Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

⚠ Safety Precautions

- Important Notes on exporting this product or equipment containing this product;
  If the end-user or application of this product is related to military affairs or weapons, its export may be controlled by “Foreign Exchange and Foreign Trade Control Law” of Japan where export license will be required before product can be exported from Japan.
- This product is designed and manufactured for use in General Purpose Industrial Equipment and it is not intended to be used in equipment or system that may cause personal injury or death.
- All servicing such as installation, wiring, operation, maintenance and etc., should be performed by qualified personnel only.
- Tighten mounting screws with an adequate torque by taking into consideration strength of the screws and the characteristics of material to which the product will be mounted. Over tightening can damage the screw and/or material; under tightening can result in loosening.
  *Example: apply 2.7 N·m – 3.3 N·m torque when tightening steel screw (M5) to steel surface.
- Install safety equipment to prevent serious accidents or loss that is expected in case of failure of this product.
- Consult us before using this product under such special conditions and environments as nuclear energy control, aerospace, transportation, medical equipment, various safety equipments or equipments which require a lesser air contamination.
- We have been making the best effort to ensure the highest quality of our products, however, some applications with exceptionally large external noise disturbance and static electricity, or failure in input power, wiring and components may result in unexpected action. It is highly recommended that you make a fail-safe design and secure the safety in the operative range.
- If the motor shaft is not electrically grounded, it may cause an electrolytic corrosion to the bearing, depending on the condition of the machine and its mounting environment, and may result in the bearing noise. Checking and verification by customer is required.
- Failure of this product depending on its content may generate smoke of about one cigarette. Take this into consideration when the application of the machine is clean room related.
- Please be careful when using the product in an environment with high concentrations of sulfur or sulfuric gases, as sulfuration can lead to disconnection from the chip resistor or a poor contact connection.
- Do not input a supply voltage which significantly exceeds the rated range to the power supply of this product. Failure to heed this caution may lead to damage of the internal parts, causing smoke and/or fire and other troubles.
- The user is responsible for matching between machine and components in terms of configuration, dimensions, life expectancy, characteristics, when installing the machine or changing specification of the machine. The user is also responsible for complying with applicable laws and regulations.
- Manufacturer’s warranty will be invalid if the product has been used outside its stated specifications.
- Component parts are subject to minor change to improve performance.
- Read and observe the instruction manual to ensure correct use of the product.

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

Contact to :

ISO 9001 **ISO9001 Certificate division**

ISO 14001 **ISO14001 Certificate division**

Panasonic Corporation,
Automotive & Industrial Systems Company,
Electromechanical Control Business Division,
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The contents of this catalog apply to the products as of February 2018.

- This product is for industrial equipment. Don't use this product at general household.
- Printed colors may be slightly different from the actual products.
- Specifications and design of the products are subject to change without notice for the product improvement.

■AQCTB01E 201802-3YE

Panasonic

Panasonic

AC Servo Motor & Driver

MINAS A6 family / MINAS E series

AC Servo Motor & Driver <MINAS A6 family, MINAS E series>

AC Servo Motor & Driver

MINAS A6

2018 / 2

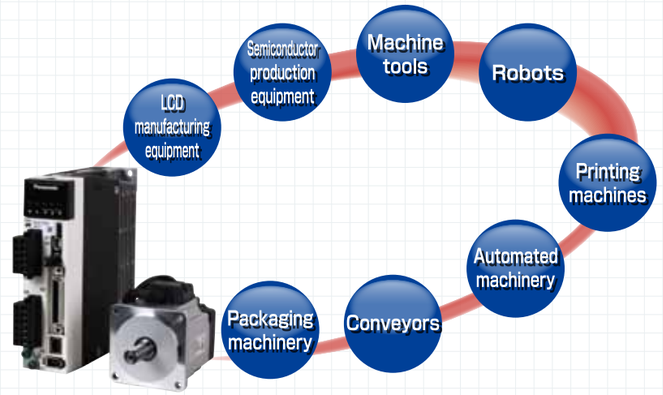
This product is for industrial equipment. Don't use this product at general household.

2018.02 | industrial.panasonic.com/ac/e/

MINAS A6

More compact, more faster and more easy-to-use Servomotors that meet the demands of the present age.

The MINAS A6 family of advanced AC servomotors is changing the landscape of industrial machinery.

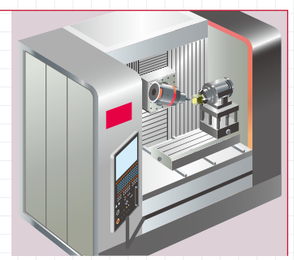


Robots

A robot is required to operate stably despite arm posture and position, workload and other conditions changing from moment to moment.
The MINAS A6 family assures stable operation by suppressing effects of load to a minimum using “adaptive load control.”

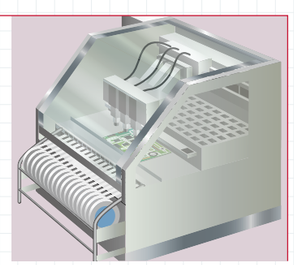
Processing machinery

With metal processing machine, it is very difficult to render mirror-like finishing on a polygonal body.
The A6 family realizes “3.2 kHz frequency response” to improve feedback responsiveness, thus enabling mirror surfacing without generating lines or streaks.



Component mounting machines

The A6 family also shows its versatility when used with a component mounting machine where speed and positional accuracy are demanded.
In addition to high frequency response, it can process accidental disturbances with the help of built-in “adaptive load control,” thus maintaining high productivity.



INDEX

A6 family

Servomotors that flexibly and effectively fit into various system configurations MINAS A6

Controller

●For compatible controllers, see our website or request the necessary information separately.

Modbus network (Block operation position control)

Pulse train position command (Block operation position control by external I/O)

Analog velocity control

Analog torque control

●For compatible controllers, see our website or request the necessary information separately.

RTEX Realtime Express

●For compatible controllers, see our website or request the necessary information separately.

EtherCAT®

Driver

Basic type

A6SE series

RS485 communication type

A6SG series

Multifunction type

A6SF series

Standard type

A6NE series

Multifunction type

A6NF series

Standard type

A6BE series

Special order product

Multifunction type

A6BF series

Special order product

Motor

MSMF Low inertia

MQMF Middle inertia/ Flat type

MDMF Middle inertia

MGMF Middle inertia/ Low speed high torque

MHMF High inertia

MQMF with gear reducer

Coming soon

MHMF with gear reducer

Coming soon

Special order product For more information, visit the website or please request to our distributors separately.

Slim design and position control type

E series

●Ultra-small design and pulse train command type only, DIN-rail mountable (using mounting Kit)

●Rated output:50 W to 400 W

DC 24 V / 48 V type Special order product

A5M/A5ML series

A5MN/A5MNL series

A5MB/A5MBL series

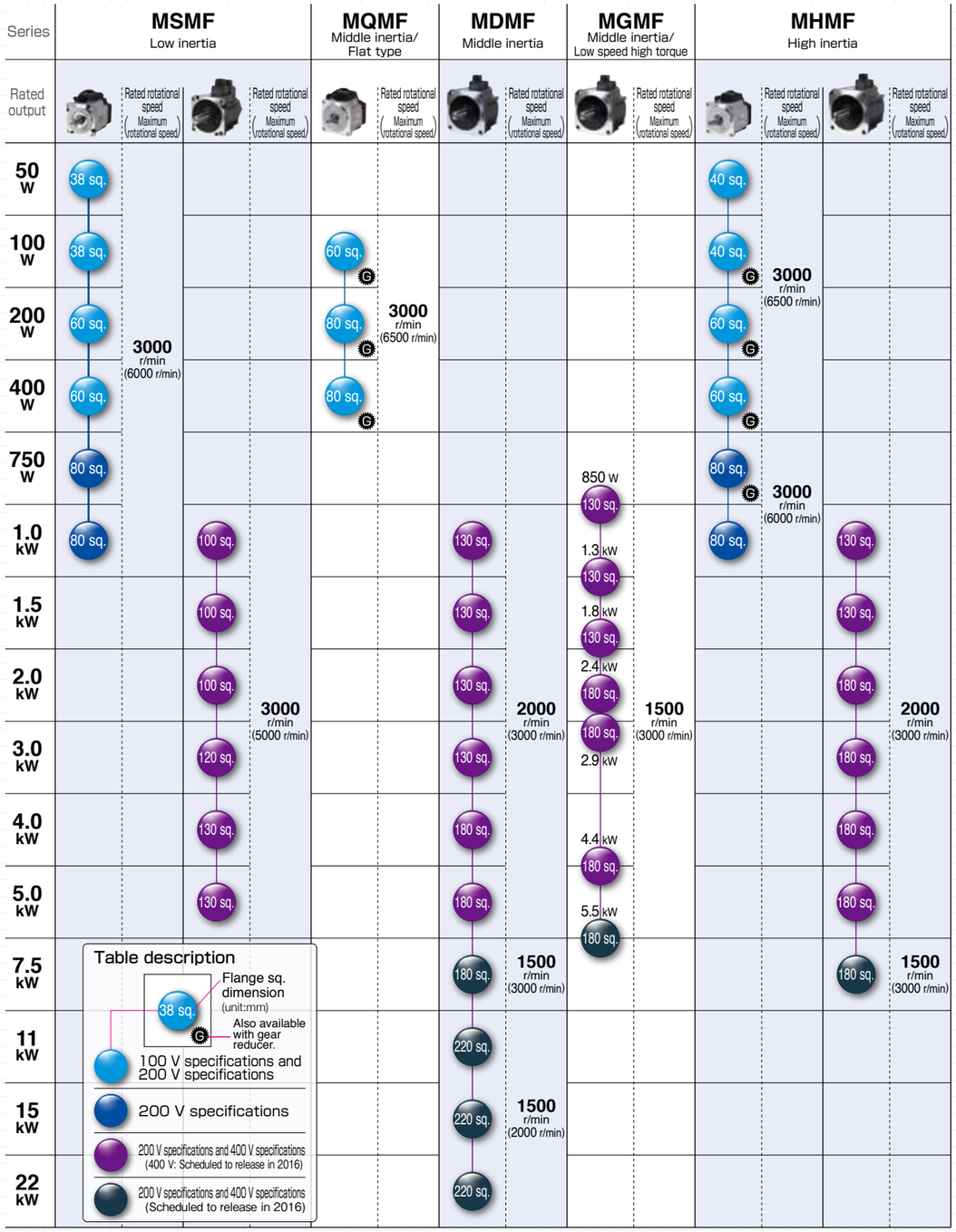
●DC24 V power supply support, ultra-compact motor and driver.

●Rated output : ·Flange size 20 mm square/10 W ·Flange size 25 mm square/10 W, 20 W, 30 W

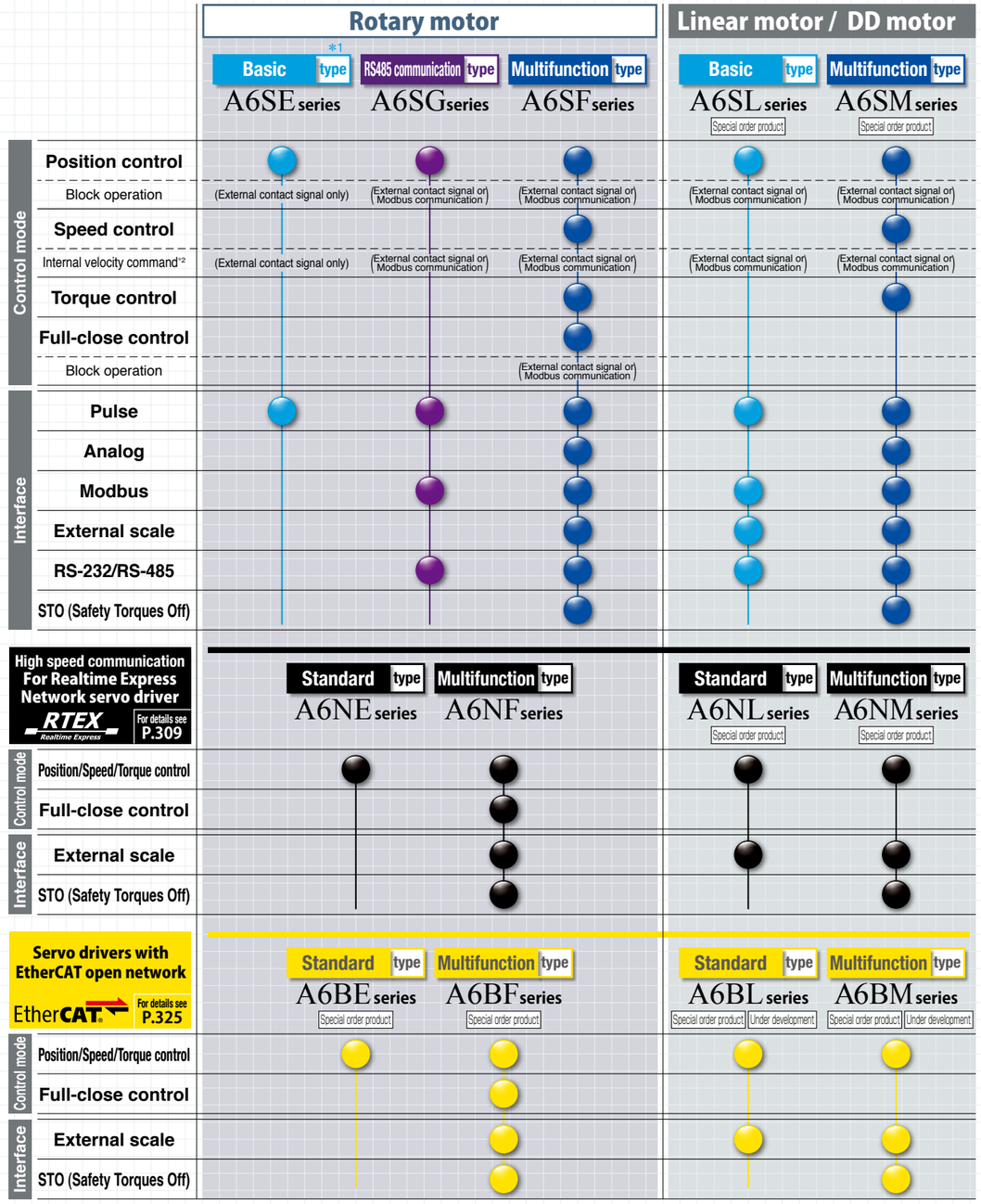
It is MINAS A6 Family lineup that meets the manufacturing industry needs.

MINAS A6

■Motor line-up



■Driver line-up



*1 A6SE series driver (Position control only) does not correspond to the absolute system of using the serial communication with the host device. It supports incremental system only.
*2 When using internal speed command with Modbus, external servo ON is required.
● Please check the instruction manual for necessary wiring.
Special order product For more information, please visit our website or request to our distributors separately.

Small, light, powerful and speedy ※1

MINAS A6

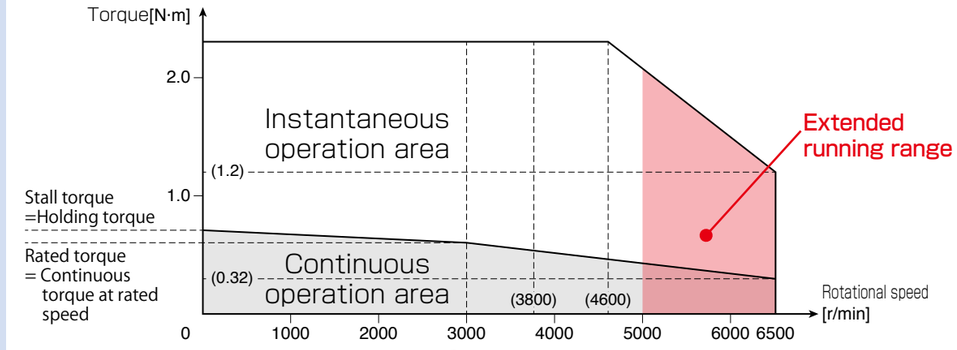
●Size of a typical business card (W90 mm × H55 mm)

Highest speed in the industry and high torque in a compact lightweight body ※1

Max. speed	Max. torque	Overall length	Weight
6500 r/min※2	Approx.350 %※2	67.5 mm※2	750 g※2
Fast	High	Short	Light
A5Family※3 5000 r/min	A5Family※3 Approx300 %	A5Family※3 99.0 mm	A5Family※3 960 g

※1 Middle and high inertia types only ※2 MHMF200 W ※3 MSMD200 W

Significantly extended running range by the highest speed and high torque in the industry's highest class.



● The graph shows performance of the MHMF200 W (200 V).

Enhanced position detecting resolution enables smoother and more precise positioning.

Encoder		Communication speed		
23 bit (8388608 Pulse / rotation)		5 Mbps		
8 times higher resolution	+	Improved	=	Low vibrations High speed and high precision positioning
(A5Family※4 20 bit)		(A5Family 2.5 Mbps)		

※4 Incremental encoder

Swifter, smarter and easier to use

MINAS A6

Powered Up compact driver

Full-scale

New two-degree-of-freedom control system

Frequency response 3.2 kHz

Built-in filters and adjusting functions

PANATERM Support

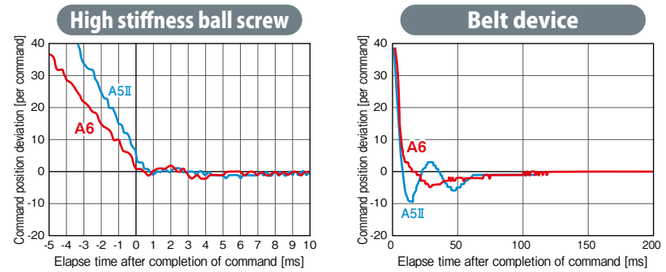
Modbus Support (AGSF, AGSG Series)

Block operation position control

High-speed response, high-precision positioning for quick and accurate movement

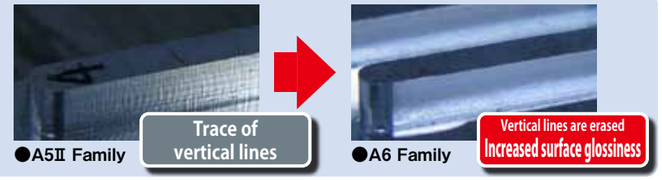
Our proprietary algorithm in addition to upgraded CPU and other hardware realized further high-speed response. Furthermore, high-precision positioning is achieved by automatically eliminating micro vibrations and machine oscillation caused by the resonance.

●Comparison of position setting waveforms



Example of operation with processing machine

A mirror finish is obtained even if a process that tends to cause streaking.

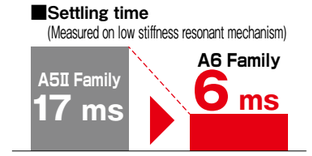


Easy and quick setting, shortening conventional settling time by approx. 64%※1

Newly developed fit gain function substantially reduces adjustment time. Adaptive notch filter and various gains can be automatically set and adjusted.

※1 Comparison with conventional product A5Ⅱfamily

■Settling time
(Measured on low stiffness resonant mechanism)



Ball screw settling time 0 ms

Belt device settling time 4 ms

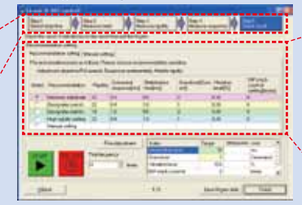
●The above is a measure based on our test environment

Adjustment completed in only 3 processes

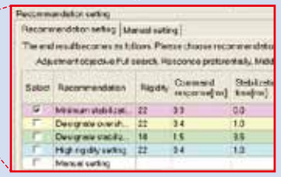
① Condition setting → ② Measurement → ③ Result determination

Load Stiffness
Command response

●Fit gain adjustment window



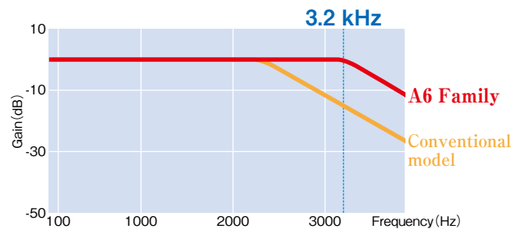
●Automatically proposes various settings



Realized 3.2 kHz frequency response to improve productivity

Realizes 3.2 kHz frequency response. At 139% that of conventional models *1, it enables high-speed operation and improves productivity.

※1 Comparison with conventional product A5Ⅱfamily



Reduced maintenance work and trouble.

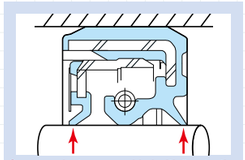
MINAS A6

Lineup of motors protected by high dust-proof, high heat-resistant oil seal (With protective lip)

Motors protected by a highly dust-proof, oil-tight oil seal (with protection lip) have been added to the lineup of motor products equipped with oil seals of conventional specifications. The oil seals of this type of motor are made of a material of higher heat resistance.

You can select appropriate motor type according to your application environment such as dusty, powdery or gear connection necessity.

- Oil-seals (with protective lip) are not available for MSMF motors with flange size 80 mm or smaller.
- MQMF and MHMF motors with flange size of 80 mm or smaller provided with oils seals (with protective lip) are not mounting-compatible with A5 Family models.



Some products are provided with "protective lip" that prevents dust and oil penetration.

■Applicable oil seals

Flange size	Motor type	With oil seal		With oil seal (with protective lip)		
80 mm or less	MSMF	◎	Made of nitrile rubber (NBR)	No setting		
	MHMF,MQMF	◎		◎	Made of fluororubber	Not mounting-compatible with A5 family products
100 mm or more	All Type	◎		◎		Mounting-compatible with A5 family products

IP67 enclosure rating (Motors with flange size of 80 mm or smaller are order-made products)

Direct-mount connectors are used for the motor power supply and encoder input and output to improve sealing performance of the motor to IP67.

- IP67-compatible motors with flange size of 80 mm or smaller are order-made products.
- For environmental conditions of applications, refer to P.271.

