



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!



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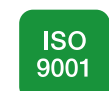
⚠ Safety Precautions

- 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.

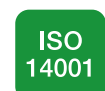
Repair Consult to the dealer from whom you have purchased this product for details of repair work.
When the product is incorporated to the machine you have purchased, consult to the machine manufacturer or its dealer.

URL Electric data of this product (Instruction Manual, CAD data) can be download from the following web site;
<http://industrial.panasonic.com/ww/products/motors-compressors/fa-motors>

Contact to :



ISO9001
Certificate
division



ISO14001
Certificate
division

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The contents of this catalog apply
to the products as of April 2015.

• 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.

AC Servo <MINAS A5II / A5 series, E series>



MINAS A5 Family

Servo motor that brings out potential of the machine. MINAS A5 Family



Two-degree-of-freedom control system
All-in-one type

A5II series

Rated output: **50 W to 15.0 kW**

- 20 bit incremental encoder, 17 bit absolute/ incremental encoder
- All-in-one: Speed, Position, Torque^{*1}, Full-closed¹ control type

^{*1} Not applicable to two-degree-of-freedom control system.

All-in-one type

A5 series

Rated output: **50 W to 15.0 kW**

- 20 bit incremental encoder, 17 bit absolute/ incremental encoder
- All-in-one: Speed, Position, Torque, Full-closed control type

Two-degree-of-freedom control system
Position control type

A5IIE series

Rated output: **50 W to 5.0 kW**

- 20 bit incremental encoder
- Position control (pulse train commands)

Position control type

A5E series

Rated output: **50 W to 5.0 kW**

- 20 bit incremental encoder
- Position control (pulse train commands)

Slim design and position control type

E series



Rated output: **50 W to 400 W**

- Ultra-small design and pulse train command type only
- Real-time auto gain tuning
- DIN-rail mountable (using mounting Kit)

High-speed communication "Realtime Express" support model

Ultra high-speed Network type

A5IIN series



Rated output:

50 W to 15.0 kW

- Synchronized motion and precise CP control up to 32 axes with 100 Mbps communication
- Standard Ethernet cable^{*2} using
- Two-degree-of-freedom control system

Linear motor and DD motor control type

A5IINL series



Capacity of applying Linear motor:

Compatible with 15.0 kW rotary AC servo motor

- Position, Speed and Thrust control
- Automatic setup function & Automatic magnetic pole detection function
- Two-degree-of-freedom control system

DC 24 V type

A5IIMN series



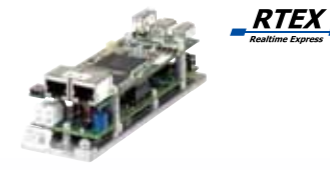
Rated output:

10 W, 20 W, 30 W

- Synchronized motion and precise CP control up to 32 axes with 100 Mbps communication
- Standard Ethernet cable^{*2} using
- Two-degree-of-freedom control system

Linear motor control, DC 24 V type

A5IIMNL series



Capacity of applying Linear motor:

Compatible with 30 W rotary AC servo motor

- Position, Speed and Thrust control
- Automatic setup function & Automatic magnetic pole detection function
- Two-degree-of-freedom control system

Linear motor and DD motor control type

A5L series



Capacity of applying Linear motor:

Compatible with 15.0 kW rotary AC servo motor

- Position, Speed, Thrust control
- Drastically reduced setup time by automatic setup
- Automatic magnetic pole detection function will detect the magnetic pole position of the linear motor.

EtherCAT communication driver type

A5B series



Rated output:

50 W to 15.0 kW

- Supports PC-based controller
- Passed Official EtherCAT Conformance Test
- Standard Ethernet cable^{*2} using
- Two-degree-of-freedom control system

A5A series



Rated output:

50 W to 5.0 kW

- Positioning is possible by built-in NC function
- Can connect up to 31 axes
- Standard Ethernet cable^{*2} using
- Two-degree-of-freedom control system

^{*} AE-LINK is a registered trade mark of Asahi Engineering.

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A5II, A5IIE, A5, A5E series

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General-purpose RS485 communication AE-LINK support type

[Special Order Product]: For details, see the website or request for information. *2 Shielded twisted pair cable (CAT5e or higher)

Quicker, Wiser and Friendlier A5II series

Two-degree-of-freedom control system
All-in-one type

• Full-closed control and torque control are not applicable to 2DOF control system.

A5II series

Ball screw settling time
0 ms

Belt device settling time
4 ms

• The above is a measure based on our test environment.



Two-degree-of-freedom control system
Only for position control type

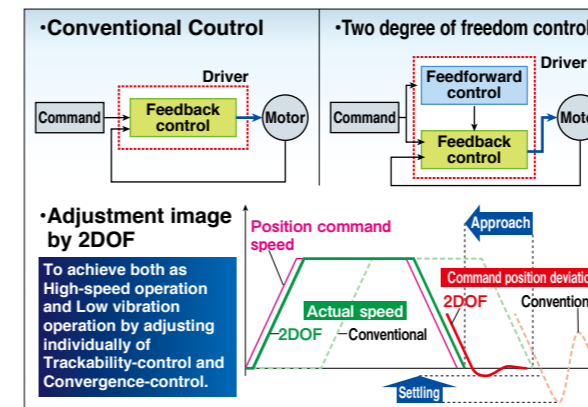
A5IIE series



Realizes quick and accurate movement. **Fast response & High-precision positioning**

Adopted New Algorithm
"Two-degree-of-freedom control" (2DOF) to improve productivity and machining accuracy.

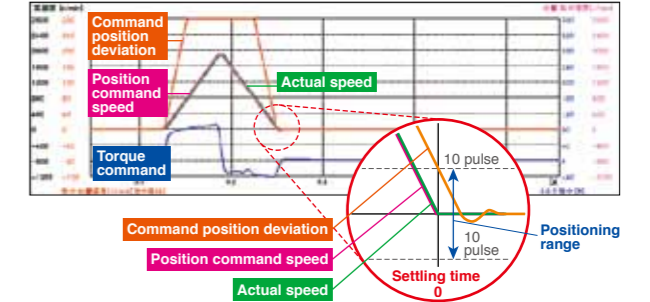
In the conventional model, because we could not adjust separately feedforward control and feedback controls, in other words even if we only adjust "Approach" of feedforward, it had connection with "Settling" of



• Full-closed control and torque control are not applicable to 2DOF control system.

feedback control, mutual adjustment was required. In 2DOF adopted A5II series, feedforward and feedback controls are adjusted separately, meaning "Approach" reaction to the given command, and the "Settling" can be adjusted separately. Realized low vibration and reduction of settling time. Realizes tact speed of the electronic component mounting machines, improves the accuracy of surface treatment of metal processing machines, allows for smooth operation and High speed industrial robots.

• Waveform of PANATERM
(the case of the ball screw: 0 ms / waveform measured settling time)



Easy and quick adjusting time. **5 times faster*** than conventional

Greatly improved "operability", easy-to-use software "PANATERM".

We have upgraded setup support software PANATERM, the convenient tool for parameter setting and monitoring often required during start-up of the machine for adjustment motor and driver. Improved to more easy-understandable screen.

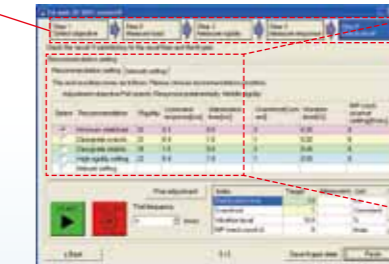
Equipped with "Fit Gain" function to realize speedy setup.

Newly developed feature "Fit Gain" maximizes the characteristics of A5II series. And adaptive notch filter function can reduce the vibration that occurs when the rigidity of the device is low, you can set and adjust automatically the best variety of gain.

• Adjustment is completed in only **3** processes



• Fit gain adjustment window



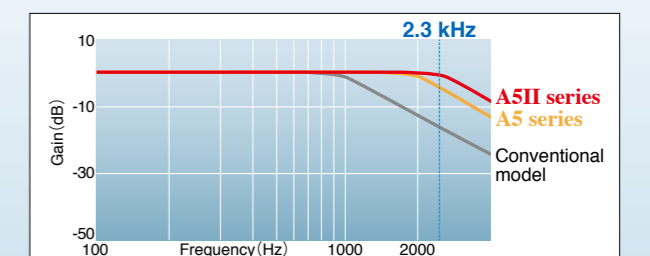
• Automatically proposes various settings

Selected	Recommendation	Rigidity	Command response[ms]	Stabilization resource[ms]
<input type="checkbox"/>	Minimum stiffness	22	3.2	0.0
<input type="checkbox"/>	Designate over	22	3.4	1.0
<input type="checkbox"/>	Designate steel	19	1.5	3.5
<input type="checkbox"/>	Highly rigid setting	22	3.4	1.0
<input type="checkbox"/>	Master setting			

Realized 2.3 kHz frequency response to improve productivity

Comparison* 1.15 times faster than conventional

Realized 2.3 kHz response makes possible high-speed operation and improves productivity.



* Comparison with conventional product A5-series.

1 Quick

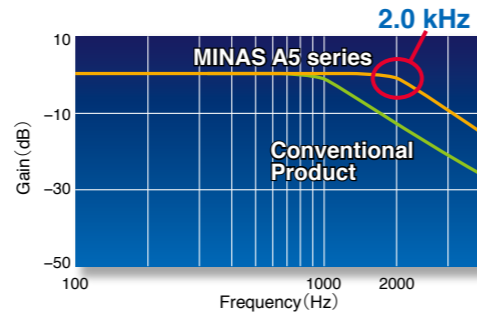


2.0 kHz Frequency Response A5 A5E

Example application Semiconductor production equipment, packaging, etc.

Achieves the industry's leading frequency response of 2.0 kHz.

Operation speed up by new developed LSI and high responsible control. **By the industry's leading speed and positioning response, a highly advanced system can be created. What's more, the shorter response delay will realize an extremely lower vibration.**



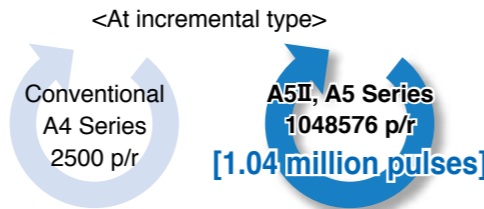
20 bits/revolution, 1.04 million pulses (At incremental type) A5II A5 A5IIE A5E

Example application Machine tools, textile machinery, etc.

Ensures smoother operation and reduced vibration at stopping.

Ensures accurate positioning in a short time.

New proprietary signal processing technology achieves 1.04 million pulses with a 20-bit incremental encoder.

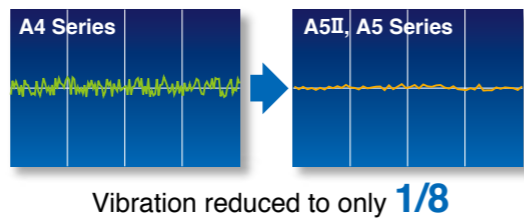


Low Cogging Torque (Excluding MSMD, MHMD, MDME 11.0 kW, 15.0 kW) A5II A5 A5IIE A5E

Example application Semiconductor production equipment, textile machinery, etc.

For the industry's most stable speed and lowest cogging

We've achieved the industry's lowest cogging by minimizing the pulse width by a new design incorporating a 10-pole rotor for the motor and a magnetic field parsing technique. **Positioning and stability are greatly improved by the minimal torque variation. This results to improved speed stability and positioning of motor rotation.**

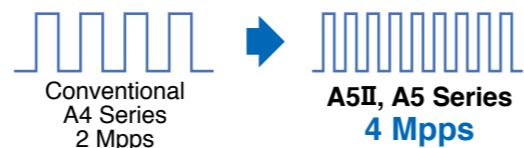


The Input/Output Pulse 4 Mpps A5II A5 A5IIE A5E

Example application Semiconductor production equipment, machine tools, etc.

Accommodates the industry's leading positioning resolution commands (with pulse train commands).

The command input and feedback output operate at the high speed of 4 Mpps. Accommodates high-resolution and high-speed operation, including standard full closed operation. (Provided with A5II, A5 only.)



2 Smart



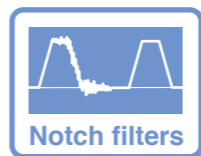
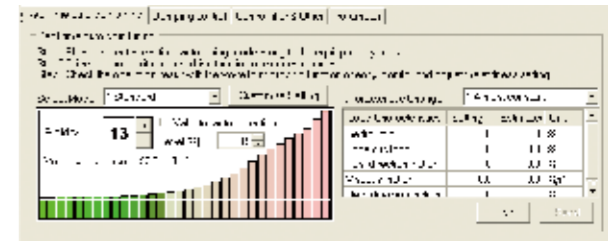
Highly Functional Real-time Auto-Gain Tuning A5II A5 A5IIE A5E

Example application Semiconductor production equipment, food processing machinery, etc.

High-performance real-time auto-gain tuning featuring simple setup.

After installation, tuning will be completed automatically after several operations. When the response is adjusted, **simple tuning** is supported with a change of one parameter value. Use of the gain adjustment mode in the setup support software contributes to optimum adjustment. **The built-in auto vibration suppression function reduces equipment damage.** Appropriate modes are provided for various machines such as **vertical axis machines and high friction machines with belts.**

This makes it possible to perform simple optimal adjustments simply by selecting the mode and stiffness.



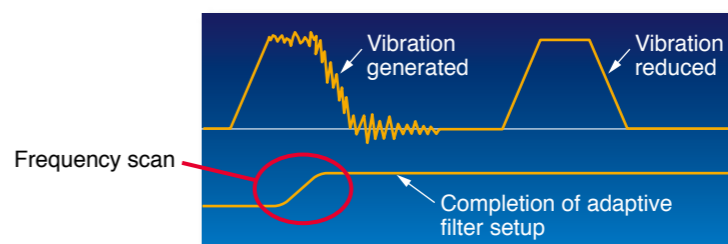
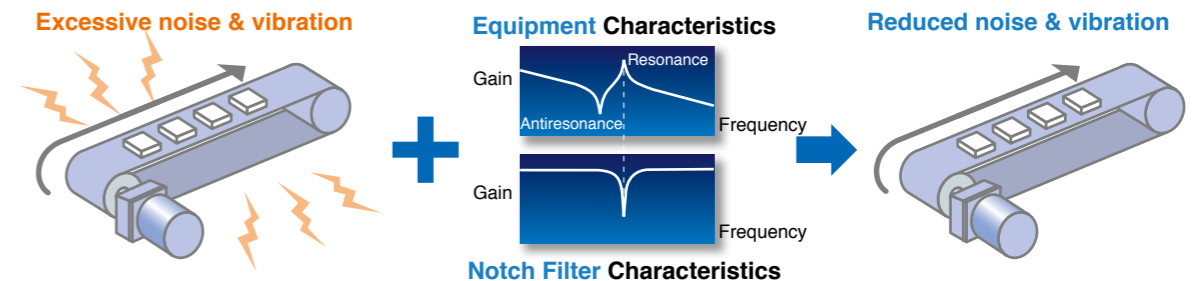
Manual/Auto Notch Filters A5II A5 A5IIE A5E

Example application Semiconductor production equipment, food processing machinery, etc.

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

during operation. The A5II, A5 series features an industry-largest total of four notch filters with setup frequencies of 50 Hz to 5000 Hz. This approach enables depth adjustment within this frequency range. (Two of the filters share the auto set-up.)





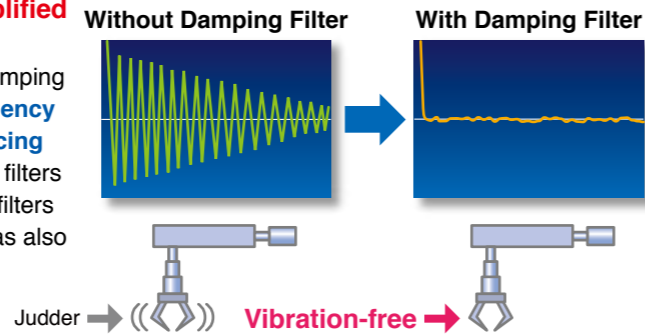
Manual/Auto Damping Filter

A5II A5 A5IIE A5E

Example application Chip mounters, food processing machinery, robots, general production machinery, etc.

Equipped with a damping filter featuring simplified automatic setup.

The setup software features automatic setup of the damping filter. This filter removes the natural vibration frequency component from the command input, greatly reducing vibration of the axis when stopping. The number of filters has been increased to four from the conventional two filters (two for simultaneous use). The adaptive frequency has also been significantly expanded from 1 Hz to 200 Hz.



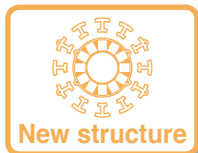
Motion Simulation

A5II A5 A5IIE A5E

Example application General production machinery, etc.

Equipped with a simplified machine simulation function.

The setup software uses frequency response data acquired from the actual machine. In addition, it features a machine simulation function for performing simulated operation. This allows you to easily confirm the effects of gain and various filters without adjusting the actual equipment.



New Structure/ Innovative Core/ Innovative Encoder

A5II A5 A5IIE A5E

Example application Robots, chip mounters, general production machinery, etc.

Featuring significantly reduced weight and a more compact motor

We've developed new designs for both compact motors and large motors. The new design used for the core has succeeded in compact. The addition of an innovative compact encoder has contributed to a 10% to 25% (1 kg to 6 kg) reduction in motor weight in the 1 kW and larger class when compared with conventional motors.



[Examples for MSM or MDM]

Series	A4	A5II A5	Weight Reduction
MSM 1 kW	4.5 kg	3.5 kg	▲1 kg
MSM 2 kW	6.5 kg	5.3 kg	▲1.2 kg
MDM 1 kW	6.8 kg	5.2 kg	▲1.6 kg
MDM 2 kW	10.6 kg	8.0 kg	▲2.6 kg



Complies with European Safety Standards.

A5II A5

Example application Semiconductor and LCD production equipment, etc.

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.)



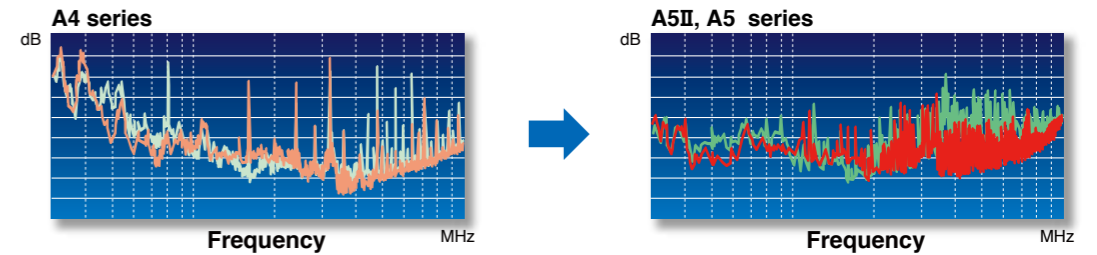
Low noise

A5II A5 A5IIE A5E

Example application Semiconductor and LCD production equipment, etc. general production machinery for export to the European market

Complies with the European EMC Directive

By incorporating the latest circuit technology, A5II, A5 series achieves a further noise reduction of 3 dB compared with the conventional A4 series, which also features noise suppression. (The A4 series also conforms to the EMC Directive.)



IP67 Enclosure Rating (Products are build to order items.)

A5II A5 A5IIE A5E

Example application Machine tools, robots, printing machines, etc.

IP67 enclosure rating for increased environmental resistance

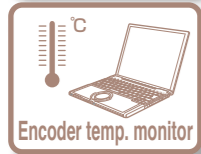
Our improved motor seals and direct-mount connectors in the motor power supply and encoder input-output areas contribute to this unit's IP67 enclosure rating.



- IP67**
- Protection against water
 - Protection against temporary immersion in water
 - Protection against dust
 - Protected against dust penetration when in full contact

- Motors of MSMD and MHMD series and 0.9 kW or higher standard stock items have IP65 rating.
- Motors of IP67 have smaller encoder connector that requires cable compatible with IP67 motor.
- * IP67 motor is build to order items.

5 Easy



PANATERM Set-up Support Software

A5II A5 A5IIE A5E

The PANATERM Set-up Support Software, with many added features.

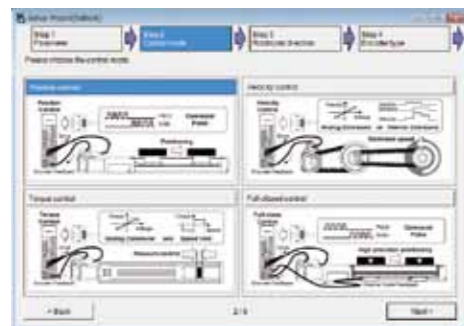
The PANATERM assists users in setting parameters, monitoring control conditions, setup support, and analyzing mechanical operation data on the PC screen, when installed in a commercially available personal computer, and connected to the MINAS A5 Family through the USB interface.

Localized in 4 languages

Choose either English, Japanese, Chinese, or Korean-language display.

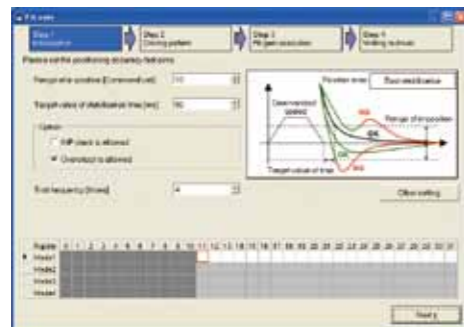
Setup Wizard

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.



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.



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

- 1) Select the adjustment method
- 2) Load measurement
- 3) Adjust gain to meet your needs by confirming results. (for A5II, A5IIE)



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.

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 (provided with 20-bit encoder only).

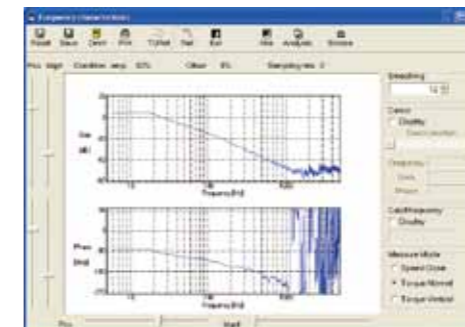
Other New Function

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.

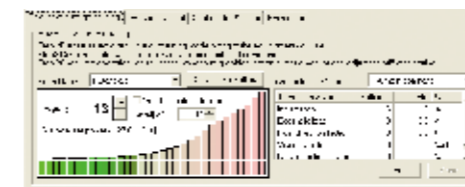


Frequency characteristics measurement function

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.

