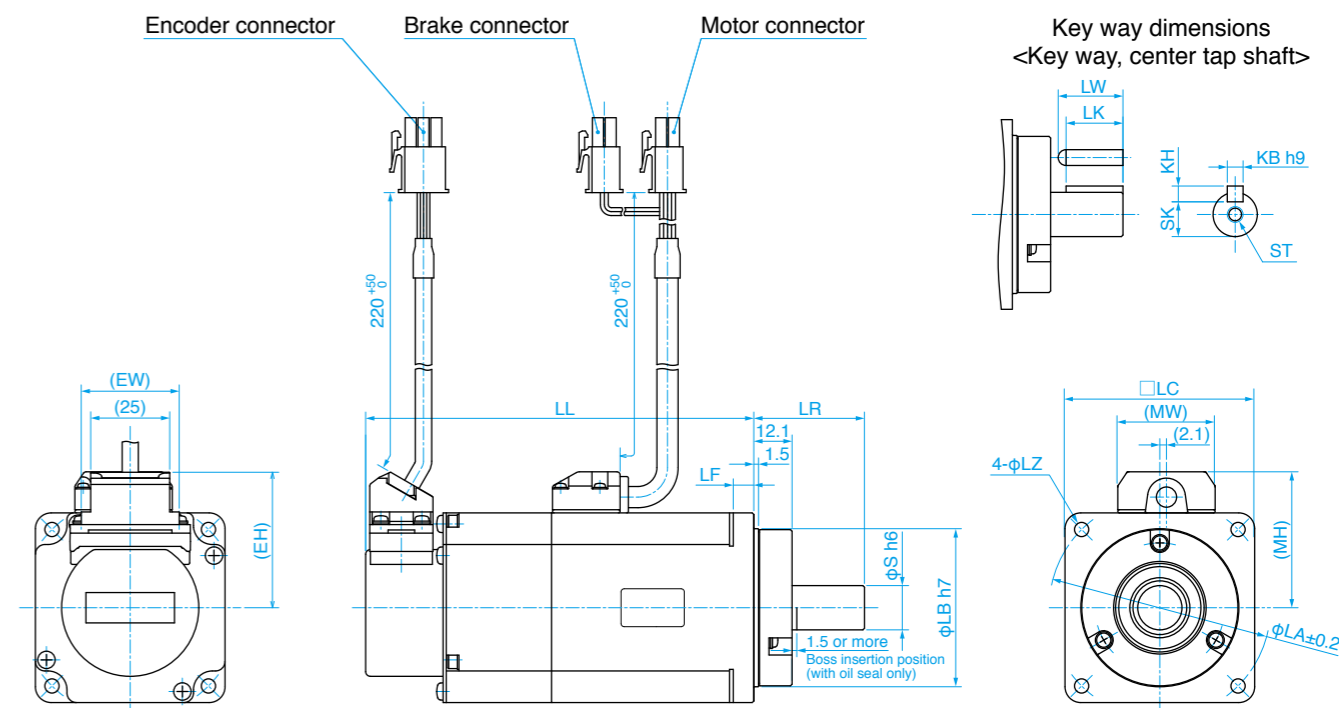
MSMF type [Low inertia]	Motor model	Output (W)	LC	LL						LR		S	LA	LZ	LB	LF	SK	KH	KB	LW	LK	ST	MW	MH	EW	EH
				without Brake			with Brake			with / without Brake																
				without oil seal	with oil seal	with protective lip / with oil seal	without oil seal	with oil seal	with protective lip / with oil seal	with / without oil seal	with protective lip / with oil seal															
				—	—	—	—	—	—	—	—															
	MSMF5AZA1□2	50	38	76.6	76.6	—	106.6	106.6	—	25	—	8	45	3.4	30	6	6.2	3	3	14	12.5	M3 depth 6	27	32	30	36.3
	MSMF01△A1□2	100	38	96.6	96.6	—	126.6	126.6	—	25	—	8	45	3.4	30	6	6.2	3	3	14	12.5	M3 depth 6	27	32	30	36.3
	MSMF02△A1□2	200	60	81	81	—	117.5	117.5	—	30	—	11	70	4.5	50	6.5	8.5	4	4	20	18	M4 depth 8	36	43	31	42.9
	MSMF04△A1□2	400	60	100.5	100.5	—	137	137	—	30	—	14	70	4.5	50	6.5	11	5	5	25	22.5	M5 depth 10	36	43	31	42.9
	MSMF082A1□2	750	80	112.6	112.6	—	149.2	149.2	—	35	—	19	90	6	70	8	15.5	6	6	25	22	M5 depth 10	36	53	31	52.7
	MSMF092A1□2	1000	80	127.6	127.6	—	164.2	164.2	—	35	—	19	90	6	70	8	15.5	6	6	25	22	M5 depth 10	36	53	31	52.7

△ in the motor part number represents the motor voltage specification, and □2 represent the motor specifications. Please refer to "[Motor] Model Designation" in P.1.

