A (Ace) Servo for the Next Generation

MINAS A4 Series

Advanced Gain Tuning

- Further Evolution in Real-Time Auto-Gain Tuning.

Agile and Intelligent

- Improved Damping Control handles all types of machines, from low to high stiffness machines with simple but solid operation.

Almighty

- Position Control, Velocity Control and Torque Control in one Driver supports multiplicity of application.

Amazingly slim size

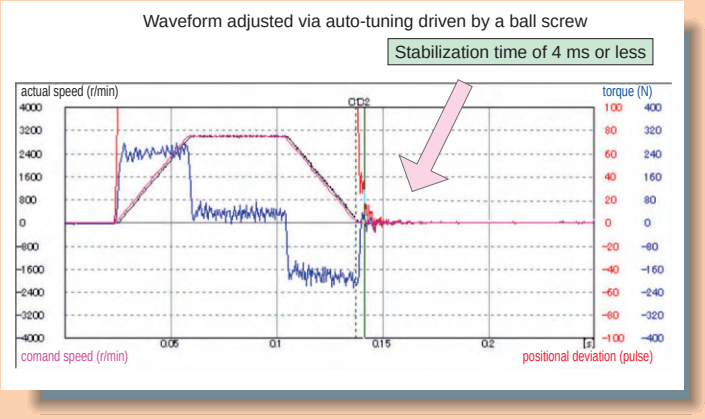
- Another Evolution in down-sizing, by 25% in size. (compared to A-series)

Details of Features

1. Further Adjustment-Free Operation

High-functionality Real-Time Auto-Gain Tuning

- Corresponds to even variation of load inertia. Offers real automatic gain tuning to low and high stiffness machines with a combination of an adaptive filter.
- Supports the vertical axis application where the load torque is different in rotational direction.
- Prevents the machine from over-traveling during automatic gain tuning with over-travel detecting function.
- Enables you to set and check while monitoring real-time automatic gain tuning conditions on the front panel.

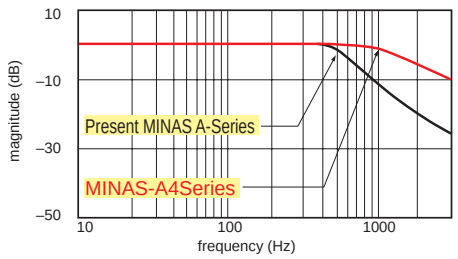


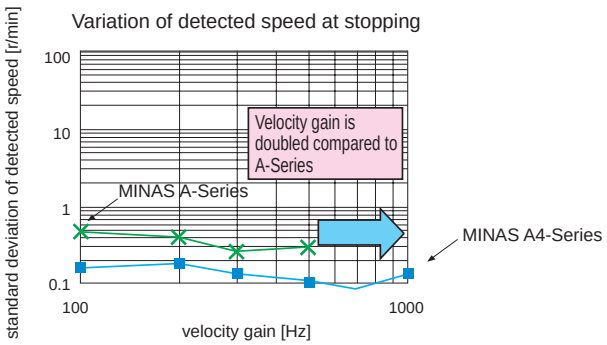
2. Further High-Speed and High-Response

Velocity response (bandwidth) of 1kHz

- Implementation of Instantaneous Velocity Observer realizes a detection of motor speed with higher speed and higher resolution.

*) In case of high stiffness machine





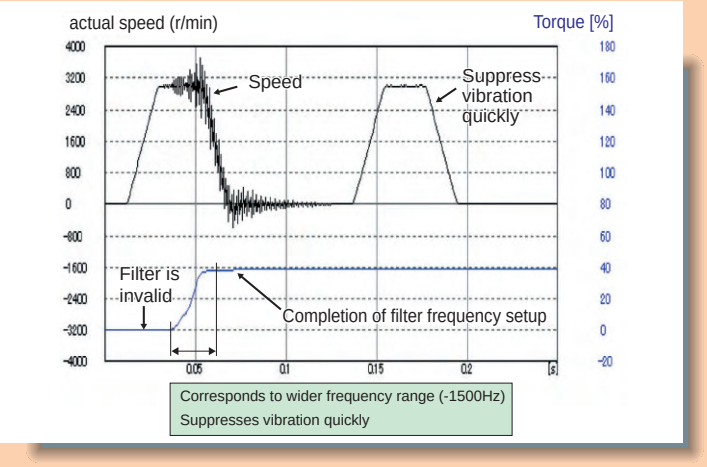
High-functionality Real-Time Auto-Gain Tuning

- Supports the low stiffness machine of belt-driven and the high stiffness machine of short stroke ball screw driven, and enables to realize high-speed positioning with high-functionality real-time auto-gain tuning.

3. Further Reduction of Vibration

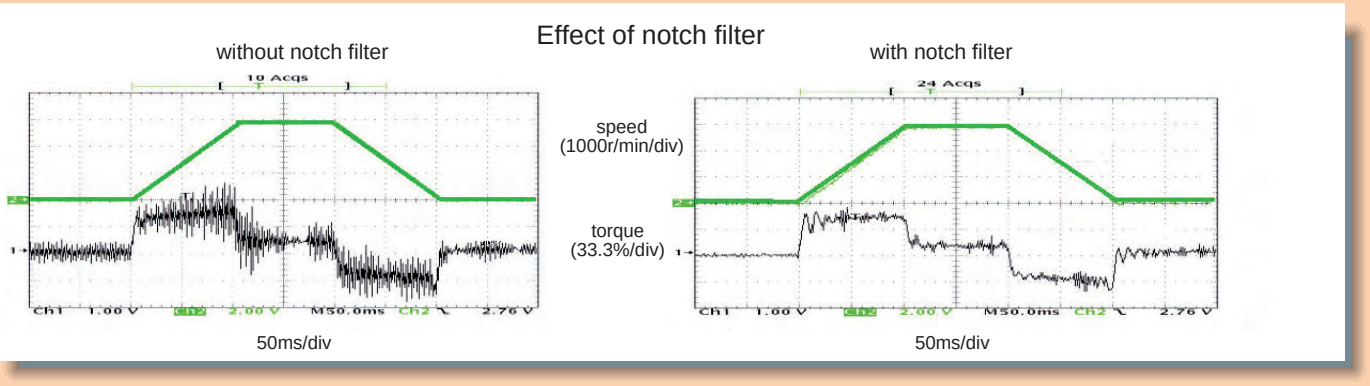
Adaptive filter

- Makes the notch filter frequency automatically follow the machine resonance frequency.
- Suppression of "Judder" noise of the machine can be expected which is caused by variation of the machines or resonance frequency due to aging.