What is IP?

An international standard that specifies the degree of dustproof and waterproof performance. (IP: Ingress Protection)

IP-67

- 6: Dust-tight type: Totally protected against dust penetration.
- 7: Protected against water penetration when immersed in water for the specified period of time and under the specified pressure.

Lifespan diagnosis / degradation diagnosis

It warns expected lifetime of the motor & driver, and deterioration limit of the equipment.

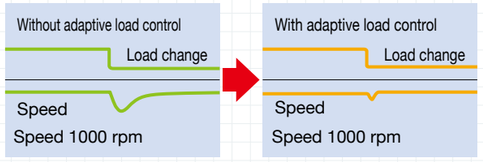
Servo motor with gear reducer

Motors with gear reducers are also available.

Other driver functions

Adaptive load control

Adaptive load control automatically sets the best suitable gain table in response to fluctuations in inertia caused by changes in workload, thus keeping machines operating stably at all times.



Positioning function (Block operation function)

Positioning is possible by using Modbus (RS 232, RS 485) or interface signal.

Friction torque compensation

This function reduces the effect of machine related friction and improves responsiveness. Three kinds of friction compensation can be set: unbalanced load compensation, which sets an offset torque that is constantly applied; kinetic friction compensation, which changes direction in response to the direction of movement; and viscous friction compensation, which changes according to the speed command.

Manual/Auto damping filter

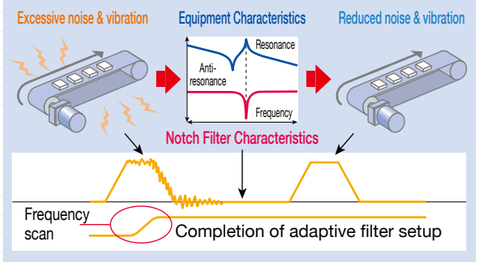
Equipped with a damping filter that is automatically set through the setup support software.This filter removes the natural vibration frequency component from the command input, greatly reducing vibration of the axis when stopping. The number of filters for simultaneous use has been increased to three from the conventional two filters.(Two from one in the two-degree-of-freedom-control mode.) The adaptive frequency has also been significantly expanded from 0.5 Hz to 300 Hz.

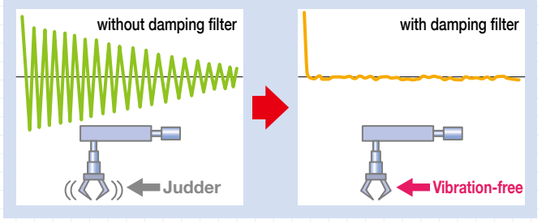
Manual/Auto notch filter

Equipped with auto-setting notch filters for greater convenience. Now there is no need to measure troublesome vibration frequencies.

Our notch filters automatically detect vibration and provide simple auto-setting. These notch filters greatly reduce noise and vibration caused by equipment resonance and respond quickly.

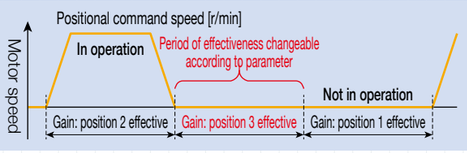
The A6 family is equipped with 5 notch filters with frequencies settable from 50 Hz to 5000 Hz. Depth can be individually adjusted within this range. (Two of the filters share automatic settings.)





3-step gain

A 3-step gain switch is available in addition to the normal gain switch.This chooses appropriate gain tunings at both stopping and running. The 3-step gain switch gives you choices of 3 different tunings for normal running, stopping for faster positioning and at stopping. The right gaining tunings achieve lower vibration and quicker positioning time of your application.



Inertia ratio conversion

You can adjust right inertia ratio by Inertia ratio conversion input (J-SEL) of interface. When you have significant load inertia changes, it can adjust unbalanced speed and position gain turning combination.It ends up quicker response of your system.

Input/output signal assignment

You can use the parameters to arbitrarily allocate the universal 10 inputs and 6 outputs. (Inputs can be selected as either A contacts or B contacts). The Panaterm setup software provides an exclusive screen for a more simplified setup.

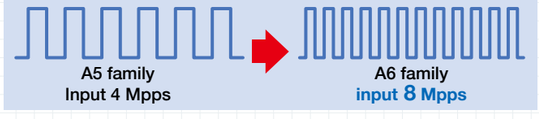
Torque limiter switching

These can be used for applications such as simplified pressure, tension control, and sensor-less homing.

Supports semi-/full-closed loop (8 Mpps input pulse, 4 Mpps output pulse) control.

Supports full-closed loop control. The A6SF series accommodates a command input of 8 Mpps and feedback output of 4 Mpps, enabling high-resolution, high-speed operation.Supports the industry's leading positioning resolution commands (pulse-train commands).

- The A6SE and A6SG series do not support full-closed loop control.
- Applicable scale: AB-phase feedback scale (general purpose product) and serial feedback scale (dedicated to Panasonic format product)



Dynamic braking

With parameter settings, you can select dynamic braking, which shorts servomotor windings U, V and W at Servo-OFF, during positive direction/ negative direction, and during power shutdown and tripping of the circuit breaker for over travel inhibition.

・The desired action sequence can be set up to accommodate your machine requirements.

Parameter initialization

Using the front panel or by connecting a PC, you can restore the parameters to the factory settings.

Inrush current preventive function

This driver is equipped with a rush current preventive resistor to prevent the circuit breaker from shutting off the power supply as a result of inrush current occurring at power-on.

Regenerative energy discharge

A regenerative resistor is used to discharge regenerative energy, which is the energy generated when stopping a load with a large moment of inertia or when using this unit in vertical operation. This energy is returned to the driver from the motor.

- Frame A, and frame B model drivers do not contain a regenerative resistor. Optional regenerative resisters are recommended.
- Frame C to frame F model drivers contain one regenerative resistor; however, adding an optional regenerative resistor provides additional regeneration capability.

Multifunctional software for quick adjustment support

MINAS A6

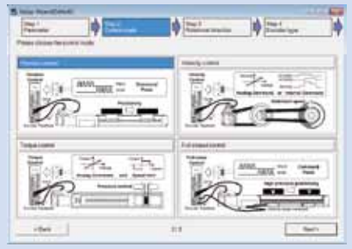
PANATERM set-up support software

The PANATERM set-up support software, with many added features. The PANATERM assists users in setting parameters, monitoring control conditions, setup support, and analyzing mechanical operation data on the PC screen, when installed in a commercially available personal computer, and connected to the MINAS A6 Family through the USB interface. Choose either English, Japanese, Chinese, Korean-language display.

Please download from our web site and use after install to the PC.
https://industrial.panasonic.com/ww/products/motors-compressors/fa-motors/ac-servo-motors/minas-a5-panaterm

Setup wizard

This wizard supports fundamental settings in each control mode step by step, including reading of default setting. In On-line condition, Input data related to each step can be monitored in real time.

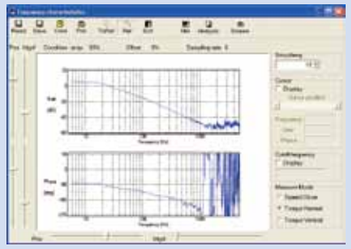


The fit gain function for setting Two-degree-of-freedom control.

1) Select the adjustment method 2) Load measurement
3) Confirming results Adjust gain to meet your needs

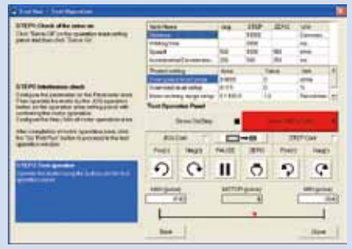
Frequency characteristics measurement function

Can check frequency response characteristics of the mechanism and motor. Since resonance frequency of the mechanism is measurable, it is effective for start-up time reduction.



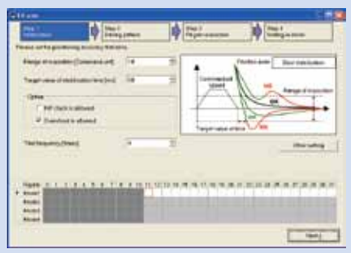
Trial run

This function supports positioning with the Z-phase search and software limit.



Fit gain

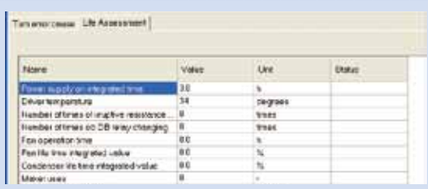
This function automatically searches the best suitable stiffness setting and mode and adjusts the gain once the target in-position range and setting time are set.



Service Life Prediction

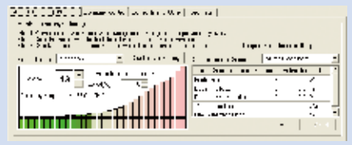
The service life prediction function considers the internal temperature for main components such as the fan and condenser. If the rated value is exceeded, an alarm is displayed. This approach prevents unexpected suspension of operation and allows for planning of systemized maintenance.

Note: The life span prediction value should be considered as a guide only.

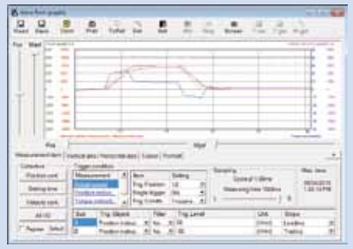


Name	Value	Unit	Status
Power supply on integrated time	30	h	
Driver temperature	34	degrees	
Number of times of inrush resistance...	8	times	
Number of times so DB relay changed	8	times	
Fan operation time	0.0	%	
Fan life time integrated value	0.0	%	
Condenser life time integrated value	0.0	%	
Mover uses	8	-	

Added New screen for gain adjustment, equipped with stiffness oscillation auto-reduction function



Significant increase of measuring objects Multi-functional waveform graphic



Encoder temperature monitor

The Encoder Temperature Monitor is a new function capable of real-time measurement of the interior temperature of the encoder, something that has been difficult to achieve in the past. It is valuable for monitoring the motor and can be used as a diagnostic in the event of a malfunction .

Other New Function

The software offers a wide range of convenient features including motor and driver data such as load factor, voltage, and driver temperature. Moreover, the logging function records the interface history. As well, a non-rotating contributing factor display function.

• Hardware configuration

Personal computer	CPU	800 MHz or more
	Memory	System memory 512MB or more Graphics memory 32MB or more
	Hard disk capacity	Vacancy of 512MB or more recommended
	OS	Windows® Vista SP1 (32 bit), Windows® 7 (32 bit, 64 bit), Windows® 8 (32 bit, 64 bit), Windows® 10 (32 bit, 64 bit) Japanese, English, Chinese (Simplified), Korean version
	Serial communication function	USB port, COM port (Communication speeds: 2400 bps to 115200 bps) * A COM port is required to use RS232 communications. A 9600 bps or higher baud rate is recommended.
Display	Resolution	1024 × 768 pix or more
	Number of colors	24 bit colors (TrueColor) or more

<CAUTION> This software is applicable only to A5 family, A6 family. To apply this software to A, AIII, E or A4 series, consult our distributors.

Compliance with MINAS A6 international standards

(A6SF series) (A6SE,A6SG series)

		Driver	Motor
EU Directives	**EMC Directives**	EN55011 EN61000-6-2 EN61000-6-4 EN61800-3	–
	Low-Voltage Directives	EN61800-5-1 EN50178	EN60034-1 EN60034-5
	Machinery Directives Functional safety *1	ISO13849-1(PL e , Cat.3) EN61508(SIL3) EN62061(SILCL 3) EN61800-5-2(SIL3、STO) IEC61326-3-1 IEC60240-1	–
UL Standards		UL508C (E164620)	UL1004-1 , UL 1004-6 (E327868)
CSA Standards		C22.2 No.14	C22.2 No.100 -04
Radio Waves Act (South Korea) (KC)*2		KN11 KN61000-4-2,3,4,5,6,8,11	–

IEC : International Electrotechnical Commission
EN : Europaischen Normen
EMC : Electromagnetic Compatibility
UL : Underwriters Laboratories
CSA : Canadian Standards Association

Pursuant to 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.

*1 A6SE, A6SG, A6NE and A6BE series doesn't correspond to the functional safety standard.

*2 Information related to the Korea Radio Law
This servo driver is a Class A commercial broadcasting radio wave generator not designed for home use.
The user and dealer should be aware of this fact.

A 급 기기 (업무용 방송통신기자재)
이 기기는 업무용(A 급) 전자파적합기기로서 판매자
또는 사용자는 이 점을 주의하시기 바라며, 가정외의
지역에서 사용하는 것을 목적으로 합니다.

(대상기종 : Servo Driver)

This products is not an object of china compulsory certification (CCC).

Low noise, compliant with EMC directives

Radiated noise is minimized to meet EMC directives and to support international standards.

Compliance with EU safety standards.

Features non-software-based independent redundant circuitry for motor power isolation. Independent redundant circuitry for motor power isolation. This obviates the need for magnetic contactors to isolate the required motor in order to accommodate low-voltage machinery commands.(The final safety compliance must be applied as machine.)

SEMI-F47

Includes a function in compliance with the SEMI F47 standard for voltage sag immunity under no load or light load. Ideal for the semiconductor and LCD industries.

- Excluding the single-phase 100-V type.
- Please verify the actual compliance with your machine checking the F47 standard for voltage sag immunity.

MEMO

Motor Line-up

Motor Line-up

Motor			Rated output (kW)	Rated rotational speed (Max. speed) (r/min)	Rotary encoder 23-bit absolute	Enclosure (*1)	Motor lead-out configuration	Features	Applications
Low inertia	MSMF	 80 mm sq. or less	0.05 0.1 0.2 0.4 0.75 1.0	3000 (6000)	○	IP65	Leadwire	· Small capacity · Suitable for high speed application · Suitable for all applications	· Bonder · Semiconductor production equipment · Packing machines etc
		 80 mm sq. or less	0.05 0.1 0.2 0.4 0.75 1.0	3000 (6000)	○	IP67	Connector		
		 100 mm sq. or more	1.0 1.5 2.0 3.0	3000 (5000)	○	IP67	Connector	· Middle capacity · Suitable for the machines directly coupled with ball screw and high stiffness and high repetitive application	· SMT machines · Food machines · LCD production equipment etc
			4.0 5.0	3000 (4500)					
Middle inertia	MQMF (Flat type)	 80 mm sq. or less	0.1 0.2 0.4	3000 (6500)	○	IP65	Leadwire	· Small capacity · Flat type and suitable for low stiffness machines with belt driven · Motors with gear reducers are also available. (See. P.261) Coming soon	· SMT machines · Inserter machines · Belt drive machines · unloading robot etc
		 80 mm sq. or less	0.1 0.2 0.4	3000 (6500)	○	IP67	Connector		
	MDMF	 130 mm sq. or more	1.0 1.5 2.0 3.0 4.0 5.0	2000 (3000)	○	IP67	Connector	· Middle capacity · Suitable for low stiffness machines with belt driven	· Conveyors · Robots · Machine tool etc
	MGME (Low speed/High torque type)	 130 mm sq. or more	0.85 1.3 1.8 2.4 2.9 4.4	1500 (3000)	○	IP67	Connector	· Middle capacity · Suitable for low speed and high torque application	· Conveyors · Robots · Textile machines etc
High inertia	MHMF	 80 mm sq. or less	0.05 0.1 0.2 0.4 0.75 1.0	3000 (6500) 3000 (6000)	○	IP65	Leadwire	· Small capacity · Suitable for low stiffness machines with belt driven · Motors with gear reducers are also available. (See. P.261) Coming soon	· Conveyors · Robots etc
		 80 mm sq. or less	0.05 0.1 0.2 0.4 0.75 1.0	3000 (6500) 3000 (6000)	○	IP67	Connector		
		 130 mm sq. or more	1.0 1.5 2.0 3.0 4.0 5.0	2000 (3000)	○	IP67	Connector	· Middle capacity · Suitable for low stiffness machines with belt driven, and large load moment of inertia	· Conveyors · Robots · LCD manufacturing equipment etc

(*1) IP65 motor (Lead wire type of MSMF, MQMF, MHMF) :Except output shaft rotating part and lead wire tip part
IP 67 Motor : Except rotating part of output shaft ,connecting pin of motor connector and encoder connector.

*** For possible combinations of motors and drivers, see P.23 to P.32.**

- When using a rotary encoder as an absolute system (using multi-turn data), connect a battery to the absolute encoder.
- When using a rotary encoder as an incremental system (not using multi-turn data), do not connect a battery for absolute encoder.

Model Designation

* For combination of elements of model number, refer to Index P.402.

Servo Motor

M S M ① | F ② | 5 A ③ | Z ④ | L ⑤ | 1 ⑥ | A 1 ⑦ | ＊ — Special specifications

① Type

Symbol	Type	
MSM	Low inertia	(50 W to 5.0 kW)
MQM	Middle inertia	(100 W to 400 W)
MDM	Middle inertia	(1.0 kW to 5.0 kW)
MGM	Middle inertia	(0.85 kW to 4.4 kW)
MHM	High inertia	(50 W to 5.0 kW)

② Series

Symbol	Series name
F	A6 family

③ Motor rated output

Symbol	Rated output
5A	50 W
01	100 W
02	200 W
04	400 W
08	750 W
09	0.85 kW, 1000 W (130 mm sq.) (80 mm sq.)
10	1.0 kW
13	1.3 kW
15	1.5 kW
18	1.8 kW
20	2.0 kW
24	2.4 kW
29	2.9 kW
30	3.0 kW
40	4.0 kW
44	4.4 kW
50	5.0 kW

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
L	Absolute	23-bit	8388608	7

⑥ Design order

Symbol	Specifications
1	Standard

<Note>
When using a rotary encoder as an incremental system (not using multi-turn data), do not connect a battery for absolute encoder.

⑦ Motor specifications: 100 mm sq. or more MSMF, MHMF, MDMF, MGMF

Symbol		Shaft		Holding brake		Oil seal		Encorder terminal	
		Round	Key-way	without	with	with	With protective lip	Connector JN2 (Small size)	Connector JL10 (Large size)*2
C	5	●		●		●		●	
C	6	●		●		●			●
C	7	●		●			●	●	
C	8	●		●			●		●
D	5	●			●	●		●	
D	6	●			●	●			●
D	7	●			●		●	●	
D	8	●			●		●		●
G	5		●	●		●		●	
G	6		●	●		●			●
G	7		●	●			●	●	
G	8		●	●			●		●
H	5		●		●	●		●	
H	6		●		●	●			●
H	7		●		●		●	●	
H	8		●		●		●		●

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

Symbol		Shaft		Holding brake		Oil seal		Motor encorder terminal *1	
		Round	Key-way, center tap	without	with	without	with	Connector JN	Lead wire
A	1	●		●		●		●	
A	2	●		●		●			●
B	1	●			●	●		●	
B	2	●			●	●			●
C	1	●		●			●	●	
C	2	●		●			●		●
D	1	●			●		●	●	
D	2	●			●		●		●
S	1		●	●		●		●	
S	2		●	●		●			●
T	1		●		●	●		●	
T	2		●		●	●			●
U	1		●	●			●	●	
U	2		●	●			●		●
V	1		●		●		●	●	
V	2		●		●		●		●

⑦ Motor specifications: 80 mm sq. or less MHMF 50 W to 1000 W MQMF 100 W to 400 W

Symbol		Shaft		Holding brake		Oil seal			Motor encorder terminal *1	
		Round	Key-way, center tap	without	with	without	with	With protective lip	Connector JN	Lead wire
A	1	●		●		●			●	
A	2	●		●		●				●
B	1	●			●	●			●	
B	2	●			●	●				●
C	1	●		●			●		●	
C	2	●		●			●			●
C	3	●		●				●	●	
C	4	●		●				●		●
D	1	●			●		●		●	
D	2	●			●		●			●
D	3	●			●			●	●	
D	4	●			●			●		●
S	1		●	●		●			●	
S	2		●	●		●				●
T	1		●		●	●			●	
T	2		●		●	●				●
U	1		●	●			●		●	
U	2		●	●			●			●
U	3		●	●				●	●	
U	4		●	●				●		●
V	1		●		●		●		●	
V	2		●		●		●			●
V	3		●		●			●	●	
V	4		●		●			●		●

*1 Connector type: IP67, Lead wire type: IP65
*2 Connector on the motor side encoder. (Also applicable to screwed type.)