■ with Brake / without protective lip



■ with Brake / with protective lip



● MHMF dimension table

[Unit: mm]

MHMF type [High inertia]	Motor model	Output (W)	LC	LL						LR		S	LA	LZ	LB	LF	SK	KH	KB	LW	LK	ST	MW	MH	EW	EH
				without Brake			with Brake			with / without Brake																
				without oil seal	with oil seal	with protective lip / with oil seal	without oil seal	with oil seal	with protective lip / with oil seal	with / without oil seal	with protective lip / with oil seal															
MHMF5AZA1□□	50	40	62.5	66.5	62.5	96.4	100.4	96.4	25	30	8	46	4.3	30	5	6.2	3	3	14	12.5	M3 depth 6	22.8	33	30	36.3	
MHMF01△A1□□	100	40	62.5	66.5	62.5	110.4	114.4	110.4	25	30	8	46	4.3	30	5	6.2	3	3	14	12.5	M3 depth 6	22.8	33	30	36.3	
MHMF02△A1□□	200	60	76.5	80	76.5	105.8	109.3	105.8	30	35	11	70	4.5	50	6.5	8.5	4	4	20	18	M4 depth 8	30.8	43	31	42.9	
MHMF04△A1□□	400	60	93.5	97	93.5	122.8	126.3	122.8	30	35	14	70	4.5	50	6.5	11	5	5	25 (20.5) ^{*1}	22.5 (18) ^{*1}	M5 depth 10	30.8	43	31	42.9	
MHMF082A1□□	750	80	100.7	104.2	100.7	134.5	138	134.5	35	40	19	90	6	70	8	15.5	6	6	25	22	M5 depth 10	30.8	53	31	52.7	
MHMF092A1□□	1000	80	113.5	117	113.5	147.3	150.8	147.3	35	40	19	90	6	70	8	15.5	6	6	25	22	M5 depth 10	30.8	53	31	52.7	

△ in the motor part number represents the motor voltage specification, and □□ represent the motor specifications. Please refer to "[Motor] Model Designation" in P.1.

*1 Figures in () represent the dimensions of with protective lip / with oil seal.

Special Order*1 Product

*1 Please avoid the motor, or equipment containing the motor to be distributed to Japan, or other regions through Japan.

Build an absolute system with no battery!

Maintenance-free - there is no need to perform battery replacement.

The battery-less absolute encoder is an innovative encoder requiring no hassle inventory management or cost of battery replacement. It contributes to the construction of ecological and economical industrial machines and systems.



- Max speed: 6500r/min (MHMF 50 W to 400 W)
- Low inertia (MSMF) to High inertia (MHMF).
- Low cogging torque: Rated torque ratio 0.5 % (typical value).
- 23-bit absolute encoder (8388608 pulse).

Battery-less absolute encoder motor lineup

	80 mm sq. or less Leadwire type					
	50 W	100 W	200 W	400 W	750 W	1000 W
Low inertia MSMF	200 V	200 V	200 V	200 V	200 V	200 V
Middle inertia MQMF		200 V	200 V	200 V		
Middle inertia MDMF	(Table description) (On sale) Voltage specifications: 200 V					
Middle inertia MGMF	(Coming soon) Voltage specifications: 200 V					
High inertia MHMF	200 V	200 V	200 V	200 V	200 V	200 V

[Motor] Model Designation



Special specifications
M: Special order product*1

① Type

Symbol	Type
MSM	Low inertia (50 W to 1000 W)
MHM	High inertia (50 W to 1000 W)

② Series

Symbol	Series name
F	A6 family

③ Motor rated output

Symbol	Rated output	Symbol	Rated output
5A	50 W	04	400 W
01	100 W	08	750 W
02	200 W	09	1000 W

④ Voltage specifications

Symbol	Specifications
2	200 V
Z	100 V/200 V common (50 W only)