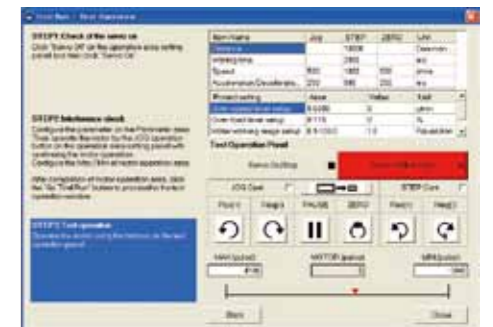


Added New screen for gain adjustment, equipped with stiffness oscillation auto-reduction function

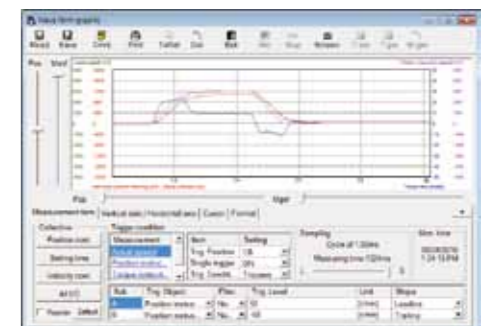


Trial run

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



Significant increase of measuring objects Multi-functional waveform graphic



<CAUTION>

This software is applicable only to A5II, A5, A5IIE, A5E series. To apply this software to conventional product (A, AIII, E or A4 series), consult our distributors.

Hardware configuration		
Personal computer	CPU	Pentium III 512MHz or more
	Memory	256MB or more (512MB recommended)
	Hard disk capacity	Vacancy of 512MB or more recommended
	OS	Windows® XP SP3 (32-bit Ver.), Windows® VISTA SP1 (32-bit Ver.) Windows® 7 (32-bit Ver., 64-bit Ver.) [English, Japanese, Chinese or Korean version]
Display	Serial communication port	USB port
	Resolution	1024 x 768pix or more (desirably 1024 x 768)
	Number of colors	24bit colors (TrueColor) or more

Please download from our web site and use after install to the PC.
<http://industrial.panasonic.com/ww/products/motors-compressors/fa-motors>

Other Functions

Command Control Mode A5II A5

- Command control mode is available for Position, Speed (including eight internal velocities) and Torque.
- Using parameter settings, you can set up one optional command control mode or two command control modes by switching.
- According to suitable application utility, proper optional command control mode can be chosen.

Full-closed Control A5II A5

AB-phase linear scale (for general all-purpose products) or serial scale (for products with Panasonic's exclusive format) scales can be used (P.14).

SEMI F47 A5II A5 A5IIE A5E

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

Inrush Current Preventive Function A5II A5 A5IIE A5E

- 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.

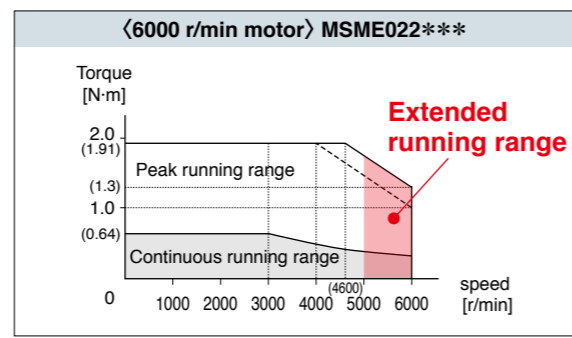
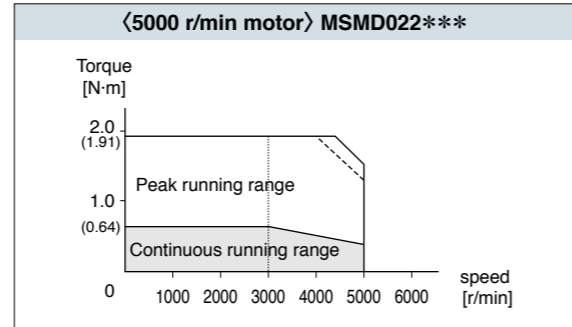
Regenerative Energy Discharge A5II A5 A5IIE A5E

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

6000-rpm capability A5II A5 A5IIE A5E
(build to order item)

The MSME motor (under 750 W) can accommodate a maximum speed of 6000 r/min.

[Comparison of new and conventional 200 W]



- **Gear head**
Gear heads for 6000 r/min and 5000 r/min motors are available. Set 5000 r/min gear head only to 5000 r/min motor, and set 6000 r/min gear head only to 6000 r/min motor.
When customers prepare a gear head, use it as follows:
MSME → 6000 r/min
MSMD } → 5000 r/min
MHMD }

Dynamic Braking A5II A5 A5IIE A5E

- 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 dynamic brake circuit of H-frame is external.
- The desired action sequence can be set up to accommodate your machine requirements.

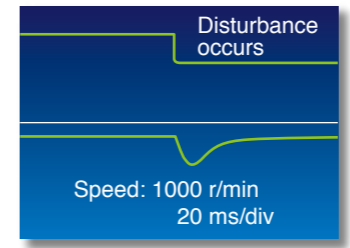
Parameter Initialization A5II A5 A5IIE A5E

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

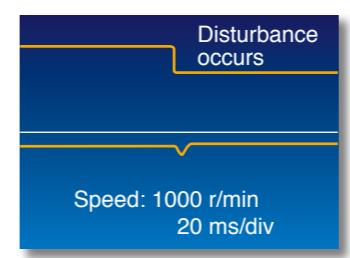
Disturbance Observer A5II A5 A5IIE A5E

By using a disturbance observer to add an estimated disturbance torque value to the torque canceling command, this function diminishes the impact of the disturbance torque, reduces vibration, and offsets any speed decline.

Disturbance observer function not in effect



Disturbance observer function in effect



Torque Feed Forward A5II A5 A5IIE A5E

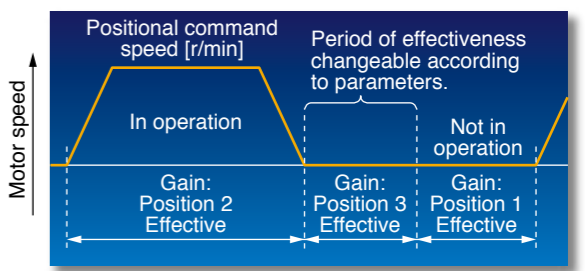
The Torque Feed Forward function performs a comparison with feedback and calculates the amount of torque to add to the necessary torque command in the command for actuation.

Friction Torque Compensation A5II A5 A5IIE A5E

This function reduces the effect of machine-related friction and improves responsiveness. Two kinds of friction compensation can be set up: unbalanced load compensation, which compensates with a constant operational offset torque; and kinetic friction, which changes direction in response to the direction of movement.

3-Step Gain A5II A5 A5IIE A5E

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 A5II A5 A5IIE A5E

You can adjust right inertia ratio by Inertia Ratio Conversion input(J-SEL). 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 A5II A5 A5IIE A5E

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 Panatorm setup software provides an exclusive screen for a more simplified setup.

Torque Limiter Switching A5II A5 A5IIE A5E

You can use the I/Os to set up torque limits. These can be used for applications such as simplified pressure, tension control, and sensor-less homing.

Applicable international safety standards

A5II A5 A5IE A5E



		Driver	Motor
EC Directives	EMC Directives	EN55011 EN61000-6-2 IEC61800-3	—
	Low-Voltage Directives	EN61800-5-1	EN60034-1 EN60034-5
	Machinery Directives Functional safety ^{*1}	ISO13849-1(PL d) (Cat. 3) EN61508(SIL2) EN62061(SILCL 2) EN61800-5-2(STO) IEC61326-3-1	—
UL Standards		UL508C (E164620)	UL1004-1, UL1004-6 (E327868)
CSA Standards		C22.2 No.14	C22.2 No.100
Radio Waves Act (South Korea) (KC) ^{*2}		KN11 KN61000-4-2, 3, 4, 5, 6, 8, 11	—

IEC : International Electrotechnical Commission
 EN : Europäischen 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 A5IE and A5E 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 product is not an object of China Compulsory Certification (CCC).

Applicable External Scales

A5II A5

Applicable External Scale	Manufacturer	Model No.	Resolution [μs]	Maximum Speed (m/s) ^{*3}
Parallel Type (AB-phase)	General	—	Maximum speed after 4 × multiplication: 4 Mpps	
Serial Type (Incremental)	Magnescale Co., Ltd.	SR75	0.01 to 1	3.3
		SR85	0.01 to 1	3.3
		SL700-PL101RP/RHP	0.1	10
		SL710-PL101RP/RHP	0.1	10
	Nidec Sankyo Corporation	BF1	0.001/0.01	0.4/1.8
Serial Type (Absolute)	DR. JOHANNES HEIDENHAIN GmbH	LIC2197P/LIC2199P	0.05/0.1	10
		LIC4193P/LIC4195P LIC4197P/LIC4199P	0.001 /0.005 /0.01	10
	Fagor Automation S.Coop.	SVAP	0.05	2.5
		SAP	0.05	2.5
		GAP	0.05	2.5
		LAP	0.1	2
	Magnescale Co., Ltd.	SR77	0.01 to 1	3.3
		SR87	0.01 to 1	3.3
	Mitutoyo Corporation	AT573A	0.05	2.5
		ST778A(L)	0.1	5
	Renishaw plc	RESOLUTE	0.001	0.4
0.05			20	
0.1			40	

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

Motor Line-up

Motor	Voltage	Rated output (kW)	Rated rotational speed (Max. speed) (r/min)	Rotary encoder		Enclosure (*1)	Features	Applications	
				20-bit incremental	17-bit absolute				
Low inertia	MSMD	100 V	0.05 0.1	3000 (5000)			IP65	• Leadwire type • Small capacity • Suitable for high speed application • Suitable for all applications	• Bonder • Semiconductor production equipment • Packing machines etc
		200 V	0.2 0.4						
	MSME	200 V	0.75	3000 (4500)			IP67	• Small capacity • Suitable for high speed application • Suitable for all applications	• SMT machines • Food machines • LCD production equipment etc
		100 V	0.05 0.1						
		200 V	0.2 0.4						
		400 V	0.75						
Middle inertia	MDME	400 V	0.4 0.6	2000 (3000)			IP65(*2)	• Middle capacity • Suitable for low stiffness machines with belt driven	• Conveyors • Robots • Machine tool etc
		200 V	1.0 1.5						
			2.0 3.0						
		400 V	4.0 5.0						
		7.5 (*3)	1500 (3000)						
	11.0 (*3)	1500 (2000)							
	MFME (Flat type) (*3)	200 V	1.5	2000 (3000)			IP67	• Middle capacity • Flat type and suitable for machines with space limitation	• Robots • Food machines etc
		400 V	2.5						
		4.5							
	MGME (Low speed/High torque type) (*3)	200 V	0.9 2.0	1000 (2000)			IP65(*2)	• Middle capacity • Suitable for low speed and high torque application	• Conveyors • Robots • Textile machines etc
400 V		3.0							
4.5 (*3)		6.0 (*3)							
High inertia	MHMD	100 V	0.2	3000 (5000)			IP65	• Leadwire type • Small capacity • Suitable for low stiffness machines with belt driven	• Conveyors • Robots etc
		200 V	0.4						
	MHME	200 V	0.75	3000 (4500)			IP65(*2)	• Middle capacity • Suitable for low stiffness machines with belt driven, and large load moment of inertia	• Conveyors • Robots • LCD manufacturing equipment etc
		400 V	1.0 1.5						
		2.0 3.0	2000 (3000)						
		4.0 5.0	1500 (3000)						
		7.5 (*3)							

(*1) Except for output shaft, and connector. (*2) IP67 motor is also available. (*3) Only IP67 motor is available.

* See the P.21 to P.28, driver and motor combination.

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

Servo Motor

M S M E 5 A Z G 1 S * *

Symbol	Type
MSMD	Low inertia (50 W to 750 W)
MSME	Low inertia (50 W to 5.0 kW)
MDME	Middle inertia (400 W to 15.0 kW)
MFME	Middle inertia (1.5 kW to 4.5 kW)
MGME	Middle inertia (0.9 kW to 6.0 kW)
MHMD	High inertia (200 W to 750 W)
MHME	High inertia (1.0 kW to 7.5 kW)

Motor rated output

Symbol	Rated output	Symbol	Rated output
5A	50 W	25	2.5 kW
01	100 W	30	3.0 kW
02	200 W	40	4.0 kW
04	400 W	45	4.5 kW
06	600 W	50	5.0 kW
08	750 W	60	6.0 kW
09	0.9 kW	75	7.5 kW
10	1.0 kW	C1	11.0 kW
15	1.5 kW	C5	15.0 kW
20	2.0 kW		

Voltage specifications

Symbol	Specifications
1	100 V
2	200 V
4	400 V
Z	100 V/200 V common (50 W only)

Rotary encoder specifications

Symbol	Format	Pulse counts	Resolution	Wires
G	Incremental	20-bit	1048576	5
S	Absolute	17-bit	131072	7

Special specifications

Motor specifications
MSME(50 W to 750 W [200 V]), MSMD, MHMD

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

MSME(750 W [400 V], 1.0 kW to 15.0 kW), MDME, MFME, MGME, MHME

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

Design order

Symbol	Specifications
C	IP65 motor
1	IP67 motor (MSMD, MHMD: IP65)

Motor with reduction gear

M S M E 0 1 1 G 3 1 N

Symbol	Type
MSMD	Low inertia (100 W to 750 W)
MSME	Low inertia (100 W to 750 W)
MHMD	High inertia (200 W to 750 W)

Motor rated output

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

Voltage specifications

Symbol	Specifications
1	100 V
2	200 V

Rotary encoder specifications

Symbol	Format	Pulse counts	Resolution	Wires
G	Incremental	20-bit	1048576	5
S	Absolute	17-bit	131072	7

Gear ratio, gear type

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

* MHMD 100 W is not prepared.

Motor structure

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

Servo Driver

Speed, Position, Torque, Full-closed type **M A D K T 1 5 0 5 * * *** **Special specifications**

Position control type **M A D K T 1 5 0 5 E * *** **Special specifications**

Frame symbol *

Symbol	Frame	Symbol	Frame
MAD	Frame A	MED	Frame E
MBD	Frame B	MFD	Frame F
MCD	Frame C	MGD	Frame G
MDD	Frame D	MHD	Frame H

* A5IE, A5E series is up to F-frame.

Power device Max. current rating

Symbol	Current rating
T1	10 A
T2	15 A
T3	30 A
T4	35 A
T5	50 A
T7	75 A
TA	100 A
TB	150 A
TC	300 A

Current detector current rating

Symbol	Specifications	Symbol	Specifications
05	5 A	40	40 A
07	7.5 A	64	64 A
10	10 A	90	90 A
12	12 A	A2	120 A
20	20 A	B4	240 A
30	30 A		

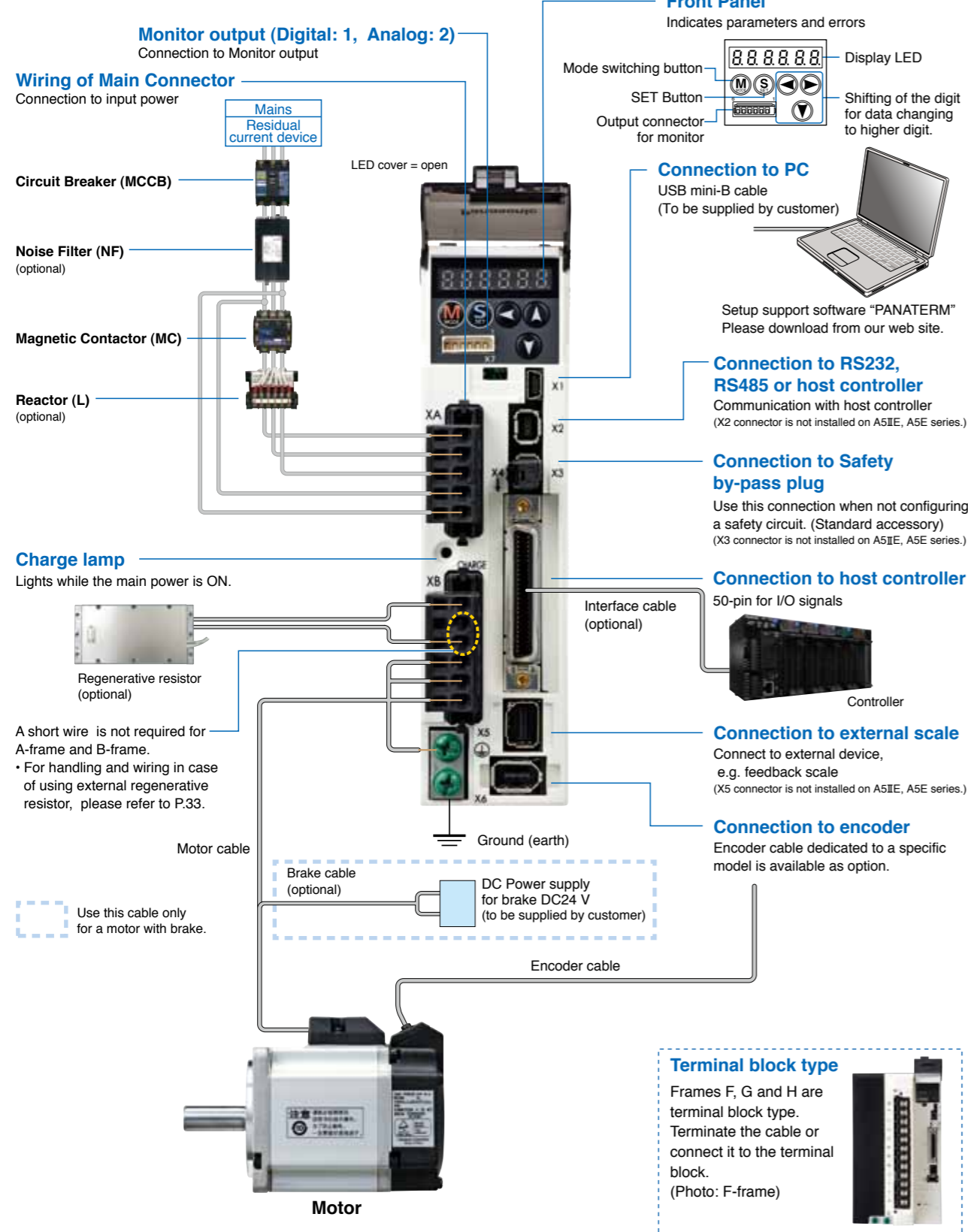
Supply voltage specifications

Symbol	Specifications
1	Single phase, 100 V
3	3-phase, 200 V
4	3-phase, 400 V
5	Single/3-phase, 200 V

Series

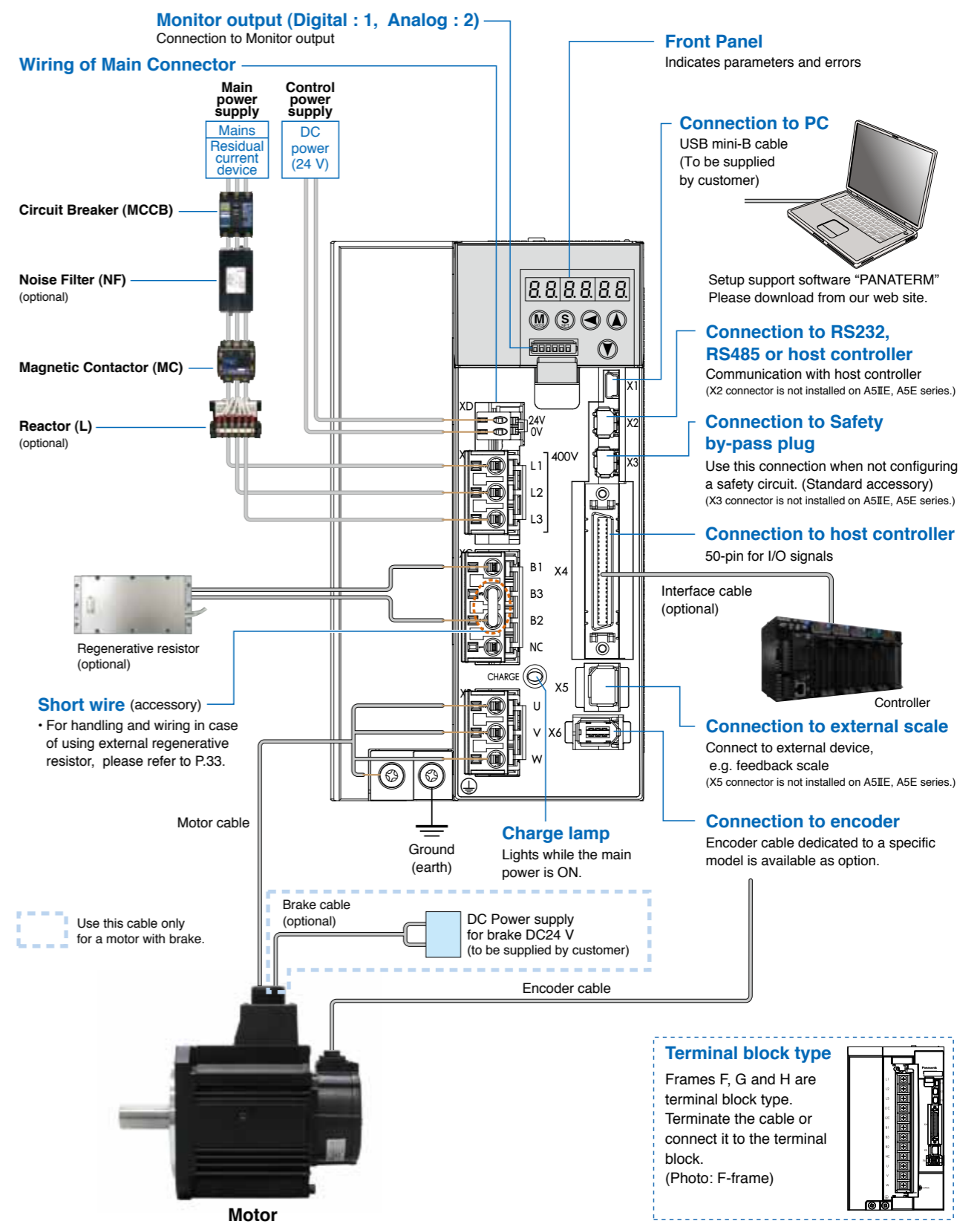
Symbol	Velocity, Position, Torque, Full-Closed type	Position control type
K	A5I series	A5IE series
H	A5 series	A5E series

[Connector type (100/200 V: A-frame to E-frame)]

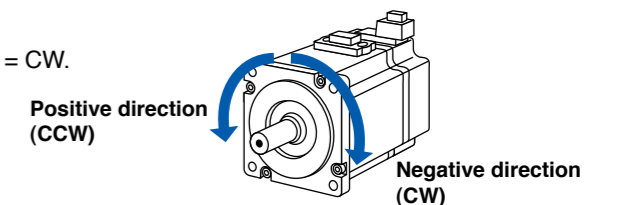


<Caution>
Apply adequate tightening torque to the product mounting screw by taking into consideration strength of the screw and the characteristics of material to which the product is installed. Overtightening can damage the screw and/or material; undertightening can result in loosening.
Example) Steel screw (M5) into steel section: 2.7 N·m to 3.3 N·m.