Servo Driver

M A D ① | L ② | N ③ | 1 ④ | 5 ⑤ | S ⑥ | E ⑦ | ＊ ＊ ＊ — Special specifications

① Frame symbol

Symbol	Frame	Symbol	Frame
MAD	A-Frame	MDD	D-Frame
MBD	B-Frame	MED	E-Frame
MCD	C-Frame	MFD	F-Frame

② Series

Symbol	Series name
L	A6 family

③ Safety Function

Symbol	Specifications
N	without the safety function
T	with the safety function

④ Max. current rating

Symbol	Current rating	Symbol	Current rating
0	6 A	5	40 A
1	8 A	8	60 A
2	12 A	9	80 A
3	22 A	A	100 A
4	24 A	B	120 A

⑤ Supply voltage specifications

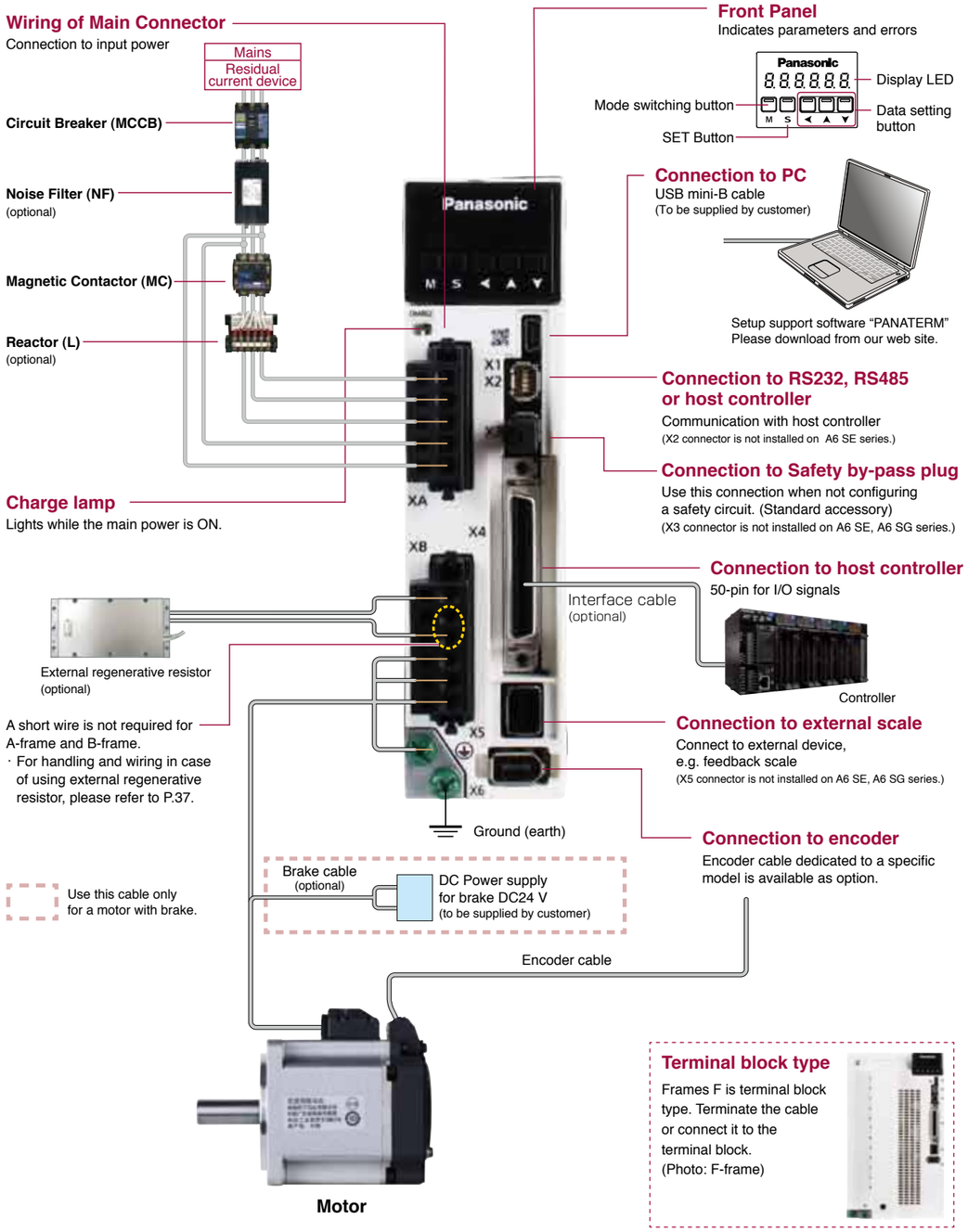
Symbol	Specifications
1	Single phase 100 V
3	3-phase 200 V
5	Single/3-phase 200 V

⑥ I/f specifications ⑦ Classification of type

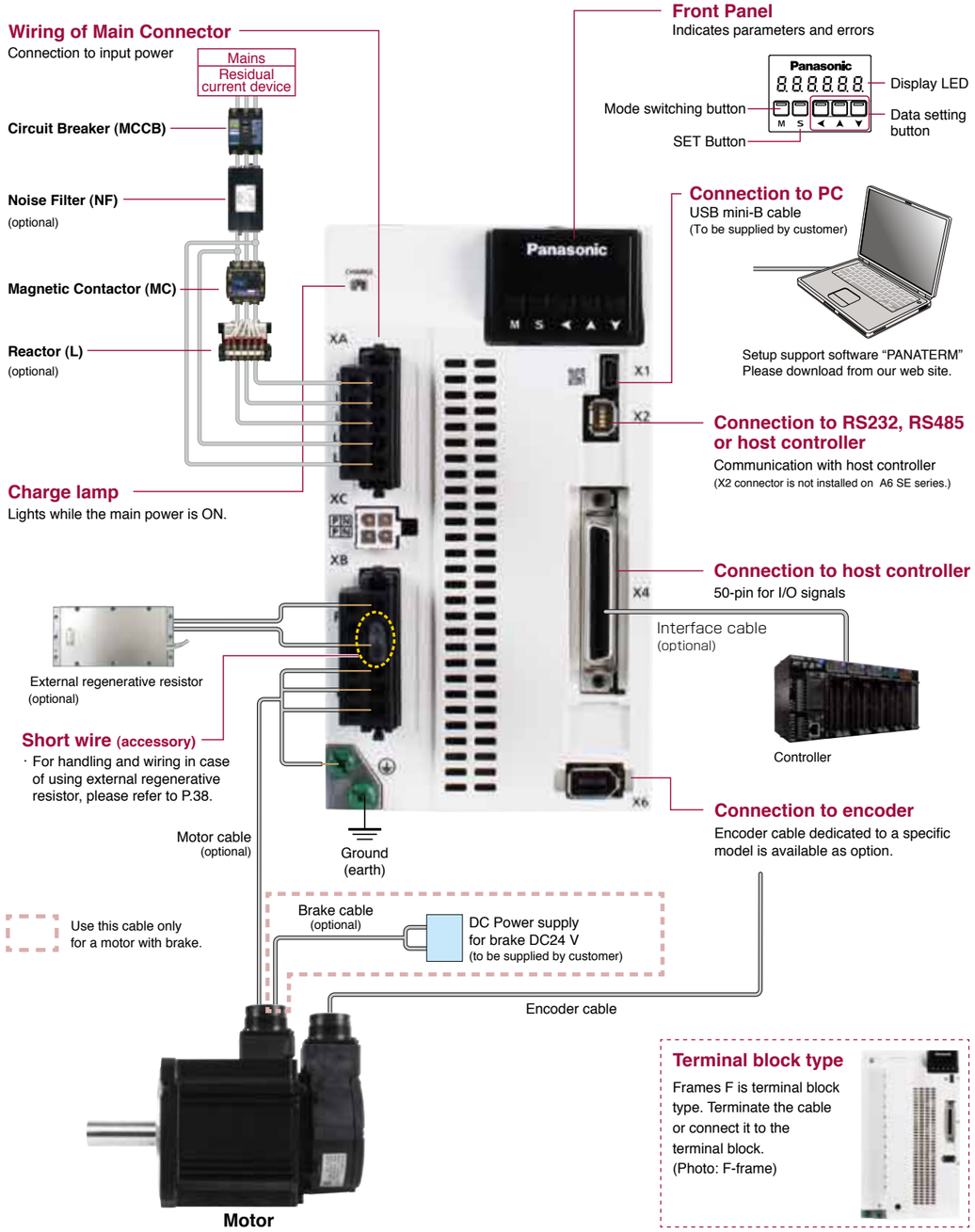
Symbol (specification)	Symbol	Specification
S (Analog/Pulse)	E	Basic type (Pulse train only)
	F	Multi fanction type (Pulse, analog, full-closed)
	G	RS485 communication type (Pulse train only)

Overall Wiring

<A6SF Series (Driver: A-frame Motor: 200 W)>



<A6SG Series/ A6SE Series (Driver: D-frame Motor: 1.0 kW)>



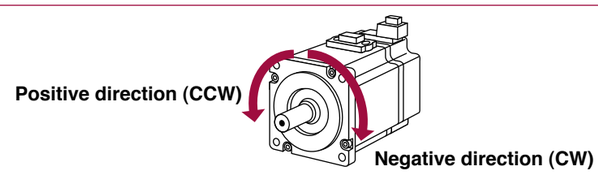
<Caution>

Apply adequate tightening torque to the product mounting screw by taking into consideration strength of the screw and the characteristics of material to which the product is installed. Overtightening can damage the screw and/or material; undertightening can result in loosening.

Example) Steel screw (M5) into steel section: 2.7 N·m to 3.3 N·m.

<Note>

Initial setup of rotational direction:
positive = CCW and negative = CW.
Pay an extra attention.



Driver and List of Applicable Peripheral Equipments

Driver	Applicable motor	Voltage (V) *1	Rated output (kW)	Required Power at the (rated load) (kVA)	Circuit breaker (rated current) (A)	Noise filter (Single phase / 3-phase)	Surge absorber (Single phase / 3-phase)	Ferrite core	Rated operating current of magnetic (contactor contact configuration)	Diameter and withstand voltage of main circuit cable	Crimp terminal for main circuit terminal block *2	Diameter and withstand voltage of control power supply cable	Crimp terminal for control power supply terminal block	Diameter and withstand voltage of motor cable *3	Diameter and withstand voltage of brake cable
MADL	MSMF MHMF	Single phase, 100	0.05	approx. 0.4	10	DV0P4170	DV0P4190	DV0P1460	20 A (3P+1a)	0.75 mm²/ AWG18 600 VAC or more to 2.0 mm²/ AWG14 600 VAC or more	Connection to exclusive connector	0.75 mm²/ AWG18 600 VAC or more	Connection to exclusive connector	0.75 mm²/ AWG18 600 VAC or more to 2.0 mm²/ AWG14 600 VAC or more	0.28 mm² to 0.75 mm²/ AWG22 to AWG18 100 VAC or more
	MSMF MQMF MHMF		0.1												
	MSMF MHMF	Single/ 3-phase 200	0.05	approx. 0.5		DV0P4170 / DV0PM20042	DV0P4190 / DV0P1450								
	MSMF MQMF MHMF		0.1, 0.2												
MBDL	MSMF MQMF MHMF	Single phase, 100	0.2	approx. 0.5		DV0P4170	DV0P4190								
		Single/ 3-phase 200	0.4	approx. 0.9		DV0P4170 / DV0PM20042	DV0P4190 / DV0P1450								
MCDL	MSMF MQMF MHMF	Single phase, 100	0.4	approx. 0.9	15	DV0PM20042	DV0P4190								
	MSMF MHMF	Single/ 3-phase 200	0.75	approx. 1.3			DV0P4190 / DV0P1450								
MDDL	MGMF	Single/ 3-phase 200	0.85	approx. 1.8	20	DV0P4220	DV0P4190 / DV0P1450		30 A (3P+1a)						0.75 mm²/ AWG18 100 VAC or more
	MSMF		1.0 (80 mm sq.)												
	MDMF MHMF		1.0												
	MHMF		1.0 (80 mm sq.)	approx. 2.3											
	MSMF		1.0												
	MGMF		1.3												
	MSMF MDMF MHMF		1.5												
MEDL	MGMF	3-phase 200	1.8	approx. 3.8	30	DV0PM20043	DV0P1450		60 A (3P+1a)	2.0 mm²/ AWG14 600 VAC or more to 3.5 mm²/ AWG12 600 VAC or more				2.0 mm²/ AWG14 600 VAC or more to 3.5 mm²/ AWG12 600 VAC or more	
	MSMF MDMF MHMF		2.0												
	MGMF		2.4	approx. 4.5										3.5 mm²/ AWG12 600 VAC or more	
MFDL	MSMF MDMF MHMF	3-phase 200	3.0	approx. 4.5	50	DV0P3410	DV0P1450		100 A (3P+1a)	3.5 mm²/ AWG12 600 VAC or more	11 mm or smaller Φ5.3 Terminal block M5		11 mm or smaller Φ5.3 Terminal block M5		
	MGMF		2.9	approx. 7.5											
	MSMF MDMF MHMF		4.0												
	MGMF		4.4												
	MSMF MDMF MHMF		5.0												

*1 Select peripheral equipments for single/3phase common specification according to the power source.
*2 For the ground screw, use the same crimp terminal as that for the main circuit terminal block.
*3 The diameter of the ground cable must be equal to, or larger than that of the motor cable.

Related page

Noise filter ..... P.366 “Composition of Peripheral Equipments”
Surge absorber ..... P.367 “Composition of Peripheral Equipments”
Ferrite core..... P.368 “Composition of Peripheral Equipments”
Motor/brake connector .... P.275 “Specifications of Motor connector”

About circuit breaker and magnetic contactor

To comply to EC Directives, install a circuit breaker between the power and the noise filter without fail, and the circuit breaker should conform to IEC Standards and UL recognized (Listed and Ⓤʟ marked).

Suitable for use on a circuit capable of delivering not more than 5000 Arms symmetrical amperes, below the maximum input voltage of the product.

If the short-circuit current of the power supply exceeds this value, install a current limit device (current limiting fuse, current limiting circuit breaker, transformer, etc.) to limit the short-circuit current.

<Caution>

· Select a circuit breaker and noise filter which match to the capacity of power supply (including a load condition).

Terminal block and protective earth terminals

· Use a copper conductor cables with temperature rating of 75 °C or higher.
· Use the attached exclusive connector for A-frame to E-frame, and maintain the peeled off length of 8 mm to 9 mm.

■ Fastening torque list (Terminal block screw/Terminal cover fastening screw)

Driver		Terminal block screw		Terminal cover fastening screw	
Frame	Terminal name	Nominal size	Fastening torque (N·m) Note)1	Nominal size	Fastening torque (N·m) Note)1
F	L1, L2, L3, L1C, L2C, P, RB, B, N, U, V, W	M5	1.0 to 1.7	M3	0.19 to 0.21

■ Fastening torque list (Ground terminal screw/Connector to host controller [X4])

Driver frame	Ground screw		Connector to host controller (X4)	
	Nominal size	Fastening torque (N·m) Note)1	Nominal size	Fastening torque (N·m) Note)1
MADL, MBDL, MCDL, MDDL, MEDL	M4	0.7 to 0.8	M2.6	0.3 to 0.35
MFDL	M5	1.4 to 1.6		

Note)1 **<Caution>**

· Applying fastening torque larger than the maximum value may result in damage to the product.
· Do not turn on power without tightening all terminal block screws properly, otherwise, loose contacts may generate heat (smoking, firing）.

<Remarks>

· To check for looseness, conduct periodic inspection of fastening torque once a year.

Motor						Driver			Power capacity at rated load (kVA)	Optional parts								
Motor series		Power supply	Output (W)	Part No. Note)1	Rating/ Spec. Dimensions (page)	A6SF series Multi function type (Pulse, analog, full-closed)	A6SG series RS485 communication / A6SE series Basic (Pulse signal input) Note)2, Note)4	Frame		Encoder Cable Note)3			Motor Cable Note)3		Brake Cable Note)3	External Regenerative Resistor	Reactor (Single phase / 3-phase)	Noise Filter (Single phase / 3-phase)
										23-bit Absolute			without Brake	with Brake				
										Use in the absolute system (with battery box) Note)5	Use in the Incremental system (without battery box)							
Low inertia	MSMF (Leadwire type) 3000 r/min IP65	Single phase 100 V	50	MSMF5AZL1 □ 2	51 101	MADLT01SF	MADLN01S◇	A-frame ★	Approx. 0.4	MFECA 0＊＊0EAE (For fixed)	MFECA 0＊＊0EAD (For fixed)		MFMCA 0＊＊0EED		MFMCB 0＊＊0GET Note)6	DV0P4280	DV0P227	DV0P4170
			100	MSMF011L1 □ 2	53 102	MADLT11SF	MADLN11S◇											
			200	MSMF021L1 □ 2	55 103	MBDLT21SF	MBDLN21S◇	B-frame ★	Approx. 0.5							DV0P4283	DV0P228	
			400	MSMF041L1 □ 2	57 105	MCDLT31SF	MCDLN31S◇	C-frame	Approx. 0.9							DV0P4282		DV0P20042
		Single phase/ 3-phase 200 V	50	MSMF5AZL1 □ 2	52 101	MADLT05SF	MADLN05S◇	A-frame ★	Approx. 0.5							DV0P4281	DV0P227 / DV0P220	DV0P4170 / DV0PM20042
			100	MSMF012L1 □ 2	54 102	MADLT05SF	MADLN05S◇											
			200	MSMF022L1 □ 2	56 103	MADLT15SF	MADLN15S◇									DV0P4283	DV0P228 / DV0P220	
			400	MSMF042L1 □ 2	58 105	MBDLT25SF	MBDLN25S◇	B-frame ★	Approx. 0.9									
			750	MSMF082L1 □ 2	59 106	MCDLT35SF	MCDLN35S◇	C-frame	Approx. 1.3									DV0PM20042
			1000	MSMF092L1 □ 2	60 107	MDDLT45SF	MDDLN45S◇	D-frame	Approx. 1.8							DV0P4284	DV0P228 / DV0P222	DV0P4220
Middle inertia Flat type	MQMF (Leadwire type) 3000 r/min IP65	Single phase 100 V	100	MQMF011L1 □ 2 MQMF011L1 □ 4	67 117	MADLT11SF	MADLN11S◇	A-frame ★	Approx. 0.4	MFECA 0＊＊0EAE (For fixed)	MFECA 0＊＊0EAD (For fixed)		MFMCA 0＊＊0EED		MFMCB 0＊＊0GET Note)6	DV0P4280	DV0P227	DV0P4170
			200	MQMF021L1 □ 2 MQMF021L1 □ 4	69 121	MBDLT21SF	MBDLN21S◇	B-frame ★	Approx. 0.5							DV0P4283	DV0P228	
			400	MQMF041L1 □ 2 MQMF041L1 □ 4	71 125	MCDLT31SF	MCDLN31S◇	C-frame	Approx. 0.9							DV0P4282		DV0P20042
		Single phase/ 3-phase 200 V	100	MQMF012L1 □ 2 MQMF012L1 □ 4	68 117	MADLT05SF	MADLN05S◇	A-frame ★	Approx. 0.5							DV0P4281	DV0P227 / DV0P220	DV0P4170 / DV0PM20042
			200	MQMF022L1 □ 2 MQMF022L1 □ 4	70 121	MADLT15SF	MADLN15S◇									DV0P4283	DV0P228 / DV0P220	
			400	MQMF042L1 □ 2 MQMF042L1 □ 4	72 125	MBDLT25SF	MBDLN25S◇	B-frame ★	Approx. 0.9									
High inertia	MHMF (Leadwire type) 3000 r/min IP65	Single phase 100 V	50	MHMF5AZL1 □ 2 MHMF5AZL1 □ 4	73 129	MADLT01SF	MADLN01S◇	A-frame ★	Approx. 0.4	MFECA 0＊＊0EAE (For fixed)	MFECA 0＊＊0EAD (For fixed)		MFMCA 0＊＊0EED		MFMCB 0＊＊0GET Note)6	DV0P4280	DV0P227	DV0P4170
			100	MHMF011L1 □ 2 MHMF011L1 □ 4	75 133	MADLT11SF	MADLN11S◇											
			200	MHMF021L1 □ 2 MHMF021L1 □ 4	77 137	MBDLT21SF	MBDLN21S◇	B-frame ★	Approx. 0.5							DV0P4283	DV0P228	
			400	MHMF041L1 □ 2 MHMF041L1 □ 4	79 141	MCDLT31SF	MCDLN31S◇	C-frame	Approx. 0.9							DV0P4282		DV0PM20042
		Single phase/ 3-phase 200 V	50	MHMF5AZL1 □ 2 MHMF5AZL1 □ 4	74 129	MADLT05SF	MADLN05S◇	A-frame ★	Approx. 0.5							DV0P4281	DV0P227 / DV0P220	DV0P4170 / DV0PM20042
			100	MHMF012L1 □ 2 MHMF012L1 □ 4	76 133	MADLT05SF	MADLN05S◇											
			200	MHMF022L1 □ 2 MHMF022L1 □ 4	78 137	MADLT15SF	MADLN15S◇									DV0P4283	DV0P228 / DV0P220	
			400	MHMF042L1 □ 2 MHMF042L1 □ 4	80 141	MBDLT25SF	MBDLN25S◇	B-frame ★	Approx. 0.9									
			750	MHMF082L1 □ 2 MHMF082L1 □ 4	81 145	MCDLT35SF	MCDLN35S◇	C-frame	Approx. 1.3									DV0PM20042
			1000	MHMF092L1 □ 2 MHMF092L1 □ 4	82 149	MDDLT55SF	MDDLN55S◇	D-frame	Approx. 2.3							DV0P4284	DV0P228 / DV0P222	DV0P4220

★: Frame-A and B drivers are not equipped with regenerative resistors.When regeneration occurs, please prepare an optional external regenerative resistor.

Note)1 □ : Represents the motor specifications. (refer to “Model designation” P.18.)

Note)2 ◇ : Represents the driver specifications. (refer to “Model designation” P.18.)

Note)3 ＊＊: Represents the cable length (03/3 m, 05/5 m, 10/10 m, 20/20 m). Example. 3 m/MFECA0030EAE

Note)4 Because A6SE series driver (dedicated for position control) does not support the absolute system specification, only incremental system can be used in combination.

Note)5 Please note that a battery is not supplied together with 23-bit absolute encoder cable (with battery box).
Please buy the battery part number “DV0P2990” separately.

Note)6 Brake cable and motor cables are required for the motors with brake.