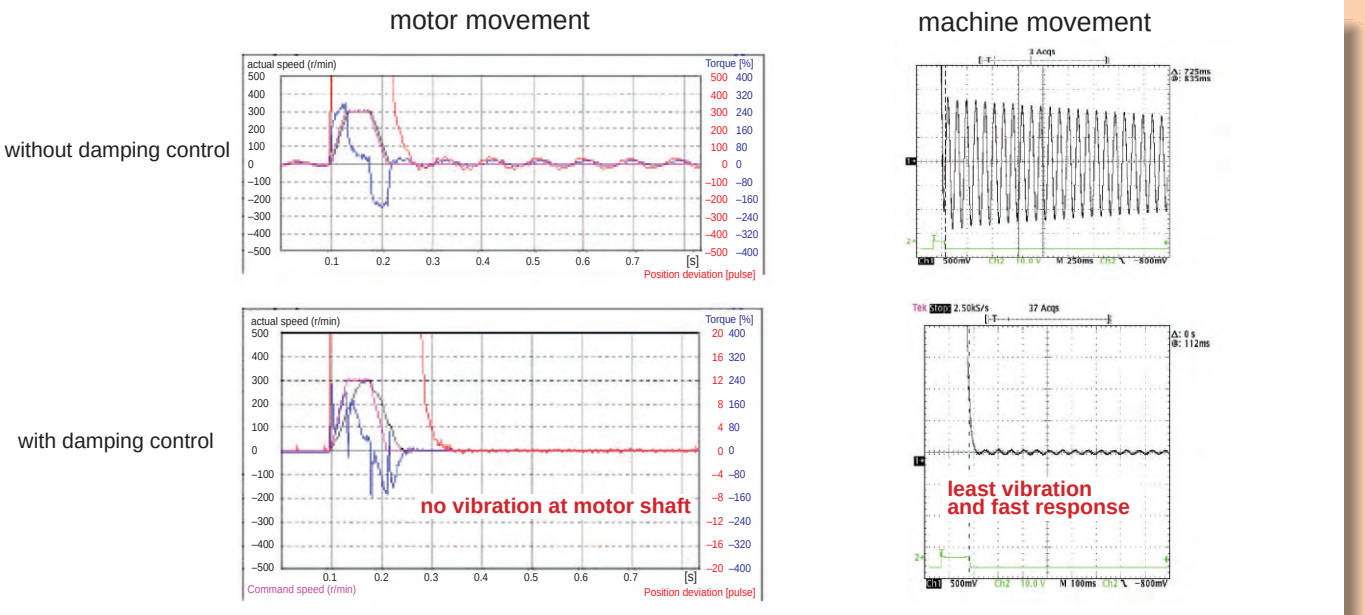
2-channel notch filters

- 2-channel notch filters are equipped in the driver independent from adaptive filter.
- You can set up both frequency and width for each of 2 filters, and set up frequency in unit of 1Hz.
- Suppression of "Judder" noise of the machine which has multiple resonance points can be expected



Damping control

- 2-channel damping filters are equipped in this driver. You can suppress vibration occurring at both starting and stopping in low stiffness machine, by manually setting up vibration frequency in 0.1Hz unit.
- You can also switch the vibration frequency set by 2-channel with rotating direction or with an external input to correspond to the variation of vibration frequency caused by the machine position.
- Easy setup with entry of only frequency and filter value. Improper setup values do not result in unstable operation



4. Further Flexibility and Multiplicity

Setup support with substantial monitoring function

- Faster communication speed of RS232/RS485 (Max.57600bps) establishes an easy and comfortable operating condition for setup support software, "PANATERM".
- Displays the factors of no-motor run and helps you to analyze the causes of troubles.
- You can set up the panel operation lock to inhibit the operation from the front panel, thus enables you to prevent miss-operation such as unintentional change of parameters.

*Note) Refer to page "F2" for setup support software.

Command control modes

- Offers you "Position" , "Velocity (including internal 8-speed)" and "Torque" command control modes
- You can set up any one of the command control modes, or selectable two command control mode with parameter.
- You can set up any command control mode depending on your application.

Monitoring function with front panel

- LED display and analog monitor terminals are installed in the front panel.
- Displays "Motor speed" , "Motor torque" Position deviation" , "Motor load factor" and "Regeneration load factor" on LED.
- You can monitor "Motor speed" ,"Motor torque" and "Position deviation" through analog monitor terminals.

Trial run (JOG)

- Features the function for trial (JOG) run through the front panel or console (option) without connecting to a host controller.
- You can shorten the machine setup time.

Full-closed control (High precision positioning)

- Features the full-closed control of position and velocity, using the signals from feedback scale installed on the load side and high resolution encoder.

Note) Applicable feedback scales are as follows,

- Made by Mitsutoyo

	Resolution(μm)	Max. Speed*(m/s)
ABS AT573A Series	0.05	2
ABS ST771A Series	0.5	5
ABS ST773A Series	0.1	4
ABS ST771AL Series	0.5	5
ABS ST773AL Series	0.1	4

- Made by Sony Manufacturing System

	Resolution(μm)	Max. Speed*(m/s)
SR77 Series	0.05	2
SR87 Series	0.05	2

High resolution laser scales are also available.

(* The maximum speed depends on the driver performance. It is limited by the machine configuration and system configuration.)

- Best suits to high precision machines.

Inrush current suppressing function

- Inrush current suppressing resistor is equipped in this driver, which prevents the circuit breaker shutdown of the power supply caused by inrush current at power-on.
- Prevents unintentional shutdown of the power supply circuit breaker in multi-axes application and does not give load to the power line.

Regeneration discharging function

- Discharges the regenerative energy with resistor, which energy is generated while stopping the load with large moment of inertia, or use in up-down operation, and is returned to the driver from the motor.
- No regeneration discharge resistor is built-in to Frame A driver (MADDT1105 type.), Frame B driver (MBDDT2210 type.) and Frame G driver (MGDDTC3B4 type.) and we recommend you to connect optional regenerative resistor.
- Regenerative resistor is built-in to Frame C to F drivers, however, connection of the optional regenerative resistor bring you further regenerative capability.

Built-in dynamic brake

- You can select the dynamic brake action which short the servo motor windings of U, V and W, at Servo-OFF, CW/CCW over-travel inhibition, power shutdown and trip.
- You can select the action sequence setup depending on the machine requirement.

Positioning pulse

- Corresponds up to 2Mpps of pulse input at positioning control.

Setup support software

- With the setup support software, "PANATERM " via RS232/RS485 communication port, you can monitor the running status of the driver and set up parameters.
- You can read out the absolute position data of the motor with absolute encoder.