[Connector type (400 V: D, E-frame)]



<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 *1	Rated output	Required Power at the (rated load)	Circuit breaker (rated current)	Noise filter (Single phase/3-phase)	Surge absorber (Single phase/3-phase)	Noise filter for signal	Rated operating current of magnetic contactor (configuration)*2	Diameter and withstand voltage of main circuit cable	Crimp terminal for main circuit terminal block *4	Diameter and withstand voltage of control power supply cable	Crimp terminal for control power supply terminal block	Diameter and withstand voltage of motor cable *5	Diameter and withstand voltage of brake cable													
MADH MADK	MSME MSMD MHMD	Single phase, 100 V Single/3-phase, 200 V	50 W to 100 W 50 W to 200 W	approx. 0.4 kVA approx. 0.5 kVA	10 A	DV0P4170 DV0P4170 DV0PM20042	DV0P4190 DV0P4190 DV0P1450		20 A (3P+1a)	0.75 mm ² / AWG18 600 VAC or more	Connection to exclusive connector	0.75 mm ² / AWG18 600 VAC or more		0.28 mm ² to 0.75 mm ² / AWG18 to AWG18 100 VAC or more														
MBDH MBDK	MSME MSMD MHMD	Single 100 V Single/3-phase, 200 V	200 W 400 W	approx. 0.5 kVA approx. 0.9 kVA		DV0P4170 DV0PM20042	DV0P4190 DV0P1450																					
MCDDH MCDDK	MSME MSMD MHMD	Single 100 V Single/3-phase, 200 V	400 W 750 W	approx. 0.9 kVA approx. 1.3 kVA	15 A	DV0PM20042	DV0P4190		30 A (3P+1a)	0.75 mm ² / AWG18 600 VAC or more	Connection to exclusive connector		0.75 mm ² / AWG18 600 VAC or more															
MDDH MDDK	MDME MHME MGME	Single/3-phase, 200 V	1.0 kW 0.9 kW 1.0 kW	approx. 1.8 kVA approx. 1.8 kVA approx. 1.8 kVA		20 A	DV0P4220	DV0P4190 DV0P1450							DV0P1460	30 A (3P+1a)	Connection to exclusive connector	Connection to exclusive connector		0.75 mm ² / AWG18 600 VAC or more								
	MSME MHME MFME MSME		1.5 kW	approx. 2.3 kVA	10 A				FN258L-16-07 (Recommended component)	DV0PM20050	DV0P1460	60 A (3P+1a)	2.0 mm ² / AWG14 600V VAC or more	0.52 mm ² / AWG20 100 VAC or more								Connection to exclusive connector	2.0 mm ² / AWG14 600V VAC or more					
	MDME MDDK		400 W 600 W	approx. 0.9 kVA approx. 1.2 kVA																				30 A	DV0PM20043	DV0P1450	DV0P1460 RJ8035 (Recommended component)*6	60 A (3P+1a)
	MSME MHME MGME MDME MHME MFME MSME	1.0 kW 0.9 kW 1.5 kW	approx. 1.8 kVA approx. 1.6 kVA approx. 2.3 kVA	15 A		FN258L-16-07 (Recommended component)	DV0PM20050	DV0P1460							30 A (3P+1a)	0.52 mm ² / AWG20 100 VAC or more	Connection to exclusive connector	0.52 mm ² / AWG20 100 VAC or more										
	MDME MEDH MEDK	2.0 kW 2.5 kW	approx. 3.3 kVA approx. 3.8 kVA																50 A	DV0P3410	DV0P1450							
	MSME MHME MFME MGME MDME MHME MFME MSME	2.0 kW 3.0 kW 4.0 kW 4.5 kW 5.0 kW	approx. 3.3 kVA approx. 4.5 kVA approx. 6.0 kVA approx. 6.8 kVA approx. 7.5 kVA		30 A				FN258L-30-07 (Recommended component)	DV0PM20050	DV0P1460	60 A (3P+1a)	0.75 mm ² / AWG18 100 VAC or more	Terminal block M4								Terminal block M3						
	MGME MDME MHME MGME MDME MHME MFME MGME MSME MHME	2.0 kW 3.0 kW 4.0 kW 4.5 kW 5.0 kW	approx. 3.8 kVA approx. 4.5 kVA approx. 6.0 kVA approx. 6.8 kVA approx. 7.5 kVA																				60 A (3P+1a)	FS5559-60-34 (Recommended component)	DV0P1450	DV0P1460 RJ8095 (Recommended component)*6	100 A (3P+1a)	0.75 mm ² / AWG18 600 VAC or more
MGME MDME MHME MGME MDME MHME MFME MGME MSME MHME	2.0 kW 3.0 kW 4.0 kW 4.5 kW 5.0 kW	approx. 3.8 kVA approx. 4.5 kVA approx. 6.0 kVA approx. 6.8 kVA approx. 7.5 kVA	30 A	FN258-42-07 or FN258-42-33 (Recommended component)		DV0PM20050	DV0P1460 RJ8095 (Recommended component)*6	60 A (3P+1a)							0.75 mm ² / AWG18 100 VAC or more	Terminal block M5	Terminal block M5											
MGME MDME MHME MGME MDME MHME	7.5 kW 6.0 kW 7.5 kW 6.0 kW 7.5 kW	approx. 11 kVA approx. 9.0 kVA approx. 11 kVA approx. 9.0 kVA approx. 11 kVA																60 A (3P+1a)	FS5559-60-34 (Recommended component)	DV0P1450	T400-61D (Recommended component)*6							
MDME MGDK	11 kW 15 kW	approx. 17 kVA approx. 22 kVA			60 A (3P+1a)				FS5559-60-34 (Recommended component)	DV0P1450	T400-61D (Recommended component)*6	150 A (3P+1a)	0.75 mm ² / AWG18 600 VAC or more	Terminal block M5								Terminal block M5						
MDME MHDK	11 kW 15 kW	approx. 17 kVA approx. 22 kVA																					50 A	FN258-42-07 or FN258-42-33 (Recommended component)	DV0PM20050	T400-61D (Recommended component)*6	100 A (3P+1a)	0.75 mm ² / AWG18 100 VAC or more
MDME MHDK	11 kW 15 kW	approx. 17 kVA approx. 22 kVA	60 A	FN258-42-07 or FN258-42-33 (Recommended component)		DV0PM20050	T400-61D (Recommended component)*6	100 A (3P+1a)							0.75 mm ² / AWG18 100 VAC or more	Terminal block M4	Terminal block M4											

- *1 Select peripheral equipments for single/3phase common specification according to the power source.
- *2 For the external dynamic brake resistor, use the magnetic contactor with the same rating as that for the main circuit.
- *3 When use the external regenerative resistor of the option (DV0PM20058, DV0PM20059), use the cable with the same diameter as the main circuit cable.
- *4 For the ground screw, use the same crimp terminal as that for the main circuit terminal block.
- *5 The diameter of the ground cable and the external dynamic brake resistor cable must be equal to, or larger than that of the motor cable.
The motor cable is a shield cable, which conforms to the EC Directives and UL Standards. (G, H-frame only)
- *6 Use these products to suit an international standard.

- Related page
Noise filterP.250 “Composition of Peripheral Equipments”
Surge absorber.....P.253 “Composition of Peripheral Equipments”
Noise filter for signal.....P.254 “Composition of Peripheral Equipments”
Motor/brake connectorP.186, P.187 “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 UL 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.

<Remarks>

- 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)

Frame	Driver		Terminal block screw		Terminal cover fastening screw	
	Terminal name		Nominal size	Fastening torque (N·m)	Nominal size	Fastening torque (N·m)
F(200 V)	L1, L2, L3, L1C, L2C, B1, B2, B3, NC, U, V, W		M5	1.0 to 1.7	M3	0.19 to 0.21
F(400 V)	24V, 0V L1, L2, L3, B1, B2, B3, NC, U, V, W		M3 M4	0.4 to 0.6 0.7 to 1.0		
G	L1C, L2C, 24V, 0V, DB1, DB2, DB3, DB4, NC		M5	1.0 to 1.7	M3	0.3 to 0.5
	L1, L2, L3, B1, B2, NC, U, V, W		M5	2.0 to 2.4		
H	L1C, L2C, 24V, 0V, DB1, DB2		M4	0.7 to 1.0	M5	2.0 to 2.5
	L1, L2, L3, B1, B2, NC, U, V, W		M6	2.2 to 2.5		

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)	Nominal size	Fastening torque (N·m)
A to E	M4	0.7 to 0.8	M2.6	0.3 to 0.35
G	M5	1.4 to 1.6		
H	M6	2.4 to 2.6		

- <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 series	Motor				Driver			Power capacity (at rated load) (kVA)	Optional parts							
	Power supply	Output (W)	Part No. (Note) 1	Rating/Spec. (page)	A5II series A5 series Part No. (Speed, Position, Torque, Full-Closed type) (Note) 2	A5IE series A5E series Part No. (Position control type) (Note) 3,4	Frame		Encoder Cable		Motor Cable		Brake Cable (Note) 5	External Regenerative Resistor	Reactor (Single phase) (3-phase)	Noise Filter (Single phase) (3-phase)
									20-bit Incremental (Note) 5	17-bit Absolute (Note) 4,5,8	without Brake (Note) 5	with Brake (Note) 5				
Low inertia	MSMD (Leadwire type) 3000 r/min	Single phase 100 V	50	MSMD5AZ □ 1 *	49	MAD ◇ T1105	MAD ◇ T1105E	A-frame	MFECA 0 ** 0EAM	MFECA 0 ** 0EAE (Note) 7	MFMCA 0 ** 0EED	MFMCB 0 ** 0GET	DV0P4280	DV0P227	DV0P4170	
			100	MSMD011 □ 1 *	51	MAD ◇ T1107	MAD ◇ T1107E	A-frame					Approx. 0.4			
			200	MSMD021 □ 1 *	53	MBD ◇ T2110	MBD ◇ T2110E	B-frame					Approx. 0.4			
		400	MSMD041 □ 1 *	55	MCD ◇ T3120	MCD ◇ T3120E	C-frame	Approx. 0.5								
		Single phase/3-phase 200 V	50	MSMD5AZ □ 1 *	50	MAD ◇ T1505	MAD ◇ T1505E	A-frame					Approx. 0.5			
			100	MSMD012 □ 1 *	52	MAD ◇ T1505	MAD ◇ T1505E						Approx. 0.5			
			200	MSMD022 □ 1 *	54	MAD ◇ T1507	MAD ◇ T1507E						Approx. 0.5			
	400		MSMD042 □ 1 *	56	MBD ◇ T2510	MBD ◇ T2510E	B-frame						Approx. 0.9			
	750	MSMD082 □ 1 *	57	MCD ◇ T3520	MCD ◇ T3520E	C-frame	Approx. 1.3									
	MSME (Connector type) 3000 r/min	Single phase 100 V	50	MSME5AZ □ 1 *	65	MAD ◇ T1105	MAD ◇ T1105E	A-frame					Approx. 0.4			
			100	MSME011 □ 1 *	67	MAD ◇ T1107	MAD ◇ T1107E	A-frame					Approx. 0.4			
			200	MSME021 □ 1 *	69	MBD ◇ T2110	MBD ◇ T2110E	B-frame					Approx. 0.5			
		400	MSME041 □ 1 *	71	MCD ◇ T3120	MCD ◇ T3120E	C-frame	Approx. 0.9								
		Single phase/3-phase 200 V	50	MSME5AZ □ 1 *	66	MAD ◇ T1505	MAD ◇ T1505E	A-frame					Approx. 0.5			
100			MSME012 □ 1 *	68	MAD ◇ T1505	MAD ◇ T1505E	Approx. 0.5									
200			MSME022 □ 1 *	70	MAD ◇ T1507	MAD ◇ T1507E	Approx. 0.5									
400	MSME042 □ 1 *		72	MBD ◇ T2510	MBD ◇ T2510E	B-frame	Approx. 0.9									
750	MSME082 □ 1 *	73	MCD ◇ T3520	MCD ◇ T3520E	C-frame	Approx. 1.3										
High inertia	MHMD (Leadwire type) 3000 r/min	Single phase 100 V	200	MHMD021 □ 1 *	59	MBD ◇ T2110	MBD ◇ T2110E	B-frame	Approx. 0.5							
			400	MHMD041 □ 1 *	61	MCD ◇ T3120	MCD ◇ T3120E	C-frame	Approx. 0.9							
	Single phase/3-phase 200 V	200	MHMD022 □ 1 *	60	MAD ◇ T1507	MAD ◇ T1507E	A-frame	Approx. 0.5								
		400	MHMD042 □ 1 *	62	MBD ◇ T2510	MBD ◇ T2510E	B-frame	Approx. 0.9								
		750	MHMD082 □ 1 *	63	MCD ◇ T3520	MCD ◇ T3520E	C-frame	Approx. 1.3								

Note) 1 Rotary encoder specifications: □ Motor specification: * (refer to P.16)

Note) 2 ◇ : Drivers series K: A5II series H: A5 series

Note) 3 ◇ : Drivers series K: A5IE series H: A5E series

Note) 4 Because A5IE, A5E series drivers (dedicated for position control) do not support the 17-bit absolute specification, only 20-bit incremental type can be used in combination.

Note) 5 Cable length: ** (03: 3 m, 05: 5 m, 10: 10 m, 20: 20 m) (Example. 3 m: MFECA0030EAM)

Note) 6 Cables for opposite to output shaft cannot be used with 50 W or 100 W motor.

Note) 7 When you use a 17-bit absolute encoder as an incremental encoder, please use the encoder cable MFECA0**0EAD.

Note) 8 Please note that a battery is not supplied together with 17-bit absolute encoder cable (with battery box). Please buy the battery part number "DV0P2990" separately.

• Selection of cable for MSME motor (Movable: For application where the cable is movable.) (Fixed: For application where the cable is fixed.)

• Encoder cable

Example: MFECA0**0 ◇ △ □

Symbol	Specifications	△ : Cable direction	□ : Encoder Specifications
M	Movable	J	Direction of motor shaft
T	Fixed	K	Opposite direction of motor shaft
		D	20-bit Incremental
		E	17-bit Absolute

• Motor cable

Example: MFMCA0**0 ◇ △ D

Symbol	Specifications	△ : Cable direction	
N	Movable	J	Direction of motor shaft
R	Fixed	K	Opposite direction of motor shaft

• Brake cable

Example: MFMCB0**0 ◇ △ T

Symbol	Specifications	△ : Cable direction	
P	Movable	J	Direction of motor shaft
S	Fixed	K	Opposite direction of motor shaft

• Options

Title	Part No.	Page		
Interface Cable	DV0P4360	197		
Interface Conversion Cable	DV0P4120			
	DV0P4121			
	DV0P4130			
	DV0P4131			
Connector Kit for Power Supply Input Connection	DV0PM20032	200		
	DV0PM20033			
Connector Kit for Motor Connection	DV0PM20034	201		
	DV0P4290			
Connector Kit for Motor/Encoder Connection	DV0P4380	202		
	DV0PM20035			
	DV0P4170			
Connector Kit for Motor/Brake Connection	DV0PM20040	206		
	DV0P4283			
Connector Kit	RS485, RS232	DV0PM20024	198	
	Safety	DV0PM20025		
	Interface	DV0P4350		
	External Scale	DV0PM20026		
	Encoder	DV0PM20010		
Analog Monitor Signal	DV0PM20031	199		
	DV0P2990			
Battery For Absolute Encoder	DV0P4430	207		
Mounting Bracket	A-frame	DV0PM20027	208	
	B-frame	DV0PM20028		
	C-frame	DV0PM20029		
Encoder Cable	without Battery Box	MFECA0**0EAD	188	
		MFECA0**0EAM		
		MFECA0**0MJD		
	with Battery Box (Note) 8	MFECA0**0MKD		189
		MFECA0**0TJD		
Motor Cable	without Brake	MFECA0**0TKD	191	
		MFECA0**0EAE		
		MFECA0**0MJE		
		MFECA0**0MKE		
		MFECA0**0TJE		
Brake Cable		MFECA0**0TKE	188	
		MFECA0**0EAE		
		MFECA0**0MJE		
		MFECA0**0MKE		
		MFECA0**0TJE		
External Regenerative Resistor	50 Ω 25 W	DV0P4280	210	
	100 Ω 25 W	DV0P4281		
	25 Ω 50 W	DV0P4282		
	50 Ω 50 W	DV0P4283		
	30 Ω 100 W	DV0P4284		
Reactor	20 Ω 130 W	DV0P4285	209	
	DV0P220, DV0P221, DV0P222, DV0P223, DV0P224, DV0P225, DV0P227, DV0P228, DV0P20047	DV0P227		
	DV0P4170, DV0PM20042, DV0P4220, DV0PM20043	DV0P228		
	DV0P3410	DV0P220		
		DV0P220		
Noise Filter	Single phase	DV0P4190	253	
	3-phase (200 V)	DV0P1450		
Surge Absorber		DV0P1460	254	

A5 Family

Table of Part Numbers and Options

400 W to 15.0 kW IP67 motor (MSME MDME MFME)

Motor					Driver			Power capacity (at rated load) (kVA)	Encoder Cable		Optional parts					
Motor series	Power supply	Output (W)	Part No. (Note) 1	Rating/Spec. (page)	A5II series A5 series Part No. (Speed, Position, Torque, Full-Closed type) (Note) 2	A5IE series A5E series Part No. (Position control type) (Note) 3,4	Frame		20-bit Incremental	17-bit Absolute	Motor Cable		Brake Cable (Note) 5	External Regenerative Resistor	Reactor (Single phase) (3-phase)	Noise Filter
									(Note) 5	(Note) 4,5,9	without Brake (Note) 5	with Brake (Note) 5				
Low inertia MSME 3000 r/min	Single phase/3-phase 200 V	1000	MSME102 □ 1 *	74	MDD ◇ T5540	MDD ◇ T5540E	D-frame	Approx. 1.8	MFECA 0**0ETD	MFECA 0**0ETE		—	DV0P4284	DV0P228	DV0P4220	
		1500	MSME152 □ 1 *	75	MDD ◇ T5540	MDD ◇ T5540E								Approx. 2.3		DV0P222
	3-phase 200 V	2000	MSME202 □ 1 *	76	MED ◇ T7364	MED ◇ T7364E	E-frame	Approx. 3.3						DV0P20047	DV0P222	DV0P20043
		3000	MSME302 □ 1 *	77	MFD ◇ TA390	MFD ◇ TA390E	F-frame	Approx. 4.5						DV0P224	DV0P225	
		4000	MSME402 □ 1 *	78	MFD ◇ TB3A2	MFD ◇ TB3A2E		Approx. 6								
	3-phase 400 V	5000	MSME502 □ 1 *	79	MFD ◇ TB3A2	MFD ◇ TB3A2E	F-frame	Approx. 7.5						DV0P4285 (Note) 7	DV0P3410	
		750	MSME084 □ 1 *	104	MDD ◇ T2412	MDD ◇ T2412E	D-frame	Approx. 1.6						MFCA 0**3ECT		MFCA 0**3FCT
		1000	MSME104 □ 1 *	105	MDD ◇ T3420	MDD ◇ T3420E		Approx. 1.8								
		1500	MSME154 □ 1 *	106	MDD ◇ T3420	MDD ◇ T3420E	Approx. 2.3									
		2000	MSME204 □ 1 *	107	MED ◇ T4430	MED ◇ T4430E	E-frame	Approx. 3.3								
	3000	MSME304 □ 1 *	108	MFD ◇ T5440	MFD ◇ T5440E	F-frame	Approx. 4.5									
	3-phase 400 V	4000	MSME404 □ 1 *	109	MFD ◇ TA464	MFD ◇ TA464E	F-frame	Approx. 6						MFCA 0**3ECT	MFCA 0**3FCT	
		5000	MSME504 □ 1 *	110	MFD ◇ TA464	MFD ◇ TA464E		Approx. 7.5								
		3-phase 200 V	750	MDME084 □ 1 *	104	MDD ◇ T2412	MDD ◇ T2412E	D-frame								Approx. 1.6
1000			MDME104 □ 1 *	105	MDD ◇ T3420	MDD ◇ T3420E	Approx. 1.8									
1500			MDME154 □ 1 *	106	MDD ◇ T3420	MDD ◇ T3420E	Approx. 2.3									
2000			MDME204 □ 1 *	107	MED ◇ T4430	MED ◇ T4430E	E-frame	Approx. 3.3								
3000			MDME304 □ 1 *	108	MFD ◇ T5440	MFD ◇ T5440E	F-frame	Approx. 4.5								
4000	MDME404 □ 1 *		109	MFD ◇ TA464	MFD ◇ TA464E	F-frame	Approx. 6									
5000	MDME504 □ 1 *	110	MFD ◇ TA464	MFD ◇ TA464E	Approx. 7.5											

Options (IP67 motor)			Title	Part No.	Page
Interface Cable			Interface Cable	DV0P4360	197
	Interface Conversion Cable			DV0P4120	
				DV0P4121	
				DV0P4130	
Connector Kit for Power Supply Input Connection	A-frame to D-frame	Single row type	DV0P4131	200	
		Double row type	DV0PM20032		
	E-frame (200 V)				DV0PM20033
					DV0PM20044
E-frame (400 V)			DV0PM20051		
			DV0PM20052		
Connector Kit for Control Power Supply Input Connection	D-frame and E-frame (400 V)		DV0PM20053	201	
Connector Kit for Motor Connection	A-frame to D-frame		DV0PM20034	201	
	E-frame (200 V)		DV0PM20046		
	D-frame (400 V)		DV0PM20054		
Connector Kit for Regenerative Resistor	E-frame		DV0PM20045	201	
	D-frame (400 V)		DV0PM20055		
Connector Kit for Motor/Encoder Connection			DV0PM20036	203	
			DV0PM20037	204	
			DV0PM20038	205	
			DV0PM20039	205	
Connector Kit	RS485, RS232		DV0PM20024	198	
	Safety		DV0PM20025		
	Interface		DV0P4350		
	External Scale		DV0PM20026		
	Encoder		DV0PM20010		
Battery For Absolute Encoder			DV0PM20031	207	
Battery Box (Note) 9			DV0P2990	207	
Mounting Bracket	D-frame		DV0P4430	208	
Encoder Cable	without Battery Box		MFECA0**0ETD	190	
	with Battery Box (Note) 9		MFECA0**0ETE		
Motor Cable	without Brake			MFCA0**2ECD	191
				MFCD0**2ECD	192
				MFCE0**2ECD	192
	with Brake			MFCA0**3ECT	193
				MFCD0**3ECT	
				MFCA0**2FCD	
				MFCE0**2FCD	
				MFCA0**3FCT	
				MFCE0**3FCT	
External Regenerative Resistor	50 Ω 25 W		DV0P4280	210	
	100 Ω 25 W		DV0P4281		
	25 Ω 50 W		DV0P4282		
	50 Ω 50 W		DV0P4283		
	30 Ω 100 W		DV0P4284		
	20 Ω 130 W		DV0P4285		
Reactor	120 Ω 80 W		DV0PM20048	209	
	80 Ω 190 W		DV0PM20049		
	DV0P220, DV0P221, DV0P222, DV0P223, DV0P224, DV0P225, DV0P227, DV0P228, DV0PM20047				
Noise Filter	DV0P4170, DV0PM20042		DV0P4280	250	
	DV0P4220, DV0PM20043		DV0P4281		
Surge Absorber	Single phase		DV0P4282	253	
	3-phase (200V)		DV0P4190		
	3-phase (400V)		DV0PM1450		
Noise Filter for Signal Lines			DV0PM20050	254	

Note) 1 Rotary encoder specifications: □ Motor specification: * (refer to P.16)
 Note) 2 ◇ : Drivers series K: A5II series H: A5 series Note) 3 ◇ : Drivers series K: A5IE series H: A5E series
 Note) 4 Because A5IE, A5E series drivers (dedicated for position control) do not support the 17-bit absolute specification, only 20-bit incremental type can be used in combination.
 Note) 5 Cable length: ** (03: 3 m, 05: 5 m, 10: 10 m, 20: 20 m), (Example. 3 m: MFECA0030EAM)

Note) 6 Recommend to get the connector kit of options.
 Note) 7 Other combinations exist, and refer to P.210 for details.
 Note) 8 Reactor should be prepared by the user.
 Note) 9 Please note that a battery is not supplied together with 17-bit absolute encoder cable (with battery box). Please buy the battery part number "DV0P2990" separately.