■ Options

Title			Part No.	Page
Interface Cable			DV0P4360	290
Interface Conversion Cable			DV0P4120	290
			DV0P4121	290
			DV0P4130	290
			DV0P4131	290
			DV0P4132	290
Connector Kit for Power Supply Input Connection	A-frame to D-frame	Single row type	DV0PM20032	293
		Double row type	DV0PM20033	293
Connector Kit for Motor Connection	A-frame to D-frame		DV0PM20034	294
Connector Kit for Motor/Encoder Connection			DV0P4290	294
Connector Kit	RS485, RS232		DV0PM20102	291
	Safety		DV0PM20103	291
	Interface		DV0P4350	292
	External Scale		DV0PM20026	292
	Encoder		DV0PM20010	292
Battery for Absolute Encoder			DV0P2990	302
Battery Box for Absolute Encoder Note)5			DV0P4430	302
Mounting Bracket	For A-frame, B-frame		DV0PM20100	303
	For C-frame, D-frame		DV0PM20101	303
Encoder Cable	with Battery Box Note)5		MFECA0＊＊0EAE	277
	without Battery Box		MFECA0＊＊0EAD	277
Motor Cable	without Brake		MFMCA0＊＊0EED	281
Brake Cable			MFMCB0＊＊0GET	289
External regenerative resistor	50 Ω 25 W		DV0P4280	305
	100 Ω 25 W		DV0P4281	305
	25 Ω 50 W		DV0P4282	305
	50 Ω 50 W		DV0P4283	305
	30 Ω 100 W		DV0P4284	305
Reactor			DV0P220	304
			DV0P222	304
			DV0P227	304
			DV0P228	304
Noise Filter			DV0P4170	366
			DV0PM20042	366
			DV0P4220	366
Surge Absorber			DV0P4190	367
			DV0P1450	367
Ferrite Core			DV0P1460	368
Daisy Chain			DV0P24610	307

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Motor					Driver			Power capacity (at rated load) (kVA)	Optional parts							
Motor series		Power supply	Output (W)	Part No. Note)1	Rating/ Spec. Dimensions (page)	A6SF series Multi fanction type (Pulse, analog, full-closed)	A6SG series RS485 communication / A6SE series Basic (Pulse signal input) Note)2, Note)5	Frame		Encoder Cable Note)3		Motor Cable Note)3		Brake Cable Note)3	External Regenerative Resistor	Reactor (Single phase / 3-phase)	Noise Filter (Single phase / 3-phase)
										23-bit Absolute		without Brake	with Brake				
										Use in the absolute system (with battery box) Note)6	Use in the Incremental system (without battery box)						
Low inertia	MSMF (Connector type) 3000 r/min IP67	Single phase 100 V	50	MSMF5AZL1 □ 1	51 101	MADLT01SF	MADLN01S◇	A-frame ★	Approx. 0.4	MFECA 0 ∗ ∗ 0MJE (For movable, direction of motor shaft)	MFECA 0 ∗ ∗ 0MJD (For movable, direction of motor shaft)	MFMCA 0 ∗ ∗ 0NJD (For movable, direction of motor shaft)	MFMCB 0 ∗ ∗ 0PJT (For movable, direction of motor shaft)		DV0P4280	DV0P227	DV0P4170
			100	MSMF011L1 □ 1	53 103	MADLT11SF	MADLN11S◇										
			200	MSMF021L1 □ 1	55 104	MBDLT21SF	MBDLN21S◇	B-frame ★	Approx. 0.5						DV0P4283	DV0P228	
			400	MSMF041L1 □ 1	57 105	MCDLT31SF	MCDLN31S◇	C-frame	Approx. 0.9						DV0P4282		DV0PM20042
		Single phase/ 3-phase 200 V	50	MSMF5AZL1 □ 1	52 101	MADLT05SF	MADLN05S◇	A-frame ★	Approx. 0.5	MFECA 0 ∗ ∗ 0MKE (For movable, opposite direction of motor shaft)	MFECA 0 ∗ ∗ 0MKD (For movable, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 0NKD (For movable, opposite direction of motor shaft)	MFMCB 0 ∗ ∗ 0PKT (For movable, opposite direction of motor shaft)		DV0P4281	DV0P227 / DV0P220	DV0P4170 / DV0PM20042
			100	MSMF012L1 □ 1	54 103	MADLT05SF	MADLN05S◇										
			200	MSMF022L1 □ 1	56 104	MADLT15SF	MADLN15S◇			MFECA 0 ∗ ∗ 0TJE (For fixed, direction of motor shaft)	MFECA 0 ∗ ∗ 0TJD (For fixed, direction of motor shaft)	MFMCA 0 ∗ ∗ 0RJD (For fixed, direction of motor shaft)	MFMCB 0 ∗ ∗ 0SJT (For fixed, direction of motor shaft)		DV0P4283		
			400	MSMF042L1 □ 1	58 105	MBDLT25SF	MBDLN25S◇	B-frame ★	Approx. 0.9	MFECA 0 ∗ ∗ 0TKE (For fixed, opposite direction of motor shaft)	MFECA 0 ∗ ∗ 0TKD (For fixed, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 0RKD (For fixed, opposite direction of motor shaft) Note)4	MFMCB 0 ∗ ∗ 0SKT (For fixed, opposite direction of motor shaft) Note)7			DV0P228 / DV0P220	DV0PM20042
			750	MSMF082L1 □ 1	59 107	MCDLT35SF	MCDLN35S◇	C-frame	Approx. 1.3								
			1000	MSMF092L1 □ 1	60 108	MDDLT45SF	MDDLN45S◇	D-frame	Approx. 1.8						DV0P4284	DV0P228 / DV0P222	DV0P4220
Middle inertia Flat type	MQMF (Connector type) 3000 r/min IP67	Single phase 100 V	100	MQMF011L1 □ 1 MQMF011L1 □ 3	67 119	MADLT11SF	MADLN11S◇	A-frame ★	Approx. 0.4	MFECA 0 ∗ ∗ 0MJE (For movable, direction of motor shaft)	MFECA 0 ∗ ∗ 0MJD (For movable, direction of motor shaft)	MFMCA 0 ∗ ∗ 0UFD (For movable, direction of motor shaft)	MFMCA 0 ∗ ∗ 0VFD (For movable, direction of motor shaft)	–	DV0P4280	DV0P227	DV0P4170
			200	MQMF021L1 □ 1 MQMF021L1 □ 3	69 123	MBDLT21SF	MBDLN21S◇	B-frame ★	Approx. 0.5						DV0P4283	DV0P228	
			400	MQMF041L1 □ 1 MQMF041L1 □ 3	71 127	MCDLT31SF	MCDLN31S◇	C-frame	Approx. 0.9	MFECA 0 ∗ ∗ 0MKE (For movable, opposite direction of motor shaft)	MFECA 0 ∗ ∗ 0MKD (For movable, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 0UGD (For movable, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 0VGD (For movable, opposite direction of motor shaft)		DV0P4282		DV0PM20042
		Single phase/ 3-phase 200 V	100	MQMF012L1 □ 1 MQMF012L1 □ 3	68 119	MADLT05SF	MADLN05S◇	A-frame ★	Approx. 0.5	MFECA 0 ∗ ∗ 0TJE (For fixed, direction of motor shaft)	MFECA 0 ∗ ∗ 0TJD (For fixed, direction of motor shaft)	MFMCA 0 ∗ ∗ 0WFD (For fixed, direction of motor shaft)	MFMCA 0 ∗ ∗ 0XFD (For fixed, direction of motor shaft)		DV0P4281	DV0P227 / DV0P220	DV0P4170 / DV0PM20042
			200	MQMF022L1 □ 1 MQMF022L1 □ 3	70 123	MADLT15SF	MADLN15S◇								DV0P4283		
			400	MQMF042L1 □ 1 MQMF042L1 □ 3	72 127	MBDLT25SF	MBDLN25S◇	B-frame ★	Approx. 0.9	MFECA 0 ∗ ∗ 0TKE (For fixed, opposite direction of motor shaft)	MFECA 0 ∗ ∗ 0TKD (For fixed, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 0WGD (For fixed, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 0XGD (For fixed, opposite direction of motor shaft)			DV0P228 / DV0P220	

★: Frame-A and B drivers are not equipped with regenerative resistors.When regeneration occurs, please prepare an optional external regenerative resistor.

Note)1 □ : Represents the motor specifications. (refer to “Model designation” P.18.)

Note)2 ◇ : Represents the driver specifications. (refer to “Model designation” P.18.)

Note)3 ∗ ∗ : Represents the cable length (03/3 m, 05/5 m, 10/10 m, 20/20 m). Example. 3 m/MFECA0030MJE

Note)4 Cables for opposite to output shaft cannot be used with 50 W or 100 W motor. (MSMF connector type only.)

Note)5 Because A6SE series driver (dedicated for position control) does not support the absolute system specification, only incremental system can be used in combination.

Note)6 Please note that a battery is not supplied together with 23-bit absolute encoder cable (with battery box). Please buy the battery part number “DV0P2990” separately.

Note)7 Brake cable and motor cables are required for the motors with brake.

[Movable : For application where the cable is movable.
Fixed : For application where the cable is fixed.
Direction of motor shaft/Opposite direction of motor shaft : Cable direction]

■ Options

Title			Part No.	Page
Interface Cable			DV0P4360	290
Interface Conversion Cable			DV0P4120	290
			DV0P4121	290
			DV0P4130	290
			DV0P4131	290
			DV0P4132	290
Connector Kit for Power Supply Input Connection	A-frame to D-frame	Single row type	DV0PM20032	293
		Double row type	DV0PM20033	293
Connector Kit for Motor Connection	A-frame to D-frame		DV0PM20034	294
Connector Kit for Motor/ Encoder Connection	MSMF		DV0PM20035	295
	MQMF		DV0PM24582	296
Connector Kit for Brake Connection			DV0PM20040	301
Connector Kit	RS485, RS232		DV0PM20102	291
	Safety		DV0PM20103	291
	Interface		DV0P4350	292
	External Scale		DV0PM20026	292
	Encoder		DV0PM20010	292
Battery for Absolute Encoder			DV0P2990	302
Battery Box for Absolute Encoder Note)6			DV0P4430	302
Mounting Bracket	For A-frame,B-frame		DV0PM20100	303
	For C-frame,D-frame		DV0PM20101	303
Encoder Cable (with Battery Box) Note)6	For movable, direction of motor shaft		MFECA0∗∗0MJE	278
	For movable, opposite direction of motor shaft		MFECA0∗∗0MKE	278
	For fixed, direction of motor shaft		MFECA0∗∗0TJE	278
	For fixed, opposite direction of motor shaft		MFECA0∗∗0TKE	278
Encoder Cable (without Battery Box)	For movable, direction of motor shaft		MFECA0∗∗0MJD	278
	For movable, opposite direction of motor shaft		MFECA0∗∗0MKD	278
	For fixed, direction of motor shaft		MFECA0∗∗0TJD	278
	For fixed, opposite direction of motor shaft		MFECA0∗∗0TKD	278
Motor Cable (For MSMF type)	For movable, direction of motor shaft		MFMCA0∗∗0NJD	281
	For movable, opposite direction of motor shaft		MFMCA0∗∗0NKD	281
	For fixed, direction of motor shaft		MFMCA0∗∗0RJD	281
	For fixed, opposite direction of motor shaft		MFMCA0∗∗0RKD	281
Motor Cable (For MQMF type) (without Brake)	For movable, direction of motor shaft		MFMCA0∗∗0UFD	282
	For movable, opposite direction of motor shaft		MFMCA0∗∗0UGD	282
	For fixed, direction of motor shaft		MFMCA0∗∗0WFD	282
	For fixed, opposite direction of motor shaft		MFMCA0∗∗0WGD	282
Motor Cable (For MQMF type) (with Brake)	For movable, direction of motor shaft		MFMCA0∗∗0VFD	285
	For movable, opposite direction of motor shaft		MFMCA0∗∗0VGD	285
	For fixed, direction of motor shaft		MFMCA0∗∗0XFD	285
	For fixed, opposite direction of motor shaft		MFMCA0∗∗0XGD	285
Brake Cable	For movable, direction of motor shaft		MFMCB0∗∗0PJT	289
	For movable, opposite direction of motor shaft		MFMCB0∗∗0PKT	289
	For fixed, direction of motor shaft		MFMCB0∗∗0SJT	289
	For fixed, opposite direction of motor shaft		MFMCB0∗∗0SKT	289
External regenerative resistor		50 Ω 25 W	DV0P4280	305
		100 Ω 25 W	DV0P4281	305
		25 Ω 50 W	DV0P4282	305
		50 Ω 50 W	DV0P4283	305
		30 Ω 100 W	DV0P4284	305
Reactor			DV0P220, DV0P222 DV0P227, DV0P228	304
Noise Filter			DV0P4170, DV0PM20042 DV0P4220	366
Surge Absorber			DV0P4190, DV0P1450	367
Ferrite Core			DV0P1460	368
Daisy Chain			DV0P24610	307

Motor					Driver			Power capacity (at rated load) (kVA)	Optional parts							
Motor series	Power supply	Output (W)	Part No. Note)1	Rating/ Spec. Dimensions (page)	A6SF series Multi fanction type (Pulse, analog, full-closed)	A6SG series RS485 communication / A6SE series Basic (Pulse signal input) Note)2, Note)4	Frame		Encoder Cable Note)3		Motor Cable Note)3		Brake Cable Note)3	External Regenerative Resistor	Reactor (Single phase / 3-phase)	Noise Filter (Single phase / 3-phase)
									23-bit Absolute		without Brake	with Brake				
									Use in the absolute system (with battery box) Note)5	Use in the Incremental system (without battery box)						
High inertia	MHMF (Connector type) 3000 r/min IP67	Single phase 100 V	50	MHMF5AZL1 □ 1 MHMF5AZL1 □ 3	73 131	MADLT01SF	MADLN01S◇	A-frame ★	Approx. 0.4	MFECA 0 ∗ ∗ 0MJE (For movable, direction of motor shaft)	MFECA 0 ∗ ∗ 0MJD (For movable, direction of motor shaft)	MFMCA 0 ∗ ∗ 7UFD (Movable/fixed common-use, direction of motor shaft)	MFMCA 0 ∗ ∗ 7VFD (Movable/fixed common-use, direction of motor shaft)	–	DV0P4280	DV0P227	DV0P4170
			100	MHMF011L1 □ 1 MHMF011L1 □ 3	75 135	MADLT11SF	MADLN11S◇					MFMCA 0 ∗ ∗ 7UGD (Movable/fixed common-use, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 7VGD (Movable/fixed common-use, opposite direction of motor shaft)				
			200	MHMF021L1 □ 1 MHMF021L1 □ 3	77 139	MBDLT21SF	MBDLN21S◇	B-frame ★	Approx. 0.5			MFMCA 0 ∗ ∗ 0UFD (For movable, direction of motor shaft)	MFMCA 0 ∗ ∗ 0VFD (For movable, direction of motor shaft)		DV0P4283	DV0P228	
												MFMCA 0 ∗ ∗ 0UGD (For movable, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 0VGD (For movable, opposite direction of motor shaft)				
			400	MHMF041L1 □ 1 MHMF041L1 □ 3	79 143	MCDLT31SF	MCDLN31S◇	C-frame	Approx. 0.9			MFMCA 0 ∗ ∗ 0WFD (For fixed, direction of motor shaft)	MFMCA 0 ∗ ∗ 0XFD (For fixed, direction of motor shaft)		DV0P4282		DV0PM20042
												MFMCA 0 ∗ ∗ 0WGD (For fixed, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 0XGD (For fixed, opposite direction of motor shaft)				
		Single phase/ 3-phase 200 V	50	MHMF5AZL1 □ 1 MHMF5AZL1 □ 3	74 131	MADLT05SF	MADLN05S◇	A-frame ★	Approx. 0.5	MFECA 0 ∗ ∗ 0MKE (For movable, opposite direction of motor shaft)	MFECA 0 ∗ ∗ 0MKD (For movable, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 7UFD (Movable/fixed common-use, direction of motor shaft)	MFMCA 0 ∗ ∗ 7VFD (Movable/fixed common-use, direction of motor shaft)	–	DV0P4281	DV0P227 / DV0P220	DV0P4170 / DV0PM20042
			100	MHMF012L1 □ 1 MHMF012L1 □ 3	76 135	MADLT05SF	MADLN05S◇					MFMCA 0 ∗ ∗ 7UGD (Movable/fixed common-use, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 7VGD (Movable/fixed common-use, opposite direction of motor shaft)				
			200	MHMF022L1 □ 1 MHMF022L1 □ 3	78 139	MADLT15SF	MADLN15S◇					MFMCA 0 ∗ ∗ 0UFD (For movable, direction of motor shaft)	MFMCA 0 ∗ ∗ 0VFD (For movable, direction of motor shaft)		DV0P4283	DV0P228 / DV0P220	DV0PM20042
			400	MHMF042L1 □ 1 MHMF042L1 □ 3	80 143	MBDLT25SF	MBDLN25S◇	B-frame ★	Approx. 0.9			MFMCA 0 ∗ ∗ 0UGD (For movable, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 0VGD (For movable, opposite direction of motor shaft)				
			750	MHMF082L1 □ 1 MHMF082L1 □ 3	81 147	MCDLT35SF	MCDLN35S◇	C-frame	Approx. 1.3			MFMCA 0 ∗ ∗ 0WFD (For fixed, direction of motor shaft)	MFMCA 0 ∗ ∗ 0XFD (For fixed, direction of motor shaft)				
			1000	MHMF092L1 □ 1 MHMF092L1 □ 3	82 151	MDDLT55SF	MDDLN55S◇	D-frame	Approx. 2.3			MFMCA 0 ∗ ∗ 0WGD (For fixed, opposite direction of motor shaft)	MFMCA 0 ∗ ∗ 0XGD (For fixed, opposite direction of motor shaft)		DV0P4284	DV0P228 / DV0P222	DV0P4220

★: Frame-A and B drivers are not equipped with regenerative resistors.When regeneration occurs, please prepare an optional external regenerative resistor.

Note)1 □ : Represents the motor specifications. (refer to “Model designation” P.18.)

Note)2 ◇ : Represents the driver specifications. (refer to “Model designation” P.18.)

Note)3 ∗ ∗ : Represents the cable length (03/3 m, 05/5 m, 10/10 m, 20/20 m). Example. 3 m/MFECA0030MJE

Note)4 Because A6SE series driver (dedicated for position control) does not support the absolute system specification, only incremental system can be used in combination.

Note)5 Please note that a battery is not supplied together with 23-bit absolute encoder cable (with battery box). Please buy the battery part number “DV0P2990” separately.

[Movable : For application where the cable is movable.
Fixed : For application where the cable is fixed.
Direction of motor shaft/Opposite direction of motor shaft : Cable direction]

■ Options

Title			Part No.	Page
Interface Cable			DV0P4360	290
Interface Conversion Cable			DV0P4120	290
			DV0P4121	290
			DV0P4130	290
			DV0P4131	290
			DV0P4132	290
Connector Kit for Power Supply Input Connection	A-frame to D-frame	Single row type	DV0PM20032	293
		Double row type	DV0PM20033	293
Connector Kit for Motor Connection	A-frame to D-frame		DV0PM20034	294
Connector Kit for Motor/ Encoder Connection	MHMF 200 W to 1.0 kW		DV0PM24582	296
	MHMF 50 W, 100 W		DV0PM24581	296
Connector Kit for Brake Connection			DV0PM20040	301
Connector Kit	RS485, RS232		DV0PM20102	291
	Safety		DV0PM20103	291
	Interface		DV0P4350	292
	External Scale		DV0PM20026	292
	Encoder		DV0PM20010	292
Battery for Absolute Encoder			DV0P2990	302
Battery Box for Absolute Encoder Note)5			DV0P4430	302
Mounting Bracket	For A-frame,B-frame		DV0PM20100	303
	For C-frame,D-frame		DV0PM20101	303
Encoder Cable (with Battery Box) Note)5	For movable, direction of motor shaft		MFECA0∗∗0MJE	278
	For movable, opposite direction of motor shaft		MFECA0∗∗0MKE	278
	For fixed, direction of motor shaft		MFECA0∗∗0TJE	278
	For fixed, opposite direction of motor shaft		MFECA0∗∗0TKE	278
Encoder Cable (without Battery Box)	For movable, direction of motor shaft		MFECA0∗∗0MJD	278
	For movable, opposite direction of motor shaft		MFECA0∗∗0MKD	278
	For fixed, direction of motor shaft		MFECA0∗∗0TJD	278
	For fixed, opposite direction of motor shaft		MFECA0∗∗0TKD	278
Motor Cable (For MHMF 200 W to 1.0 kW) (without Brake)	For movable, direction of motor shaft		MFMCA0∗∗0UFD	282
	For movable, opposite direction of motor shaft		MFMCA0∗∗0UGD	282
	For fixed, direction of motor shaft		MFMCA0∗∗0WFD	282
	For fixed, opposite direction of motor shaft		MFMCA0∗∗0WGD	282
Motor Cable (For MHMF 200 W to 1.0 kW) (with Brake)	For movable, direction of motor shaft		MFMCA0∗∗0VFD	285
	For movable, opposite direction of motor shaft		MFMCA0∗∗0VGD	285
	For fixed, direction of motor shaft		MFMCA0∗∗0XFD	285
	For fixed, opposite direction of motor shaft		MFMCA0∗∗0XGD	285
Motor Cable (For MHMF 50 W, 100 W) (without Brake)	Movable/fixed common-use, direction of motor shaft		MFMCA0∗∗7UFD	281
	Movable/fixed common-use, opposite direction of motor shaft		MFMCA0∗∗7UGD	281
Motor Cable (For MHMF 50 W, 100 W) (with Brake)	Movable/fixed common-use, direction of motor shaft		MFMCA0∗∗7VFD	285
	Movable/fixed common-use, opposite direction of motor shaft		MFMCA0∗∗7VGD	285
External regenerative resistor	50 Ω 25 W		DV0P4280	305
	100 Ω 25 W		DV0P4281	305
	25 Ω 50 W		DV0P4282	305
	50 Ω 50 W		DV0P4283	305
	30 Ω 100 W		DV0P4284	305
Reactor			DV0P220, DV0P222 DV0P227, DV0P228	304
Noise Filter			DV0P4170, DV0PM20042 DV0P4220	366
Surge Absorber			DV0P4190, DV0P1450	367
Ferrite Core			DV0P1460	368
Daisy Chain			DV0P24610	307

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100 mm sq. or more 0.85 kW to 5.0 kW