Wave-form graphic function

- With the setup support software, "PANATERM" , you can monitor the "Command speed" , "Actual speed" ,"Torque" , "Position deviation " and "Positioning complete signal" .
- Helps you to analyze the machine and shorten the setup time

*Note) Refer to page "F2" for setup support software.

Torque limit value switching

- You can setup 2 torque limits and use them for tension control or press & hold control.
- It is possible to apply it to bumping homing.

SEMI F47 voltage sag immunity

- Features the function which complies to voltage sag immunity standard of SEMI F47 at no load or light load.
- Useful for semiconductor industry.

Notes)
1) Not applicable to single phase, 100V type.
2) Verify with the actual machine condition to F47, voltage sag immunity standard.

Frequency analyzing function

- You can confirm the response frequency characteristics of total machine mechanism including the servo motor with the setup support software, "PANATERM"
- Helps you to analyze the machine and shorten the setup time

*Note) Refer to page "F2" for setup support software.

Applicable overseas safety standards

Subject	Standard conformed		
Motor	IEC60034-1 IEC60034-5 UL1004 CSA22.2 No.100		Conforms to Low-Voltage Directives
Motor and driver	EN50178 UL508C CSA22.2 No.14		
	EN55011	Radio Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment	Conforms to references by EMC Directives
	EN61000-6-2	Immunity for Industrial Environments	
	IEC61000-4-2	Electrostatic Discharge Immunity Test	
	IEC61000-4-3	Radio Frequency Electromagnetic Field Immunity Test	
	IEC61000-4-4	Electric High-Speed Transition Phenomenon/ Burst Immunity Test	
	IEC61000-4-5	Lightening Surge Immunity Test	
	IEC61000-4-6	High Frequency Conduction Immunity Test	
	IEC61000-4-11	Instantaneous Outage Immunity Test	

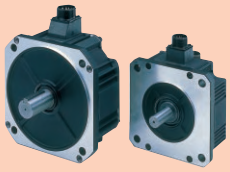
I E C : International Electrotechnical Commission
E N : Europaischen Normen
EMC : Electromagnetic Compatibility
U L : Underwriters Laboratories
CSA : Canadian Standards Association

Pursuant to at the directive 2004/108/EC,article 9(2)

Panasonic Testing Centre
Panasonic Service Europe,
a division of Panasonic Marketing Europe GmbH
Winsbergring 15,22525 Hamburg,F.R.Germany

* When export this product, follow statutory provisions of the destination country.

Motor Line-up

	Motor series *	Rated output (kW)	Rated rotational speed (Max. speed) (r/min)	Rotary encoder		Brake	Gear	CE/UL	Enclosure	Features	Applications
				2500P/r incremental	17bit absolute/ incremental	Holding	High precision				
Ultra low inertia	**MAMA** 	**0.1-0.75** 4 models 0.1, 0.2, 0.4 and 0.75	5000 (6000)	○	○	○	—	○	IP65 (Except shaft through hole and connector)	·Small capacity ·Suitable for the machines directly coupled with high speed ball screw and high stiffness and high repetitive application	·SMT machines ·Inserters ·High repetitive positioning application
Low inertia	**MSMD** 	**0.05-0.75** 5 models 0.05, 0.1, 0.2, 0.4 and 0.75	3000 (5000) *For 400W/100V and 750W 3000 (4500)	○	○	○	○	○	IP65 (Except shaft through hole and connector)	·Small capacity ·Suitable for all applications	·Inserters ·Belt driven machines ·Unloading robot
	MQMA (Cube type) 	**0.1-0.4** 3 models 0.1, 0.2, and 0.4	3000 (5000) *For 400W/100V 3000 (4500)	○	○	○	—	○	IP65 (Except shaft through hole and connector)	·Small capacity ·Suitable for flat type and low stiffness machines with belt driven	·SMT machines ·Inserters ·Belt driven machines ·Unloading robot
	MSMA 	**1.0-5.0** 6 models 1.0,1.5,2.0, 3.0,4.0 and 5.0	3000 (5000) *For 4kW and 5kW 3000 (4500)	○	○	○	—	○	IP65 (Except cannon plug/ connector pins)	·Middle capacity ·Suitable for the machines directly coupled with ball screw and high stiffness and high repetitive application	·SMT machines ·Inserter ·Food machines
Middle inertia	**MDMA** 	**1.0-7.5** 7 models 1.0,1.5,2.0, 3.0,4.0,5.0 and 7.5	2000 (3000) *For 7.5kW 1500 (3000)	○	○	○	—	○	IP65 (Except cannon plug/ connector pins)	·Middle capacity ·Suitable for low stiffness machines with belt driven	·Belt driven machines ·Conveyers ·Robots
	MGMA (Low speed/ High torque type) 	**0.9-6.0** 5 models 0.9,2.0, 3.0,4.5 and 6.0	1000 (2000)	○	○	○	—	○	IP65 (Except cannon plug/ connector pins)	·Middle capacity ·Suitable for machines requiring low speed with high torque	·Belt driven machines ·Conveyers ·Robots
	MFMA (Flat type) 	**0.4-4.5** 4 models 0.4,1.5, 2.5 and 4.5	2000 (3000)	○	○	○	—	○	IP65 (Except cannon plug/ connector pins)	·Middle capacity ·Flat type and suitable for machines with space limitation	·Robots ·Food machines
High inertia	**MHMA** 	**0.5-7.5** 8 models 0.5,1.0,1.5, 2.0,3.0,4.0, 5.0 and 7.5	2000 (3000) *For 7.5kW 1500 (3000)	○	○	○	—	○	IP65 (Except cannon plug/ connector pins)	·Middle capacity ·Suitable for low stiffness machines with belt driven, and large load moment of inertia	·Belt driven machines ·Conveyors ·Robots

* Motor is sharing with A4F/A4P series

Model Designation

• Servo Motor

M S M D 5 A Z S 1 S * *

Special specifications

Motor structure

Design order
1 : Standard

Rotary encoder specifications

Symbol	Format	Pulse counts	Resolution	Wires
P	Incremental	2500P/r	10000	5
S	Absolute/ Incremental common	17bit	131072	7

Voltage specifications

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

Motor rated output

Symbol	Rated output	Symbol	Rated output
5A	50W	15	1.5kW
01	100W	20	2.0kW
02	200W	25	2.5kW
04	400W	30	3.0kW
05	500W	40	4.0kW
08	750W	45	4.5kW
09	900W	50	5.0kW
10	1.0kW	60	6.0kW
		75	7.5kW

Symbol	Type
MAMA	Ultra low inertia (100W-750W)
MSMD	Low inertia (50W-750W)
MQMA	Low inertia (100W-400W)
MSMA	Low inertia (1.0kW-5.0W)
MDMA	Middle inertia (1.0kW-7.5kW)
MGMA	Middle inertia (900W-6.0kW)
MFMA	Middle inertia (400W-4.5kW)
MHMA	High inertia (500W-7.5kW)

Motor structure

MSMD(standard stock), MQMA(build to order)

Symbol	Shaft		Holding brake		Oil seal	
	Round	Key-way, center tap	without	with	without	with*
A	●		●		●	
B	●			●	●	
S		●	●		●	
T		●		●	●	

*Motor with oil seal is manufactured by order.