A5 Family

Table of Part Numbers and Options

0.9 kW to 7.5 kW IP67 motor (MGME/MHME)

Motor					Driver			Power capacity (at rated load) (kVA)	Optional parts											
Motor series	Power supply	Output (W)	Part No. (Note) 1	Rating/Spec. (page)	A5II series A5 series Part No. (Speed, Position, Torque, Full-Closed type) (Note) 2	A5IE series A5E series Part No. (Position control type) (Note) 3,4	Frame		Encoder Cable		Motor Cable		Brake Cable (Note) 5	External Regenerative Resistor	Reactor (Single phase) 3-phase	Noise Filter				
									20-bit Incremental (Note) 5	17-bit Absolute (Note) 4,5,9	without Brake (Note) 5	with Brake (Note) 5								
Middle inertia	MGME (Low speed/ High torque type) 1000 r/min	Single phase/ 3-phase 200 V	900	MGME092 □ 1 *	92	MDD ◇ T5540	MDD ◇ T5540E	D-frame	Approx. 1.8	MFECA 0**0ETD	MFECA 0**0ETE	—	DV0P4284	DV0P228 DV0P221	DV0P4220					
		3-phase 200 V	2000	MGME202 □ 1 *	93	MFD ◇ TA390	MFD ◇ TA390E	F-frame	Approx. 3.8					MFMCA 0**3ECT		MFMCA 0**3FCT	—	DV0P4285 x2 in parallel	DV0P223 DV0P224	DV0P3410
			3000	MGME302 □ 1 *	94	MFD ◇ TB3A2	MFD ◇ TB3A2E		Approx. 4.5											
			4500	MGME452 □ 1 *	95	MFD ◇ TB3A2	MFD ◇ TB3A2E		Approx. 7.5											
			6000	MGME602 □ 1 *	96	MGD ◇ TC3B4	—		G-frame										Approx. 9.0	
	3-phase 400 V	900	MGME094 □ 1 *	125	MDD ◇ T3420	MDD ◇ T3420E	D-frame	Approx. 1.8	MFECA 0**0ETD	MFECA 0**0ETE	—	DV0PM20048	— (Note) 7	Recommended components P.252						
		2000	MGME204 □ 1 *	126	MFD ◇ T5440	MFD ◇ T5440E	F-frame	Approx. 3.8												
		3000	MGME304 □ 1 *	127	MFD ◇ TA464	MFD ◇ TA464E		Approx. 4.5												
		4500	MGME454 □ 1 *	128	MFD ◇ TA464	MFD ◇ TA464E		Approx. 7.5												
		6000	MGME604 □ 1 *	129	MGD ◇ TB4A2	—		G-frame							Approx. 9.0	— (Note) 6	— (Note) 6			
High inertia	MHME 2000 r/min	Single phase/ 3-phase 200 V	1000	MHME102 □ 1 *	97	MDD ◇ T3530	MDD ◇ T3530E	D-frame	Approx. 1.8	MFECA 0**0ETD	MFECA 0**0ETE	—	DV0P4284	DV0P228 DV0P222	DV0P4220					
		3-phase 200 V	1500	MHME152 □ 1 *	98	MDD ◇ T5540	MDD ◇ T5540E		Approx. 2.3					MFMCE 0**2ECD		MFMCE 0**2FCD	—	DV0P4285 Note) 8	DV0P223	DV0PM20043
			2000	MHME202 □ 1 *	99	MED ◇ T7364	MED ◇ T7364E	E-frame	Approx. 3.3											
			3000	MHME302 □ 1 *	100	MFD ◇ TA390	MFD ◇ TA390E	F-frame	Approx. 4.5											
			4000	MHME402 □ 1 *	101	MFD ◇ TB3A2	MFD ◇ TB3A2E		Approx. 6											
		5000	MHME502 □ 1 *	102	MFD ◇ TB3A2	MFD ◇ TB3A2E	Approx. 7.5	— (Note) 6	— (Note) 6					— (Note) 7		Recommended components P.252				
		7500	MHME752 □ 1 *	103	MGD ◇ TC3B4	—	G-frame										Approx. 11			
		3-phase 400 V	1000	MHME104 □ 1 *	130	MDD ◇ T2412	MDD ◇ T2412E										D-frame	Approx. 1.8	MFECA 0**0ETD	MFECA 0**0ETE
			1500	MHME154 □ 1 *	131	MDD ◇ T3420	MDD ◇ T3420E	Approx. 2.3												
			2000	MHME204 □ 1 *	132	MED ◇ T4430	MED ◇ T4430E	E-frame	Approx. 3.3											
	3000		MHME304 □ 1 *	133	MFD ◇ T5440	MFD ◇ T5440E	F-frame	Approx. 4.5												
	4000		MHME404 □ 1 *	134	MFD ◇ TA464	MFD ◇ TA464E		Approx. 6												
	5000	MHME504 □ 1 *	135	MFD ◇ TA464	MFD ◇ TA464E	Approx. 7.5	— (Note) 6	— (Note) 6	— (Note) 7	Recommended components P.252										
	7500	MHME754 □ 1 *	136	MGD ◇ TB4A2	—	G-frame					Approx. 9.0									

- Note) 1 Rotary encoder specifications: □ Motor specification: * (refer to P.16)
 Note) 2 ◇ : Drivers series K: A5II series H: A5 series
 Note) 3 ◇ : Drivers series K: A5IE series H: A5E series
 Note) 4 Because A5IE, A5E series drivers (dedicated for position control) do not support the 17-bit absolute specification, only 20-bit incremental type can be used in combination.
 Note) 5 Cable length: ** (03: 3 m, 05: 5 m, 10: 10 m, 20: 20 m), (Example. 3 m: MFECA0030EAM)
 Note) 6 Recommend to get the connector kit of options.
 Note) 7 Reactor should be prepared by the user.
 Note) 8 Other combinations exist, and refer to P.210 for details.
 Note) 9 Please note that a battery is not supplied together with 17-bit absolute encoder cable (with battery box). Please buy the battery part number "DV0P2990" separately.

Options (IP67 motor)		
Title	Part No.	Page
Interface Cable	DV0P4360	197
Interface Conversion Cable	DV0P4120	
	DV0P4121	
	DV0P4130	
	DV0P4131	
Connector Kit for Power Supply Input Connection	DV0PM20032	200
	DV0PM20033	
	DV0PM20044	
	DV0PM20051	
Connector Kit for Control Power Supply Input Connection	DV0PM20052	201
	DV0PM20053	
Connector Kit for Motor Connection	DV0PM20034	201
	DV0PM20046	
Connector Kit for Regenerative Resistor	DV0PM20054	201
	DV0PM20045	
Connector Kit for Motor/Encoder Connection	DV0PM20036	203
	DV0PM20037	
	DV0PM20038	
	DV0PM20039	
Connector Kit	DV0PM20024	198
	DV0PM20025	
	DV0P4350	
	DV0PM20026	
	DV0PM20010	
Battery For Absolute Encoder	DV0P2990	207
	DV0P4430	
Battery Box (Note) 9	DV0P4430	208
Mounting Bracket	DV0PM20030	208
Encoder Cable	MFECA0**0ETD	190
	MFECA0**0ETE	
Motor Cable	MFMCA0**2ECD	191
	MFMCD0**2ECD	
	MFMCE0**2ECD	
	MFMCF0**2ECD	
	MFMCA0**3ECT	
	MFMCD0**3ECT	
without Brake	MFMCA0**2FCD	192
	MFMCE0**2FCD	
	MFMCA0**3FCT	
with Brake	MFMCE0**2FCD	194
	MFMCD0**2FCD	
	MFMCA0**3FCT	
External Regenerative Resistor	50 Ω 25 W	210
	100 Ω 25 W	
	25 Ω 50 W	
	50 Ω 50 W	
	30 Ω 100 W	
	20 Ω 130 W	
	120 Ω 80 W	
80 Ω 190 W		
Reactor	DV0P220, DV0P221, DV0P222, DV0P223, DV0P224, DV0P225, DV0P227, DV0P228, DV0PM20047	209
	DV0P4170, DV0PM20042	
	DV0P4220, DV0PM20043	
	DV0P3410	
	DV0P4190	
Surge Absorber	3-phase (200 V)	253
	3-phase (400 V)	
Noise Filter for Signal Lines	DV0P1460	254

Basic Specifications	Input power	100 V	Main circuit	Single phase, 100 V to 120 V	+10 % -15 %	50 Hz/60 Hz		
			Control circuit	Single phase, 100 V to 120 V	+10 % -15 %	50 Hz/60 Hz		
		200 V	Main circuit	A-frame to D-frame	Single/3-phase, 200 V to 240 V	+10 % -15 %	50 Hz/60 Hz	
				E-frame to H-frame	3-phase, 200 V to 230 V	+10 % -15 %	50 Hz/60 Hz	
			Control circuit	A-frame to D-frame	Single phase, 200 V to 240 V	+10 % -15 %	50 Hz/60 Hz	
				E-frame to H-frame	Single phase, 200 V to 230 V	+10 % -15 %	50 Hz/60 Hz	
		400 V	Main circuit	D-frame to H-frame	3-phase, 380 V to 480 V	+10 % -15 %	50 Hz/60 Hz	
			Control circuit	D-frame to H-frame	DC 24 V ± 15 %			
		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 (No continuous use at resonance frequency)				
	Control method		IGBT PWM Sinusoidal wave drive					
	Encoder feedback		17-bit (131072 resolution) absolute encoder, 7-wire serial 20-bit (1048576 resolution) incremental encoder, 5-wire serial					
	Feedback scale feedback	A/B phase	A/B phase, initialization signal differential input.					
		serial	Manufacturers that support serial communication scale: DR. JOHANNES HEIDENHAIN GmbH Fagor Automation S.Coop. Magnescale Co., Ltd. Mitutoyo Corporation Nidec Sankyo Corporation Renishaw plc					
	Parallel I/O 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 (16Bit A/D : 1 input, 12Bit A/D : 2 inputs)				
			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	Connection with PC etc.					
		RS232	1 : 1 communication					
		RS485	1 : n communication up to 31 axes to a host.					
	Safety function		Used for functional safety.					
Front panel		(1) 5 keys (2) LED (6-digit) (3) Connector for monitor (Analog monitor output (2ch), Digital monitor output (1ch))						
Regeneration		A, B, G and H-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 G-frame: Built-in (external resistor is also available to G-frame) H-frame: External only						
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.

*2 Not applicable to 2DOF control system.

Function	Position control	Control input		(1) Deviation counter clear (2) Command pulse inhibition (3) Electric gear (4) Damping control switching etc.			
		Control output		Positioning complete (In-position) etc.			
		Pulse input	Max. command pulse frequency	Exclusive interface for Photo-coupler: 500 kpps Exclusive interface for line driver : 4 Mpps			
			Input pulse signal format	Differential input (1) Positive and Negative direction, (2) A and B-phase, (3) Command and direction)			
			Electronic gear (Division/Multiplication of command pulse)	1/1000 times to 1000 times			
			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.			
		Instantaneous Speed Observer		Available			
		Damping Control		Available			
		2DOF settings		Only available at A5II Series			
		Speed control	Control input		(1) Selection of internal velocity setup 1 (2) Selection of internal velocity setup 2 (3) Selection of internal velocity setup 3 (4) Speed zero clamp etc.		
	Control output		Speed arrival etc.				
	Analog input		Velocity command input	Speed command input can be provided by means of analog voltage. Parameters are used for scale setting and command polarity. (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 8speed 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		Speed zero clamp input is enabled.				
	Instantaneous Speed Observer		Available				
	Speed Control filter		Available				
	2DOF settings		Only available at A5II Series				
	Torque control ^{*2}		Control input		Speed zero clamp, Torque command sign input etc.		
		Control output		Speed arrival etc.			
		Analog input	Torque command input	Speed command input can be provided by means of analog voltage. Parameters are used for scale setting and command polarity. (3 V/rated torque Default)			
			Speed limit function	Speed limit value with parameter is enabled.			
Control input		(1) Deviation counter clear (2) Command pulse inhibition (3) Command dividing gradual increase switching (4) Damping control switching etc.					
Control output		Full-closed positioning complete etc.					
Full-closed control ^{*2}	Pulse input	Max. command pulse frequency	Exclusive interface for Photo-coupler: 500 kpps Exclusive interface for line driver : 4 Mpps				
		Input pulse signal format	Differential input				
		Electronic gear (Division/Multiplication of command pulse)	1/1000 times to 1000 times				
		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.				
Setup range of division/multiplication of feedback scale		1/40 times to 160 times					
Damping 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.				
		Soft error	Excess position deviation, command pulse division error, EEPROM error etc.				
	Traceability of alarm data		The alarm data history can be referred to.				

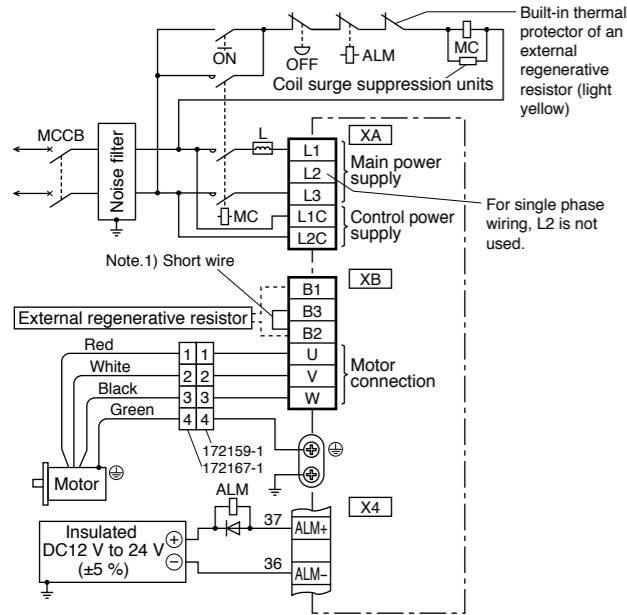
Basic Specifications	Input power	100 V	Main circuit	Single phase, 100 V to 120 V	+10 % -15 %	50 Hz/60 Hz	
			Control circuit	Single phase, 100 V to 120 V	+10 % -15 %	50 Hz/60 Hz	
		200 V	Main circuit	A-frame to D-frame	Single/3-phase, 200 V to 240 V	+10 % -15 %	50 Hz/60 Hz
				E-frame to F-frame	3-phase, 200 V to 230 V	+10 % -15 %	50 Hz/60 Hz
			Control circuit	A-frame to D-frame	Single phase, 200 V to 240 V	+10 % -15 %	50 Hz/60 Hz
				E-frame to F-frame	Single phase, 200 V to 230 V	+10 % -15 %	50 Hz/60 Hz
		400 V	Main circuit	D-frame to F-frame	3-phase, 380 V to 480 V	+10 % -15 %	50 Hz/60 Hz
			Control circuit	D-frame to F-frame	DC 24 V ± 15 %		
		Environment	temperature	Ambient temperature: 0 °C to 50 °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 (No continuous use at resonance frequency)				
	Control method		IGBT PWM Sinusoidal wave drive				
	Encoder feedback		20-bit (1048576 resolution) incremental encoder, 5-wire serial				
	Parallel I/O 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	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	Connection with PC etc.					
Front panel	(1) 5 keys (2) LED (6-digit) (3) Analog monitor output (2ch)						
Regeneration	A, 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	Built-in						
Control mode	(1) Position control (2) Internal velocity control (3) Position/ Internal velocity control						

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

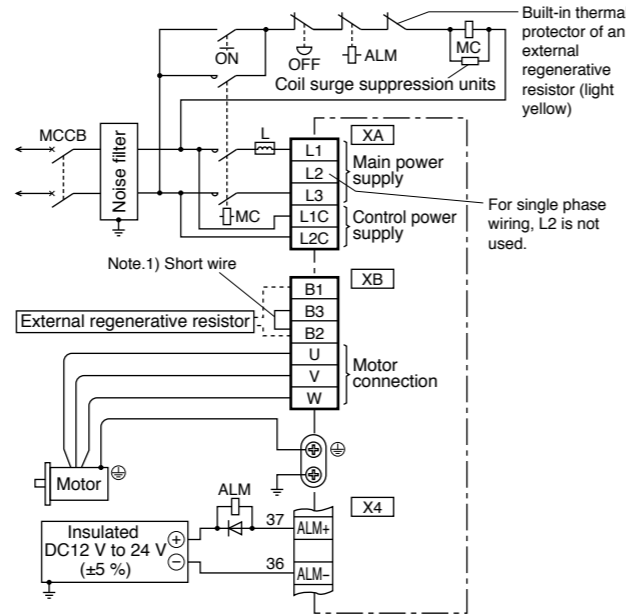
Function	Position control	Control input	(1) Deviation counter clear (2) Command pulse inhibition (3) Electric gear (4) Damping control switching etc.	
		Control output	Positioning complete (In-position) etc.	
		Pulse input	Max. command pulse frequency	Exclusive interface for Photo-coupler: 500 kpps Exclusive interface for line driver : 4 Mpps
			Input pulse signal format	Differential input ((1) Positive and Negative direction, (2) A and B-phase, (3) Command and direction)
			Electronic gear (Division/Multiplication of command pulse)	1/1000 times to 1000 times
			Smoothing filter	Primary delay filter or FIR type filter is adaptable to the command input
		Instantaneous Speed Observer	Available	
		Damping Control	Available	
		2DOF settings	Only available at A5II E Series	
		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.
		Traceability of alarm data	The alarm data history can be referred to.	
		Common		

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

In Case of MSMD, MHMD



In Case of MSME



Note.1)

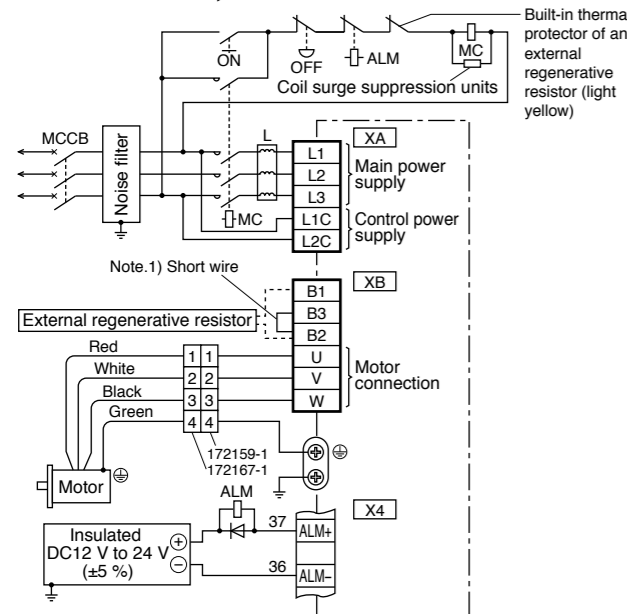
Frame No.	Short wire (Accessory)	Built-in regenerative resistor	Connection of the connector XB	
			In case of using an external regenerative resistor.	In case of not using an external regenerative resistor.
A-frame B-frame	without	without	<ul style="list-style-type: none"> Always open between B2-B3 Connect an external regenerative resistor between B1-B2 	<ul style="list-style-type: none"> Always open between B2-B3
C-frame D-frame	with	with	<ul style="list-style-type: none"> Remove the short wire accessory from between B2-B3. Connect an external regenerative resistor between B1-B2 	<ul style="list-style-type: none"> Shorted between B2-B3 with an attached short wire

Note.1)

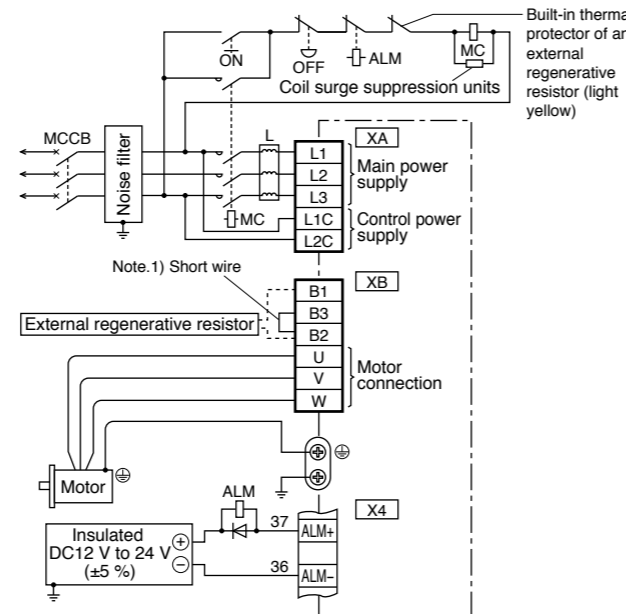
Frame No.	Short wire (Accessory)	Built-in regenerative resistor	Connection of the connector XB	
			In case of using an external regenerative resistor.	In case of not using an external regenerative resistor.
A-frame B-frame	without	without	<ul style="list-style-type: none"> Always open between B2-B3 Connect an external regenerative resistor between B1-B2 	<ul style="list-style-type: none"> Always open between B2-B3
C-frame D-frame	with	with	<ul style="list-style-type: none"> Remove the short wire accessory from between B2-B3. Connect an external regenerative resistor between B1-B2 	<ul style="list-style-type: none"> Shorted between B2-B3 with an attached short wire

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

In Case of MSMD, MHMD



In Case of MSME



Note.1)

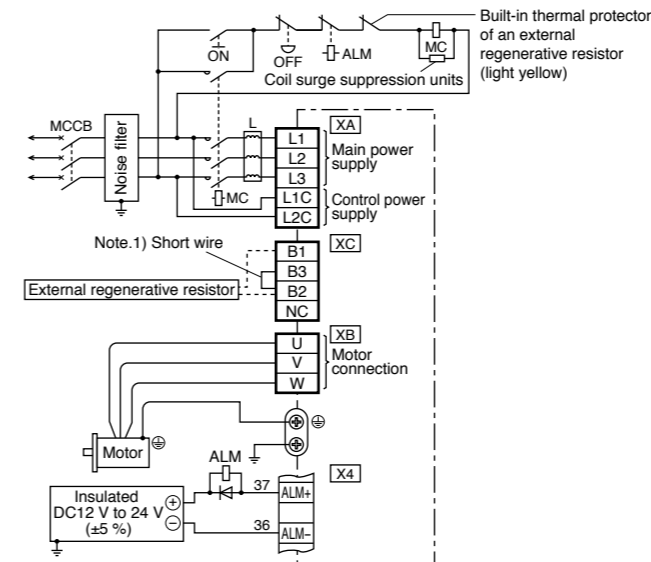
Frame No.	Short wire (Accessory)	Built-in regenerative resistor	Connection of the connector XB	
			In case of using an external regenerative resistor.	In case of not using an external regenerative resistor.
A-frame B-frame	without	without	<ul style="list-style-type: none"> Always open between B2-B3 Connect an external regenerative resistor between B1-B2 	<ul style="list-style-type: none"> Always open between B2-B3
C-frame D-frame	with	with	<ul style="list-style-type: none"> Remove the short wire accessory from between B2-B3. Connect an external regenerative resistor between B1-B2 	<ul style="list-style-type: none"> Shorted between B2-B3 with an attached short wire

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	<ul style="list-style-type: none"> Always open between B2-B3 Connect an external regenerative resistor between B1-B2 	<ul style="list-style-type: none"> Always open between B2-B3
C-frame D-frame	with	with	<ul style="list-style-type: none"> Remove the short wire accessory from between B2-B3. Connect an external regenerative resistor between B1-B2 	<ul style="list-style-type: none"> Shorted between B2-B3 with an attached short wire

* Refer to P.186, P.187, Specifications of Motor connector.