IP67 motor Encorder connector (Large size JL10) type

Motor						Driver			Optional parts						
Motor series		Power supply	Output (W)	Part No. Note)1	Rating/ Spec. Dimensions (page)	A6SF series Multi function type (Pulse, analog, full-closed)	A6SG series RS485 communication / A6SE series Basic (Pulse signal input) Note)2, Note)4	Frame	Power capacity (at rated load) (kVA)	Encoder Cable Note)3,5 JL10 (Large size) (One-touch lock type / N/MS screwed type) 23-bit Absolute: Use in the absolute system (with battery box) Note)7	Encoder Cable Note)3,5 JL10 (Large size) (One-touch lock type / N/MS screwed type) 23-bit Absolute: Use in the Incremental system (without battery box)	Motor Cable Note)3,5 JL10 (One-touch lock type / JL04 screwed type): without Brake	Motor Cable Note)3,5 JL10 (One-touch lock type / JL04 screwed type): with Brake	External Regenerative Resistor	Reactor (Single phase / 3-phase)	Noise Filter
Low inertia	MSMF Large size JL10 type 3000 r/min IP67	Single phase/ 3-phase 200 V	1000	MSMF102L1 □ 6 MSMF102L1 □ 8	61 109	MDDLT55SF	MDDLN55S◇	D-frame	Approx. 2.3	MFECA 0＊＊0EPE / MFECA 0＊＊0ESE	MFECA 0＊＊0EPD / MFECA 0＊＊0ESD	MFMCD 0＊＊2EUD / MFMCD 0＊＊2ECD	MFMCA 0＊＊2FUD / MFMCA 0＊＊2FCD	DV0P4284	DV0P228 / DV0P222 DV0PM20047 / DV0P222	DV0P4220
			1500	MSMF152L1 □ 6 MSMF152L1 □ 8	62 110	MDDLT55SF	MDDLN55S◇									
		3-phase 200 V	2000	MSMF202L1 □ 6 MSMF202L1 □ 8	63 111	MEDLT83SF	MEDLN83S◇	E-frame	Approx. 3.8					DV0P4285 Note)6	DV0P223	DV0PM20043
			3000	MSMF302L1 □ 6 MSMF302L1 □ 8	64 113	MFDLTA3SF	MFDLNA3S◇	F-frame	Approx. 4.5			MFMCA 0＊＊3EUT / MFMCA 0＊＊3ECT	MFMCA 0＊＊3FUT / MFMCA 0＊＊3FCT	DV0P4285 ×2 in parallel	DV0P224	DV0P3410
			4000	MSMF402L1 □ 6 MSMF402L1 □ 8	65 114	MFDLTB3SF	MFDLNB3S◇		Approx. 7.5						DV0P225	
			5000	MSMF502L1 □ 6 MSMF502L1 □ 8	66 115	MFDLTB3SF	MFDLNB3S◇									
Middle inertia	MDMF Large size JL10 type 2000 r/min IP67	Single phase/ 3-phase 200 V	1000	MDMF102L1 □ 6 MDMF102L1 □ 8	89 161	MDDLT45SF	MDDLN45S◇	D-frame	Approx. 1.8	MFECA 0＊＊0EPE / MFECA 0＊＊0ESE	MFECA 0＊＊0EPD / MFECA 0＊＊0ESD	MFMCD 0＊＊2EUD / MFMCD 0＊＊2ECD	MFMCA 0＊＊2FUD / MFMCA 0＊＊2FCD	DV0P4284	DV0P228 / DV0P222 DV0PM20047 / DV0P222	DV0P4220
			1500	MDMF152L1 □ 6 MDMF152L1 □ 8	90 162	MDDLT55SF	MDDLN55S◇		Approx. 2.3							
		3-phase 200 V	2000	MDMF202L1 □ 6 MDMF202L1 □ 8	91 163	MEDLT83SF	MEDLN83S◇	E-frame	Approx. 3.8					DV0P4285 Note)6	DV0P223	DV0PM20043
			3000	MDMF302L1 □ 6 MDMF302L1 □ 8	92 165	MFDLTA3SF	MFDLNA3S◇	F-frame	Approx. 4.5			MFMCA 0＊＊3EUT / MFMCA 0＊＊3ECT	MFMCA 0＊＊3FUT / MFMCA 0＊＊3FCT	DV0P4285 ×2 in parallel	DV0P224	DV0P3410
			4000	MDMF402L1 □ 6 MDMF402L1 □ 8	93 166	MFDLTB3SF	MFDLNB3S◇		Approx. 7.5						DV0P225	
			5000	MDMF502L1 □ 6 MDMF502L1 □ 8	94 167	MFDLTB3SF	MFDLNB3S◇									
	MGMF Large size JL10 type (Low speed/ High torque type) 1500 r/min IP67	Single phase/ 3-phase 200 V	850	MGMF092L1 □ 6 MGMF092L1 □ 8	95 169	MDDLT45SF	MDDLN45S◇	D-frame	Approx. 1.8	MFECA 0＊＊0EPE / MFECA 0＊＊0ESE	MFECA 0＊＊0EPD / MFECA 0＊＊0ESD	MFMCD 0＊＊2EUD / MFMCD 0＊＊2ECD	MFMCA 0＊＊2FUD / MFMCA 0＊＊2FCD	DV0P4284	DV0P228 / DV0P221 DV0PM20047 / DV0P222	DV0P4220
			1300	MGMF132L1 □ 6 MGMF132L1 □ 8	96 170	MDDLT55SF	MDDLN55S◇		Approx. 2.3							
		3-phase 200 V	1800	MGMF182L1 □ 6 MGMF182L1 □ 8	97 171	MEDLT83SF	MEDLN83S◇	E-frame	Approx. 3.8			MFMCE 0＊＊3EUT / MFMCE 0＊＊3ECT	MFMCD 0＊＊3FUT / MFMCD 0＊＊3FCT	DV0P4285	DV0P223 DV0P224	DV0PM20043
			2400	MGMF242L1 □ 6 MGMF242L1 □ 8	98 173	MEDLT93SF	MEDLN93S◇		Approx. 4.5							
			2900	MGMF292L1 □ 6 MGMF292L1 □ 8	99 174	MFDLTB3SF	MFDLNB3S◇	F-frame	Approx. 7.5			MFMCA 0＊＊3EUT / MFMCA 0＊＊3ECT	MFMCA 0＊＊3FUT / MFMCA 0＊＊3FCT	DV0P4285 ×2 in parallel	DV0P225	DV0P3410
			4400	MGMF442L1 □ 6 MGMF442L1 □ 8	100 175	MFDLTB3SF	MFDLNB3S◇									
High inertia	MHMF Large size JL10 type 2000 r/min IP67	Single phase/ 3-phase 200 V	1000	MHMF102L1 □ 6 MHMF102L1 □ 8	83 153	MDDLT45SF	MDDLN45S◇	D-frame	Approx. 1.8	MFECA 0＊＊0EPE / MFECA 0＊＊0ESE	MFECA 0＊＊0EPD / MFECA 0＊＊0ESD	MFMCD 0＊＊2EUD / MFMCD 0＊＊2ECD	MFMCA 0＊＊2FUD / MFMCA 0＊＊2FCD	DV0P4284	DV0P228 / DV0P222 DV0PM20047 / DV0P222	DV0P4220
			1500	MHMF152L1 □ 6 MHMF152L1 □ 8	84 154	MDDLT55SF	MDDLN55S◇		Approx. 2.3							
		3-phase 200 V	2000	MHMF202L1 □ 6 MHMF202L1 □ 8	85 155	MEDLT83SF	MEDLN83S◇	E-frame	Approx. 3.8			MFMCE 0＊＊2EUD / MFMCE 0＊＊2ECD	MFMCE 0＊＊2FUD / MFMCE 0＊＊2FCD	DV0P4285 Note)6	DV0P223	DV0PM20043
			3000	MHMF302L1 □ 6 MHMF302L1 □ 8	86 157	MFDLTA3SF	MFDLNA3S◇	F-frame	Approx. 4.5			MFMCA 0＊＊3EUT / MFMCA 0＊＊3ECT	MFMCA 0＊＊3FUT / MFMCA 0＊＊3FCT	DV0P4285 ×2 in parallel	DV0P224	DV0P3410
			4000	MHMF402L1 □ 6 MHMF402L1 □ 8	87 158	MFDLTB3SF	MFDLNB3S◇		Approx. 7.5						DV0P225	
			5000	MHMF502L1 □ 6 MHMF502L1 □ 8	88 159	MFDLTB3SF	MFDLNB3S◇									

Note)1 □ : Represents the motor specifications. (refer to “Model designation” P.18.)

Note)2 ◇ : Represents the driver specifications. (refer to “Model designation” P.18.)

Note)3 ＊＊ : Represents the cable length (03/3 m, 05/5 m, 10/10 m, 20/20 m). Example. 3 m/MFECA0030EPE

Note)4 Because A6SE series driver (dedicated for position control) does not support the absolute system specification, only incremental system can be used in combination.

Note)5 Use of JL10 type encoder cables and motor cables enable one-touch lock connections. Conventional screwed type N/MS and JL04V type cables can also be used.

Note)6 For other possible combinations, refer to P.303.

Note)7 Please note that a battery is not supplied together with 23-bit absolute encoder cable (with battery box). Please buy the battery part number “DV0P2990” separately.

■ Options

Title			Part No.	Page
Interface Cable			DV0P4360	290
Interface Conversion Cable			DV0P4120	290
			DV0P4121	290
			DV0P4130	290
			DV0P4131	290
			DV0P4132	290
Connector Kit for Power Supply Input Connection	A-frame to D-frame	Single row type	DV0PM20032	293
		Double row type	DV0PM20033	293
	E-frame		DV0PM20044	293
Connector Kit for Motor Connection	A-frame to D-frame		DV0PM20034	294
	E-frame		DV0PM20046	294
Connector Kit for Regenerative Resistor	E-frame		DV0PM20045	293
Connector Kit for Motor/ Encoder Connection	without Brake		DV0PM24587 MSMF 1.0 kW to 2.0 kW MDMF 1.0 kW to 2.0 kW MGMF 0.85 kW to 1.8 kW MHMF 1.0 kW, 1.5 kW	297
			DV0PM24588 MSMF 3.0 kW to 5.0 kW MDMF 3.0 kW to 5.0 kW MGMF 2.4 kW to 4.4 kW MHMF 2.0 kW to 5.0 kW	298
	with Brake		DV0PM24589 MSMF 1.0 kW to 2.0 kW MDMF 1.0 kW to 2.0 kW MGMF 0.85 kW to 1.8 kW MHMF 1.0 kW, 1.5 kW	297
			DV0PM24590 MSMF 3.0 kW to 5.0 kW MDMF 3.0 kW to 5.0 kW MGMF 2.4 kW to 4.4 kW MHMF 2.0 kW to 5.0 kW	298
Connector Kit	RS485, RS232		DV0PM20102	291
	Safety		DV0PM20103	291
	Interface		DV0P4350	292
	External Scale		DV0PM20026	292
	Encoder		DV0PM20010	292
Battery for Absolute Encoder			DV0P2990	302
Battery Box for Absolute Encoder Note)7			DV0P4430	302
Mounting Bracket	D-frame		DV0PM20101	303
Encoder Cable (with Battery Box) Note)7	One-touch lock type		MFECA0＊＊0EPE	279
	Screwed type		MFECA0＊＊0ESE	280
Encoder Cable (without Battery Box)	One-touch lock type		MFECA0＊＊0EPD	279
	Screwed type		MFECA0＊＊0ESD	279
Motor Cable (without Brake)	One-touch lock type		MFMCD0＊＊2EUD	282
	Screwed type		MFMCD0＊＊2ECD	282
	One-touch lock type		MFMCE0＊＊2EUD	283
	Screwed type		MFMCE0＊＊2ECD	283
	One-touch lock type		MFMCA0＊＊3EUT	284
	Screwed type		MFMCA0＊＊3ECT	284
Motor Cable (with Brake)	One-touch lock type		MFMCA0＊＊2FUD	286
	Screwed type		MFMCA0＊＊2FCD	286
	One-touch lock type		MFMCE0＊＊2FUD	286
	Screwed type		MFMCE0＊＊2FCD	287
	One-touch lock type		MFMCA0＊＊3FUT	288
	Screwed type		MFMCA0＊＊3FCT	288
External regenerative resistor	30 Ω 100 W 20 Ω 130 W		DV0P4284 DV0P4285	305
Reactor			DV0P222, DV0P223 DV0P224, DV0P225 DV0P228, DV0PM20047	304
Noise Filter			DV0P4220, DV0PM20043 DV0P3410	366
Surge Absorber			DV0P4190, DV0P1450	367
Ferrite Core			DV0P1460	368
Daisy Chain			DV0PM24610	307

100 mm sq. or more 0.85 kW to 5.0 kW

IP67 motor Encorder connector (Small size JN2) type

Motor						Driver			Power capacity (at rated load) (kVA)	Optional parts						
Motor series		Power supply	Output (W)	Part No. Note)1	Rating/ Spec. Dimensions (page)	A6SF series Multi function type (Pulse, analog, full-closed)	A6SG series RS485 communication / A6SE series Basic (Pulse signal input) Note)2, Note)4	Frame		Encoder Cable Note)3 JN2 (Small size) (One-touch lock type) 23-bit Absolute Use in the absolute system (with battery box) Note)7	Encoder Cable Note)3 JN2 (Small size) (One-touch lock type) 23-bit Absolute Use in the Incremental system (without battery box)		Motor Cable Note)3,5 JL10 (One-touch lock type) / JL04 screwed type without Brake	Motor Cable Note)3,5 JL10 (One-touch lock type) / JL04 screwed type with Brake	External Regenerative Resistor	Reactor (Single phase / 3-phase)	Noise Filter
Low inertia	MSMF Small size JN2 type 3000 r/min IP67	Single phase/ 3-phase 200 V	1000	MSMF102L1 □ 5 MSMF102L1 □ 7	61 109	MDDLT55SF	MDDLN55S◇	D-frame	Approx. 2.3	MFECA 0＊＊0ETE	MFECA 0＊＊0ETD		MFMCD 0＊＊2EUD / MFMCD 0＊＊2ECD	MFMCA 0＊＊2FUD / MFMCA 0＊＊2FCD	DV0P4284	DV0P228 / DV0P222	DV0P4220
			1500	MSMF152L1 □ 5 MSMF152L1 □ 7	62 111	MDDLT55SF	MDDLN55S◇									DV0P20047 / DV0P222	
		3-phase 200 V	2000	MSMF202L1 □ 5 MSMF202L1 □ 7	63 112	MEDLT83SF	MEDLN83S◇	E-frame	Approx. 3.8						DV0P4285 Note)6	DV0P223	DV0PM20043
			3000	MSMF302L1 □ 5 MSMF302L1 □ 7	64 113	MFDLTA3SF	MFDLNA3S◇	F-frame	Approx. 4.5				MFMCA 0＊＊3EUT / MFMCA 0＊＊3ECT	MFMCA 0＊＊3FUT / MFMCA 0＊＊3FCT	DV0P4285 ×2 in parallel	DV0P224	DV0P3410
			4000	MSMF402L1 □ 5 MSMF402L1 □ 7	65 115	MFDLTB3SF	MFDLNB3S◇		Approx. 7.5							DV0P225	
			5000	MSMF502L1 □ 5 MSMF502L1 □ 7	66 116	MFDLTB3SF	MFDLNB3S◇										
Middle inertia	MDMF Small size JN2 type 2000 r/min IP67	Single phase/ 3-phase 200 V	1000	MDMF102L1 □ 5 MDMF102L1 □ 7	89 161	MDDLT45SF	MDDLN45S◇	D-frame	Approx. 1.8	MFECA 0＊＊0ETE	MFECA 0＊＊0ETD		MFMCD 0＊＊2EUD / MFMCD 0＊＊2ECD	MFMCA 0＊＊2FUD / MFMCA 0＊＊2FCD	DV0P4284	DV0P228 / DV0P222	DV0P4220
			1500	MDMF152L1 □ 5 MDMF152L1 □ 7	90 163	MDDLT55SF	MDDLN55S◇		Approx. 2.3							DV0P20047 / DV0P222	
		3-phase 200 V	2000	MDMF202L1 □ 5 MDMF202L1 □ 7	91 164	MEDLT83SF	MEDLN83S◇	E-frame	Approx. 3.8						DV0P4285 Note)6	DV0P223	DV0PM20043
			3000	MDMF302L1 □ 5 MDMF302L1 □ 7	92 165	MFDLTA3SF	MFDLNA3S◇	F-frame	Approx. 4.5				MFMCA 0＊＊3EUT / MFMCA 0＊＊3ECT	MFMCA 0＊＊3FUT / MFMCA 0＊＊3FCT	DV0P4285 ×2 in parallel	DV0P224	DV0P3410
			4000	MDMF402L1 □ 5 MDMF402L1 □ 7	93 167	MFDLTB3SF	MFDLNB3S◇		Approx. 7.5							DV0P225	
			5000	MDMF502L1 □ 5 MDMF502L1 □ 7	94 168	MFDLTB3SF	MFDLNB3S◇										
	MGMF Small size JN2 type (Low speed/ High torque type) 1500 r/min IP67	Single phase/ 3-phase 200 V	850	MGMF092L1 □ 5 MGMF092L1 □ 7	95 169	MDDLT45SF	MDDLN45S◇	D-frame	Approx. 1.8	MFECA 0＊＊0ETE	MFECA 0＊＊0ETD		MFMCD 0＊＊2EUD / MFMCD 0＊＊2ECD	MFMCA 0＊＊2FUD / MFMCA 0＊＊2FCD	DV0P4284	DV0P228 / DV0P221	DV0P4220
			1300	MGMF132L1 □ 5 MGMF132L1 □ 7	96 171	MDDLT55SF	MDDLN55S◇		Approx. 2.3							DV0PM20047 / DV0P222	
		3-phase 200 V	1800	MGMF182L1 □ 5 MGMF182L1 □ 7	97 172	MEDLT83SF	MEDLN83S◇	E-frame	Approx. 3.8						DV0P4285	DV0P223	DV0PM20043
			2400	MGMF242 L1 □ 5 MGMF242 L1 □ 7	98 173	MEDLT93SF	MEDLN93S◇		Approx. 4.5				MFMCE 0＊＊3EUT / MFMCE 0＊＊3ECT	MFMCD 0＊＊3FUT / MFMCD 0＊＊3FCT		DV0P224	
			2900	MGMF292L1 □ 5 MGMF292L1 □ 7	99 175	MFDLTB3SF	MFDLNB3S◇	F-frame	Approx. 7.5				MFMCA 0＊＊3EUT / MFMCA 0＊＊3ECT	MFMCA 0＊＊3FUT / MFMCA 0＊＊3FCT	DV0P4285 ×2 in parallel	DV0P225	DV0P3410
			4400	MGMF442L1 □ 5 MGMF442L1 □ 7	100 176	MFDLTB3SF	MFDLNB3S◇										
High inertia	MHMF Small size JN2 type 2000 r/min IP67	Single phase/ 3-phase 200 V	1000	MHMF102L1 □ 5 MHMF102L1 □ 7	83 153	MDDLT45SF	MDDLN45S◇	D-frame	Approx. 1.8	MFECA 0＊＊0ETE	MFECA 0＊＊0ETD		MFMCD 0＊＊2EUD / MFMCD 0＊＊2ECD	MFMCA 0＊＊2FUD / MFMCA 0＊＊2FCD	DV0P4284	DV0P228 / DV0P222	DV0P4220
			1500	MHMF152L1 □ 5 MHMF152L1 □ 7	84 155	MDDLT55SF	MDDLN55S◇		Approx. 2.3							DV0PM20047 / DV0P222	
		3-phase 200 V	2000	MHMF202L1 □ 5 MHMF202L1 □ 7	85 156	MEDLT83SF	MEDLN83S◇	E-frame	Approx. 3.8				MFMCE 0＊＊2EUD / MFMCE 0＊＊2ECD	MFMCE 0＊＊2FUD / MFMCE 0＊＊2FCD	DV0P4285 Note)6	DV0P223	DV0PM20043
			3000	MHMF302L1 □ 5 MHMF302L1 □ 7	86 157	MFDLTA3SF	MFDLNA3S◇	F-frame	Approx. 4.5				MFMCA 0＊＊3EUT / MFMCA 0＊＊3ECT	MFMCA 0＊＊3FUT / MFMCA 0＊＊3FCT	DV0P4285 ×2 in parallel	DV0P224	DV0P3410
			4000	MHMF402L1 □ 5 MHMF402L1 □ 7	87 159	MFDLTB3SF	MFDLNB3S◇		Approx. 7.5							DV0P225	
			5000	MHMF502L1 □ 5 MHMF502L1 □ 7	88 160	MFDLTB3SF	MFDLNB3S◇										

Note)1 □ : Represents the motor specifications. (refer to “Model designation” P.18.)
Note)2 ◇ : Represents the driver specifications. (refer to “Model designation” P.18.)
Note)3 ＊＊ : Represents the cable length (03/3 m, 05/5 m, 10/10 m, 20/20 m). Example. 3 m/MFECA0030ETE
Note)4 Because A6SE series driver (dedicated for position control) does not support the absolute system specification, only incremental system can be used in combination.
Note)5 Use of JL10 type motor cables enable one-touch lock connections. Conventional screwed type JL04V type cables can also be used.
Note)6 For other possible combinations, refer to P.303.
Note)7 Please note that a battery is not supplied together with 23-bit absolute encoder cable (with battery box). Please buy the battery part number “DV0P2990” separately.