MSMA , MDMA , MGMA , MFMA , MHMA

Symbol	Shaft		Holding brake		Oil seal	
	Round	Key-way	without	with	without	with
C	●		●			●
D	●			●		●
G		●	●			●
H		●		●		●

Products are standard stock items or build to order items. See index (page F31).

MAMA

Symbol	Shaft		Holding brake		Oil seal	
	Round	Key-way	without	with	without	with
A	●		●		●	
B	●			●	●	
E		●	●		●	
F		●		●	●	

Products are standard stock items or build to order items. See index (page F31).

See page, A4-77 for motor specifications

• Motor with reduction gear

M S M D 0 1 1 P 3 1 N

Symbol	Type
MSMD	Low inertia (100W-750W)

Motor rated output

Symbol	Rated output
01	100W
02	200W
04	400W
08	750W

Voltage specifications

Symbol	Specifications
1	100V
2	200V

Rotary encoder specifications

Symbol	Format	Pulse counts	Resolution	Wires
P	Incremental	2500P/r	10000	5
S	Absolute/ Incremental common	17bit	131072	7

Motor structure

Symbol	Shaft	Holding brake	
	Key-way	without	with
3	●	●	
4	●		●

Gear reduction ration, gear type

Symbol	Gear reduction ratio	Motor output (W)				Gear type
		100	200	400	750	
1N	1 / 5	●	●	●	●	For high accuracy
2N	1 / 9	●	●	●	●	
3N	1 / 15	●	●	●	●	
4N	1 / 25	●	●	●	●	

See page, A4-133 for motor with gear reducer specifications

• Servo Driver

M A D D T 1 2 0 5 * * *

Special specifications

Frame symbol

Symbol	Frame
MADD	A4 series, Frame A
MBDD	A4 series, Frame B
MCDD	A4 series, Frame C
MDDD	A4 series, Frame D
MEDD	A4 series, Frame E
MFDD	A4 series, Frame F
MGDD	A4 series, Frame G

Power device Max. current rating

Symbol	Power device Max. current rating
T1	1 0A
T2	1 5A
T3	3 0A
T5	5 0A
T7	7 5A
TA	1 0 0A
TB	1 5 0A
TC	3 0 0A

Supply voltage specifications

Symbol	Specifications
1	Single phase, 100V
2	Single phase, 200V
3	3-phase, 200V
5	Single/3-phase,200V

Current detector current rating

Symbol	Current detector, current rating
05	5A
07	7.5A
10	1 0A
20	2 0A
30	3 0A
40	4 0A
64	6 4A
90	9 0A
A2	1 2 0A
B4	2 4 0A

See page, A4-15 for driver specifications

Wiring example

Driver Frame Type Symbol (Frame A, B, C, D)

For details, refer to the Instruction Manual.

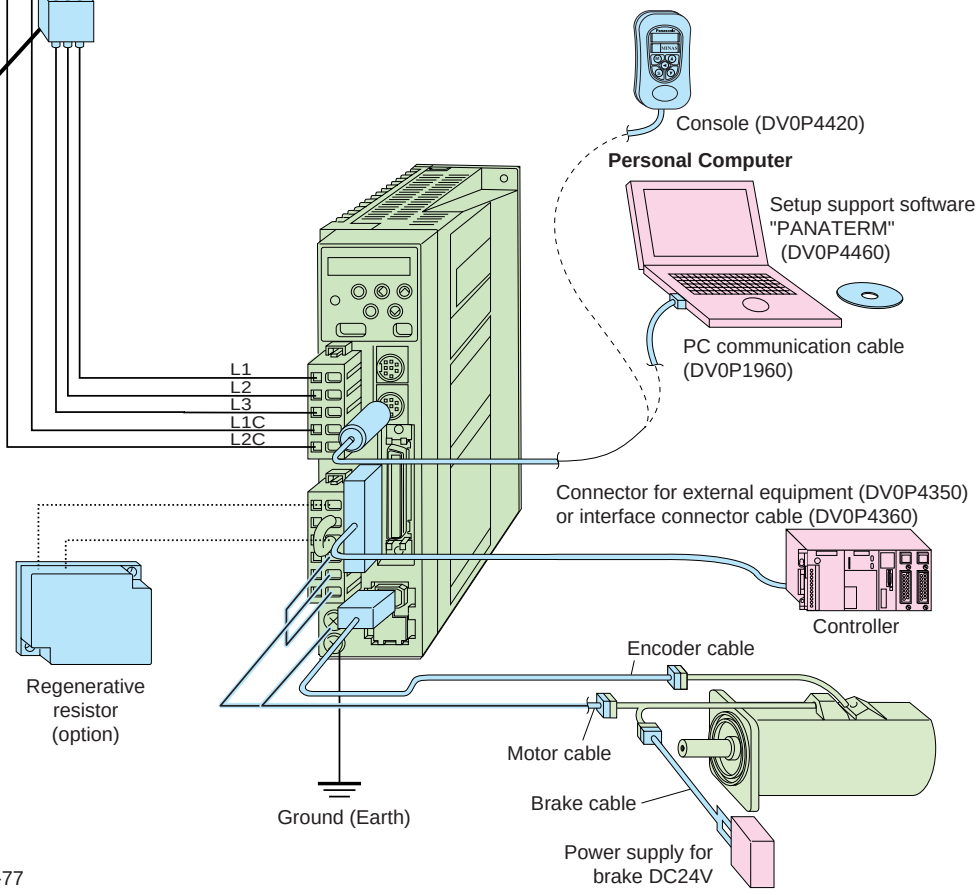
● Wiring of main circuit

Circuit Breaker (NFB)
Protects the power lines.
Shuts off the circuit when overcurrent passes.

Noise Filter (NF)
Prevents external noise from the power lines.
And reduces an effect of the noise generated by the servo driver.

Magnetic Contactor (MC)
Turns on/off the main power of the servo driver.
Surge absorber to be used together with this.

Reactor (L)
Reduces harmonic current of the main power.



Pin RB1, RB2 and RB3 ...