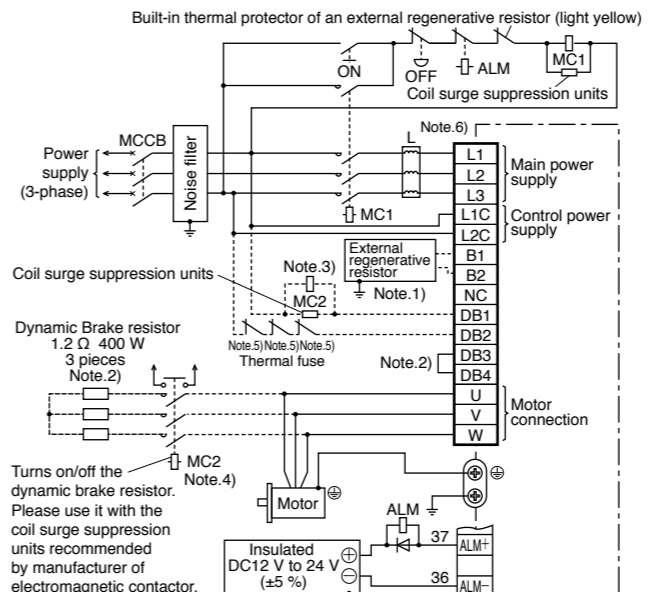
In Case of 3-phase, E-frame, 200 V type



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	<ul style="list-style-type: none"> Remove the short wire accessory from between B2-B3. Connect an external regenerative resistor between B1-B2 	<ul style="list-style-type: none"> Shorted between B2-B3 with an attached short wire

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



Note.1) About regenerative resistor

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.
G-frame	without	without	<ul style="list-style-type: none"> Connect an external regenerative resistor between B1-B2 	<ul style="list-style-type: none"> Open between B1-B2

Note.2) About dynamic brake resistor

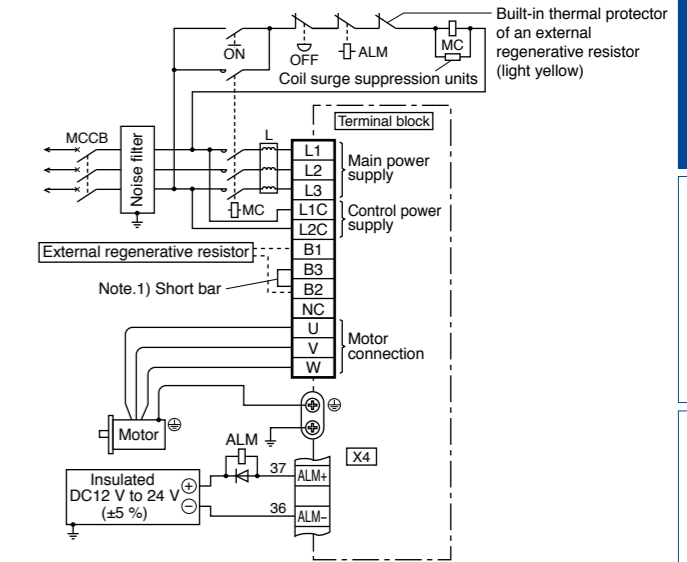
Frame No.	Short bar (Accessory)	Built-in dynamic brake resistor.	Connection of terminal block	
			In case of using an external dynamic brake resistor.	In case of not using an external dynamic brake resistor.
G-frame	with	with	<ul style="list-style-type: none"> Remove attached short bar between DB3-DB4. Connect external dynamic brake resistor as shown above. 	<ul style="list-style-type: none"> Shorted with attached short bar between DB3-DB4 Open between DB1-DB2

<common for G & H frame>

- Note.3) Magnetic contactor MC2 must be the same rating as the contactor MC1 in the main circuit.
- Note.4) Servo may be turned on in the internal sequence if the contact deposits: to protect the system, provide the auxiliary contact.
- Note.5) Provide an external protective device (e.g. thermal fuse) to monitor the temperature of the external dynamic brake resistor.
- Note.6) Reactor should be prepared by the customer.

* Refer to P.186, P.187, Specifications of Motor connector.

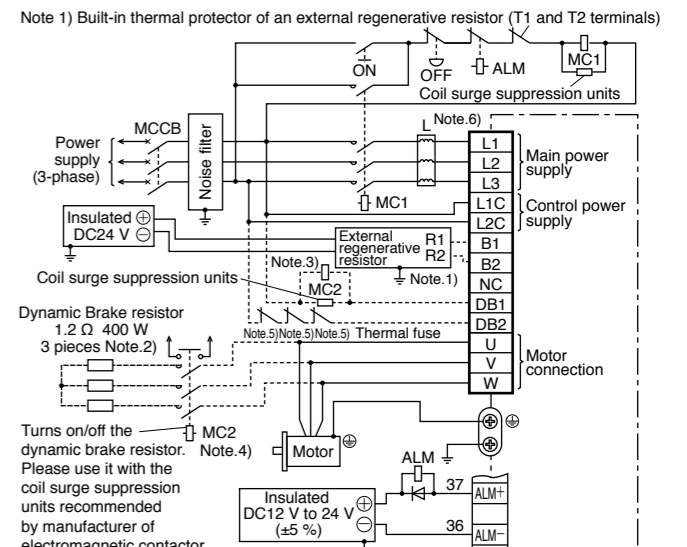
In Case of 3-phase, F-frame, 200 V type



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	<ul style="list-style-type: none"> Remove the short bar accessory from between B2-B3. Connect an external regenerative resistor between B1-B2 	<ul style="list-style-type: none"> Shorted between B2-B3 with an attached short bar

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



Note.1) About regenerative resistor

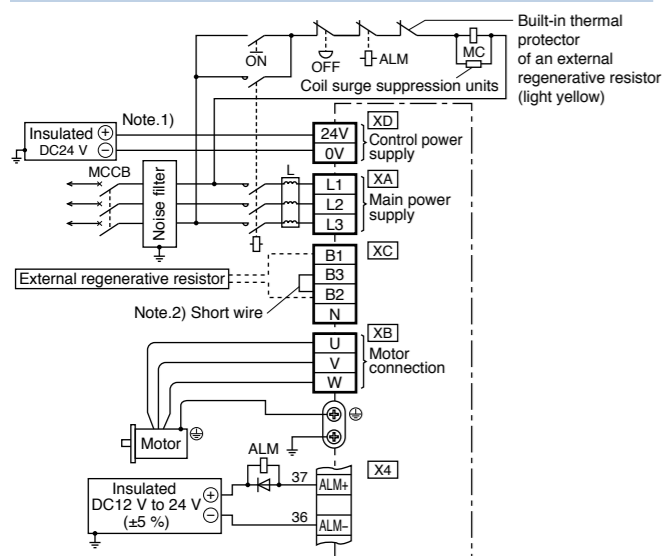
Frame No.	Short bar (Accessory)	Built-in regenerative resistor	Connection of terminal block	
			In case of using an external regenerative resistor.	In case of not using an external regenerative resistor.
H-frame	without	without	<ul style="list-style-type: none"> (External regenerative resistor terminal) Terminal R1, R2 connect to B1, B2 Terminal T1, T2 connect as shown above Terminal 24 V, 0 V connect to DC power supply of DC24 V. E terminal connect to the ground 	<ul style="list-style-type: none"> Open between B1-B2

Specification of external regenerative resistor, please refer to P.139, "Options Components".

Note.2) About dynamic brake resistor

Frame No.	Short bar (Accessory)	Built-in dynamic brake resistor.	Connection of terminal block	
			In case of using an external dynamic brake resistor.	In case of not using an external dynamic brake resistor.
H-frame	without	without	<ul style="list-style-type: none"> Connect external dynamic brake resistor as shown above. 	<ul style="list-style-type: none"> Open between DB1-DB2

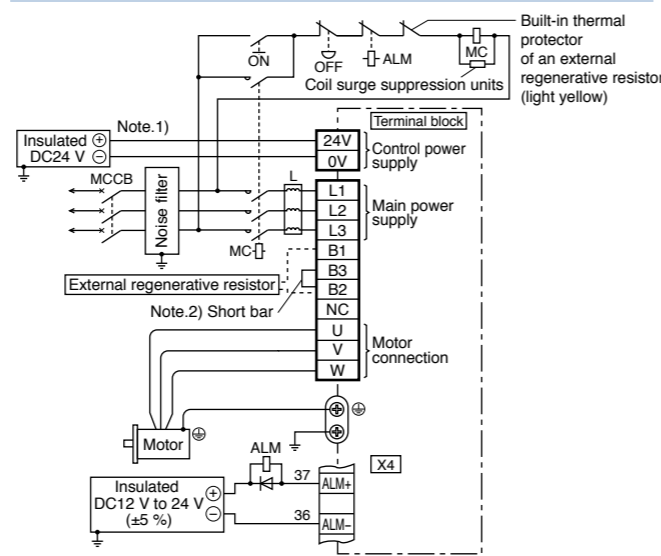
In Case of 3-phase, D-frame and E-frame, 400 V type



Note.1) Shielding the circuit is recommended for the purpose of noise reduction.
Note.2)

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	<ul style="list-style-type: none"> Remove the short wire accessory from between B2-B3. Connect an external regenerative resistor between B1-B2. 	<ul style="list-style-type: none"> Shorted between B2-B3 with an attached short wire.

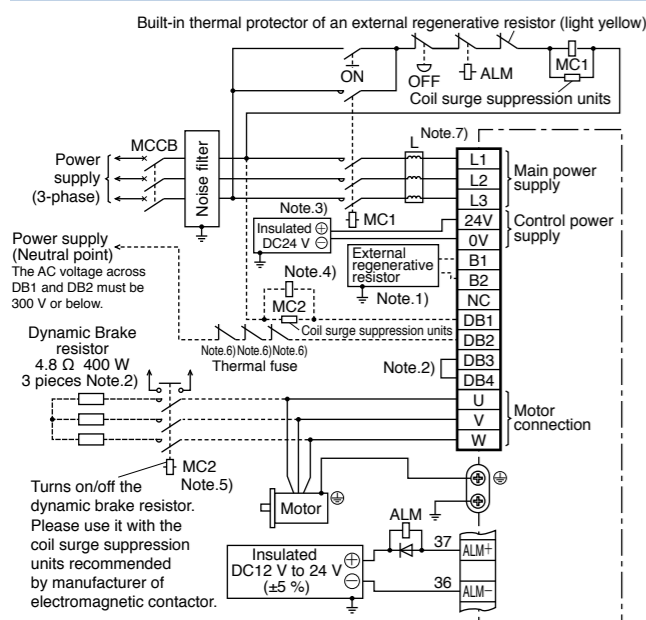
In Case of 3-phase, F-frame, 400 V type



Note.1) Shielding the circuit is recommended for the purpose of noise reduction.
Note.2)

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	<ul style="list-style-type: none"> Remove the short bar accessory from between B2-B3. Connect an external regenerative resistor between B1-B2. 	<ul style="list-style-type: none"> Shorted between B2-B3 with an attached short bar.

In Case of 3-phase, G-frame, 400 V type



Note.1) About regenerative resistor

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.
G-frame	without	without	<ul style="list-style-type: none"> Connect an external regenerative resistor between B1-B2. 	<ul style="list-style-type: none"> Open between B1-B2.

Note.2) About dynamic brake resistor

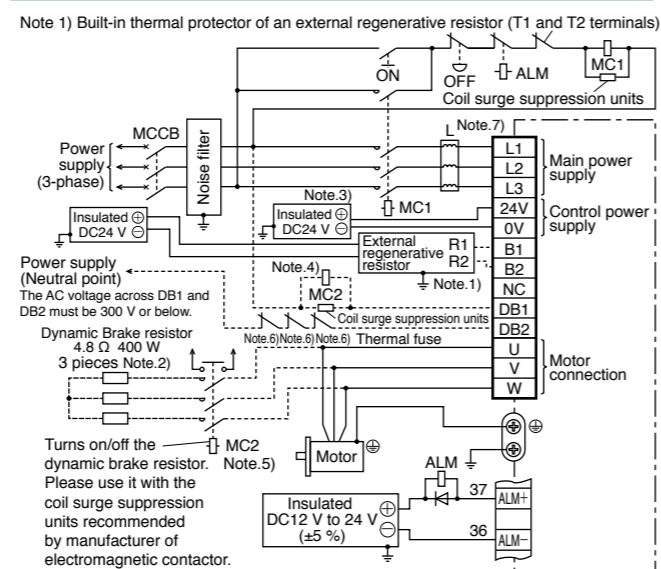
Frame No.	Short bar (Accessory)	Built-in dynamic brake resistor.	Connection of terminal block	
			In case of using an external dynamic brake resistor.	In case of not using an external dynamic brake resistor.
G-frame	with	with	<ul style="list-style-type: none"> Remove attached short bar between DB3-DB4. Connect external dynamic brake resistor as shown above. 	<ul style="list-style-type: none"> Shorted with attached short bar between DB3-DB4. Open between DB1-DB2.

<common for G & H frame>

Note.3) Shielding the circuit is recommended for the purpose of noise reduction.
Note.4) Magnetic contactor MC2 must be the same rating as the contactor MC1 in the main circuit.
Note.5) Servo may be turned on in the external sequence if the contact deposits: to protect the system, provide the auxiliary contact.
Note.6) Provide an external protective device (e.g. thermal fuse) to monitor the temperature of the external dynamic brake resistor.
Note.7) Reactor should be prepared by the customer.

* Refer to P.186, P.187, Specifications of Motor connector.

In Case of 3-phase, H-frame, 400 V type



Note.1) About regenerative resistor

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.
H-frame	without	without	<ul style="list-style-type: none"> (External regenerative resistor terminal) Terminal R1, R2 connect to B1, B2. Terminal T1, T2 connection as shown above. Terminal 24 V, 0 V connect to DC power supply of DC24 V. E terminal connect to the ground. 	<ul style="list-style-type: none"> Open between B1-B2.

Specification of external regenerative resistor, please refer to P.139, "Options Components".

Note.2) About dynamic brake resistor

Frame No.	Short bar (Accessory)	Built-in dynamic brake resistor.	Connection of terminal block	
			In case of using an external dynamic brake resistor.	In case of not using an external dynamic brake resistor.
H-frame	without	without	<ul style="list-style-type: none"> Connect external dynamic brake resistor as shown above. 	<ul style="list-style-type: none"> Open between DB1-DB2.

Wiring to the Connector, X3 (Excluding A5IIE, A5E 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.

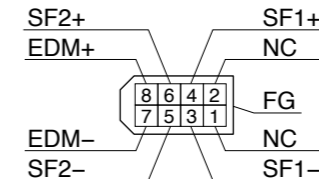
Outline Description of Safe Torque Off (STO)

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 safety state.
This is an alarm condition and the 7-seg LED on the front panel displays the error code number.

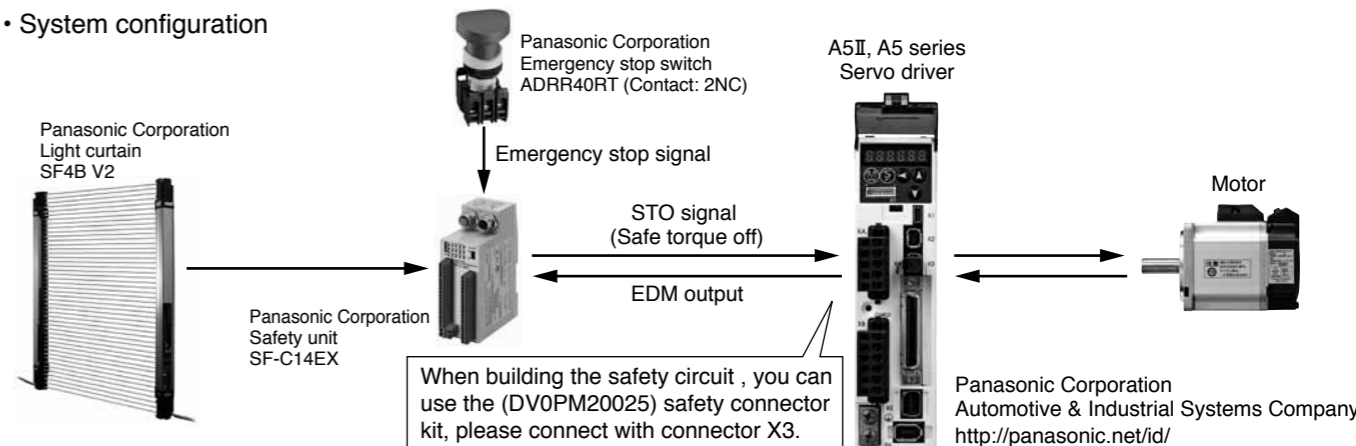
Safety Precautions

- 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)



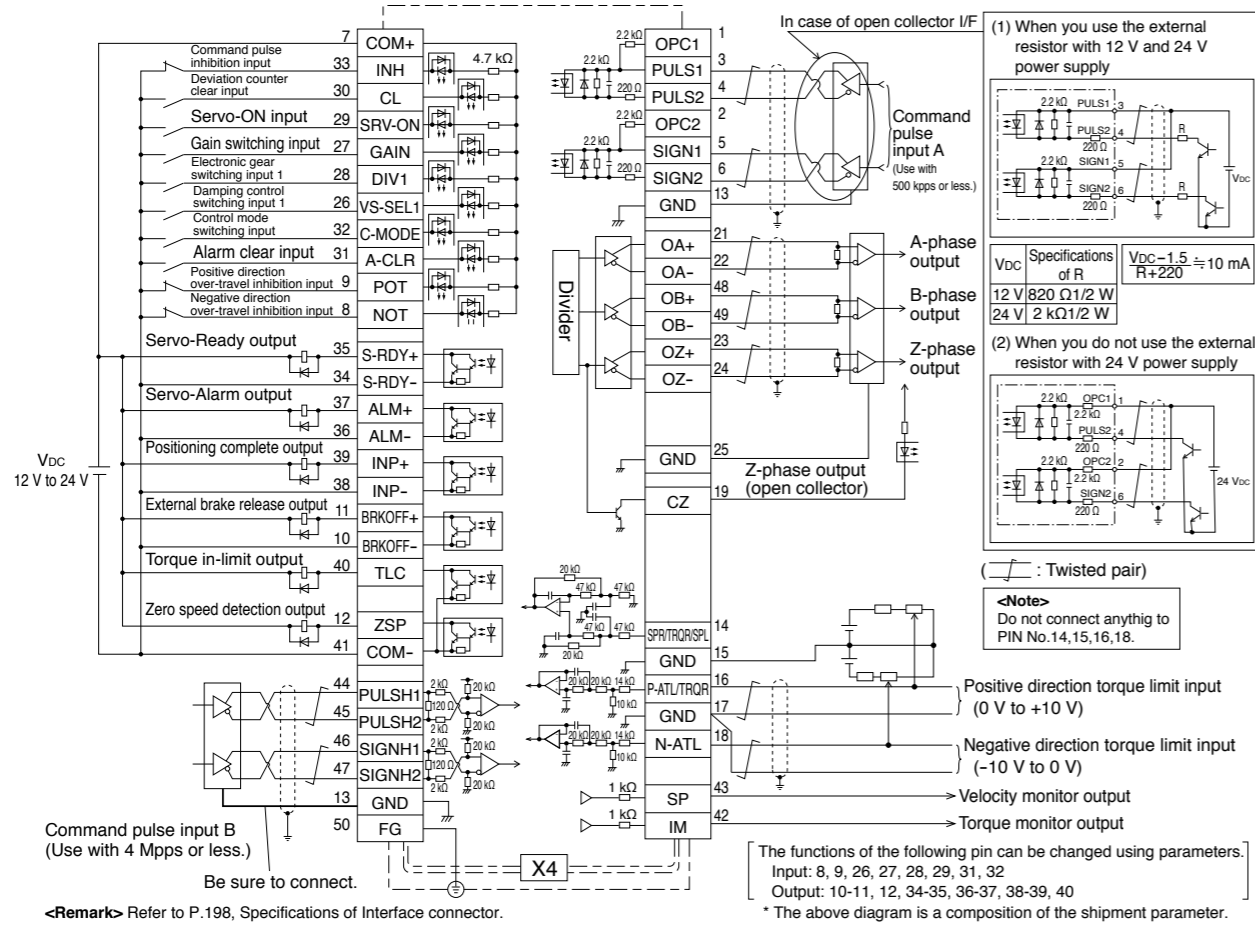
System configuration



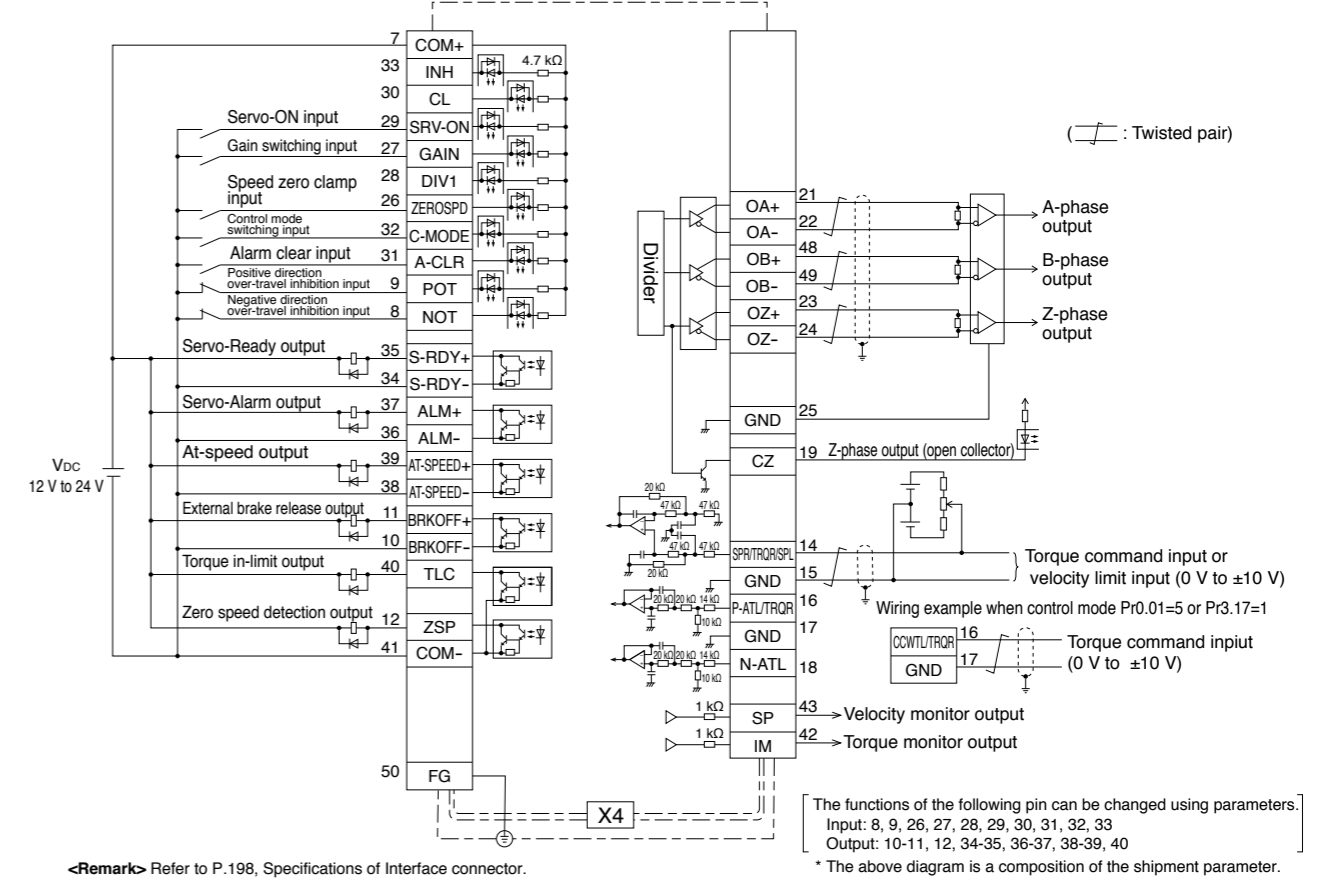
When building the safety circuit, you can use the (DV0PM20025) safety connector kit, please connect with connector X3.