■ Options

Title			Part No.	Page
Interface Cable			DV0P4360	290
Interface Conversion Cable			DV0P4120	290
			DV0P4121	290
			DV0P4130	290
			DV0P4131	290
			DV0P4132	290
Connector Kit for Power Supply Input Connection	A-frame to D-frame	Single row type	DV0PM20032	293
		Double row type	DV0PM20033	293
	E-frame		DV0PM20044	293
Connector Kit for Motor Connection	A-frame to D-frame		DV0PM20034	294
	E-frame		DV0PM20046	294
Connector Kit for Regenerative Resistor	E-frame		DV0PM20045	293
Connector Kit for Motor/ Encoder Connection	without Brake		DV0PM24583 MSMF 1.0 kW to 2.0 kW MDMF 1.0 kW to 2.0 kW MGMF 0.85 kW to 1.8 kW MHMF 1.0 kW, 1.5 kW	297
			DV0PM24584 MSMF 3.0 kW to 5.0 kW MDMF 3.0 kW to 5.0 kW MGMF 2.4 kW to 4.4 kW MHMF 2.0 kW to 5.0 kW	298
	with Brake		DV0PM24585 MSMF 1.0 kW to 2.0 kW MDMF 1.0 kW to 2.0 kW MGMF 0.85 kW to 1.8 kW MHMF 1.0 kW, 1.5 kW	297
			DV0PM24586 MSMF 3.0 kW to 5.0 kW MDMF 3.0 kW to 5.0 kW MGMF 2.4 kW to 4.4 kW MHMF 2.0 kW to 5.0 kW	298
Connector Kit	RS485, RS232		DV0PM20102	291
	Safety		DV0PM20103	291
	Interface		DV0P4350	292
	External Scale		DV0PM20026	292
	Encoder		DV0PM20010	292
Battery for Absolute Encoder			DV0P2990	302
Battery Box for Absolute Encoder Note)7			DV0P4430	302
Mounting Bracket	D-frame		DV0PM20101	303
Encoder Cable (with Battery Box) Note)7	One-touch lock type		MFECA0＊＊0ETE	280
Encoder Cable (without Battery Box)	One-touch lock type		MFECA0＊＊0ETD	280
Motor Cable (without Brake)	One-touch lock type		MFMCD0＊＊2EUD	282
	Screwed type		MFMCD0＊＊2ECD	282
	One-touch lock type		MFMCE0＊＊2EUD	283
	Screwed type		MFMCE0＊＊2ECD	283
	One-touch lock type		MFMCA0＊＊3EUT	284
	Screwed type		MFMCA0＊＊3ECT	284
Motor Cable (with Brake)	One-touch lock type		MFMCA0＊＊2FUD	286
	Screwed type		MFMCA0＊＊2FCD	286
	One-touch lock type		MFMCE0＊＊2FUD	286
	Screwed type		MFMCE0＊＊2FCD	287
	One-touch lock type		MFMCA0＊＊3FUT	288
	Screwed type		MFMCA0＊＊3FCT	288
External regenerative resistor	30 Ω 100 W 20 Ω 130 W		DV0P4284 DV0P4285	305
Reactor			DV0P222, DV0P223 DV0P224, DV0P225 DV0P228, DV0PM20047	304
Noise Filter			DV0P4220, DV0PM20043 DV0P3410	366
Surge Absorber			DV0P4190, DV0P1450	367
Ferrite Core			DV0P1460	368
Daisy Chain			DV0P24610	307

Panasonic Corporation Electromechanical Control Business Division
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A6SF series (Multifanction type)

Position, Speed, Torque, Full-closed type

Basic Specifications

Input power	100 V	Main circuit		Single phase 100 V +10 % –15 % to 120 V +10 % –15 % 50 Hz / 60 Hz
		Control circuit		Single phase 100 V +10 % –15 % to 120 V +10 % –15 % 50 Hz / 60 Hz
	200 V	Main circuit	A-frame to D-frame	Single/3-phase 200 V +10 % –15 % to 240 V +10 % –15 % 50 Hz / 60 Hz
			E-frame, F-frame	Single/3-phase 200 V +10 % –15 % to 240 V +10 % –15 % 50 Hz / 60 Hz
		Control circuit	A-frame to D-frame	Single phase 200 V +10 % –15 % to 240 V +10 % –15 % 50 Hz / 60 Hz
			E-frame, F-frame	Single phase 200 V +10 % –15 % to 240 V +10 % –15 % 50 Hz / 60 Hz
Environment		temperature		Ambient temperature: 0 ˚C to 55 ˚C (free from freezing) Storage temperature: –20 ˚C to 65 ˚C (Max.temperature guarantee: 80 ˚C for 72 hours free from condensation*1)
		humidity		Both operating and storage : 20 % to 85 %RH (free from condensation*1)
		Altitude		Lower than 1000 m
		Vibration		5.88 m/s^2 or less, 10 Hz to 60 Hz
Control method				IGBT PWM Sinusoidal wave drive
Encoder feedback				23-bit (8388608 resolution) absolute encoder, 7-wire serial * When using it as an incremental system (not using multiturn data), do not connect the battery for absolute encoder. Parameter Pr. 0.15 must be set to “1” (factory settings).
External scale feedback				A/B phase, homing signal differential input. Serial communication is also supported. Manufacturers that support serial communication scale: Fagor Automation S.Coop., HEIDENHAIN, Magnescale Co., Ltd., Mitutoyo Corporation Nidec Sankyo Corporation, Renishaw plc
Interface connector	Control signal		Input	General purpose 10 inputs The function of general-purpose input is selected by parameters.
			Output	General purpose 6 outputs The function of general-purpose output is selected by parameters.
	Analog signal		Input	3 inputs (16-bit A/D : 1 input, 12-bit A/D : 2 inputs)
			Output	2 outputs (Analog monitor: 2 output)
	Pulse signal		Input	2 inputs (Photo-coupler input, Line receiver input) Both open collector and line driver interface can be connected. High speed line driver interface can be connected.
			Output	4 outputs (Line driver: 3 output, open collector: 1 output) Line driver output for encoder pulses (A/B/Z signal) or external feedback pulses (EXA/EXB/EXZ signal) open collector output also available for Z or EXZ signal.
Communication function			USB	USB interface to connect to computers for parameter setting or status monitoring.
			RS232	1:1 communication
			RS485	1: n communication (max 31)
Safety function				A dedicated connector is provided for Functional Safety.
Front panel				(1) 5 keys (2) LED (6-digit)
Regeneration				A-frame, B,-frame: no built-in regenerative resistor (external resistor only) C-frame to F-frame: Built-in regenerative resistor (external resistor is also enabled.)
Dynamic brake				A-frame to F-frame: Built-in
Control mode				Switching among the following 7 mode is enabled, (1) Position control (2) Speed control (3) Toque control (4) Position/Speed control (5) Position/Torque control (6) Speed/Torque control (7) Full-closed control

*1 Air containing water vapor will become saturated with water vapor as the temperature falls, causing dew.

Function

Control input			(1) servo-ON input (2) Alarm clear input (3) Gain switch input (4) Positive direction drive inhibit input (5) Negative direction drive inhibit input (6) Forced alarm input (7) Inertia ratio switch input
Control output			(1) Servo-alarm output (2) Servo-ready output (3) External brake off output (4) At-speed output (5) Torque in-limit output (6) Zero speed detection output (7) Warning output (8) Alarm clear attribute output (9) Servo on status output
Position control	Control input		(1) Deviation counter clear input (2) Command pulse inhibit input (3) Command division/multiplication switch input (4) Anti-vibration switch input (5) Torque limit switch input (6) Control mode switch input
	Control output		(1) In-position output (2) Position command ON/OFF output
	Pulse input	Max. command pulse frequency	500 kpps (Optocoupler interface), 8 Mpps (When using line receiver input multiplied by 4)
		Input pulse signal format	Differential input. Selectable by parameter. ([1]Positive/Negative pulse [2]A/B quadrature [3]Pulse/Direction)
		Electronic gear (Division/Multiplication of command pulse)	Applicable scaling ratio: 1/1000 times to 8000 times Any value of 1 - 2^{30} can be set for both numerator (which corresponds to encoder resolution) and denominator (which corresponds to command pulse resolution per motor revolution), but the combination has to be within the range shown above.
		Smoothing filter	Primary delay filter or FIR type filter is adaptable to the command input
	Analog input	Torque limit command input	Individual torque limit for both positive and negative direction is enabled.
		Torque feed forward input	Analog voltage can be used as torque feed forward input.
	Two-degree-of-freedom control		Available
	Anti-vibration control		Available
	Load variation suppression control		Available
	Block operation		Modbus (RS 232, RS 485) or interface is selectable
Speed control	Control input		(1) Internal command velocity selection input (2) Speed zero clamp input (3) Velocity command sign input (4) Control mode switch input
	Control output		(1) Speed coincidence output (2) Velocity command ON/OFF output
	Analog input	Velocity command input	Velocity command input with analog voltage is possible. Scale setting and command polarity vary depending on parameters. (6 V/Rated rotational speed: Default)
		Torque limit command input	Individual torque limit for both positive and negative direction is enabled.
		Torque feed forward input	Analog voltage can be used as torque feed forward input.
	Internal velocity command		Switching the internal 8 speed is enabled by command input.
	Soft-start/down function		Individual setup of acceleration and deceleration is enabled, with 0 s to 10 s/1000 r/min. Sigmoid acceleration/deceleration is also enabled.
	Speed zero clamp		Internal velocity command can be clamped to 0 with speed zero clamp input.
	Two-degree-of-freedom control		Available
Torque control	Control input		Speed zero clamp input, torque command sign input, control mode switch input.
	Control output		(1) Speed coincidence output (2) Speed in-limit output
	Analog input	Torque command input	Torque command input with analog voltage is possible. Scale setting and command polarity vary depending on parameters. (3 V/rated torque Default)
	Speed limit function		Speed limit value with parameter is enabled.
Full-closed control	Control input		(1) Deviation counter clear input (2) Command pulse inhibit input (3) Command division/multiplication switch input (4) Anti-vibration switch input (5) Torque limit switch input
	Control output		(1) In-position output (2) Position command ON/OFF output
	Pulse input	Max. command pulse frequency	500 kpps (Optocoupler interface), 8 Mpps (When using line receiver input multiplied by 4)
		Input pulse signal format	Differential input. Selectable by parameter. ([1]Positive/Negative pulse [2]A/B quadrature [3]Pulse/Direction)
		Electronic gear (Division/Multiplication of command pulse)	Applicable scaling ratio: 1/1000 times to 8000 times Any value of 1 - 2^{30} can be set for both numerator (which corresponds to encoder resolution) and denominator (which corresponds to command pulse resolution per motor revolution), but the combination has to be within the range shown above.
		Smoothing filter	Primary delay filter or FIR type filter is adaptable to the command input
	Analog input	Torque limit command input	Individual torque limit for both positive and negative direction is enabled.
		Torque feed forward input	Analog voltage can be used as torque feed forward input.
	Setting range of external scale division/multiplication		1/40 times to 1280 times Although ratio of the encoder pulse (numerator) and external scale pulse (denominator) can be arbitrarily set in the range of 1 to 2^{23} for the numerator and in the range of 1 to 2^{23} for the denominator, this product should be used within the aforementioned range.
	Two-degree-of-freedom control		Available
	Anti-vibration control		Available
	Load variation suppression control		Available
	Block operation		Modbus (RS 232, RS 485) or interface is selectable
Common	Auto tuning		The load inertia is identified in real time by the driving state of the motor operating according to the command given by the controlling device and set up support software “PANATERM”. The gain is set automatically in accordance with the rigidity setting.
	Division of encoder feedback pulse		Set up of any value is enabled (encoder pulses count is the max.).
	Protective function	Hard error	Over-voltage, under-voltage, over-speed, over-load, over-heat, over-current and encoder error etc.
		Soft error	Excess position deviation, command pulse division error, EEPROM error etc.
	Alarm data trace back		Tracing back of alarm data is available

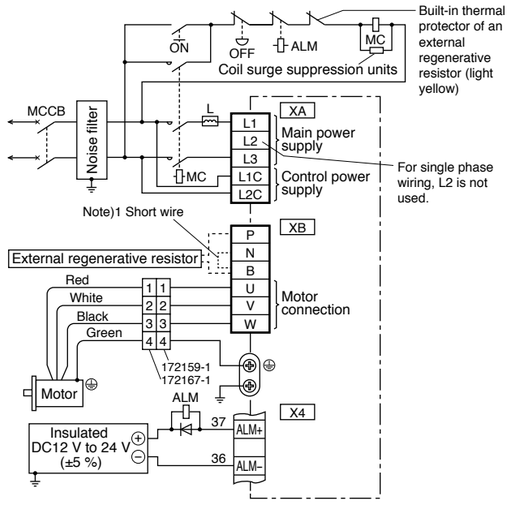
Basic Specifications	Input power	100 V	Main circuit	Single phase 100 V +10 % –15 % to 120 V +10 % –15 % 50 Hz / 60 Hz
			Control circuit	Single phase 100 V +10 % –15 % to 120 V +10 % –15 % 50 Hz / 60 Hz
		200 V	Main circuit: A-frame to D-frame	Single/3-phase 200 V +10 % –15 % to 240 V +10 % –15 % 50 Hz / 60 Hz
			Main circuit: E-frame to F-frame	Single/3-phase 200 V +10 % –15 % to 240 V +10 % –15 % 50 Hz / 60 Hz
			Control circuit: A-frame to D-frame	Single phase 200 V +10 % –15 % to 240 V +10 % –15 % 50 Hz / 60 Hz
			Control circuit: E-frame to F-frame	Single phase 200 V +10 % –15 % to 240 V +10 % –15 % 50 Hz / 60 Hz
	Environment		temperature	Ambient temperature: 0 ˚C to 55 ˚C (free from freezing) Storage temperature: –20 ˚C to 65 ˚C (Max.temperature guarantee: 80 ˚C for 72 hours free from condensation*1)
			humidity	Both operating and storage : 20 % to 85 %RH (free from condensation*1)
			Altitude	Lower than 1000 m
			Vibration	5.88 m/s^2 or less, 10 Hz to 60 Hz
	Control method			IGBT PWM Sinusoidal wave drive
	Encoder feedback			23-bit (8388608 resolution) absolute encoder, 7-wire serial * A6SG series When using it as an incremental system (not using multiturn data), do not connect the battery for absolute encoder. Parameter Pr. 0.15 must be set to “1” (factory settings). * A6SE series Since it can be used only as an incremental system, do not connect the battery for absolute encoder. Parameter Pr. 0.15 must be set to “1” (factory settings).
	Interface connector	Control signal	Input	General purpose 10 inputs The function of general-purpose input is selected by parameters.
			Output	General purpose 6 outputs The function of general-purpose input is selected by parameters.
		Analog signal	Input	None
			Output	2 outputs (Analog monitor: 2 output)
		Pulse signal	Input	2 inputs (Photo-coupler input, Line receiver input)
			Output	4 outputs (Line driver: 3 output, open collector: 1 output)
	Communication function		USB	USB interface to connect to computers for parameter setting or status monitoring.
			RS232	1:1 communication
			RS485	1: n communication (max 31)
				* RS485, RS232 connector is not installed on A6 SE series.
	Front panel			(1) 5 keys (2) LED (6-digit)
	Regeneration			A-frame, B,-frame: no built-in regenerative resistor (external resistor only) C-frame to F-frame: Built-in regenerative resistor (external resistor is also enabled.)
	Dynamic brake			A-frame to F-frame: Built-in
	Control mode			(1) Position control (2) Internal velocity command (3) Position/Internal velocity command

*1 Air containing water vapor will become saturated with water vapor as the temperature falls, causing dew.

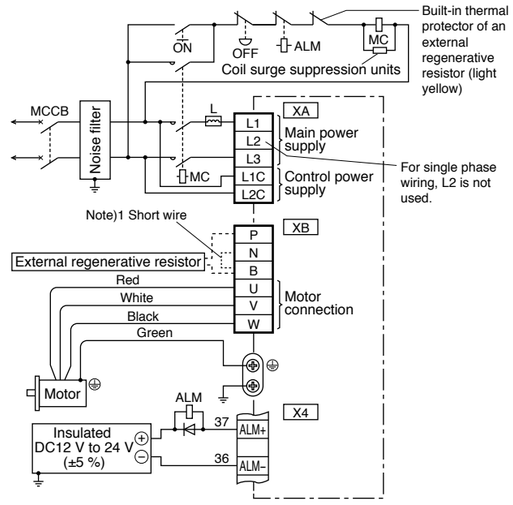
Function	Control input		(1) servo-ON input (2) Alarm clear input (3) Gain switch input (4) Positive direction drive inhibit input (5) Negative direction drive inhibit input (6) Forced alarm input (7) Inertia ratio switch input
	Control output		(1) Servo-alarm output (2) Servo-ready output (3) External brake off output (4) At-speed output (5) Torque in-limit output (6) Zero speed detection output (7) Warning output (8) Alarm clear attribute output (9) Servo on status output
	Position control	Control input	(1) Deviation counter clear input (2) Command pulse inhibit input (3) Command division/multiplication switch input (4) Anti-vibration switch input (5) Torque limit switch input (6) Control mode switch input
		Control output	(1) In-position output (2) Position command ON/OFF output
		Pulse input: Max. command pulse frequency	500 kpps (Optocoupler interface) 8 Mpps (Line receiver interface)
		Pulse input: Input pulse signal format	Differential input. Selectable by parameter. ([1]Positive/Negative pulse [2]A/B quadrature [3]Pulse/Direction)
		Pulse input: Electronic gear (Division/Multiplication of command pulse)	Applicable scaling ratio: 1/1000 times to 8000 times Any value of 1 - 2^{30} can be set for both numerator (which corresponds to encoder resolution) and denominator (which corresponds to command pulse resolution per motor revolution), but the combination has to be within the range shown above.
		Pulse input: Smoothing filter	Primary delay filter or FIR type filter is adaptable to the command input
		Anti-vibration control	Available
		Two-degree-of-freedom control	Available
		Load variation suppression control	Available
		Block operation	Modbus (RS 232, RS 485) or interface is selectable. (A6SE : interface only.)
	Speed control	Control input	(1) Internal command velocity selection input (2) Speed zero clamp input (3) Velocity command sign input (4) Control mode switch input
		Control output	(1) Speed coincidence output (2) Velocity command ON/OFF output
		Internal velocity command	Switching the internal 8 speed is enabled by command input.
		Soft-start/down function	Individual setup of acceleration and deceleration is enabled, with 0 s to 10 s/1000 r/min. Sigmoid acceleration/deceleration is also enabled.
		Zero-speed clamp	Internal velocity command can be clamped to 0 with speed zero clamp input.
		Two-degree-of-freedom control	Available
	Common	Auto tuning	The load inertia is identified in real time by the driving state of the motor operating according to the command given by the controlling device and set up support software “PANATERM”. The gain is set automatically in accordance with the rigidity setting.
		Division of encoder feedback pulse	Set up of any value is enabled (encoder pulses count is the max.).
		Protective function: Hard error	Over-voltage, under-voltage, over-speed, over-load, over-heat, over-current and encoder error etc.
		Protective function: Soft error	Excess position deviation, command pulse division error, EEPROM error etc.
		Alarm data trace back	Tracing back of alarm data is available

In Case of Single phase, A-frame, B-frame, 100 V / 200 V type

● In Case of Leadwire type

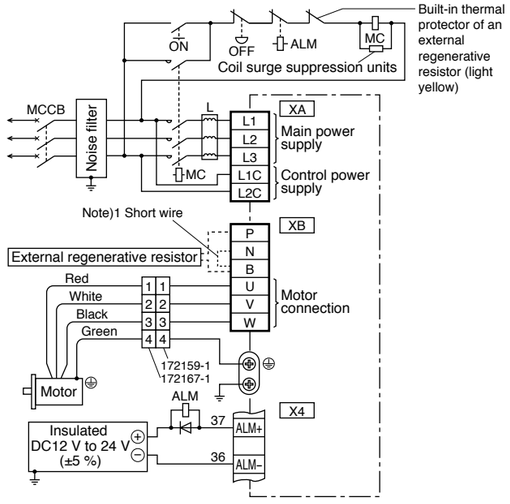


● In Case of Connector type

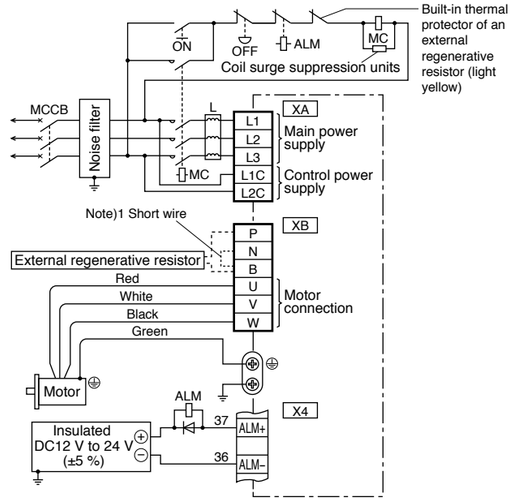


In Case of 3-phase, A-frame, B-frame, 200 V type

● In Case of Leadwire type



● In Case of Connector type



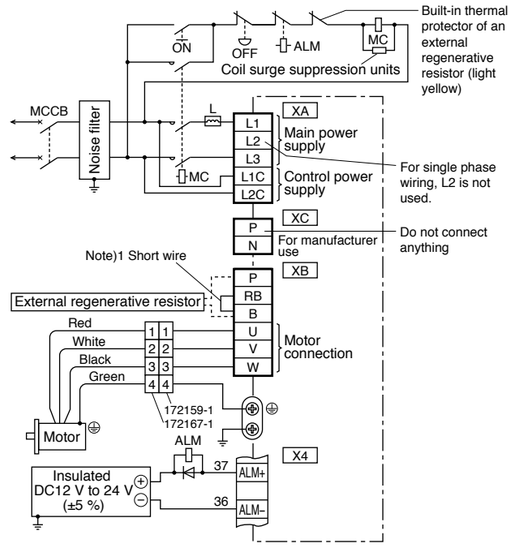
Note)1

Frame No.	Short wire (Accessory)	Built-in regenerative resistor	Connection of the connector XB	
			In case of using an external regenerative resistor	In case of not using an external regenerative resistor
A-frame B-frame	without	without	• Connect an external regenerative resistor between P-B.	• Always open between P-B.