⑤ Rotary encoder specifications

Symbol	Format	Pulse counts	Resolution	Wires
A	Absolute	23-bit	8388608	7

⑥ Design order

Symbol	Specifications
1	Standard

⑦ Motor specifications: 80 mm sq. or less Leadwire type IP65 MSMF 50 W to 1000 W

Symbol	Shaft	Holding brake		Oil seal			
		Round	Key-way, center tap	without	with	without	with
A	2	●		●		●	
B	2	●			●		●
C	2	●		●			●
D	2	●			●		●
S	2		●	●		●	
T	2		●		●		●
U	2		●	●			●
V	2		●		●		●

⑦ Motor specifications: 80 mm sq. or less Leadwire type IP65 MHMF 50 W to 1000 W

Symbol	Shaft	Holding brake		Oil seal		With protective lip	
		Round	Key-way, center tap	without	with		without
A	2	●		●			
B	2	●			●		
C	2	●		●			●
C	4	●			●		
D	2	●			●		●
D	4	●			●		●
S	2		●	●		●	
T	2		●		●		●
U	2		●	●			●
U	4		●		●		●
V	2		●		●		●
V	4		●		●		●

Table of Model Numbers

● 80 mm sq. or less 50 W to 1000 W MSMF, MQMF, MHMF Leadwire type IP65

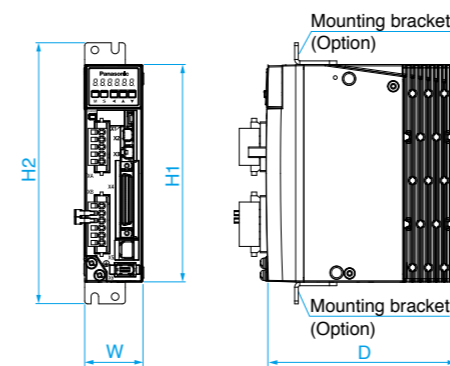
Motor series	Motor			Driver		Power capacity (at rated load)
	Power supply	Output (W)	Model No.	A6 series Model No.	Dimension Frame	
MSMF (Leadwire type) 3000 r/min Low inertia	Single phase/ 3-phase 200 V	50	MSMF5AZA1□2M	MADL☆05○★	A-frame	Approx. 0.5 kVA
		100	MSMF012A1□2M			
		200	MSMF022A1□2M	MADL☆15○★	B-frame	Approx. 0.9 kVA
		400	MSMF042A1□2M	MBDL☆25○★		
		750	MSMF082A1□2M	MCDL☆35○★		
		1000	MSMF092A1□2M	MDDL☆45○★		
MHMF (Leadwire type) 3000 r/min High inertia	Single phase/ 3-phase 200 V	50	MHMF5AZA1□□M	MADL☆05○★	A-frame	Approx. 0.5 kVA
		100	MHMF012A1□□M			
		200	MHMF022A1□□M	MADL☆15○★	B-frame	Approx. 0.9 kVA
		400	MHMF042A1□□M	MBDL☆25○★		
		750	MHMF082A1□□M	MCDL☆35○★		
		1000	MHMF092A1□□M	MDDL☆55○★		

[Motor] □ : For more information, Please refer to "[Motor] Model Designation" in P.11.
[Driver] ☆ ○ ★ : For more information, Please refer to "[Driver] Model Designation" below.

[Driver] Model Designation ● About "☆" "○" "★" in the above table

(☆) Safety Function		(○) I/f specifications		(★) Classification of type	
Symbol	Specifications	Symbol (specification)	Symbol	Specifications	
N	without the safety function	S (Analog/Pulse)	E	Basic type (Pulse train only)*2	
T	with the safety function		F	Multi function type (Pulse, analog, full-closed)	
N	without the safety function		G	RS485 communication type (Pulse train only)	
N	without the safety function	N (RTEX)	E	Standard for rotary motor	
T	with the safety function		F	Multifunction for rotary motor	
N	without the safety function	B (EtherCAT)	E	Standard for rotary motor	
T	with the safety function		F	Multifunction for rotary motor	

[Driver] Dimensions



Frame symbol	W (mm)	H1 (mm)	H2 (mm)	D (mm)	Mass (kg)
A-frame	40	150	180	130	0.8
B-frame	55	150	180	130	1.0
C-frame	65	150	180	170	1.6
D-frame	85	150	180	170	2.1

Rack mount type (Base mount type [Back-end mounting] is also available.)

● Please refer to A6 family catalog for details.

Encoder Cable (Option)

Length (m)	Part No.(ex.)
3	MFECA0030EAD
5	MFECA0050EAD
10	MFECA0100EAD

● Please contact us for 10 m to 20 m.