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

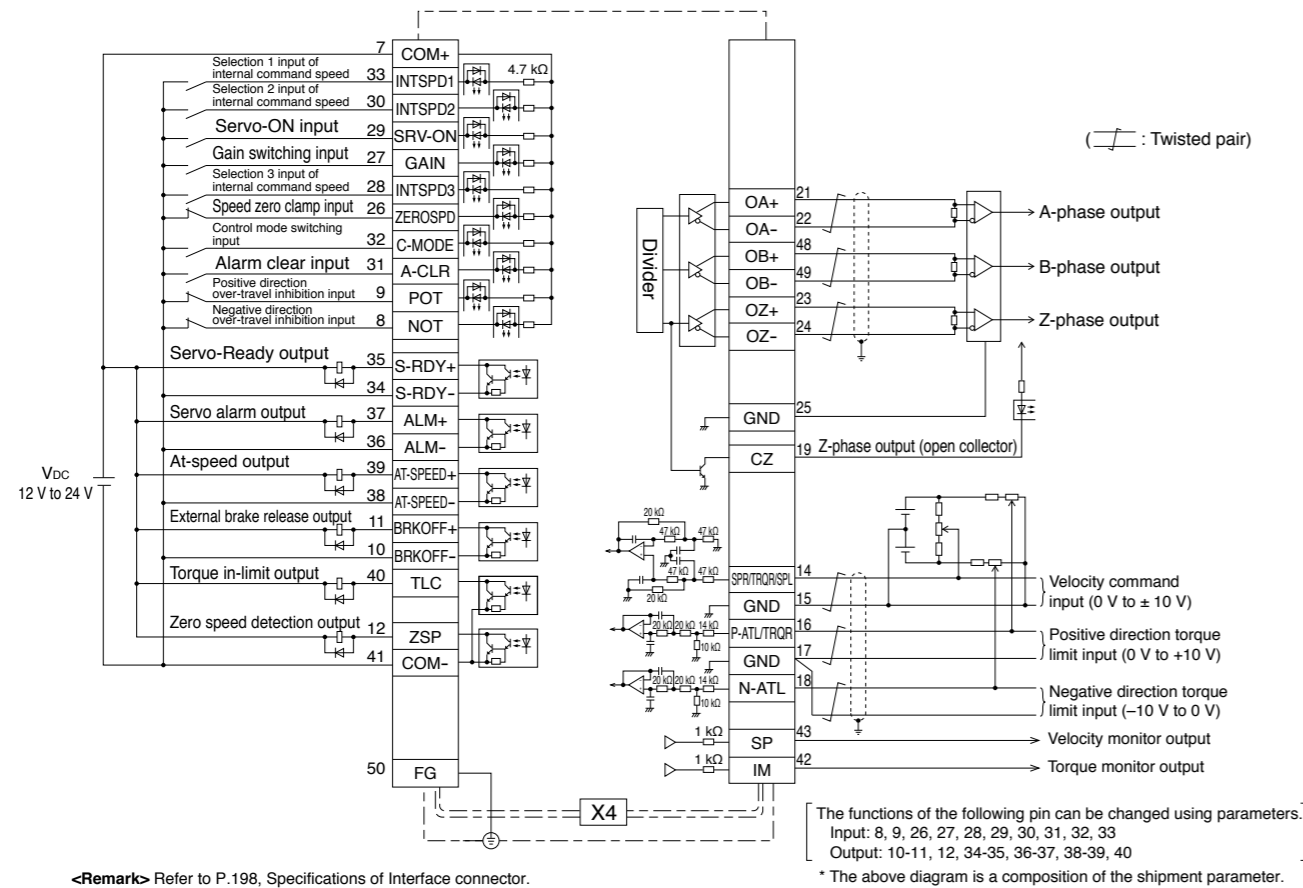
Wiring Example of Position Control Mode



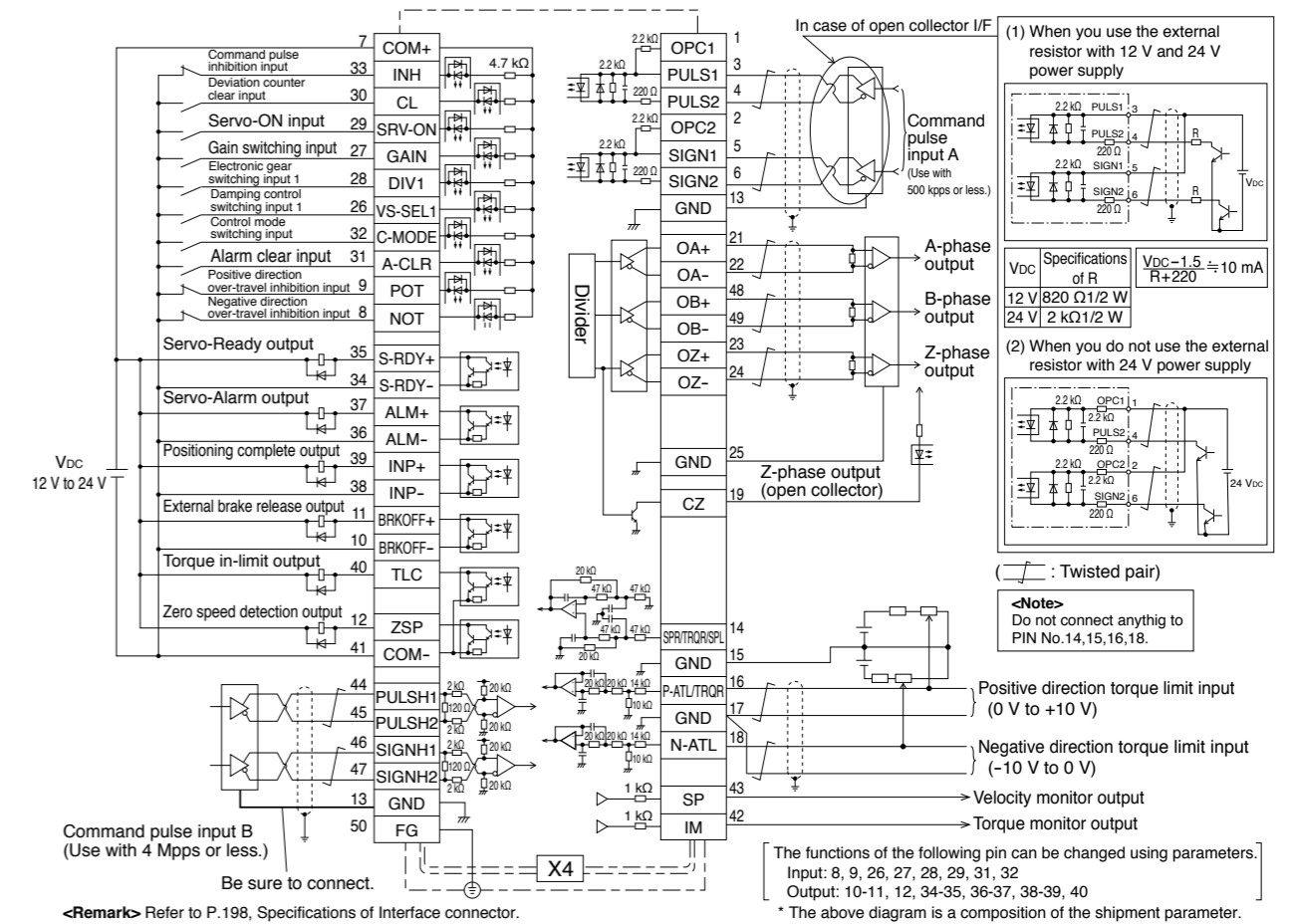
Wiring Example of Torque Control Mode (Excluding A5IE, A5E series)



Wiring Example of Velocity Control Mode (Excluding A5IE, A5E series)



Wiring Example of Full-closed Control Mode (Excluding A5IE, A5E series)



Applicable External Scale

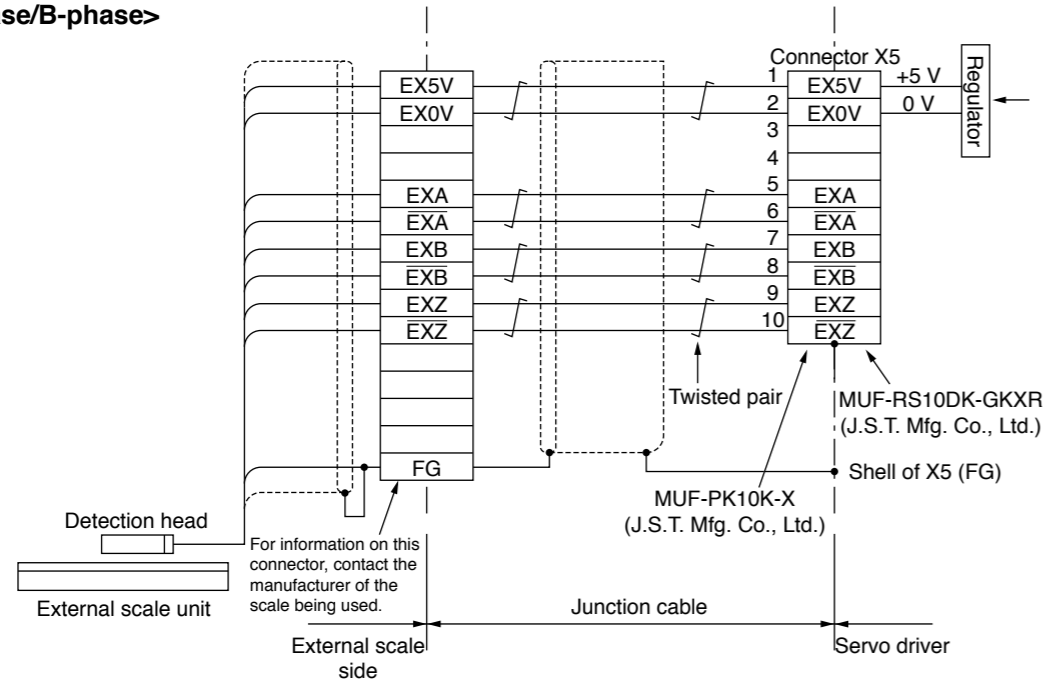
The manufacturers applicable external scales for this product are as follows.

- DR. JOHANNES HEIDENHAIN GmbH
- Fagor Automation S.Coop.
- Magnescale Co., Ltd.
- Mitutoyo Corporation
- Nidec Sankyo Corporation
- Renishaw plc

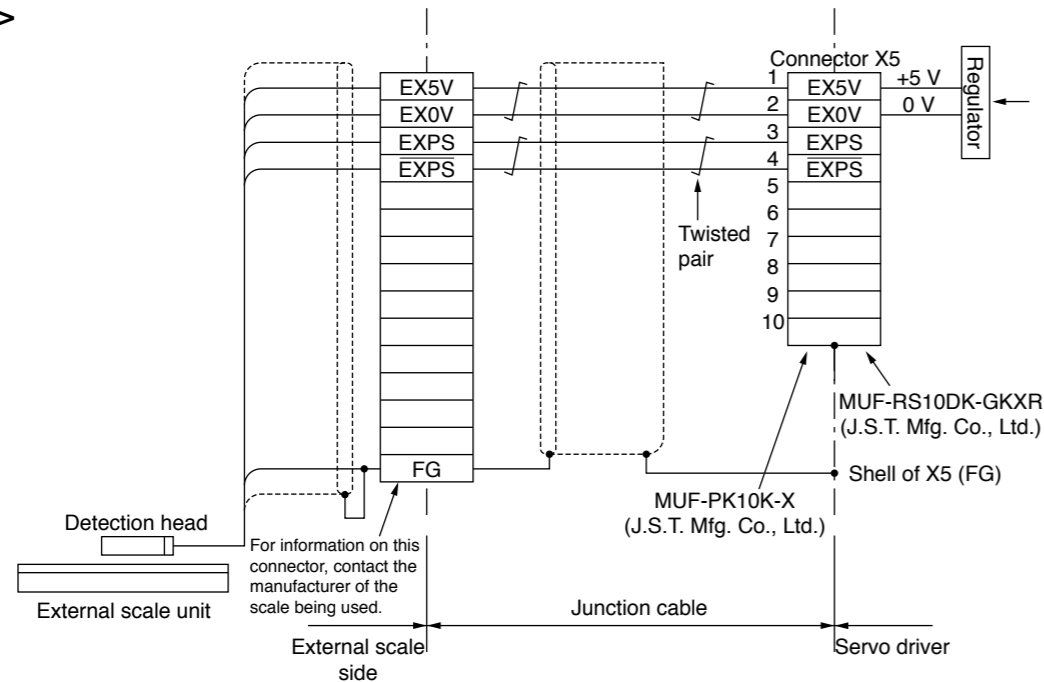
* For the details of the external scale product, contact each company.

Wiring Diagram of X5

<A-phase/B-phase>

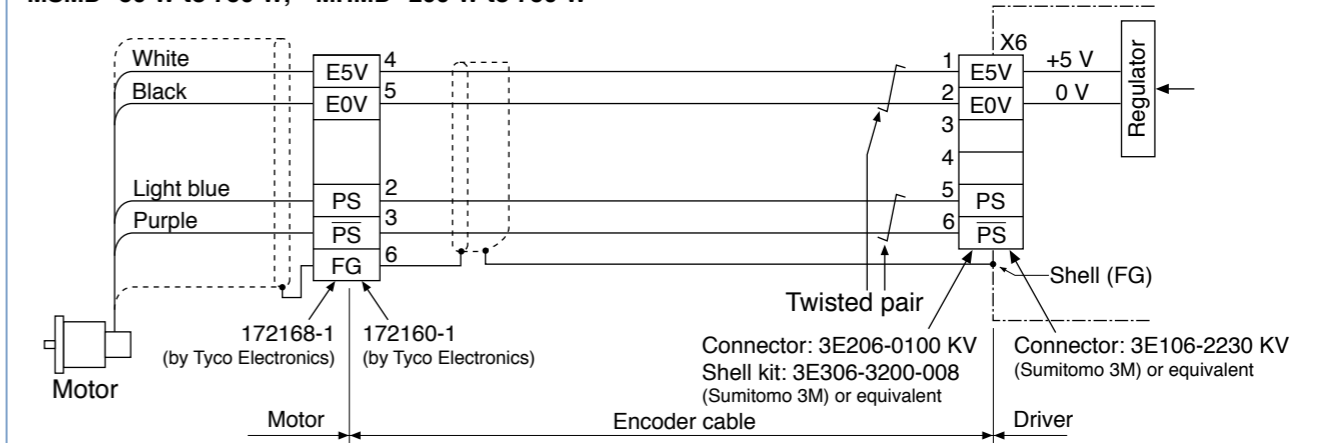


<Serial>

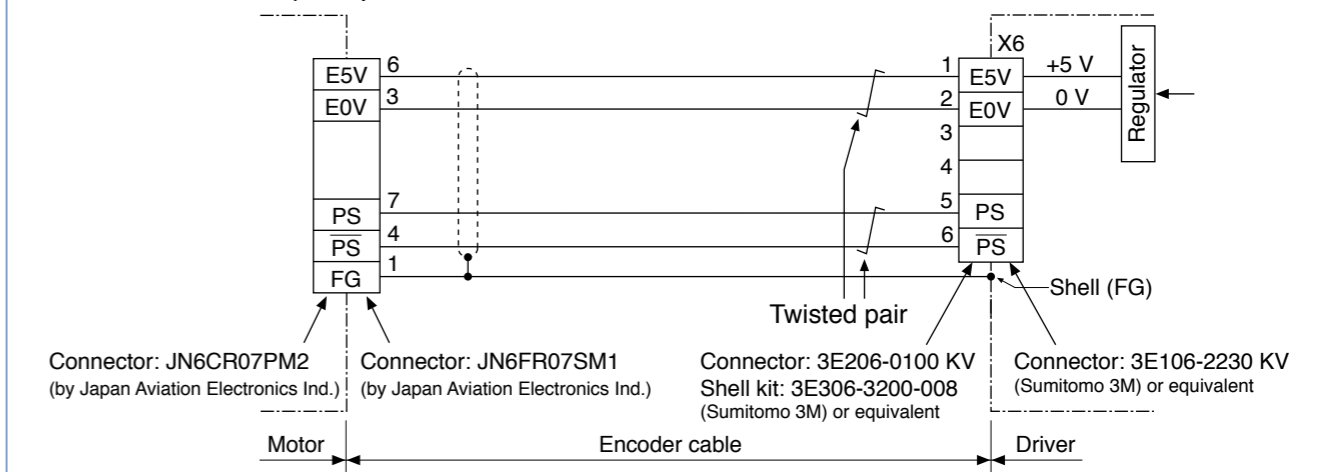


In Case of 20-bit Incremental Encoder

MSMD 50 W to 750 W, MHMD 200 W to 750 W

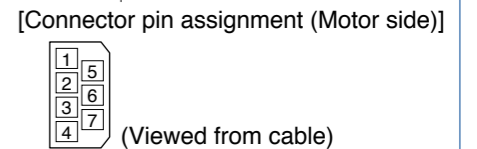


MSME 50 W to 750 W (200 V)

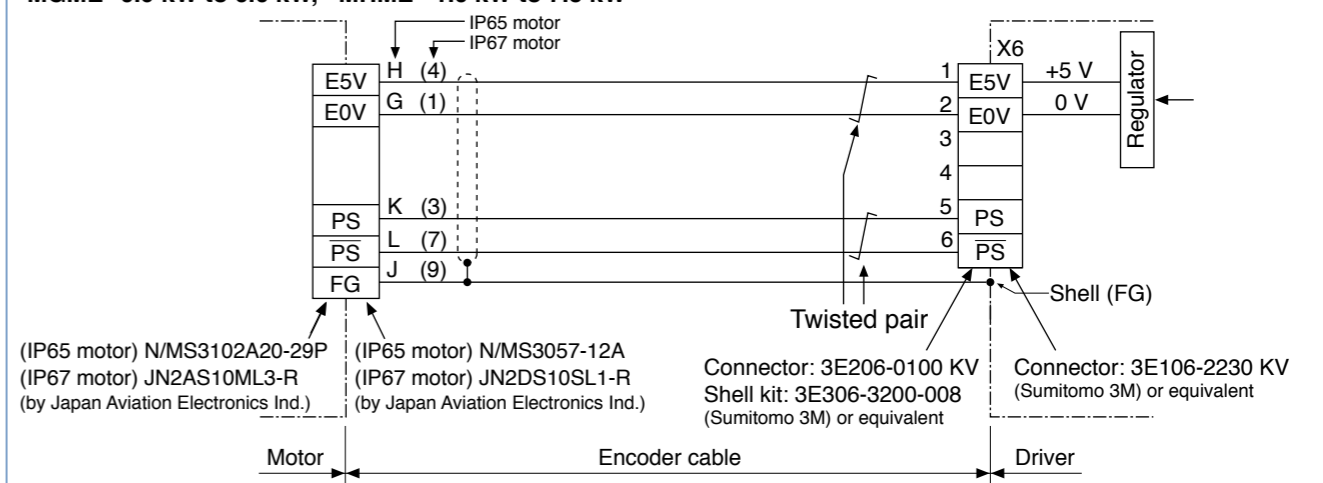


<Caution>

- 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.