- RB2 and RB3 to be kept shorted for normal operation.
- When the internal regenerative resistor capacity has shortage, disconnect between RB2 and RB3, then connect an external regenerative resistor between RB1 and RB2. (Note: that no regenerative resistor is equipped in Frame A and B type.)

Motor to page A4-77
Driver to page A4-15
Option to page A4-141
Recommended equipments to page A4-12
Parts customer to prepare

Driver Frame Type Symbol (Frame E, F)

For details, refer to the Instruction Manual.

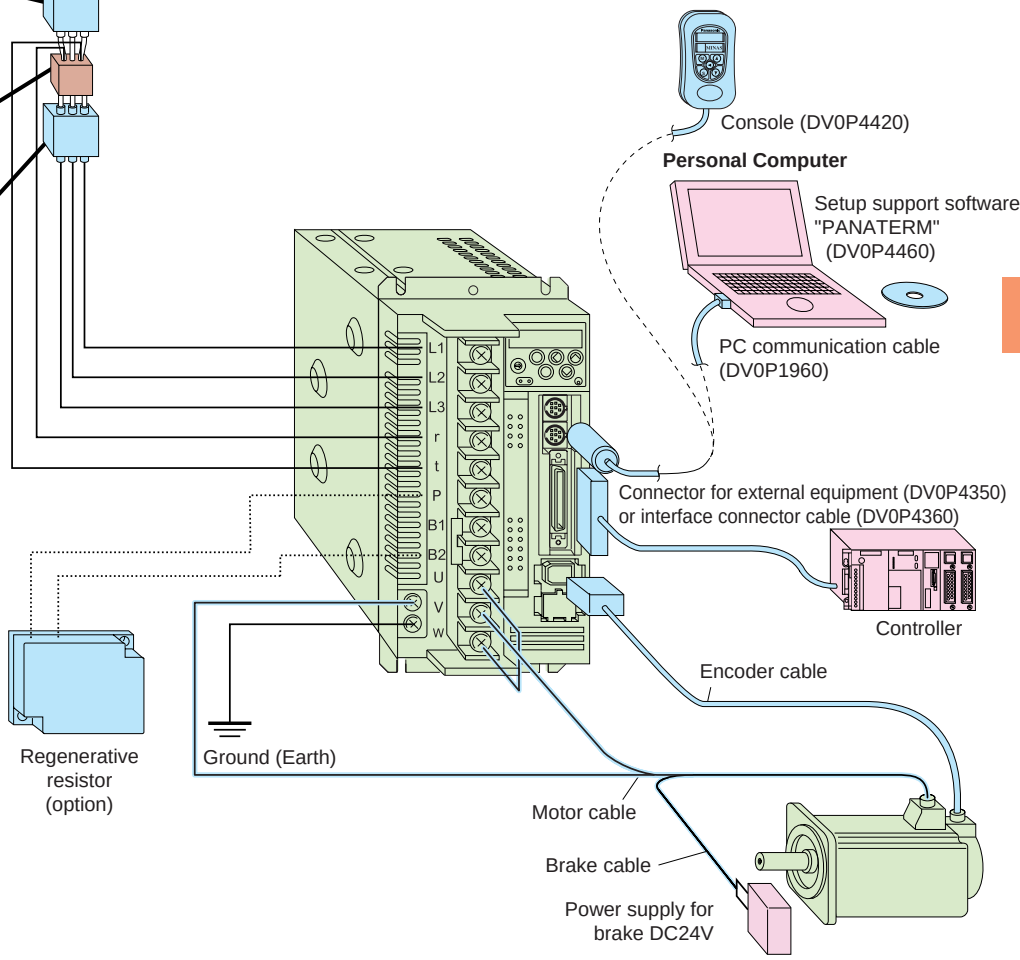
● Wiring of main circuit

Circuit Breaker (NFB)
Protects the power lines.
Shuts off the circuit when overcurrent passes.

Noise Filter (NF)
Prevents external noise from the power lines.
And reduces an effect of the noise generated by the servo driver.

Magnetic Contactor (MC)
Turns on/off the main power of the servo driver.
Surge absorber to be used together with this.

Reactor (L)
Reduces harmonic current of the main power.



P, B1 and B2 ...

- B1 and B2 to be kept shorted for normal operation.
- When the internal regenerative resistor capacity has shortage, disconnect between B1 and B2, then connect an external regenerative resistor between P and B2.

Motor	to page A4-77
Driver	to page A4-15
Option	to page A4-141
Recommended equipments	to page A4-12
Parts customer to prepare	

Wiring example

Driver Frame Type Symbol (Frame G)

For details, refer to the Instruction Manual.