*2 Because A6SE series driver (dedicated for position control) does not support the absolute system specification, only incremental system can be used in combination.

Motor Specifications

Special Order Product

MSMF type [Low inertia]

Please avoid the motor, or equipment containing the motor to be distributed to Japan, or other regions through Japan.

		[Dimension Motor : P.7 Driver: P.12]		50 W	100 W	200 W
				AC200 V	AC200 V	AC200 V
Motor model ^{*1}		IP65		MSMF5AZA1□2M	MSMF012A1□2M	MSMF022A1□2M
Applicable driver	Model No.	Multifunction type		MADLT05SF	MADLT05SF	MADLT15SF
		RS485 communication type ^{*2}		MADLN05SG	MADLN05SG	MADLN15SG
		Basic type ^{*2}		MADLN05SE	MADLN05SE	MADLN15SE
Frame symbol		A-frame		A-frame	A-frame	A-frame
Power supply capacity	(kVA)	0.5		0.5	0.5	0.5
Rated output	(W)	50		100	200	200
Rated torque	(N·m)	0.16		0.32	0.64	0.64
Continuous stall torque	(N·m)	0.16		0.32	0.64	0.64
Momentary Max. peak torque	(N·m)	0.48		0.95	1.91	1.91
Rated current	(A(rms))	1.1		1.1	1.5	1.5
Max. current	(A(o-p))	4.7		4.7	6.5	6.5
Regenerative brake frequency (times/min) Note ¹		Without option		No limit Note ²	No limit Note ²	No limit Note ²
		With option		DVOP4281 / No limit Note ²	DVOP4281 / No limit Note ²	DVOP4283 / No limit Note ²
Rated rotational speed	(r/min)	3000		3000	3000	3000
Max. rotational speed	(r/min)	6000		6000	6000	6000
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)		Without brake		0.026	0.048	0.14
		With brake		0.029	0.051	0.17
Recommended moment of inertia ratio of the load and the rotor Note ³		30 times or less		30 times or less	30 times or less	30 times or less
Rotary encoder specifications		23-bit Absolute		23-bit Absolute	23-bit Absolute	23-bit Absolute
	Resolution per single turn	8388608		8388608	8388608	8388608

		[Dimension Motor : P.7 Driver: P.12]		400 W	750 W	1000 W
				AC200 V	AC200 V	AC200 V
Motor model ^{*1}		IP65		MSMF042A1□2M	MSMF082A1□2M	MSMF092A1□2M
Applicable driver	Model No.	Multifunction type		MBDLT25SF	MCDLT35SF	MDDLTL45SF
		RS485 communication type ^{*2}		MBDLN25SG	MCDLN35SG	MDDLNL45SG
		Basic type ^{*2}		MBDLN25SE	MCDLN35SE	MDDLNL45SE
Frame symbol		B-frame		C-frame	D-frame	D-frame
Power supply capacity	(kVA)	0.9		1.8	2.4	2.4
Rated output	(W)	400		750	1000	1000
Rated torque	(N·m)	1.27		2.39	3.18	3.18
Continuous stall torque	(N·m)	1.27		2.39	3.18	3.18
Momentary Max. peak torque	(N·m)	3.82		7.16	9.55	9.55
Rated current	(A(rms))	2.4		4.1	5.7	5.7
Max. current	(A(o-p))	10.2		17.4	24.2	24.2
Regenerative brake frequency (times/min) Note ¹		Without option		No limit Note ²	No limit Note ²	No limit Note ²
		With option		DVOP4283 / No limit Note ²	DVOP4283 / No limit Note ²	DVOP4284 / No limit Note ²
Rated rotational speed	(r/min)	3000		3000	3000	3000
Max. rotational speed	(r/min)	6000		6000	6000	6000
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)		Without brake		0.27	0.96	1.26
		With brake		0.3	1.06	1.36
Recommended moment of inertia ratio of the load and the rotor Note ³		30 times or less		20 times or less	15 times or less	15 times or less
Rotary encoder specifications		23-bit Absolute		23-bit Absolute	23-bit Absolute	23-bit Absolute
	Resolution per single turn	8388608		8388608	8388608	8388608

• For details of Note)1 to Note)3, refer to the back cover.

*1 □□ in the motor part number represents the motor specifications. Detail of model designation, refer to "[Motor] Model Designation" in P.11.