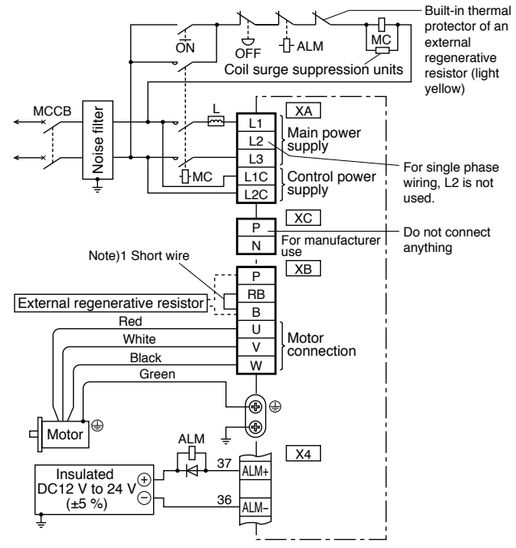
* Refer to P.275 Specifications of Motor connector.

In Case of Single phase, C-frame, D-frame, 100 V / 200 V type

● In Case of Leadwire type

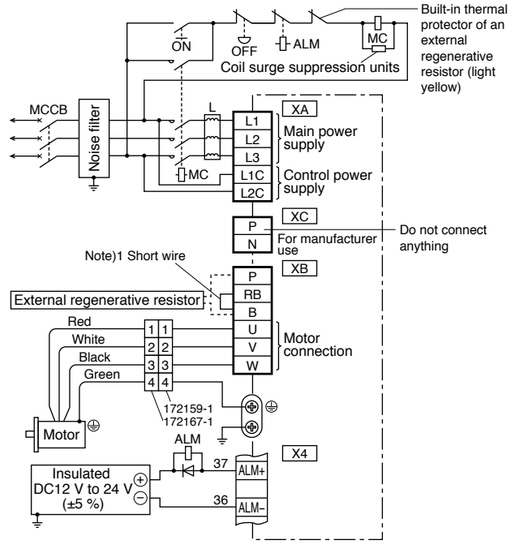


● In Case of Connector type

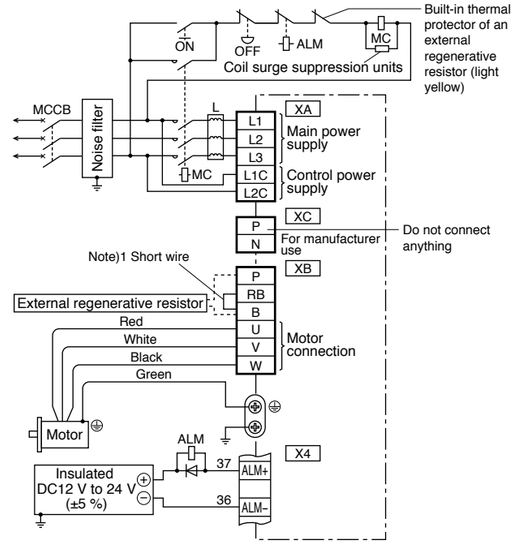


In Case of 3-phase, C-frame, D-frame, 200 V type

● In Case of Leadwire type



● In Case of Connector type

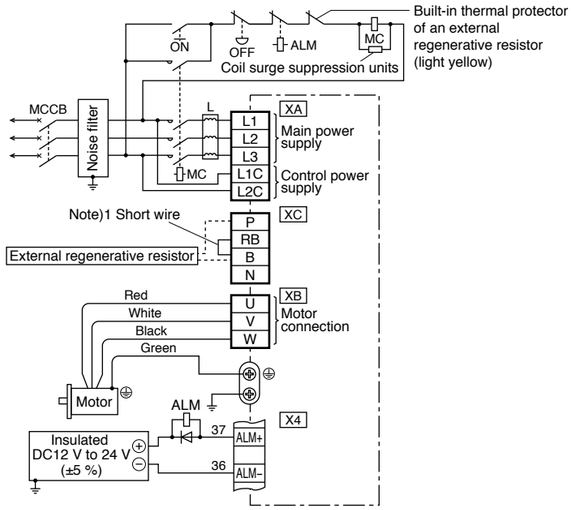


Note)1

Frame No.	Short wire (Accessory)	Built-in regenerative resistor	Connection of the connector XB	
			In case of using an external regenerative resistor	In case of not using an external regenerative resistor
C-frame D-frame	with	with	• Remove the short wire accessory from between RB-B. • Connect an external regenerative resistor between P-B.	• Shorted between RB-B with an attached short wire

* Refer to P.275, P.276, Specifications of Motor connector.

In Case of 3-phase, E-frame, 200 V type

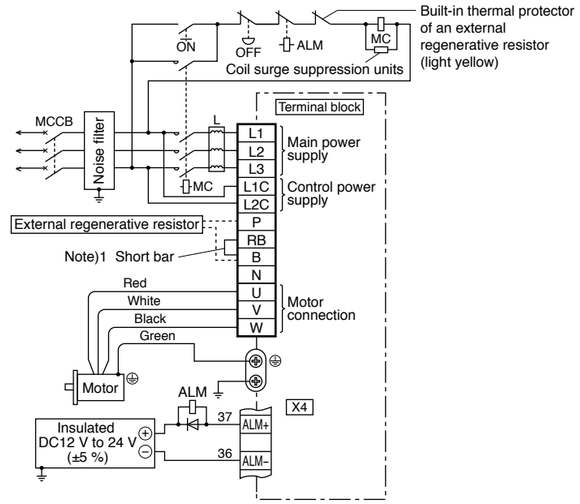


Note)1

Frame No.	Short wire (Accessory)	Built-in regenerative resistor	Connection of the connector XC	
			In case of using an external regenerative resistor	In case of not using an external regenerative resistor
E-frame	with	with	• Remove the short wire accessory from between RB-B. • Connect an external regenerative resistor between P-B.	• Shorted between RB-B with an attached short wire

*** Refer to P.276, Specifications of Motor connector.**

In Case of 3-phase, F-frame, 200 V type



Note)1

Frame No.	Short bar (Accessory)	Built-in regenerative resistor	Connection of terminal block	
			In case of using an external regenerative resistor	In case of not using an external regenerative resistor
F-frame	with	with	• Remove the short bar accessory from between RB-B. • Connect an external regenerative resistor between P-B.	• Shorted between RB-B with an attached short bar

*** Refer to P.276, Specifications of Motor connector.**

Wiring to the Connector, X3 * Excluding A6SE, A6SG Series

Connecting the host controller can configure a safety circuit that controls the safety functions.

When not constructing the safety circuit, use the supplied safety bypass plug.

Outline Description of Safe Torque Off (STO)

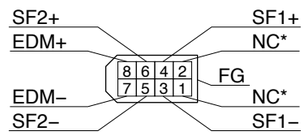
The safe torque off (STO) function is a safety function that shuts the motor current and turns off motor output torque by forcibly turning off the driving signal of the servo driver internal power transistor. For this purpose, the STO uses safety input signal and hardware (circuit).

When STO function operates, the servo driver turns off the servo ready output signal (S-RDY) and enters STO state. When the driver becomes STO state, front panel displays the “St.”. Then, when the driver's state is STO input is off and servo-on input is off, the driver automatically becomes servo-off.

Safety Precautions

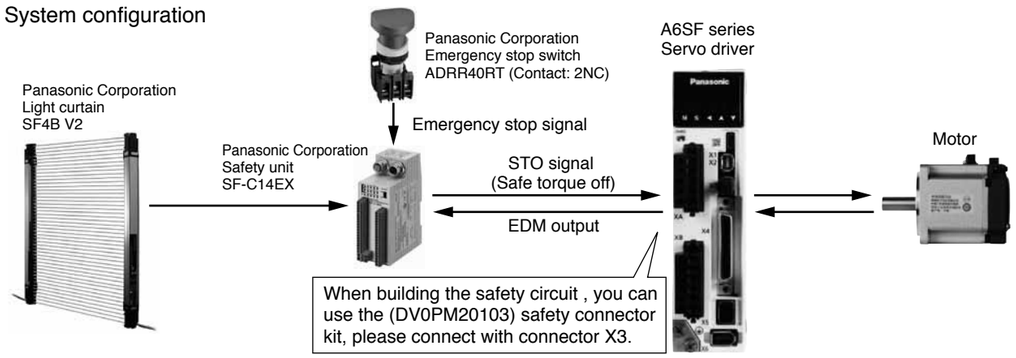
- When using the STO function, be sure to perform equipment risk assessment to ensure that the system conforms to the safety requirements.
- Even while the STO function is working, the following potential safety hazards exist. Check safety in risk assessment.
  - The motor may move when external force (e.g. gravity force on vertical axis) is exerted on it. Provide an external brake, etc., as necessary to secure the motor. Note that the purpose of motor with brake is holding and it cannot be used for braking application.
  - When parameter Pr5.10 Sequence at alarm is set to free run (disable dynamic brake), the motor is free run state and requires longer stop distance even if no external force is applied. Make sure that this does not cause any problem.
  - When power transistor, etc., becomes defective, the motor will move to the extent equivalent of 180 electrical angle (max.). Make sure that this does not cause any problem.
  - The STO turns off the current to the motor but does not turn off power to the servo driver and does not isolate it. When starting maintenance service on the servo driver, turn off the driver by using a different disconnecting device.
- External device monitor (EDM) output signal is not a safety signal. Do not use it for an application other than failure monitoring.
- Dynamic brake and external brake release signal output are not related to safety function. When designing the system, make sure that the failure of external brake release during STO condition does not result in danger condition.
- When using STO function, connect equipment conforming to the safety standards.

[Connector pin assignment]
(Viewed from cable)



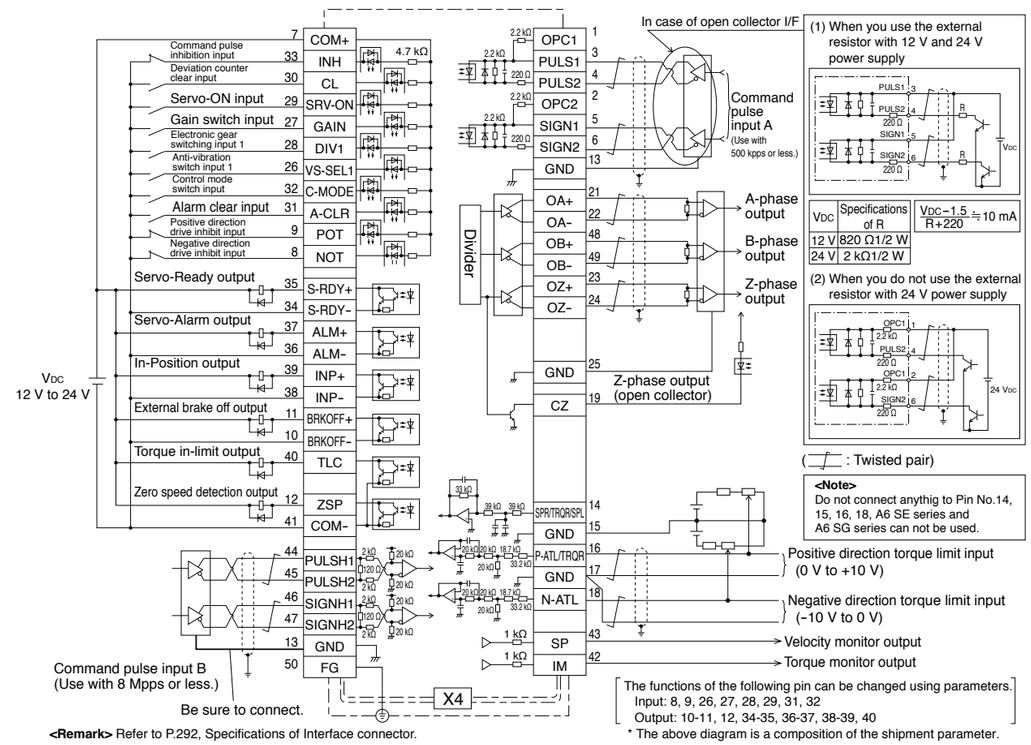
* Do not connect anything to NC.

- System configuration



Panasonic Corporation Automotive & Industrial Systems Company http://panasonic.net/id/

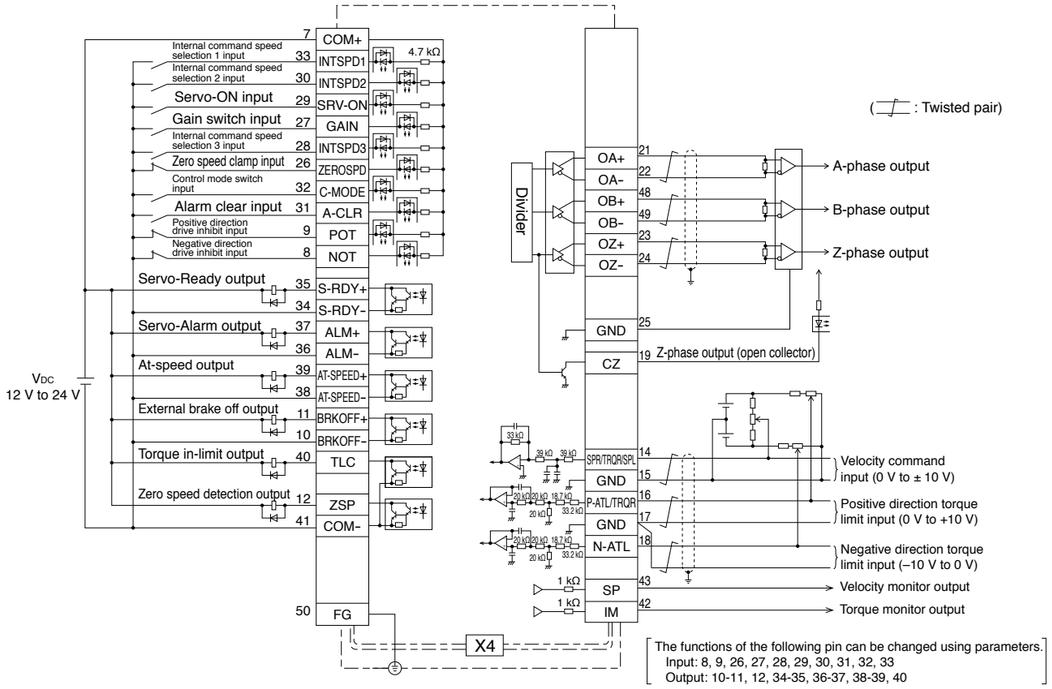
Wiring Example of Position Control Mode



<Remark> Refer to P.292, Specifications of Interface connector.

Wiring Example of Velocity Control Mode

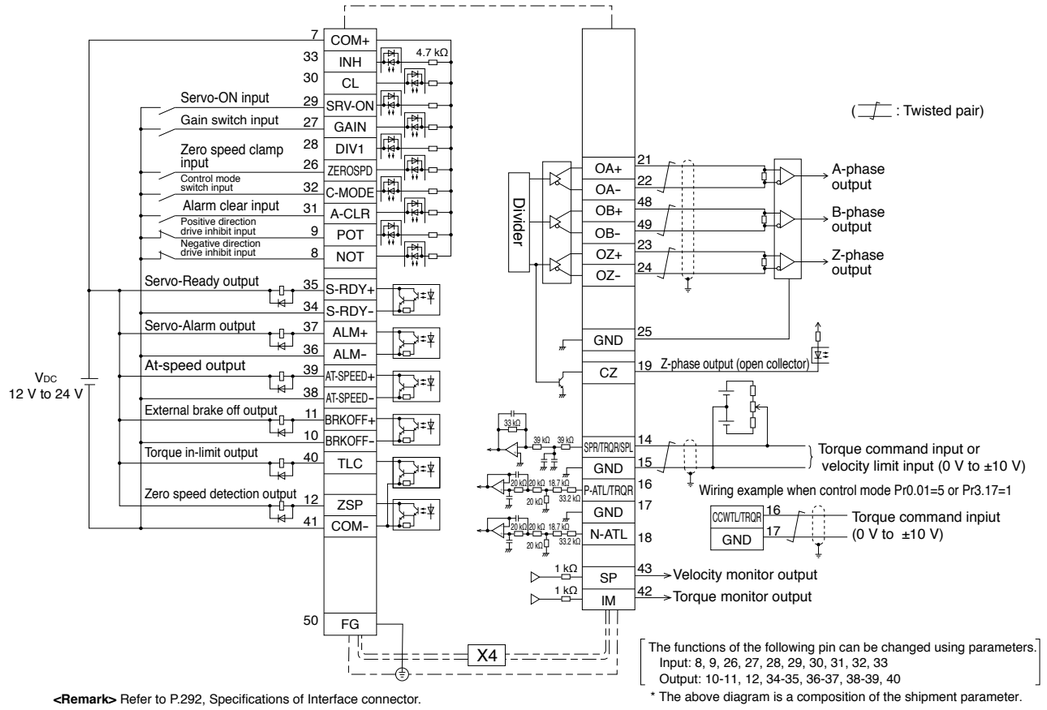
* Excluding A6SE, A6SG Series



<Remark> Refer to P.292, Specifications of Interface connector.

Wiring Example of Torque Control Mode

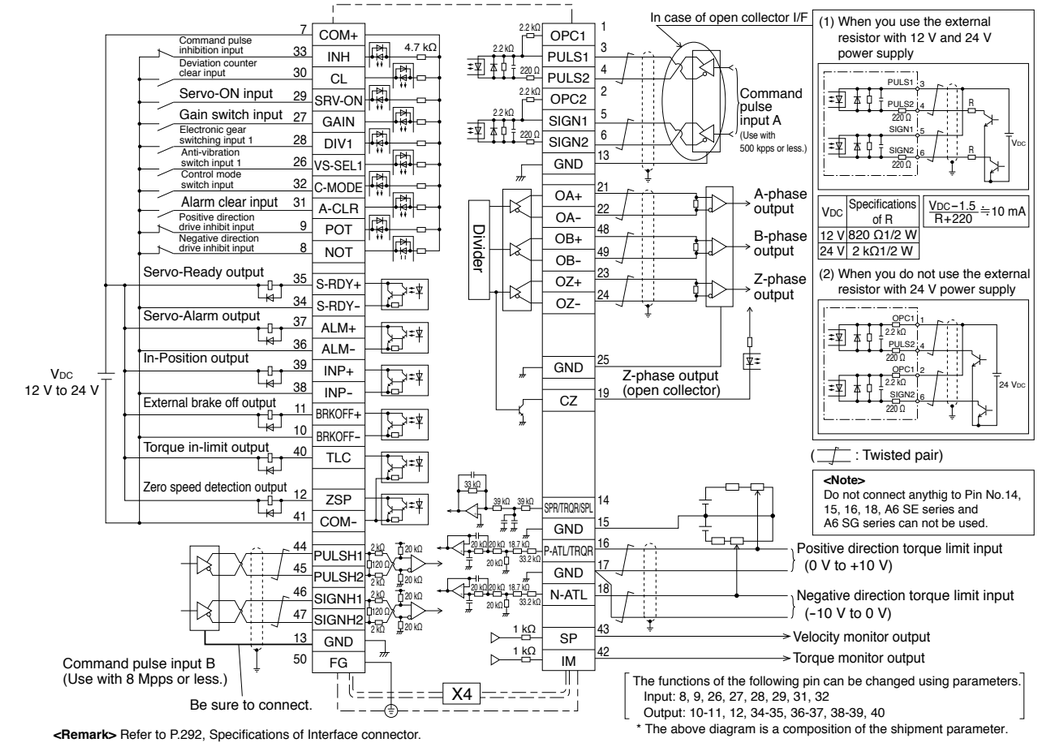
* Excluding A6SE, A6SG Series



<Remark> Refer to P.292, Specifications of Interface connector.

Wiring Example of Full-closed Control Mode

* Excluding A6SE, A6SG Series



<Remark> Refer to P.292, Specifications of Interface connector.

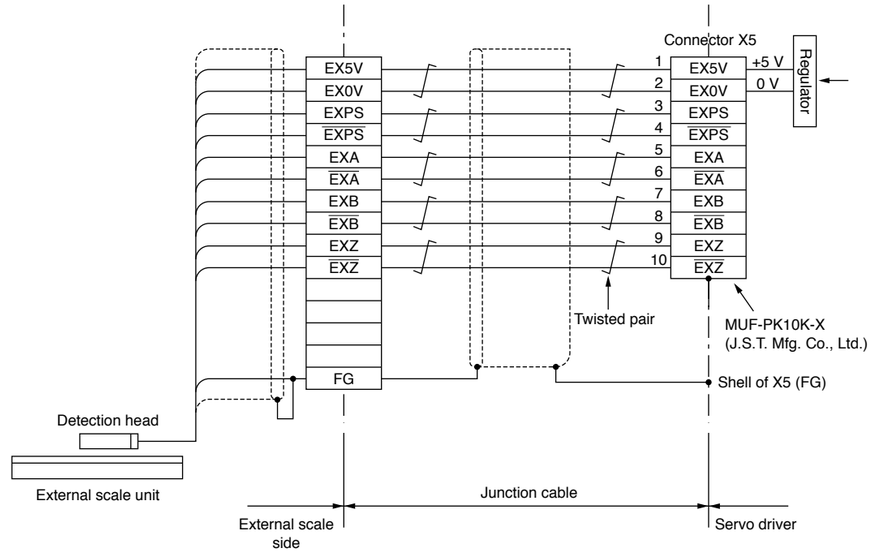
Applicable External Scale

Applicable External Scale	Manufacturer	Model No.	Resolution [µm]	Maximum speed (m/s)*1
Parallel type (AB-phase)	General	—	Maximum speed after 4 × multiplication : 4 Mpps	
Serial type (Incremental system)	Magnescale Co., Ltd.	SL700-PL101RP/RHP SL710-PL101RP/RHP	0.1	10
		SR75 / SR85	0.01 to 1	3.3
		BF1	0.001/0.01	0.4/1.8
		SQ10	0.05/0.1/ 0.5/1	3
	NIDEC SANKYO CORPORATION	PSLH041 + PSLG	0.1	6
	Renishaw plc	TONiC	0.001 to 5	6.48 m/s @ 1 µm 0.648 m/s @ 0.1 µm
		ATOM	0.001 to 10	
		VIONIC	0.0025 to 5	
Serial type (Absolute system)	Fagor Automation S.Coop	S2AP/SV2AP/G2AP	0.01/0.05	3
		LAP	0.01/0.05	3
		EXA/ EXG/ EXT	0.01/0.05	8
		H2AP-D200/H2AP-D90	29 bit/23 bit	750 r/min, 1500 r/min
		S2AP-D170,/S2AP-D90	23 bit	1500 r/min
	HEIDENHAIN	LIC2197P/LIC2199P	0.05/0.1	10
		LIC4193P/LIC4195P LIC4197P/LIC4199P	0.001/0.005/0.01	10
		LC195P/LC495P	0.001/0.01	3
		ECA 4490P	27 bits to 29 bits	7000 r/min to 550 r/min (Depends on drum size)
		RCN 2x90P/RCN 5x90P	26 bits/28 bits	1500 r/min
		RCN 8x90P	29 bit	500 r/min
	RSF Electronik	MC 15P MP/MC 15P MK	0.05/0.1	10
	Magnescale Co., Ltd.	SR77 / SR87	0.01 to 1	3.3
	Mitutoyo Corporation	AT573-SC/H	0.05	2.5
		ST700	0.1	5
		ST1300	0.001/0.01	8
	Renishaw plc	RESOLUTE	0.001	A5/0.4, A6/4
			0.05	A5/20, A6/100
			0.1	A5/40, A6/100

*1 The maximum speed is a characteristic of the driver. It is limited by the configration of the machine and the system.