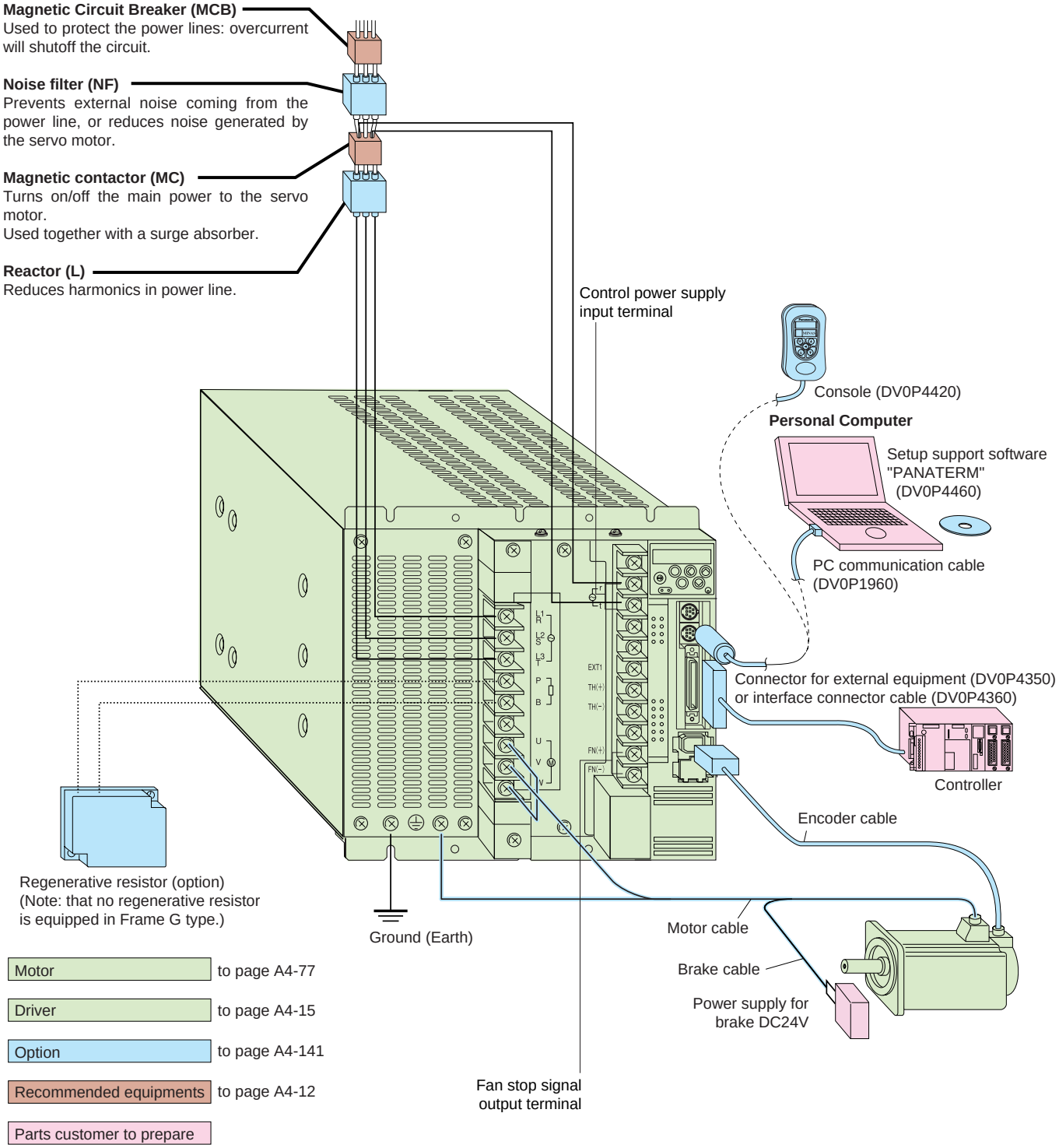
● Wiring of main circuit

Magnetic Circuit Breaker (MCB)
Used to protect the power lines: overcurrent will shutoff the circuit.

Noise filter (NF)
Prevents external noise coming from the power line, or reduces noise generated by the servo motor.

Magnetic contactor (MC)
Turns on/off the main power to the servo motor.
Used together with a surge absorber.

Reactor (L)
Reduces harmonics in power line.



Motor	to page A4-77
Driver	to page A4-15
Option	to page A4-141
Recommended equipments	to page A4-12
Parts customer to prepare	

● List of recommended peripheral equipments

Power supply voltage	Applicable motor Series	Applicable motor Output	Power capacity (atrated load)	Circuit breaker (rated current)	Noise filter	Surge absorber	Noise filter (signal)	Magnetic contactor (Contact)	Cable diameter (Main circuit)	Cable diameter (controlcircuit)	Connector
Single phase, 100V	MSMD	50W	Approx. 0.4kVA	BBW2102 (10A)	DVOP4170	DVOP4190	DVOP1460	BMFT61041N (3P+1a)	0.75mm² to 2.0mm² AWG14 to 18	0.75mm² AWG18	Connection to exclusive connector
	MSMD MQMA	100W									
	MQMA	200W	Approx. 0.5kVA								
		400W	Approx. 0.9kVA		DVOP4180			BMFT61541N (3P+1a)			
Single phase, 200V	MSMD	50W	Approx. 0.5kVA		DVOP4170			BMFT61542N (3P+1a)			
		100W									
	MAMA MQMA	100W	Approx. 0.3kVA								
	MAMA MSMD MQMA	200W	Approx. 0.5kVA								
	MSMD MQMA	400W	Approx. 0.9kVA								
Single/ 3-phase, 200V	MAMA MFMA	400W	Approx. 0.9kVA	BBW3152 (15A)	DVOP4180	DVOP1450					
	MHMA	500W	Approx. 1.1kVA								
	MSMD	750W	Approx. 1.3kVA								
	MAMA		Approx. 1.6kVA		DVOP4220			BMFT61842N (3P+1a)	2.0mm² AWG14		
	MDMA MHMA	1.0kW	Approx. 1.8kVA								
	MGMA	900W		BBW3202 (20A)							
	MSMA	1.0kW									
	MSMA MDMA MFMA MHMA	1.5kW	Approx. 2.3kVA								
3-phase, 200V	MSMA MDMA MHMA	2.0kW	Approx. 3.3kVA	BBW3302 (30A)	DVOP4220			BMF6352N (3P+2a2b)	3.5mm² AWG12		Terminal block M5 11.0 or smaller ø5.3
	MFMA MGMA	2.5kW 2.0kW	Approx. 3.8kVA	BBW350S (50A)	DVOP3410						
	MSMA MDMA MHMA MGMA	3.0kW	Approx. 4.5kVA								
	MSMA MDMA MHMA	4.0kW	Approx. 6.0kVA					BMF6652N (3P+2a2b)	5.3mm² AWG10		
	MFMA	4.5kW	Approx. 6.8kVA								
	MGMA		Approx. 7.5kVA								
	MSMA MDMA MHMA	5.0kW									
	MGMA	6.0kW	Approx. 9.0kVA	BBW360S (60A)					L1, L2, L3 5.3mm² AWG10 U, V, W 14mm² AWG6		
	MDMA MHMA	7.5kW	Approx. 11kVA								

●Select a single and 3-phase common specifications corresponding to the power supplies.
●Listed circuit breaker and magnetic contactor are manufactured by Panasonic Electric Works.
To conform to EC Directives, install a circuit breaker which conforms to IEC and UL Standards (Listed, UL marked) between noise filter and power supply without fail.
●For details of noise filter, refer to Page A4-138.

<Remarks>

- Select a circuit breaker and noise filter which match to the capacity of power supply (including a load condition).
- Terminal block and earth terminals
  - Use a copper conductor cables with temperature rating of 60˚C or higher.
  - Earth terminals for Frame A to D are M4 and M5 for Frame E to G.
  - Larger tightening toque for screws than the max.value (M4 : 1.2 N·m, M5 : 2.0 N·m) may damage the terminal block.
  - Mounting screws on the cover of terminal block for frames E to G and screw on acrylic cover of terminal block for frame G should be tightened with 0.2 N·m torque.
    Application of torque larger than 0.2 N·m may damage the thread on the driver.
- Use an earth cable with the same diameter as that of the main circuit cable.
  If the diameter of the main circuit cable is 1.6mm² or less, use an earth cable with a diameter of 1.6mm² (AWG14).
- Use the attached exclusive connector for A to D-frame, and maintain the peeled off length of 8 tot 9mm.
- Tighten the screws of the connector, CN X5 for the host controller with the torque of 0.3 to 0.35 N·m.
- Larger torque than 0.35N·m may damage the connector at the driver side.

<Caution>

Do not turn on power without first positively tightening all terminal block screws, otherwise, loose contacts may generate heat (smoking, firing).