*2 Basic type and RS485 communication type are "Position control type". Detail of model designation, refer to "[Driver] Model Designation" in P.12.

Motor Specifications

Special Order Product

MHMF type [High inertia]

Please avoid the motor, or equipment containing the motor to be distributed to Japan, or other regions through Japan.

		[Dimension Motor : P.9 Driver: P.12]		50 W	100 W	200 W
				AC200 V	AC200 V	AC200 V
Motor model ^{*1}		IP65		MHMF5AZA1□□M	MHMF012A1□□M	MHMF022A1□□M
Applicable driver	Model No.	Multifunction type		MADLT05SF	MADLT05SF	MADLT15SF
		RS485 communication type ^{*2}		MADLN05SG	MADLN05SG	MADLN15SG
		Basic type ^{*2}		MADLN05SE	MADLN05SE	MADLN15SE
Frame symbol		A-frame		A-frame	A-frame	A-frame
Power supply capacity	(kVA)	0.5		0.5	0.5	0.5
Rated output	(W)	50		100	200	200
Rated torque	(N·m)	0.16		0.32	0.64	0.64
Continuous stall torque	(N·m)	0.18		0.33	0.76	0.76
Momentary Max. peak torque	(N·m)	0.56		1.11	2.23	2.23
Rated current	(A(rms))	1.1		1.1	1.4	1.4
Max. current	(A(o-p))	5.5		5.5	6.9	6.9
Regenerative brake frequency (times/min) Note ¹		Without option		No limit Note ²	No limit Note ²	No limit Note ²
		With option		DVOP4281 / No limit Note ²	DVOP4281 / No limit Note ²	DVOP4283 / No limit Note ²
Rated rotational speed	(r/min)	3000		3000	3000	3000
Max. rotational speed	(r/min)	6500		6500	6500	6500
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)		Without brake		0.038	0.071	0.29
		With brake		0.042	0.074	0.31
Recommended moment of inertia ratio of the load and the rotor Note ³		30 times or less		30 times or less	30 times or less	30 times or less
Rotary encoder specifications		23-bit Absolute		23-bit Absolute	23-bit Absolute	23-bit Absolute
	Resolution per single turn	8388608		8388608	8388608	8388608

		[Dimension Motor : P.9 Driver: P.12]		400 W	750 W	1000 W
				AC200 V	AC200 V	AC200 V
Motor model ^{*1}		IP65		MHMF042A1□□M	MHMF082A1□□M	MHMF092A1□□M
Applicable driver	Model No.	Multifunction type		MBDLT25SF	MCDLT35SF	MDDLTL45SF
		RS485 communication type ^{*2}		MBDLN25SG	MCDLN35SG	MDDLNL45SG
		Basic type ^{*2}		MBDLN25SE	MCDLN35SE	MDDLNL45SE
Frame symbol		B-frame		C-frame	D-frame	D-frame
Power supply capacity	(kVA)	0.9		1.8	2.4	2.4
Rated output	(W)	400		750	1000	1000
Rated torque	(N·m)	1.27		2.39	3.18	3.18
Continuous stall torque	(N·m)	1.4		2.86	3.34	3.34
Momentary Max. peak torque	(N·m)	4.46		8.36	11.1	11.1
Rated current	(A(rms))	2.1		3.8	5.7	5.7
Max. current	(A(o-p))	10.4		18.8	28.2	28.2
Regenerative brake frequency (times/min) Note ¹		Without option		No limit Note ²	No limit Note ²	No limit Note ²
		With option		DVOP4283 / No limit Note ²	DVOP4283 / No limit Note ²	DVOP4284 / No limit Note ²
Rated rotational speed	(r/min)	3000		3000	3000	3000
Max. rotational speed	(r/min)	6500		6000	6000	6000
Moment of inertia of rotor (×10 ⁻⁴ kg·m ²)		Without brake		0.56	1.56	2.03
		With brake		0.58	1.66	2.13
Recommended moment of inertia ratio of the load and the rotor Note ³		30 times or less		20 times or less	15 times or less	15 times or less
Rotary encoder specifications		23-bit Absolute		23-bit Absolute	23-bit Absolute	23-bit Absolute
	Resolution per single turn	8388608		8388608	8388608	8388608

• For details of Note)1 to Note)3, refer to the back cover.

*1 □□ in the motor part number represents the motor specifications. Detail of model designation, refer to "[Motor] Model Designation" in P.11.

*2 Basic type and RS485 communication type are "Position control type". Detail of model designation, refer to "[Driver] Model Designation" in P.12.