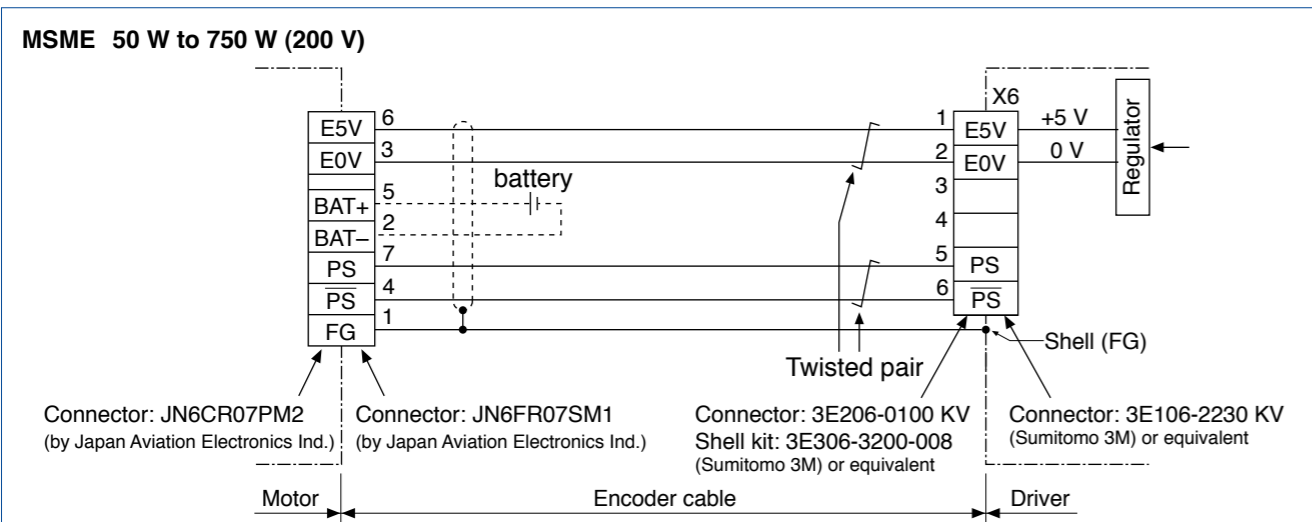
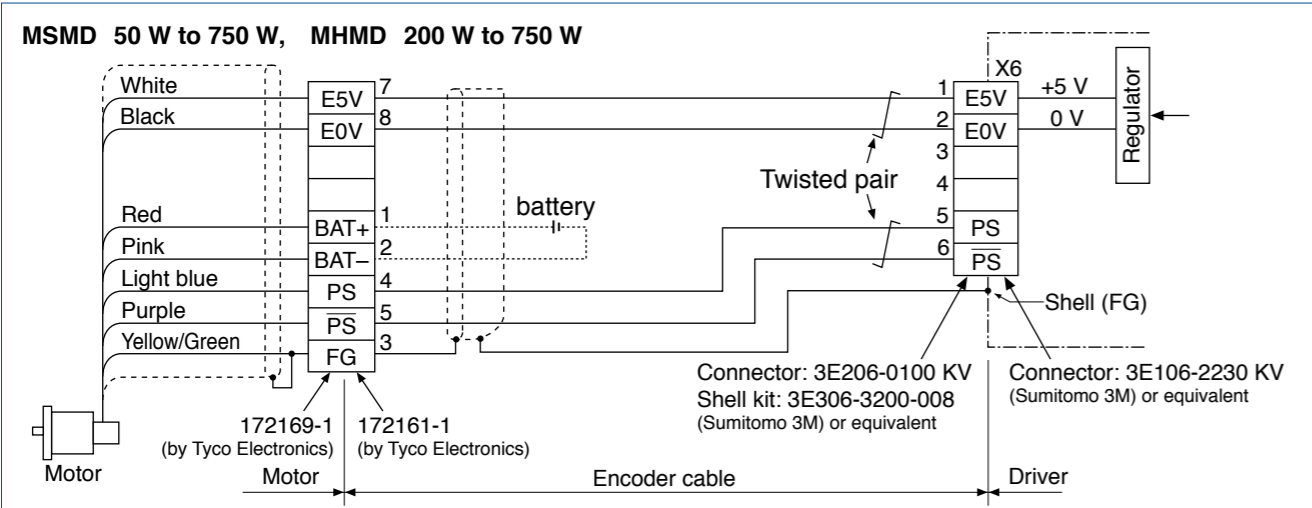


MSME 750 W (400 V), 1.0 kW to 5.0 kW, MDME 400 W to 15.0 kW, MFME 1.5 kW to 4.5 kW
MGME 0.9 kW to 6.0 kW, MHME 1.0 kW to 7.5 kW



[Connector pin assignment] Refer to P.186, P.187 "Specifications of Motor connector".

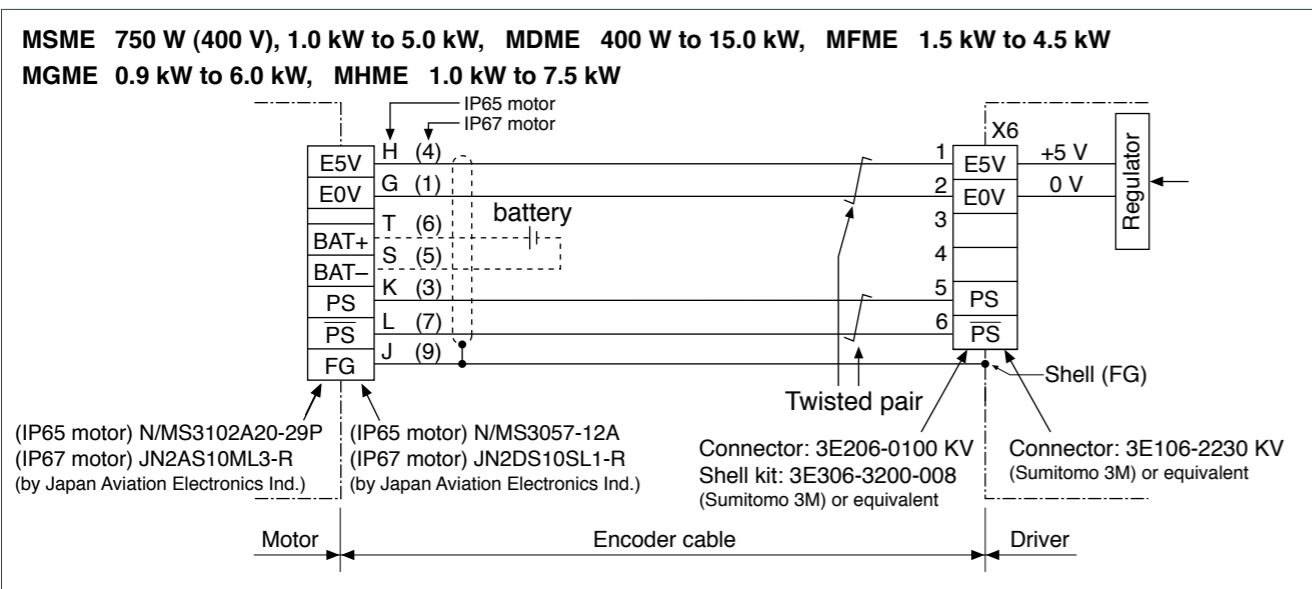
In Case of 17-bit Absolute Encoder (A5IE, A5E series does not correspond.)



<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)]

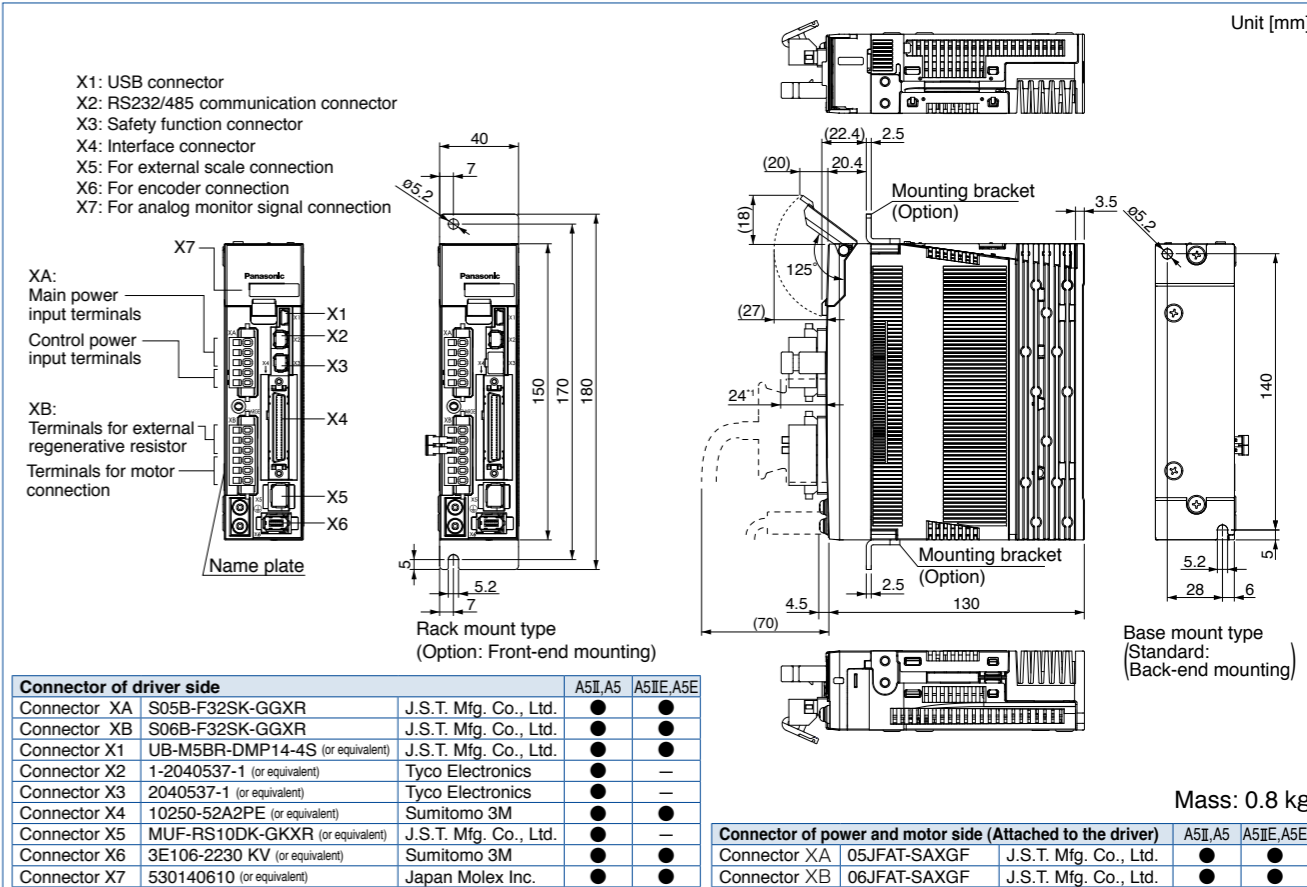


[Connector pin assignment] Refer to P.186, P.187 "Specifications of Motor connector".

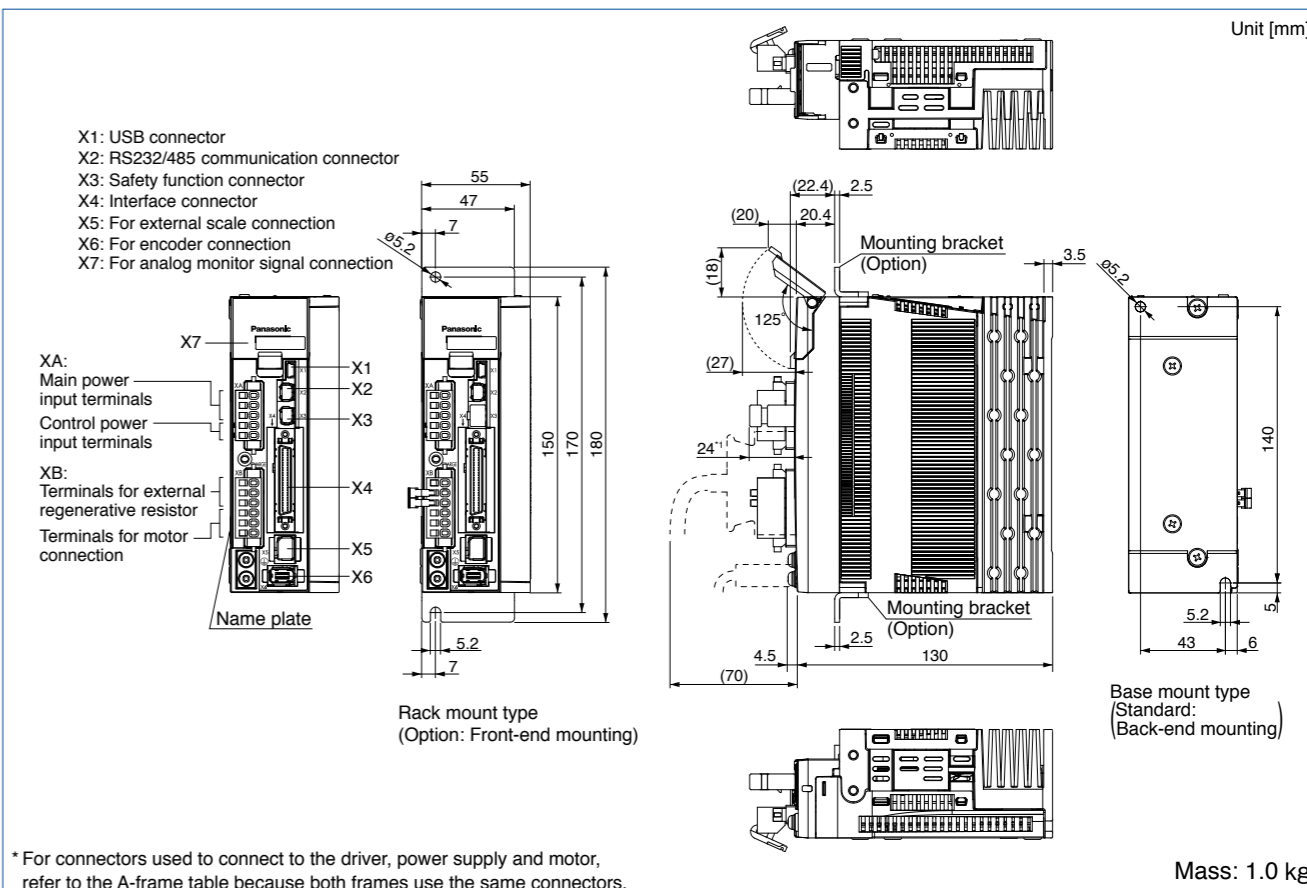
• The size of A5II, A5 series and A5IE, A5E series is same.

*1 The height of the safety by-pass provided plug is one of the 14 mm or 24 mm to connector X3.

A-frame



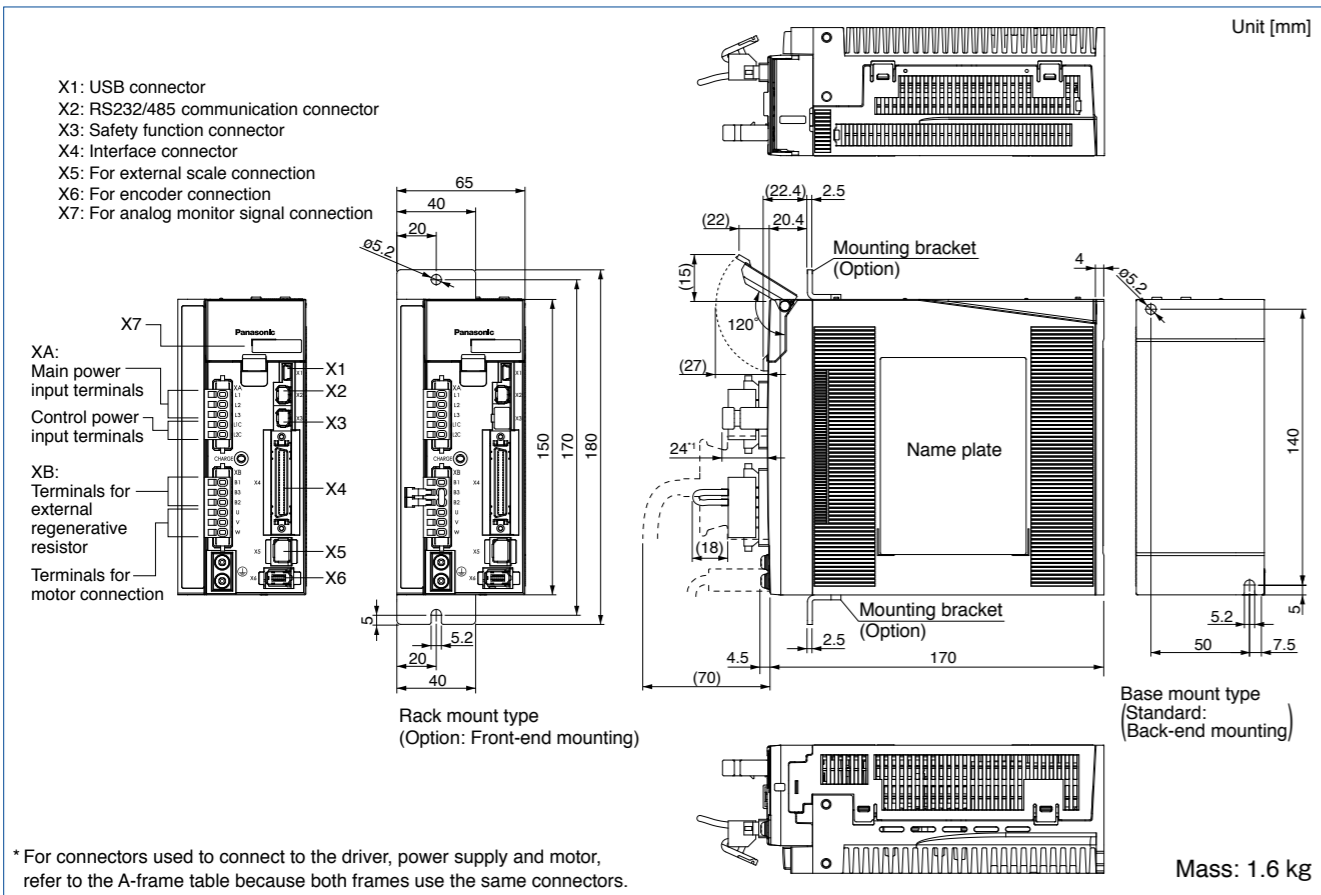
B-frame



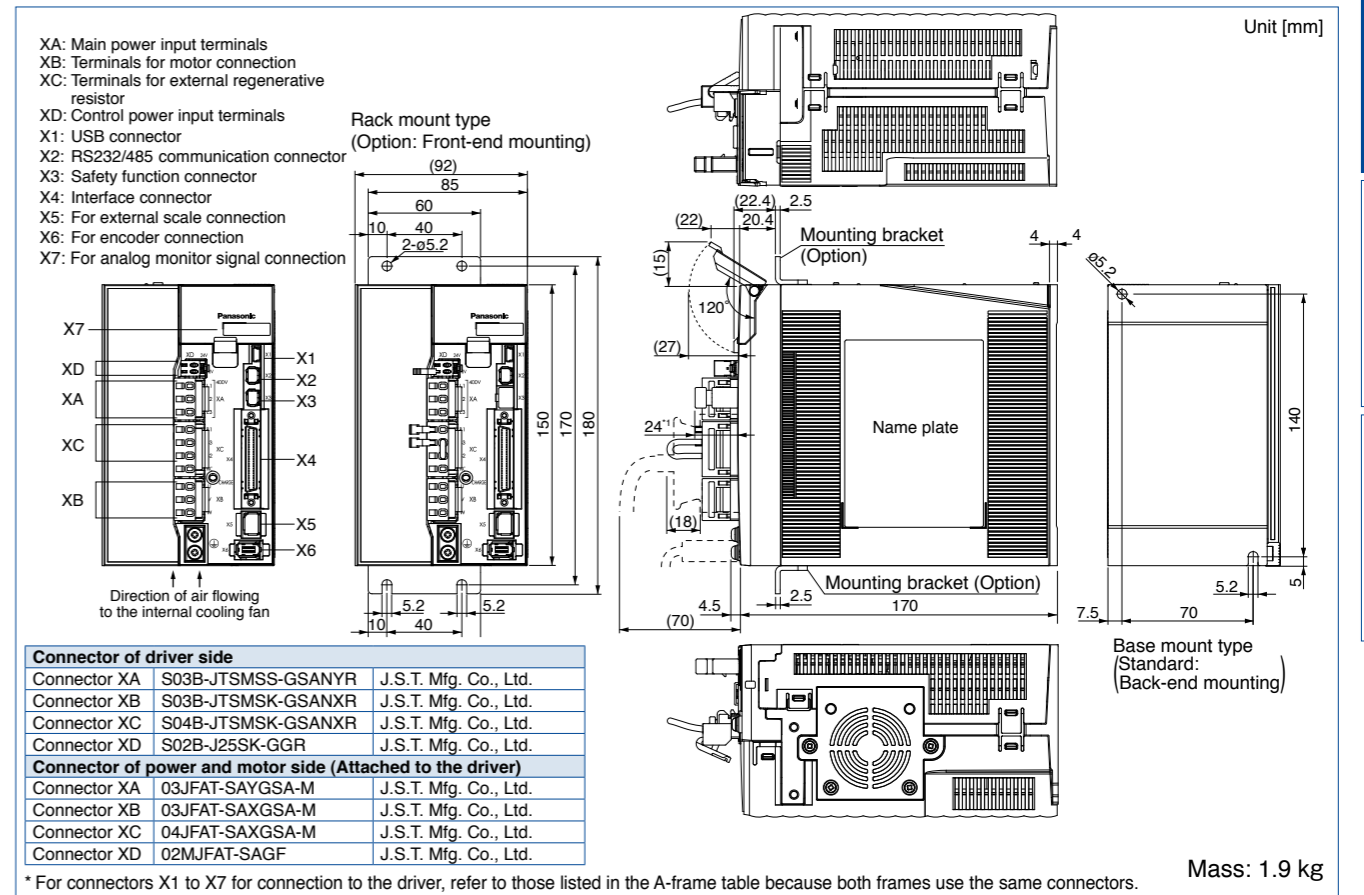
* For connectors used to connect to the driver, power supply and motor, refer to the A-frame table because both frames use the same connectors.

● The size of A5II, A5 series and A5IE, A5E series is same.
 *1 The height of the safety by-pass provided plug is one of the 14 mm or 24 mm to connector X3.