Table of Part Numbers and Options

Motor series	Power supply	Rated rotational speed (r/min)	Output (W)	2500P/r, Incremental			17bit, Absolute/Incremental common				2500P/r and 17bit common	
				Motor Note) 1	Rating/ Spec. (page)	Encoder cable Note) 2	Motor Note) 1	Rating/ Spec. (page)	Encoder cable Note) 2	Encoder cable Note) 2	Driver	Frame symbol
MAMA [Ultra low inertia]	Single phase 200V	5000	100	MAMA012P1□	A4-77	MFECA 0**0EAM	MAMA012S1□	A4-77	MFECA 0**0EAE	MFECA 0**0EAD	MADDT1207	A-frame
			200	MAMA022P1□			MAMA022S1□				MBDDT2210	B-frame
			400	MAMA042P1□			MAMA042S1□				MCDDT3520	C-frame
			750	MAMA082P1□			MAMA082S1□				MDDDT5540	D-frame
	3-phase, 200V	5000	400	MAMA042P1□			MAMA042S1□				MCDDT3520	C-frame
			750	MAMA082P1□			MAMA082S1□				MDDDT5540	D-frame
MSMD [low inertia]	Single phase 100V	3000	50	MSMD5AZP1□	A4-79	MFECA 0**0EAM	MSMD5AZS1□	A4-79	MFECA 0**0EAE	MFECA 0**0EAD	MADDT1105	A-frame
			100	MSMD011P1□			MSMD011S1□				MADDT1107	
			200	MSMD021P1□	A4-81		MSMD021S1□	A4-81			MBDDT2110	B-frame
			400	MSMD041P1□			MSMD041S1□				MCDDT3120	C-frame
	Single phase 200V	3000	50	MSMD5AZP1□	A4-83		MSMD5AZS1□	A4-83			MADDT1205	
			100	MSMD012P1□			MSMD012S1□				MADDT1205	A-frame
			200	MSMD022P1□			MSMD022S1□				MADDT1207	
			400	MSMD042P1□	A4-85		MSMD042S1□	A4-85			MBDDT2210	B-frame
			750	MSMD082P1□			MSMD082S1□				MCDDT3520	C-frame
	3-phase, 200V	3000	750	MSMD082P1□			MSMD082S1□				MCDDT3520	
MQMA [Low inertia Cube type]	Single phase 100V	3000	100	MQMA011P1□	A4-87	MFECA 0**0EAM	MQMA011S1□	A4-87	MFECA 0**0EAE	MFECA 0**0EAD	MADDT1107	A-frame
			200	MQMA021P1□			MQMA021S1□				MBDDT2110	B-frame
			400	MQMA041P1□			MQMA041S1□				MCDDT3120	C-frame
	Single phase 200V	3000	100	MQMA012P1□	A4-89		MQMA012S1□	A4-89			MADDT1205	A-frame
			200	MQMA022P1□			MQMA022S1□				MADDT1207	
			400	MQMA042P1□			MQMA042S1□				MBDDT2210	B-frame
MSMA [low inertia]	Single phase 200V	3000	1000	MSMA102P1□	A4-91	MFECA 0**0ESD	MSMA102S1□	A4-91	MFECA 0**0ESE	MFECA 0**0ESD	MDDDT5540	D-frame
			1500	MSMA152P1□			MSMA152S1□				MDDDT5540	
	3-phase, 200V	3000	1000	MSMA102P1□			MSMA102S1□				MDDDT5540	
			1500	MSMA152P1□			MSMA152S1□				MDDDT5540	
			2000	MSMA202P1□			MSMA202S1□				MEDDT7364	E-frame
			3000	MSMA302P1□			MSMA302S1□				MFDDTA390	
			4000	MSMA402P1□	A4-93		MSMA402S1□	A4-93			MFDDTB3A2	F-frame
			5000	MSMA502P1□			MSMA502S1□				MFDDTB3A2	
MDMA [Middle inertia]	Single phase 200V	2000	1000	MDMA102P1□	A4-95	MFECA 0**0ESD	MDMA102S1□	A4-95	MFECA 0**0ESE	MFECA 0**0ESD	MDDDT3530	D-frame
			1500	MDMA152P1□			MDMA152S1□				MDDDT5540	
	3-phase, 200V	2000 Note)3	1000	MDMA102P1□			MDMA102S1□				MDDDT3530	
			1500	MDMA152P1□			MDMA152S1□				MDDDT5540	
			2000	MDMA202P1□	A4-97		MDMA202S1□	A4-97			MEDDT7364	E-frame
			3000	MDMA302P1□			MDMA302S1□				MFDDTA390	
			4000	MDMA402P1□			MDMA402S1□				MFDDTB3A2	F-frame
			5000	MDMA502P1□	A4-99		MDMA502S1□	A4-99			MFDDTB3A2	
			7500	MDMA752P1□			MDMA752S1□				MGDDTC3B4	G-frame
MGMA [Middle inertia Low speed/ High torque]	Single phase 200V	1000	900	MGMA092P1□	A4-101	MFECA 0**0ESD	MGMA092S1□	A4-101	MFECA 0**0ESE	MFECA 0**0ESD	MDDDT5540	D-frame
	3-phase, 200V	1000	900	MGMA092P1□			MGMA092S1□				MDDDT5540	
			2000	MGMA202P1□			MGMA202S1□				MFDDTA390	
			3000	MGMA302P1□			MGMA302S1□				MFDDTB3A2	F-frame
			4500	MGMA452P1□	A4-103		MGMA452S1□	A4-103			MFDDTB3A2	
			6000	MGMA602P1□			MGMA602S1□				MGDDTC3B4	G-frame
MFMA [Middle inertia Flat type]	Single phase 200V	2000	400	MFMA042P1□	A4-105	MFECA 0**0ESD	MFMA042S1□	A4-105	MFECA 0**0ESE	MFECA 0**0ESD	MCDDT3520	C-frame
			1500	MFMA152P1□			MFMA152S1□				MDDDT5540	D-frame
	3-phase, 200V	2000 Note)3	400	MFMA042P1□			MFMA042S1□				MCDDT3520	C-frame
			1500	MFMA152P1□			MFMA152S1□				MDDDT5540	D-frame
			2500	MFMA252P1□	A4-107		MFMA252S1□	A4-107			MEDDT7364	E-frame
			4500	MFMA452P1□			MFMA452S1□				MFDDTB3A2	F-frame
MHMA [High inertia]	Single phase 200V	2000	500	MHMA052P1□	A4-109	MFECA 0**0ESD	MHMA052S1□	A4-109	MFECA 0**0ESE	MFECA 0**0ESD	MCDDT3520	C-frame
			1000	MHMA102P1□			MHMA102S1□				MDDDT3530	D-frame
			1500	MHMA152P1□			MHMA152S1□				MDDDT5540	
	3-phase, 200V	2000 Note)3	500	MHMA052P1□			MHMA052S1□				MCDDT3520	C-frame
			1000	MHMA102P1□			MHMA102S1□				MDDDT3530	D-frame
			1500	MHMA152P1□			MHMA152S1□				MDDDT5540	
			2000	MHMA202P1□			MHMA202S1□				MEDDT7364	E-frame
			3000	MHMA302P1□	A4-111		MHMA302S1□	A4-111			MFDDTA390	
			4000	MHMA402P1□			MHMA402S1□				MFDDTB3A2	F-frame
			5000	MHMA502P1□			MHMA502S1□				MFDDTB3A2	
			7500	MHMA752P1□	A4-113		MHMA752S1□	A4-113			MGDDTC3B4	G-frame