* For more information about the external scale product, please contact the manufacturer.

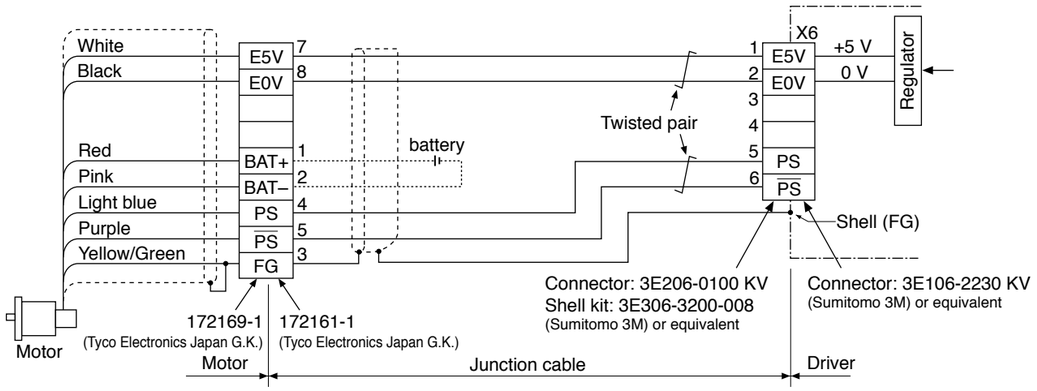
Wiring Diagram of X5



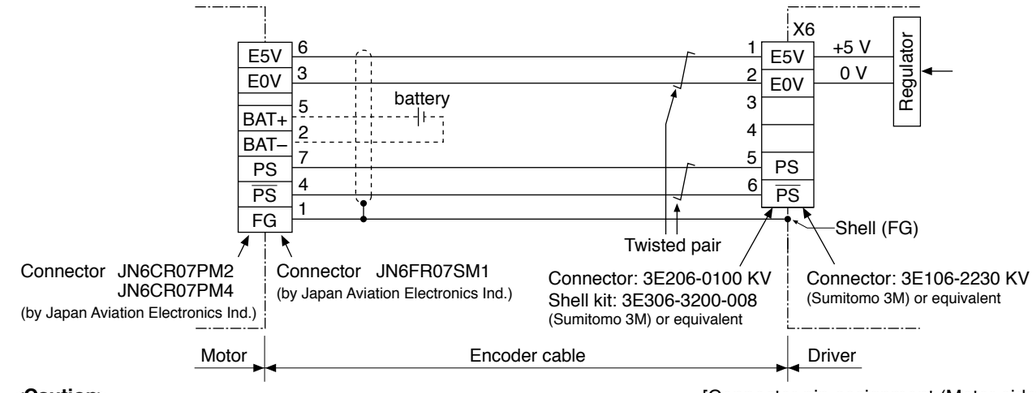
When using a 23-bit absolute encoder as an absolute system*.

* When use a multi-turn data.

● MSMF 50 W to 1000 W ● MHMF 50 W to 1000 W ● MQMF 100 W to 400 W <Leadwire type>



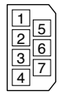
● MSMF 50 W to 1000 W ● MHMF 50 W to 1000 W ● MQMF 100 W to 400 W <Connector type>



<Caution>

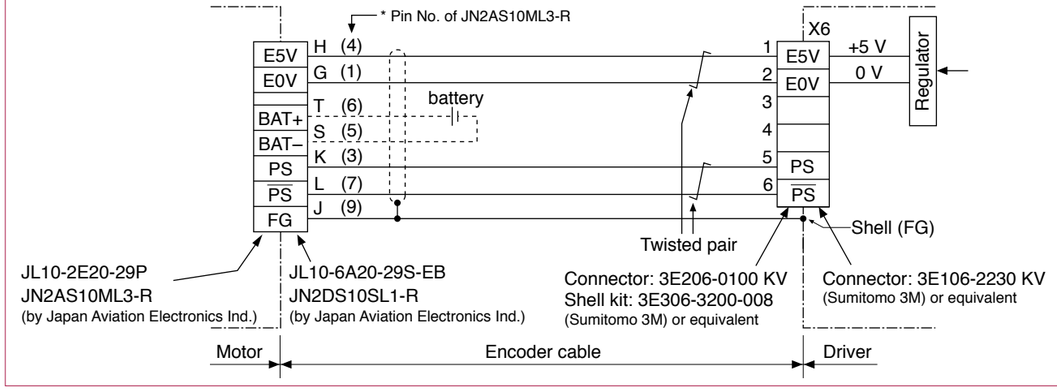
- Tighten the motor connector mounting screw (M2) with a torque between 0.19 N·m and 0.21 N·m. To avoid damage, be sure to use only the screw supplied with the connector.
- Do not remove the gasket supplied with the junction cable connector. Securely install the gasket in place. Otherwise, the degree of protection of IP67 will not be guaranteed.

[Connector pin assignment (Motor side)]



(Viewed from cable)

● MSMF 1.0 kW to 5.0 kW ● MHMF 1.0 kW to 5.0 kW
● MDMF 1.0 kW to 5.0 kW ● MGMF 0.85 kW to 4.4 kW

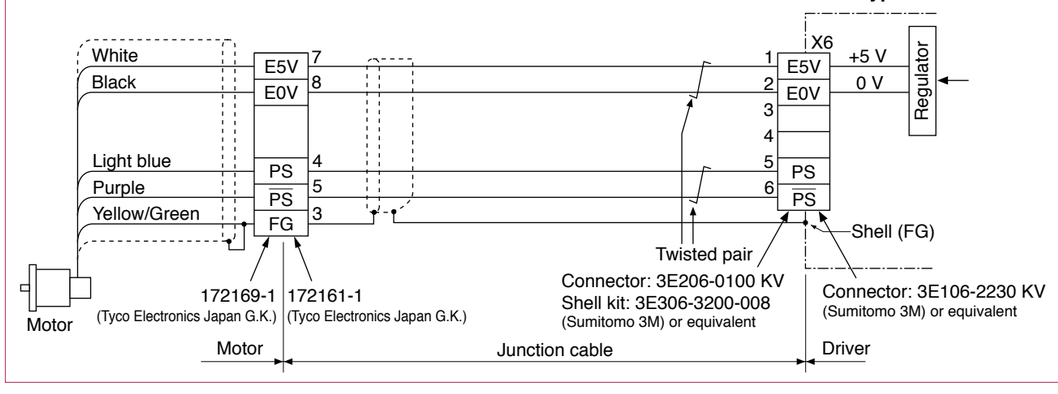


[Connector pin assignment] Refer to P.275, P.276 “Specifications of Motor connector”.

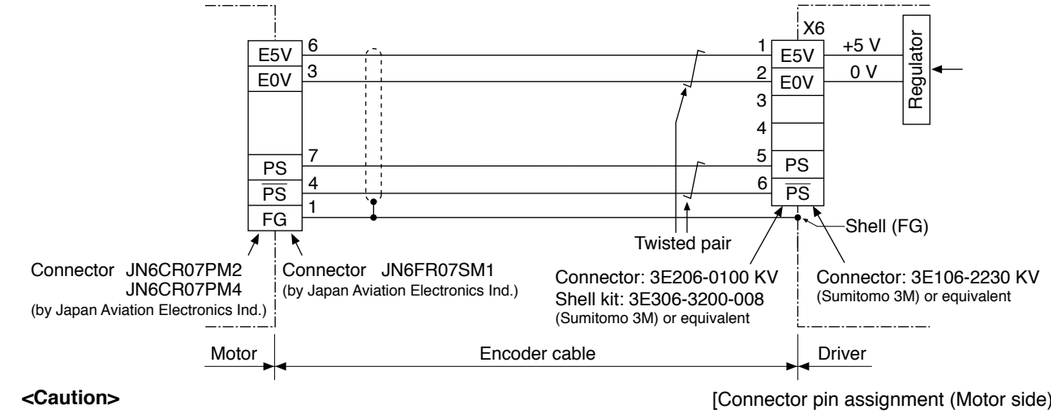
When using a 23-bit absolute encoder as a incremental system*.

* When do not use a multi-turn data.

● MSMF 50 W to 1000 W ● MHMF 50 W to 1000 W ● MQMF 100 W to 400 W <Leadwire type>



● MSMF 50 W to 1000 W ● MHMF 50 W to 1000 W ● MQMF 100 W to 400 W <Connector type>



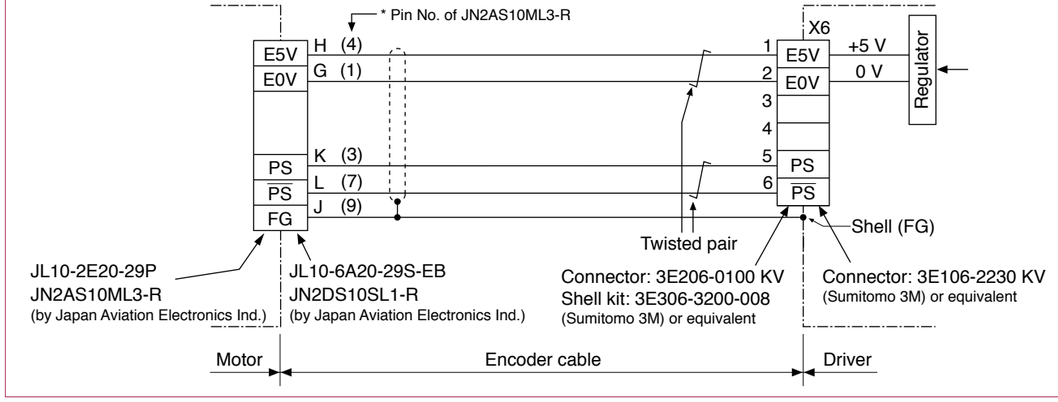
<Caution>

- Tighten the motor connector mounting screw (M2) with a torque between 0.19 N·m and 0.21 N·m. To avoid damage, be sure to use only the screw supplied with the connector.
- Do not remove the gasket supplied with the junction cable connector. Securely install the gasket in place. Otherwise, the degree of protection of IP67 will not be guaranteed.

[Connector pin assignment (Motor side)]

(Viewed from cable)

● MSMF 1.0 kW to 5.0 kW ● MHMF 1.0 kW to 5.0 kW
● MDMF 1.0 kW to 5.0 kW ● MGMF 0.85 kW to 4.4 kW



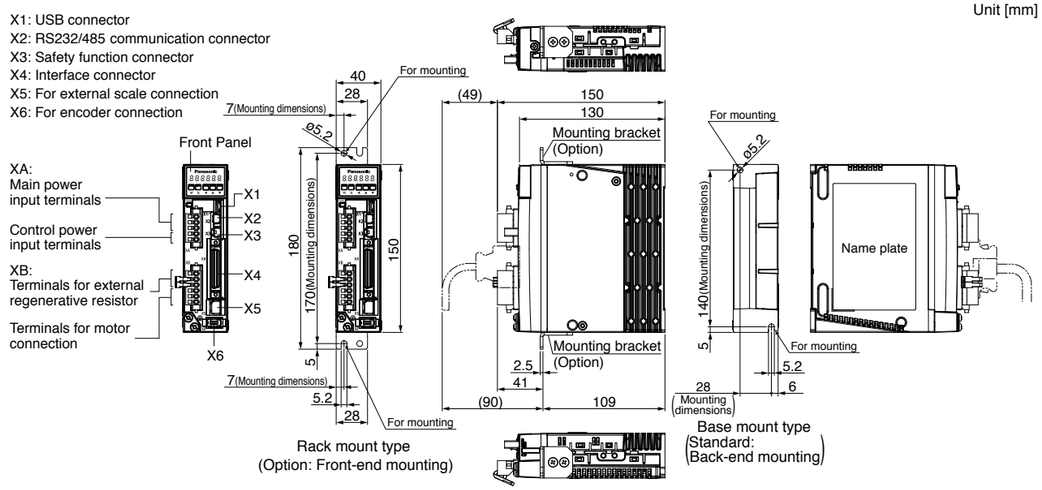
[Connector pin assignment] Refer to P.275, P.276 “Specifications of Motor connector”.

* All dimensions shown in this catalog are for the A6SF series, but outer dimensions are the same as the A6SE series. For appearance, refer to P.19 and P.20.

A-frame

Unit [mm]

X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: Interface connector
X5: For external scale connection
X6: For encoder connection



A-frame: Connector of driver side			Multifunction type	RS485 communication type	Basic type
Connector XA	S05B-F32SK-GGXR	J.S.T. Mfg. Co., Ltd.	●	●	●
Connector XB	S06B-F32SK-GGXR	J.S.T. Mfg. Co., Ltd.	●	●	●
Connector X1	UB-M5BR-DMP14-4S (or equivalent)	J.S.T. Mfg. Co., Ltd.	●	●	●
Connector X2	1-2040537-1 (or equivalent)	Tyco Electronics Japan G.K.	●	●	—
Connector X3	2040537-1 (or equivalent)	Tyco Electronics Japan G.K.	●	—	—
Connector X4	10250-52A2PE (or equivalent)	Sumitomo 3M	●	●	●
Connector X5	MUF-RS10DK-GKXR (or equivalent)	J.S.T. Mfg. Co., Ltd.	●	—	—
Connector X6	3E106-2230 KV (or equivalent)	Sumitomo 3M	●	●	●

<Attached to the driver>

Connector of power and motor side			Multifunction type	RS485 communication type	Basic type
Connector XA	05JFAT-SAXGF	J.S.T. Mfg. Co., Ltd.	●	●	●
Connector XB	06JFAT-SAXGF	J.S.T. Mfg. Co., Ltd.	●	●	●

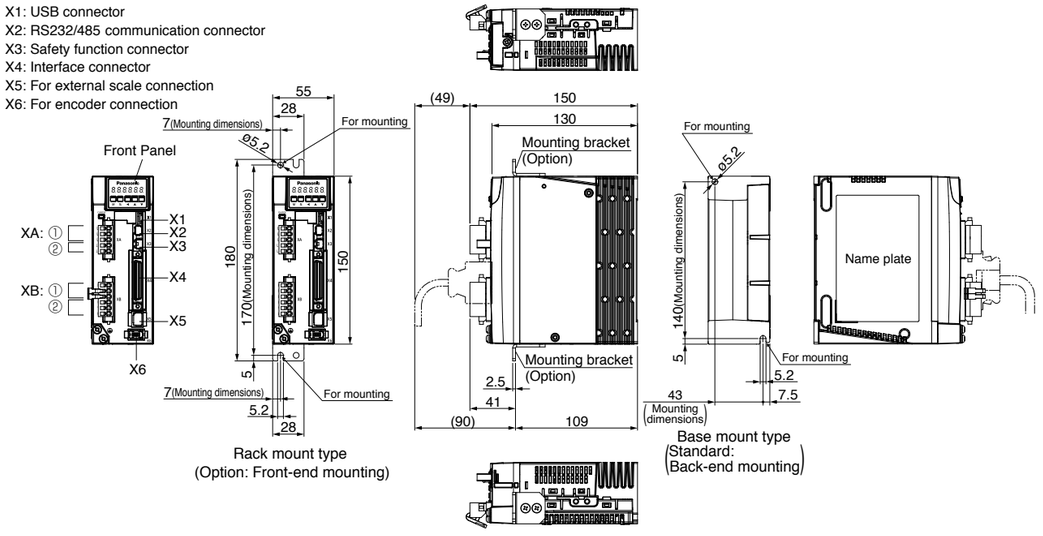
Mass: 0.8 kg

B-frame

Unit [mm]

XA: ① Main power input terminals
② Control power input terminals
XB: ① Terminals for external regenerative resistor
② Terminals for motor connection

X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: Interface connector
X5: For external scale connection
X6: For encoder connection



* For connectors used to connect to the driver, power supply and motor, refer to the A-frame table because both frames use the same connectors.

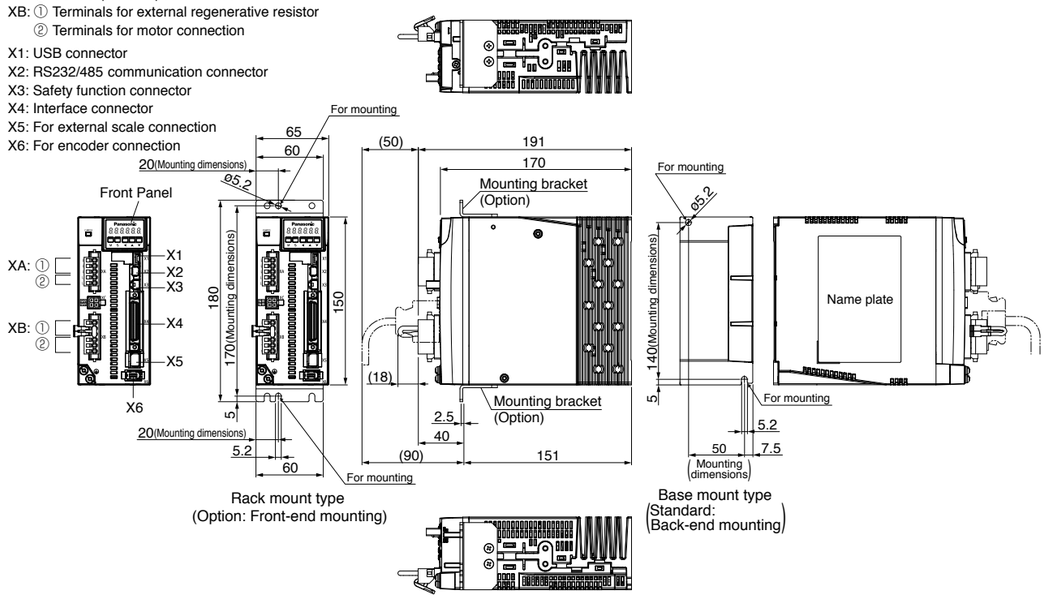
Mass: 1.0 kg

C-frame

Unit [mm]

XA: ① Main power input terminals
② Control power input terminals
XB: ① Terminals for external regenerative resistor
② Terminals for motor connection

X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: Interface connector
X5: For external scale connection
X6: For encoder connection



* For connectors used to connect to the driver, power supply and motor, refer to the A-frame table because both frames use the same connectors.

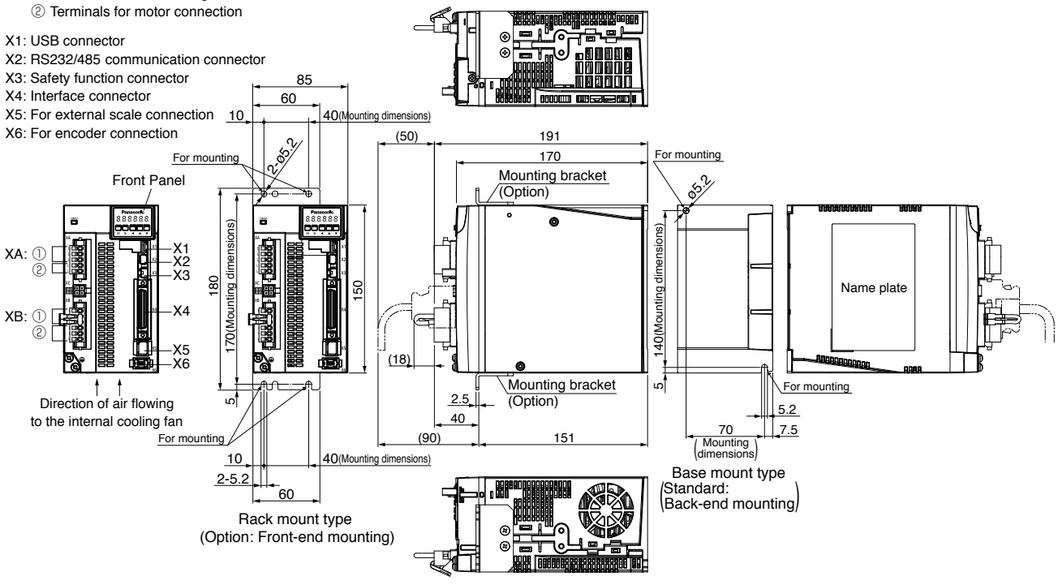
Mass: 1.6 kg

D-frame (200 V)

Unit [mm]

XA: ① Main power input terminals
② Control power input terminals
XB: ① Terminals for external regenerative resistor
② Terminals for motor connection

X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: Interface connector
X5: For external scale connection
X6: For encoder connection



* For connectors used to connect to the driver, power supply and motor, refer to the A-frame table because both frames use the same connectors.

Mass: 2.1 kg