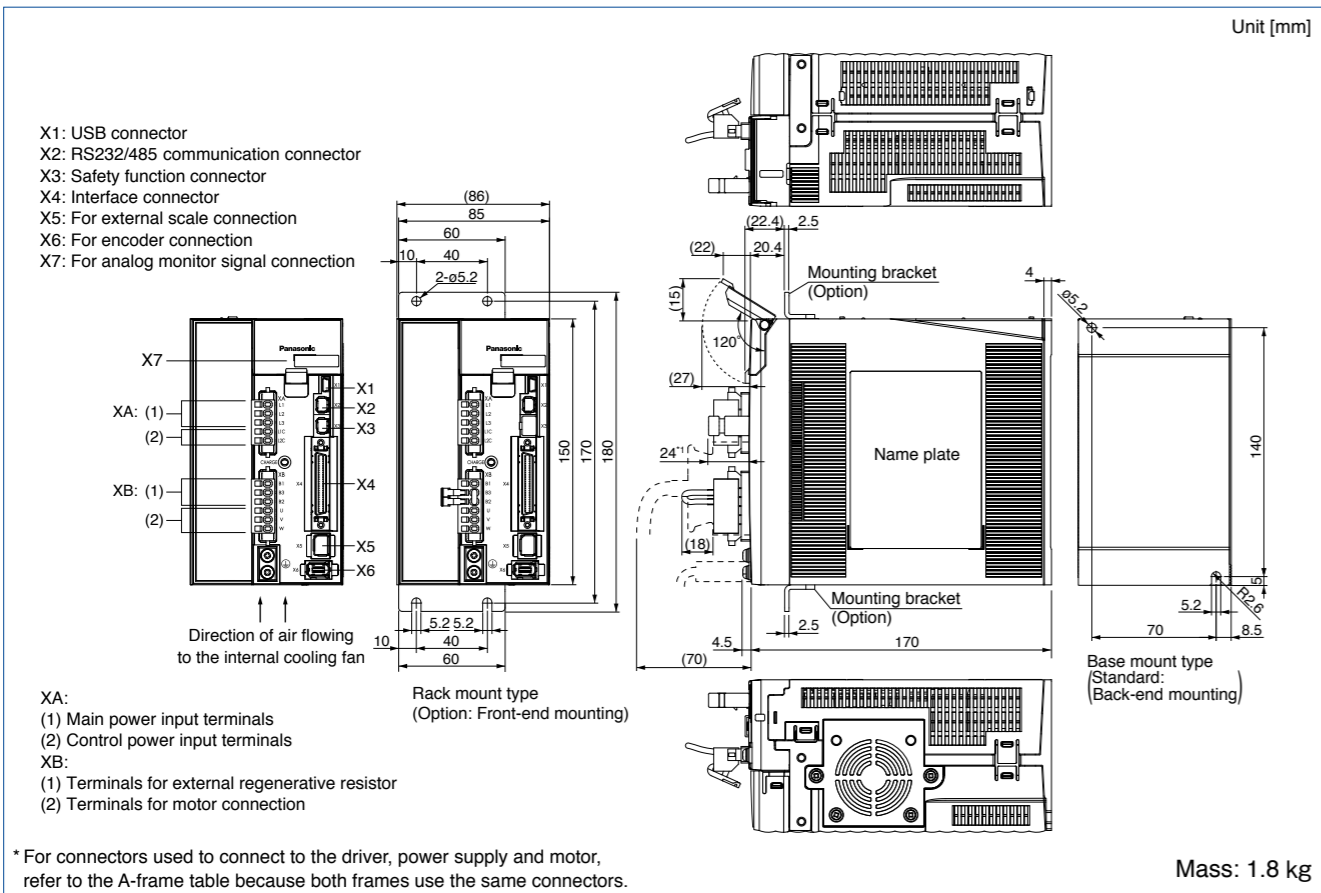
C-frame



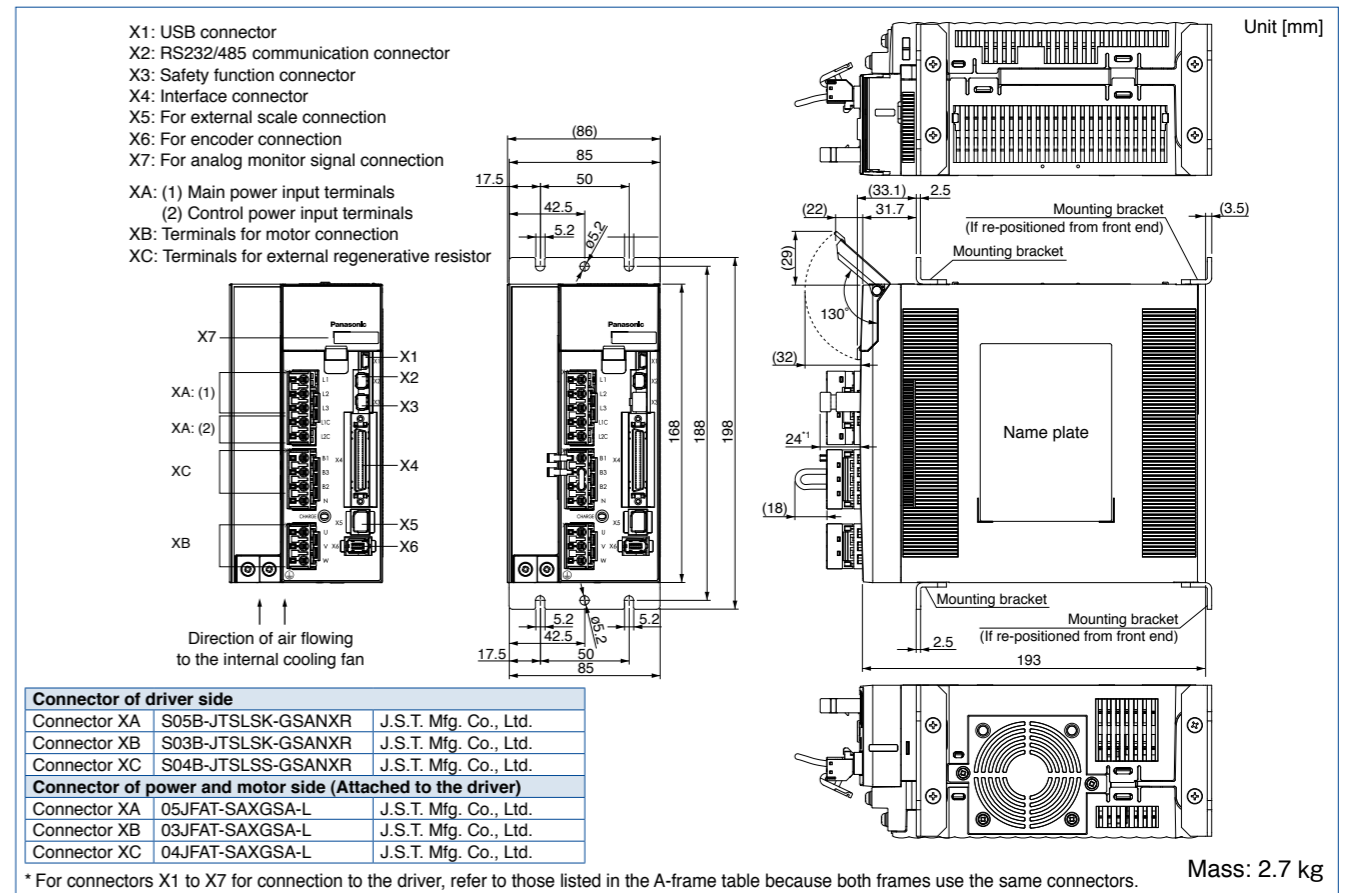
D-frame (400 V)



D-frame (200 V)



E-frame (200 V)

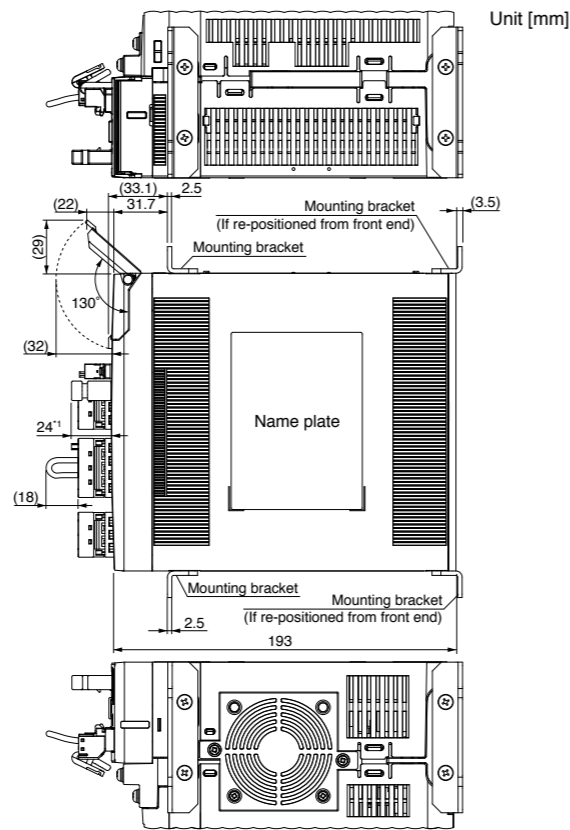
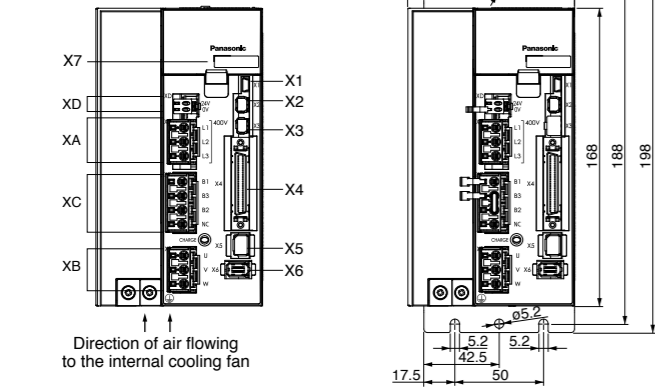


• The size of A5II, A5 series and A5IE, A5E series is same.

*1 The height of the safety by-pass provided plug is one of the 14 mm or 24 mm to connector X3.

E-frame (400 V)

- X1: USB connector
- X2: RS232/485 communication connector
- X3: Safety function connector
- X4: Interface connector
- X5: For external scale connection
- X6: For encoder connection
- X7: For analog monitor signal connection
- XA: Main power input terminals
- XB: Terminals for motor connection
- XC: Terminals for external regenerative resistor
- XD: Control power input terminals



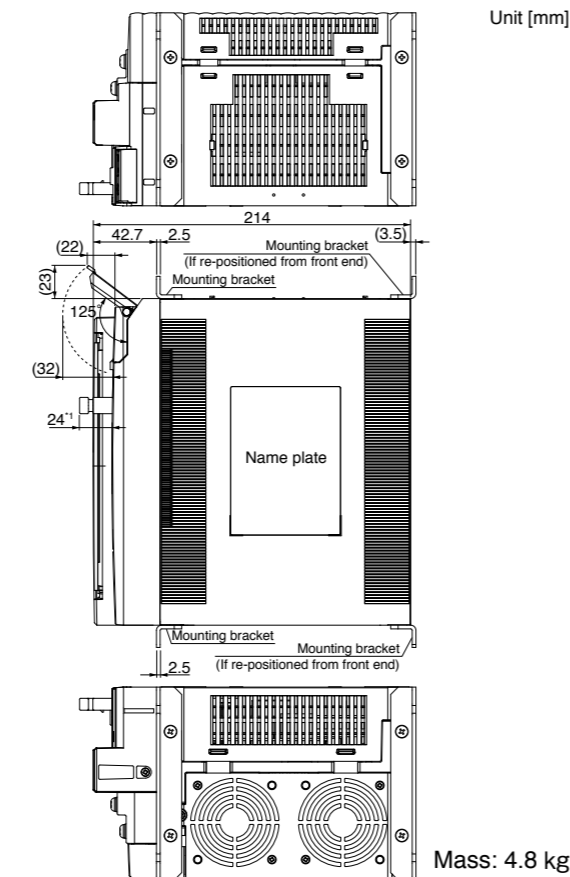
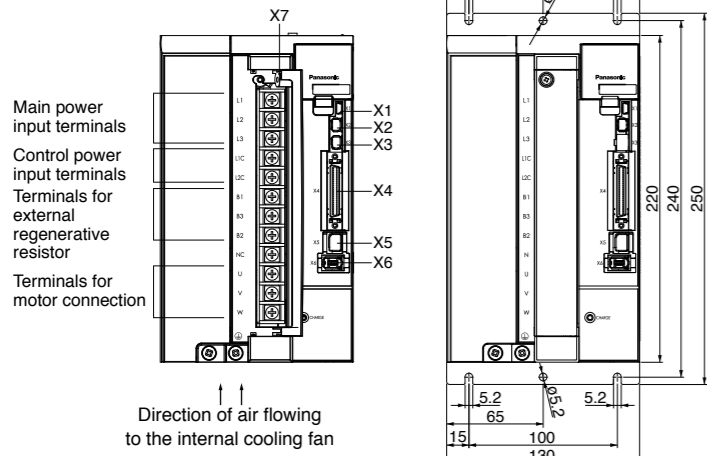
Mass: 2.7 kg

Connector of driver side		
Connector XA	S03B-JTSLSS-GSANYR	J.S.T. Mfg. Co., Ltd.
Connector XB	S03B-JTSLSK-GSANXR	J.S.T. Mfg. Co., Ltd.
Connector XC	S04B-JTSLSK-GSANXR	J.S.T. Mfg. Co., Ltd.
Connector XD	S02B-J25SK-GGR	J.S.T. Mfg. Co., Ltd.
Connector of power and motor side (Attached to the driver)		
Connector XA	03JFAT-SAYGSA-L	J.S.T. Mfg. Co., Ltd.
Connector XB	03JFAT-SAXGSA-L	J.S.T. Mfg. Co., Ltd.
Connector XC	04JFAT-SAXGSA-L	J.S.T. Mfg. Co., Ltd.
Connector XD	02MJFAT-SAGF	J.S.T. Mfg. Co., Ltd.

* For connectors X1 to X7 for connection to the driver, refer to those listed in the A-frame table because both frames use the same connectors.

F-frame (200 V/400 V)

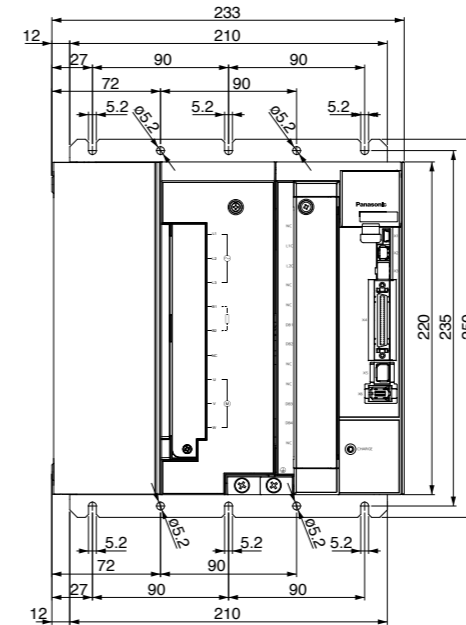
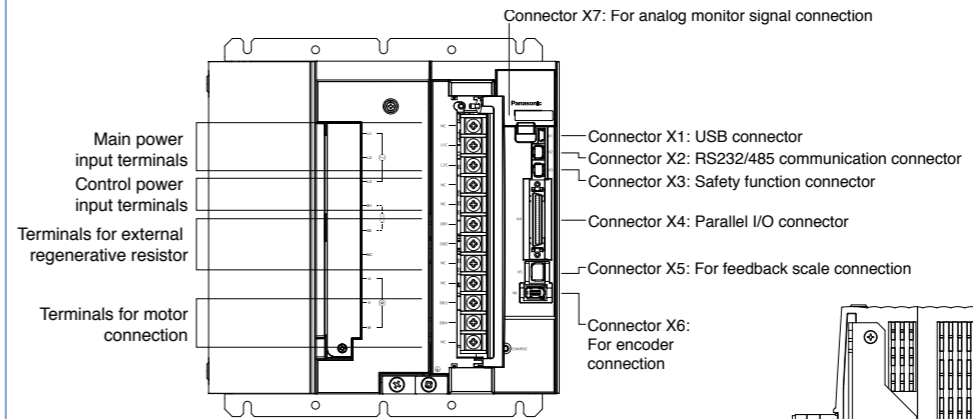
- X1: USB connector
- X2: RS232/485 communication connector
- X3: Safety function connector
- X4: Interface connector
- X5: For external scale connection
- X6: For encoder connection
- X7: For analog monitor signal connection



Mass: 4.8 kg

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

G-frame (200 V/400 V) * A5IE, A5E series is out of the lineup.



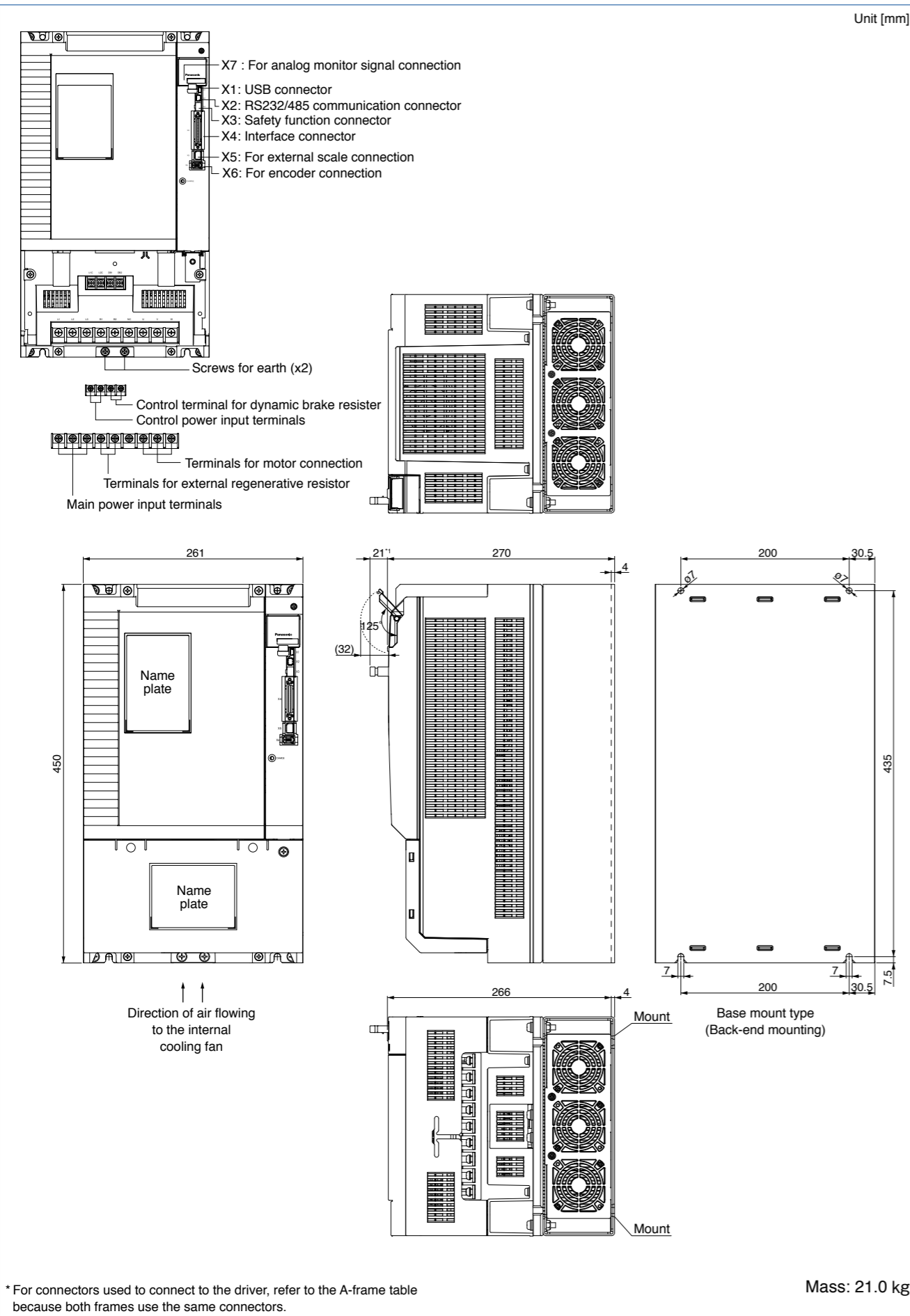
Mass: 13.5 kg

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

● A5IE, A5E series is out of the lineup.

*1 The height of the safety by-pass provided plug is one of the 11 mm or 21 mm to connector X3.

H-frame (200 V/400 V)



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

Motor Contents

MSMD (100 V/200 V)
 50 W to 750 W P.49

MHMD (100 V/200 V)
 200 W to 750 W P.59

MSME (100 V/200 V)
 50 W to 750 W P.65

MSME (200 V)
 1.0 kW to 5.0 kW P.74

MDME (200 V)
 1.0 kW to 15.0 kW P.80

MFME (200 V)
 1.5 kW to 4.5 kW P.89

MGME (200 V)
 0.9 kW to 6.0 kW P.92

MHME (200 V)
 1.0 kW to 7.5 kW P.97

MSME (400 V)
 750 W to 5.0 kW P.104

MDME (400 V)
 400 W to 15.0 kW P.111

MFME (400 V)
 1.5 kW to 4.5 kW P.122

MGME (400 V)
 0.9 kW to 6.0 kW P.125

MHME (400 V)
 1.0 kW to 7.5 kW P.130

IP67 motor
 dimensions..... P.137

Motors with Gear Reducer
 Type and Specifications..... P.141
 Model No. designation..... P.142
 The combination of the driver and the motor..... P.142
 Table of motor specifications... P.143
 Torque Characteristics of Motor P.144
 Dimensions of Motor..... P.147

Motor Specification Description
 Environmental Conditions.... P.182
 Notes on [Motor specification] page..... P.182
 Permissible Load at Output Shaft..... P.183
 Built-in Holding Brake..... P.184

Features/ Lineup

Features

- Line-up IP65 motor: 50 W to 5.0 kW
 IP67 motor: 50 W to 15.0 kW
- Max speed: 6000r/min (MSME 50 W to 750 W)
- Low inertia (MSME) to High inertia (MHME).
- Low cogging torque: Rated torque ratio 0.5 % (typical value).
- 20-bit incremental encoder (1048576 pulse)
- 17-bit absolute encoder (131072 pulse).

Motor Lineup

Small capacity	<p>MSME Low inertia Max. speed: 6000 r/min Rated speed: 3000 r/min Rated output: 50 W to 750 W(200 V) Enclosure: IP67</p>	<p>MSMD Low inertia Max. speed: 5000 r/min : 4500 r/min(750 W) Rated speed: 3000 r/min Rated output: 50 W to 750 W Enclosure: IP65</p>	<p>MHMD High inertia Max. speed: 5000 r/min : 4500 r/min(750 W) Rated speed: 3000 r/min Rated output: 200 W to 750 W Enclosure: IP65</p>
	<p>MSME Low inertia Max. speed: 5000r /min : 4500 r/min (from 4.0 kW) Rated speed: 3000 r/min Rated output: 750 W(400 V), 1.0 kW to 5.0 kW Enclosure: IP65, IP67</p>	<p>MDME Middle inertia Max. speed: 3000 r/min : 2000 r/min (from 11.0 kW) Rated speed: 2000 r/min : 1500 r/min (from 7.5 kW) Rated output IP65: 400 W to 5.0 kW IP67: 400 W to 15.0 kW Enclosure: IP65, IP67</p>	<p>MFME (Flat type)* Middle inertia Max. speed: 3000 r/min Rated speed: 2000 r/min Rated output: 1.5 kW to 4.5 kW Enclosure: IP67</p>
	<p>MGME (Low speed/ High torque type) Middle inertia Max. speed: 2000 r/min Rated speed: 1000 r/min Rated output IP65: 0.9 kW to 3.0 kW IP67: 0.9 kW to 6.0 kW Enclosure: IP65, IP67</p>	<p>MHME High inertia Max. speed: 3000 r/min Rated speed: 2000 r/min : 1500 r/min(7.5 kW) Rated output IP65: 1.0 kW to 5.0 kW IP67: 1.0 kW to 7.5 kW Enclosure: IP65, IP67</p>	<p>Middle capacity motor has the IP67 type.</p> <p>(IP65 type motor)</p> <p>Compact (IP67 type motor)</p> <p>Part No.: M□ME****□* C: IP65 motor 1: IP67 motor</p>