	Optional parts					
	Motor cable Note) 2	Motor cable (with brake) Note) 2	Brake cable Note) 2	Regenerative resistor	Reactor	Noise filter
	MFMCA 0**0EED	—	MFMCB 0**0GET	DV0P4283	DV0P220	DV0P4170
					DV0P221	DV0P4180
				DV0P4284		DV0P4220
				DV0P4283	DV0P220	DV0P4180
				DV0P4284	DV0P221	DV0P4220
	MFMCA 0**0EED	—	MFMCB 0**0GET	DV0P4280	DV0P227	DV0P4170
				DV0P4283	DV0P228	
				DV0P4282		DV0P4180
				DV0P4281	DV0P220	DV0P4170
				DV0P4283	DV0P221	DV0P4180
	MFMCA 0**0EED	—	MFMCB 0**0GET	DV0P4280	DV0P227	DV0P4170
				DV0P4283	DV0P228	
				DV0P4282		DV0P4180
				DV0P4281	DV0P220	
				DV0P4283	DV0P221	DV0P4170
	MFMCD 0**2ECD	MFMCA 0**2FCD	—	DV0P4284	DV0P222	DV0P4220
	MFMCD0**2ECT	MFMCA0**2FCT		DV0P4285	DV0P223	
	MFMCA 0**3ECT	MFMCA 0**3FCT		DV0P4285 x 2 in parallel	DV0P224	
					DV0P225	DV0P3410
					—	
	MFMCD 0**2ECD	MFMCA 0**2FCD	—	DV0P4284	DV0P222	DV0P4220
	MFMCD0**2ECT	MFMCA0**2FCT		DV0P4285	DV0P223	
	MFMCA 0**3ECT	MFMCA 0**3FCT		DV0P4285 x 2 in parallel	DV0P224	
					DV0P225	DV0P3410
	—	—		DV0P4285 x 4 in parallel	—	
	MFMCD 0**2ECD	MFMCA 0**2FCD	—	DV0P4284	DV0P222	DV0P4220
	MFMCA 0**3ECT	MFMCA 0**3FCT		DV0P4285 x 2 in parallel	DV0P223	
					DV0P224	
					—	DV0P3410
	—	—		DV0P4285 x 4 in parallel	—	
	MFMCA 0**2ECD	MFMCA 0**2FCD	—	DV0P4283	DV0P220	DV0P4180
				DV0P4284	DV0P222	DV0P4220
				DV0P4283	DV0P220	DV0P4180
				DV0P4284	DV0P222	DV0P4220
	MFMCD 0**3ECT	MFMCA 0**3FCT		DV0P4285	DV0P224	
				DV0P4285 x 2 in parallel	—	DV0P3410
	MFMCD 0**2ECD	MFMCA 0**2FCD	—	DV0P4283	DV0P220	DV0P4180
				DV0P4284	DV0P222	DV0P4220
				DV0P4283	DV0P220	DV0P4180
				DV0P4284	DV0P222	DV0P4220
				DV0P4285	DV0P223	
	MFMCA 0**3ECT	MFMCA 0**3FCT		DV0P4285 x 2 in parallel	DV0P224	
					DV0P225	DV0P3410
	—	—		DV0P4285 x 4 in parallel	—	

● Carrying page

Options		Part No.	Carrying page
Technical reference	Japanese	DV0P4200	—
	English	DV0P4210	—
Console		DV0P4420	A4-152
Setup support software, PANATERM	Japanese	DV0P4460	A4-151
	English		
RS232 communication cable (for connection with PC)		DV0P1960	A4-147
RS485 communication cable (for connection with PC)		DV0P1970	A4-147
		DV0P1971	
		DV0P1972	
Interface cable		DV0P4360	A4-147
Connector kit for external equipment		DV0P4350	A4-146
Connector kit for motor and encoder		DV0P4290	A4-148
		DV0P4380	
		DV0P4310	A4-149
		DV0P4320	
		DV0P4330	
		DV0P4340	
		DV0PM20005	A4-150
		DV0PM20006	
Battery for absolute encoder		DV0P2990	A4-154
Mounting bracket	Frame A	DV0P4271	A4-151
	Frame B	DV0P4272	
	Frame C	DV0P4273	
	Frame D	DV0P4274	
Encoder cable	MFECA0**0EAD		A4-143
	MFECA0**0EAE		
	MFECA0**0EAM		
	MFECA0**0ESD		
	MFECA0**0ESE		
Motor cable	MFMCA0**0EED		A4-144
	MFMCA0**2ECD		
	MFMCA0**3ECT		
	MFMCD0**2ECD		
	MFMCD0**2ECT		
	MFMCD0**3ECT		
Motor cable (with brake)	MFMCA0**2FCD		A4-145
	MFMCA0**2FCT		
	MFMCA0**3FCT		
Brake cable	MFMCB0**0GET		A4-145
Regenerative resistor	50 Ω, 25W	DV0P4280	A4-153
	100 Ω, 25W	DV0P4281	
	25 Ω, 50W	DV0P4282	
	50 Ω, 50W	DV0P4283	
	30 Ω, 100W	DV0P4284	
	20 Ω, 130W	DV0P4285	
Reactor		DV0P220 to DV0P228	A4-152
Noise filter		DV0P4170	A4-138
		DV0P4180	
		DV0P4220	
		DV0P3410	
Surge absorber	Single phase 100V, 200V	DV0P4190	A4-139
	3-phase 200V	DV0P1450	
Noise filter for signal wire		DV0P1460	A4-139

Note) 1. □represents the motor structure.
Note) 2. ** represents the cable length (specified value)
For details, refer to cable specifications (A4-141).
Note) 3. 7.5kW output type:1500(r/min)